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 §257.90(e) inclusive of the Semiannual Progress Report §257.97(a)
JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residuals (CCR) Units

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 – 257.98), apply to the Consumers Energy Company (Consumers Energy) Bottom Ash Pond CCR Unit and Landfill CCR Unit at the JC Weadock Power Plant Site. Pursuant to the CCR Rule, no later than January 31, 2018, and annually thereafter, 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). This *2021 Annual Groundwater Monitoring and Corrective Action* report documents activities from January 2021 through December 2021.

This letter along with the May 2021 and October 2021 semiannual groundwater sampling reports for the Weadock Bottom Ash Pond (Enclosures 3 and 4), four quarterly groundwater sampling reports for the Weadock Landfill (Enclosures 5 through 8), and a technical memorandum discussing the nature and extent of contamination characterization (Enclosure 9) collectively comprise the 2021 Annual Groundwater Monitoring and Corrective Action Report and meet the requirements of §257.90(e) as documented in the enclosed checklists developed for each unit (Enclosures 1 and 2).

The Weadock Bottom Ash Pond and Weadock Landfill were in assessment monitoring at the beginning and at the end of the period covered by this report. Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97 and is continuing semiannual assessment monitoring in accordance with §257.95.

Weadock Bottom Ash Pond and Landfill Assessment Activities

Consumers Energy prepared and submitted to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) a closure work plan for the Weadock Bottom Ash Pond (Weadock Bottom Ash Pond Work Plan) and a Response Action Plan developed for the Weadock Bottom Ash Pond and Weadock Landfill in accordance with Part 115 dated November 30, 2018 and March 15, 2019, respectively. These plans were developed in anticipation of supporting the Assessment of Corrective Measures that would be necessary for evaluating and selecting a remedy for the Weadock Bottom Ash Pond and Weadock Landfill. Consumers Energy provided notification of exceeding a Groundwater Protection Standard (GWPS) per §257.95(g), which documented beryllium and lithium were present at statistically significant levels above the GWPS in one downgradient well at the Weadock Bottom Ash Pond and arsenic was present at one downgradient monitoring well in the original Weadock Landfill groundwater monitoring system on January 14, 2019.

EGLE approved the Weadock Bottom Ash Pond Work Plan on December 20, 2018 based on expectation that a report documenting the removal activities and certifying solid waste has been removed in accordance with the work plan would be submitted at the completion of activities. Subsequently, EGLE approved the Response Action Plan on May 14, 2019 based on the anticipated submittal of the Assessment of Corrective Measures. Consumers Energy has completed the excavation activities described in the Weadock Bottom Ash Pond Work Plan and submitted a final excavation certification report on August 31, 2020 to satisfy requirements for completing the removal of solid waste which rendered the need for a solid waste operating license unnecessary. This final excavation report documenting removal of solid waste was approved by EGLE on November 30, 2020.

The certification report satisfied requirements under the response action plan to remove identified sources of contamination on a schedule that required consideration of concentrations of hazardous substances, rate of migration, and risks to human health and the environment. Additional steps needed to address residual groundwater contamination are discussed in the observations and results sections below.

For the Weadock Landfill, Consumers Energy completed construction of a soil-bentonite slurry wall (Weadock Slurry Wall) that enclosed the landfill with the exception of a 1,600 ft venting feature (NTH Consultants, Ltd., 2009). Later, construction of the Weadock Slurry Wall was extended to include the previous vent (Golder, 2018). EGLE approved the construction certification reports on June 24, 2009 and December 19, 2018, respectively. This engineered barrier is monitored in accordance with the Landfill Hydrogeological Monitoring Plan, prepared by TRC, dated February 2021 approved and incorporated by reference into the renewed Solid Waste Operating License No. 9640 dated March 11, 2021.

This annual groundwater monitoring and corrective action report including a semiannual progress report, prepared as a requirement of §257.97(a) of the CCR Rule, describes progress towards selecting and implementing any additional remedy for the Weadock Bottom Ash Pond and Weadock Landfill after the completion of the *Assessment of Corrective Measures, JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residual Unit*, dated September, 11, 2019 (Weadock ACM) (TRC, 2019). Groundwater management alternatives considered to be technically feasible following source removal activities for the Weadock Bottom Ash Pond that could potentially address the residual arsenic under *known* groundwater conditions were identified in the report as: 1) Post-remedy monitoring, 2) Groundwater capture/control, 3) Impermeable barrier, 4) Active geochemical sequestration, and 5) Passive geochemical sequestration. These groundwater corrective strategies also apply to the Weadock

Landfill upon completing source containment through the construction of the soil-bentonite slurry wall and construction of an impermeable final cover system.

Weadock Bottom Ash Pond: Results of the May 2021 and October 2021 Sampling Events

Statistical analysis from the October 2021 assessment groundwater monitoring event verified that there were no Appendix IV constituents present at statistically significant levels above the established Groundwater Protection Standard (GWPS) within the Weadock Bottom Ash Pond groundwater monitoring system. Results are presented in the enclosed *May 2021 Assessment Monitoring Data Summary and Statistical Evaluation Consumers Energy, JC Weadock Site, Bottom Ash Pond CCR Unit* (Enclosure 3) and *October 2021 Assessment Monitoring Data Summary and Statistical Evaluation Consumers Energy, JC Weadock Site, Bottom Ash Pond CCR Unit* (Enclosure 4).

Significant observations from the event summary are as follows:

- Beryllium and lithium are no longer present at statistically significant levels, which has been confirmed for the last five semiannual events in the Weadock Bottom Ash Pond groundwater monitoring system;
- Lithium and beryllium concentrations have been below the GWPS since October 2019;
- No additional Appendix IV constituents have been observed at statistically significant levels above GWPS for the Weadock Bottom Ash Pond groundwater monitoring system; and
- The nature and extent of contamination (e.g. beryllium, and lithium) in groundwater relative to GWPSs has been defined per the RCRA CCR Rule requirements based on the site-specific hydrogeology and there are currently no adverse effects on human health or the environment from either surface water or groundwater due to the former CCR management at the Weadock Bottom Ash Pond as discussed in the enclosed *Second Semiannual 2021 Nature and Extent Data Summary, JC Weadock, Consumers Energy, Essexville, Michigan* (TRC, 2022).

Weadock Landfill: Results of the May 2021 and October 2021 Sampling Events

Statistical analysis from the first through fourth quarter assessment groundwater monitoring events have verified that there were no Appendix IV constituents present at statistically significant levels above the established Groundwater Protection Standard (GWPS) within the Weadock Landfill groundwater monitoring system. Additionally, monitoring performed under the Weadock GSI Compliance Program demonstrates protection of human health and the environment with criteria determined to be protective at the point of exposure, as discussed in each of the enclosed reports:

- *First Quarter 2021 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* (Enclosure 5)
- *Second Quarter 2021 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* (Enclosure 6)
- *Third Quarter 2021 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* (Enclosure 7)

- *Fourth Quarter 2021 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* (Enclosure 8)

Significant observations from the event summary are as follows:

- No Appendix IV constituents have been observed at statistically significant levels above GWPS for the Weadock Landfill groundwater monitoring system;
- Arsenic was determined to be present at statistically significant levels above the GWPS at one of the three downgradient monitoring wells at the time of the initial semiannual monitoring event (April and May 2018; pre-soil-bentonite slurry wall construction); however, based on the revised groundwater monitoring system (post soil-bentonite slurry wall construction) arsenic is not present at a statistically significant level above the GWPS
- An Alternate Source Demonstration is continuing to be asserted for arsenic and molybdenum concentrations at monitoring well MW-55 as detailed in Appendix G of the *2021 Semiannual Groundwater Monitoring Report and Fourth Quarter 2021 Hydrogeological Monitoring Report; JC Weadock Solid Waste Disposal Area* (Enclosure 8) indicating elevated levels of constituents at that location are not related to materials management within the Weadock Landfill; and
- The nature and extent of contamination (e.g. arsenic) in groundwater relative to GWPSs has been defined per the RCRA CCR Rule requirements based on the site-specific hydrogeology and there are currently no adverse effects on human health or the environment from either surface water or groundwater due to the former CCR management at the Weadock Landfill as discussed in the enclosed *Second Semiannual 2021 Nature and Extent Data Summary, JC Weadock, Consumers Energy, Essexville, Michigan* (Enclosure 9).

Conclusions

Source removal activities for the Weadock Bottom Ash Pond have been completed and documented in the Weadock Bottom Ash Pond Closure Report dated August 28, 2020 and approved by EGLE on November 30, 2020. Improvements in groundwater quality have been observed in the groundwater monitoring system at the Weadock Bottom Ash Pond and Weadock Landfill. Sampling events completed since source removal activities were completed at the Weadock Bottom Ash Pond and indicate that a monitoring-only remedial option has a high likelihood of meeting performance objectives for clean closure under §257.102(c) and remedy selection under §257.97. The completed enclosure of the Weadock Landfill with a soil-bentonite slurry wall accompanying a final cover indicates that it can meet the closure in place standards and remediation objectives in the federal rule. The Weadock Bottom Ash Pond and Weadock Landfill are co-located within the JC Weadock Solid Waste Disposal Area governed by Solid Waste Operating License No. 9640 dated March 11, 2021. As a special condition of that license, the closure plan for the solid waste disposal area focused on improvements to the final cover design that were required to be submitted and approved by the Department. Consumers Energy is continuing to update the design and plan based on response to comments from EGLE. Once the final cover design and final closure plan is approved, the remedy selection for the Weadock Bottom Ash Pond can proceed. As conditions continue to be evaluated post-source removal, the drinking water and groundwater-surface water interface (GSI) pathway are protected by quarterly monitoring performed under the Michigan-approved hydrogeological monitoring plan that includes a GSI Compliance Monitoring Program. The final remedy for the Weadock Bottom Ash Pond

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

The next semiannual progress report will be submitted in six months by July 30, 2022. Please feel free to contact me with any questions or clarifications.

Sincerely,

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cc: Mr. Phil Roycraft, EGLE Saginaw Bay District Office
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Mr. Jim Arduin, EGLE Lansing Office
Mr. Caleb Batts, Consumers Energy
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 Weadock Bottom Ash Pond CCR Unit.

2) CCR Annual Groundwater Report Requirements: § 257.90(e). Checklist for the Weadock Landfill CCR Unit.

3) *May 2021 Assessment Monitoring Data Summary and Statistical Evaluation Consumers Energy, JC Weadock Site, Bottom Ash Pond CCR Unit*. (TRC, July 30, 2021).

4) *October 2021 Assessment Monitoring Data Summary and Statistical Evaluation Consumers Energy, JC Weadock Site, Bottom Ash Pond CCR Unit*. (TRC, January 28, 2022).

5) *First Quarter 2021 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan*. (TRC, April 30, 2021).

6) *Second Quarter 2021 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* (TRC, July 29, 2021).

7) *Third Quarter 2021 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* (TRC, October 28, 2021).

8) *Fourth Quarter 2021 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* (TRC, January 28, 2022).

9) *Second Semiannual 2021 Nature and Extent Data Summary, JC Weadock, Consumers Energy, Essexville, Michigan*. (TRC, January 28, 2022).

CCR Annual Groundwater Report Requirements: § 257.90(e)
Checklist for the Weadock Bottom Ash Pond 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)]
(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 2.2 [(2),(3)]
(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 1.1 Program Summary [(2),(3)]
(5) Other information required to be included in the annual report as specified in §§ 257.90 through 257.98.	Nature and Extent Data Summary [(4)]
(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;	Corrective Action Progress Report [(1)]; Section 1.1 Program Summary [(2),(3)]
(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;	Corrective Action Progress Report [(1)]; Section 1.1 Program Summary [(2),(3)]
(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 1.1 Program Summary [(2),(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	Section 1.1 Program Summary [(2),(3)]
(B) Provide the date when the assessment monitoring program was initiated for the CCR unit.	Section 1.1 Program Summary [(2),(3)]
(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:	Corrective Action Progress Report [(1)]; Section 1.1 Program Summary [(2),(3)]
(A) Identify those constituents listed in appendix IV to this part and the names of the monitoring wells associated with such an increase;	Section 1.1 Program Summary [(3)]
(B) Provide the date when the assessment of corrective measures was initiated for the CCR unit;	Section 1.1 Program Summary [(3)]
(C) Provide the date when the public meeting was held for the assessment of corrective measures for the CCR unit; and	Not Applicable - final remedy still under evaluation
(D) Provide the date when the assessment of corrective measures was completed for the CCR unit.	Corrective Action Progress Report [(1)]; Section 1.1 Program Summary [(2),(3)]
(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	Corrective Action Progress Report [(1)]; final remedy still under evaluation
(vi) Whether remedial activities were initiated or are ongoing pursuant to § 257.98 during the current annual reporting period.	Corrective Action Progress Report [(1)]; final remedy still under evaluation

Notes:

(1) *2021 Annual Groundwater Monitoring and Corrective Action Report JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residuals CCR Units.* Consumers Energy. January 28, 2022.

(2) *May 2021 Assessment Monitoring Data Summary and Statistical Evaluation Consumers Energy, JC Weadock Site, Bottom Ash Pond CCR Unit.* TRC. July 30, 2021, Revised January 2022.

(3) *October 2021 Assessment Monitoring Data Summary and Statistical Evaluation Consumers Energy, JC Weadock Site, Bottom Ash Pond CCR Unit*. TRC. January 28, 2022.

(4) *Second Semiannual 2021 Nature and Extent Data Summary, JC Weadock, Consumers Energy, Essexville, Michigan*. TRC. January 28, 2022.

CCR Annual Groundwater Report Requirements: § 257.90(e)
Checklist for the Weadock Landfill 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.	Nature and Extent Data Summary [(6)]; Certified ASD[(5)]
(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;	Corrective Action Progress Report [(1)]; 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;	Corrective Action Progress Report [(1)]; 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 1.2 Program Summary [(5)]
(A) Identify those constituents listed in appendix III to this part and the names of the monitoring wells associated with such an increase; and	Section 1.2 Program Summary [(5)]
(B) Provide the date when the assessment monitoring program was initiated for the CCR unit.	Section 1.2 Program Summary [(5)]
(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:	Corrective Action Progress Report [(1)]; Section 1.2 Program Summary [(2),(3),(4),(5)]
(A) Identify those constituents listed in appendix IV to this part and the names of the monitoring wells associated with such an increase;	Section 1.2 Program Summary [(2),(3),(4),(5)]
(B) Provide the date when the assessment of corrective measures was initiated for the CCR unit;	Section 1.2 Program Summary [(5)]
(C) Provide the date when the public meeting was held for the assessment of corrective measures for the CCR unit; and	Not Applicable - final remedy still under evaluation
(D) Provide the date when the assessment of corrective measures was completed for the CCR unit.	Corrective Action Progress Report [(1)]
(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	Corrective Action Progress Report [(1)]; final remedy still under evaluation
(vi) Whether remedial activities were initiated or are ongoing pursuant to § 257.98 during the current annual reporting period.	Corrective Action Progress Report [(1)]; final remedy still under evaluation

Notes:

(1) *2021 Annual Groundwater Monitoring and Corrective Action Report JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residuals CCR Units.* Consumers Energy. January 28, 2022.

(2) *First Quarter 2021 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* TRC. April 30, 2021.

(3) *Second Quarter 2021 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* TRC. July 29, 2021.

(4) *Third Quarter 2021 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* TRC. October 28, 2021.

(5) *Fourth Quarter 2021 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* TRC. January 28, 2022.

(6) *Second Semiannual 2021 Nature and Extent Data Summary, JC Weadock, Consumers Energy, Essexville, Michigan.* TRC. January 28, 2022.

May 2021 Assessment Monitoring Data Summary and Statistical Evaluation

JC Weadock, Bottom Ash Pond CCR Unit

Essexville, Michigan

July 2021, Revised January 2022

Prepared For:

Consumers Energy Company

Prepared By:

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APPENDICES

Appendix A Data Quality Reviews
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1.0 Introduction

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

Consumers Energy is continuing assessment monitoring in accordance with §257.95 of the CCR Rule for the Weadock Bottom Ash Pond in Essexville, Michigan (Figure 1). This monitoring report has been prepared to provide the summary of the May 2021 assessment groundwater monitoring results, data quality review, and statistical data evaluation for the Weadock Bottom Ash Pond groundwater monitoring systems.

1.1 Program Summary

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

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

- Boron at JCW-MW-15010;
- Calcium at JCW-MW-15009;
- Field pH at JCW-MW-15009 (low), JCW-MW-15010 (high), JCW-MW-15028 (high); and
- Sulfate at JCW-MW-15009.

On April 25, 2018, Consumers Energy entered assessment monitoring upon determining that an Alternate Source Demonstration for the Appendix III constituents was not successful. On January 14, 2019, Consumers Energy provided notification that beryllium and lithium were present at statistically significant levels above the Groundwater Protection Standards (GWPSs) in one of the downgradient monitoring wells at the Weadock Bottom Ash Pond. The notification of the GWPS exceedance was followed up with a Response Action Plan Submitted to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) on March 15, 2019 laying out the preliminary understanding of water quality and actions that were underway to mitigate or eliminate unacceptable risk associated with the identified release from the CCR unit. The *Assessment of Corrective Measures* (ACM) (TRC, September 2019) was submitted on September 11, 2019 in accordance with the schedule in §257.96 and the requirements of the Response Action Plan.

The ACM documents that the groundwater nature and extent has been defined, as required in §257.95(g)(1). Although site-specific constituents of concern (COCs) (i.e., arsenic [Weadock Landfill], beryllium and lithium [Weadock Bottom Ash Pond]) have been identified in

groundwater monitoring locations at concentrations exceeding their respective GWPS, COCs are delineated within the limits of the property owned by Consumers Energy and there are currently no adverse effects on human health or the environment from either surface water or groundwater due to CCR management at the Weadock Bottom Ash Pond.

Evaluation of groundwater under the CCR Rule focuses on the following constituents that are collected unfiltered in the field:

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

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

Additional Monitoring Constituents (Michigan Part 115/PA 640[1])	
Detection Monitoring	**Assessment Monitoring**
Iron	Copper
	Nickel
	Silver
	Vanadium
	Zinc

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

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

1.2 Site Overview

The Weadock Bottom Ash Pond is located within the JC Weadock Power Plant site, which is located south of the DE Karn Power Plant site, east of the Saginaw River, west of Underwood Drain and Saginaw Bay, and north of Tacey Drain and agricultural land (Figure 1). The Weadock Bottom Ash Pond is located immediately west of the JC Weadock Solid Waste Disposal Area (*i.e.* Weadock Landfill) and outside of the soil-bentonite slurry wall (Figure 2). The Weadock Landfill is being monitored in accordance with the EGLE-approved *Landfill Hydrogeological Monitoring Plan*, JC Weadock Solid Waste Disposal Area (February 2021). In addition to the Weadock Bottom Ash Pond and Weadock Landfill, the Site consists of the generating facility which retired eight coal-fired generating units and infrastructure and utilities that support electrical transmission. Units 1 to 6 commenced operation in 1940 and retired in 1980 and Units 7 and 8 were added in 1955 and 1958 continued to operate through April 15, 2016.

The Weadock Bottom Ash Pond was formerly the primary settling/detention structure for the National Pollutant Discharge Elimination System (NPDES) Treatment System prior to discharge and characterized as an existing CCR surface impoundment. Consumers Energy ceased hydraulic loading to the Weadock Bottom Ash Pond in April 2018 and has allowed the area to dewater by gravity. The active dewatering and excavation work was completed between February and July 2020. The excavation extended to six inches below known CCR elevations established from previous investigations. Excavated CCR has been placed in the neighboring Weadock Landfill that is constructed with of a fully encapsulation soil-bentonite slurry wall keyed into a competently confining clay unit. The Weadock Bottom Ash Pond has been restored by backfilling and grading the surface with clean fill in accordance with the plan to promote stormwater drainage, minimize ponding of surface water, and to reduce the potential of infiltration and migration of residual arsenic and any future COCs. Consumers Energy submitted for review and approval, *J.C. Weadock Generating Facility Bottom Ash Pond CCR Removal Documentation Report* (Weadock Bottom Ash Pond Closure Report) on August 26, 2020 to satisfy requirements for completing the removal of solid waste which rendered the need for a solid waste operating license unnecessary. EGLE approved the removal documentation report satisfying state requirements to close on December 1, 2020. Groundwater conditions post-CCR removal continue to be monitored.

1.3 Geology/Hydrogeology

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

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. A sandstone unit, which is part of the Saginaw formation, was generally encountered at 80-90 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. Along the perimeter of the landfill, there is a well graded sand present at depths ranging from 10 to 20 ft-bgs. The sand is variable in thickness, ranging from <1 to ~6.5 feet, and is discontinuous along the perimeter, as evidenced by the soil boring logs and slurry wall construction documentation.

The alluvium soils pinch out and are not observed in soil borings located south and east of the Weadock Bottom Ash Pond and Weadock Landfill, along the location of the historic shoreline. The non-water-bearing region south of these units extends for at least a mile south and southeast of the site.

Beneath the surficial fill and sand unit (where present) is 70 to 80 feet of clay till. Along the southern perimeter of the landfill, some of the upper portion of the clay till is sand-rich (generally greater than 20 ft-bgs). The clay till acts as a hydraulic barrier that separates the shallow groundwater from the underlying sandstone. The sandstone unit, which is part of the Saginaw Formation, is generally encountered at 80-90 ft-bgs.

The Weadock Bottom Ash Pond and Weadock Landfill are bounded by several surface water features (Figure 1): the Saginaw River to the west, a discharge channel and Saginaw Bay (Lake Huron) to the north, Underwood Drain to the east, and Tacey Drain to the south. Groundwater flow in the upper aquifer is largely controlled by the surface water elevations of Saginaw River and Saginaw Bay. In general, shallow groundwater is encountered at a similar or slightly higher elevation relative to the surrounding surface water features. The shallow groundwater flow direction in the vicinity of the Weadock Bottom Ash Pond is to the north toward the discharge channel and to the east toward the Saginaw River. Historical groundwater flow beneath the Weadock Landfill was directed north to the discharge channel due to the bentonite/soil slurry wall. Originally, the slurry wall enclosed the historical fly ash disposal area with the exception of a small segment along the perimeter dike that is designed to vent along the discharge channel immediately upgradient from the NPDES external outfall to prevent water from building up within the facility. In July 2018, this vent was closed and the slurry wall reduced porewater flux around the entire perimeter of the landfill. Following the closure of the vent, the static water level elevations inside of the slurry wall are generally significantly different (>1 ft) than static water levels outside of the slurry wall, which demonstrates the presence of a low permeability feature between the well pairs.

In previous investigations, bedrock groundwater was generally encountered around 578 ft (NAVD88), which is several feet lower than the shallow groundwater. Groundwater flow direction was generally to the northeast under a very shallow gradient. Given the different groundwater flow regime in the bedrock than the shallow saturated unit, bedrock wells near the surface water bodies are several feet below the surface water elevation. Based on the fact that the shallow sand and the bedrock are separated by over 50 ft of clay, the bedrock unit does not appear to be hydraulically connected to the shallow sand.

2.0 Groundwater Monitoring

2.1 Monitoring Well Network

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

Groundwater around the Weadock Bottom Ash Pond was characterized as radial based on the eight initial background sampling events prior to commencing detection monitoring; therefore, the four downgradient wells (JCW-MW-15007, JCW-MW-15009, JCW-MW-15010, and JCW-MW-15028) were installed in the accessible areas along the perimeter of the Weadock Bottom Ash Pond. Following the cessation of hydraulic loading, groundwater near the Weadock Bottom Ash Pond continues to flow to the north toward the discharge channel and to the west near the Saginaw River; therefore, the compliance wells continue to accurately represent the quality of groundwater passing the waste boundary that ensures detection of groundwater contamination such that all potential contaminant pathways are monitored.

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

2.2 May 2021 Assessment Monitoring

Per §257.95, all wells in the CCR unit monitoring program must be sampled at least semiannually. TRC conducted the first semiannual assessment monitoring event of 2021 for Appendix III and IV constituents at Bottom Ash Pond CCR Unit in accordance with the *JC Weadock Monitoring Program Sample Analysis Plan* (TRC, 2018) (SAP). The semiannual assessment monitoring event was performed on May 3 through 12, 2021. The Bottom Ash Pond downgradient monitoring well network (JCW-MW-15007, JCW-MW-15009, JCW-MW-15010, and JCW-MW-15028), and background monitoring wells (MW-15002, MW-15008, MW-15016, and MW-15019) were sampled during the semiannual assessment monitoring event. The locations of the monitoring wells are depicted on Figure 2.

The May 2021 sampling event consisted of collecting static water level measurements from the Weadock Bottom Ash Pond groundwater monitoring system. Static water level measurements were also collected at other site wells to support preparation of a groundwater contour map. Static water elevation data are summarized in Table 1 and groundwater elevation data are shown on Figure 3. 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.

Eurofins TestAmerica Inc. (TestAmerica) in St. Louis, Missouri, provided the radiological analysis of the groundwater samples. The remaining Appendix III and IV constituents were analyzed by Consumers Energy Laboratory Services in Jackson, Michigan in accordance with the SAP. The analytical results for the background monitoring wells are summarized in Table 3. The analytical results for the Bottom Ash Pond downgradient monitoring wells are summarized in Table 4.

2.2.1 Groundwater Flow Rate and Direction

Groundwater elevation data collected during the May 2021 assessment monitoring event are provided in Table 1. These data were used to construct the groundwater contour map (Figure 3). Groundwater elevations at the Weadock site are generally within the range of 581 to 594 feet above mean sea level (ft NAVD88) and groundwater is typically encountered at a similar or slightly higher elevation relative to the surrounding surface water features measured by the NOAA gauging station data.

Figure 3 shows that groundwater near the Weadock Bottom Ash Pond continues to flow to the north toward the discharge channel and to the west near the Saginaw River. The average hydraulic gradient throughout the bottom ash pond area during the May 2021 event is estimated at 0.0030 ft/ft. The gradient was calculated using the monitoring well pairs JCW-MW-15028/JCW-MW-15009, JCW-MW-15007/JCW-MW-15010, and MW-15016/MW-15002. Using the mean hydraulic conductivity of 16 ft/day (ARCADIS, 2016) and an assumed effective porosity of 0.3, the estimated seepage velocity observed in May 2021 (0.16 ft/day or 59 ft/year). The general flow direction is similar to that identified in previous monitoring rounds and continues to demonstrate that the downgradient monitoring wells are appropriately positioned to detect the presence of Appendix III/IV constituents that could potentially migrate from the Weadock Bottom Ash Pond.

2.2.2 Data Quality

Data was evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. Analytical data were found to be usable for assessment monitoring and were generally consistent with previous sampling events. The Data Quality Reviews are included as Appendix A.

3.0 Assessment Monitoring Statistical Evaluation

Assessment monitoring is continuing at the Weadock Bottom Ash Pond while corrective measures are further evaluated in accordance with §257.96 and §257.97 as outlined in the ACM. The following section summarizes the statistical approach applied to assess the May 2021 groundwater data in accordance with the assessment monitoring program.

3.1 Establishing Groundwater Protection Standards

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

3.2 Data Comparison to Groundwater Protection Standards

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

Confidence intervals were established per the statistical methods detailed in the *Statistical Evaluation of May 2021 Assessment Monitoring Sampling Event* technical memorandum provided in Appendix B. For each Appendix IV constituent, the concentrations were first compared directly to the respective GWPSs. Constituent-well combinations that included a direct exceedance of the GWPSs were retained for further statistical analysis using confidence limits.

Overall, the assessment monitoring statistical evaluations have confirmed that beryllium, and lithium are the only Appendix IV constituents that have been present at statistically significant levels above the GWPS. The statistical evaluation of this semiannual assessment monitoring event data indicate that no appendix IV constituents are present at statistically significant levels exceeding the GWPS in downgradient monitoring wells at the Weadock Bottom Ash Pond:

Constituent	GWPS	#Downgradient Wells Observed

No constituents are present at statistically significant levels exceeding the GWPS

Previously, beryllium and lithium at JCW-MW-15009 were present at a statistically significant levels; however, the May 2021 statistical evaluations show that the lower confidence limit for all Appendix IV constituents are below their respective GWPSs. Source removal of CCR has been completed, as reported in the *Weadock Bottom Ash Pond Removal Documentation Report* (Golder, August 2020) and approved by the EGLE on December 18, 2020. Lithium and beryllium concentrations have been below the GWPS at JCW-MW-15009 for the past four semi-annual sampling events. Assessment monitoring will continue while Consumers Energy continues to evaluate corrective measures per §257.96 and §257.97. A summary of the confidence intervals for May 2021 is provided in Table 5.

4.0 Conclusions and Recommendations

Corrective action has been triggered and assessment monitoring is ongoing at the Weadock Bottom Ash Pond CCR unit. A summary of the May 2021 assessment monitoring event is presented in this report. Overall, the statistical assessments have confirmed that beryllium and lithium are the only Appendix IV constituents present at statistically significant levels above the GWPS. Consumers Energy has completed the removal of CCR consistent with the timeline for closure of the Weadock Bottom Ash Pond under the *J.C. Weadock Generating Facility Bottom Ash Pond Closure Plan* (Golder, January 2018) and the CCR Rule's closure by removal provisions in §257.102(c).

Consumers Energy will continue assessment monitoring and evaluate corrective measures in accordance with §257.96 and §257.97 as outlined in the Weadock ACM. The groundwater management remedy for the Weadock Bottom Ash Pond will be selected as soon as feasible to meet the federal standards of §257.96(b). Consumers Energy will continue the assessment of corrective measures, per §257.95(g), and execute the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98. The next semiannual monitoring event is tentatively scheduled for the fourth calendar quarter of 2021.

5.0 References

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

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

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Golder Associates Inc. January 2018. J.C. Weadock Generating Facility Bottom Ash Pond Closure Plan, Essexville, Michigan. Prepared for Consumers Energy Company.

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TRC Environmental Corporation. January 2018. Annual Groundwater Monitoring Report – JC Weadock Power Plant, Bottom Ash Pond CCR Unit. Prepared for Consumers Energy Company.

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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).

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

Office of Solid Waste and Emergency Response, now the Office of Land and Emergency Management.

Tables

Table 1
Summary of Groundwater Elevation Data: May 2021
Second Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, 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 Monitoring Wells							
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
Bottom Ash Pond: Downgradient Monitoring Wells							
JCW-MW-15007	587.40	Sand	582.7	to	579.2	3.98	583.42
JCW-MW-15009	589.64	Sand	581.9	to	576.9	8.40	581.24
JCW-MW-15010	597.76	Sand	579.7	to	578.2	16.64	581.12
JCW-MW-15028	589.64	Sand	567.7	to	564.7	7.73	581.91
Landfill: Downgradient Monitoring Wells (outside slurry wall)							
JCW-MW-18001	596.73	Sand and Sandy Clay	578.3	to	573.3	15.98	580.75
JCW-MW-18004	593.04	Sandy Clay	583.9	to	578.9	11.65	581.39
JCW-MW-18005	590.89	Sand and Sandy Clay	580.0	to	575.0	8.80	582.09
JCW-MW-18006	600.72	Fly Ash and Sandy Clay	582.8	to	577.8	14.76	585.96
MW-50	593.36	Sand	577.8	to	574.8	12.53	580.83
MW-51	594.29	Sand and Clay	577.8	to	574.8	13.30	580.99
MW-52	594.90	Sand	579.3	to	576.3	13.93	580.97
MW-53	593.68	Sand and Clay	579.1	to	576.1	12.90	580.78
MW-53R	594.25	Sand and Clay	580.4	to	575.4	13.40	580.85
MW-54R	593.89	Clay and Sand	581.3	to	576.3	13.00	580.89
MW-55	593.82	Sand	581.5	to	578.5	12.93	580.89
OW-57ROUT	591.00	Sandy Clay	577.0	to	572.0	10.18	580.82
Landfill: Static Water Level Only (inside slurry wall)							
JCW-OW-18001	595.84	Fly Ash and Sand	581.1	to	576.1	6.40	589.44
JCW-OW-18002	593.63	Sand	578.9	to	573.9	11.75	581.88
JCW-OW-18003	593.99	Sand and Clay	580.5	to	575.5	10.28	583.71
JCW-OW-18004	594.19	Sandy Clay	584.6	to	579.6	7.42	586.77
JCW-OW-18006	600.61	Fly Ash and Clay with Sand	582.9	to	577.9	11.42	589.19
MW-20	592.73	NR	~581.1	to	~578.1	7.03	585.70
OW-51	593.62	Clay and Sand	578.9	to	575.9	10.01	583.61
OW-53	593.64	Clay and Sand	579.0	to	576.0	8.62	585.02
OW-54	594.10	Clay and Sand	580.0	to	577.0	8.09	586.01
OW-55	594.67	Clay (or Sand and Clay)	580.9	to	577.9	6.80	587.87
OW-56R	592.01	Ash and Sand	577.5	to	572.5	17.15	574.86
OW-57R IN	590.86	Sandy Clay	575.7	to	570.7	7.41	583.45
OW-61	612.37	Ash and Sand	588.0	to	585.0	21.98	590.39
OW-63	612.53	Ash and Sand	594.2	to	591.2	26.80	585.73
Landfill: Leachate Headwells							
LH-103	603.49	Fly Ash	30.2	to	33.2	16.70	586.79
LH-104	596.56	Fly Ash	8.0	to	11.0	9.30	587.26

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 Parameters: May 2021
JC Weadock Bottom Ash Pond - Essexville - RCRA CCR Monitoring Program
Essexville, Michigan

Sample Location	Sample Date	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (umhos/cm)	Temperature (°C)	Turbidity (NTU)
Background							
MW-15002	5/3/2021	1.67	-53.1	6.5	6,236	10.4	4.4
MW-15008	5/3/2021	0.24	-225.3	6.8	967	9.0	5.4
MW-15016	5/3/2021	1.74	-10.4	7.2	991	10.2	3.1
MW-15019	5/3/2021	1.79	-69.2	6.8	1,398	8.6	3.4
Weadock Bottom Ash Pond							
JCW-MW-15007	5/12/2021	2.01	-38.3	7.1	13,475	9.0	3.10
JCW-MW-15009	5/12/2021	2.04	62.3	5.6	2,601	9.7	3.90
JCW-MW-15010	5/11/2021	1.81	-139.3	7.2	1,090	11.8	1.85
JCW-MW-15028	5/12/2021	2.18	-40.1	7.7	3,972	9.9	0.39

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
DE Karn & JC Weadock Background – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	**MW-15002**	**MW-15008**	**MW-15016**	**MW-15019**
					Sample Date:	5/3/2021	5/3/2021	5/3/2021	5/3/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Background			
Appendix III[(1)]									
Boron	ug/L	NC	500	500	4,000	102	121	349	239
Calcium	mg/L	NC	NC	NC	500[EE]	364	105	219	155
Chloride	mg/L	**250****	**250[E]**	**250[E]**	**50**	**2,630**	**225**	**108**	**344**
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	500[EE]	31.3	< 1	**255**	52.4
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	**5,390**	**822**	**979**	**1,160**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	6.5	6.8	7.2	6.8
Appendix IV[(1)]									
Antimony	ug/L	6	6	6	2	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	10	10	10	1	< 1	4	1
Barium	ug/L	2,000	2,000	2,000	1,200	1,040	62	53	335
Beryllium	ug/L	4	4	4	33	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5	5	2.5	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4	4	14	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	19	15	79	12
Mercury	ug/L	2	2	2	0.20#	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	120	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NC	NC	NC	1.24	< 0.298	< 0.218	< 0.309
Radium-228	pCi/L	NC	NC	NC	NC	2.49	< 0.699	0.606	< 0.707
Radium-226/228	pCi/L	5	NC	NC	NC	3.72	0.804	0.658	0.902
Selenium	ug/L	50	50	50	5	< 1	< 1	< 1	4
Thallium	ug/L	2	2	2	2	< 2	< 2	< 2	< 2
Additional MI Part 115[(2)]									
Iron	ug/L	**300****	**300[E]**	**300[E]**	500,000[EE]	**14,600**	**11,300**	**1,170**	**14,300**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	1	1	1	< 1
Nickel	ug/L	NC	100	100	120	7	< 2	6	28
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	62	27	**12**	**8**	2	4
Zinc	ug/L	5,000**	2,400	5,000[E]	260	< 10	< 10	< 10	< 10

Notes:

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

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.

* - 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}

- 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}.

(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 Groundwater Sampling Results (Analytical): May 2021
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	JCW-MW-15007	JCW-MW-15009	JCW-MW-15010	JCW-MW-15028
					Sample Date:	5/12/2021	5/12/2021	5/11/2021	5/12/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^				
Appendix III[(1)]									
Boron	ug/L	NC	**500**	**500**	4,000	233	255	**1,080**	**563**
Calcium	mg/L	NC	NC	NC	**500[EE]**	280	**574**	128	235
Chloride	mg/L	**250****	**250[E]**	**250[E]**	**50**	**3,780**	14.8	**67.8**	**921**
Fluoride	ug/L	4,000	4,000	4,000	NC	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	**500[EE]**	29	**1,450**	74.7	102
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	**7,200**	**2,230**	**607**	**2,130**
pH, Field	SU	**6.5 - 8.5****	**6.5 - 8.5[E]**	**6.5 - 8.5[E]**	**6.5 - 9.0**	7.1	**5.6**	7.2	7.7
Appendix IV[(1)]									
Antimony	ug/L	6	6	6	2	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	**31**	< 1	6	3
Barium	ug/L	2,000	2,000	2,000	**1,200**	**1,680**	23	148	342
Beryllium	ug/L	4	4	4	33	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5	5	2.5	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	4,000	4,000	NC	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4	4	14	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	70	89	70	51
Mercury	ug/L	2	2	2	0.20#	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	120	8	< 5	< 5	< 5
Radium-226	pCi/L	NC	NC	NC	NC	1.32	0.333	< 0.410	0.621
Radium-228	pCi/L	NC	NC	NC	NC	1.27	0.720	0.700	0.997
Radium-226/228	pCi/L	NC	NC	NC	NC	2.59	1.05	0.898	1.62
Selenium	ug/L	50	50	50	5	4	< 1	< 1	< 1
Thallium	ug/L	2	2	2	2	< 2	< 2	< 2	< 2
Additional MI Part 115[(2)]									
Iron	ug/L	**300****	**300[E]**	**300[E]**	500,000[EE]	**3,230**	**28,300**	30	294
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	1	3	< 1	< 1
Nickel	ug/L	NC	100	100	120	7	9	2	4
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	62	27	**16**	3	< 2	**5**
Zinc	ug/L	5,000**	2,400	5,000	260	< 10	< 10	< 10	< 10

Notes:
ug/L - micrograms per liter; mg/L - milligrams per liter.
pCi/L - picocuries per liter; SU - standard units; pH is a field parameter.
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April, 2012.
NC - no criteria.
* - 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}.
\# - 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 5
Summary of Groundwater Protection Standard Exceedances – May 2021
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

Constituent	Units	GWPS	JCW-MW-15007		JCW-MW-15009	
			LCL	UCL	LCL	UCL
Arsenic	ug/L	21	13	48	--	--
Beryllium	ug/L	4	--	--	1.0	7.1
Barium	ug/L	2,000	940	2,400	--	--
Lithium	ug/L	180	--	--	47	210

Notes:

ug/L - micrograms per Liter

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

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

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

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

Figures

BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

N

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

0 3,000 6,000 FEET

TRC

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Ann Arbor, MI 48108-3284
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www.trccompanies.com

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:	JULY 2021
PROJ. NO.:	418426.0000
FILE:	418426-102-004.mxd

FIGURE 1

S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\3_WEADOCK\2021_MXDs\2021_002_MAY\418426-102-004.mxd -- Saved By: AADAIR on 7/29/2021, 11:56:38 AM

LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING WELL
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL
- SLURRY WALL (APPROXIMATE)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).

N

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:

CONSUMERS ENERGY COMPANY
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:

SITE MAP

DRAWN BY:	A. ADAIR	PROJ NO.:	418426.0000
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		**FIGURE 2**
DATE:	JULY 2021		

TRC

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Ann Arbor, MI 48108-3284
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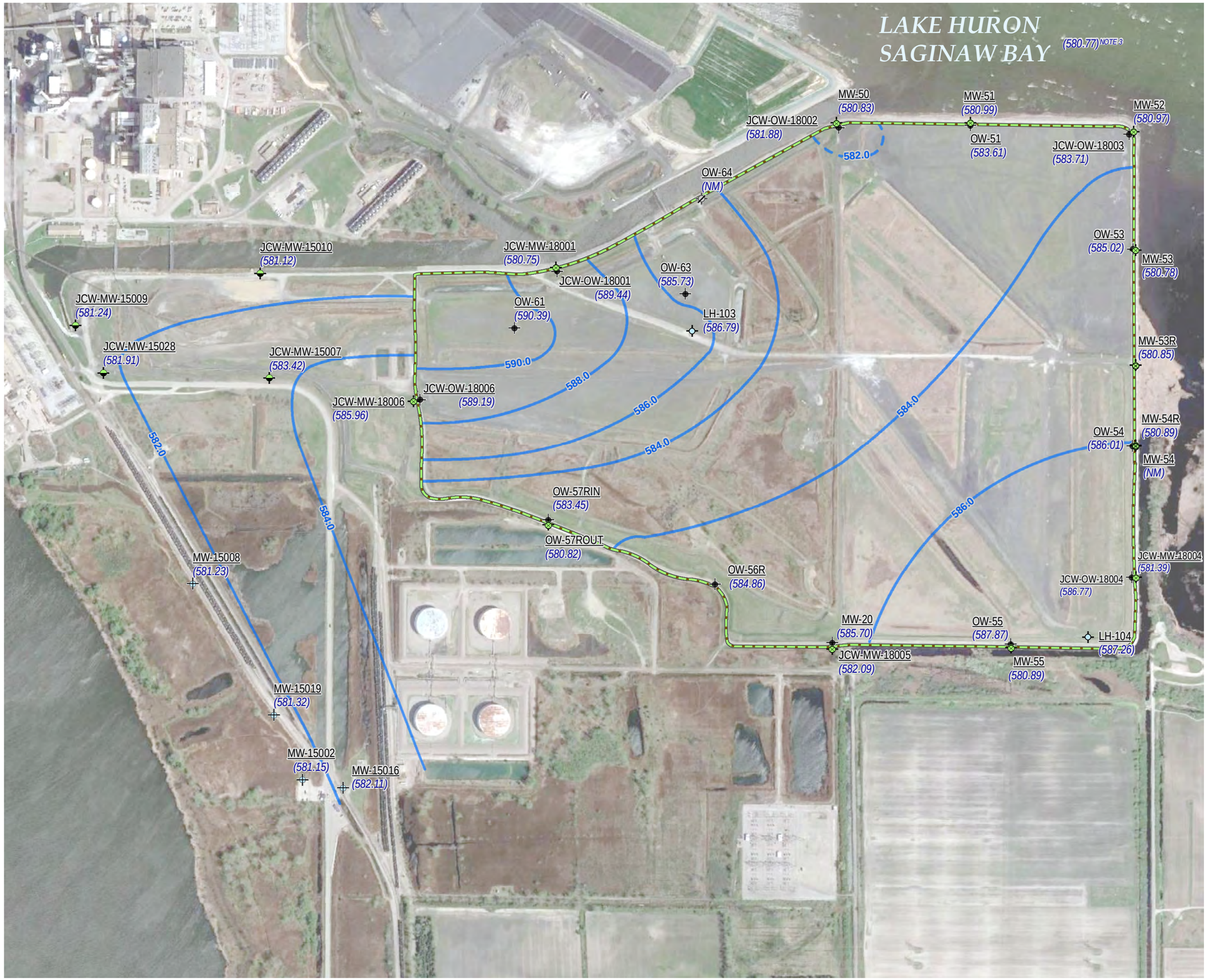
FILE NO.: 418426-102-000.mxd

Plot Date: 7/29/2021, 11:58:15 AM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 2697673 WEADOCK\2021 MXDs\2021 002 MAY\418426-102-000.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS



LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING WELL
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL
- SLURRY WALL (APPROXIMATE)
- GROUNDWATER ELEVATION CONTOUR (2' INTERVAL, DASHED WHERE INFERRED)
- (580.85) GROUNDWATER ELEVATION (FEET)
- (NU) NOT USED TO DEVELOP CONTOURS

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018.
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
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:
POTENTIOMETRIC SURFACE MAP
MAY 2021

DRAWN BY:	A. ADAIR	PROJ NO.:	418426.0000
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		
DATE:	JULY 2021		

FIGURE 3

TRC
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FILE NO.: 418426-102-003A.mxd

Plot Date: 7/29/2021, 14:43:19 PM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 26976713 WEADOCK\2021 MXDs\2021 002 MAY\418426-102-003A.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

Appendix A
Data Quality Reviews

Laboratory Data Quality Review
Groundwater Monitoring Event May 2021
JC Weadock/Karn DEK Background

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, located in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 21-0525.

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

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

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Chloride, Fluoride, Sulfate)	EPA 300.0
Total Dissolved Solids	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 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, field blanks, and equipment 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 and IV constituents as well as iron, copper, nickel, silver, vanadium, and zinc will be utilized for the purposes of an assessment monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- One field blank (FB-Background) was collected. Total metals and anions were not detected in this blank sample.
- An equipment blank was not collected with this data set.
- MS and MSD analyses were not performed on a sample from this data set.
- The field duplicate pair samples were DUP-Background/ MW-15002. All criteria were met.
- Laboratory duplicate analyses were not performed on a sample from this data set.

Laboratory Data Quality Review
Groundwater Monitoring Event May 2021
JC Weadock Bottom Ash Pond

Groundwater samples were collected by TRC for the May 2021 sampling event. Samples were analyzed for metals, anions, alkalinity, and total dissolved solids by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 21-0527.

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

- JCW-MW-15007
- JCW-MW-15009
- JCW-MW-15010
- JCW-MW-15028

Each sample was analyzed for the following constituents:

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

This data usability report addresses the following items:

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

Review Summary

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

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

QA/QC Sample Summary:

- One equipment blank (EB-JCW-BAP) and one field blank (FB-JCW-BAP) were collected. Total metals were not detected in these blank samples.
- MS and MSD analyses were performed on sample JCW-MW-15009 for total metals, anions, and alkalinity. The recoveries were within the acceptance limits. 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.
- The field duplicate pair samples were DUP-JCW-BAP and JCW-MW-15007; all criteria between the parent and duplicate sample were within the QC limits with the following exception:
    - The RPD for copper (66.7%) exceeded the acceptance limits. Potential uncertainty exists for all positive results for copper, as summarized in the attached table, 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
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
JCW-MW-15007	5/12/2021	Copper	Field duplicate analysis exceeds acceptance criteria (<60% RPD); indicates potential uncertainty in copper results.
JCW-MW-15009	5/12/2021		
DUP-JCW-BAP	5/12/2021		

Laboratory Data Quality Review
Groundwater Monitoring Event May 2021
JC Weadock/Karn DEK Background

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) 240-149188-1.

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

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

Each sample was analyzed for the following constituents:

Analyte Group	Method
Radium (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 and field blanks. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. Field 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. 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 constituents will be utilized for the purposes of an assessment monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- A method blank was analyzed with each analytical batch for radium. Target analytes were not detected in the method blank samples.
- One field blank (FB-BACKGROUND) was collected. Target analytes were not detected in this blank sample.
- The LCS and LCSD recoveries and relative percent differences (RPDs) for radium 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-BACKGROUND/MW-15002. All criteria were met.
- Laboratory duplicate analyses were not performed on a sample from this data set.
- Carrier recoveries were within 40-110%.

Laboratory Data Quality Review
Groundwater Monitoring Event May 2021
JC Weadock Bottom Ash Pond

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) 240-149376-1.

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

- JCW-MW-15007
- JCW-MW-15009
- JCW-MW-15010
- JCW-MW-15028
-
-

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 and equipment blanks. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. 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. 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 constituents will be utilized for the purposes of an assessment monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- A method blank was analyzed with each analytical batch for radium. Target analytes were not detected in the method blank samples.
- One equipment blank (EB-JCW BAP) was collected. Target analytes were not detected in this blank sample.
- The LCS and LCSD recoveries and relative percent differences (RPDs) for radium 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-JCW BAP/JCW-MW-15007. All criteria were met.
- Laboratory duplicate analyses were not performed on a sample from this data set.
- Carrier recoveries were within 40-110%.

Appendix B
Statistical Evaluation of May 2021 Assessment Monitoring Sampling Event

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Ann Arbor, MI 48108

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TRCcompanies.com

Technical Memorandum

Date:	July 27, 2021
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC Katy Reminga, TRC
Project No.:	418426.0001 Phase 002, Task 002
Subject:	Statistical Evaluation of May 2021 Assessment Monitoring Sampling Event JC Weadock Bottom Ash Pond, Consumers Energy Company, Essexville, Michigan

During the statistical evaluation of the initial assessment monitoring event (May 2018), beryllium and lithium were present in one or more downgradient monitoring wells at statistically significant levels exceeding the Groundwater Protection Standards (GWPSs). Therefore, Consumers Energy Company (Consumers Energy) initiated an Assessment of Corrective Measures (ACM) within 90 days from when the Appendix IV exceedance was determined. The ACM was completed on September 11, 2019.

Currently, Consumers Energy is continuing semiannual assessment monitoring in accordance with §257.95 of the CCR Rule[1] at the JC Weadock Power Plant Bottom Ash Pond. The first semiannual assessment monitoring event for 2021 was conducted on May 10 through 12, 2021. In accordance with §257.95, the assessment monitoring data must be compared to GWPSs to determine whether or not Appendix IV constituents are detected at statistically significant levels above the GWPSs. GWPSs were established in accordance with §257.95(h), as detailed in the October 15, 2018 Groundwater Protection Standards technical memorandum, which was also included in the 2018 Annual Groundwater Monitoring Report (TRC, January 2019). The following narrative describes the methods employed and the results obtained and the Sanitas™ output files are included as an attachment.

The statistical evaluation of the first semiannual 2021 assessment monitoring event data indicate no constituents are present at statistically significant levels that exceed the GWPSs in downgradient monitoring wells at the Weadock Bottom Ash Pond.

Constituent	**GWPS**	**#Downgradient Wells Observed**

No constituents are present at statistically significant levels above the GWPSs.

All Appendix IV constituent concentrations have been below the GWPS for the past four semiannual sampling events, with the exception of arsenic at JCW-MW-15007, which has periodically exceeded the GWPS, but concentrations are not present at statistically significant levels (i.e., lower confidence limit is below the GWPS). Both beryllium and lithium at downgradient well JCW-MW-15009 were previously

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

present at statistically significant levels; however, the May 2021 statistical evaluation shows that the lower confidence limits for lithium and beryllium are currently below the GWPSs. Although no Appendix IV constituents are present at statistically significant levels above the GWPS based on this data evaluation, corrective action has been triggered as a result of data collected during the previous assessment monitoring events. Compliance with the GWPSs established under § 257.95(h) will be achieved by demonstrating that concentrations of constituents listed in Appendix IV to this part have not exceeded the GWPSs for a period of three consecutive years using the statistical procedures and performance standards in § 257.93(f) and (g). Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97. Consumers Energy will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

Assessment Monitoring Statistical Evaluation

The four downgradient wells (JCW-MW-15007, JCW-MW-15009, JCW-MW-15010, and JCW-MW-15028) are located in accessible areas along the downgradient perimeter of the Weadock Bottom Ash Pond. Following the assessment monitoring sampling event, compliance well data for the Weadock Bottom Ash Pond were evaluated in accordance with the Groundwater Statistical Evaluation Plan (Stats Plan) (TRC, October 2017).

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

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

For each detected Appendix IV constituent, the concentrations from each well were first compared directly to the GWPS, as shown on Table 1. Parameter-well combinations that included a direct

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

exceedance of the GWPS within the past eight sampling events (April 2018 through May 2021) were retained for further analysis. Arsenic and barium at JCW-MW-15007, and beryllium and lithium at JCW-MW-15009 had individual results exceeding their respective GWPSs within this time period.

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

The statistical data evaluation included the following steps:

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

The results of these evaluations are presented and discussed below.

Data from each round were evaluated for completeness, overall quality, and usability and were deemed appropriate for the purposes of the CCR assessment monitoring program. Initially, the assessment monitoring results (April 2018 through May 2021) were observed visually for potential trends. No outliers were identified. Arsenic concentrations in JCW-MW-15010 and beryllium and lithium concentrations in JCW-MW-15009 appear to exhibit a downward trend and barium concentrations at JCW-MW-15028 appear to exhibit an increasing trend on the time series charts (Attachment 1). These data sets were tested further in Sanitas™ utilizing Sen's Slope to estimate the average rate of change in concentration over time and utilizing the Mann-Kendall trend test to test for significance of the trend at the 98% confidence level. The trend tests show that barium in in JCW-MW-15028 is generally increasing with time, as evidenced by the positive Sen's Slope, but that the upward trend is not statistically significant (Attachment 1). Arsenic concentrations in JCW-MW-15010 and beryllium and lithium concentrations in JCW-MW-15009 are generally decreasing with time, as evidenced by the negative Sen's Slope, but were also not statistically significant. The decreases in constituent concentrations at JCW-MW-15009 are causing the confidence intervals to widen. Calculating a confidence interval around a trending data set incorporates not only variability present naturally in the underlying dataset, but also incorporates variability due to the trend itself. Beryllium and lithium

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

concentrations have already triggered assessment monitoring (e.g., not newly identified GWPS exceedances) and an interim measure has been initiated through cessation of hydraulic loading to the bottom ash pond in April 2018; therefore, traditional confidence interval calculations are presented in this statistical evaluation until more data are available. Once additional data are collected in the absence of hydraulic loading, confidence bands may be a more appropriate assessment to determine compliance with the CCR Rule. Confidence bands are selected by the UG as the appropriate method for calculating confidence intervals on trending data. A confidence band calculates upper and lower confidence limits at each point along the trend to reduce variability and create a narrower confidence interval. At least 8 to 10 measurements should be available when computing a confidence band around a linear regression.

The Sanitas™ software was then used to test compliance at the downgradient monitoring wells using the confidence interval method for the most recent 8 sampling events. Eight independent sampling events provide the appropriate density of data as recommended per the Unified Guidance yet are collected recently enough to provide an indication of current condition. The tests were run with a per-test significance of $\alpha = 0.01$. The software outputs are included in Attachment 1 along with data reports showing the values used for the evaluation. The percentage of non-detect observations are also included in Attachment 1. Non-detect data was handled in accordance with the Stats Plan for the purposes of calculating the confidence intervals.

The Sanitas™ software generates an output that includes graphs of the parametric or non-parametric confidence intervals for each well along with notes data transformations, as appropriate. The data sets for arsenic at JCW-MW-15007 and lithium at JCW-MW-15009 were found to be normally distributed. Non-parametric confidence intervals were used for barium at JCW-MW-15007 and beryllium at JCW-MW-15009 due to non-normal datasets. The confidence interval test compares the lower confidence limit to the GWPS. The statistical evaluation of the Appendix IV parameters shows no constituents present at statistically significant levels that exceed the GWPSs. The results of the assessment monitoring statistical evaluation are consistent with the previous (October 2020) assessment monitoring data statistical evaluation. Although no Appendix IV constituents are present at statistically significant levels above the GWPS based on this data evaluation. Compliance with the GWPSs established under § 257.95(h) will be achieved by demonstrating that concentrations of constituents listed in Appendix IV to this part have not exceeded the GWPSs for a period of three consecutive years using the statistical procedures and performance standards in § 257.93(f) and (g). Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97. Consumers Energy will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

Attachments

Table 1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards – December 2015 to May 2021

Attachment 1 Sanitas™ Output Files

Table

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – April 2018 to May 2021
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	JCW-MW-15007									
					Sample Date:	4/10/2018	5/23/2018	11/7/2018	4/9/2019	10/15/2019	10/15/2019	5/14/2020	10/13/2020	5/12/2021	5/12/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS										
Appendix III											Field Dup				Field Dup
Boron	ug/L	NC	NA	619	NA	--	308	656	290	470	460	335	329	233	240
Calcium	mg/L	NC	NA	302	NA	--	145	153	200	130	120	217	413	280	294
Chloride	mg/L	250*	NA	2,440	NA	--	1,660	788	1,600	1,200	1,200	2,870	5,810	3,780	3,830
Fluoride	ug/L	4,000	NA	1,000	NA	< 1,000	< 1,000	< 1,000	< 10,000 (1)	< 5,000(1)	< 5,000(1)	< 1,000	1,160	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA	--	19.6	23.9	< 20	44	43	57.2	4.47	29.0	29.8
Total Dissolved Solids	mg/L	500*	NA	4,600	NA	--	3,210	1,790	3,400	2,300	2,400	5,080	11,200	7,200	7,280
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA	7.1	7.2	7.1	7.2	7.1	--	7.6	7.3	7.1	--
Appendix IV															
Antimony	ug/L	6	NA	1	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**	16.7	**25.6**	**46.3**	9.8	**34**	**35**	19	**61**	**31**	**31**
Barium	ug/L	2,000	NA	1,300	**2,000**	957	941	1,060	950	970	970	1,180	**2,400**	1,680	1,670
Beryllium	ug/L	4	NA	1	**4**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 1.0	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1	1	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 15.0	< 15.0	< 30.0 (1)	< 6.0	< 6.0	< 6.0	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000	< 1,000	< 1,000	< 1,000	< 10,000 (1)	< 5,000(1)	< 5,000(1)	< 1,000	1,160	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	**180**	80	88	87	67	70	67	103	94	70	69
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100	6.4	7.6	< 25.0	6.2	9.7	9.6	< 5	< 5	8	8
Radium-226	pCi/L	NC	NA	NA	NA	0.878	0.239	1.33	0.628	0.659	0.442	0.728	1.71	1.32	1.01
Radium-228	pCi/L	NC	NA	NA	NA	0.761	0.795	0.975	0.492	0.796	0.543	0.698	1.67	1.27	1.43
Radium-226/228	pCi/L	5	NA	3.32	5	1.64	1.03	2.31	1.12	1.45	0.986	1.43	3.38	2.59	2.45
Selenium	ug/L	50	NA	2	50	1.2	< 1.0	< 1.0	3.2	< 1.0	< 1.0	< 1	< 1	4	3
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 10.0 (1)	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2	< 2

Notes:

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

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – April 2018 to May 2021
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	JCW-MW-15009							
					Sample Date:	4/10/2018	5/23/2018	11/7/2018	4/9/2019	10/15/2019	5/14/2020	10/13/2020	5/12/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS								
Appendix III													
Boron	ug/L	NC	NA	619	NA	--	297	422	290	330	141	263	255
Calcium	mg/L	NC	NA	302	NA	--	530	589	510	520	314	560	574
Chloride	mg/L	250*	NA	2,440	NA	--	41	64.9	43	18	3.19	5.96	14.8
Fluoride	ug/L	4,000	NA	1,000	NA	< 1,000	< 1,000	< 1,000	< 2,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA	--	1,690	1,980	1,600	1,400	611	1,060	1,450
Total Dissolved Solids	mg/L	500*	NA	4,600	NA	--	2,510	2,620	2,400	2,100	1,370	1,910	2,230
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA	4.7	4.9	4.8	5.4	6.1	7.2	6.6	5.6
Appendix IV													
Antimony	ug/L	6	NA	1	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**	1.6	1.4	< 5.0	< 1.0	< 1.0	< 1	1	< 1
Barium	ug/L	2,000	NA	1,300	**2,000**	12.3	14.4	14.8	14	66	58	51	23
Beryllium	ug/L	4	NA	1	**4**	**7.1**	**6.5**	**6.6**	**4.3**	< 1.0	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 1.0	0.24	< 0.20	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100	1.4	1.4	< 5.0	1.4	< 1.0	2	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 15.0	< 15.0	< 30.0 (1)	< 6.0	< 6.0	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000	< 1,000	< 1,000	< 1,000	< 2,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	**180**	**210**	**190**	**240**	150	94	18	53	89
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100	< 5.0	< 5.0	< 25.0	< 5.0	9.3	10	9	< 5
Radium-226	pCi/L	NC	NA	NA	NA	< 0.703	< 0.723	< 0.803	< 0.0879	0.175	< 0.125	< 0.352	0.333
Radium-228	pCi/L	NC	NA	NA	NA	0.707	1.11	1.25	< 0.411	0.548	< 0.491	< 0.495	0.720
Radium-226/228	pCi/L	5	NA	3.32	5	< 1.37	< 1.37	< 1.54	< 0.411	0.723	< 0.491	< 0.495	1.05
Selenium	ug/L	50	NA	2	50	14.2	5.2	< 5.0	2.0	2.0	1	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 10.0 (1)	< 2.0	< 2.0	< 2	< 2	< 2

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

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – April 2018 to May 2021
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	JCW-MW-15010									
					Sample Date:	4/10/2018	5/22/2018	5/22/2018	11/7/2018	4/9/2019	10/14/2019	5/14/2020	10/13/2020	10/13/2020	5/11/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS										
Appendix III								Field Dup						Field Dup	
Boron	ug/L	NC	NA	619	NA	--	1,330	1,220	1,360	1,400	1,400	2,070	2,000	2,030	1,080
Calcium	mg/L	NC	NA	302	NA	--	78.3	78.8	84.4	120	110	286	218	204	128
Chloride	mg/L	250*	NA	2,440	NA	--	99.8	99.7	96.5	140	140	90.4	105	106	67.8
Fluoride	ug/L	4,000	NA	1,000	NA	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA	--	24.3	23.2	22.3	36	30	553	254	255	74.7
Total Dissolved Solids	mg/L	500*	NA	4,600	NA	--	458	486	492	670	600	1,500	982	997	607
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA	7.3	7.5	--	7.4	7.6	7.3	7.7	7.1	--	7.2
Appendix IV															
Antimony	ug/L	6	NA	1	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**	12.5	11.4	11.1	9.5	16	13	4	4	4	6
Barium	ug/L	2,000	NA	1,300	**2,000**	121	123	116	114	190	180	400	220	221	148
Beryllium	ug/L	4	NA	1	**4**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100	< 1.0	< 1.0	< 1.0	1.2	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 15.0	< 15.0	< 15.0	< 6.0	< 6.0	< 6.0	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	**180**	77	72	72	70	73	84	116	96	97	70
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NA	NA	NA	< 0.831	< 0.618	< 0.668	< 0.879	0.215	< 0.134	0.409	< 0.442	< 0.445	< 0.410
Radium-228	pCi/L	NC	NA	NA	NA	1.39	< 0.741	< 0.701	< 0.776	0.424	0.412	< 0.467	< 0.493	< 0.566	0.700
Radium-226/228	pCi/L	5	NA	3.32	5	< 2.04	< 1.36	< 1.37	< 1.66	0.639	0.536	0.781	< 0.493	< 0.566	0.898
Selenium	ug/L	50	NA	2	50	< 1.0	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2	< 2

Notes:

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

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – April 2018 to May 2021
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	JCW-MW-15028											
					Sample Date:	4/11/2018	4/11/2018	5/23/2018	11/7/2018	11/7/2018	4/9/2019	4/9/2019	10/14/2019	5/14/2020	5/14/2020	10/13/2020	5/12/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS												
Appendix III							Field Dup			Field Dup		Field Dup			Field Dup		
Boron	ug/L	NC	NA	619	NA	--	--	444	517	525	530	560	550	570	562	644	563
Calcium	mg/L	NC	NA	302	NA	--	--	125	153	153	170	180	170	205	204	221	235
Chloride	mg/L	250*	NA	2,440	NA	--	--	69.5	352	347	660	650	640	823	806	811	921
Fluoride	ug/L	4,000	NA	1,000	NA	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 2,000	< 2,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA	--	--	32.2	111	110	120	120	120	128	122	99.8	102
Total Dissolved Solids	mg/L	500*	NA	4,600	NA	--	--	1,030	976	966	1,800	1,800	1,500	2,210	2,240	2,070	2,130
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA	7.8	--	8.0	7.9	--	8.0	--	7.8	8.1	--	7.9	7.7
Appendix IV																	
Antimony	ug/L	6	NA	1	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**	1.2	1.4	< 1.0	< 1.0	1.1	1.1	1.1	< 1.0	< 1	1	< 1	3
Barium	ug/L	2,000	NA	1,300	**2,000**	148	145	148	156	158	250	240	230	324	331	332	342
Beryllium	ug/L	4	NA	1	**4**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 15.0	< 15.0	< 15.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 2,000	< 2,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	2	< 1
Lithium	ug/L	NC	40	180	**180**	48	47	48	51	49	53	51	48	60	60	53	51
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NA	NA	NA	< 0.934	< 0.450	< 0.739	1.13	0.786	0.621	0.384	0.576	0.515	< 0.136	0.697	0.621
Radium-228	pCi/L	NC	NA	NA	NA	0.988	0.874	< 0.676	< 0.685	<0.591	0.729	0.658	0.585	0.733	< 0.399	< 0.468	0.997
Radium-226/228	pCi/L	5	NA	3.32	5	1.65	1.30	< 1.42	1.60	1.26	1.35	1.04	1.16	1.25	< 0.399	1.15	1.62
Selenium	ug/L	50	NA	2	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2	< 2

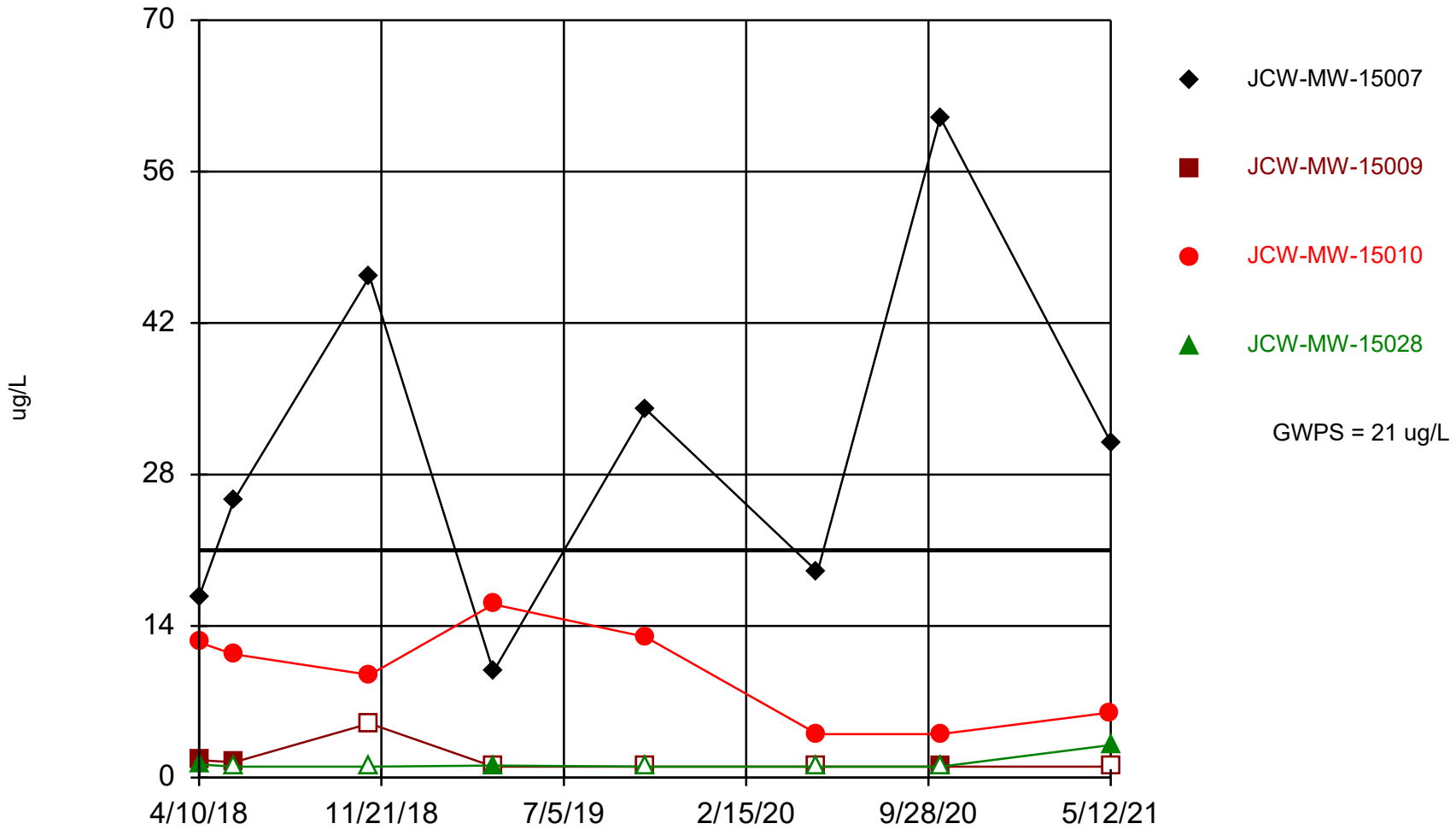
Notes:

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

Attachment 1
Sanitas™ Output Files

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

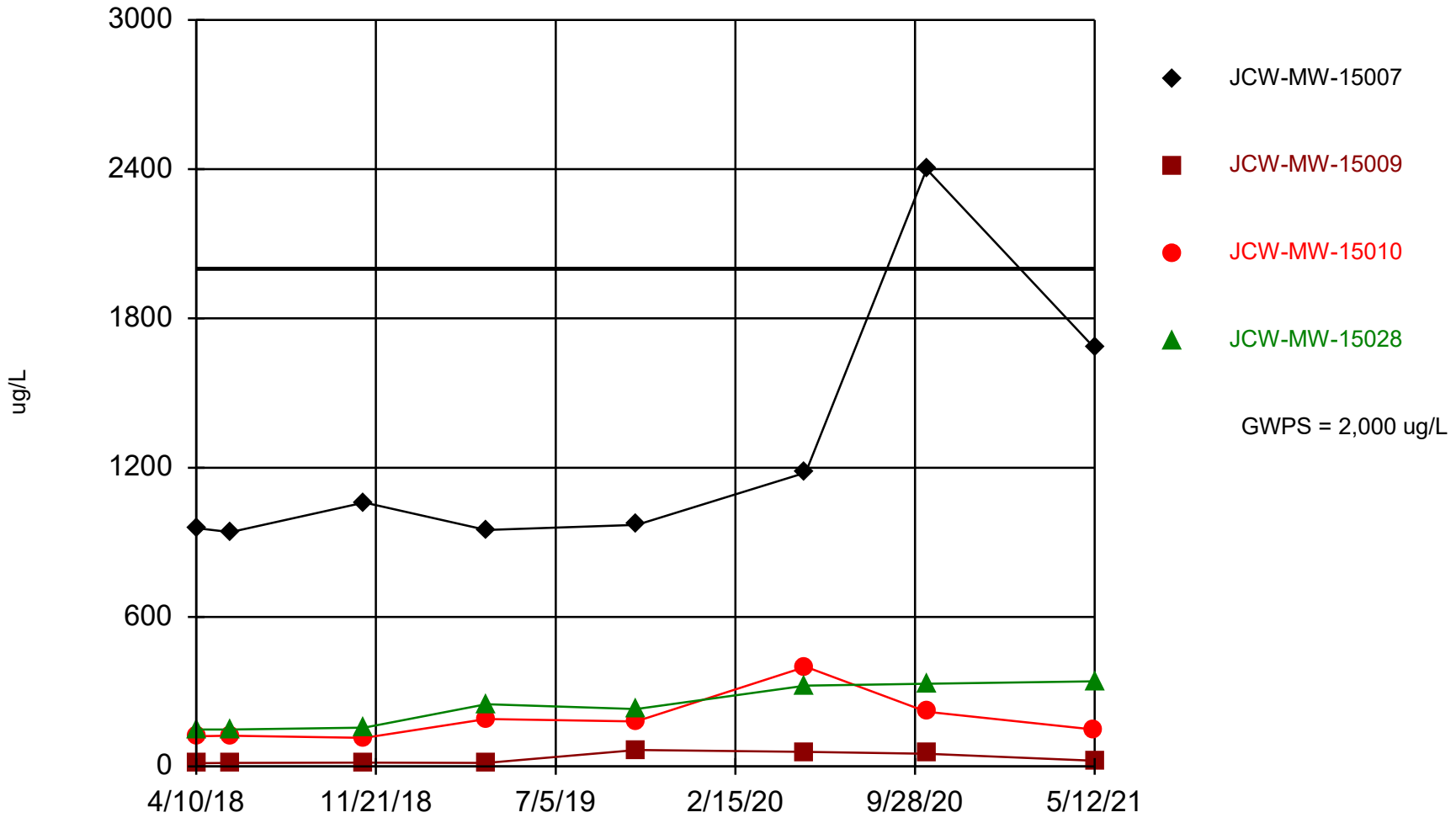
Arsenic Comparison to GWPS



Time Series Analysis Run 6/18/2021 9:35 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Barium Comparison to GWPS

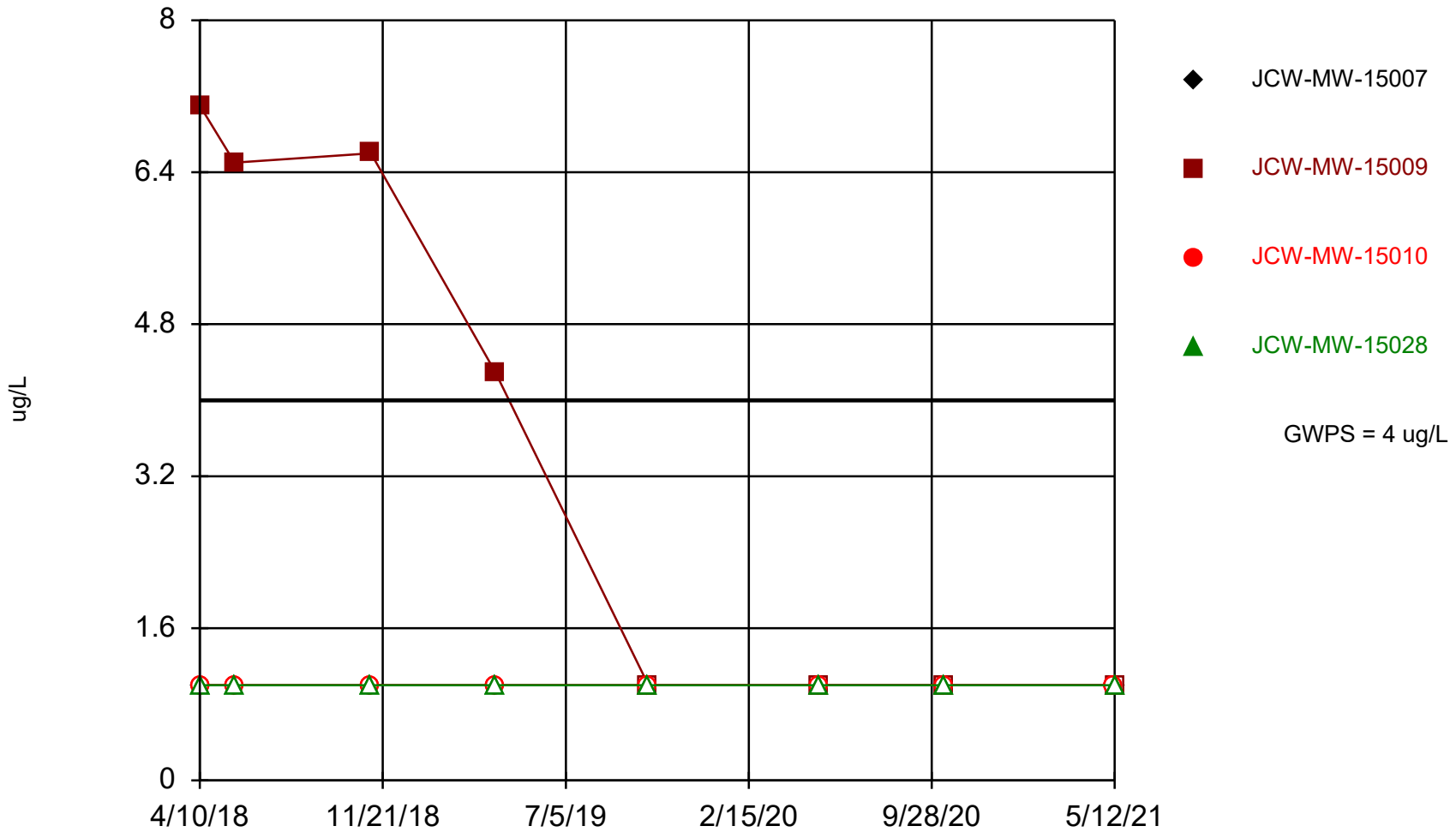


Time Series Analysis Run 6/18/2021 9:37 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

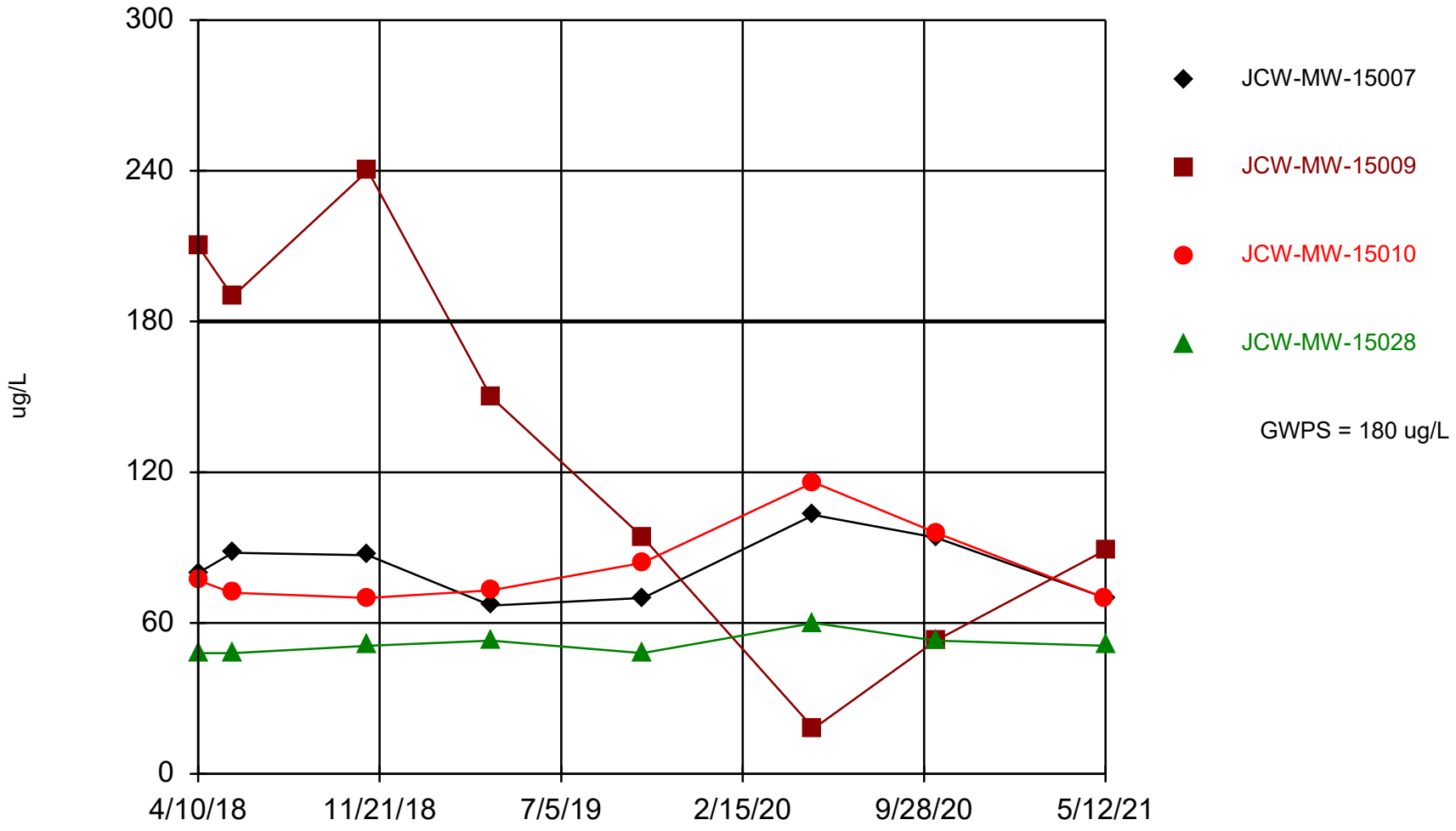
Beryllium Comparison to GWPS



Time Series Analysis Run 6/18/2021 9:37 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Lithium Comparison to GWPS

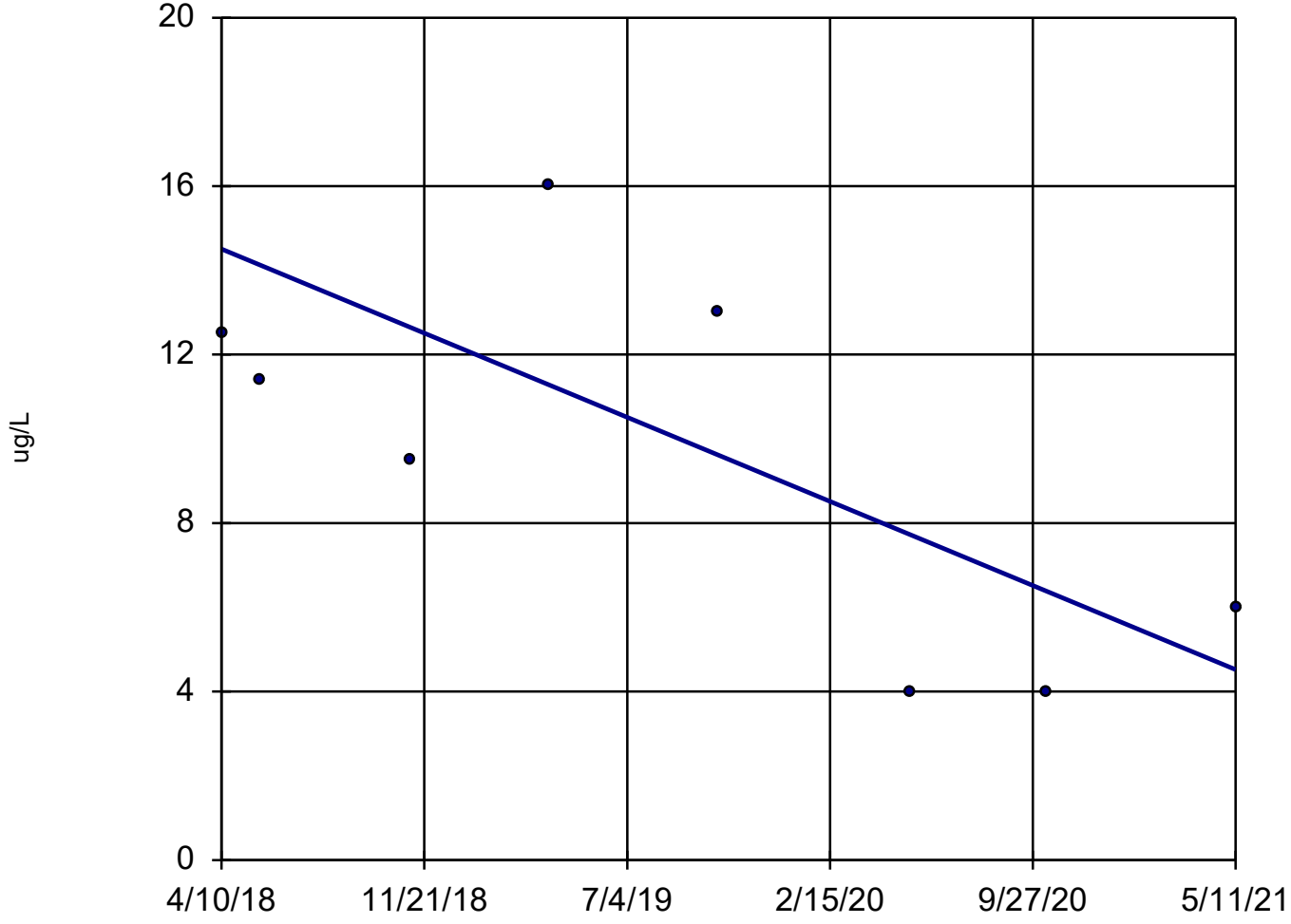


Time Series Analysis Run 6/18/2021 9:38 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Arsenic, Total

JCW-MW-15010



n = 8

Slope = -3.235 units per year.

Mann-Kendall statistic = -11
critical = -20

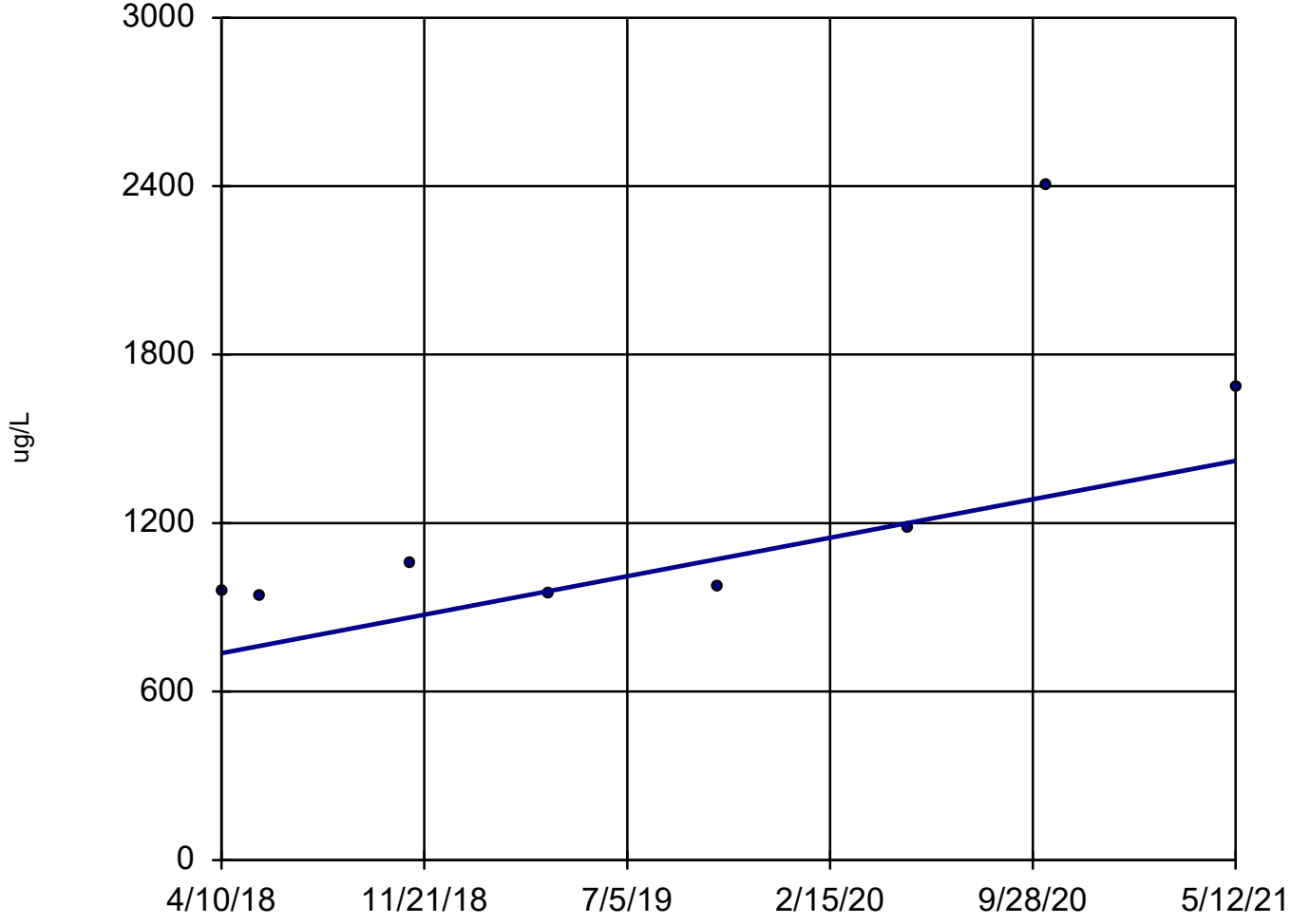
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 7/2/2021 3:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2_backup

Barium, Total

JCW-MW-15007



n = 8

Slope = 221.7 units per year.

Mann-Kendall statistic = 18
critical = 20

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

Sen's Slope Estimator Analysis Run 7/2/2021 3:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2_backup

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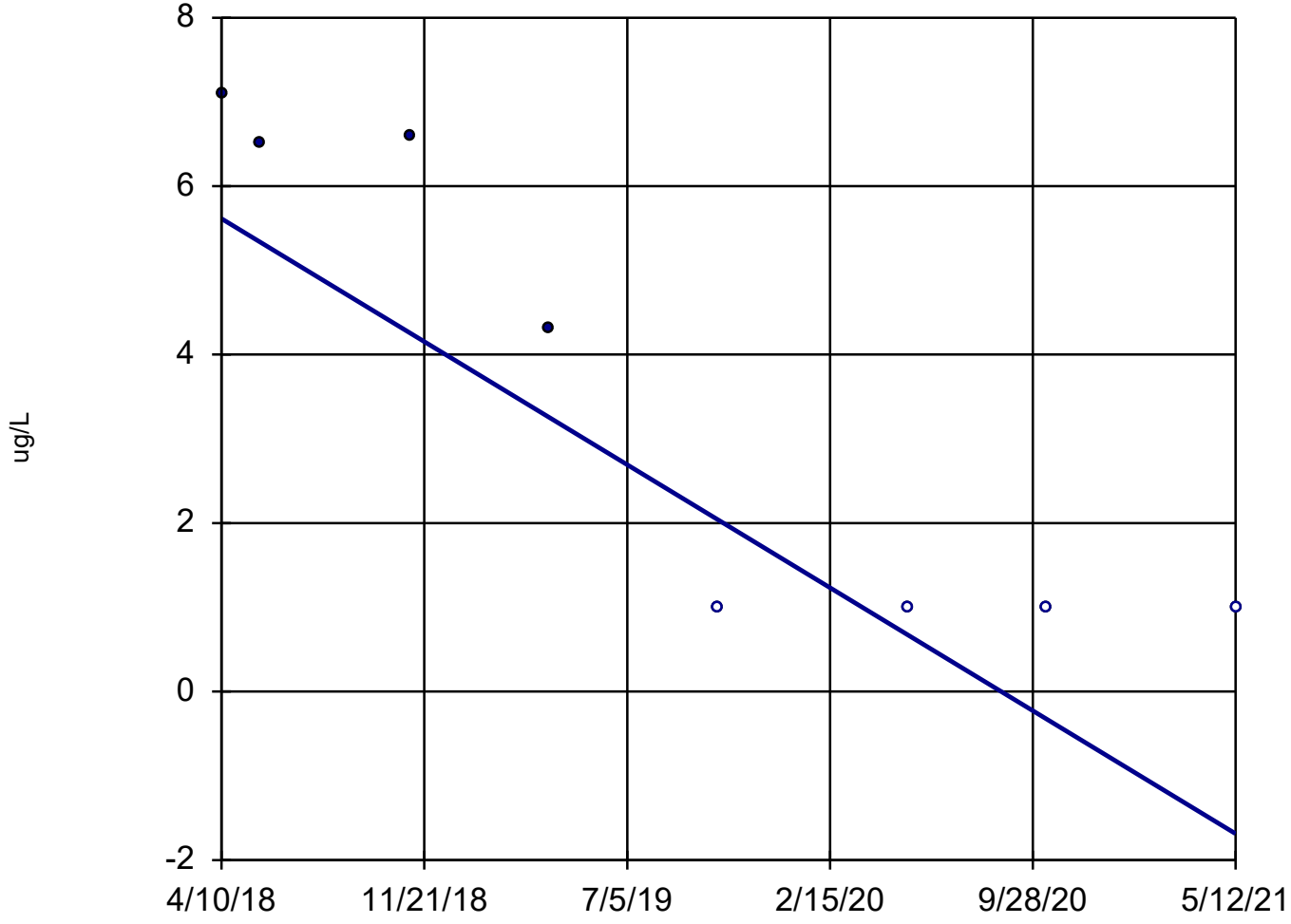
Hollow symbols indicate censored values.

Beryllium, Total

JCW-MW-15009



n = 8

Slope = -2.362 units per year.

Mann-Kendall statistic = -20
critical = -20

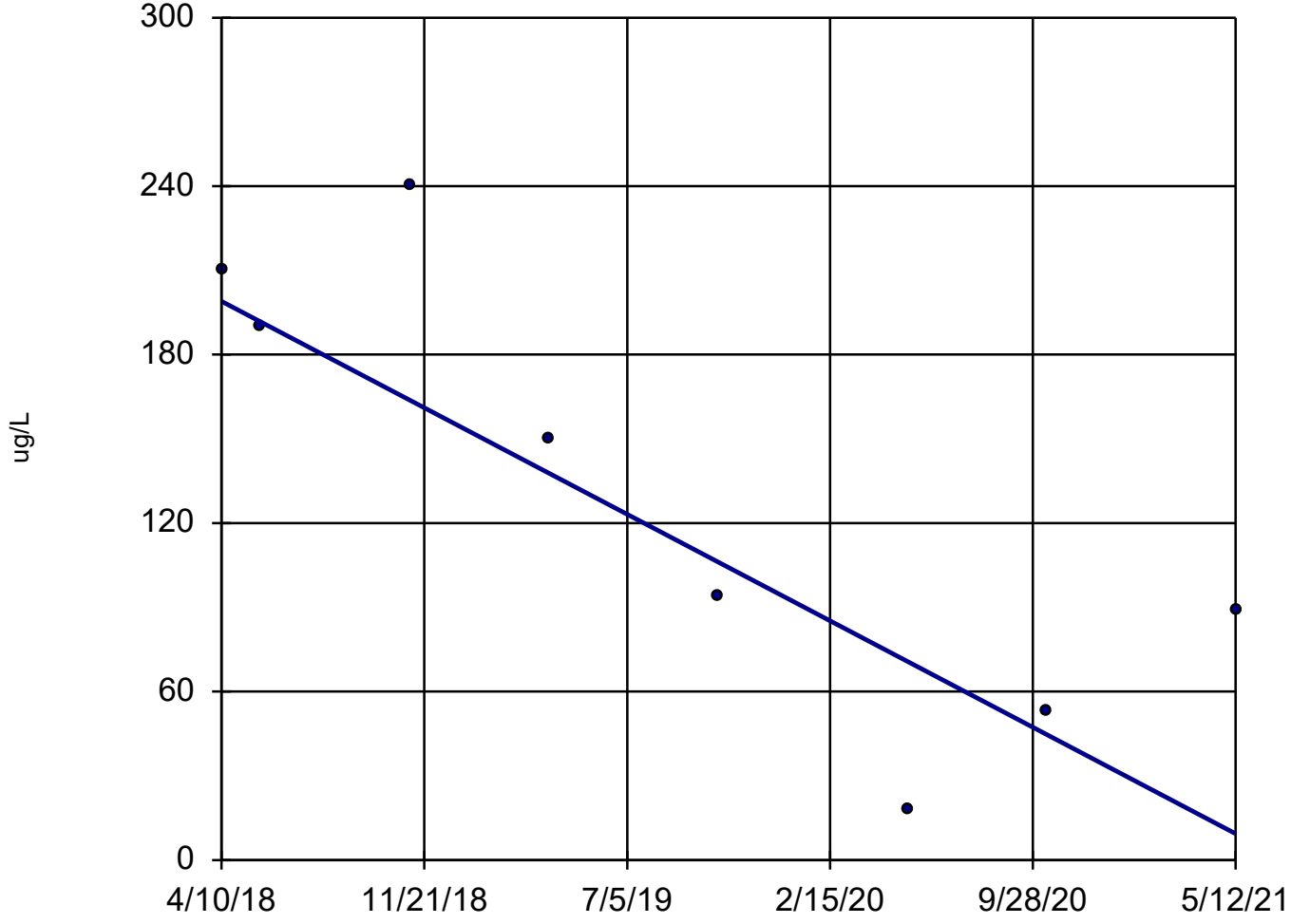
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 7/2/2021 3:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2_backup

Lithium, Total

JCW-MW-15009



n = 8

Slope = -61.33 units per year.

Mann-Kendall statistic = -18
critical = -20

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

Sen's Slope Estimator Analysis Run 7/2/2021 3:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2_backup

Summary Report

Constituent: Arsenic, Total Analysis Run 6/18/2021 9:40 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

For observations made between 4/10/2018 and 5/12/2021, a summary of the selected data set:

Observations = 32
ND/Trace = 10
Wells = 4
Minimum Value = 1
Maximum Value = 61
Mean Value = 10.72
Median Value = 4
Standard Deviation = 14.61
Coefficient of Variation = 1.362
Skewness = 1.929

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-15007	8	0	9.8	61	30.43	28.3	16.77	0.551	0.6374
JCW-MW-15009	8	5	1	5	1.625	1	1.383	0.8513	2.147
JCW-MW-15010	8	0	4	16	9.55	10.45	4.47	0.468	-0.07738
JCW-MW-15028	8	5	1	3	1.288	1	0.6958	0.5404	2.22

Summary Report

Constituent: Barium, Total Analysis Run 6/18/2021 9:40 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

For observations made between 4/10/2018 and 5/12/2021, a summary of the selected data set:

Observations = 32
ND/Trace = 0
Wells = 4
Minimum Value = 12.3
Maximum Value = 2400
Mean Value = 431.8
Median Value = 185
Standard Deviation = 557.8
Coefficient of Variation = 1.292
Skewness = 1.898

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-15007	8	0	941	2400	1267	1015	520.4	0.4107	1.508
JCW-MW-15009	8	0	12.3	66	31.69	18.9	22.65	0.7148	0.5568
JCW-MW-15010	8	0	114	400	187	164	93.97	0.5025	1.601
JCW-MW-15028	8	0	148	342	241.3	240	84.6	0.3507	0.02388

Summary Report

Constituent: Beryllium, Total Analysis Run 6/18/2021 9:40 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

For observations made between 4/10/2018 and 5/12/2021, a summary of the selected data set:

Observations = 32
ND/Trace = 28
Wells = 4
Minimum Value = 1
Maximum Value = 7.1
Mean Value = 1.641
Median Value = 1
Standard Deviation = 1.765
Coefficient of Variation = 1.076
Skewness = 2.449

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-15007	8	8	1	1	1	1	0	0	NaN
JCW-MW-15009	8	4	1	7.1	3.563	2.65	2.858	0.8023	0.2011
JCW-MW-15010	8	8	1	1	1	1	0	0	NaN
JCW-MW-15028	8	8	1	1	1	1	0	0	NaN

Summary Report

Constituent: Lithium, Total Analysis Run 6/18/2021 9:40 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

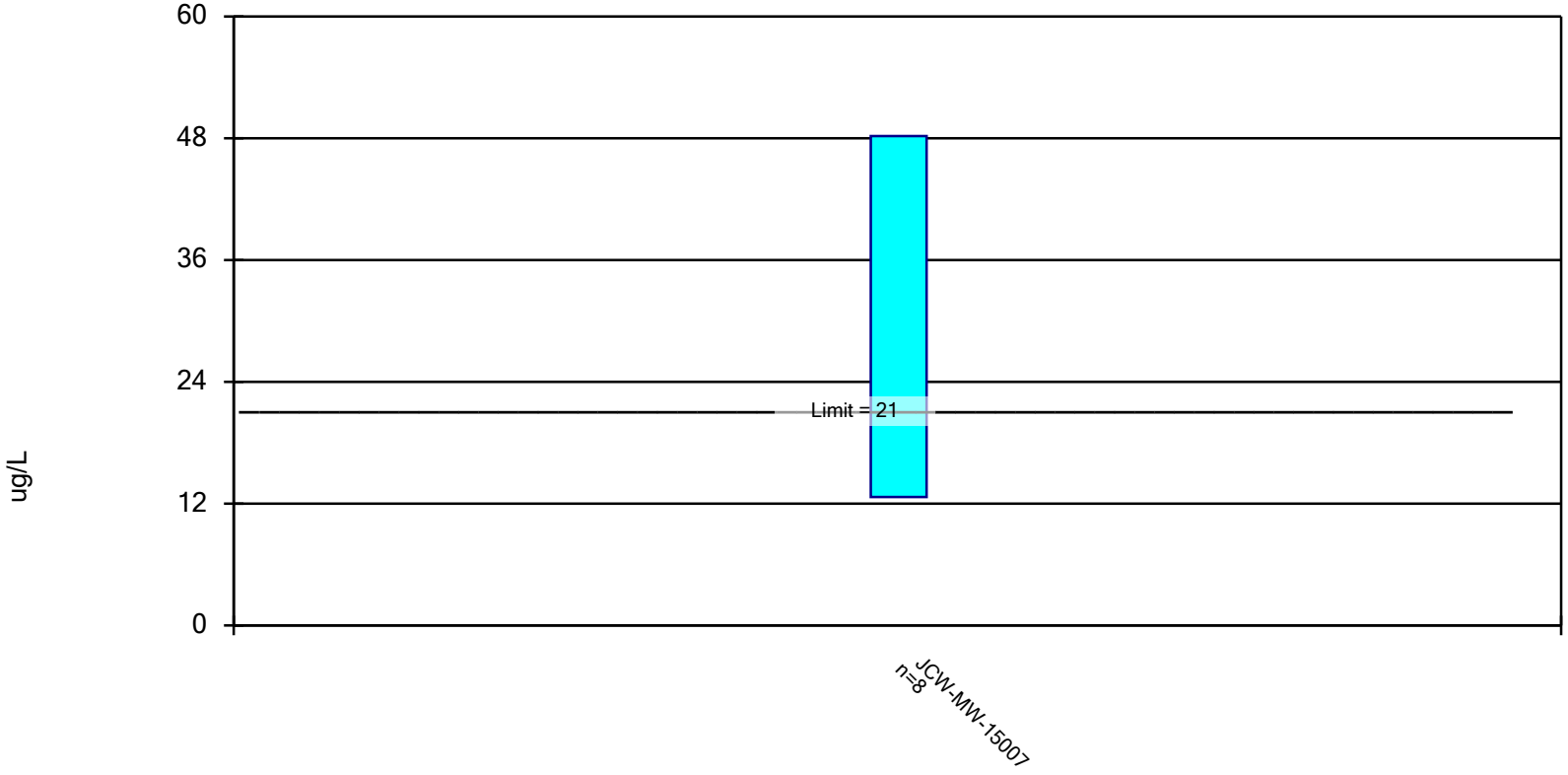
For observations made between 4/10/2018 and 5/12/2021, a summary of the selected data set:

Observations = 32
ND/Trace = 0
Wells = 4
Minimum Value = 18
Maximum Value = 240
Mean Value = 86.66
Median Value = 72.5
Standard Deviation = 48.41
Coefficient of Variation = 0.5586
Skewness = 1.768

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-15007	8	0	67	103	82.38	83.5	12.88	0.1564	0.2274
JCW-MW-15009	8	0	18	240	130.5	122	79.24	0.6072	0.00738
JCW-MW-15010	8	0	70	116	82.25	75	16.25	0.1976	1.257
JCW-MW-15028	8	0	48	60	51.5	51	4.036	0.07836	1.143

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, Total Analysis Run 6/18/2021 9:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2_backup

Confidence Interval

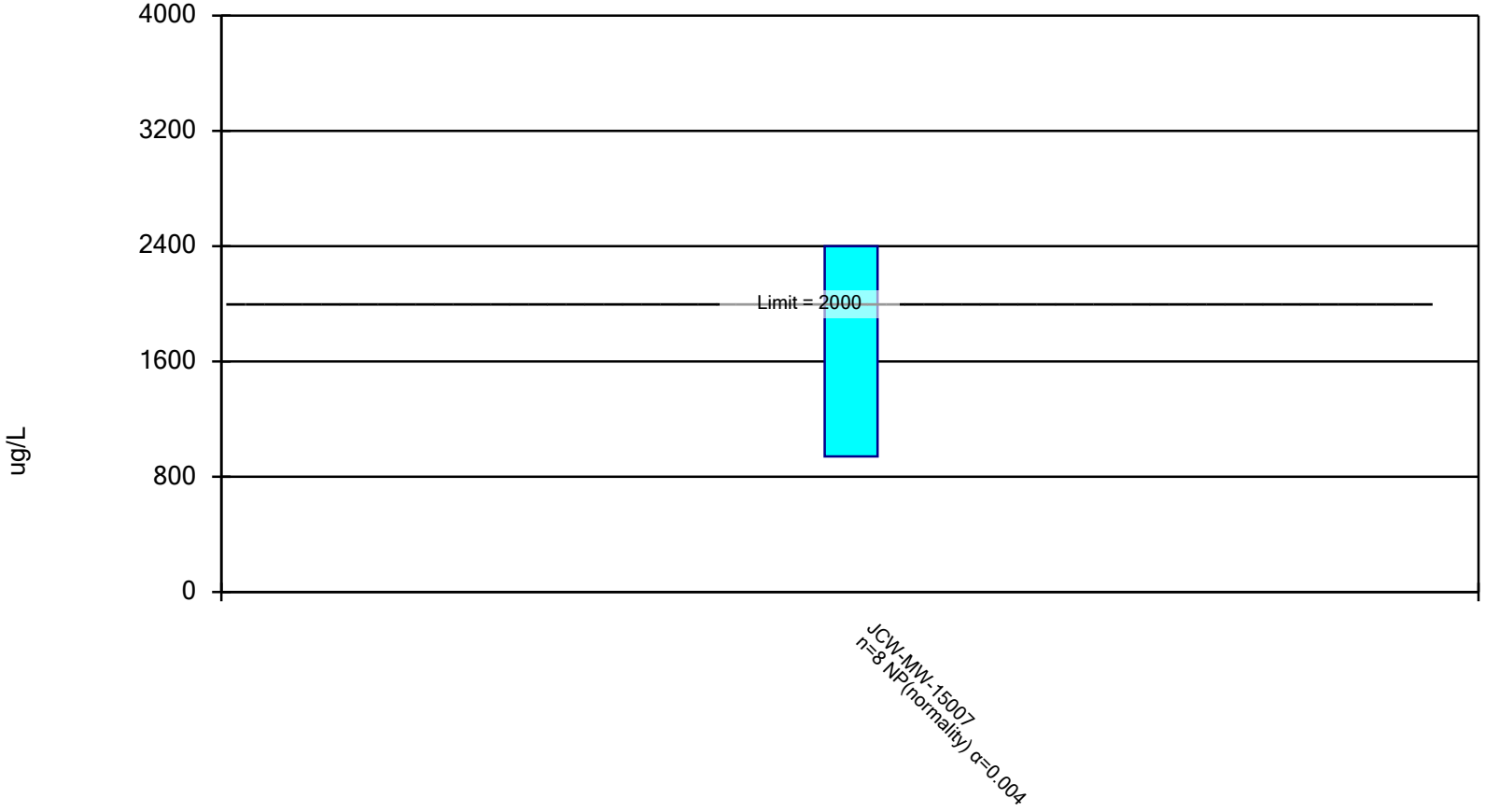
Constituent: Arsenic, Total (ug/L) Analysis Run 6/18/2021 9:45 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2_backup

	JCW-MW-15007
4/10/2018	16.7
5/23/2018	25.6
11/7/2018	46.3
4/9/2019	9.8
10/15/2019	34
5/14/2020	19
10/13/2020	61
5/12/2021	31
Mean	30.43
Std. Dev.	16.77
Upper Lim.	48.2
Lower Lim.	12.65

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Barium, Total Analysis Run 6/18/2021 9:45 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2_backup

Confidence Interval

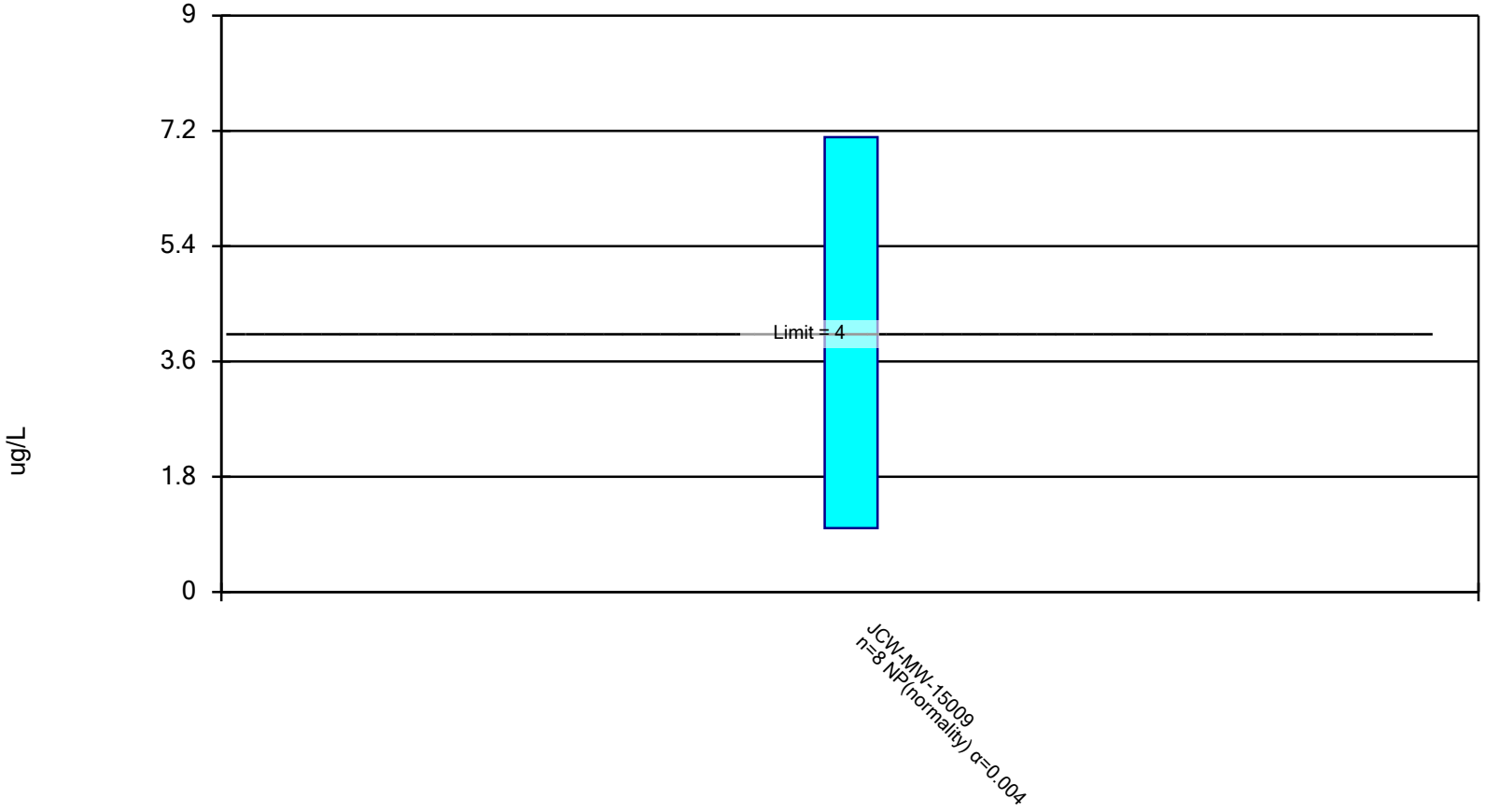
Constituent: Barium, Total (ug/L) Analysis Run 6/18/2021 9:45 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2_backup

	JCW-MW-15007
4/10/2018	957
5/23/2018	941
11/7/2018	1060
4/9/2019	950
10/15/2019	970
5/14/2020	1180
10/13/2020	2400
5/12/2021	1680
Mean	1267
Std. Dev.	520.4
Upper Lim.	2400
Lower Lim.	941

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Beryllium, Total Analysis Run 6/18/2021 9:45 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2_backup

Confidence Interval

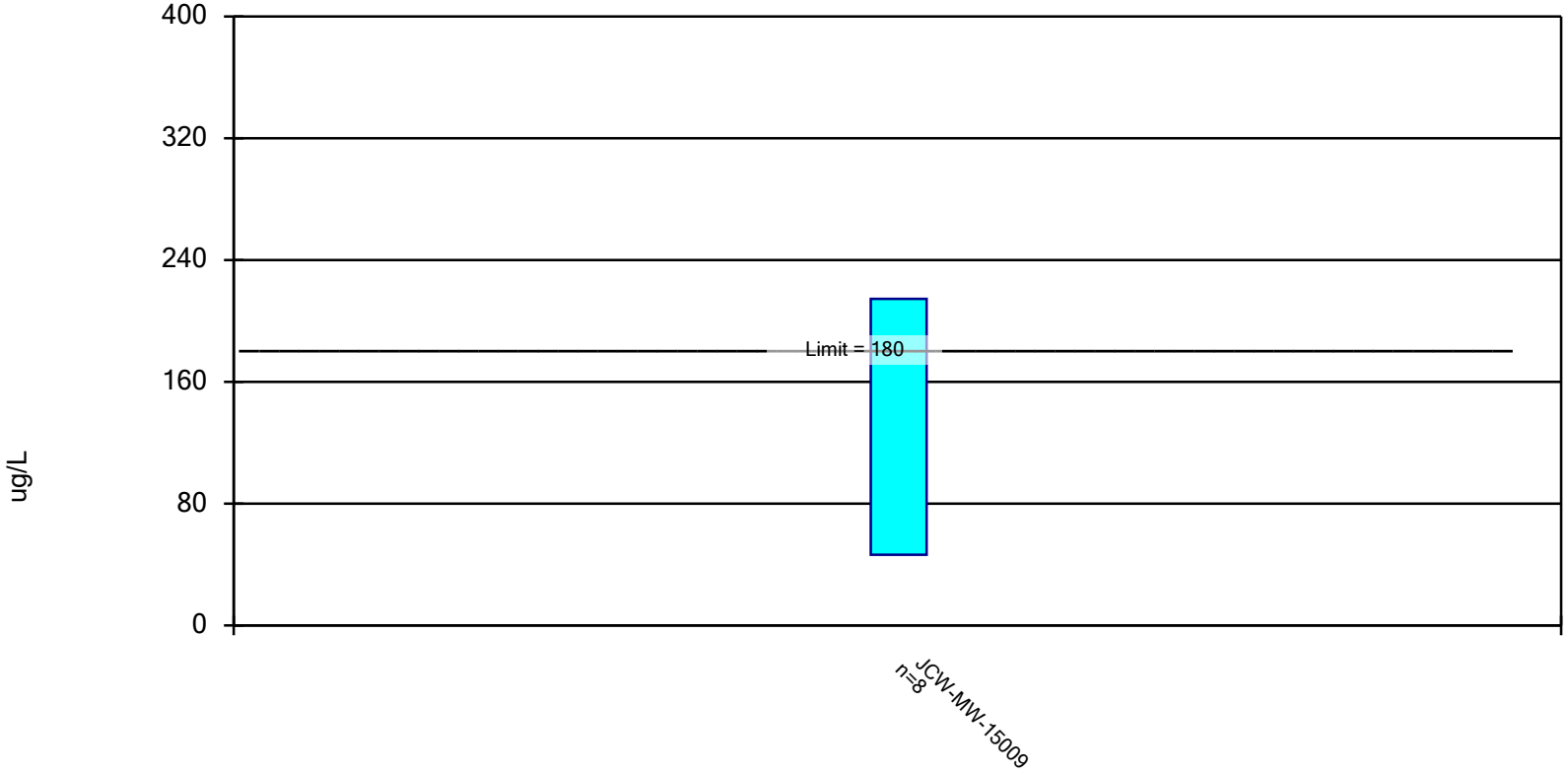
Constituent: Beryllium, Total (ug/L) Analysis Run 6/18/2021 9:45 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2_backup

	JCW-MW-15009
4/10/2018	7.1
5/23/2018	6.5
11/7/2018	6.6
4/9/2019	4.3
10/15/2019	<1
5/14/2020	<1
10/13/2020	<1
5/12/2021	<1
Mean	3.563
Std. Dev.	2.858
Upper Lim.	7.1
Lower Lim.	1

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, Total Analysis Run 6/18/2021 9:45 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2_backup

Confidence Interval

Constituent: Lithium, Total (ug/L) Analysis Run 6/18/2021 9:45 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2_backup

	JCW-MW-15009
4/10/2018	210
5/23/2018	190
11/7/2018	240
4/9/2019	150
10/15/2019	94
5/14/2020	18
10/13/2020	53
5/12/2021	89
Mean	130.5
Std. Dev.	79.24
Upper Lim.	214.5
Lower Lim.	46.52

Appendix C
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: May 23, 2021

Subject: RCRA GROUNDWATER MONITORING – DEK-JCW BACKGROUND 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: 21-0525

TRC Environmental, Inc. conducted groundwater monitoring at the Karn/Weadock Background 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 2009 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

Testing performed in accordance with the A2LA scope of accredidation specified in the listed certificate.
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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_2020 DEK & JCW RCRA Background Wells
Date Received: 5/5/2021
Chemistry Project: 21-0525

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-0525-01	MW-15002	Groundwater	05/03/2021 02:00 PM	DEK JCW Background
21-0525-02	MW-15008	Groundwater	05/03/2021 03:56 PM	DEK JCW Background
21-0525-03	MW-15016	Groundwater	05/03/2021 03:09 PM	DEK JCW Background
21-0525-04	MW-15019	Groundwater	05/03/2021 04:03 PM	DEK JCW Background
21-0525-05	DUP-04	Groundwater	05/03/2021 12:00 AM	DEK JCW Background
21-0525-06	FB-04	Water	05/03/2021 04:03 PM	DEK JCW Background

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Analytical Report

Report Date: 05/23/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15002**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-01	Collect Time:	02:00 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0525-01-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: 21-0525-01-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	1		ug/L	1	05/13/2021	AB21-0514-08
Barium	1040		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	102		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	364000		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	1		ug/L	1	05/13/2021	AB21-0514-08
Iron	14600		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	19		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	53200		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	ND		ug/L	5	05/13/2021	AB21-0514-08
Nickel	7		ug/L	2	05/13/2021	AB21-0514-08
Potassium	6120		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	1490000		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	12		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: 21-0525-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	2630000		ug/L	1000	05/17/2021	AB21-0506-07
Fluoride	ND		ug/L	1000	05/06/2021	AB21-0506-07
Sulfate	31300		ug/L	1000	05/06/2021	AB21-0506-07

Total Dissolved Solids by SM 2540C

Aliquot: 21-0525-01-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	5390		mg/L	10	05/07/2021	AB21-0507-02

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Analytical Report

Report Date: 05/23/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15002**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-01	Collect Time:	02:00 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0525-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	471000		ug/L	10000	05/11/2021	AB21-0511-11
Alkalinity Bicarbonate	471000		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 JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15008**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-02	Collect Time:	03:56 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0525-02-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: 21-0525-02-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	ND		ug/L	1	05/13/2021	AB21-0514-08
Barium	62		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	121		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	105000		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	1		ug/L	1	05/13/2021	AB21-0514-08
Iron	11300		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	15		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	15500		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	2450		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	167000		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	8		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: 21-0525-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	225000		ug/L	1000	05/17/2021	AB21-0506-07
Fluoride	ND		ug/L	1000	05/06/2021	AB21-0506-07
Sulfate	ND		ug/L	1000	05/06/2021	AB21-0506-07

Total Dissolved Solids by SM 2540C

Aliquot: 21-0525-02-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	822		mg/L	10	05/07/2021	AB21-0507-02

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Analytical Report

Report Date: 05/23/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15008**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-02	Collect Time:	03:56 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0525-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	360000		ug/L	10000	05/11/2021	AB21-0511-11
Alkalinity Bicarbonate	360000		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 JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15016**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-03	Collect Time:	03:09 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0525-03-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: 21-0525-03-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	53		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	349		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	219000		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	1		ug/L	1	05/13/2021	AB21-0514-08
Iron	1170		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	79		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	26500		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	ND		ug/L	5	05/13/2021	AB21-0514-08
Nickel	6		ug/L	2	05/13/2021	AB21-0514-08
Potassium	14600		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	58200		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	2		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: 21-0525-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	108000		ug/L	1000	05/17/2021	AB21-0506-07
Fluoride	ND		ug/L	1000	05/06/2021	AB21-0506-07
Sulfate	255000		ug/L	1000	05/17/2021	AB21-0506-07

Total Dissolved Solids by SM 2540C

Aliquot: 21-0525-03-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	979		mg/L	10	05/07/2021	AB21-0507-02

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Analytical Report

Report Date: 05/23/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15016**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-03	Collect Time:	03:09 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0525-03-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	372000		ug/L	10000	05/11/2021	AB21-0511-11
Alkalinity Bicarbonate	372000		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 JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15019**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-04	Collect Time:	04:03 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0525-04-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: 21-0525-04-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	1		ug/L	1	05/13/2021	AB21-0514-08
Barium	335		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	239		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	155000		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	14300		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	33400		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	ND		ug/L	5	05/13/2021	AB21-0514-08
Nickel	28		ug/L	2	05/13/2021	AB21-0514-08
Potassium	2350		ug/L	100	05/14/2021	AB21-0514-08
Selenium	4		ug/L	1	05/13/2021	AB21-0514-08
Silver	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Sodium	224000		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: 21-0525-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	344000		ug/L	1000	05/17/2021	AB21-0506-07
Fluoride	ND		ug/L	1000	05/06/2021	AB21-0506-07
Sulfate	52400		ug/L	1000	05/06/2021	AB21-0506-07

Total Dissolved Solids by SM 2540C

Aliquot: 21-0525-04-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1160		mg/L	10	05/07/2021	AB21-0507-02

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Analytical Report

Report Date: 05/23/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15019**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-04	Collect Time:	04:03 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0525-04-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	440000		ug/L	10000	05/11/2021	AB21-0511-11
Alkalinity Bicarbonate	440000		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 JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**DUP-04**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-05	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0525-05-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: 21-0525-05-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	ND		ug/L	1	05/13/2021	AB21-0514-08
Barium	1090		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	102		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	379000		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	1		ug/L	1	05/13/2021	AB21-0514-08
Iron	14600		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	19		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	53700		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	ND		ug/L	5	05/13/2021	AB21-0514-08
Nickel	7		ug/L	2	05/13/2021	AB21-0514-08
Potassium	6220		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	1510000		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	13		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: 21-0525-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	2640000		ug/L	1000	05/18/2021	AB21-0506-07
Fluoride	ND		ug/L	1000	05/06/2021	AB21-0506-07
Sulfate	32000		ug/L	1000	05/06/2021	AB21-0506-07

Total Dissolved Solids by SM 2540C

Aliquot: 21-0525-05-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	5330		mg/L	10	05/07/2021	AB21-0507-02

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Analytical Report

Report Date: 05/23/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**DUP-04**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-05	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0525-05-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	475000		ug/L	10000	05/11/2021	AB21-0511-11
Alkalinity Bicarbonate	475000		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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Report Date: 05/23/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**FB-04**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-06	Collect Time:	04:03 PM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0525-06-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: 21-0525-06-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	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

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

Aliquot: 21-0525-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	05/06/2021	AB21-0506-07
Fluoride	ND		ug/L	1000	05/06/2021	AB21-0506-07
Sulfate	ND		ug/L	1000	05/06/2021	AB21-0506-07

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Analytical Report

Report Date: 05/23/21

Data Qualifiers	Exception Summary
	No exceptions occured.

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-0525

Inspection Date: 05/05/21 **Inspection By:** CUH

Sample Origin/Project Name: KIW Background

Shipment Delivered By: Enter the type of shipment carrier.

Pony ____ FedEx ✓ UPS ____ USPS ____ Airborne ____

Other/Hand Carry (whom) ____

Tracking Number: 786769796241 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
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)	10				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	12				
24 mL vial (glass)					
250 ~~500~~ mL (plastic)	5				
Other					

PG. 2 of 2 not needed

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

SAMPLING SITE: DEK & JCW Background- 2021 Q2 RCRA

PROJECT NUMBER: 21-0525

SAMPLING TEAM: TRC

DATE SHIPPED: 5-4-21

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
21-0525-01	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)
[signature]	5-4-21 1630	Fedex
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
Fed Ex	5.5.21 1100	[signature] Hansen

COMMENTS: 0.3-1.6°C 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: May 26, 2021

Subject: RCRA GROUNDWATER MONITORING – JCW BOTTOM ASH POND 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: 21-0527

TRC Environmental, Inc. conducted groundwater monitoring at the JCWeadock Bottom Ash Pond Wells area on 05/11/2021 and 05/12/2021, 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 05/12/2021.

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

Testing performed in accordance with the A2LA scope of accredidation specified in the listed certificate.
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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 JCW RCRA Bottom Ash Pond Wells
Date Received: 5/12/2021
Chemistry Project: 21-0527

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-0527-01	JCW-MW-15007	Groundwater	05/12/2021 06:25 AM	JCW Bottom Ash Pond
21-0527-02	JCW-MW-15009	Groundwater	05/12/2021 06:37 AM	JCW Bottom Ash Pond
21-0527-03	JCW-MW-15010	Groundwater	05/11/2021 03:33 PM	JCW Bottom Ash Pond
21-0527-04	JCW-MW-15028	Groundwater	05/12/2021 07:31 AM	JCW Bottom Ash Pond
21-0527-05	DUP-JCW-BAP	Groundwater	05/12/2021 12:00 AM	JCW Bottom Ash Pond
21-0527-06	JCW-MW-15009 Field MS	Groundwater	05/12/2021 08:37 AM	JCW Bottom Ash Pond
21-0527-07	JCW-MW-15009 Field MSD	Groundwater	05/12/2021 08:37 AM	JCW Bottom Ash Pond
21-0527-08	EB-JCW-BAP	Water	05/12/2021 08:55 AM	JCW Bottom Ash Pond
21-0527-09	FB-JCW-BAP	Water	05/12/2021 09:00 AM	JCW Bottom Ash Pond

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-0527**
Field Sample ID:	**JCW-MW-15007**	Collect Date:	05/12/2021
Lab Sample ID:	21-0527-01	Collect Time:	06:25 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0527-01-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0527-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	31		ug/L	1	05/19/2021	AB21-0519-21
Barium	1680		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	233		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	280000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	1		ug/L	1	05/19/2021	AB21-0519-21
Iron	3230		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	70		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	27800		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	8		ug/L	5	05/19/2021	AB21-0519-21
Nickel	7		ug/L	2	05/19/2021	AB21-0519-21
Potassium	11900		ug/L	100	05/20/2021	AB21-0519-21
Selenium	4		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	2400000		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	16		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0527-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	3780000		ug/L	1000	05/14/2021	AB21-0514-03
Fluoride	ND		ug/L	1000	05/13/2021	AB21-0514-03
Sulfate	29000		ug/L	1000	05/13/2021	AB21-0514-03

Total Dissolved Solids by SM 2540C

Aliquot: 21-0527-01-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	7200		mg/L	10	05/13/2021	AB21-0514-01

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-0527**
Field Sample ID:	**JCW-MW-15007**	Collect Date:	05/12/2021
Lab Sample ID:	21-0527-01	Collect Time:	06:25 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0527-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	405000		ug/L	10000	05/20/2021	AB21-0520-06
Alkalinity Bicarbonate	405000		ug/L	10000	05/20/2021	AB21-0520-06
Alkalinity Carbonate	ND		ug/L	10000	05/20/2021	AB21-0520-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-0527**
Field Sample ID:	**JCW-MW-15009**	Collect Date:	05/12/2021
Lab Sample ID:	21-0527-02	Collect Time:	06:37 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0527-02-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0527-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	ND		ug/L	1	05/19/2021	AB21-0519-21
Barium	23		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	255		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	574000		ug/L	1000	05/24/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	3		ug/L	1	05/19/2021	AB21-0519-21
Iron	28300		ug/L	20	05/24/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	89		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	35900		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	9		ug/L	2	05/19/2021	AB21-0519-21
Potassium	10500		ug/L	100	05/20/2021	AB21-0519-21
Selenium	ND		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	15000		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	3		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0527-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	14800		ug/L	1000	05/13/2021	AB21-0514-03
Fluoride	ND		ug/L	1000	05/13/2021	AB21-0514-03
Sulfate	1450000		ug/L	1000	05/14/2021	AB21-0514-03

Total Dissolved Solids by SM 2540C

Aliquot: 21-0527-02-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	2230		mg/L	10	05/13/2021	AB21-0514-01

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-0527**
Field Sample ID:	**JCW-MW-15009**	Collect Date:	05/12/2021
Lab Sample ID:	21-0527-02	Collect Time:	06:37 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0527-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	76200		ug/L	10000	05/20/2021	AB21-0520-06
Alkalinity Bicarbonate	76200		ug/L	10000	05/20/2021	AB21-0520-06
Alkalinity Carbonate	ND		ug/L	10000	05/20/2021	AB21-0520-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-0527**
Field Sample ID:	**JCW-MW-15010**	Collect Date:	05/11/2021
Lab Sample ID:	21-0527-03	Collect Time:	03:33 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0527-03-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0527-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	6		ug/L	1	05/19/2021	AB21-0519-21
Barium	148		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	1080		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	128000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	ND		ug/L	1	05/19/2021	AB21-0519-21
Iron	30		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	70		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	17200		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	2		ug/L	2	05/19/2021	AB21-0519-21
Potassium	9360		ug/L	100	05/20/2021	AB21-0519-21
Selenium	ND		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	54400		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0527-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	67800		ug/L	1000	05/13/2021	AB21-0514-03
Fluoride	ND		ug/L	1000	05/13/2021	AB21-0514-03
Sulfate	74700		ug/L	1000	05/13/2021	AB21-0514-03

Total Dissolved Solids by SM 2540C

Aliquot: 21-0527-03-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	607		mg/L	10	05/13/2021	AB21-0514-01

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-0527**
Field Sample ID:	**JCW-MW-15010**	Collect Date:	05/11/2021
Lab Sample ID:	21-0527-03	Collect Time:	03:33 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0527-03-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	363000		ug/L	10000	05/20/2021	AB21-0520-06
Alkalinity Bicarbonate	363000		ug/L	10000	05/20/2021	AB21-0520-06
Alkalinity Carbonate	ND		ug/L	10000	05/20/2021	AB21-0520-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-0527**
Field Sample ID:	**JCW-MW-15028**	Collect Date:	05/12/2021
Lab Sample ID:	21-0527-04	Collect Time:	07:31 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0527-04-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0527-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	3		ug/L	1	05/19/2021	AB21-0519-21
Barium	342		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	563		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	235000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	ND		ug/L	1	05/19/2021	AB21-0519-21
Iron	294		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	51		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	35500		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	4		ug/L	2	05/19/2021	AB21-0519-21
Potassium	10100		ug/L	100	05/20/2021	AB21-0519-21
Selenium	ND		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	465000		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	5		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0527-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	921000		ug/L	1000	05/14/2021	AB21-0514-03
Fluoride	ND		ug/L	1000	05/14/2021	AB21-0514-03
Sulfate	102000		ug/L	1000	05/14/2021	AB21-0514-03

Total Dissolved Solids by SM 2540C

Aliquot: 21-0527-04-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	2130		mg/L	10	05/13/2021	AB21-0514-01

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-0527**
Field Sample ID:	**JCW-MW-15028**	Collect Date:	05/12/2021
Lab Sample ID:	21-0527-04	Collect Time:	07:31 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0527-04-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	302000		ug/L	10000	05/20/2021	AB21-0520-06
Alkalinity Bicarbonate	302000		ug/L	10000	05/20/2021	AB21-0520-06
Alkalinity Carbonate	ND		ug/L	10000	05/20/2021	AB21-0520-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-0527**
Field Sample ID:	**DUP-JCW-BAP**	Collect Date:	05/12/2021
Lab Sample ID:	21-0527-05	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0527-05-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0527-05-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	31		ug/L	1	05/19/2021	AB21-0519-21
Barium	1670		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	240		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	294000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	2		ug/L	1	05/19/2021	AB21-0519-21
Iron	3130		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	69		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	27600		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	8		ug/L	5	05/19/2021	AB21-0519-21
Nickel	8		ug/L	2	05/19/2021	AB21-0519-21
Potassium	12300		ug/L	100	05/20/2021	AB21-0519-21
Selenium	3		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	2330000		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	17		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0527-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	3830000		ug/L	1000	05/15/2021	AB21-0514-03
Fluoride	ND		ug/L	1000	05/14/2021	AB21-0514-03
Sulfate	29800		ug/L	1000	05/14/2021	AB21-0514-03

Total Dissolved Solids by SM 2540C

Aliquot: 21-0527-05-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	7280		mg/L	10	05/13/2021	AB21-0514-01

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-0527**
Field Sample ID:	**DUP-JCW-BAP**	Collect Date:	05/12/2021
Lab Sample ID:	21-0527-05	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0527-05-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	390000		ug/L	10000	05/20/2021	AB21-0520-06
Alkalinity Bicarbonate	390000		ug/L	10000	05/20/2021	AB21-0520-06
Alkalinity Carbonate	ND		ug/L	10000	05/20/2021	AB21-0520-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-0527**
Field Sample ID:	**JCW-MW-15009 Field MS**	Collect Date:	05/12/2021
Lab Sample ID:	21-0527-06	Collect Time:	08:37 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0527-06-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	97.4		%	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0527-06-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	106		%	1	05/19/2021	AB21-0519-21
Arsenic	106		%	1	05/19/2021	AB21-0519-21
Barium	106		%	5	05/19/2021	AB21-0519-21
Beryllium	91		%	1	05/19/2021	AB21-0519-21
Boron	87		%	20	05/19/2021	AB21-0519-21
Cadmium	103		%	0.2	05/19/2021	AB21-0519-21
Calcium	102		%	1000	05/24/2021	AB21-0519-21
Chromium	96		%	1	05/19/2021	AB21-0519-21
Cobalt	97		%	6	05/19/2021	AB21-0519-21
Copper	92		%	1	05/19/2021	AB21-0519-21
Iron	113		%	20	05/24/2021	AB21-0519-21
Lead	98		%	1	05/19/2021	AB21-0519-21
Lithium	92		%	10	05/19/2021	AB21-0519-21
Magnesium	113		%	1000	05/20/2021	AB21-0519-21
Molybdenum	106		%	5	05/19/2021	AB21-0519-21
Nickel	94		%	2	05/19/2021	AB21-0519-21
Potassium	111		%	100	05/20/2021	AB21-0519-21
Selenium	100		%	1	05/19/2021	AB21-0519-21
Silver	99.7		%	0.2	05/19/2021	AB21-0519-21
Sodium	112		%	1000	05/20/2021	AB21-0519-21
Thallium	98		%	2	05/19/2021	AB21-0519-21
Vanadium	101		%	2	05/19/2021	AB21-0519-21
Zinc	94		%	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0527-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	96		%	1000	05/14/2021	AB21-0514-03
Fluoride	84		%	1000	05/14/2021	AB21-0514-03
Sulfate	101		%	1000	05/15/2021	AB21-0514-03

Alkalinity by SM 2320B

Aliquot: 21-0527-06-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	95		%	10000	05/20/2021	AB21-0520-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-0527**
Field Sample ID:	**JCW-MW-15009 Field MSD**	Collect Date:	05/12/2021
Lab Sample ID:	21-0527-07	Collect Time:	08:37 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0527-07-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	99.9		%	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0527-07-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	106		%	1	05/19/2021	AB21-0519-21
Arsenic	105		%	1	05/19/2021	AB21-0519-21
Barium	105		%	5	05/19/2021	AB21-0519-21
Beryllium	91		%	1	05/19/2021	AB21-0519-21
Boron	84		%	20	05/19/2021	AB21-0519-21
Cadmium	103		%	0.2	05/19/2021	AB21-0519-21
Calcium	103		%	1000	05/24/2021	AB21-0519-21
Chromium	96		%	1	05/19/2021	AB21-0519-21
Cobalt	100		%	6	05/19/2021	AB21-0519-21
Copper	93		%	1	05/19/2021	AB21-0519-21
Iron	108		%	20	05/24/2021	AB21-0519-21
Lead	96		%	1	05/19/2021	AB21-0519-21
Lithium	91		%	10	05/19/2021	AB21-0519-21
Magnesium	109		%	1000	05/20/2021	AB21-0519-21
Molybdenum	108		%	5	05/19/2021	AB21-0519-21
Nickel	95		%	2	05/19/2021	AB21-0519-21
Potassium	108		%	100	05/20/2021	AB21-0519-21
Selenium	107		%	1	05/19/2021	AB21-0519-21
Silver	99.7		%	0.2	05/19/2021	AB21-0519-21
Sodium	109		%	1000	05/20/2021	AB21-0519-21
Thallium	96		%	2	05/19/2021	AB21-0519-21
Vanadium	102		%	2	05/19/2021	AB21-0519-21
Zinc	95		%	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0527-07-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	97		%	1000	05/14/2021	AB21-0514-03
Fluoride	85		%	1000	05/14/2021	AB21-0514-03
Sulfate	98		%	1000	05/15/2021	AB21-0514-03

Alkalinity by SM 2320B

Aliquot: 21-0527-07-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	95		%	10000	05/20/2021	AB21-0520-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-0527**
Field Sample ID:	**EB-JCW-BAP**	Collect Date:	05/12/2021
Lab Sample ID:	21-0527-08	Collect Time:	08:55 AM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0527-08-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0527-08-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	ND		ug/L	1	05/19/2021	AB21-0519-21
Barium	ND		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	ND		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	ND		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	ND		ug/L	1	05/19/2021	AB21-0519-21
Iron	ND		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	ND		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	ND		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	ND		ug/L	2	05/19/2021	AB21-0519-21
Potassium	ND		ug/L	100	05/20/2021	AB21-0519-21
Selenium	ND		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	ND		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-0527**
Field Sample ID:	**FB-JCW-BAP**	Collect Date:	05/12/2021
Lab Sample ID:	21-0527-09	Collect Time:	09:00 AM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0527-09-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0527-09-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	ND		ug/L	1	05/19/2021	AB21-0519-21
Barium	ND		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	ND		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	ND		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	ND		ug/L	1	05/19/2021	AB21-0519-21
Iron	ND		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	ND		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	ND		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	ND		ug/L	2	05/19/2021	AB21-0519-21
Potassium	ND		ug/L	100	05/20/2021	AB21-0519-21
Selenium	ND		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	ND		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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Analytical Report

Report Date: 05/26/21

Data Qualifiers	Exception Summary
	No exceptions occured.

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-0527

Inspection Date: 5/13/21 **Inspection By:** CLH

Sample Origin/Project Name: JCP BAP

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx _____ UPS _____ USPS _____ Airborne _____

Other/Hand Carry (whom) EB-Consumers

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 5.1°C Samples Received on Ice: Yes ✓ No _____

M&TE # and Expiration 015407 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 mL (plastic)	5				
Other					

Fig. 2 & 2 not needed

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SAMPLING SITE: JCW Bottom Ash Pond – 2021 Q2

PROJECT NUMBER: 21-0527

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
21-0527-01	5/12/21	0625	GW	JCW-MW-15007		5	X	X	X	X					
-02	5/12/21	0637	GW	JCW-MW-15009		5	X	X	X	X					
-03	5/11/21	1533	GW	JCW-MW-15010		5	X	X	X	X					
-04	5/10/21	0731	GW	JCW-MW-15028		5	X	X	X	X					
-05	5/10/21	—	GW	DUP-JCW-BAP		5	X	X	X	X					
-06	5/10/21	0837	GW	JCW-MW-15009 MS		4	X	X		X					
-07	5/10/21	0837	GW	JCW-MW-15009 MSD		4	X	X		X					
-08	5/10/21	0855	W	EB-JCW-BAP		1	X								
-09	5/10/21	0900	W	FB-JCW-BAP		1	X								

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	COMMENTS
[signature]	5/12/21 1015	[signature]	5.1°C * 015402
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	

ORIGINAL TO LAB COPY TO CUSTOMER

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ANALYTICAL REPORT

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Tel: (330)497-9396

Laboratory Job ID: 240-149188-1
Client Project/Site: Karn/Weadock CCR Background Wells

For:
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

Attn: Darby Litz

Authorized for release by:
6/17/2021 12:48:02 PM

Kris Brooks, Project Manager II
(330)966-9790
Kris.Brooks@Eurofinset.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

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

Job ID: 240-149188-1

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: 240-149188-1

Laboratory: Eurofins TestAmerica, Canton

Narrative

Job Narrative
240-149188-1

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 0.6º 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. MW-15002 (240-149188-1), MW-15008 (240-149188-2), MW-15016 (240-149188-3), MW-15019 (240-149188-4), DUP-BACKGROUND (240-149188-5), FB-BACKGROUND (240-149188-6), (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. MW-15002 (240-149188-1), MW-15008 (240-149188-2), MW-15016 (240-149188-3), MW-15019 (240-149188-4), DUP-BACKGROUND (240-149188-5), FB-BACKGROUND (240-149188-6), (LCS 160-510305/1-A), (LCSD 160-510305/2-A) and (MB 160-510305/22-A)

Method PrecSep_0:

Method PrecSep_0: Ra-228 Batch 160-510305:

Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: MW-15016 (240-149188-3) and FB-BACKGROUND (240-149188-6). 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: MW-15002 (240-149188-1), MW-15008 (240-149188-2), MW-15019 (240-149188-4) and DUP-BACKGROUND (240-149188-5). 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:

Method PrecSep STD: Ra-226 Batch 160-510304:

Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: MW-15016 (240-149188-3) and FB-BACKGROUND (240-149188-6). 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: MW-15002 (240-149188-1), MW-15008 (240-149188-2), MW-15019 (240-149188-4) and DUP-BACKGROUND (240-149188-5). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead of a sample duplicate (DUP) to demonstrate batch precision.

Job ID: 240-149188-1 (Continued)

Laboratory: Eurofins TestAmerica, Canton (Continued)

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

Method Summary

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

Job ID: 240-149188-1

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.
Project/Site: Karn/Weadock CCR Background Wells

Job ID: 240-149188-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
240-149188-1	MW-15002	Water	05/03/21 14:00	05/12/21 08:00	
240-149188-2	MW-15008	Water	05/03/21 15:56	05/12/21 08:00	
240-149188-3	MW-15016	Water	05/03/21 15:09	05/12/21 08:00	
240-149188-4	MW-15019	Water	05/03/21 16:03	05/12/21 08:00	
240-149188-5	DUP-BACKGROUND	Water	05/03/21 00:00	05/12/21 08:00	
240-149188-6	FB-BACKGROUND	Water	05/03/21 16:03	05/12/21 08:00	

Client Sample Results

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

Job ID: 240-149188-1

Client Sample ID: MW-15002

Date Collected: 05/03/21 14:00
Date Received: 05/12/21 08:00

Lab Sample ID: 240-149188-1

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	1.24		0.315	0.334	1.00	0.274	pCi/L	05/18/21 13:46	06/14/21 21:14	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*75.4*		*40 - 110*	*05/18/21 13:46*	*06/14/21 21:14*	*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	2.49		0.578	0.622	1.00	0.689	pCi/L	05/18/21 14:33	06/11/21 14:07	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*75.4*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:07*	*1*
Y Carrier	*92.3*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:07*	*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	3.72		0.658	0.706	5.00	0.689	pCi/L		06/15/21 21:24	1

Client Sample Results

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

Job ID: 240-149188-1

Client Sample ID: MW-15008

Date Collected: 05/03/21 15:56
Date Received: 05/12/21 08:00

Lab Sample ID: 240-149188-2

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	0.127	U	0.177	0.177	1.00	0.298	pCi/L	05/18/21 13:46	06/14/21 21:18	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*72.1*		*40 - 110*	*05/18/21 13:46*	*06/14/21 21:18*	*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	0.677	U	0.453	0.457	1.00	0.699	pCi/L	05/18/21 14:33	06/11/21 14:08	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*72.1*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:08*	*1*
Y Carrier	*89.7*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:08*	*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	**0.804**		0.486	0.490	5.00	0.699	pCi/L		06/15/21 21:24	1

Client Sample Results

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

Job ID: 240-149188-1

Client Sample ID: MW-15016

Date Collected: 05/03/21 15:09
Date Received: 05/12/21 08:00

Lab Sample ID: 240-149188-3

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	0.0524	U	0.121	0.122	1.00	0.218	pCi/L	05/18/21 13:46	06/14/21 21:18	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*73.6*		*40 - 110*	*05/18/21 13:46*	*06/14/21 21:18*	*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	**0.606**		0.327	0.332	1.00	0.480	pCi/L	05/18/21 14:33	06/11/21 14:08	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*73.6*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:08*	*1*
Y Carrier	*84.5*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:08*	*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	**0.658**		0.349	0.354	5.00	0.480	pCi/L		06/15/21 21:24	1

Client Sample Results

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

Job ID: 240-149188-1

Client Sample ID: MW-15019

Date Collected: 05/03/21 16:03
Date Received: 05/12/21 08:00

Lab Sample ID: 240-149188-4

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	0.302	U	0.212	0.214	1.00	0.309	pCi/L	05/18/21 13:46	06/14/21 21:18	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*71.8*		*40 - 110*	*05/18/21 13:46*	*06/14/21 21:18*	*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	0.600	U	0.451	0.454	1.00	0.707	pCi/L	05/18/21 14:33	06/11/21 14:08	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*71.8*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:08*	*1*
Y Carrier	*89.3*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:08*	*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	**0.902**		0.498	0.502	5.00	0.707	pCi/L		06/15/21 21:24	1

Client Sample Results

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

Job ID: 240-149188-1

Client Sample ID: DUP-BACKGROUND

Lab Sample ID: 240-149188-5

Date Collected: 05/03/21 00:00
Date Received: 05/12/21 08:00

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	1.01		0.280	0.294	1.00	0.277	pCi/L	05/18/21 13:46	06/14/21 21:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.8*		*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	3.43		0.617	0.694	1.00	0.684	pCi/L	05/18/21 14:33	06/11/21 14:07	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.8*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:07*	*1*
Y Carrier	*88.2*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:07*	*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	4.44		0.678	0.754	5.00	0.684	pCi/L		06/15/21 21:24	1

Client Sample Results

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

Job ID: 240-149188-1

Client Sample ID: FB-BACKGROUND

Lab Sample ID: 240-149188-6

Date Collected: 05/03/21 16:03
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	-0.0247	U	0.0896	0.0897	1.00	0.187	pCi/L	05/18/21 13:46	06/14/21 21:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*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	0.206	U	0.284	0.285	1.00	0.474	pCi/L	05/18/21 14:33	06/11/21 13:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*40 - 110*	*05/18/21 14:33*	*06/11/21 13:57*	*1*
Y Carrier	*91.2*		*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	0.181	U	0.298	0.299	5.00	0.474	pCi/L		06/15/21 21:24	1

Tracer/Carrier Summary

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

Job ID: 240-149188-1

Method: 903.0 - Radium-226 (GFPC)

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

		Percent Yield (Acceptance Limits)							
Lab Sample ID	Client Sample ID	Ba (40-110)							
240-149188-1	MW-15002	75.4							
240-149188-2	MW-15008	72.1							
240-149188-3	MW-15016	73.6							
240-149188-4	MW-15019	71.8							
240-149188-5	DUP-BACKGROUND	86.8							
240-149188-6	FB-BACKGROUND	88.3							
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)							
Lab Sample ID	Client Sample ID	Ba (40-110)	Y (40-110)						
240-149188-1	MW-15002	75.4	92.3						
240-149188-2	MW-15008	72.1	89.7						
240-149188-3	MW-15016	73.6	84.5						
240-149188-4	MW-15019	71.8	89.3						
240-149188-5	DUP-BACKGROUND	86.8	88.2						
240-149188-6	FB-BACKGROUND	88.3	91.2						
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
Matrix: Water
Analysis Batch: 514296

Client Sample ID: Method Blank
Prep Type: Total/NA
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
Matrix: Water
Analysis Batch: 514248

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
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
Matrix: Water
Analysis Batch: 514248

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
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
Matrix: Water
Analysis Batch: 513770

Client Sample ID: Method Blank
Prep Type: Total/NA
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
Matrix: Water
Analysis Batch: 513948

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
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
Matrix: Water
Analysis Batch: 513948

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
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.
Project/Site: Karn/Weadock CCR Background Wells

Job ID: 240-149188-1

Rad

Prep Batch: 510304

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-149188-1	MW-15002	Total/NA	Water	PrecSep STD	
240-149188-2	MW-15008	Total/NA	Water	PrecSep STD	
240-149188-3	MW-15016	Total/NA	Water	PrecSep STD	
240-149188-4	MW-15019	Total/NA	Water	PrecSep STD	
240-149188-5	DUP-BACKGROUND	Total/NA	Water	PrecSep STD	
240-149188-6	FB-BACKGROUND	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
240-149188-1	MW-15002	Total/NA	Water	PrecSep_0	
240-149188-2	MW-15008	Total/NA	Water	PrecSep_0	
240-149188-3	MW-15016	Total/NA	Water	PrecSep_0	
240-149188-4	MW-15019	Total/NA	Water	PrecSep_0	
240-149188-5	DUP-BACKGROUND	Total/NA	Water	PrecSep_0	
240-149188-6	FB-BACKGROUND	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.
Project/Site: Karn/Weadock CCR Background Wells

Job ID: 240-149188-1

Client Sample ID: MW-15002

Lab Sample ID: 240-149188-1
Date Collected: 05/03/21 14:00
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	514248	06/14/21 21:14	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513948	06/11/21 14:07	ANW	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Client Sample ID: MW-15008

Lab Sample ID: 240-149188-2
Date Collected: 05/03/21 15:56
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 21:18	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513948	06/11/21 14:08	ANW	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Client Sample ID: MW-15016

Lab Sample ID: 240-149188-3
Date Collected: 05/03/21 15:09
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 21:18	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513948	06/11/21 14:08	ANW	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Client Sample ID: MW-15019

Lab Sample ID: 240-149188-4
Date Collected: 05/03/21 16:03
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 21:18	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513948	06/11/21 14:08	ANW	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Lab Chronicle

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

Job ID: 240-149188-1

Client Sample ID: DUP-BACKGROUND

Lab Sample ID: 240-149188-5

Date Collected: 05/03/21 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 21:19	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513948	06/11/21 14:07	ANW	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Client Sample ID: FB-BACKGROUND

Lab Sample ID: 240-149188-6

Date Collected: 05/03/21 16:03
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

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.
Project/Site: Karn/Weadock CCR Background Wells

Job ID: 240-149188-1

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

Chain of Custody Record

0-5/10-6

MICHIGAN 190

Eurofins | Environment Testing America

Client Information	Sampler: Jake Krenz	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-82579-29047.1
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 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:				D	D		
MW-15002	5-3-21	1400	G	Water	N	N	X	X		
MW-15008	5-3-21	1556	G	Water	N	N	X	X		
MW-15016	5-3-21	1509	G	Water	N	N	X	X		
MW-15019	5-3-21	1603	G	Water	N	N	X	X		
~~DUP-05~~ DUP-Background	5-3-21	—	G	Water	N	N	X	X		
~~FB-03~~ FB-Background	5-3-21	1603	G	Water	N	N	X	X		
				Water						

240-149188 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]	5-7-21/1538	TRC	[signature]	5/7/21 1545	ETA
[signature] - cold storage	5/7/21 1545	ETA	[signature]	5-12-21 800	ETA

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

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 # 1 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. 0.5 °C Corrected Cooler Temp. 0.6 °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: _____

WI-NC-099

Login Container Summary Report

Temperature readings: _____

Client Sample ID	Lab ID	Container Type	Container pH	Container Temp	Preservative Added (mls)	Lot #
MW-15002	240-149188-A-1	Plastic 1 liter - Nitric Acid	<2			
MW-15002	240-149188-B-1	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-149188-A-2	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-149188-B-2	Plastic 1 liter - Nitric Acid	<2			
MW-15016	240-149188-A-3	Plastic 1 liter - Nitric Acid	<2			
MW-15016	240-149188-B-3	Plastic 1 liter - Nitric Acid	<2			
MW-15019	240-149188-A-4	Plastic 1 liter - Nitric Acid	<2			
MW-15019	240-149188-B-4	Plastic 1 liter - Nitric Acid	<2			
DUP-BACKGROUND	240-149188-A-5	Plastic 1 liter - Nitric Acid	<2			
DUP-BACKGROUND	240-149188-B-5	Plastic 1 liter - Nitric Acid	<2			
FB-BACKGROUND	240-149188-A-6	Plastic 1 liter - Nitric Acid	<2			
FB-BACKGROUND	240-149188-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: 240-136575.1
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 #: 240-149188-1
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	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
MW-15002 (240-149188-1)	5/3/21	14:00 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15008 (240-149188-2)	5/3/21	15:56 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15016 (240-149188-3)	5/3/21	15:09 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15019 (240-149188-4)	5/3/21	16:03 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-BACKGROUND (240-149188-5)	5/3/21	Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
FB-BACKGROUND (240-149188-6)	5/3/21	16:03 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
Unconfirmed

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) Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:		Method of Shipment:	
Relinquished by: [signature]	Date/Time: 5-12-21 1700	Company: ETA	Received by: FED EX	Date/Time:	Company
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: 240-149188-1

Login Number: 149188
List Number: 2
Creator: Worthington, Sierra M

List Source: Eurofins TestAmerica, St. Louis
List Creation: 05/13/21 11:28 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	

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ANALYTICAL REPORT

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Tel: (330)497-9396

Laboratory Job ID: 240-149376-1
Client Project/Site: Karn/Weadock CCR JCW Bottom Ash Pond

For:
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

Attn: Darby Litz

Authorized for release by:
6/17/2021 3:33:15 PM

Kris Brooks, Project Manager II
(330)966-9790
Kris.Brooks@Eurofinset.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

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

Job ID: 240-149376-1

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: 240-149376-1

Laboratory: Eurofins TestAmerica, Canton

Narrative

Job Narrative
240-149376-1

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 5/13/2021 8:00 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 3.3º C and 7.5º C.

RAD
Method 903.0: Radium-226 prep batch 160-511204: 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. JCW-MW-15007 (240-149376-1), JCW-MW-15009 (240-149376-2), JCW-MW-15010 (240-149376-3), JCW-MW-15028 (240-149376-4), DUP-JCW BAP (240-149376-5), EB-JCW BAP (240-149376-6), (LCS 160-511204/1-A), (LCSD 160-511204/2-A) and (MB 160-511204/23-A)

Method 904.0: Radium 228 prep batch 160-511205: 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. JCW-MW-15007 (240-149376-1), JCW-MW-15009 (240-149376-2), JCW-MW-15010 (240-149376-3), JCW-MW-15028 (240-149376-4), DUP-JCW BAP (240-149376-5), EB-JCW BAP (240-149376-6), (LCS 160-511205/1-A), (LCSD 160-511205/2-A) and (MB 160-511205/23-A)

Method PrecSep_0: Ra-228 Batch 160-511205: Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: JCW-MW-15007 (240-149376-1), JCW-MW-15009 (240-149376-2), JCW-MW-15028 (240-149376-4), DUP-JCW BAP (240-149376-5) and EB-JCW BAP (240-149376-6). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

Method PrecSep_0: Ra-228 Batch 160-511205: The following samples were prepared at a reduced aliquot due to Matrix: JCW-MW-15010 (240-149376-3). 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 160-511204: Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: JCW-MW-15007 (240-149376-1), JCW-MW-15009 (240-149376-2), JCW-MW-15028 (240-149376-4), DUP-JCW BAP (240-149376-5) and EB-JCW BAP (240-149376-6). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

Method PrecSep STD: Ra-226 Batch 160-511204: The following samples were prepared at a reduced aliquot due to Matrix: JCW-MW-15010 (240-149376-3). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead of a sample duplicate (DUP) to demonstrate batch precision.

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

Method Summary

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

Job ID: 240-149376-1

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.
Project/Site: Karn/Weadock CCR JCW Bottom Ash Pond

Job ID: 240-149376-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
240-149376-1	JCW-MW-15007	Water	05/12/21 06:25	05/14/21 08:00	
240-149376-2	JCW-MW-15009	Water	05/12/21 08:37	05/14/21 08:00	
240-149376-3	JCW-MW-15010	Water	05/11/21 15:33	05/14/21 08:00	
240-149376-4	JCW-MW-15028	Water	05/12/21 07:21	05/14/21 08:00	
240-149376-5	DUP-JCW BAP	Water	05/12/21 00:00	05/14/21 08:00	
240-149376-6	EB-JCW BAP	Water	05/12/21 08:55	05/14/21 08:00	

Client Sample Results

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

Job ID: 240-149376-1

Client Sample ID: JCW-MW-15007

Lab Sample ID: 240-149376-1

Date Collected: 05/12/21 06:25
Date Received: 05/14/21 08:00

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	1.32		0.314	0.336	1.00	0.247	pCi/L	05/23/21 12:41	06/15/21 18:24	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.6*		*40 - 110*	*05/23/21 12:41*	*06/15/21 18:24*	*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	1.27		0.322	0.342	1.00	0.393	pCi/L	05/23/21 13:19	06/14/21 13:40	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.6*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*1*
Y Carrier	*95.0*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*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	2.59		0.450	0.479	5.00	0.393	pCi/L		06/16/21 17:23	1

Client Sample Results

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

Job ID: 240-149376-1

Client Sample ID: JCW-MW-15009

Lab Sample ID: 240-149376-2

Date Collected: 05/12/21 08:37
Matrix: Water
Date Received: 05/14/21 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	0.333		0.213	0.215	1.00	0.297	pCi/L	05/23/21 12:41	06/15/21 18:24	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*78.1*		*40 - 110*	*05/23/21 12:41*	*06/15/21 18:24*	*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	0.720		0.333	0.339	1.00	0.485	pCi/L	05/23/21 13:19	06/14/21 13:40	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*78.1*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*1*
Y Carrier	*86.0*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*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	1.05		0.395	0.401	5.00	0.485	pCi/L		06/16/21 17:23	1

Client Sample Results

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

Job ID: 240-149376-1

Client Sample ID: JCW-MW-15010

Lab Sample ID: 240-149376-3

Date Collected: 05/11/21 15:33

Matrix: Water

Date Received: 05/14/21 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	0.198	U	0.247	0.248	1.00	0.410	pCi/L	05/23/21 12:41	06/15/21 18:25	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*78.7*		*40 - 110*	*05/23/21 12:41*	*06/15/21 18:25*	*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	**0.700**		0.398	0.403	1.00	0.595	pCi/L	05/23/21 13:19	06/14/21 13:40	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*78.7*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*1*
Y Carrier	*84.5*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*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	**0.898**		0.468	0.473	5.00	0.595	pCi/L		06/16/21 17:23	1

Client Sample Results

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

Job ID: 240-149376-1

Client Sample ID: JCW-MW-15028

Lab Sample ID: 240-149376-4

Date Collected: 05/12/21 07:21
Date Received: 05/14/21 08:00

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	0.621		0.264	0.270	1.00	0.309	pCi/L	05/23/21 12:41	06/15/21 18:26	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*68.5*		*40 - 110*	*05/23/21 12:41*	*06/15/21 18:26*	*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	0.997		0.370	0.381	1.00	0.501	pCi/L	05/23/21 13:19	06/14/21 13:40	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*68.5*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*1*
Y Carrier	*84.5*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*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	1.62		0.455	0.467	5.00	0.501	pCi/L		06/16/21 17:23	1

Client Sample Results

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

Job ID: 240-149376-1

Client Sample ID: DUP-JCW BAP

Lab Sample ID: 240-149376-5

Date Collected: 05/12/21 00:00
Date Received: 05/14/21 08:00

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	1.01		0.298	0.311	1.00	0.305	pCi/L	05/23/21 12:41	06/15/21 18:26	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*40 - 110*	*05/23/21 12:41*	*06/15/21 18:26*	*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	1.43		0.358	0.381	1.00	0.431	pCi/L	05/23/21 13:19	06/14/21 13:40	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*1*
Y Carrier	*79.6*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*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	2.45		0.466	0.492	5.00	0.431	pCi/L		06/16/21 17:23	1

Client Sample Results

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

Job ID: 240-149376-1

Client Sample ID: EB-JCW BAP

Date Collected: 05/12/21 08:55
Date Received: 05/14/21 08:00

Lab Sample ID: 240-149376-6

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	-0.124	U	0.125	0.126	1.00	0.305	pCi/L	05/23/21 12:41	06/15/21 18:26	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.9*		*40 - 110*	*05/23/21 12:41*	*06/15/21 18:26*	*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	-0.0282	U	0.284	0.284	1.00	0.519	pCi/L	05/23/21 13:19	06/14/21 13:40	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.9*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*1*
Y Carrier	*70.3*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*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	-0.152	U	0.310	0.311	5.00	0.519	pCi/L		06/16/21 17:23	1

Tracer/Carrier Summary

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

Job ID: 240-149376-1

Method: 903.0 - Radium-226 (GFPC)

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

		Percent Yield (Acceptance Limits)								
Lab Sample ID	Client Sample ID	Ba (40-110)								
240-149376-1	JCW-MW-15007	85.6								
240-149376-2	JCW-MW-15009	78.1								
240-149376-3	JCW-MW-15010	78.7								
240-149376-4	JCW-MW-15028	68.5								
240-149376-5	DUP-JCW BAP	88.3								
240-149376-6	EB-JCW BAP	79.9								
LCS 160-511204/1-A	Lab Control Sample	81.7								
LCSD 160-511204/2-A	Lab Control Sample Dup	79.9								
MB 160-511204/23-A	Method Blank	68.5								

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

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

		Percent Yield (Acceptance Limits)								
Lab Sample ID	Client Sample ID	Ba (40-110)	Y (40-110)							
240-149376-1	JCW-MW-15007	85.6	95.0							
240-149376-2	JCW-MW-15009	78.1	86.0							
240-149376-3	JCW-MW-15010	78.7	84.5							
240-149376-4	JCW-MW-15028	68.5	84.5							
240-149376-5	DUP-JCW BAP	88.3	79.6							
240-149376-6	EB-JCW BAP	79.9	70.3							
LCS 160-511205/1-A	Lab Control Sample	81.7	81.9							
LCSD 160-511205/2-A	Lab Control Sample Dup	79.9	86.0							
MB 160-511205/23-A	Method Blank	68.5	87.9							

Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier

QC Sample Results

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

Job ID: 240-149376-1

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-511204/23-A
Matrix: Water
Analysis Batch: 514476

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 511204

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.07694	U	0.0891	0.0894	1.00	0.247	pCi/L	05/23/21 12:41	06/15/21 22:03	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*68.5*		*40 - 110*	*05/23/21 12:41*	*06/15/21 22:03*	*1*

Lab Sample ID: LCS 160-511204/1-A
Matrix: Water
Analysis Batch: 514296

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 511204

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-226			11.3	11.90		1.41	1.00	0.303	pCi/L	105	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*81.7*		*40 - 110*

Lab Sample ID: LCSD 160-511204/2-A
Matrix: Water
Analysis Batch: 514296

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 511204

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-226			11.3	11.38		1.37	1.00	0.316	pCi/L	100	75 - 125	0.19	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*79.9*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-511205/23-A
Matrix: Water
Analysis Batch: 514248

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 511205

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.2797	U	0.309	0.310	1.00	0.506	pCi/L	05/23/21 13:19	06/14/21 13:57	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*68.5*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:57*	*1*
Y Carrier	*87.9*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:57*	*1*

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

Lab Sample ID: LCS 160-511205/1-A
Matrix: Water
Analysis Batch: 514268

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 511205

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-228			9.63	10.32		1.23	1.00	0.501	pCi/L	107	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*81.7*		*40 - 110*
Y Carrier	*81.9*		*40 - 110*

Lab Sample ID: LCSD 160-511205/2-A
Matrix: Water
Analysis Batch: 514268

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 511205

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-228			9.63	9.802		1.17	1.00	0.450	pCi/L	102	75 - 125	0.21	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*79.9*		*40 - 110*
Y Carrier	*86.0*		*40 - 110*

QC Association Summary

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

Job ID: 240-149376-1

Rad

Prep Batch: 511204

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-149376-1	JCW-MW-15007	Total/NA	Water	PrecSep STD	
240-149376-2	JCW-MW-15009	Total/NA	Water	PrecSep STD	
240-149376-3	JCW-MW-15010	Total/NA	Water	PrecSep STD	
240-149376-4	JCW-MW-15028	Total/NA	Water	PrecSep STD	
240-149376-5	DUP-JCW BAP	Total/NA	Water	PrecSep STD	
240-149376-6	EB-JCW BAP	Total/NA	Water	PrecSep STD	
MB 160-511204/23-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-511204/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
LCSD 160-511204/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	

Prep Batch: 511205

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-149376-1	JCW-MW-15007	Total/NA	Water	PrecSep_0	
240-149376-2	JCW-MW-15009	Total/NA	Water	PrecSep_0	
240-149376-3	JCW-MW-15010	Total/NA	Water	PrecSep_0	
240-149376-4	JCW-MW-15028	Total/NA	Water	PrecSep_0	
240-149376-5	DUP-JCW BAP	Total/NA	Water	PrecSep_0	
240-149376-6	EB-JCW BAP	Total/NA	Water	PrecSep_0	
MB 160-511205/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-511205/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-511205/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Lab Chronicle

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

Job ID: 240-149376-1

Client Sample ID: JCW-MW-15007

Lab Sample ID: 240-149376-1
Date Collected: 05/12/21 06:25
Matrix: Water
Date Received: 05/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514296	06/15/21 18:24	FLC	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514268	06/14/21 13:40	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Client Sample ID: JCW-MW-15009

Lab Sample ID: 240-149376-2
Date Collected: 05/12/21 08:37
Matrix: Water
Date Received: 05/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514296	06/15/21 18:24	FLC	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514268	06/14/21 13:40	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Client Sample ID: JCW-MW-15010

Lab Sample ID: 240-149376-3
Date Collected: 05/11/21 15:33
Matrix: Water
Date Received: 05/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514366	06/15/21 18:25	JCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514268	06/14/21 13:40	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Client Sample ID: JCW-MW-15028

Lab Sample ID: 240-149376-4
Date Collected: 05/12/21 07:21
Matrix: Water
Date Received: 05/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514366	06/15/21 18:26	JCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514268	06/14/21 13:40	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Lab Chronicle

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

Job ID: 240-149376-1

Client Sample ID: DUP-JCW BAP

Lab Sample ID: 240-149376-5

Date Collected: 05/12/21 00:00
Matrix: Water
Date Received: 05/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514366	06/15/21 18:26	JCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514268	06/14/21 13:40	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Client Sample ID: EB-JCW BAP

Lab Sample ID: 240-149376-6

Date Collected: 05/12/21 08:55
Matrix: Water
Date Received: 05/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514366	06/15/21 18:26	JCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514268	06/14/21 13:40	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	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.
Project/Site: Karn/Weadock CCR JCW Bottom Ash Pond

Job ID: 240-149376-1

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

Chain of Custody Record

7-4 | 75
37 | 33

MICHIGAN
190

eurofins
Environment Testing America

Client Information	Sampler: JAVIER JASS	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-82581-29049 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:			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 JCW 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:		X	X	D	D	X	
JCW-MW-15007	5/12/21	0625	G	Water	N	N	X	X	2	
JCW-MW-15009	5/12/21	0837	G	Water	N	N	X	X	2	
JCW-MW-15010	5/12/21	1533	G	Water	N	N	X	X	2	
JCW-MW-15028	5/12/21	0731	G	Water	N	N	X	X	2	
DUP-02	5/12/21	—	G	Water	N	N	X	X	2	
EB-02	5/12/21	0851	G	Water	N	N	X	X	2	
				Water						

240-149376 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: [signature]	Date/Time: 5/12/21 1230	Company: TRC	Received by: [signature]	Date/Time: 5/12/21 1230	Company: EYA
Relinquished by: [signature]	Date/Time: 5/12/21 1230	Company: ETA	Received by: [signature]	Date/Time: 5/14/21 0800	Company: ETA
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time: 13	Company:

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.	Cooler Temperature(s) °C and Other Remarks: Kms 5/17/21

Ver: 11/01 2020

Eurofins TestAmerica Canton Sample Receipt Form/Narrative **Login #** 149376
Canton Facility

Client TRC 13 WMB 51721 Site Name Karn/Weadock Cooler unpacked by Jme
Cooler Received on 5 ~~14~~ 21 Opened on 5 14 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 # TA 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 ____ °C Corrected Cooler Temp ____ °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 2 Yes No
-Were the seals on the outside of the cooler(s) signed & dated? 1 on ea 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

One of the two coolers arrived with an elevated temp.

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

Login # · 149376

Eurofins TestAmerica Canton Sample Receipt Multiple Cooler Form				
Cooler Description (Circle)	IR Gun # (Circle)	Observed Temp °C	Corrected Temp °C	Coolant (Circle)
TA Client Box Other	IR-11 IR-12	74	75	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12	32	33	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR 12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR 11 IR 12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR 12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
☐ See Temperature Excursion Form				

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

Login Container Summary Report

Temperature readings. _____

Client Sample ID	Lab ID	Container Type	Container pH	Container Temp	Preservative Added (mls)	Lot #
JCW-MW 15007	240-149376-A-1	Plastic 1 liter Nitric Acid				
JCW-MW-15007	240-149376-B-1	Plastic 1 liter - Nitric Acid				
JCW-MW-15009	240-149376-A-2	Plastic 1 liter - Nitric Acid				
JCW-MW-15009	240-149376-B-2	Plastic 1 liter - Nitric Acid				
JCW-MW-15010	240-149376-A-3	Plastic 1 liter - Nitric Acid				
JCW-MW 15010	240-149376-B-3	Plastic 1 liter - Nitric Acid				
JCW-MW-15028	240-149376-A-4	Plastic 1 liter - Nitric Acid				
JCW-MW 15028	240-149376-B-4	Plastic 1 liter Nitric Acid				
DUP-02	240-149376-A 5	Plastic 1 liter - Nitric Acid				
DUP-02	240-149376-B-5	Plastic 1 liter Nitric Acid				
EB-02	240-149376-A-6	Plastic 1 liter - Nitric Acid				
EB-02	240-149376-B-6	Plastic 1 liter - Nitric Acid				

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: 240-136755.1
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 #: 240-149376-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 6/15/2021			
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:								
JCW-MW-15007 (240-149376-1)	5/12/21	09:25 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-15009 (240-149376-2)	5/12/21	08:37 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-15010 (240-149376-3)	5/12/21	15:33 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-15028 (240-149376-4)	5/12/21	07:21 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-02 (240-149376-5)	5/12/21	Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
EB-02 (240-149376-6)	5/12/21	08:55 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 *Unconfirmed*	***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) 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]	5-14-21 1700	EFA	FED EX		
FED EX			[signature]	6/15/21 0815	FTA STL

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

Ver: 11/01/2020

Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

Job Number: 240-149376-1

Login Number: 149376
List Number: 2
Creator: Mazariegos, Leonel A

List Source: Eurofins TestAmerica, St. Louis
List Creation: 05/15/21 01:18 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	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	

October 2021 Assessment Monitoring Data Summary and Statistical Evaluation

JC Weadock, Bottom Ash Pond CCR Unit

Essexville, Michigan

January 2022

Prepared For:

Consumers Energy Company

Prepared By:

TRC
1540 Eisenhower Place
Ann Arbor, Michigan 48108

Darby Litz
Hydrogeologist/Project Manager

Kristin Lowery, E.I.T.
Project Engineer

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TABLES

Table 1 Summary of Groundwater Elevation Data: October 2021
Table 2 Summary of Field Parameter Results: October 2021
Table 3 Summary of Background Well Groundwater Sampling Results (Analytical): October 2021
Table 4 Summary of Groundwater Sampling Results (Analytical) – JC Weadock Bottom Ash Pond: October 2021
Table 5 Summary of Groundwater Protection Standard Exceedances – October 2021

FIGURES

Figure 1 Site Location Map
Figure 2 Site Map
Figure 3 Potentiometric Surface Map – October 2021

APPENDICES

Appendix A Data Quality Reviews
Appendix B Statistical Evaluation of October 2021 Assessment Monitoring Sampling Event
Appendix C Laboratory Analytical Reports

1.0 Introduction

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

Consumers Energy is continuing assessment monitoring in accordance with §257.95 of the CCR Rule for the Weadock Bottom Ash Pond in Essexville, Michigan (Figure 1). This monitoring report has been prepared to provide the summary of the October 2021 assessment groundwater monitoring results, data quality review, and statistical data evaluation for the Weadock Bottom Ash Pond groundwater monitoring system.

1.1 Program Summary

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

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

- Boron at JCW-MW-15010;
- Calcium at JCW-MW-15009;
- Field pH at JCW-MW-15009 (low), JCW-MW-15010 (high), JCW-MW-15028 (high); and
- Sulfate at JCW-MW-15009.

On April 25, 2018, Consumers Energy entered assessment monitoring upon determining that an Alternate Source Demonstration for the Appendix III constituents was not successful. On January 14, 2019, Consumers Energy provided notification that beryllium and lithium were present at statistically significant levels above the Groundwater Protection Standards (GWPSs) in one of the downgradient monitoring wells (JCW-MW-15009) at the Weadock Bottom Ash Pond. The notification of the GWPS exceedance was followed up with a Response Action Plan Submitted to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) on March 15, 2019 laying out the preliminary understanding of water quality and actions that were underway to mitigate or eliminate unacceptable risk associated with the identified release from the CCR unit. The *Assessment of Corrective Measures* (ACM) (TRC, September 2019) was initiated on April 14, 2019 and submitted on September 11, 2019 in accordance with the schedule in §257.96 and the requirements of the Response Action Plan.

The ACM documents that the groundwater nature and extent has been defined, as required in §257.95(g)(1). Although site-specific constituents of concern (COCs) (i.e., arsenic [Weadock

Landfill], beryllium and lithium [Weadock Bottom Ash Pond]) have been identified in groundwater monitoring locations at concentrations exceeding their respective GWPS, COCs are delineated within the limits of the property owned by Consumers Energy and there are currently no adverse effects on human health or the environment from either surface water or groundwater due to CCR management at the Weadock Bottom Ash Pond.

Evaluation of groundwater under the CCR Rule focuses on the following constituents that are collected unfiltered in the field:

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

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

Additional Monitoring Constituents (Michigan Part 115/PA 640[1])	
Detection Monitoring	**Assessment Monitoring**
Iron	Copper
	Nickel
	Silver
	Vanadium
	Zinc

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

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

1.2 Site Overview

The Weadock Bottom Ash Pond is located within the JC Weadock Power Plant site, which is located south of the DE Karn Power Plant site, east of the Saginaw River, west of Underwood Drain and Saginaw Bay, and north of Tacey Drain and agricultural land (Figure 1). The Weadock Bottom Ash Pond is located immediately west of the JC Weadock Solid Waste Disposal Area (*i.e.* Weadock Landfill) and outside of the soil-bentonite slurry wall (Figure 2). The Weadock Landfill is being monitored in accordance with the EGLE-approved *Landfill Hydrogeological Monitoring Plan*, JC Weadock Solid Waste Disposal Area (February 2021). In addition to the Weadock Bottom Ash Pond and Weadock Landfill, the Site consists of the generating facility which retired eight coal-fired generating units and infrastructure and utilities that support electrical transmission. Units 1 to 6 commenced operation in 1940 and retired in 1980 and Units 7 and 8 were added in 1955 and 1958 and continued to operate through April 15, 2016.

The Weadock Bottom Ash Pond was formerly the primary settling/detention structure for the National Pollutant Discharge Elimination System (NPDES) Treatment System prior to discharge and characterized as an existing CCR surface impoundment. Consumers Energy ceased hydraulic loading to the Weadock Bottom Ash Pond in April 2018 and has allowed the area to dewater by gravity. The active dewatering and excavation work was completed between February and July 2020. The excavation extended to six inches below known CCR elevations established from previous investigations. Excavated CCR has been placed in the neighboring Weadock Landfill that is constructed with of a fully encapsulation soil-bentonite slurry wall keyed into a competently confining clay unit. The Weadock Bottom Ash Pond has been restored by backfilling and grading the surface with clean fill in accordance with the plan to promote stormwater drainage, minimize ponding of surface water, and to reduce the potential of infiltration and migration of residual arsenic and any future COCs. Consumers Energy submitted for review and approval, *J.C. Weadock Generating Facility Bottom Ash Pond CCR Removal Documentation Report* (Weadock Bottom Ash Pond Closure Report) on August 26, 2020 to satisfy requirements for completing the removal of solid waste which rendered the need for a solid waste operating license unnecessary. EGLE approved the removal documentation report satisfying state requirements to close on December 1, 2020. Groundwater conditions post-CCR removal continue to be monitored.

1.3 Geology/Hydrogeology

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

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. A sandstone unit, which is part of the Saginaw formation, was generally encountered at 80-90 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. Along the perimeter of the landfill, there is a well graded sand present at depths ranging from 10 to 20 ft-bgs. The sand is variable in thickness, ranging from <1 to ~6.5 feet, and is discontinuous along the perimeter, as evidenced by the soil boring logs and slurry wall construction documentation.

The alluvium soils pinch out and are not observed in soil borings located south and east of the Weadock Bottom Ash Pond and Weadock Landfill, along the location of the historic shoreline. The non-water-bearing region south of these units extends for at least a mile south and southeast of the site.

Beneath the surficial fill and sand unit (where present) is 70 to 80 feet of clay till. Along the southern perimeter of the landfill, some of the upper portion of the clay till is sand-rich (generally greater than 20 ft-bgs). The clay till acts as a hydraulic barrier that separates the shallow groundwater from the underlying sandstone. The sandstone unit, which is part of the Saginaw Formation, is generally encountered at 80-90 ft-bgs.

The Weadock Bottom Ash Pond and Weadock Landfill are bounded by several surface water features (Figure 1): the Saginaw River to the west, a discharge channel and Saginaw Bay (Lake Huron) to the north, Underwood Drain to the east, and Tacey Drain to the south. Groundwater flow in the upper aquifer is largely controlled by the surface water elevations of Saginaw River and Saginaw Bay. In general, shallow groundwater is encountered at a similar or slightly higher elevation relative to the surrounding surface water features. The shallow groundwater flow direction in the vicinity of the Weadock Bottom Ash Pond is to the north toward the discharge channel and to the east toward the Saginaw River. Historical groundwater flow beneath the Weadock Landfill was directed north to the discharge channel due to the bentonite/soil slurry wall. Originally, the slurry wall enclosed the historical fly ash disposal area with the exception of a small segment along the perimeter dike that is designed to vent along the discharge channel immediately upgradient from the NPDES external outfall to prevent water from building up within the facility. In July 2018, this vent was closed and the slurry wall reduced porewater flux around the entire perimeter of the landfill. Following the closure of the vent, the static water level elevations inside of the slurry wall are generally significantly different (>1 ft) than static water levels outside of the slurry wall, which demonstrates the presence of a low permeability feature between the well pairs.

In previous investigations, bedrock groundwater was generally encountered around 578 ft (NAVD88), which is several feet lower than the shallow groundwater. Groundwater flow direction was generally to the northeast under a very shallow gradient. Given the different groundwater flow regime in the bedrock than the shallow saturated unit, bedrock wells near the

surface water bodies are several feet below the surface water elevation. Based on the fact that the shallow sand and the bedrock are separated by over 50 ft of clay, the bedrock unit does not appear to be hydraulically connected to the shallow sand.

2.0 Groundwater Monitoring

2.1 Monitoring Well Network

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

Groundwater around the Weadock Bottom Ash Pond was characterized as radial based on the eight initial background sampling events prior to commencing detection monitoring; therefore, the four downgradient wells (JCW-MW-15007, JCW-MW-15009, JCW-MW-15010, and JCW-MW-15028) were installed in the accessible areas along the perimeter of the Weadock Bottom Ash Pond. Following the cessation of hydraulic loading, groundwater near the Weadock Bottom Ash Pond continues to flow to the north toward the discharge channel and to the west near the Saginaw River; therefore, the compliance wells continue to accurately represent the quality of groundwater passing the waste boundary that ensures detection of groundwater contamination such that all potential contaminant pathways are monitored.

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

2.2 October 2021 Assessment Monitoring

Per §257.95, all wells in the CCR unit monitoring program must be sampled at least semiannually. TRC conducted the second semiannual assessment monitoring event of 2021 for Appendix III and IV constituents at Bottom Ash Pond CCR Unit in accordance with the *JC Weadock Monitoring Program Sample Analysis Plan* (TRC, 2018) (SAP). The semiannual assessment monitoring event was performed on October 4 through 13, 2021. The Bottom Ash Pond downgradient monitoring well network (JCW-MW-15007, JCW-MW-15009, JCW-MW-15010, and JCW-MW-15028), and background monitoring wells (MW-15002, MW-15008, MW-15016, and MW-15019) were sampled during the semiannual assessment monitoring event. The locations of the monitoring wells are depicted on Figure 2.

The October 2021 sampling event consisted of collecting static water level measurements from the Weadock Bottom Ash Pond groundwater monitoring system. Static water level measurements were also collected at other site wells to support preparation of a groundwater contour map. Static water elevation data are summarized in Table 1 and groundwater elevation data are shown on Figure 3. 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.

Eurofins TestAmerica Inc. (TestAmerica) in St. Louis, Missouri, provided the radiological analysis of the groundwater samples. The remaining Appendix III and IV constituents were analyzed by Consumers Energy Laboratory Services in Jackson, Michigan in accordance with the SAP. The analytical results for the background monitoring wells are summarized in Table 3. The analytical results for the Weadock Bottom Ash Pond downgradient monitoring wells are summarized in Table 4. Analytical results from the October 2021 monitoring event are included in the attached laboratory reports (Appendix C).

2.2.1 Groundwater Flow Rate and Direction

Groundwater elevation data collected during the October 2021 assessment monitoring event are provided in Table 1. These data were used to construct the groundwater contour map (Figure 3). Groundwater elevations at the Weadock site are generally within the range of 581 to 594 feet above mean sea level (ft NAVD88) and groundwater is typically encountered at a similar or slightly higher elevation relative to the surrounding surface water features measured by the NOAA gauging station data.

Figure 3 shows that groundwater near the Weadock Bottom Ash Pond continues to flow to the north toward the discharge channel and to the west near the Saginaw River. The average hydraulic gradient throughout the bottom ash pond area during the October 2021 event is estimated at 0.0044 ft/ft. The gradient was calculated using the monitoring well pairs JCW-MW-15028/JCW-MW-15009, JCW-MW-15007/JCW-MW-15010, and MW-15016/MW-15002. Using the mean hydraulic conductivity of 16 ft/day (ARCADIS, 2016) and an assumed effective porosity of 0.3, the estimated seepage velocity observed in October 2021 is 0.24 ft/day or 86 ft/year. The general flow direction is similar to that identified in previous monitoring rounds and continues to demonstrate that the downgradient monitoring wells are appropriately positioned to detect the presence of Appendix III/IV constituents that could potentially migrate from the Weadock Bottom Ash Pond.

2.2.2 Data Quality

Data was evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. Analytical data were found to be usable for assessment monitoring and were generally consistent with previous sampling events. The Data Quality Reviews are included as Appendix A.

3.0 Assessment Monitoring Statistical Evaluation

Assessment monitoring is continuing at the Weadock Bottom Ash Pond while corrective measures are further evaluated in accordance with §257.96 and §257.97 as outlined in the ACM. The following section summarizes the statistical approach applied to assess the October 2021 groundwater data in accordance with the assessment monitoring program.

3.1 Establishing Groundwater Protection Standards

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

3.2 Data Comparison to Groundwater Protection Standards

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

Confidence intervals were established per the statistical methods detailed in the *Statistical Evaluation of October 2021 Assessment Monitoring Sampling Event* technical memorandum provided in Appendix B. For each Appendix IV constituent, the concentrations were first compared directly to the respective GWPSs. Constituent-well combinations that included a direct exceedance of the GWPSs were retained for further statistical analysis using confidence limits.

Overall, the assessment monitoring statistical evaluations have confirmed that beryllium, and lithium are the only Appendix IV constituents that have been present at statistically significant levels above the GWPS. The statistical evaluation of this semiannual assessment monitoring event data indicate that no appendix IV constituents are present at statistically significant levels exceeding the GWPS in downgradient monitoring wells at the Weadock Bottom Ash Pond:

Constituent	GWPS	#Downgradient Wells Observed

No constituents are present at statistically significant levels exceeding the GWPS

Previously, beryllium and lithium at JCW-MW-15009 were present at a statistically significant levels; however, the lower confidence limit for all Appendix IV constituents are below their respective GWPSs since May 2019. Source removal of CCR has been completed, as reported in the *Weadock Bottom Ash Pond Removal Documentation Report* (Golder, August 2020) and approved by the EGLE on December 18, 2020. Lithium and beryllium concentrations have been below the GWPS at JCW-MW-15009 for the past five semi-annual sampling events. Assessment monitoring will continue while Consumers Energy continues to evaluate corrective measures per §257.96 and §257.97. A summary of the confidence intervals for October 2021 is provided in Table 5.

4.0 Conclusions and Recommendations

Corrective action has been triggered and assessment monitoring is ongoing at the Weadock Bottom Ash Pond CCR unit. A summary of the October 2021 assessment monitoring event is presented in this report. Overall, the statistical assessments have confirmed that beryllium and lithium are the only Appendix IV constituents present at statistically significant levels above the GWPS. Consumers Energy has completed the removal of CCR consistent with the timeline for closure of the Weadock Bottom Ash Pond under the *J.C. Weadock Generating Facility Bottom Ash Pond Closure Plan* (Golder, January 2018) and the CCR Rule's closure by removal provisions in §257.102(c).

Consumers Energy will continue assessment monitoring and evaluate corrective measures in accordance with §257.96 and §257.97 as outlined in the Weadock ACM. The groundwater management remedy for the Weadock Bottom Ash Pond will be selected as soon as feasible to meet the federal standards of §257.96(b). Consumers Energy will continue the assessment of corrective measures, per §257.95(g), and execute the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98. The next semiannual monitoring event is tentatively scheduled for the second calendar quarter of 2022.

5.0 References

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

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

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Golder Associates Inc. January 2018. J.C. Weadock Generating Facility Bottom Ash Pond Closure Plan, Essexville, Michigan. Prepared for Consumers Energy Company.

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

TRC Environmental Corporation. January 2018. Annual Groundwater Monitoring Report – JC Weadock Power Plant, Bottom Ash Pond CCR Unit. Prepared for Consumers Energy Company.

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TRC. September 2019. Assessment of Corrective Measures – JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residual Units. 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).

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

Office of Solid Waste and Emergency Response, now the Office of Land and Emergency Management.

Tables

Table 1
Summary of Groundwater Elevation Data: October 2021
JC Weadock - 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 Monitoring Wells							
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
Bottom Ash Pond: Downgradient Monitoring Wells							
JCW-MW-15007	587.40	Sand	582.7	to	579.2	3.43	583.97
JCW-MW-15009	589.64	Sand	581.9	to	576.9	8.18	581.46
JCW-MW-15010	597.76	Sand	579.7	to	578.2	16.52	581.24
JCW-MW-15028	589.64	Sand	567.7	to	564.7	7.16	582.48
Landfill: Downgradient Monitoring Wells (outside slurry wall)							
JCW-MW-18001	596.73	Sand and Sandy Clay	578.3	to	573.3	15.76	580.97
JCW-MW-18004	593.04	Sandy Clay	583.9	to	578.9	11.72	581.32
JCW-MW-18005	590.89	Sand and Sandy Clay	580.0	to	575.0	9.25	581.64
JCW-MW-18006	600.72	Fly Ash and Sandy Clay	582.8	to	577.8	13.98	586.74
MW-50	593.36	Sand	577.8	to	574.8	12.47	580.89
MW-51	594.29	Sand and Clay	577.8	to	574.8	13.45	580.84
MW-52	594.90	Sand	579.3	to	576.3	14.00	580.90
MW-53	593.68	Sand and Clay	579.1	to	576.1	12.97	580.71
MW-53R	594.25	Sand and Clay	580.4	to	575.4	13.28	580.97
MW-54R	593.89	Clay and Sand	581.3	to	576.3	12.78	581.11
MW-55	593.82	Sand	581.5	to	578.5	13.15	580.67
OW-57ROUT	591.00	Sandy Clay	577.0	to	572.0	9.64	581.36
Landfill: Static Water Level Only (inside slurry wall)							
JCW-OW-18001	595.84	Fly Ash and Sand	581.1	to	576.1	7.90	587.94
JCW-OW-18002	593.63	Sand	578.9	to	573.9	10.64	582.99
JCW-OW-18003	593.99	Sand and Clay	580.5	to	575.5	9.20	584.79
JCW-OW-18004	594.19	Sandy Clay	584.6	to	579.6	8.65	585.54
JCW-OW-18006	600.61	Fly Ash and Clay with Sand	582.9	to	577.9	11.22	589.39
MW-20	592.73	NR	~581.1	to	~578.1	7.10	585.63
OW-51	593.62	Clay and Sand	578.9	to	575.9	10.60	583.02
OW-53	593.64	Clay and Sand	579.0	to	576.0	8.03	585.61
OW-54	594.10	Clay and Sand	580.0	to	577.0	7.90	586.20
OW-55	594.67	Clay (or Sand and Clay)	580.9	to	577.9	7.17	587.50
OW-56R	592.01	Ash and Sand	577.5	to	572.5	6.73	585.28
OW-57R IN	590.86	Sandy Clay	575.7	to	570.7	6.90	583.96
OW-61	612.37	Ash and Sand	588.0	to	585.0	22.65	589.72
OW-63	612.53	Ash and Sand	594.2	to	591.2	26.36	586.17
Landfill: Leachate Headwells							
LH-103	603.49	Fly Ash	30.2	to	33.2	NM	NM
LH-104	596.56	Fly Ash	8.0	to	11.0	9.88	586.68

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

NM: Not Measured

Table 2
Summary of Field Parameters: October 2021
JC Weadock Bottom Ash Pond - RCRA CCR Monitoring Program
Essexville, Michigan

Sample Location	Sample Date	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (umhos/cm)	Temperature (°C)	Turbidity (NTU)
Background							
MW-15002	10/7/2021	0.50	-101.9	7.0	919	16.5	3.2
MW-15008	10/6/2021	0.46	-93.6	6.6	1,202	16.0	10.7
MW-15016	10/7/2021	0.54	-71.2	6.9	1,498	17.4	1.5
MW-15019	10/7/2012	0.48	-72.2	6.4	1,829	15.2	1.2
Weadock Bottom Ash Pond							
JCW-MW-15007	10/12/2021	0.48	-122.5	7.0	9,830	17.6	4.8
JCW-MW-15009	10/13/2021	0.55	-195.0	6.0	2,695	17.3	6.8
JCW-MW-15010	10/13/2021	0.46	-319.0	7.1	1,125	15.0	0.4
JCW-MW-15028	10/12/2021	0.40	-170.3	7.8	4,215	13.9	3.0

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

Table 3
Summary of Groundwater Sampling Results (Analytical): October 2021
DE Karn & JC Weadock Background – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	**MW-15002**	**MW-15008**	**MW-15016**	**MW-15019**
					Sample Date:	10/7/2021	10/6/2021	10/7/2021	10/7/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Background			
Appendix III[(1)]									
Boron	ug/L	NC	**500**	**500**	4,000	51	204	**661**	351
Calcium	mg/L	NC	NC	NC	500[EE]	76.8	116	236	165
Chloride	mg/L	**250****	**250[E]**	**250[E]**	**50**	**146**	**197**	**138**	**363**
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	500[EE]	3.76	11.6	**433**	58.3
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	290	**810**	**1,140**	**1,130**
pH, Field	SU	**6.5 - 8.5****	**6.5 - 8.5[E]**	**6.5 - 8.5[E]**	**6.5 - 9.0**	7.0	6.6	6.9	**6.4**
Appendix IV[(1)]									
Antimony	ug/L	6	6.0	6.0	2.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	10	10	10	3	3	8	3
Barium	ug/L	2,000	2,000	2,000	1,200	85	65	63	283
Beryllium	ug/L	4	4.0	4.0	33	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	< 1	2	< 1	< 1
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	14	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	< 10	30	85	15
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	120	< 5	< 5	7	< 5
Radium-226	pCi/L	NC	NC	NC	NC	0.775	1.05	0.934	1.42
Radium-228	pCi/L	NC	NC	NC	NC	< 0.582	1.11	< 0.478	< 0.424
Radium-226/228	pCi/L	5	NC	NC	NC	1.00	2.16	1.33	1.72
Selenium	ug/L	50	50	50	5.0	< 1	< 1	2	< 1
Thallium	ug/L	2	2.0	2.0	2.0	< 2	< 2	< 2	< 2
Additional MI Part 115[(2)]									
Iron	ug/L	**300****	**300[E]**	**300[E]**	500,000[EE]	**2,810**	**14,500**	**2,670**	**20,900**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	< 1	< 1	1	< 1
Nickel	ug/L	NC	100	100	120	4	6	14	7
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	62	27	< 2	**6**	< 2	2
Zinc	ug/L	5,000**	2,400	5,000[E]	260	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
pCi/L - picocuries per liter; SU - standard units; pH is a field parameter.
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April, 2012.
NC - no criteria.
* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020.
** - 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 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}.
(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 Groundwater Sampling Results (Analytical): October 2021
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	JCW-MW-15007	JCW-MW-15009	JCW-MW-15010	JCW-MW-15028
					Sample Date:	10/12/2021	10/13/2021	10/13/2021	10/12/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^				
Appendix III[(1)]									
Boron	ug/L	NC	**500**	**500**	4,000	**503**	289	**1,190**	**620**
Calcium	mg/L	NC	NC	NC	**500[EE]**	265	**615**	142	205
Chloride	mg/L	**250****	**250[E]**	**250[E]**	**50**	**2,820**	28.7	**50.7**	**974**
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	**500[EE]**	82.1	**1,410**	77	97
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	**5,070**	**2,400**	**667**	**2,360**
pH, Field	SU	**6.5 - 8.5****	**6.5 - 8.5[E]**	**6.5 - 8.5[E]**	**6.5 - 9.0**	7.0	**6.0**	7.1	7.8
Appendix IV[(1)]									
Antimony	ug/L	6	6.0	6.0	2.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	**17**	3	**22**	**11**
Barium	ug/L	2,000	2,000	2,000	**1,200**	**1,620**	23	221	363
Beryllium	ug/L	4	4.0	4.0	33	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	1	< 1	< 1	< 1
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	14	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	144	112	92	66
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	120	7	< 5	< 5	< 5
Radium-226	pCi/L	NC	NC	NC	NC	1.35	0.388	0.389	0.819
Radium-228	pCi/L	NC	NC	NC	NC	1.63	0.922	0.858	1.19
Radium-226/228	pCi/L	5	NC	NC	NC	2.98	1.31	1.25	2.00
Selenium	ug/L	50	50	50	5.0	< 1	< 1	< 1	< 1
Thallium	ug/L	2	2.0	2.0	2.0	< 2	< 2	< 2	< 2
Additional MI Part 115[(2)]									
Iron	ug/L	**300****	**300[E]**	**300[E]**	500,000[EE]	**3,600**	**17,100**	< 20	**829**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	3	2	< 1	< 1
Nickel	ug/L	NC	100	100	120	18	33	9	11
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	62	27	**12**	< 2	< 2	**6**
Zinc	ug/L	5,000**	2,400	5,000[E]	260	< 10	< 10	< 10	15

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
pCi/L - picocuries per liter; SU - standard units; pH is a field parameter.
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April, 2012.
NC - no criteria.
* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020.
** - 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) 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 5
Summary of Groundwater Protection Standard Exceedances – October 2021
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

Constituent	Units	GWPS	JCW-MW-15007		JCW-MW-15009		JCW-MW-15010	
			LCL	UCL	LCL	UCL	LCL	UCL
Arsenic	ug/L	21	15	49	--	--	4.1	17
Barium	ug/L	2,000	890	1,800	--	--	--	--
Beryllium	ug/L	4	--	--	1.0	6.6	--	--
Lithium	ug/L	180	--	--	41	200	--	--

Notes:

ug/L - micrograms per Liter

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

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

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

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

Figures

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:	A. ADAIR
CHECKED BY:	J. KRENZ
APPROVED BY:	D. LITZ
DATE:	JULY 2021
PROJ. NO.:	418426.0000
FILE:	418426-102-004.mxd

FIGURE 1

S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\3_WEADOCK\2021_MXDs\2021_002_MAY\418426-102-004.mxd -- Saved By: AADAIR on 7/29/2021, 11:56:38 AM

LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING WELL
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL
- SLURRY WALL (APPROXIMATE)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).

N

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:

CONSUMERS ENERGY COMPANY
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:

SITE MAP

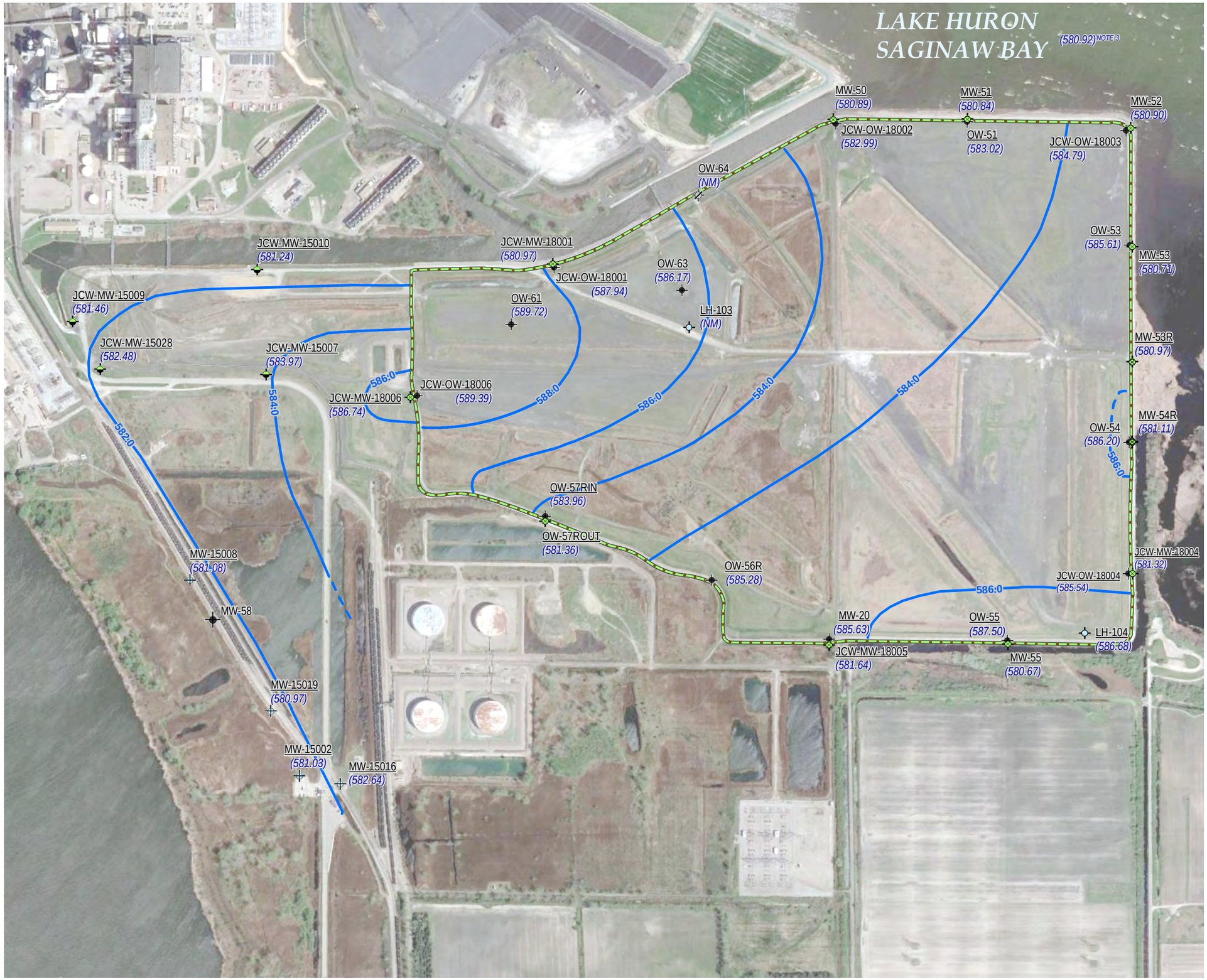
DRAWN BY:	A. ADAIR	PROJ NO.:	418426.0000
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		**FIGURE 2**
DATE:	JULY 2021		

TRC

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

FILE NO.: 418426-102-000.mxd

Plot Date: 7/29/2021, 11:58:15 AM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 2697673 WEADOCK\2021 MXDs\2021 002 MAY\418426-102-000.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS



LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVELS ONLY)
- DECOMMISSIONED MONITORING WELL
- SLURRY WALL (APPROXIMATE)
- GROUNDWATER ELEVATION CONTOUR (2' INTERVAL, DASHED WHERE INFERRED)
- (580.85) GROUNDWATER ELEVATION (FEET)
- (NM) NOT MEASURED

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018.
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
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:

POTENTIOMETRIC SURFACE MAP
OCTOBER 2021

DRAWN BY:	A. ADAIR	PROJ NO.:	418426.0000
CHECKED BY:	J. KRENZ		**FIGURE 3**
APPROVED BY:	D. LITZ		
DATE:	JANUARY 2022		

TRC

1540 Eisenhower Place
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FILE NO.: 418426-401-003_af.mxd

Plot Date: 1/27/2022, 15:00:09 PM by AFOJTIK -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 2897673 WEADOCK\2021 MXDs\2021 004 OCTOBER\418426-401-003 af.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

Appendix A
Data Quality Reviews

Laboratory Data Quality Review
Groundwater Monitoring Event October 2021
JC Weadock/Karn DEK Background

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, located 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) 21-1171 and 240-157750-1.

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

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

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Chloride, Fluoride, Sulfate)	EPA 300.0
Total Dissolved Solids	SM 2540C
Total Metals	SW-846 6020B/7470A
Alkalinity	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 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, field blanks, and equipment 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 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. Radium was not detected in the method blanks.
- One equipment blank (EB-04) and one field blank (FB-MW-15002) were collected. Total metals and anions were not detected in the field blank sample. Radium 226 (0.666 pCi/L), radium 228 (0.649 pCi/L), and combined radium (1.31 pCi/L) were detected in EB-04; positive detections for radium 226, radium 228, and combined radium in groundwater

samples are potentially false positive results as summarized in the attached table, Attachment 1.

- 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 (72-125%); 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.
- The field duplicate pair samples were DUP-Background/DUP-04 and MW-15019; all criteria were met.
- 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 October 2021
JC Weadock/Karn DEK Background

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, located 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) 21-1171 and 240-157750-1.

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

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

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Chloride, Fluoride, Sulfate)	EPA 300.0
Total Dissolved Solids	SM 2540C
Total Metals	SW-846 6020B/7470A
Alkalinity	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 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, field blanks, and equipment 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 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. Radium was not detected in the method blanks.
- One equipment blank (EB-04) and one field blank (FB-MW-15002) were collected. Total metals and anions were not detected in the field blank sample. Radium 226 (0.666 pCi/L), radium 228 (0.649 pCi/L), and combined radium (1.31 pCi/L) were detected in EB-04; positive detections for radium 226, radium 228, and combined radium in groundwater

samples are potentially false positive results as summarized in the attached table, Attachment 1.

- 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 (72-125%); 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.
- The field duplicate pair samples were DUP-Background/DUP-04 and MW-15019; all criteria were met.
- 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 Porewater Analytical Data
DE Karn & JC Weadock – Background Wells
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
MW-15002	10/7/2021	Radium 226, Combined Radium	Potential false positive results due to equipment blank contamination.
MW-15008	10/6/2021		
MW-15016	10/7/2021		
MW-15019	10/7/2021		
DUP-04	10/7/2021		
MW-15008	10/6/2021	Radium 228	Potential false positive results due to equipment blank contamination.
EB-04	10/7/2021	Radium 228	Percent recovery in LCS above criteria; results are potentially biased high.
MW-15008	10/6/2021		

Laboratory Data Quality Review
Groundwater Monitoring Event October 2021
JC Weadock Bottom Ash Pond

Groundwater samples were collected by TRC for the October 2021 sampling event. Samples were analyzed for total metals, anions, alkalinity, and total dissolved solids 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) 21-1172 and 240-157983-1.

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

- JCW-MW-15007
- JCW-MW-15009
- JCW-MW-15010
- JCW-MW-15028

Each sample was analyzed for the following constituents:

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

This data usability report addresses the following items:

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

Review Summary

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

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

QA/QC Sample Summary

- A method blank was analyzed with each analytical batch for radium. Radium was not detected in the method blanks.
- LCS/LCSDs were analyzed with each batch for radium. All criteria were met.
- Two equipment blanks (EB-JCW-BAP, EB-02) and one field blank (FB-JCW-BAP) were collected. Total metals and radium were not detected in the equipment blank samples and total metals was not detected in the field blank.

- MS and MSD analyses were performed on sample JCW-MW-15009 for total metals, anions, and alkalinity. The recovery of iron (129%) in the MSD was outside of the acceptance criteria; this was likely due to the concentration of iron in the unspiked sample relative to the amount spiked and therefore there is likely no impact on data usability due to this issue. 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 recoveries were generally within the acceptance limits, there is no impact on data usability due to this issue.
- The field duplicate pair samples were DUP-JCW-BAP/DUP-02 and JCW-MW-15007; all criteria between the parent and duplicate sample were within the QC limits with the following exception.
  - The RPD for arsenic (90%) was above acceptance criteria; detections of arsenic in all groundwater samples are estimated as summarized in the attached table, attachment 1.
- 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 October 2021
JC Weadock Bottom Ash Pond

Groundwater samples were collected by TRC for the October 2021 sampling event. Samples were analyzed for total metals, anions, alkalinity, and total dissolved solids 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) 21-1172 and 240-157983-1.

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

- JCW-MW-15007
- JCW-MW-15009
- JCW-MW-15010
- JCW-MW-15028

Each sample was analyzed for the following constituents:

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

This data usability report addresses the following items:

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

Review Summary

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

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

QA/QC Sample Summary

- A method blank was analyzed with each analytical batch for radium. Radium was not detected in the method blanks.
- LCS/LCSDs were analyzed with each batch for radium. All criteria were met.
- Two equipment blanks (EB-JCW-BAP, EB-02) and one field blank (FB-JCW-BAP) were collected. Total metals and radium were not detected in the equipment blank samples and total metals was not detected in the field blank.

- MS and MSD analyses were performed on sample JCW-MW-15009 for total metals, anions, and alkalinity. The recovery of iron (129%) in the MSD was outside of the acceptance criteria; this was likely due to the concentration of iron in the unspiked sample relative to the amount spiked and therefore there is likely no impact on data usability due to this issue. 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 recoveries were generally within the acceptance limits, there is no impact on data usability due to this issue.
- The field duplicate pair samples were DUP-JCW-BAP/DUP-02 and JCW-MW-15007; all criteria between the parent and duplicate sample were within the QC limits with the following exception.
  - The RPD for arsenic (90%) was above acceptance criteria; detections of arsenic in all groundwater samples are estimated as summarized in the attached table, attachment 1.
- 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
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
JCW-MW-15007	10/12/2021	Arsenic	Potential uncertainty due to field duplicate variability
JCW-MW-15009	10/13/2021		
JCW-MW-15010	10/13/2021		
JCW-MW-15028	10/13/2021		
DUP-JCW-BAP	10/12/2021		

Appendix B
Statistical Evaluation of October 2021 Assessment Monitoring Sampling Event

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Technical Memorandum

Date:	January 28, 2022
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC Alex Eklund, TRC
Project No.:	418426.0001 Phase 002, Task 002
Subject:	Statistical Evaluation of October 2021 Assessment Monitoring Sampling Event JC Weadock Bottom Ash Pond, Consumers Energy Company, Essexville, Michigan

During the statistical evaluation of the initial assessment monitoring event (May 2018), beryllium and lithium were present in one or more downgradient monitoring wells at statistically significant levels exceeding the Groundwater Protection Standards (GWPSs). Therefore, Consumers Energy Company (Consumers Energy) initiated an Assessment of Corrective Measures (ACM) within 90 days from when the Appendix IV exceedance was determined. The ACM was completed on September 11, 2019.

Currently, Consumers Energy is continuing semiannual assessment monitoring in accordance with §257.95 of the CCR Rule[1] at the JC Weadock Power Plant Bottom Ash Pond. The second semiannual assessment monitoring event for 2021 was conducted on October 4 through 13, 2021. In accordance with §257.95, the assessment monitoring data must be compared to GWPSs to determine whether or not Appendix IV constituents are detected at statistically significant levels above the GWPSs. GWPSs were established in accordance with §257.95(h), as detailed in the October 15, 2018 Groundwater Protection Standards technical memorandum, which was also included in the 2018 Annual Groundwater Monitoring Report (TRC, January 2019). The following narrative describes the methods employed and the results obtained and the Sanitas™ output files are included as an attachment.

The statistical evaluation of the second semiannual 2021 assessment monitoring event data indicates that no constituents are present at statistically significant levels that exceed the GWPSs in downgradient monitoring wells at the Weadock Bottom Ash Pond.

Constituent	GWPS	#Downgradient Wells Observed

No constituents are present at statistically significant levels above the GWPSs.

Both beryllium and lithium at downgradient well JCW-MW-15009 were previously present at statistically significant levels; however, the October 2021 statistical evaluation shows that the lower confidence limits for lithium and beryllium are currently below the GWPSs. Beryllium and lithium have not been present at statistically significant levels since the first semiannual event of 2019. Although no Appendix

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

IV constituents are present at statistically significant levels above the GWPS based on this data evaluation, corrective action has been triggered as a result of data collected during the previous assessment monitoring events. Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97. Once a final remedy is selected, an attainment monitoring program will be developed and used to demonstrate compliance with the GWPSs established under § 257.95(h) by showing that concentrations of constituents listed in Appendix IV to this part are below the GWPSs (i.e. upper confidence limit below GWPSs) for a period of three consecutive years using the statistical procedures and performance standards in § 257.93(f) and (g). Consumers Energy will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

Assessment Monitoring Statistical Evaluation

The four downgradient wells (JCW-MW-15007, JCW-MW-15009, JCW-MW-15010, and JCW-MW-15028) are located in accessible areas along the downgradient perimeter of the Weadock Bottom Ash Pond. Following the assessment monitoring sampling event, compliance well data for the Weadock Bottom Ash Pond were evaluated in accordance with the Groundwater Statistical Evaluation Plan (Stats Plan) (TRC, October 2017).

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

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

For each detected Appendix IV constituent, the concentrations from each well were first compared directly to the GWPS, as shown on Table 1. Parameter-well combinations that included a direct

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

exceedance of the GWPS within the past eight sampling events (May 2018 through October 2021) were retained for further analysis. Arsenic at JCW-MW-15007 and JCW-MW-15010, barium at JCW-MW-15007, and beryllium and lithium at JCW-MW-15009 had individual results exceeding their respective GWPSs within this time period.

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

The statistical data evaluation included the following steps:

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

The results of these evaluations are presented and discussed below.

Data from each round were evaluated for completeness, overall quality, and usability and were deemed appropriate for the purposes of the CCR assessment monitoring program. Initially, the assessment monitoring results (May 2018 through October 2021) were observed visually for potential trends. No outliers or visual trends were identified. The decreases in constituent concentrations at JCW-MW-15009 are causing the confidence intervals to widen. Calculating a confidence interval around a trending data set incorporates not only variability present naturally in the underlying dataset, but also incorporates variability due to the trend itself. Beryllium and lithium concentrations have already triggered assessment monitoring (e.g., not newly identified GWPS exceedances) and an interim measure has been initiated through cessation of hydraulic loading to the bottom ash pond in April 2018; therefore, traditional confidence interval calculations are presented in this statistical evaluation until more data are available. Once additional data are collected in the absence of hydraulic loading, confidence bands may be a more appropriate assessment to determine compliance with the CCR Rule. Confidence bands are selected by the Unified Guidance as the appropriate method for calculating confidence intervals on trending data. A confidence band calculates upper and lower confidence limits at each point along the trend to reduce variability and create a narrower confidence interval. At least 8

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

to 10 measurements should be available when computing a confidence band around a linear regression.

The Sanitas™ software was then used to test compliance at the downgradient monitoring wells using the confidence interval method for the most recent 8 sampling events. Eight independent sampling events provide the appropriate density of data as recommended per the Unified Guidance yet are collected recently enough to provide an indication of current condition. The tests were run with a per-test significance of $\alpha = 0.01$. The software outputs are included in Attachment 1 along with data reports showing the values used for the evaluation. The percentage of non-detect observations are also included in Attachment 1. Non-detect data was handled in accordance with the Stats Plan for the purposes of calculating the confidence intervals.

The Sanitas™ software generates an output that includes graphs of the parametric or non-parametric confidence intervals for each well along with notes data transformations, as appropriate. The data sets for arsenic at JCW-MW-15007 and JCW-MW-15010 and lithium at JCW-MW-15009 were found to be normally distributed. Barium at JCW-MW-15007 was normalized using a natural log transformation. A non-parametric confidence interval was used for beryllium at JCW-MW-15009 due to a high percentage of non-detects in the dataset. The confidence interval test compares the lower confidence limit to the GWPS. The statistical evaluation of the Appendix IV parameters shows no constituents present at statistically significant levels that exceed the GWPSs. The results of the assessment monitoring statistical evaluation are consistent with the previous (May 2021) assessment monitoring data statistical evaluation. Although no Appendix IV constituents are present at statistically significant levels above the GWPS based on this data evaluation, corrective action has been triggered as a result of data collected during the previous assessment monitoring events. Compliance with the GWPSs established under § 257.95(h) will be achieved by demonstrating that concentrations of constituents listed in Appendix IV to this part have not exceeded the GWPSs (i.e. upper confidence limit is below GWPS) for a period of three consecutive years using the statistical procedures and performance standards in § 257.93(f) and (g). Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97. Consumers Energy will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

Attachments

Table 1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2018 to October 2021

Attachment 1 Sanitas™ Output Files

Table

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2018 to October 2021
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	JCW-MW-15007										
					Sample Date:	5/23/2018	11/7/2018	4/9/2019	10/15/2019	10/15/2019	5/14/2020	10/13/2020	5/12/2021	5/12/2021	10/12/2021	10/12/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS											
Appendix III										Field Dup				Field Dup		Field Dup
Boron	ug/L	NC	NA	619	NA	308	656	290	470	460	335	329	233	240	503	532
Calcium	mg/L	NC	NA	302	NA	145	153	200	130	120	217	413	280	294	265	267
Chloride	mg/L	250*	NA	2,440	NA	1,660	788	1,600	1,200	1,200	2,870	5,810	3,780	3,830	2,820	2,790
Fluoride	ug/L	4,000	NA	1,000	NA	< 1,000	< 1,000	< 10,000 (1)	< 5,000(1)	< 5,000(1)	< 1,000	1,160	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA	19.6	23.9	< 20	44	43	57.2	4.47	29.0	29.8	82.1	82.5
Total Dissolved Solids	mg/L	500*	NA	4,600	NA	3,210	1,790	3,400	2,300	2,400	5,080	11,200	7,200	7,280	5,070	4,920
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA	7.2	7.1	7.2	7.1	--	7.6	7.3	7.1	--	7.0	--
Appendix IV																
Antimony	ug/L	6	NA	1	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**	**25.6**	**46.3**	9.8	**34**	**35**	19	**61**	**31**	**31**	17	**45**
Barium	ug/L	2,000	NA	1,300	**2,000**	941	1,060	950	970	970	1,180	**2,400**	1,680	1,670	1,620	1,590
Beryllium	ug/L	4	NA	1	**4**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 1.0	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1	1	< 1	< 1	1	1
Cobalt	ug/L	NC	6	15	15	< 15.0	< 30.0 (1)	< 6.0	< 6.0	< 6.0	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000	< 1,000	< 1,000	< 10,000 (1)	< 5,000(1)	< 5,000(1)	< 1,000	1,160	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	**180**	88	87	67	70	67	103	94	70	69	144	151
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100	7.6	< 25.0	6.2	9.7	9.6	< 5	< 5	8	8	7	7
Radium-226	pCi/L	NC	NA	NA	NA	0.239	1.33	0.628	0.659	0.442	0.728	1.71	1.32	1.01	1.35	1.02
Radium-228	pCi/L	NC	NA	NA	NA	0.795	0.975	0.492	0.796	0.543	0.698	1.67	1.27	1.43	1.63	1.66
Radium-226/228	pCi/L	5	NA	3.32	5	1.03	2.31	1.12	1.45	0.986	1.43	3.38	2.59	2.45	2.98	2.68
Selenium	ug/L	50	NA	2	50	< 1.0	< 1.0	3.2	< 1.0	< 1.0	< 1	< 1	4	3	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2.0	< 10.0 (1)	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

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

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2018 to October 2021
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	JCW-MW-15009							
					Sample Date:	5/23/2018	11/7/2018	4/9/2019	10/15/2019	5/14/2020	10/13/2020	5/12/2021	10/13/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS								
Appendix III													
Boron	ug/L	NC	NA	619	NA	297	422	290	330	141	263	255	289
Calcium	mg/L	NC	NA	302	NA	530	589	510	520	314	560	574	615
Chloride	mg/L	250*	NA	2,440	NA	41	64.9	43	18	3.19	5.96	14.8	28.7
Fluoride	ug/L	4,000	NA	1,000	NA	< 1,000	< 1,000	< 2,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA	1,690	1,980	1,600	1,400	611	1,060	1,450	1,410
Total Dissolved Solids	mg/L	500*	NA	4,600	NA	2,510	2,620	2,400	2,100	1,370	1,910	2,230	2,400
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA	4.9	4.8	5.4	6.1	7.2	6.6	5.6	6.0
Appendix IV													
Antimony	ug/L	6	NA	1	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**	1.4	< 5.0	< 1.0	< 1.0	< 1	1	< 1	3
Barium	ug/L	2,000	NA	1,300	**2,000**	14.4	14.8	14	66	58	51	23	23
Beryllium	ug/L	4	NA	1	**4**	**6.5**	**6.6**	**4.3**	< 1.0	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 1.0	0.24	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100	1.4	< 5.0	1.4	< 1.0	2	< 1	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 15.0	< 30.0 (1)	< 6.0	< 6.0	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000	< 1,000	< 1,000	< 2,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15	< 1.0	< 5.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	**180**	**190**	**240**	150	94	18	53	89	112
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100	< 5.0	< 25.0	< 5.0	9.3	10	9	< 5	< 5
Radium-226	pCi/L	NC	NA	NA	NA	< 0.723	< 0.803	< 0.0879	0.175	< 0.125	< 0.352	0.333	0.388
Radium-228	pCi/L	NC	NA	NA	NA	1.11	1.25	< 0.411	0.548	< 0.491	< 0.495	0.72	0.922
Radium-226/228	pCi/L	5	NA	3.32	5	< 1.37	< 1.54	< 0.411	0.723	< 0.491	< 0.495	1.05	1.31
Selenium	ug/L	50	NA	2	50	5.2	< 5.0	2.0	2.0	1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2.0	< 10.0 (1)	< 2.0	< 2.0	< 2	< 2	< 2	< 2

Notes:

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

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2018 to October 2021
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	JCW-MW-15010									
					Sample Date:	5/22/2018	5/22/2018	11/7/2018	4/9/2019	10/14/2019	5/14/2020	10/13/2020	10/13/2020	5/11/2021	10/13/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS										
Appendix III							Field Dup						Field Dup		
Boron	ug/L	NC	NA	619	NA	1,330	1,220	1,360	1,400	1,400	2,070	2,000	2,030	1,080	1,190
Calcium	mg/L	NC	NA	302	NA	78.3	78.8	84.4	120	110	286	218	204	128	142
Chloride	mg/L	250*	NA	2,440	NA	99.8	99.7	96.5	140	140	90.4	105	106	67.8	50.7
Fluoride	ug/L	4,000	NA	1,000	NA	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA	24.3	23.2	22.3	36	30	553	254	255	74.7	77
Total Dissolved Solids	mg/L	500*	NA	4,600	NA	458	486	492	670	600	1,500	982	997	607	667
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA	7.5	--	7.4	7.6	7.3	7.7	7.1	--	7.2	7.1
Appendix IV															
Antimony	ug/L	6	NA	1	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**	11.4	11.1	9.5	16	13	4	4	4	6	**22**
Barium	ug/L	2,000	NA	1,300	**2,000**	123	116	114	190	180	400	220	221	148	221
Beryllium	ug/L	4	NA	1	**4**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100	< 1.0	< 1.0	1.2	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 15.0	< 15.0	< 6.0	< 6.0	< 6.0	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	**180**	72	72	70	73	84	116	96	97	70	92
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NA	NA	NA	< 0.618	< 0.668	< 0.879	0.215	< 0.134	0.409	< 0.442	< 0.445	< 0.410	0.389
Radium-228	pCi/L	NC	NA	NA	NA	< 0.741	< 0.701	< 0.776	0.424	0.412	< 0.467	< 0.493	< 0.566	0.700	0.858
Radium-226/228	pCi/L	5	NA	3.32	5	< 1.36	< 1.37	< 1.66	0.639	0.536	0.781	< 0.493	< 0.566	0.898	1.25
Selenium	ug/L	50	NA	2	50	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2

Notes:

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

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2018 to October 2021
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	JCW-MW-15028										
					Sample Date:	5/23/2018	11/7/2018	11/7/2018	4/9/2019	4/9/2019	10/14/2019	5/14/2020	5/14/2020	10/13/2020	5/12/2021	10/12/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS											
Appendix III								Field Dup		Field Dup			Field Dup			
Boron	ug/L	NC	NA	619	NA	444	517	525	530	560	550	570	562	644	563	620
Calcium	mg/L	NC	NA	302	NA	125	153	153	170	180	170	205	204	221	235	205
Chloride	mg/L	250*	NA	2,440	NA	69.5	352	347	660	650	640	823	806	811	921	974
Fluoride	ug/L	4,000	NA	1,000	NA	< 1,000	< 1,000	< 1,000	< 2,000	< 2,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA	32.2	111	110	120	120	120	128	122	99.8	102	97
Total Dissolved Solids	mg/L	500*	NA	4,600	NA	1,030	976	966	1,800	1,800	1,500	2,210	2,240	2,070	2,130	2,360
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA	8.0	7.9	--	8.0	--	7.8	8.1	--	7.9	7.7	7.8
Appendix IV																
Antimony	ug/L	6	NA	1	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**	< 1.0	< 1.0	1.1	1.1	1.1	< 1.0	< 1	1	< 1	3	11
Barium	ug/L	2,000	NA	1,300	**2,000**	148	156	158	250	240	230	324	331	332	342	363
Beryllium	ug/L	4	NA	1	**4**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 15.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000	< 1,000	< 1,000	< 1,000	< 2,000	< 2,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	2	< 1	< 1
Lithium	ug/L	NC	40	180	**180**	48	51	49	53	51	48	60	60	53	51	66
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NA	NA	NA	< 0.739	1.13	0.786	0.621	0.384	0.576	0.515	< 0.136	0.697	0.621	0.819
Radium-228	pCi/L	NC	NA	NA	NA	< 0.676	< 0.685	<0.591	0.729	0.658	0.585	0.733	< 0.399	< 0.468	0.997	1.19
Radium-226/228	pCi/L	5	NA	3.32	5	< 1.42	1.60	1.26	1.35	1.04	1.16	1.25	< 0.399	1.15	1.62	2.00
Selenium	ug/L	50	NA	2	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2

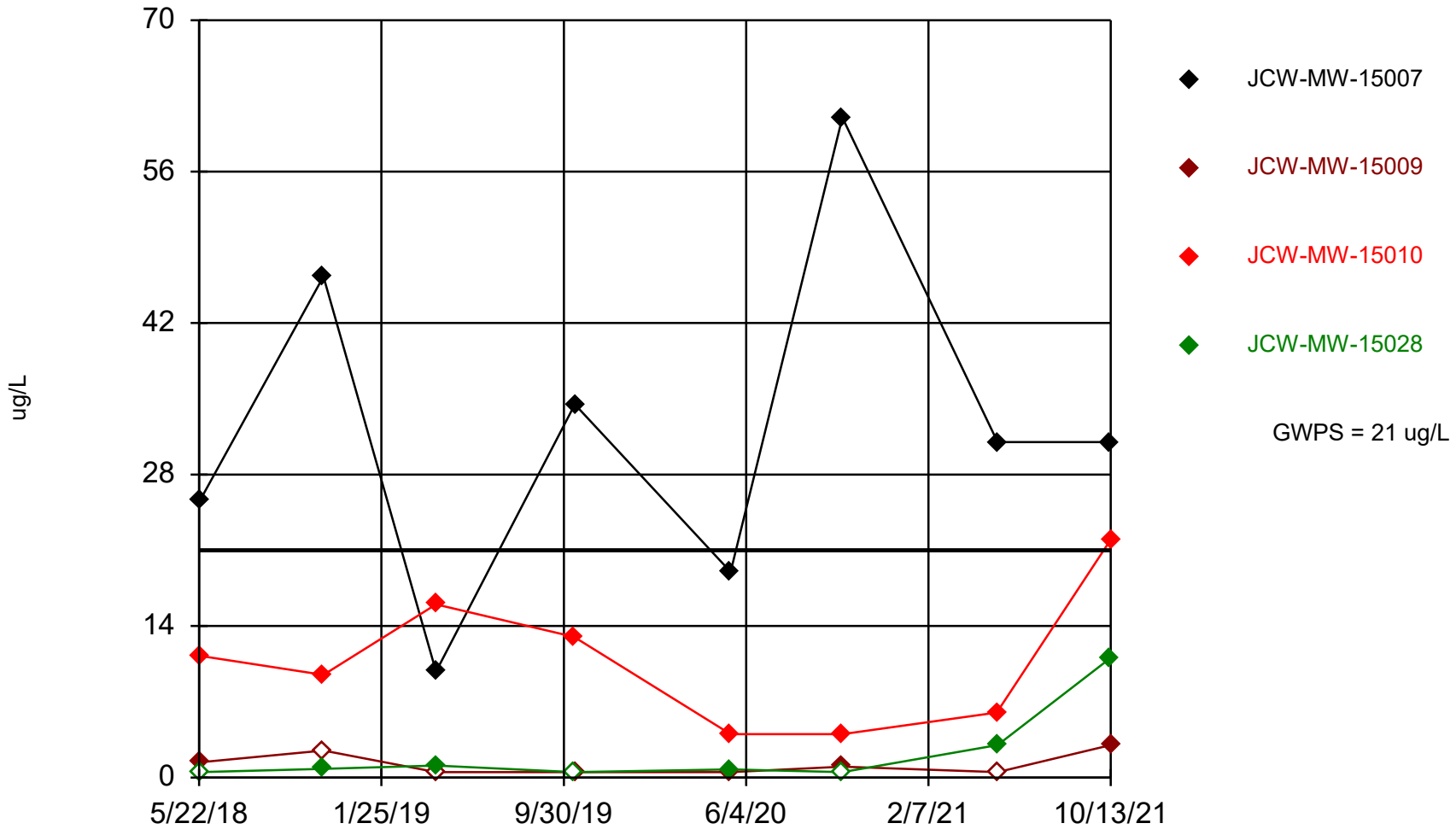
Notes:

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

Attachment 1
Sanitas™ Output Files

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

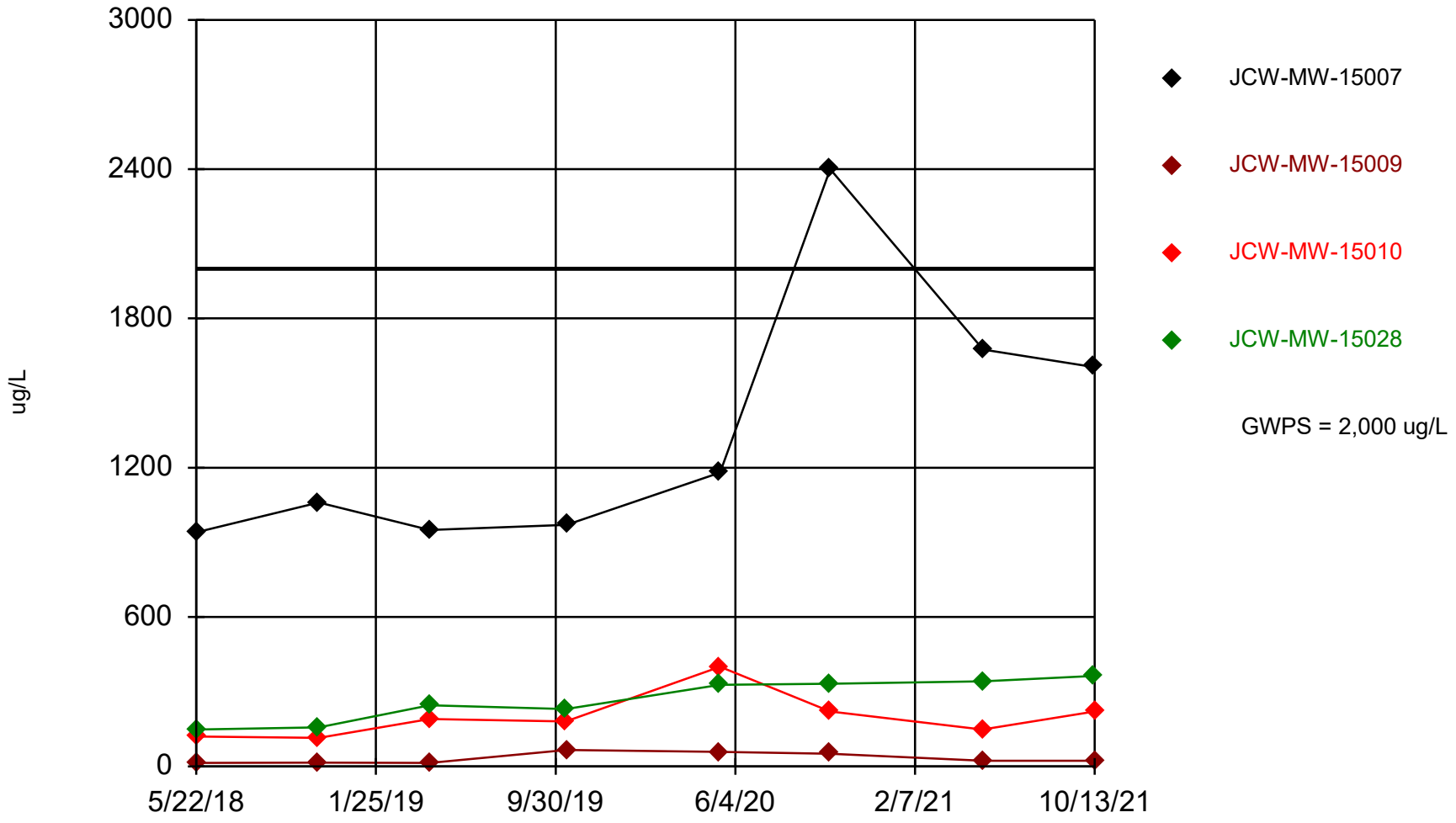
Arsenic Comparison to GWPS



Time Series Analysis Run 12/7/2021 1:46 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Barium Comparison to GWPS

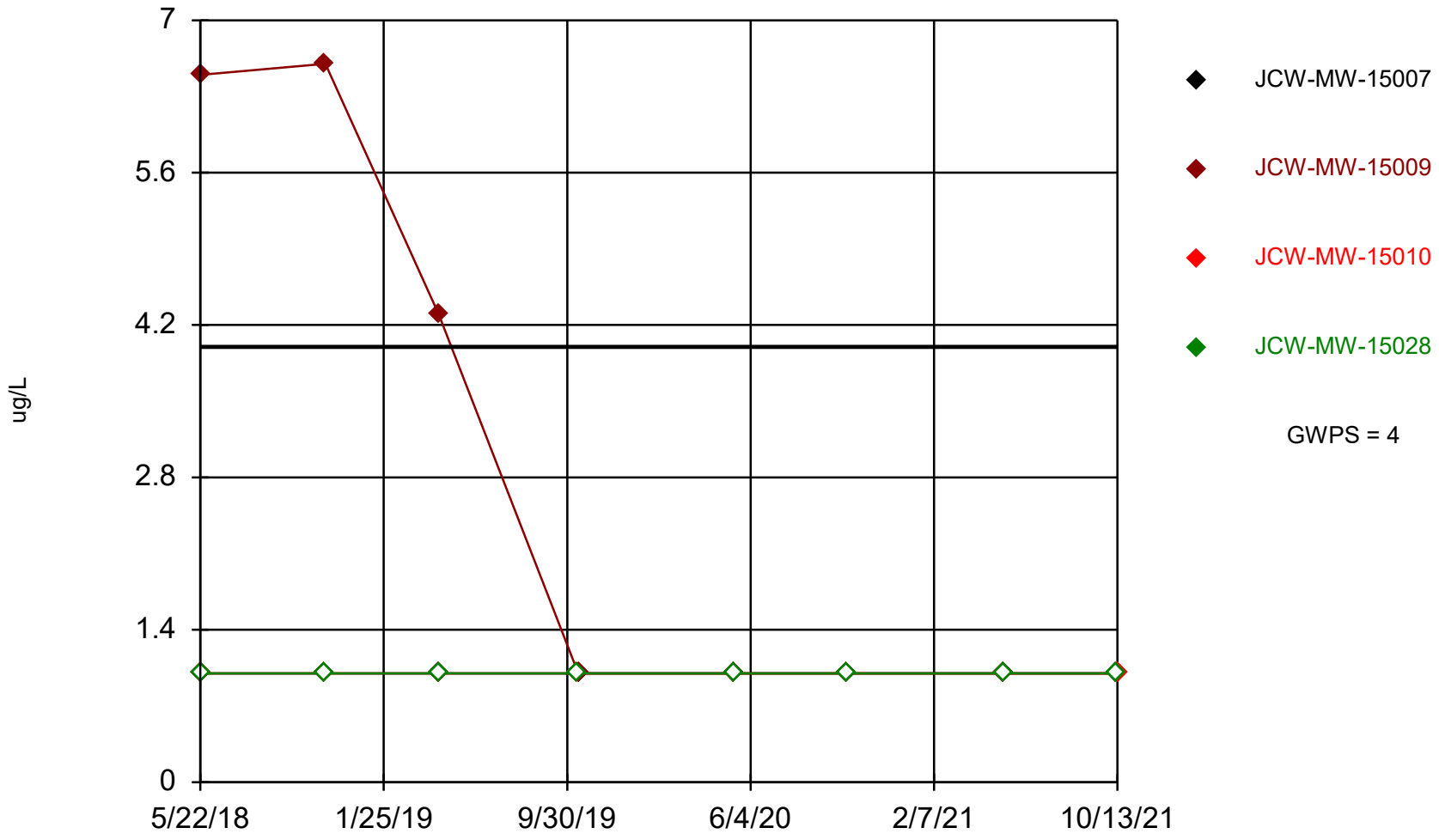


Time Series Analysis Run 12/7/2021 1:47 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

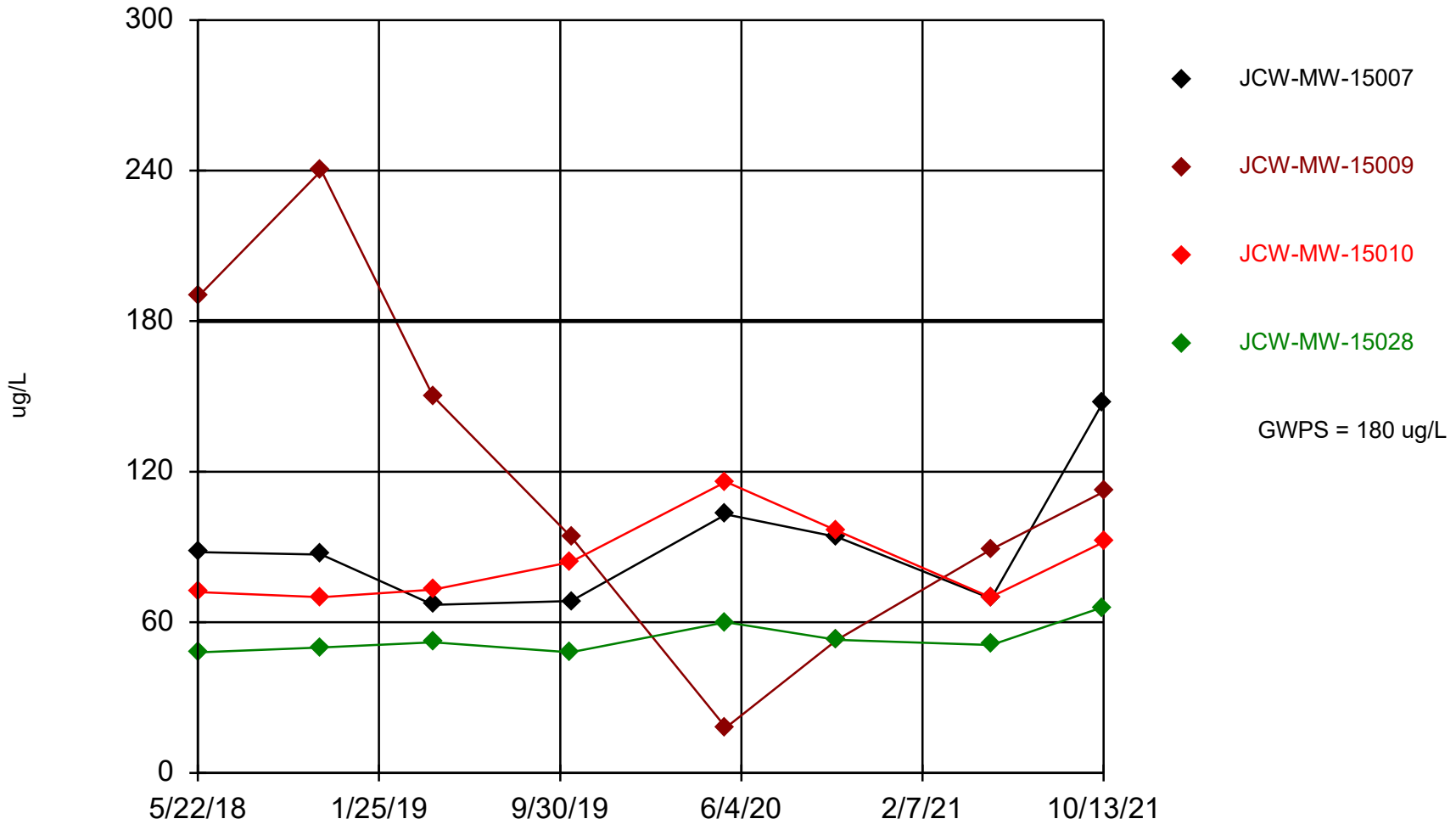
Beryllium Comparison to GWPS



Time Series Analysis Run 12/8/2021 11:13 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Lithium Comparison to GWPS



Time Series Analysis Run 12/7/2021 1:49 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Summary Report

Constituent: Arsenic, Total Analysis Run 12/7/2021 1:52 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

For observations made between 5/22/2018 and 10/13/2021, a summary of the selected data set:

Observations = 32
ND/Trace = 8
Wells = 4
Minimum Value = 0.5
Maximum Value = 61
Mean Value = 11.63
Median Value = 4
Standard Deviation = 15.15
Coefficient of Variation = 1.303
Skewness = 1.643

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-15007	8	0	9.8	61	32.28	31	15.84	0.4907	0.4796
JCW-MW-15009	8	5	0.5	3	1.238	0.75	0.997	0.8057	0.905
JCW-MW-15010	8	0	4	22	10.72	10.38	6.264	0.5844	0.5477
JCW-MW-15028	8	3	0.5	11	2.269	0.775	3.625	1.598	2.056

Summary Report

Constituent: Barium, Total Analysis Run 12/7/2021 1:52 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

For observations made between 5/22/2018 and 10/13/2021, a summary of the selected data set:

Observations = 32
ND/Trace = 0
Wells = 4
Minimum Value = 14
Maximum Value = 2400
Mean Value = 462
Median Value = 220.8
Standard Deviation = 583.9
Coefficient of Variation = 1.264
Skewness = 1.743

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-15007	8	0	941	2400	1348	1120	515.2	0.3823	1.123
JCW-MW-15009	8	0	14	66	33.03	23	21.63	0.6551	0.5404
JCW-MW-15010	8	0	114	400	199.1	185	90.98	0.4569	1.392
JCW-MW-15028	8	0	148	363	268.1	286.3	85.22	0.3179	-0.3546

Summary Report

Constituent: Beryllium, Total Analysis Run 12/7/2021 1:52 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

For observations made between 5/22/2018 and 10/13/2021, a summary of the selected data set:

Observations = 32
ND/Trace = 29
Wells = 4
Minimum Value = 0.5
Maximum Value = 6.6
Mean Value = 0.9969
Median Value = 0.5
Standard Deviation = 1.604
Coefficient of Variation = 1.609
Skewness = 2.979

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-15007	8	8	0.5	0.5	0.5	0.5	0	0	NaN
JCW-MW-15009	8	5	0.5	6.6	2.488	0.5	2.83	1.138	0.6798
JCW-MW-15010	8	8	0.5	0.5	0.5	0.5	0	0	NaN
JCW-MW-15028	8	8	0.5	0.5	0.5	0.5	0	0	NaN

Summary Report

Constituent: Lithium, Total Analysis Run 12/7/2021 1:52 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

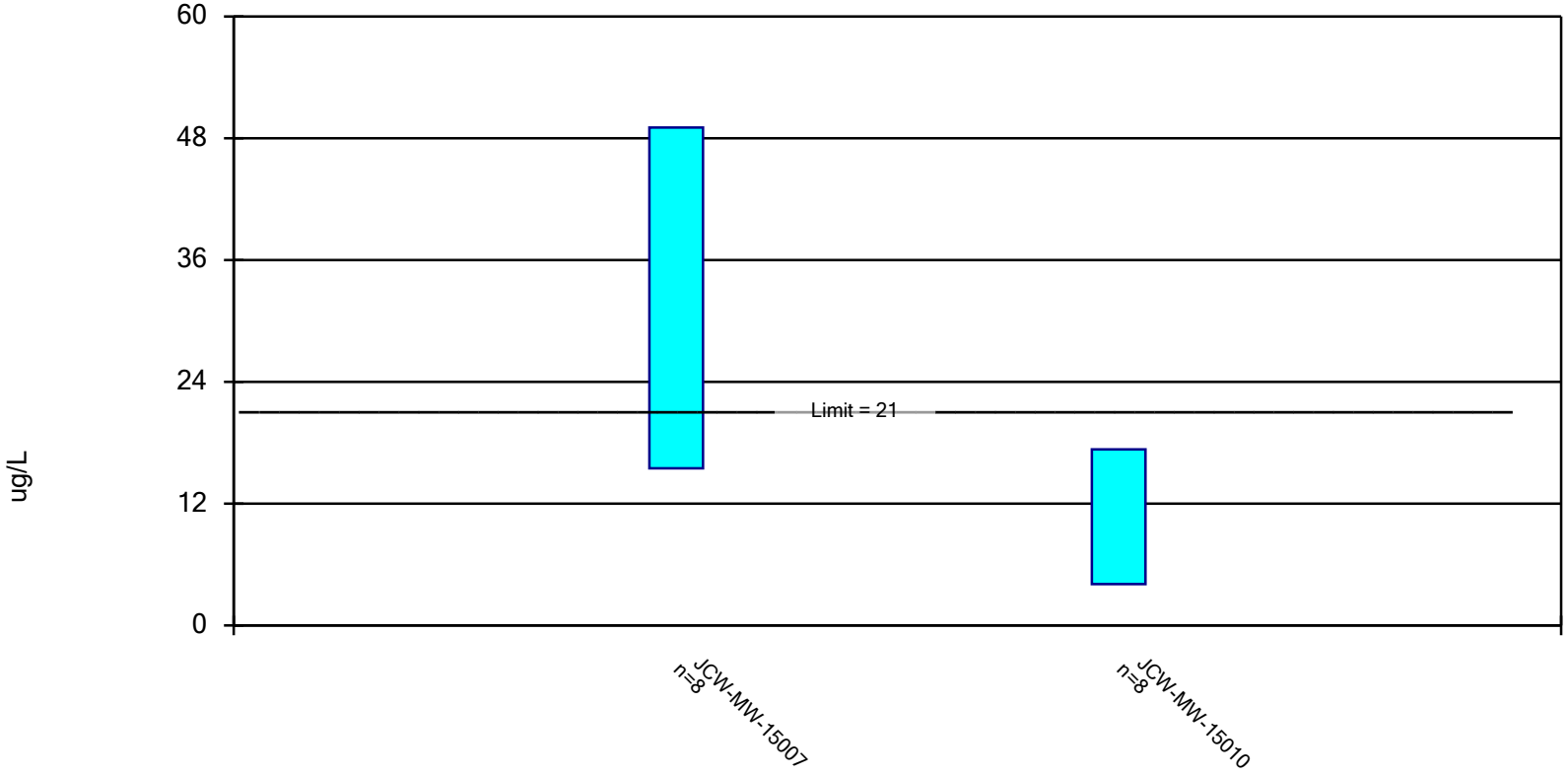
For observations made between 5/22/2018 and 10/13/2021, a summary of the selected data set:

Observations = 32
ND/Trace = 0
Wells = 4
Minimum Value = 18
Maximum Value = 240
Mean Value = 86.63
Median Value = 72.5
Standard Deviation = 44.29
Coefficient of Variation = 0.5113
Skewness = 1.708

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-15007	8	0	67	147.5	90.56	87.5	26.49	0.2925	1.259
JCW-MW-15009	8	0	18	240	118.3	103	72.48	0.6129	0.3535
JCW-MW-15010	8	0	70	116	84.19	78.5	16.48	0.1957	0.8742
JCW-MW-15028	8	0	48	66	53.5	51.5	6.325	0.1182	1.107

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, Total Analysis Run 12/8/2021 11:20 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Confidence Interval

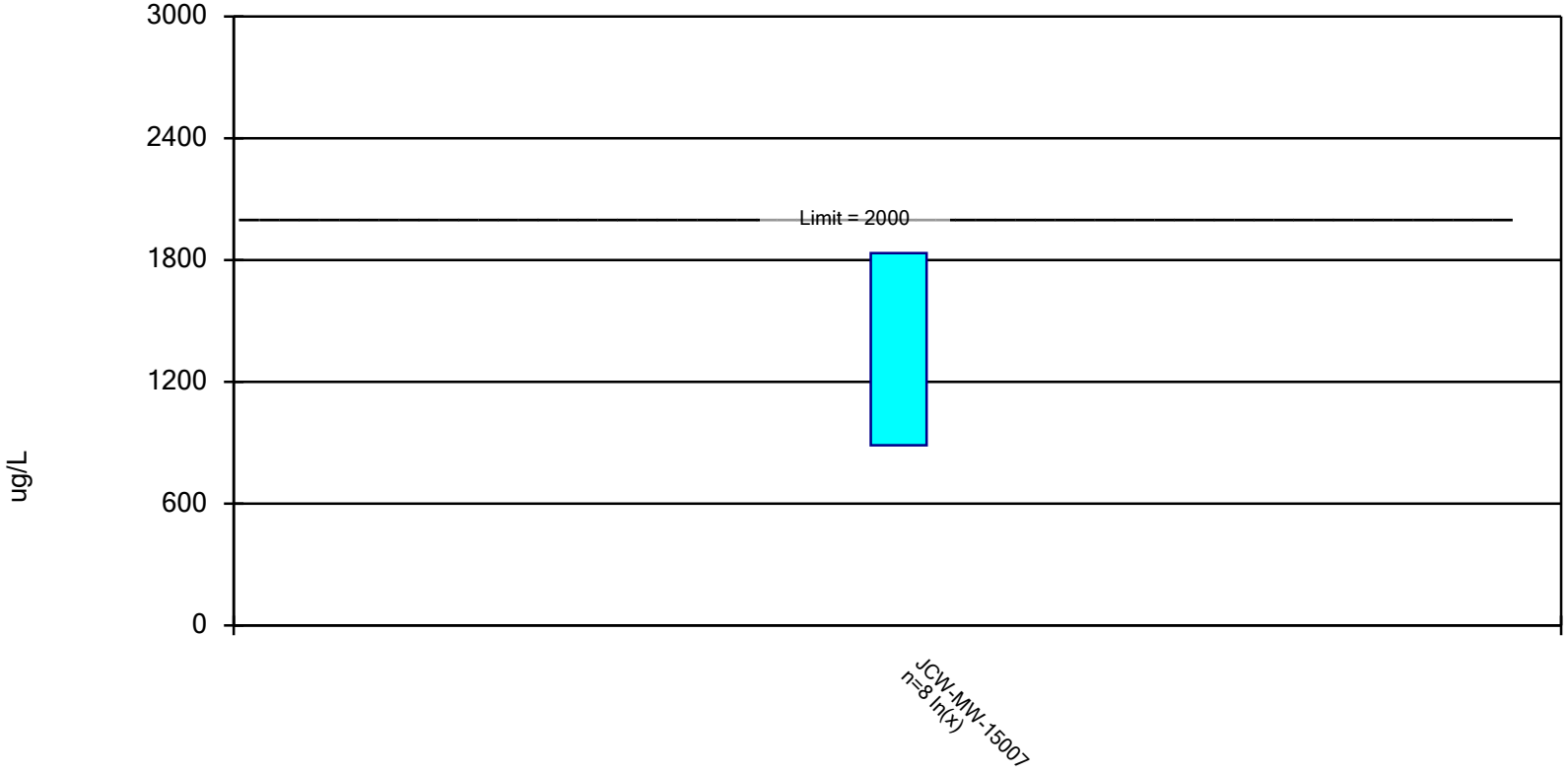
Constituent: Arsenic, Total (ug/L) Analysis Run 12/8/2021 11:21 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

	JCW-MW-15007	JCW-MW-15010
5/22/2018		11.25 (D)
5/23/2018	25.6	
11/7/2018	46.3	9.5
4/9/2019	9.8	16
10/14/2019		13
10/15/2019	34.5 (D)	
5/14/2020	19	4
10/13/2020	61	4 (D)
5/11/2021		6
5/12/2021	31 (D)	
10/12/2021	31 (D)	
10/13/2021		22
Mean	32.28	10.72
Std. Dev.	15.84	6.264
Upper Lim.	49.06	17.36
Lower Lim.	15.49	4.079

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Barium, Total Analysis Run 12/8/2021 11:20 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Confidence Interval

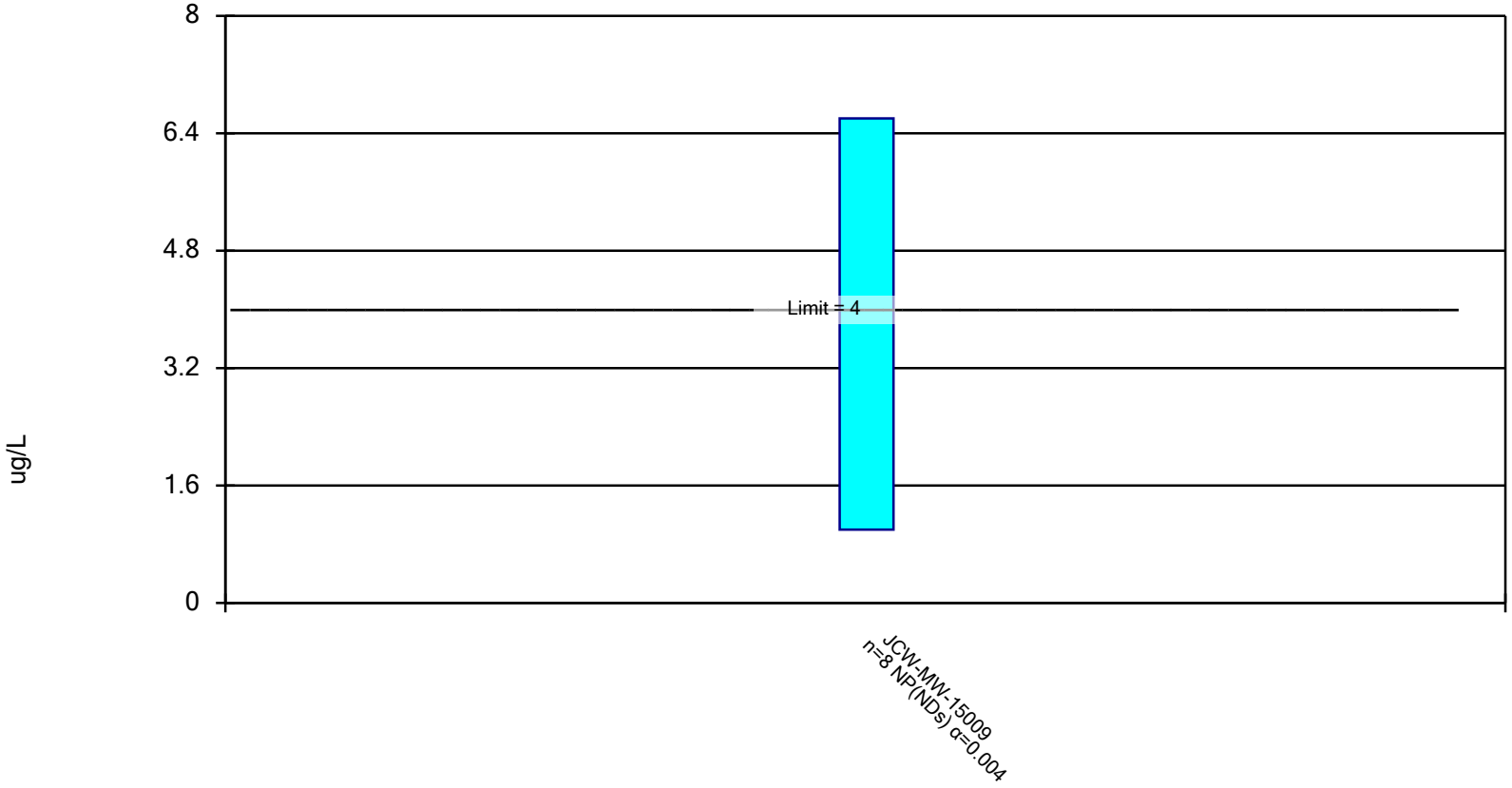
Constituent: Barium, Total (ug/L) Analysis Run 12/8/2021 11:21 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

	JCW-MW-15007
5/23/2018	941
11/7/2018	1060
4/9/2019	950
10/15/2019	970 (D)
5/14/2020	1180
10/13/2020	2400
5/12/2021	1675 (D)
10/12/2021	1605 (D)
Mean	1348
Std. Dev.	515.2
Upper Lim.	1834
Lower Lim.	887.1

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Beryllium, Total Analysis Run 12/8/2021 11:20 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Confidence Interval

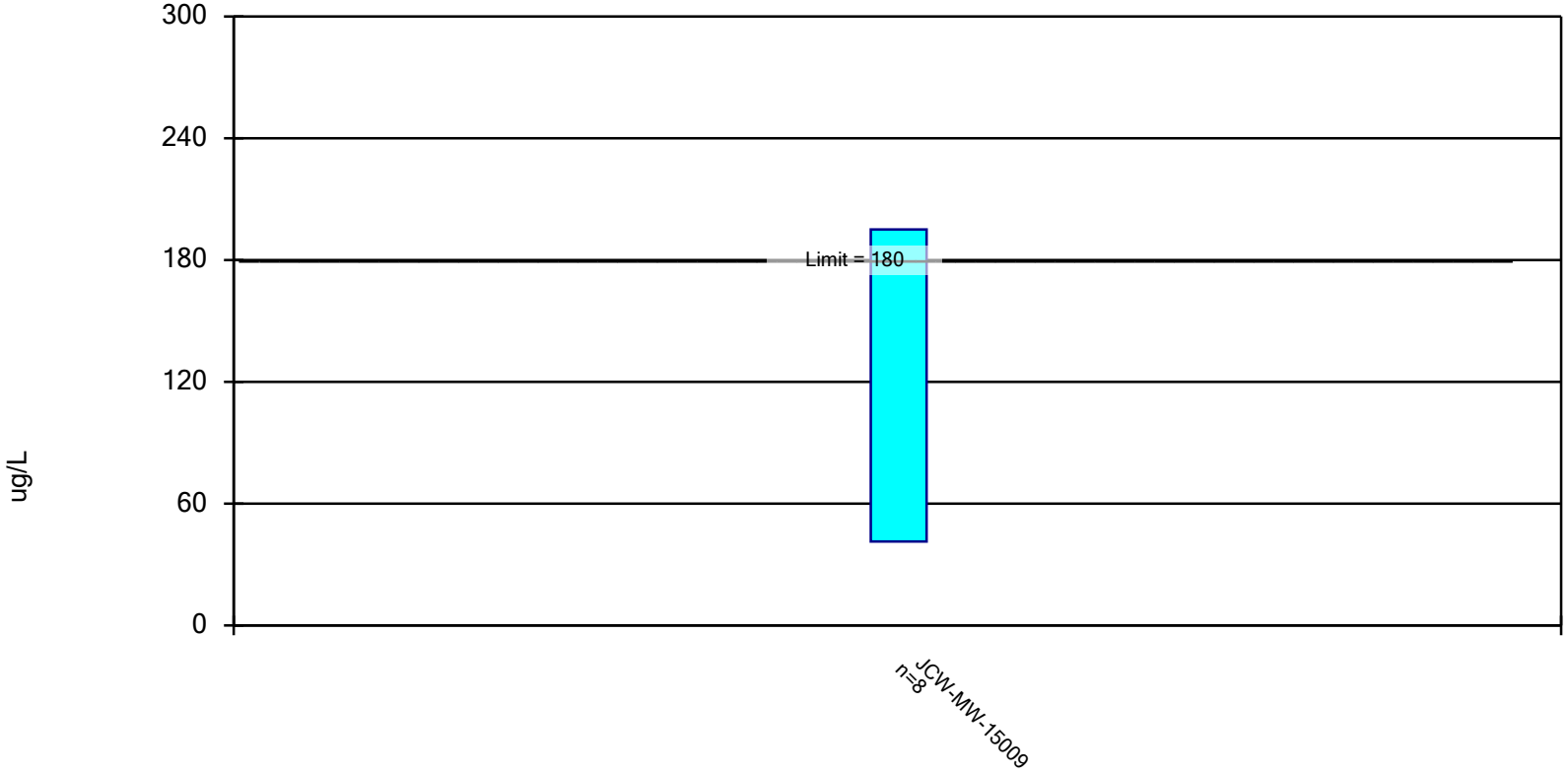
Constituent: Beryllium, Total (ug/L) Analysis Run 12/8/2021 11:21 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

	JCW-MW-15009
5/23/2018	6.5
11/7/2018	6.6
4/9/2019	4.3
10/15/2019	<1
5/14/2020	<1
10/13/2020	<1
5/12/2021	<1
10/13/2021	<1
Mean	2.8
Std. Dev.	2.58
Upper Lim.	6.6
Lower Lim.	1

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Lithium, Total Analysis Run 12/8/2021 11:20 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Confidence Interval

Constituent: Lithium, Total (ug/L) Analysis Run 12/8/2021 11:21 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

	JCW-MW-15009
5/23/2018	190
11/7/2018	240
4/9/2019	150
10/15/2019	94
5/14/2020	18
10/13/2020	53
5/12/2021	89
10/13/2021	112
Mean	118.3
Std. Dev.	72.48
Upper Lim.	195.1
Lower Lim.	41.43

Appendix C
Laboratory Analytical Reports

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

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

To: CDBatts, Karn/Weadock

From: EBlaj, T-258

Date: November 01, 2021

Subject: RCRA GROUNDWATER MONITORING – DEK-JCW BACKGROUND 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: 21-1171

TRC Environmental, Inc. conducted groundwater monitoring at the Karn/Weadock Background Wells 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

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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 & JCW RCRA Background Wells
Date Received: 10/7/2021
Chemistry Project: 21-1171

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-1171-01	MW-15002	Groundwater	10/07/2021 09:08 AM	DEK JCW Background
21-1171-02	MW-15008	Groundwater	10/06/2021 04:02 PM	DEK JCW Background
21-1171-03	MW-15016	Groundwater	10/07/2021 10:10 AM	DEK JCW Background
21-1171-04	MW-15019	Groundwater	10/07/2021 08:10 AM	DEK JCW Background
21-1171-05	DUP-Background	Groundwater	10/07/2021 12:00 AM	DEK JCW Background
21-1171-06	FB-MW-15002	Water	10/07/2021 09:08 AM	DEK JCW Background

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Analytical Report

Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15002**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-01	Collect Time:	09:08 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1171-01-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 #: 21-1171-01-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	3		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	85		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	51		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	76800		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	2810		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	8530		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	1240		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	138000		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 #: 21-1171-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	146000		ug/L	1000.0	10/18/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	3760		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1171-01-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	290		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15002**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-01	Collect Time:	09:08 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1171-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	277000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Bicarbonate	277000		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: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15008**	Collect Date:	10/06/2021
Lab Sample ID:	21-1171-02	Collect Time:	04:02 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1171-02-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 #: 21-1171-02-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	3		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	204		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	116000		ug/L	1000.0	10/28/2021	AB21-1028-02
Chromium	2		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	14500		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	30		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	15800		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	6		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	3170		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	168000		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	6		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 #: 21-1171-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	197000		ug/L	1000.0	10/18/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	11600		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1171-02-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	810		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15008**	Collect Date:	10/06/2021
Lab Sample ID:	21-1171-02	Collect Time:	04:02 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1171-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	361000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Bicarbonate	361000		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: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15016**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-03	Collect Time:	10:10 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1171-03-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 #: 21-1171-03-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	8		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	63		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	661		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	236000		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	1		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	2670		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	85		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	26400		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	7		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	14		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	20800		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	96000		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 #: 21-1171-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	138000		ug/L	1000.0	10/18/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	433000		ug/L	1000.0	10/18/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1171-03-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1140		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15016**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-03	Collect Time:	10:10 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1171-03-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	214000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Bicarbonate	214000		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: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15019**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-04	Collect Time:	08:10 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1171-04-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 #: 21-1171-04-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	3		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	283		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	351		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	165000		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	20900		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	15		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	35200		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	7		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	2120		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	238000		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	2		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 #: 21-1171-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	363000		ug/L	1000.0	10/18/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	58300		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1171-04-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1130		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15019**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-04	Collect Time:	08:10 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1171-04-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	432000		ug/L	10000.0	10/15/2021	AB21-1015-20
Alkalinity Bicarbonate	432000		ug/L	10000.0	10/15/2021	AB21-1015-20
Alkalinity Carbonate	ND		ug/L	10000.0	10/15/2021	AB21-1015-20

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Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**DUP-Background**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-05	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1171-05-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-06

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

Aliquot #: 21-1171-05-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	305		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	338		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	170000		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	21200		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	16		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	34700		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	2340		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	240000		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	2		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 #: 21-1171-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	350000		ug/L	1000.0	10/18/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	54700		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1171-05-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1220		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**DUP-Background**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-05	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1171-05-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	438000		ug/L	10000.0	10/15/2021	AB21-1015-20
Alkalinity Bicarbonate	438000		ug/L	10000.0	10/15/2021	AB21-1015-20
Alkalinity Carbonate	ND		ug/L	10000.0	10/15/2021	AB21-1015-20

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Analytical Report

Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**FB-MW-15002**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-06	Collect Time:	09:08 AM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1171-06-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-06

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

Aliquot #: 21-1171-06-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	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	ND		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	ND		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	ND		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	ND		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	ND		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	ND		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 #: 21-1171-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	ND		ug/L	1000.0	10/14/2021	AB21-1014-08

Analytical Report

Report Date: 11/01/21

Data Qualifiers	Exception Summary
	No exceptions occured.

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-1171

Inspection Date: 10·8·21 **Inspection By:** CLH

Sample Origin/Project Name: Background

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx _____ UPS _____ USPS _____ Airborne _____

Other/Hand Carry (whom) TRC

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

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

Cooler (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 0154.02 | 6·3·22 Samples Received on Ice: Yes ✓ No _____

M&TE # and Expiration 5.8°C

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

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or 60mL)	10				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	12				
24 mL vial (glass)					
250 ~~500~~ mL (plastic)	5				
Other					

7G.2q2 not needed

CHAIN OF CUSTODY

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Consumers Energy

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

SAMPLING SITE: DEK & JCW Background- 2021 Q4

PROJECT NUMBER: 21-1171

SAMPLING TEAM: Andrew cs.

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
21-1171-01	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)
	10/07/21 1530	
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)

COMMENTS

5.8°c

#015402

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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: November 01, 2021

Subject: RCRA GROUNDWATER MONITORING – JCW BOTTOM ASH POND WELLS – 2021 Q4

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: 21-1172

TRC Environmental, Inc. conducted groundwater monitoring at the JCWeadock Bottom Ash Pond Wells area on 10/12/2021 and 10/13/2021, 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 10/13/2021.

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

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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 JCW RCRA Bottom Ash Pond Wells
Date Received: 10/13/2021
Chemistry Project: 21-1172

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-1172-01	JCW-MW-15007	Groundwater	10/12/2021 01:47 PM	JCW Bottom Ash Pond
21-1172-02	JCW-MW-15009	Groundwater	10/13/2021 07:43 AM	JCW Bottom Ash Pond
21-1172-03	JCW-MW-15010	Groundwater	10/13/2021 06:36 AM	JCW Bottom Ash Pond
21-1172-04	JCW-MW-15028	Groundwater	10/12/2021 02:41 PM	JCW Bottom Ash Pond
21-1172-05	DUP-JCW-BAP	Groundwater	10/12/2021 12:00 AM	JCW Bottom Ash Pond
21-1172-06	JCW-MW-15009 Field MS	Groundwater	10/13/2021 07:43 AM	JCW Bottom Ash Pond
21-1172-07	JCW-MW-15009 Field MSD	Groundwater	10/13/2021 07:43 AM	JCW Bottom Ash Pond
21-1172-08	EB-JCW-BAP	Water	10/13/2021 08:06 AM	JCW Bottom Ash Pond
21-1172-09	FB-JCW-BAP	Water	10/13/2021 08:03 AM	JCW Bottom Ash Pond

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-1172**
Field Sample ID:	**JCW-MW-15007**	Collect Date:	10/12/2021
Lab Sample ID:	21-1172-01	Collect Time:	01:47 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1172-01-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-06

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

Aliquot #: 21-1172-01-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	17		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	1620		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	503		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	265000		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	3		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	3600		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	144		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	27000		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	7		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	18		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	18100		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	1660000		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	12		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 #: 21-1172-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	2820000		ug/L	1000.0	10/19/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	82100		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1172-01-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	5070		mg/L	10.0	10/15/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-1172**
Field Sample ID:	**JCW-MW-15007**	Collect Date:	10/12/2021
Lab Sample ID:	21-1172-01	Collect Time:	01:47 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1172-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	525000		ug/L	10000.0	10/15/2021	AB21-1015-24
Alkalinity Bicarbonate	525000		ug/L	10000.0	10/15/2021	AB21-1015-24
Alkalinity Carbonate	ND		ug/L	10000.0	10/15/2021	AB21-1015-24

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-1172**
Field Sample ID:	**JCW-MW-15009**	Collect Date:	10/13/2021
Lab Sample ID:	21-1172-02	Collect Time:	07:43 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1172-02-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1172-02-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	3		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	23		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	289		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	615000		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	2		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	17100		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	112		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	26700		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	33		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	9980		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	21300		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 #: 21-1172-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	28700		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	1410000		ug/L	1000.0	10/18/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1172-02-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	2400		mg/L	10.0	10/14/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-1172**
Field Sample ID:	**JCW-MW-15009**	Collect Date:	10/13/2021
Lab Sample ID:	21-1172-02	Collect Time:	07:43 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1172-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	158000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Bicarbonate	158000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

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Analytical Report

Report Date: 11/01/21

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **JCW-MW-15010**
Lab Sample ID: 21-1172-03
Matrix: Groundwater

Laboratory Project: **21-1172**
Collect Date: 10/13/2021
Collect Time: 06:36 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1172-03-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-06

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

Aliquot #: 21-1172-03-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	22		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	221		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	1190		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	142000		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	ND		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	92		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	19000		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	9		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	9820		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	54800		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 #: 21-1172-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	50700		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	77000		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1172-03-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	667		mg/L	10.0	10/14/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-1172**
Field Sample ID:	**JCW-MW-15010**	Collect Date:	10/13/2021
Lab Sample ID:	21-1172-03	Collect Time:	06:36 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1172-03-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	419000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Bicarbonate	419000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-1172**
Field Sample ID:	**JCW-MW-15028**	Collect Date:	10/12/2021
Lab Sample ID:	21-1172-04	Collect Time:	02:41 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1172-04-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-06

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

Aliquot #: 21-1172-04-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	11		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	363		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	620		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	205000		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	829		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	66		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	32500		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	11		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	8710		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	554000		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	6		ug/L	2.0	10/28/2021	AB21-1028-02
Zinc	15		ug/L	10.0	10/28/2021	AB21-1028-02

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

Aliquot #: 21-1172-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	974000		ug/L	1000.0	10/18/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	97000		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1172-04-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	2360		mg/L	10.0	10/14/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-1172**
Field Sample ID:	**JCW-MW-15028**	Collect Date:	10/12/2021
Lab Sample ID:	21-1172-04	Collect Time:	02:41 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1172-04-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	311000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Bicarbonate	311000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

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Analytical Report

Report Date: 11/01/21

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **DUP-JCW-BAP**
Lab Sample ID: 21-1172-05
Matrix: Groundwater

Laboratory Project: **21-1172**
Collect Date: 10/12/2021
Collect Time: 12:00 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1172-05-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-06

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

Aliquot #: 21-1172-05-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	45		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	1590		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	532		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	267000		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	3		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	3400		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	151		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	27600		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	7		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	19		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	18200		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	1790000		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	13		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 #: 21-1172-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	2790000		ug/L	1000.0	10/19/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	82500		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1172-05-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	4920		mg/L	10.0	10/15/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-1172**
Field Sample ID:	**DUP-JCW-BAP**	Collect Date:	10/12/2021
Lab Sample ID:	21-1172-05	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1172-05-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	533000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Bicarbonate	533000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-1172**
Field Sample ID:	**JCW-MW-15009 Field MS**	Collect Date:	10/13/2021
Lab Sample ID:	21-1172-06	Collect Time:	07:43 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1172-06-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	103		%	0.2	10/14/2021	AB21-1014-06

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

Aliquot #: 21-1172-06-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	99		%	1.0	10/28/2021	AB21-1028-02
Arsenic	103		%	1.0	10/28/2021	AB21-1028-02
Barium	96		%	5.0	10/28/2021	AB21-1028-02
Beryllium	108		%	1.0	10/28/2021	AB21-1028-02
Boron	105		%	20.0	10/28/2021	AB21-1028-02
Cadmium	98.1		%	0.2	10/28/2021	AB21-1028-02
Calcium	108		%	1000.0	10/28/2021	AB21-1028-02
Chromium	113		%	1.0	10/28/2021	AB21-1028-02
Cobalt	110		%	6.0	10/28/2021	AB21-1028-02
Copper	102		%	1.0	10/28/2021	AB21-1028-02
Iron	113		%	20.0	10/28/2021	AB21-1028-02
Lead	84		%	1.0	10/28/2021	AB21-1028-02
Lithium	86		%	10.0	10/28/2021	AB21-1028-02
Magnesium	108		%	1000.0	10/28/2021	AB21-1028-02
Molybdenum	92		%	5.0	10/28/2021	AB21-1028-02
Nickel	104		%	2.0	10/28/2021	AB21-1028-02
Potassium	114		%	100.0	10/28/2021	AB21-1028-02
Selenium	102		%	1.0	10/28/2021	AB21-1028-02
Silver	90.3		%	0.2	10/28/2021	AB21-1028-02
Sodium	107		%	1000.0	10/28/2021	AB21-1028-02
Thallium	90		%	2.0	10/28/2021	AB21-1028-02
Vanadium	92		%	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 #: 21-1172-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	96		%	1000.0	10/14/2021	AB21-1014-08
Fluoride	86		%	1000.0	10/14/2021	AB21-1014-08
Sulfate	97		%	1000.0	10/18/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1172-06-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	97.2		%	10000.0	10/18/2021	AB21-1018-06

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Analytical Report

Report Date: 11/01/21

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **JCW-MW-15009 Field MSD**
Lab Sample ID: 21-1172-07
Matrix: Groundwater

Laboratory Project: **21-1172**
Collect Date: 10/13/2021
Collect Time: 07:43 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1172-07-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	93.8		%	0.2	10/14/2021	AB21-1014-06

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

Aliquot #: 21-1172-07-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	96		%	1.0	10/28/2021	AB21-1028-02
Arsenic	106		%	1.0	10/28/2021	AB21-1028-02
Barium	92		%	5.0	10/28/2021	AB21-1028-02
Beryllium	107		%	1.0	10/28/2021	AB21-1028-02
Boron	103		%	20.0	10/28/2021	AB21-1028-02
Cadmium	92.8		%	0.2	10/28/2021	AB21-1028-02
Calcium	111		%	1000.0	10/28/2021	AB21-1028-02
Chromium	118		%	1.0	10/28/2021	AB21-1028-02
Cobalt	115		%	6.0	10/28/2021	AB21-1028-02
Copper	108		%	1.0	10/28/2021	AB21-1028-02
Iron	129		%	20.0	10/28/2021	AB21-1028-02
Lead	84		%	1.0	10/28/2021	AB21-1028-02
Lithium	83		%	10.0	10/28/2021	AB21-1028-02
Magnesium	109		%	1000.0	10/28/2021	AB21-1028-02
Molybdenum	91		%	5.0	10/28/2021	AB21-1028-02
Nickel	112		%	2.0	10/28/2021	AB21-1028-02
Potassium	111		%	100.0	10/28/2021	AB21-1028-02
Selenium	101		%	1.0	10/28/2021	AB21-1028-02
Silver	91.6		%	0.2	10/28/2021	AB21-1028-02
Sodium	110		%	1000.0	10/28/2021	AB21-1028-02
Thallium	89		%	2.0	10/28/2021	AB21-1028-02
Vanadium	92		%	2.0	10/28/2021	AB21-1028-02
Zinc	124		%	10.0	10/28/2021	AB21-1028-02

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

Aliquot #: 21-1172-07-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	94		%	1000.0	10/14/2021	AB21-1014-08
Fluoride	87		%	1000.0	10/14/2021	AB21-1014-08
Sulfate	95		%	1000.0	10/18/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1172-07-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	97.2		%	10000.0	10/18/2021	AB21-1018-06

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-1172**
Field Sample ID:	**EB-JCW-BAP**	Collect Date:	10/13/2021
Lab Sample ID:	21-1172-08	Collect Time:	08:06 AM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1172-08-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-06

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

Aliquot #: 21-1172-08-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	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	ND		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	ND		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	ND		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	ND		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	ND		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	ND		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

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**21-1172**
Field Sample ID:	**FB-JCW-BAP**	Collect Date:	10/13/2021
Lab Sample ID:	21-1172-09	Collect Time:	08:03 AM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1172-09-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-06

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

Aliquot #: 21-1172-09-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	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	ND		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	ND		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	ND		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	ND		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	ND		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	ND		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

Analytical Report

Report Date: 11/01/21

Data Qualifiers	Exception Summary
	No exceptions occured.

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-1172

Inspection Date: 10/13/21 **Inspection By:** LWH

Sample Origin/Project Name: JCW BAP Q4-2021

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 2.6-5.0°C Samples Received on Ice: Yes ✓ 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)	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)	5				
Other _____					

PG. 2 of 2 not needed

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: **JCW Bottom Ash Pond – 2021 Q4**

PROJECT NUMBER: **21-1172**

ANALYSIS REQUESTED

SEND REPORT TO: CDBatts

HD Register, TRC

PHONE:

SAMPLING TEAM:

DATE SHIPPED:

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
21-1172-01	10/12/21	1347	GW	JCW-MW-15007		5	X	X	X	X					
-02	10/13/21	0743	GW	JCW-MW-15009		5	X	X	X	X					
-03	10/13/21	0636	GW	JCW-MW-15010		5	X	X	X	X					
-04	10/12/21	1441	GW	JCW-MW-15028		5	X	X	X	X					
-05	10/12/21	—	GW	DUP-JCW-BAP		5	X	X	X	X					
-06	10/13/21	0743	GW	JCW-MW-15009 MS		4	X	X		X					
-07	10/13/21	0742	GW	JCW-MW-15009 MSD		4	X	X		X					
-08	10/13/21	0606	W	EB-JCW-BAP		1	X								
-09	10/13/21	0803	W	FB-JCW-BAP		1	X								

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
[signature]	10/13/21 1110	Carl Hansen
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)

COMMENTS

2.6-5.0°C
015402
exp: 6-3-22

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eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Tel: (330)497-9396

Laboratory Job ID: 240-157750-1
Client Project/Site: Karn/Weadock CCR Background Wells

For:
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

Attn: Darby Litz

Authorized for release by:
11/19/2021 8:10:30 PM

Kris Brooks, Project Manager II
(330)966-9790
Kris.Brooks@Eurofinset.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

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

Job ID: 240-157750-1

Qualifiers

Rad

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
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: 240-157750-1

Laboratory: Eurofins TestAmerica, Canton

Narrative

Job Narrative
240-157750-1

Comments
The EPA Method 903.0 Radium-226, EPA Method 904.0 Radium-228, 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 10/9/2021 10:10 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 1.9º C, 2.5º C and 3.1º C.

RAD
Method 903.0: Radium 226 batch 531995
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. MW-15002 (240-157750-1), MW-15008 (240-157750-2), MW-15016 (240-157750-3), MW-15019 (240-157750-4), DUP-04 (240-157750-5), EB-04 (240-157750-6), (LCS 160-531995/1-A), (LCSD 160-531995/2-A) and (MB 160-531995/20-A)

Method 904.0: Radium 228 batch 531998
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. MW-15002 (240-157750-1), MW-15008 (240-157750-2), MW-15016 (240-157750-3), MW-15019 (240-157750-4), DUP-04 (240-157750-5), EB-04 (240-157750-6), (LCS 160-531998/1-A), (LCSD 160-531998/2-A) and (MB 160-531998/20-A)

Method PrecSep_0: Radium-228 Prep Batch 160-531998
The following samples were prepared at a reduced aliquot due to Matrix: MW-15002 (240-157750-1), MW-15008 (240-157750-2), MW-15016 (240-157750-3), MW-15019 (240-157750-4) and DUP-04 (240-157750-5). 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: 160-531995
The following samples were prepared at a reduced aliquot due to Matrix: MW-15002 (240-157750-1), MW-15008 (240-157750-2), MW-15016 (240-157750-3), MW-15019 (240-157750-4) and DUP-04 (240-157750-5). As a result a laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead of a sample duplicate (DUP) to demonstrate batch precision. MW-15002 (240-157750-1), MW-15008 (240-157750-2), MW-15016 (240-157750-3), MW-15019 (240-157750-4) and DUP-04 (240-157750-5)

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

Method Summary

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

Job ID: 240-157750-1

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.
Project/Site: Karn/Weadock CCR Background Wells

Job ID: 240-157750-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-157750-1	MW-15002	Water	10/07/21 09:08	10/09/21 10:10
240-157750-2	MW-15008	Water	10/06/21 16:02	10/09/21 10:10
240-157750-3	MW-15016	Water	10/07/21 10:10	10/09/21 10:10
240-157750-4	MW-15019	Water	10/07/21 08:10	10/09/21 10:10
240-157750-5	DUP-04	Water	10/07/21 00:00	10/09/21 10:10
240-157750-6	EB-04	Water	10/07/21 10:10	10/09/21 10:10

Client Sample Results

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

Job ID: 240-157750-1

Client Sample ID: MW-15002

Date Collected: 10/07/21 09:08
Date Received: 10/09/21 10:10

Lab Sample ID: 240-157750-1

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	**0.775**		0.361	0.367	1.00	0.415	pCi/L	10/15/21 11:10	11/08/21 17:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*96.1*		*40 - 110*	*10/15/21 11:10*	*11/08/21 17:29*	*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	0.225	U	0.347	0.347	1.00	0.582	pCi/L	10/15/21 11:44	11/08/21 13:12	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*96.1*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:12*	*1*
Y Carrier	*81.5*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:12*	*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	**1.00**		0.501	0.505	5.00	0.582	pCi/L		11/18/21 22:40	1

Client Sample Results

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

Job ID: 240-157750-1

Client Sample ID: MW-15008

Date Collected: 10/06/21 16:02
Date Received: 10/09/21 10:10

Lab Sample ID: 240-157750-2

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	1.05		0.410	0.421	1.00	0.455	pCi/L	10/15/21 11:10	11/08/21 17:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*102*		*40 - 110*	*10/15/21 11:10*	*11/08/21 17:29*	*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	1.11	*	0.371	0.385	1.00	0.493	pCi/L	10/15/21 11:44	11/08/21 13:12	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*102*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:12*	*1*
Y Carrier	*80.4*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:12*	*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	2.16		0.553	0.570	5.00	0.493	pCi/L		11/18/21 22:40	1

Client Sample Results

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

Job ID: 240-157750-1

Client Sample ID: MW-15016

Date Collected: 10/07/21 10:10
Date Received: 10/09/21 10:10

Lab Sample ID: 240-157750-3

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	**0.934**		0.379	0.388	1.00	0.406	pCi/L	10/15/21 11:10	11/08/21 17:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*101*		*40 - 110*	*10/15/21 11:10*	*11/08/21 17:29*	*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	0.393	U	0.304	0.306	1.00	0.478	pCi/L	10/15/21 11:44	11/08/21 13:12	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*101*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:12*	*1*
Y Carrier	*83.7*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:12*	*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	**1.33**		0.486	0.494	5.00	0.478	pCi/L		11/18/21 22:40	1

Client Sample Results

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

Job ID: 240-157750-1

Client Sample ID: MW-15019

Date Collected: 10/07/21 08:10
Date Received: 10/09/21 10:10

Lab Sample ID: 240-157750-4

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	**1.42**		0.469	0.486	1.00	0.494	pCi/L	10/15/21 11:10	11/08/21 17:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*101*		*40 - 110*	*10/15/21 11:10*	*11/08/21 17:32*	*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	0.308	U	0.267	0.268	1.00	0.424	pCi/L	10/15/21 11:44	11/08/21 13:13	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*101*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:13*	*1*
Y Carrier	*84.5*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:13*	*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	**1.72**		0.540	0.555	5.00	0.494	pCi/L		11/18/21 22:40	1

Client Sample Results

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

Job ID: 240-157750-1

Client Sample ID: DUP-04

Date Collected: 10/07/21 00:00
Date Received: 10/09/21 10:10

Lab Sample ID: 240-157750-5

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	**0.723**		0.374	0.379	1.00	0.485	pCi/L	10/15/21 11:10	11/08/21 17:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*103*		*40 - 110*	*10/15/21 11:10*	*11/08/21 17:32*	*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	0.0453	U	0.221	0.221	1.00	0.395	pCi/L	10/15/21 11:44	11/08/21 13:15	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*103*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:15*	*1*
Y Carrier	*86.0*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:15*	*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	**0.769**		0.434	0.439	5.00	0.485	pCi/L		11/18/21 22:40	1

Client Sample Results

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

Job ID: 240-157750-1

Client Sample ID: EB-04

Date Collected: 10/07/21 10:10
Date Received: 10/09/21 10:10

Lab Sample ID: 240-157750-6

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	0.666		0.322	0.328	1.00	0.408	pCi/L	10/15/21 11:10	11/08/21 17:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.3*		*40 - 110*	*10/15/21 11:10*	*11/08/21 17:32*	*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	0.649	*	0.247	0.254	1.00	0.327	pCi/L	10/15/21 11:44	11/08/21 13:15	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.3*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:15*	*1*
Y Carrier	*83.7*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:15*	*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	1.31		0.406	0.415	5.00	0.408	pCi/L		11/18/21 22:40	1

Tracer/Carrier Summary

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

Job ID: 240-157750-1

Method: 903.0 - Radium-226 (GFPC)

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

		Percent Yield (Acceptance Limits)							
Lab Sample ID	Client Sample ID	Ba (40-110)							
240-157750-1	MW-15002	96.1							
240-157750-2	MW-15008	102							
240-157750-3	MW-15016	101							
240-157750-4	MW-15019	101							
240-157750-5	DUP-04	103							
240-157750-6	EB-04	93.3							
LCS 160-531995/1-A	Lab Control Sample	96.4							
LCSD 160-531995/2-A	Lab Control Sample Dup	90.4							
MB 160-531995/20-A	Method Blank	82.4							

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

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

		Percent Yield (Acceptance Limits)							
Lab Sample ID	Client Sample ID	Ba (40-110)	Y (40-110)						
240-157750-1	MW-15002	96.1	81.5						
240-157750-2	MW-15008	102	80.4						
240-157750-3	MW-15016	101	83.7						
240-157750-4	MW-15019	101	84.5						
240-157750-5	DUP-04	103	86.0						
240-157750-6	EB-04	93.3	83.7						
LCS 160-531998/1-A	Lab Control Sample	96.4	60.2						
LCSD 160-531998/2-A	Lab Control Sample Dup	90.4	84.9						
MB 160-531998/20-A	Method Blank	82.4	89.0						

Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-531995/20-A
Matrix: Water
Analysis Batch: 536236

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 531995

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.04114	U	0.120	0.120	1.00	0.258	pCi/L	10/15/21 11:10	11/12/21 10:22	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.4*		*40 - 110*	*10/15/21 11:10*	*11/12/21 10:22*	*1*

Lab Sample ID: LCS 160-531995/1-A
Matrix: Water
Analysis Batch: 535397

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 531995

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-226			15.1	14.43		1.84	1.00	0.468	pCi/L	95	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*96.4*		*40 - 110*

Lab Sample ID: LCSD 160-531995/2-A
Matrix: Water
Analysis Batch: 535397

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 531995

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-226			15.1	12.63		1.71	1.00	0.582	pCi/L	84	75 - 125	0.51	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*90.4*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-531998/20-A
Matrix: Water
Analysis Batch: 535405

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 531998

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.5019	U	0.341	0.344	1.00	0.526	pCi/L	10/15/21 11:44	11/08/21 13:16	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.4*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:16*	*1*
Y Carrier	*89.0*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:16*	*1*

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

Lab Sample ID: LCS 160-531998/1-A
Matrix: Water
Analysis Batch: 535393

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 531998

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-228			12.2	15.51		1.85	1.00	0.733	pCi/L	127	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*96.4*		*40 - 110*
Y Carrier	*60.2*		*40 - 110*

Lab Sample ID: LCSD 160-531998/2-A
Matrix: Water
Analysis Batch: 535393

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 531998

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-228			12.2	13.75		1.59	1.00	0.509	pCi/L	112	75 - 125	0.51	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*90.4*		*40 - 110*
Y Carrier	*84.9*		*40 - 110*

QC Association Summary

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

Job ID: 240-157750-1

Rad

Prep Batch: 531995

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-157750-1	MW-15002	Total/NA	Water	PrecSep STD	
240-157750-2	MW-15008	Total/NA	Water	PrecSep STD	
240-157750-3	MW-15016	Total/NA	Water	PrecSep STD	
240-157750-4	MW-15019	Total/NA	Water	PrecSep STD	
240-157750-5	DUP-04	Total/NA	Water	PrecSep STD	
240-157750-6	EB-04	Total/NA	Water	PrecSep STD	
MB 160-531995/20-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-531995/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
LCSD 160-531995/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	

Prep Batch: 531998

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-157750-1	MW-15002	Total/NA	Water	PrecSep_0	
240-157750-2	MW-15008	Total/NA	Water	PrecSep_0	
240-157750-3	MW-15016	Total/NA	Water	PrecSep_0	
240-157750-4	MW-15019	Total/NA	Water	PrecSep_0	
240-157750-5	DUP-04	Total/NA	Water	PrecSep_0	
240-157750-6	EB-04	Total/NA	Water	PrecSep_0	
MB 160-531998/20-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-531998/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-531998/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Lab Chronicle

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

Job ID: 240-157750-1

Client Sample ID: MW-15002 — Lab Sample ID: 240-157750-1

Date Collected: 10/07/21 09:08
Date Received: 10/09/21 10:10
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			531995	10/15/21 11:10	BMP	TAL SL
Total/NA	Analysis	903.0		1	535397	11/08/21 17:29	FLC	TAL SL
Total/NA	Prep	PrecSep_0			531998	10/15/21 11:44	BMP	TAL SL
Total/NA	Analysis	904.0		1	535390	11/08/21 13:12	JLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	537496	11/18/21 22:40	EMH	TAL SL

Client Sample ID: MW-15008 — Lab Sample ID: 240-157750-2

Date Collected: 10/06/21 16:02
Date Received: 10/09/21 10:10
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			531995	10/15/21 11:10	BMP	TAL SL
Total/NA	Analysis	903.0		1	535397	11/08/21 17:29	FLC	TAL SL
Total/NA	Prep	PrecSep_0			531998	10/15/21 11:44	BMP	TAL SL
Total/NA	Analysis	904.0		1	535390	11/08/21 13:12	JLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	537496	11/18/21 22:40	EMH	TAL SL

Client Sample ID: MW-15016 — Lab Sample ID: 240-157750-3

Date Collected: 10/07/21 10:10
Date Received: 10/09/21 10:10
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			531995	10/15/21 11:10	BMP	TAL SL
Total/NA	Analysis	903.0		1	535397	11/08/21 17:29	FLC	TAL SL
Total/NA	Prep	PrecSep_0			531998	10/15/21 11:44	BMP	TAL SL
Total/NA	Analysis	904.0		1	535390	11/08/21 13:12	JLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	537496	11/18/21 22:40	EMH	TAL SL

Client Sample ID: MW-15019 — Lab Sample ID: 240-157750-4

Date Collected: 10/07/21 08:10
Date Received: 10/09/21 10:10
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			531995	10/15/21 11:10	BMP	TAL SL
Total/NA	Analysis	903.0		1	535393	11/08/21 17:32	FLC	TAL SL
Total/NA	Prep	PrecSep_0			531998	10/15/21 11:44	BMP	TAL SL
Total/NA	Analysis	904.0		1	535390	11/08/21 13:13	JLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	537496	11/18/21 22:40	EMH	TAL SL

Lab Chronicle

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

Job ID: 240-157750-1

Client Sample ID: DUP-04

Lab Sample ID: 240-157750-5

Date Collected: 10/07/21 00:00
Matrix: Water
Date Received: 10/09/21 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			531995	10/15/21 11:10	BMP	TAL SL
Total/NA	Analysis	903.0		1	535393	11/08/21 17:32	FLC	TAL SL
Total/NA	Prep	PrecSep_0			531998	10/15/21 11:44	BMP	TAL SL
Total/NA	Analysis	904.0		1	535405	11/08/21 13:15	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	537496	11/18/21 22:40	EMH	TAL SL

Client Sample ID: EB-04

Lab Sample ID: 240-157750-6

Date Collected: 10/07/21 10:10
Matrix: Water
Date Received: 10/09/21 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			531995	10/15/21 11:10	BMP	TAL SL
Total/NA	Analysis	903.0		1	535393	11/08/21 17:32	FLC	TAL SL
Total/NA	Prep	PrecSep_0			531998	10/15/21 11:44	BMP	TAL SL
Total/NA	Analysis	904.0		1	535405	11/08/21 13:15	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	537496	11/18/21 22:40	EMH	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.
Project/Site: Karn/Weadock CCR Background Wells

Job ID: 240-157750-1

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	06-30-22
California	State	2886	06-30-21 *
Connecticut	State	PH-0241	03-31-23
Florida	NELAP	E87689	06-30-22
HI - RadChem Recognition	State	n/a	06-30-22
Illinois	NELAP	200023	11-30-22
Iowa	State	373	12-01-22
Kansas	NELAP	E-10236	10-31-22
Kentucky (DW)	State	KY90125	01-01-22
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-21
Louisiana	NELAP	04080	06-30-22
Louisiana (DW)	State	LA011	12-31-21
Maryland	State	310	09-30-22
MI - RadChem Recognition	State	9005	06-30-22
Missouri	State	780	06-30-22
Nevada	State	MO000542020-1	07-31-22
New Jersey	NELAP	MO002	06-30-22
New York	NELAP	11616	04-01-22
North Dakota	State	R-207	06-30-22
NRC	NRC	24-24817-01	12-31-22
Oklahoma	State	9997	08-31-22
Oregon	NELAP	4157	09-01-22
Pennsylvania	NELAP	68-00540	03-01-22
South Carolina	State	85002001	06-30-22
Texas	NELAP	T104704193	07-31-22
US Fish & Wildlife	US Federal Programs	058448	07-31-22
USDA	US Federal Programs	P330-17-00028	03-11-23
Utah	NELAP	MO000542021-14	08-01-22
Virginia	NELAP	10310	06-14-22
Washington	State	C592	08-30-22
West Virginia DEP	State	381	10-31-22

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

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 Amer a

Client Information	Sampler: Andrew W	Lab PM: Brooks, Kris M	Car ier 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			
Emai 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:				D	D		
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
	10/7/21	TRC		10/7/21 1714	TRC
BY	10.8.21 1152			10/8/21 1152	
	10/8/21 1345			10/9/21 1010	

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.

Cooler Temperature(s) °C and Other Remarks.

Ver: 06/08/2021

Eurofins TestAmerica Canton Sample Receipt Form/Narrative
Canton Facility

Login # : 157750

Client TRC Site Name _____ Cooler unpacked by: Trent

Cooler Received on 10/9/21 Opened on 10/9/21

FedEx 1st Grd ~~Exp~~ UPS FAS Clipper Client Drop Off TestAmerica Courier Other _____

Receipt After-hours Drop-off Date/Time TC 10-9-21 Storage Location _____

TestAmerica Cooler # 155 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-14 (CF +0.1 °C) Observed Cooler Temp _____ °C Corrected Cooler Temp. _____ °C

IR GUN #IR-15 (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# **HC157842**

14 Were VOAs on the COC? Yes No

15 Were air bubbles >6 mm in any VOA vials? ● ⬅ Larger than this. Yes No NA

16 Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # _____ Yes No

17 Was a LL Hg or Me Hg trip blank present? _____ Yes No

Tests that are not checked for pH by Receiving:

VOAs
Oil and Grease
TOC

Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other

Concerning _____

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

Samples processed by:

_____

_____

_____

_____

19 SAMPLE CONDITION

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

Sample(s) _____ were received in a broken container

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

20. SAMPLE PRESERVATION

Sample(s) _____ were further preserved in the laboratory

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

VOA Sample Preservation Date/Time VOAs Frozen. _____

Login # _____

Eurofins TestAmerica Canton Sample Receipt Multiple Cooler Form				
Cooler Description (Circle)	IR Gun # (Circle)	Observed Temp °C	Corrected Temp °C	Coolant (Circle)
TA Client Box Other	IR-14 IR-15	3.0	3.1	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15	2.4	2.5	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15	1.8	1.9	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
				☐ See Temperature Excursion Form

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

Login Container Summary Report

Temperature readings _____

Client Sample ID	Lab ID	Container Type	Container pH	Container Temp	Preservative Added (mls)	Lot #
MW 15002	240-157750-A 1	Plastic 1 liter Nitric Acid	<2			
MW-15002	240-157750-B 1	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-157750-A-2	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-157750-B 2	Plastic 1 liter - Nitric Acid	<2			
MW 15016	240-157750-A-3	Plastic 1 liter Nitric Acid	<2			
MW-15016	240-157750-B-3	Plastic 1 liter Nitric Acid	<2			
MW 15019	240-157750-A-4	Plastic 1 liter Nitric Acid	<2			
MW 15019	240-157750-B-4	Plastic 1 liter Nitric Acid	<2			
DUP-04	240-157750-A 5	Plastic 1 liter - Nitric Acid	<2			
DUP-04	240-157750-B-5	Plastic 1 liter - Nitric Acid	<2			
EB-04	240-157750-A-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

eurofins Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-143998.1
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 #: 240-157750-1
Address: 13715 Rider Trail North,	Due Date Requested: 11/9/2021			
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	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
MW-15002 (240-157750-1)	10/7/21	09:08 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15008 (240-157750-2)	10/6/21	16:02 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15016 (240-157750-3)	10/7/21	10:10 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15019 (240-157750-4)	10/7/21	08:10 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-04 (240-157750-5)	10/7/21	Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
EB-04 (240-157750-6)	10/7/21	10:10 Eastern		Water			X	X	1	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
Unconfirmed

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) Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: [signature]	Date/Time: 10-11-21 1034	Company: ETA	Received by: FED EX	Date/Time:	Company:
Relinquished by: FED EX	Date/Time:	Company:	Received by: Micha Kominkinger	Date/Time: OCT 12 2021 09:05	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:

Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

Job Number: 240-157750-1

Login Number: 157750
List Number: 2
Creator: Korrinhizer, Micha L

List Source: Eurofins TestAmerica, St. Louis
List Creation: 10/12/21 05:16 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Tel: (330)497-9396

Laboratory Job ID: 240-157983-1
Client Project/Site: Karn/Weadock CCR JCW Bottom Ash Pond

For:
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

Attn: Darby Litz

Authorized for release by:
11/17/2021 4:05:33 PM

Kris Brooks, Project Manager II
(330)966-9790
Kris.Brooks@Eurofinset.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: TRC Environmental Corporation.
Job ID: 240-157983-1
Project/Site: Karn/Weadock CCR JCW Bottom Ash Pond

Qualifiers

Rad

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

Glossary

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

Job ID: 240-157983-1

Laboratory: Eurofins TestAmerica, Canton

Narrative

Job Narrative
240-157983-1

Comments
The EPA Method 903.0 Radium-226, EPA Method 904.0 Radium-228 and Ra226_Ra228 Combined Radium 226 and Radium 228 analyses were performed at the Eurofins TestAmerica St. Loius laboratory.

Receipt
The samples were received on 10/14/2021 8:00 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 1.0º C, 1.1º C and 1.1º C.

RAD
Method 903.0: 160-533149:
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.

Method 904.0: Radium 228 batch 533167
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. JCW-MW-15007 (240-157983-1), JCW-MW-15009 (240-157983-2), JCW-MW-15010 (240-157983-3), JCW-MW-15028 (240-157983-4), DUP-02 (240-157983-5), EB-02 (240-157983-6), (LCS 160-533167/1-A), (LCSD 160-533167/2-A) and (MB 160-533167/23-A)

Method PrecSep_0: Radium-228 Prep Batch 160-533167
The following samples were prepared at a reduced aliquot due to Matrix: JCW-MW-15009 (240-157983-2), JCW-MW-15010 (240-157983-3) and JCW-MW-15028 (240-157983-4). 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: Radium-228 Prep Batch 160-533167
Insufficient sample volume was available to perform a sample duplicate for the following samples: JCW-MW-15007 (240-157983-1), DUP-02 (240-157983-5) and EB-02 (240-157983-6). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

Method PrecSep STD: Radium-226 Prep Batch 160-533149
The following samples were prepared at a reduced aliquot due to Matrix: JCW-MW-15009 (240-157983-2), JCW-MW-15010 (240-157983-3) and DUP-02 (240-157983-5). 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: Radium-226 Prep Batch 160-533149
Insufficient sample volume was available to perform a sample duplicate for the following samples: JCW-MW-15007 (240-157983-1), JCW-MW-15028 (240-157983-4) and EB-02 (240-157983-6). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

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

Method Summary

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

Job ID: 240-157983-1

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.
Project/Site: Karn/Weadock CCR JCW Bottom Ash Pond

Job ID: 240-157983-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-157983-1	JCW-MW-15007	Water	10/12/21 13:47	10/14/21 12:02
240-157983-2	JCW-MW-15009	Water	10/13/21 07:43	10/14/21 12:02
240-157983-3	JCW-MW-15010	Water	10/13/21 06:36	10/14/21 12:02
240-157983-4	JCW-MW-15028	Water	10/12/21 14:41	10/14/21 12:02
240-157983-5	DUP-02	Water	10/12/21 00:00	10/14/21 12:02
240-157983-6	EB-02	Water	10/13/21 06:00	10/14/21 12:02

Client Sample Results

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

Job ID: 240-157983-1

Client Sample ID: JCW-MW-15007

Lab Sample ID: 240-157983-1

Date Collected: 10/12/21 13:47
Date Received: 10/14/21 12:02

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	1.35		0.242	0.271	1.00	0.171	pCi/L	10/22/21 09:08	11/15/21 11:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*102*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:32*	*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	1.63		0.344	0.375	1.00	0.390	pCi/L	10/22/21 09:51	11/11/21 12:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*102*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:52*	*1*
Y Carrier	*81.5*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:52*	*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	2.98		0.421	0.463	5.00	0.390	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157983-1

Client Sample ID: JCW-MW-15009

Lab Sample ID: 240-157983-2

Date Collected: 10/13/21 07:43
Date Received: 10/14/21 12:02

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	0.388		0.188	0.191	1.00	0.244	pCi/L	10/22/21 09:08	11/15/21 11:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.5*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:32*	*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	0.922		0.363	0.373	1.00	0.497	pCi/L	10/22/21 09:51	11/11/21 12:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.5*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:52*	*1*
Y Carrier	*79.3*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:52*	*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	1.31		0.409	0.419	5.00	0.497	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157983-1

Client Sample ID: JCW-MW-15010

Lab Sample ID: 240-157983-3

Date Collected: 10/13/21 06:36
Date Received: 10/14/21 12:02

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	0.389		0.194	0.197	1.00	0.254	pCi/L	10/22/21 09:08	11/15/21 11:33	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.5*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:33*	*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	0.858		0.466	0.472	1.00	0.709	pCi/L	10/22/21 09:51	11/11/21 12:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.5*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:52*	*1*
Y Carrier	*77.8*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:52*	*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	1.25		0.505	0.511	5.00	0.709	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157983-1

Client Sample ID: JCW-MW-15028

Lab Sample ID: 240-157983-4

Date Collected: 10/12/21 14:41
Date Received: 10/14/21 12:02

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	0.819		0.228	0.240	1.00	0.207	pCi/L	10/22/21 09:08	11/15/21 11:33	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*98.3*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:33*	*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	1.19		0.385	0.400	1.00	0.501	pCi/L	10/22/21 09:51	11/11/21 12:53	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*98.3*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:53*	*1*
Y Carrier	*81.5*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:53*	*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	2.00		0.447	0.466	5.00	0.501	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157983-1

Client Sample ID: DUP-02

Date Collected: 10/12/21 00:00
Date Received: 10/14/21 12:02

Lab Sample ID: 240-157983-5

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	1.02		0.204	0.224	1.00	0.140	pCi/L	10/22/21 09:08	11/15/21 11:33	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*107*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:33*	*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	1.66		0.350	0.381	1.00	0.408	pCi/L	10/22/21 09:51	11/11/21 12:53	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*107*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:53*	*1*
Y Carrier	*80.0*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:53*	*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	2.68		0.405	0.442	5.00	0.408	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157983-1

Client Sample ID: EB-02

Date Collected: 10/13/21 06:00
Date Received: 10/14/21 12:02

Lab Sample ID: 240-157983-6

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	-0.00938	U	0.0764	0.0764	1.00	0.158	pCi/L	10/22/21 09:08	11/15/21 11:33	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.5*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:33*	*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	0.335	U	0.258	0.260	1.00	0.407	pCi/L	10/22/21 09:51	11/11/21 12:53	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.5*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:53*	*1*
Y Carrier	*79.3*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:53*	*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	0.326	U	0.269	0.271	5.00	0.407	pCi/L		11/15/21 15:35	1

Tracer/Carrier Summary

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

Job ID: 240-157983-1

Method: 903.0 - Radium-226 (GFPC)

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

		Percent Yield (Acceptance Limits)								
Lab Sample ID	Client Sample ID	Ba (40-110)								
240-157983-1	JCW-MW-15007	102								
240-157983-2	JCW-MW-15009	99.5								
240-157983-3	JCW-MW-15010	95.5								
240-157983-4	JCW-MW-15028	98.3								
240-157983-5	DUP-02	107								
240-157983-6	EB-02	99.5								
LCS 160-533149/1-A	Lab Control Sample	104								
LCSD 160-533149/2-A	Lab Control Sample Dup	99.8								
MB 160-533149/23-A	Method Blank	80.3								

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

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

		Percent Yield (Acceptance Limits)								
Lab Sample ID	Client Sample ID	Ba (40-110)	Y (40-110)							
240-157983-1	JCW-MW-15007	102	81.5							
240-157983-2	JCW-MW-15009	99.5	79.3							
240-157983-3	JCW-MW-15010	95.5	77.8							
240-157983-4	JCW-MW-15028	98.3	81.5							
240-157983-5	DUP-02	107	80.0							
240-157983-6	EB-02	99.5	79.3							
LCS 160-533167/1-A	Lab Control Sample	104	79.6							
LCSD 160-533167/2-A	Lab Control Sample Dup	99.8	81.1							
MB 160-533167/23-A	Method Blank	80.3	86.4							

Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier

QC Sample Results

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

Job ID: 240-157983-1

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-533149/23-A
Matrix: Water
Analysis Batch: 536662

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 533149

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.005876	U	0.138	0.138	1.00	0.273	pCi/L	10/22/21 09:08	11/15/21 11:39	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*80.3*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:39*	*1*

Lab Sample ID: LCS 160-533149/1-A
Matrix: Water
Analysis Batch: 536661

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 533149

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-226			15.1	12.44		1.37	1.00	0.214	pCi/L	82	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*104*		*40 - 110*

Lab Sample ID: LCSD 160-533149/2-A
Matrix: Water
Analysis Batch: 536661

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 533149

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-226			15.1	13.44		1.47	1.00	0.236	pCi/L	89	75 - 125	0.35	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*99.8*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-533167/23-A
Matrix: Water
Analysis Batch: 536046

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 533167

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.3359	U	0.379	0.380	1.00	0.623	pCi/L	10/22/21 09:51	11/11/21 12:58	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*80.3*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*1*
Y Carrier	*86.4*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*1*

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

Lab Sample ID: LCS 160-533167/1-A
Matrix: Water
Analysis Batch: 536205

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 533167

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-228			12.2	11.13		1.44	1.00	0.713	pCi/L	91	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*104*		*40 - 110*
Y Carrier	*79.6*		*40 - 110*

Lab Sample ID: LCSD 160-533167/2-A
Matrix: Water
Analysis Batch: 536205

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 533167

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-228			12.2	12.44		1.47	1.00	0.575	pCi/L	102	75 - 125	0.45	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*99.8*		*40 - 110*
Y Carrier	*81.1*		*40 - 110*

QC Association Summary

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

Job ID: 240-157983-1

Rad

Prep Batch: 533149

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-157983-1	JCW-MW-15007	Total/NA	Water	PrecSep STD	
240-157983-2	JCW-MW-15009	Total/NA	Water	PrecSep STD	
240-157983-3	JCW-MW-15010	Total/NA	Water	PrecSep STD	
240-157983-4	JCW-MW-15028	Total/NA	Water	PrecSep STD	
240-157983-5	DUP-02	Total/NA	Water	PrecSep STD	
240-157983-6	EB-02	Total/NA	Water	PrecSep STD	
MB 160-533149/23-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-533149/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
LCSD 160-533149/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	

Prep Batch: 533167

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-157983-1	JCW-MW-15007	Total/NA	Water	PrecSep_0	
240-157983-2	JCW-MW-15009	Total/NA	Water	PrecSep_0	
240-157983-3	JCW-MW-15010	Total/NA	Water	PrecSep_0	
240-157983-4	JCW-MW-15028	Total/NA	Water	PrecSep_0	
240-157983-5	DUP-02	Total/NA	Water	PrecSep_0	
240-157983-6	EB-02	Total/NA	Water	PrecSep_0	
MB 160-533167/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-533167/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-533167/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Lab Chronicle

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

Job ID: 240-157983-1

Client Sample ID: JCW-MW-15007 — Lab Sample ID: 240-157983-1

Date Collected: 10/12/21 13:47 — **Matrix: Water**
Date Received: 10/14/21 12:02

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536661	11/15/21 11:32	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536055	11/11/21 12:52	MLK	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Client Sample ID: JCW-MW-15009 — Lab Sample ID: 240-157983-2

Date Collected: 10/13/21 07:43 — **Matrix: Water**
Date Received: 10/14/21 12:02

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536661	11/15/21 11:32	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536055	11/11/21 12:52	MLK	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Client Sample ID: JCW-MW-15010 — Lab Sample ID: 240-157983-3

Date Collected: 10/13/21 06:36 — **Matrix: Water**
Date Received: 10/14/21 12:02

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536661	11/15/21 11:33	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536055	11/11/21 12:52	MLK	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Client Sample ID: JCW-MW-15028 — Lab Sample ID: 240-157983-4

Date Collected: 10/12/21 14:41 — **Matrix: Water**
Date Received: 10/14/21 12:02

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536661	11/15/21 11:33	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536055	11/11/21 12:53	MLK	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Lab Chronicle

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

Job ID: 240-157983-1

Client Sample ID: DUP-02

Lab Sample ID: 240-157983-5

Date Collected: 10/12/21 00:00
Matrix: Water
Date Received: 10/14/21 12:02

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536661	11/15/21 11:33	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536055	11/11/21 12:53	MLK	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Client Sample ID: EB-02

Lab Sample ID: 240-157983-6

Date Collected: 10/13/21 06:00
Matrix: Water
Date Received: 10/14/21 12:02

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536661	11/15/21 11:33	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536055	11/11/21 12:53	MLK	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	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.
Project/Site: Karn/Weadock CCR JCW Bottom Ash Pond

Job ID: 240-157983-1

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	06-30-22
California	State	2886	06-30-21 *
Connecticut	State	PH-0241	03-31-23
Florida	NELAP	E87689	06-30-22
HI - RadChem Recognition	State	n/a	06-30-22
Illinois	NELAP	200023	11-30-22
Iowa	State	373	12-01-22
Kansas	NELAP	E-10236	10-31-22
Kentucky (DW)	State	KY90125	01-01-22
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-21
Louisiana	NELAP	04080	06-30-22
Louisiana (DW)	State	LA011	12-31-21
Maryland	State	310	09-30-22
MI - RadChem Recognition	State	9005	06-30-22
Missouri	State	780	06-30-22
Nevada	State	MO000542020-1	07-31-22
New Jersey	NELAP	MO002	06-30-22
New York	NELAP	11616	04-01-22
North Dakota	State	R-207	06-30-22
NRC	NRC	24-24817-01	12-31-22
Oklahoma	State	9997	08-31-22
Oregon	NELAP	4157	09-01-22
Pennsylvania	NELAP	68-00540	03-01-22
South Carolina	State	85002001	06-30-22
Texas	NELAP	T104704193	07-31-22
US Fish & Wildlife	US Federal Programs	058448	07-31-22
USDA	US Federal Programs	P330-17-00028	03-11-23
Utah	NELAP	MO000542021-14	08-01-22
Virginia	NELAP	10310	06-14-22
Washington	State	C592	08-30-22
West Virginia DEP	State	381	10-31-22

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

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 JASSY	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-87195-29049.1
Client Contact: Jacob Krenz	Phone: 734 904 3310	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 JCW Bottom Ash Pond	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:				D	D		
JCW-MW-15007	10/12/21	1347	G	Water	N	N	H	H	2	
JCW-MW-15009	10/13/21	0743	G	Water	N	N	H	H	2	
JCW-MW-15010	10/13/21	0826	G	Water	N	N	H	H	2	
JCW-MW-15028	10/12/21	1441	G	Water	N	N	H	H	2	
DUP-02	10/12/21	—	G	Water	N	N	H	H	2	
EB-02	10/12/21	0800	G	Water	N	N	H	H	2	
				Water						

240-157983 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: 10/13/21 1011	Company TRC	Received by:	Date/Time: 10/13/21 1015	Company ETA
Relinquished by:	Date/Time: 10/13/21 1020	Company ETA	Received by:	Date/Time: 10/14/21 800	Company ETA
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 Sample Receipt Form/Narrative **Login # :**_____
Canton Facility

Client TRC Site Name_____ Cooler unpacked by: Trent

Cooler Received on 10/14/21 Opened on 10/14/21

FedEx: 1st Grd Exp UPS FAS Clipper Client Drop Off TestAmerica Courier Other_____

Receipt After-hours: Drop-off Date/Time_____ Storage Location_____

TestAmerica Cooler # 7A 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-14 (CF +0.1 °C) Observed Cooler Temp._____°C Corrected Cooler Temp._____°C
   IR GUN #IR-15 (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# **HC157842**
14. Were VOAs on the COC? Yes No
15. Were air bubbles >6 mm in any VOA vials? ● ⬅ Larger than this. Yes No NA
16. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot #_____ Yes No
17. Was a LL Hg or Me Hg trip blank present? _____ Yes No

Tests that are not checked for pH by Receiving:

VOAs
Oil and Grease
TOC

Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other

Concerning _____

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

Samples processed by:

19. SAMPLE CONDITION

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

Sample(s) _____ were received in a broken container.

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

20. SAMPLE PRESERVATION

Sample(s) _____were further preserved in the laboratory.

Time preserved: _____Preservative(s) added/Lot number(s):_____

VOA Sample Preservation - Date/Time VOAs Frozen: _____

Login # : _____

Eurofins TestAmerica Canton Sample Receipt Multiple Cooler Form				
Cooler Description (Circle)	IR Gun # (Circle)	Observed Temp °C	Corrected Temp °C	Coolant (Circle)
TA Client Box Other	IR-14 IR-15	1.0	1.1	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15	0.9	1.0	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15	1.0	1.1	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
				☐ See Temperature Excursion Form

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

Login Container Summary Report

Temperature readings: _____

Client Sample ID	Lab ID	Container Type	Container pH	Container Temp	Preservative Added (mls)	Lot #
JCW-MW-15007	240-157983-A-1	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15007	240-157983-B-1	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15009	240-157983-A-2	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15009	240-157983-B-2	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15010	240-157983-A-3	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15010	240-157983-B-3	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15028	240-157983-A-4	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15028	240-157983-B-4	Plastic 1 liter - Nitric Acid	<2			
DUP-02	240-157983-A-5	Plastic 1 liter - Nitric Acid	<2			
DUP-02	240-157983-B-5	Plastic 1 liter - Nitric Acid	<2			
EB-02	240-157983-A-6	Plastic 1 liter - Nitric Acid	<2			
EB-02	240-157983-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

eurofins

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-144122.1
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 #: 240-157983-1
Address: 13715 Rider Trail North,	Due Date Requested: 11/14/2021			
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	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
JCW-MW-15007 (240-157983-1)	10/12/21	13:47 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-15009 (240-157983-2)	10/13/21	07:43 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-15010 (240-157983-3)	10/13/21	06:36 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-15028 (240-157983-4)	10/12/21	14:41 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-02 (240-157983-5)	10/12/21	Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
EB-02 (240-157983-6)	10/13/21	06:00 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]	10-14-21 1433	ETA	FED EX		
FED EX			[signature]	OCT 15 2021 0932	ETA STL

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

Ver: 06/08/2021

Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

Job Number: 240-157983-1

Login Number: 157983
List Number: 2
Creator: Johnson, Autumn R

List Source: Eurofins TestAmerica, St. Louis
List Creation: 10/15/21 12:21 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

First Quarter 2021 Hydrogeological Monitoring Report

JC Weadock Solid Waste Disposal Area

Essexville, Michigan

April 2021

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1.0 Introduction

Consumers Energy implemented a comprehensive compliance monitoring plan documented in the *Revised Hydrogeological Monitoring Plan* (Natural Resource Technology, 2010) for the JC Weadock Solid Waste Disposal Area required by Special License Condition 20.b in Solid Waste Disposal Area Operating License No. 9233 issued on October 15, 2009. Since that time, 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) imposing groundwater monitoring and corrective action requirements that apply to the landfill (Weadock Landfill). Michigan amended Part 115 of the Natural Resources and Environmental Protection Act (NREPA) PA 451 of 1994, as amended (a.k.a., Michigan Part 115 Solid Waste Management) to provide a basis for establishing a groundwater monitoring system and initiating detection and assessment monitoring to conform requirements for any licensed coal ash impoundment or landfill after December 28, 2018 with Part 115 amendments and the CCR Rule.

On January 15, 2021, Consumers Energy submitted the *Landfill Hydrogeological Monitoring Plan, JC Weadock Power Plant, Essexville, Michigan* (Weadock Landfill HMP), which includes components for Detection Monitoring, Assessment Monitoring as well as Groundwater Surface Water Interface (GSI) Compliance Monitoring, to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) to comply with the requirements of Part 115 and the CCR Rule. The Weadock Landfill HMP (TRC, February 2021) was revised per EGLE comments, submitted, and approved by EGLE on February 19, 2021 and incorporated, by reference, in Solid Waste Disposal Area Operating License No. 9640 issued on March 11, 2021.

1.1 Statement of Adherence to Approved Hydrogeological Monitoring Plan

This First Quarter 2021 JC Weadock 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, dated July 5, 2013 *Format for Solid Waste Disposal Facility Monitoring Submittals*. All references herein to the EGLE are inclusive of the MDEQ. Information contained in this report was prepared in adherence to the approved Weadock Landfill HMP that was approved by the EGLE on February 19, 2021. The Weadock Landfill HMP is compliant with 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 first quarter 2021 at the JC Weadock Solid Waste Disposal Area located at 2742 Weadock Highway

in Essexville, Michigan (Figure 1). This JC Weadock Disposal Area is currently authorized under a permit (Groundwater Discharge Authorization GWE-0005) issued pursuant to Part 31 to discharge to the unusable aquifer directly underlying the solid waste that vents almost immediately to the Saginaw River and Saginaw Bay. The Weadock Landfill is currently in assessment monitoring pursuant to the CCR Rule, as discussed in the *2020 Annual Groundwater Monitoring and Corrective Action Report* (TRC, January 2021), which was indicative of impact from landfill operations. Consumers Energy provided notice to the Department on January 14, 2019 that arsenic was detected at statistically significant levels above the federal groundwater protection standards (GWPS) established pursuant to §257.95(h) in one monitoring well at the JC Weadock Landfill (JCW-MW-15023), which was located downgradient of a 1,600 linear foot vent within the slurry wall enclosing the historical fly ash disposal area. The vent was designed to direct groundwater flow beneath the landfill to the discharge channel immediately upgradient from the NPDES external outfall to prevent water from building up within the facility. In July 2018, this vent was closed (Golder, 2018) and the engineering improvement was approved the by the Department (MDEQ, 2018). Closing the vent and completely encircling the Weadock Landfill with a soil-bentonite slurry wall has demonstrated reduced groundwater flux around the entire perimeter of the landfill.

In March 2019, Consumers Energy submitted a Response Action Plan (Consumers, 2019), which identified interim response activities taken or to be taken to control possible sources of contamination. Consumers Energy further evaluated arsenic in groundwater at the Weadock Landfill as part of the nature and extent analysis and outlined potential remedies in the Assessment of Corrective Measures (TRC, 2019), which focused on materials management with an emphasis on improving source control through the closure plan.

Compliance monitoring is being implemented under the Weadock Landfill HMP dated February 2021 and approved by the EGLE on February 19, 2021. Groundwater data collected in accordance with the Weadock Landfill HMP are used to:

- Assess background groundwater quality for the purposes of establishing and updating GWPS (HMP Section 7.1 Background Determination)
- Perform detection monitoring to assess whether a new release has occurred during operation of the landfill (*i.e.* statistically significant increase (SSI) over background) (HMP Section 7.2 Detection Monitoring)
- Perform assessment monitoring to assess whether constituent concentrations in groundwater from prior operations are above a risk-based standard (*i.e.* statistically significant level over the groundwater protection standard [GWPS]) (HMP Section 7.3 Assessment Monitoring)
- Assess compliance with the GSI pathway (HMP Section 7.4)

1.3 Site Overview

The JC Weadock Solid Waste Disposal Area is located within the former JC Weadock Power Plant (Site) is located south of the DE Karn Power Plant, east of the Saginaw River, west of Underwood Drain and Saginaw Bay, and north of Tacey Drain and agricultural land (Figure 1). In addition to the disposal area, the Site consists of the generating facility which retired eight coal-

fired generating units and infrastructure and utilities that support electrical transmission. Units 1 to 6 commenced operation in 1940 and retired in 1980 and Units 7 and 8 were added in 1955 and 1958 continued to operate through April 15, 2016.

1.4 Geology/Hydrogeology

The majority of Weadock Landfill area is comprised of surficial CCR and sand fill, as described in the Weadock Landfill HMP. USGS topographic maps and aerial photographs dating back to 1950, 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 depth ranging from 25-75 ft bgs. A sandstone unit, which is part of the Saginaw Formation, was generally encountered at 80-90 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. Along the perimeter of the landfill, there is a well-graded sand present at depths ranging from 10 to 20 ft bgs. The sand is variable in thickness, ranging from <1 to ~6.5 feet, and is discontinuous along the landfill perimeter, as evidenced by the soil boring logs and slurry wall construction documentation.

The alluvium soils pinch out and are not observed in soil borings located south and east of the Weadock Bottom Ash Pond and Weadock Landfill, along the location of the historic shoreline. The non-water-bearing region south of these units extends for at least a mile south and southeast of the site.

Beneath the surficial fill and sand unit (where present) is 70 to 80 feet of clay till. Along the southern perimeter of the landfill, some of the upper portion of the clay till is sand-rich (generally greater than 20 ft bgs). The clay till acts as a hydraulic barrier that separates the shallow groundwater from the underlying sandstone. The sandstone unit, which is part of the Saginaw Formation, is generally encountered at 80-90 ft bgs.

The Weadock Landfill is bounded by several surface water features (Figures 1 and 2): the Saginaw River to the west, a discharge channel and Saginaw Bay (Lake Huron) to the north, Underwood Drain to the east, and Tacey Drain to the south. Groundwater flow in this water bearing zone is largely controlled by the surface water elevations of Saginaw River and Saginaw Bay.

2.0 Leachate Monitoring

The leachate monitoring program under this revised plan consists of an annual laboratory leachate sampling program (Q1) and an annual field leachate sampling program (Q4) per the Weadock Landfill HMP. This program was instituted to maintain the facility under the applicable portions of Part 115, Rule 311 – Leaching tests to evaluate potential for groundwater contamination at unlined industrial waste landfills. Specifically, Subrule (3) states that waste that is disposed of in an industrial waste landfill shall be retested to evaluate potential for groundwater contamination annually or on a more frequent schedule as specified by the solid waste control agency. The Weadock Landfill HMP includes laboratory leachate testing, which consists of four dry-handled Coal Combustion Residual (CCR) samples collected under normal plant operating conditions during the active life of the landfill.

Additional support for evaluating the potential for groundwater contamination at the unlined industrial waste landfill includes the field leachate monitoring program conducted during the 4th quarter of each year. This program consists of an annual sampling collection from two (2) leachate headwells; LH-103 and LH-104. This program was implemented to determine constituents in the leachate as measured under actual conditions in the field that need to be included as a part of the groundwater and GSI monitoring program. Constituents will be added to the GSI and groundwater monitoring program if detected and confirmed in a field-collected leachate sample at a concentration greater than its GSI criterion.

Laboratory leachate data for the four dry-handled CCR samples are shown in Table 4. The 2021 laboratory leachate data are generally consistent with data collected in previous years.

3.0 Groundwater Monitoring

3.1 Monitoring Well Network

The groundwater monitoring system presented in the HMP has been established in accordance with R 299.4906 and the CCR Rule §257.91, which consists of 16 monitoring wells (four background monitoring wells and 12 downgradient monitoring wells) that are screened in the uppermost aquifer. The monitoring well network has been designed to provide appropriate coverage for water level and water quality data collection along the perimeter of the landfill. Consumers Energy installed an additional nine monitoring wells in August 2018 to supplement the preexisting groundwater well network currently used under the approved 2015 HMP for Michigan Part 115 compliance to provide appropriate coverage for the collection of groundwater levels and water quality data along the perimeter of the Weadock Landfill. The monitoring well locations are shown on Figure 2. Monitoring well specifications and purpose (i.e. static water level monitoring, groundwater quality monitoring, or GSI monitoring) are included in Table 1.

The Weadock Landfill HMP groundwater monitoring system consists of the following:

- ***Background Groundwater Quality:*** Four monitoring wells located southwest of the Weadock Landfill provide data on background groundwater quality that has not been affected by the CCR unit (MW-15002, MW-15008, MW-15016, and MW-15019) and are used to establish groundwater protection standards (GWPSs) for the landfill:
  - MW-15002
  - JCW-MW-15008
  - JCW-MW-15016
  - JCW-MW-15019
- ***Downgradient Groundwater Quality:*** The twelve downgradient monitoring wells, located on the outside of the perimeter slurry wall include:
  - JCW-MW-18001
  - JCW-MW-18004
  - JCW-MW-18005
  - JCW-MW-18006
  - MW-50
  - MW-51
  - MW-52
  - MW-53
  - MW-53R
  - MW-54R
  - MW-55
  - OW-57R Out
- ***Groundwater-Surface Water Interface (GSI) Monitoring***: Monitoring wells located along the surface water features adjacent to the Weadock Landfill are included in the monitoring program to meet the requirements of Part 31. Locations and alignments were established in the Phase II Groundwater Discharge Evaluation, Figure: Appendix K (Natural Resource Technology, 2005) as a baseline for monitoring future results. These monitoring wells are screened across the water table of the uppermost aquifer and will serve as GSI monitoring wells to determine compliance with generic GSI criteria or site-specific mixing zone-based criteria as appropriate. The eight GSI compliance monitoring wells include:
  - MW-50
  - MW-51
  - MW-52
  - MW-53
  - MW-53R
  - MW-54R
  - MW-55
  - JCW-MW-18004

- ***Static Water Level Measurement Only:*** Eleven (11) monitoring wells, located on the inside of the perimeter slurry wall, at paired locations with several of the downgradient monitoring wells include:
  - JCW-OW-18001
  - JCW-OW-18002
  - JCW-MW-18003
  - JCW-MW-18004
  - JCW-MW-18005
  - JCW-MW-18006
  - MW-20
  - OW-51
  - OW-53
  - OW-54
  - OW-55
  - OW-56R
  - OW-57R IN
  - OW-61
  - OW-63

3.2 March 2021 Monitoring Event

In accordance with the Weadock Landfill HMP, TRC conducted the first quarter 2021 monitoring event for the Weadock Landfill on March 1 through 9, 2021. Groundwater monitoring was performed in accordance with the Weadock Landfill HMP. Samples that were collected during this event were submitted to Consumers Energy Laboratory Services in Jackson, Michigan for analysis of the following total metals and inorganic parameters:

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 the additional constituent's magnesium, sodium, potassium, and bicarbonate, carbonate, and total alkalinity. Analytical results from the first quarter 2021 monitoring event are included in the attached laboratory reports (Appendix E).

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 Weadock Landfill 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 F).

Groundwater samples were collected using a peristaltic pump. The samples were collected in vendor-provided, nitric acid pre-preserved (metals only) and unpreserved sample containers and submitted to the laboratory for analysis. Groundwater 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 (MW-50), and field matrix spike/matrix spike duplicate samples collected at JCW-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 Weadock Landfill HMP. The data quality reviews for the JC Weadock Disposal Area network wells are summarized in Appendix B.

3.3 Groundwater Flow Rate and Direction

Potentiometric monitoring initiated in the unusable aquifer beneath the facility includes static water level data collected for development of water table contours and evaluation of the potential for discharge from the facility. The monitoring under this section will be conducted quarterly until closure, as approved by the Director, and semiannually during the 30-year post-closure period. Monitoring will continue until the end of post closure (30 years) or as otherwise approved by the Director.

The measurements for top of casing (TOC) and quarterly recorded depth to water (DTW) with corresponding calculated static water level (SWL) is tabulated and presented in Table 1. A potentiometric surface map is provided as Figure 2.

Groundwater elevations measured at the site in March 2021 are generally within the range of 580 to 593 feet above mean sea level (ft NAVD88). Groundwater elevations in monitoring wells located adjacent to Saginaw Bay and adjoining surface water bodies are typically encountered at a similar or slightly higher elevation relative to surrounding surface water features measured

by the NOAA gauging station. A time-series plot included in Appendix A compares the groundwater elevation of MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, JCW-MW-18004, and MW-55 to the nearby NOAA staff gauge. Water levels in wells adjacent to surface water bodies (e.g. Saginaw Bay, Tacey Drain) closely mirror the surface water elevation. Such conditions would result in a minimal gradient to potentially a reverse gradient (i.e., toward the landfill) between the well and the drain which would result in minimal to zero mass flux to the drain (Appendix A: Table A1).The static water level elevations inside of the Weadock Landfill perimeter slurry wall are generally significantly different (>3 ft) than static water levels outside of the slurry wall, which demonstrates the presence of a low permeability feature between the well pairings inside and outside of the constructed slurry wall. The groundwater monitoring system is structured such that there are eleven (11) monitoring well pairs used to evaluate the hydraulic gradient and potential for water flux across the slurry wall. Static water level observations from the paired wells are shown on time series charts in Appendix A. As such, the water level elevations indicate that the slurry wall is performing as designed. The general flow direction observed within the confinement of the slurry wall is similar to that identified in previous monitoring rounds. Due to the potential for radial flow, the downgradient wells are appropriately positioned to detect the presence of detection or assessment parameters that could potentially migrate from the Weadock Landfill.

As shown on Figure 3 and in Appendix A, the static water level outside of the slurry wall is lower than the static water level inside of the wall; therefore, the potential groundwater flux across the slurry wall was calculated and included in Table A-2 of Appendix A.

3.4 Groundwater Analytical Data and Relevant Screening Criteria

Groundwater analytical data are evaluated in accordance with the Weadock Landfill HMP for the purposes of solid waste license compliance as well as to determine compliance with applicable generic GSI and site-specific GSI mixing zone-based criteria. Data are evaluated by using a combination of screening against relevant criteria, as well as utilizing statistical analyses.

Analytical results from the first quarter 2021 monitoring event are included in the attached laboratory report (Appendix E). Groundwater analytical data from the first quarter 2021 monitoring events are summarized in Table 2, as well as the associated Part 201 generic GSI and site-specific mixing-zone GSI criteria. Field data are summarized in Table 3.

Mixing-zone criteria for arsenic, boron, and selenium are provided for the Karn-Weadock complex in the mixing zone determination, dated December 23, 2015 (MDEQ, 2015). 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 criteria applies to select monitoring locations as noted in Section 3.4.4 below.

The mixing zone determination included both final acute values (FAV) and final chronic values (FCV). If a concentration of a constituent at a groundwater well exceeds the acute criteria, and the exceedances are upgradient of the GSI compliance monitoring wells, Consumers Energy must demonstrate that data from all of the compliance monitoring wells are, and will be, in compliance with acute mixing zone-based GSI criteria for those parameters. Averaging of

groundwater data is not allowed for comparison to generic GSI or acute mixing zone-based GSI criteria. Acute mixing zoned-based or generic GSI criteria may not be exceeded in any individual GSI compliance monitoring well. If a concentration of a constituent at a well exceeds the chronic criterion, compliance can be demonstrated on a mass-flux basis. The facility can choose to demonstrate compliance by evaluating the total chronic loading based upon the contribution from each compliance well with respect to the total flux observed in the mixing zone.

Table 5 provides a summary of the statistically significant increases or exceedances over the most recent four quarters in accordance with the EGLE-prescribed format; only well/constituent pairs that exceed the relevant GSI criteria (within the last four quarters) are included.

3.4.1 Groundwater Monitoring Analytical Results

Groundwater monitoring is being conducted under Weadock Landfill HMP, which provides for sampling at historic wells (MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and MW-55) along with wells that were newly installed in 2018 (OW-57R OUT, JCW-MW-18001, JCW-MW-18004, JCW-MW-18005, and JCW-MW-18006). Data for these wells are tabulated in Table 2. Summaries of the statistical evaluations are provided in sections 3.4.2, 3.4.3, and 3.4.4 below.

Analytical results for these wells are being evaluated to determine the effectiveness of landfill structural and operational enhancement measures on the quality and quantity of groundwater flow beneath the footprint of the facility. Additionally, analytical results for these wells are being evaluated in support of GSI compliance. GSI criteria only apply to the designated compliance point as specified in Section 3.2.4 below; however, analytical results and data trends in groundwater collected from the perimeter dike wells are evaluated to identify potential GSI compliance issues.

Overall, observed trends and concentrations further demonstrate that constituents present in groundwater in the monitoring well system are not expected to result in adverse impacts at the GSI (Table 5). As discussed in the ASD presented in the third quarter 2018 Hydrogeological Monitoring Report, redox conditions are changing at MW-55, which could explain some of the changes in trends of redox-sensitive parameters such as arsenic and molybdenum at that location. Additionally, as detailed in Section 3.1, water levels have increased over 4 feet since 2010 (Appendix A), geochemistry is changing, and data trends will continue to be monitored and evaluated. Several of these newly observed trends, such as those observed for specific conductance, may be a result of increased lake levels rather than a change in flux from the landfill as the water level data demonstrate that the slurry wall is performing as designed.

3.4.2 Detection Monitoring

Detection monitoring is continuing through the active life of the Weadock Landfill to monitor for new releases from landfill operations. The detection monitoring program consists of potentiometric analysis and groundwater quality analysis. The potentiometric analysis, as discussed in Section 3.1, demonstrates that the slurry wall is performing as designed.

Analytical data for the detection monitoring program are tabulated in Table 2. In addition to the

comparison of analytical data to relevant screening criteria, statistical trend analyses are used to evaluate groundwater quality each quarter. Consumers Energy manages and evaluates its groundwater data using Sanitas™ Statistical Software. Consumers Energy conducts intrawell trend analyses to examine data for a given well over time to determine if changes in water quality are occurring that may be associated with the landfill and to identify potential GSI compliance issues. Specifically, the Mann-Kendall test for trend was performed 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. Constituents that were added to the monitoring program by the Weadock Landfill HMP (i.e., calcium, chloride, fluoride, and total dissolved solids) had an insufficient amount of data to perform trend analysis. Trend analysis will be completed for these constituents following the collection of a minimum of eight sampling events.

Appendix C includes a table summarizing the results of the trend tests as well as the Sanitas™ output summary statistics and graphs. Data are stable or declining for the majority of the well/constituent pairs, with the following exceptions:

- A new increasing trend for iron at MW-50 was observed in fourth quarter 2020 and confirmed in first quarter 2021.
- A continuous increasing trend was observed for sulfate at JCW-MW-18001. Sulfate concentrations remain below the generic final acute value (FAV).

The potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill. Iron and sulfate are both redox sensitive parameters and are attributed to localized changes in geochemistry near MW-50 and JCW-MW-18001 as a result of changing water levels, rather than a change in flux from the landfill, as discussed further in Section 3.5.

3.4.3 Assessment Monitoring Data Evaluation

Assessment monitoring is continuing at the Weadock Landfill in accordance with the Weadock Landfill HMP and §257.95. The assessment monitoring data were statistically evaluated in accordance with the procedures in the Weadock Landfill HMP. The statistical evaluation details are provided in Appendix C (*Assessment Monitoring and GSI Statistical Evaluation of March 2021 Sampling Event*).

3.4.3.1 Establishing Groundwater Protection Standards

The groundwater protection standards (GWPSs) are used to assess constituent concentrations present in groundwater as a result of CCR Unit operations by statistically comparing concentrations in the downgradient wells to each of the respective GWPSs for each detection and assessment monitoring constituent. The calculation of the GWPSs in accordance with the Weadock Landfill HMP is documented in the *Groundwater Protection Standards* technical memorandum included in Appendix H. The Federal CCR Rule requires establishment of GWPSs for assessment monitoring (Appendix IV) constituents only. Part 115 requires establishment of GWPSs for both detection and assessment monitoring constituents.

3.4.3.2 Data Comparison to Groundwater Protection Standards

Consistent with the *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (Unified Guidance) (USEPA, 2009) and the Weadock Landfill HMP, the preferred method for comparisons to a fixed standard are confidence limits. An exceedance of the standard occurs when the 99 percent lower confidence level of the downgradient data exceeds the GWPS.

Detection Monitoring Constituents: The first quarter 2021 statistical evaluation indicates that boron at JCW-MW-18001, JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and OW-57R OUT and calcium at MW-51 were present at statistically significant levels above the GWPSs. The GWPSs for calcium and boron were established based on background concentrations observed in wells unaffected by the Weadock Landfill or Weadock Bottom Ash Pond, as described in Appendix H. Boron and calcium are both detection monitoring (i.e., Appendix III) constituents that do not have associated health-based criteria and there is not a complete drinking water pathway on site. As such, the relevant Part 115 compliance pathway the GSI pathway. Concentrations of boron and calcium are below relevant GSI criteria, as discussed in Section 3.5.3.

Assessment Monitoring Constituents: Based on the first quarter 2021 statistical evaluation, there are no assessment monitoring constituents present at statistically significant levels within the Weadock Landfill groundwater monitoring system. Although concentrations of arsenic and molybdenum at MW-55 observed during individual sampling events are above the GWPS, the elevated concentrations of those constituents are not a result of a release from the Weadock Landfill, as detailed in Section 3.5. The head differential of 8.13 feet between OW-55 inside the slurry wall and MW-55 outside of the slurry wall also suggests that the integrity of the slurry wall is maintained and groundwater flow from the landfill to the south is impeded by the low permeability of the slurry wall. Groundwater conditions at MW-55 will continue to be monitored.

3.4.4 GSI Compliance Monitoring

The GSI monitoring program consists of the eight monitoring points located along the surface water features:

- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- JCW-MW-18004

First quarter 2021 data from the GSI monitoring points are tabulated in Table 2. Consistent with the Weadock Landfill HMP, confidence intervals were established for the following GSI monitoring program constituents:

- Boron
- pH
- Arsenic
- Lithium
- Selenium
- Iron
- Sulfate
- Chromium
- Molybdenum
- Vanadium

The confidence interval calculations are provided in Appendix D (*Assessment Monitoring and GSI Statistical Evaluation of March 2021 Sampling Event*). The confidence interval test compares the lower confidence limit to the GSI. Overall, data continue to demonstrate compliance with the applicable GSI criteria.

Arsenic: The statistical evaluation found that although arsenic was present at concentrations above the chronic-based mixing zone GSI criterion (100 ug/L) in monitoring well MW-55 the past three quarterly events, the lower confidence limit based on eight events is below 100 ug/L, demonstrating that arsenic is not present at a statistically significant level above GSI criteria. Additionally, water levels in MW-55 closely mirror the surface water elevation measured at the NOAA gauging station, which indicates there is a minimal outward gradient to a potentially, modest reverse gradient (i.e., toward the landfill) between the monitoring well and the drain, resulting in a minimal to zero mass flux to the drain.

Boron: The assessment monitoring statistical evaluation found that boron was present at statistically significant levels above the GWPS at JCW-MW-18001, JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and OW-57R . Boron is a detection monitoring (i.e. Appendix III) constituent and there is not a complete drinking water pathway on site. As such, the relevant Part 115 compliance pathway is the GSI pathway. All observations of boron are less than the recommended mixing-zone based GSI value specified in Table 3 of the *Implementation of a Mixing Zone Request, Consumers Energy DE Karn/JC Weadock Complex* (MDEQ, 2015) (Appendix D: Table 2).

Molybdenum: The statistical evaluation found that molybdenum was present at a statistically significant levels above the generic GSI criterion of 120 ug/L in monitoring well MW-55. However, water levels in MW-55 closely mirror the surface water elevation measured at the NOAA gauging station, which indicates there is a minimal outward gradient to a potentially, modest reverse gradient (i.e., toward the landfill) between the monitoring well and the drain, resulting in a minimal to zero mass flux to the drain.

Sulfate: Sulfate concentrations are compared to the Final Acute Value (FAV) of 1,200 mg/L (Rule 323.1057 [Toxic Substances; “Rule 57”] of the Part 4 Water Quality Standards). In the past 8 quarterly events, there has been one unconfirmed detection of sulfate above the FAV at JCW-18004. The exceedance occurred during the October 2019 sampling event, when the monitoring well was sampled simultaneously under the federal CCR program and the prior HMP (Rev 2; Consumers Energy, 2015). The reported sulfate concentrations were 1,260 ug/L and 930 ug/L, which average 1,095 ug/L. Sulfate concentrations observed in JCW-MW-18004 have been below the FAV since March 2020.

3.5 Alternate Source Demonstration

Although a confirmed increasing trend was observed at MW-50 for iron and at JCW-MW-18001 for sulfate, the potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill. Iron and sulfate are both redox sensitive parameters and are attributed to changes in geochemistry near MW-50 and JCW-MW-18001 as a result of changing water levels, rather than a change in flux from the landfill therefore Consumers Energy

is presenting an Alternate Source Demonstration for these constituents. Timeseries charts included in Appendix G illustrate the correlation between the increased concentrations and the changing redox conditions.

- Dissolved oxygen in increasing at both MW-50 and JCW-MW-18001. Sulfate is used as an oxidizing agent when oxygen is not present. As groundwater is transitioning to a more oxygenated state from the rising adjacent surface water level, less sulfate is being reduced as an electron acceptor, causing increasing concentrations (i.e. less sulfate is being reduced to sulfide/sulfite/elemental sulfur, so the amount of sulfate present increases).
- These changes in sulfate concentrations may in turn affect iron concentrations. When appreciable amounts of sulfide are present (such as from a reduction of sulfate), iron concentrations can be reduced due to the precipitation of iron sulfides. If the amount of sulfide is reduced, this could result in increased iron concentrations. As dissolved oxygen increases further, and is greater than 1-2 mg/L, iron concentrations may be reduced, as iron occurs as Fe^{3+}, which is less soluble than Fe^{2+}.
- Sulfate concentrations at JCW-MW-18001 (549 mg/L) are higher than sulfate concentrations in leachate headwell LH-104 (302 mg/L), which further supports that the landfill is not the source of sulfate.
- Iron concentrations at MW-50 (2,100 ug/L) are much higher than iron concentrations in leachate headwell LH-104 (225 ug/L), which further supports that the landfill is not the source of sulfate.

Consumers Energy is continuing to assert an Alternate Source Demonstration (ASD) for a arsenic and of molybdenum at MW-55 indicating elevated levels of constituents at that location are not related to materials management of the Weadock Landfill (*2019 Annual Groundwater Monitoring and Corrective Action Report*; TRC, January 2020). The basis for this ASD is summarized below and updated time series plots in support of this ASD are included in Appendix G.

Data collected from the 2018 investigation as well as data collected during routine sampling events for Part 115 and Federal CCR groundwater compliance show the following:

- **Distinct Chemistry from Leachate –** The leachate chemistry from a monitoring well screened at the base of the ash fill (LH-104) is distinctly different from the groundwater chemistry near MW- 55 and the temporary monitoring wells installed by TRC in the investigation area, as illustrated Appendix G of the 2019 Annual Groundwater Monitoring and Corrective Action Report (TRC, January 2020).
- **Conservative Tracer –** Boron is a metalloid known to be present in coal ash and can be used as a conservative tracer in groundwater. Concentrations of boron in Leachate Headwell LH-104 are significantly higher than concentrations observed at any of the other location sampled as a part of this ASD. Additionally, boron concentrations at MW-55 have decreased since 2010, as evidenced by the time series plots in Appendix G. A downward trend in concentration for boron is strong evidence that the water quality at MW-55 is not directly affected by groundwater migrating from the landfill.
- **Reducing Conditions and Groundwater Head Levels –** Water levels for MW-55, as shown in Appendices A and G, are trending upwards and have increased over 4-ft since 2010. The oxidation-reduction potential (ORP) at MW-55 is generally lower (i.e., more reducing) than other wells along the southern and eastern portion of the landfill perimeter

Table 3). The lowering of ORP over time as a result of increased water levels has changed the geochemical conditions in the vicinity of MW-55 and has resulted in an increased solubility of arsenic and molybdenum.

4.0 Conclusions and Recommendations

Detection monitoring is continuing through the active life of the Weadock Landfill to monitor for new releases from landfill operations. The detection monitoring program consists of potentiometric analysis and groundwater quality analysis. Evaluation of the first quarter 2021 data demonstrate that the slurry wall is functioning as designed.

The Weadock Landfill is currently in assessment monitoring pursuant to the CCR Rule, as discussed in the *2020 Annual Groundwater Monitoring and Corrective Action Report*, which was indicative of impact from past landfill operations. Evaluation of the first quarter 2021 data demonstrate that boron and calcium are present at concentrations above the GWPS. Boron and calcium are both detection monitoring (i.e., Appendix III) constituents that do not have associated health-based criteria and there is not a complete drinking water pathway on site. As such, the relevant Part 115 compliance pathway the GSI pathway. Concentrations of boron and calcium are below relevant GSI criteria, as discussed in Section 3.5.3.

The statistical evaluation found that molybdenum was present at a statistically significant levels above the generic GSI criterion of 120 ug/L. However, water levels in MW-55 closely mirror the surface water elevation measured at the NOAA gauging station, which indicates there is a minimal gradient to potentially a reverse gradient (i.e., toward the landfill) between the well and the drain, resulting in a minimal to zero mass flux to the drain. No other constituents were present at statistically significant levels above applicable GSI criteria.

Therefore, Consumers Energy will continue with the detection and assessment monitoring program at the Weadock Landfill Impoundment unit in conformance with the JC Weadock Landfill HMP. The second quarter monitoring event for is scheduled for the first week of May 2021.

5.0 References

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Tables

Table 1
Summary of Groundwater Elevation Data: March 2021
First Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, 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 Monitoring Wells							
MW-15002	587.71	Sand	580.9	to	570.9	5.99	581.72
MW-15008	585.36	Sand with clay	578.7	to	568.7	4.00	581.36
MW-15016	586.49	Sand	581.2	to	578.2	3.54	582.95
MW-15019	586.17	Sand and Sand/Clay	579.5	to	569.5	4.77	581.40
Bottom Ash Pond: Downgradient Monitoring Wells							
JCW-MW-15007	587.40	Sand	582.7	to	579.2	3.22	584.18
JCW-MW-15009	589.64	Sand	581.9	to	576.9	7.75	581.89
JCW-MW-15010	597.76	Sand	579.7	to	578.2	16.46	581.30
JCW-MW-15028	589.64	Sand	567.7	to	564.7	6.29	583.35
Landfill: Downgradient Monitoring Wells (outside slurry wall)							
JCW-MW-18001	596.73	Sand and Sandy Clay	578.3	to	573.3	15.85	580.88
JCW-MW-18004	593.04	Sandy Clay	583.9	to	578.9	11.60	581.44
JCW-MW-18005	590.89	Sand and Sandy Clay	580.0	to	575.0	8.23	582.66
JCW-MW-18006	600.72	Fly Ash and Sandy Clay	582.8	to	577.8	13.94	586.78
MW-50	593.36	Sand	577.8	to	574.8	12.78	580.58
MW-51	594.29	Sand and Clay	577.8	to	574.8	13.40	580.89
MW-52	594.90	Sand	579.3	to	576.3	14.00	580.90
MW-53	593.68	Sand and Clay	579.1	to	576.1	12.81	580.87
MW-53R	594.25	Sand and Clay	580.4	to	575.4	13.35	580.90
MW-54R	593.89	Clay and Sand	581.3	to	576.3	12.89	581.00
MW-55	593.82	Sand	581.5	to	578.5	12.97	580.85
OW-57ROUT	591.00	Sandy Clay	577.0	to	572.0	8.90	582.10
Landfill: Static Water Level Only (inside slurry wall)							
JCW-OW-18001	595.84	Fly Ash and Sand	581.1	to	576.1	6.10	589.74
JCW-OW-18002	593.63	Sand	578.9	to	573.9	10.08	583.55
JCW-OW-18003	593.99	Sand and Clay	580.5	to	575.5	7.38	586.61
JCW-OW-18004	594.19	Sandy Clay	584.6	to	579.6	6.96	587.23
JCW-OW-18006	600.61	Fly Ash and Clay with Sand	582.9	to	577.9	8.10	592.51
MW-20	592.73	NR	~581.1	to	~578.1	6.24	586.49
OW-51	593.62	Clay and Sand	578.9	to	575.9	9.91	583.71
OW-53	593.64	Clay and Sand	579.0	to	576.0	6.27	587.37
OW-54	594.10	Clay and Sand	580.0	to	577.0	6.40	587.70
OW-55	594.67	Clay (or Sand and Clay)	580.9	to	577.9	5.69	588.98
OW-56R	592.01	Ash and Sand	577.5	to	572.5	5.90	586.12
OW-57R IN	590.86	Sandy Clay	575.7	to	570.7	6.43	584.43
OW-61	612.37	Ash and Sand	588.0	to	585.0	20.69	591.68
OW-63	612.53	Ash and Sand	594.2	to	591.2	25.45	587.08
Landfill: Leachate Headwells							
LH-103	603.49	Fly Ash	30.2	to	33.2	15.21	588.28
LH-104	596.56	Fly Ash	8.0	to	11.0	6.64	589.92

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 Groundwater Sampling Results (Analytical): March 2021
First Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

							Sample Location:	JCW-MW-18001	JCW-MW-18004	JCW-MW-18005	JCW-MW-18006	MW-50	MW-51
							Sample Date:	3/8/2021	3/8/2021	3/9/2021	3/9/2021	3/8/2021	3/8/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Chronic-Based Mixing Zone GSI Criteria^	Acute-Based Mixing Zone GSI Criteria^						
Appendix III[(1)]													
Boron	ug/L	NC	**500**	**500**	NA	44,000	69,000	**1,350**	232	**987**	**2,650**	**1,510**	**1,040**
Calcium	mg/L	NC	NC	NC	500[EE]	NC	NC	270	252	286	148	386	293
Chloride	mg/L	250**	250[E]	250[E]	**50**	NC	NC	**72.1**	17.9	43.7	**66.1**	**86.5**	**91.2**
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	1,200[F]	NC	NC	549	581	535	57.3	1,130	452
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	NC	NC	**1,610**	**1,390**	**1,420**	**823**	**2,360**	**1,530**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	NC	NC	6.9	6.9	6.8	6.9	6.9	7.0
Appendix IV[(1)]													
Antimony	ug/L	6	6.0	6.0	2.0	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	NA	**100**	680	2	< 1	7	**30**	1	**11**
Barium	ug/L	2,000	2,000	2,000	1,200	NC	NC	213	20	135	477	116	143
Beryllium	ug/L	4	4.0	4.0	33	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	NC	NC	< 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
Cobalt	ug/L	NC	40	100	100	NC	NC	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	14	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	NC	NC	69	35	39	58	126	62
Mercury	ug/L	2	2.0	2.0	0.20#	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	**73**	210	**120**	NC	NC	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226/228	pCi/L	NC	NC	NC	NC	NC	NC	--	--	--	--	--	--
Selenium	ug/L	50	50	50	NA	55	120	< 1	7	< 1	< 1	1	1
Thallium	ug/L	2	2.0	2.0	2.0	NC	NC	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115[(2)]													
Iron	ug/L	**300****	**300[E]**	**300[E]**	500,000[EE]	NC	NC	183	21	**4,800**	**5,730**	**2,100**	**1,940**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	NC	NC	2	3	2	< 1	4	2
Nickel	ug/L	NC	100	100	120	NC	NC	8	< 2	8	3	< 2	< 2
Silver	ug/L	100**	34	98	0.2	NC	NC	< 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	3	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000[E]	260	NC	NC	< 10	< 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}.

[F] - Criterion is the Final Acute Value (FAV) .

[(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 2
Summary of Groundwater Sampling Results (Analytical): March 2021
First Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

							Sample Location:	**MW-52**	**MW-53**	**MW-53R**	**MW-54R**	**MW-55**	**OW-57ROUT**
							Sample Date:	3/8/2021	3/8/2021	3/8/2021	3/8/2021	3/9/2021	3/9/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Chronic-Based Mixing Zone GSI Criteria^	Acute-Based Mixing Zone GSI Criteria^						
Appendix III[(1)]													
Boron	ug/L	NC	**500**	**500**	NA	44,000	69,000	**1,120**	**3,920**	**1,510**	**2,470**	**593**	**1,660**
Calcium	mg/L	NC	NC	NC	500[EE]	NC	NC	211	187	234	178	151	128
Chloride	mg/L	250**	250[E]	250[E]	**50**	NC	NC	**51.8**	**52.9**	32.5	28.0	16.7	**59.0**
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	1,200[F]	NC	NC	531	317	227	79.9	48.0	86.0
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	NC	NC	**1,390**	**1,110**	**1,140**	**763**	**794**	**761**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	NC	NC	7.0	7.1	6.8	6.9	7.1	7.2
Appendix IV[(1)]													
Antimony	ug/L	6	6.0	6.0	2.0	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	NA	**100**	680	< 1	< 1	**19**	1	**152**	< 1
Barium	ug/L	2,000	2,000	2,000	1,200	NC	NC	123	202	202	118	366	70
Beryllium	ug/L	4	4.0	4.0	33	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	NC	NC	< 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
Cobalt	ug/L	NC	40	100	100	NC	NC	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	14	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	NC	NC	31	52	64	66	28	26
Mercury	ug/L	2	2.0	2.0	0.20#	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	**73**	210	**120**	NC	NC	< 5	< 5	< 5	< 5	**166**	7
Radium-226/228	pCi/L	NC	NC	NC	NC	NC	NC	--	--	--	--	--	--
Selenium	ug/L	50	50	50	NA	55	120	1	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2	2.0	2.0	2.0	NC	NC	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115[(2)]													
Iron	ug/L	**300****	**300[E]**	**300[E]**	500,000[EE]	NC	NC	**879**	**1,180**	**971**	115	**23,500**	46
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	NC	NC	2	2	2	1	< 1	2
Nickel	ug/L	NC	100	100	120	NC	NC	< 2	< 2	< 2	< 2	< 2	15
Silver	ug/L	100**	34	98	0.2	NC	NC	< 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	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000[E]	260	NC	NC	< 10	< 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}.

[F] - Criterion is the Final Acute Value (FAV) .

[(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 3
Summary of Field Parameters: March 2021
First Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Sample Location	Sample Date	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (umhos/cm)	Temperature (°C)	Turbidity (NTU)
JCW Landfill							
JCW-MW-18001	3/8/2021	1.87	-86.3	6.9	2,316	10.1	3.99
JCW-MW-18004	3/8/2021	5.90	113.5	6.9	1,830	7.4	0.15
JCW-MW-18005	3/9/2021	2.13	-13.6	6.8	1,988	7.8	4.95
JCW-MW-18006	3/9/2021	1.95	-60.0	6.9	1,510	11.4	0.65
MW-50	3/8/2021	1.92	-75.9	6.9	3,042	9.1	1.00
MW-51	3/8/2021	2.29	-66.0	7.0	2,273	8.1	0.15
MW-52	3/8/2021	2.09	-39.0	7.0	1,997	8.7	1.00
MW-53	3/8/2021	2.28	-59.0	7.1	1,704	8.1	0.18
MW-53R	3/8/2021	1.98	-17.5	6.8	1,812	8.8	3.95
MW-54R	3/8/2021	3.30	60.0	6.9	1,325	8.0	0.97
MW-55	3/9/2021	1.97	-123.4	7.1	1,476	7.8	4.90
OW-57ROUT	3/9/2021	5.29	58.8	7.2	1,363	8.6	0.45

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

Table 4
Synthetic Precipitation Leaching Procedure Results
First Quarter 2021 Quarterly Report
JC Weadock Landfill, Essexville, Michigan

Parameter	Reporting Limit	Units	DE Karn Ash Silo Samples - March 8 and 9, 2021			
			Fly Ash	Fly Ash	Fly Ash	Fly Ash
			Grab 1	Grab 2	Grab 3	Grab 4
Antimony	1	µg/L	<RL	<RL	<RL	<RL
Arsenic	1	µg/L	1	1	<RL	<RL
Barium	5	µg/L	2,400	2,400	4,200	3,900
Beryllium	1	µg/L	<RL	<RL	<RL	<RL
Boron	20	µg/L	260	230	140	120
Cadmium	0.2	µg/L	<RL	<RL	<RL	<RL
Chromium	1	µg/L	99	110	130	120
Cobalt	15	µg/L	<RL	<RL	<RL	<RL
Copper	2	µg/L	2	<RL	3	3
Iron	20	µg/L	45	40	42	48
Lead	1	µg/L	<RL	<RL	<RL	<RL
Lithium	10	µg/L	30	30	33	34
Mercury	0.2	µg/L	<RL	<RL	<RL	<RL
Molybdenum	5	µg/L	150	150	100	95
Nickel	2	µg/L	<RL	<RL	3	<RL
Selenium	1	µg/L	22	21	26	26
Silver	0.2	µg/L	<RL	<RL	<RL	<RL
Sodium	1,000	µg/L	44,900	43,600	31,700	28,300
Thallium	2	µg/L	<RL	<RL	<RL	<RL
Vanadium	2	µg/L	59	54	63	61
Zinc	10	µg/L	<RL	<RL	21	<RL
Alkalinity, Bicarbonate	10,000	µg/L	<RL	<RL	<RL	<RL
Sulfate	1,000	µg/L	376,000	331,000	200,000	195,000
Phosphorus	10	µg/L	<RL	<RL	<RL	<RL

Notes:

µg/L = micrograms per liter

RL = reporting limit

Table 5
EGLE Exceedance Summary Table
First Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, 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: JC Weadock – WDS# 395457

Well #	Location	Parameter	Part 201 GRCC	Statistical Limit (or 'CC' for Control Charts)	1 Qtr. 2021 (**bold** >201)	4 Qtr. 2020 (**bold** >201)	3 Qtr. 2020 (**bold** >201)	2 Qtr. 2020 (**bold** >201)

No Exceedances at Compliance Locations

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:	JANUARY 2021
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 12/7/2020, 10:50:36 AM

LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING WELL
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL
- SLURRY WALL (APPROXIMATE)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).

N

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:

CONSUMERS ENERGY COMPANY
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:

SITE MAP

DRAWN BY:	A. ADAIR	PROJ NO.:	418426.0000
CHECKED BY:	J. KRENZ		
APPROVED BY:	L. DARBY		
DATE:	APRIL 2021		

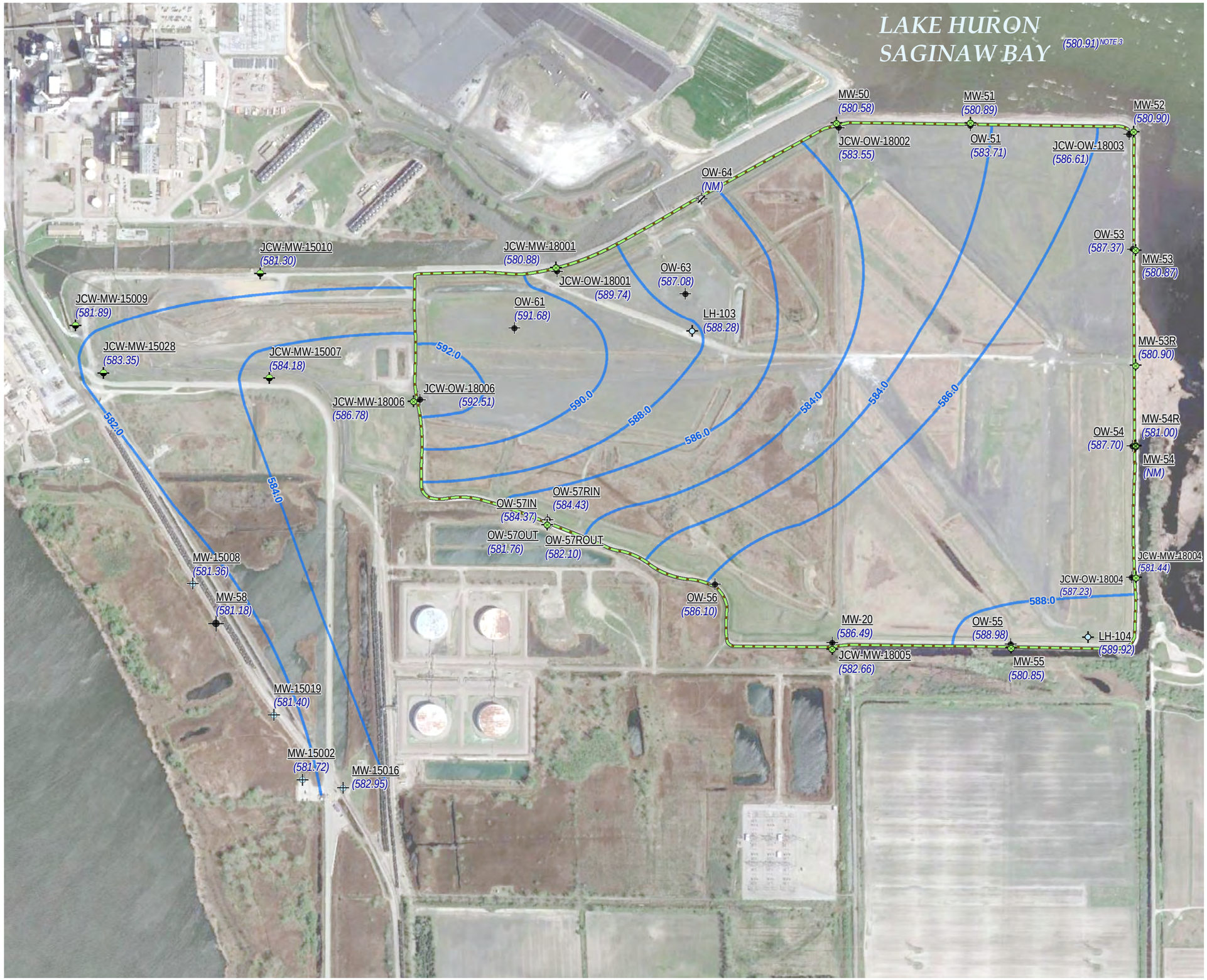
FIGURE 2

TRC

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

FILE NO.: 418426-002-000.mxd

Plot Date: 4/22/2021, 11:12:39 AM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 2693767\3 WEADOCK\2021 MXDs\2021 001 MARCH\418426-002-000.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS



LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING WELL
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL
- SLURRY WALL (APPROXIMATE)
- GROUNDWATER ELEVATION CONTOUR (2' INTERVAL, DASHED WHERE INFERRED)
- (580.85) GROUNDWATER ELEVATION (FEET)
- (NU) NOT USED TO DEVELOP CONTOURS

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018.
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
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:
POTENTIOMETRIC SURFACE MAP
MARCH 2021

DRAWN BY:	A. ADAIR	PROJ NO.:	418426.0000
CHECKED BY:	J. KRENZ		**FIGURE 3**
APPROVED BY:	L. DARBY		
DATE:	APRIL 2021		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
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FILE NO.: 418426-003-000.mxd

Plot Date: 4/22/2021, 11:36:03 AM by AADAIR -- LAYOUT: ANSI B(11"x17")
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Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

Appendix A
Static Water Level Evaluation

Table A1

Static Water Levels for Select Perimeter Dike Monitoring Wells and NOAA Staff Gauge

First Quarter 2021 Quarterly Report

JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Well Location	Date Measured	Groundwater Water Elevation (GWE) (ft)	Saginaw Bay Surface Water Elevation (SWE) (ft)	Elevation Difference (GWE-SWE)(1)
MW-50	3/1/2021	580.58	580.91	-0.33
MW-51	3/1/2021	580.89		-0.02
MW-52	3/1/2021	580.90		-0.01
MW-53	3/1/2021	580.87		-0.04
MW-53R	3/1/2021	580.90		-0.01
MW-54R	3/1/2021	581.00		0.09
MW-55	3/1/2021	580.85		-0.06
JCW-MW-18004	3/1/2021	581.44		0.53
Average:		**580.93**		

Notes:

Elevation in feet above North American Vertical Datum 1988 (NAVD 88)

TOC: top of well casing

ft BTOC: feet below top of well casing

(1) Positive elevation difference indicates flow toward the surface water body.

Table A2
Slurry Wall Gradient and Flux
First Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Monitoring Well Pair Discharge Channel	SWL Obs Well (ft NAVD 88)	SWL MW (ft NAVD 88)	x_{wells} (ft)	i (ft/ft)	Saturated Thickness (ft)	Mean Thickness (ft)	Section Length (ft)	K (cm/sec)	i (ft/ft)	Area (ft^2)	Flow ft^3/day	Flow Gal/day	Flow Gal/yr
JCW-OW-18001	589.74		22.37	3.96E-01	2.00	2.88	1,010	2.30E-08	0.40	2,904	7.50E-02	0.56	205
JCW-MW-18001		580.88			3.75								
JCW-OW-18002	583.55		28.87	1.03E-01	4.00	4.25	970		0.10	4,123	2.77E-02	0.21	75
MW-50		580.58			4.50								

Monitoring Well Pair Adjacent Zone	SWL Obs Well (ft NAVD 88)	SWL MW (ft NAVD 88)	x_{wells} (ft)	i (ft/ft)	Saturated Thickness (ft)	Mean Thickness (ft)	Section Length (ft)	K (cm/sec)	i (ft/ft)	Area (ft^2)	Flow ft^3/day	Flow Gal/day	Flow Gal/yr
OW-51	583.71		14.38	1.96E-01	4.00	4.50	1,850	2.30E-08	0.20	8,325	1.06E-01	0.80	291
MW-51		580.89			5.00								
JCW-OW-18003	586.61		33.85	1.69E-01	3.50	4.00	740		0.17	2,960	3.26E-02	0.24	89
MW-52		580.90			4.50								
OW-53	587.37		20.14	3.23E-01	1.25	1.75	730		0.32	1,278	2.69E-02	0.20	73
MW-53		580.87			2.25								

Monitoring Well Pair Non-Adjacent Zone	SWL Obs Well (ft NAVD 88)	SWL MW (ft NAVD 88)	x_{wells} (ft)	i (ft/ft)	Saturated Thickness (ft)	Mean Thickness (ft)	Section Length (ft)	K (cm/sec)	i (ft/ft)	Area (ft^2)	Flow ft^3/day	Flow Gal/day	Flow Gal/yr
OW-54	587.7		21.23	3.16E-01	2.00	2.25	510	2.30E-08	0.32	1,148	2.36E-02	0.18	64
MW-54R		581.00			2.50								
JCW-OW-18004	587.23		26.59	2.18E-01	8.00	4.77	820		0.22	3,911	5.55E-02	0.42	152
JCW-MW-18004		581.44			1.54								
OW-55	588.98		23.95	3.39E-01	2.00	2.43	1,220		0.34	2,959	6.55E-02	0.49	179
MW-55		580.85			2.85								
MW-20	586.49		40.93	9.36E-02	1.50	1.38	1,120		0.09	1,540	9.40E-03	0.07	26
JCW-MW-18005		582.66			1.25								

Calculated Groundwater Discharge from JC Weadock (gal per day)	**=**	**3.16**
(cubic ft per day)	**=**	**0.42**
(cubic ft per min)		**2.9E-04**
Calculated Groundwater Discharge from JC Weadock (gal per yr)	**=**	**1,154**
(cubic ft per yr)	**=**	**154**
Calculated Groundwater Discharge from JC Weadock (gal per year per linear foot of dike)	**=**	**0.13**
(cubic feet per year per linear foot of dike)	**=**	**1.72E-02**

Notes:

Water level data collected on March 1, 2021 are shown by yellow cells:

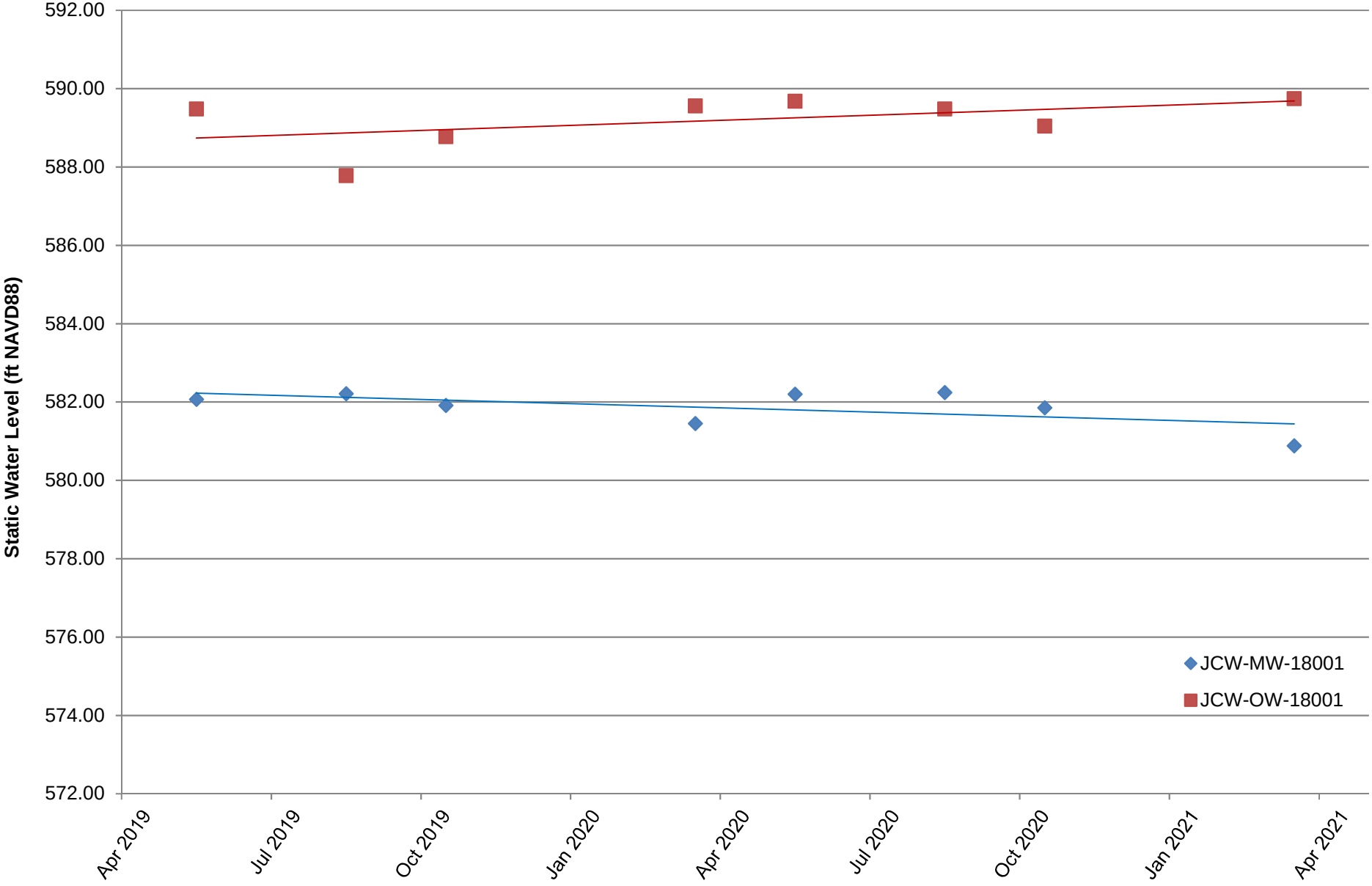
1. Monitoring Well Zones based on Phase II Evaluation, Appendix K Groundwater Discharge Calculations, September 30, 2005. Representative wells based on the Landfill Hydrogeological Monitoring Plan, February 2021.
2. Saturated thickness will be the thickness of the sand unit when the observed SWL is above the top of the sand unit, or the measured saturated thickness of the sand unit if the SWL is below the top of the sand unit.
3. Hydraulic conductivity taken as harmonic mean of laboratory tests done on in-place slurry wall from NTH Certified Quality Assurance Report, Appendix E, April 24, 2009
4. Arithmetic average used to develop geometric properties of each section/zone (e.g. discharge channel, adjacent, and non-adjacent)
5. If Obs well SWL < MW SWL calculated flow will be zero.

SWL = Static Water Level; Obs Well = Observation Well; MW= Monitoring Well; ft NAVD 88 = feet above North American Vertical Datum 1988

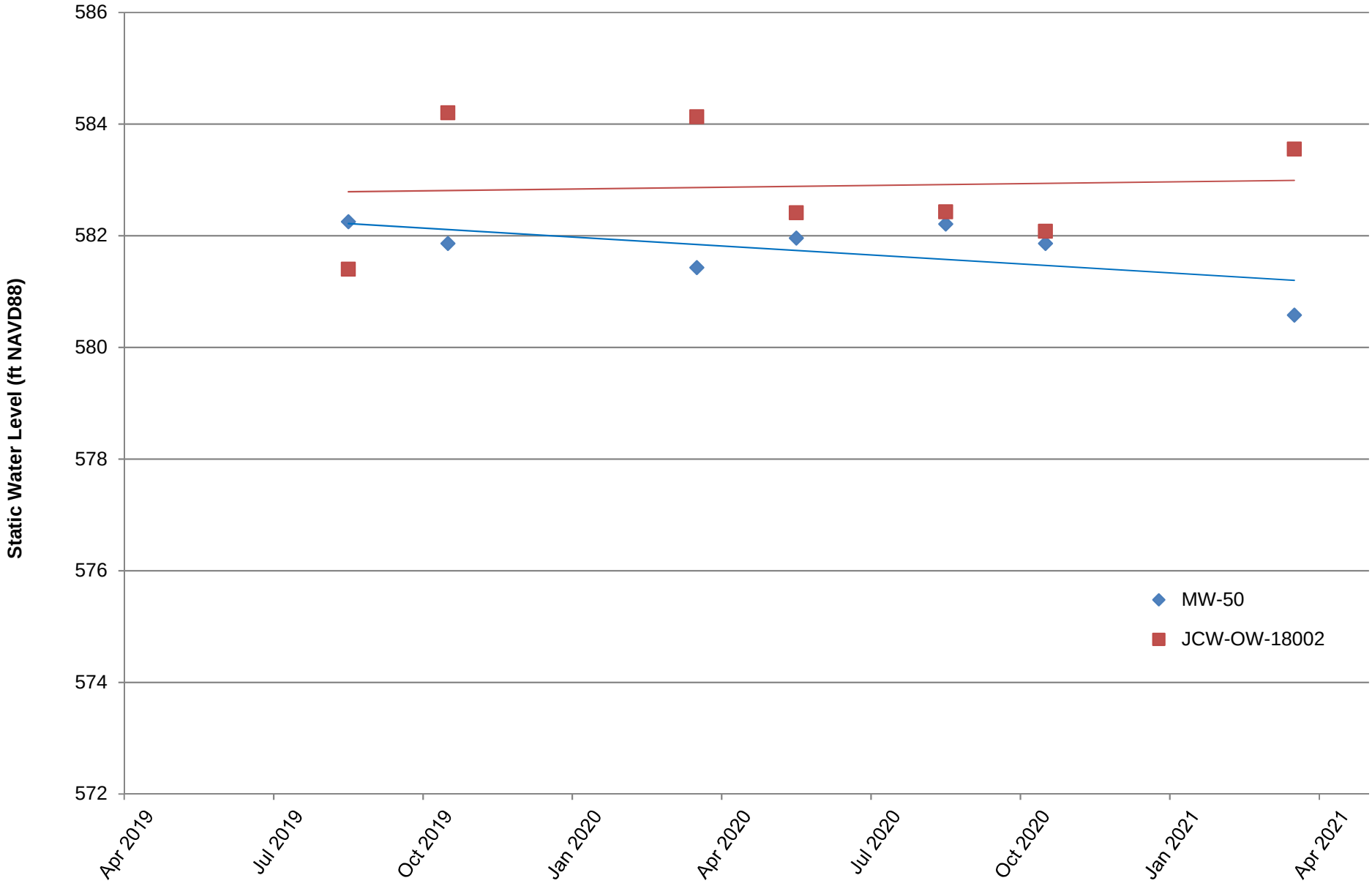
ft/ft = feet per foot; cm/sec = centimeters per second; ft^2 = square feet; ft^3/day = cubic feet per day; Gal/day = gallons per day; Gal/yr = gallons per year

i = hydraulic gradient; K = hydraulic conductivity; x_{wells} = distance between well pairs

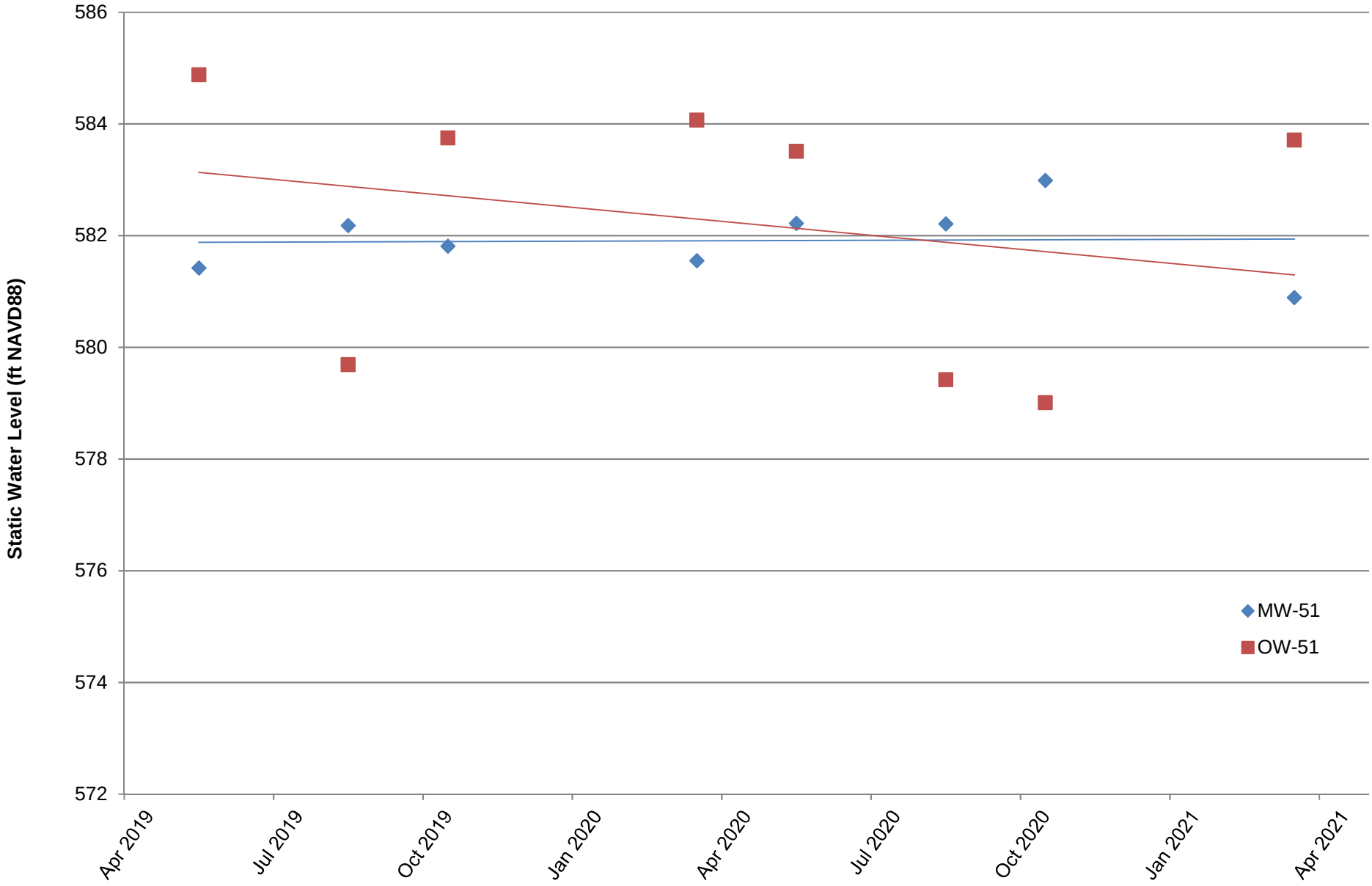
Appendix A
Static Water Level for JCW-MW-18001 and JCW-OW-18001



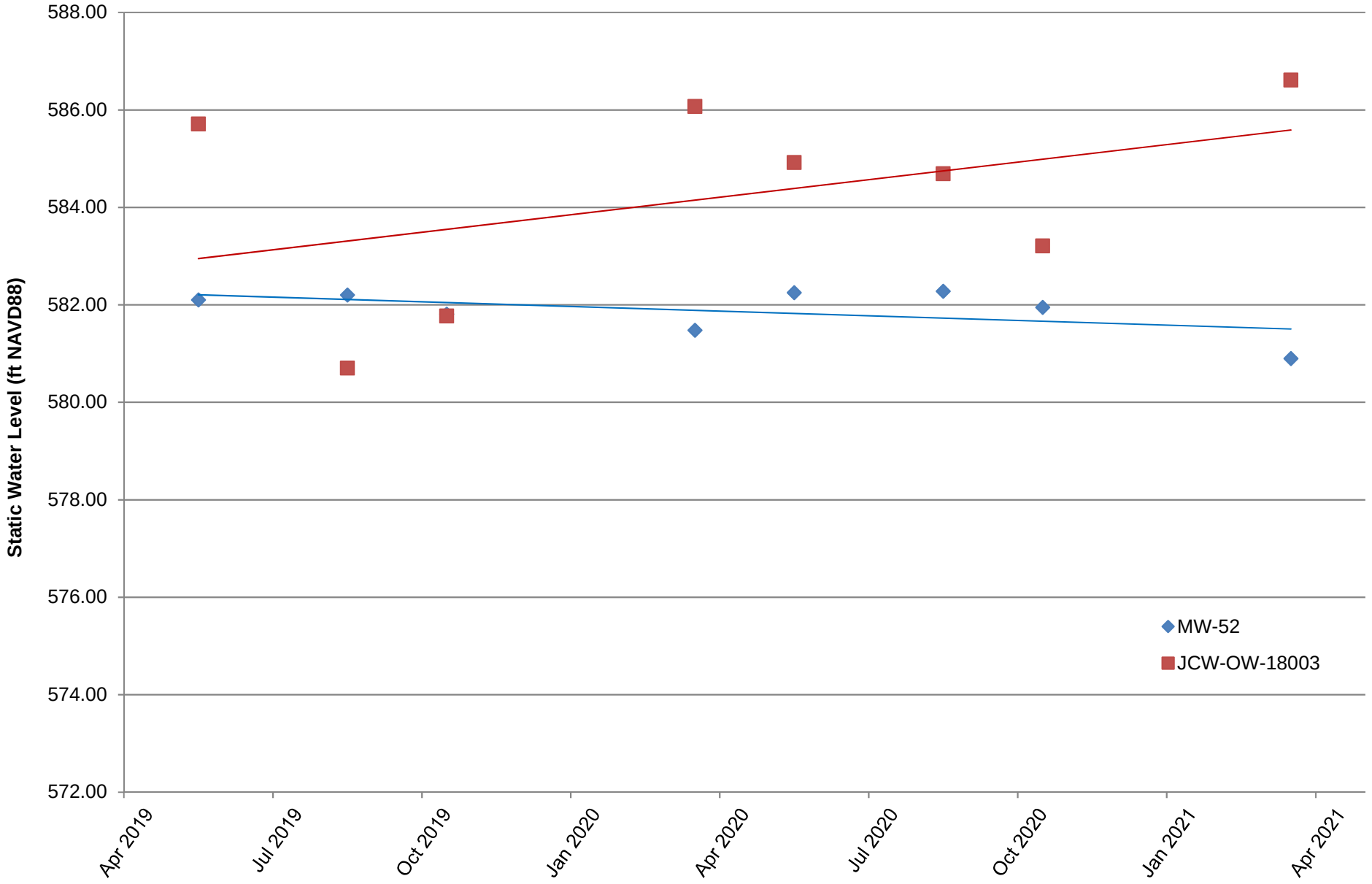
Appendix A
Static Water Level for MW-50 and JCW-OW-18002



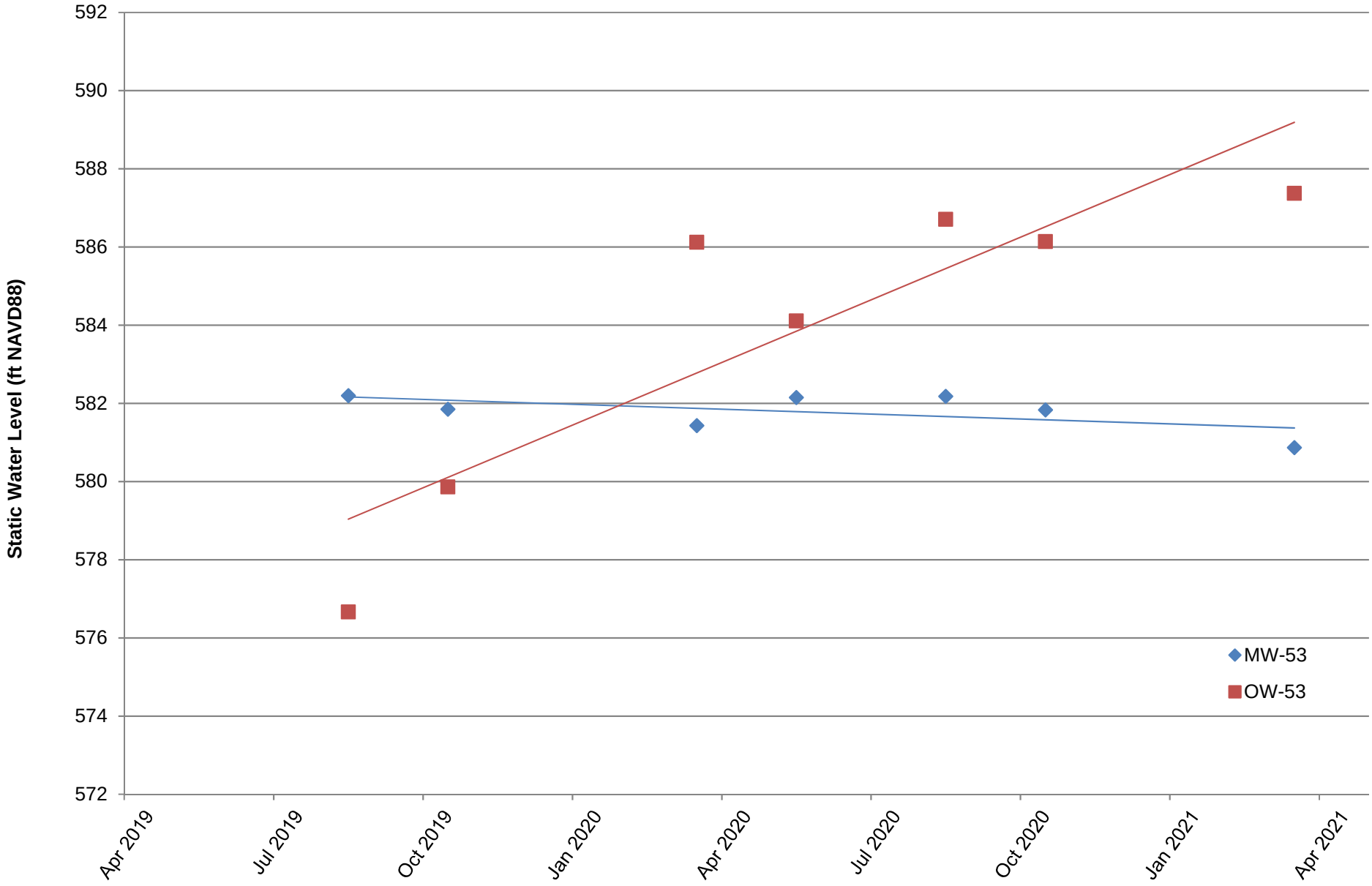
Appendix A
Static Water Level for MW-51 and OW-51



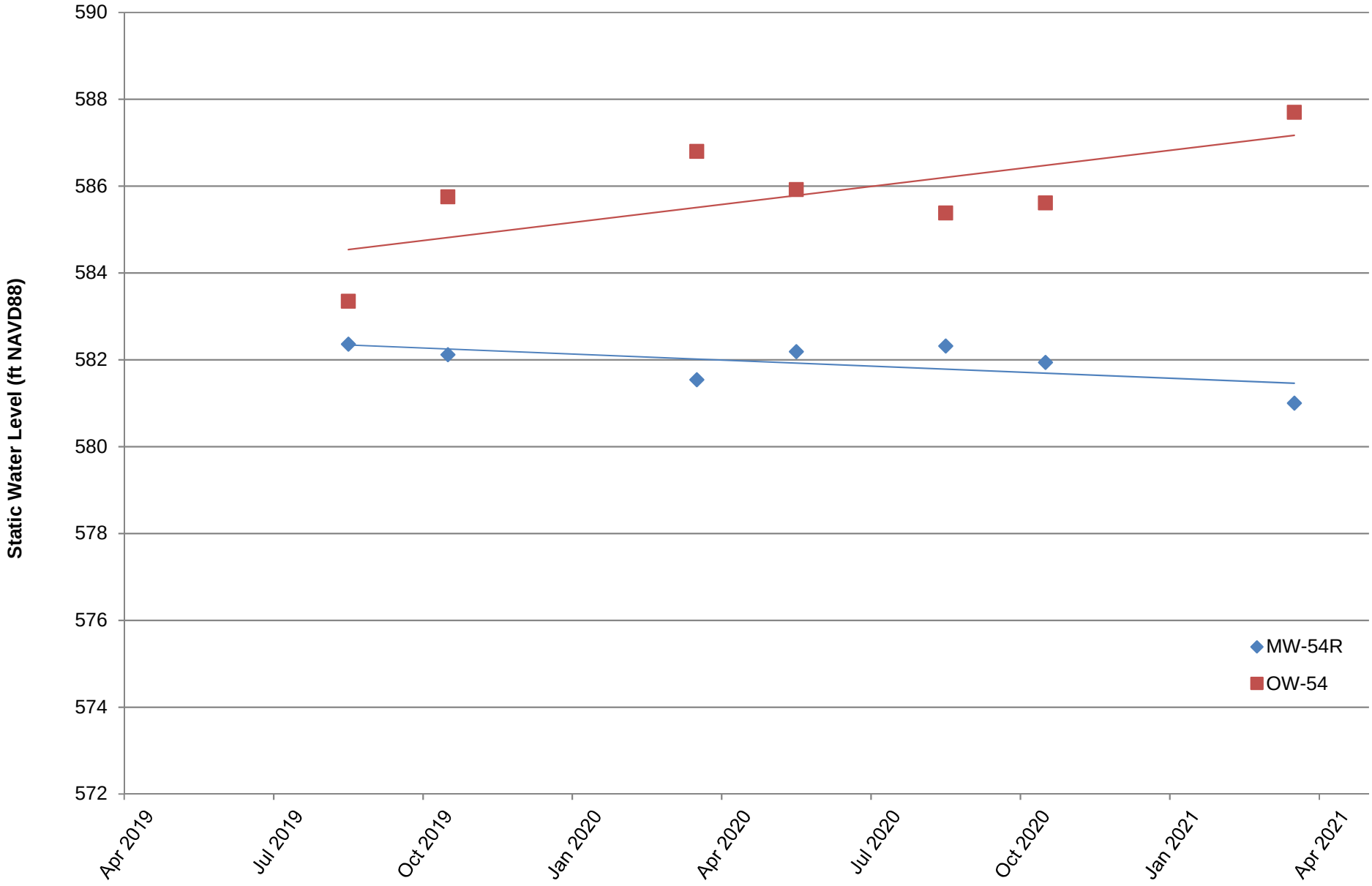
Appendix A
Static Water Level for MW-52 and JCW-OW-18003



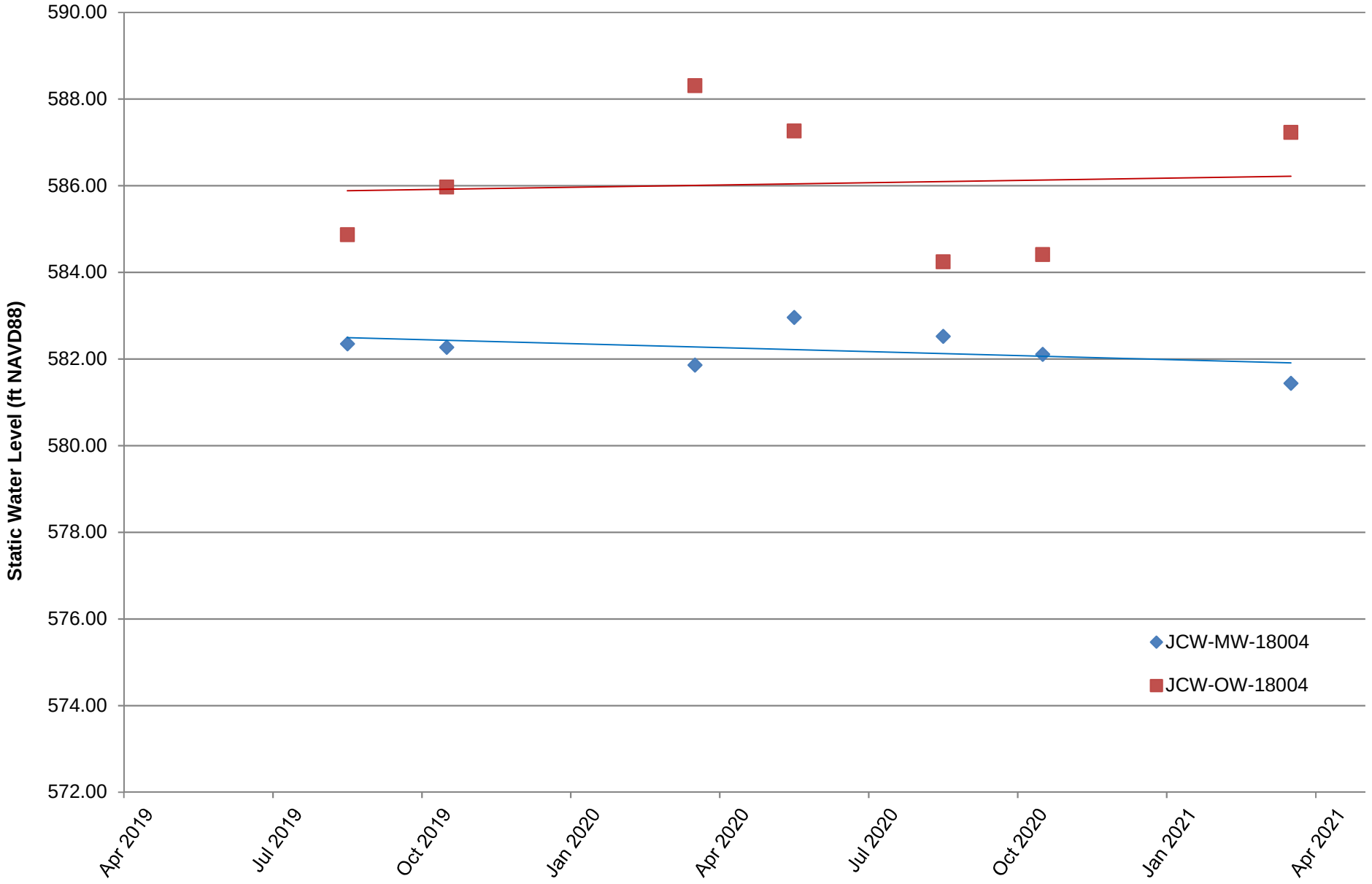
Appendix A
Static Water Level for MW-53 and OW-53



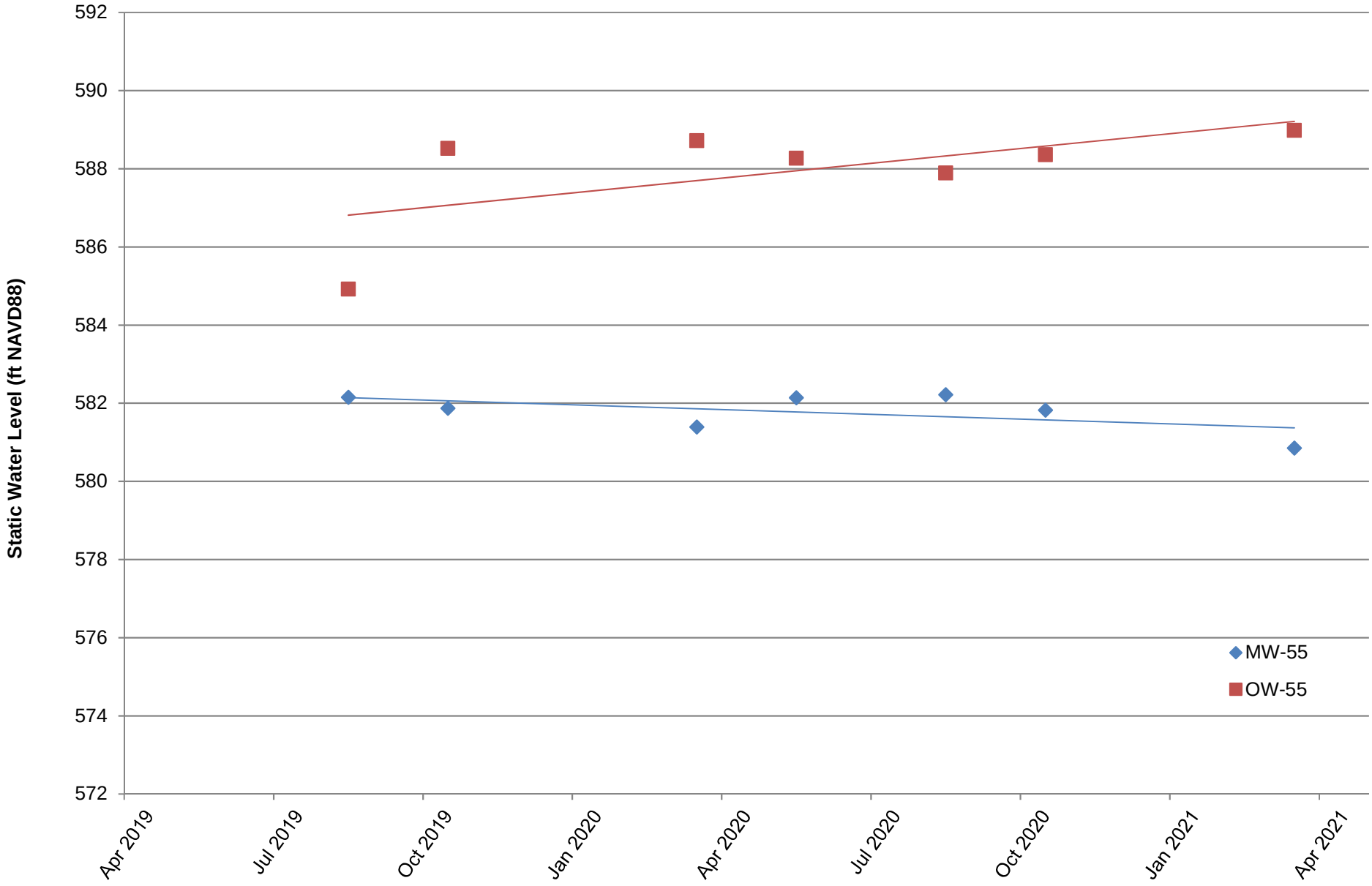
Appendix A
Static Water Level for MW-54R and OW-54



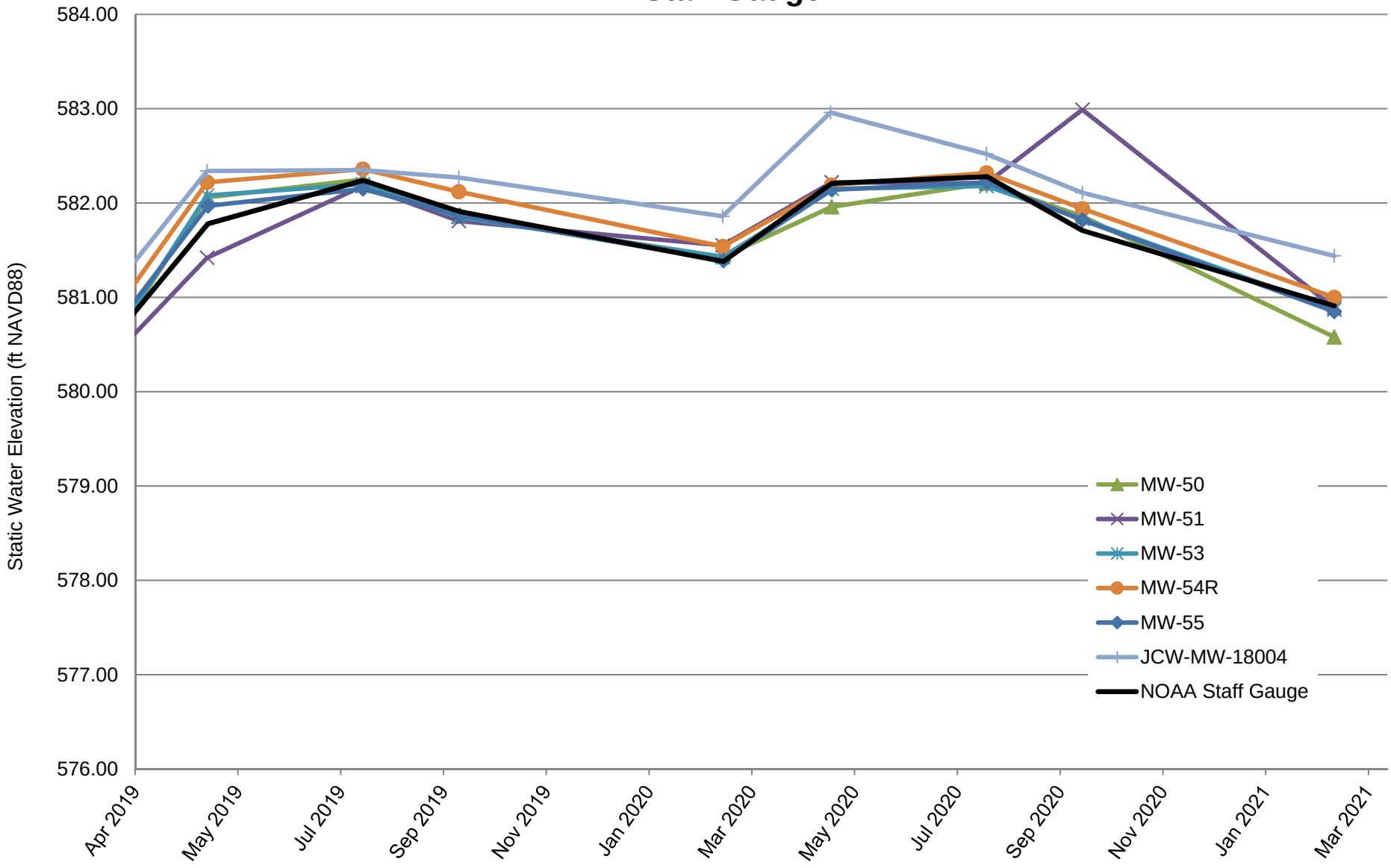
Appendix A
Static Water Level for JCW-MW-18004 and JCW-OW-18004



Appendix A
Static Water Level for MW-55 and OW-55



Appendix A
Static Water Elevations for Select Perimeter Dike Monitoring Wells and NOAA Staff Gauge



Appendix B
Data Quality Review

Laboratory Data Quality Review
Groundwater Monitoring Event March 2021
JC Weadock Landfill

Porewater samples were collected by TRC for the March 2021 sampling event. Samples were analyzed for total metals, anions, total dissolved solids, alkalinity, and total phosphorus by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group 21-0213.

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

- JCW-MW-18001
- JCW-MW-18004
- JCW-MW-18005
- JCW-MW-18006
- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- MW-58
- OW-55
- OW-57R OUT
- LH-104

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Fluoride, Chloride, Sulfate)	EPA 300.0
Total Dissolved Solids (TDS)	SM 2540C
Total Metals	SW-846 6020B/7470A
Alkalinity (Bicarbonate, Carbonate, and Total)	SM 2320B
Total Phosphorus	SM-4500-P

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 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, alkalinity, and total phosphorus analyses.

This data usability report addresses the following items:

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

Review Summary

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

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

QA/QC Sample Summary:

- One field blank (FB-01) and one equipment blank (EB-01) sample were collected. Target analytes were not detected in these blank samples.
- MS and MSD analyses were performed on sample JCW-MW-18001 for total metals, anions, alkalinity, and total phosphorus. 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.

- The field duplicate pair samples were DUP-01 and MW-50; the 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.

Appendix C
Detection Monitoring Statistical Trend Tests

Appendix C
Detection Monitoring Statistical Summary for JC Weadock Facility
First Quarter 2021 Quarterly Report
Data from May 2019 to March 2021

Porewater Monitoring Points						
PARAMETER	**JCW-MW-18001**	**JCW-MW-18004**	**JCW-MW-18005**	**JCW-MW-18006**	**MW-50**	**MW-51**
Boron	O	O	↓	O	O	O
Calcium	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Chloride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Fluoride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Iron	O	O	O	O	↑	O
pH/Corrosivity	O	O	O	O	O	O
Sulfate	↑	O	O	O	O	O
Total Dissolved Solids	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events

Notes:

O* = Non-detect (70%)
O = No trend
↑ = Upward trend, continuous
↑* = Upward trend, new
↑ = Upward trend, confirmed
↓ = Downward trend, continuous
↓* = Downward trend, new

Appendix C
Detection Monitoring Statistical Summary for JC Weadock Facility
First Quarter 2021 Quarterly Report
Data from May 2019 to March 2021

Porewater Monitoring Points						
PARAMETER	**MW-52**	**MW-53**	**MW-53R**	**MW-54R**	**MW-55**	**OW-57R OUT**
Boron	O	O	O	O	O	O
Calcium	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Chloride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Fluoride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Iron	O	O	O	O	O	O
pH/Corrosivity	O	O	O	O	O	O
Sulfate	O	O	O	O	O	O
Total Dissolved Solids	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events

Notes:

O* = Non-detect (70%)
O = No trend
↑ = Upward trend, continuous
↑* = Upward trend, new
↑ = Upward trend, confirmed
↓ = Downward trend, continuous
↓* = Downward trend, new

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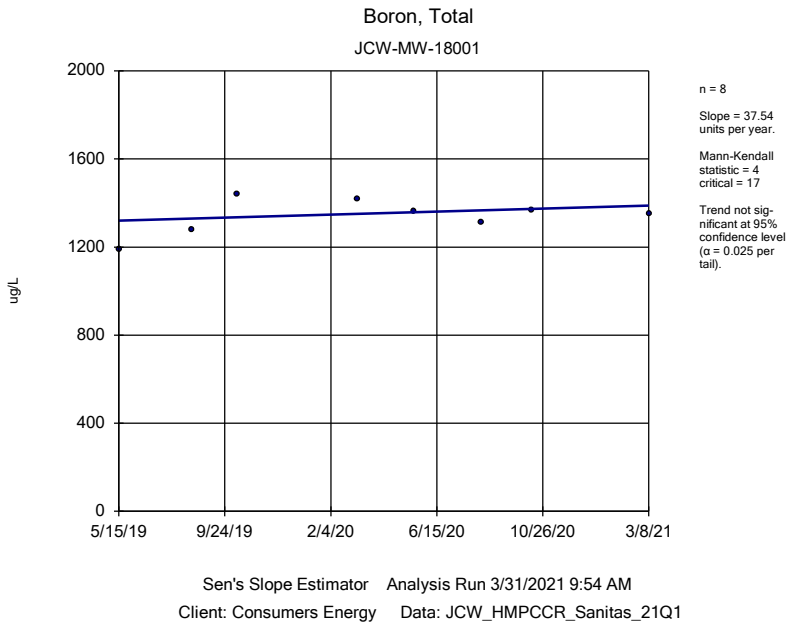

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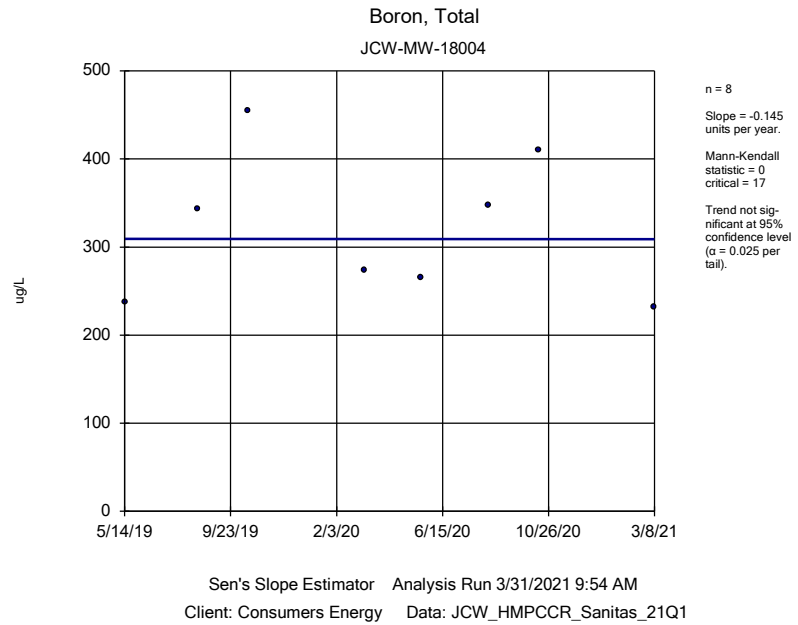

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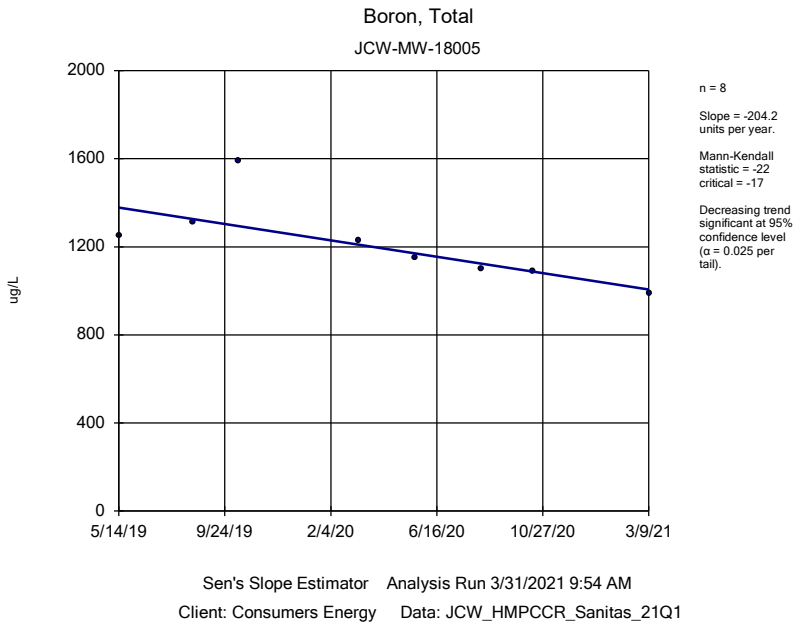

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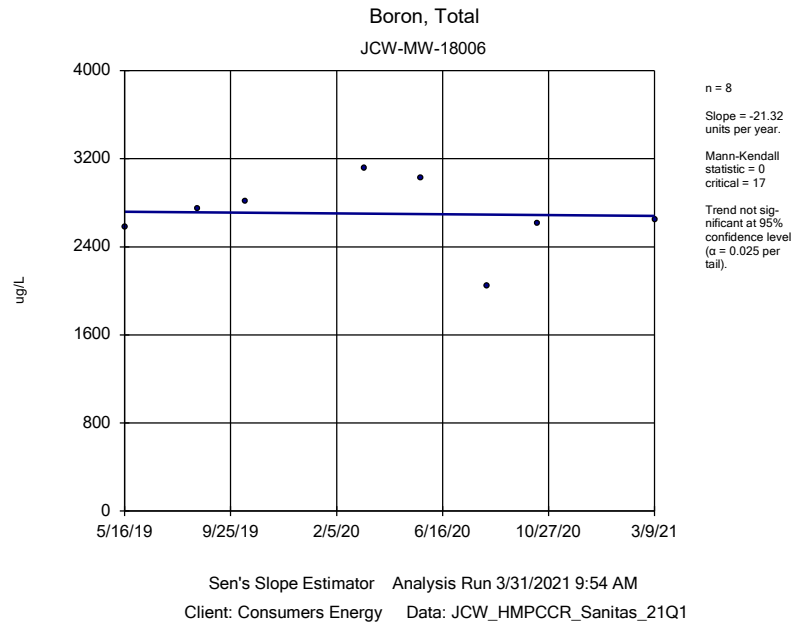

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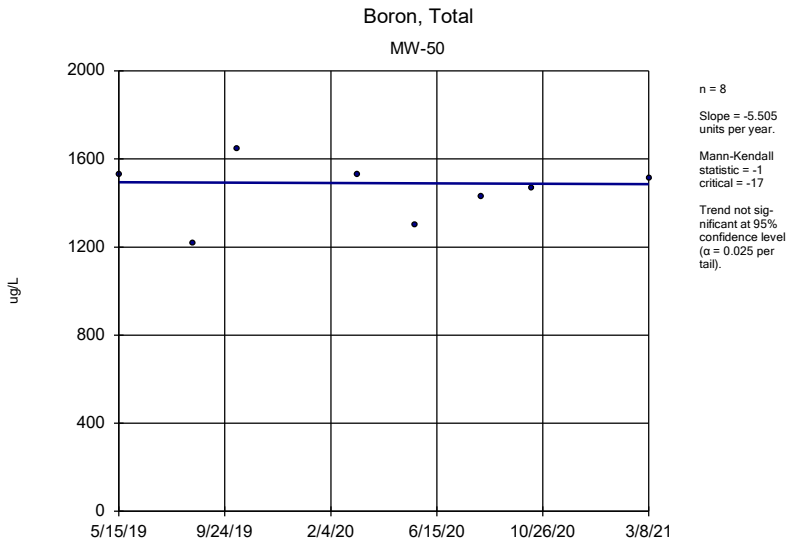

n = 8

Slope = -5.505 units per year.

Mann-Kendall statistic = -1 critical = -17

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

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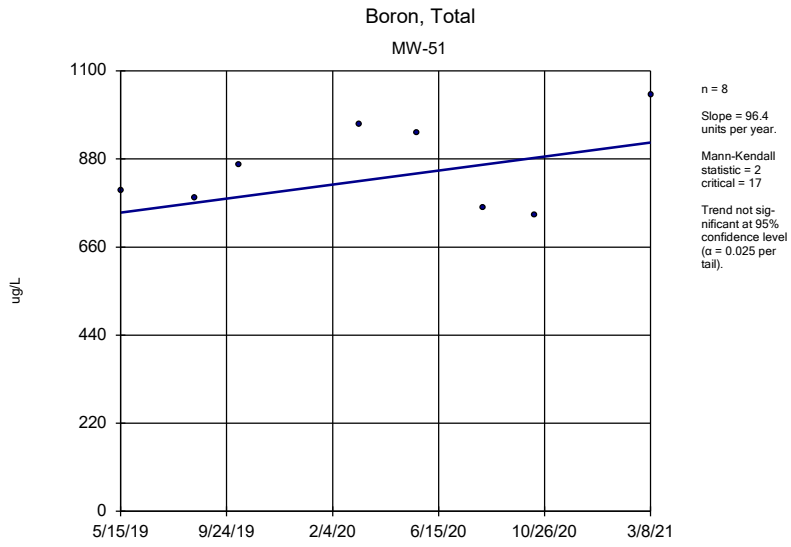

n = 8

Slope = 96.4 units per year.

Mann-Kendall statistic = 2 critical = 17

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

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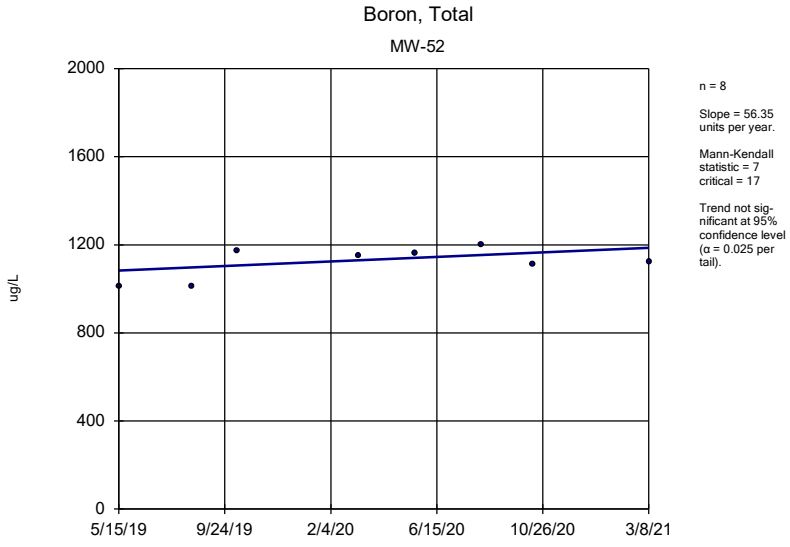

n = 8

Slope = 56.35 units per year.

Mann-Kendall statistic = 7 critical = 17

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

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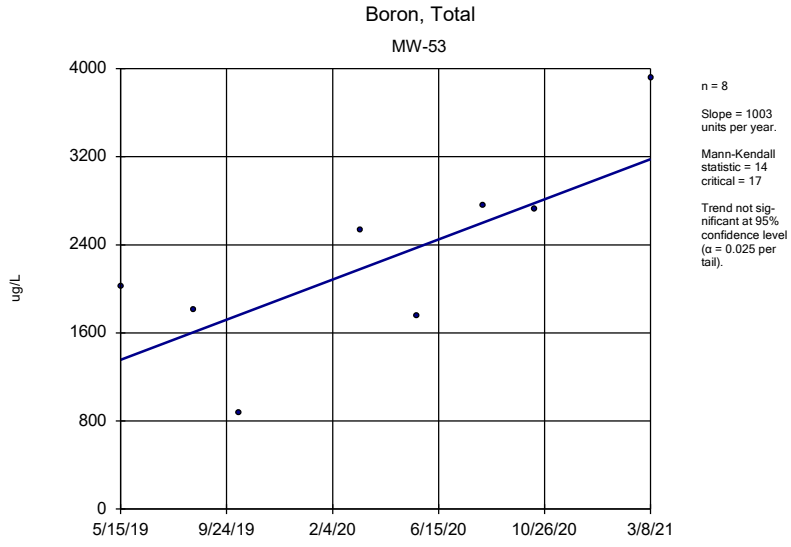

n = 8

Slope = 1003 units per year.

Mann-Kendall statistic = 14 critical = 17

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

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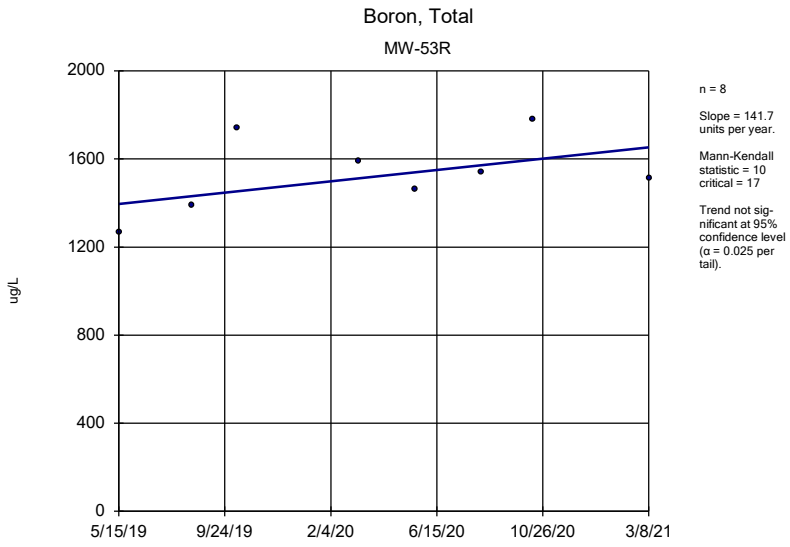

n = 8

Slope = 141.7 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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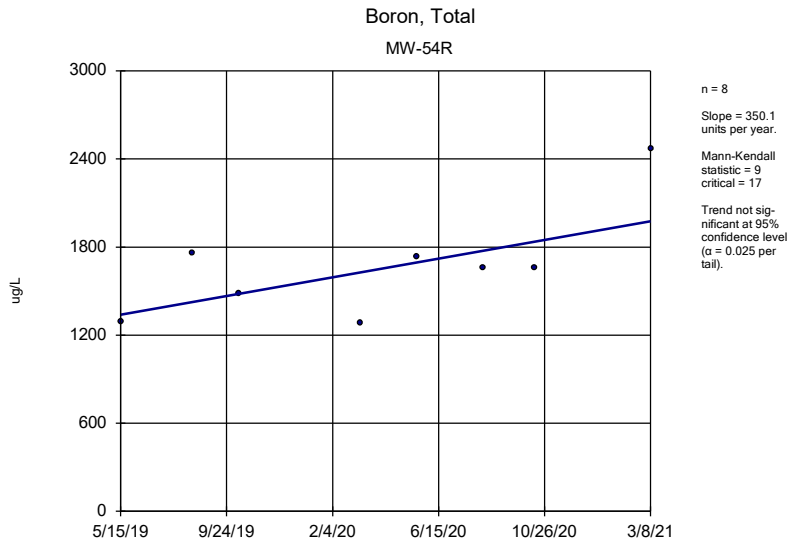

n = 8

Slope = 350.1 units per year.

Mann-Kendall statistic = 9 critical = 17

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

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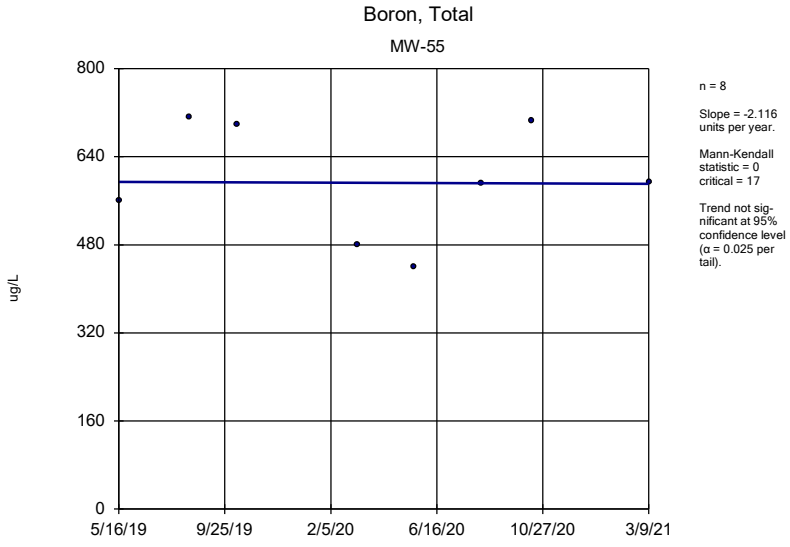

n = 8

Slope = -2.116 units per year.

Mann-Kendall statistic = 0 critical = 17

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

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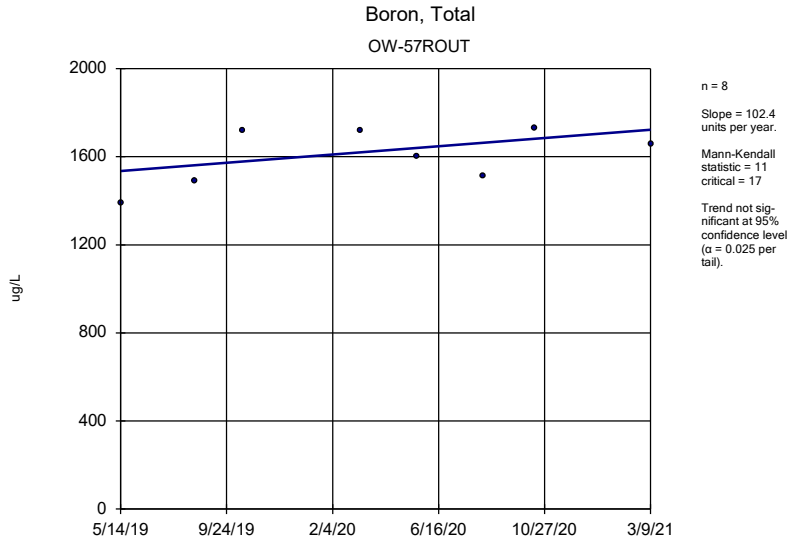

n = 8

Slope = 102.4 units per year.

Mann-Kendall statistic = 11 critical = 17

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

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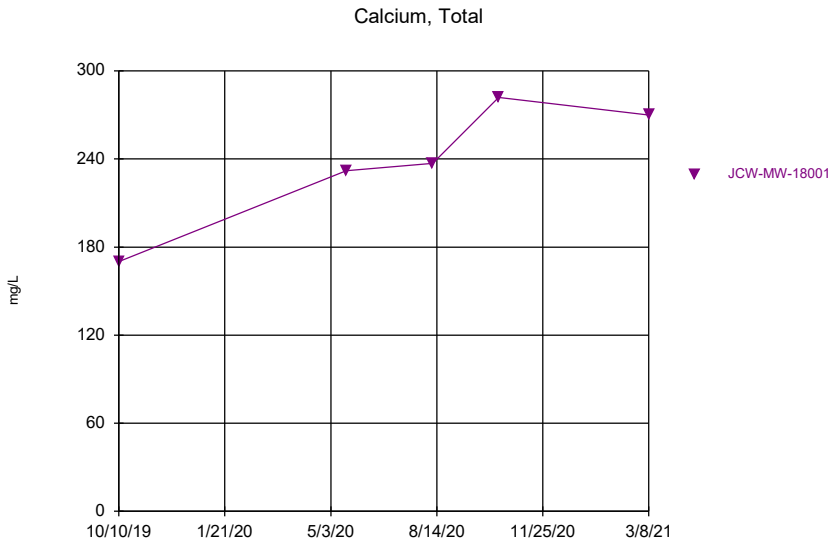

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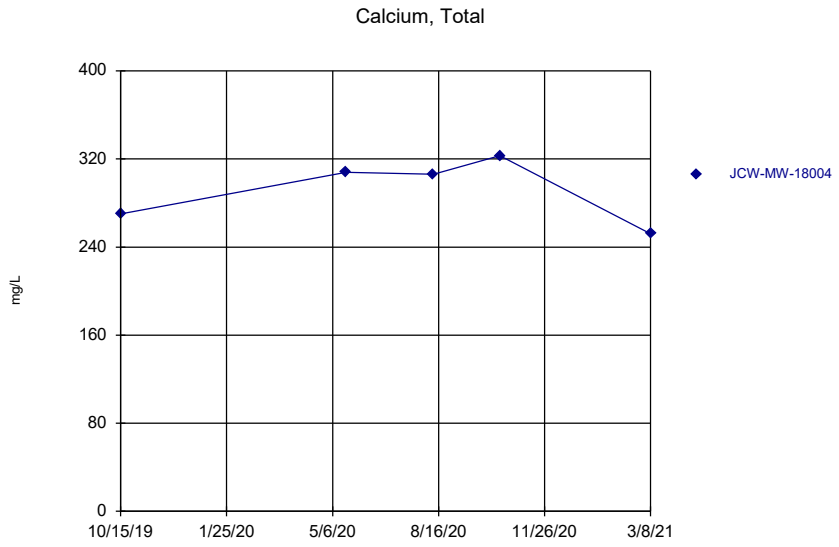

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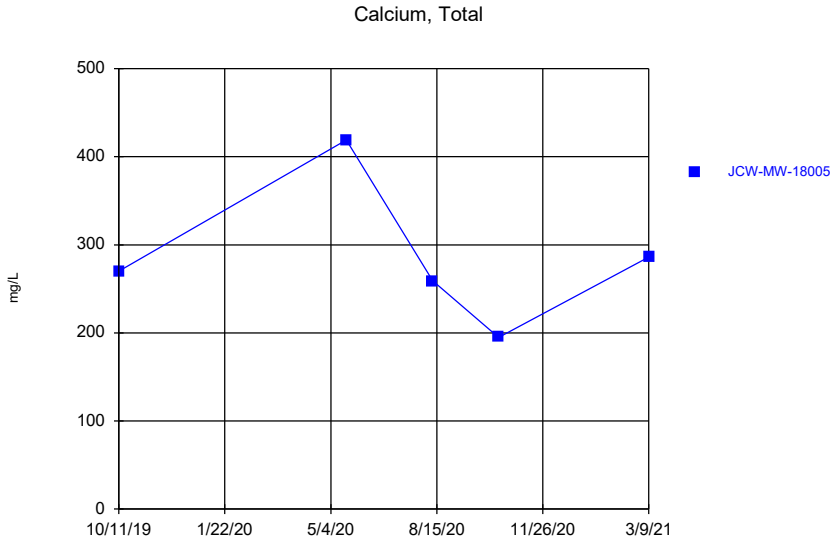

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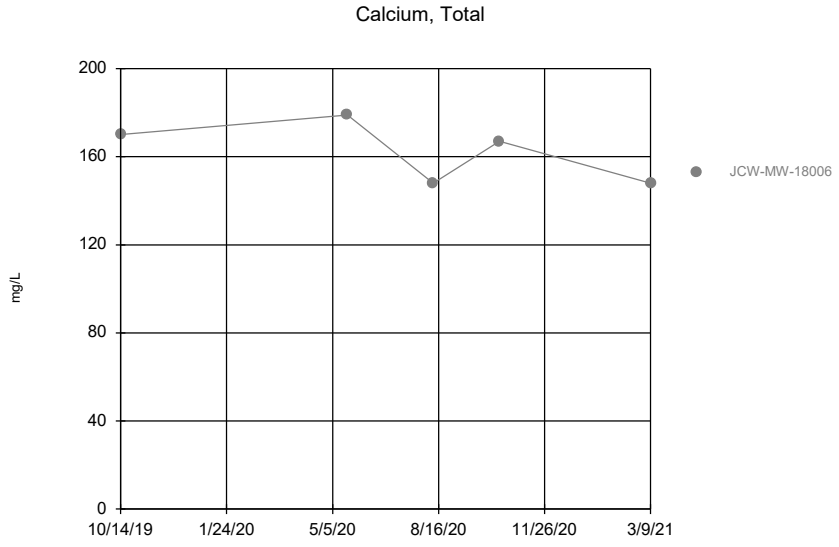

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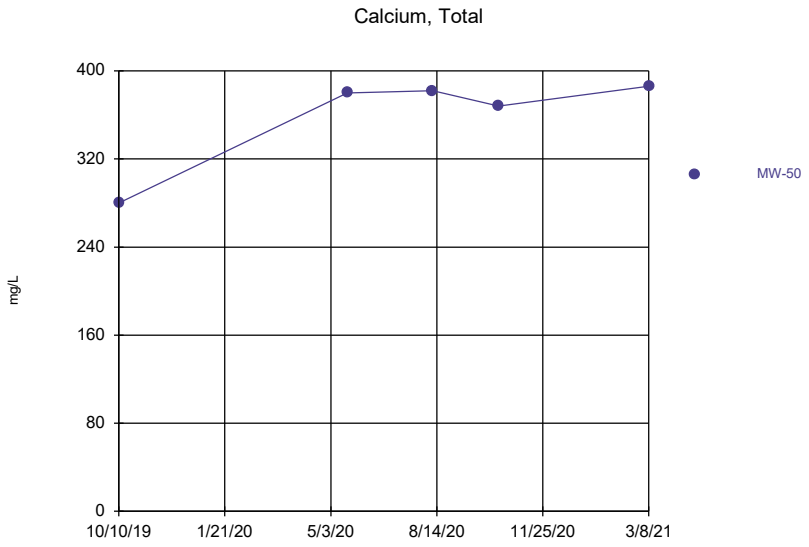

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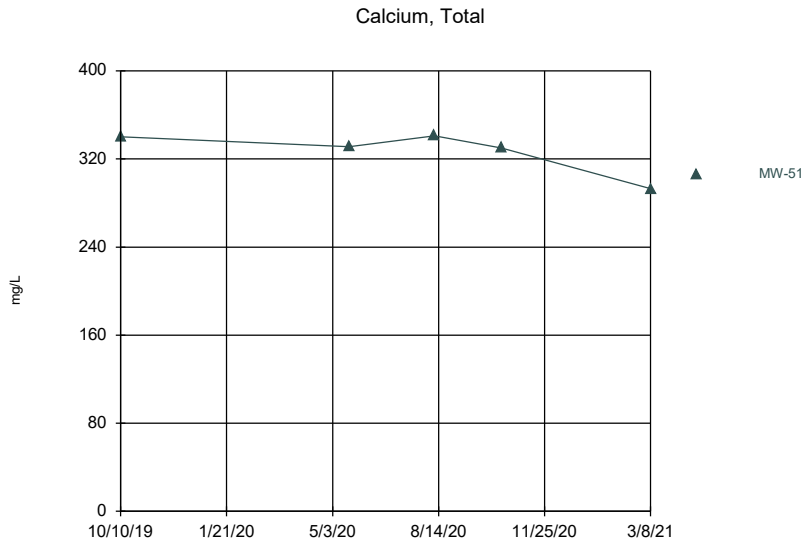

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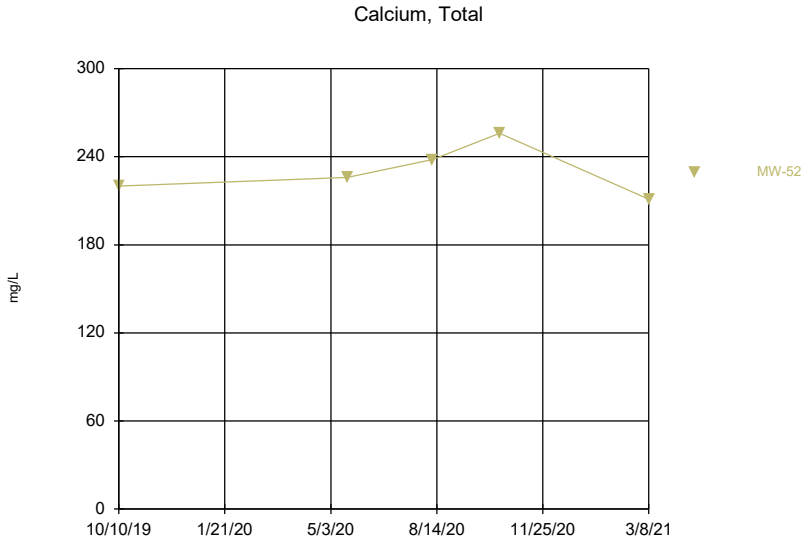

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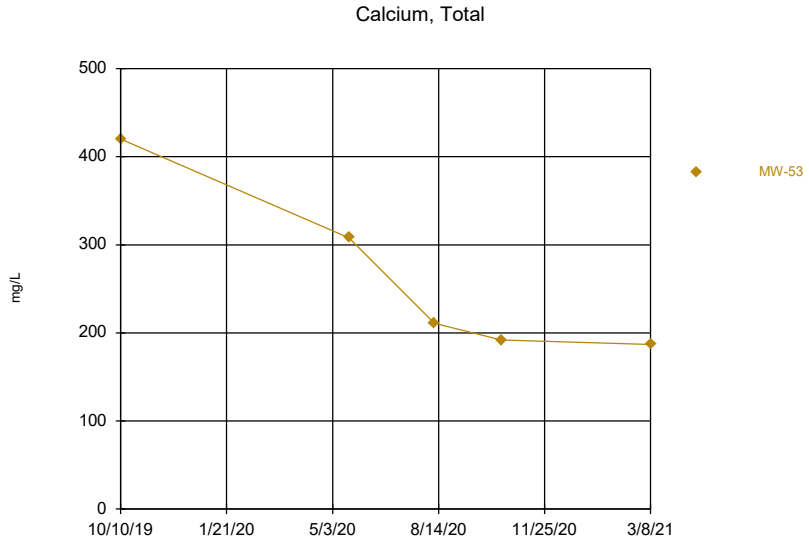

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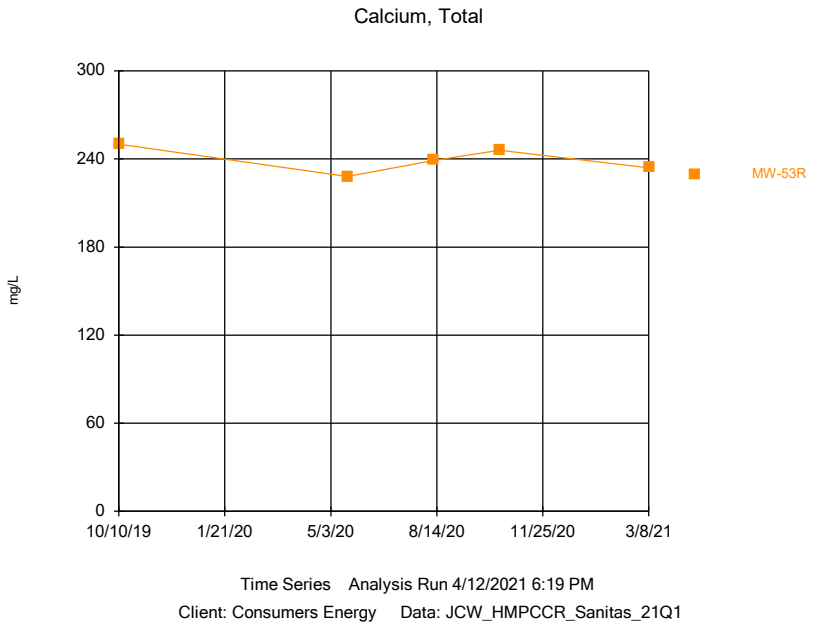

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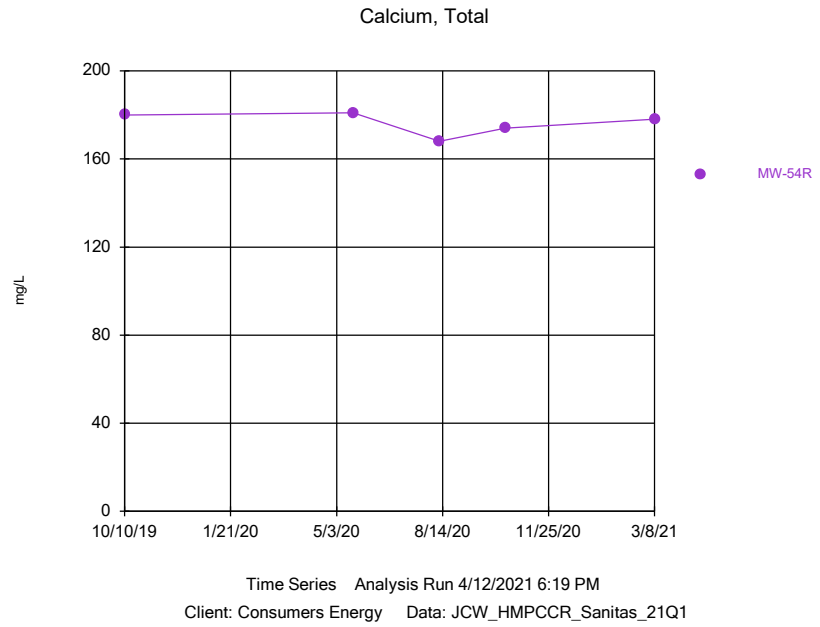

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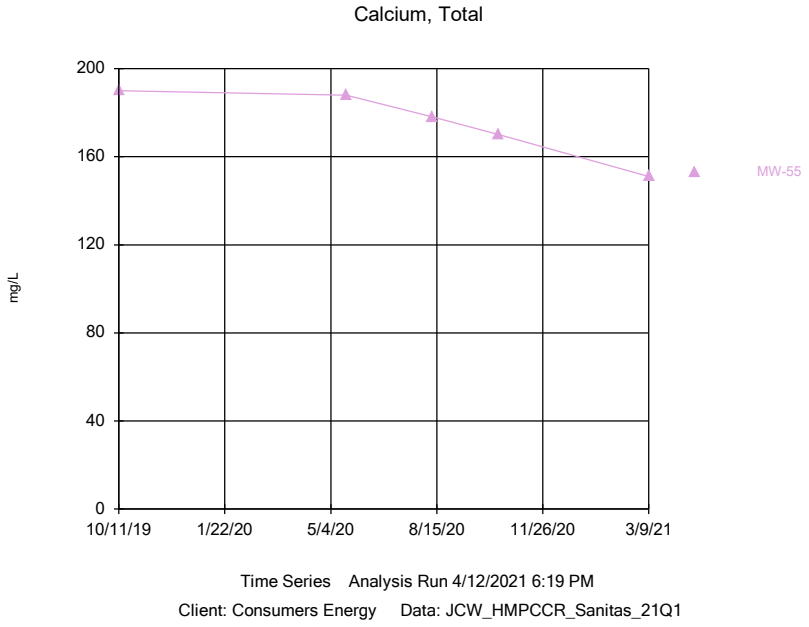

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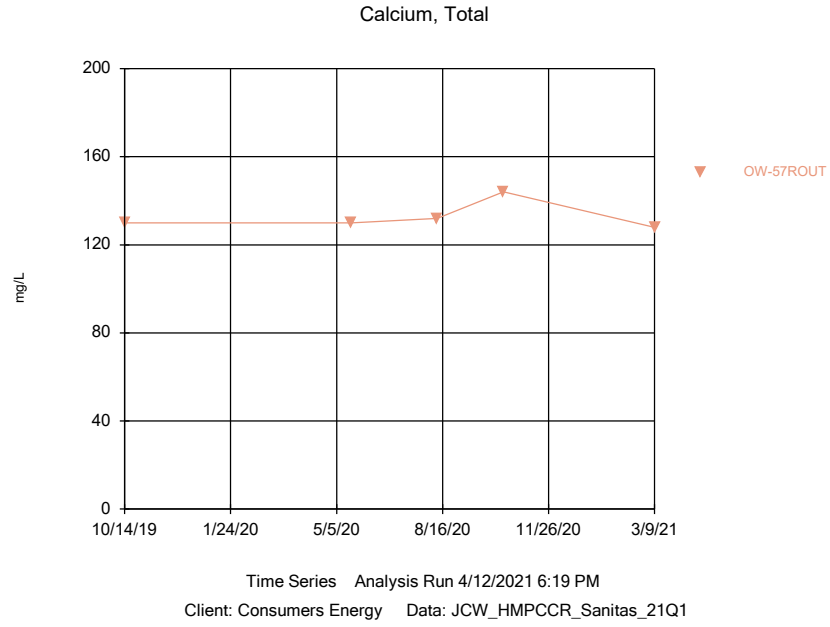

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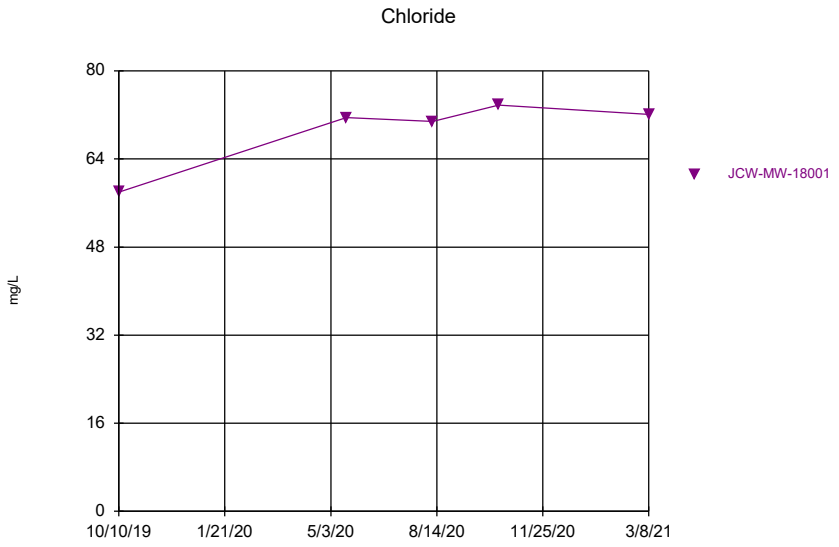

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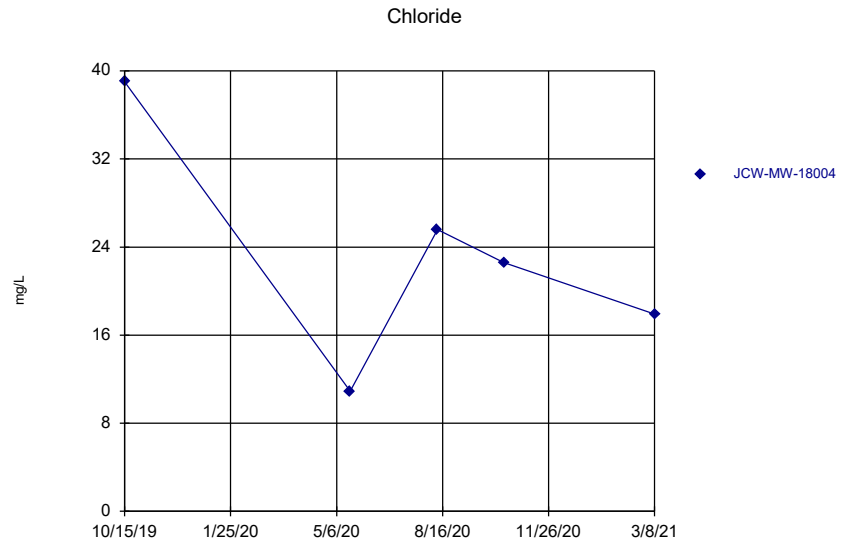

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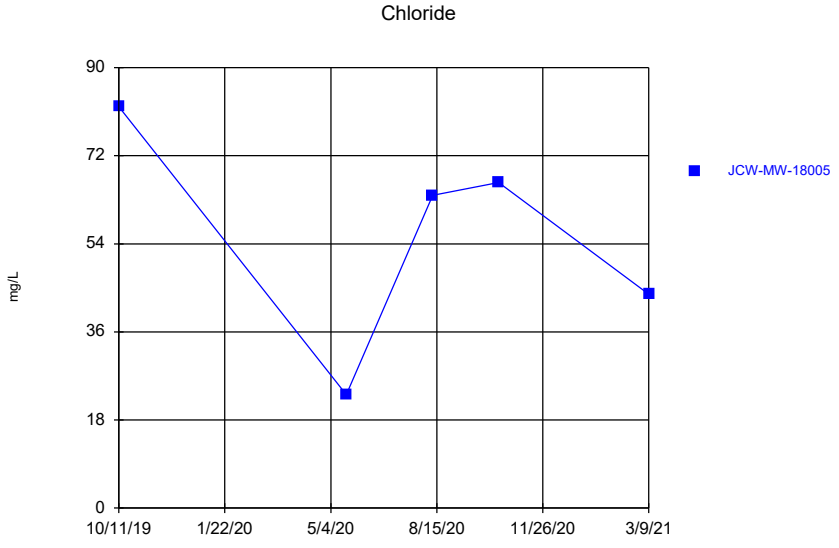

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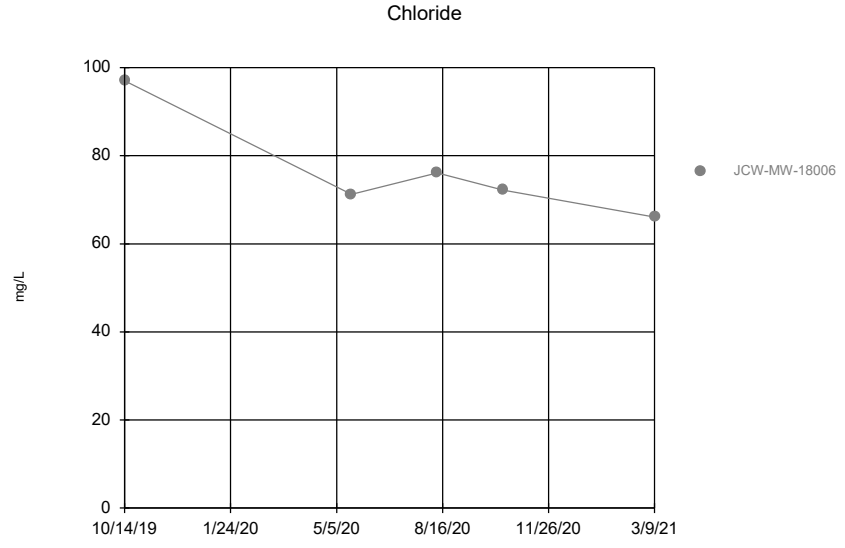

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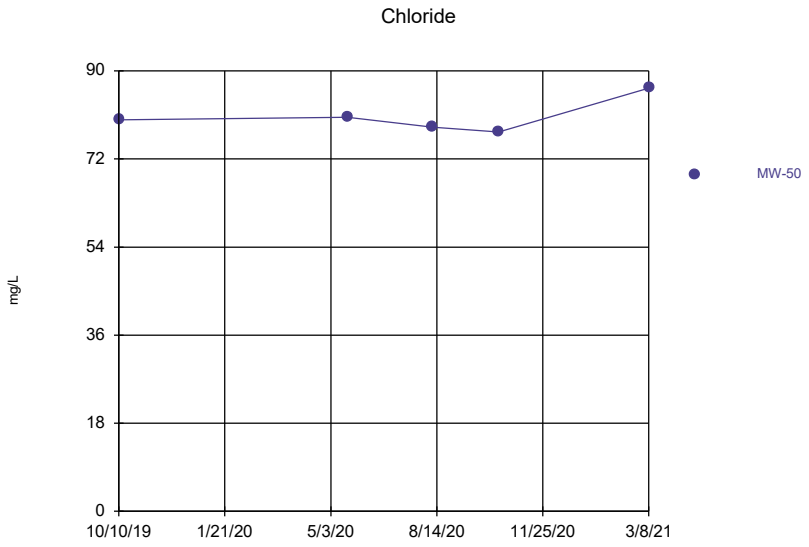

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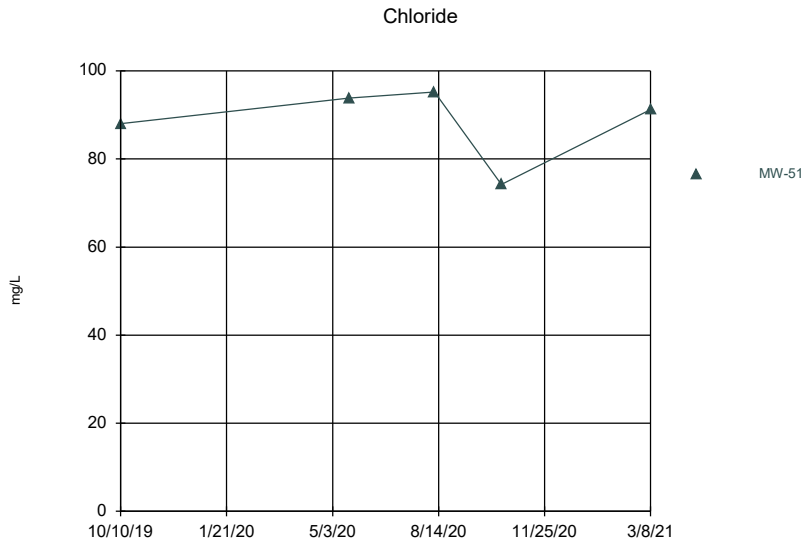

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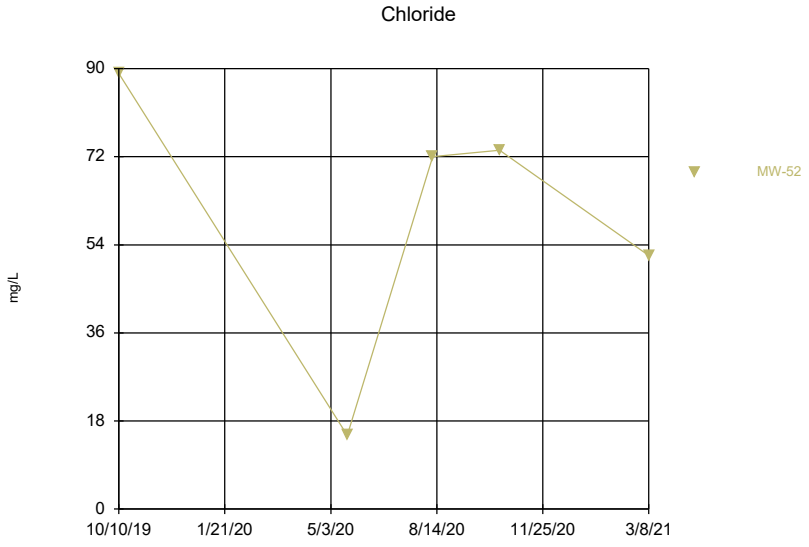

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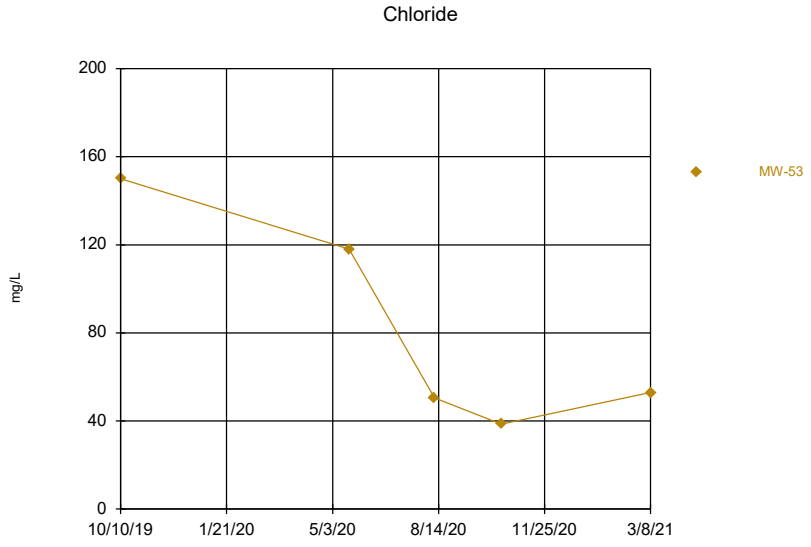

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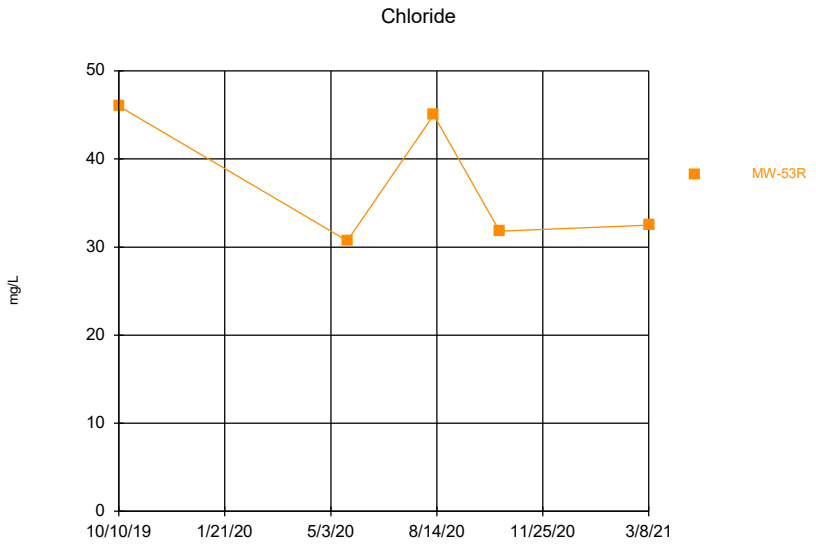

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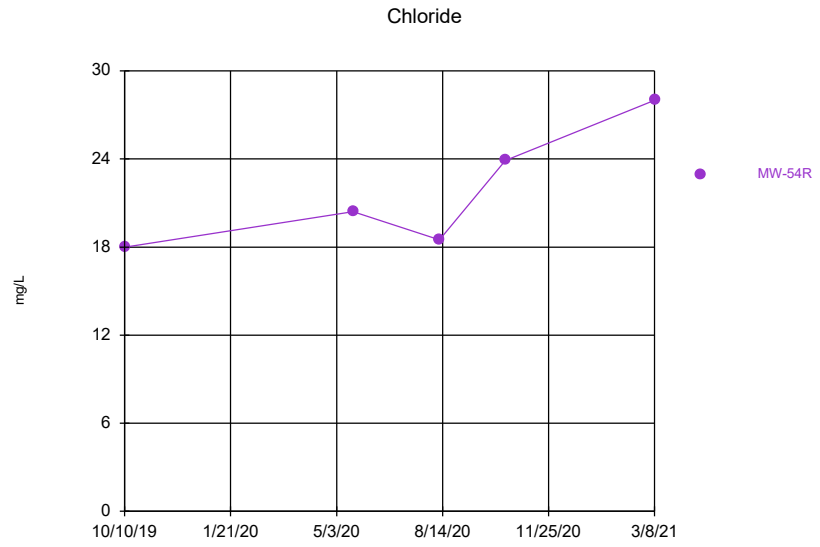

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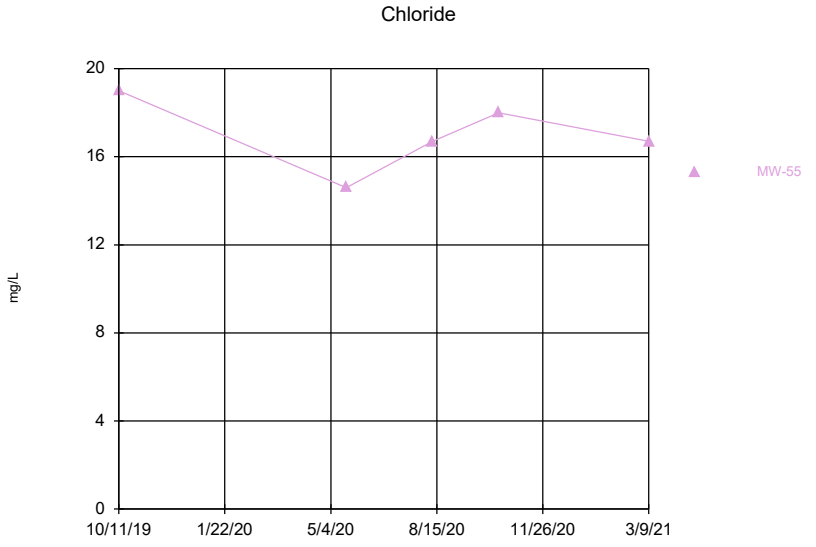

Time Series Analysis Run 4/12/2021 6:19 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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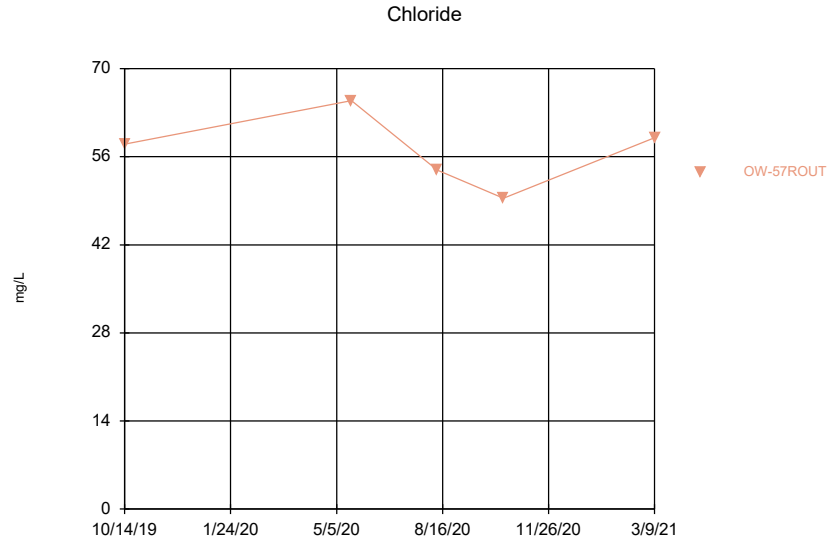

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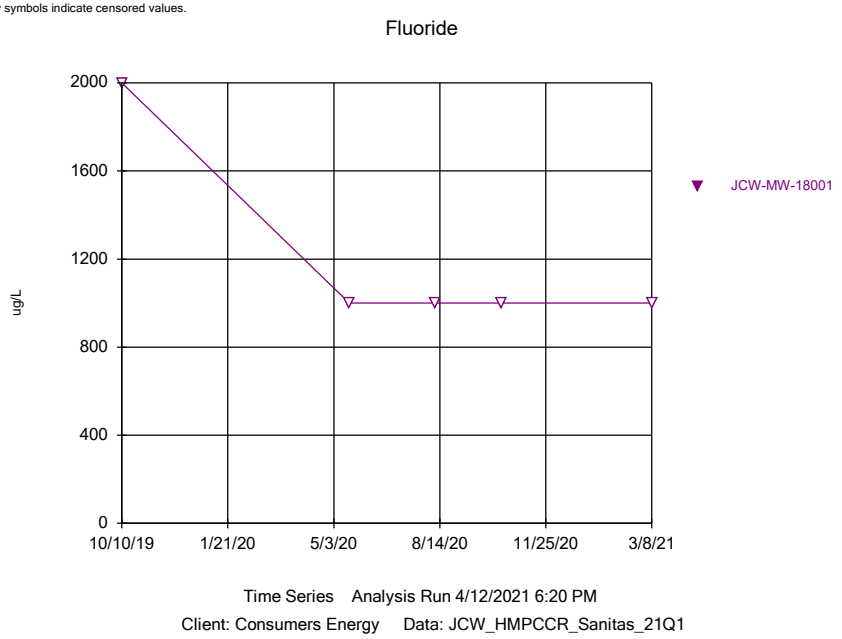

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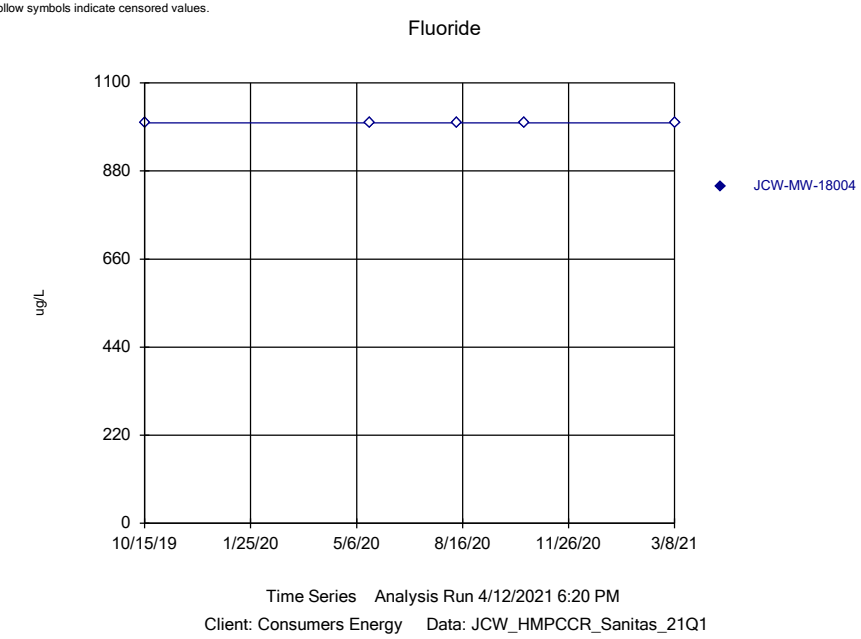

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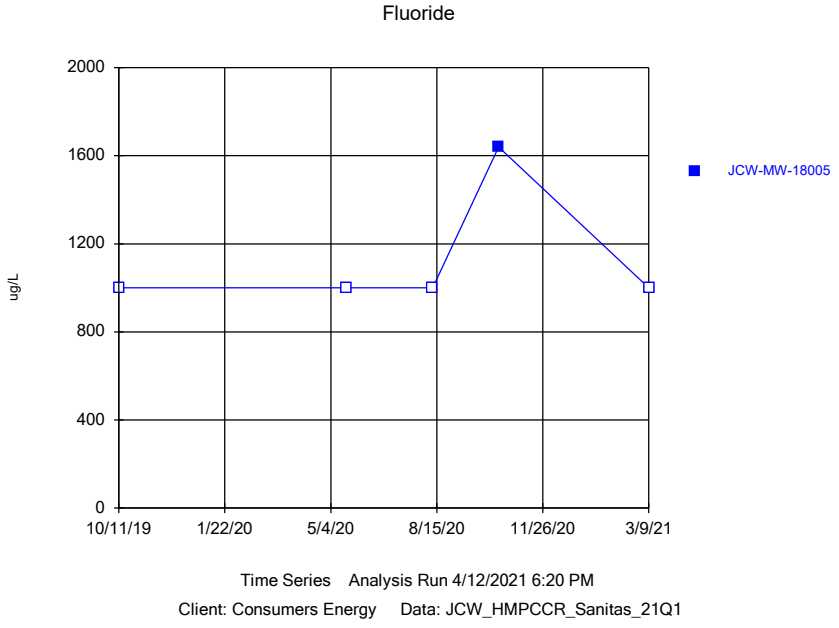

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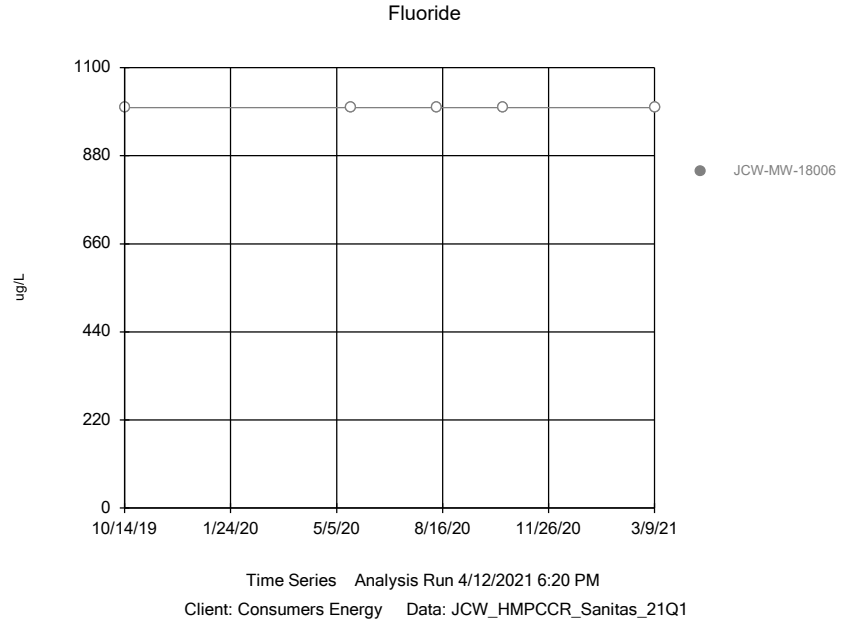

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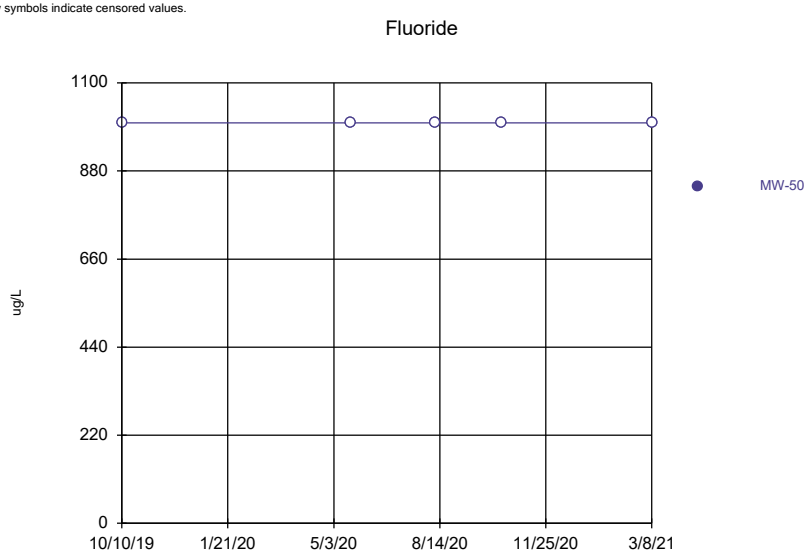

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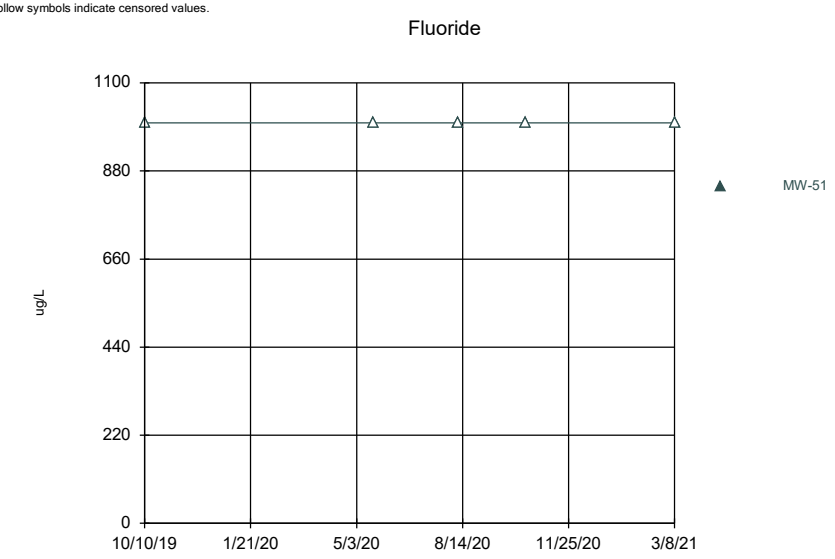

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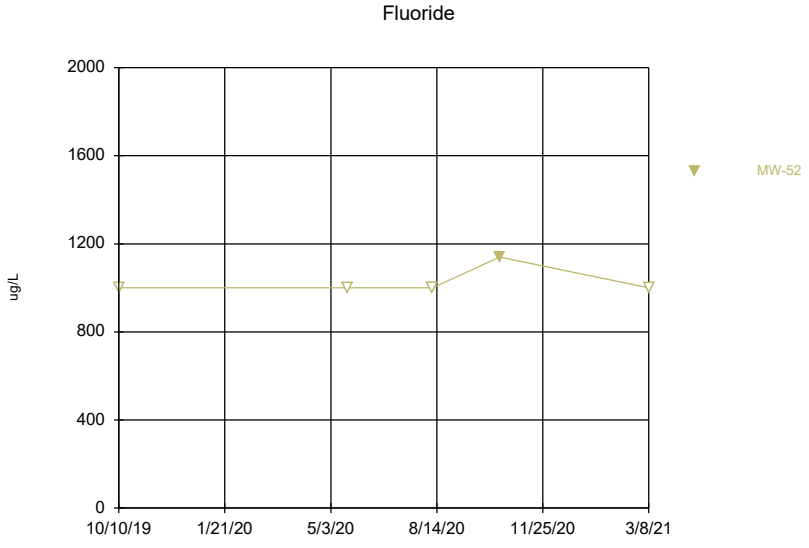

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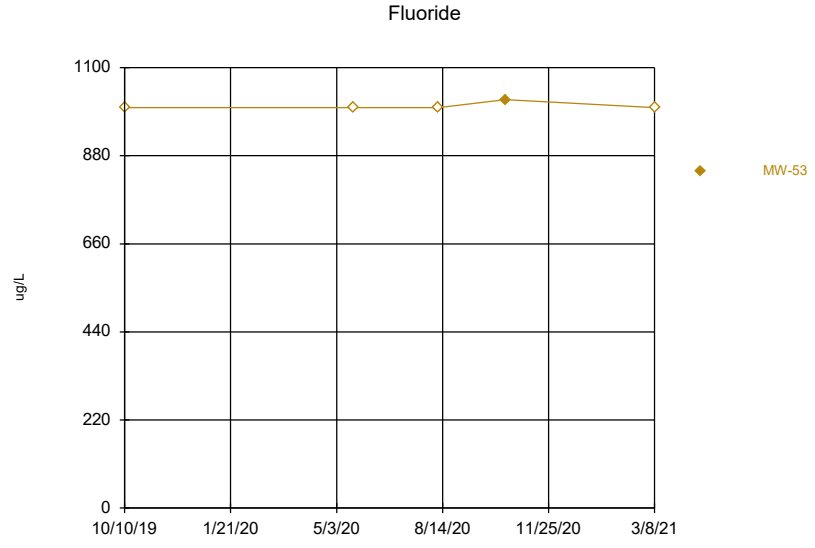

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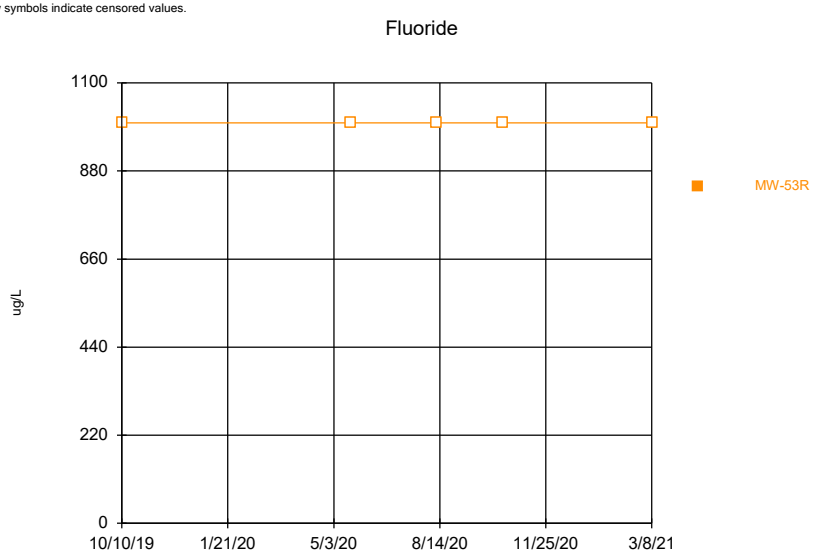

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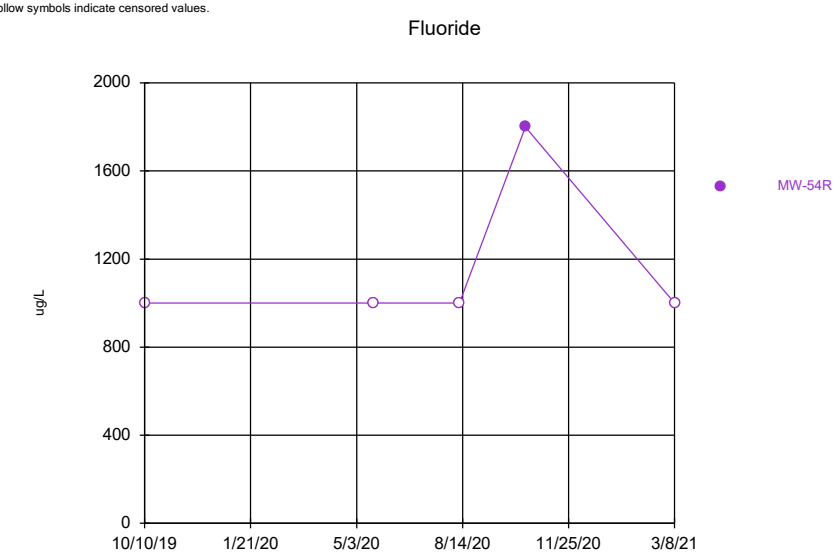

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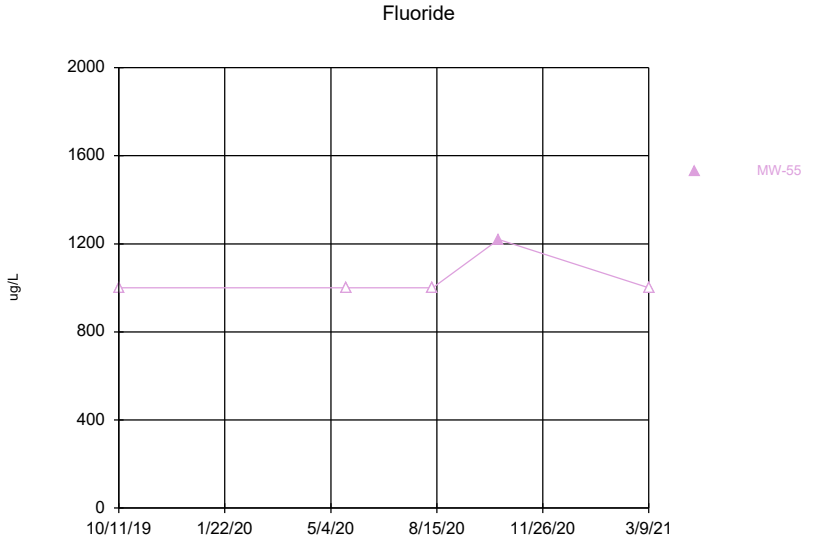

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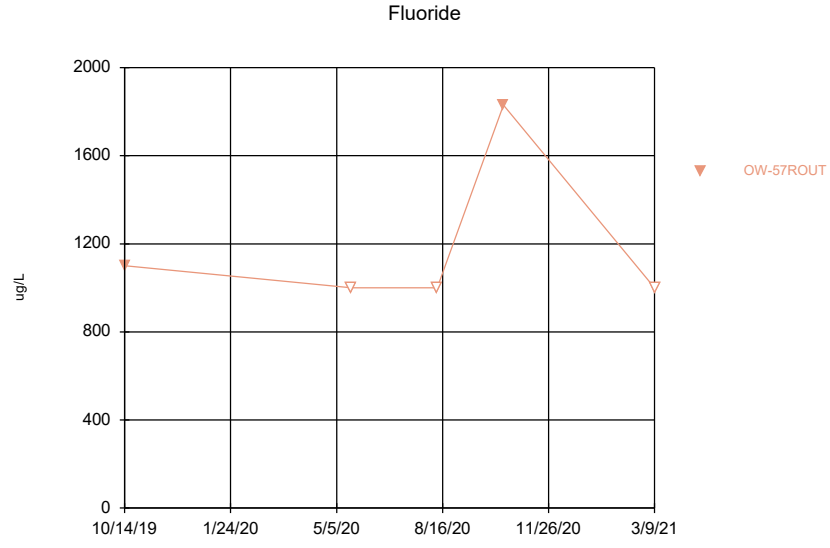

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Sen's Slope Estimator Analysis Run 3/31/2021 9:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA

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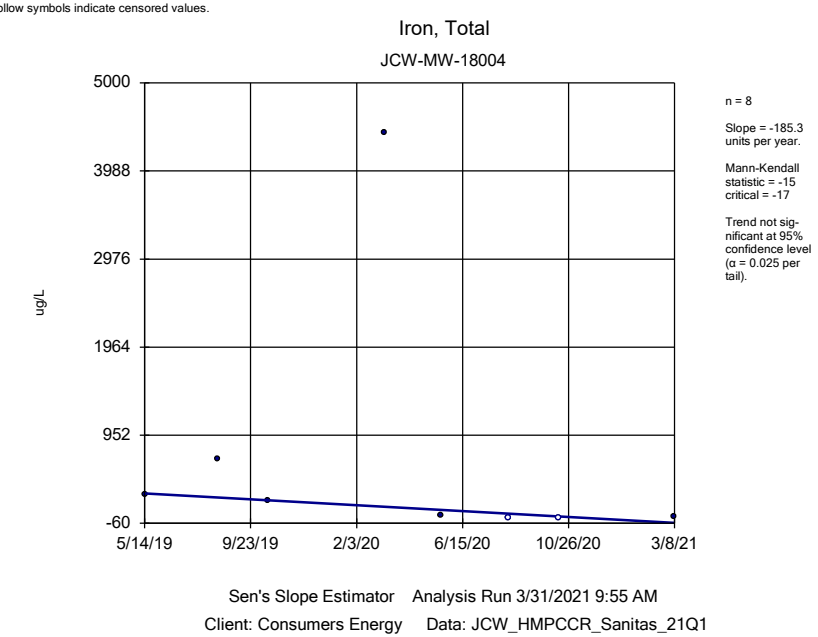

Sen's Slope Estimator Analysis Run 3/31/2021 9:55 AM

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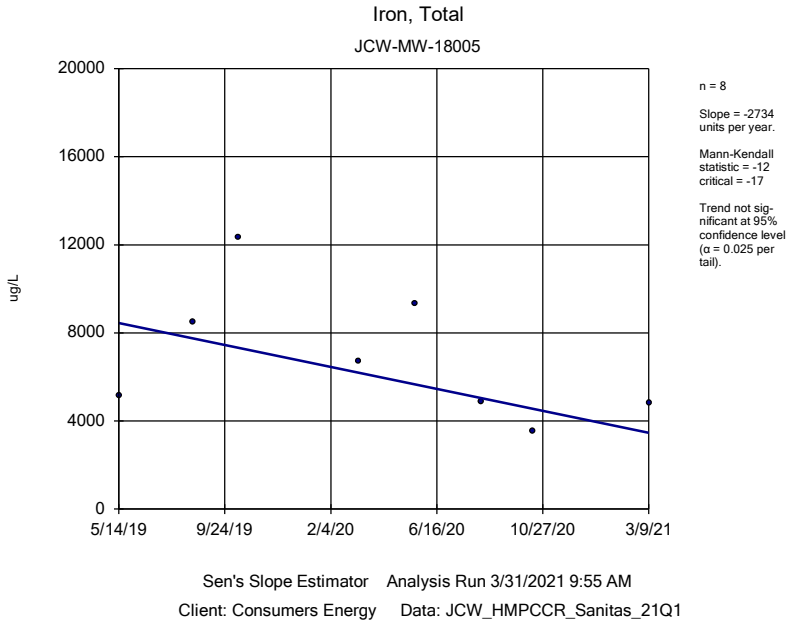

Sen's Slope Estimator Analysis Run 3/31/2021 9:55 AM

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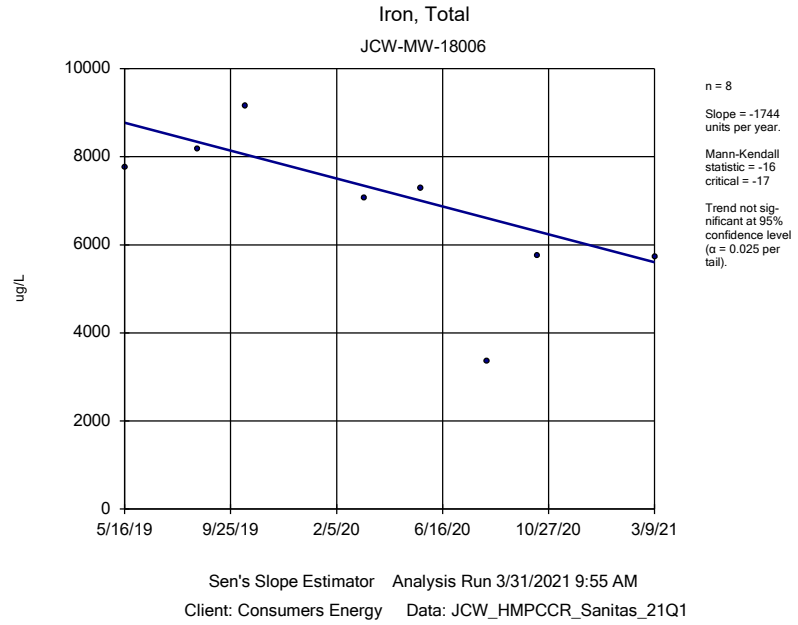

Sen's Slope Estimator Analysis Run 3/31/2021 9:55 AM

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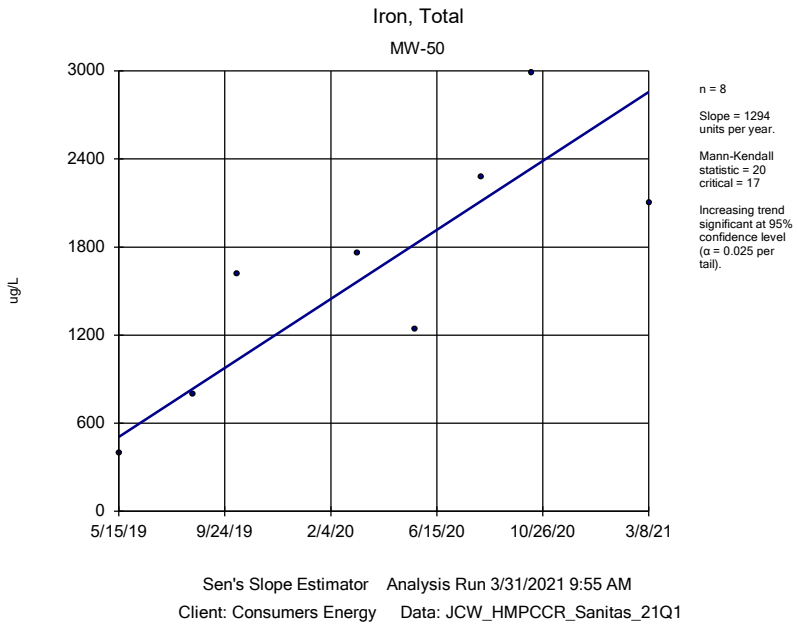

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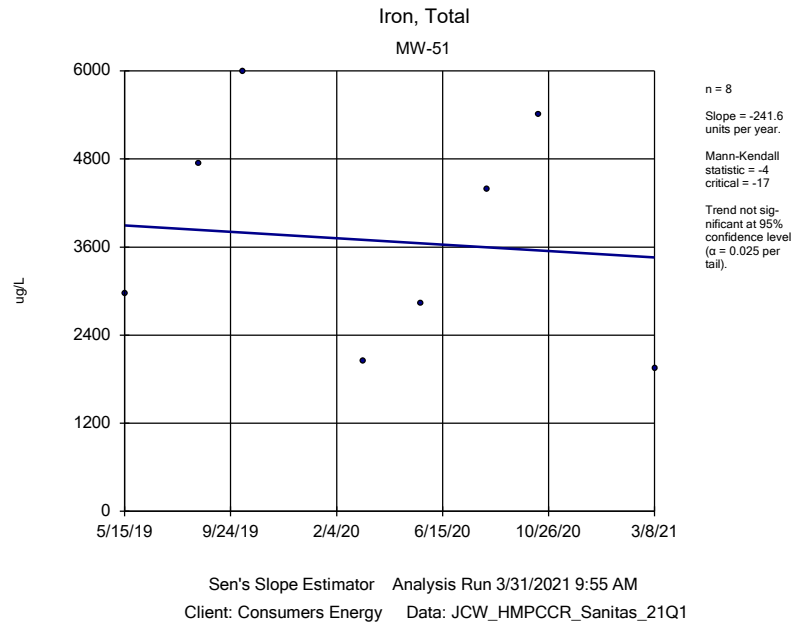

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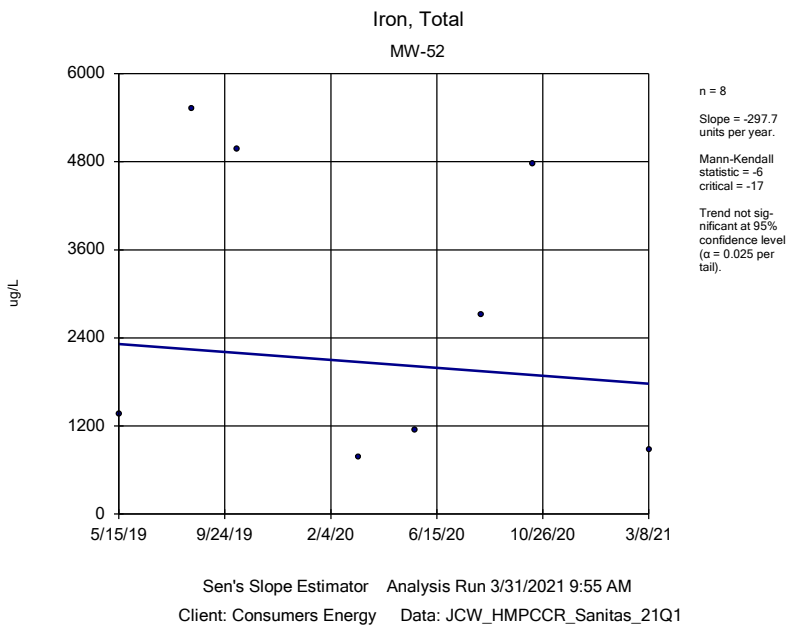

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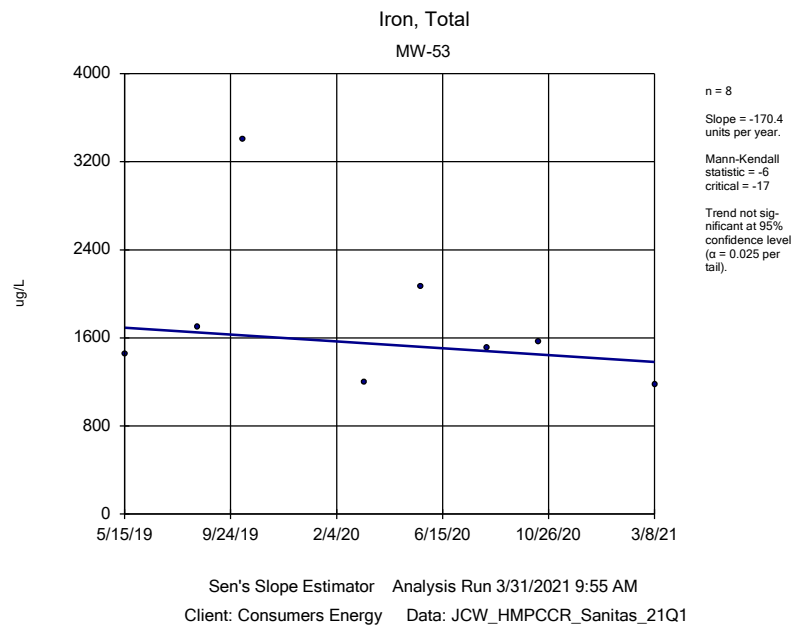

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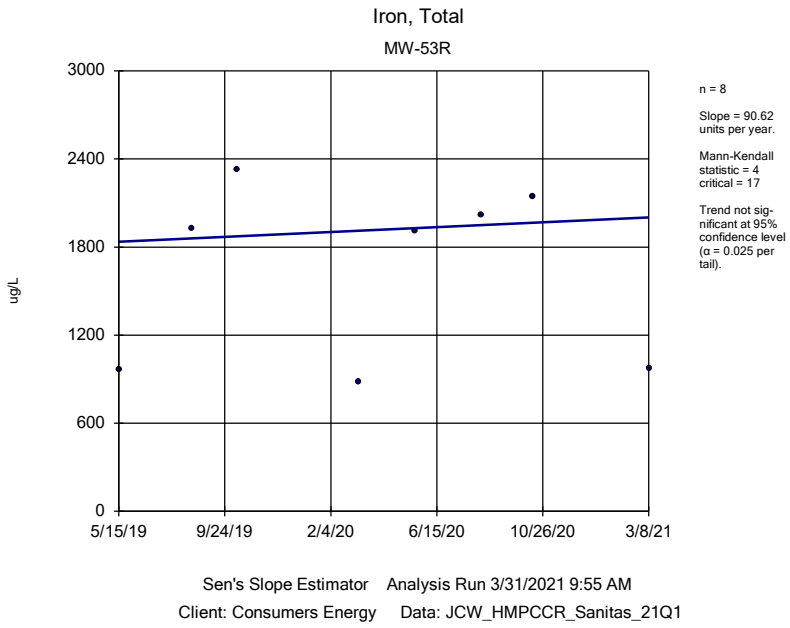

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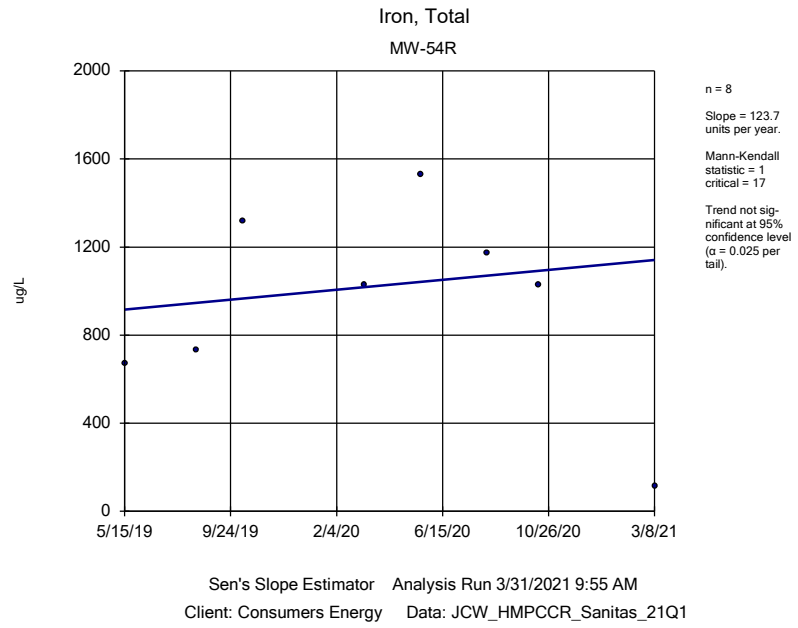

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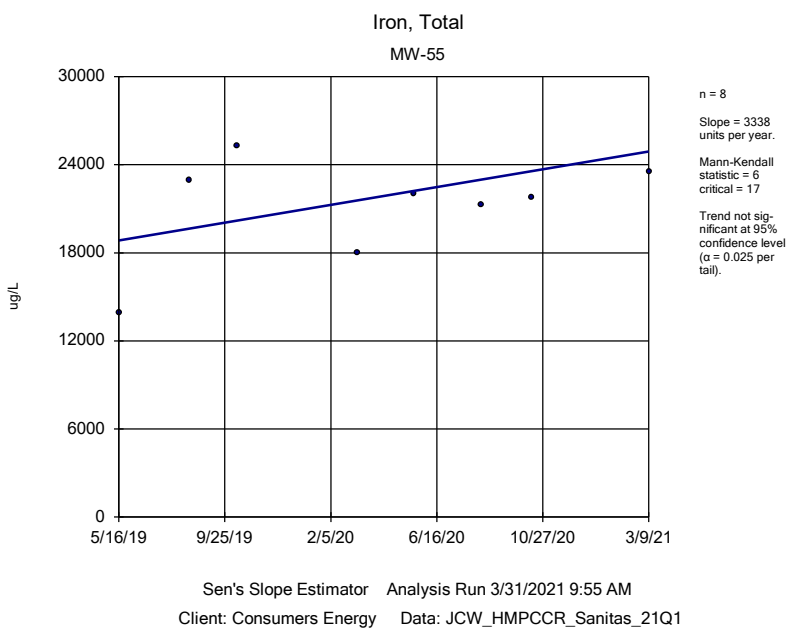

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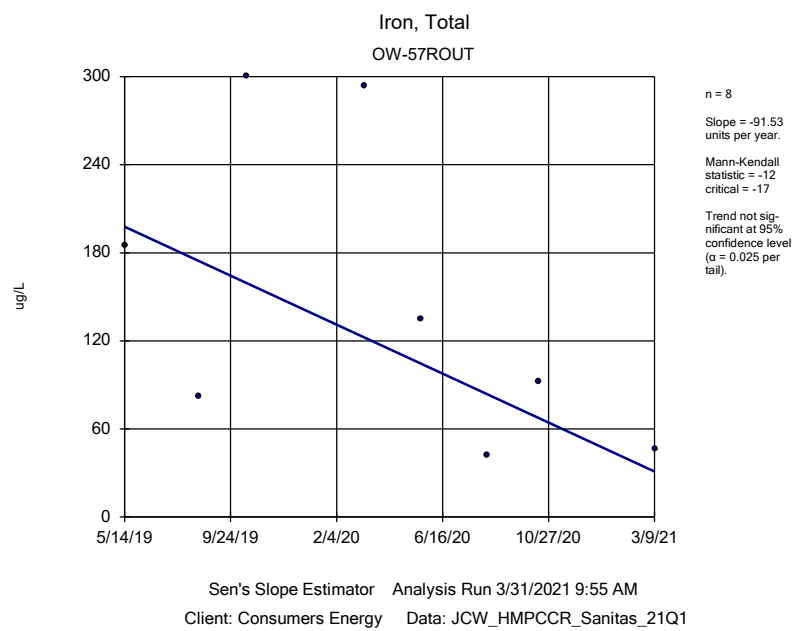

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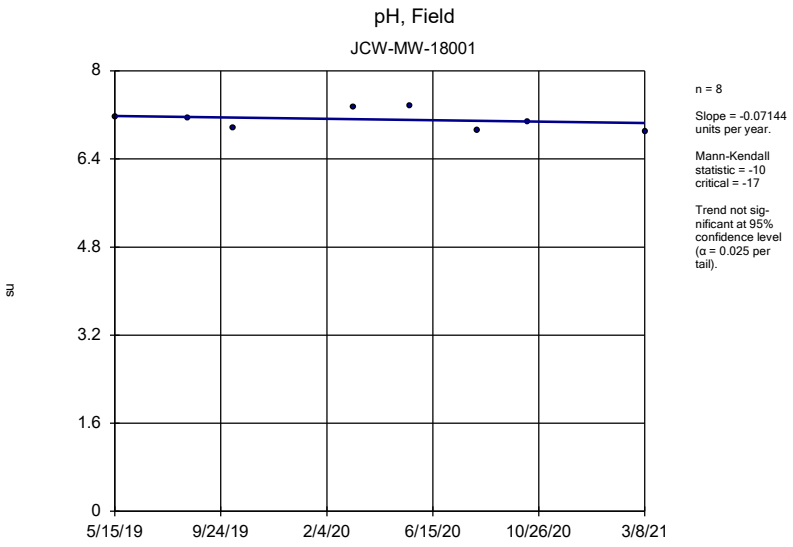

n = 8

Slope = -0.07144 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 3/31/2021 9:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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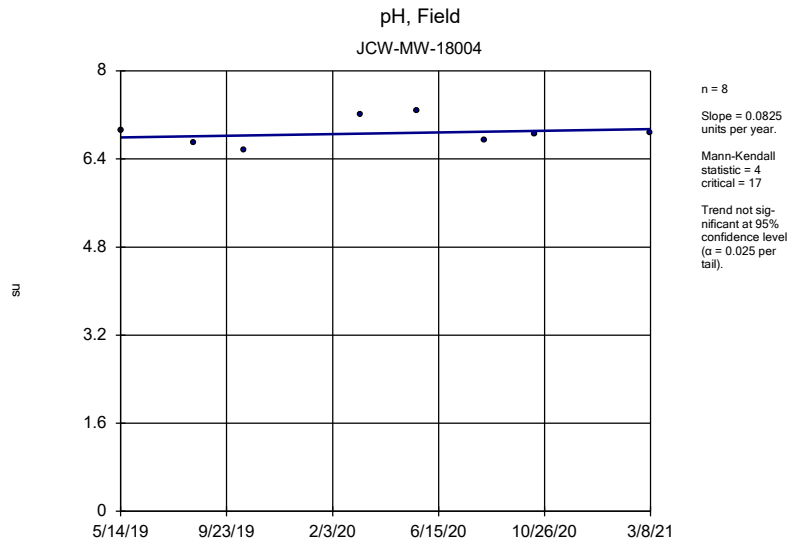


n = 8

Slope = 0.0825 units per year.

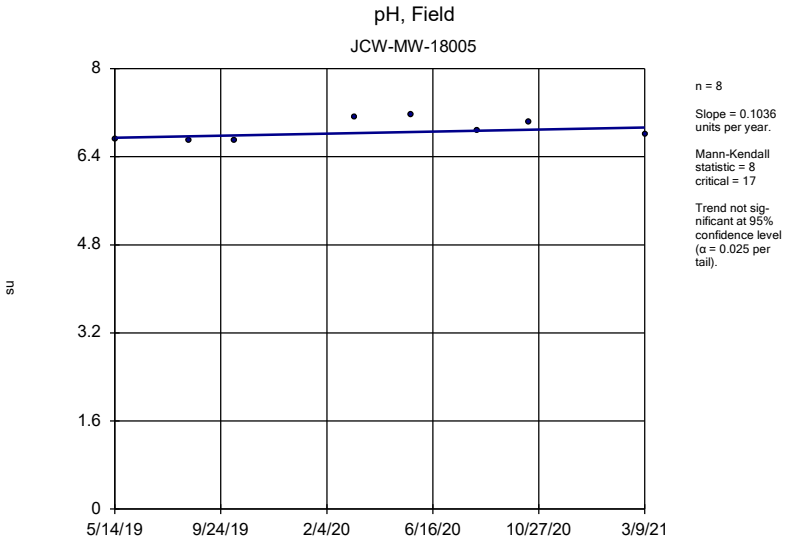
Mann-Kendall statistic = 4 critical = 17

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

Sen's Slope Estimator Analysis Run 3/31/2021 9:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA



n = 8

Slope = 0.1036 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 3/31/2021 9:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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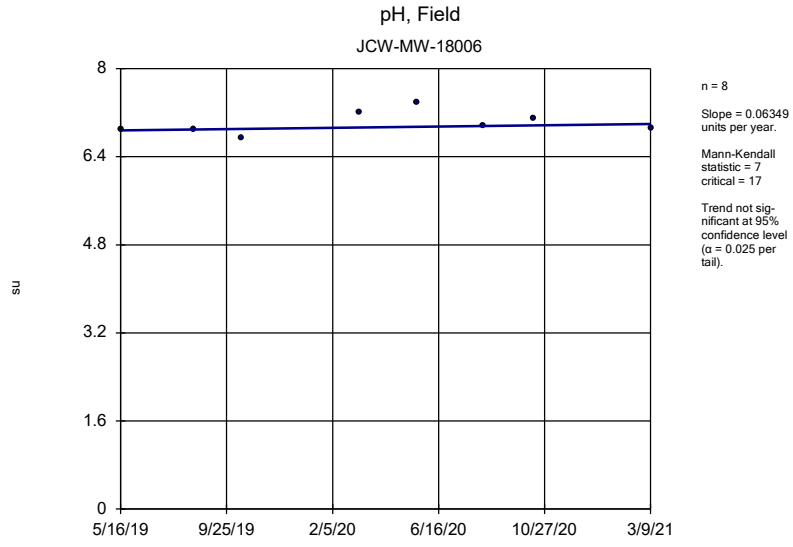

n = 8

Slope = 0.06349 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 3/31/2021 9:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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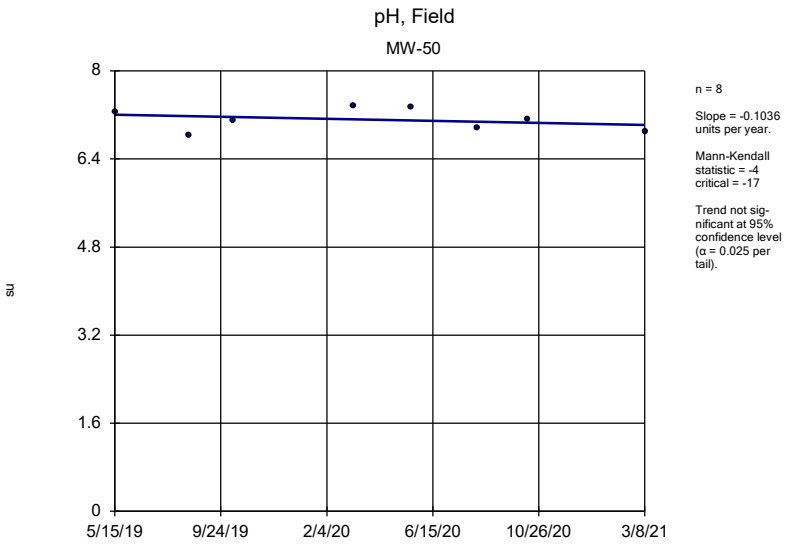

n = 8

Slope = -0.1036 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 3/31/2021 9:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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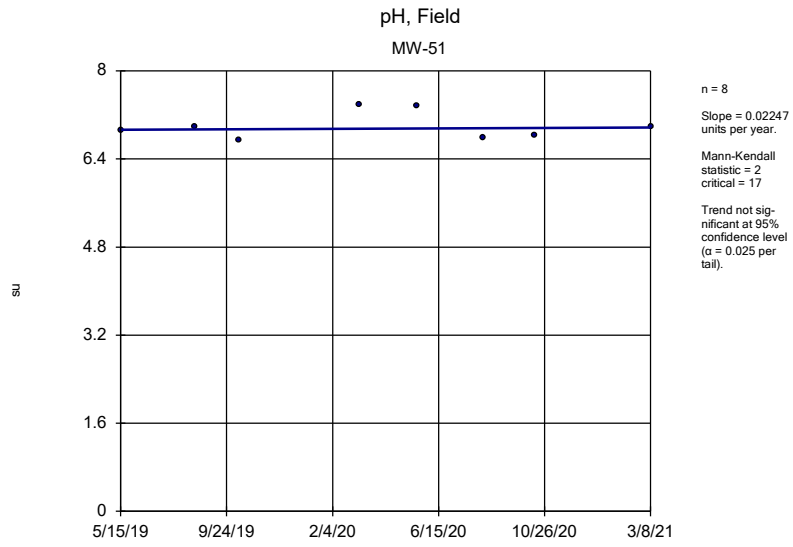


n = 8

Slope = 0.02247 units per year.

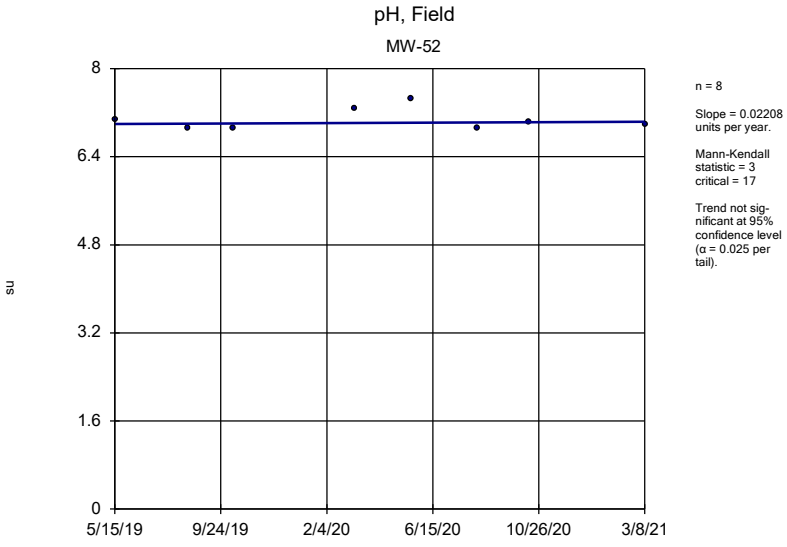
Mann-Kendall statistic = 2 critical = 17

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

Sen's Slope Estimator Analysis Run 3/31/2021 9:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA



n = 8

Slope = 0.02208 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 3/31/2021 9:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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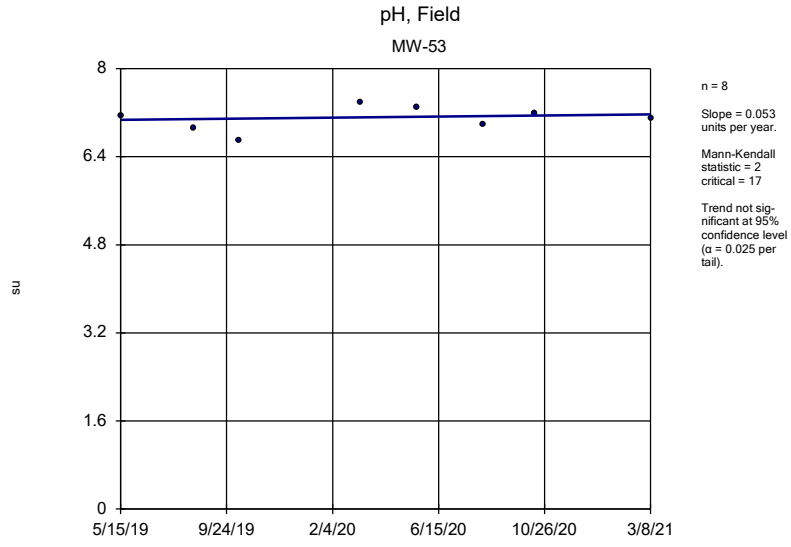

n = 8

Slope = 0.053 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 3/31/2021 9:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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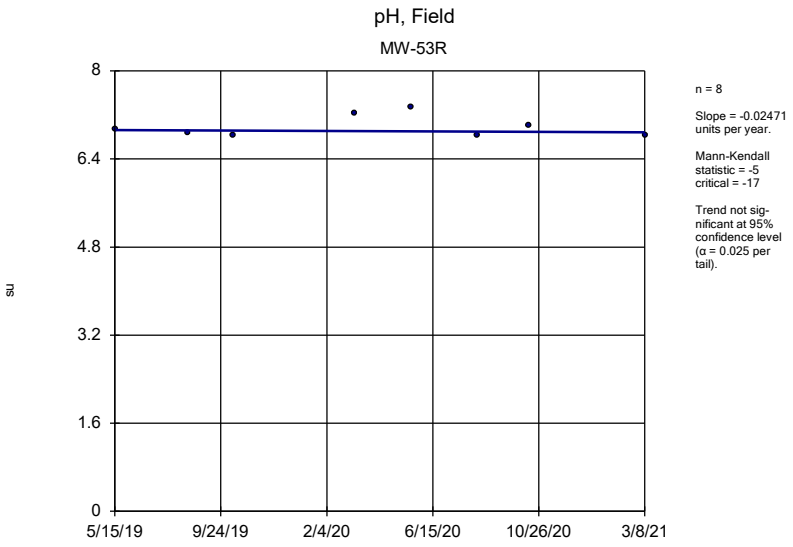


n = 8

Slope = -0.02471 units per year.

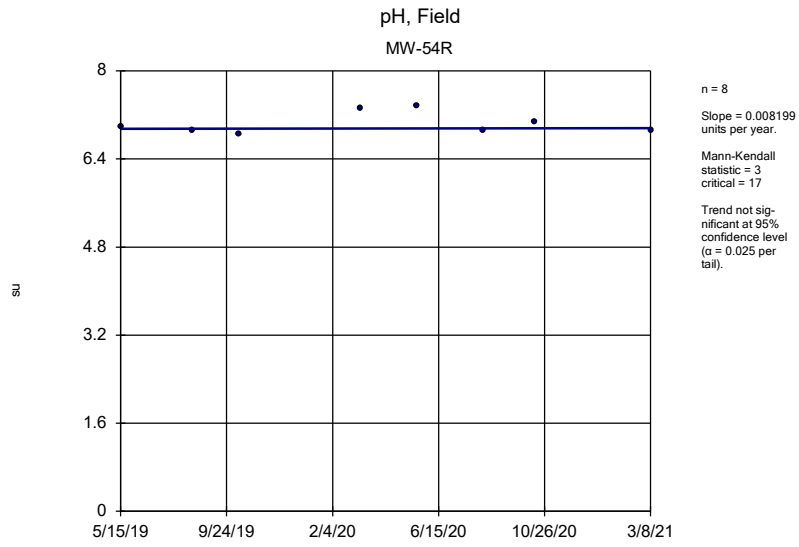
Mann-Kendall statistic = -5 critical = -17

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

Sen's Slope Estimator Analysis Run 3/31/2021 9:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA



n = 8

Slope = 0.008199 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 3/31/2021 9:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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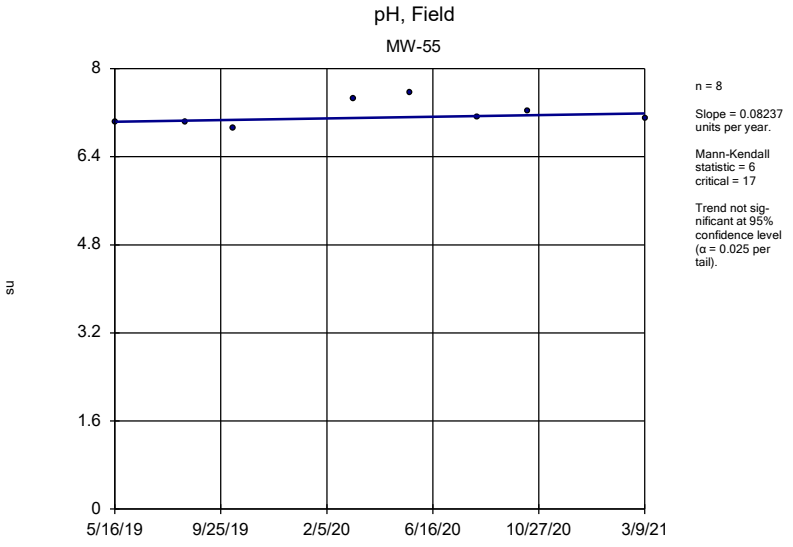

n = 8

Slope = 0.08237 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 3/31/2021 9:55 AM

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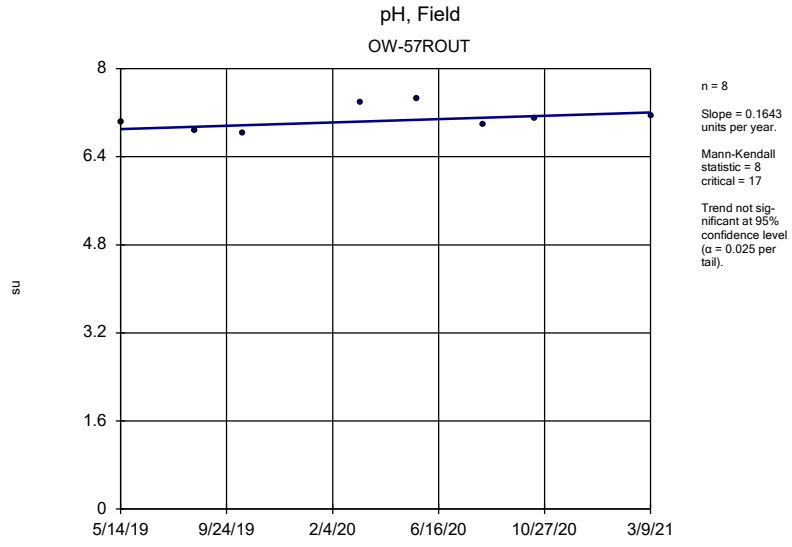

n = 8

Slope = 0.1643 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 3/31/2021 9:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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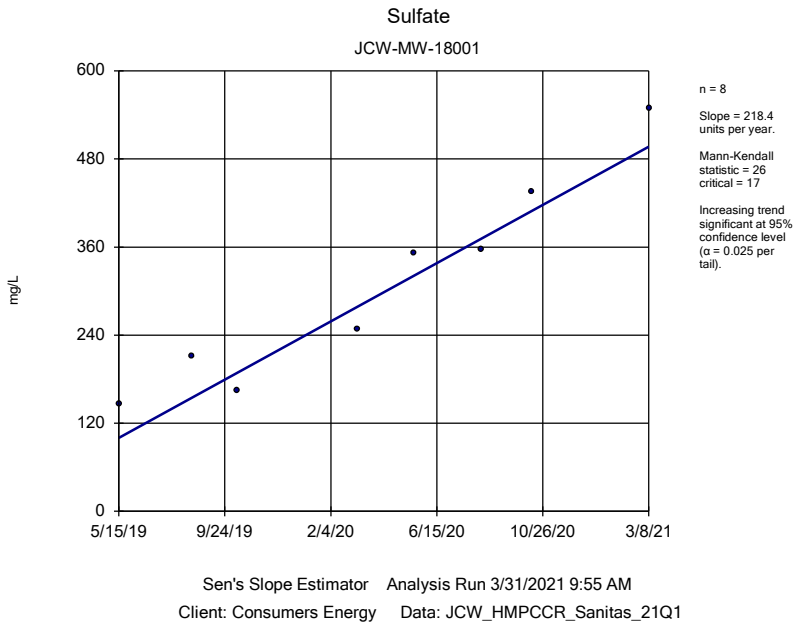

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Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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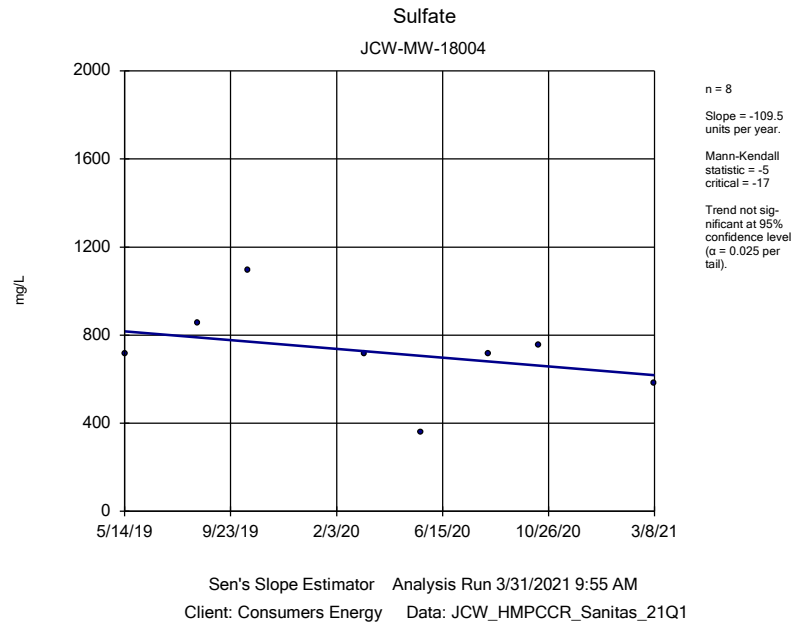

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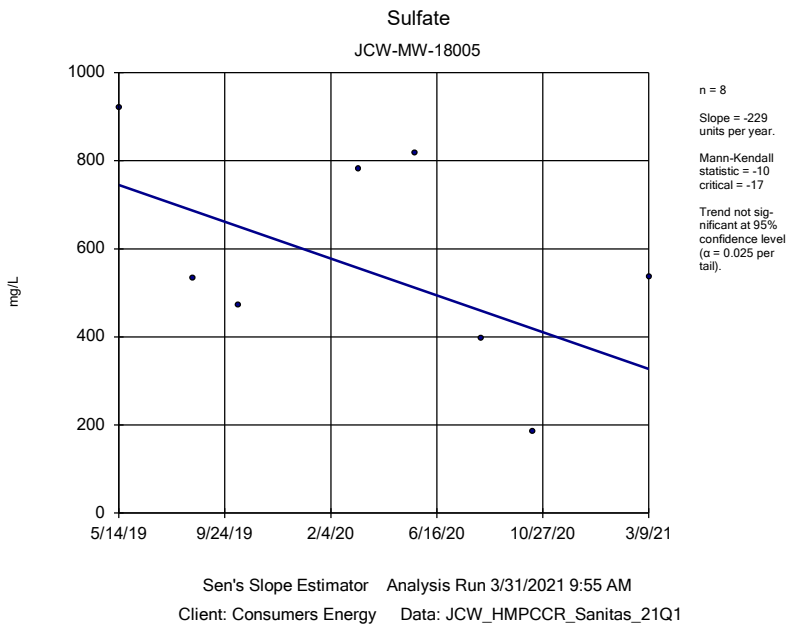

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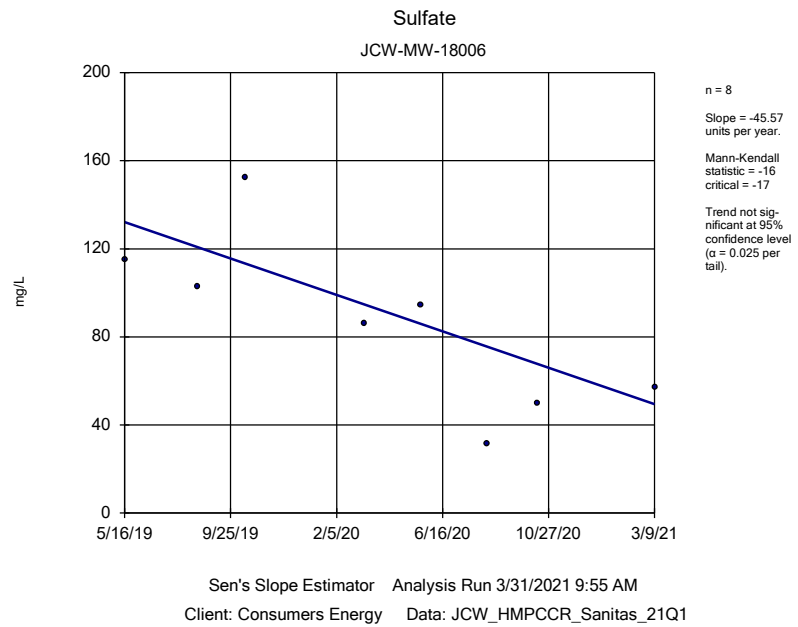

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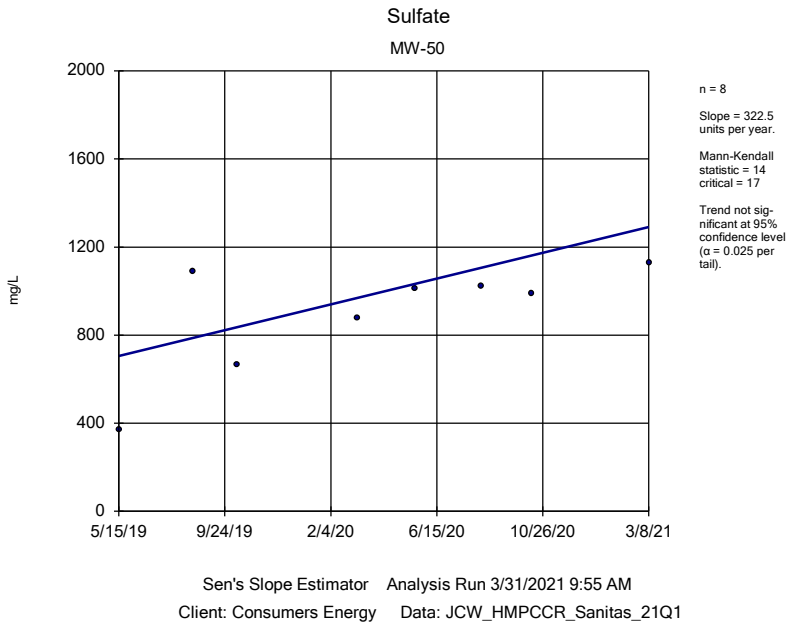

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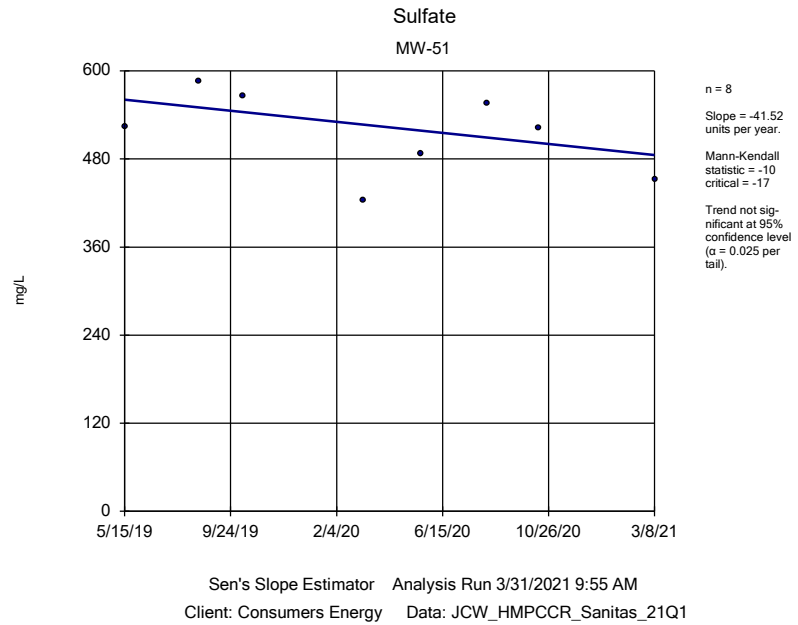

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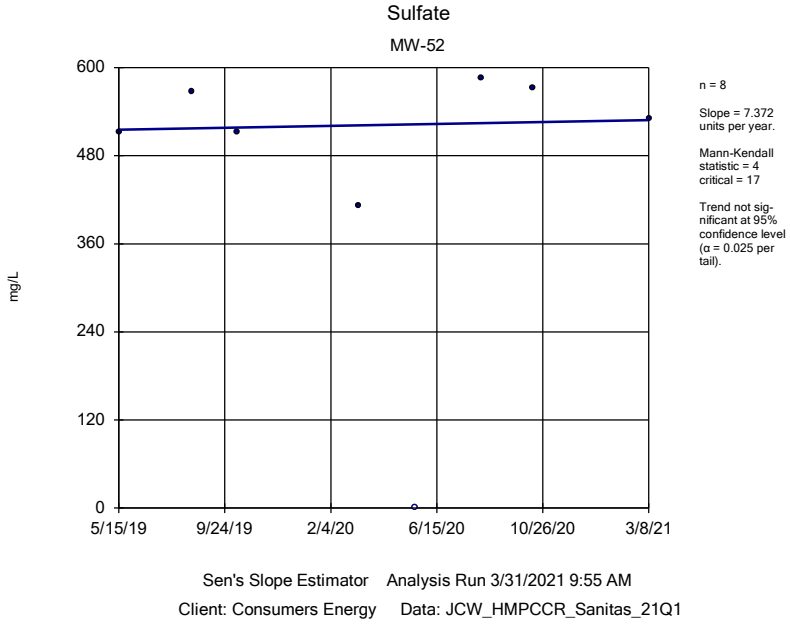
Hollow symbols indicate censored values.



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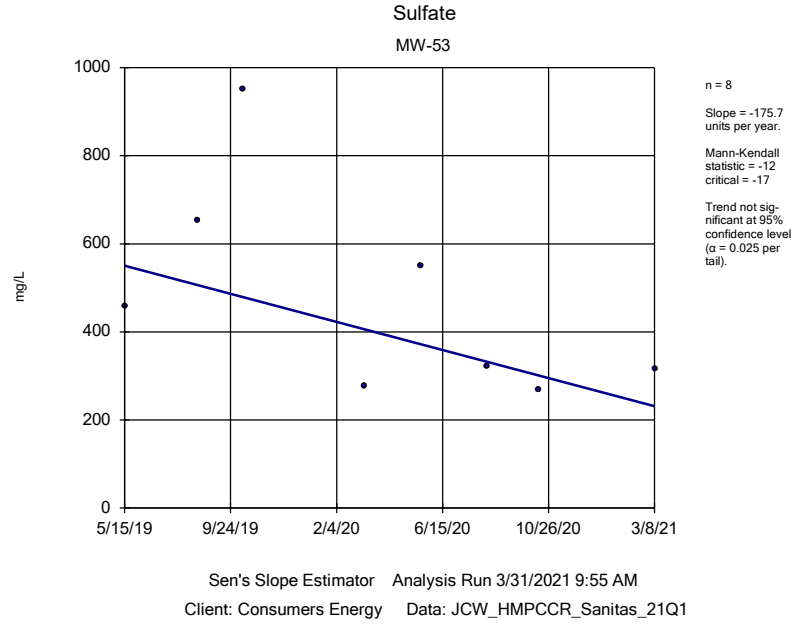

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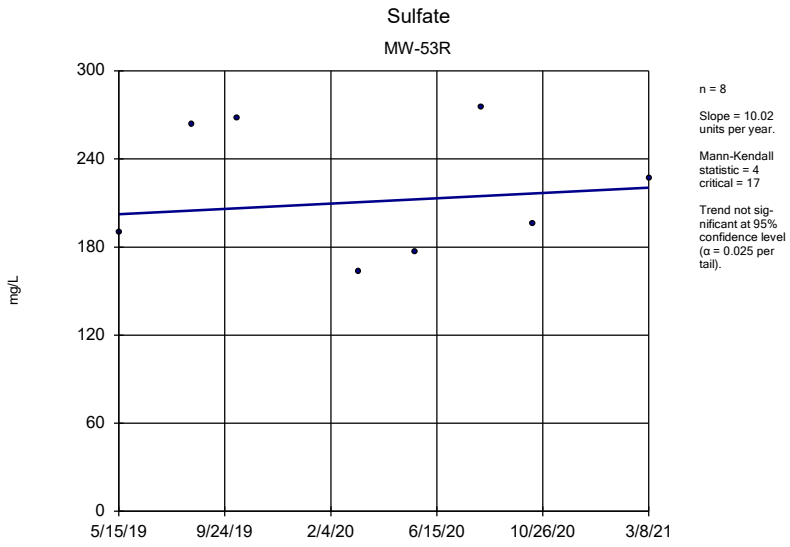


n = 8

Slope = 10.02 units per year.

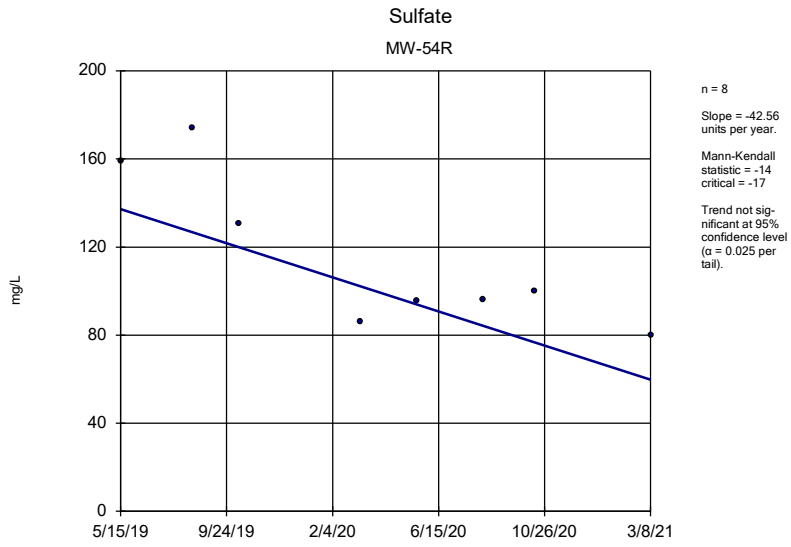
Mann-Kendall statistic = 4 critical = 17

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

Sen's Slope Estimator Analysis Run 3/31/2021 9:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA



n = 8

Slope = -42.56 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 3/31/2021 9:55 AM

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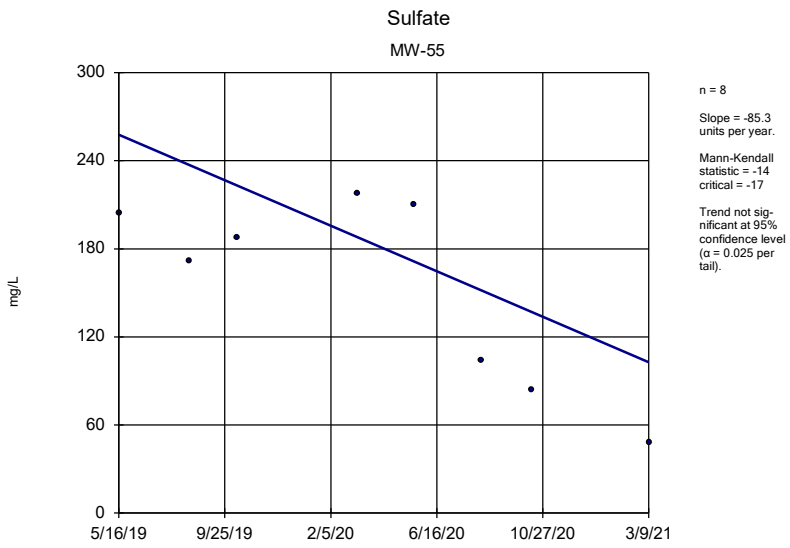

n = 8

Slope = -85.3 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 3/31/2021 9:55 AM

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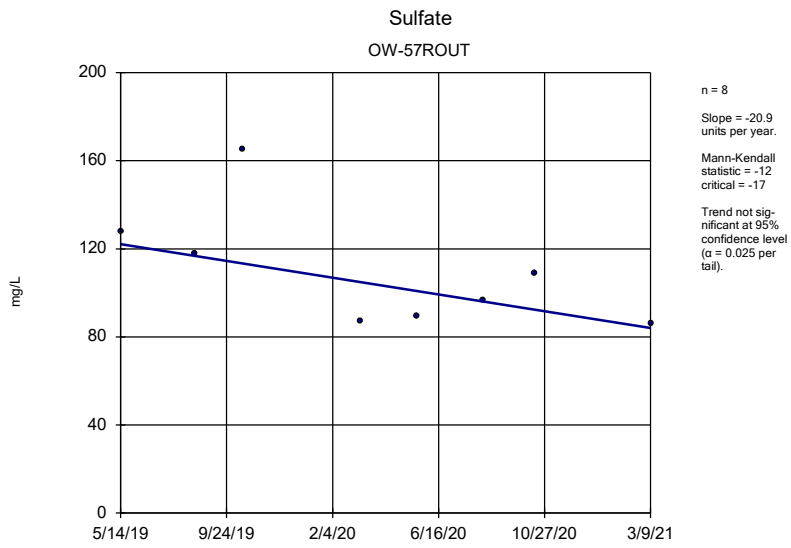

n = 8

Slope = -20.9 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 3/31/2021 9:55 AM

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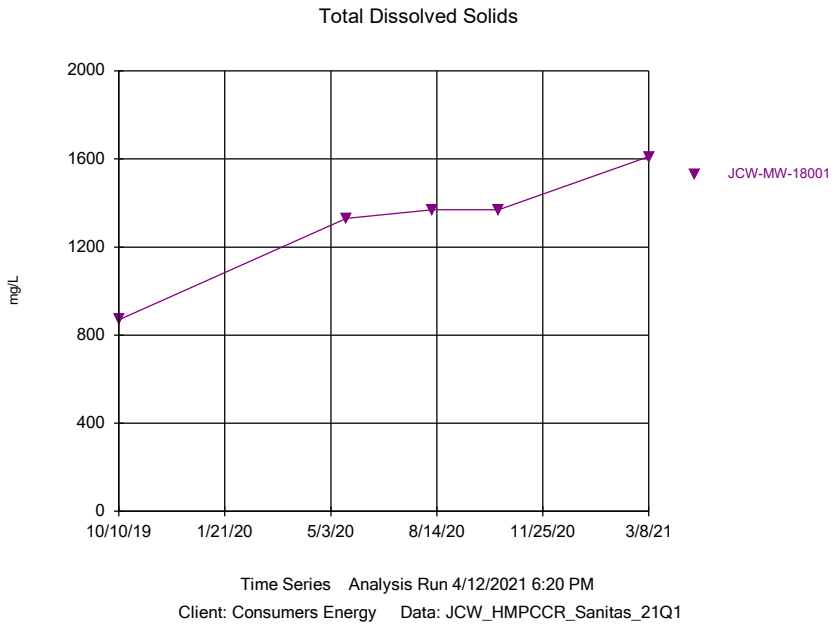

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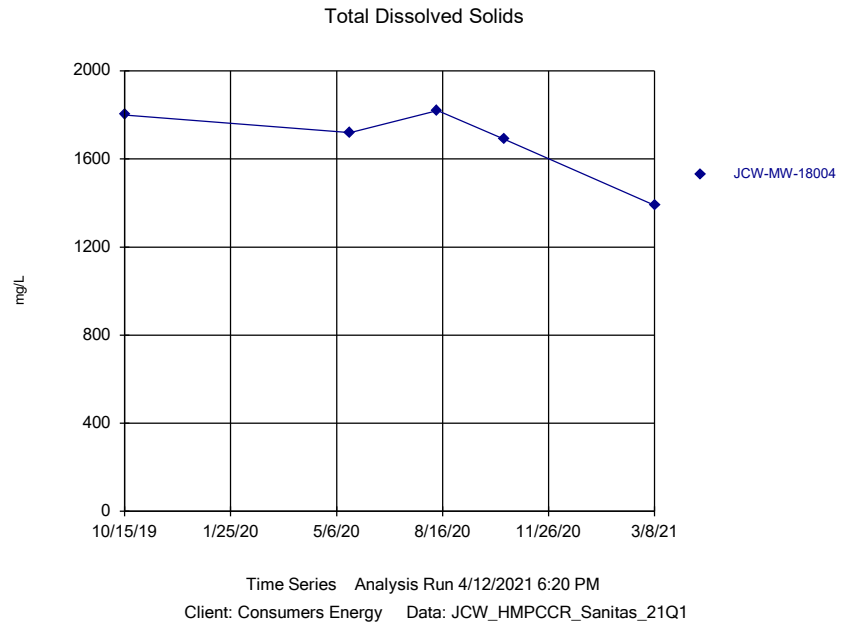

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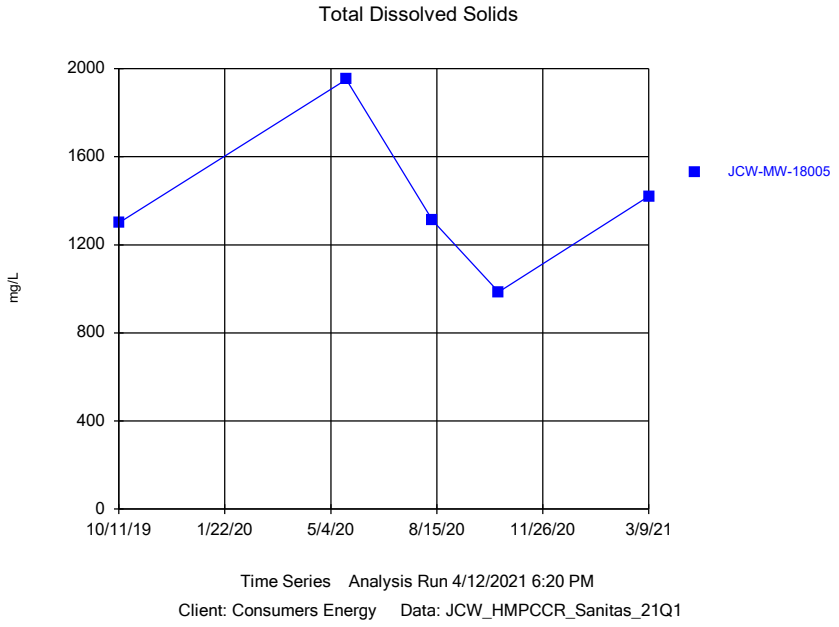

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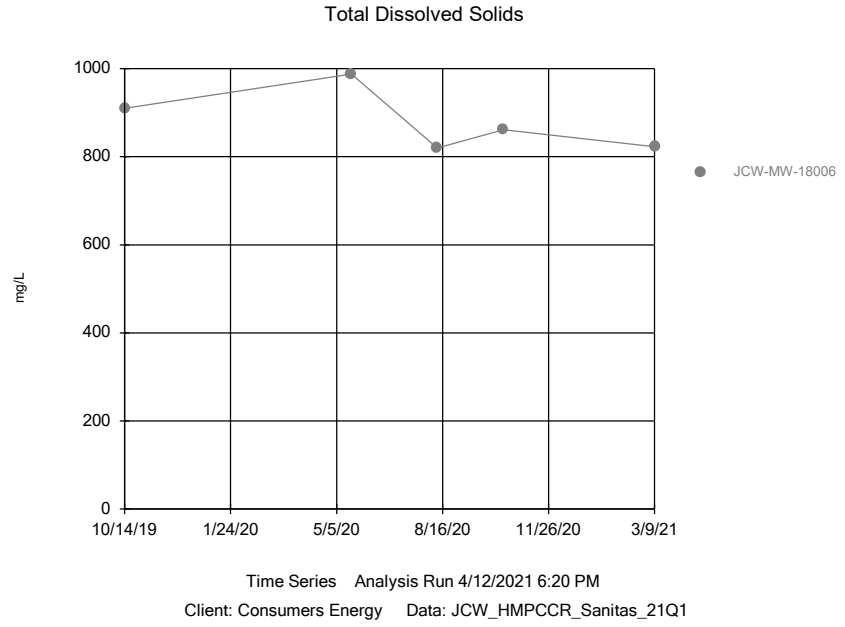

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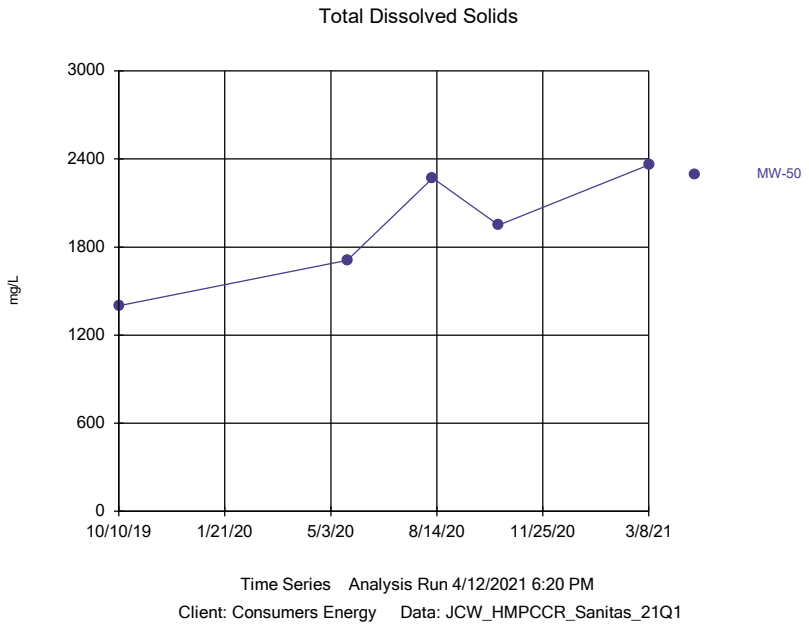

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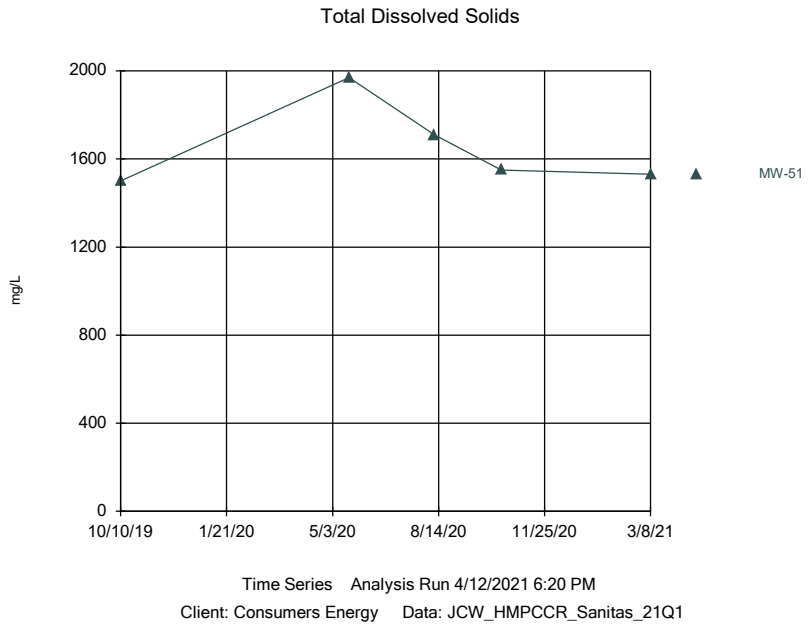

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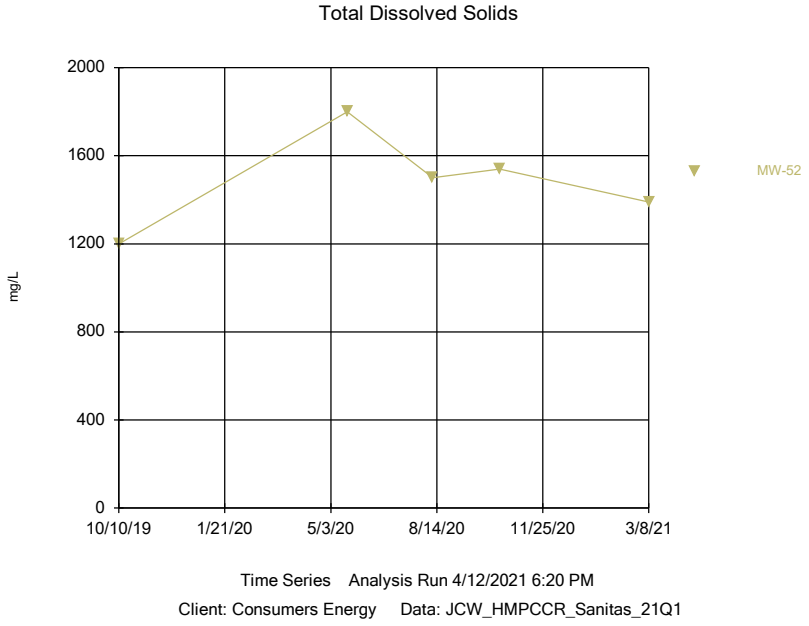

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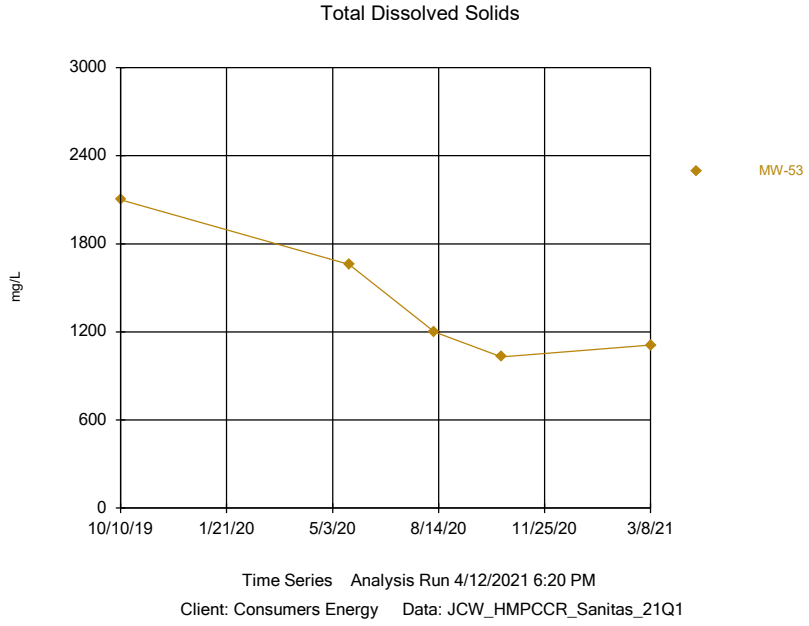

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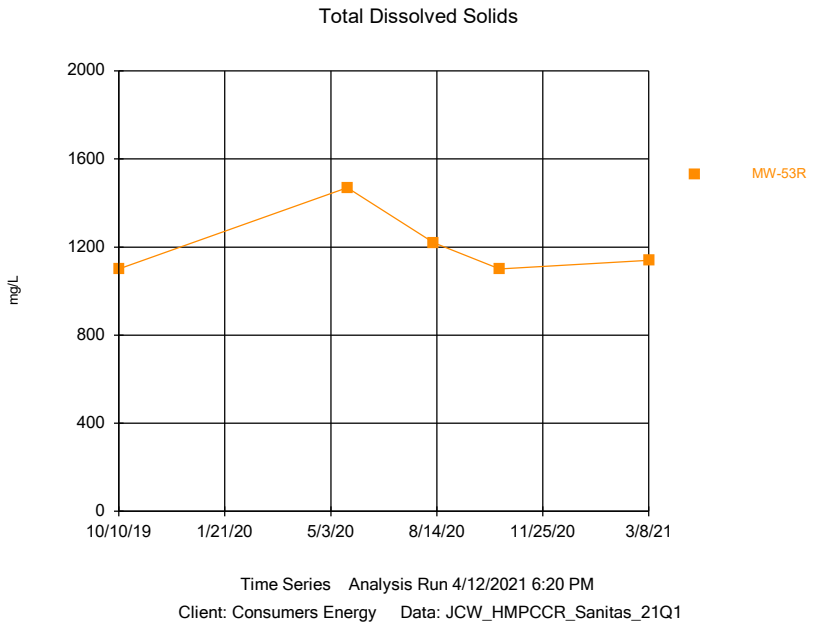

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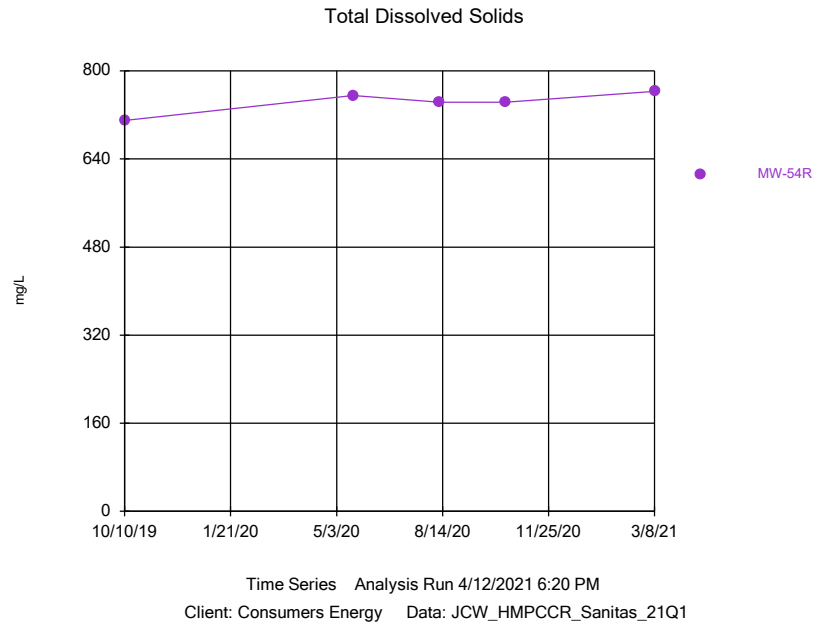

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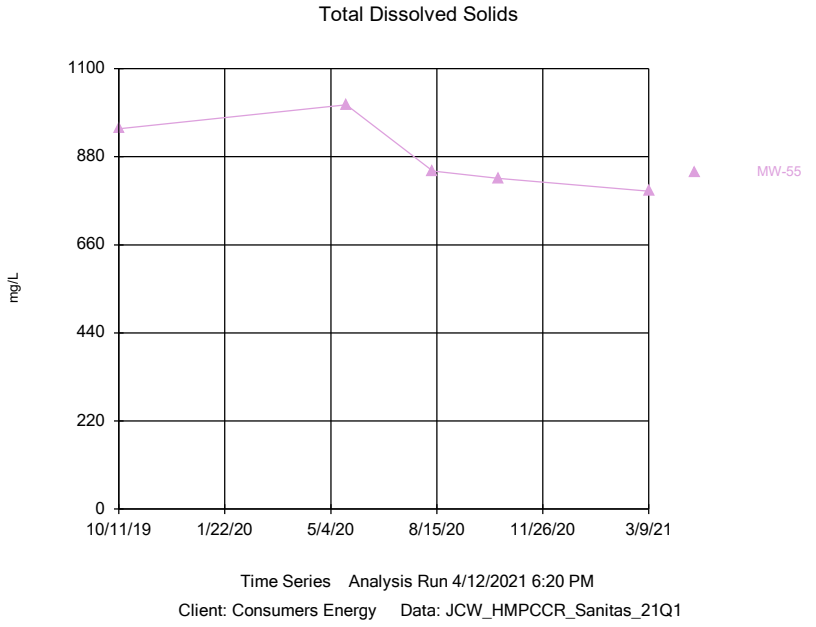

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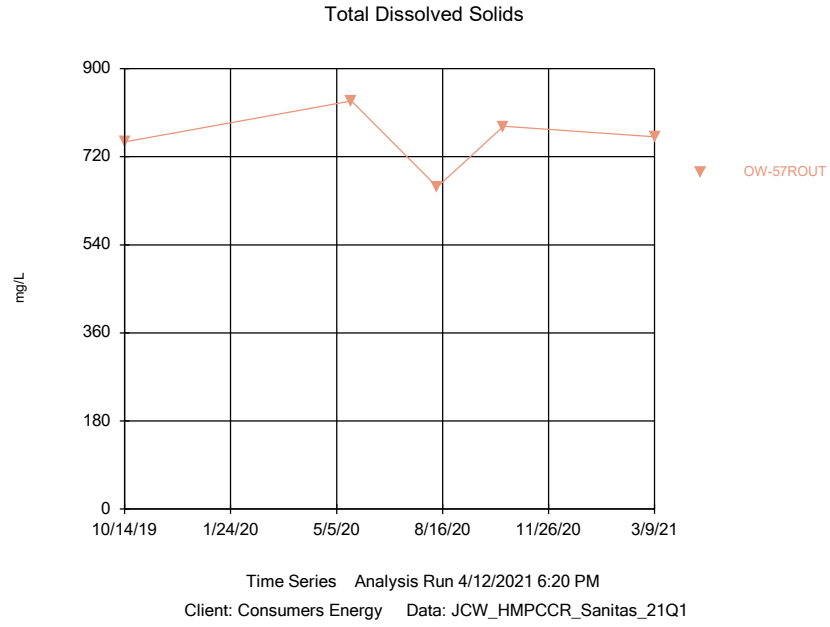

Appendix D
Assessment Monitoring and GSI Statistical Evaluation

1540 Eisenhower Pl.
Ann Arbor, MI 48108

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TRCcompanies.com

Technical Memorandum

Date:	April 23, 2021
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC Kristin Lowery, TRC Katy Reminga, TRC
Project No.:	418426.0000 Phase 002, Task 002
Subject:	Assessment Monitoring and GSI Statistical Evaluation of March 2021 Sampling Event JC Weadock Landfill, Consumers Energy Company, Essexville, Michigan

During the statistical evaluation of the initial assessment monitoring event (May 2018), arsenic was present in one or more downgradient monitoring wells at statistically significant levels exceeding the Groundwater Protection Standards (GWPSs). Therefore, Consumers Energy Company (Consumers Energy) initiated an Assessment of Corrective Measures (ACM) within 90 days from when the Appendix IV exceedance was determined. The ACM was completed on September 11, 2019.

Currently, Consumers Energy is continuing semiannual assessment monitoring in accordance with §257.95 of the CCR Rule[1] at the JC Weadock Power Plant Landfill and quarterly groundwater monitoring in accordance with the February 2021 Landfill Hydrogeological Monitoring Plan (HMP). The first quarter 2021 monitoring event was conducted on March 8 through 9, 2021. In accordance with §257.95 and the HMP, the assessment monitoring data must be compared to GWPSs to determine whether or not Appendix III and Appendix IV constituents, and additional Michigan Part 115 (as amended by PA 640) Section 11511a(3) and Section 11519b(2) constituents, are detected at statistically significant levels above the GWPSs. GWPSs were established in accordance with §257.95(h) and Part 115, as detailed in the April 23, 2021 Groundwater Protection Standards technical memorandum, which was also included in the First Quarter 2021 Hydrogeological Monitoring Report (TRC, April 2021).

The evaluation of the initial semiannual assessment monitoring event data (April and May 2018) indicated that arsenic was present at statistically significant levels above the GWPS at one of the three downgradient wells. The three downgradient wells were located within a vent (e.g., opening) of the perimeter soil/bentonite slurry wall to assess the quality of groundwater passing the waste boundary. As discussed in detail below, in July 2018, a vent (e.g., opening) in the perimeter soil/bentonite slurry wall was closed and the slurry wall is now continuous along the entire perimeter of the Weadock

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

Landfill. As a result of the change in groundwater flow conditions, the groundwater monitoring system was revised, as documented in the HMP. The monitoring well network now consists of eleven (11) downgradient monitoring wells and eight (8) groundwater-surface water (GSI) monitoring wells. The statistical evaluation of the first quarter 2021 assessment monitoring event data indicates that the following constituents are present at statistically significant levels above the GWPSs in downgradient monitoring wells at the Weadock Landfill:

Constituent	GWPS	#Downgradient Wells Observed
Boron	560 µg/L	10 of 12
Calcium	280 mg/L	1 of 12

New GWPS exceedances were noted for boron at JCW-MW-18001, JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and OW-57R OUT and calcium at MW-51. The new exceedances are the result of the addition of the Appendix III constituents to the assessment monitoring statistical evaluation program in accordance with the HMP. Corrective action has been triggered as a result of data collected during the initial assessment monitoring event. Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97 and execute the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

The statistical evaluation found that molybdenum was present at statistically significant levels exceeding the site-specific GSI criterion.

Statistical Evaluation Procedures

Following each quarterly sampling event, compliance well data for the Weadock Landfill are evaluated in accordance with the Assessment Monitoring Statistical Data Evaluation and GSI Data Evaluation procedures in the HMP. The assessment monitoring and GSI monitoring programs were developed to evaluate concentrations of constituents present in the uppermost aquifer relative to acceptable levels (i.e., GWPSs or GSI criteria). To evaluate whether or not a criteria exceedance is statistically significant, the difference in concentration observed at the downgradient wells during a given monitoring event compared to the applicable criterion must be large enough, after accounting for variability in the sample data, that the result is unlikely to have occurred merely by chance. Consistent with the Unified Guidance [2], the preferred method for comparisons to a fixed standard are confidence limits. Based on the number of historical observations in the representative sample population, the population mean, the population standard deviation, and a selected confidence level (i.e., 99 percent), an upper and lower confidence limit is calculated. The true concentration, with 99 percent confidence, will fall between the lower and upper confidence limits.

The concentrations observed in the downgradient wells are deemed to be a statistically significant exceedance when the 99 percent lower confidence limit of the downgradient data exceeds the criterion. If the confidence interval straddles the criterion (i.e. the lower confidence level is below the criterion, but the upper confidence level is above), the statistical test result indicates that there is insufficient

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

confidence that the measured concentrations are different from the criterion and thus no compelling evidence that the measured concentration is a result of a release from the CCR unit versus the inherent variability of the sample data. This statistical approach is consistent with the statistical methods for assessment monitoring presented in §257.93(f) and (g). Statistical evaluation methodologies built into the CCR Rule and Part 115, and numerous other federal rules, are key in determining whether or not individually measured data points represent a concentration increase over the baseline or a fixed standard (such as a GWPS in an assessment monitoring program).

For each detected constituent, the concentrations for each well were first compared directly to the GWPS, as shown on Table 1, or the GSI criteria, as shown on Table 2. Parameter-well combinations that included a direct exceedance of the criteria within the most recent two years of sampling events (eight quarterly sampling events, May 2019 to March 2021) were retained for further analysis. Data collected under the previous HMP is used where available.

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

The statistical data evaluation included the following steps:

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

The results of these evaluations are presented and discussed below.

Data from each round were evaluated for completeness, overall quality, and usability and were deemed appropriate for the purposes of the assessment and GSI monitoring programs. Initially, the results were observed visually for potential trends. No outliers were identified in the data set.

The Sanitas™ software was then used to test compliance at the downgradient monitoring wells using the confidence interval method for the most recent eight sampling events. The tests were run with a per-test significance of α = 0.01. Non-detect data was handled in accordance with the HMP for the

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

purposes of calculating the confidence intervals.

The Sanitas™ software generates an output that includes graphs of the parametric or non-parametric confidence intervals for each well along with notes data transformations, as appropriate.

Assessment Monitoring Statistical Evaluation

The assessment monitoring statistical evaluation is performed on the downgradient monitoring wells in accordance with the HMP. The downgradient monitoring wells include:

- JCW-MW-18001
- JCW-MW-18004
- JCW-MW-18005
- JCW-MW-18006
- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- OW-57R Out

The concentrations from each well were first compared directly to the GWPS, as shown on Table 1. Constituent-well combinations that included a direct exceedance of the GWPS within the past eight[4] monitoring events were retained for further analysis (Attachment 1). Direct comparison GWPS exceedances include the following constituent well combinations:

- Boron in MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, MW-55, OW-57R OUT, JCW-MW-18001, JCW-MW-18005, and JCW-MW-18006;
- Calcium in MW-50, MW-51, MW-53, JCW-MW-18001, JCW-MW-18004, and JCW-MW-18005;
- Sulfate in MW-50, MW-53, JCW-MW-18004, and JCW-MW-18005;
- Arsenic in MW-53R, MW-55, and JCW-MW-18006;
- Molybdenum in MW-55;
- Iron in MW-55; and,
- Vanadium in JCW-MW-18004.

The concentrations of arsenic and molybdenum at MW-55 are not a result of a release from the unit, as detailed in the *Alternate Source Demonstration* (TRC, December 2019); therefore, confidence intervals were not calculated.

The software outputs for the assessment monitoring data evaluation are included in Attachment 1 along with data reports showing the values used for the evaluation. The percentage of non-detect observations are also included in Attachment 1. Visual trends were apparent in multiple wells for boron, calcium, and sulfate.

The Sanitas™ software generates an output that includes graphs of the parametric or non-parametric confidence intervals for each well along with notes on data transformations, as appropriate. The data distributions are as follows:

[4] The past two years of available data (five events total) were used for constituents that were not previously included in quarterly monitoring for the Weadock Landfill, i.e. calcium, chloride, fluoride, total dissolved solids, beryllium, cadmium, cobalt, mercury, radium, thallium, nickel, and zinc. Use of the most recent two years of data ensure the timeframe for analysis is consistent with other constituents and is representative of current site conditions.

Distribution	Constituent-Well Combinations
Normal	Boron at JCW-MW-18001, JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, MW-55, and OW-57R OUT Calcium at JCW-MW-18001, JCW-MW-18004, JCW-MW-18005, and MW-53 Sulfate at JCW-MW-18004, JCW-MW-18005, and MW-53 Arsenic at JCW-MW-18006 and MW-53R Iron at MW-55
Normalized by square root transformation	Boron at MW-54R
Normalized by squared transformation	Sulfate at MW-50
Normalized by sixth power transformation	Calcium at MW-51
Non-Parametric (not able to be normalized)	Calcium at MW-50 Vanadium at JCW-MW-18004

The confidence interval test compares the lower confidence limit to the GWPS. Arsenic concentrations at JCW-MW-18006 were previously considered statistically significant; however arsenic concentrations appear to be decreasing and the lower confidence limit was below the GWPS in the first quarter 2021. Concentrations trends will continue to be monitored. New exceedances were noted for boron at JCW-MW-18001, JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and OW-57R OUT and calcium at MW-51. The new exceedances are the result of the addition of the Appendix III constituents to the assessment monitoring statistical evaluation program in accordance with the HMP. Corrective action has been triggered as a result of data collected during the initial May 2018 assessment monitoring event. Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97 and will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

GSI Statistical Evaluation

Eight monitoring wells located along the surface water features adjacent to the Weadock Landfill are included in the GSI monitoring program to meet the requirements of Part 31:

- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- JCW-MW-18004

The concentrations from each well were first compared directly to the GSI criteria, as shown on Table 2. Constituent-well combinations that included a direct exceedance of the GSI criteria within the past eight monitoring events were retained for further analysis (Attachment 2). Direct comparison GSI criteria exceedances include the following constituent well combinations:

- Sulfate in JCW-MW-18004;
- Arsenic in MW-55;

- Chromium in MW-54R and JCW-MW-18004; and
- Molybdenum in MW-55.

The software outputs for the assessment monitoring data evaluation are included in Attachment 2 along with data reports showing the values used for the evaluation. The percentage of non-detect observations are also included in Attachment 2. The Sanitas™ software generates an output that includes graphs of the parametric or non-parametric confidence intervals for each well along with notes on data transformations, as appropriate. The data distributions are as follows:

Distribution	Constituent-Well Combinations
Normal	Sulfate at JCW-MW-18004 Arsenic at MW-55 Molybdenum at MW-55
Non-Parametric (not able to be normalized)	Chromium at JCW-MW-18004 and MW-54R

The confidence interval test compares the lower confidence limit to the GSI. The statistical evaluation found that molybdenum was present at statistically significant levels exceeding the site-specific GSI criterion.

Attachments

Table 1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2019 to March 2021

Table 2 Comparison of Groundwater Sampling Results to GSI – May 2019 to March 2021

Attachment 1 Assessment Monitoring Sanitas™ Output Files

Attachment 2 GSI Evaluation Sanitas™ Output Files

Tables

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2019 to March 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-50											
		Sample Date:	5/15/2019	8/16/2019	10/10/2019(1)	10/10/2019(1)	3/9/2020	3/9/2020	5/19/2020	8/10/2020	8/10/2020	10/13/2020	3/8/2021	3/8/2021
Constituent	Unit	GWPS												
Appendix III								Field Dup			Field Dup			Field Dup
Boron	ug/L	**560**	**1,530**	**1,220**	**1,700**	**1,590**	**1,530**	**1,500**	**1,300**	**1,430**	**1,360**	**1,470**	**1,510**	**1,610**
Calcium	mg/L	**280**	--	--	280	--	--	--	**380**	**382**	**382**	**368**	**386**	**375**
Chloride	mg/L	2,300	--	--	80	--	--	--	80.5	78.5	79.9	77.5	86.5	85.6
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	372	**1,090**	660	677	**878**	**919**	**1,010**	**1,020**	**1,040**	**990**	**1,130**	**1,120**
Total Dissolved Solids	mg/L	4,700	--	--	1,400	--	--	--	1,710	2,270	2,820	1,950	2,360	2,380
pH, Field	SU	6.5 - 8.5	7.3	6.8	7.1	7.1	7.4	--	7.4	7.0	--	7.1	6.9	--
Appendix IV														
Antimony	ug/L	6.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	1	3	2.8	3	1	1	1	2	2	3	1	1
Barium	ug/L	2,000	212	204	180	182	218	223	163	150	153	147	116	115
Beryllium	ug/L	4.0	--	--	< 1.0	--	--	--	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	--	< 0.20	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1	1.4	< 1	1	< 1	< 1	< 1	< 1	< 1	1	1
Cobalt	ug/L	15	--	--	< 6.0	--	--	--	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	68	96	79	93	91	86	97	111	115	100	126	128
Mercury	ug/L	2.0	--	--	< 0.20	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	19	6.6	7	< 5	< 5	8	7	8	7	< 5	< 5
Radium-226	pCi/L	NA	--	--	0.572	--	--	--	0.512	--	--	< 0.537	--	--
Radium-228	pCi/L	NA	--	--	1.49	--	--	--	< 0.402	--	--	0.613	--	--
Radium-226/228	pCi/L	5.0	--	--	2.06	--	--	--	0.814	--	--	1.01	--	--
Selenium	ug/L	50	1	2	< 1.0	< 1	2	2	2	< 1	< 1	1	1	1
Thallium	ug/L	2.0	--	--	< 2.0	--	--	--	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters														
Copper	ug/L	1,000	1	3	< 1.0	1	3	2	3	3	7	3	4	4
Iron	ug/L	**28,000**	401	801	1,800	1,440	1,760	1,730	1,240	2,280	2,230	2,990	2,100	2,190
Nickel	ug/L	100	--	--	2.1	--	--	--	3	< 2	2	< 2	< 2	< 2
Silver	ug/L	34	< 0.2	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	--	< 10	--	--	--	< 10	< 30	< 30	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2019 to March 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-51												
		Sample Date:	5/15/2019	8/16/2019	10/10/2019(1)	10/10/2019(1)	10/10/2019(1)	10/10/2019(1)	3/9/2020	5/19/2020	5/19/2020	8/10/2020	10/14/2020	10/14/2020	3/8/2021
Constituent	Unit	GWPS													
Appendix III						Field Dup		Field Dup			Field Dup			Field Dup	
Boron	ug/L	**560**	**802**	**782**	**890**	**900**	**843**	**819**	**967**	**944**	**967**	**758**	**739**	**798**	**1,040**
Calcium	mg/L	**280**	--	--	**340**	**350**	--	--	--	**331**	**322**	**341**	**330**	**337**	**293**
Chloride	mg/L	2,300	--	--	88	88	--	--	--	93.8	94.2	95.2	74.2	75.4	91.2
Fluoride	ug/L	4,000	--	--	< 1,000	< 1,000	--	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	524	586	570	580	562	557	424	487	474	556	522	537	452
Total Dissolved Solids	mg/L	4,700	--	--	1,500	1,500	--	--	--	1,970	1,690	1,710	1,550	1,530	1,530
pH, Field	SU	6.5 - 8.5	6.9	7.0	6.7	--	6.7	--	7.4	7.4	--	6.8	6.8	--	7.0
Appendix IV															
Antimony	ug/L	6.0	< 1	< 1	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	12	17	20	19	18	19	14	12	12	12	17	17	11
Barium	ug/L	2,000	159	175	180	180	184	181	158	150	153	153	147	150	143
Beryllium	ug/L	4.0	--	--	< 1.0	< 1.0	--	--	--	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	--	< 0.20	< 0.20	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1	< 1.0	< 1.0	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	--	< 6.0	< 6.0	--	--	--	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	--	< 1,000	< 1,000	--	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	56	56	49	50	59	57	50	55	57	57	51	55	62
Mercury	ug/L	2.0	--	--	< 0.20	< 0.20				< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5.0	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	--	0.316	0.365	--	--	--	0.461	0.299	--	1.35	< 0.352	--
Radium-228	pCi/L	NA	--	--	1.68	1.26	--	--	--	0.719	0.745	--	< 0.588	0.776	--
Radium-226/228	pCi/L	5.0	--	--	1.99	1.63	--	--	--	1.18	1.04	--	1.43	1.11	--
Selenium	ug/L	50	< 1	1	< 1.0	< 1.0	< 1	< 1	1	1	< 1	< 1	< 1	< 1	1
Thallium	ug/L	2.0	--	--	< 2.0	< 2.0	--	--	--	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters															
Copper	ug/L	1,000	1	2	< 1.0	< 1.0	2	2	1	2	2	2	2	2	2
Iron	ug/L	**28,000**	2,960	4,740	6,700	6,800	5,270	5,250	2,050	2,830	2,750	4,390	5,400	5,600	1,940
Nickel	ug/L	100	--	--	< 2.0	< 2.0	--	--	--	2	< 2	2	< 2	< 2	< 2
Silver	ug/L	34	< 0.2	< 0.2	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	--	< 10	< 10	--	--	--	< 10	< 10	< 30	< 10	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2019 to March 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-52								
		Sample Date:	5/15/2019	8/15/2019	10/10/2019(1)	10/10/2019(1)	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021
Constituent	Unit	GWPS									
Appendix III											
Boron	ug/L	**560**	**1,010**	**1,010**	**1,200**	**1,150**	**1,150**	**1,160**	**1,200**	**1,110**	**1,120**
Calcium	mg/L	**280**	--	--	220	--	--	226	238	256	211
Chloride	mg/L	2,300	--	--	89	--	--	15.1	72.0	73.3	51.8
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	1,140	< 1,000
Sulfate	mg/L	**780**	512	567	520	506	412	< 1	586	572	531
Total Dissolved Solids	mg/L	4,700	--	--	1,200	--	--	1,800	1,500	1,540	1,390
pH, Field	SU	6.5 - 8.5	7.1	6.9	6.9	6.9	7.3	7.5	6.9	7.0	7.0
Appendix IV											
Antimony	ug/L	6.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	< 1	1	< 1.0	1	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	137	129	120	125	120	144	144	139	123
Beryllium	ug/L	4.0	--	--	< 1.0	--	--	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	--	< 6.0	--	--	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	1,140	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	32	38	30	38	28	32	38	33	31
Mercury	ug/L	2.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	--	0.252	--	--	< 0.241	--	0.744	--
Radium-228	pCi/L	NA	--	--	< 0.772	--	--	0.626	--	0.636	--
Radium-226/228	pCi/L	5.0	--	--	1.01	--	--	0.740	--	1.38	--
Selenium	ug/L	50	< 1	2	< 1.0	1	< 1	< 1	< 1	1	1
Thallium	ug/L	2.0	--	--	< 2.0	--	--	< 2	< 2	< 2	< 2
MI Part 115 Parameters											
Copper	ug/L	1,000	1	2	< 1.0	1	1	2	2	2	2
Iron	ug/L	**28,000**	1,370	5,530	5,600	4,350	782	1,140	2,720	4,770	879
Nickel	ug/L	100	--	--	< 2.0	--	--	< 2	< 2	< 2	< 2
Silver	ug/L	34	< 0.2	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	--	< 10	--	--	< 10	< 30	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2019 to March 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-53								
		Sample Date:	5/15/2019	8/15/2019	10/10/2019(1)	10/10/2019(1)	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021
Constituent	Unit	GWPS									
Appendix III											
Boron	ug/L	**560**	**2,020**	**1,810**	**900**	**840**	**2,530**	**1,750**	**2,760**	**2,720**	**3,920**
Calcium	mg/L	**280**	--	--	**420**	--	--	**308**	211	192	187
Chloride	mg/L	2,300	--	--	150	--	--	118	50.5	38.6	52.9
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	1,020	< 1,000
Sulfate	mg/L	**780**	457	653	**960**	**940**	278	549	321	269	317
Total Dissolved Solids	mg/L	4,700	--	--	2,100	--	--	1,660	1,200	1,030	1,110
pH, Field	SU	6.5 - 8.5	7.1	6.9	6.7	6.7	7.4	7.3	7.0	7.2	7.1
Appendix IV											
Antimony	ug/L	6.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	1	3	2.9	3	< 1	2	2	2	< 1
Barium	ug/L	2,000	139	114	77	80	129	144	130	131	202
Beryllium	ug/L	4.0	--	--	< 1.0	--	--	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1	< 1.0	< 1	< 1	6	< 1	< 1	< 1
Cobalt	ug/L	15	--	--	< 6.0	--	--	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	1,020	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	50	48	45	55	47	58	53	49	52
Mercury	ug/L	2.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	--	0.263	--	--	0.386	--	< 0.531	--
Radium-228	pCi/L	NA	--	--	< 0.750	--	--	< 0.385	--	0.503	--
Radium-226/228	pCi/L	5.0	--	--	0.962	--	--	0.725	--	0.823	--
Selenium	ug/L	50	< 1	2	< 1.0	< 1	1	2	< 1	< 1	< 1
Thallium	ug/L	2.0	--	--	< 2.0	--	--	< 2	< 2	< 2	< 2
MI Part 115 Parameters											
Copper	ug/L	1,000	< 1	2	< 1.0	2	2	4	1	2	2
Iron	ug/L	**28,000**	1,450	1,700	3,700	3,100	1,200	2,070	1,510	1,560	1,180
Nickel	ug/L	100	--	--	3.0	--	--	3	< 2	< 2	< 2
Silver	ug/L	34	< 0.2	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	--	< 10	--	--	< 10	< 30	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2019 to March 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-53R								
		Sample Date:	5/15/2019	8/15/2019	10/10/2019[1]	10/10/2019[1]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021
Constituent	Unit	GWPS									
Appendix III											
Boron	ug/L	**560**	**1,270**	**1,390**	**1,800**	**1,680**	**1,590**	**1,460**	**1,540**	**1,780**	**1,510**
Calcium	mg/L	**280**	--	--	250	--	--	228	239	246	234
Chloride	mg/L	2,300	--	--	46	--	--	30.7	45.0	31.8	32.5
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	190	264	240	295	163	177	275	196	227
Total Dissolved Solids	mg/L	4,700	--	--	1,100	--	--	1,470	1,220	1,100	1,140
pH, Field	SU	6.5 - 8.5	6.9	6.9	6.8	6.8	7.2	7.4	6.8	7.0	6.8
Appendix IV											
Antimony	ug/L	6.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**23**	**31**	**32**	**32**	19	**27**	**31**	**40**	19
Barium	ug/L	2,000	263	261	240	237	239	252	208	242	202
Beryllium	ug/L	4.0	--	--	< 1.0	--	--	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1	1.7	1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	--	< 6.0	--	--	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	52	66	61	69	53	60	71	66	64
Mercury	ug/L	2.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	--	0.552	--	--	0.356	--	--	--
Radium-228	pCi/L	NA	--	--	< 0.7	--	--	0.846	--	--	--
Radium-226/228	pCi/L	5.0	--	--	1.02	--	--	1.20	--	--	--
Selenium	ug/L	50	< 1	1	< 1.0	< 1	< 1	< 1	< 1	1	< 1
Thallium	ug/L	2.0	--	--	< 2.0	--	--	< 2	< 2	< 2	< 2
MI Part 115 Parameters											
Copper	ug/L	1,000	1	1	< 1.0	3	1	1	3	1	2
Iron	ug/L	**28,000**	968	1,930	2,600	2,050	881	1,910	2,020	2,140	971
Nickel	ug/L	100	--	--	< 2.0	--	--	< 2	< 2	< 2	< 2
Silver	ug/L	34	< 0.2	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	--	< 10	--	--	< 10	< 30	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2019 to March 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-54R								
		Sample Date:	5/15/2019	8/13/2019	10/10/2019[1]	10/10/2019[1]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021
Constituent	Unit	GWPS									
Appendix III											
Boron	ug/L	**560**	**1,290**	**1,760**	**1,500**	**1,470**	**1,280**	**1,730**	**1,660**	**1,660**	**2,470**
Calcium	mg/L	**280**	--	--	180	--	--	181	168	174	178
Chloride	mg/L	2,300	--	--	18	--	--	20.4	18.5	23.9	28.0
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	1,800	< 1,000
Sulfate	mg/L	**780**	159	174	130	131	86.2	95.7	96.2	100	79.9
Total Dissolved Solids	mg/L	4,700	--	--	710	--	--	755	743	743	763
pH, Field	SU	6.5 - 8.5	7.0	6.9	6.9	6.9	7.3	7.4	6.9	7.1	6.9
Appendix IV											
Antimony	ug/L	6.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	< 1	3	2.3	3	3	2	3	3	1
Barium	ug/L	2,000	82	28	88	93	87	95	104	103	118
Beryllium	ug/L	4.0	--	--	< 1.0	--	--	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	16	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	--	< 6.0	--	--	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	1,800	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	57	69	53	61	47	58	61	57	66
Mercury	ug/L	2.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	9	6.2	7	< 5	< 5	5	5	< 5
Radium-226	pCi/L	NA	--	--	0.328	--	--	< 0.192	--	< 0.334	--
Radium-228	pCi/L	NA	--	--	< 0.828	--	--	0.499	--	< 0.504	--
Radium-226/228	pCi/L	5.0	--	--	0.860	--	--	0.546	--	0.546	--
Selenium	ug/L	50	< 1	6	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2.0	--	--	< 2.0	--	--	< 2	< 2	< 2	< 2
MI Part 115 Parameters											
Copper	ug/L	1,000	1	2	< 1.0	1	< 1	1	< 1	1	1
Iron	ug/L	**28,000**	670	731	1,400	1,240	1,030	1,530	1,170	1,030	115
Nickel	ug/L	100	--	--	8.2	--	--	4	6	4	< 2
Silver	ug/L	34	< 0.2	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	--	< 10	--	--	< 10	< 30	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2019 to March 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-55								
		Sample Date:	5/16/2019	8/13/2019	10/11/2019(1)	10/11/2019(1)	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/9/2021
Constituent	Unit	GWPS									
Appendix III											
Boron	ug/L	**560**	**561**	**712**	**700**	**699**	481	441	**592**	**705**	**593**
Calcium	mg/L	**280**	--	--	190	--	--	188	178	170	151
Chloride	mg/L	2,300	--	--	19	--	--	14.6	16.7	18.0	16.7
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	1,220	< 1,000
Sulfate	mg/L	**780**	204	172	190	185	218	210	104	84.0	48.0
Total Dissolved Solids	mg/L	4,700	--	--	950	--	--	1,010	844	826	794
pH, Field	SU	6.5 - 8.5	7.0	7.0	6.9	6.9	7.5	7.6	7.1	7.2	7.1
Appendix IV											
Antimony	ug/L	6.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**41**	**75**	**76**	**83**	**65**	**85**	**107**	**123**	**152**
Barium	ug/L	2,000	233	283	250	263	215	223	250	223	366
Beryllium	ug/L	4.0	--	--	< 1.0	--	--	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	--	< 0.20	--	--	0.4	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	--	< 6.0	--	--	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	1,220	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	20	28	27	33	21	27	33	33	28
Mercury	ug/L	2.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	**113**	**216**	**190**	**202**	**181**	**214**	**207**	**179**	**166**
Radium-226	pCi/L	NA	--	--	0.409	--	--	0.448	--	< 0.447	--
Radium-228	pCi/L	NA	--	--	1.05	--	--	< 0.460	--	0.566	--
Radium-226/228	pCi/L	5.0	--	--	1.45	--	--	0.858	--	0.798	--
Selenium	ug/L	50	4	1	< 1.0	< 1	1	< 1	2	1	< 1
Thallium	ug/L	2.0	--	--	< 2.0	--	--	< 2	< 2	< 2	< 2
MI Part 115 Parameters											
Copper	ug/L	1,000	1	1	< 1.0	1	1	1	< 1	< 1	< 1
Iron	ug/L	**28,000**	13,900	22,900	**29,000**	21,600	18,000	22,000	21,300	21800	23,500
Nickel	ug/L	100	--	--	< 2.0	--	--	< 2	< 2	< 2	< 2
Silver	ug/L	34	< 0.2	< 0.2	< 0.20	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	--	< 10	--	--	< 10	< 30	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2019 to March 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	OW-57R OUT								
		Sample Date:	5/14/2019	8/15/2019	10/14/2019(1)	10/14/2019(1)	3/10/2020	5/20/2020	8/11/2020	10/14/2020	3/9/2021
Constituent	Unit	GWPS									
Appendix III											
Boron	ug/L	**560**	**1,390**	**1,490**	**1,700**	**1,740**	**1,720**	**1,600**	**1,510**	**1,730**	**1,660**
Calcium	mg/L	**280**	--	--	130	--	--	130	132	144	128
Chloride	mg/L	2,300	--	--	58	--	--	64.9	53.9	49.4	59.0
Fluoride	ug/L	4,000	--	--	1,100	--	--	< 1,000	< 1,000	1,830	< 1,000
Sulfate	mg/L	**780**	128	118	110	220	87.2	89.4	96.8	109	86.0
Total Dissolved Solids	mg/L	4,700	--	--	750	--	--	834	658	782	761
pH, Field	SU	6.5 - 8.5	7.0	6.9	6.8	6.8	7.4	7.5	7.0	7.1	7.2
Appendix IV											
Antimony	ug/L	6.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	2	1	1.7	2	1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	73	77	73	74	74	72	77	73	70
Beryllium	ug/L	4.0	--	--	< 1.0	--	--	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	6	5.4	10	2	2	1	1	1
Cobalt	ug/L	15	--	--	< 6.0	--	--	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	--	1,100	--	--	< 1,000	< 1,000	1,830	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	23	24	25	27	22	24	27	24	26
Mercury	ug/L	2.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	8	8	7.4	8	7	7	7	8	7
Radium-226	pCi/L	NA	--	--	0.195	--	--	< 0.305	--	< 0.324	--
Radium-228	pCi/L	NA	--	--	< 0.373	--	--	0.468	--	< 0.463	--
Radium-226/228	pCi/L	5.0	--	--	< 0.373	--	--	0.688	--	0.499	--
Selenium	ug/L	50	< 1	1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2.0	--	--	< 2.0	--	--	< 2	< 2	< 2	< 2
MI Part 115 Parameters											
Copper	ug/L	1,000	1	2	< 1.0	2	2	2	2	2	2
Iron	ug/L	**28,000**	185	82	280	320	294	135	42	92	46
Nickel	ug/L	100	--	--	20	--	--	16	16	14	15
Silver	ug/L	34	< 0.2	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	--	< 10	--	--	< 10	< 30	16	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2019 to March 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18001									
		Sample Date:	5/15/2019	5/15/2019	8/15/2019	10/10/2019(1)	10/10/2019(1)	3/9/2020	5/18/2020	8/10/2020	10/13/2020	3/8/2021
Constituent	Unit	GWPS										
Appendix III				Field Dup								
Boron	ug/L	**560**	**1,190**	**1,210**	**1,280**	**1,500**	**1,380**	**1,420**	**1,360**	**1,310**	**1,370**	**1,350**
Calcium	mg/L	**280**	--	--	--	170	--	--	232	237	**282**	270
Chloride	mg/L	2,300	--	--	--	58	--	--	71.5	70.8	73.8	72.1
Fluoride	ug/L	4,000	--	--	--	< 2,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	147	153	212	170	159	248	352	357	435	549
Total Dissolved Solids	mg/L	4,700	--	--	--	870	--	--	1330	1,370	1,370	1,610
pH, Field	SU	6.5 - 8.5	7.2	--	7.2	7.0	7.0	7.4	7.4	6.9	7.1	6.9
Appendix IV												
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	3	4	2	2.5	2	3	3	3	3	2
Barium	ug/L	2,000	202	201	223	220	218	257	252	261	273	213
Beryllium	ug/L	4.0	--	--	--	< 1.0	--	--	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	--	--	< 6.0	--	--	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	--	--	< 2,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	45	48	52	53	58	56	60	69	66	69
Mercury	ug/L	2.0	--	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	--	--	0.434	--	--	0.372	--	< 0.423	--
Radium-228	pCi/L	NA	--	--	--	< 0.715	--	--	0.385	--	0.616	--
Radium-226/228	pCi/L	5.0	--	--	--	1.07	--	--	0.757	--	1.03	--
Selenium	ug/L	50	< 1	1	1	< 1.0	< 1	1	< 1	< 1	< 1	< 1
Thallium	ug/L	2.0	--	--	--	< 2.0	--	--	< 2	< 2	< 2	< 2
MI Part 115 Parameters												
Copper	ug/L	1,000	1	1	1	< 1.0	< 1	1	1	1	1	2
Iron	ug/L	**28,000**	210	203	286	130	110	201	277	202	182	183
Nickel	ug/L	100	--	--	--	< 2.0	--	--	< 2	< 2	2	8
Silver	ug/L	34	< 0.2	< 0.4	< 0.2	< 0.20	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	--	--	< 10	--	--	< 10	< 30	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2019 to March 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18004								
		Sample Date:	5/14/2019	8/13/2019	10/15/2019(1)	10/15/2019(1)	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021
Constituent	Unit	GWPS									
Appendix III											
Boron	ug/L	**560**	238	344	430	479	274	265	347	410	232
Calcium	mg/L	**280**	--	--	270	--	--	**308**	**306**	**323**	252
Chloride	mg/L	2,300	--	--	39	--	--	10.9	25.6	22.6	17.9
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	714	**856**	**930**	**1,260**	714	361	718	756	581
Total Dissolved Solids	mg/L	4,700	--	--	1,800	--	--	1,720	1,820	1,690	1,390
pH, Field	SU	6.5 - 8.5	6.9	6.7	6.6	6.6	7.2	7.3	6.7	6.9	6.9
Appendix IV											
Antimony	ug/L	6.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	< 1	< 1	< 1.0	< 1	3	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	33	45	43	46	47	28	36	34	20
Beryllium	ug/L	4.0	--	--	< 1.0	--	--	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	54	< 1.0	< 1	49	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	--	< 6.0	--	--	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1.0	< 1	2	< 1	< 1	< 1	< 1
Lithium	ug/L	180	29	32	37	39	29	31	39	37	35
Mercury	ug/L	2.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	--	< 0.135	--	--	< 0.256	--	< 0.424	--
Radium-228	pCi/L	NA	--	--	< 0.495	--	--	< 0.368	--	1.04	--
Radium-226/228	pCi/L	5.0	--	--	< 0.495	--	--	< 0.368	--	0.922	--
Selenium	ug/L	50	8	1	< 1.0	< 1	1	1	< 1	< 1	7
Thallium	ug/L	2.0	--	--	< 2.0	--	--	< 2	< 2	< 2	< 2
MI Part 115 Parameters											
Copper	ug/L	1,000	1	7	< 1.0	3	5	3	2	3	3
Iron	ug/L	**28,000**	271	687	180	214	4,430	29	< 20	< 20	21
Nickel	ug/L	100	--	--	< 2.0	--	--	< 2	< 2	4	< 2
Silver	ug/L	34	< 0.2	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	3	< 2.0	< 2	**10**	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	--	< 10	--	--	< 10	< 30	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2019 to March 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18005								
		Sample Date:	5/14/2019	8/15/2019	10/11/2019[1]	10/11/2019[1]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/9/2021
Constituent	Unit	GWPS									
Appendix III											
Boron	ug/L	**560**	**1,250**	**1,310**	**1,700**	**1,480**	**1,230**	**1,150**	**1,100**	**1,090**	**987**
Calcium	mg/L	**280**	--	--	270	--	--	**419**	259	195	**286**
Chloride	mg/L	2,300	--	--	82	--	--	23.2	63.9	66.5	43.7
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	1,640	< 1,000
Sulfate	mg/L	**780**	**920**	533	470	476	**781**	**817**	398	185	535
Total Dissolved Solids	mg/L	4,700			1,300	--	--	1,950	1,310	986	1,420
pH, Field	SU	6.5 - 8.5	6.7	6.7	6.7	6.7	7.1	7.2	6.9	7.0	6.8
Appendix IV											
Antimony	ug/L	6.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	4	8	11	10	7	12	8	8	7
Barium	ug/L	2,000	153	196	180	171	140	141	87	98	135
Beryllium	ug/L	4.0	--	--	< 1.0	--	--	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	27	12	7	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	--	< 6.0	--	--	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	1,640	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	53	62	50	59	47	53	45	33	39
Mercury	ug/L	2.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	--	0.397	--	--	0.381	--	1.07	--
Radium-228	pCi/L	NA	--	--	< 0.635	--	--	0.457	--	0.540	--
Radium-226/228	pCi/L	5.0	--	--	0.698	--	--	0.838	--	1.61	--
Selenium	ug/L	50	2	2	< 1.0	< 1	1	1	< 1	< 1	< 1
Thallium	ug/L	2.0	--	--	< 2.0	--	--	< 2	< 2	< 2	< 2
MI Part 115 Parameters											
Copper	ug/L	1,000	1	3	< 1.0	1	2	3	2	1	2
Iron	ug/L	**28,000**	5,130	8,500	14,000	10,700	6,730	9,310	4,900	3,550	4,800
Nickel	ug/L	100	--	--	12	--	--	4	9	11	8
Silver	ug/L	34	< 0.2	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	--	< 10	--	--	< 10	< 30	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2019 to March 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18006								
		Sample Date:	5/16/2019	8/15/2019	10/14/2019(1)	10/14/2019(1)	3/11/2020	5/20/2020	8/11/2020	10/14/2020	3/9/2021
Constituent	Unit	GWPS									
Appendix III											
Boron	ug/L	**560**	**2,580**	**2,750**	**2,800**	**2,830**	**3,110**	**3,030**	**2,040**	**2,610**	**2,650**
Calcium	mg/L	**280**	--	--	170	--	--	179	148	167	148
Chloride	mg/L	2,300	--	--	97	--	--	71.2	76.1	72.2	66.1
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	115	103	100	205	86.2	94.5	31.2	50.1	57.3
Total Dissolved Solids	mg/L	4,700	--	--	910	--	--	988	820	861	823
pH, Field	SU	6.5 - 8.5	6.9	6.9	6.8	6.8	7.2	7.4	7.0	7.1	6.9
Appendix IV											
Antimony	ug/L	6.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**41**	**36**	**32**	**41**	**41**	**33**	12	**22**	**30**
Barium	ug/L	2,000	459	545	480	472	488	500	361	489	477
Beryllium	ug/L	4.0	--	--	< 1.0	--	--	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	2	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	--	< 6.0	--	--	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	--	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	69	73	72	77	65	70	41	59	58
Mercury	ug/L	2.0			< 0.20			< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	--	0.454	--	--	0.649	--	0.716	--
Radium-228	pCi/L	NA	--	--	0.500	--	--	0.346	--	0.853	--
Radium-226/228	pCi/L	5.0	--	--	0.954	--	--	0.995	--	1.57	--
Selenium	ug/L	50	1	1	< 1.0	1	1	< 1	< 1	< 1	< 1
Thallium	ug/L	2.0	--	--	< 2.0	--	--	< 2	< 2	< 2	< 2
MI Part 115 Parameters											
Copper	ug/L	1,000	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Iron	ug/L	**28,000**	7,760	8,170	9,900	8,400	7,060	7,280	3,360	5,760	5,730
Nickel	ug/L	100	--	--	4.7	--	--	4	2	< 2	3
Silver	ug/L	34	< 0.2	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	3	4	3.4	4	4	3	< 2	3	3
Zinc	ug/L	2,400	--	--	< 10	--	--	< 10	< 30	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – May 2019 to March 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-50											
					Sample Date:	5/15/2019	8/16/2019	10/10/2019(1)	10/10/2019(1)	3/9/2020	3/9/2020	5/19/2020	8/10/2020	8/10/2020	10/13/2020	3/8/2021	3/8/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**												
Appendix III											Field Dup			Field Dup			Field Dup
Boron	ug/L	4,000	44,000	69,000	44,000	1,530	1,220	1,700	1,590	1,530	1,500	1,300	1,430	1,360	1,470	1,510	1,610
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	372	1,090	660	677	878	919	1,010	1,020	1,040	990	1,130	1,120
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.3	6.8	7.1	7.1	7.4	--	7.4	7.0	--	7.1	6.9	--
Appendix IV																	
Arsenic	ug/L	10	100	680	**100**	1	3	2.8	3	1	1	1	2	2	3	1	1
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	< 1	1.4	< 1	1	< 1	< 1	< 1	< 1	< 1	1	1
Lithium	ug/L	440	NC	NC	440	68	96	79	93	91	86	97	111	115	100	126	128
Molybdenum	ug/L	120	NC	NC	**120**	< 5	19	6.6	7	< 5	< 5	8	7	8	7	< 5	< 5
Selenium	ug/L	50	55	120	55	1	2	< 1.0	< 1	2	2	2	< 1	< 1	1	1	1
MI Part 115 Parameters																	
Iron	ug/L	500,000[EE]	NC	NC	500,000	401	801	1,800	1,440	1,760	1,730	1,240	2,280	2,230	2,990	2,100	2,190
Vanadium	ug/L	27	NC	NC	27	< 2	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

NA - not applicable.

NC - no criteria.

-- - not analyzed.

^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.

* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.

** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.

[F] - Criterion is the Final Acute Value (FAV) .

[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.

[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

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

All metals were analyzed as total unless otherwise specified.

(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – May 2019 to March 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-51												
					Sample Date:	5/15/2019	8/16/2019	10/10/2019(1)	10/10/2019(1)	10/10/2019(1)	10/10/2019(1)	3/9/2020	5/19/2020	5/19/2020	8/10/2020	10/14/2020	10/14/2020	3/8/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**													
Appendix III									Field Dup		Field Dup			Field Dup			Field Dup	
Boron	ug/L	4,000	44,000	69,000	44,000	802	782	890	900	843	819	967	944	967	758	739	798	1,040
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	524	586	570	580	562	557	424	487	474	556	522	537	452
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.9	7.0	6.7	--	6.7	--	7.4	7.4	--	6.8	6.8	--	7.0
Appendix IV																		
Arsenic	ug/L	10	100	680	**100**	12	17	20	19	18	19	14	12	12	12	17	17	11
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	< 1	< 1.0	< 1.0	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	56	56	49	50	59	57	50	55	57	57	51	55	62
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5.0	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	< 1	1	< 1.0	< 1.0	< 1	< 1	1	1	< 1	< 1	< 1	< 1	1
MI Part 115 Parameters																		
Iron	ug/L	500,000[EE]	NC	NC	500,000	2,960	4,740	6,700	6,800	5,270	5,250	2,050	2,830	2,750	4,390	5,400	5,600	1,940
Vanadium	ug/L	27	NC	NC	27	< 2	< 2	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

NA - not applicable.

NC - no criteria.

-- - not analyzed.

^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.

* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.

** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.

[F] - Criterion is the Final Acute Value (FAV) .

[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.

[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

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

All metals were analyzed as total unless otherwise specified.

(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – May 2019 to March 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-52								
					Sample Date:	5/15/2019	8/15/2019	10/10/2019(1)	10/10/2019(1)	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III														
Boron	ug/L	4,000	44,000	69,000	44,000	1,010	1,010	1,200	1,150	1,150	1,160	1,200	1,110	1,120
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	512	567	520	506	412	< 1	586	572	531
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.1	6.9	6.9	6.9	7.3	7.5	6.9	7.0	7.0
Appendix IV														
Arsenic	ug/L	10	100	680	**100**	< 1	1	< 1.0	1	< 1	< 1	< 1	< 1	< 1
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	32	38	30	38	28	32	38	33	31
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	< 1	2	< 1.0	1	< 1	< 1	< 1	1	1
MI Part 115 Parameters														
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,370	5,530	5,600	4,350	782	1,140	2,720	4,770	879
Vanadium	ug/L	27	NC	NC	27	< 2	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

NA - not applicable.

NC - no criteria.

-- - not analyzed.

^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.

* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.

** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.

[F] - Criterion is the Final Acute Value (FAV) .

[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.

[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

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

All metals were analyzed as total unless otherwise specified.

(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – May 2019 to March 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-53								
					Sample Date:	5/15/2019	8/15/2019	10/10/2019(1)	10/10/2019(1)	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III														
Boron	ug/L	4,000	44,000	69,000	44,000	2,020	1,810	900	840	2,530	1,750	2,760	2,720	3,920
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	457	653	960	940	278	549	321	269	317
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.1	6.9	6.7	6.7	7.4	7.3	7.0	7.2	7.1
Appendix IV														
Arsenic	ug/L	10	100	680	**100**	1	3	2.9	3	< 1	2	2	2	< 1
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	< 1	< 1.0	< 1	< 1	6	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	50	48	45	55	47	58	53	49	52
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	< 1	2	< 1.0	< 1	1	2	< 1	< 1	< 1
MI Part 115 Parameters														
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,450	1,700	3,700	3,100	1,200	2,070	1,510	1,560	1,180
Vanadium	ug/L	27	NC	NC	27	< 2	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

NA - not applicable.

NC - no criteria.

-- - not analyzed.

^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.

* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.

** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.

[F] - Criterion is the Final Acute Value (FAV) .

[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.

[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

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

All metals were analyzed as total unless otherwise specified.

(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – May 2019 to March 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-53R								
					Sample Date:	5/15/2019	8/15/2019	10/10/2019(1)	10/10/2019(1)	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III														
Boron	ug/L	4,000	44,000	69,000	44,000	1,270	1,390	1,800	1,680	1,590	1,460	1,540	1,780	1,510
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	190	264	240	295	163	177	275	196	227
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.9	6.9	6.8	6.8	7.2	7.4	6.8	7.0	6.8
Appendix IV														
Arsenic	ug/L	10	100	680	**100**	23	31	32	32	19	27	31	40	19
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	< 1	1.7	1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	52	66	61	69	53	60	71	66	64
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	< 1	1	< 1.0	< 1	< 1	< 1	< 1	1	< 1
MI Part 115 Parameters														
Iron	ug/L	500,000[EE]	NC	NC	500,000	968	1,930	2,600	2,050	881	1,910	2,020	2,140	971
Vanadium	ug/L	27	NC	NC	27	< 2	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – May 2019 to March 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-54R								
					Sample Date:	5/15/2019	8/13/2019	10/10/2019(1)	10/10/2019(1)	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III														
Boron	ug/L	4,000	44,000	69,000	44,000	1,290	1,760	1,500	1,470	1,280	1,730	1,660	1,660	2,470
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	159	174	130	131	86.2	95.7	96.2	100	79.9
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.0	6.9	6.9	6.9	7.3	7.4	6.9	7.1	6.9
Appendix IV														
Arsenic	ug/L	10	100	680	**100**	< 1	3	2.3	3	3	2	3	3	1
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	**16**	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	57	69	53	61	47	58	61	57	66
Molybdenum	ug/L	120	NC	NC	**120**	< 5	9	6.2	7	< 5	< 5	5	5	< 5
Selenium	ug/L	50	55	120	55	< 1	6	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
MI Part 115 Parameters														
Iron	ug/L	500,000[EE]	NC	NC	500,000	670	731	1,400	1,240	1,030	1,530	1,170	1,030	115
Vanadium	ug/L	27	NC	NC	27	< 2	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – May 2019 to March 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-55								
					Sample Date:	5/16/2019	8/13/2019	10/11/2019(1)	10/11/2019(1)	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/9/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III														
Boron	ug/L	4,000	44,000	69,000	44,000	561	712	700	699	481	441	592	705	593
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	204	172	190	185	218	210	104	84.0	48.0
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.0	7.0	6.9	6.9	7.5	7.6	7.1	7.2	7.1
Appendix IV														
Arsenic	ug/L	10	100	680	**100**	41	75	76	83	65	85	**107**	**123**	**152**
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	20	28	27	33	21	27	33	33	28
Molybdenum	ug/L	120	NC	NC	**120**	113	**216**	**190**	**202**	**181**	**214**	**207**	**179**	**166**
Selenium	ug/L	50	55	120	55	4	1	< 1.0	< 1	1	< 1	2	1	< 1
MI Part 115 Parameters														
Iron	ug/L	500,000[EE]	NC	NC	500,000	13,900	22,900	29,000	21,600	18,000	22,000	21,300	21,800	23,500
Vanadium	ug/L	27	NC	NC	27	< 2	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

NA - not applicable.

NC - no criteria.

-- - not analyzed.

^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.

* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.

** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.

[F] - Criterion is the Final Acute Value (FAV) .

[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.

[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

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

All metals were analyzed as total unless otherwise specified.

(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – May 2019 to March 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	JCW-MW-18004								
					Sample Date:	5/14/2019	8/13/2019	10/15/2019(1)	10/15/2019(1)	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III														
Boron	ug/L	4,000	44,000	69,000	44,000	238	344	430	479	274	265	347	410	232
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	714	856	930	**1,260**	714	361	718	756	581
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.9	6.7	6.6	6.6	7.2	7.3	6.7	6.9	6.9
Appendix IV														
Arsenic	ug/L	10	100	680	**100**	< 1	< 1	< 1.0	< 1	3	< 1	< 1	< 1	< 1
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	**54**	< 1.0	< 1	**49**	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	29	32	37	39	29	31	39	37	35
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	8	1	< 1.0	< 1	1	1	< 1	< 1	7
MI Part 115 Parameters														
Iron	ug/L	500,000[EE]	NC	NC	500,000	271	687	180	214	4,430	29	< 20	< 20	21
Vanadium	ug/L	27	NC	NC	27	< 2	3	< 2.0	< 2	10	< 2	< 2	< 2	< 2

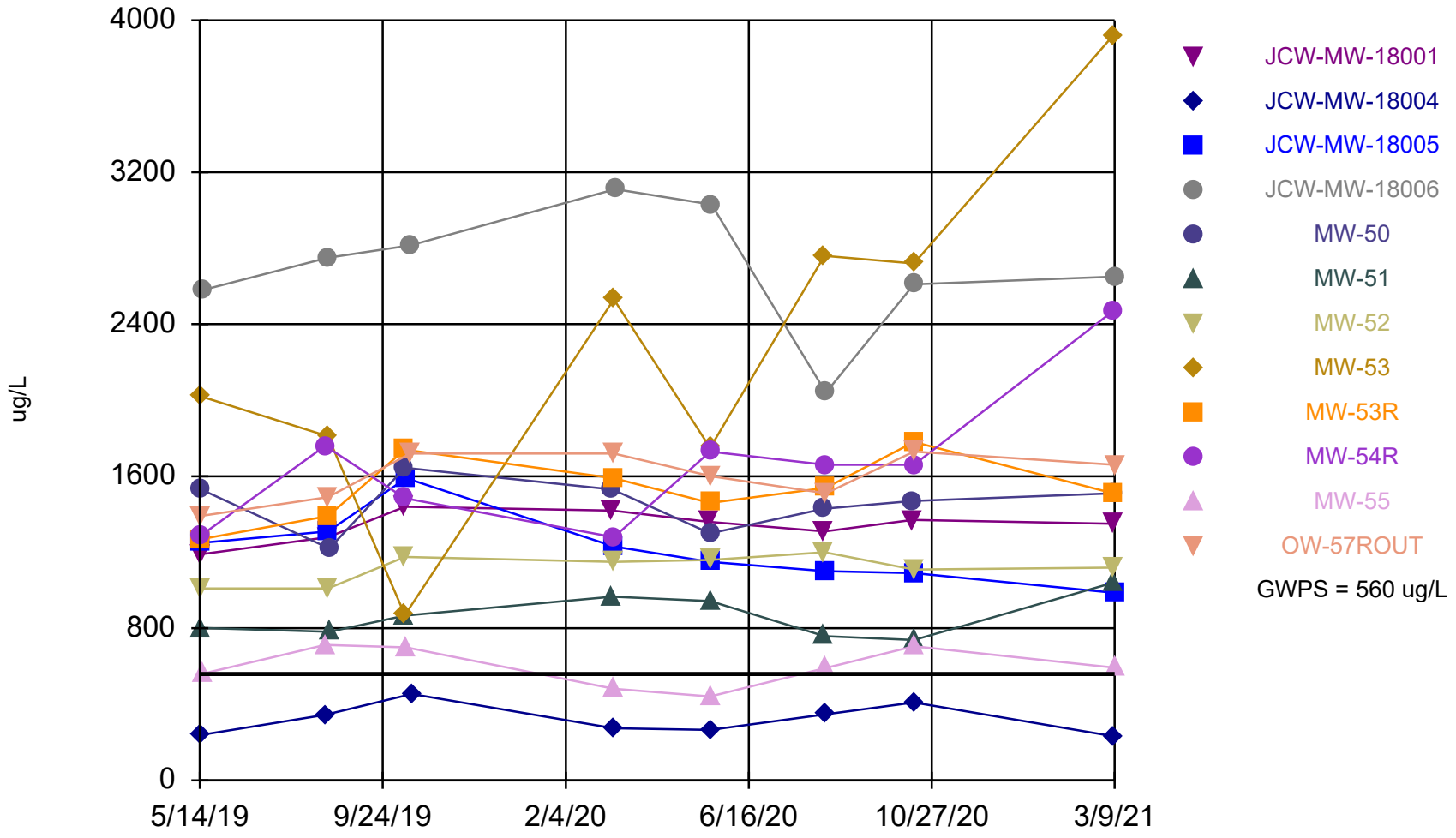
Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(1) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Attachment 1
Assessment Monitoring Sanitas™ Output Files

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

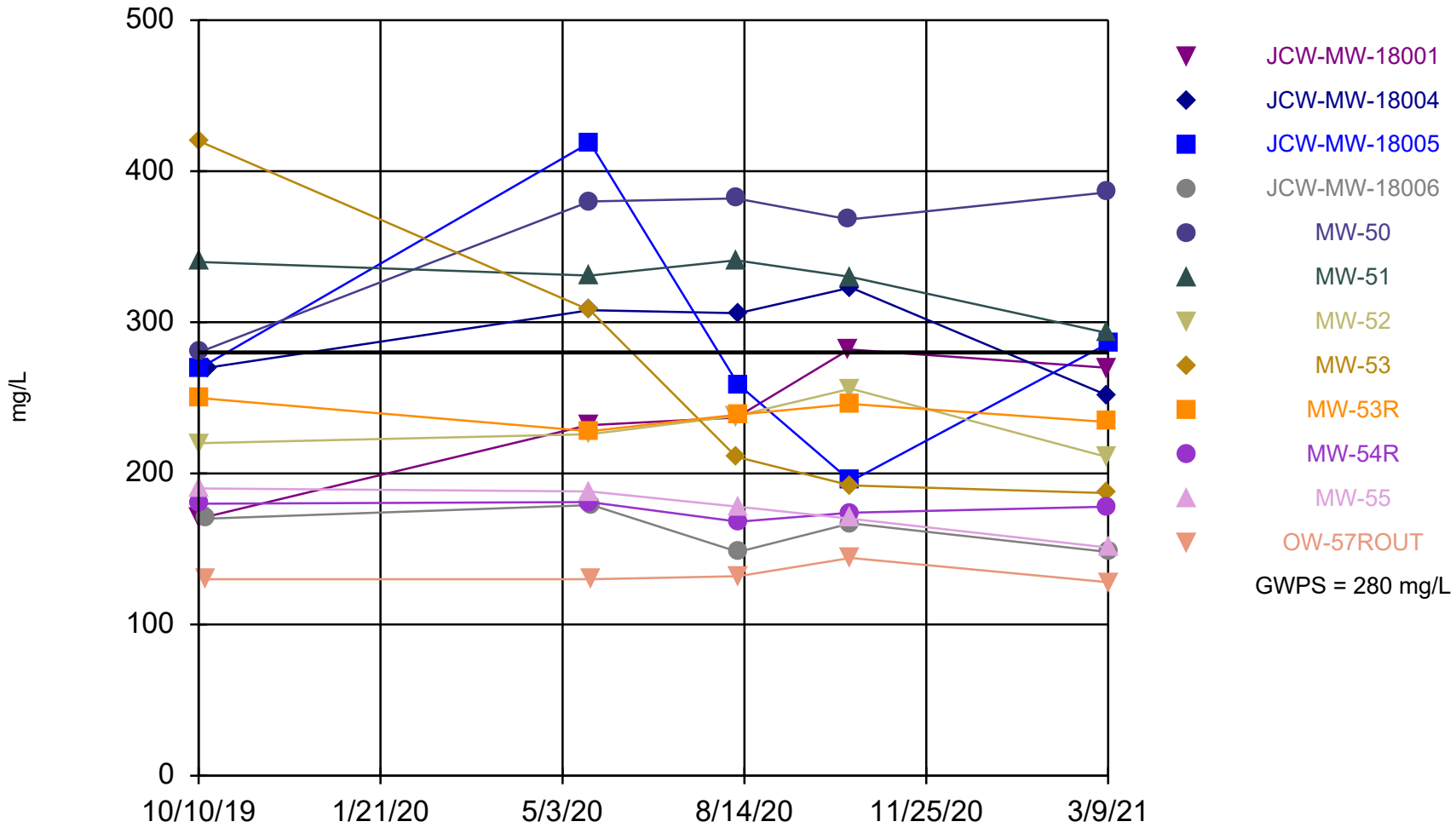


Time Series Analysis Run 4/12/2021 4:02 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

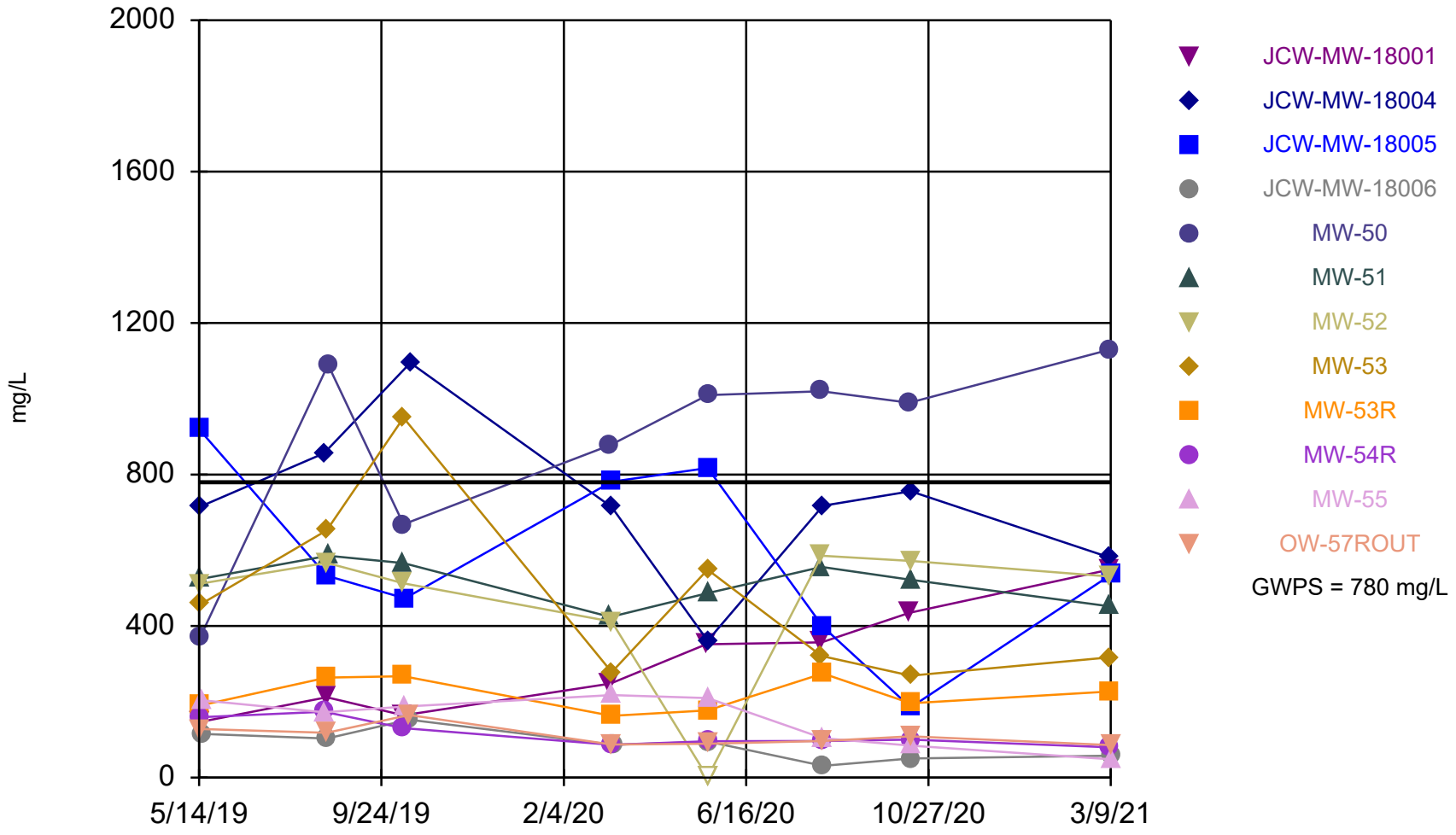


Time Series Analysis Run 4/12/2021 4:04 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Sulfate

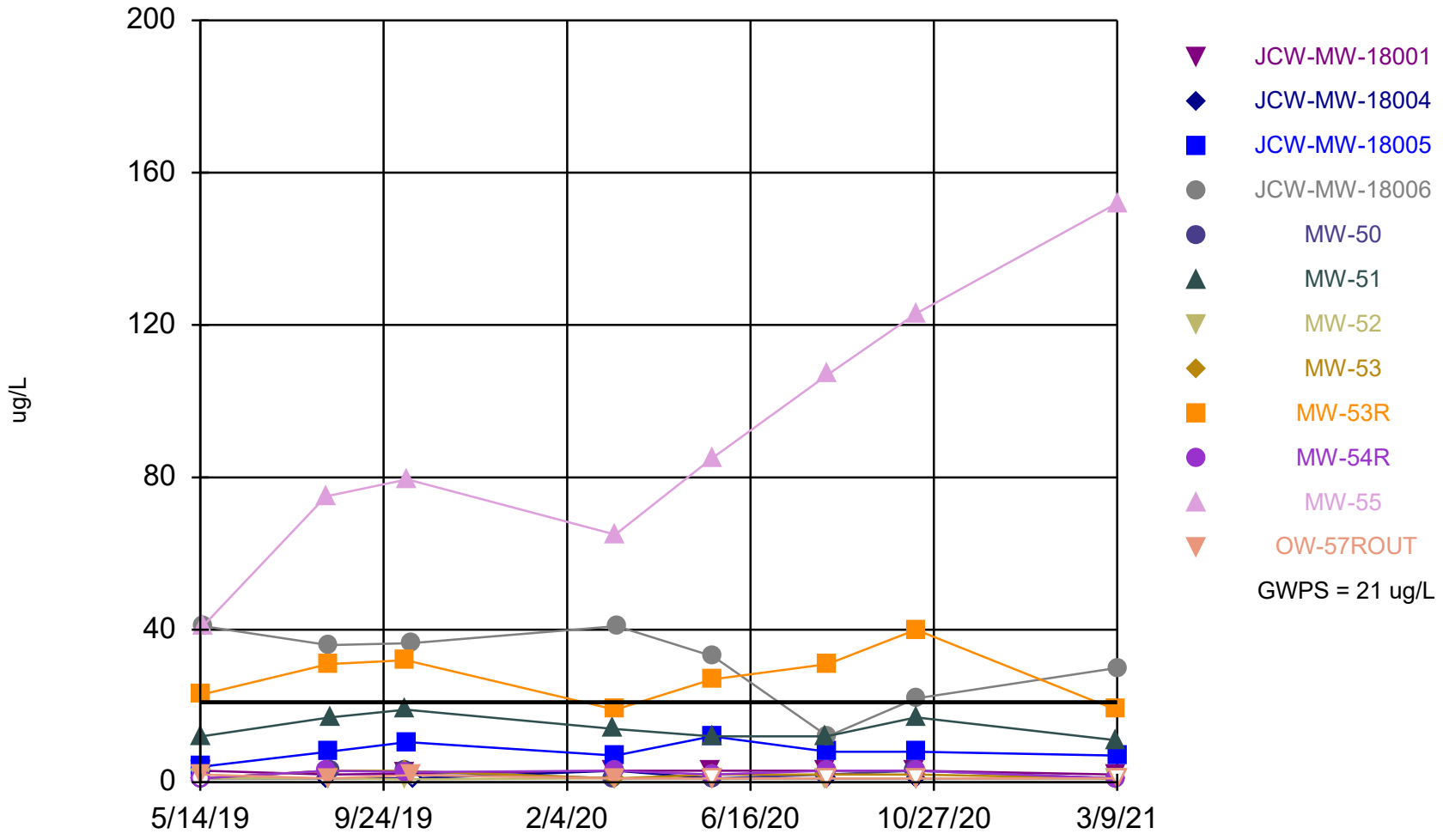


Time Series Analysis Run 4/12/2021 4:04 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Arsenic, Total

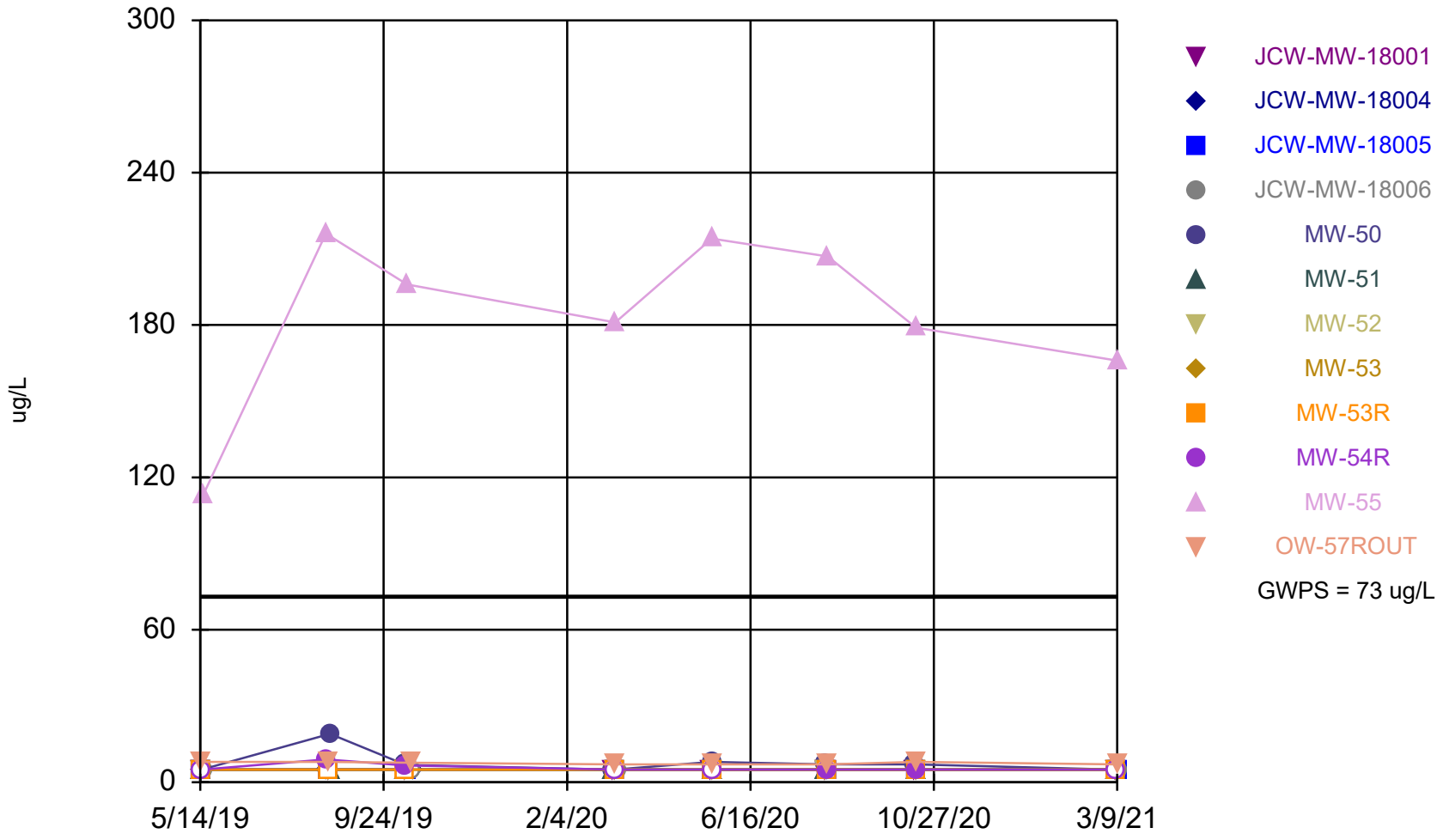


Time Series Analysis Run 4/12/2021 4:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Molybdenum, Total

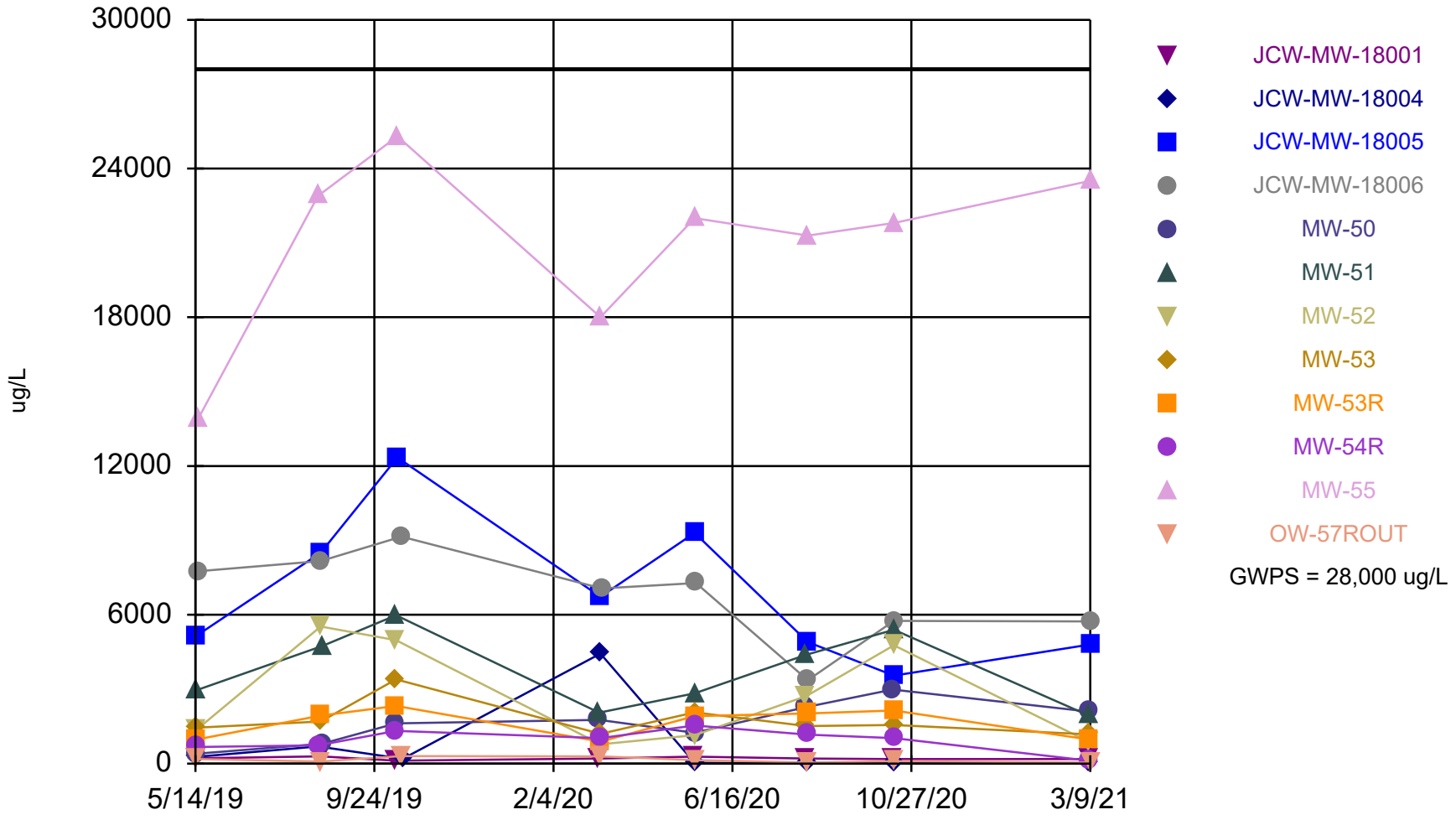


Time Series Analysis Run 4/12/2021 4:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

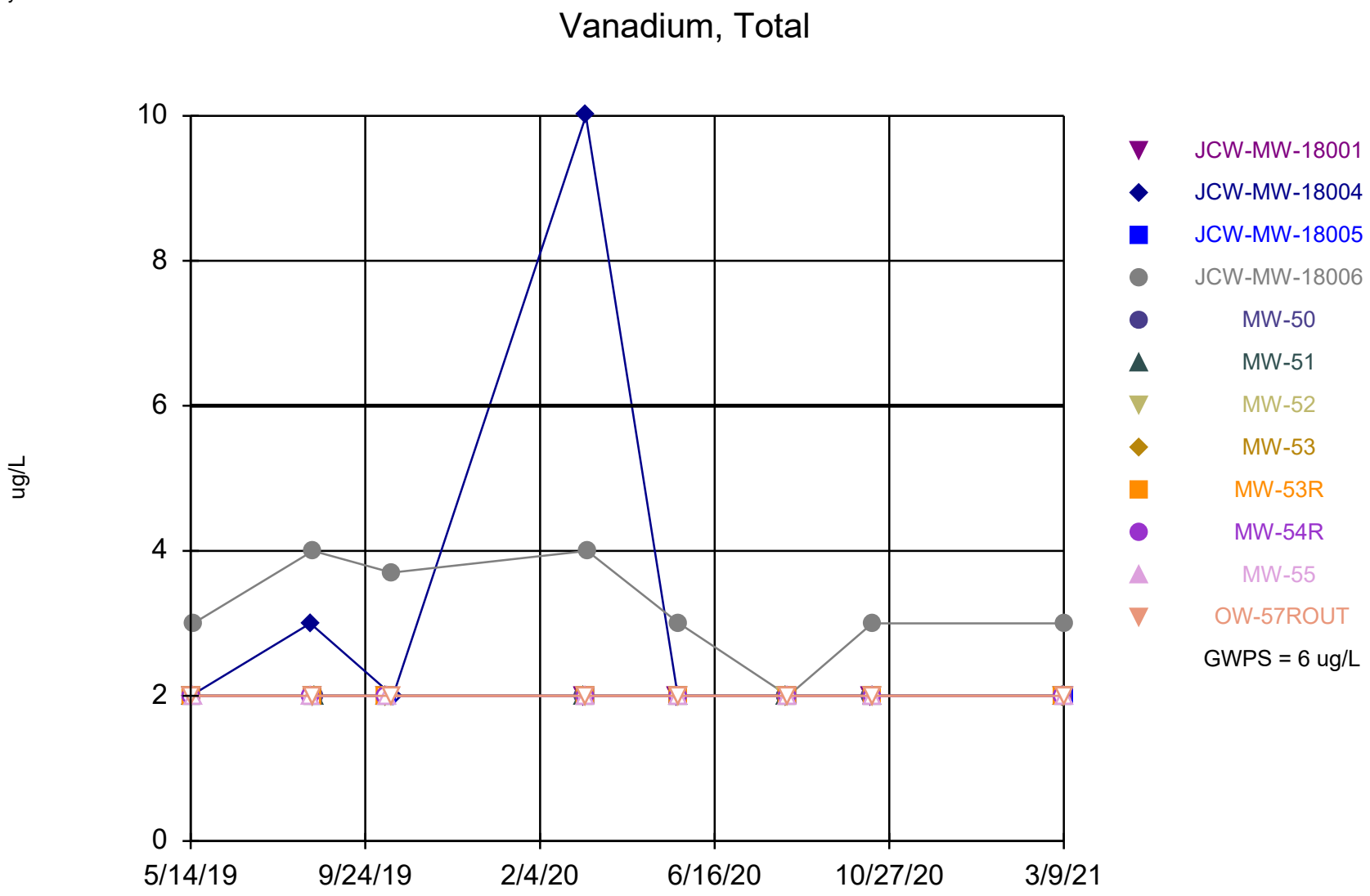
Iron, Total



Time Series Analysis Run 4/12/2021 4:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.



Time Series Analysis Run 4/12/2021 4:07 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Summary Report

Constituent: Boron, Total Analysis Run 4/12/2021 4:09 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 5/14/2019 and 3/9/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 0
Wells = 12
Minimum Value = 232
Maximum Value = 3920
Mean Value = 1392
Median Value = 1330
Standard Deviation = 704.5
Coefficient of Variation = 0.5061
Skewness = 0.8821

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	1190	1440	1340	1355	80	0.0597	-0.6174
JCW-MW-18004	8	0	232	454.5	320.6	309	82.03	0.2559	0.4481
JCW-MW-18005	8	0	987	1590	1213	1190	183.7	0.1514	0.9659
JCW-MW-18006	8	0	2040	3110	2698	2700	328	0.1216	-0.7758
MW-50	8	0	1220	1645	1454	1490	136.5	0.09387	-0.5162
MW-51	8	0	739	1040	862.3	834.3	110.5	0.1281	0.4029
MW-52	8	0	1010	1200	1117	1135	71.86	0.06434	-0.6398
MW-53	8	0	870	3920	2298	2275	904.8	0.3938	0.2573
MW-53R	8	0	1270	1780	1535	1525	170.1	0.1108	0.04317
MW-54R	8	0	1280	2470	1667	1660	374.7	0.2248	1.166
MW-55	8	0	441	712	598.1	592.5	103.2	0.1725	-0.2481
OW-57ROUT	8	0	1390	1730	1603	1630	127.4	0.07948	-0.466

Summary Report

Constituent: Calcium, Total Analysis Run 4/12/2021 4:09 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 10/10/2019 and 3/9/2021, a summary of the selected data set:

Observations = 60
ND/Trace = 0
Wells = 12
Minimum Value = 128
Maximum Value = 420
Mean Value = 240.2
Median Value = 233
Standard Deviation = 77.71
Coefficient of Variation = 0.3236
Skewness = 0.5584

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	5	0	170	282	238.2	237	43.65	0.1832	-0.6765
JCW-MW-18004	5	0	252	323	291.8	306	29.57	0.1013	-0.3884
JCW-MW-18005	5	0	195	419	285.8	270	82.09	0.2872	0.8041
JCW-MW-18006	5	0	148	179	162.4	167	13.87	0.08539	-0.09028
MW-50	5	0	280	386	359.2	380	44.78	0.1247	-1.419
MW-51	5	0	293	341	327	331	19.66	0.06012	-1.261
MW-52	5	0	211	256	230.2	226	17.44	0.07577	0.497
MW-53	5	0	187	420	263.6	211	100.2	0.3803	0.8189
MW-53R	5	0	228	250	239.4	239	8.877	0.03708	-0.06416
MW-54R	5	0	168	181	176.2	178	5.31	0.03014	-0.7293
MW-55	5	0	151	190	175.4	178	15.84	0.09029	-0.6724
OW-57ROUT	5	0	128	144	132.8	130	6.419	0.04833	1.321

Summary Report

Constituent: Sulfate Analysis Run 4/12/2021 4:09 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 5/14/2019 and 3/9/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 1
Wells = 12
Minimum Value = 1
Maximum Value = 1130
Mean Value = 386.9
Median Value = 297.5
Standard Deviation = 294
Coefficient of Variation = 0.76
Skewness = 0.8137

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	147	549	308.1	300	140.3	0.4556	0.4416
JCW-MW-18004	8	0	361	1095	724.4	716	209.9	0.2898	0.03782
JCW-MW-18005	8	0	185	920	580.3	534	244.1	0.4206	-0.0909
JCW-MW-18006	8	0	31.2	152.5	86.23	90.35	39.17	0.4543	0.2091
MW-50	8	0	372	1130	894.8	1000	255.3	0.2853	-1.19
MW-51	8	0	424	586	514.6	523	56.68	0.1101	-0.3689
MW-52	8	1	1	586	461.8	522	194	0.4201	-1.944
MW-53	8	0	269	950	474.3	389	237	0.4996	1.034
MW-53R	8	0	163	275	219.9	211.5	44.47	0.2022	0.09753
MW-54R	8	0	79.9	174	115.2	98.1	35.19	0.3055	0.7186
MW-55	8	0	48	218	153.4	179.8	65.26	0.4253	-0.5509
OW-57ROUT	8	0	86	165	109.9	102.9	27.01	0.2458	1.062

Summary Report

Constituent: Arsenic, Total Analysis Run 4/12/2021 4:09 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 5/14/2019 and 3/9/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 20
Wells = 12
Minimum Value = 1
Maximum Value = 152
Mean Value = 15.39
Median Value = 3
Standard Deviation = 27.07
Coefficient of Variation = 1.759
Skewness = 2.911

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	2	3	2.656	3	0.4807	0.181	-0.5903
JCW-MW-18004	8	7	1	3	1.25	1	0.7071	0.5657	2.268
JCW-MW-18005	8	0	4	12	8.063	8	2.397	0.2973	0.06745
JCW-MW-18006	8	0	12	41	31.44	34.5	10.01	0.3183	-0.9469
MW-50	8	0	1	3	1.863	1.5	0.9753	0.5237	0.2463
MW-51	8	0	11	19	14.25	13	3.012	0.2114	0.4486
MW-52	8	6	1	1	1	1	0	0	NaN
MW-53	8	2	1	3	1.869	2	0.825	0.4415	0.2044
MW-53R	8	0	19	40	27.75	29	7.226	0.2604	0.2171
MW-54R	8	1	1	3	2.331	2.825	0.89	0.3818	-0.7639
MW-55	8	0	41	152	90.94	82.25	35.05	0.3855	0.415
OW-57ROUT	8	4	1	2	1.231	1	0.4301	0.3493	1.185

Summary Report

Constituent: Molybdenum, Total Analysis Run 4/12/2021 4:09 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 5/14/2019 and 3/9/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 71
Wells = 12
Minimum Value = 5
Maximum Value = 216
Mean Value = 20.42
Median Value = 5
Standard Deviation = 50.45
Coefficient of Variation = 2.471
Skewness = 3.161

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	8	5	5	5	5	0	0	NaN
JCW-MW-18004	8	8	5	5	5	5	0	0	NaN
JCW-MW-18005	8	8	5	5	5	5	0	0	NaN
JCW-MW-18006	8	8	5	5	5	5	0	0	NaN
MW-50	8	3	5	19	7.85	6.9	4.649	0.5922	1.998
MW-51	8	8	5	5	5	5	0	0	NaN
MW-52	8	8	5	5	5	5	0	0	NaN
MW-53	8	8	5	5	5	5	0	0	NaN
MW-53R	8	8	5	5	5	5	0	0	NaN
MW-54R	8	4	5	9	5.7	5	1.446	0.2537	1.747
MW-55	8	0	113	216	184	188.5	33.8	0.1837	-1.148
OW-57ROUT	8	0	7	8	7.463	7.35	0.5041	0.06755	0.09959

Summary Report

Constituent: Iron, Total Analysis Run 4/12/2021 4:09 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 5/14/2019 and 3/9/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 2
Wells = 12
Minimum Value = 20
Maximum Value = 25300
Mean Value = 4034
Median Value = 1730
Standard Deviation = 5848
Coefficient of Variation = 1.45
Skewness = 2.277

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	120	286	207.6	201.5	53.42	0.2573	0.1105
JCW-MW-18004	8	2	20	4430	709.4	113	1521	2.144	2.171
JCW-MW-18005	8	0	3550	12350	6909	5930	2949	0.4268	0.7027
JCW-MW-18006	8	0	3360	9150	6784	7170	1800	0.2653	-0.665
MW-50	8	0	401	2990	1649	1690	833	0.5051	0.03536
MW-51	8	0	1940	5985	3787	3675	1546	0.4083	0.1208
MW-52	8	0	782	5530	2771	2045	2022	0.7299	0.3322
MW-53	8	0	1180	3400	1759	1535	720.9	0.4099	1.643
MW-53R	8	0	881	2325	1643	1920	597.1	0.3634	-0.3717
MW-54R	8	0	115	1530	949.5	1030	440.5	0.4639	-0.6347
MW-55	8	0	13900	25300	21088	21900	3574	0.1695	-1.02
OW-57ROUT	8	0	42	300	147	113.5	103.6	0.7045	0.575

Summary Report

Constituent: Vanadium, Total Analysis Run 4/12/2021 4:09 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

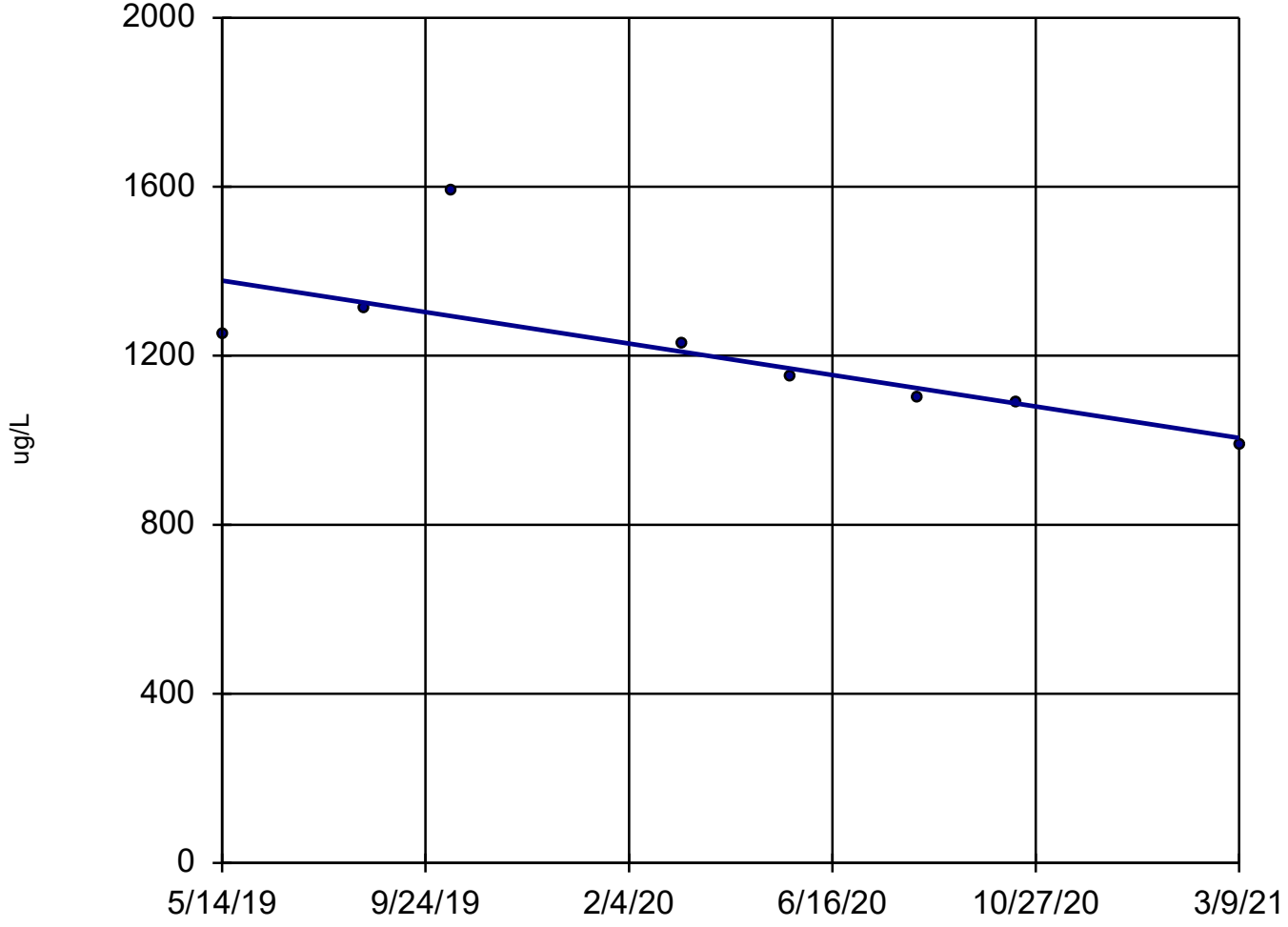
For observations made between 5/14/2019 and 3/9/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 87
Wells = 12
Minimum Value = 2
Maximum Value = 10
Mean Value = 2.195
Median Value = 2
Standard Deviation = 0.8959
Coefficient of Variation = 0.4082
Skewness = 7.25

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	8	2	2	2	2	0	0	NaN
JCW-MW-18004	8	6	2	10	3.125	2	2.8	0.896	2.202
JCW-MW-18005	8	8	2	2	2	2	0	0	NaN
JCW-MW-18006	8	1	2	4	3.213	3	0.6686	0.2081	-0.3722
MW-50	8	8	2	2	2	2	0	0	NaN
MW-51	8	8	2	2	2	2	0	0	NaN
MW-52	8	8	2	2	2	2	0	0	NaN
MW-53	8	8	2	2	2	2	0	0	NaN
MW-53R	8	8	2	2	2	2	0	0	NaN
MW-54R	8	8	2	2	2	2	0	0	NaN
MW-55	8	8	2	2	2	2	0	0	NaN
OW-57ROUT	8	8	2	2	2	2	0	0	NaN

Boron, Total

JCW-MW-18005



n = 8

Slope = -204.2 units per year.

Mann-Kendall statistic = -22
critical = -20

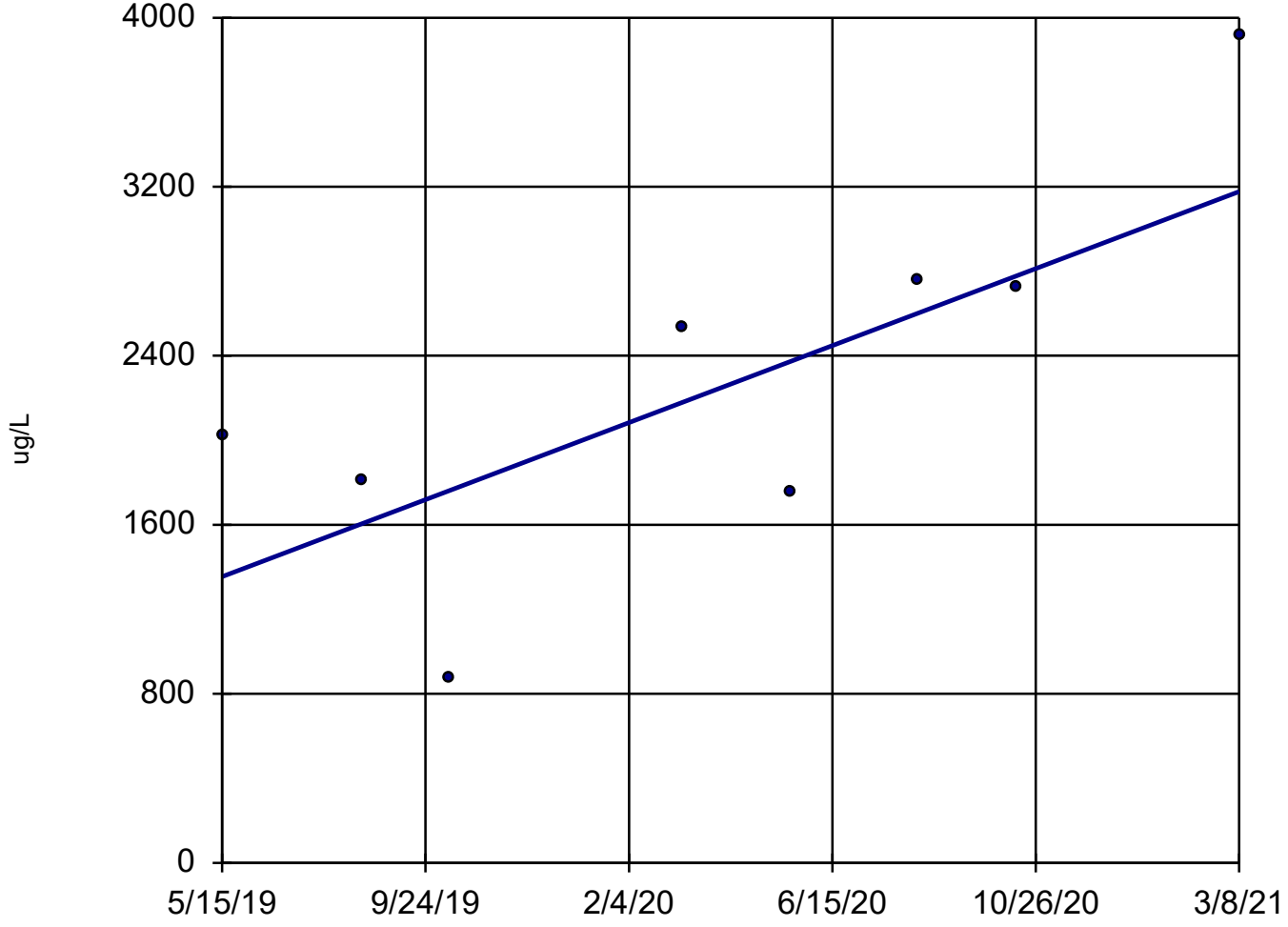
Decreasing trend significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Boron, Total

MW-53



n = 8

Slope = 1003 units per year.

Mann-Kendall statistic = 14 critical = 20

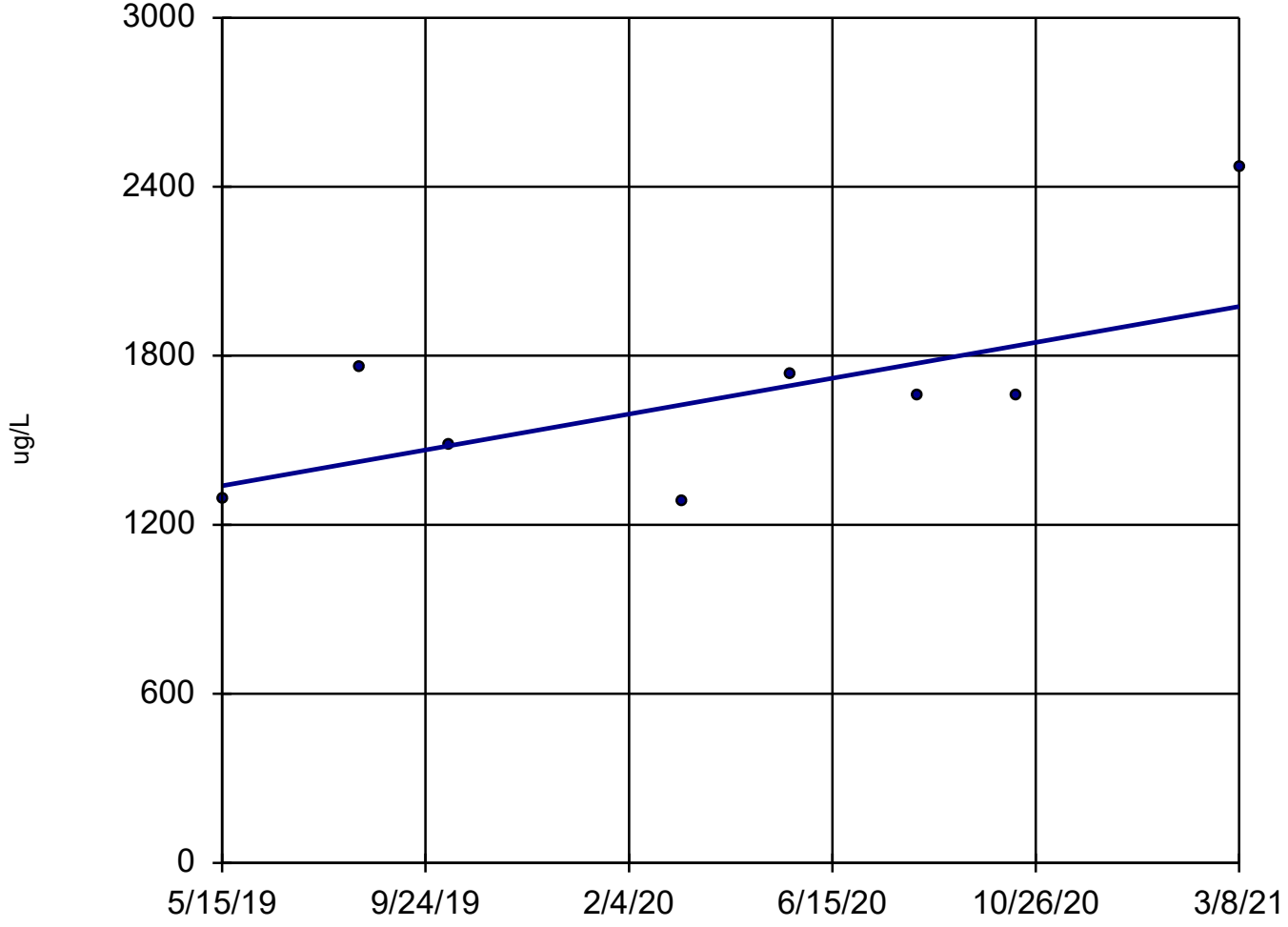
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Boron, Total

MW-54R



n = 8

Slope = 350.1 units per year.

Mann-Kendall statistic = 9
critical = 20

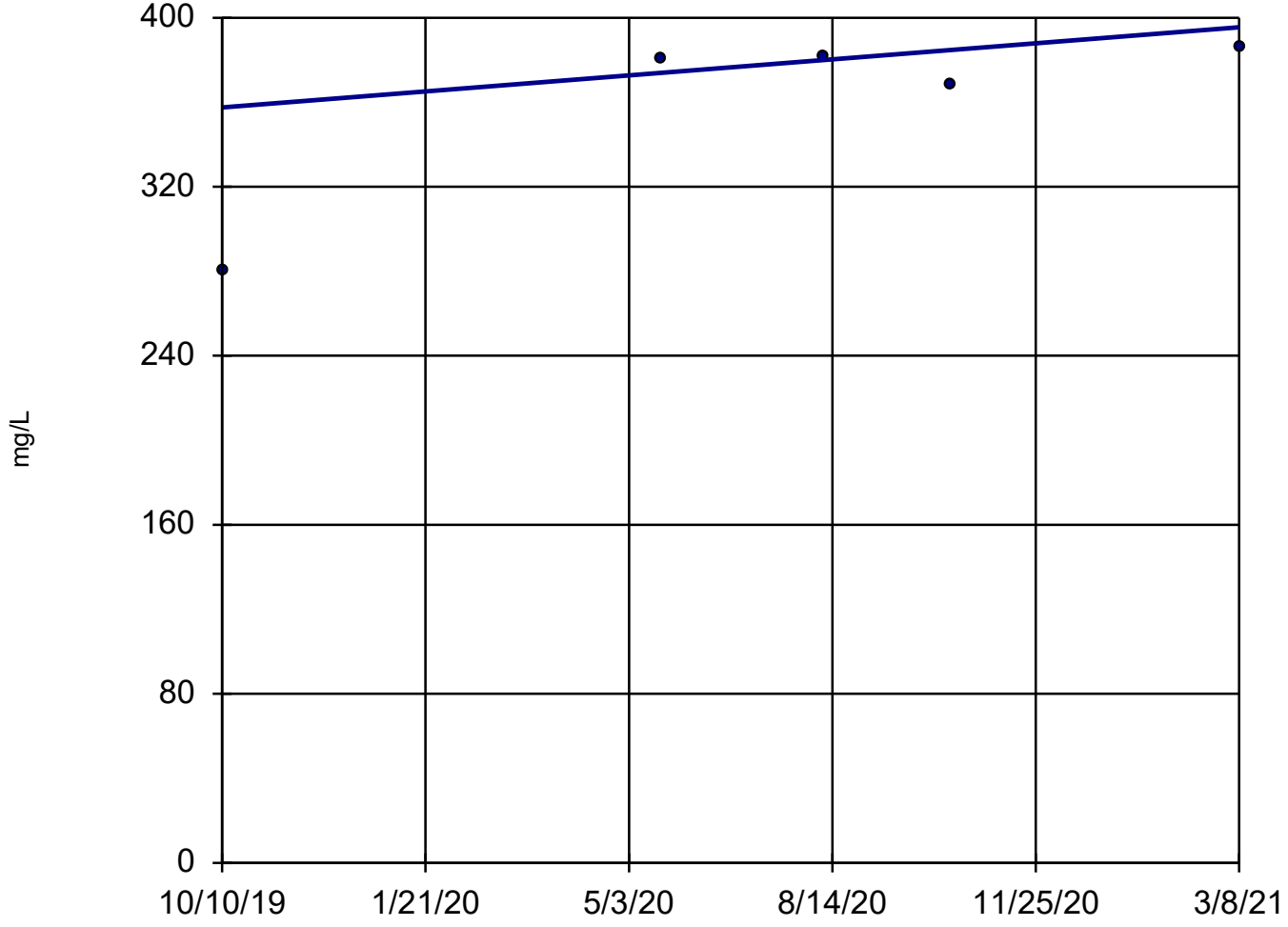
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Calcium, Total

MW-50



n = 5

Slope = 26.9 units per year.

Mann-Kendall statistic = 6
critical = 10

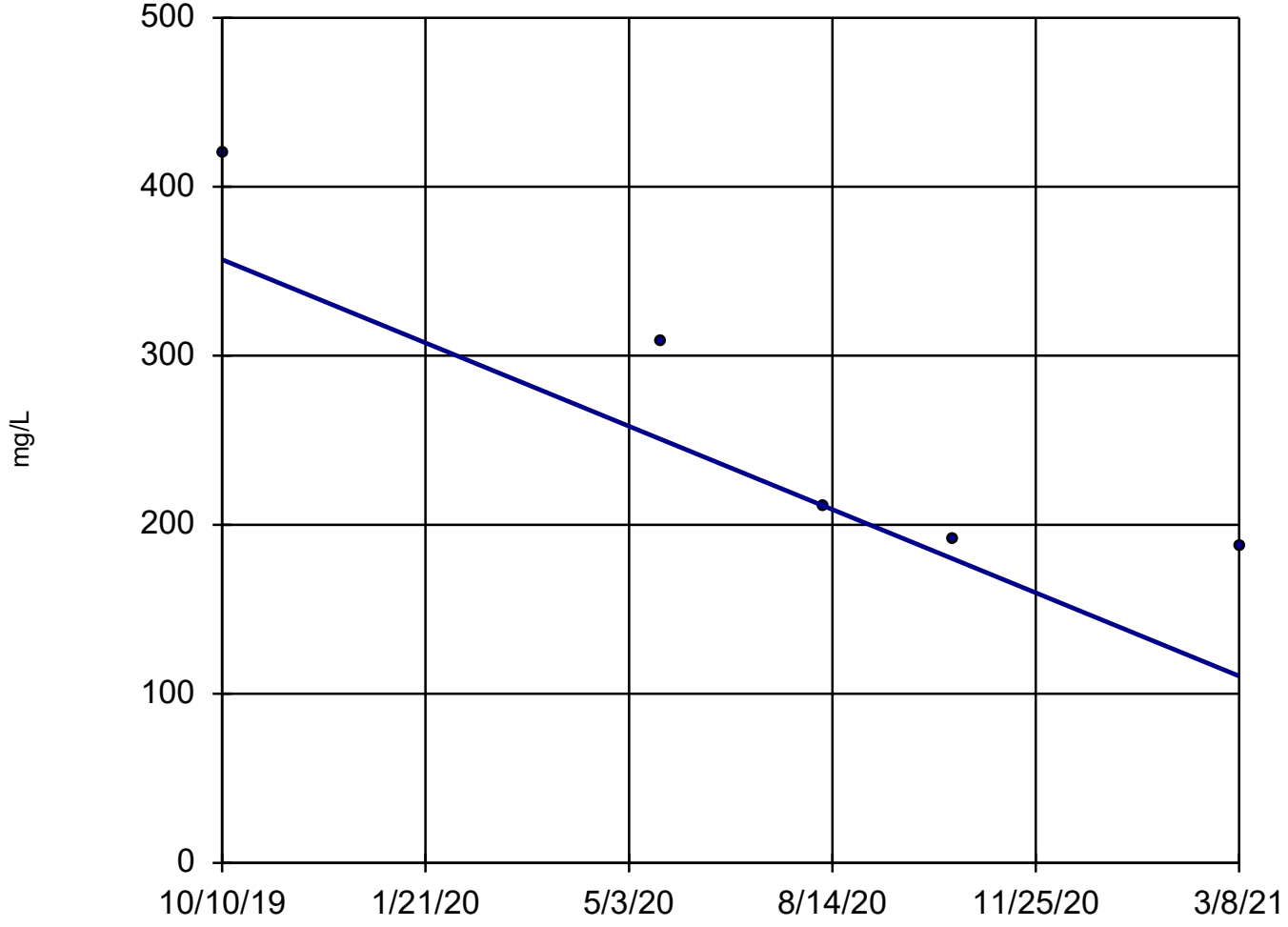
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Calcium, Total

MW-53



n = 5

Slope = -174.6 units per year.

Mann-Kendall statistic = -10
critical = -10

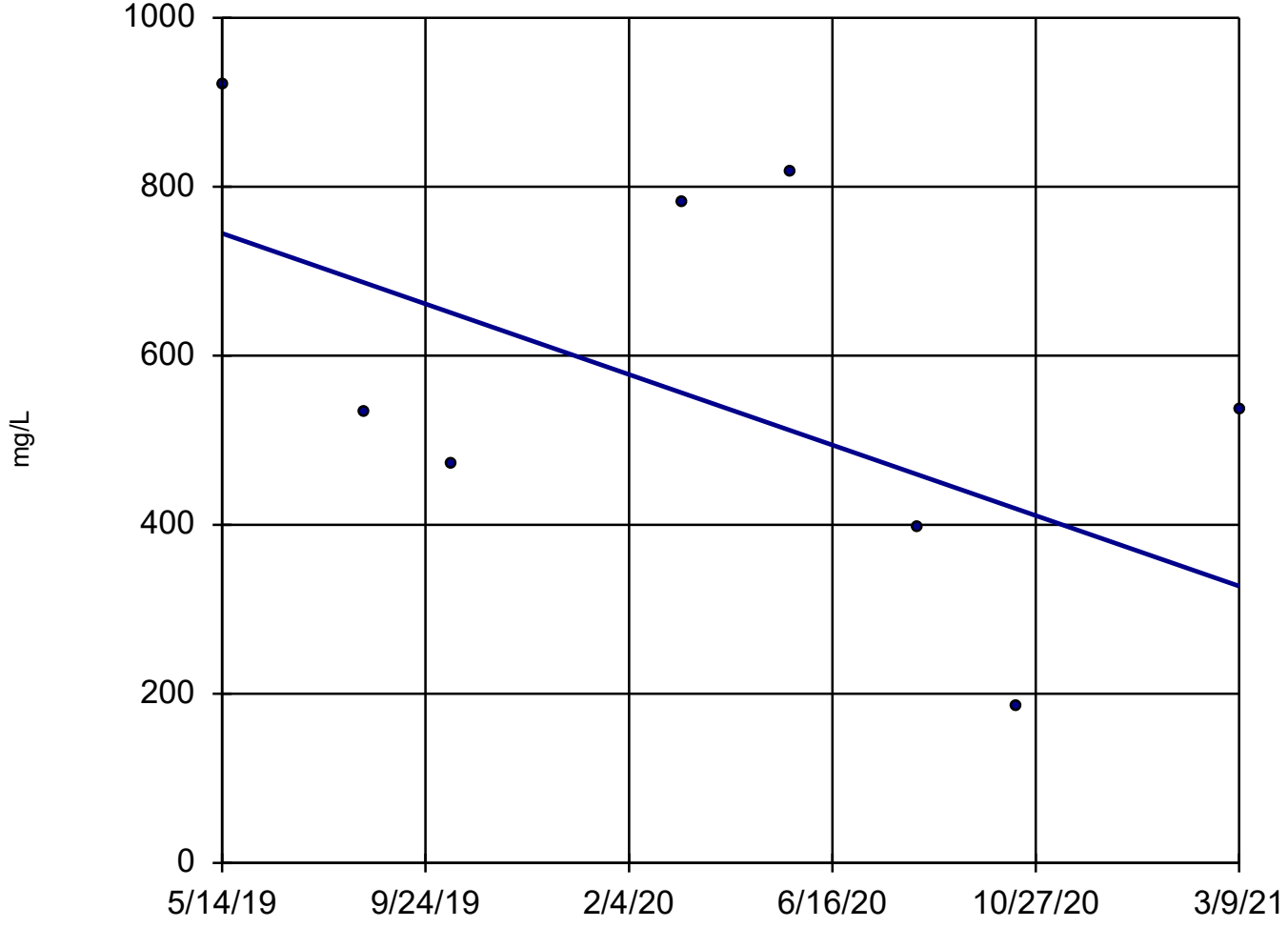
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sulfate

JCW-MW-18005



n = 8

Slope = -229 units per year.

Mann-Kendall statistic = -10
critical = -20

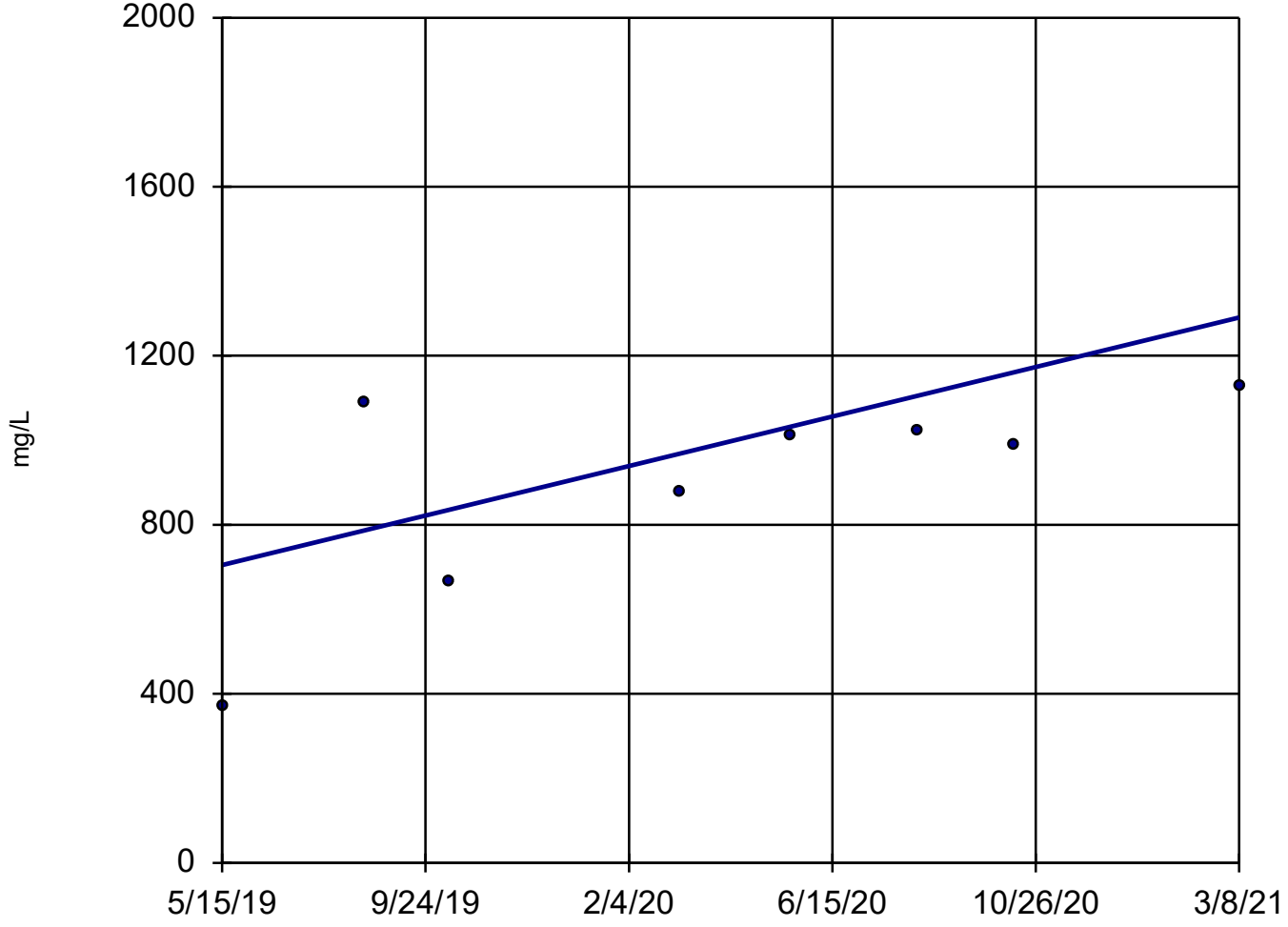
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sulfate

MW-50



n = 8

Slope = 322.5 units per year.

Mann-Kendall statistic = 14
critical = 20

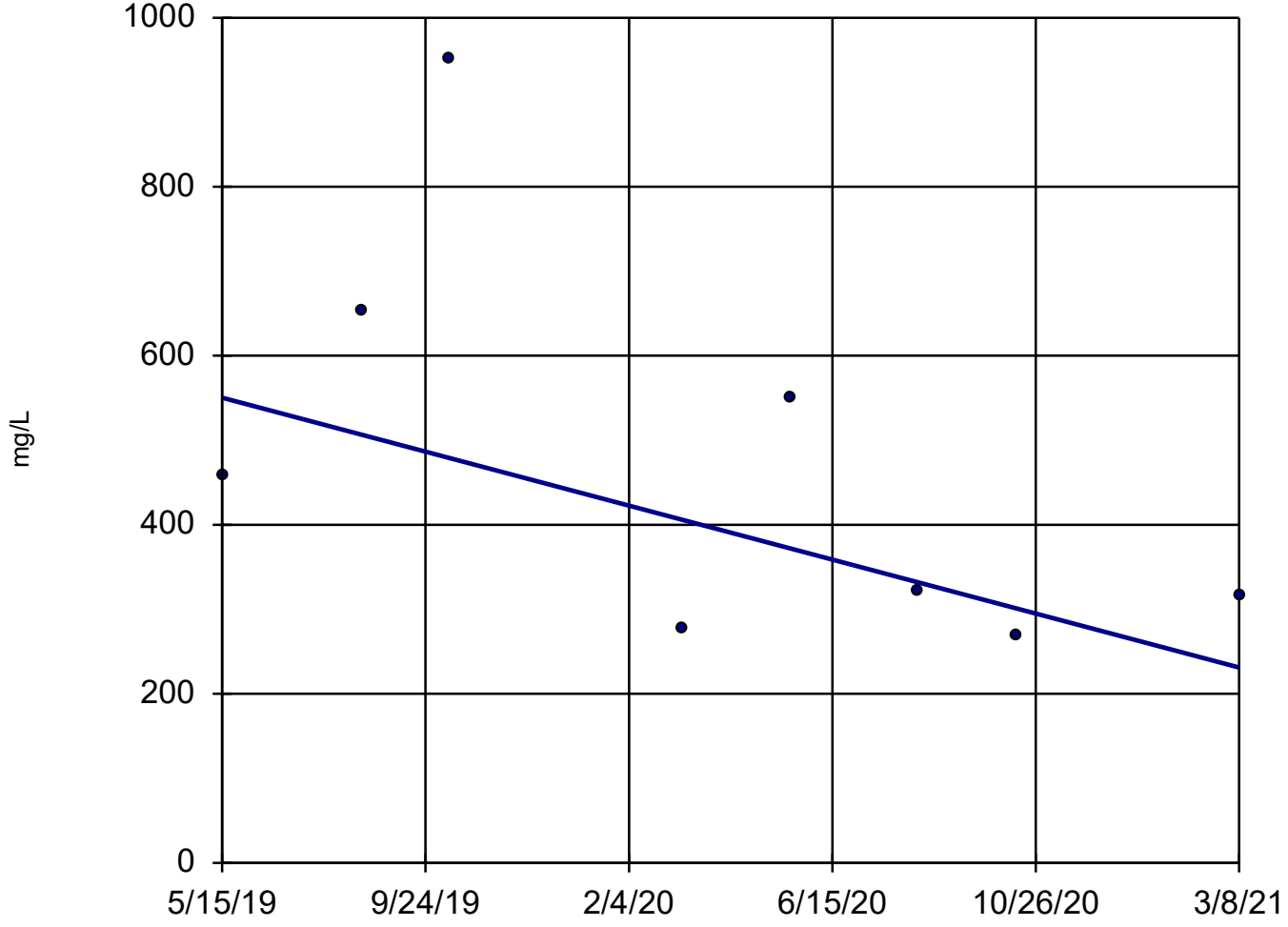
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sulfate

MW-53



n = 8

Slope = -175.7 units per year.

Mann-Kendall statistic = -12
critical = -20

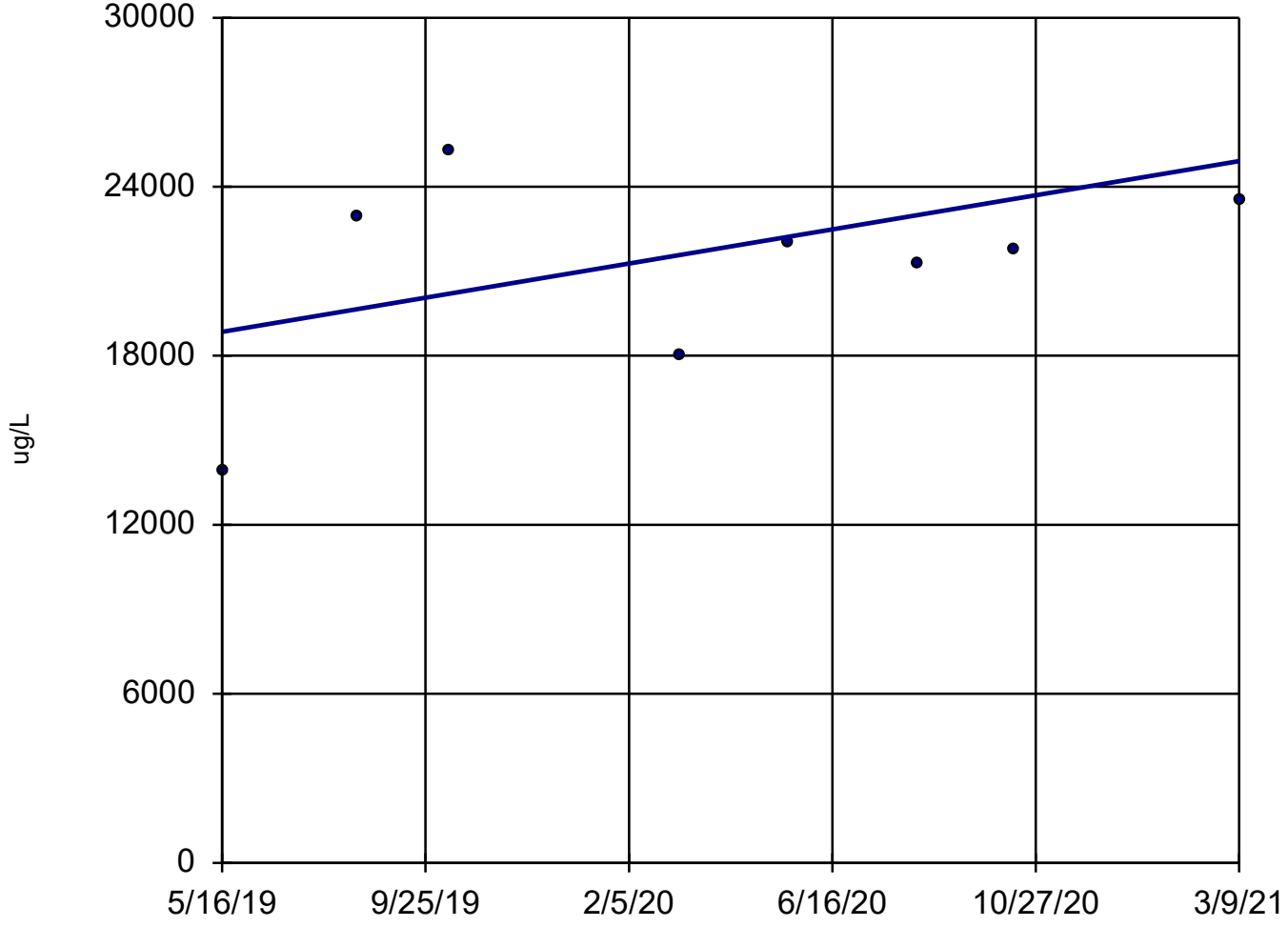
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Iron, Total

MW-55



n = 8

Slope = 3338 units per year.

Mann-Kendall statistic = 6 critical = 20

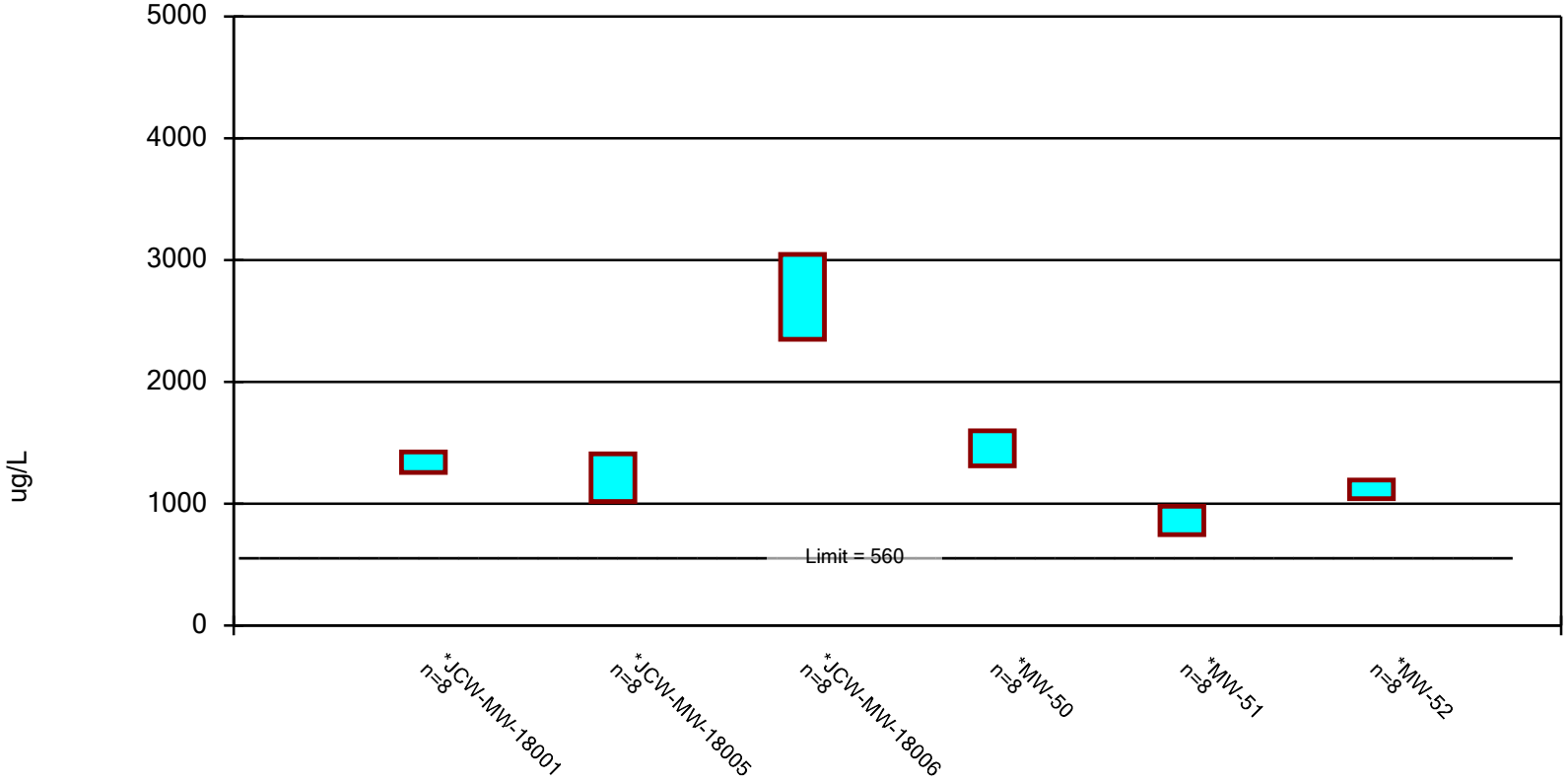
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2021 4:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Parametric Confidence Interval

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



Constituent: Boron, Total Analysis Run 4/12/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Confidence Interval

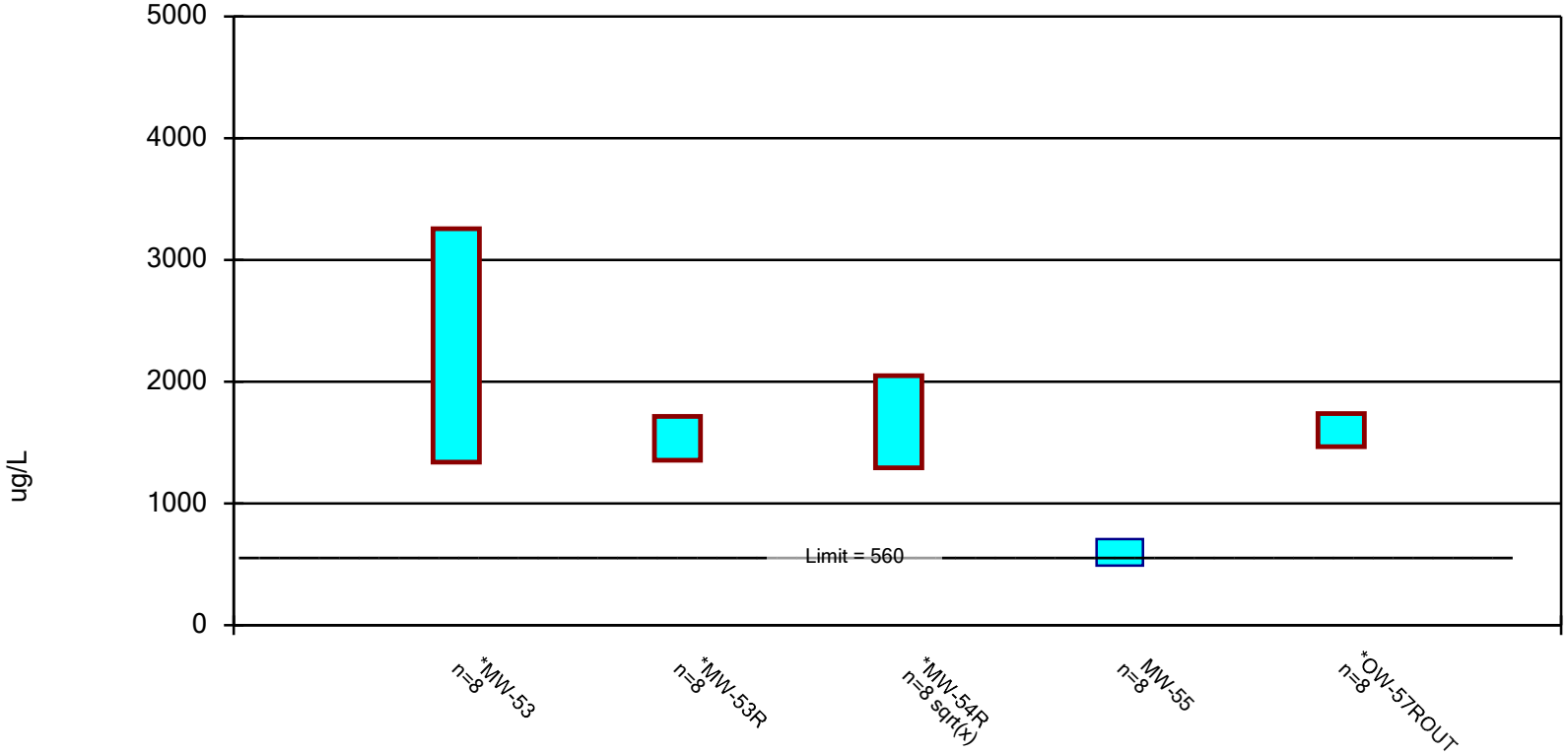
Constituent: Boron, Total (ug/L) Analysis Run 4/12/2021 4:17 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

	JCW-MW-18001	JCW-MW-18005	JCW-MW-18006	MW-50	MW-51	MW-52
5/14/2019		1250				
5/15/2019	1190			1530	802	1010
5/16/2019			2580			
8/15/2019	1280	1310	2750			1010
8/16/2019				1220	782	
10/10/2019	1440 (D)			1645 (D)	866.5 (D)	1175 (D)
10/11/2019		1590 (D)				
10/14/2019			2815 (D)			
3/9/2020	1420			1530	967	
3/10/2020		1230				1150
3/11/2020			3110			
5/18/2020	1360					
5/19/2020		1150		1300	944	1160
5/20/2020			3030			
8/10/2020	1310			1430	758	1200
8/11/2020		1100	2040			
10/13/2020	1370			1470		
10/14/2020		1090	2610		739	1110
3/8/2021	1350			1510	1040	1120
3/9/2021		987	2650			
Mean	1340	1213	2698	1454	862.3	1117
Std. Dev.	80	183.7	328	136.5	110.5	71.86
Upper Lim.	1425	1408	3046	1599	979.4	1193
Lower Lim.	1255	1019	2350	1310	745.2	1041

Parametric Confidence Interval

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



Constituent: Boron, Total Analysis Run 4/12/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Confidence Interval

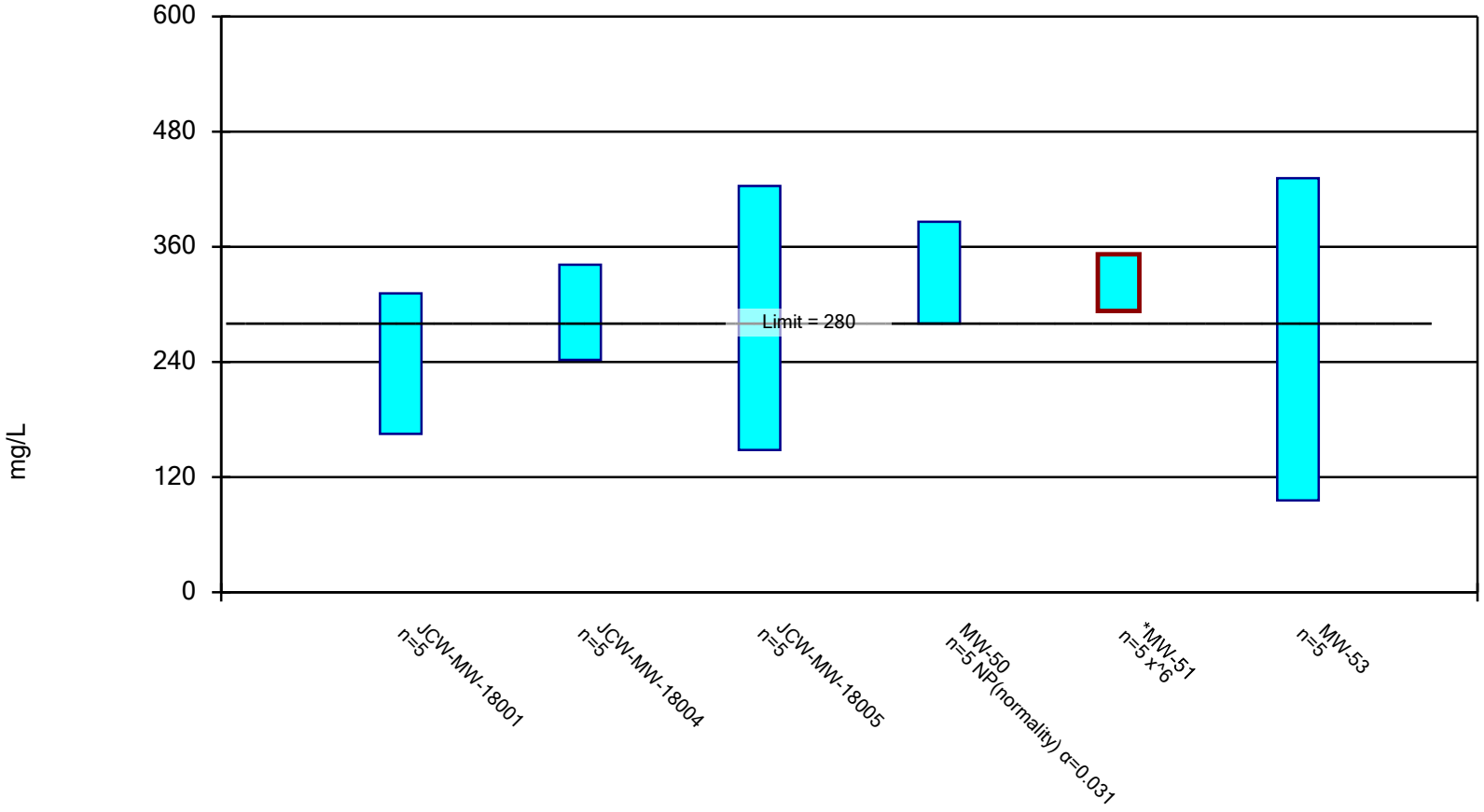
Constituent: Boron, Total (ug/L) Analysis Run 4/12/2021 4:17 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

	MW-53	MW-53R	MW-54R	MW-55	OW-57ROUT
5/14/2019					1390
5/15/2019	2020	1270	1290		
5/16/2019				561	
8/13/2019			1760	712	
8/15/2019	1810	1390			1490
10/10/2019	870 (D)	1740 (D)	1485 (D)		
10/11/2019				699.5 (D)	
10/14/2019					1720 (D)
3/10/2020	2530	1590	1280	481	1720
5/19/2020	1750	1460	1730	441	
5/20/2020					1600
8/10/2020	2760				
8/11/2020		1540	1660	592	1510
10/14/2020	2720	1780	1660	705	1730
3/8/2021	3920	1510	2470		
3/9/2021				593	1660
Mean	2298	1535	1667	598.1	1603
Std. Dev.	904.8	170.1	374.7	103.2	127.4
Upper Lim.	3257	1715	2050	707.4	1737
Lower Lim.	1338	1355	1293	488.7	1468

Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Calcium, Total Analysis Run 4/12/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Confidence Interval

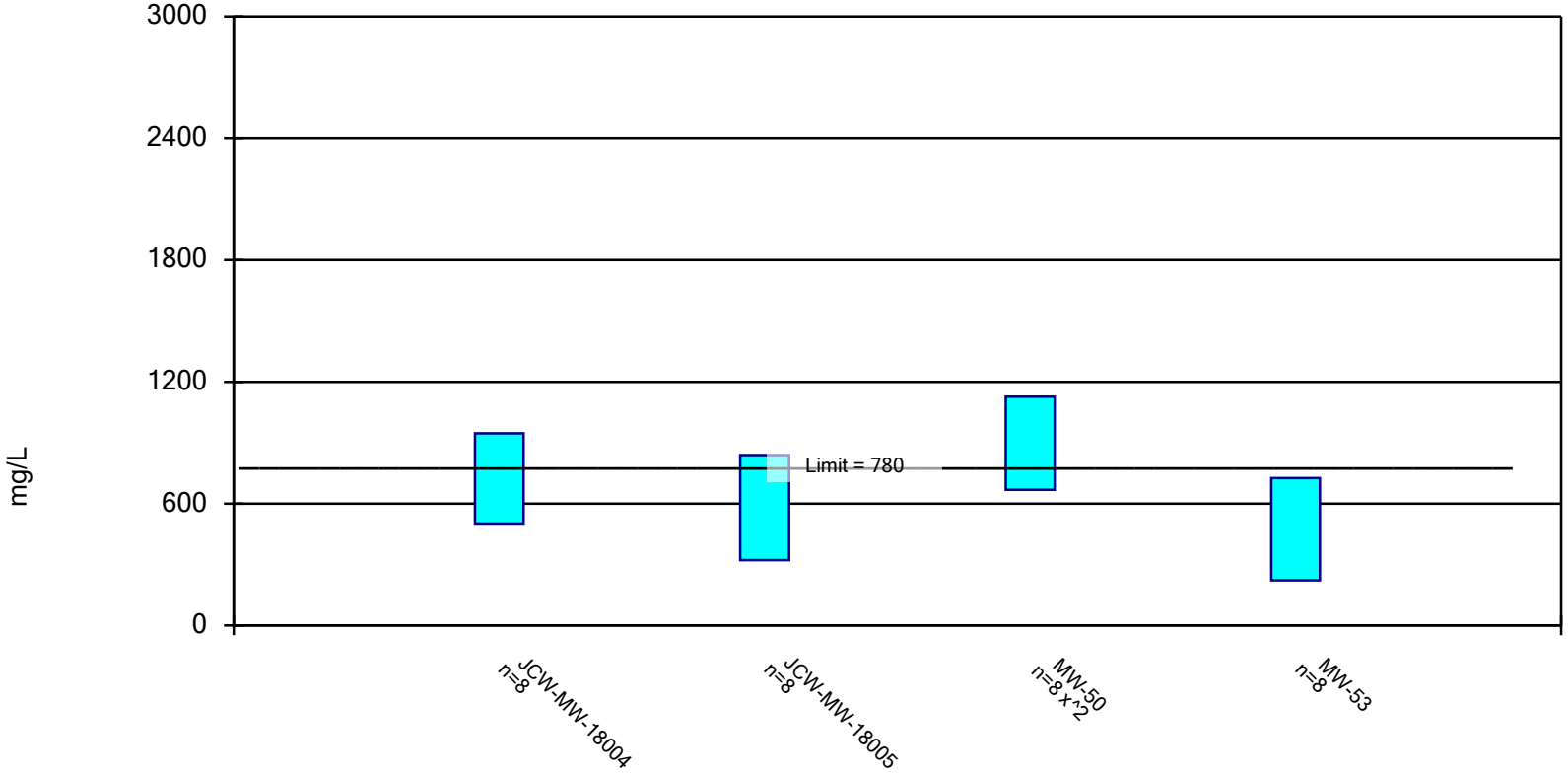
Constituent: Calcium, Total (mg/L) Analysis Run 4/12/2021 4:17 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

	JCW-MW-18001	JCW-MW-18004	JCW-MW-18005	MW-50	MW-51	MW-53
10/10/2019	170			280	340	420
10/11/2019			270			
10/15/2019		270				
5/18/2020	232					
5/19/2020		308	419	380	331	308
8/10/2020	237			382	341	211
8/11/2020		306	259			
10/13/2020	282			368		
10/14/2020		323	195		330	192
3/8/2021	270	252		386	293	187
3/9/2021			286			
Mean	238.2	291.8	285.8	359.2	327	263.6
Std. Dev.	43.65	29.57	82.09	44.78	19.66	100.2
Upper Lim.	311.3	341.3	423.4	386	352.1	431.6
Lower Lim.	165.1	242.3	148.2	280	293.2	95.63

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Sulfate Analysis Run 4/12/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Confidence Interval

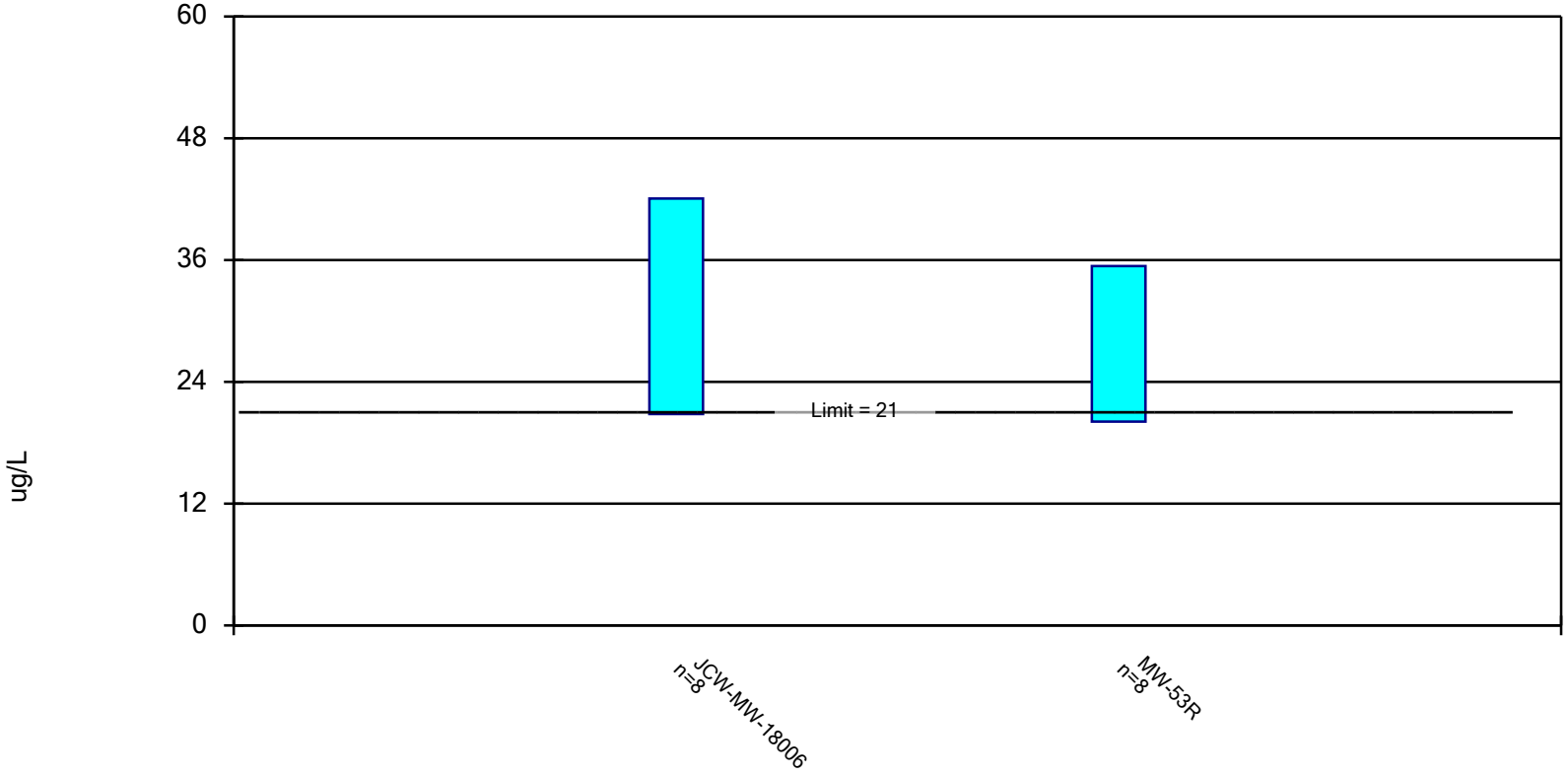
Constituent: Sulfate (mg/L) Analysis Run 4/12/2021 4:17 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

	JCW-MW-18004	JCW-MW-18005	MW-50	MW-53
5/14/2019	714	920		
5/15/2019			372	457
8/13/2019	856			
8/15/2019		533		653
8/16/2019			1090	
10/10/2019			668.5 (D)	950 (D)
10/11/2019		473 (D)		
10/15/2019	1095 (D)			
3/9/2020			878	
3/10/2020	714	781		278
5/19/2020	361	817	1010	549
8/10/2020			1020	321
8/11/2020	718	398		
10/13/2020			990	
10/14/2020	756	185		269
3/8/2021	581		1130	317
3/9/2021		535		
Mean	724.4	580.3	894.8	474.3
Std. Dev.	209.9	244.1	255.3	237
Upper Lim.	946.9	839	1126	725.4
Lower Lim.	501.8	321.5	668.2	223.1

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, Total Analysis Run 4/12/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Confidence Interval

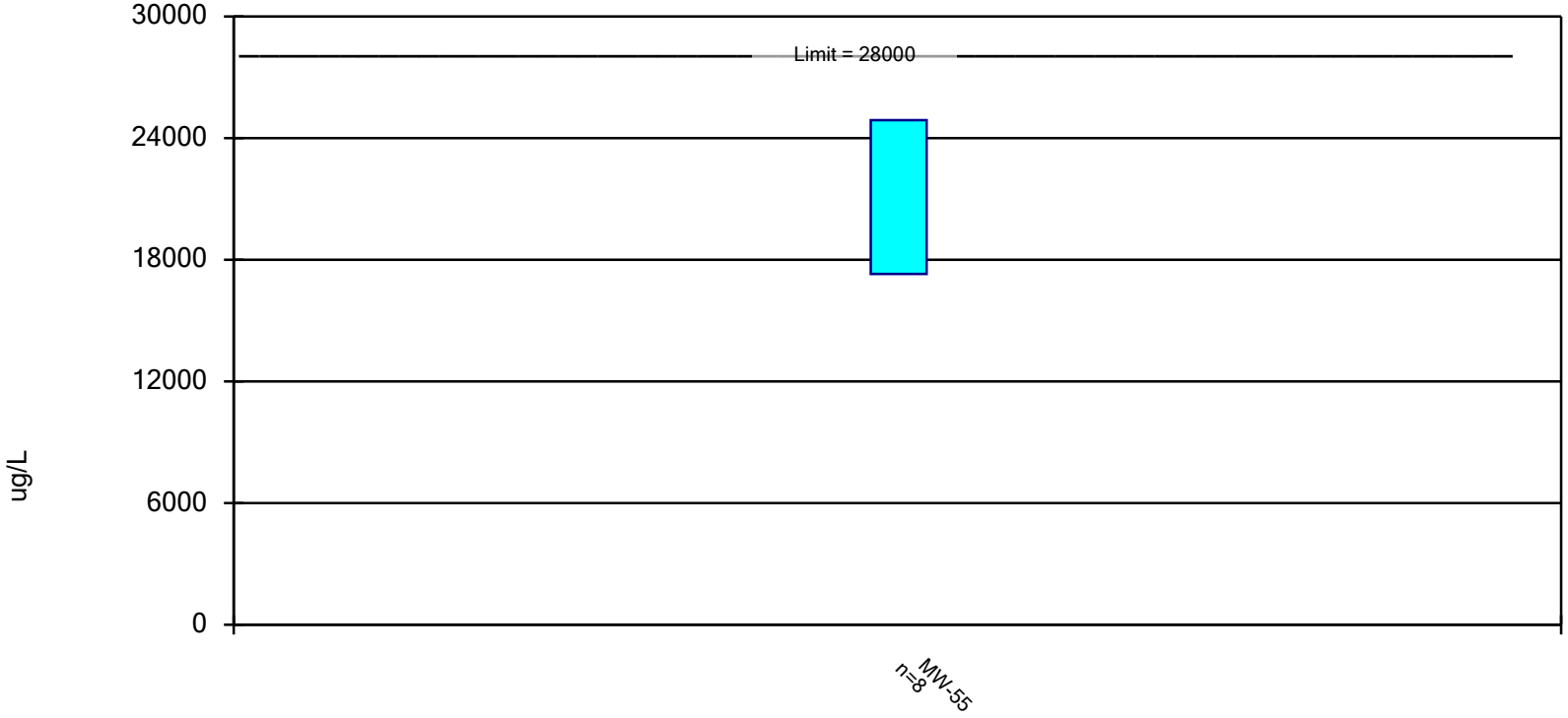
Constituent: Arsenic, Total (ug/L) Analysis Run 4/12/2021 4:17 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

	JCW-MW-18006	MW-53R
5/15/2019		23
5/16/2019	41	
8/15/2019	36	31
10/10/2019		32 (D)
10/14/2019	36.5 (D)	
3/10/2020		19
3/11/2020	41	
5/19/2020		27
5/20/2020	33	
8/11/2020	12	31
10/14/2020	22	40
3/8/2021		19
3/9/2021	30	
Mean	31.44	27.75
Std. Dev.	10.01	7.226
Upper Lim.	42.04	35.41
Lower Lim.	20.83	20.09

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Iron, Total Analysis Run 4/12/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Confidence Interval

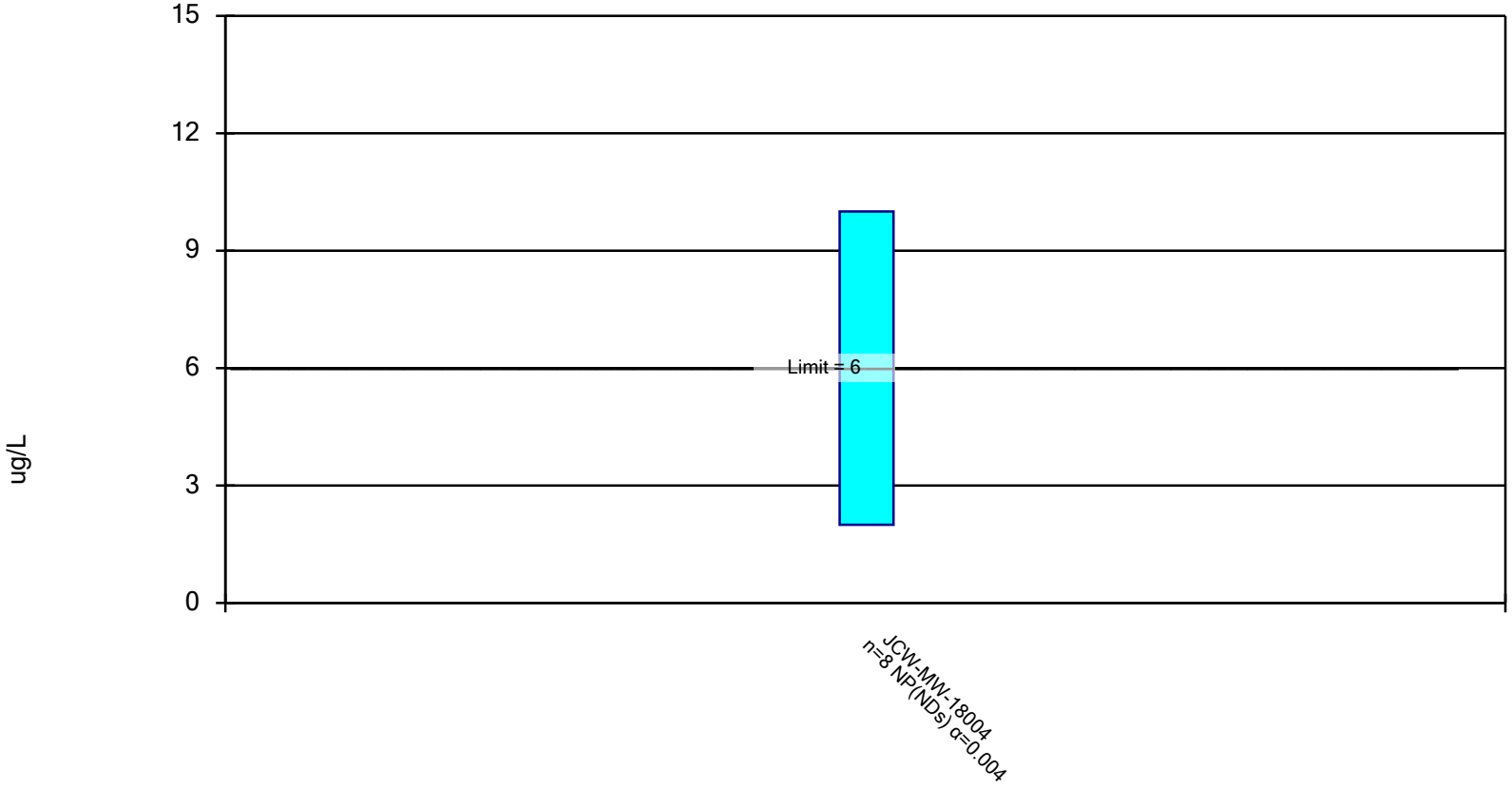
Constituent: Iron, Total (ug/L) Analysis Run 4/12/2021 4:17 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

	MW-55
5/16/2019	13900
8/13/2019	22900
10/11/2019	25300 (D)
3/10/2020	18000
5/19/2020	22000
8/11/2020	21300
10/14/2020	21800
3/9/2021	23500
Mean	21088
Std. Dev.	3574
Upper Lim.	24876
Lower Lim.	17299

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Vanadium, Total Analysis Run 4/12/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Confidence Interval

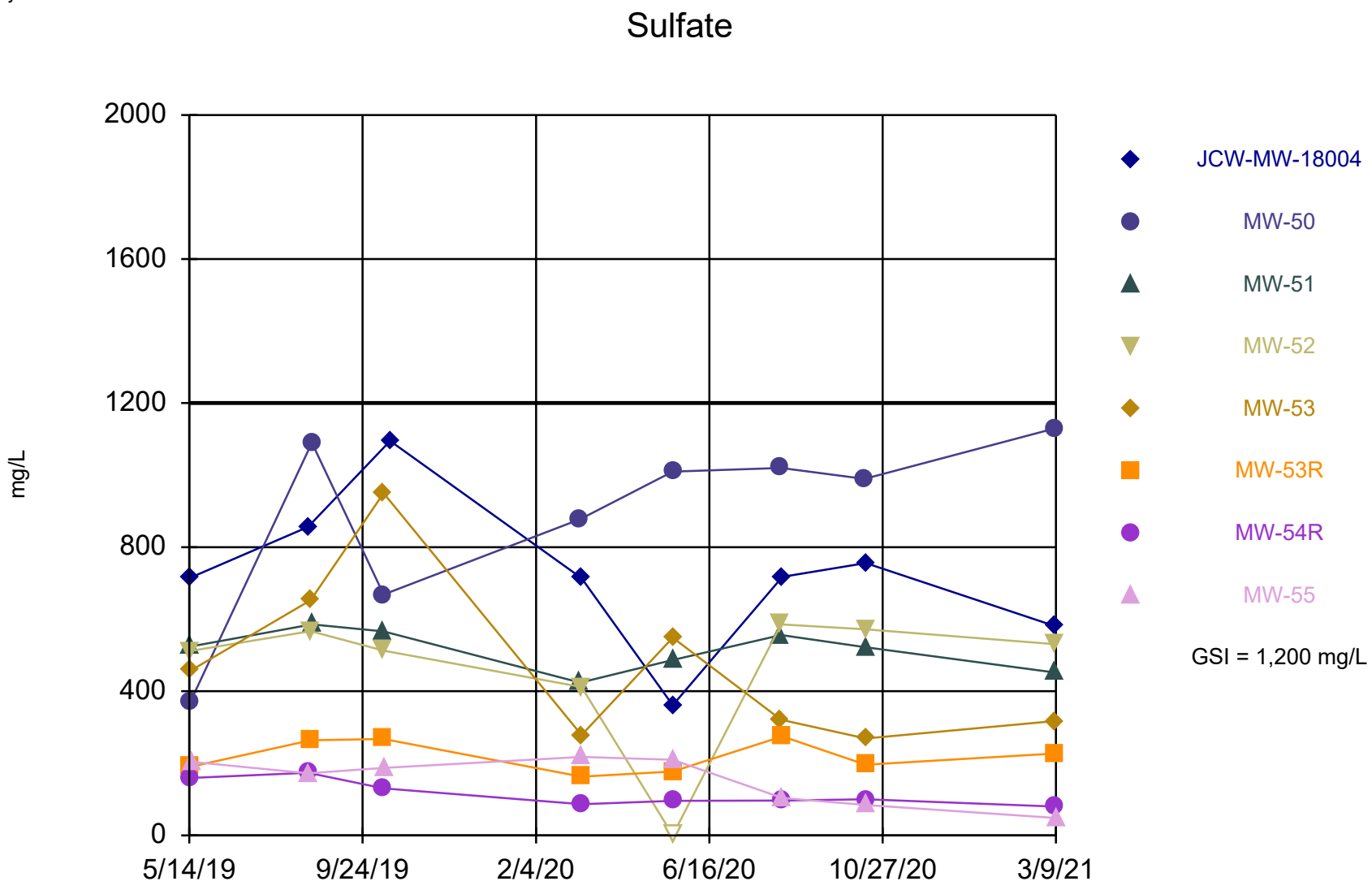
Constituent: Vanadium, Total (ug/L) Analysis Run 4/12/2021 4:17 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

	JCW-MW-18004
5/14/2019	<2
8/13/2019	3
10/15/2019	<2 (D)
3/10/2020	10
5/19/2020	<2
8/11/2020	<2
10/14/2020	<2
3/8/2021	<2
Mean	3.125
Std. Dev.	2.8
Upper Lim.	10
Lower Lim.	2

Attachment 2
GSI Evaluation Sanitas™ Output Files

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

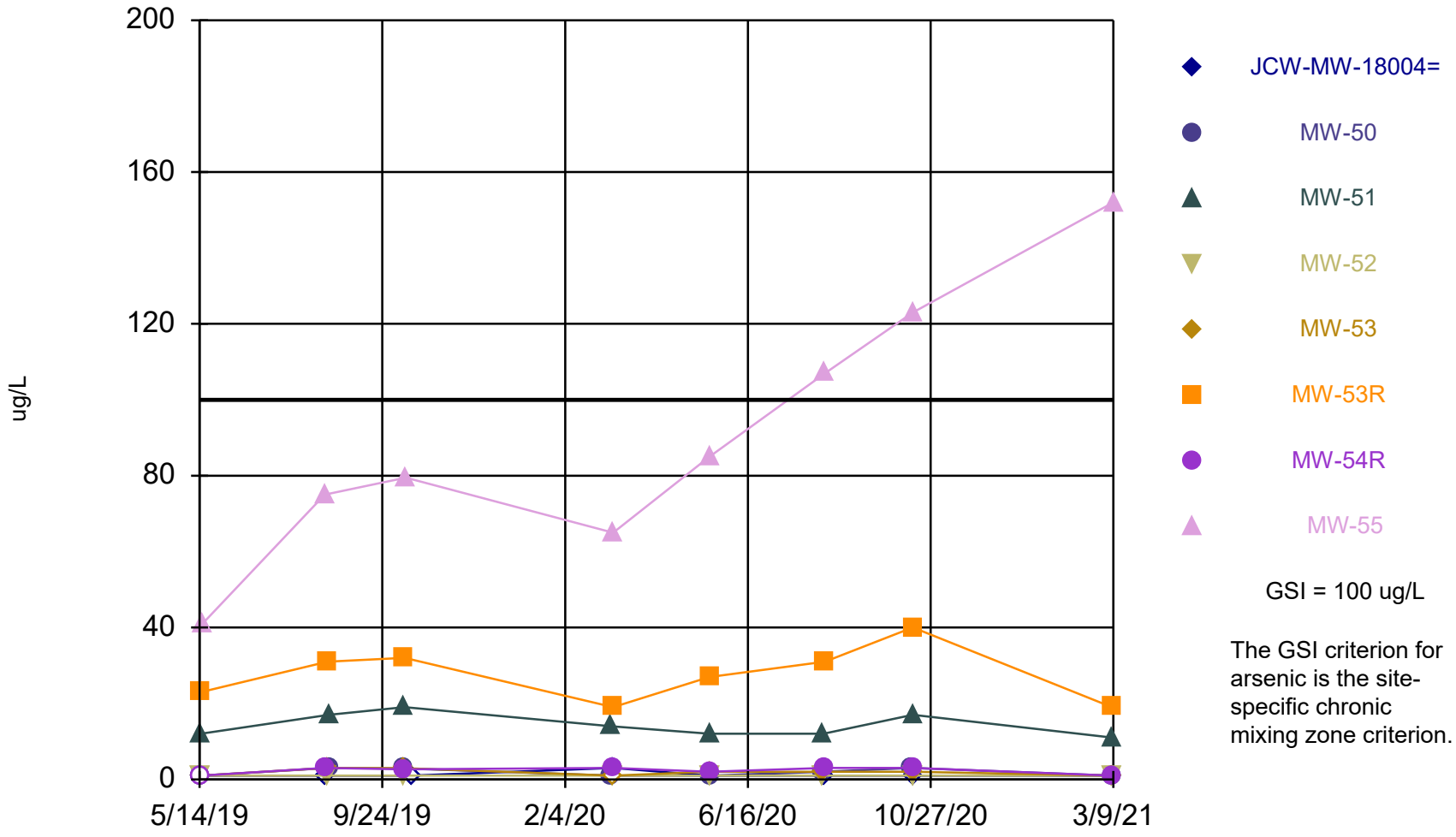


Time Series Analysis Run 4/21/2021 10:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Arsenic, Total

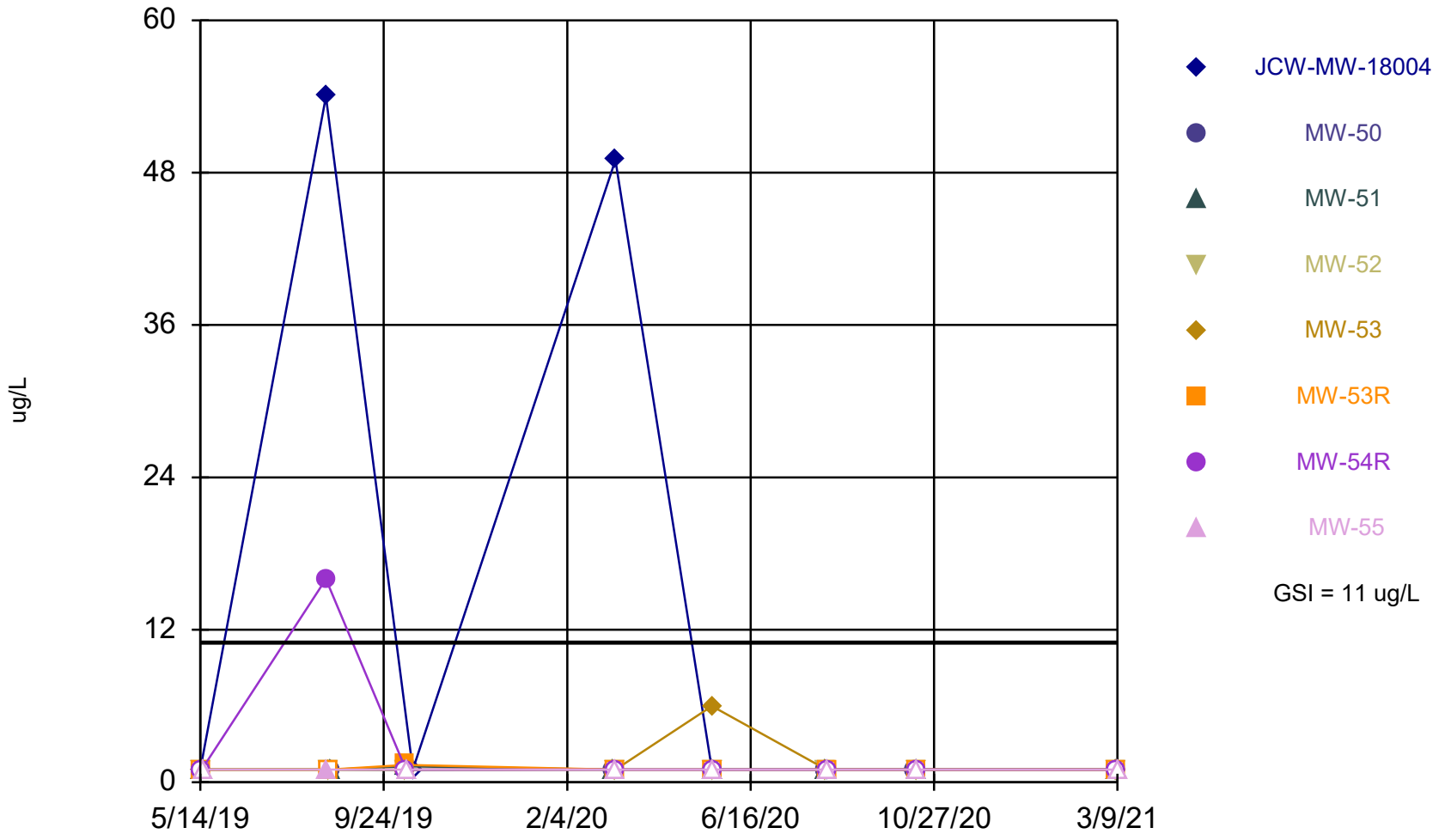


Time Series Analysis Run 4/26/2021 9:35 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Chromium, Total

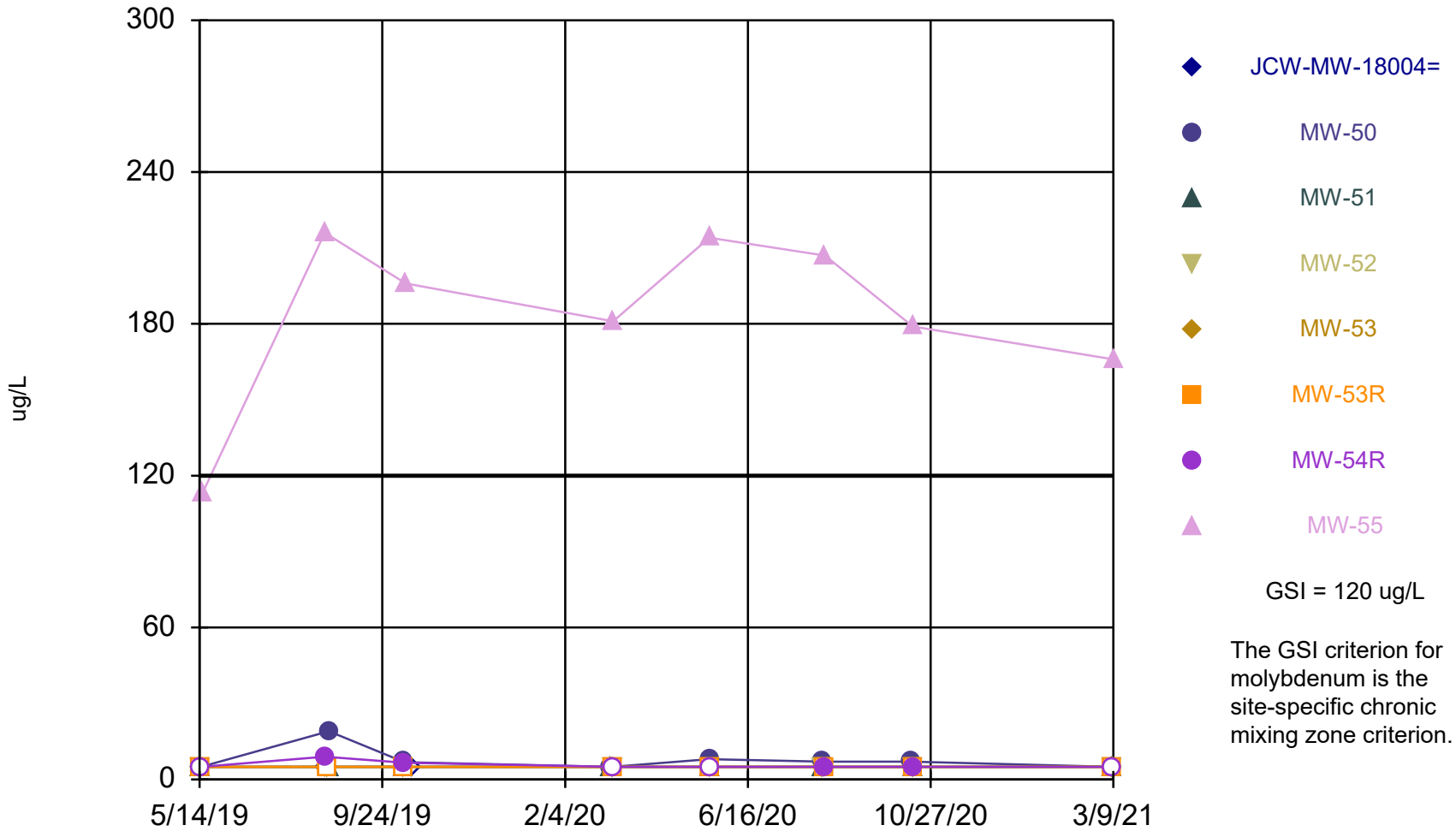


Time Series Analysis Run 4/12/2021 4:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Molybdenum, Total



Time Series Analysis Run 4/26/2021 9:33 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Summary Report

Constituent: Sulfate Analysis Run 4/21/2021 10:44 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 5/14/2019 and 3/9/2021, a summary of the selected data set:

Observations = 64
ND/Trace = 1
Wells = 8
Minimum Value = 0.5
Maximum Value = 1130
Mean Value = 444.8
Median Value = 418
Standard Deviation = 301.9
Coefficient of Variation = 0.6788
Skewness = 0.6299

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	0	361	1095	724.4	716	209.9	0.2898	0.03782
MW-50	8	0	372	1130	894.8	1000	255.3	0.2853	-1.19
MW-51	8	0	424	586	514.6	523	56.68	0.1101	-0.3689
MW-52	8	1	0.5	586	461.7	522	194.1	0.4205	-1.945
MW-53	8	0	269	950	474.3	389	237	0.4996	1.034
MW-53R	8	0	163	275	219.9	211.5	44.47	0.2022	0.09753
MW-54R	8	0	79.9	174	115.2	98.1	35.19	0.3055	0.7186
MW-55	8	0	48	218	153.4	179.8	65.26	0.4253	-0.5509

Summary Report

Constituent: Arsenic, Total Analysis Run 4/26/2021 9:35 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 5/14/2019 and 3/9/2021, a summary of the selected data set:

Observations = 64
ND/Trace = 16
Wells = 8
Minimum Value = 1
Maximum Value = 152
Mean Value = 17.66
Median Value = 2.975
Standard Deviation = 31.66
Coefficient of Variation = 1.793
Skewness = 2.525

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	7	1	3	1.25	1	0.7071	0.5657	2.268
MW-50	8	0	1	3	1.863	1.5	0.9753	0.5237	0.2463
MW-51	8	0	11	19	14.25	13	3.012	0.2114	0.4486
MW-52	8	6	1	1	1	1	0	0	NaN
MW-53	8	2	1	3	1.869	2	0.825	0.4415	0.2044
MW-53R	8	0	19	40	27.75	29	7.226	0.2604	0.2171
MW-54R	8	1	1	3	2.331	2.825	0.89	0.3818	-0.7639
MW-55	8	0	41	152	90.94	82.25	35.05	0.3855	0.415

Summary Report

Constituent: Chromium, Total Analysis Run 4/12/2021 4:23 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 5/14/2019 and 3/9/2021, a summary of the selected data set:

Observations = 64
ND/Trace = 54
Wells = 8
Minimum Value = 0.5
Maximum Value = 54
Mean Value = 2.485
Median Value = 0.5
Standard Deviation = 9.116
Coefficient of Variation = 3.668
Skewness = 5.056

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	6	0.5	54	13.25	0.5	23.65	1.785	1.166
MW-50	8	5	0.5	1.2	0.7125	0.5	0.2997	0.4206	0.6547
MW-51	8	7	0.5	1.5	0.625	0.5	0.3536	0.5657	2.268
MW-52	8	8	0.5	0.5	0.5	0.5	0	0	NaN
MW-53	8	7	0.5	6	1.188	0.5	1.945	1.638	2.268
MW-53R	8	7	0.5	1.35	0.6063	0.5	0.3005	0.4957	2.268
MW-54R	8	7	0.5	16	2.438	0.5	5.48	2.248	2.268
MW-55	8	7	0.5	1	0.5625	0.5	0.1768	0.3143	2.268

Summary Report

Constituent: Molybdenum, Total Analysis Run 4/26/2021 9:34 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

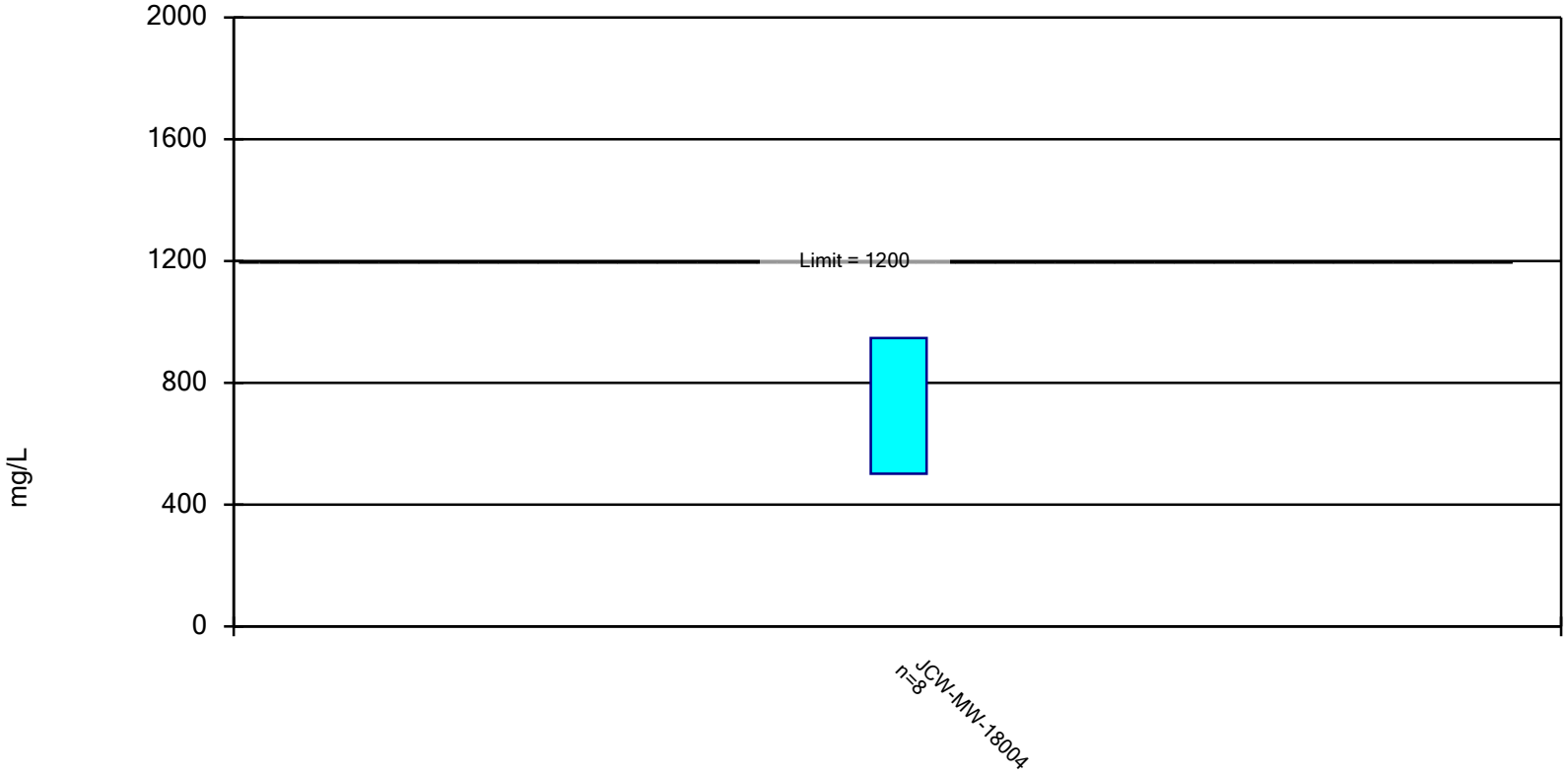
For observations made between 5/14/2019 and 3/9/2021, a summary of the selected data set:

Observations = 64
ND/Trace = 47
Wells = 8
Minimum Value = 5
Maximum Value = 216
Mean Value = 27.82
Median Value = 5
Standard Deviation = 60.58
Coefficient of Variation = 2.178
Skewness = 2.396

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	8	5	5	5	5	0	0	NaN
MW-50	8	3	5	19	7.85	6.9	4.649	0.5922	1.998
MW-51	8	8	5	5	5	5	0	0	NaN
MW-52	8	8	5	5	5	5	0	0	NaN
MW-53	8	8	5	5	5	5	0	0	NaN
MW-53R	8	8	5	5	5	5	0	0	NaN
MW-54R	8	4	5	9	5.7	5	1.446	0.2537	1.747
MW-55	8	0	113	216	184	188.5	33.8	0.1837	-1.148

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Sulfate Analysis Run 4/21/2021 10:46 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Confidence Interval

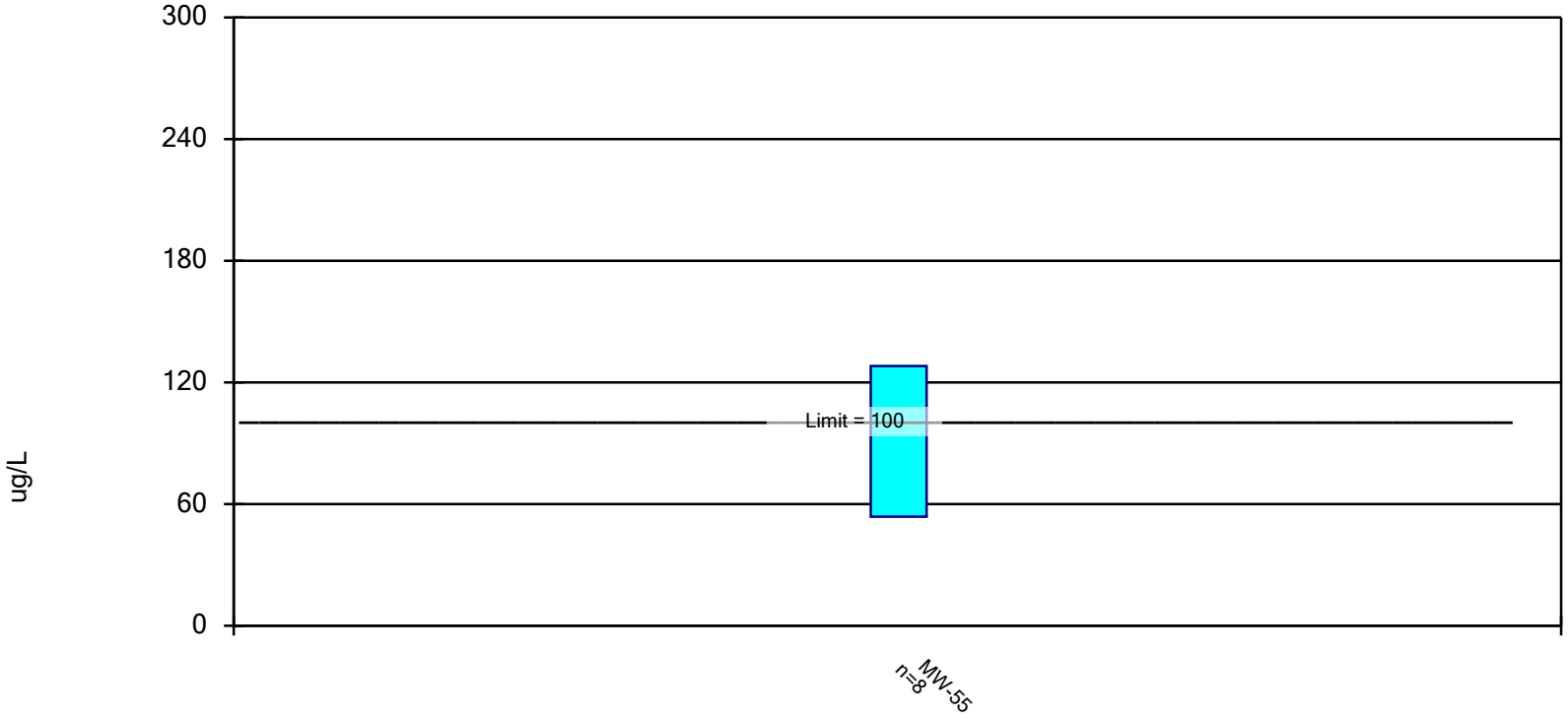
Constituent: Sulfate (mg/L) Analysis Run 4/21/2021 10:47 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

	JCW-MW-18004
5/14/2019	714
8/13/2019	856
10/15/2019	1095 (D)
3/10/2020	714
5/19/2020	361
8/11/2020	718
10/14/2020	756
3/8/2021	581
Mean	724.4
Std. Dev.	209.9
Upper Lim.	946.9
Lower Lim.	501.8

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, Total Analysis Run 4/26/2021 9:37 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Confidence Interval

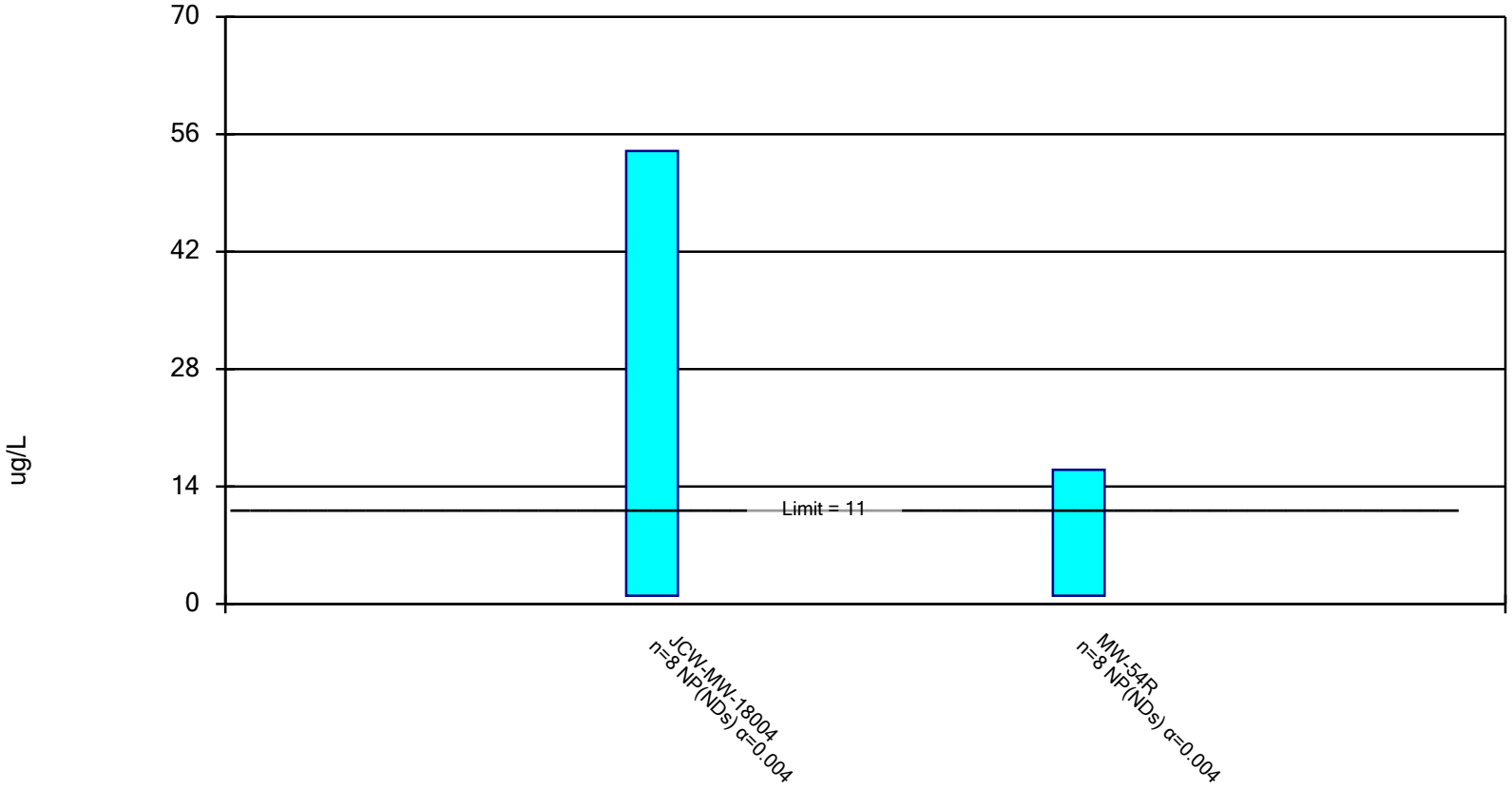
Constituent: Arsenic, Total (ug/L) Analysis Run 4/26/2021 9:39 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

	MW-55
5/16/2019	41
8/13/2019	75
10/11/2019	79.5 (D)
3/10/2020	65
5/19/2020	85
8/11/2020	107
10/14/2020	123
3/9/2021	152
Mean	90.94
Std. Dev.	35.05
Upper Lim.	128.1
Lower Lim.	53.78

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Chromium, Total Analysis Run 4/12/2021 4:25 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Confidence Interval

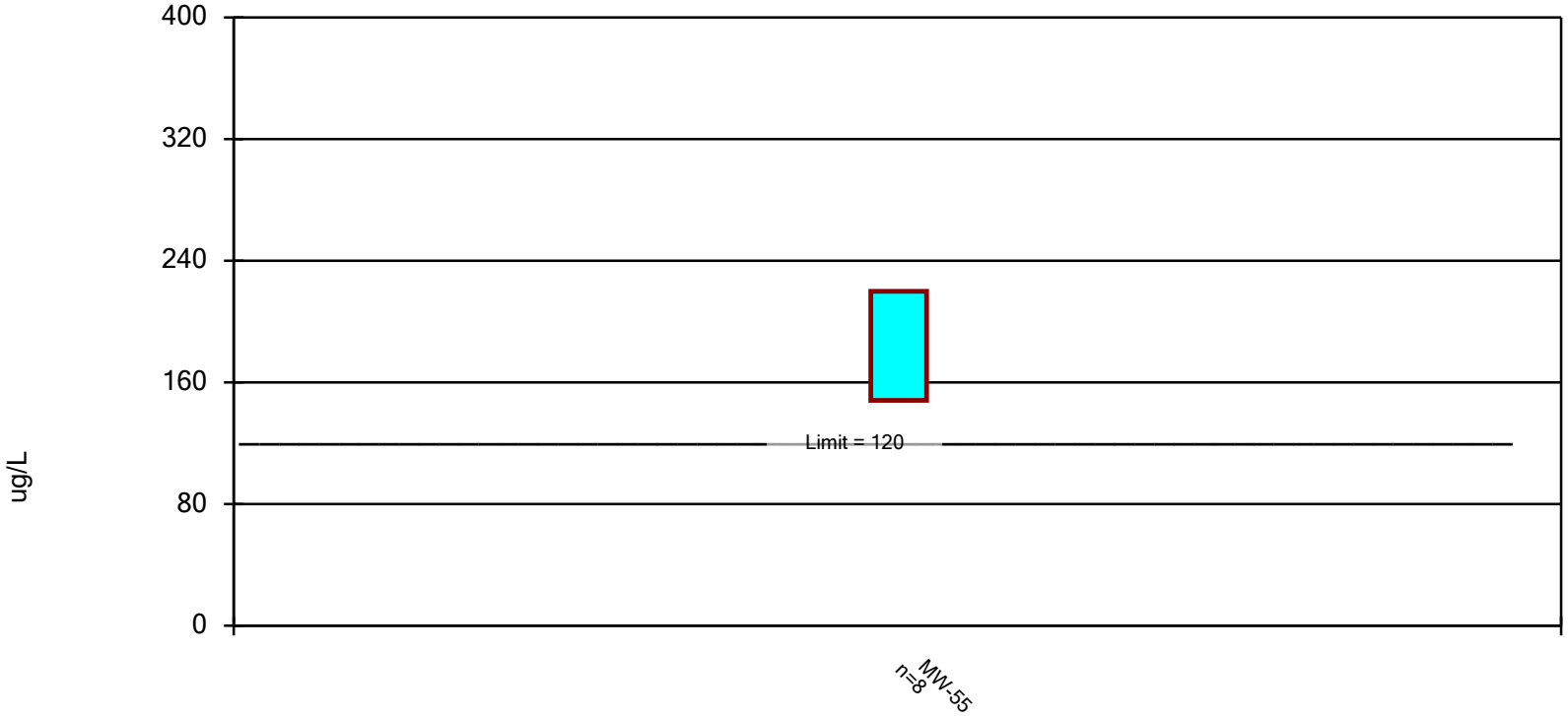
Constituent: Chromium, Total (ug/L) Analysis Run 4/12/2021 4:26 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

	JCW-MW-18004	MW-54R
5/14/2019	<1	
5/15/2019		<1
8/13/2019	54	16
10/10/2019		<1 (D)
10/15/2019	<1 (D)	
3/10/2020	49	<1
5/19/2020	<1	<1
8/11/2020	<1	<1
10/14/2020	<1	<1
3/8/2021	<1	<1
Mean	13.63	2.875
Std. Dev.	23.42	5.303
Upper Lim.	54	16
Lower Lim.	1	1

Parametric Confidence Interval

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



Constituent: Molybdenum, Total Analysis Run 4/26/2021 9:37 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Confidence Interval

Constituent: Molybdenum, Total (ug/L) Analysis Run 4/26/2021 9:39 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

	MW-55
5/16/2019	113
8/13/2019	216
10/11/2019	196 (D)
3/10/2020	181
5/19/2020	214
8/11/2020	207
10/14/2020	179
3/9/2021	166
Mean	184
Std. Dev.	33.8
Upper Lim.	219.8
Lower Lim.	148.2

Appendix E
Laboratory Analytical Report

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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 22, 2021

Subject: PART 115 GROUNDWATER MONITORING – JCW POREWATER – 2021 Q1

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

Darby Litz, Project Manager
TRC Environmental Corporation
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 21-0213

TRC Environmental, Inc. conducted groundwater monitoring at the JCWeadock site on 03/08/2021 and 03/09/2021, for the 1st Quarter monitoring requirement, as specified in the Hydrogeological Monitoring Plan for the site. The samples were received for analysis by the Chemistry department of Laboratory Services on 03/09/2021.

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

Testing performed in accordance with the A2LA scope of accredidation specified in the listed certificate.
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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, latest edition.

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 JCW Part 115 & RCRA Porewater
Date Received: 3/9/2021
Chemistry Project: 21-0213

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-0213-01	JCW-MW-18001	Groundwater	03/08/2021 07:37 AM	JCW Solid Waste Disposal Area, Porewater
21-0213-02	JCW-MW-18004	Groundwater	03/08/2021 03:01 PM	JCW Solid Waste Disposal Area, Porewater
21-0213-03	JCW-OW-18004	Groundwater	03/08/2021 02:23 PM	JCW Solid Waste Disposal Area, Porewater
21-0213-04	JCW-MW-18005	Groundwater	03/09/2021 11:57 AM	JCW Solid Waste Disposal Area, Porewater
21-0213-05	JCW-MW-18006	Groundwater	03/09/2021 01:02 PM	JCW Solid Waste Disposal Area, Porewater
21-0213-06	MW-50	Groundwater	03/08/2021 08:36 AM	JCW Solid Waste Disposal Area, Porewater
21-0213-07	MW-51	Groundwater	03/08/2021 09:33 AM	JCW Solid Waste Disposal Area, Porewater
21-0213-08	MW-52	Groundwater	03/08/2021 10:27 AM	JCW Solid Waste Disposal Area, Porewater
21-0213-09	MW-53	Groundwater	03/08/2021 11:06 AM	JCW Solid Waste Disposal Area, Porewater
21-0213-10	MW-53R	Groundwater	03/08/2021 12:24 PM	JCW Solid Waste Disposal Area, Porewater
21-0213-11	MW-54R	Groundwater	03/08/2021 01:25 PM	JCW Solid Waste Disposal Area, Porewater
21-0213-12	MW-55	Groundwater	03/09/2021 10:49 AM	JCW Solid Waste Disposal Area, Porewater
21-0213-13	OW-55	Groundwater	03/09/2021 09:35 AM	JCW Solid Waste Disposal Area, Porewater
21-0213-14	OW-57R OUT	Groundwater	03/09/2021 12:29 PM	JCW Solid Waste Disposal Area, Porewater
21-0213-15	MW-58	Groundwater	03/09/2021 06:56 AM	JCW Solid Waste Disposal Area, Porewater
21-0213-16	LH-104	Groundwater	03/09/2021 08:05 AM	JCW Solid Waste Disposal Area, Porewater
21-0213-17	DUP-01	Groundwater	03/08/2021 12:00 AM	JCW Solid Waste Disposal Area, Porewater
21-0213-18	JCW-MW-18001 MS	Groundwater	03/08/2021 07:37 AM	JCW Solid Waste Disposal Area, Porewater
21-0213-19	JCW-MW-18001 MSD	Groundwater	03/08/2021 07:37 AM	JCW Solid Waste Disposal Area, Porewater
21-0213-20	FB-01	Water	03/09/2021 01:07 PM	JCW Solid Waste Disposal Area, Porewater
21-0213-21	EB-01	Water	03/09/2021 01:11 PM	JCW Solid Waste Disposal Area, Porewater

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**JCW-MW-18001**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-01	Collect Time:	07:37 AM
Matrix:	Groundwater		

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

Aliquot: 21-0213-01-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	2		ug/L	1	03/15/2021	AB21-0315-14
Barium	213		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	1350		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	270000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	ND		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	2		ug/L	1	03/15/2021	AB21-0315-14
Iron	183		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	69		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	63500		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	8		ug/L	2	03/15/2021	AB21-0315-14
Potassium	11300		ug/L	100	03/15/2021	AB21-0315-14
Selenium	ND		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	125000		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	ND		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-01-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/15/2021	AB21-0315-05

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

Aliquot: 21-0213-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	72100		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	549000		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-01-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	106		ug/L	10	03/15/2021	AB21-0315-08

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**JCW-MW-18001**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-01	Collect Time:	07:37 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-01-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1610		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-01-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	561000		ug/L	10000	03/15/2021	AB21-0315-13
Alkalinity bicarbonate	561000		ug/L	10000	03/15/2021	AB21-0315-13
Alkalinity carbonate	ND		ug/L	10000	03/15/2021	AB21-0315-13

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-02	Collect Time:	03:01 PM
Matrix:	Groundwater		

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

Aliquot: 21-0213-02-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	ND		ug/L	1	03/15/2021	AB21-0315-14
Barium	20		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	232		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	252000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	ND		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	3		ug/L	1	03/15/2021	AB21-0315-14
Iron	21		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	35		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	86300		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	ND		ug/L	2	03/15/2021	AB21-0315-14
Potassium	2160		ug/L	100	03/15/2021	AB21-0315-14
Selenium	7		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	25600		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	ND		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-02-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/15/2021	AB21-0315-05

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

Aliquot: 21-0213-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	17900		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	581000		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-02-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	ND		ug/L	10	03/15/2021	AB21-0315-08

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-02	Collect Time:	03:01 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-02-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1390		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-02-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	441000		ug/L	10000	03/15/2021	AB21-0315-13
Alkalinity bicarbonate	441000		ug/L	10000	03/15/2021	AB21-0315-13
Alkalinity carbonate	ND		ug/L	10000	03/15/2021	AB21-0315-13

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**JCW-OW-18004**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-03	Collect Time:	02:23 PM
Matrix:	Groundwater		

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

Aliquot: 21-0213-03-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	ND		ug/L	1	03/15/2021	AB21-0315-14
Barium	71		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	642		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	179000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	ND		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	2		ug/L	1	03/15/2021	AB21-0315-14
Iron	131		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	ND		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	66700		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	ND		ug/L	2	03/15/2021	AB21-0315-14
Potassium	2400		ug/L	100	03/15/2021	AB21-0315-14
Selenium	ND		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	63300		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	ND		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-03-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/15/2021	AB21-0315-05

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

Aliquot: 21-0213-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	81500		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	226000		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-03-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	ND		ug/L	10	03/15/2021	AB21-0315-08

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**JCW-OW-18004**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-03	Collect Time:	02:23 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-03-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1000		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-03-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	500000		ug/L	10000	03/15/2021	AB21-0315-13
Alkalinity bicarbonate	500000		ug/L	10000	03/15/2021	AB21-0315-13
Alkalinity carbonate	ND		ug/L	10000	03/15/2021	AB21-0315-13

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-04	Collect Time:	11:57 AM
Matrix:	Groundwater		

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

Aliquot: 21-0213-04-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	7		ug/L	1	03/15/2021	AB21-0315-14
Barium	135		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	987		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	286000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	ND		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	2		ug/L	1	03/15/2021	AB21-0315-14
Iron	4800		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	39		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	65000		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	8		ug/L	2	03/15/2021	AB21-0315-14
Potassium	3070		ug/L	100	03/15/2021	AB21-0315-14
Selenium	ND		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	62200		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	ND		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-04-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/15/2021	AB21-0315-05

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

Aliquot: 21-0213-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	43700		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	535000		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-04-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	18		ug/L	10	03/15/2021	AB21-0315-08

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-04	Collect Time:	11:57 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-04-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1420		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-04-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	514000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity bicarbonate	514000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity carbonate	ND		ug/L	10000	03/18/2021	AB21-0318-03

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**JCW-MW-18006**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-05	Collect Time:	01:02 PM
Matrix:	Groundwater		

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

Aliquot: 21-0213-05-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	30		ug/L	1	03/15/2021	AB21-0315-14
Barium	477		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	2650		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	148000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	ND		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	ND		ug/L	1	03/15/2021	AB21-0315-14
Iron	5730		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	58		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	44500		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	3		ug/L	2	03/15/2021	AB21-0315-14
Potassium	7530		ug/L	100	03/15/2021	AB21-0315-14
Selenium	ND		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	77300		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	3		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-05-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/15/2021	AB21-0315-05

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

Aliquot: 21-0213-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	66100		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	57300		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-05-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	73		ug/L	10	03/16/2021	AB21-0316-17

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**JCW-MW-18006**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-05	Collect Time:	01:02 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-05-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	823		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-05-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	600000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity bicarbonate	600000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity carbonate	ND		ug/L	10000	03/18/2021	AB21-0318-03

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-50**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-06	Collect Time:	08:36 AM
Matrix:	Groundwater		

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

Aliquot: 21-0213-06-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	1		ug/L	1	03/15/2021	AB21-0315-14
Barium	116		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	1510		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	386000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	1		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	4		ug/L	1	03/15/2021	AB21-0315-14
Iron	2100		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	126		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	114000		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	ND		ug/L	2	03/15/2021	AB21-0315-14
Potassium	14200		ug/L	100	03/15/2021	AB21-0315-14
Selenium	1		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	120000		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	ND		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-06-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/15/2021	AB21-0315-05

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

Aliquot: 21-0213-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	86500		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	1130000		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-06-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	49		ug/L	10	03/16/2021	AB21-0316-17

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-50**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-06	Collect Time:	08:36 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-06-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	2360		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-06-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	493000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity bicarbonate	493000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity carbonate	ND		ug/L	10000	03/18/2021	AB21-0318-03

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-51**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-07	Collect Time:	09:33 AM
Matrix:	Groundwater		

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

Aliquot: 21-0213-07-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	11		ug/L	1	03/15/2021	AB21-0315-14
Barium	143		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	1040		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	293000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	ND		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	2		ug/L	1	03/15/2021	AB21-0315-14
Iron	1940		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	62		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	58100		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	ND		ug/L	2	03/15/2021	AB21-0315-14
Potassium	6830		ug/L	100	03/15/2021	AB21-0315-14
Selenium	1		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	89900		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	ND		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-07-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/15/2021	AB21-0315-05

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

Aliquot: 21-0213-07-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	91200		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	452000		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-07-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	33		ug/L	10	03/16/2021	AB21-0316-17

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-51**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-07	Collect Time:	09:33 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-07-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1530		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-07-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	634000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity bicarbonate	634000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity carbonate	ND		ug/L	10000	03/18/2021	AB21-0318-03

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-52**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-08	Collect Time:	10:27 AM
Matrix:	Groundwater		

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

Aliquot: 21-0213-08-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	ND		ug/L	1	03/15/2021	AB21-0315-14
Barium	123		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	1120		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	211000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	ND		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	2		ug/L	1	03/15/2021	AB21-0315-14
Iron	879		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	31		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	80200		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	ND		ug/L	2	03/15/2021	AB21-0315-14
Potassium	4010		ug/L	100	03/15/2021	AB21-0315-14
Selenium	1		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	73100		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	ND		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-08-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/15/2021	AB21-0315-05

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

Aliquot: 21-0213-08-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	51800		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	531000		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-08-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	13		ug/L	10	03/16/2021	AB21-0316-17

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-52**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-08	Collect Time:	10:27 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-08-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1390		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-08-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	469000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity bicarbonate	469000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity carbonate	ND		ug/L	10000	03/18/2021	AB21-0318-03

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-53**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-09	Collect Time:	11:06 AM
Matrix:	Groundwater		

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

Aliquot: 21-0213-09-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	ND		ug/L	1	03/15/2021	AB21-0315-14
Barium	202		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	3920		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	187000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	ND		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	2		ug/L	1	03/15/2021	AB21-0315-14
Iron	1180		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	52		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	46900		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	ND		ug/L	2	03/15/2021	AB21-0315-14
Potassium	5660		ug/L	100	03/15/2021	AB21-0315-14
Selenium	ND		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	85300		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	ND		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-09-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/15/2021	AB21-0315-05

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

Aliquot: 21-0213-09-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	52900		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	317000		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-09-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	66		ug/L	10	03/16/2021	AB21-0316-17

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-53**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-09	Collect Time:	11:06 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-09-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1110		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-09-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	500000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity bicarbonate	500000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity carbonate	ND		ug/L	10000	03/18/2021	AB21-0318-03

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-53R**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-10	Collect Time:	12:24 PM
Matrix:	Groundwater		

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

Aliquot: 21-0213-10-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	19		ug/L	1	03/15/2021	AB21-0315-14
Barium	202		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	1510		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	234000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	ND		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	2		ug/L	1	03/15/2021	AB21-0315-14
Iron	971		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	64		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	61500		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	ND		ug/L	2	03/15/2021	AB21-0315-14
Potassium	5390		ug/L	100	03/15/2021	AB21-0315-14
Selenium	ND		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	55800		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	ND		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-10-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/15/2021	AB21-0315-05

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

Aliquot: 21-0213-10-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	32500		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	227000		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-10-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	46		ug/L	10	03/16/2021	AB21-0316-17

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-53R**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-10	Collect Time:	12:24 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-10-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1140		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-10-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	704000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity bicarbonate	704000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity carbonate	ND		ug/L	10000	03/18/2021	AB21-0318-03

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-54R**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-11	Collect Time:	01:25 PM
Matrix:	Groundwater		

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

Aliquot: 21-0213-11-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	1		ug/L	1	03/15/2021	AB21-0315-14
Barium	118		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	2470		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	178000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	ND		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	1		ug/L	1	03/15/2021	AB21-0315-14
Iron	115		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	66		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	40600		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	ND		ug/L	2	03/15/2021	AB21-0315-14
Potassium	2430		ug/L	100	03/15/2021	AB21-0315-14
Selenium	ND		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	21700		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	ND		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-11-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/16/2021	AB21-0316-05

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

Aliquot: 21-0213-11-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	28000		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	79900		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-11-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	ND		ug/L	10	03/16/2021	AB21-0316-17

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Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-54R**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-11	Collect Time:	01:25 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-11-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	763		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-11-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	572000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity bicarbonate	572000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity carbonate	ND		ug/L	10000	03/18/2021	AB21-0318-03

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-55**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-12	Collect Time:	10:49 AM
Matrix:	Groundwater		

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

Aliquot: 21-0213-12-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	152		ug/L	1	03/15/2021	AB21-0315-14
Barium	366		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	593		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	151000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	ND		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	ND		ug/L	1	03/15/2021	AB21-0315-14
Iron	23500		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	28		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	27200		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	166		ug/L	5	03/15/2021	AB21-0315-14
Nickel	ND		ug/L	2	03/15/2021	AB21-0315-14
Potassium	3640		ug/L	100	03/15/2021	AB21-0315-14
Selenium	ND		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	88200		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	ND		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-12-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/16/2021	AB21-0316-05

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

Aliquot: 21-0213-12-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	16700		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	48000		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-12-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	359		ug/L	10	03/16/2021	AB21-0316-17

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-55**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-12	Collect Time:	10:49 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-12-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	794		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-12-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	664000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity bicarbonate	664000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity carbonate	ND		ug/L	10000	03/18/2021	AB21-0318-03

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**OW-55**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-13	Collect Time:	09:35 AM
Matrix:	Groundwater		

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

Aliquot: 21-0213-13-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	11		ug/L	1	03/15/2021	AB21-0315-14
Barium	301		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	1780		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	164000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	4		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	3		ug/L	1	03/15/2021	AB21-0315-14
Iron	3270		ug/L	20	03/15/2021	AB21-0315-14
Lead	2		ug/L	1	03/15/2021	AB21-0315-14
Lithium	22		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	28100		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	4		ug/L	2	03/15/2021	AB21-0315-14
Potassium	5740		ug/L	100	03/15/2021	AB21-0315-14
Selenium	ND		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	46900		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	5		ug/L	2	03/15/2021	AB21-0315-14
Zinc	13		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-13-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/16/2021	AB21-0316-05

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

Aliquot: 21-0213-13-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	21800		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	13600		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-13-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	152		ug/L	10	03/16/2021	AB21-0316-17

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**OW-55**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-13	Collect Time:	09:35 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-13-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	703		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-13-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	622000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity bicarbonate	622000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity carbonate	ND		ug/L	10000	03/18/2021	AB21-0318-03

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**OW-57R OUT**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-14	Collect Time:	12:29 PM
Matrix:	Groundwater		

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

Aliquot: 21-0213-14-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	ND		ug/L	1	03/15/2021	AB21-0315-14
Barium	70		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	1660		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	128000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	1		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	2		ug/L	1	03/15/2021	AB21-0315-14
Iron	46		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	26		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	64400		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	7		ug/L	5	03/15/2021	AB21-0315-14
Nickel	15		ug/L	2	03/15/2021	AB21-0315-14
Potassium	2360		ug/L	100	03/15/2021	AB21-0315-14
Selenium	ND		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	51800		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	ND		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-14-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/16/2021	AB21-0316-05

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

Aliquot: 21-0213-14-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	59000		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	86000		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-14-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	ND		ug/L	10	03/16/2021	AB21-0316-17

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**OW-57R OUT**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-14	Collect Time:	12:29 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-14-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	761		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-14-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	527000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity bicarbonate	527000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity carbonate	ND		ug/L	10000	03/18/2021	AB21-0318-03

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-58**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-15	Collect Time:	06:56 AM
Matrix:	Groundwater		

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

Aliquot: 21-0213-15-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	ND		ug/L	1	03/15/2021	AB21-0315-14
Barium	96		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	114		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	101000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	ND		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	ND		ug/L	1	03/15/2021	AB21-0315-14
Iron	5400		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	19		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	16500		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	ND		ug/L	2	03/15/2021	AB21-0315-14
Potassium	3480		ug/L	100	03/15/2021	AB21-0315-14
Selenium	2		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	164000		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	3		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-15-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/16/2021	AB21-0316-05

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

Aliquot: 21-0213-15-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	235000		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	16400		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-15-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	138		ug/L	10	03/16/2021	AB21-0316-17

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**MW-58**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-15	Collect Time:	06:56 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-15-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	838		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-15-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	333000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity bicarbonate	333000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity carbonate	ND		ug/L	10000	03/18/2021	AB21-0318-03

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**LH-104**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-16	Collect Time:	08:05 AM
Matrix:	Groundwater		

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

Aliquot: 21-0213-16-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	17		ug/L	1	03/15/2021	AB21-0315-14
Barium	248		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	10900		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	109000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	ND		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	1		ug/L	1	03/15/2021	AB21-0315-14
Iron	225		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	51		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	67100		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	159		ug/L	5	03/15/2021	AB21-0315-14
Nickel	ND		ug/L	2	03/15/2021	AB21-0315-14
Potassium	7720		ug/L	100	03/15/2021	AB21-0315-14
Selenium	ND		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	48600		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	2		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-16-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/16/2021	AB21-0316-05

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

Aliquot: 21-0213-16-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	42400		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	302000		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-16-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	27		ug/L	10	03/16/2021	AB21-0316-17

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**LH-104**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-16	Collect Time:	08:05 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-16-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	849		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-16-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	312000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity bicarbonate	312000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity carbonate	ND		ug/L	10000	03/18/2021	AB21-0318-03

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**DUP-01**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-17	Collect Time:	12:00 AM
Matrix:	Groundwater		

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

Aliquot: 21-0213-17-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	1		ug/L	1	03/15/2021	AB21-0315-14
Barium	115		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	1610		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	375000		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	1		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	4		ug/L	1	03/15/2021	AB21-0315-14
Iron	2190		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	128		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	116000		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	ND		ug/L	2	03/15/2021	AB21-0315-14
Potassium	14400		ug/L	100	03/15/2021	AB21-0315-14
Selenium	1		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	120000		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	ND		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-17-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/16/2021	AB21-0316-05

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

Aliquot: 21-0213-17-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	85600		ug/L	1000	03/15/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/15/2021	AB21-0315-06
Sulfate	1120000		ug/L	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-17-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	48		ug/L	10	03/16/2021	AB21-0316-17

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**DUP-01**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-17	Collect Time:	12:00 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-17-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	2380		mg/L	10	03/11/2021	AB21-0311-02

Alkalinity by SM 2320B

Aliquot: 21-0213-17-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	498000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity bicarbonate	498000		ug/L	10000	03/18/2021	AB21-0318-03
Alkalinity carbonate	ND		ug/L	10000	03/18/2021	AB21-0318-03

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**JCW-MW-18001 MS**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-18	Collect Time:	07:37 AM
Matrix:	Groundwater		

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

Aliquot: 21-0213-18-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	111		%	1	03/15/2021	AB21-0315-14
Arsenic	113		%	1	03/15/2021	AB21-0315-14
Barium	108		%	5	03/15/2021	AB21-0315-14
Beryllium	107		%	1	03/15/2021	AB21-0315-14
Boron	110		%	20	03/15/2021	AB21-0315-14
Cadmium	106		%	0.2	03/15/2021	AB21-0315-14
Calcium	124		%	1000	03/15/2021	AB21-0315-14
Chromium	103		%	1	03/15/2021	AB21-0315-14
Cobalt	100		%	6	03/15/2021	AB21-0315-14
Copper	99		%	1	03/15/2021	AB21-0315-14
Iron	98		%	20	03/15/2021	AB21-0315-14
Lead	100		%	1	03/15/2021	AB21-0315-14
Lithium	105		%	10	03/15/2021	AB21-0315-14
Magnesium	107		%	1000	03/15/2021	AB21-0315-14
Molybdenum	111		%	5	03/15/2021	AB21-0315-14
Nickel	97		%	2	03/15/2021	AB21-0315-14
Potassium	98		%	100	03/15/2021	AB21-0315-14
Selenium	90		%	1	03/15/2021	AB21-0315-14
Silver	103		%	0.2	03/15/2021	AB21-0315-14
Sodium	116		%	1000	03/15/2021	AB21-0315-14
Thallium	102		%	2	03/15/2021	AB21-0315-14
Vanadium	107		%	2	03/15/2021	AB21-0315-14
Zinc	97		%	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-18-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	94.3		%	0.2	03/16/2021	AB21-0316-05

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

Aliquot: 21-0213-18-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	97		%	1000	03/15/2021	AB21-0315-06
Fluoride	93		%	1000	03/15/2021	AB21-0315-06
Sulfate	103		%	1000	03/15/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-18-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	103		%	10	03/15/2021	AB21-0315-08

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**JCW-MW-18001 MS**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-18	Collect Time:	07:37 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0213-18-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	95		%	10000	03/15/2021	AB21-0315-13

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**JCW-MW-18001 MSD**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-19	Collect Time:	07:37 AM
Matrix:	Groundwater		

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

Aliquot: 21-0213-19-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	111		%	1	03/15/2021	AB21-0315-14
Arsenic	113		%	1	03/15/2021	AB21-0315-14
Barium	107		%	5	03/15/2021	AB21-0315-14
Beryllium	107		%	1	03/15/2021	AB21-0315-14
Boron	111		%	20	03/15/2021	AB21-0315-14
Cadmium	105		%	0.2	03/15/2021	AB21-0315-14
Calcium	121		%	1000	03/15/2021	AB21-0315-14
Chromium	102		%	1	03/15/2021	AB21-0315-14
Cobalt	99		%	6	03/15/2021	AB21-0315-14
Copper	99		%	1	03/15/2021	AB21-0315-14
Iron	95		%	20	03/15/2021	AB21-0315-14
Lead	100		%	1	03/15/2021	AB21-0315-14
Lithium	107		%	10	03/15/2021	AB21-0315-14
Magnesium	115		%	1000	03/15/2021	AB21-0315-14
Molybdenum	110		%	5	03/15/2021	AB21-0315-14
Nickel	96		%	2	03/15/2021	AB21-0315-14
Potassium	106		%	100	03/15/2021	AB21-0315-14
Selenium	89		%	1	03/15/2021	AB21-0315-14
Silver	102		%	0.2	03/15/2021	AB21-0315-14
Sodium	115		%	1000	03/15/2021	AB21-0315-14
Thallium	103		%	2	03/15/2021	AB21-0315-14
Vanadium	106		%	2	03/15/2021	AB21-0315-14
Zinc	98		%	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-19-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	93.7		%	0.2	03/16/2021	AB21-0316-05

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

Aliquot: 21-0213-19-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	98		%	1000	03/16/2021	AB21-0315-06
Fluoride	94		%	1000	03/16/2021	AB21-0315-06
Sulfate	103		%	1000	03/16/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-19-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	104		%	10	03/15/2021	AB21-0315-08

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**JCW-MW-18001 MSD**	Collect Date:	03/08/2021
Lab Sample ID:	21-0213-19	Collect Time:	07:37 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0213-19-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	94		%	10000	03/15/2021	AB21-0315-13

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**FB-01**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-20	Collect Time:	01:07 PM
Matrix:	Water		

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

Aliquot: 21-0213-20-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	ND		ug/L	1	03/15/2021	AB21-0315-14
Barium	ND		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	ND		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	ND		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	ND		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	ND		ug/L	1	03/15/2021	AB21-0315-14
Iron	ND		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	ND		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	ND		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	ND		ug/L	2	03/15/2021	AB21-0315-14
Potassium	ND		ug/L	100	03/15/2021	AB21-0315-14
Selenium	ND		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	ND		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	ND		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-20-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/16/2021	AB21-0316-05

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

Aliquot: 21-0213-20-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	03/16/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/16/2021	AB21-0315-06
Sulfate	ND		ug/L	1000	03/16/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-20-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	ND		ug/L	10	03/16/2021	AB21-0316-17

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**FB-01**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-20	Collect Time:	01:07 PM
Matrix:	Water		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-20-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	ND		mg/L	10	03/11/2021	AB21-0311-02

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**EB-01**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-21	Collect Time:	01:11 PM
Matrix:	Water		

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

Aliquot: 21-0213-21-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/15/2021	AB21-0315-14
Arsenic	ND		ug/L	1	03/15/2021	AB21-0315-14
Barium	ND		ug/L	5	03/15/2021	AB21-0315-14
Beryllium	ND		ug/L	1	03/15/2021	AB21-0315-14
Boron	ND		ug/L	20	03/15/2021	AB21-0315-14
Cadmium	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Calcium	ND		ug/L	1000	03/15/2021	AB21-0315-14
Chromium	ND		ug/L	1	03/15/2021	AB21-0315-14
Cobalt	ND		ug/L	6	03/15/2021	AB21-0315-14
Copper	ND		ug/L	1	03/15/2021	AB21-0315-14
Iron	ND		ug/L	20	03/15/2021	AB21-0315-14
Lead	ND		ug/L	1	03/15/2021	AB21-0315-14
Lithium	ND		ug/L	10	03/15/2021	AB21-0315-14
Magnesium	ND		ug/L	1000	03/15/2021	AB21-0315-14
Molybdenum	ND		ug/L	5	03/15/2021	AB21-0315-14
Nickel	ND		ug/L	2	03/15/2021	AB21-0315-14
Potassium	ND		ug/L	100	03/15/2021	AB21-0315-14
Selenium	ND		ug/L	1	03/15/2021	AB21-0315-14
Silver	ND		ug/L	0.2	03/15/2021	AB21-0315-14
Sodium	ND		ug/L	1000	03/15/2021	AB21-0315-14
Thallium	ND		ug/L	2	03/15/2021	AB21-0315-14
Vanadium	ND		ug/L	2	03/15/2021	AB21-0315-14
Zinc	ND		ug/L	10	03/15/2021	AB21-0315-14

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0213-21-C01-A02 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/16/2021	AB21-0316-05

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

Aliquot: 21-0213-21-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	03/16/2021	AB21-0315-06
Fluoride	ND		ug/L	1000	03/16/2021	AB21-0315-06
Sulfate	ND		ug/L	1000	03/16/2021	AB21-0315-06

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0213-21-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	ND		ug/L	10	03/16/2021	AB21-0316-17

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Analytical Report

Report Date: 03/22/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0213**
Field Sample ID:	**EB-01**	Collect Date:	03/09/2021
Lab Sample ID:	21-0213-21	Collect Time:	01:11 PM
Matrix:	Water		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0213-21-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	ND		mg/L	10	03/11/2021	AB21-0311-02

Analytical Report

Report Date: 03/22/21

Data Qualifiers	Exception Summary
	No exceptions occured.

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-0213

Inspection Date: 03-10-2021 **Inspection By:** CUH

Sample Origin/Project Name: JCW Porewater Q1-2021

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 4.2-5.6°C 4.6-5.8°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)	38				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	63				
24 mL vial (glass)					
250 ~~500~~ mL (plastic)	19				
Other _____					

Pg. 2 & 2 not needed

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

SAMPLING SITE: JCW Porewater – 2021 Q1

PROJECT NUMBER: 21-0213

SAMPLING TEAM:

DATE SHIPPED:

SITE SKETCHED ATTACHED? CIRCLE ONE: YES NO

Page 1 of 2

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	Total Phosphorus	TDS	Alkalinity				REMARKS
21-0213-01	3/8/21	0737	GW	JCW-MW-18001		6	X	X	X	X	X				
-02	3/8/21	1501	GW	JCW-MW-18004		6	X	X	X	X	X				
-03	3/8/21	1423	GW	JCW-OW-18004		6	X	X	X	X	X				
-04	3/9/21	1157	GW	JCW-MW-18005		6	X	X	X	X	X				
-05	3/9/21	1300	GW	JCW-MW-18006		6	X	X	X	X	X				
-06	3/8/21	0836	GW	MW-50		6	X	X	X	X	X				
-07	3/8/21	0933	GW	MW-51		6	X	X	X	X	X				
-08	3/8/21	1027	GW	MW-52		6	X	X	X	X	X				
-09	3/8/21	1106	GW	MW-53		6	X	X	X	X	X				
-10	3/8/21	1224	GW	MW-53R		6	X	X	X	X	X				
-11	3/8/21	1325	GW	MW-54R		6	X	X	X	X	X				
-12	3/9/21	1049	GW	MW-55		6	X	X	X	X	X				

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
[signature]	3/9/21 1544	[signature]
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)

COMMENTS: 4.2-5.6°C on ice

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SAMPLING SITE: **JCW Porewater – 2021 Q1**

PROJECT NUMBER: **21-0213**

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	Total Phosphorus	TDS	Alkalinity				REMARKS
21-0213-13	3/9/21	0935	GW	OW-55		6	x	x	x	x	x				
-14	3/9/21	1229	GW	OW-57R OUT		6	x	x	x	x	x				
-15	3/9/21	0656	GW	MW-58		6	x	x	x	x	x				
-16	3/9/21	0805	GW	LH-104		6	x	x	x	x	x				
-17	3/8/21	—	GW	DUP-01		6	x	x	x	x	x				
-18	3/8/21	0733	GW	JCW-MW-18001 MS		5	x	x	x		x				
-19	" "	0733	GW	JCW-MW-18001 MSD		5	x	x	x		x				
-20	3/9/21	1307	W	FB-01		4	x	x	x	x					
-21	3/9/21	1311	W	EB-01		4	x	x	x	x					

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)	COMMENTS
[signature]	3/9/21 1546	CASCOTT Hansen	4.6-5.8°C on ice
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: March 23, 2021

Subject: PART 115 GROUNDWATER MONITORING – LABORATORY LEACHATE – 2021

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: 21-0311

Four fly ash samples were collected on March 8th and 9th, 2021, from the DE Karn Unit 1 and Unit 2, for the annual laboratory leachate requirement, as specified in the Hydrogeological Monitoring Plan for the site. The samples were received for SPLP analysis by the Chemistry Department of Laboratory Services on March 09, 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. Please note that the SPLP extraction is not included in the scope of accreditation, only the individual analytes tested. 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

Testing performed in accordance with the A2LA scope of accredidation specified in the listed certificate.
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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.

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 in this report are presented by laboratory sample ID, container, and aliquot number. Results for the field blanks, field duplicate and recoveries of the field matrix spike & matrix spike duplicate samples are included in the results section. 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 used 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: Sodium and Boron were found in the SPLP Extraction Blank. Both analytes are common in the glass fiber filters used in the preparatory extraction. Sodium measured 5700 ug/L and Boron measured 246 ug/L; all samples have been flagged (X) to indicate the potential bias.

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: 2021 Part 115 DEK Fly Ash HMP Laboratory Leachate
Date Received: 3/09/2021
Chemistry Project: 21-0311

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-0311-01	Fly Ash #1 (Unit 2 Sample 1)	Fly Ash	03/08/2021 02:30 PM	DEK Solid Waste Disposal Area
21-0311-02	Fly Ash #2 (Unit 2 Sample 2)	Fly Ash	03/08/2021 02:30 PM	DEK Solid Waste Disposal Area
21-0311-03	Fly Ash #3 (Unit 1 Sample 1)	Fly Ash	03/09/2021 09:30 AM	DEK Solid Waste Disposal Area
21-0311-04	Fly Ash #4 (Unit 1 Sample 2)	Fly Ash	03/09/2021 10:00 AM	DEK Solid Waste Disposal Area

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Analytical Report

Report Date: 03/23/21

Sample Site:	**DEK Solid Waste Disposal Area (392503)**	Laboratory Project:	**21-0311**
Field Sample ID:	**Fly Ash #1 (Unit 2 Sample 1)**	Collect Date:	03/08/2021
Lab Sample ID:	21-0311-01	Collect Time:	02:30 PM
Matrix:	Fly Ash		

SPLP Extraction by EPA 1312

Aliquot: 21-0311-01-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
SPLP Extraction	complete				03/16/2021	AB21-0315-04

SPLP Laboratory Leachate Metals by EPA 1312/6020A

Aliquot: 21-0311-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/18/2021	AB21-0316-20
Arsenic	1		ug/L	1	03/18/2021	AB21-0316-20
Barium	2400		ug/L	5	03/18/2021	AB21-0316-20
Beryllium	ND		ug/L	1	03/18/2021	AB21-0316-20
Boron	260	X	ug/L	20	03/18/2021	AB21-0316-20
Cadmium	ND		ug/L	0.2	03/18/2021	AB21-0316-20
Chromium	99		ug/L	1	03/18/2021	AB21-0316-20
Cobalt	ND		ug/L	6	03/18/2021	AB21-0316-20
Copper	2		ug/L	2	03/18/2021	AB21-0316-20
Iron	45		ug/L	20	03/18/2021	AB21-0316-20
Lead	ND		ug/L	1	03/18/2021	AB21-0316-20
Lithium	30		ug/L	10	03/18/2021	AB21-0316-20
Molybdenum	150		ug/L	5	03/18/2021	AB21-0316-20
Nickel	ND		ug/L	2	03/18/2021	AB21-0316-20
Selenium	22		ug/L	1	03/18/2021	AB21-0316-20
Silver	ND		ug/L	0.2	03/18/2021	AB21-0316-20
Sodium	44900	X	ug/L	1000	03/18/2021	AB21-0316-20
Thallium	ND		ug/L	2	03/18/2021	AB21-0316-20
Vanadium	59		ug/L	2	03/18/2021	AB21-0316-20
Zinc	ND		ug/L	10	03/18/2021	AB21-0316-20

SPLP Sulfate by EPA 300.0

Aliquot: 21-0311-01-C01-A03 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Sulfate	376000		ug/L	1000	03/16/2021	AB21-0316-02

SPLP Mercury by EPA 1312 / 7470A

Aliquot: 21-0311-01-C01-A04 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/16/2021	AB21-0316-14

SPLP Alkalinity Bicarbonate by EPA 1312 / SM 2330B

Aliquot: 21-0311-01-C01-A05 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
SPLP Alkalinity, Bicarbonate	ND		ug/L	10000	03/16/2021	AB21-0316-16

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Analytical Report

Report Date: 03/23/21

Sample Site:	**DEK Solid Waste Disposal Area (392503)**	Laboratory Project:	**21-0311**
Field Sample ID:	**Fly Ash #1 (Unit 2 Sample 1)**	Collect Date:	03/08/2021
Lab Sample ID:	21-0311-01	Collect Time:	02:30 PM
Matrix:	Fly Ash		

SPLP Phosphorus by EPA 1312 / SM 4500-P; B5-E

Aliquot: 21-0311-01-C01-A06 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
SPLP Phosphorus	ND		ug/L	10	03/16/2021	AB21-0316-18

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Analytical Report

Report Date: 03/23/21

Sample Site:	**DEK Solid Waste Disposal Area (392503)**	Laboratory Project:	**21-0311**
Field Sample ID:	**Fly Ash #2 (Unit 2 Sample 2)**	Collect Date:	03/08/2021
Lab Sample ID:	21-0311-02	Collect Time:	02:30 PM
Matrix:	Fly Ash		

SPLP Extraction by EPA 1312

Aliquot: 21-0311-02-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
SPLP Extraction	complete				03/16/2021	AB21-0315-04

SPLP Laboratory Leachate Metals by EPA 1312/6020A

Aliquot: 21-0311-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/18/2021	AB21-0316-20
Arsenic	1		ug/L	1	03/18/2021	AB21-0316-20
Barium	2400		ug/L	5	03/18/2021	AB21-0316-20
Beryllium	ND		ug/L	1	03/18/2021	AB21-0316-20
Boron	230	X	ug/L	20	03/18/2021	AB21-0316-20
Cadmium	ND		ug/L	0.2	03/18/2021	AB21-0316-20
Chromium	110		ug/L	1	03/18/2021	AB21-0316-20
Cobalt	ND		ug/L	6	03/18/2021	AB21-0316-20
Copper	ND		ug/L	2	03/18/2021	AB21-0316-20
Iron	40		ug/L	20	03/18/2021	AB21-0316-20
Lead	ND		ug/L	1	03/18/2021	AB21-0316-20
Lithium	30		ug/L	10	03/18/2021	AB21-0316-20
Molybdenum	150		ug/L	5	03/18/2021	AB21-0316-20
Nickel	ND		ug/L	2	03/18/2021	AB21-0316-20
Selenium	21		ug/L	1	03/18/2021	AB21-0316-20
Silver	ND		ug/L	0.2	03/18/2021	AB21-0316-20
Sodium	43600	X	ug/L	1000	03/18/2021	AB21-0316-20
Thallium	ND		ug/L	2	03/18/2021	AB21-0316-20
Vanadium	54		ug/L	2	03/18/2021	AB21-0316-20
Zinc	ND		ug/L	10	03/18/2021	AB21-0316-20

SPLP Sulfate by EPA 300.0

Aliquot: 21-0311-02-C01-A03 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Sulfate	331000		ug/L	1000	03/16/2021	AB21-0316-02

SPLP Mercury by EPA 1312 / 7470A

Aliquot: 21-0311-02-C01-A04 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/16/2021	AB21-0316-14

SPLP Alkalinity Bicarbonate by EPA 1312 / SM 2330B

Aliquot: 21-0311-02-C01-A05 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
SPLP Alkalinity, Bicarbonate	ND		ug/L	10000	03/16/2021	AB21-0316-16

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Analytical Report

Report Date: 03/23/21

Sample Site:	**DEK Solid Waste Disposal Area (392503)**	Laboratory Project:	**21-0311**
Field Sample ID:	**Fly Ash #2 (Unit 2 Sample 2)**	Collect Date:	03/08/2021
Lab Sample ID:	21-0311-02	Collect Time:	02:30 PM
Matrix:	Fly Ash		

SPLP Phosphorus by EPA 1312 / SM 4500-P; B5-E

Aliquot: 21-0311-02-C01-A06 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
SPLP Phosphorus	ND		ug/L	10	03/16/2021	AB21-0316-18

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Analytical Report

Report Date: 03/23/21

Sample Site:	**DEK Solid Waste Disposal Area (392503)**	Laboratory Project:	**21-0311**
Field Sample ID:	**Fly Ash #3 (Unit 1 Sample 1)**	Collect Date:	03/09/2021
Lab Sample ID:	21-0311-03	Collect Time:	09:30 AM
Matrix:	Fly Ash		

SPLP Extraction by EPA 1312

Aliquot: 21-0311-03-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
SPLP Extraction	complete				03/16/2021	AB21-0315-04

SPLP Laboratory Leachate Metals by EPA 1312/6020A

Aliquot: 21-0311-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/18/2021	AB21-0316-20
Arsenic	ND		ug/L	1	03/18/2021	AB21-0316-20
Barium	4200		ug/L	5	03/18/2021	AB21-0316-20
Beryllium	ND		ug/L	1	03/18/2021	AB21-0316-20
Boron	140	X	ug/L	20	03/18/2021	AB21-0316-20
Cadmium	ND		ug/L	0.2	03/18/2021	AB21-0316-20
Chromium	130		ug/L	1	03/18/2021	AB21-0316-20
Cobalt	ND		ug/L	6	03/18/2021	AB21-0316-20
Copper	3		ug/L	2	03/18/2021	AB21-0316-20
Iron	42		ug/L	20	03/18/2021	AB21-0316-20
Lead	ND		ug/L	1	03/18/2021	AB21-0316-20
Lithium	33		ug/L	10	03/18/2021	AB21-0316-20
Molybdenum	100		ug/L	5	03/18/2021	AB21-0316-20
Nickel	3		ug/L	2	03/18/2021	AB21-0316-20
Selenium	26		ug/L	1	03/18/2021	AB21-0316-20
Silver	ND		ug/L	0.2	03/18/2021	AB21-0316-20
Sodium	31700	X	ug/L	1000	03/18/2021	AB21-0316-20
Thallium	ND		ug/L	2	03/18/2021	AB21-0316-20
Vanadium	63		ug/L	2	03/18/2021	AB21-0316-20
Zinc	21		ug/L	10	03/18/2021	AB21-0316-20

SPLP Sulfate by EPA 300.0

Aliquot: 21-0311-03-C01-A03 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Sulfate	200000		ug/L	1000	03/16/2021	AB21-0316-02

SPLP Mercury by EPA 1312 / 7470A

Aliquot: 21-0311-03-C01-A04 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/16/2021	AB21-0316-14

SPLP Alkalinity Bicarbonate by EPA 1312 / SM 2330B

Aliquot: 21-0311-03-C01-A05 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
SPLP Alkalinity, Bicarbonate	ND		ug/L	10000	03/16/2021	AB21-0316-16

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Analytical Report

Report Date: 03/23/21

Sample Site:	**DEK Solid Waste Disposal Area (392503)**	Laboratory Project:	**21-0311**
Field Sample ID:	**Fly Ash #3 (Unit 1 Sample 1)**	Collect Date:	03/09/2021
Lab Sample ID:	21-0311-03	Collect Time:	09:30 AM
Matrix:	Fly Ash		

SPLP Phosphorus by EPA 1312 / SM 4500-P; B5-E

Aliquot: 21-0311-03-C01-A06 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
SPLP Phosphorus	ND		ug/L	10	03/16/2021	AB21-0316-18

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Analytical Report

Report Date: 03/23/21

Sample Site:	**DEK Solid Waste Disposal Area (392503)**	Laboratory Project:	**21-0311**
Field Sample ID:	**Fly Ash #4 (Unit 1 Sample 2)**	Collect Date:	03/09/2021
Lab Sample ID:	21-0311-04	Collect Time:	10:00 AM
Matrix:	Fly Ash		

SPLP Extraction by EPA 1312

Aliquot: 21-0311-04-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
SPLP Extraction	complete				03/16/2021	AB21-0315-04

SPLP Laboratory Leachate Metals by EPA 1312/6020A

Aliquot: 21-0311-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	03/18/2021	AB21-0316-20
Arsenic	ND		ug/L	1	03/18/2021	AB21-0316-20
Barium	3900		ug/L	5	03/18/2021	AB21-0316-20
Beryllium	ND		ug/L	1	03/18/2021	AB21-0316-20
Boron	120	X	ug/L	20	03/18/2021	AB21-0316-20
Cadmium	ND		ug/L	0.2	03/18/2021	AB21-0316-20
Chromium	120		ug/L	1	03/18/2021	AB21-0316-20
Cobalt	ND		ug/L	6	03/18/2021	AB21-0316-20
Copper	3		ug/L	2	03/18/2021	AB21-0316-20
Iron	48		ug/L	20	03/18/2021	AB21-0316-20
Lead	ND		ug/L	1	03/18/2021	AB21-0316-20
Lithium	34		ug/L	10	03/18/2021	AB21-0316-20
Molybdenum	95		ug/L	5	03/18/2021	AB21-0316-20
Nickel	ND		ug/L	2	03/18/2021	AB21-0316-20
Selenium	26		ug/L	1	03/18/2021	AB21-0316-20
Silver	ND		ug/L	0.2	03/18/2021	AB21-0316-20
Sodium	28300	X	ug/L	1000	03/18/2021	AB21-0316-20
Thallium	ND		ug/L	2	03/18/2021	AB21-0316-20
Vanadium	61		ug/L	2	03/18/2021	AB21-0316-20
Zinc	ND		ug/L	10	03/18/2021	AB21-0316-20

SPLP Sulfate by EPA 300.0

Aliquot: 21-0311-04-C01-A03 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Sulfate	195000		ug/L	1000	03/16/2021	AB21-0316-02

SPLP Mercury by EPA 1312 / 7470A

Aliquot: 21-0311-04-C01-A04 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	03/16/2021	AB21-0316-14

SPLP Alkalinity Bicarbonate by EPA 1312 / SM 2330B

Aliquot: 21-0311-04-C01-A05 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
SPLP Alkalinity, Bicarbonate	ND		ug/L	10000	03/16/2021	AB21-0316-16

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Analytical Report

Report Date: 03/23/21

Sample Site:	**DEK Solid Waste Disposal Area (392503)**	Laboratory Project:	**21-0311**
Field Sample ID:	**Fly Ash #4 (Unit 1 Sample 2)**	Collect Date:	03/09/2021
Lab Sample ID:	21-0311-04	Collect Time:	10:00 AM
Matrix:	Fly Ash		

SPLP Phosphorus by EPA 1312 / SM 4500-P; B5-E

Aliquot: 21-0311-04-C01-A06 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
SPLP Phosphorus	ND		ug/L	10	03/16/2021	AB21-0316-18

Analytical Report

Report Date: 03/23/21

Data Qualifiers	Exception Summary
X = Sodium and Boron found in the SPLP Extraction Blank.	No other exceptions occured.

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-0311

Inspection Date: 03/10/2021 **Inspection By:** EB

Sample Origin/Project Name: Karn Ash Samples

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 N/A Dented _____ Leaking _____

Other _____

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

Shipping Containers Received: Opened N/A 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 N/A Samples Received on Ice: Yes ____ No ____

M&TE # and Expiration N/A

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

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

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

SAMPLING SITE: Karn Ash Samples

PROJECT NUMBER: 21-0311

SAMPLING TEAM: Caleb Batts, Jason Jacobsen

DATE SHIPPED: 3-9-2021

SITE SKETCH ATTACHED? CIRCLE ONE: YES NO

ANALYSIS REQUESTED

PAGE 1 OF 1

SEND REPORT TO: Harold Register

PHONE:

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH	# OF CONTAINERS	REMARKS
21-0311-01 -02	3-8-21	14:30	Fly Ash	K2 - 1&2 #1 #2	N/A	2	contact JR for analysis
21-0311-03 -04	3-9-21	09:30 10:00	Fly Ash	K1 - 1&2 #3 #4	N/A	2	contact JR for analysis

RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED BY: (SIGNATURE)
Jason Jacobsen	3-9-21 / 1300	[signature] 3/9/21 1300
[signature]	3/9/21 1540	[signature]

COMMENTS

ORIGINAL TO LAB COPY TO CUSTOMER

Appendix F
Field Records

TRC

PROJECT NAME: CEC Weadock LF; 2021 GW Complience

PROJECT NUMBER: 418426.0000.0000

PROJECT MANAGER: Darby Litz

SITE LOCATION: 2742 Weadock Hwy
Essexville,MI 48732

DATES OF FIELDWORK: 3/1/21 TO 3/1/21

PURPOSE OF FIELDWORK: First Quarter 2021 HMP Sampling and Supplemental CCR sampling

WORK PERFORMED BY: Javier Jasso

SIGNED 3/10/21 DATE

CHECKED BY 3/16/2021 DATE

TRC

GENERAL NOTES

PROJECT NAME: CEC Weadock LF: 2021 GW Com	DATE: 3/16/21	TIME ARRIVED: 0835
PROJECT NUMBER: 418426.0000.0000	AUTHOR: Javier Jasso	TIME LEFT: 1630

WEATHER

TEMPERATURE: 39 °F WIND: 20to25 MPH VISIBILITY: cloud

WORK / SAMPLING PERFORMED

waterlevels

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN

COMMUNICATION

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

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
~~purge water~~ SR		

SIGNED 3/16/21 DATE

CHECKED BY 3/16/2021 DATE

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME: CEC Weadock LF; 2021 gw Co	DATE: 3/8/21	TIME ARRIVED: 0619
PROJECT NUMBER: 418426.0000.0000	AUTHOR: Javier Jasso	TIME LEFT: 1520

WEATHER

TEMPERATURE: 35 °F WIND: 15 MPH VISIBILITY: cloudy

WORK / SAMPLING PERFORMED

water levels

wells sampled 18001, MS + MSD, S0, Dup #01, S1, S2, S3, S3R, S4R
GW-18004, MW-18004

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
non	

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Batts	~~dte~~ CEC	on site
Jason	~~dte~~ CEC	on site
	JK	

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
~~N/A~~ JK	DNM	purged to ground
purge water		

SIGNED [signature] DATE 3/10/21

CHECKED BY [signature] DATE 3/16/2021

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME:	CEC Weadock LF; 2021 gw Co	DATE:	3/9/21	TIME ARRIVED:	0608
PROJECT NUMBER:	418426.0000.0000	AUTHOR:	Javier Jasso	TIME LEFT:	1330

WEATHER

TEMPERATURE: 38 °F WIND: 10 MPH VISIBILITY: Clear

WORK / SAMPLING PERFORMED

water levels

wells sampled MW-58, LH-104, OW 55, 55, 18005, 57 Rout 18004, EB01, FB01

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
NONE	

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Batts	~~dte~~ CEC	on site
Jason	~~dte~~ CEC	on site

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
purge water	NM	purged to ground

3/10/21
SIGNED DATE

3/16/2021
CHECKED BY DATE

REVISED 04/2019

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Weadock LF: 2021 GW Compliance	MODEL: K10 DSS	SAMPLER: JJ
PROJECT NO.:	418426.0000.0000	SERIAL #: AA	DATE: 3/8/21

PH CALIBRATION CHECK

pH 7 (LOT #): 06K 445 (EXP. DATE): 11/22	pH 4 / 10 (LOT #): 06K 004 (EXP. DATE): 11/22	CAL. RANGE	TIME
POST-CAL. READING / STANDARD	POST-CAL. READING / STANDARD		
700 / 700	400 / 400	☑ WITHIN RANGE	0400
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 06I1135 (EXP. DATE): 9/21	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING / STANDARD			
1413 / 1413	NA	☑ WITHIN RANGE	0400
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 19K 100016 (EXP. DATE): 9/24	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING / STANDARD			
223 / 223	20.0	☑ WITHIN RANGE	0400
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING /SATURATED AIR			
8.85 / 8.85	20.	☑ WITHIN RANGE	0400
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A 9317 (EXP. DATE): 11/21	(LOT #): (EXP. DATE):	CAL. RANGE	TIME
POST-CAL. READING / STANDARD	POST-CAL. READING / STANDARD		
0 / 0	/	☑ WITHIN RANGE	0400
200 / 200	/	☑ WITHIN RANGE	0400
/	/	☐ 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 [signature] 3/10/21 DATE

CHECKED BY [signature] 3/16/2021 DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Weadock LF: 2021 GW Compliance	MODEL:	Pro DSS	SAMPLER:	JJ
PROJECT NO.:	418426.0000.0000	SERIAL #:	AA	DATE:	3/9/21

PH CALIBRATION CHECK

pH 7 (LOT #) 06K445 (EXP. DATE): 11/22 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 06K004 (EXP. DATE): 11/22 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
700 / 700	400 / 400	☑ WITHIN RANGE	0530
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 06F135 (EXP. DATE): 9/21 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL RANGE	TIME
1413 / 1413	N A	☑ WITHIN RANGE	0530
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 19H0016 (EXP. DATE): 4/24 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
220 / 220	22	☑ WITHIN RANGE	0530
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
8.51 / 8.51	22	☑ WITHIN RANGE	0530
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A937 (EXP. DATE): 11/21 POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
0 / 0	/	☑ WITHIN RANGE	0530
200 / 200	/	☑ WITHIN RANGE	0530
/	/	☐ 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 [signature] 3/10/21 DATE

CHECKED BY [signature] 3/16/2021 DATE

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC Weadock LF: 2021 GW Compliance	DATE:	3/1/21
PROJECT NUMBER:	418426.0000.0000	AUTHOR:	Javier Jasso

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
JCW-MW-18001	0843	TOC	15.81	23.35	NA	NM
JCW-MW-18004	0932	TOC	11.62	14.72	NA	NM
JCW-MW-18005	0936	TOC	8.23	16.28	NA	NM
JCW-MW-18006	0952	TOC	13.94	23.01	NA	NM
JCW-OW-18001	0846	TOC	6.10	20.25	NA	NM
JCW-OW-18002	0848	TOC	10.08	19.41	NA	NM
JCW-OW-18003	0857	TOC	7.38	18.67	NA	NM
JCW-OW-18004	0924	TOC	6.86	14.85	NA	NM
JCW-OW-18006	0953	TOC	8.10	23.45	NA	NM
LH-103	1000	TOC	15.21	22.16	NA	NM
LH-104	0937	TOC	6.64	14.00	NA	NM
MW-20	0937	TOC	6.24	14.00	NA	NM
MW-50	0847	TOC	12.78	19.40	NA	NM
MW-51	0851	TOC	13.40	20.0	NA	NM
MW-52	0856	TOC	14.00	19.74	NA	NM
MW-53	0903	TOC	12.81	18.18	NA	NM
MW-53R	0907	TOC	13.31	18.80	NA	NM
MW-54R	0914	TOC	12.89	17.27	NA	NM
MW-55	0932	TOC	12.97	16.38	NA	NM
MW-58	1025	TOC	5.08	18.28	NA	NM
OW-51	0852	TOC	9.91	17.28	NA	NM
OW-53	0904	TOC	6.27	18.06	NA	NM
OW-54	0911	TOC	6.40	16.48	NA	NM
OW-55	0933	TOC	5.69	18.47	NA	NM
OW-56R	0940	TOC	5.90	20.27	NA	NM

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

SIGNED 3/10/21 DATE

CHECKED 3/16/2021 DATE

REVISED 04/2019

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC Weadock LF: 2021 GW Compliance	DATE: 3/1/21	
PROJECT NUMBER:	418426.0000.0000	AUTHOR:	Javier Jasso

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
OW-57 IN	0948	TOC	6.26	19.60	NA	NM
OW-57R IN	0947	TOC	6.93	19.60	NA	NM
OW-57 OUT	0946	TOC	9.57	19.48	NA	NM
OW-57R OUT	945	TOC	8.90	19.60	NA	NM
OW-61	1009	TOC	20.69	37.07	NA	NM
OW-63	1003	TOC	26.65	37.00	NA	NM
JCW-MW15003	0837		9.80	100 Plus		
JCW MW15022	0900		13.00	100 plus		
JCW MW15026	0910		14.20	100 plus		
MW-21R	0911		13.10	19.87		
JCW MW15021	0924		13.97	100 plus		
~~MW-20~~	~~0937~~		~~6.24~~	~~19.00~~		
OW-56	0942		5.92	19.21		
MW-68	1003		25.45	37.10		
MW-67	1009		20.69	37.07		
MW-19	1016		9.38	20.83		

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

SIGNED 3/10/21 DATE

CHECKED 3/16/2021 DATE

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/10/21	BY: JK	DATE: 3/16/21

SAMPLE ID: JCWMW-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: 0637	DATE: 3/8/21	SAMPLE	TIME: 0772	DATE: 3/8/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER _____		PH: 6.90 SU	CONDUCTIVITY: 2316 umhos/cm	
			ORP: -86.3 mV	DO: 1.87 mg/L	
DEPTH TO WATER: 13.94 T/ PVC			TURBIDITY: 3.99 NTU		
DEPTH TO BOTTOM: 23.85 T/ PVC			☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: n/a	☐ LITERS ☐ GALLONS		TEMPERATURE: 10.1 °C	OTHER: _____	
VOLUME REMOVED: 15	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: yes	
COLOR: Cloudy	ODOR: yes		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)
0637	200	4.05	2659	100.0	9.71	750.0	10.0	13.94	INITIAL
0642		6.65	2764	-54.0	2.25	76.0	11.0	16.03	1
0442		6.90	2674	-75.1	2.10	12.35	10.5	16.05	2
0447		6.90	2340	-66.0	2.00	12.57	10.3	16.05	3
0452		6.90	2335	-64.0	1.97	10.75	10.1	16.08	4
0457		6.89	2340	-70.0	1.91	12.75	10.3	16.10	5
0202		6.89	2343	-73.0	1.90	9.70	10.1	16.10	6
0207		6.90	2350	-78.3	1.89	9.65	10.1	16.10	7
0212		6.90	2348	-81.0	1.89	6.81	10.1	16.10	8
0217		6.90	2334	-83.0	1.88	4.50	10.0	16.10	9

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	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N	
3	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N	
3	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N	
3	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N	
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N	

SHIPPING METHOD: fed ex or drop o	DATE SHIPPED: 3/9/21	AIRBILL NUMBER: n/a
COC NUMBER: n/a	SIGNATURE:	DATE SIGNED: 3/10/21

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME:	CEC Weadock LF; 2021 GW Co	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/10/21	BY: JK	DATE: 3/16/21

SAMPLE ID: JCW-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)
0722	24	6.90	2330	-85.9	1.87	4.05	10.1	16.10	10
0727		6.90	2320	-86.1	1.86	3.91	10.1	16.10	11
0732		6.90	2316	-86.3	1.87	3.94	10.1	16.10	12

SIGNATURE: 3/10/21

DATE SIGNED: _____

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/10/21	BY: JK	DATE: 3/16/21

SAMPLE ID: MW 50 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0756	DATE: 3/8/21	SAMPLE	TIME: 0836	DATE: 3/8/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.90 SU	CONDUCTIVITY: 3048 umhos/cm	
			ORP: -75.9 mV	DO: 1.4 mg/L	
DEPTH TO WATER: 12.65 T/ PVC			TURBIDITY: 1.00 NTU		
DEPTH TO BOTTOM: 19.40 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: n/a	☐ LITERS ☐ GALLONS		TEMPERATURE: 9.1 °C	OTHER:	
VOLUME REMOVED: 8	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: none	
COLOR: cloudy	ODOR: none		FILTRATE (0.45 um) ☐ YES ☐ NO		
TURBIDITY			FILTRATE COLOR:	FILTRATE ODOR:	
☐ NONE ☐ SLIGHT ☑ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD ☑ DUP- 01		
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)
0756	200	7.49	3180	-5.6	9.71	40.0	7.1	12.61	INITIAL
0801		6.99	3198	-52.0	2.64	20.71	8.6	12.70	1
0806		6.95	3130	-68.0	2.00	16.71	8.7	12.70	2
0811		6.94	3108	-72.0	2.04	7.80	8.9	12.70	3
0816		6.93	3088	-75.0	1.98	2.60	8.9	12.70	4
0821		6.92	3066	-74.9	1.96	2.55	8.9	12.72	5
0826		6.91	3060	-75.9	1.93	1.15	9.0	12.72	6
0831		6.91	3045	-75.8	1.92	1.10	9.1	12.72	7
0836		6.90	3048	-75.9	1.92	1.00	9.1	12.72	8

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
4	125 mL	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
2	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
2	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
2	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
2	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o	DATE SHIPPED: 3/9/21	AIRBILL NUMBER: n/a
COC NUMBER: n/a	SIGNATURE:	DATE SIGNED: 3/10/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/16/21	BY: SK	DATE: 3/16/21

SAMPLE ID: MW-51 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0853	DATE: 3/16/21	SAMPLE	TIME: 0933	DATE: 3/16/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 13.46 T/ PVC

DEPTH TO BOTTOM: 20.00 T/ PVC

WELL VOLUME: n/a ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 8 ☑ LITERS ☐ GALLONS

COLOR: Brown ODOR: None

TURBIDITY: ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 6.99 SU CONDUCTIVITY: 2273 umhos/cm

ORP: -66.0 mV DO: 2.29 mg/L

TURBIDITY: 0.15 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 8.1 °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)
0853	200	7.61	1107	22.8	10.0	250.0	6.8	13.46	INITIAL
0858		7.17	2193	22.7	3.97	44.70	7.7	13.57	1.0
0903		7.08	2236	-41.1	3.16	5.50	7.9	13.57	2.0
0908		7.06	2249	-47.0	2.61	1.38	7.9	13.57	3.0
0913		7.02	2264	-57.0	2.59	0.60	8.0	13.57	4.0
0918		7.01	2267	-69.0	2.49	1.00	8.1	13.57	5.0
0923		6.99	2270	-64.8	2.30	0.14	8.1	13.57	6
0928		6.99	2268	-65.8	2.28	0.10	8.1	13.57	7
0933		6.99	2273	-66.0	2.29	0.15	8.1	13.57	8

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	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o	DATE SHIPPED: 3/19/21	AIRBILL NUMBER: n/a
COC NUMBER: n/a	SIGNATURE:	DATE SIGNED: 3/16/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/10/21	BY: JK	DATE: 3/16/21

SAMPLE ID: MW-52 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0947	DATE: 3/10/21	SAMPLE	TIME: 1027	DATE: 3/10/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.99 SU	CONDUCTIVITY: 1997 umhos/cm	
			ORP: -39.0 mV	DO: 2.09 mg/L	
DEPTH TO WATER: 14.15 T/ PVC			TURBIDITY: 1.00 NTU		
DEPTH TO BOTTOM: 19.74 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: n/a	☐ LITERS ☐ GALLONS		TEMPERATURE: 8.7 °C	OTHER:	
VOLUME REMOVED: 4	☑ LITERS ☐ GALLONS		COLOR: clear	ODOR: none	
COLOR: Brownish	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)
0947	100	7.74	827	18.1	9.76	73.0	8.1	14.11	INITIAL
0952		7.15	2017	21.0	2.99	25.10	8.1	14.15	.5
0957		7.11	2013	5.3	2.86	10.45	8.1	14.15	1
1002		7.09	2007	-2.5	2.69	10.79	8.2	14.15	1.5
1007		7.05	2001	-14.7	2.34	3.50	8.4	14.15	2
1012		7.02	1999	-24.0	2.24	1.11	8.5	14.15	2.5
1017		7.00	1996	-39.0	2.10	1.00	8.6	14.15	3
1022		7.00	1996	-39.5	2.09	0.96	8.7	14.15	3.5
1027		6.99	1997	-39.0	2.09	1.00	8.7	14.15	4

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	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o	DATE SHIPPED: 3/9/21	AIRBILL NUMBER: n/a
COC NUMBER: n/a	SIGNATURE:	DATE SIGNED: 3/10/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/10/21	BY: SK	DATE: 3/16/21

SAMPLE ID: MW-53 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1041	DATE: 3/8/21	SAMPLE	TIME: 1100	DATE: 3/8/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.10 SU	CONDUCTIVITY: 1704 umhos/cm	
			ORP: -59.0 mV	DO: 2.28 mg/L	
DEPTH TO WATER: 13.02 T/ PVC			TURBIDITY: 018 NTU		
DEPTH TO BOTTOM: 18.18 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: n/a ☐ LITERS ☐ GALLONS			TEMPERATURE: 8.1 °C	OTHER:	
VOLUME REMOVED: 5 ☑ LITERS ☐ GALLONS			COLOR: Clear	ODOR: none	
COLOR: Cloudy 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)
1041	200	9.57	821	23.1	9.50	30.0	8.6	1300	INITIAL
1046		7.24	1684	31.7	3.22	3.00	8.0	1310	1
1051		7.12	1699	-41.0	2.49	057	8.0	1310	2
1056		7.10	1703	-58.8	2.30	033	8.0	1310	3
1101		7.10	1705	-58.8	2.27	013	8.1	1310	4
1106		7.10	1704	-59.0	2.28	018	8.1	1310	5

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	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o	DATE SHIPPED: 3/9/21	AIRBILL NUMBER: n/a
COC NUMBER: n/a	SIGNATURE:	DATE SIGNED: 3/10/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/16/21	BY: JK	DATE: 3/16/21

SAMPLE ID: MW-53R | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1119	DATE: 3/8/21	SAMPLE	TIME: 1224	DATE: 3/8/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 13.66 T/ PVC

DEPTH TO BOTTOM: 18.80 T/ PVC

WELL VOLUME: n/a ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 6.5 ☑ LITERS ☐ GALLONS

COLOR: Brown ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 6.82 SU | CONDUCTIVITY: 1812 umhos/cm

ORP: -17.5 mV | DO: 1.98 mg/L

TURBIDITY: 3.91 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 8.8 °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)
1119	100	7.39	904	-12.6	16.0	2700.0	9.9	13.66	INITIAL
1124		6.87	2091	-14.0	2.61	2095.0	8.8	13.75	.5
1129		6.85	2105	21.5	2.32	495.0	8.5	13.75	1
1134		6.85	2081	36.0	2.20	46.75	8.5	13.75	1.5
1139		6.84	2038	29.0	2.14	23.25	8.5	13.75	2
1144		6.84	2008	18.0	2.12	66.75	8.6	13.75	2.5
1149		6.83	1954	5.5	2.08	15.70	8.5	13.75	3
1154		6.83	1918	-1.3	2.05	88.75	8.6	13.75	3.5
1159		6.83	1883	-8.5	2.00	18.30	8.7	13.75	4
1204		6.83	1872	-10.0	2.00	10.60	8.8	13.75	4.5

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	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o | DATE SHIPPED: 3/9/21 | AIRBILL NUMBER: n/a

COC NUMBER: n/a | SIGNATURE: | DATE SIGNED: 3/16/21

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME:	CEC Weadock LF; 2021 GW Co	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/16/21	BY: JK	DATE: 3/16/21

SAMPLE ID: MW-53R

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)
1209	100	6.83	1853	-13.0	2.00	8.80	8.8	137.5	5
1214		6.82	1840	-16.8	1.99	3.90	8.8	137.5	5.5
1219		6.83	1824	-17.1	1.99	4.10	8.9	137.5	6
1224		6.83	1812	-17.5	1.98	3.95	8.8	137.5	6.5

SIGNATURE: 3/16/21

DATE SIGNED: _____

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/10/21	BY: JK	DATE: 3/16/21

SAMPLE ID: MW-54R

WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1240	DATE: 3/10/21	SAMPLE	TIME: 1325	DATE: 3/10/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 13.17 T/ PVC

DEPTH TO BOTTOM: 17.22 T/ PVC

WELL VOLUME: n/a ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 4.1 ☑ LITERS ☐ GALLONS

COLOR: Brownish ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 6.92 SU CONDUCTIVITY: 1321 umhos/cm

ORP: 60.0 mV DO: 3.30 mg/L

TURBIDITY: 097 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 8.0 °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)
1240	100	7.64	1360	43.0	9.30	400	9.0	13.17	INITIAL
1245		7.09	1318	54.5	6.48	98.37	8.2	13.28	.5
1250		7.08	1312	59.8	6.26	14.30	8.0	13.30	1
1255		7.07	1311	64.0	6.12	3.92	8.0	13.33	1.5
1300		7.02	1312	68.9	5.17	2.70	7.8	13.34	2
1305		6.97	1317	73.0	4.44	1.00	8.0	13.34	2.5
1310		6.94	1321	72.0	3.50	083	8.1	13.34	3
1315		6.93	1325	60.0	3.49	050	8.1	13.34	3.5
1320		6.92	1325	60.0	3.35	041	8.0	1334	4
1325		6.92	1321	60.0	3.30	097	8.0	1334	4.5

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	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o	DATE SHIPPED: 3/9/21	AIRBILL NUMBER: n/a
COC NUMBER: n/a	SIGNATURE:	DATE SIGNED: 3/10/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/6/21	BY: SK	DATE: 3/16/21

SAMPLE ID: JCW-OW-18004 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1343	DATE: 3/8/21	SAMPLE	TIME: 1423	DATE: 3/8/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.99 SU	CONDUCTIVITY: 1637 umhos/cm	
			ORP: 92.1 mV	DO: 3.97 mg/L	
DEPTH TO WATER: 6.92 T/ PVC			TURBIDITY: 4.00 NTU		
DEPTH TO BOTTOM: 14.85 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: n/a	☐ LITERS ☐ GALLONS		TEMPERATURE: 7.1 °C	OTHER:	
VOLUME REMOVED: 4	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: none	
COLOR: Tannish	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)
1343	100	7.70	714	79.1	9.96	1100	11.6	6.92	INITIAL
1348		7.04	1625	84.5	4.66	3000	8.4	7.58	.5
1353		7.02	1627	88.1	4.43	12750	7.9	8.18	1
1358		7.02	1628	90.7	4.32	560	7.3	9.10	1.5
1403		7.02	1633	84.0	4.52	12.40	7.1	9.84	2
1408		7.01	1632	89.0	4.22	5.70	7.1	9.95	2.5
1413		7.00	1632	92.0	4.09	4.50	7.1	10.11	3
1418		6.99	1635	92.5	3.99	4.25	7.0	10.40	3.5
1423		6.99	1637	92.5	3.97	4.00	7.1	10.66	4

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	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o	DATE SHIPPED: 3/9/21	AIRBILL NUMBER: n/a
COC NUMBER: n/a	SIGNATURE:	DATE SIGNED: 3/10/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/16/21	BY: JK	DATE: 3/16/21

SAMPLE ID: JCW-MW 180064 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1434	DATE: 3/8/21	SAMPLE	TIME: 1501	DATE: 3/8/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.88 SU	CONDUCTIVITY: 1830 umhos/cm	
			ORP: 113.5 mV	DO: 5.90 mg/L	
DEPTH TO WATER: 11.78 T/ PVC			TURBIDITY: 0.15 NTU		
DEPTH TO BOTTOM: 14.77 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: n/a	☐ LITERS ☐ GALLONS		TEMPERATURE: 7.4 °C	OTHER:	
VOLUME REMOVED: 2.5	☑ 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-		
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)
1436	100	7.42	984	100	9.5	39.0	10.3	11.78	INITIAL
1441		6.87	1991	108.0	5.51	0.90	7.8	12.03	.5
1446		6.86	1900	110.8	5.95	0.30	7.6	12.08	1
1451		6.88	1835	113.0	6.05	0.10	7.5	12.57	1.5
1456		6.88	1845	113.5	5.95	0.10	7.4	12.65	2
1501		6.88	1830	113.5	5.90	0.15	7.4	12.88	2.5

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	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o	DATE SHIPPED: 3/9/21	AIRBILL NUMBER: n/a
COC NUMBER: n/a	SIGNATURE:	DATE SIGNED: 3/10/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/10/1	BY: JK	DATE: 3/16/21

SAMPLE ID: MW - 5E

WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0611	DATE: 3/9/21	SAMPLE	TIME: 0656	DATE: 3/9/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 5.00 T/ PVC

DEPTH TO BOTTOM: 18.28 T/ PVC

WELL VOLUME: n/a ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 9 ☑ LITERS ☐ GALLONS

COLOR: orange ODOR: NOK

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 6.88 SU CONDUCTIVITY: 1636 umhos/cm

ORP: -83.4 mV DO: 2.17 mg/L

TURBIDITY: 3.71 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 5.8 °C OTHER:

COLOR: Clear ODOR: NOK

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)
0611	200	4.00	1699	18.1	9.02	4000	3.7	5.02	INITIAL
0616		6.66	2099	-71.4	2.09	3066	5.8	5.05	1
0621		6.74	2000	-81.7	1.91	1311	5.8	5.05	2
0626		6.83	1990	-86.1	1.89	271.0	5.7	5.05	3
0631		6.83	1697	-72.0	2.42	10.30	5.8	5.05	4
0636		6.85	1664	-79.1	2.22	4.00	5.8	5.05	5
0641		6.86	1651	-82.6	2.20	4.00	5.8	5.05	6
0646		6.88	1642	-82.9	2.17	4.00	5.8	5.05	7
0651		6.88	1639	-83.0	2.17	3.95	5.8	5.05	8
0656		6.88	1636	-83.4	2.17	3.75	5.8	5.05	9

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
3	125 mL	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o	DATE SHIPPED: 3/9/21	AIRBILL NUMBER: n/a
COC NUMBER: n/a	SIGNATURE:	DATE SIGNED: 3/10/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 7/(0)1	BY: JK	DATE: 3/16/21

SAMPLE ID: LH-104 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0721	DATE: 3/9/21	SAMPLE	TIME: 0805	DATE: 3/9/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.80 SU	CONDUCTIVITY: 1332 umhos/cm	
			ORP: -79.1 mV	DO: 2.13 mg/L	
DEPTH TO WATER: 6.94 T/ PVC			TURBIDITY: 0.55 NTU		
DEPTH TO BOTTOM: 14.00 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: n/a	☐ LITERS ☐ GALLONS		TEMPERATURE: 6.7 °C	OTHER:	
VOLUME REMOVED: 4	☑ 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)
0721	100	7.53	713	-9.4	11.93	5.72	5.6	6.94	INITIAL
0730		7.75	1440	-29.7	2.54	2.15	6.4	7.50	.5
0735		7.76	1437	-29.5	2.40	2.0	6.3	7.60	1
0740		7.76	1436	-39.0	2.28	1.94	6.4	7.65	1.5
0745		7.77	1403	-57.0	2.22	1.43	6.5	7.65	2
0750		7.78	1368	-78.0	2.20	0.74	6.5	7.65	2.5
0755		7.80	1345	-78.8	2.16	0.48	6.4	7.65	3
0800		7.80	1330	-79.0	2.13	0.80	6.7	7.65	3.5
0805		7.80	1332	-79.1	2.13	0.55	6.7	7.65	4

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	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o	DATE SHIPPED: 3/9/21	AIRBILL NUMBER: n/a
COC NUMBER: n/a	SIGNATURE:	DATE SIGNED: 3/16/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/10/21	BY: JK	DATE: 3/16/21

SAMPLE ID: GW-55 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0830	DATE: 3/9/21	SAMPLE	TIME: 0935	DATE: 3/9/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 6.00 T/ PVC

DEPTH TO BOTTOM: 18.42 T/ PVC

WELL VOLUME: n/a ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 6.5 ☑ LITERS ☐ GALLONS

COLOR: Brown ODOR: non

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 7.28 SU | CONDUCTIVITY: 1240 umhos/cm

ORP: -79.8 mV | DO: 2.14 mg/L

TURBIDITY: 24.75 NTU

☐ NONE ☑ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 7.0 °C | OTHER:

COLOR: Cloudy | 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)
0830	100	7.60	1118	-68.5	9.55	250.0	4.8	6.00	INITIAL
0835		7.49	1091	-103.3	1.89	440.0	6.4	7.28	.5
0840		7.49	1089	-108.3	1.81	730.0	6.7	8.08	1
0845		7.45	1107	-89.7	2.39	600.0	6.5	8.68	1.5
0850		7.43	1125	-84.5	2.82	200.0	6.5	9.18	2
0855		7.40	1145	-82.6	2.49	205.0	6.6	9.73	2.5
0900		7.38	1157	-84.4	2.21	195.25	6.6	10.10	3
0905		7.35	1172	-84.8	2.16	123.55	6.8	10.45	3.5
0910		7.33	1185	-84.5	2.14	220.0	6.8	10.75	4.0
0915		7.31	1201	-77.5	2.60	100.0	6.9	11.05	4.5

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	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o | DATE SHIPPED: 3/9/21 | AIRBILL NUMBER: n/a

COC NUMBER: n/a | SIGNATURE: | DATE SIGNED: 3/10/21

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME:	CEC Weadock LF; 2021 GW Co	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/16/21	BY: JK	DATE: 3/16/21

SAMPLE ID: OW-55

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)
0920	100	7.30	1214	-78.5	2.20	42.70	7.0	1120	5
0925		7.28	1230	-80.0	2.16	250	7.2	1143	5.5
0930		7.28	1237	-80.0	2.14	25.0	7.2	1158	6
0935		7.28	1240	-79.8	2.14	24.75	7.2	1169	6.5

SIGNATURE: 3/16/21

DATE SIGNED: _____

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/16/21	BY: JK	DATE: 3/16/21

SAMPLE ID: MW 55 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0949	DATE: 3/9/21	SAMPLE	TIME: 1049	DATE: 3/9/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.10 SU	CONDUCTIVITY: 1476 umhos/cm	
			ORP: -123.4 mV	DO: 1.97 mg/L	
DEPTH TO WATER: 12.98 T/ PVC			TURBIDITY: 4.90 NTU		
DEPTH TO BOTTOM: 16.38 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: n/a	☐ LITERS ☐ GALLONS		TEMPERATURE: 78 °C	OTHER:	
VOLUME REMOVED: 13	☑ LITERS ☐ GALLONS		COLOR: clear	ODOR: none	
COLOR: Brown	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)
0949	200	7.43	675	-91.3	9.52	470.0	6.5	12.98	INITIAL
0954		7.17	1393	-116.7	2.73	76.0	7.2	1305	1
0959		7.15	1435	-121.8	2.28	33.00	7.3	1305	2
1004		7.13	1461	-124.0	2.11	25.00	7.5	1305	3
1009		7.13	1464	-124.0	2.08	21.33	7.4	1305	4
1014		7.11	1467	-114.1	2.39	19.0	7.4	1305	5
1019		7.11	1471	-120.0	2.10	15.0	7.4	1305	6
1024		7.11	1473	-125.0	2.0	10.0	7.5	1305	7
1029		7.11	1475	-124.0	2.0	8.0	7.6	1305	8
1034		7.10	1475	-123.9	1.98	6.50	7.8	1305	9

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	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o	DATE SHIPPED: 3/9/21	AIRBILL NUMBER: n/a
COC NUMBER: n/a	SIGNATURE:	DATE SIGNED: 3/16/21

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME:	CEC Weadock LF; 2021 GW Co	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/10/21	BY: JK	DATE: 3/16/21

SAMPLE ID: MW-55

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)
1039	200	7.10	1478	-123.5	1.98	5.05	7.7	1305	10
1044	1	7.10	1476	-123.5	1.97	4.95	7.8	1305	11
1049		7.10	1476	-123.4	1.97	4.90	7.8	1305	12

SIGNATURE: 3/10/21

DATE SIGNED: _____

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/16/21	BY: SK	DATE: 3/16/21

SAMPLE ID: JCW-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: 1057	DATE: 3/9/21	SAMPLE	TIME: 1157	DATE: 3/9/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 8.63 T/ PVC

DEPTH TO BOTTOM: 16.28 T/ PVC

WELL VOLUME: n/a ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 6 ☑ LITERS ☐ GALLONS

COLOR: orange ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☒ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 6.80 SU | CONDUCTIVITY: 1488 umhos/cm

ORP: -13.6 mV | DO: 2.13 mg/L

TURBIDITY: 4.45 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 7.8 °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)
1057	100	7.19	840	-30.0	9.00	320	10.1	8.63	INITIAL
1102		6.87	1770	-14.1	2.87	1353.0	8.7	9.20	.5
1107		6.88	1701	-13.0	2.48	210.0	8.3	9.35	1
1112		6.88	1662	-12.5	2.20	150.0	8.1	9.44	1.5
1117		6.90	1655	-12.4	2.85	64.81	7.9	9.45	2
1122		6.88	1681	-9.5	2.50	28.40	7.8	9.45	2.5
1127		6.86	1736	-10.1	2.36	20.99	7.8	9.45	3
1132		6.85	1763	-11.0	2.30	14.6	7.7	9.45	3.5
1137		6.83	1831	-11.8	2.20	10.0	7.8	9.45	4
1142		6.83	1881	-12.5	2.19	8.0	7.8	9.45	4.5

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	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o | DATE SHIPPED: 3/9/21 | AIRBILL NUMBER: n/a

COC NUMBER: n/a | SIGNATURE: | DATE SIGNED: 3/10/21

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME:	CEC Weadock LF; 2021 GW Co	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/16/21	BY: SK	DATE: 3/16/21

SAMPLE ID: JCW-MW-1800F

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)
1147	100	6.80	1983	-13.0	2.15	5.0	7.8	941	5
1152		6.80	1980	-13.5	2.14	4.95	7.8	941	5.1
1157		6.80	1988	-13.6	2.13	4.95	7.8	941	6

SIGNATURE: 3/16/21

DATE SIGNED: _____

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/10/21	BY: JK	DATE: 3/16/21

SAMPLE ID: OW-57R out | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1209	DATE: 3/9/21	SAMPLE	TIME: 1229	DATE: 3/9/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.15 SU	CONDUCTIVITY: 1363 umhos/cm	
			ORP: 58.8 mV	DO: 5.24 mg/L	
DEPTH TO WATER: 9.90 T/ PVC			TURBIDITY: 045 NTU		
DEPTH TO BOTTOM: 20.20 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: n/a	☐ LITERS ☐ GALLONS		TEMPERATURE: 8.6 °C	OTHER:	
VOLUME REMOVED: 2	☑ LITERS ☐ GALLONS		COLOR: clear	ODOR: non	
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)
1209	100	7.53	539	-13.5	9.85	8.70	9.6	9.96	INITIAL
1214		7.17	1369	29.7	5.56	3.0	8.6	10.84	.5
1219		7.16	1367	58.8	5.30	036	8.6	11.80	1
1224		7.15	1365	58.8	5.24	065	8.6	12.75	1.5
1229		7.15	1363	58.8	5.24	045	8.6	13.90	2
									~~2.5~~
									JK ~~3~~
									~~3.5~~

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	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o	DATE SHIPPED: 3/9/21	AIRBILL NUMBER: n/a
COC NUMBER: n/a	SIGNATURE:	DATE SIGNED: 3/10/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/10/21	BY: JK	DATE: 3/16/21

SAMPLE ID: JCW-MW 18006 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1240	DATE: 3/9/21	SAMPLE	TIME: 1300	DATE: 3/9/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.91 SU	CONDUCTIVITY: 1510 umhos/cm	
			ORP: -60.0 mV	DO: 1.91 mg/L	
DEPTH TO WATER: 13.89 T/ PVC			TURBIDITY: 061 NTU		
DEPTH TO BOTTOM: 23.65 T/ PVC			☑ ~~NONE~~ ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: n/a	☐ LITERS ☐ GALLONS		TEMPERATURE: 11.6 °C	OTHER:	
VOLUME REMOVED: 4	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: none	
COLOR: Brown	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)
1240	200	7.18	6607	-64.5	9.80	600	12.0	1389	INITIAL
1245		7.00	1532	-85.6	1.90	190.0	11.5	1395	1
1250		6.91	1480	-59.8	1.95	089	11.4	1395	2
1255		6.91	1500	-59.8	1.93	071	11.5	1395	3
1300		6.91	1510	-60.0	1.95	061	11.4	1395	4
~~1305~~	JK						JK	~~1395~~	~~5~~
~~1310~~								~~1395~~	~~6~~

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	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o	DATE SHIPPED: 3/9/21	AIRBILL NUMBER: n/a
COC NUMBER: n/a	SIGNATURE:	DATE SIGNED: 3/16/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/10/21	BY: JK	DATE: 3/16/21

SAMPLE ID: FB01 | 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: 1307	DATE: 3/9/21

PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER	PH: NA SU	CONDUCTIVITY: NA umhos/cm
		ORP: NA mV	DO: NA mg/L
DEPTH TO WATER: _____ T/ PVC		TURBIDITY: NA NTU	
DEPTH TO BOTTOM: _____ T/ PVC		☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY	
WELL VOLUME: n/a ☐ LITERS ☐ GALLONS		TEMPERATURE: NA °C	OTHER: _____
VOLUME REMOVED: _____ ☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: none
COLOR: _____ ODOR: _____		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:	

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.: +/- **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
	125 mL	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	fed ex or drop o	DATE SHIPPED: 3/9/21	AIRBILL NUMBER: n/a
COC NUMBER:	n/a	SIGNATURE:	DATE SIGNED: 3/10/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 3/6/21	BY: JK	DATE: 3/16/21

SAMPLE ID: EB01 | 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: 1311	DATE: 3/9/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: _____ T/ PVC

DEPTH TO BOTTOM: _____ T/ PVC

WELL VOLUME: n/a ☐ 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.: +/- **10 %** ORP: +/- **10 %** D.O.: +/- **10 %** TURB: +/- **10 %** or <= **5** TEMP.: +/- **0.5°C**

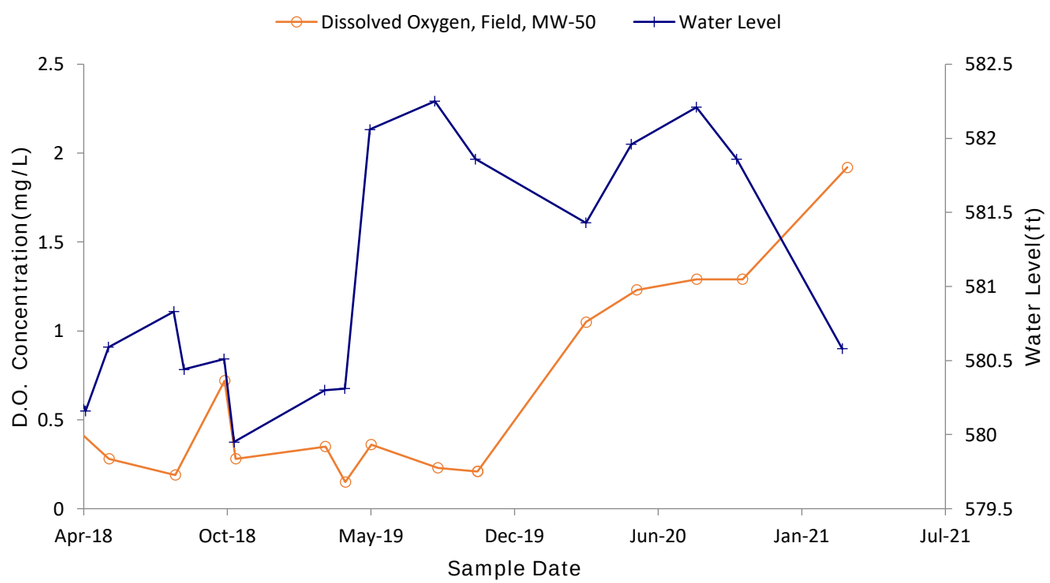
BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

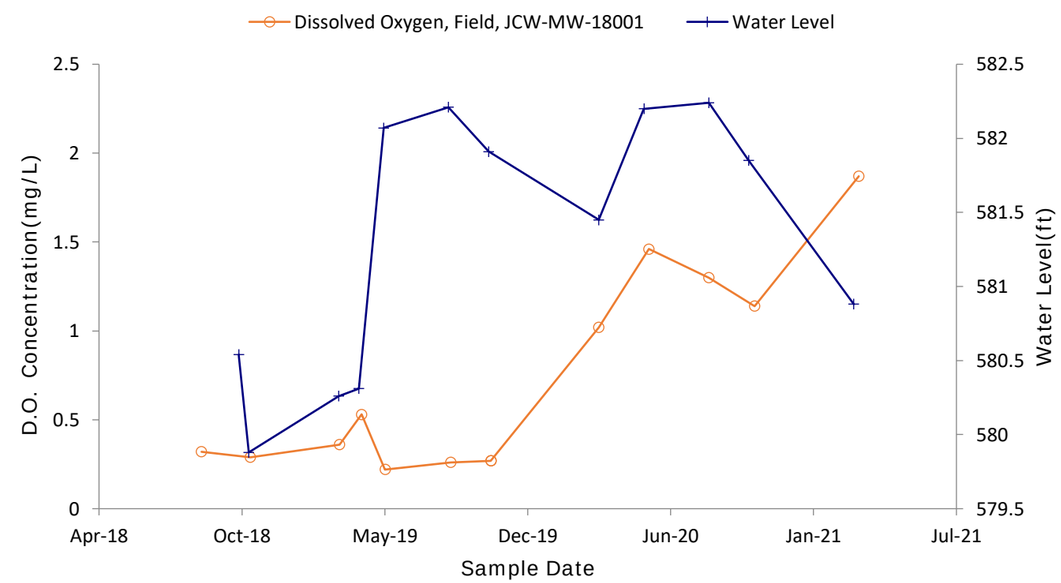
NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
	125 mL	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

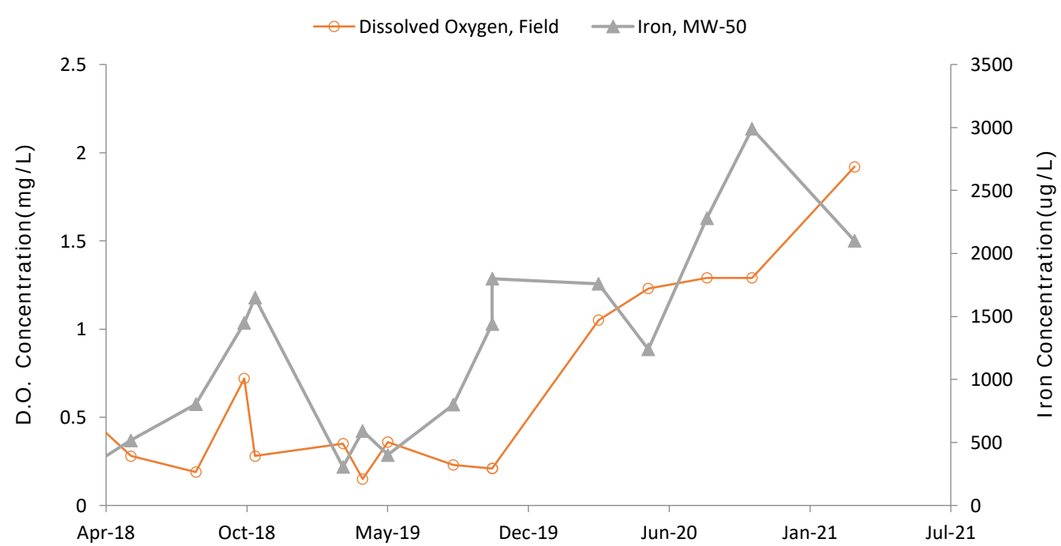
SHIPPING METHOD:	fed ex or drop o	DATE SHIPPED: 3/9/21	AIRBILL NUMBER: n/a
COC NUMBER:	n/a	SIGNATURE:	DATE SIGNED: 3/10/21

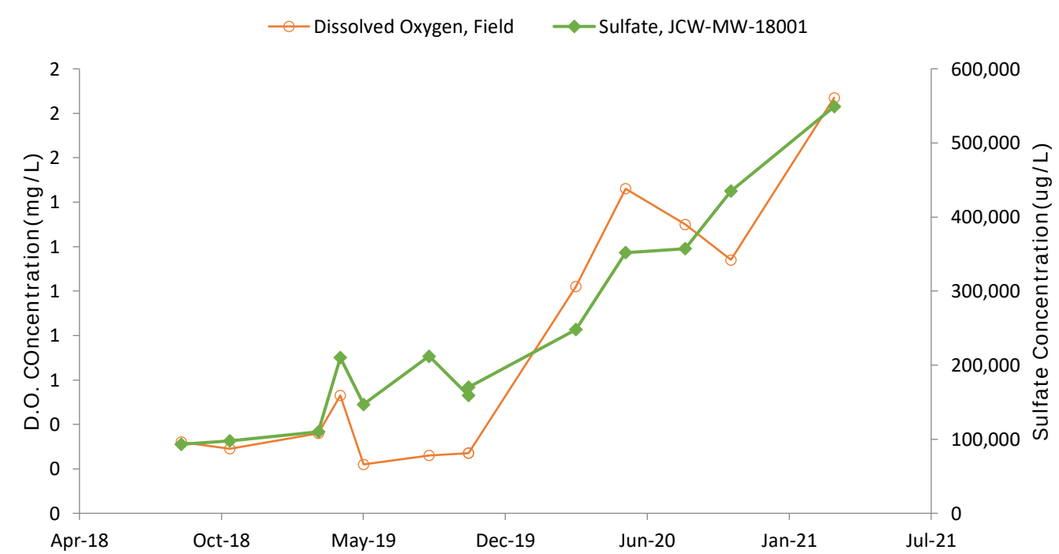
Appendix G
Alternate Source Demonstration Supporting Information

Appendix G1: Time Series Plots for MW-50 and JCW-MW-18001 ASD

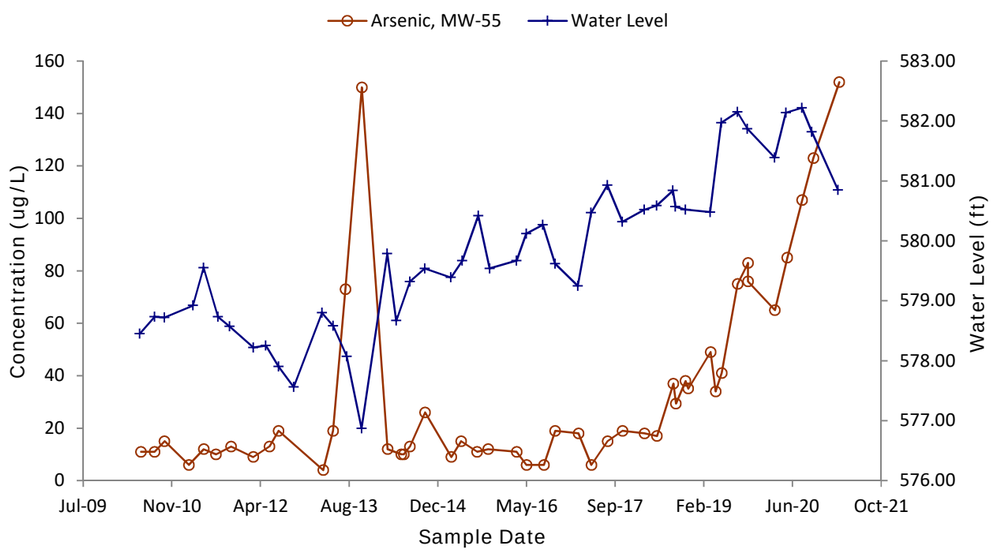


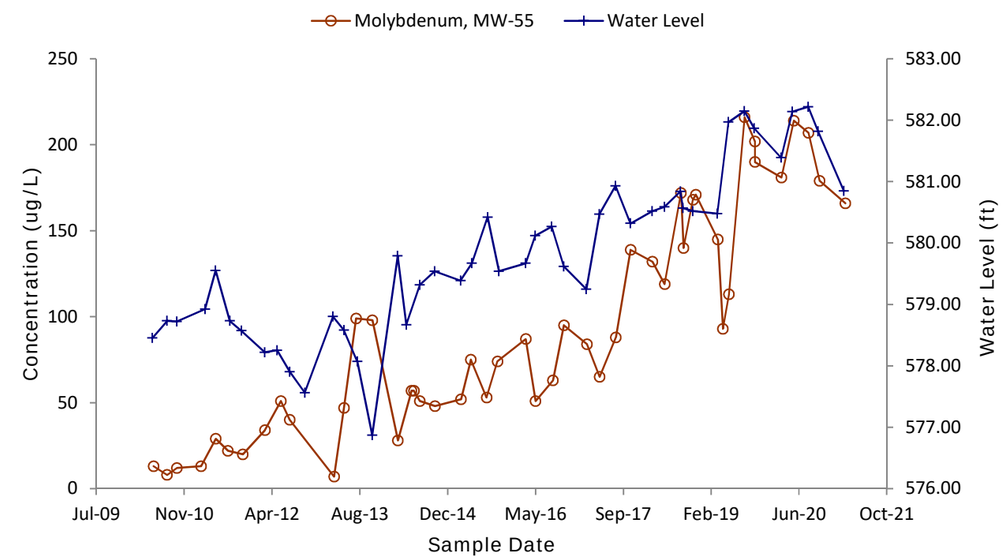


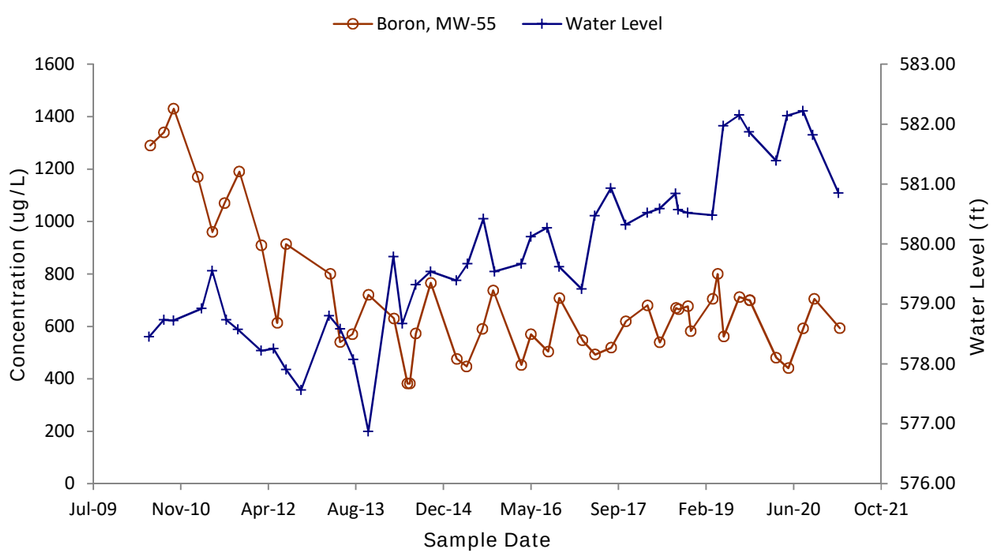


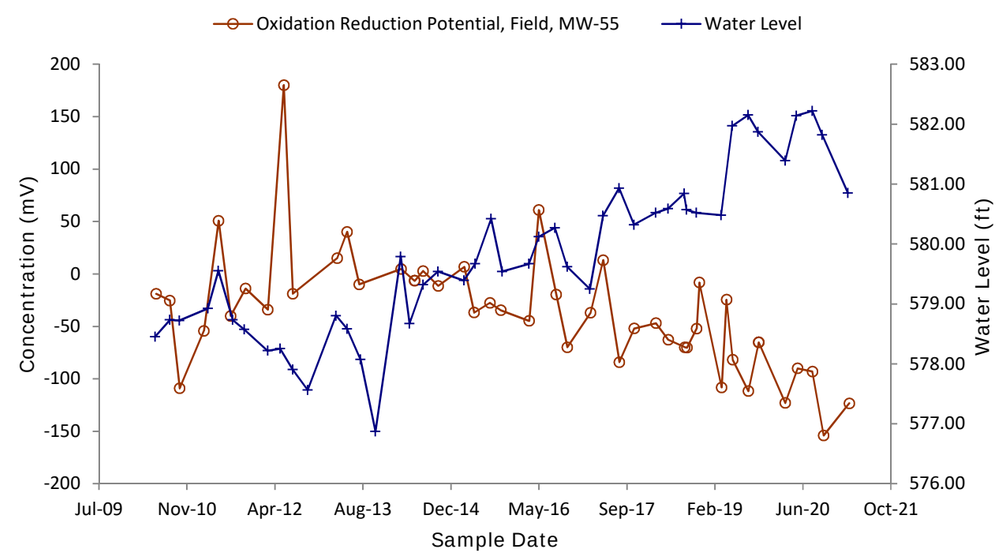


Appendix G2: Time Series Plots for MW-55 ASD









Appendix H
Groundwater Protection Standards

1540 Eisenhower Pl.
Ann Arbor, MI 48108

T 734.971.7080
TRCcompanies.com

Technical Memorandum

Date:	April 23, 2021
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC Kristin Lowery, TRC
Project No.:	418426.0000.0000
Subject:	Groundwater Protection Standards – Consumers Energy, JC Weadock Landfill, Essexville, Michigan

On April 17, 2015, the United States Environmental Protection Agency (USEPA) issued the Coal Combustion Residual (CCR) Resource Conservation and Recovery Act (RCRA) Rule (40 CFR 257 Subpart D) ("CCR Rule") to regulate the solid waste management of CCRs at electrical generating facilities. The scope of the CCR Rule applies to inactive, existing, and newly constructed CCR units. The CCR Rule, which became effective on October 19, 2015, applies to the JC Weadock Landfill (Weadock Landfill). Consumers Energy began monitoring groundwater at the Weadock Landfill in accordance with the CCR Rule in 2015.

On December 28, 2018, the State of Michigan enacted Public Act No. 640 of 2018 (PA 640) to amend the Natural Resources and Environmental Protection Act, also known as Part 115 of PA 451 of 1994, as amended (a.k.a., Michigan Part 115 Solid Waste Management). The December 2018 amendments to Part 115 were developed to provide state of Michigan oversight of coal combustion residual impoundments and landfills and to ensure compliance with the federal CCR standards through a permitting program. In accordance with the requirements of Part 115, as amended by PA 640, Consumers Energy prepared the Landfill Hydrogeological Monitoring Plan (Landfill HMP) (TRC, February 2021) to combine the requirements of both the state and federal CCR programs.

Pursuant to the Landfill HMP, groundwater protection standards (GWPSs) will be established for the detection monitoring constituents in Section 11511a(3) and assessment monitoring constituents in Section 11519b(2) in accordance with 40 CFR 257.95(h)[1]. The GWPS will be set at the lowest of the EPA maximum contaminant level (MCL), the EPA Regional Screening Level (RSL), or the applicable Michigan Part 201 criteria, or a value based on background data. The lowest of the MCLs or RSLs or Part 201 criteria will be the GWPSs unless the background concentration is greater than the MCL or RSL or Part 201 criteria, in which case, the statistically-determined background value becomes the GWPS. For GWPSs that are established using background, tolerance limits are anticipated to be used to calculate the

[1] As amended per Phase One, Part One of the CCR Rule (83 FR 36435).

GWPS. This memorandum presents the background statistical limits and GWPSs derived for the detection monitoring and assessment monitoring constituents for the Weadock Landfill using the aforementioned approach pursuant to §257.95(h).

The background data for the Weadock Landfill were evaluated in accordance with the Landfill HMP. The groundwater data are maintained within a database accessible through Sanitas™ statistical software. Sanitas™ is a software tool that is commercially available for performing statistical evaluation consistent with procedures outlined in U.S. EPA's Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities (Unified Guidance; UG). Within the Sanitas™ statistical program (and the UG), tolerance limits were selected to perform the statistical calculation for background limits. Use of tolerance limits is a streamlined approach that offers adequate statistical power under the current, initial stage of establishing background and developing the monitoring program. Additionally, tolerance limits are recommended by the UG as an acceptable approach to establish background-based groundwater protection standards for assessment monitoring under the CCR rule. Upper tolerance limits (UTLs) were calculated for each of the detection and assessment monitoring constituents, with both an upper and lower tolerance limit calculated for pH. The following narrative describes the methods employed and the results obtained and the Sanitas™ output files are included as an attachment.

Four monitoring wells located south of the Weadock Landfill provide data on background groundwater quality that has not been affected by the CCR units (MW-15002, MW-15008, MW-15016, and MW-15019). Due to the site hydrogeology and operational history of the site, a hydraulically upgradient location was not available to monitor CCR units at the JC Weadock site. The area where background wells are located, while not upgradient, is not affected by any CCR units and therefore meets the requirements of § 257.91(a)(1). Analytical data collected from the background monitoring wells from December 2015 to October 2020 are presented in attached Table 1. The background evaluation included the following steps:

- Review of data quality reports for the baseline/background data sets for CCR Appendix III and Appendix IV constituents;
- Graphical representation of the baseline data as time versus concentration (T v. C) by well/constituent pair;
- Outlier testing of individual data points that appear from the graphical representations as potential outliers;
- Evaluation of percentage of non-detects for each background well-constituent (w/c) pair;
- Distribution of the data;
- Calculation of the UTL for each combined background data set (upper and lower confidence limits calculated for pH); and
- Establishment of GWPS as the lowest of the MCL, RSL, or Part 201 criteria, or the statistical limit if the statistical limit is higher than the MCL/RSL/Part 201 criteria for each constituent.

The results of these evaluations are presented and discussed below.

Data Quality

Data from each sampling round were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The review was completed using the following quality control (QC) information which at a minimum included chain-of-custody forms, investigative sample results including blind field duplicates, and matrix spike and matrix spike duplicates (MS/MSDs) recoveries, and, as provided by the laboratory, method blanks, laboratory control spikes, and laboratory duplicates. The data were found to be complete and usable for the purposes of the CCR monitoring program.

Time v. Concentration Graphs

The T v. C graphs show potential outliers for fluoride and lead in MW-15002 (Sanitas™ outputs). While variations in results are present, the graphs do not suggest that data sets, as a whole, likely have overall trending or seasonality. The data sets are of relatively short duration for making such observations.

Outlier Testing

The T v. C graphs (Sanitas™ outputs) indicated potential outliers for fluoride at MW-15002 in April 2019 and lead in MW-15002 in May 2020. The fluoride result in MW-15002 in April 2019 has an elevated reporting limit due a sample dilution. As fluoride is consistently not detected in the background wells above the standard laboratory reporting limit (1,000 µg/L), the elevated reporting limit was removed as an outlier.

Lead was detected in MW-15002 in May 2020 at a concentration of 3 µg/L. This is the only detection of lead in the background wells. This lead detection has not been confirmed. Therefore, the single detection was classified as an outlier per the Double Quantification Rule as outlined in the Landfill HMP and the Unified Guidance and removed from the baseline data set.

Percentage of Non-Detects

Table 1 summarizes the percentage of results below the reporting limit for each w/c pair.

Table 1
Summary of Percentage of Results Below Reporting Limit

Constituent	Percent Non-Detect				
	MW-15002	MW-15008	MW-15016	MW-15019	Combined
Boron	13	0	0	0	3
Calcium	0	0	0	0	0
Chloride	0	0	0	0	0
Fluoride	100	100	100	100	100
Iron	0	0	0	0	0

Table 1
Summary of Percentage of Results Below Reporting Limit

Constituent	Percent Non-Detect				
	MW-15002	MW-15008	MW-15016	MW-15019	Combined
pH	0	0	0	0	0
Sulfate	20	0	0	0	5
Total Dissolved Solids	0	0	0	0	0
Antimony	100	100	100	100	100
Arsenic	33	67	20	87	52
Barium	0	0	0	0	0
Beryllium	100	100	100	100	100
Cadmium	100	100	100	100	100
Chromium	40	13	67	73	48
Cobalt	100	100	100	100	100
Copper	80	80	20	100	70
Fluoride	100	100	100	100	100
Lead	100	100	100	100	100
Lithium	40	0	0	0	10
Mercury	100	100	100	100	100
Molybdenum	100	100	53	100	88
Nickel	60	80	0	80	55
Radium 226/228	40	20	60	13	33
Selenium	93	100	67	100	88
Silver	100	100	100	100	100
Thallium	100	100	100	100	100
Vanadium	40	0	100	80	55
Zinc	80	100	60	100	85

Distribution of the Data Sets

The distribution of the data sets is determined by the Sanitas™ software during calculation of the tolerance limits. The Shapiro-Francia normality test is used for samples sizes greater than 50. Non-detect/censored data were handled in accordance with the Landfill HMP. If the data appear to be non-normal, mathematical transformations of the data may be utilized such that the transformed data follow a normal distribution (e.g., lognormal distributions). Alternatively, non-parametric tests may be utilized when data cannot be normalized. Table 2 summarizes the

distributions determined by the Sanitas™ software. The distribution is based on the combined baseline results for all four background monitoring wells.

Table 2
Summary of Baseline Data Distributions

Constituent	Distribution
Boron	Normal
Calcium	Normal
Chloride	Non-normal
Fluoride	All ND – use highest RL
Iron	Normal
pH	Non-normal
Sulfate	Normal
Total Dissolved Solids	Non-normal
Antimony	All ND – use highest RL
Arsenic	Non-normal (>50% ND)
Barium	Non-normal
Beryllium	All ND – use highest RL
Cadmium	All ND – use highest RL
Chromium	Non-normal
Cobalt	All ND – use highest RL
Copper	Non-normal (>50% ND)
Fluoride	All ND – use highest RL
Lead	All ND – use highest RL
Lithium	Non-normal
Mercury	All ND – use highest RL
Molybdenum	Non-normal (>50% ND)
Nickel	Non-normal (>50% ND)
Radium 226/228	Non-normal
Selenium	Non-normal (>50% ND)
Silver	All ND – use highest RL
Thallium	All ND – use highest RL
Vanadium	Non-normal (>50% ND)
Zinc	Non-normal (>50% ND)

Upper Tolerance Limits

Table 3 presents the calculated upper tolerance limits for the background/baseline data sets. For data sets with normal distributions or distributions normalized by transformation, UTLs are calculated for 95 percent coverage and 95 percent confidence using parametric tolerance limits. For non-normal background datasets, a nonparametric tolerance limit is utilized, resulting in the highest value from the background dataset as the UTL. GWPSs are established in accordance with the HMP. The GWPS is set at the lowest of the MCL, the RSL, or applicable Michigan Part 201 criteria[2], unless the background concentration is greater than the MCL, RSL, or applicable Part 201 criteria, in which case, the statistically-determined background value (UTL) becomes the GWPS. Compliance with the GWPSs will be determined using confidence limits in accordance with the Landfill HMP. Verification resampling (1 of 2) is recommended per the Landfill HMP and UG to achieve a site-wide false positive rate within the range specified in the CCR rule and PA 640.

Table 3
Summary of Groundwater Protection Standards

Constituent		Units	UTL	MCL	RSL	Part 201 Criteria1		GWPS
						RDWC	NRDWC	
Detection Monitoring Constituents	Boron	µg/L	560	NC	NC	500	500	560
	Calcium	mg/L	280	NC	NC	NC	NC	280
	Chloride	mg/L	2,300	250*	NC	250[E]	250[E]	2,300
	Fluoride	µg/L	1,000	4,000	NC	NC	NC	4,000
	Iron	µg/L	28,000	300*	NC	300[E]	300[E]	28,000
	pH	su	6.5 – 7.8	6.5-8.5*	NC	6.5-8.5[E]	6.5-8.5[E]	6.5 – 8.5
	Sulfate	mg/L	780	250*	NC	250[E]	250[E]	780
	Total Dissolved Solids	mg/L	4,700	500*	NC	500[E]	500[E]	4,700
Assessment Monitoring Constituents	Antimony	µg/L	1	6	NC	6.0	6.0	6.0
	Arsenic	µg/L	21	10	NC	10	10	21
	Barium	µg/L	1,000	2,000	NC	2,000	2,000	2,000
	Beryllium	µg/L	1	4	NC	4.0	4.0	4.0
	Cadmium	µg/L	0.2	5	NC	5.0	5.0	5.0
	Chromium	µg/L	16	100	NC	100	100	100

[2] Applicable Part 201 criteria include the residential and non-residential drinking water criteria. Groundwater-surface water interface (GSI) criteria are only applicable to perimeter wells; compliance with GSI criteria will be assessed separately pursuant to the HMP.

Table 3
Summary of Groundwater Protection Standards

Constituent		Units	UTL	MCL	RSL	Part 201 Criteria1		GWPS
						RDWC	NRDWC	
	Cobalt	µg/L	15	NC	6	40	100	15
	Copper	µg/L	7.6	1,000*	NC	1,000[E]	1,000[E]	1,000
	Fluoride	µg/L	1,000	4,000	NC	NC	NC	4,000
	Lead	µg/L	1	NC	15	4.0	4.0	4.0
	Lithium	µg/L	180	NC	40	170	350	180
	Mercury	µg/L	0.2	2	NC	2.0	2.0	2.0
	Molybdenum	µg/L	6.5	NC	100	73	210	73
	Nickel	µg/L	9.5	NC	NC	100	100	100
	Radium 226/228	pCi/L	4.7	5	NC	NC	NC	5
	Selenium	µg/L	2.2	50	NC	50	50	50
	Silver	µg/L	0.2	100*	NC	34	98	34
	Thallium	µg/L	2	2	NC	2.0	2.0	2.0
	Vanadium	µg/L	6	NC	NC	4.5	62	6
	Zinc	µg/L	26	5,000*	NC	2,400	5,000[E]	2,400

Notes:
UTL = Upper Tolerance Limit (95%) of the background data set calculated by Sanitas
MCL = Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
* = Secondary MCL.
RSL = Regional Screening Level from 83 FR 36435.
GWPS = Groundwater Protection Standard.
µg/L = micrograms per liter.
mg/L = milligrams per liter.
su = standard units; pH is a field parameter.
pCi/L = picocuries per liter.
NC = No Criteria.
(1) Residential Drinking Water (RDWC) and Non-residential Drinking Water (NRDWC) criteria from Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 30, 2013.
[E] - Criterion is the aesthetic drinking water value per footnote {E}.

Table

Table 1
Summary of Groundwater Sampling Results (Analytical): December 2015 - October 2020
DE Karn & JC Weadock Background – RCRA CCR Monitoring Program
Essexville, Michigan

Sample Location:		MW-15002															
Sample Date:		12/8/2015	3/28/2016	5/23/2016	8/22/2016	11/30/2016	2/22/2017	5/17/2017	8/1/2017	9/19/2017	4/9/2018	5/22/2018	11/8/2018	4/8/2019	10/16/2019	5/15/2020	10/13/2020
Constituent	Unit																
Appendix III																	
Boron	ug/L	275	22	163	79	48	133	138	205	313	--	69.2	76.8	110	< 50	< 20	28
Calcium	mg/L	198	174	288	114	84.7	260	267	255	249	--	221	88.5	230	61	35.2	62.7
Chloride	mg/L	1,130	773	2,140	420	260	1,470	1,970	2,290	2,270	--	2,020	499	2,200	250	160	74.8
Fluoride	ug/L	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 20,000(1)	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	9.63	40.3	5.25	39.8	23.4	13.1	11.5	< 2.0	< 2.0	--	37.8	25.6	< 40	16	5.87	8.86
Total Dissolved Solids	mg/L	2,400	1700	4,500	1,300	980	3,100	4,300	4,600	4,280	--	3,810	1,230	4,700	700	577	466
pH, Field	SU	7.0	7.0	6.6	6.9	7.2	7.0	6.8	6.9	6.9	6.7	7.0	7.3	7.0	7.3	7.8	7.6
Appendix IV																	
Antimony	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1
Arsenic	ug/L	4	< 1	7	< 1	2	2	3	4.8	--	< 1.0	< 1.0	2.8	< 1.0	2.6	1	3
Barium	ug/L	1,010	216	796	167	212	851	580	912	--	547	364	290	510	77	43	51
Beryllium	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1
Cadmium	ug/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.20	--	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2
Chromium	ug/L	1	1	2	< 1	1	1	2	1.3	--	< 1.0	< 1.0	< 1.0	1.2	11	< 1	< 1
Cobalt	ug/L	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15.0	--	< 15.0	< 15.0	< 6.0	< 6.0	< 6.0	< 6	< 6
Fluoride	ug/L	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 20,000(1)	< 1,000	< 1,000	< 1,000
Lead	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3	< 1
Lithium	ug/L	37.7	< 10	21	< 10	< 10	24	22	31	--	24	14	16	17	< 10	< 10	< 10
Mercury	ug/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.20	--	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2
Molybdenum	ug/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5.0	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5	< 5
Radium-226	pCi/L	0.637	0.330	0.893	< 0.264	< 0.402	0.556	0.879	1.72	--	0.866	0.751	< 0.904	0.677	0.203	< 0.132	< 0.295
Radium-228	pCi/L	1.41	< 0.644	1.63	< 1.05	< 0.433	1.48	2.10	2.93	--	1.58	1.72	1.30	1.81	< 0.580	< 0.568	< 0.409
Radium-226/228	pCi/L	2.047	< 0.644	2.52	< 1.05	< 0.433	2.04	2.98	4.65	--	2.45	2.47	1.90	2.48	< 0.580	< 0.568	< 0.409
Selenium	ug/L	< 1	< 1	1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1
Thallium	ug/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2.0	--	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2
MI Part 115 Parameters																	
Iron	ug/L	--	--	--	--	--	--	--	--	--	--	--	8,550	10,000	3,000	1,080	2,720
Copper	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 1.0	< 1.0	<1.0	2	< 1
Nickel	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 1.0	< 2.0	6.8	< 2	2
Silver	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 0.20	< 0.20	<0.20	< 0.2	< 0.2
Vanadium	ug/L	--	--	--	--	--	--	--	--	--	--	--	1.1	2.1	<2.0	3	< 2
Zinc	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 10.0	19	<10	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
All metals were analyzed as total unless otherwise specified.
(1) Elevated laboratory reporting limit due to sample dilution.

Table 1
Summary of Groundwater Sampling Results (Analytical): December 2015 - October 2020
DE Karn & JC Weadock Background – RCRA CCR Monitoring Program
Essexville, Michigan

Sample Location:		MW-15008															
Sample Date:		12/9/2015	3/29/2016	5/24/2016	8/23/2016	11/30/2016	2/22/2017	5/17/2017	8/2/2017	9/19/2017	4/10/2018	5/22/2018	11/8/2018	4/8/2019	10/15/2019	5/14/2020	10/13/2020
Constituent	Unit																
Appendix III																	
Boron	ug/L	236	169	176	202	204	174	187	164	183	--	153	209	150	200	129	148
Calcium	mg/L	114	126	113	114	113	107	114	108	109	--	111	129	110	120	124	115
Chloride	mg/L	292	231	246	214	192	200	149	300	329	--	255	302	280	320	305	246
Fluoride	ug/L	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	5.15	26.7	8.6	17.9	25.6	27.7	10.1	13.4	3.9	--	4.3	11.2	4.9	11	5.68	2.55
Total Dissolved Solids	mg/L	860	720	880	730	790	760	840	866	848	--	744	882	880	890	1,110	871
pH, Field	SU	6.8	6.7	6.5	6.7	6.8	6.8	6.7	6.9	6.8	6.6	6.8	6.8	6.7	6.6	6.7	7.1
Appendix IV																	
Antimony	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1
Arsenic	ug/L	< 1	1	1	1	1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	1.6	< 1.0	< 1.0	< 1	< 1
Barium	ug/L	69	64	63	58	69	57	60	58.2	--	57.1	54.7	71.4	65	70	79	65
Beryllium	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1
Cadmium	ug/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.20	--	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2
Chromium	ug/L	3	2	3	2	2	1	2	1.1	--	< 1.0	2.0	1.1	2.2	2.1	< 1	1
Cobalt	ug/L	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15.0	--	< 15.0	< 15.0	< 6.0	< 6.0	< 6.0	< 6	< 6
Fluoride	ug/L	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1
Lithium	ug/L	22.3	19.7	17	20	22	20	19	22	--	26	19	33	19	20	19	17
Mercury	ug/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.20	--	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2
Molybdenum	ug/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5.0	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5	< 5
Radium-226	pCi/L	0.481	0.546	0.411	0.320	0.444	< 0.419	0.228	< 0.937	--	< 0.621	< 0.929	< 1.00	0.250	0.365	0.403	0.593
Radium-228	pCi/L	1.05	0.874	1.20	1.64	1.01	0.717	1.22	< 0.848	--	0.795	1.94	< 0.672	0.570	< 0.559	0.976	< 0.488
Radium-226/228	pCi/L	1.531	1.42	1.61	1.96	1.45	0.826	1.45	< 1.79	--	< 1.26	2.00	< 1.67	0.820	0.702	1.38	0.806
Selenium	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1
Thallium	ug/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2.0	--	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2
MI Part 115 Parameters																	
Iron	ug/L	--	--	--	--	--	--	--	--	--	--	--	17,500	17,000	19,000	13,700	11,700
Copper	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 1.0	7.6	<1.0	< 1	< 1
Nickel	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 1.0	< 2.0	<2.0	< 2	2
Silver	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 0.20	< 0.20	<0.20	< 0.2	< 0.2
Vanadium	ug/L	--	--	--	--	--	--	--	--	--	--	--	5.3	4.5	5.2	6	6
Zinc	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 10.0	< 10	<10	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
All metals were analyzed as total unless otherwise specified.
(1) Elevated laboratory reporting limit due to sample dilution.

Table 1
Summary of Groundwater Sampling Results (Analytical): December 2015 - October 2020
DE Karn & JC Weadock Background – RCRA CCR Monitoring Program
Essexville, Michigan

Sample Location:		MW-15016															
Sample Date:		12/8/2015	3/29/2016	5/24/2016	8/22/2016	11/30/2016	2/22/2017	5/17/2017	8/1/2017	9/19/2017	4/10/2018	5/22/2018	11/8/2018	4/9/2019	10/16/2019	5/15/2020	10/13/2020
Constituent	Unit																
Appendix III																	
Boron	ug/L	490	56	472	660	435	463	491	590	602	--	409	329	270	460	278	510
Calcium	mg/L	178	204	188	216	192	295	221	208	160	--	212	171	180	230	182	259
Chloride	mg/L	89.7	264	91	94	83	160	110	113	99.5	--	82.4	57.5	75	65	69.1	63.3
Fluoride	ug/L	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	35.1	151	75	70.6	18.1	817	243	294	13.3	--	539	347	370	530	300	521
Total Dissolved Solids	mg/L	670	1,000	900	920	840	1,700	1,100	1,090	756	--	1,230	806	970	1,000	922	1150
pH, Field	SU	7.1	7.1	6.8	6.8	7.0	7.2	7.0	7.0	7.1	7.3	7.3	7.3	6.9	7.0	7.5	7.3
Appendix IV																	
Antimony	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1
Arsenic	ug/L	11	2	16	18	16	2	12	20.5	--	< 1.0	< 1.0	< 1.0	2.1	1	1	2
Barium	ug/L	237	114	233	299	241	109	151	197	--	41.8	47.4	31.3	43	58	48	55
Beryllium	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1
Cadmium	ug/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.20	--	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2
Chromium	ug/L	1	1	1	< 1	< 1	2	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	16	< 1	< 1
Cobalt	ug/L	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15.0	--	< 15.0	< 15.0	< 6.0	< 6.0	< 6.0	< 6	< 6
Fluoride	ug/L	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1
Lithium	ug/L	31.2	16.9	33	48	28	181	88	83	--	120	100	81	110	92	70	84
Mercury	ug/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.20	--	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2
Molybdenum	ug/L	6	< 5	< 5	< 5	< 5	6	< 5	< 5.0	--	5.4	6.5	5.6	< 5.0	5.5	< 5	6
Radium-226	pCi/L	0.311	0.303	0.292	< 0.199	< 0.304	< 0.312	0.479	< 1.01	--	< 0.658	< 0.711	< 0.650	< 0.110	< 0.213	0.167	< 0.423
Radium-228	pCi/L	1.27	< 0.673	1.11	< 1.41	0.871	0.573	< 0.619	< 1.33	--	< 0.697	< 0.765	0.867	< 0.529	< 0.552	< 0.546	< 0.537
Radium-226/228	pCi/L	1.581	0.750	1.40	< 1.41	1.08	0.736	0.958	< 2.34	--	< 1.36	< 1.48	< 1.25	< 0.529	< 0.552	< 0.546	< 0.537
Selenium	ug/L	< 1	< 1	< 1	< 1	< 1	2	1	< 1.0	--	1.7	1.2	2.2	< 1.0	< 1.0	< 1	2
Thallium	ug/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2.0	--	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2
MI Part 115 Parameters																	
Iron	ug/L	--	--	--	--	--	--	--	--	--	--	--	136	1,400	130	988	139
Copper	ug/L	--	--	--	--	--	--	--	--	--	--	--	2.6	< 1.0	3.0	2	4
Nickel	ug/L	--	--	--	--	--	--	--	--	--	--	--	1.3	2.3	9.5	2	7
Silver	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 0.20	< 0.20	<0.20	< 0.2	< 0.2
Vanadium	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 1.0	< 2.0	<2.0	< 2	< 2
Zinc	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 10.0	26	10	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
All metals were analyzed as total unless otherwise specified.
(1) Elevated laboratory reporting limit due to sample dilution.

Table 1
Summary of Groundwater Sampling Results (Analytical): December 2015 - October 2020
DE Karn & JC Weadock Background – RCRA CCR Monitoring Program
Essexville, Michigan

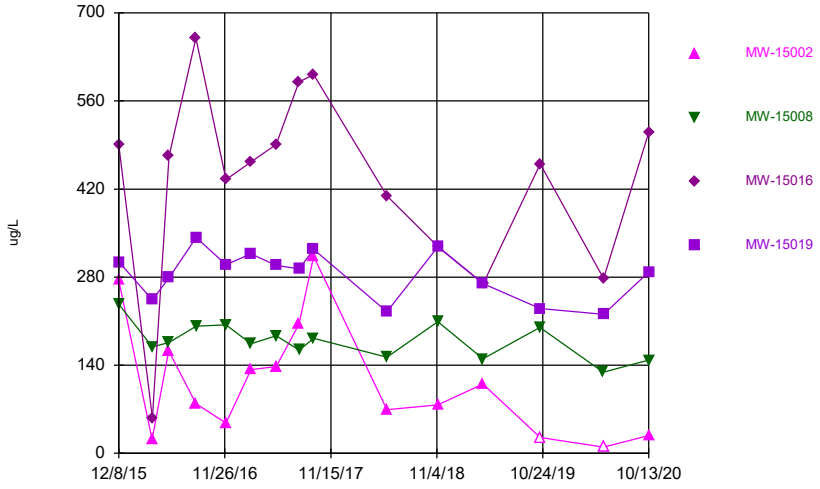
Sample Location:		MW-15019															
Sample Date:		12/9/2015	3/29/2016	5/24/2016	8/23/2016	11/30/2016	2/22/2017	5/16/2017	8/2/2017	9/19/2017	4/9/2018	5/22/2018	11/8/2018	4/8/2019	10/16/2019	5/15/2020	10/13/2020
Constituent	Unit																
Appendix III																	
Boron	ug/L	304	244	279	343	300	317	299	293	324	--	225	328	270	230	221	288
Calcium	mg/L	171	150	179	227	154	149	146	165	155	--	128	142	140	120	163	158
Chloride	mg/L	437	387	408	358	359	379	357	380	438	--	382	415	430	320	287	355
Fluoride	ug/L	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	99.7	51.2	116	195	67.3	54.2	49.5	120	99.7	--	51.6	40.6	46	71	103	35
Total Dissolved Solids	mg/L	1,400	1,100	1,300	1,300	1,100	1,200	1,100	1,250	1,200	--	1,080	1,080	1,200	1,000	1,190	1,180
pH, Field	SU	6.8	6.8	6.7	6.7	6.8	6.8	6.8	6.9	6.9	6.8	6.9	6.9	7.0	6.8	6.6	7.0
Appendix IV																	
Antimony	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1
Arsenic	ug/L	< 1	< 1	1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	3	< 1	< 1
Barium	ug/L	293	263	269	319	275	289	283	265	--	246	258	281	300	220	287	290
Beryllium	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1
Cadmium	ug/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.20	--	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2
Chromium	ug/L	2	2	2	< 1	< 1	1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1
Cobalt	ug/L	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15.0	--	< 15.0	< 15.0	< 6.0	< 6.0	< 6.0	< 6	< 6
Fluoride	ug/L	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1
Lithium	ug/L	15.8	11	14	21	13	13	14	16	--	17	11	17	12	14	14	13
Mercury	ug/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.20	--	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2
Molybdenum	ug/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5.0	--	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5	< 5
Radium-226	pCi/L	1.02	0.477	0.515	0.759	0.524	< 0.3	0.36	< 0.844	--	0.444	< 0.690	< 0.863	0.259	0.458	0.282	0.545
Radium-228	pCi/L	0.815	0.766	0.987	0.918	< 0.666	0.814	1.38	< 0.722	--	< 0.589	< 0.874	1.67	0.772	0.559	< 0.649	0.65
Radium-226/228	pCi/L	1.835	1.24	1.50	1.68	1.01	1.05	1.74	< 1.57	--	1.03	< 1.56	2.04	1.03	1.02	0.911	1.19
Selenium	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	--	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1
Thallium	ug/L	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2.0	--	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2
MI Part 115 Parameters																	
Iron	ug/L	--	--	--	--	--	--	--	--	--	--	--	21,200	21,000	14,000	14,300	14,700
Copper	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 1.0	< 1.0	<1.0	< 1	< 1
Nickel	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 1.0	< 2.0	<2.0	< 2	4
Silver	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 0.20	< 0.20	<0.20	< 0.2	< 0.2
Vanadium	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 1.0	< 2.0	<2.0	2	< 2
Zinc	ug/L	--	--	--	--	--	--	--	--	--	--	--	< 10.0	< 10	<10	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
All metals were analyzed as total unless otherwise specified.
(1) Elevated laboratory reporting limit due to sample dilution.

Attachment 1
Sanitas Outputs

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

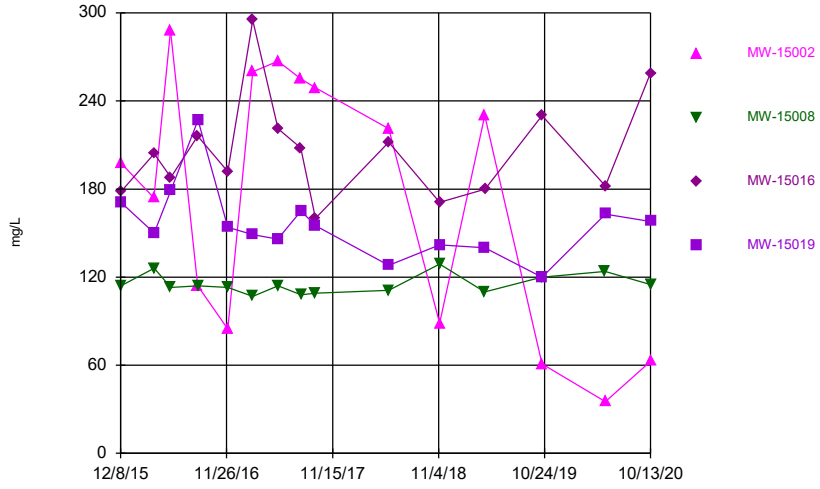
Boron, Total



Time Series Analysis Run 3/29/2021 3:10 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA

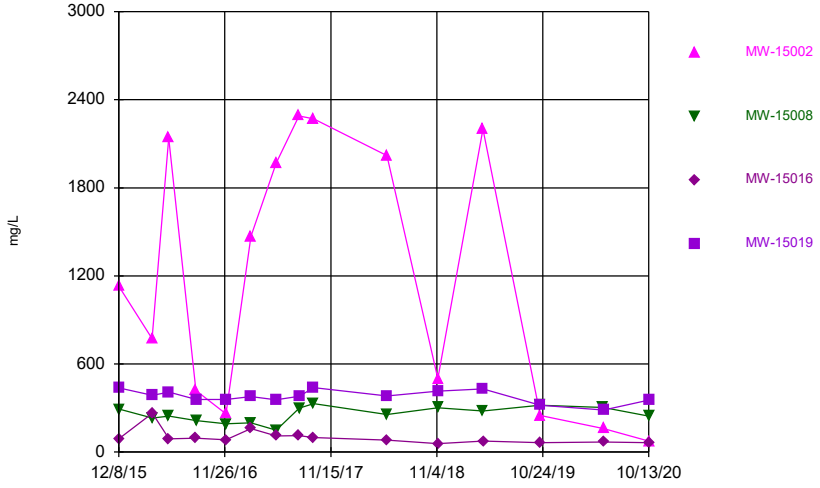
Calcium, Total



Time Series Analysis Run 3/29/2021 3:10 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA

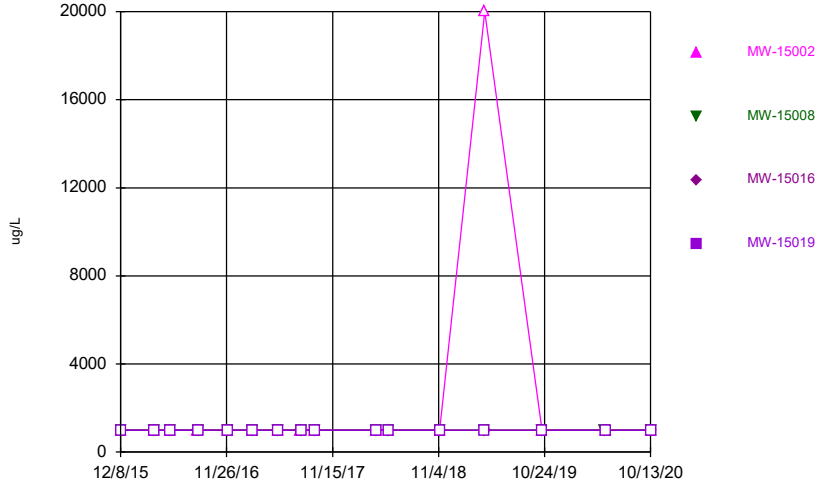
Chloride



Time Series Analysis Run 3/29/2021 3:10 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

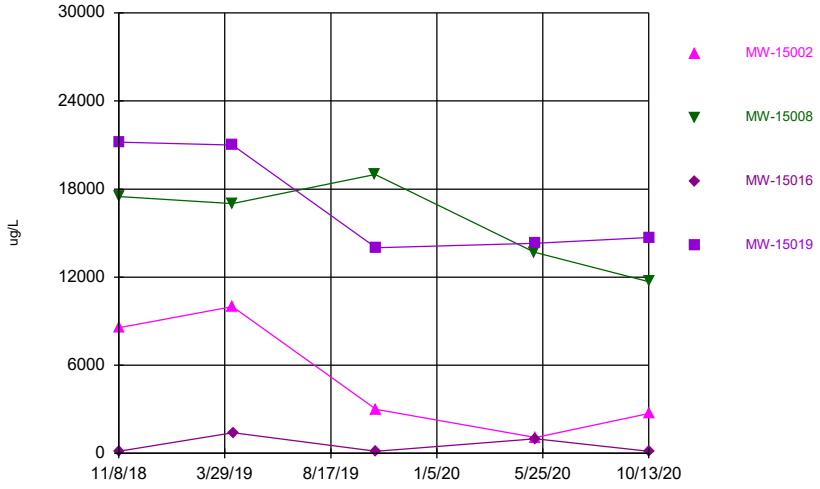
Fluoride



Time Series Analysis Run 3/29/2021 3:10 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

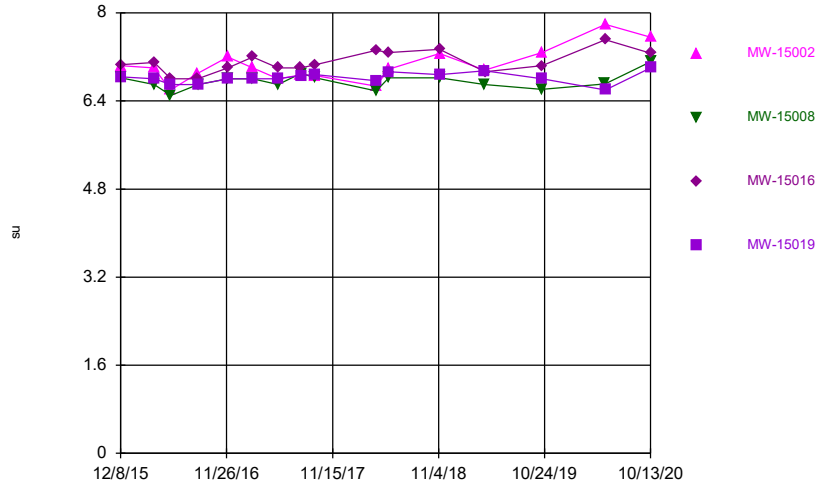


Time Series Analysis Run 3/29/2021 3:10 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA

pH, Field

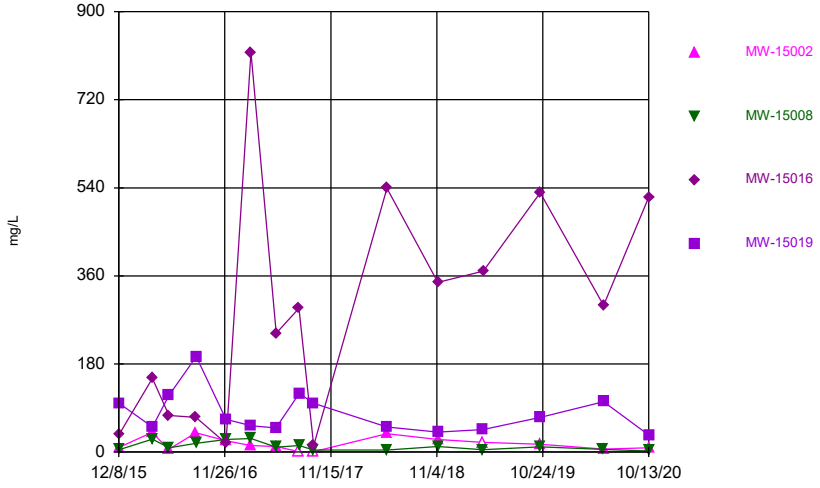


Time Series Analysis Run 3/29/2021 3:10 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Sulfate

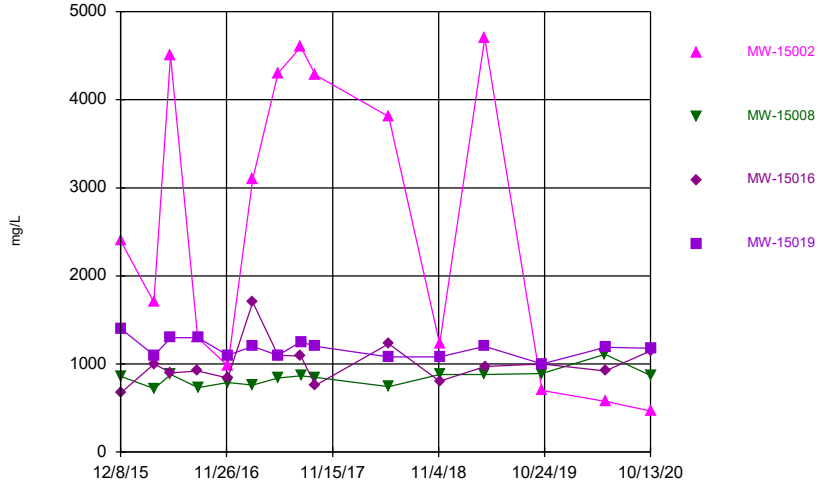


Time Series Analysis Run 3/29/2021 3:10 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids



Time Series Analysis Run 3/29/2021 3:10 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Summary Report

Constituent: Boron, Total Analysis Run 3/29/2021 3:25 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 2
Wells = 4
Minimum Value = 20
Maximum Value = 660
Mean Value = 253.2
Median Value = 227.5
Standard Deviation = 151.1
Coefficient of Variation = 0.5965
Skewness = 0.6885

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	2	20	313	115.3	79	90.59	0.7855	0.9454
MW-15008	15	0	129	236	178.9	176	28.23	0.1578	0.1668
MW-15016	15	0	56	660	434.3	463	152.3	0.3505	-0.8953
MW-15019	15	0	221	343	284.3	293	38.98	0.1371	-0.3674

Summary Report

Constituent: Calcium, Total Analysis Run 3/29/2021 3:25 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 0
Wells = 4
Minimum Value = 35.2
Maximum Value = 295
Mean Value = 162.6
Median Value = 156.5
Standard Deviation = 58.5
Coefficient of Variation = 0.3597
Skewness = 0.3024

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	0	35.2	288	172.5	198	88.81	0.5147	-0.253
MW-15008	15	0	107	129	115.1	114	6.675	0.05797	0.8454
MW-15016	15	0	160	295	206.4	204	35.43	0.1716	1.079
MW-15019	15	0	120	227	156.5	154	24.85	0.1588	1.375

Summary Report

Constituent: Chloride Analysis Run 3/29/2021 3:25 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 0
Wells = 4
Minimum Value = 57.5
Maximum Value = 2290
Mean Value = 483.3
Median Value = 296
Standard Deviation = 607.8
Coefficient of Variation = 1.258
Skewness = 2.143

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	0	74.8	2290	1195	1130	885.4	0.7409	0.04306
MW-15008	15	0	149	329	257.4	255	52.77	0.205	-0.456
MW-15016	15	0	57.5	264	101.1	89.7	51.78	0.5122	2.281
MW-15019	15	0	287	438	379.5	380	42.68	0.1125	-0.4345

Summary Report

Constituent: Fluoride Analysis Run 3/29/2021 3:25 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 63
ND/Trace = 63
Wells = 4
Minimum Value = 1000
Maximum Value = 1000
Mean Value = 1000
Median Value = 1000
Standard Deviation = 0
Coefficient of Variation = 0
Skewness = NaN

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	15	1000	1000	1000	1000	0	0	NaN
MW-15008	16	16	1000	1000	1000	1000	0	0	NaN
MW-15016	16	16	1000	1000	1000	1000	0	0	NaN
MW-15019	16	16	1000	1000	1000	1000	0	0	NaN

Summary Report

Constituent: Iron, Total Analysis Run 3/29/2021 3:25 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 11/8/2018 and 10/13/2020, a summary of the selected data set:

Observations = 20
ND/Trace = 0
Wells = 4
Minimum Value = 130
Maximum Value = 21200
Mean Value = 9612
Median Value = 10850
Standard Deviation = 7724
Coefficient of Variation = 0.8036
Skewness = 0.01912

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	5	0	1080	10000	5070	3000	3942	0.7774	0.3496
MW-15008	5	0	11700	19000	15780	17000	2991	0.1896	-0.3825
MW-15016	5	0	130	1400	558.6	139	598.1	1.071	0.5838
MW-15019	5	0	14000	21200	17040	14700	3715	0.218	0.3958

Summary Report

Constituent: pH, Field Analysis Run 3/29/2021 3:25 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 64
ND/Trace = 0
Wells = 4
Minimum Value = 6.5
Maximum Value = 7.79
Mean Value = 6.933
Median Value = 6.875
Standard Deviation = 0.2486
Coefficient of Variation = 0.03586
Skewness = 1.082

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	16	0	6.6	7.79	7.048	6.99	0.3104	0.04405	0.9016
MW-15008	16	0	6.5	7.11	6.756	6.755	0.1411	0.02089	0.5575
MW-15016	16	0	6.8	7.51	7.107	7.06	0.1984	0.02791	0.2707
MW-15019	16	0	6.6	7	6.819	6.8	0.1008	0.01478	-0.2773

Summary Report

Constituent: Sulfate Analysis Run 3/29/2021 3:25 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 3
Wells = 4
Minimum Value = 2
Maximum Value = 817
Mean Value = 99.73
Median Value = 36.45
Standard Deviation = 163.4
Coefficient of Variation = 1.638
Skewness = 2.512

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	3	2	40.3	18.74	13.1	14.57	0.7776	0.479
MW-15008	15	0	2.55	27.7	11.91	10.1	8.67	0.7279	0.8208
MW-15016	15	0	13.3	817	288.3	294	237.8	0.825	0.6136
MW-15019	15	0	35	195	79.99	67.3	42.79	0.535	1.296

Summary Report

Constituent: Total Dissolved Solids Analysis Run 3/29/2021 3:25 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

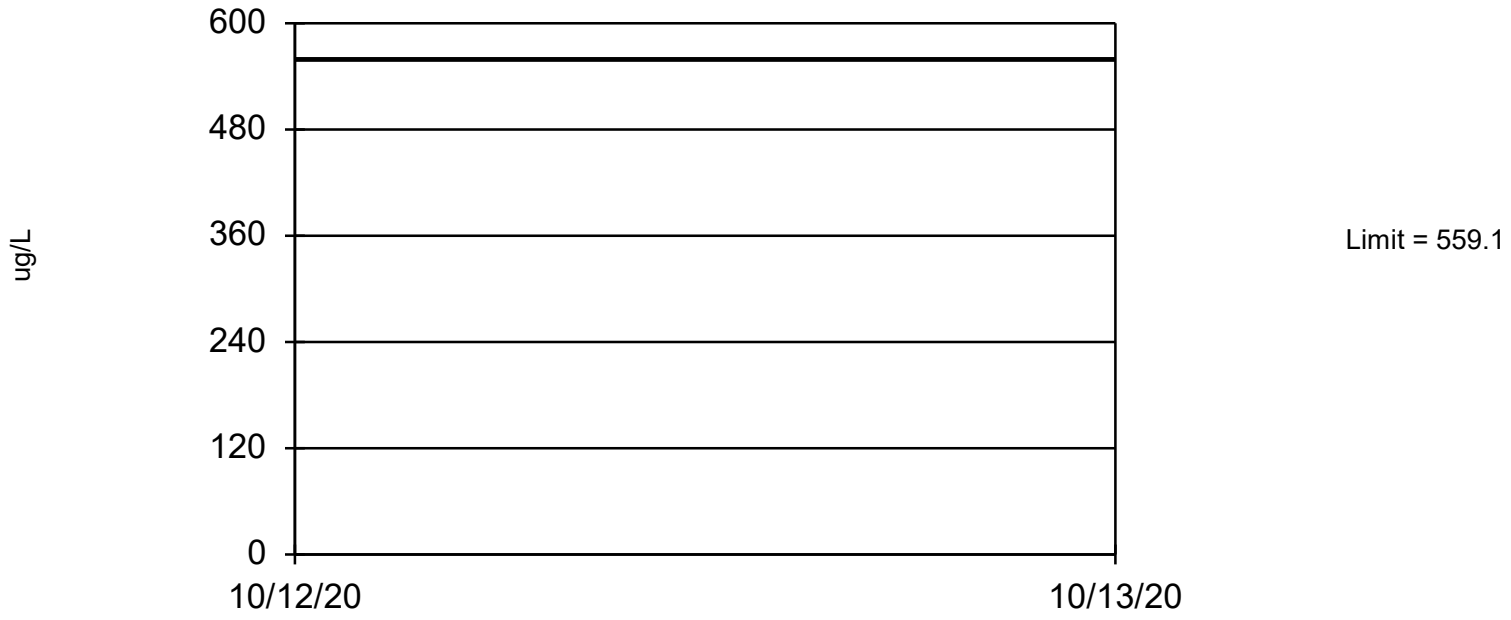
For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 0
Wells = 4
Minimum Value = 466
Maximum Value = 4700
Mean Value = 1401
Median Value = 1080
Standard Deviation = 1076
Coefficient of Variation = 0.7682
Skewness = 2.196

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	0	466	4700	2576	2400	1663	0.6457	0.06143
MW-15008	15	0	720	1110	844.7	860	95.15	0.1126	1.175
MW-15016	15	0	670	1700	1004	970	244.7	0.2438	1.45
MW-15019	15	0	1000	1400	1179	1190	105.2	0.08926	0.3634

Boron, Total

Interwell Parametric



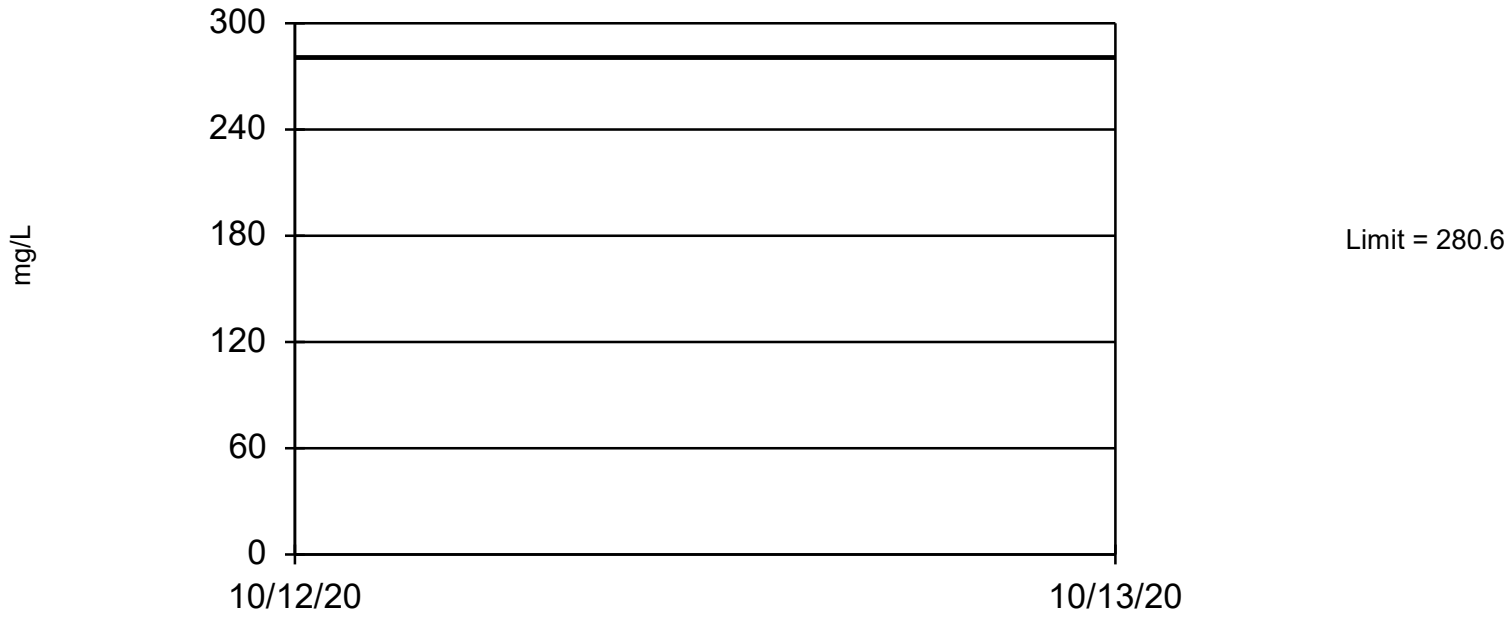
95% coverage. Background Data Summary: Mean=252.7, Std. Dev.=151.9, n=60, 3.333% NDs. Normality test: Shapiro Francia @alpha = 0.01, calculated = 0.9585, critical = 0.945. Report alpha = 0.05.

Tolerance Limit Analysis Run 3/29/2021 3:41 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Calcium, Total

Interwell Parametric



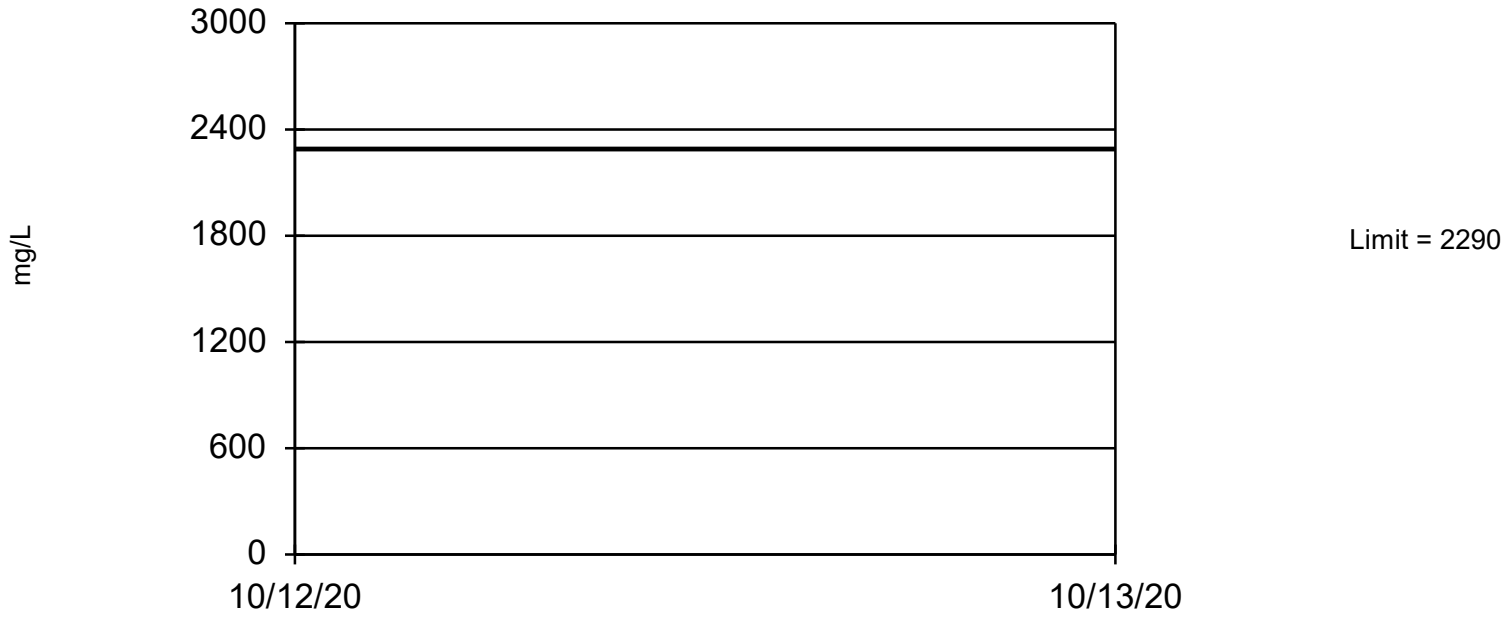
95% coverage. Background Data Summary: Mean=162.6, Std. Dev.=58.5, n=60. Normality test: Shapiro Francia @alpha = 0.01, calculated = 0.9779, critical = 0.945. Report alpha = 0.05.

Tolerance Limit Analysis Run 3/29/2021 3:41 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Chloride

Interwell Non-parametric



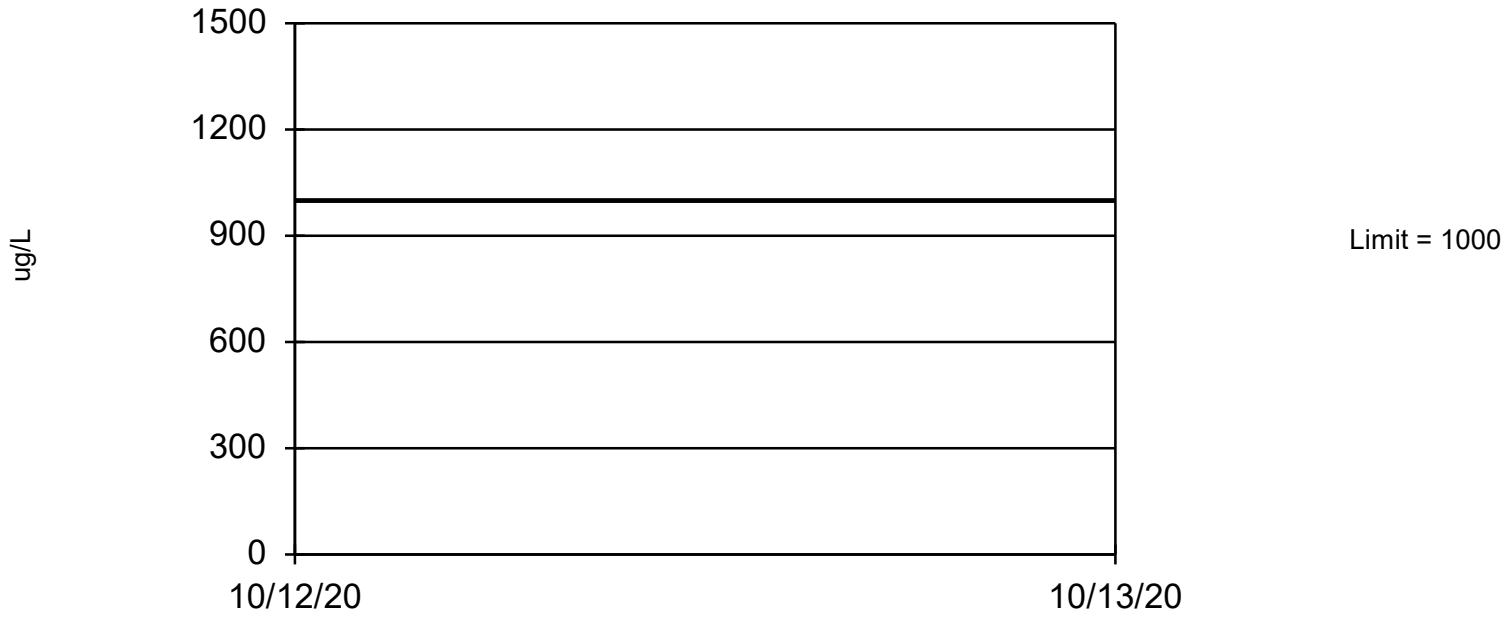
Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 60 background values. 92.77% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04607.

Tolerance Limit Analysis Run 3/29/2021 3:41 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Fluoride

Interwell Non-parametric



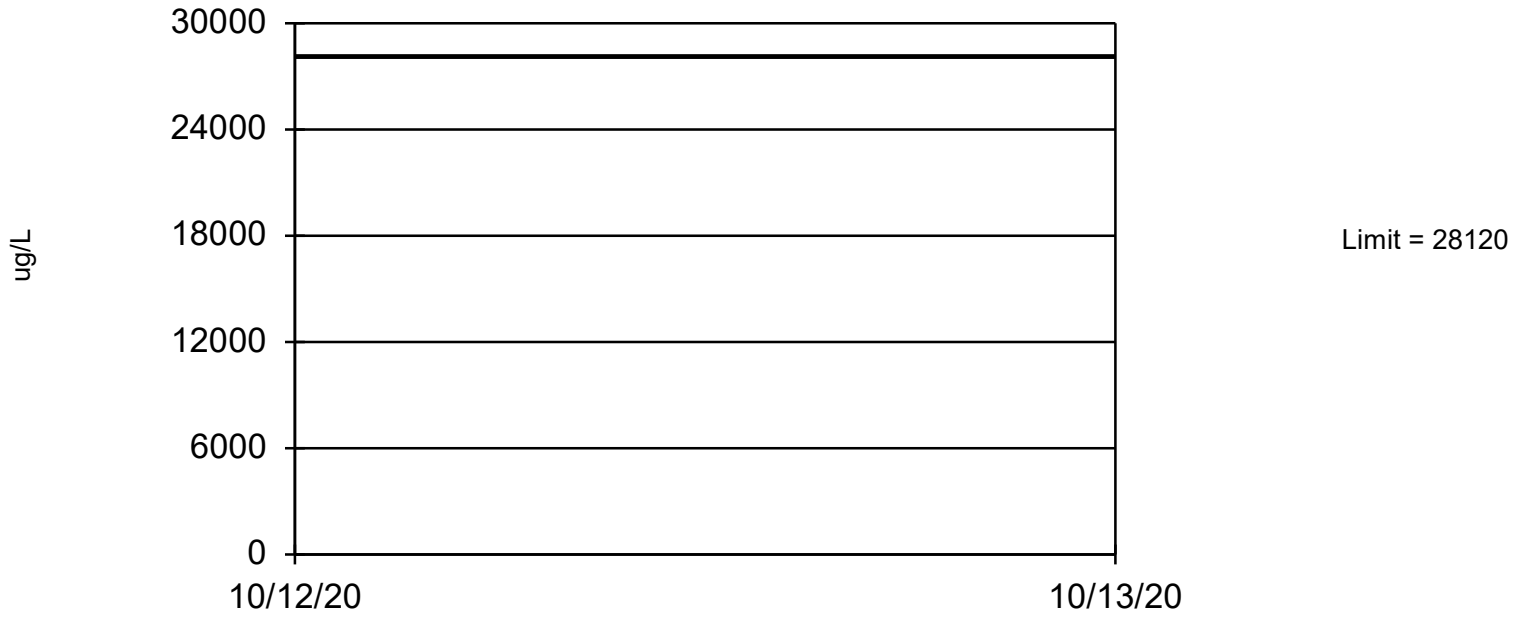
Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 63 background values. 100% NDs. 92.77% coverage at alpha=0.01; 95.51% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.0395.

Tolerance Limit Analysis Run 3/29/2021 3:41 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Iron, Total

Interwell Parametric



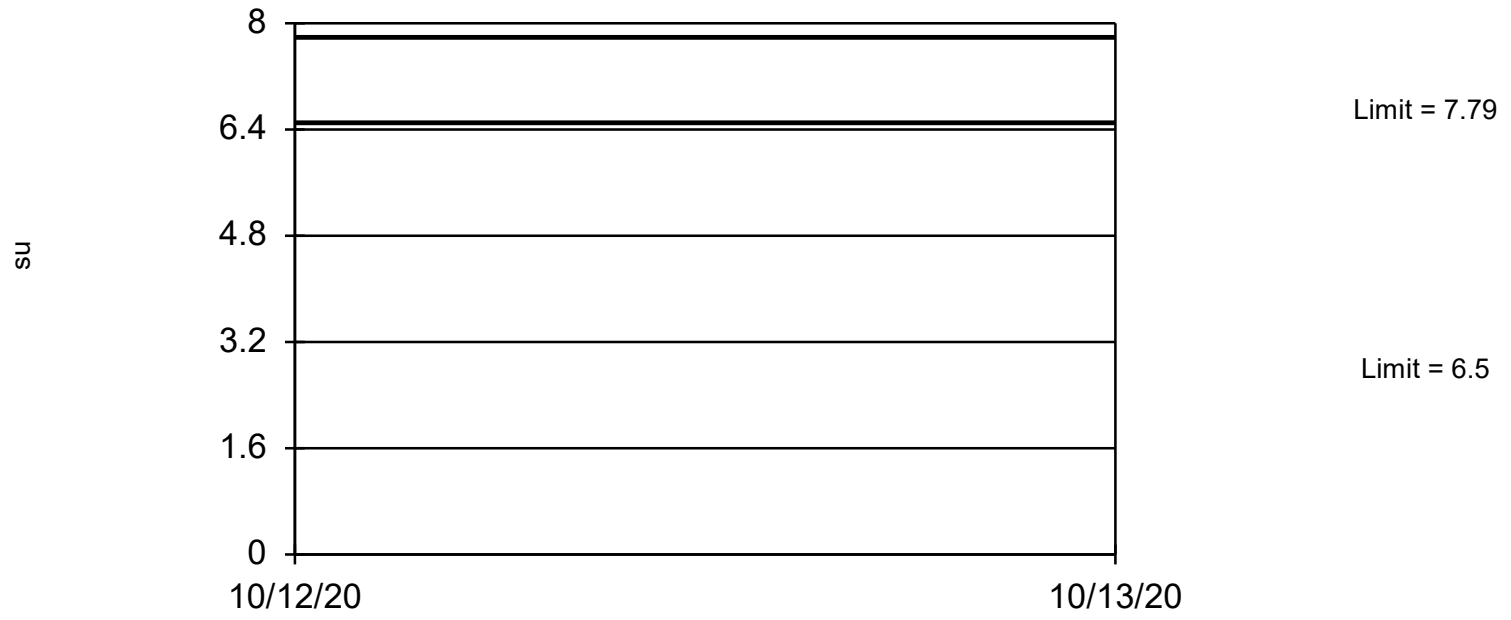
95% coverage. Background Data Summary: Mean=9612, Std. Dev.=7724, n=20. Normality test: Shapiro Wilk @alpha = 0.01, calculated = 0.8814, critical = 0.868. Report alpha = 0.05.

Tolerance Limit Analysis Run 3/29/2021 3:41 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

pH, Field

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limits are highest and lowest of 64 background values. 90.04% coverage at alpha=0.01; 92.77% coverage at alpha=0.05; 97.46% coverage at alpha=0.5. Report alpha = 0.1639 (0.08196 per tail).

Tolerance Limit Analysis Run 3/29/2021 3:41 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sulfate

Interwell Parametric

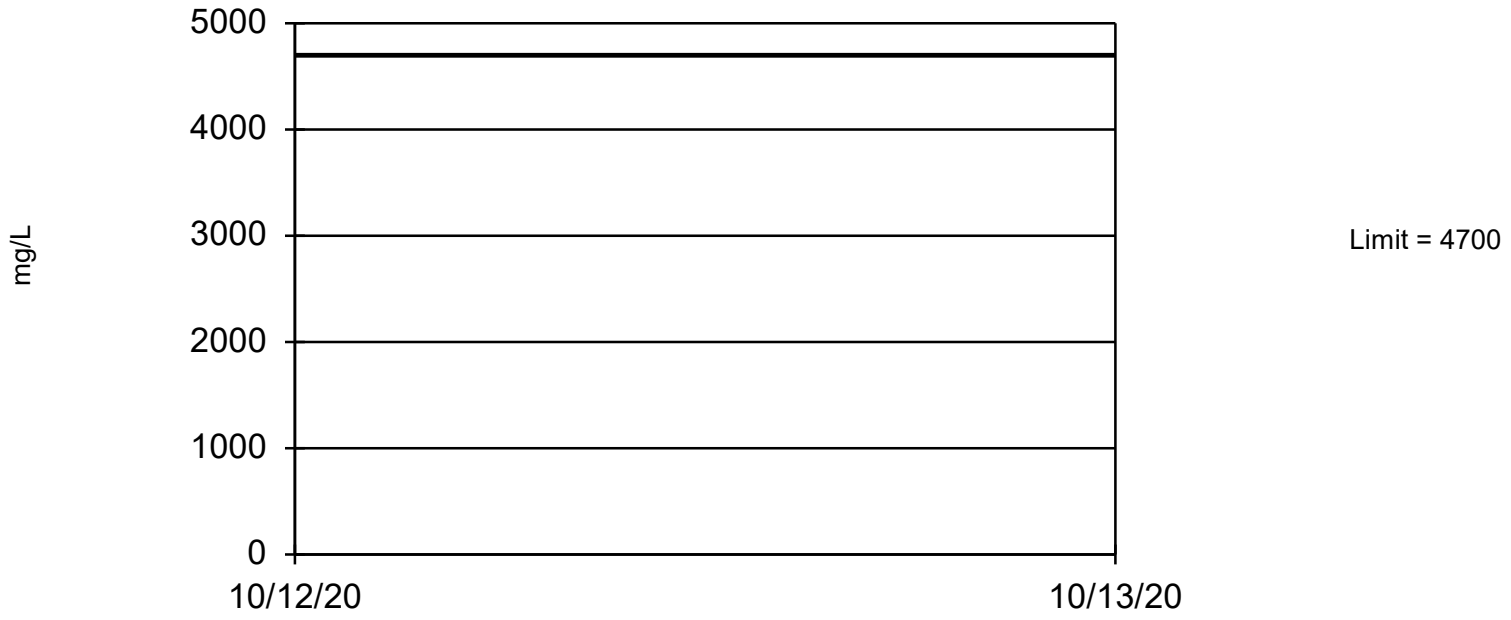
95% coverage. Background Data Summary (based on natural log transformation): Mean=3.503, Std. Dev.=1.567, n=60, 5% NDs. Normality test: Shapiro Francia @alpha = 0.01, calculated = 0.9907, critical = 0.945. Report alpha = 0.05.

Tolerance Limit Analysis Run 3/29/2021 3:41 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Total Dissolved Solids

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 60 background values. 92.77% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04607.

Tolerance Limit Analysis Run 3/29/2021 3:41 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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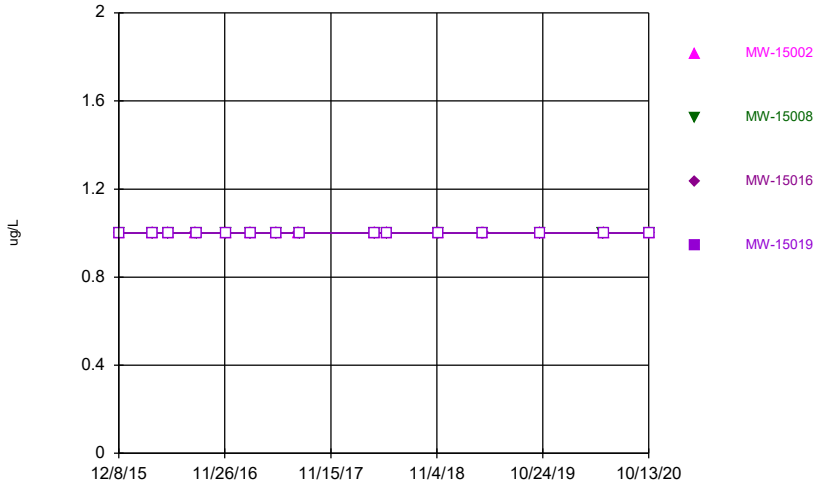
Hollow symbols indicate censored values.

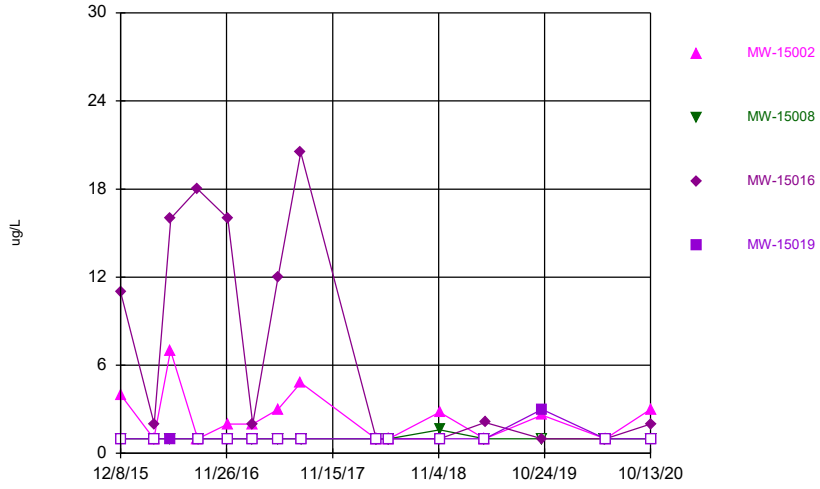
Antimony, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Arsenic, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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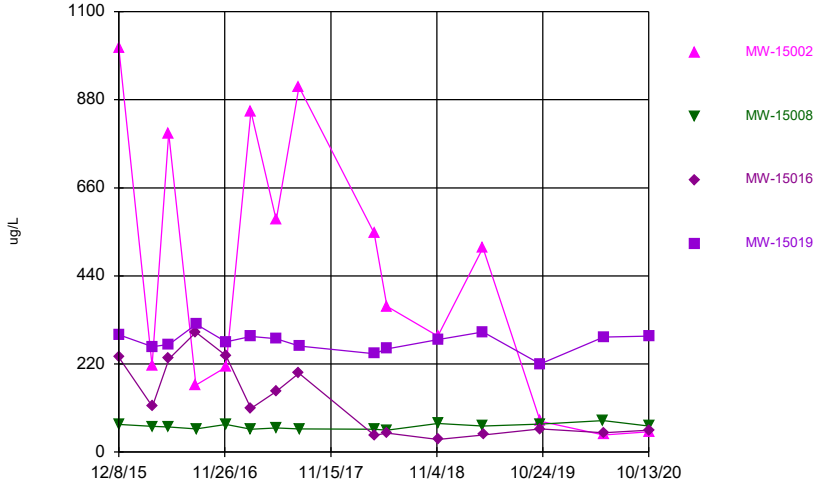
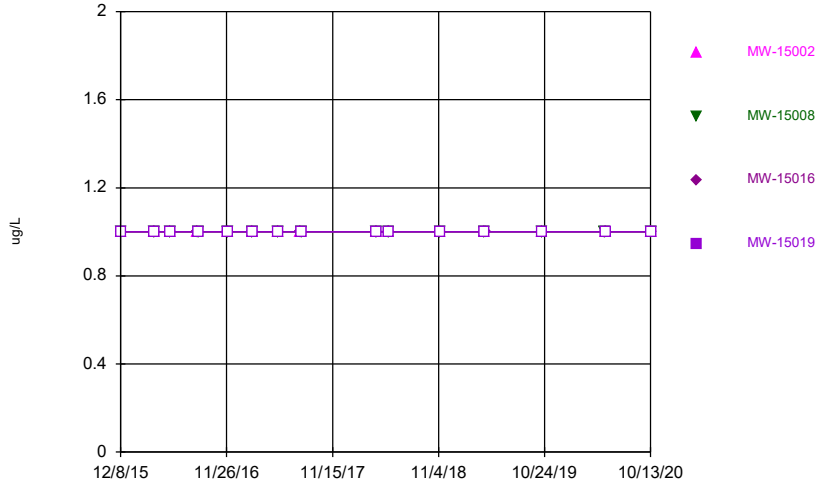
Barium, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

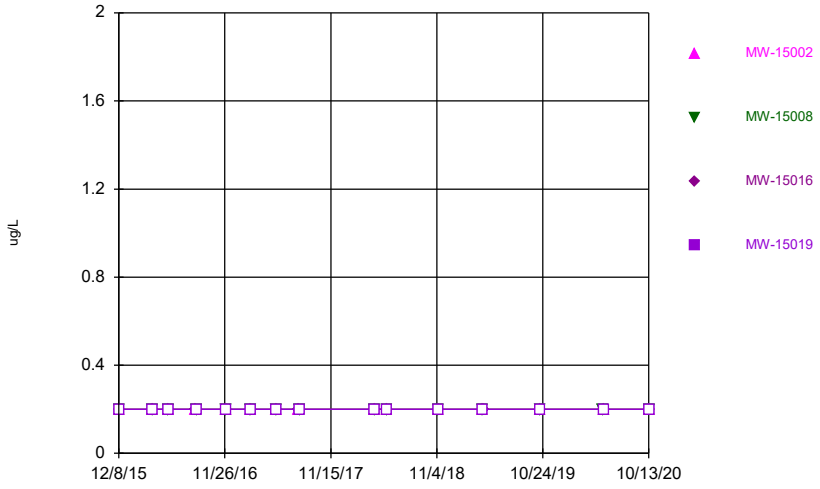
Beryllium, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Cadmium, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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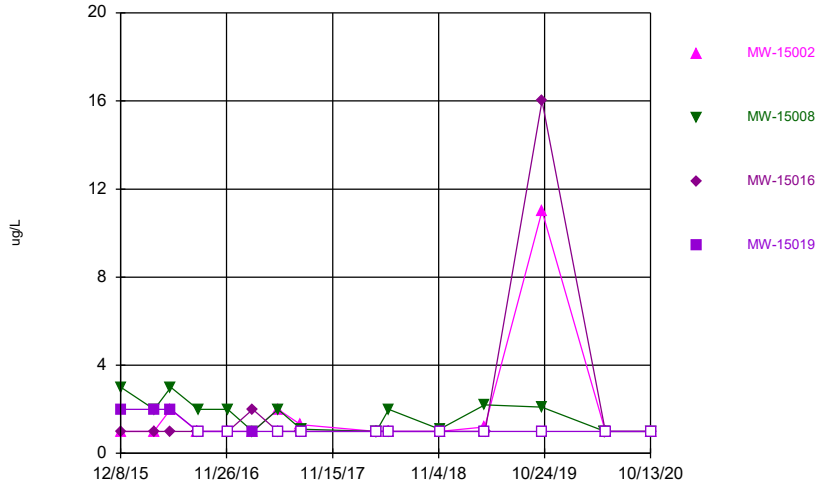
Hollow symbols indicate censored values.

Chromium, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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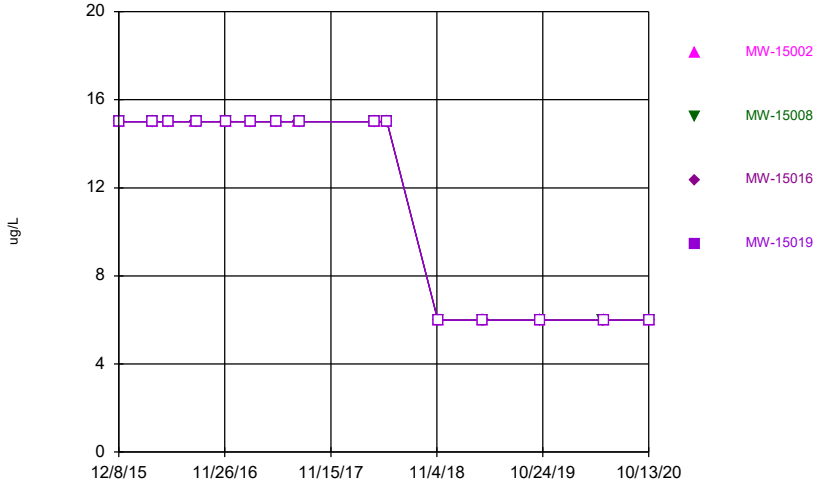
Hollow symbols indicate censored values.

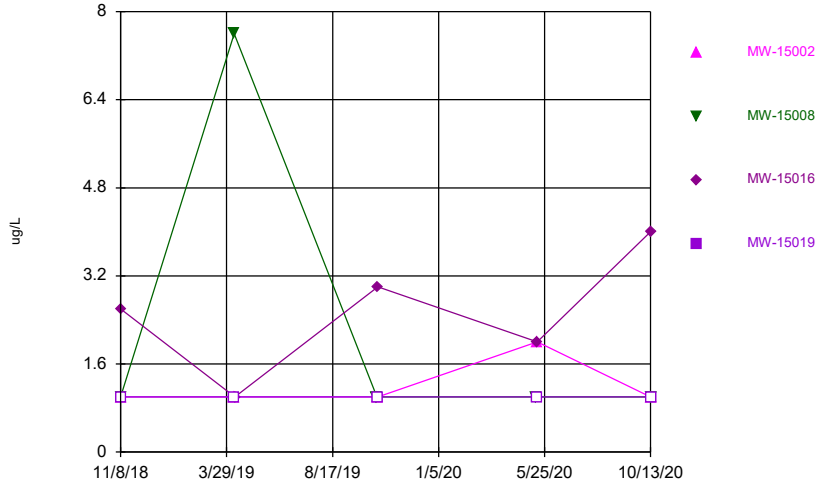
Cobalt, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

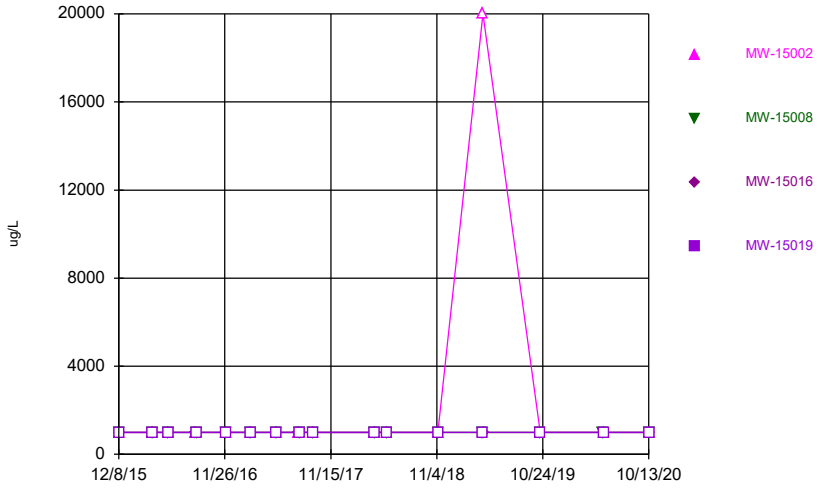
Copper, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

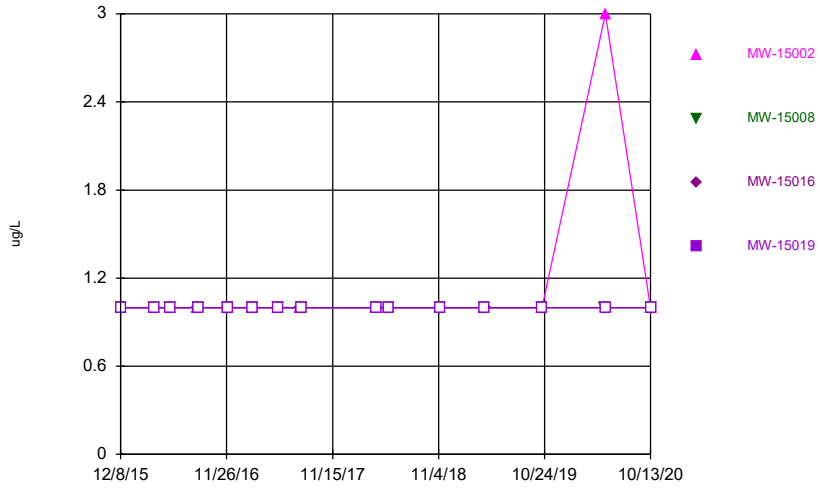
Fluoride



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Lead, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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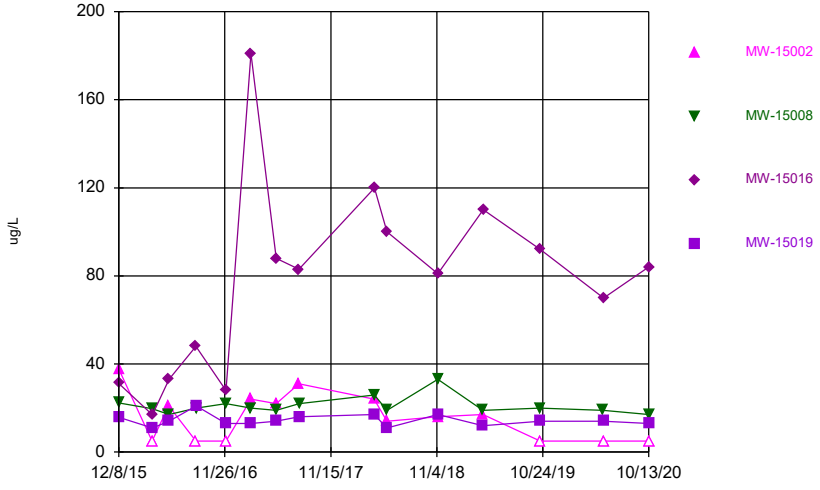
Hollow symbols indicate censored values.

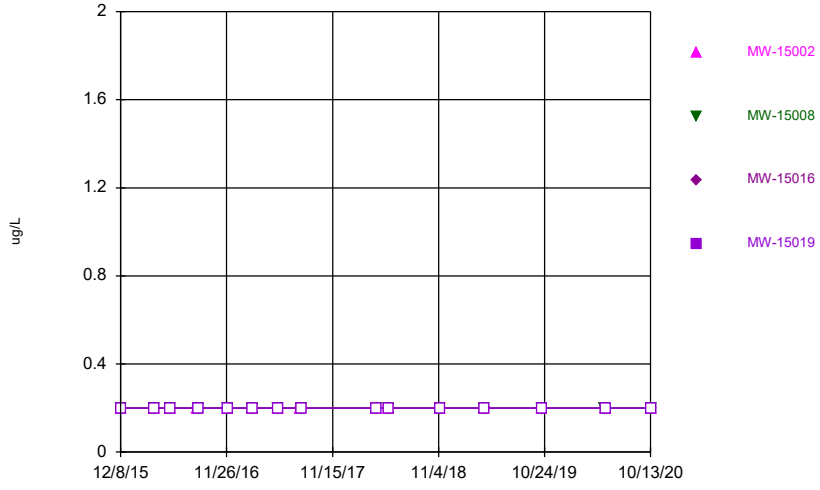
Lithium, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Mercury, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

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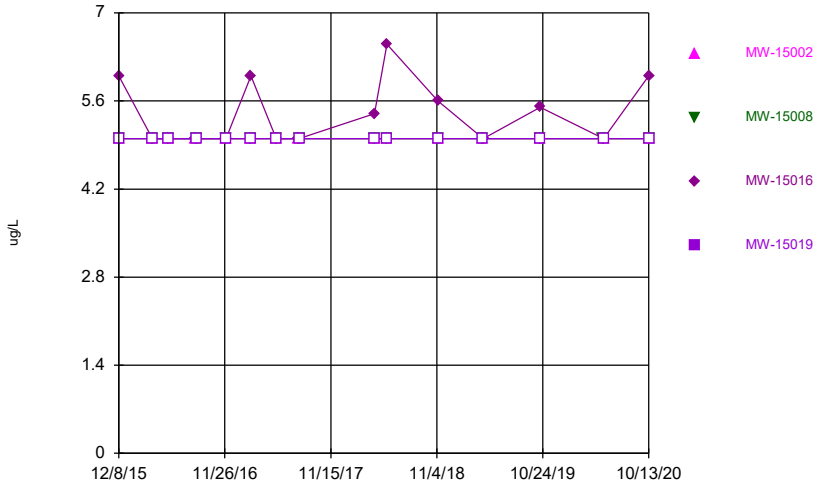
Hollow symbols indicate censored values.

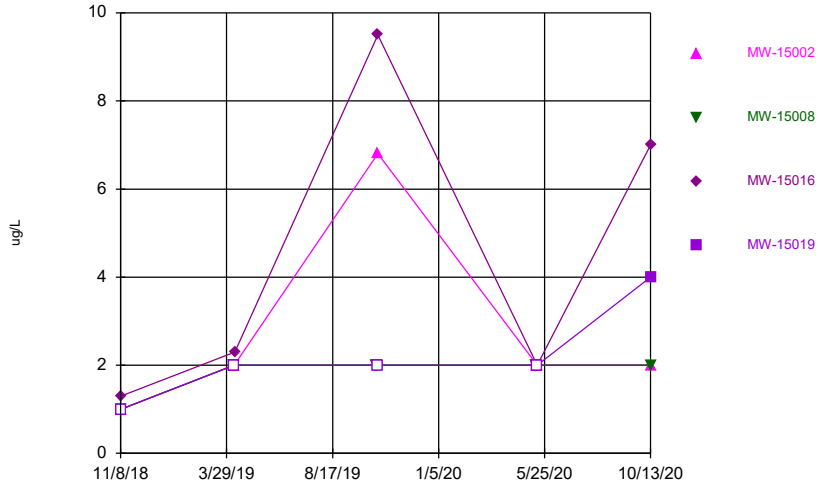
Molybdenum, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

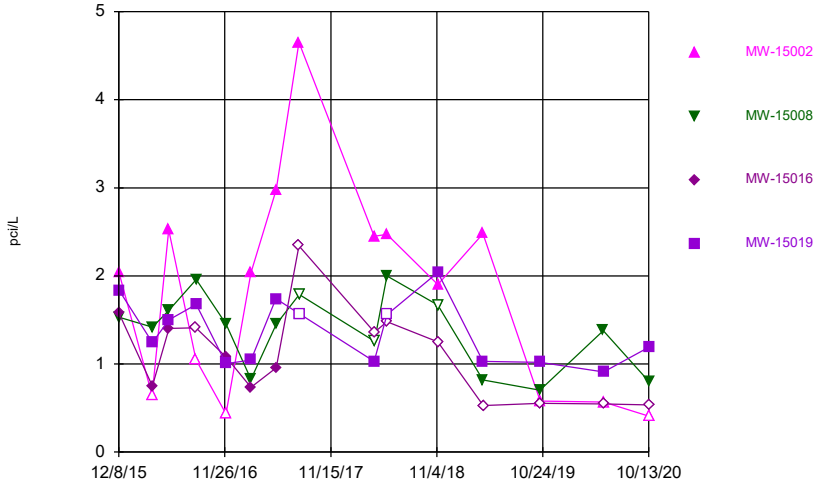
Nickel, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

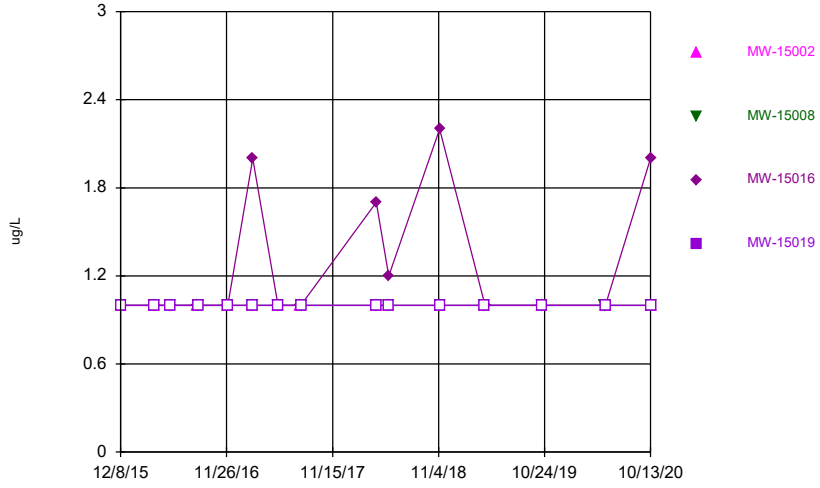
Radium-226/228



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

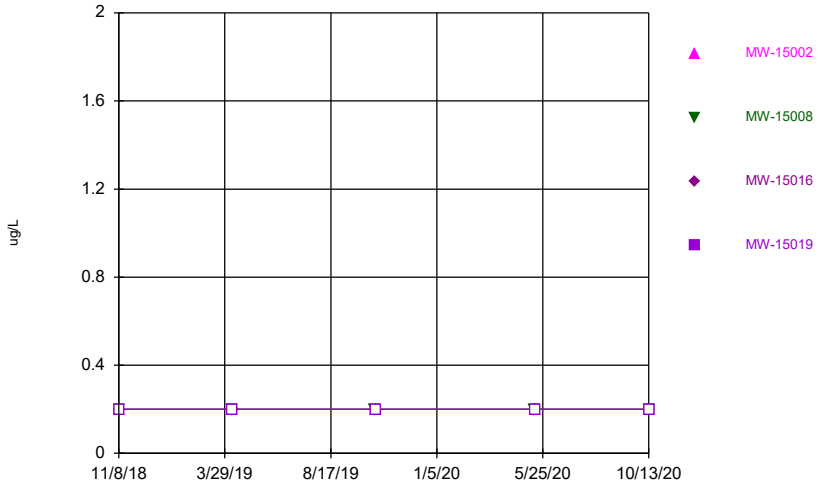
Selenium, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

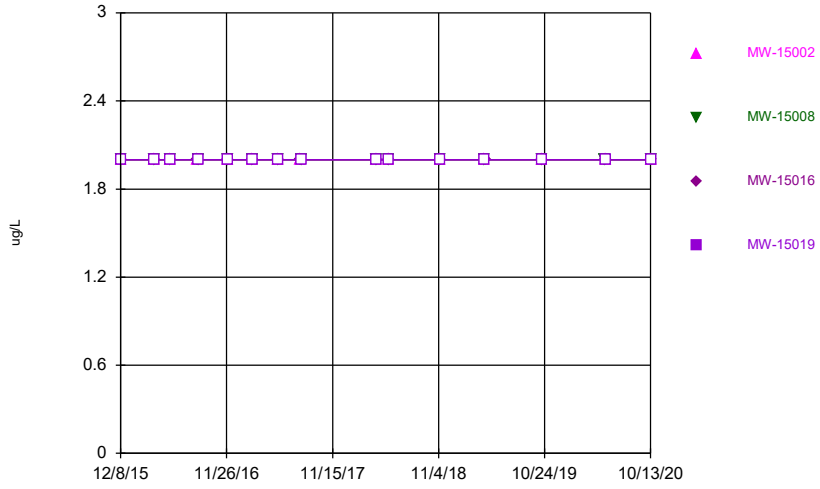
Silver, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

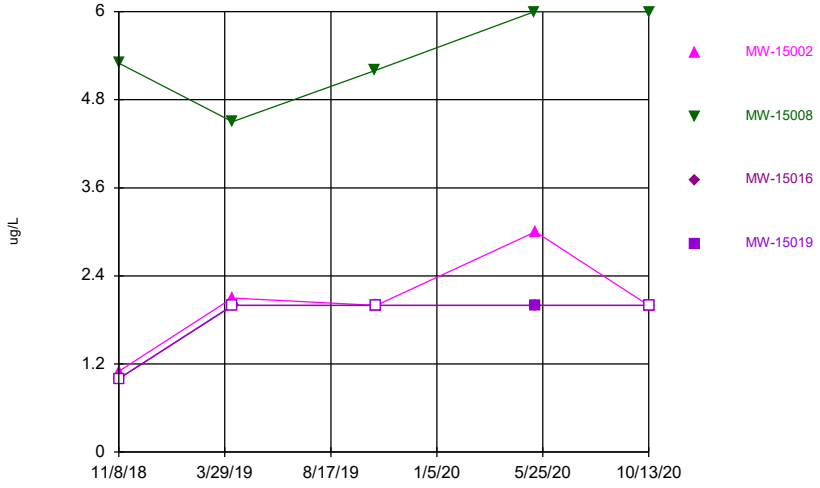
Thallium, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

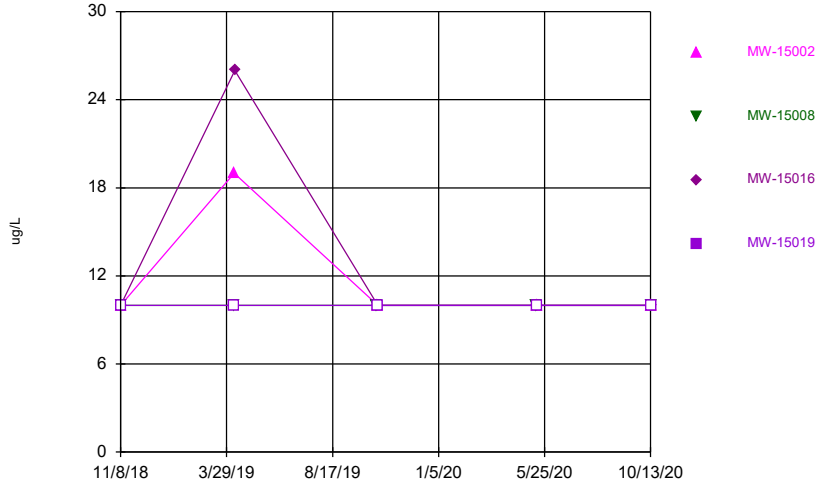
Vanadium, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Zinc, Total



Time Series Analysis Run 3/29/2021 3:13 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Summary Report

Constituent: Antimony, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 60
Wells = 4
Minimum Value = 1
Maximum Value = 1
Mean Value = 1
Median Value = 1
Standard Deviation = 0
Coefficient of Variation = 0
Skewness = NaN

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	15	1	1	1	1	0	0	NaN
MW-15008	15	15	1	1	1	1	0	0	NaN
MW-15016	15	15	1	1	1	1	0	0	NaN
MW-15019	15	15	1	1	1	1	0	0	NaN

Summary Report

Constituent: Arsenic, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 31
Wells = 4
Minimum Value = 1
Maximum Value = 20.5
Mean Value = 2.94
Median Value = 1
Standard Deviation = 4.507
Coefficient of Variation = 1.533
Skewness = 2.677

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	5	1	7	2.48	2	1.74	0.7016	1.249
MW-15008	15	10	1	1.6	1.04	1	0.1549	0.149	3.474
MW-15016	15	3	1	20.5	7.107	2	7.489	1.054	0.6364
MW-15019	15	13	1	3	1.133	1	0.5164	0.4556	3.474

Summary Report

Constituent: Barium, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 0
Wells = 4
Minimum Value = 31.3
Maximum Value = 1010
Mean Value = 227.2
Median Value = 204.5
Standard Deviation = 222.7
Coefficient of Variation = 0.9805
Skewness = 1.867

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	0	43	1010	441.7	364	330	0.7471	0.38
MW-15008	15	0	54.7	79	64.03	64	6.748	0.1054	0.5403
MW-15016	15	0	31.3	299	127	109	91.76	0.7223	0.5399
MW-15019	15	0	220	319	275.9	281	23.87	0.08651	-0.5665

Summary Report

Constituent: Beryllium, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 60
Wells = 4
Minimum Value = 1
Maximum Value = 1
Mean Value = 1
Median Value = 1
Standard Deviation = 0
Coefficient of Variation = 0
Skewness = NaN

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	15	1	1	1	1	0	0	NaN
MW-15008	15	15	1	1	1	1	0	0	NaN
MW-15016	15	15	1	1	1	1	0	0	NaN
MW-15019	15	15	1	1	1	1	0	0	NaN

Summary Report

Constituent: Cadmium, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 60
Wells = 4
Minimum Value = 0.2
Maximum Value = 0.2
Mean Value = 0.2
Median Value = 0.2
Standard Deviation = 0
Coefficient of Variation = 0
Skewness = NaN

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	15	0.2	0.2	0.2	0.2	0	0	NaN
MW-15008	15	15	0.2	0.2	0.2	0.2	0	0	NaN
MW-15016	15	15	0.2	0.2	0.2	0.2	0	0	NaN
MW-15019	15	15	0.2	0.2	0.2	0.2	0	0	NaN

Summary Report

Constituent: Chromium, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 29
Wells = 4
Minimum Value = 1
Maximum Value = 16
Mean Value = 1.717
Median Value = 1
Standard Deviation = 2.314
Coefficient of Variation = 1.348
Skewness = 5.108

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	6	1	11	1.833	1	2.559	1.396	3.369
MW-15008	15	2	1	3	1.767	2	0.6997	0.396	0.3322
MW-15016	15	10	1	16	2.067	1	3.863	1.869	3.449
MW-15019	15	11	1	2	1.2	1	0.414	0.345	1.5

Summary Report

Constituent: Cobalt, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 60
Wells = 4
Minimum Value = 6
Maximum Value = 15
Mean Value = 12
Median Value = 15
Standard Deviation = 4.278
Coefficient of Variation = 0.3565
Skewness = -0.7071

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	15	6	15	12	15	4.392	0.366	-0.7071
MW-15008	15	15	6	15	12	15	4.392	0.366	-0.7071
MW-15016	15	15	6	15	12	15	4.392	0.366	-0.7071
MW-15019	15	15	6	15	12	15	4.392	0.366	-0.7071

Summary Report

Constituent: Copper, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 11/8/2018 and 10/13/2020, a summary of the selected data set:

Observations = 20
ND/Trace = 14
Wells = 4
Minimum Value = 1
Maximum Value = 7.6
Mean Value = 1.76
Median Value = 1
Standard Deviation = 1.615
Coefficient of Variation = 0.9177
Skewness = 2.65

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	5	4	1	2	1.2	1	0.4472	0.3727	1.5
MW-15008	5	4	1	7.6	2.32	1	2.952	1.272	1.5
MW-15016	5	1	1	4	2.52	2.6	1.119	0.444	-0.05976
MW-15019	5	5	1	1	1	1	0	0	NaN

Summary Report

Constituent: Fluoride Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 63
ND/Trace = 63
Wells = 4
Minimum Value = 1000
Maximum Value = 1000
Mean Value = 1000
Median Value = 1000
Standard Deviation = 0
Coefficient of Variation = 0
Skewness = NaN

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	15	1000	1000	1000	1000	0	0	NaN
MW-15008	16	16	1000	1000	1000	1000	0	0	NaN
MW-15016	16	16	1000	1000	1000	1000	0	0	NaN
MW-15019	16	16	1000	1000	1000	1000	0	0	NaN

Summary Report

Constituent: Lead, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 59
ND/Trace = 59
Wells = 4
Minimum Value = 1
Maximum Value = 1
Mean Value = 1
Median Value = 1
Standard Deviation = 0
Coefficient of Variation = 0
Skewness = NaN

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	14	14	1	1	1	1	0	0	NaN
MW-15008	15	15	1	1	1	1	0	0	NaN
MW-15016	15	15	1	1	1	1	0	0	NaN
MW-15019	15	15	1	1	1	1	0	0	NaN

Summary Report

Constituent: Lithium, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 6
Wells = 4
Minimum Value = 10
Maximum Value = 181
Mean Value = 32.73
Median Value = 19.35
Standard Deviation = 33.92
Coefficient of Variation = 1.037
Skewness = 2.31

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	6	10	37.7	17.78	16	8.695	0.489	0.8908
MW-15008	15	0	17	33	21	20	4.012	0.1911	1.937
MW-15016	15	0	16.9	181	77.74	83	42.81	0.5507	0.622
MW-15019	15	0	11	21	14.39	14	2.632	0.183	0.9424

Summary Report

Constituent: Mercury, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 60
Wells = 4
Minimum Value = 0.2
Maximum Value = 0.2
Mean Value = 0.2
Median Value = 0.2
Standard Deviation = 0
Coefficient of Variation = 0
Skewness = NaN

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	15	0.2	0.2	0.2	0.2	0	0	NaN
MW-15008	15	15	0.2	0.2	0.2	0.2	0	0	NaN
MW-15016	15	15	0.2	0.2	0.2	0.2	0	0	NaN
MW-15019	15	15	0.2	0.2	0.2	0.2	0	0	NaN

Summary Report

Constituent: Molybdenum, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 53
Wells = 4
Minimum Value = 5
Maximum Value = 6.5
Mean Value = 5.1
Median Value = 5
Standard Deviation = 0.3031
Coefficient of Variation = 0.05943
Skewness = 3.127

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	15	5	5	5	5	0	0	NaN
MW-15008	15	15	5	5	5	5	0	0	NaN
MW-15016	15	8	5	6.5	5.4	5	0.5085	0.09417	0.83
MW-15019	15	15	5	5	5	5	0	0	NaN

Summary Report

Constituent: Nickel, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 11/8/2018 and 10/13/2020, a summary of the selected data set:

Observations = 20
ND/Trace = 11
Wells = 4
Minimum Value = 1
Maximum Value = 9.5
Mean Value = 2.795
Median Value = 2
Standard Deviation = 2.285
Coefficient of Variation = 0.8176
Skewness = 1.88

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	5	3	1	6.8	2.76	2	2.3	0.8332	1.36
MW-15008	5	4	1	2	1.8	2	0.4472	0.2485	-1.5
MW-15016	5	0	1.3	9.5	4.42	2.3	3.624	0.82	0.553
MW-15019	5	4	1	4	2.2	2	1.095	0.4979	0.8675

Summary Report

Constituent: Radium-226/228 Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 20
Wells = 4
Minimum Value = 0.409
Maximum Value = 4.65
Mean Value = 1.413
Median Value = 1.391
Standard Deviation = 0.7386
Coefficient of Variation = 0.5226
Skewness = 1.543

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	6	0.409	4.65	1.815	2.036	1.201	0.662	0.6099
MW-15008	15	3	0.702	2	1.379	1.45	0.4213	0.3056	-0.2915
MW-15016	15	9	0.529	2.34	1.101	1.079	0.5152	0.4681	0.73
MW-15019	15	2	0.911	2.04	1.36	1.243	0.3625	0.2665	0.3804

Summary Report

Constituent: Selenium, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 53
Wells = 4
Minimum Value = 1
Maximum Value = 2.2
Mean Value = 1.068
Median Value = 1
Standard Deviation = 0.2501
Coefficient of Variation = 0.2341
Skewness = 3.61

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	14	1	1	1	1	0	0	NaN
MW-15008	15	15	1	1	1	1	0	0	NaN
MW-15016	15	9	1	2.2	1.273	1	0.4511	0.3543	1.157
MW-15019	15	15	1	1	1	1	0	0	NaN

Summary Report

Constituent: Silver, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 11/8/2018 and 10/13/2020, a summary of the selected data set:

Observations = 20
ND/Trace = 20
Wells = 4
Minimum Value = 0.2
Maximum Value = 0.2
Mean Value = 0.2
Median Value = 0.2
Standard Deviation = 0
Coefficient of Variation = 0
Skewness = NaN

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	5	5	0.2	0.2	0.2	0.2	0	0	NaN
MW-15008	5	5	0.2	0.2	0.2	0.2	0	0	NaN
MW-15016	5	5	0.2	0.2	0.2	0.2	0	0	NaN
MW-15019	5	5	0.2	0.2	0.2	0.2	0	0	NaN

Summary Report

Constituent: Thallium, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 12/8/2015 and 10/13/2020, a summary of the selected data set:

Observations = 60
ND/Trace = 60
Wells = 4
Minimum Value = 2
Maximum Value = 2
Mean Value = 2
Median Value = 2
Standard Deviation = 0
Coefficient of Variation = 0
Skewness = NaN

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	15	15	2	2	2	2	0	0	NaN
MW-15008	15	15	2	2	2	2	0	0	NaN
MW-15016	15	15	2	2	2	2	0	0	NaN
MW-15019	15	15	2	2	2	2	0	0	NaN

Summary Report

Constituent: Vanadium, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 11/8/2018 and 10/13/2020, a summary of the selected data set:

Observations = 20
ND/Trace = 11
Wells = 4
Minimum Value = 1
Maximum Value = 6
Mean Value = 2.76
Median Value = 2
Standard Deviation = 1.649
Coefficient of Variation = 0.5974
Skewness = 1.013

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	5	2	1.1	3	2.04	2	0.6731	0.3299	0.04972
MW-15008	5	0	4.5	6	5.4	5.3	0.6285	0.1164	-0.3445
MW-15016	5	5	1	2	1.8	2	0.4472	0.2485	-1.5
MW-15019	5	4	1	2	1.8	2	0.4472	0.2485	-1.5

Summary Report

Constituent: Zinc, Total Analysis Run 3/29/2021 3:24 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

For observations made between 11/8/2018 and 10/13/2020, a summary of the selected data set:

Observations = 20
ND/Trace = 17
Wells = 4
Minimum Value = 10
Maximum Value = 26
Mean Value = 11.25
Median Value = 10
Standard Deviation = 4.011
Coefficient of Variation = 0.3566
Skewness = 3.044

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
MW-15002	5	4	10	19	11.8	10	4.025	0.3411	1.5
MW-15008	5	5	10	10	10	10	0	0	NaN
MW-15016	5	3	10	26	13.2	10	7.155	0.5421	1.5
MW-15019	5	5	10	10	10	10	0	0	NaN

Antimony, Total

Interwell Non-parametric

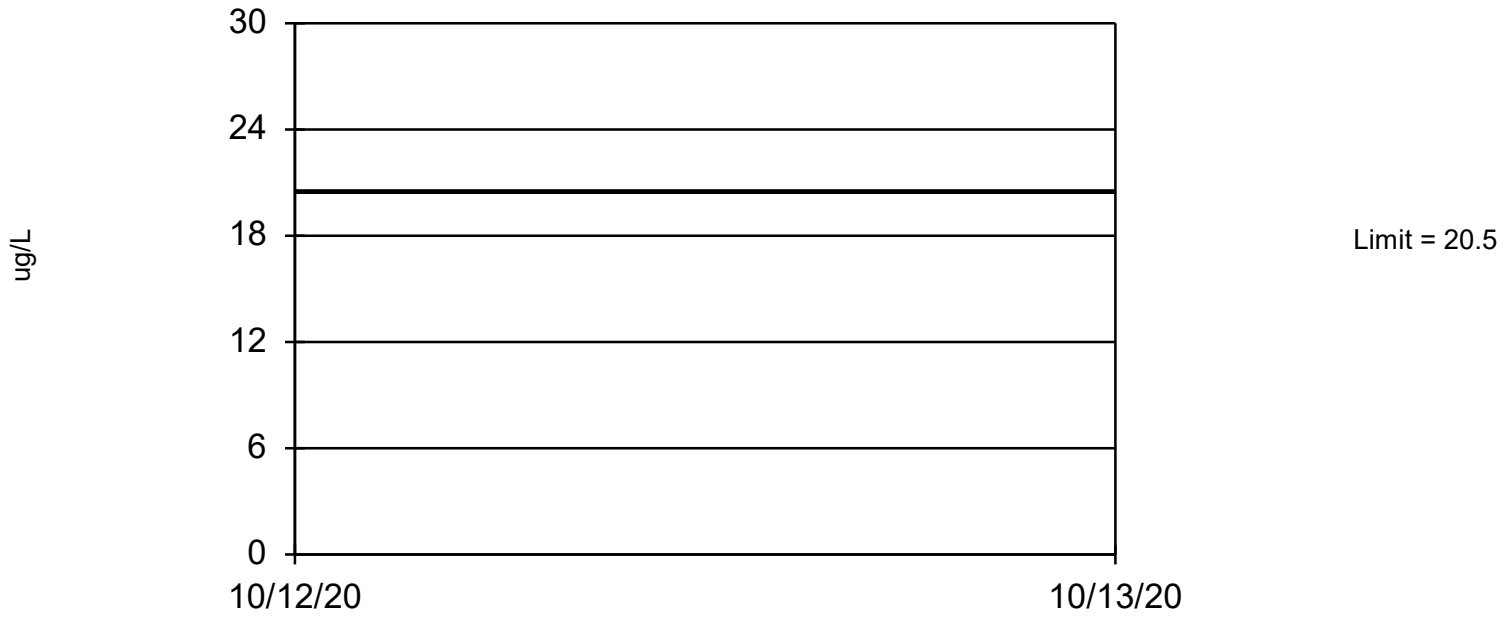
Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 60 background values. 100% NDs. 92.77% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04607.

Tolerance Limit Analysis Run 3/29/2021 3:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Arsenic, Total

Interwell Non-parametric



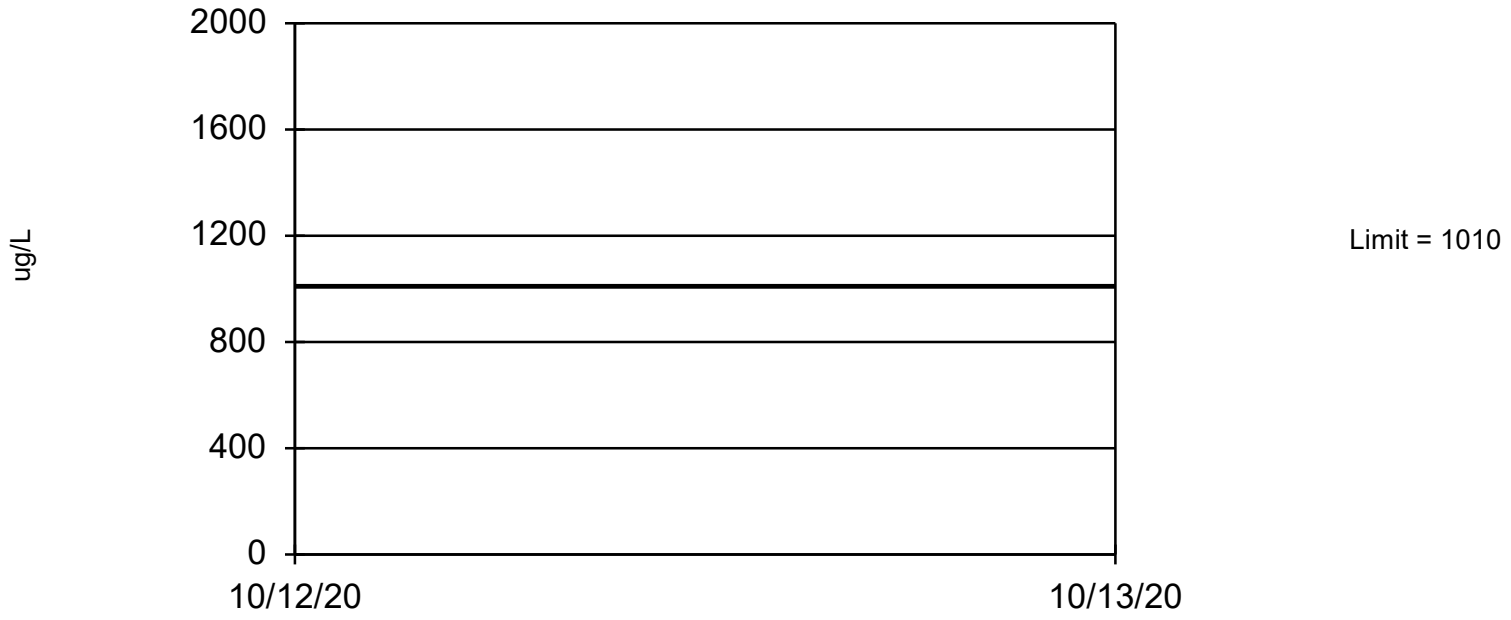
Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 60 background values. 51.67% NDs. 92.77% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04607.

Tolerance Limit Analysis Run 3/29/2021 3:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Barium, Total

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 60 background values. 92.77% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04607.

Tolerance Limit Analysis Run 3/29/2021 3:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Beryllium, Total

Interwell Non-parametric

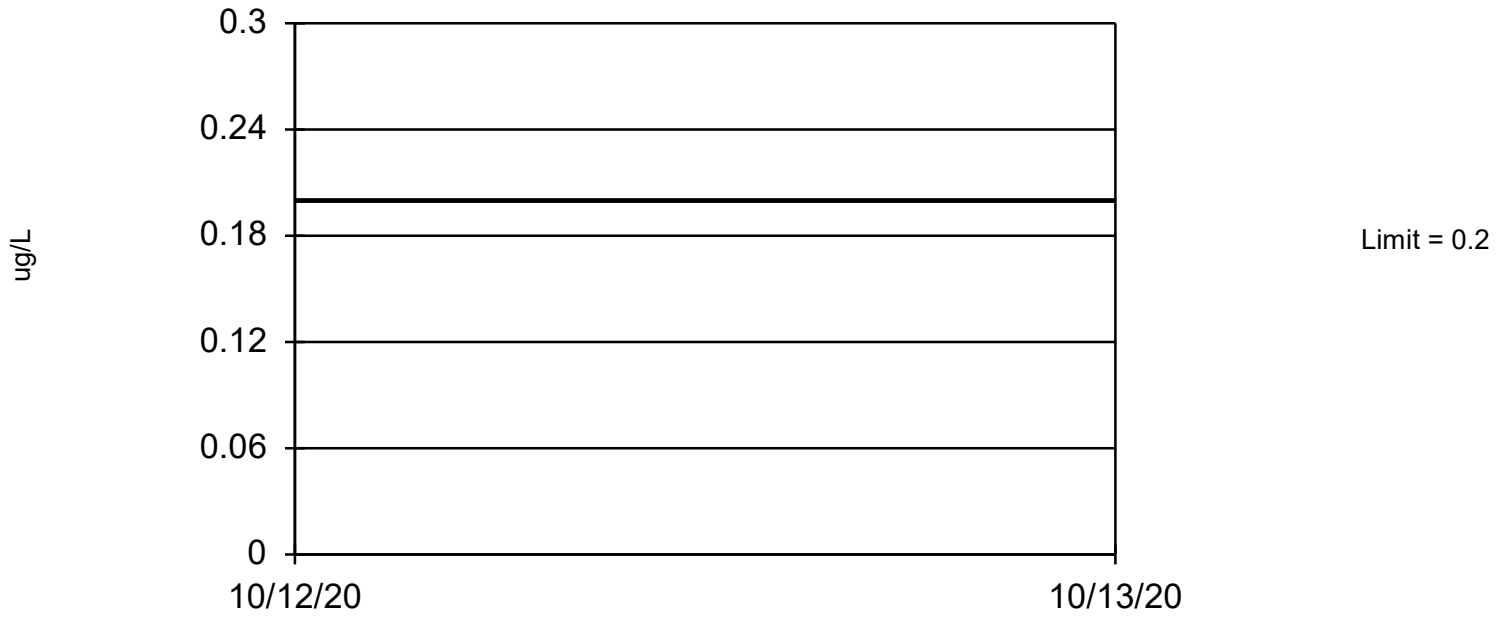
Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 60 background values. 100% NDs. 92.77% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04607.

Tolerance Limit Analysis Run 3/29/2021 3:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Cadmium, Total

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 60 background values. 100% NDs. 92.77% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04607.

Tolerance Limit Analysis Run 3/29/2021 3:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Chromium, Total

Interwell Non-parametric

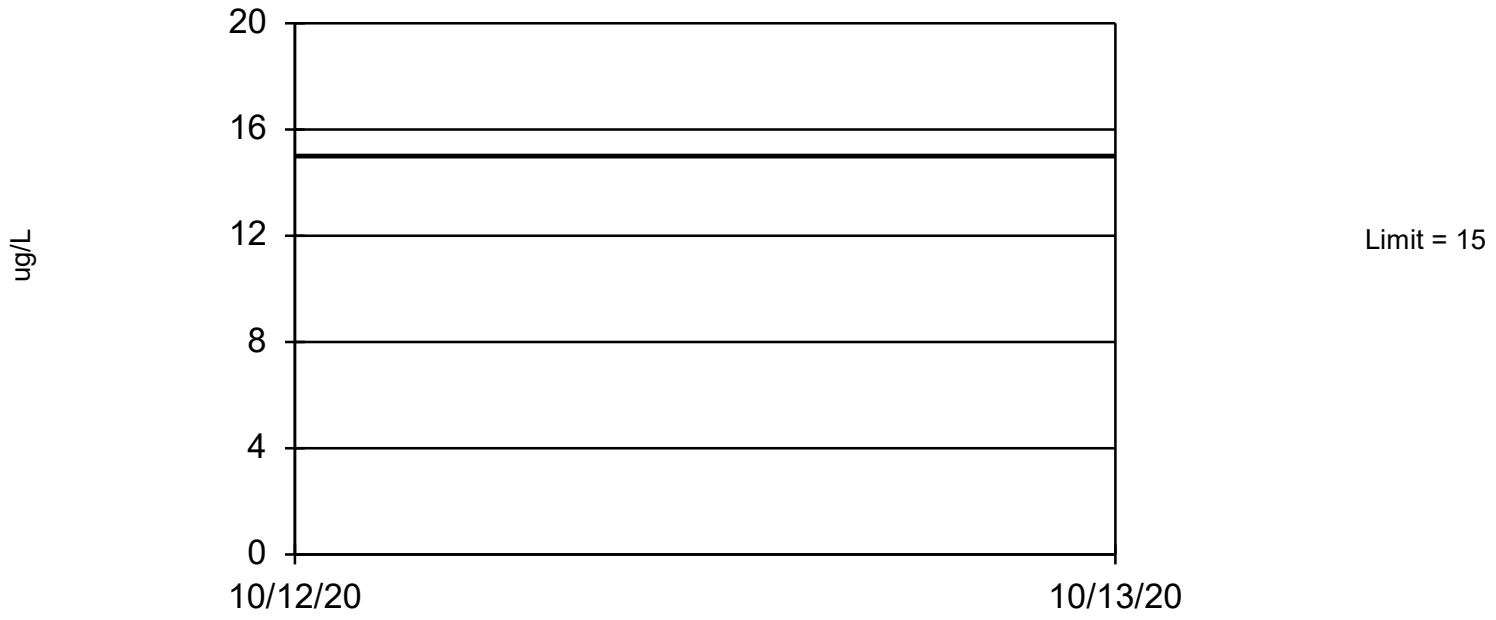
Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 60 background values. 48.33% NDs. 92.77% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04607.

Tolerance Limit Analysis Run 3/29/2021 3:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Cobalt, Total

Interwell Non-parametric



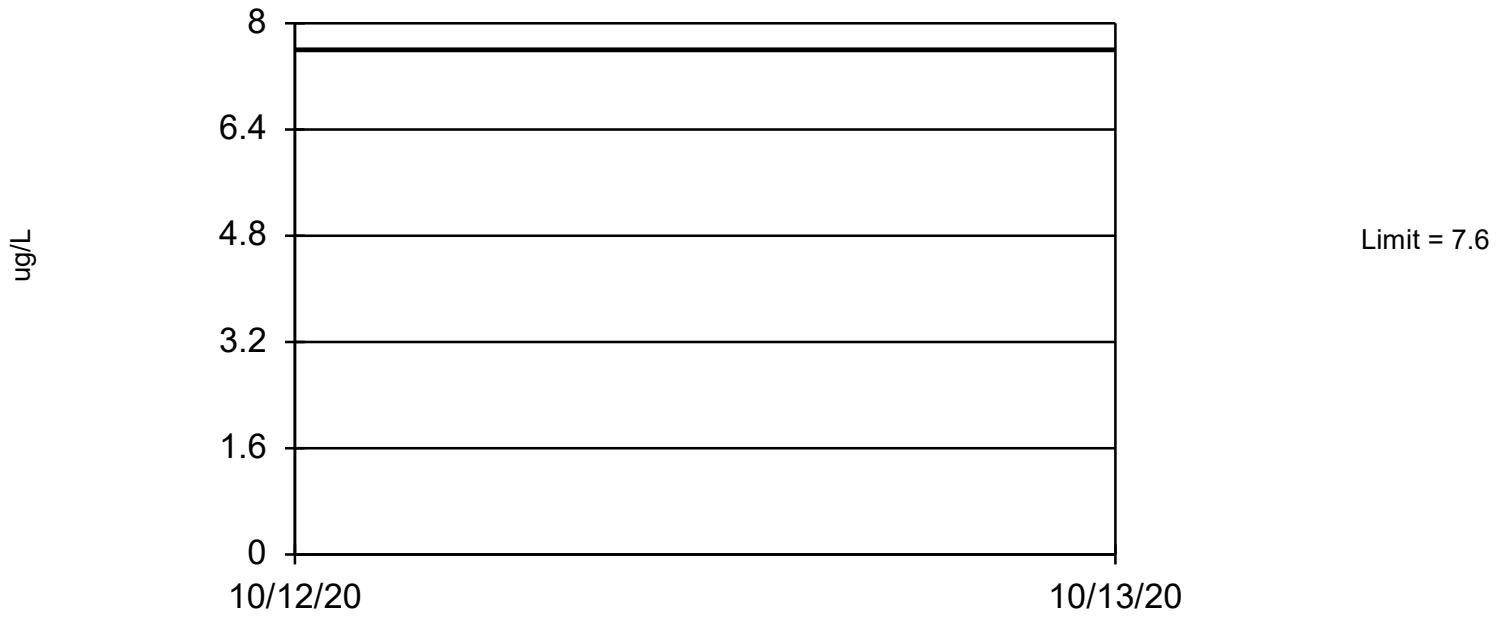
Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 60 background values. 100% NDs. 92.77% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04607.

Tolerance Limit Analysis Run 3/29/2021 3:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Copper, Total

Interwell Non-parametric



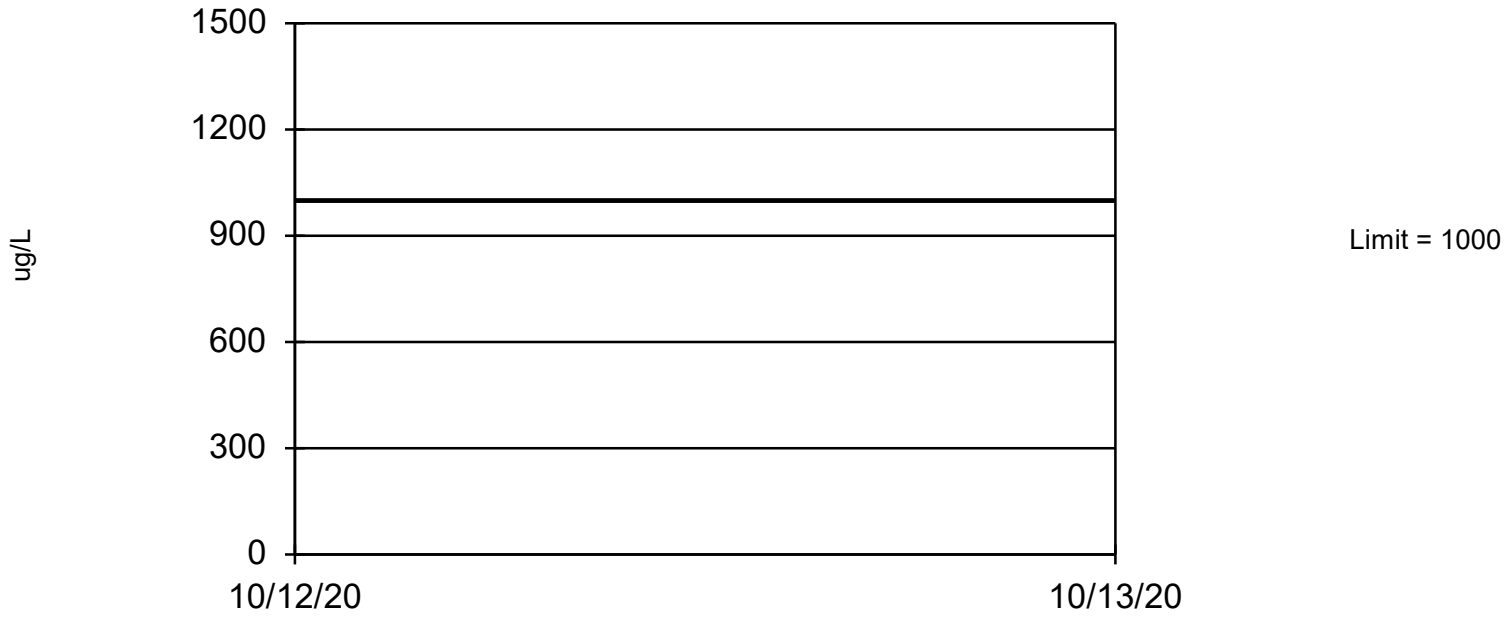
Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 20 background values. 70% NDs. 79.49% coverage at alpha=0.01; 86.13% coverage at alpha=0.05; 96.68% coverage at alpha=0.5. Report alpha = 0.3585.

Tolerance Limit Analysis Run 3/29/2021 3:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Fluoride

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 63 background values. 100% NDs. 92.77% coverage at alpha=0.01; 95.51% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.0395.

Tolerance Limit Analysis Run 3/29/2021 3:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Lead, Total

Interwell Non-parametric

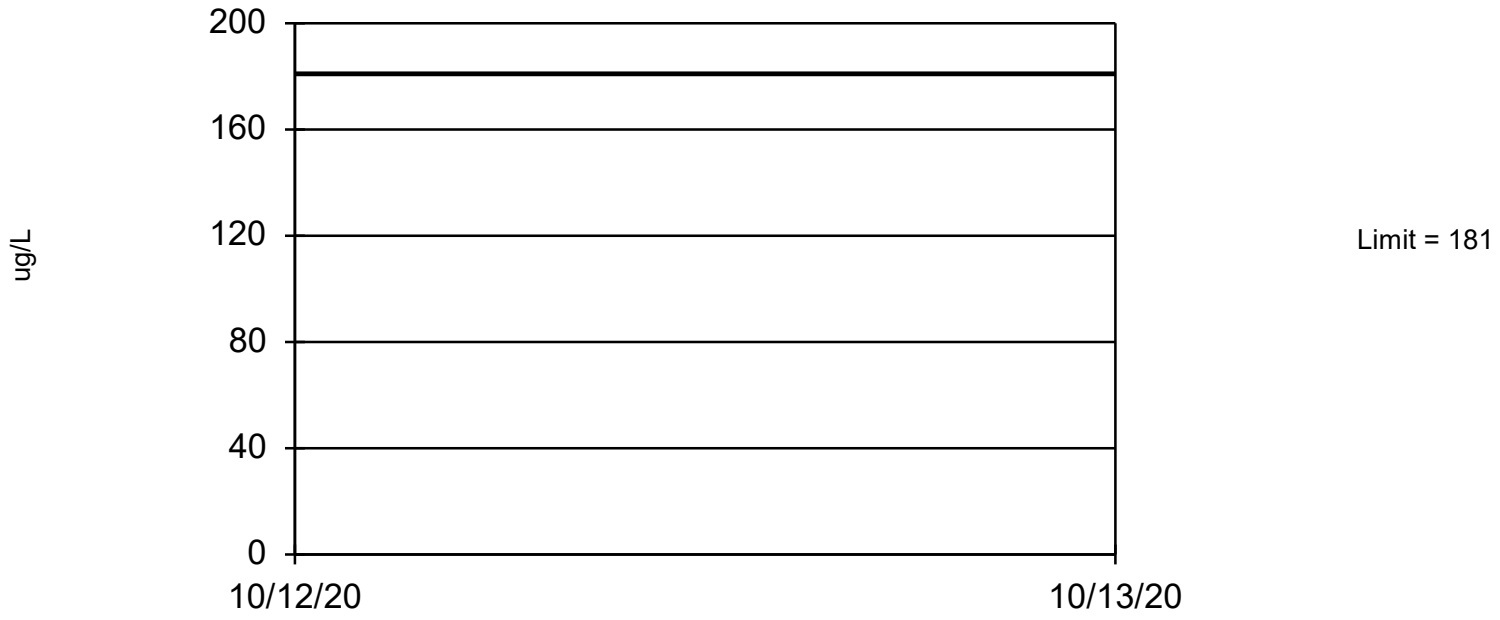
Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 59 background values. 100% NDs. 92.38% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04849.

Tolerance Limit Analysis Run 3/29/2021 3:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Lithium, Total

Interwell Non-parametric



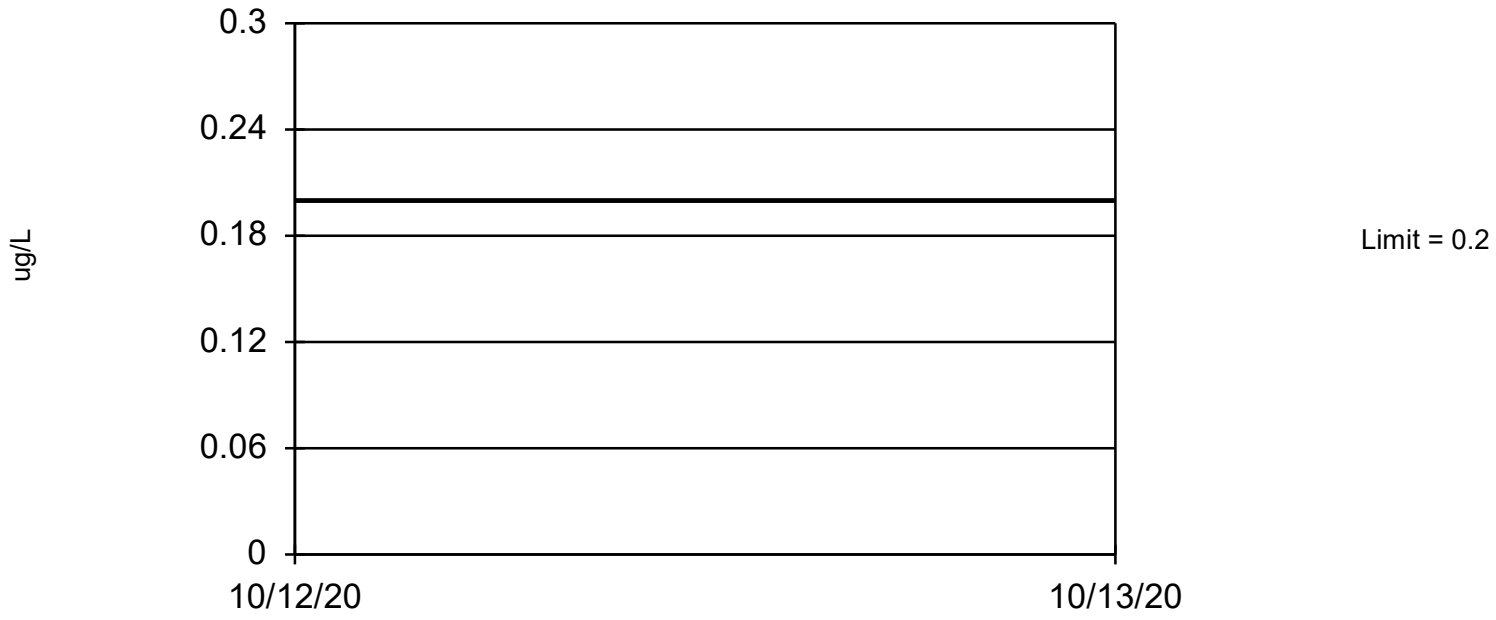
Non-parametric test used in lieu of parametric tolerance limit because the Shapiro Francia normality test showed the data to be non-normal at the 0.01 alpha level. Limit is highest of 60 background values. 10% NDs. 92.77% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04607.

Tolerance Limit Analysis Run 3/29/2021 3:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Mercury, Total

Interwell Non-parametric



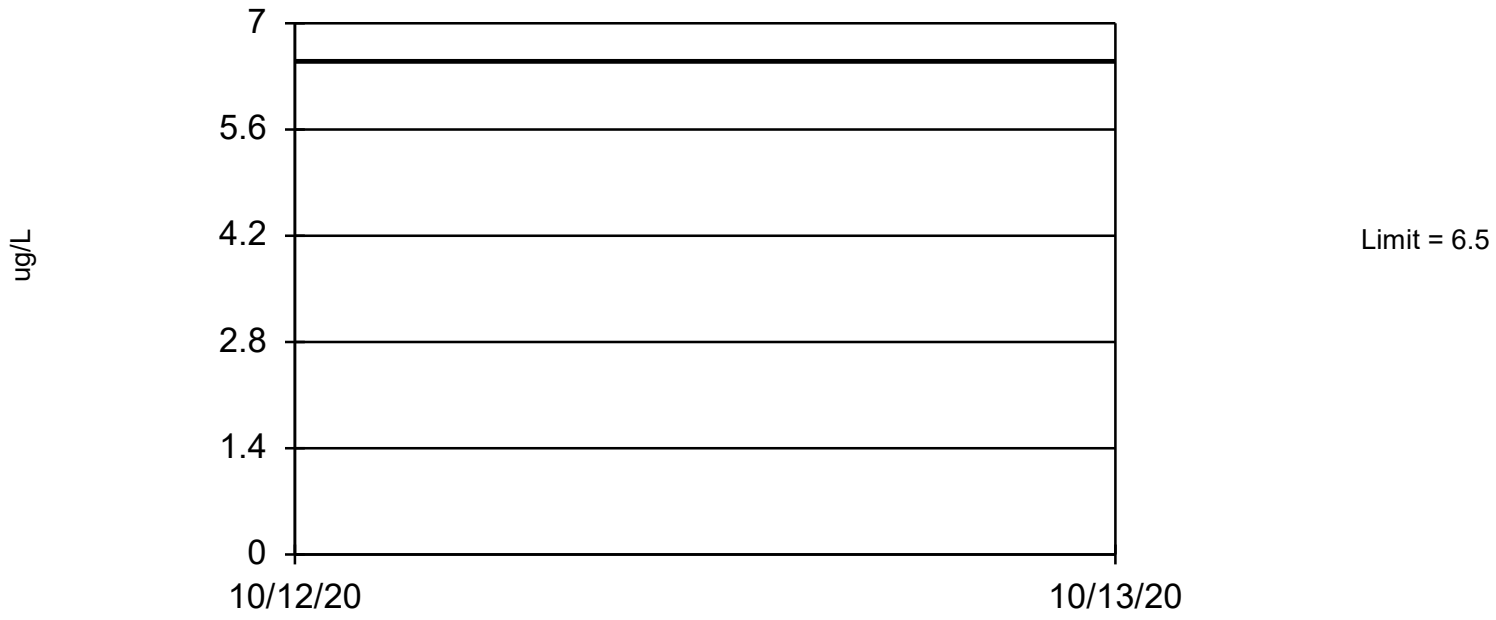
Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 60 background values. 100% NDs. 92.77% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04607.

Tolerance Limit Analysis Run 3/29/2021 3:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Molybdenum, Total

Interwell Non-parametric



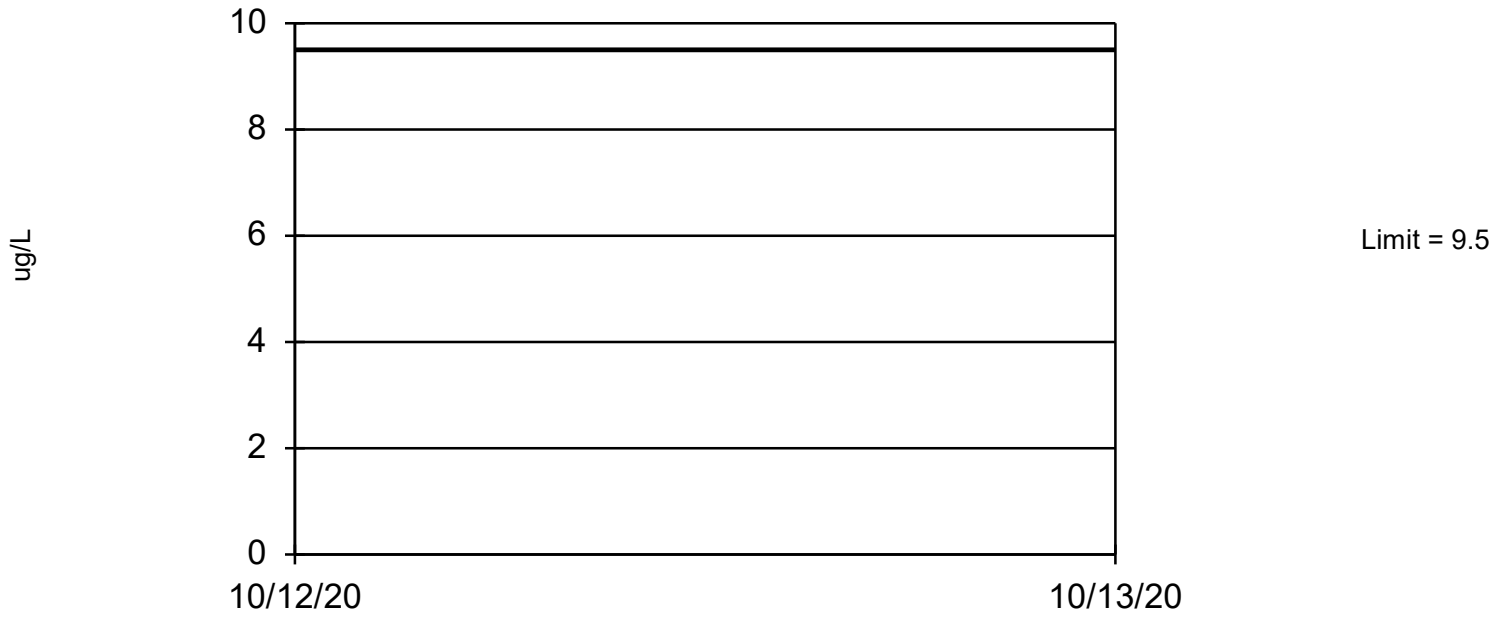
Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 60 background values. 88.33% NDs. 92.77% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04607.

Tolerance Limit Analysis Run 3/29/2021 3:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Nickel, Total

Interwell Non-parametric



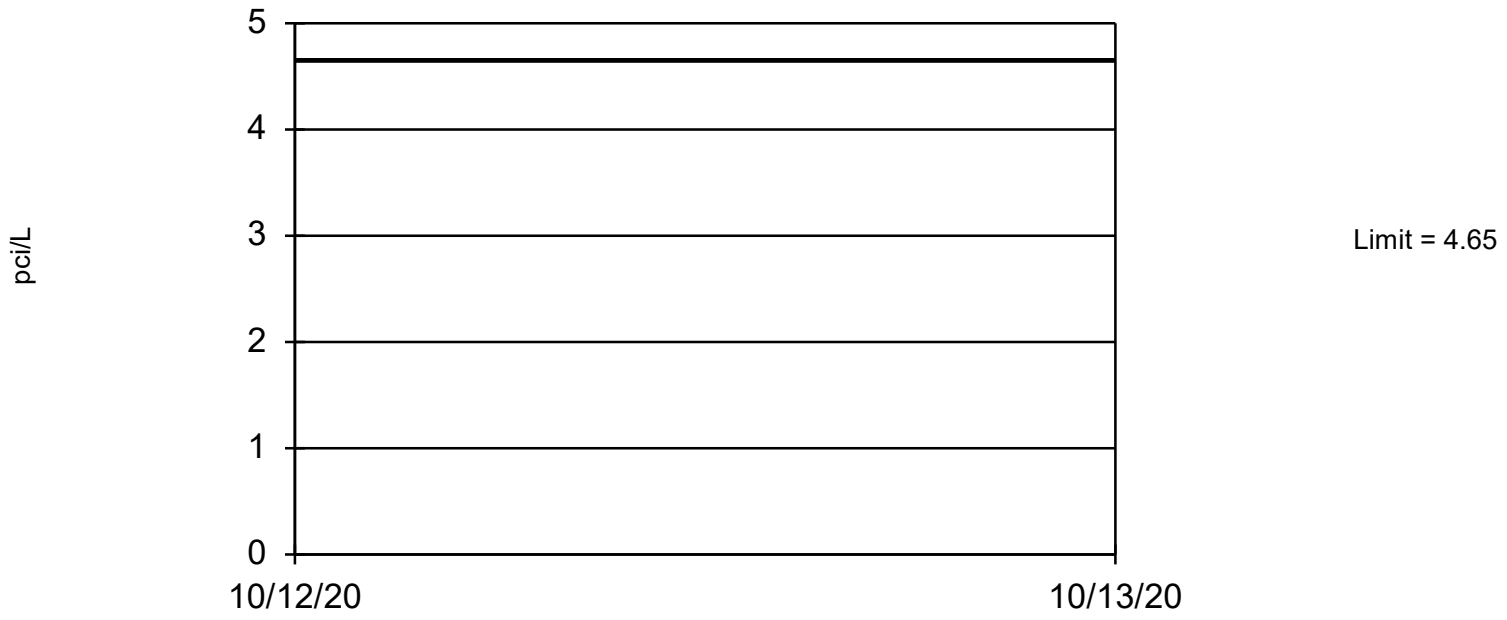
Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 20 background values. 55% NDs. 79.49% coverage at alpha=0.01; 86.13% coverage at alpha=0.05; 96.68% coverage at alpha=0.5. Report alpha = 0.3585.

Tolerance Limit Analysis Run 3/29/2021 3:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Radium-226/228

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because the data required both a power transformation and Cohen's adjustment. Limit is highest of 60 background values. 33.33% NDs. 92.77% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04607.

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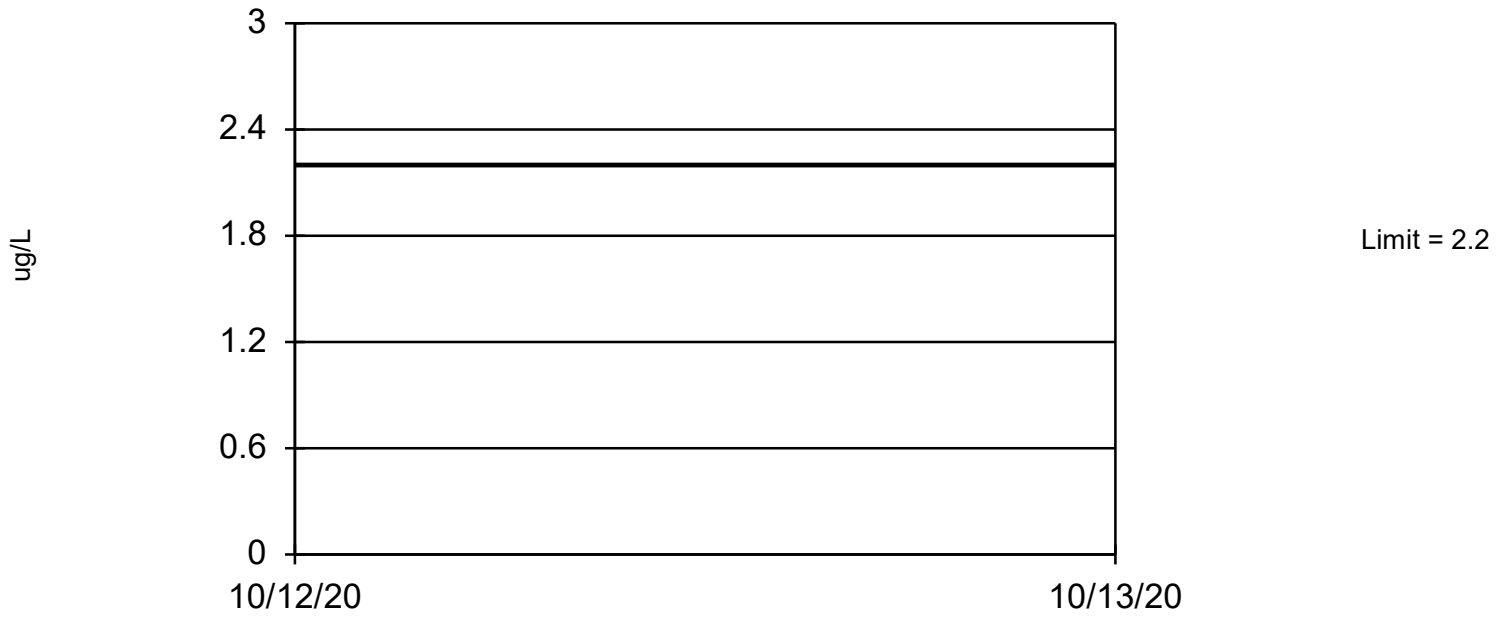
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Selenium, Total

Interwell Non-parametric



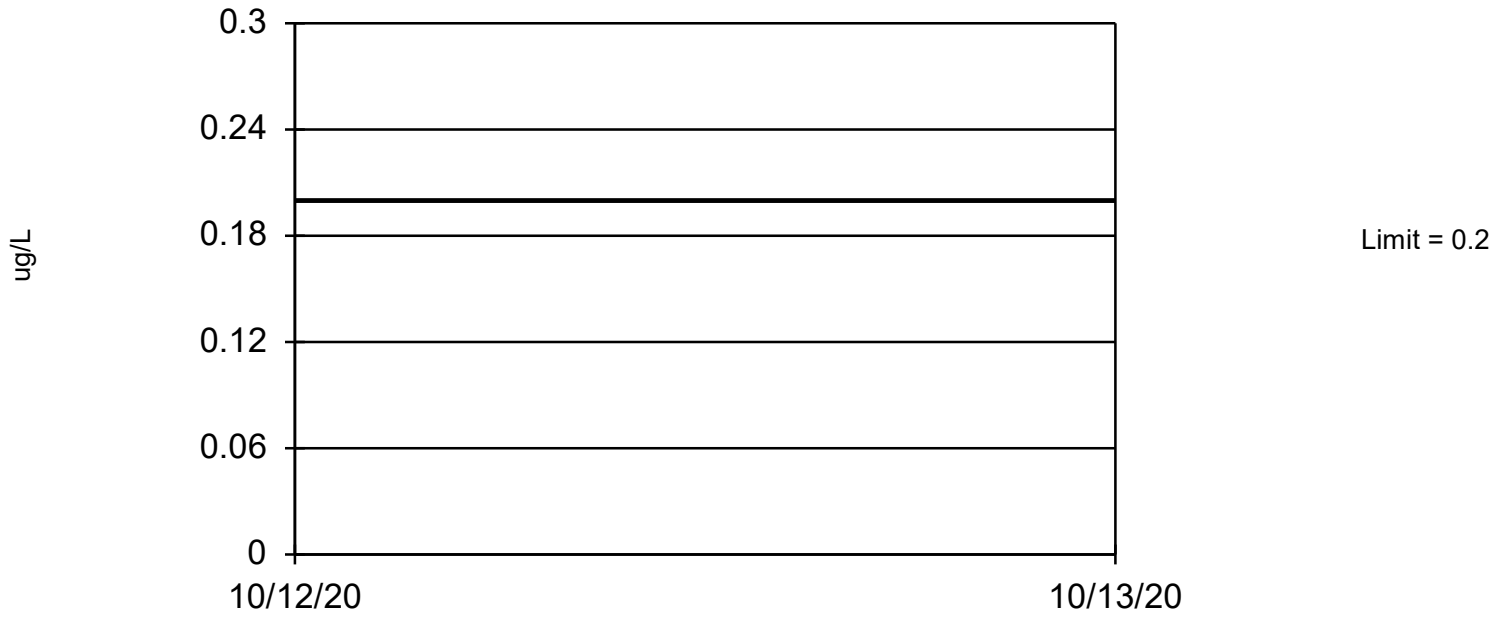
Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 60 background values. 88.33% NDs. 92.77% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04607.

Tolerance Limit Analysis Run 3/29/2021 3:40 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Silver, Total

Interwell Non-parametric



Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 20 background values. 100% NDs. 79.49% coverage at alpha=0.01; 86.13% coverage at alpha=0.05; 96.68% coverage at alpha=0.5. Report alpha = 0.3585.

Tolerance Limit Analysis Run 3/29/2021 3:40 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Thallium, Total

Interwell Non-parametric

Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 60 background values. 100% NDs. 92.77% coverage at alpha=0.01; 95.12% coverage at alpha=0.05; 99.02% coverage at alpha=0.5. Report alpha = 0.04607.

Tolerance Limit Analysis Run 3/29/2021 3:40 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Vanadium, Total

Interwell Non-parametric

Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 20 background values. 55% NDs. 79.49% coverage at alpha=0.01; 86.13% coverage at alpha=0.05; 96.68% coverage at alpha=0.5. Report alpha = 0.3585.

Tolerance Limit Analysis Run 3/29/2021 3:40 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

Zinc, Total

Interwell Non-parametric

Non-parametric test used in lieu of parametric tolerance limit because censored data exceeded 50%. Limit is highest of 20 background values. 85% NDs. 79.49% coverage at alpha=0.01; 86.13% coverage at alpha=0.05; 96.68% coverage at alpha=0.5. Report alpha = 0.3585.

Tolerance Limit Analysis Run 3/29/2021 3:40 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q1

2021 Semiannual Groundwater Monitoring Report and Second Quarter 2021 Hydrogeological Monitoring Report

JC Weadock Solid Waste Disposal Area

Essexville, Michigan

July 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

Kristin Lowery, E.I.T.
Project Engineer

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Appendix C Detection Monitoring Statistical Trend Tests
Appendix D Assessment Monitoring and GSI Statistical Evaluation
Appendix E Laboratory Analytical Report
Appendix F Field Records
Appendix G Alternate Source Demonstration Supporting Information

1.0 Introduction

Consumers Energy implemented a comprehensive compliance monitoring plan documented in the *Revised Hydrogeological Monitoring Plan* (Natural Resource Technology, 2010) for the JC Weadock Solid Waste Disposal Area required by Special License Condition 20.b in Solid Waste Disposal Area Operating License No. 9233 issued on October 15, 2009. Since that time, 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) imposing groundwater monitoring and corrective action requirements that apply to the landfill (Weadock Landfill). Michigan amended Part 115 of the Natural Resources and Environmental Protection Act (NREPA) PA 451 of 1994, as amended (a.k.a., Michigan Part 115 Solid Waste Management) to provide a basis for establishing a groundwater monitoring system and initiating detection and assessment monitoring to conform requirements for any licensed coal ash impoundment or landfill after December 28, 2018 with Part 115 amendments and the CCR Rule.

On January 15, 2021, Consumers Energy submitted the *Landfill Hydrogeological Monitoring Plan, JC Weadock Power Plant, Essexville, Michigan* (Weadock Landfill HMP), which includes components for Detection Monitoring, Assessment Monitoring as well as Groundwater Surface Water Interface (GSI) Compliance Monitoring, to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) to comply with the requirements of Part 115 and the CCR Rule. The Weadock Landfill HMP (TRC, February 2021) was revised per EGLE comments, submitted, and approved by EGLE on February 19, 2021 and incorporated, by reference, in Solid Waste Disposal Area Operating License No. 9640 issued on March 11, 2021.

1.1 Statement of Adherence to Approved Hydrogeological Monitoring Plan

This 2021 Semiannual Groundwater Monitoring Report and Second Quarter 2021 JC Weadock 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 landfill. 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, dated July 5, 2013 *Format for Solid Waste Disposal Facility Monitoring Submittals*. All references herein to the EGLE are inclusive of the MDEQ. Information contained in this report was prepared in adherence to the approved Weadock Landfill HMP that was approved by the EGLE on February 19, 2021. The Weadock Landfill HMP is compliant with 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 JC Weadock Solid Waste Disposal Area located at 2742 Weadock Highway in Essexville, Michigan (Figure 1). This JC Weadock Disposal Area is currently authorized

under a permit (Groundwater Discharge Authorization GWE-0005) issued pursuant to Part 31 to discharge to the unusable aquifer directly underlying the solid waste that vents almost immediately to the Saginaw River and Saginaw Bay. The Weadock Landfill is currently in assessment monitoring pursuant to the CCR Rule, as discussed in the *2020 Annual Groundwater Monitoring and Corrective Action Report* (TRC, January 2021), after concentrations which were indicative of impact from landfill operations were observed in groundwater. Consumers Energy provided notice to the Department on January 14, 2019 that arsenic was detected at statistically significant levels above the federal groundwater protection standards (GWPS) established pursuant to §257.95(h) in one monitoring well at the JC Weadock Landfill (JCW-MW-15023), which was located downgradient of a 1,600 linear foot vent within the slurry wall enclosing the historical fly ash disposal area. The vent was designed to direct groundwater flow beneath the landfill to the discharge channel immediately upgradient from the NPDES external outfall to prevent water from building up within the facility. In July 2018, this vent was closed (Golder, 2018) and the engineering improvement was approved the by the Department (MDEQ, 2018). Closing the vent and completely encircling the Weadock Landfill with a soil-bentonite slurry wall has demonstrated reduced groundwater flux around the entire perimeter of the landfill.

In March 2019, Consumers Energy submitted a Response Action Plan (Consumers, 2019), which identified interim response activities taken or to be taken to control possible sources of contamination. Consumers Energy further evaluated arsenic in groundwater at the Weadock Landfill as part of the nature and extent analysis and outlined potential remedies in the Assessment of Corrective Measures (TRC, 2019), which focused on materials management with an emphasis on improving source control through the closure plan.

Compliance monitoring is being implemented under the Weadock Landfill HMP dated February 2021 and approved by the EGLE on February 19, 2021. Groundwater data collected in accordance with the Weadock Landfill HMP are used to:

- Assess background groundwater quality for the purposes of establishing and updating GWPS (HMP Section 7.1 Background Determination)
- Perform detection monitoring to assess whether a new release has occurred during operation of the landfill (*i.e.* statistically significant increase (SSI) over background) (HMP Section 7.2 Detection Monitoring)
- Perform assessment monitoring to assess whether constituent concentrations in groundwater from prior operations are above a risk-based standard (*i.e.* statistically significant level over the GWPS) (HMP Section 7.3 Assessment Monitoring)
- Assess compliance with the GSI pathway (HMP Section 7.4)

Consumers Energy also continues to execute the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98, which includes semiannual assessment monitoring in accordance with §257.95. Assessment monitoring data collected in accordance with the CCR Rule is used to assess whether constituent concentrations in groundwater from prior operations are above a risk-based standard (*i.e.* statistically significant level over the Appendix IV GWPS).

1.3 Site Overview

The JC Weadock Solid Waste Disposal Area is located within the former JC Weadock Power Plant (Site) is located south of the DE Karn Power Plant, east of the Saginaw River, west of Underwood Drain and Saginaw Bay, and north of Tacey Drain and agricultural land (Figure 1). In addition to the disposal area, the Site consists of the generating facility which retired eight coal-fired generating units and infrastructure and utilities that support electrical transmission. Units 1 to 6 commenced operation in 1940 and retired in 1980 and Units 7 and 8 were added in 1955 and 1958 continued to operate through April 15, 2016.

1.4 Geology/Hydrogeology

The majority of Weadock Landfill area is comprised of surficial CCR and sand fill, as described in the Weadock Landfill HMP. USGS topographic maps and aerial photographs dating back to 1950, 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 depth ranging from 25-75 ft bgs. A sandstone unit, which is part of the Saginaw Formation, was generally encountered at 80-90 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. Along the perimeter of the landfill, there is a well-graded sand present at depths ranging from 10 to 20 ft bgs. The sand is variable in thickness, ranging from <1 to ~6.5 feet, and is discontinuous along the landfill perimeter, as evidenced by the soil boring logs and slurry wall construction documentation.

The alluvium soils pinch out and are not observed in soil borings located south and east of the Weadock Bottom Ash Pond and Weadock Landfill, along the location of the historic shoreline. The non-water-bearing region south of these units extends for at least a mile south and southeast of the site.

Beneath the surficial fill and sand unit (where present) is 70 to 80 feet of clay till. Along the southern perimeter of the landfill, some of the upper portion of the clay till is sand-rich (generally greater than 20 ft bgs). The clay till acts as a hydraulic barrier that separates the shallow groundwater from the underlying sandstone. The sandstone unit, which is part of the Saginaw Formation, is generally encountered at 80-90 ft bgs.

The Weadock Landfill is bounded by several surface water features (Figures 1 and 2): the Saginaw River to the west, a discharge channel and Saginaw Bay (Lake Huron) to the north, Underwood Drain to the east, and Tacey Drain to the south. Groundwater flow in this water bearing zone is largely controlled by the surface water elevations of Saginaw River and Saginaw Bay.

2.0 Leachate Monitoring

The leachate monitoring program under this revised plan consists of an annual laboratory leachate sampling program (Q1) and an annual field leachate sampling program (Q4) per the Weadock Landfill HMP. This program was instituted to maintain the facility under the applicable portions of Part 115, Rule 311 – Leaching tests to evaluate potential for groundwater contamination at unlined industrial waste landfills. Specifically, Subrule (3) states that waste that is disposed of in an industrial waste landfill shall be retested to evaluate potential for groundwater contamination annually or on a more frequent schedule as specified by the solid waste control agency. The Weadock Landfill HMP includes laboratory leachate testing, which consists of four dry-handled Coal Combustion Residual (CCR) samples collected under normal plant operating conditions during the active life of the landfill.

Additional support for evaluating the potential for groundwater contamination at the unlined industrial waste landfill includes the field leachate monitoring program conducted during the fourth quarter of each year. This program consists of an annual sampling collection from two (2) leachate headwells; LH-103 and LH-104. This program was implemented to determine constituents in the leachate as measured under actual conditions in the field that need to be included as a part of the groundwater and GSI monitoring program. Constituents will be added to the GSI and groundwater monitoring program if detected and confirmed in a field-collected leachate sample at a concentration greater than its GSI criterion.

Laboratory leachate data was not collected during the second quarter.

3.0 Groundwater Monitoring

3.1 Monitoring Well Network

The groundwater monitoring system presented in the HMP has been established in accordance with R 299.4906 and the CCR Rule §257.91, which consists of 16 monitoring wells (four background monitoring wells and 12 downgradient monitoring wells) that are screened in the uppermost aquifer. The monitoring well network has been designed to provide appropriate coverage for water level and water quality data collection along the perimeter of the landfill. The monitoring well locations are shown on Figure 2. Monitoring well specifications and purpose (i.e. static water level monitoring, groundwater quality monitoring, or GSI monitoring) are included in Table 1.

The Weadock Landfill HMP groundwater monitoring system consists of the following:

- ***Background Groundwater Quality:*** Four monitoring wells located southwest of the Weadock Landfill provide data on background groundwater quality that has not been affected by the CCR unit (MW-15002, MW-15008, MW-15016, and MW-15019) and are used to establish groundwater protection standards (GWPSs) for the landfill:
  - MW-15002
  - MW-15008
  - MW-15016
  - MW-15019
- ***Downgradient Groundwater Quality:*** The twelve downgradient monitoring wells, located on the outside of the perimeter slurry wall include:
  - JCW-MW-18001
  - JCW-MW-18004
  - JCW-MW-18005
  - JCW-MW-18006
  - MW-50
  - MW-51
  - MW-52
  - MW-53
  - MW-53R
  - MW-54R
  - MW-55
  - OW-57R Out
- ***Groundwater-Surface Water Interface (GSI) Monitoring***: Monitoring wells located along the surface water features adjacent to the Weadock Landfill are included in the monitoring program to meet the requirements of Part 31. Locations and alignments were established in the Phase II Groundwater Discharge Evaluation, Figure: Appendix K (Natural Resource Technology, 2005) as a baseline for monitoring future results. These monitoring wells are screened across the water table of the uppermost aquifer and will serve as GSI monitoring wells to determine compliance with generic GSI criteria or site-specific mixing zone-based criteria as appropriate. The eight GSI compliance monitoring wells include:
  - MW-50
  - MW-51
  - MW-52
  - MW-53
  - MW-53R
  - MW-54R
  - MW-55
  - JCW-MW-18004

- ***Static Water Level Measurement Only:*** Eleven (11) monitoring wells, located on the inside of the perimeter slurry wall, at paired locations with several of the downgradient monitoring wells include:
  - JCW-OW-18001
  - JCW-OW-18002
  - JCW-MW-18003
  - JCW-MW-18004
  - JCW-MW-18005
  - JCW-MW-18006
  - MW-20
  - OW-51
  - OW-53
  - OW-54
  - OW-55
  - OW-56R
  - OW-57R IN
  - OW-61
  - OW-63

3.2 May 2021 Monitoring Event

In accordance with the Weadock Landfill HMP, TRC conducted the second quarter 2021 monitoring event for the Weadock Landfill on May 3 through 11, 2021. Per §257.95(d), all wells in the CCR monitoring program must be sampled at least semiannually. Groundwater monitoring was performed in accordance with the Weadock Landfill HMP. Samples that were collected during this event were submitted to Consumers Energy Laboratory Services in Jackson, Michigan for analysis of total metals and inorganic parameters. Radium analysis was performed by Eurofins TestAmerica in St Louis, Missouri. Semi-annual monitoring constituents include:

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
	Radium 226 and 228
	Selenium
	Silver

Section 11511a(3)(c) – Detection Monitoring Constituents	Section 11519b(2) – Assessment Monitoring Constituents
	Thallium Vanadium Zinc

Samples were also analyzed for the additional constituents magnesium, sodium, potassium, and bicarbonate, carbonate, and total alkalinity. Analytical results from the second quarter 2021 monitoring event are included in the attached laboratory reports (Appendix E).

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 Weadock Landfill 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 F).

Groundwater samples were collected using a peristaltic pump. The samples were collected in vendor-provided, nitric acid pre-preserved (metals only) and unpreserved sample containers and submitted to the laboratory for analysis. Groundwater 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 (MW-50), and field matrix spike/matrix spike duplicate samples collected at JCW-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 Weadock Landfill HMP. The data quality reviews for the JC Weadock Disposal Area network wells are summarized in Appendix B.

3.3 Groundwater Flow Rate and Direction

Potentiometric monitoring initiated in the unusable aquifer beneath the facility includes static water level data collected for development of water table contours and evaluation of the potential for discharge from the facility. The monitoring under this section will be conducted quarterly until closure, as approved by the Director, and semiannually during the 30-year post-closure period. Monitoring will continue until the end of post closure (30 years) or as otherwise approved by the Director.

The measurements for top of casing (TOC) and quarterly recorded depth to water (DTW) with corresponding calculated static water level (SWL) is tabulated and presented in Table 1. A potentiometric surface map is provided as Figure 2.

Groundwater elevations measured at the site in May 2021 are generally within the range of 580 to 593 feet above mean sea level (ft NAVD88). Groundwater elevations in monitoring wells located adjacent to Saginaw Bay and adjoining surface water bodies are typically encountered at a similar or slightly higher elevation relative to surrounding surface water features measured by the NOAA gauging station. A time-series plot included in Appendix A compares the groundwater elevation of MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, JCW-MW-18004, and MW-55 to the nearby NOAA staff gauge. Water levels in wells adjacent to surface water bodies (e.g. Saginaw Bay, Tacey Drain) closely mirror the surface water elevation. Such conditions would result in a minimal gradient to potentially a reverse gradient (i.e., toward the landfill) between the well and the drain which would result in minimal to zero mass flux to the drain (Appendix A: Table A1).The static water level elevations inside of the Weadock Landfill perimeter slurry wall are generally significantly different (>3 ft) than static water levels outside of the slurry wall, which demonstrates the presence of a low permeability feature between the well pairings inside and outside of the constructed slurry wall. The groundwater monitoring system is structured such that there are eleven (11) monitoring well pairs used to evaluate the hydraulic gradient and potential for water flux across the slurry wall. Static water level observations from the paired wells are shown on time series charts in Appendix A. As such, the water level elevations indicate that the slurry wall is performing as designed. The general flow direction observed within the confinement of the slurry wall is similar to that identified in previous monitoring rounds. Due to the potential for radial flow, the downgradient wells are appropriately positioned to detect the presence of detection or assessment parameters that could potentially migrate from the Weadock Landfill.

As shown on Figure 3 and in Appendix A, the static water level outside of the slurry wall is lower than the static water level inside of the wall; therefore, the potential groundwater flux across the slurry wall was calculated and included in Table A-2 of Appendix A.

3.4 Groundwater Analytical Data and Relevant Screening Criteria

Groundwater analytical data are evaluated in accordance with the Weadock Landfill HMP for the purposes of solid waste license compliance as well as to determine compliance with applicable generic GSI and site-specific GSI mixing zone-based criteria. Data are evaluated by using a combination of screening against relevant criteria, as well as utilizing statistical analyses.

Analytical results from the second quarter 2021 monitoring event are included in the attached laboratory report (Appendix E). Groundwater analytical data from the second quarter 2021 monitoring events are summarized in Table 2 (Weadock Landfill monitoring wells) and Table 3 (background monitoring wells), as well as the associated Part 201 generic GSI and site-specific mixing-zone GSI criteria. Field data are summarized in Table 4.

Mixing-zone criteria for arsenic, boron, and selenium are provided for the Karn-Weadock complex in the mixing zone determination, dated December 23, 2015 (MDEQ, 2015). 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. All data are screened against GSI criteria; however, compliance with GSI criteria is determined at select monitoring locations as noted in Section 3.4.4 below.

The mixing zone determination included both final acute values (FAV) and final chronic values (FCV). If a concentration of a constituent at a groundwater well exceeds the acute criteria, and the exceedances are upgradient of the GSI compliance monitoring wells, Consumers Energy must demonstrate that data from all of the compliance monitoring wells are, and will be, in compliance with acute mixing zone-based GSI criteria for those parameters. Averaging of groundwater data is not allowed for comparison to generic GSI or acute mixing zone-based GSI criteria. Acute mixing zoned-based or generic GSI criteria may not be exceeded in any individual GSI compliance monitoring well. If a concentration of a constituent at a well exceeds the chronic criterion, compliance can be demonstrated on a mass-flux basis. The facility can choose to demonstrate compliance by evaluating the total chronic loading based upon the contribution from each compliance well with respect to the total flux observed in the mixing zone.

Table 7 provides a summary of the statistically significant increases or exceedances over the most recent four quarters in accordance with the EGLE-prescribed format; only well/constituent pairs that exceed the relevant GSI criteria (within the last four quarters) are included.

3.4.1 Groundwater Monitoring Analytical Results

Groundwater monitoring is being conducted under Weadock Landfill HMP, which provides for sampling at historic wells (MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and MW-55) along with wells that were newly installed in 2018 (OW-57R OUT, JCW-MW-18001, JCW-MW-18004, JCW-MW-18005, and JCW-MW-18006). Data for these wells are tabulated in Table 2. Summaries of the statistical evaluations are provided in sections 3.4.2, 3.4.3, and 3.4.4 below.

Analytical results for these wells are being evaluated to determine the effectiveness of landfill structural and operational enhancement measures on the quality and quantity of groundwater flow beneath the footprint of the facility. Additionally, analytical results for these wells are being evaluated in support of GSI compliance. GSI criteria only apply to the designated compliance point as specified in Section 3.4.4 below; however, analytical results and data trends in groundwater collected from the perimeter dike wells are evaluated to identify potential GSI compliance issues.

Overall, observed trends and concentrations further demonstrate that constituents present in groundwater in the monitoring well system are not expected to result in adverse impacts at the GSI (Table 7). As discussed in the ASD presented in the third quarter 2018 Hydrogeological Monitoring Report, redox conditions are changing at MW-55, which could explain some of the changes in trends of redox-sensitive parameters such as arsenic and molybdenum at that location. Additionally, as detailed in Section 3.1, water levels have increased over 4 feet since 2010 (Appendix A), geochemistry is changing, and data trends will continue to be monitored and evaluated. Several of these newly observed trends, such as those observed for specific

conductance, may be a result of increased lake levels rather than a change in flux from the landfill as the water level data demonstrate that the slurry wall is performing as designed.

3.4.2 Detection Monitoring

Detection monitoring is continuing through the active life of the Weadock Landfill to monitor for new releases from landfill operations. The detection monitoring program consists of potentiometric analysis and groundwater quality analysis. The potentiometric analysis, as discussed in Section 3.1, demonstrates that the slurry wall is performing as designed.

Analytical data for the detection monitoring program are tabulated in Table 2. In addition to the comparison of analytical data to relevant screening criteria, statistical trend analyses are used to evaluate groundwater quality each quarter. Consumers Energy manages and evaluates its groundwater data using Sanitas™ Statistical Software. Consumers Energy conducts intrawell trend analyses to examine data for a given well over time to determine if changes in water quality are occurring that may be associated with the landfill and to identify potential GSI compliance issues. Specifically, the Mann-Kendall test for trend was performed 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. Constituents that were added to the monitoring program by the Weadock Landfill HMP (i.e., calcium, chloride, fluoride, and total dissolved solids) had an insufficient amount of data to perform trend analysis. Trend analysis will be completed for these constituents following the collection of a minimum of eight sampling events.

Appendix C includes a table summarizing the results of the trend tests as well as the Sanitas™ output summary statistics and graphs. Data are stable or declining for the majority of the well/constituent pairs, with the following exceptions:

- A new, unconfirmed increasing trend for boron at MW-53 was observed in second quarter 2021.
- A new increasing trend for iron at MW-50 was observed in fourth quarter 2020 and confirmed in first quarter 2021 but did not continue in second quarter 2021.
- A continuous increasing trend was observed for sulfate at JCW-MW-18001. Sulfate concentrations remain below the generic final acute value (FAV).

The potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill. Iron and sulfate are both redox sensitive parameters and are attributed to localized changes in geochemistry near MW-50 and JCW-MW-18001 as a result of changing water levels, rather than a change in flux from the landfill, as discussed further in Section 3.5. Iron concentrations appear to be stabilizing, as evidenced by the lack of trend observed in second quarter 2021. The increasing trend for concentrations of boron at MW-53 has not been confirmed and will continue to be monitored.

3.4.3 Assessment Monitoring Data Evaluation

Assessment monitoring is continuing at the Weadock Landfill in accordance with the Weadock Landfill HMP and §257.95. The assessment monitoring data were statistically evaluated in accordance with the procedures in the Weadock Landfill HMP. The statistical evaluation details are provided in Appendix C (*Assessment Monitoring and GSI Statistical Evaluation of May 2021 Sampling Event*). A summary of the confidence interval evaluation is provided in Table 5.

3.4.3.1 Establishing Groundwater Protection Standards

The GWPSs are used to assess constituent concentrations present in groundwater as a result of CCR Unit operations by statistically comparing concentrations in the downgradient wells to each of the respective GWPSs for each detection and assessment monitoring constituent. The calculation of the GWPSs in accordance with the Weadock Landfill HMP is documented in the *Groundwater Protection Standards* technical memorandum included as Appendix H of the *First Quarter 2021 Hydrogeological Monitoring Report* (TRC, April 2021). The Federal CCR Rule requires establishment of GWPSs for assessment monitoring (Appendix IV) constituents only. Part 115 requires establishment of GWPSs for both detection and assessment monitoring constituents.

3.4.3.2 Data Comparison to Groundwater Protection Standards

Consistent with the *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (Unified Guidance) (USEPA, 2009) and the Weadock Landfill HMP, the preferred method for comparisons to a fixed standard are confidence limits. An exceedance of the standard occurs when the 99 percent lower confidence level of the downgradient data exceeds the GWPS.

Detection Monitoring Constituents: The first quarter 2021 statistical evaluation indicates that boron at JCW-MW-18001, JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and OW-57R OUT and calcium at MW-51, and sulfate at MW-50 were present at statistically significant levels above the GWPSs. The GWPSs for calcium, boron, and sulfate were established based on background concentrations observed in wells unaffected by the Weadock Landfill or Weadock Bottom Ash Pond. Boron, calcium, and sulfate are detection monitoring (i.e., Appendix III) constituents that do not have associated health-based criteria and there is not a complete drinking water pathway on site. As such, the relevant Part 115 compliance pathway is the GSI pathway. Concentrations of boron and calcium are below relevant GSI criteria, as discussed in Section 3.5.3. Sulfate concentrations are below the FAV at MW-50.

Assessment Monitoring Constituents: Based on the second quarter 2021 statistical evaluation, there are no assessment monitoring constituents present at statistically significant levels within the Weadock Landfill groundwater monitoring system. Although concentrations of arsenic and molybdenum at MW-55 observed during individual sampling events are above the GWPS, the elevated concentrations of those constituents are not a result of a release from the Weadock Landfill, as detailed in Section 3.5. The head differential of 6.98 feet between OW-55 inside the slurry wall and MW-55 outside of the slurry wall also suggests that the integrity of the

slurry wall is maintained and groundwater flow from the landfill to the south is impeded by the low permeability of the slurry wall. Groundwater conditions at MW-55 will continue to be monitored.

3.4.4 GSI Compliance Monitoring

The GSI monitoring program consists of the eight monitoring points located along the surface water features:

- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- JCW-MW-18004

Second quarter 2021 data from the GSI monitoring points are tabulated in Table 2. Consistent with the Weadock Landfill HMP, confidence intervals were established for the following GSI monitoring program constituents:

- Boron
- Iron
- pH
- Sulfate
- Arsenic
- Chromium
- Lithium
- Molybdenum
- Selenium
- Vanadium

The confidence interval calculations are provided in Appendix D (*Assessment Monitoring and GSI Statistical Evaluation of May 2021 Sampling Event*). The confidence interval test compares the lower confidence limit to the GSI. Overall, data continue to demonstrate compliance with the applicable GSI criteria.

Arsenic: The statistical evaluation found that arsenic was present at concentrations above the chronic-based mixing zone GSI criterion (100 ug/L) in monitoring well MW-55 for the past four quarterly events and the lower confidence limit based on the increasing trend in the past 8 events is also above 100 ug/L. However, water levels in MW-55 closely mirror the surface water elevation measured at the NOAA gauging station, which indicates there is a minimal outward gradient to a potentially, modest reverse gradient (i.e., toward the landfill) between the monitoring well and the drain, resulting in a minimal to zero mass flux to the drain. The calculated mass-flux loading for arsenic based upon the contribution from each compliance point with respect to the total flux observed in the mixing zone has been evaluated and compared to the chronic loading limits (Table 6). Table 6 shows that the estimated mass flux of arsenic (9.5×10^{-5} lbs/day) is less than the mixing zone-based chronic loading limits of 4.3×10^{-4} lbs/day demonstrating compliance on a mass flux basis.

Boron: The assessment monitoring statistical evaluation found that boron was present at statistically significant levels above the GWPS at JCW-MW-18001, JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and OW-57R . Boron is a detection monitoring (i.e. Appendix III) constituent and there is not a complete drinking water pathway on site. As such, the relevant Part 115 compliance pathway is the GSI pathway. All

observations of boron are less than the recommended mixing-zone based GSI value specified in Table 3 of the *Implementation of a Mixing Zone Request, Consumers Energy DE Karn/JC Weadock Complex* (MDEQ, 2015) (Appendix D: Table 2).

Molybdenum: The statistical evaluation found that although molybdenum was present at concentrations above the generic GSI criterion of 120 ug/L in monitoring well MW-55, the concentrations are decreasing and the lower confidence limit of the decreasing trend over the past 8 events was below the GSI criteria. Additionally, water levels in MW-55 closely mirror the surface water elevation measured at the NOAA gauging station, which indicates there is a minimal outward gradient to a potentially, modest reverse gradient (i.e., toward the landfill) between the monitoring well and the drain, resulting in a minimal to zero mass flux to the drain. The calculated mass-flux loading for molybdenum based upon the contribution from each compliance point with respect to the total flux observed in the mixing zone has been evaluated and compared to the chronic loading limits (Table 6). Table 6 shows that the estimated mass flux of molybdenum (7.4×10^{-5} lbs/day) is less than the loading limits of 5.1×10^{-4} lbs/day based on the generic GSI criterion, supporting compliance on a mass flux basis.

Sulfate: Sulfate concentrations are compared to the FAV of 1,200 mg/L (Rule 323.1057 [Toxic Substances; "Rule 57"] of the Part 4 Water Quality Standards). In the past 8 quarterly events, there has been one unconfirmed detection of sulfate above the FAV at JCW-18004. The exceedance occurred during the October 2019 sampling event, when the monitoring well was sampled simultaneously under the federal CCR program and the prior HMP (Rev 2; Consumers Energy, 2015). The reported sulfate concentrations were 1,260 ug/L and 930 ug/L, which average 1,095 ug/L. Sulfate concentrations observed in JCW-MW-18004 have been below the FAV since March 2020.

3.5 Alternate Source Demonstration

Although confirmed increasing trends were observed at MW-50 for iron (through Q1 2021) and at JCW-MW-18001 for sulfate (through Q2 2021), the potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill. Iron and sulfate are both redox sensitive parameters and are attributed to changes in geochemistry near MW-50 and JCW-MW-18001 as a result of changing water levels, rather than a change in flux from the landfill therefore Consumers Energy is presenting an Alternate Source Demonstration for these constituents. Time series charts included in Appendix G (Figure G1) illustrate the correlation between the increased concentrations and the changing redox conditions.

- Dissolved oxygen is increasing at both MW-50 and JCW-MW-18001. Sulfate is used as an oxidizing agent when oxygen is not present. As groundwater is transitioning to a more oxygenated state from the rising adjacent surface water level, less sulfate is being reduced as an electron acceptor, causing increasing concentrations (i.e. less sulfate is being reduced to sulfide/sulfite/elemental sulfur, so the amount of sulfate present increases).
- These changes in sulfate concentrations may in turn affect iron concentrations. When appreciable amounts of sulfide are present (such as from a reduction of sulfate), iron concentrations can be reduced due to the precipitation of iron sulfides. If the amount of sulfide is reduced, this could result in increased iron concentrations. As dissolved oxygen

increases further, and is greater than 1-2 mg/L, iron concentrations may be reduced, as iron occurs as Fe^{3+}, which is less soluble than Fe^{2+}.

- Sulfate concentrations at JCW-MW-18001 (580 mg/L) are much higher than sulfate concentrations observed on the inside of the slurry wall at JCW-OW-18001 (86.8 ug/L), which further supports that the landfill is not the source of sulfate (Appendix G: Table G1).

Consumers Energy is continuing to assert an Alternate Source Demonstration (ASD) for a arsenic and of molybdenum at MW-55 indicating elevated levels of constituents at that location are not related to materials management of the Weadock Landfill (*2019 Annual Groundwater Monitoring and Corrective Action Report*; TRC, January 2020). The basis for this ASD is summarized below and updated time series plots in support of this ASD are included in Appendix G (Figure G2).

Data collected from the 2018 investigation as well as data collected during routine sampling events for Part 115 and Federal CCR groundwater compliance show the following:

- **Distinct Chemistry from Leachate –** The leachate chemistry from a monitoring well screened at the base of the ash fill (LH-104) is distinctly different from the groundwater chemistry near MW- 55 and the temporary monitoring wells installed by TRC in the investigation area, as illustrated Appendix G of the 2019 Annual Groundwater Monitoring and Corrective Action Report (TRC, January 2020). Additionally, Table G2 shows concentrations of arsenic, boron, and molybdenum within the landfill (OW-55, JCW-OW-18004 and LH-104) are noticeably different than arsenic and molybdenum concentrations observed in MW-55. Arsenic and molybdenum concentrations are generally much lower inside the slurry wall and boron concentrations are much higher.
- **Conservative Tracer –** Boron is a metalloid known to be present in coal ash and can be used as a conservative tracer in groundwater. Concentrations of boron in Leachate Headwell LH-104 are significantly higher than concentrations observed at any of the other location sampled as a part of this ASD. Additionally, boron concentrations at MW-55 have decreased since 2010, as evidenced by the time series plots in Figure G2. A downward trend in concentration for boron is strong evidence that the water quality at MW-55 is not directly affected by groundwater migrating from the landfill.
- **Reducing Conditions and Groundwater Head Levels –** Water levels for MW-55, as shown in Appendices A and G, are trending upwards and have increased over 4-ft since 2010. The oxidation-reduction potential (ORP) at MW-55 is generally lower (i.e., more reducing) than other wells along the southern and eastern portion of the landfill perimeter Table 4, Table G2). The lowering of ORP over time as a result of increased water levels has changed the geochemical conditions in the vicinity of MW-55 and has resulted in an increased solubility of arsenic and molybdenum.

4.0 Conclusions and Recommendations

Detection monitoring is continuing through the active life of the Weadock Landfill to monitor for new releases from landfill operations. The detection monitoring program consists of potentiometric analysis and groundwater quality analysis. Evaluation of the second quarter 2021 data demonstrate that the slurry wall is functioning as designed.

The Weadock Landfill is currently in assessment monitoring pursuant to the CCR Rule, as discussed in the *2020 Annual Groundwater Monitoring and Corrective Action Report*, due to observed groundwater concentrations that are indicative of impact from past landfill operations. Evaluation of the second quarter 2021 data in accordance with the Weadock Landfill HMP demonstrate that boron, calcium, and sulfate are present at concentrations above the GWPS. Boron, calcium, and sulfate are detection monitoring (i.e., Appendix III) constituents that do not have associated health-based criteria and there is not a complete drinking water pathway on site. As such, the relevant Part 115 compliance pathway is the GSI pathway. Concentrations of boron, calcium, and sulfate are below relevant GSI criteria, as discussed in Section 3.4.4.

The statistical evaluation found that molybdenum was present at a statistically significant levels above the generic GSI criterion of 120 ug/L. However, water levels in MW-55 closely mirror the surface water elevation measured at the NOAA gauging station, which indicates there is a minimal gradient to potentially a reverse gradient (i.e., toward the landfill) between the well and the drain, resulting in a minimal to zero mass flux to the drain. No other constituents were present at statistically significant levels above applicable GSI criteria.

Therefore, Consumers Energy will continue with the detection and assessment monitoring program at the Weadock Landfill unit in conformance with the JC Weadock Landfill HMP. The third quarter monitoring event for is scheduled for August 2021.

5.0 References

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Tables

Table 1
Summary of Groundwater Elevation Data: May 2021
Second Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, 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 Monitoring Wells							
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
Bottom Ash Pond: Downgradient Monitoring Wells							
JCW-MW-15007	587.40	Sand	582.7	to	579.2	3.98	583.42
JCW-MW-15009	589.64	Sand	581.9	to	576.9	8.40	581.24
JCW-MW-15010	597.76	Sand	579.7	to	578.2	16.64	581.12
JCW-MW-15028	589.64	Sand	567.7	to	564.7	7.73	581.91
Landfill: Downgradient Monitoring Wells (outside slurry wall)							
JCW-MW-18001	596.73	Sand and Sandy Clay	578.3	to	573.3	15.98	580.75
JCW-MW-18004	593.04	Sandy Clay	583.9	to	578.9	11.65	581.39
JCW-MW-18005	590.89	Sand and Sandy Clay	580.0	to	575.0	8.80	582.09
JCW-MW-18006	600.72	Fly Ash and Sandy Clay	582.8	to	577.8	14.76	585.96
MW-50	593.36	Sand	577.8	to	574.8	12.53	580.83
MW-51	594.29	Sand and Clay	577.8	to	574.8	13.30	580.99
MW-52	594.90	Sand	579.3	to	576.3	13.93	580.97
MW-53	593.68	Sand and Clay	579.1	to	576.1	12.90	580.78
MW-53R	594.25	Sand and Clay	580.4	to	575.4	13.40	580.85
MW-54R	593.89	Clay and Sand	581.3	to	576.3	13.00	580.89
MW-55	593.82	Sand	581.5	to	578.5	12.93	580.89
OW-57ROUT	591.00	Sandy Clay	577.0	to	572.0	10.18	580.82
Landfill: Static Water Level Only (inside slurry wall)							
JCW-OW-18001	595.84	Fly Ash and Sand	581.1	to	576.1	6.40	589.44
JCW-OW-18002	593.63	Sand	578.9	to	573.9	11.75	581.88
JCW-OW-18003	593.99	Sand and Clay	580.5	to	575.5	10.28	583.71
JCW-OW-18004	594.19	Sandy Clay	584.6	to	579.6	7.42	586.77
JCW-OW-18006	600.61	Fly Ash and Clay with Sand	582.9	to	577.9	11.42	589.19
MW-20	592.73	NR	~581.1	to	~578.1	7.03	585.70
OW-51	593.62	Clay and Sand	578.9	to	575.9	10.01	583.61
OW-53	593.64	Clay and Sand	579.0	to	576.0	8.62	585.02
OW-54	594.10	Clay and Sand	580.0	to	577.0	8.09	586.01
OW-55	594.67	Clay (or Sand and Clay)	580.9	to	577.9	6.80	587.87
OW-56R	592.01	Ash and Sand	577.5	to	572.5	17.15	574.86
OW-57R IN	590.86	Sandy Clay	575.7	to	570.7	7.41	583.45
OW-61	612.37	Ash and Sand	588.0	to	585.0	21.98	590.39
OW-63	612.53	Ash and Sand	594.2	to	591.2	26.80	585.73
Landfill: Leachate Headwells							
LH-103	603.49	Fly Ash	30.2	to	33.2	16.70	586.79
LH-104	596.56	Fly Ash	8.0	to	11.0	9.30	587.26

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 Groundwater Sampling Results (Analytical): May 2021
Second Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

							Sample Location:	**JCW-MW-18001**	**JCW-MW-18004**	**JCW-MW-18005**	**JCW-MW-18006**	**MW-50**	**MW-51**
							Sample Date:	5/10/2021	5/11/2021	5/11/2021	5/11/2021	5/10/2021	5/10/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Chronic-Based Mixing Zone GSI Criteria^	Acute-Based Mixing Zone GSI Criteria^	Downgradient	Downgradient/ GSI	Downgradient	Downgradient	Downgradient/ GSI	Downgradient/ GSI
Appendix III(1)													
Boron	ug/L	NC	**500**	**500**	4,000	44,000	69,000	**1,340**	246	**919**	**2,720**	**1,380**	**1,040**
Calcium	mg/L	NC	NC	NC	500EE	NC	NC	305	266	202	147	363	303
Chloride	mg/L	250**	250E	250E	**50**	NC	NC	**77.3**	12.4	**56.0**	**72.6**	**68.9**	**93.6**
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250E**	**250E**	**500EE**	NC	NC	**580**	**523**	**263**	47.0	**856**	**450**
Total Dissolved Solids	mg/L	**500****	**500E**	**500E**	**500**	NC	NC	**1,670**	**1,270**	**1,020**	**784**	**1,950**	**1,500**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5E	6.5 - 8.5E	6.5 - 9.0	NC	NC	6.9	6.8	6.9	6.9	6.9	7.0
Appendix IV(1)													
Antimony	ug/L	6	6	6	2	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	**100**	680	2	< 1	9	**30**	1	**11**
Barium	ug/L	2,000	2,000	2,000	1,200	NC	NC	166	27	93	472	108	148
Beryllium	ug/L	4	4	4	33	NC	NC	< 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
Chromium	ug/L	100	100	100	11	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	40	100	100	NC	NC	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4	4	14	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	NC	NC	68	36	30	53	100	57
Mercury	ug/L	2	2	2	0.20#	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	**73**	210	**120**	NC	NC	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226/228	pCi/L	5	NC	NC	NC	NC	NC	< 0.558	< 0.425	0.728	0.888	0.650	0.851
Selenium	ug/L	50	50	50	5	55	120	< 1	1	1	1	< 1	< 1
Thallium	ug/L	2	2	2	2	NC	NC	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115(2)													
Iron	ug/L	**300****	**300E**	**300E**	500,000EE	NC	NC	154	24	**4,590**	**5,490**	**1,810**	**2,200**
Copper	ug/L	1,000**	1,000E	1,000E	20	NC	NC	3	2	1	2	< 1	< 1
Nickel	ug/L	NC	100	100	120	NC	NC	2	2	10	3	< 2	< 2
Silver	ug/L	100**	34	98	0.2	NC	NC	< 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	3	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000E	260	NC	NC	< 10	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
pCi/L - picocuries per liter; SU - standard units; pH is a field parameter.
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April, 2012.
NC - no criteria; -- - not analyzed.
* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 30, 2013.
** - 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 2
Summary of Groundwater Sampling Results (Analytical): May 2021
Second Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

							Sample Location:	**MW-52**	**MW-53**	**MW-53R**	**MW-54R**	**MW-55**	**OW-57R OUT**
							Sample Date:	5/10/2021	5/10/2021	5/10/2021	5/11/2021	5/11/2021	5/11/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Chronic-Based Mixing Zone GSI Criteria^	Acute-Based Mixing Zone GSI Criteria^	Downgradient/ GSI	Downgradient/ GSI	Downgradient/ GSI	Downgradient/ GSI	Downgradient/ GSI	Downgradient
Appendix III(1)													
Boron	ug/L	NC	**500**	**500**	4,000	44,000	69,000	**1,160**	**3,790**	**1,580**	**3,140**	**866**	**1,710**
Calcium	mg/L	NC	NC	NC	500EE	NC	NC	244	187	227	196	147	133
Chloride	mg/L	250**	250E	250E	**50**	NC	NC	**53.9**	**51.8**	31.1	32.7	19.5	**62.9**
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250E**	**250E**	**500EE**	NC	NC	**574**	**322**	170	72.7	18.5	78.3
Total Dissolved Solids	mg/L	**500****	**500E**	**500E**	**500**	NC	NC	**1,500**	**1,050**	**1,040**	**762**	**729**	**743**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5E	6.5 - 8.5E	6.5 - 9.0	NC	NC	6.9	7.1	6.8	6.6	7.1	7.0
Appendix IV(1)													
Antimony	ug/L	6	6	6	2	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	**100**	680	< 1	< 1	**18**	1	**169**	< 1
Barium	ug/L	2,000	2,000	2,000	1,200	NC	NC	132	214	208	122	323	73
Beryllium	ug/L	4	4	4	33	NC	NC	< 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
Chromium	ug/L	100	100	100	11	NC	NC	< 1	< 1	< 1	< 1	< 1	1
Cobalt	ug/L	NC	40	100	100	NC	NC	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4	4	14	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	NC	NC	29	46	59	64	24	24
Mercury	ug/L	2	2	2	0.20#	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	**73**	210	**120**	NC	NC	< 5	< 5	< 5	< 5	**131**	6
Radium-226/228	pCi/L	5	NC	NC	NC	NC	NC	< 0.407	0.684	1.13	0.900	1.42	0.615
Selenium	ug/L	50	50	50	5	55	120	1	2	< 1	< 1	1	< 1
Thallium	ug/L	2	2	2	2	NC	NC	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115(2)													
Iron	ug/L	**300****	**300E**	**300E**	500,000EE	NC	NC	**1,400**	**1,420**	**2,220**	**782**	**21,500**	100
Copper	ug/L	1,000**	1,000E	1,000E	20	NC	NC	< 1	< 1	1	2	< 1	1
Nickel	ug/L	NC	100	100	120	NC	NC	< 2	< 2	< 2	3	< 2	16
Silver	ug/L	100**	34	98	0.2	NC	NC	< 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	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000E	260	NC	NC	< 10	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
pCi/L - picocuries per liter; SU - standard units; pH is a field parameter.
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April, 2012.
NC - no criteria; -- - not analyzed.
* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 30, 2013.
** - 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 3
Summary of Groundwater Sampling Results (Analytical): May 2021
Second Quarter 2021 Quarterly Report
DE Karn & JC Weadock Background – Essexville, Michigan

							Sample Location:	**MW-15002**	**MW-15008**	**MW-15016**	**MW-15019**
							Sample Date:	5/3/2021	5/3/2021	5/3/2021	5/3/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Mixing Zone GSI Criteria^	Mixing Zone GSI Criteria^	Background			
Appendix III[(1)]											
Boron	ug/L	NC	500	500	4,000	44,000	69,000	102	121	349	239
Calcium	mg/L	NC	NC	NC	500[EE]	NC	NC	364	105	219	155
Chloride	mg/L	**250****	**250[E]**	**250[E]**	**50**	NC	NC	**2,630**	**225**	**108**	**344**
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	500[EE]	NC	NC	31.3	< 1.00	**255**	52.4
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	NC	NC	**5,390**	**822**	**979**	**1,160**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	NC	NC	6.5	6.8	7.2	6.8
Appendix IV[(1)]											
Antimony	ug/L	6	6	6	2	NC	NC	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	10	10	10	100	680	1	< 1	4	1
Barium	ug/L	2,000	2,000	2,000	1,200	NC	NC	1,040	62	53	335
Beryllium	ug/L	4	4	4	33	NC	NC	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5	5	2.5	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	NC	NC	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	40	100	100	NC	NC	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4	4	14	NC	NC	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	NC	NC	19	15	79	12
Mercury	ug/L	2	2	2	0.20#	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	120	NC	NC	< 5	< 5	< 5	< 5
Radium-226/228	pCi/L	5	NC	NC	NC	NC	NC	3.72	0.804	0.658	0.902
Selenium	ug/L	50	50	50	5	55	120	< 1	< 1	< 1	4
Thallium	ug/L	2	2	2	2	NC	NC	< 2	< 2	< 2	< 2
Additional MI Part 115[(2)]											
Iron	ug/L	**300****	**300[E]**	**300[E]**	500,000[EE]	NC	NC	**14,600**	**11,300**	**1,170**	**14,300**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	NC	NC	1	1	1	< 1
Nickel	ug/L	NC	100	100	120	NC	NC	7	< 2	6	28
Silver	ug/L	100**	34	98	0.2	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	62	27	NC	NC	**12**	**8**	2	4
Zinc	ug/L	5,000**	2,400	5,000[E]	260	NC	NC	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
pCi/L - picocuries per liter; SU - standard units; pH is a field parameter.
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April, 2012.
NC - no criteria.
* - 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}
\# - 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}.
(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 Field Parameters: May 2021
Second Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Sample Location	Sample Date	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (umhos/cm)	Temperature (°C)	Turbidity (NTU)
JCW Landfill							
JCW-MW-18001	5/10/2021	2.10	39.5	6.9	2,368	10.0	0.22
JCW-MW-18004	5/11/2021	5.03	64.0	6.8	1,746	7.7	0.63
JCW-MW-18005	5/11/2021	2.19	-32.8	6.9	1,556	9.4	4.87
JCW-MW-18006	5/11/2021	2.08	-29.4	6.9	1,460	10.3	0.36
MW-50	5/10/2021	2.16	-9.0	6.9	2,653	9.4	0.60
MW-51	5/10/2021	2.06	-28.5	7.0	2,258	9.0	0.23
MW-52	5/10/2021	2.07	3.8	6.9	2,106	9.4	0.45
MW-53	5/10/2021	2.08	-19.3	7.1	1,649	8.9	0.52
MW-53R	5/10/2021	2.07	-9.0	6.8	1,720	8.9	1.40
MW-54R	5/11/2021	2.43	79.5	6.6	1,346	6.7	0.65
MW-55	5/11/2021	2.00	-123.0	7.1	1,373	9.8	2.35
OW-57ROUT	5/11/2021	2.55	2.8	7.0	1,371	10.3	2.40

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

Table 5
Summary of Confidence Interval Evaluation: May 2021
Second Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Assessment Monitoring Statistical Evaluation

Constituent	Units	GWPS	MW-50		MW-51		MW-52		MW-53		MW-53R		MW-54R		MW-55		OW-57R OUT		JCW-MW-18001		JCW-MW-18004		JCW-MW-18005		JCW-MW-18006	
			UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL
Boron	ug/L	560	1,600	**1,300**	1,000	**760**	1,200	**1,100**	3,600	**1,400**	1,700	**1,400**	2,500	**1,300**	780	490	1,700	**1,500**	1,400	**1,300**	--	--	1,400	**950**	3,100	**2,400**
Calcium	mg/L	280	390	280	350	**300**	--	--	420	190	--	--	--	--	--	--	--	--	310	180	330	250	380	160	--	--
Sulfate	mg/L	780	1,100	**800**	--	--	--	--	950	270	--	--	--	--	--	--	--	--	--	--	940	470	730	260	--	--
Arsenic	ug/L	21	--	--	--	--	--	--	--	--	35	19	--	--	--(1)	--(1)	--	--	--	--	--	--	--	--	40	20
Molybdenum	ug/L	73	--	--	--	--	--	--	--	--	--	--	--	--	--(1)	--(1)	--	--	--	--	--	--	--	--	--	--
Iron	ug/L	28,000	--	--	--	--	--	--	--	--	--	--	--	--	24,000	20,000	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/L	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	10	2.0	--	--	--	--

GSI Statistical Evaluation

Constituent	Units	GSI	MW-54R		MW-55		JCW-MW-18004	
			UCL	LCL	UCL	LCL	UCL	LCL
Sulfate	mg/L	1,200	--	--	--	--	940	470
Arsenic	ug/L	100	--	--	190	**120**	--	--
Chromium	ug/L	11	16	1.0	--	--	54	1.0
Molybdenum	ug/L	120	--	--	200	110	--	--

Notes:

ug/L - micrograms per Liter

mg/L - milligrams per Liter

-- - Not Applicable; well/parameter pair did not directly exceed the applicable criterion and was not included in further analysis.

GWPS - Groundwater Protection Standard as established in TRC's Technical Memorandum dated April 23, 2021

GSI - Groundwater Surface Water Interface Criteria; GSI criteria is the generic Michigan Part 201 GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.

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

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

1,300	Indicates a statistically significant exceedance of the GWPS (detection monitoring constituent). An exceedance occurs when the LCL is greater than the criterion.
1,300	Indicates a statistically significant exceedance of the GWPS (assessment monitoring constituent). An exceedance occurs when the LCL is greater than the criterion.
1,300	Indicates a statistically significant exceedance of the applicable GSI criterion. An exceedance occurs when the LCL is greater than the criterion.

(1) The concentrations of arsenic and molybdenum at MW-55 are not a result of a release from the unit, as detailed in the Alternate Source Demonstration (TRC, December 2019); therefore, confidence intervals were not calculated

Table 6
Mass Flux Calculations
Second Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Karn-Weadock Mixing Zone Compliance

Saginaw Bay Static Water Elevation: 580.77 5/3/2021

Monitoring Well Segment[1]	Segment Width (ft)	Static Water Elevation (ft NAVD88)	Aquifer Base Elevation (ft NAVD88)	Average Thickness of Segment[2] (ft)	Distance from Well to Bay (ft)	Total Area (ft^2)	Hydraulic Conductivity[3] (ft/day)	Gradient (ft/ft)	Q=KIA Total Volume (ft^3/day)	Total Volume (liters/day)	Arsenic 100 µg/L total volume x concentration: Concentration[4] (µg/L)	Arsenic: Total Loading (µg/day)	Molybdenum 120 µg/L total volume x concentration: Concentration[4] (µg/L)	Molybdenum: Total Loading (µg/day)
Non-Adjacent Zone														
MW-54R	510	580.89	576.3	2.50	55	1,275		0.0022	1.98E+00	5.59E+01	1	5.59E+01	5	2.80E+02
JCW-MW-18004	820	581.39	579.9	1.49	45	1,222		0.0138	1.20E+01	3.38E+02	1	3.38E+02	5	1.69E+03
MW-55	1,220	580.89	578.0	2.89	45	3,526		0.0027	6.68E+00	1.89E+02	169	3.19E+04	131	2.48E+04
JCW-MW-18005	1,120	582.09	578.5	1.25	120	1,400		0.0110	1.09E+01	3.10E+02	9	2.79E+03	5	1.55E+03
Discharge Channel														
JCW-MW-18001	1,010	580.75	574.8	3.75	40	3,788	7.1E-01	-0.0005	0.00E+00	0.00E+00	2	0.00E+00	5	0.00E+00
MW-50	970	580.83	574.31	4.50	45	4,365		0.0013	4.13E+00	1.17E+02	1	1.17E+02	5	5.85E+02
Adjacent Zone														
MW-51	1,850	580.99	575.3	5.00	60	9,250		0.0037	2.41E+01	6.82E+02	11	7.50E+03	5	3.41E+03
MW-52	740	580.97	575.79	4.50	55	3,330		0.0036	8.60E+00	2.43E+02	1	2.43E+02	5	1.22E+03
MW-53	730	580.78	577.84	2.25	35	1,643		0.0003	3.33E-01	9.44E+00	1	9.44E+00	5	4.72E+01

ft^3 to liter is (ft^3 x 28.32)

Total Volume: 6.87E+01 ft^3/day
1.95E+03 liter/day
7.95E-04 ft^3/sec

	Arsenic		Molybdenum	
Total (lbs/day):	9.46E-05		7.38E-05	
Total (µg/day):	43,002		33,545	
Chronic Loading Limits				
	4.28E-04	lb/day	5.13E-04	lb/day
	1.95E-04	kg/day	2.33E-04	kg/day
	1.95E-01	g/day	2.33E-01	g/day
	1.95E+02	mg/day	2.33E+02	mg/day
	194,502	µg/day	233,403	µg/day

Notes:

NM - Not Measured

(1) Monitoring Well Zones based on Phase II Evaluation, Appendix K Groundwater Discharge Calculations, September 30, 2005.
Representative wells based on the Landfill Hydrogeological Monitoring Plan, February 2021.

(2) Saturated thickness will be the thickness of the sand unit when the observed static water elevation is above the top of the sand unit, or the measured saturated thickness of the sand unit if the static water elevation is below the top of the sand unit.

(3) Hydraulic conductivity is the harmonic mean of the testing results, Phase II Evaluation, Appendix K Groundwater Discharge Calculations, September 30, 2005.

(4) Concentration reported as equal to the laboratory reporting limit for non detect sample results.

Green cells can be modified by the user.

Calculated red and yellow loadings are compared with the unit specific chronic loading limits.

Table 7
EGLE Exceedance Summary Table
Second Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, 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: JC Weadock – WDS# 395457

Well #	Location	Parameter	Part 201 GRCC	Statistical Limit (or 'CC' for Control Charts)	2 Qtr. 2021 (**bold** >201)	1 Qtr. 2021 (**bold** >201)	4 Qtr. 2020 (**bold** >201)	3 Qtr. 2020 (**bold** >201)

No Exceedances at Compliance Locations

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:	A. ADAIR
CHECKED BY:	J. KRENZ
APPROVED BY:	D. LITZ
DATE:	JULY 2021
PROJ. NO.:	418426.0000
FILE:	418426-102-004.mxd

FIGURE 1

S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\3_WEADOCK\2021_MXDs\2021_002_MAY\418426-102-004.mxd -- Saved By: AADAIR on 7/29/2021, 11:56:38 AM

LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING WELL
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL
- SLURRY WALL (APPROXIMATE)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).

N

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:

CONSUMERS ENERGY COMPANY
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:

SITE MAP

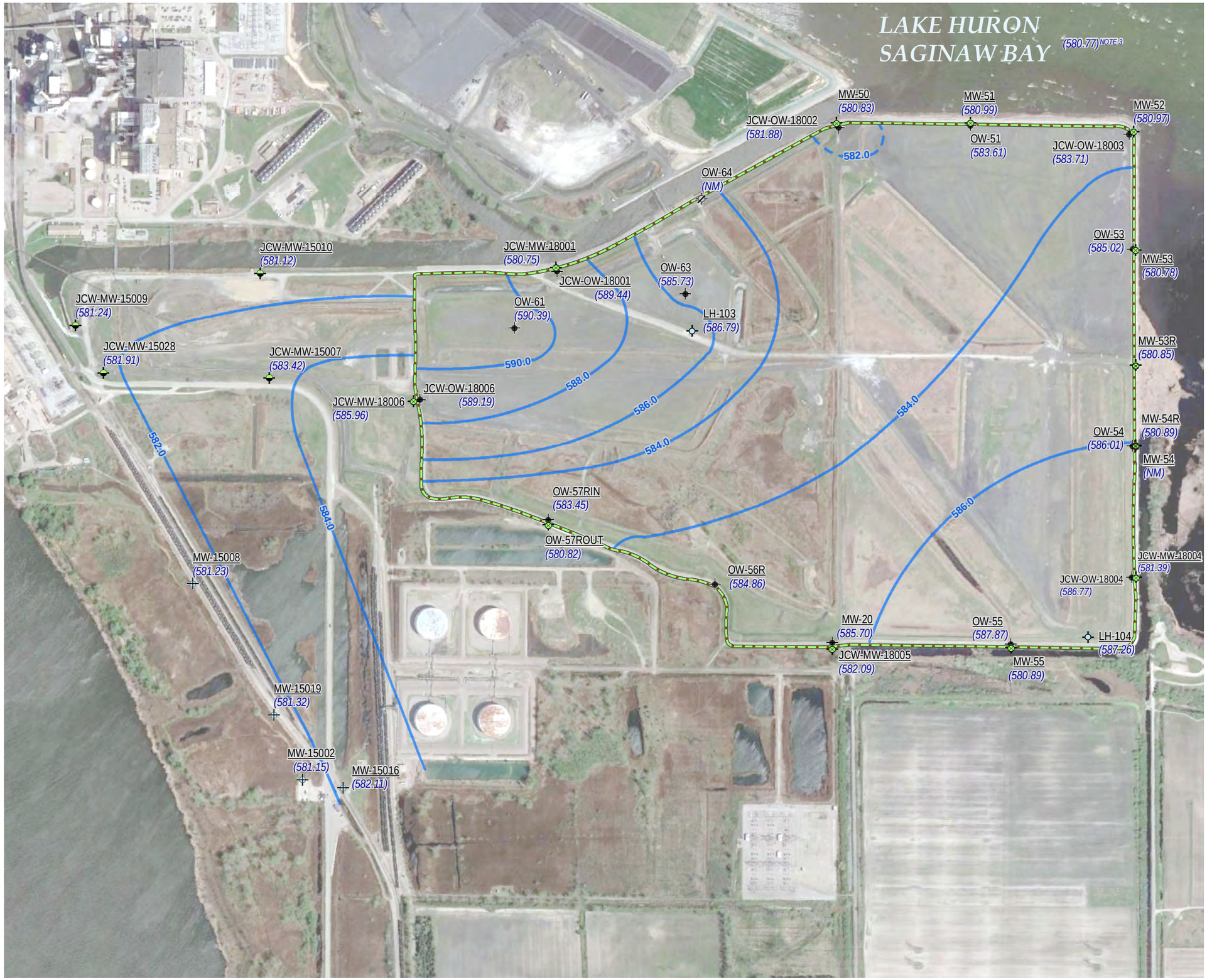
DRAWN BY:	A. ADAIR	PROJ NO.:	418426.0000
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		**FIGURE 2**
DATE:	JULY 2021		

TRC

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

FILE NO.: 418426-102-000.mxd

Plot Date: 7/29/2021, 11:58:15 AM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 2697673 WEADOCK\2021 MXDs\2021 002 MAY\418426-102-000.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS



LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING WELL
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL
- SLURRY WALL (APPROXIMATE)
- GROUNDWATER ELEVATION CONTOUR (2' INTERVAL, DASHED WHERE INFERRED)
- (580.85) GROUNDWATER ELEVATION (FEET)
- (NU) NOT USED TO DEVELOP CONTOURS

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018.
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
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:
POTENTIOMETRIC SURFACE MAP
MAY 2021

DRAWN BY:	A. ADAIR	PROJ NO.:	418426.0000
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		
DATE:	JULY 2021		

FIGURE 3

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
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FILE NO.: 418426-102-003A.mxd

Plot Date: 7/29/2021, 14:43:19 PM by AADAIR -- LAYOUT: ANSI B(11"x17")
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Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

Appendix A
Static Water Level Evaluation

Table A1

Static Water Levels for Select Perimeter Dike Monitoring Wells and NOAA Staff Gauge

Second Quarter 2021 Quarterly Report

JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Well Location	Date Measured	Groundwater Water Elevation (GWE) (ft)	Saginaw Bay Surface Water Elevation (SWE) (ft)	Elevation Difference (GWE-SWE)(1)
MW-50	5/3/2021	580.83	580.77	0.06
MW-51	5/3/2021	580.99		0.22
MW-52	5/3/2021	580.97		0.20
MW-53	5/3/2021	580.78		0.01
MW-53R	5/3/2021	580.85		0.08
MW-54R	5/3/2021	580.89		0.12
MW-55	5/3/2021	580.89		0.12
JCW-MW-18004	5/3/2021	581.39		0.62
Average:		**580.95**		

Notes:

Elevation in feet above North American Vertical Datum 1988 (NAVD 88)

TOC: top of well casing

ft BTOC: feet below top of well casing

(1) Positive elevation difference indicates flow toward the surface water body.

Table A2
Slurry Wall Gradient and Flux
Second Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Monitoring Well Pair Discharge Channel	SWL Obs Well (ft NAVD 88)	SWL MW (ft NAVD 88)	x_{wells} (ft)	i (ft/ft)	Saturated Thickness (ft)	Mean Thickness (ft)	Section Length (ft)	K (cm/sec)	i (ft/ft)	Area (ft^2)	Flow ft^3/day	Flow Gal/day	Flow Gal/yr
JCW-OW-18001	589.44		22.37	3.88E-01	2.00	2.88	1,010	2.30E-08	0.39	2,904	7.35E-02	0.55	201
JCW-MW-18001		580.75			3.75								
JCW-OW-18002	581.88		28.87	3.64E-02	4.00	4.25	970		0.04	4,123	9.78E-03	0.07	27
MW-50		580.83			4.50								

Monitoring Well Pair Adjacent Zone	SWL Obs Well (ft NAVD 88)	SWL MW (ft NAVD 88)	x_{wells} (ft)	i (ft/ft)	Saturated Thickness (ft)	Mean Thickness (ft)	Section Length (ft)	K (cm/sec)	i (ft/ft)	Area (ft^2)	Flow ft^3/day	Flow Gal/day	Flow Gal/yr
OW-51	583.61		14.38	1.82E-01	4.00	4.50	1,850	2.30E-08	0.18	8,325	9.89E-02	0.74	270
MW-51		580.99			5.00								
JCW-OW-18003	583.71		33.85	8.09E-02	3.50	4.00	740		0.08	2,960	1.56E-02	0.12	43
MW-52		580.97			4.50								
OW-53	585.02		20.14	2.11E-01	1.25	1.75	730		0.21	1,278	1.75E-02	0.13	48
MW-53		580.78			2.25								

Monitoring Well Pair Non-Adjacent Zone	SWL Obs Well (ft NAVD 88)	SWL MW (ft NAVD 88)	x_{wells} (ft)	i (ft/ft)	Saturated Thickness (ft)	Mean Thickness (ft)	Section Length (ft)	K (cm/sec)	i (ft/ft)	Area (ft^2)	Flow ft^3/day	Flow Gal/day	Flow Gal/yr
OW-54	586.01		21.23	2.41E-01	2.00	2.25	510	2.30E-08	0.24	1,148	1.80E-02	0.13	49
MW-54R		580.89			2.50								
JCW-OW-18004	586.77		26.59	2.02E-01	8.00	4.75	820		0.20	3,891	5.13E-02	0.38	140
JCW-MW-18004		581.39			1.49								
OW-55	587.87		23.95	2.91E-01	2.00	2.44	1,220		0.29	2,983	5.67E-02	0.42	155
MW-55		580.89			2.89								
MW-20	585.70		40.93	8.82E-02	1.50	1.38	1,120		0.09	1,540	8.86E-03	0.07	24
JCW-MW-18005		582.09			1.25								

Calculated Groundwater Discharge from JC Weadock (gal per day)	**=**	**2.62**
(cubic ft per day)	**=**	**0.35**
(cubic ft per min)		**2.4E-04**
Calculated Groundwater Discharge from JC Weadock (gal per yr)	**=**	**956**
(cubic ft per yr)	**=**	**128**
Calculated Groundwater Discharge from JC Weadock (gal per year per linear foot of dike)	**=**	**0.11**
(cubic feet per year per linear foot of dike)	**=**	**1.43E-02**

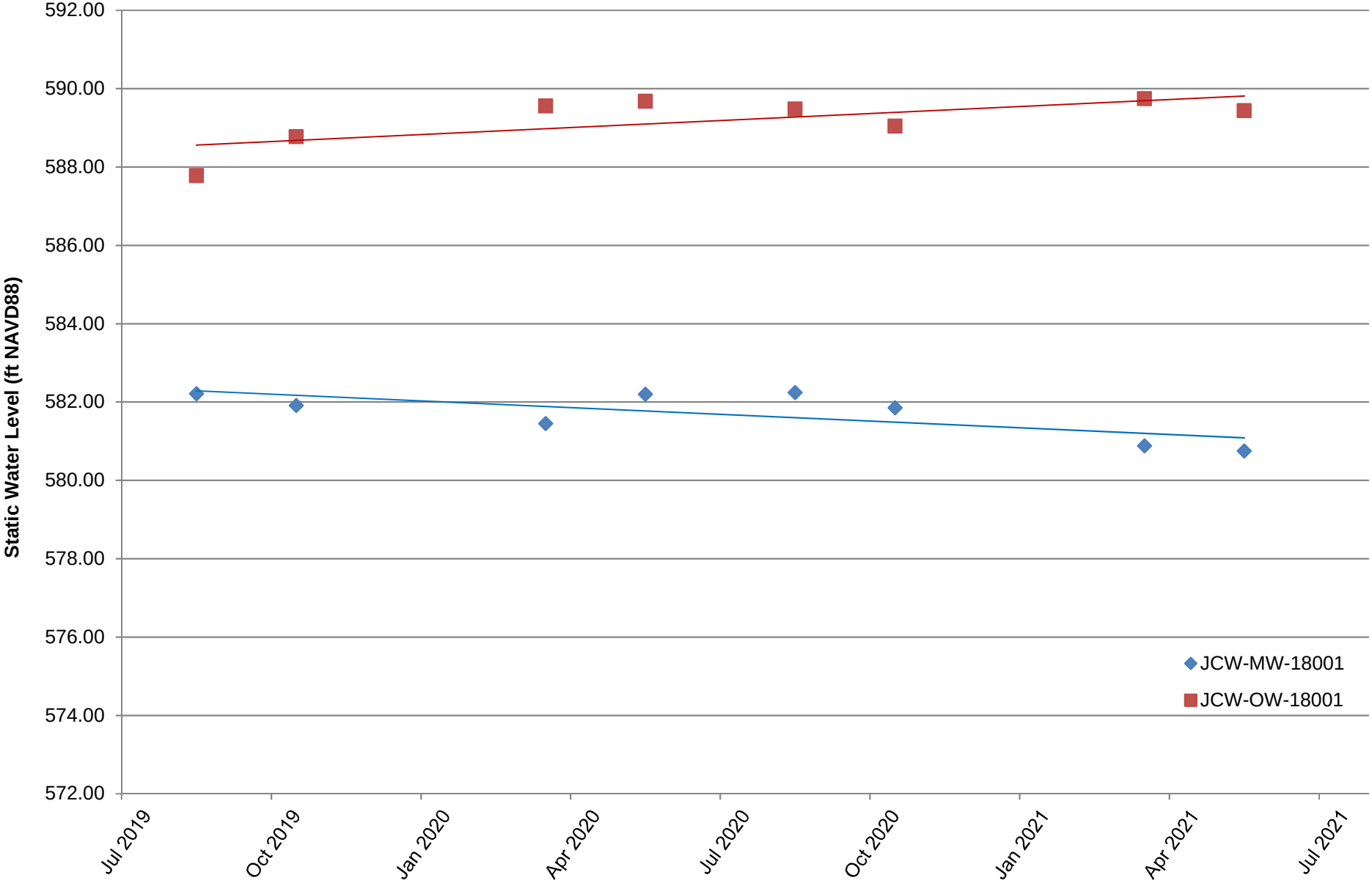
Notes:

Water level data collected on May 3, 2021 are shown by yellow cells:

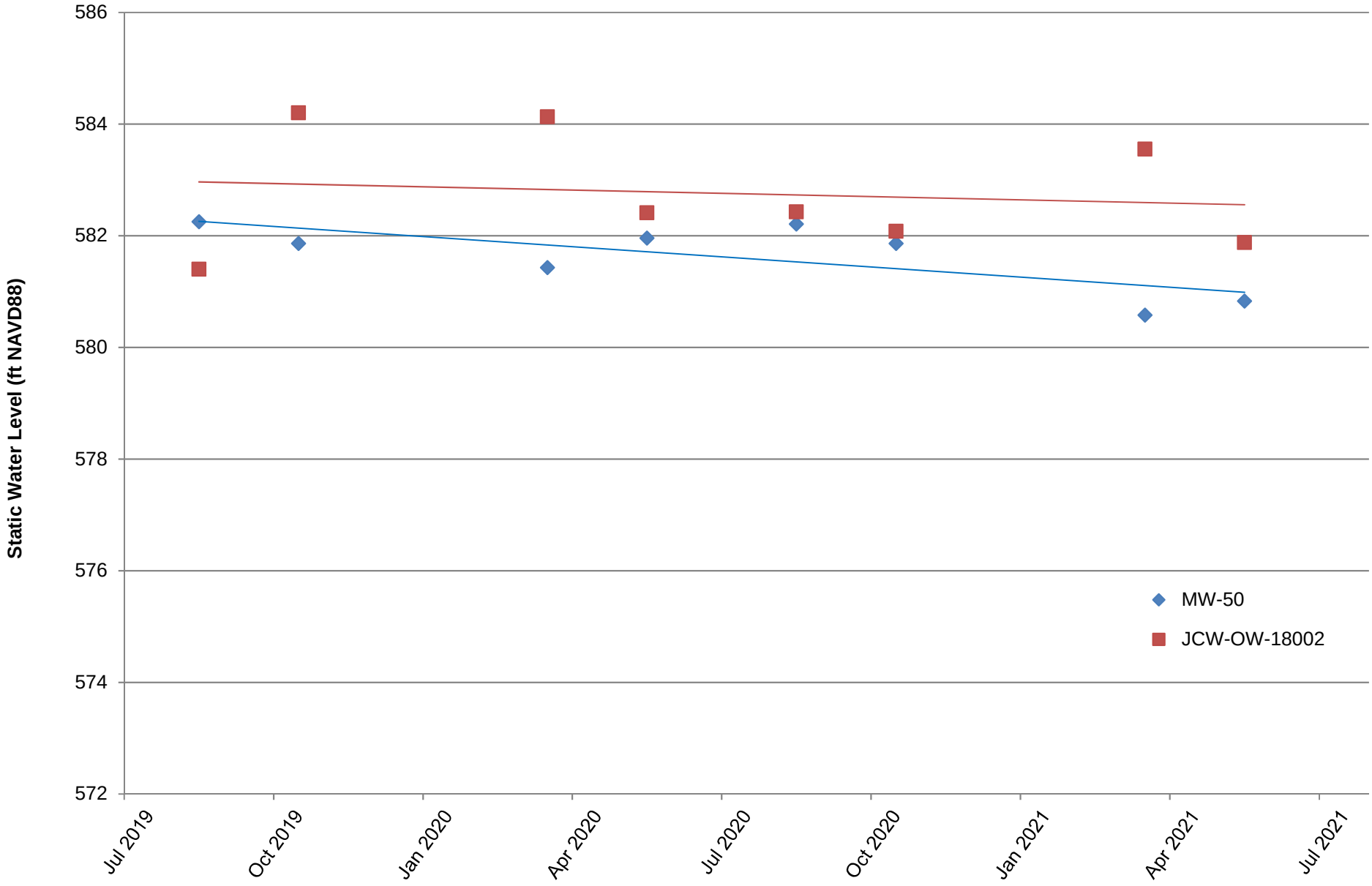
1. Monitoring Well Zones based on Phase II Evaluation, Appendix K Groundwater Discharge Calculations, September 30, 2005. Representative wells based on the Landfill Hydrogeological Monitoring Plan, February 2021.
2. Saturated thickness will be the thickness of the sand unit when the observed SWL is above the top of the sand unit, or the measured saturated thickness of the sand unit if the SWL is below the top of the sand unit.
3. Hydraulic conductivity taken as harmonic mean of laboratory tests done on in-place slurry wall from NTH Certified Quality Assurance Report, Appendix E, April 24, 2009
4. Arithmetic average used to develop geometric properties of each section/zone (e.g. discharge channel, adjacent, and non-adjacent)
5. If Obs well SWL < MW SWL calculated flow will be zero.

SWL = Static Water Level; Obs Well = Observation Well; MW= Monitoring Well; ft NAVD 88 = feet above North American Vertical Datum 1988
ft/ft = feet per foot; cm/sec = centimeters per second; ft^2 = square feet; ft^3/day = cubic feet per day; Gal/day = gallons per day; Gal/yr = gallons per year
i = hydraulic gradient; K = hydraulic conductivity; x_{wells} = distance between well pairs

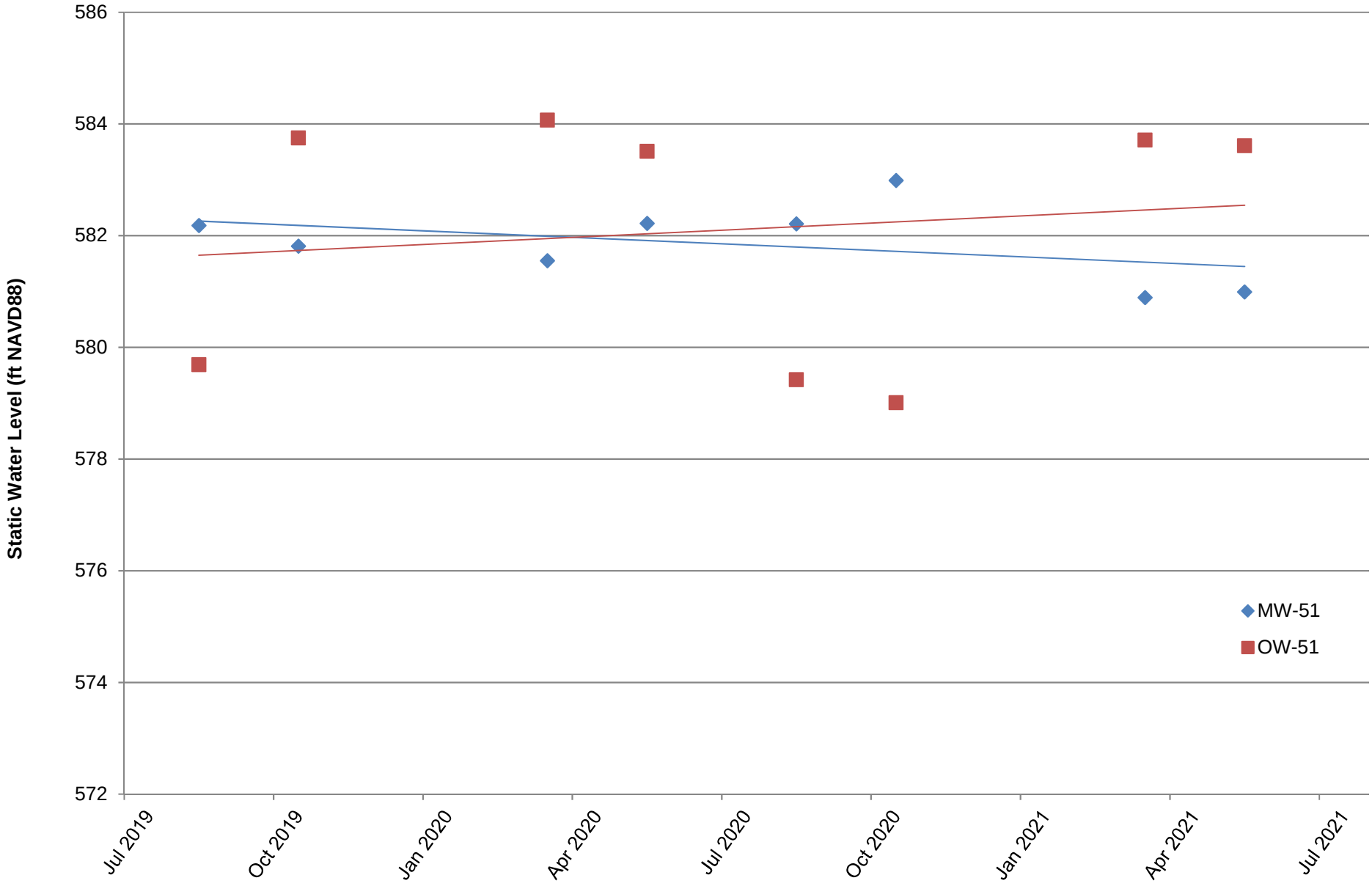
Appendix A
Static Water Level for JCW-MW-18001 and JCW-OW-18001



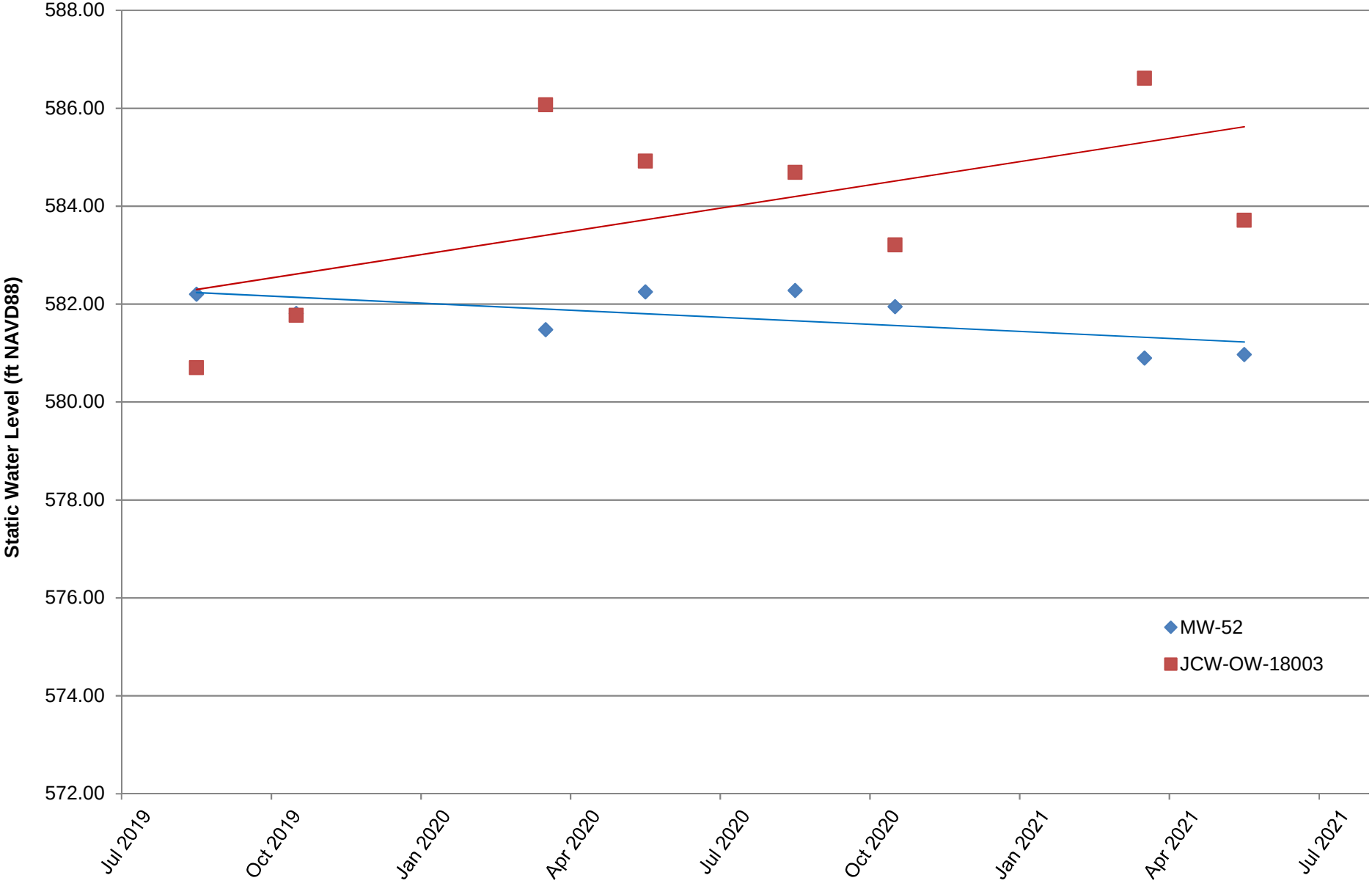
Appendix A
Static Water Level for MW-50 and JCW-OW-18002



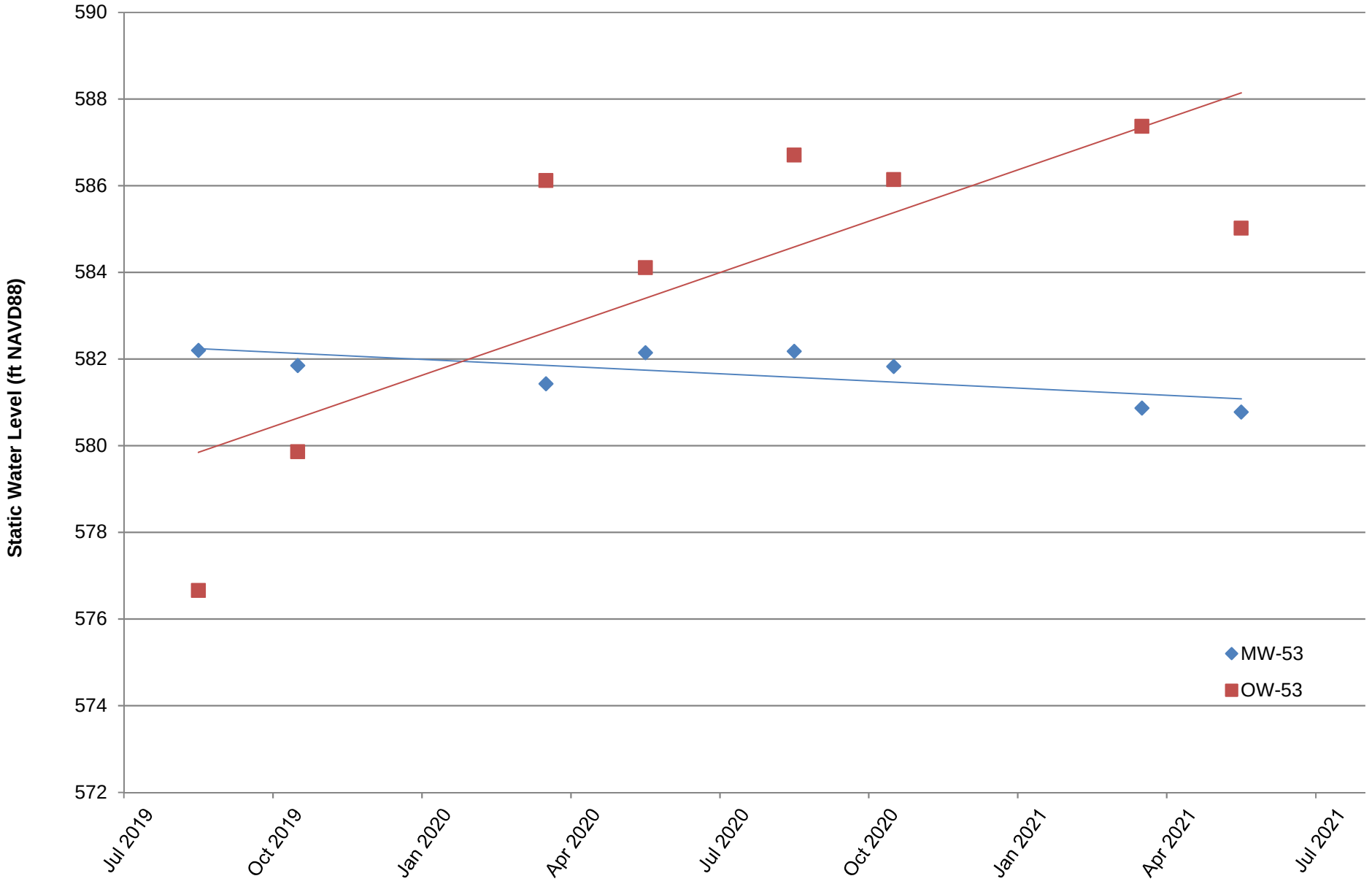
Appendix A
Static Water Level for MW-51 and OW-51



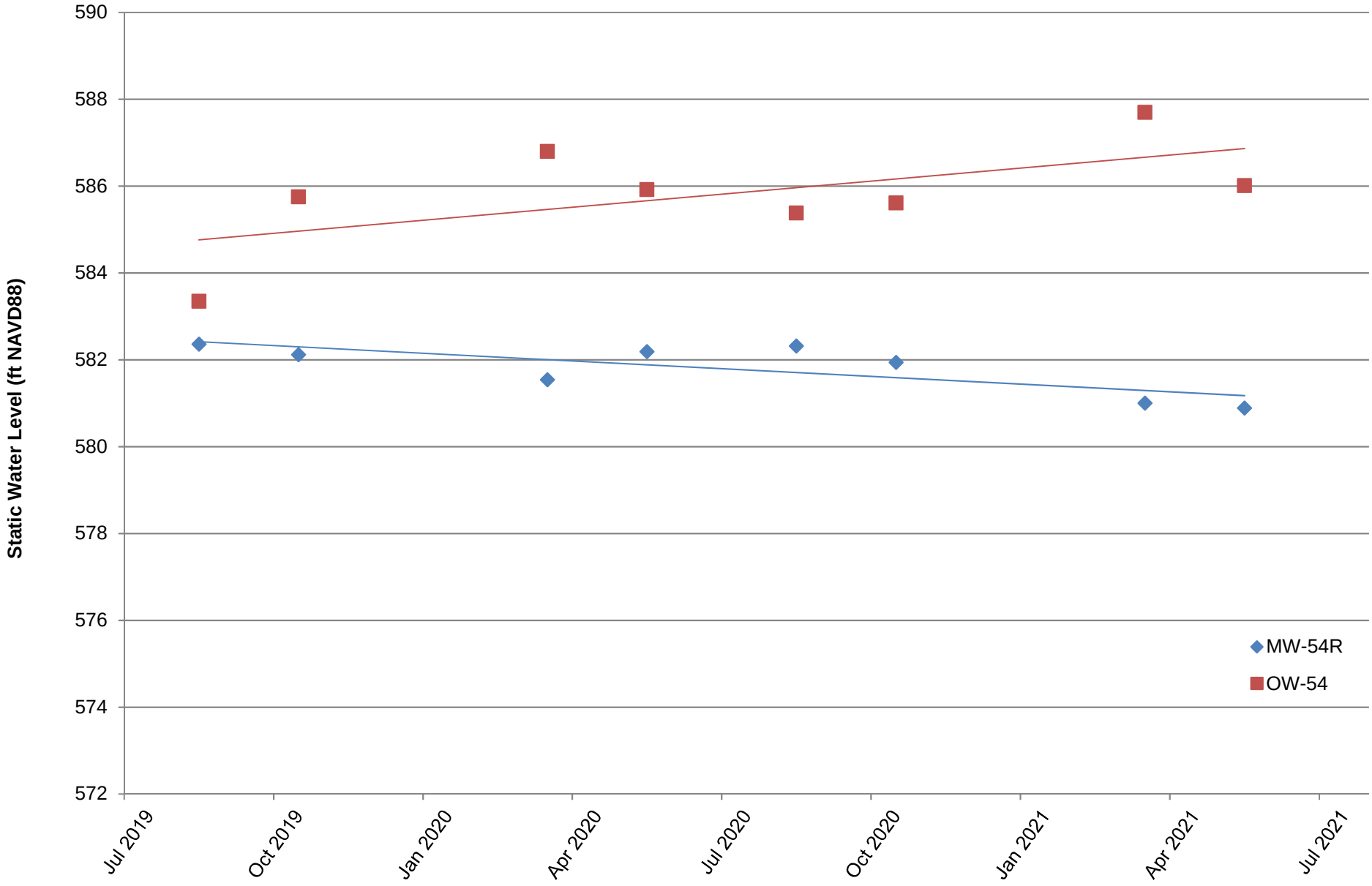
Appendix A
Static Water Level for MW-52 and JCW-OW-18003



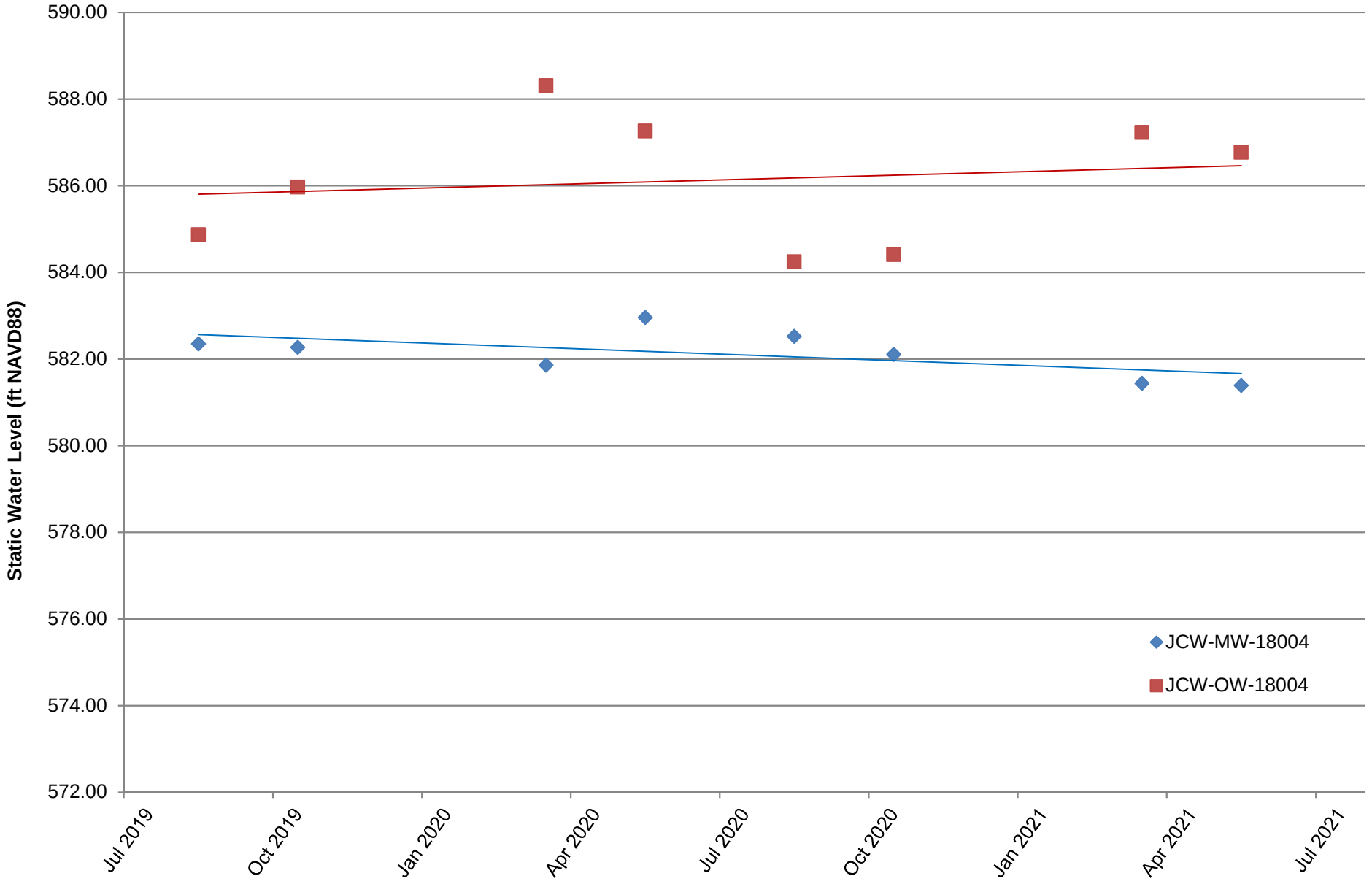
Appendix A
Static Water Level for MW-53 and OW-53



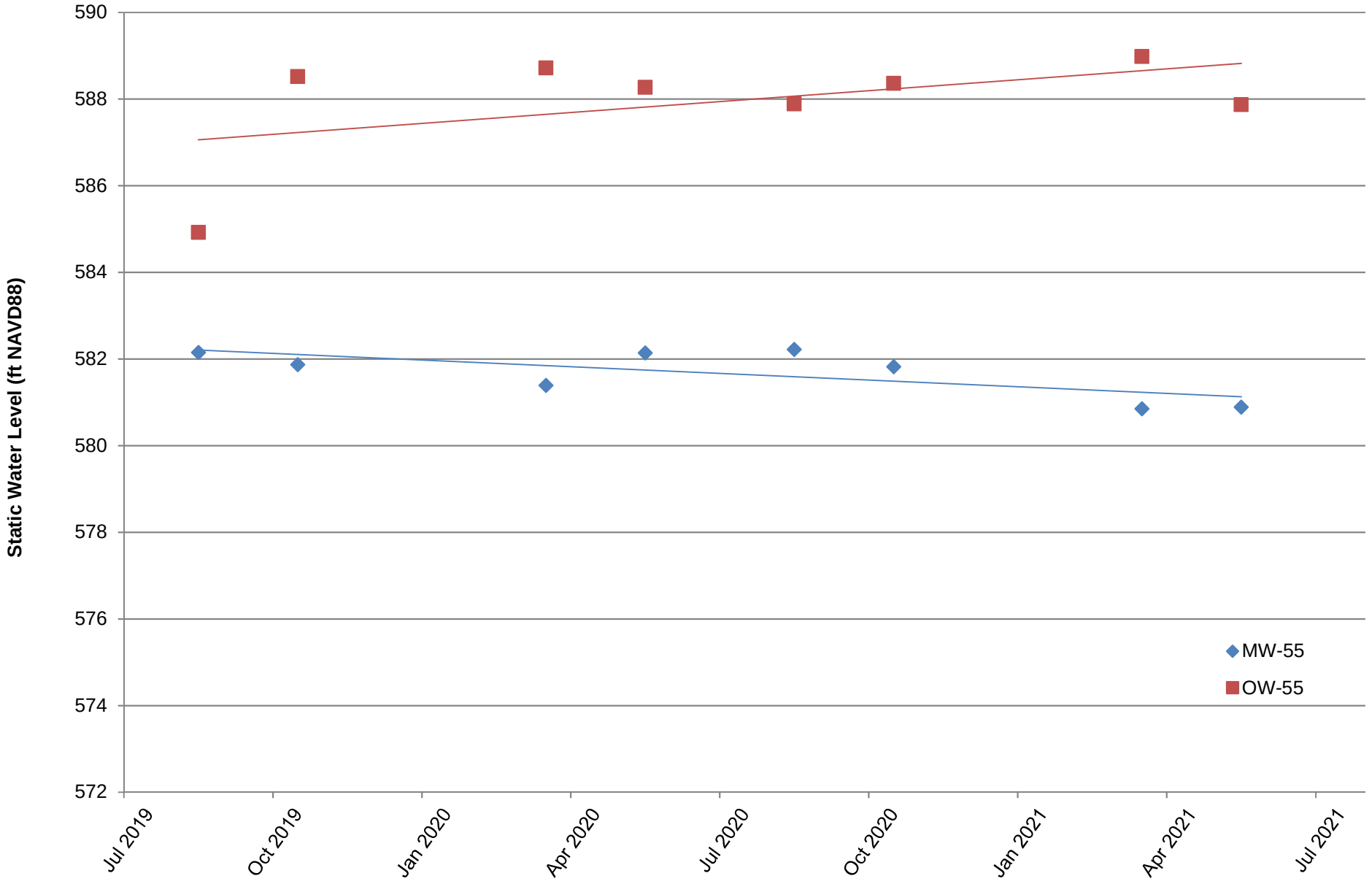
Appendix A
Static Water Level for MW-54R and OW-54



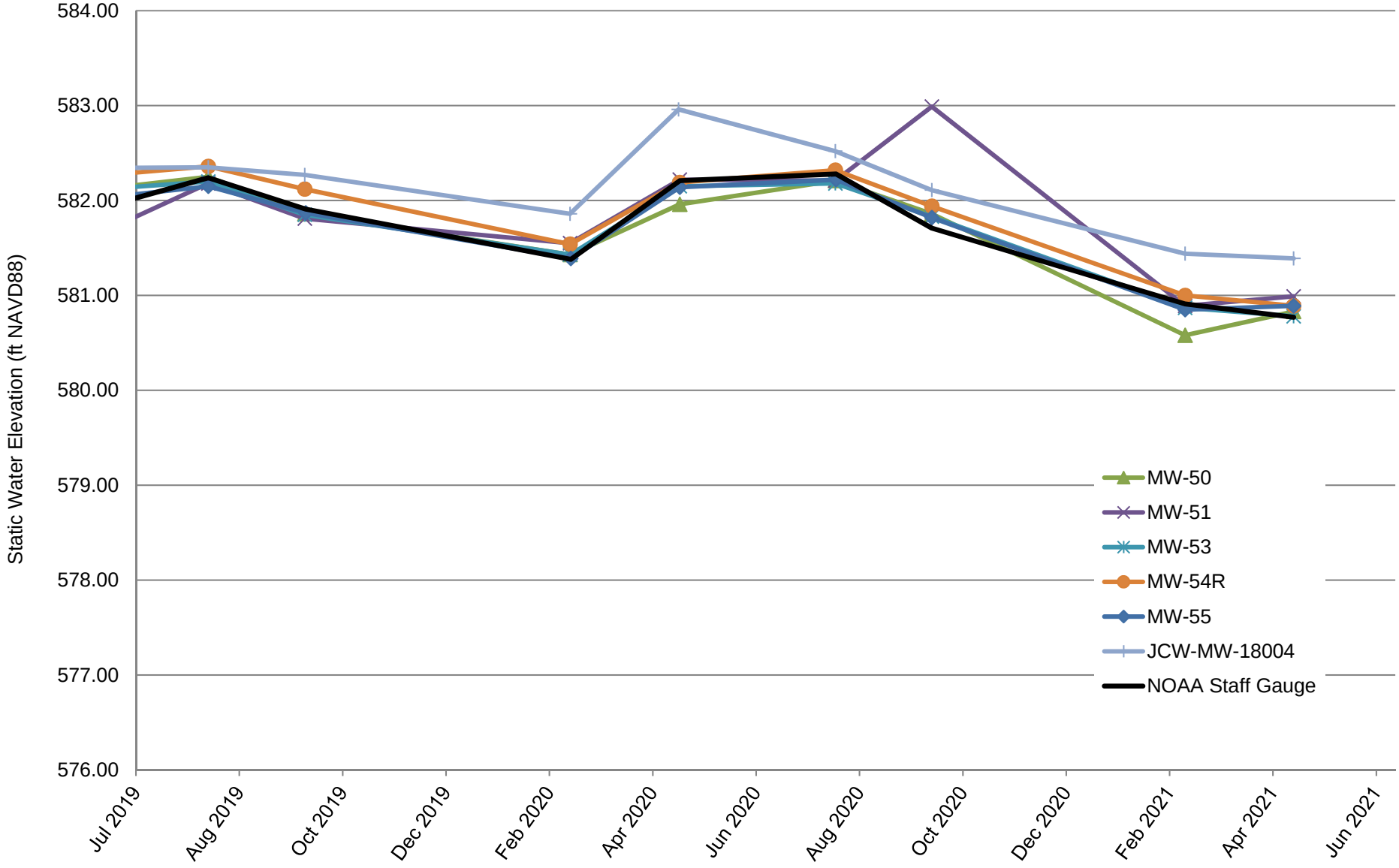
Appendix A
Static Water Level for JCW-MW-18004 and JCW-OW-18004



Appendix A
Static Water Level for MW-55 and OW-55



Appendix A
Static Water Elevations for Select Perimeter Dike Monitoring Wells and NOAA Staff Gauge



Appendix B
Data Quality Review

Laboratory Data Quality Review
Groundwater Monitoring Event May 2021
JC Weadock Landfill

Porewater samples were collected by TRC for the May 2021 sampling event. Samples were analyzed for total metals, anions, total dissolved solids, alkalinity, and total phosphorus by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 21-0531.

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

- JCW-MW-18001
- JCW-MW-18004
- JCW-MW-18005
- JCW-MW-18006
- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- OW-55
- MW-57R OUT
- LH-104
- JCW-OW-18001
- JCW-OW-18002
- JCW-OW-18004

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Fluoride, Chloride, Sulfate)	EPA 300.0
Total Dissolved Solids (TDS)	SM 2540C
Total Metals	SW-846 6020B/7470A
Alkalinity	SM 2320B
Total Phosphorus	SM-4500-P

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 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, alkalinity, and total phosphorus analyses.

This data usability report addresses the following items:

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

Review Summary

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

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

QA/QC Sample Summary:

- One field blank (FB-01) and one equipment blank (EB-01) sample were collected. Total metals, anions and total phosphorus were not detected in these blank samples.
- MS and MSD analyses were performed on sample JCW-MW-18001 for total metals, anions, alkalinity, and total phosphorus. 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. The recoveries were within the acceptance limits with the following exceptions.

- The recovery of sodium (129%) was above the acceptance limit in the MSD; all sodium detections in groundwater samples are potentially biased high, as summarized in the attached table, Attachment 1.
- The field duplicate pair samples were DUP-01 and MW-50; the 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.

Attachment 1
Summary of Data Non-Conformances for Groundwater Analytical Data
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
JCW-MW-18001	5/10/2021	Sodium	High recovery in matrix spike duplicate analysis; indicates potential high bias. Detected concentrations are within the range of historically observed concetration at these wells; therefore, data deemed usable for intended purpose.
JCW-OW-18001	5/10/2021		
JCW-OW-18002	5/10/2021		
JCW-MW-18004	5/11/2021		
JCW-OW-18004	5/11/2021		
JCW-MW-18005	5/11/2021		
JCW-MW-18006	5/11/2021		
MW-50	5/10/2021		
MW-51	5/10/2021		
MW-52	5/10/2021		
MW-53	5/10/2021		
MW-53R	5/10/2021		
MW-54R	5/11/2021		
MW-55	5/11/2021		
MW-57R OUT	5/11/2021		
OW-55	5/11/2021		
LH-104	5/11/2021		
DUP-01	5/10/2021		

Laboratory Data Quality Review
Groundwater Monitoring Event May 2021
JC Weadock/Karn DEK Background

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, located in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 21-0525.

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

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

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Chloride, Fluoride, Sulfate)	EPA 300.0
Total Dissolved Solids	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 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, field blanks, and equipment 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 and IV constituents as well as iron, copper, nickel, silver, vanadium, and zinc will be utilized for the purposes of an assessment monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- One field blank (FB-Background) was collected. Total metals and anions were not detected in this blank sample.
- An equipment blank was not collected with this data set.
- MS and MSD analyses were not performed on a sample from this data set.
- The field duplicate pair samples were DUP-Background/ MW-15002. All criteria were met.
- Laboratory duplicate analyses were not performed on a sample from this data set.

Laboratory Data Quality Review
Groundwater Monitoring Event May 2021
JC Weadock/Karn DEK Background

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) 240-149188-1.

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

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

Each sample was analyzed for the following constituents:

Analyte Group	Method
Radium (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 and field blanks. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. Field 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. 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 constituents will be utilized for the purposes of an assessment monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- A method blank was analyzed with each analytical batch for radium. Target analytes were not detected in the method blank samples.
- One field blank (FB-BACKGROUND) was collected. Target analytes were not detected in this blank sample.
- The LCS and LCSD recoveries and relative percent differences (RPDs) for radium 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-BACKGROUND/MW-15002. All criteria were met.
- Laboratory duplicate analyses were not performed on a sample from this data set.
- Carrier recoveries were within 40-110%.

Laboratory Data Quality Review
Groundwater Monitoring Event May 2021
JC Weadock Landfill

Porewater 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) 240-149380-1.

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

- JCW-MW-18001
- JCW-MW-18004
- JCW-MW-18005
- JCW-MW-18006
- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- OW-57R OUT

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. 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 the 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.
- One equipment blank (EB-WEADOCK LF) sample was collected. Target analytes were not detected in this blank sample.
- The LCS and LCSD recoveries and relative percent differences (RPDs) for radium 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-WEADOCK LF/MW-50. All criteria were met.
- Laboratory duplicate analyses were not performed on a sample from this data set.
- Carrier recoveries were within 40-110%.

Appendix C
Detection Monitoring Statistical Trend Tests

Appendix C
Detection Monitoring Statistical Summary for JC Weadock Facility
Second Quarter 2021 Quarterly Report
Data from August 2019 to May 2021

Porewater Monitoring Points						
PARAMETER	**JCW-MW-18001**	**JCW-MW-18004**	**JCW-MW-18005**	**JCW-MW-18006**	**MW-50**	**MW-51**
Boron	O	O	↓	O	O	O
Calcium	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Chloride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Fluoride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Iron	O	O	↓*	↓*	O	O
pH/Corrosivity	O	O	O	O	O	O
Sulfate	↑	O	O	O	O	O
Total Dissolved Solids	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events

Notes:

O* = Non-detect (70%)
O = No trend
↑ = Upward trend, continuous
↑* = Upward trend, new
↑ = Upward trend, confirmed
↓ = Downward trend, continuous
↓* = Downward trend, new

Appendix C
Detection Monitoring Statistical Summary for JC Weadock Facility
Second Quarter 2021 Quarterly Report
Data from August 2019 to May 2021

Porewater Monitoring Points						
PARAMETER	**MW-52**	**MW-53**	**MW-53R**	**MW-54R**	**MW-55**	**OW-57R OUT**
Boron	O	↑*	O	O	O	O
Calcium	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Chloride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Fluoride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Iron	O	O	O	O	O	O
pH/Corrosivity	O	O	O	O	O	O
Sulfate	O	O	O	O	↓*	O
Total Dissolved Solids	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events

Notes:

O* = Non-detect (70%)
O = No trend
↑ = Upward trend, continuous
↑* = Upward trend, new
↑ = Upward trend, confirmed
↓ = Downward trend, continuous
↓* = Downward trend, new

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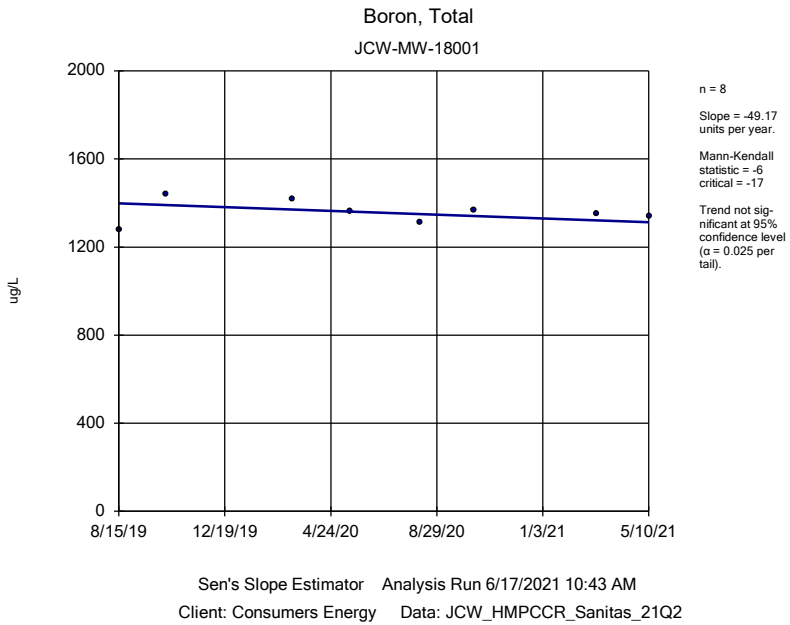

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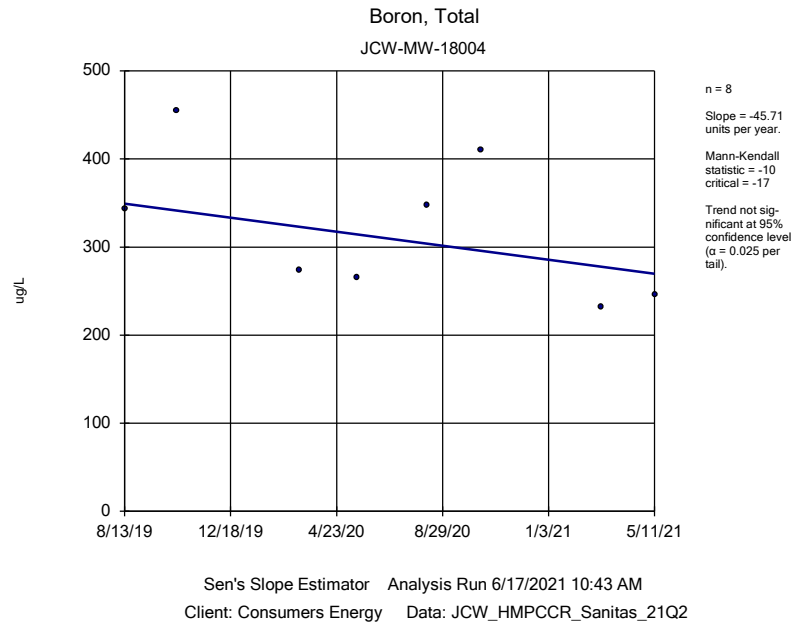

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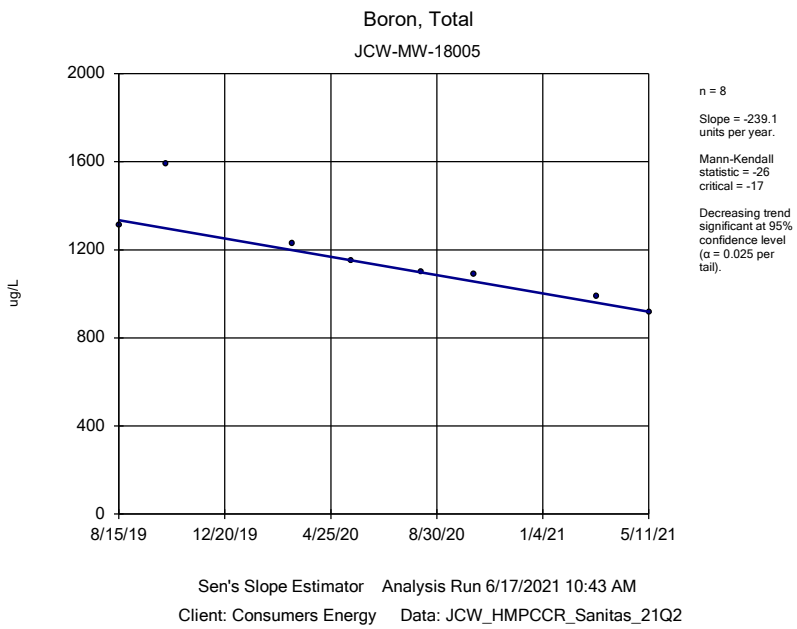

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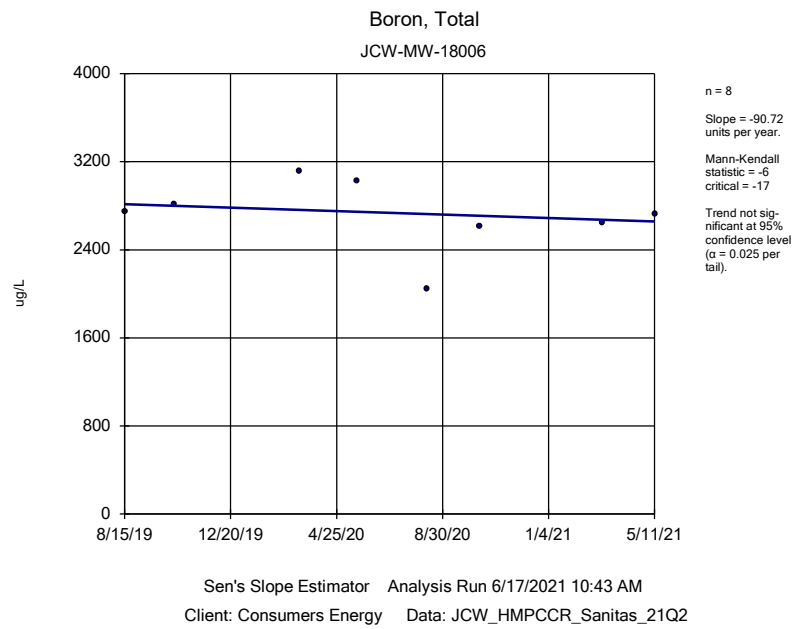

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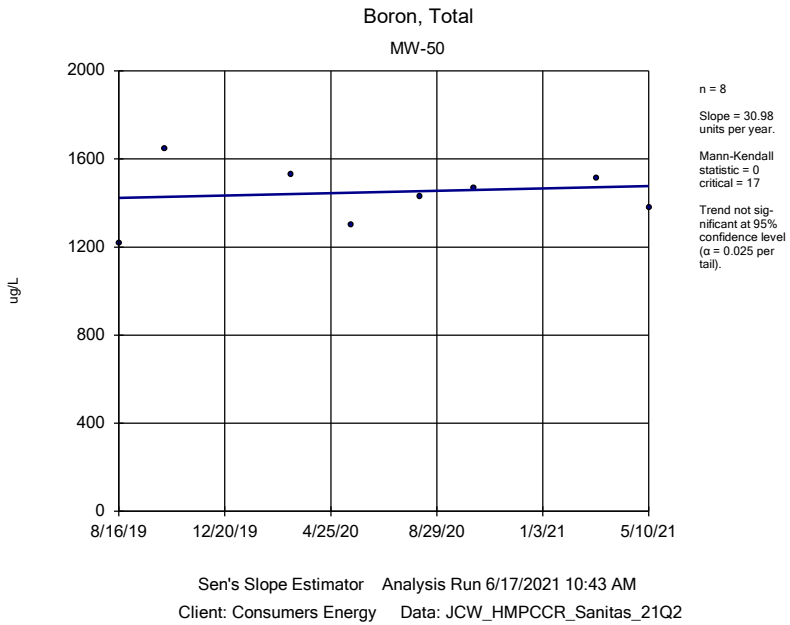

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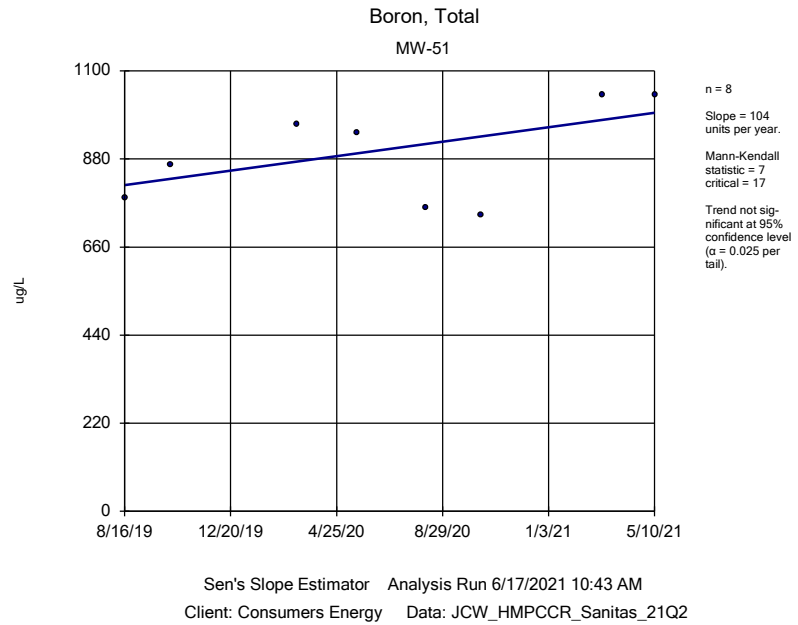

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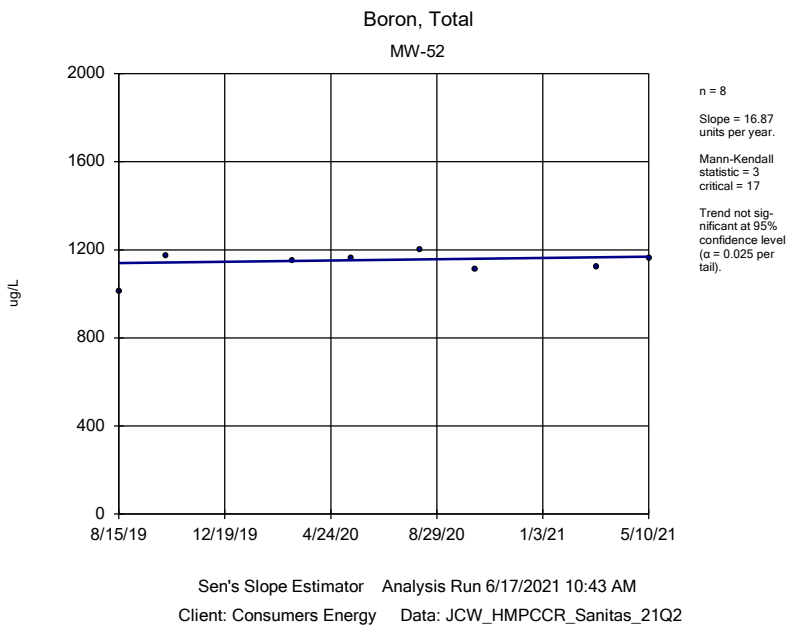

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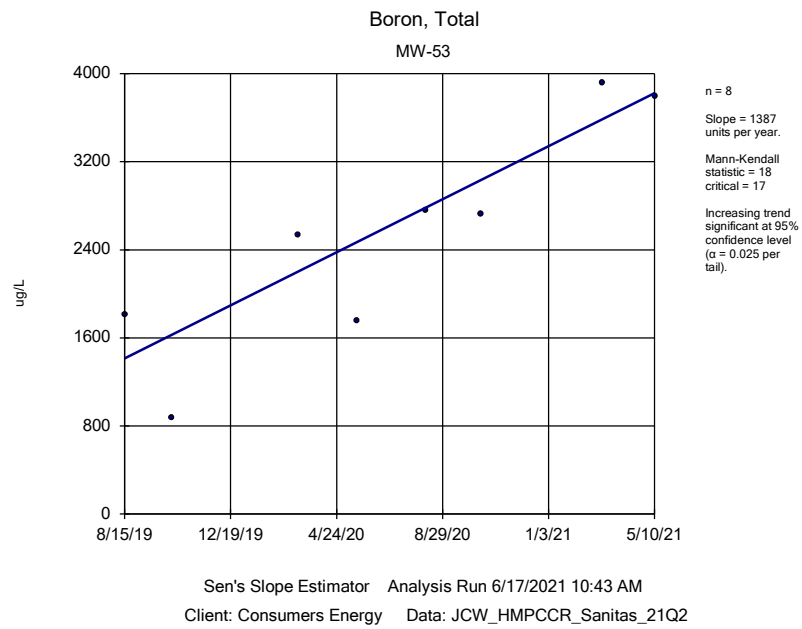

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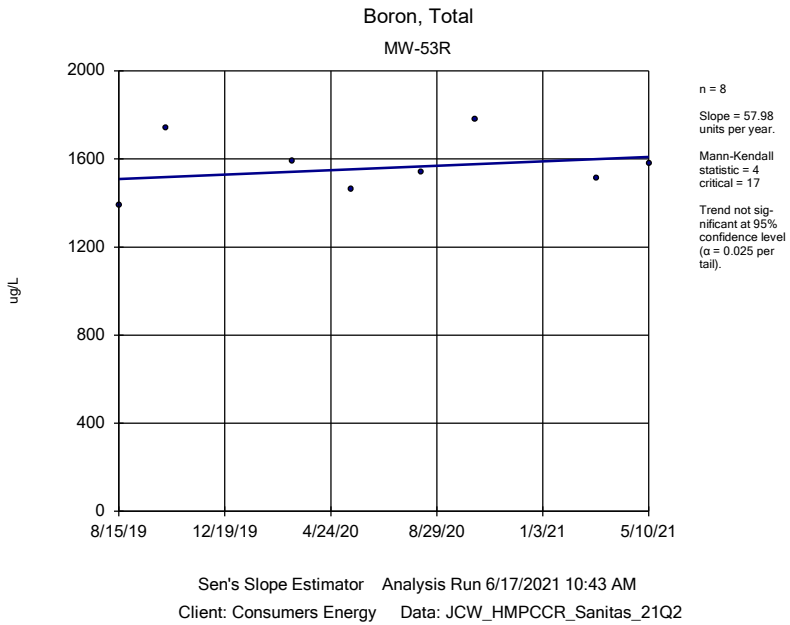

Sen's Slope Estimator Analysis Run 6/17/2021 10:43 AM

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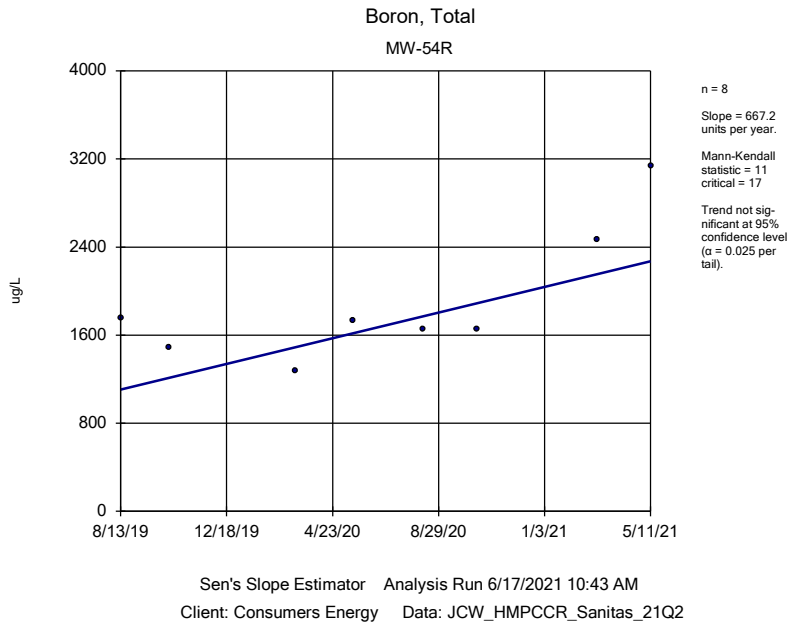

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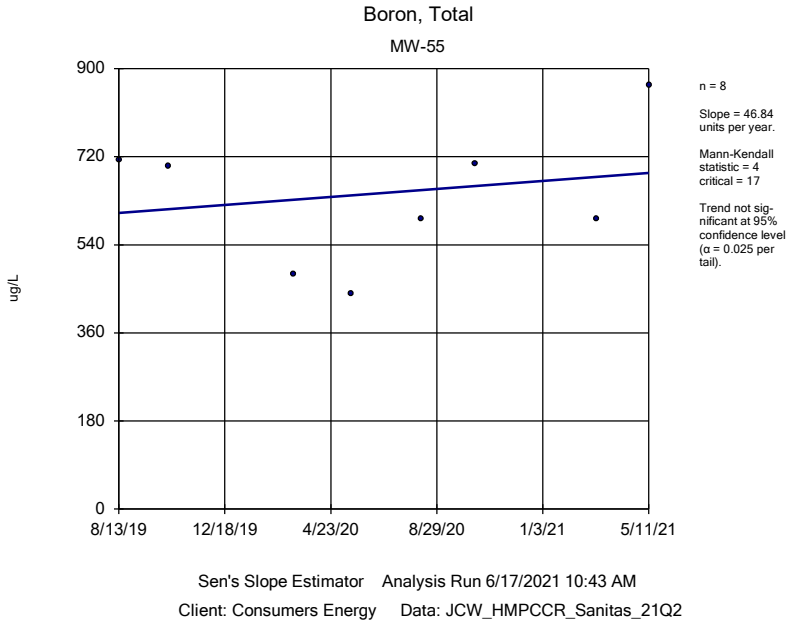

Sen's Slope Estimator Analysis Run 6/17/2021 10:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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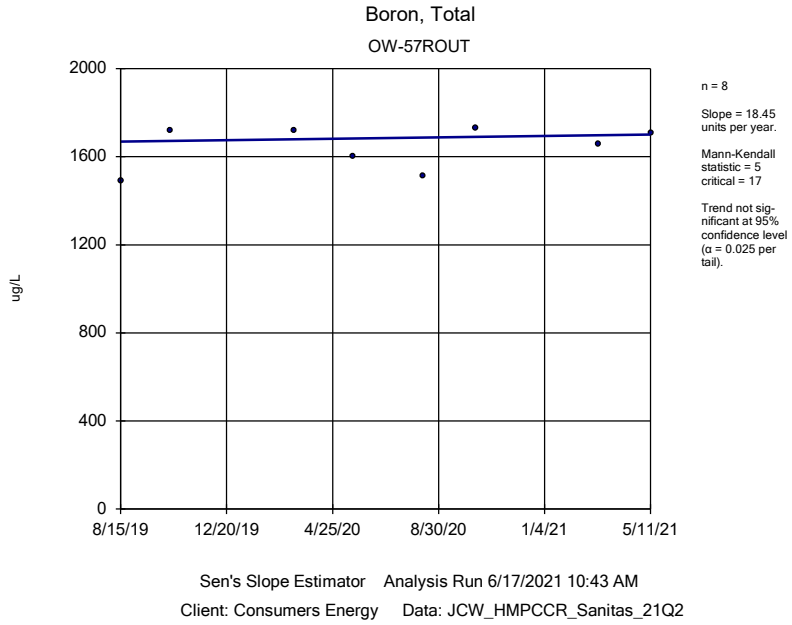

Sen's Slope Estimator Analysis Run 6/17/2021 10:43 AM

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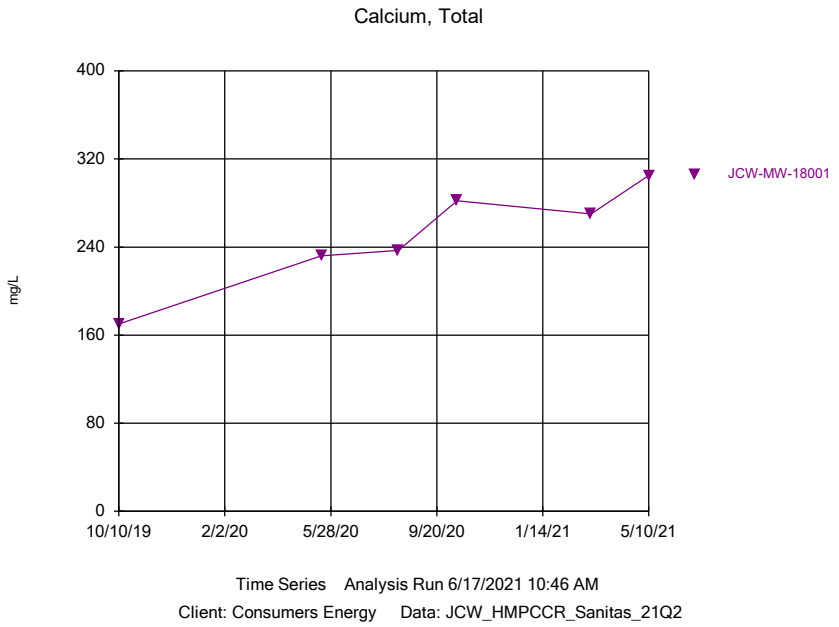

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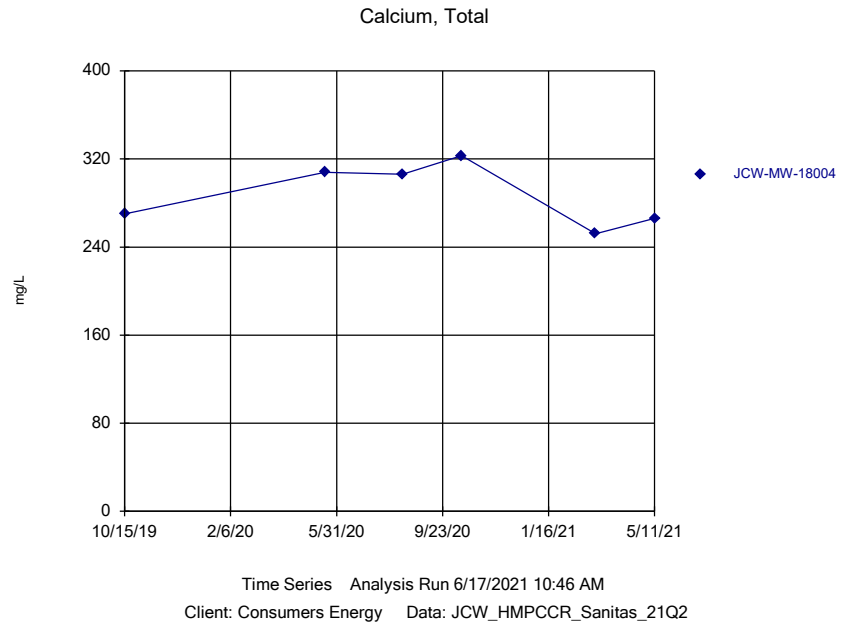

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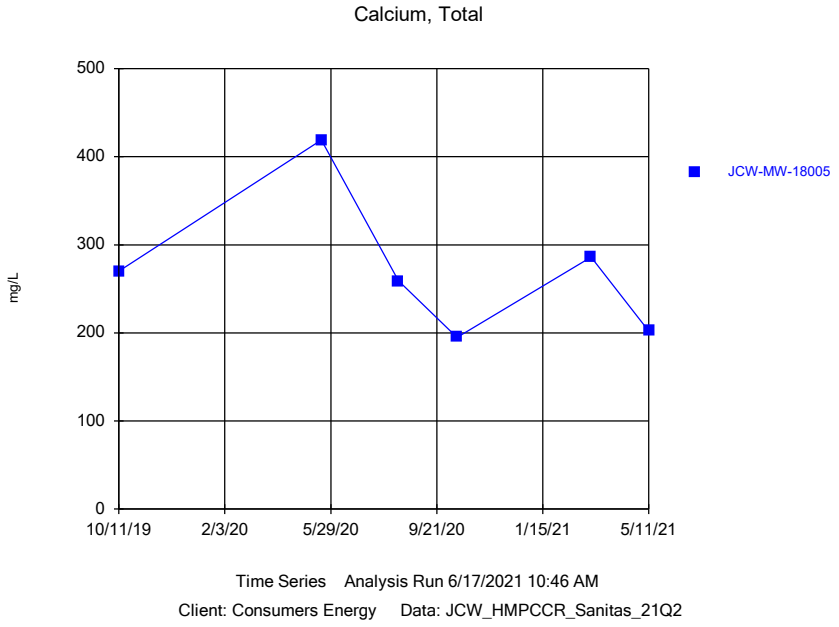

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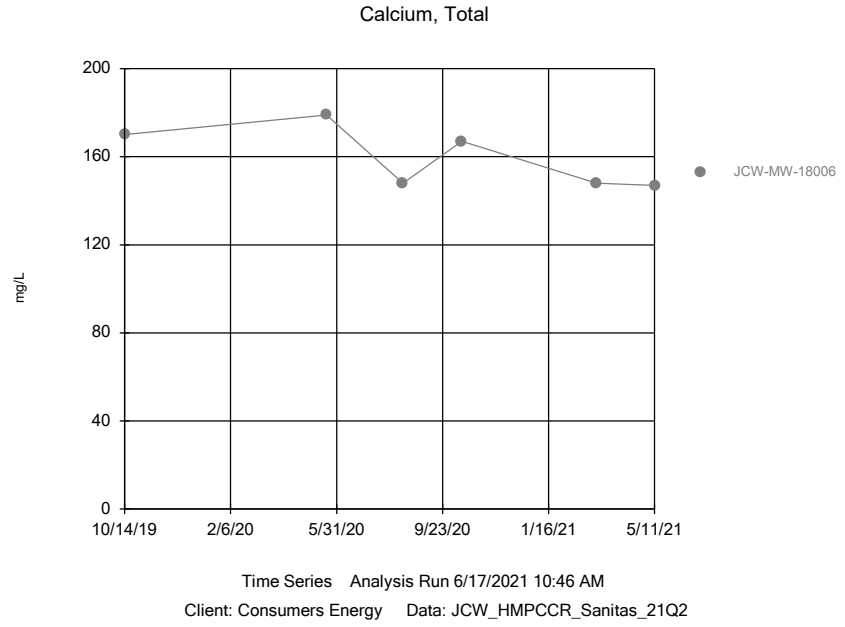

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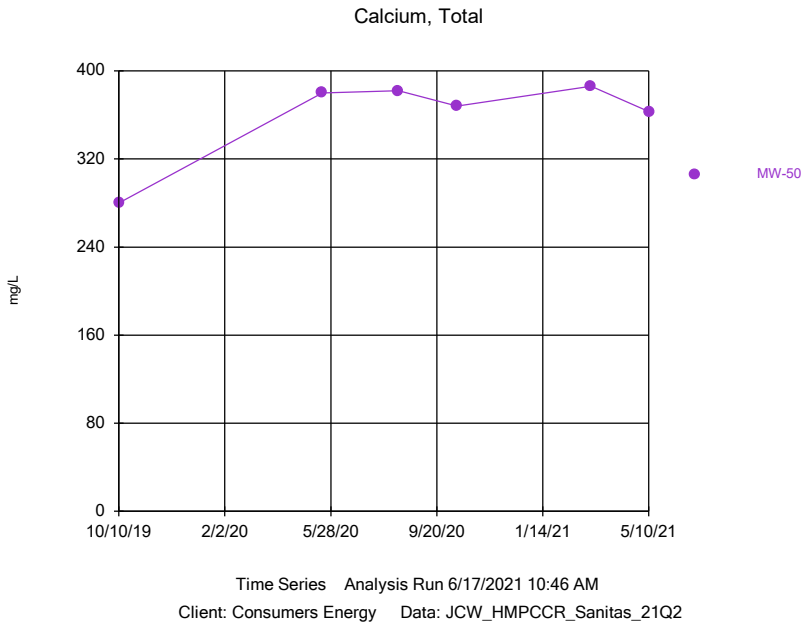

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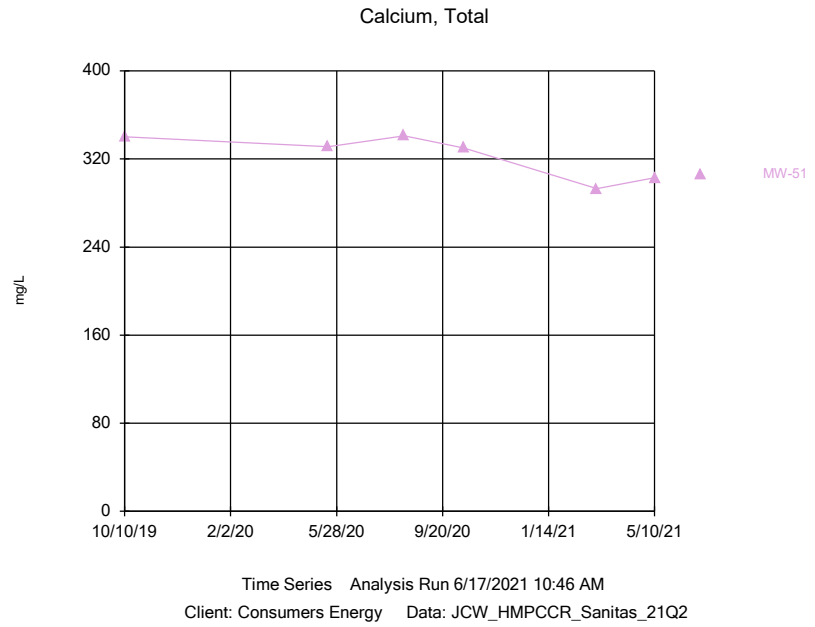

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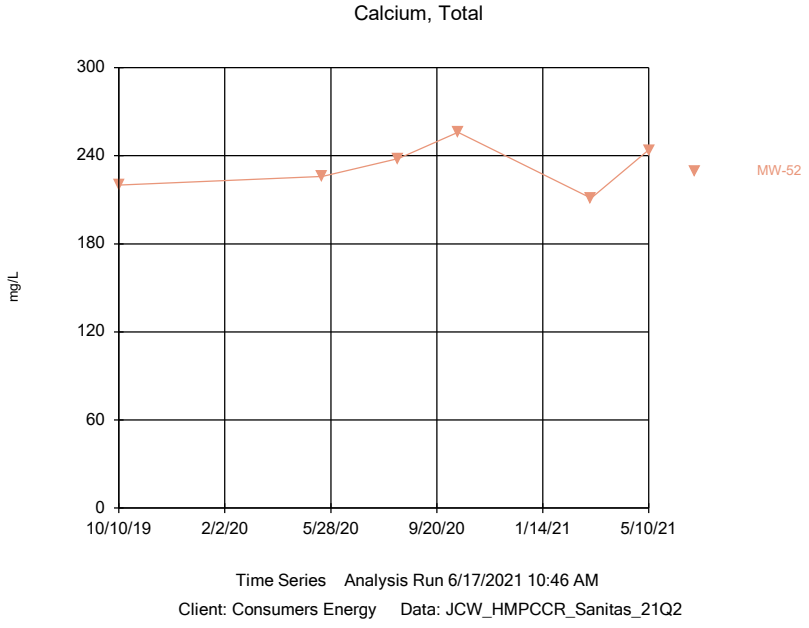

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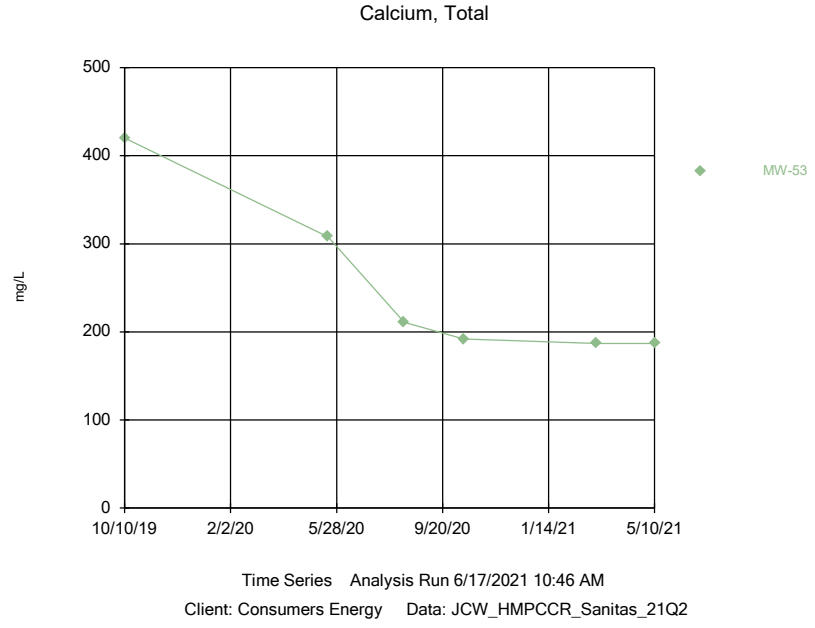

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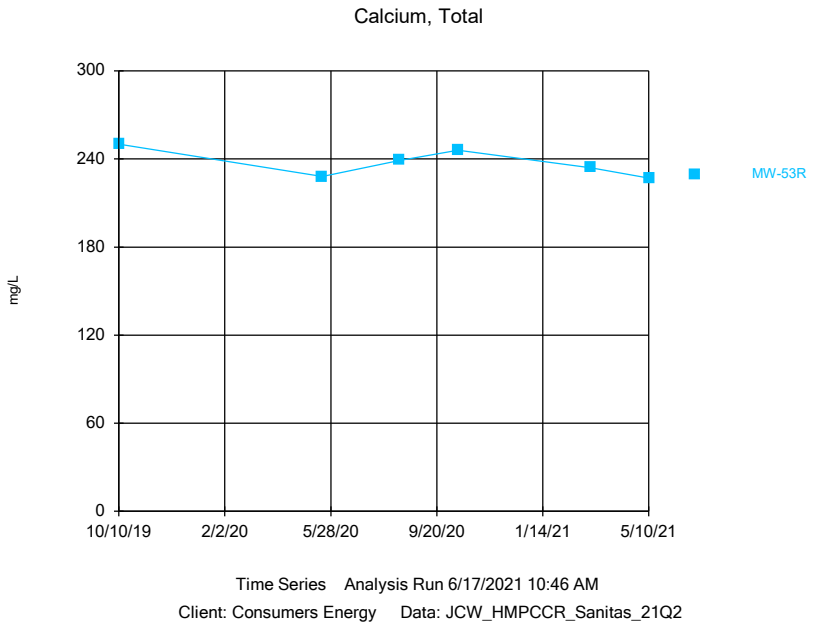

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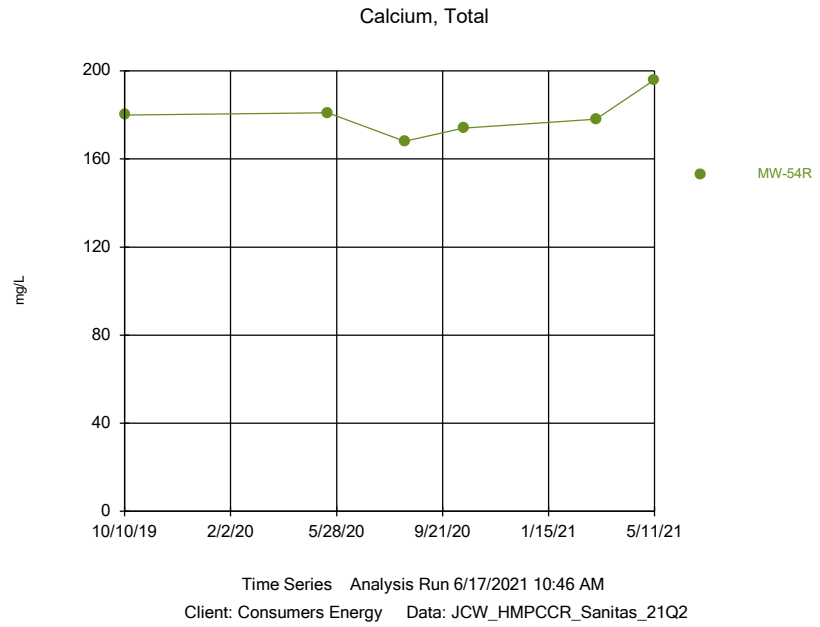

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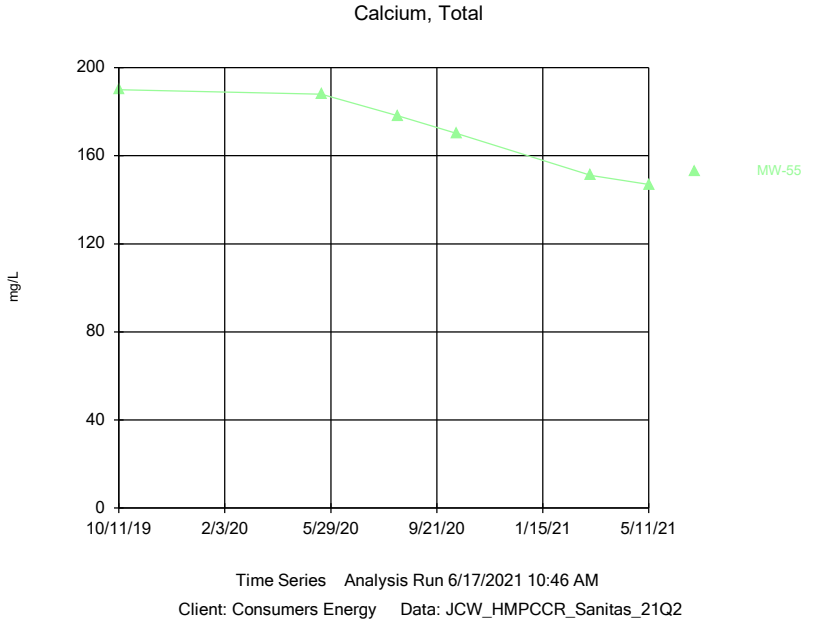

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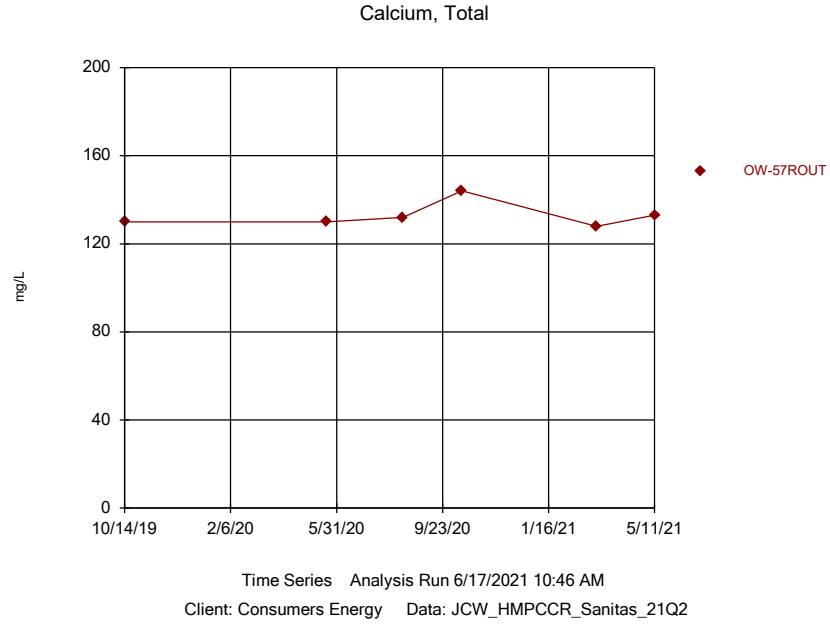

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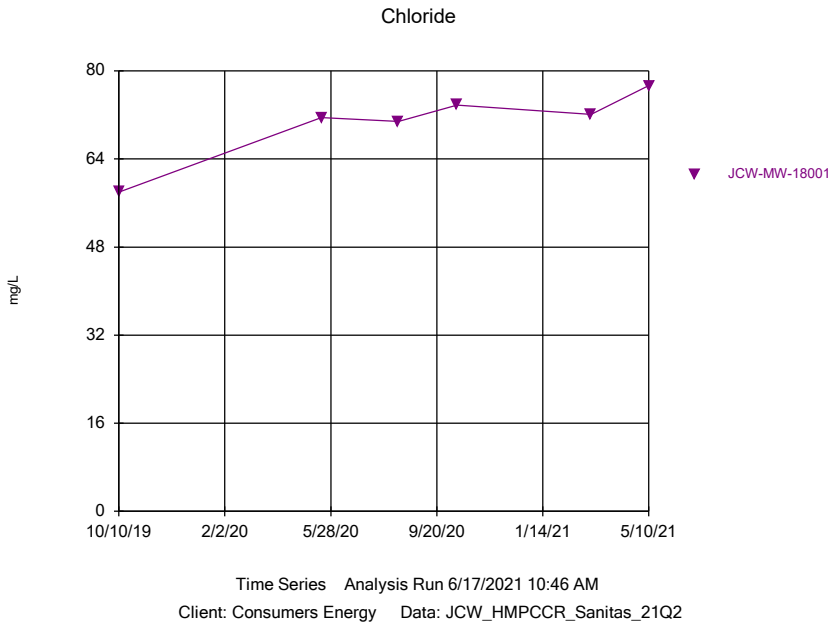

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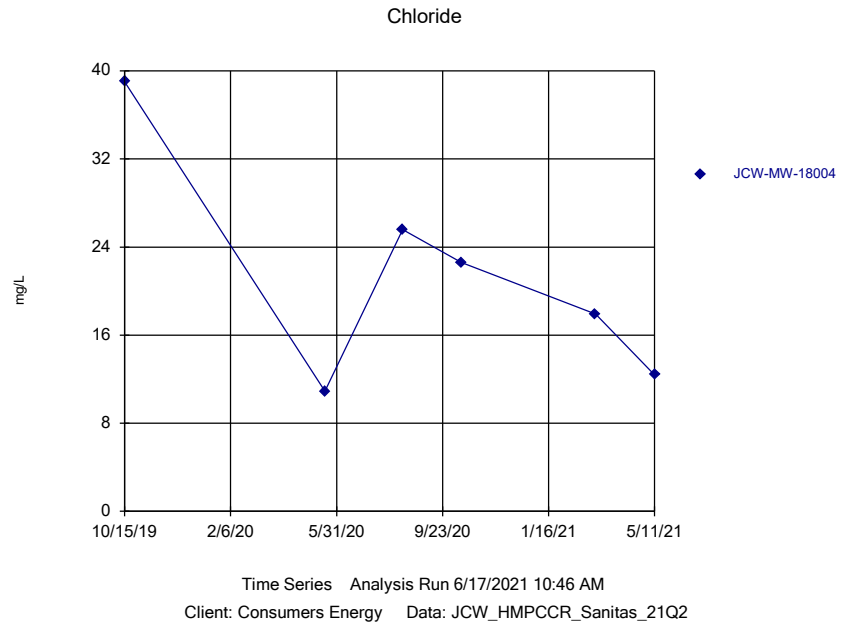

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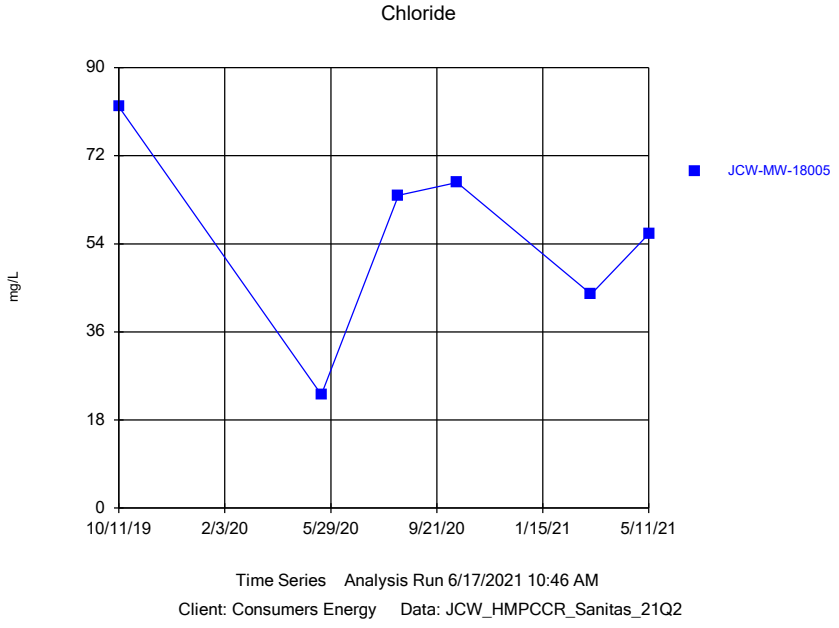

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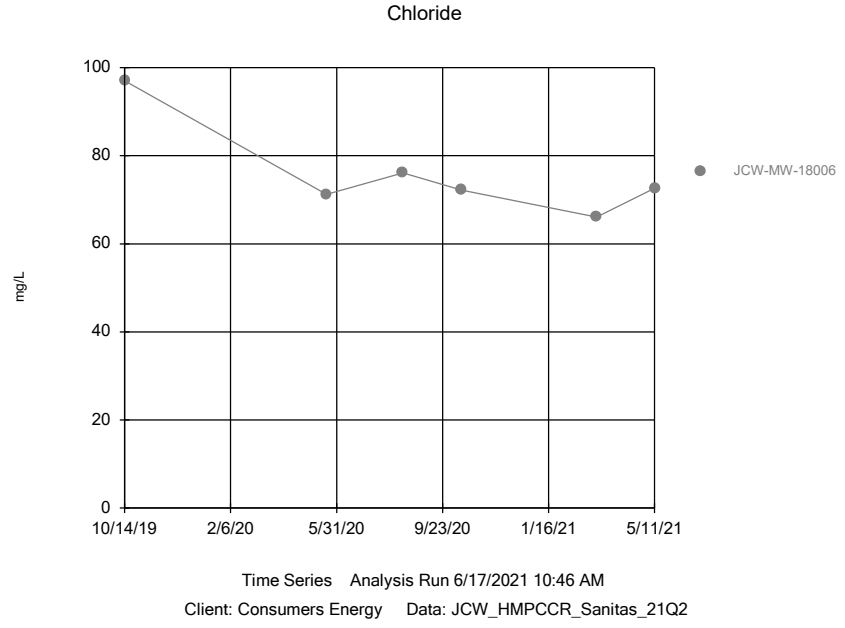

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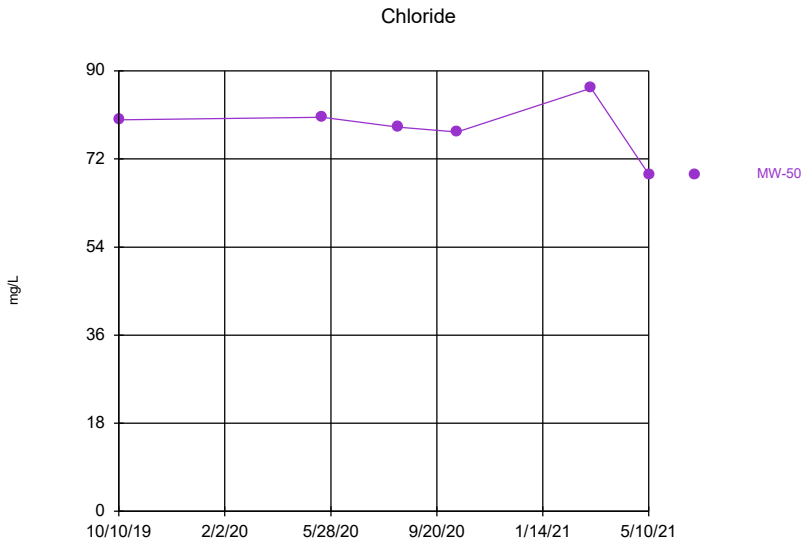

Time Series Analysis Run 6/17/2021 10:46 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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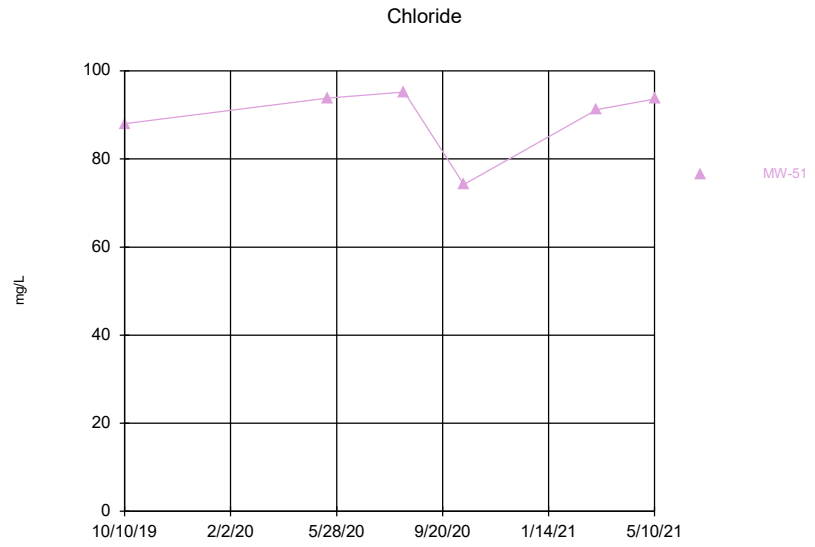

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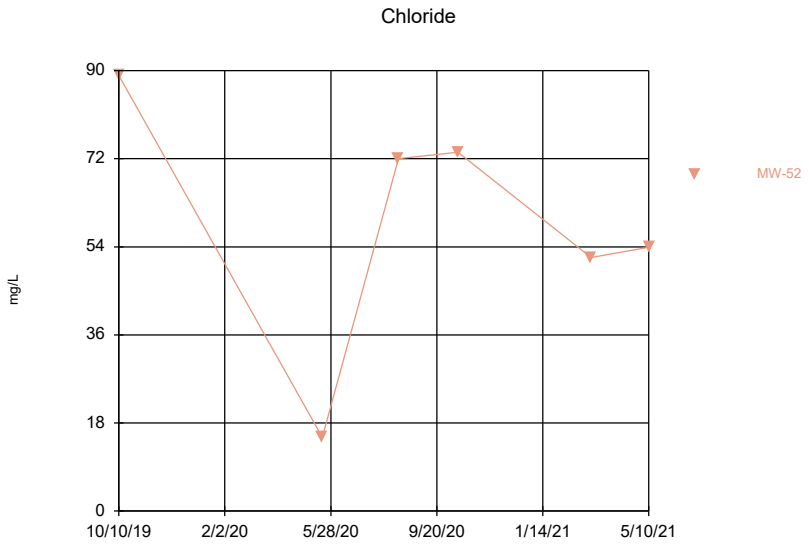

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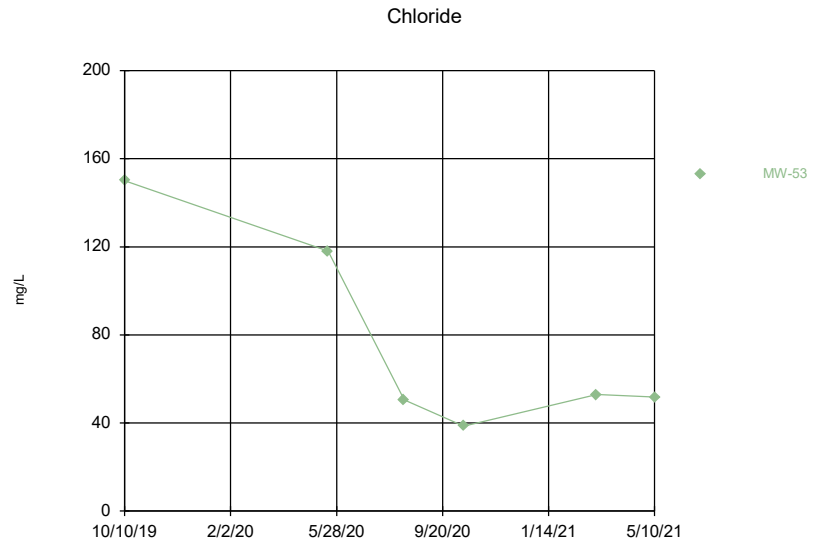

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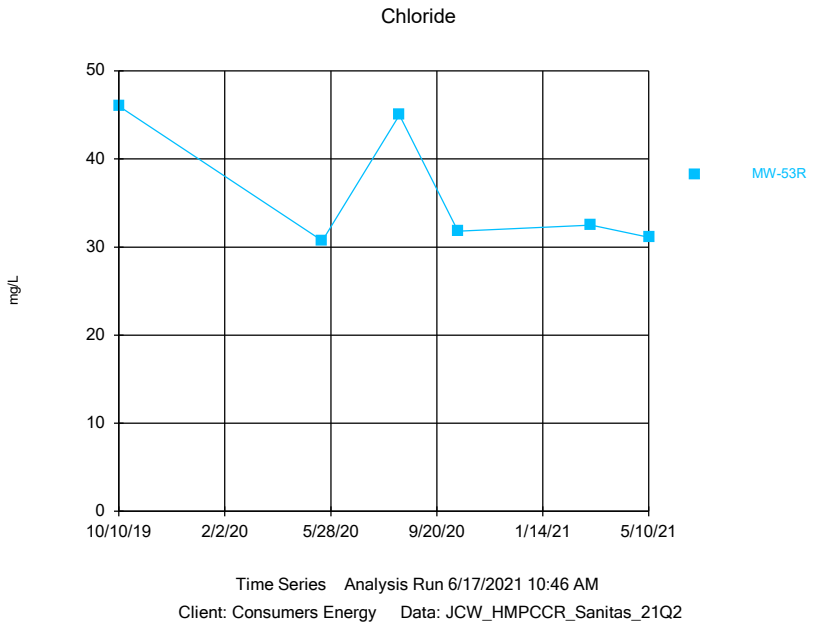

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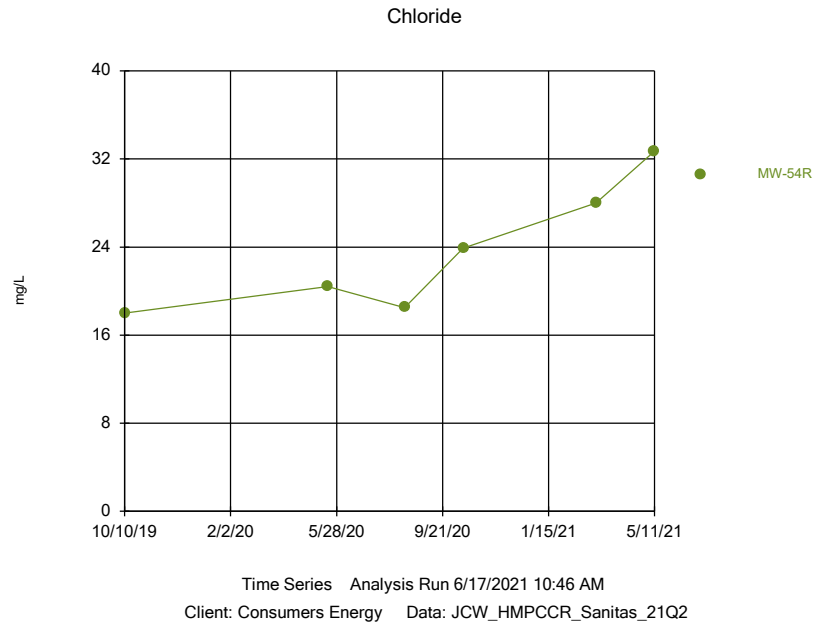

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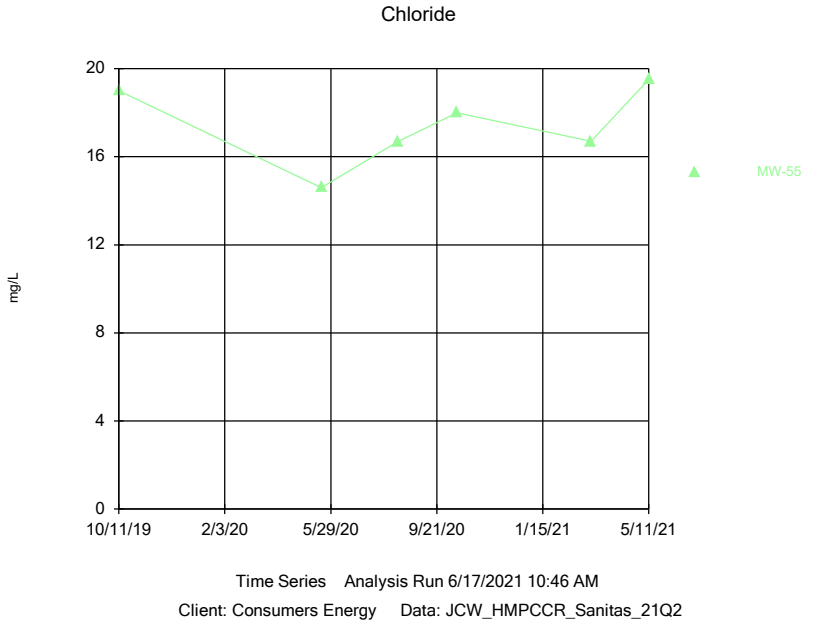

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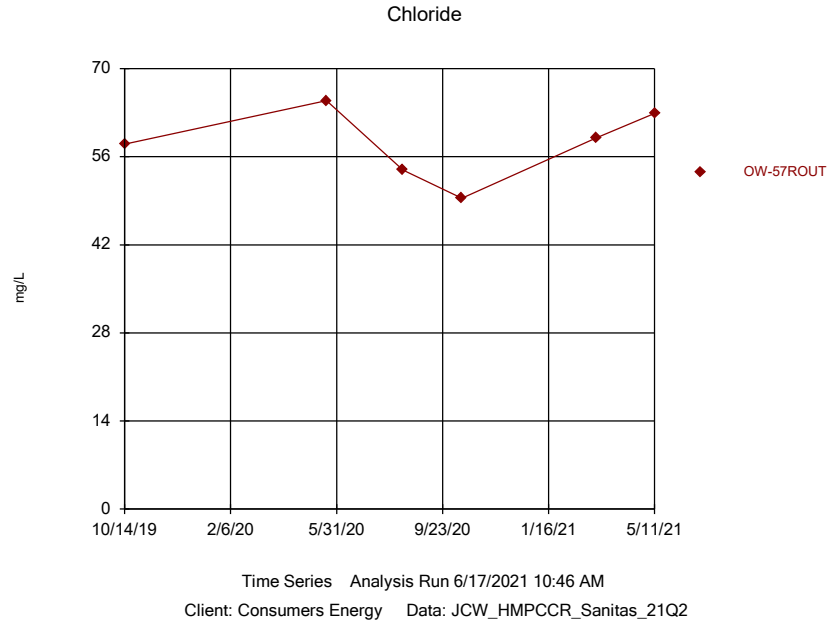

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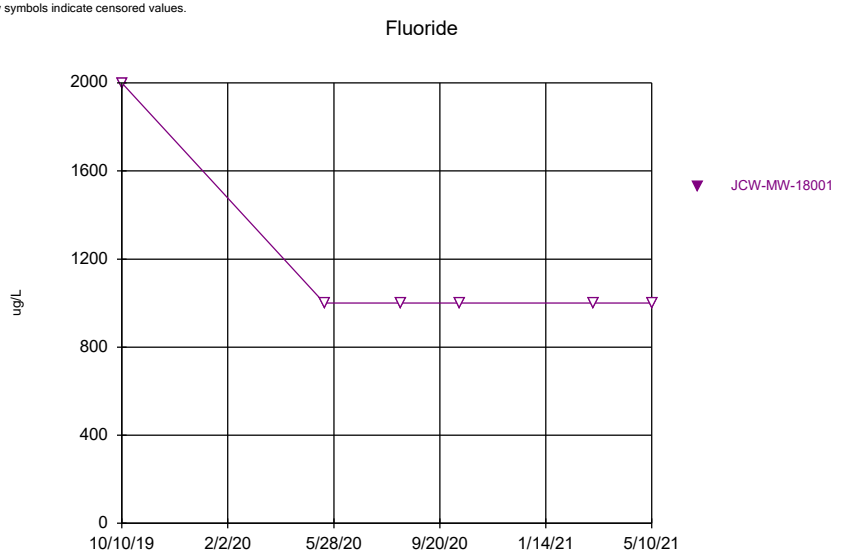

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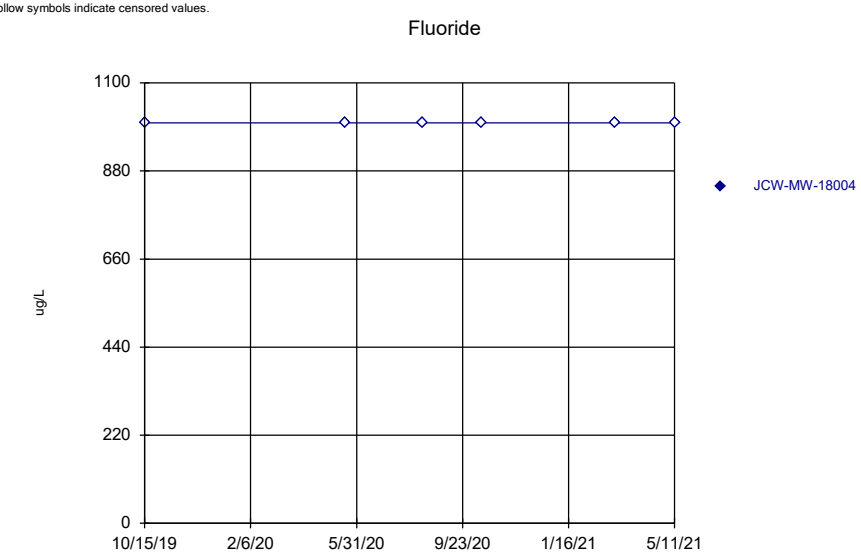

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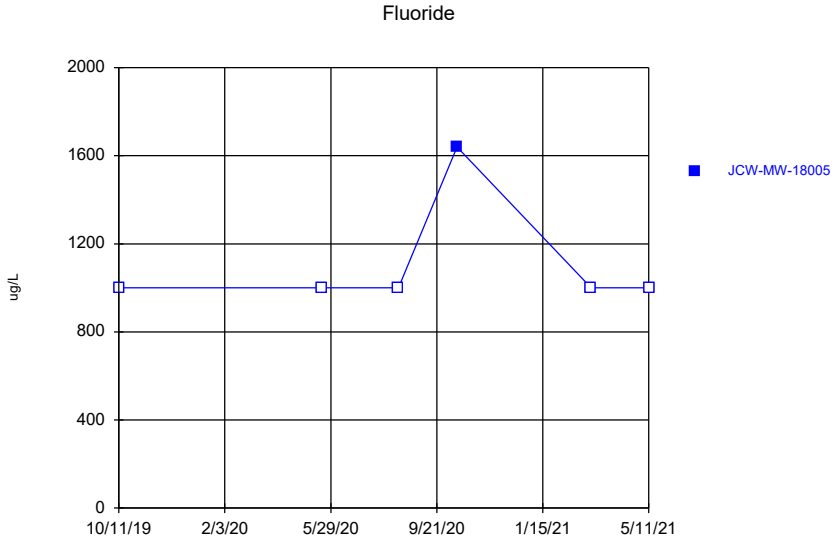

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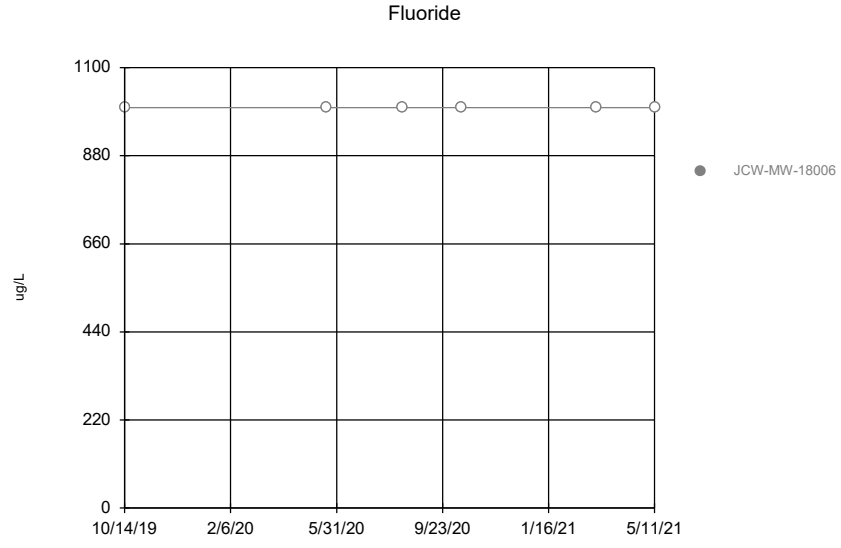

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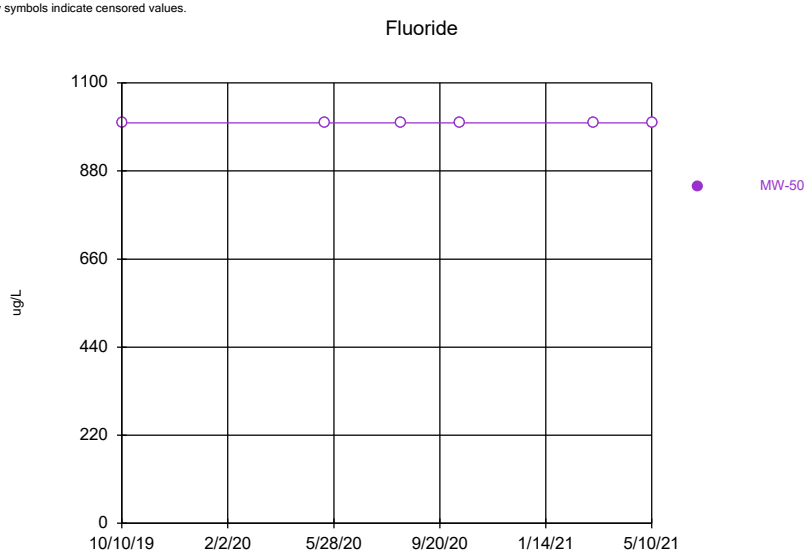

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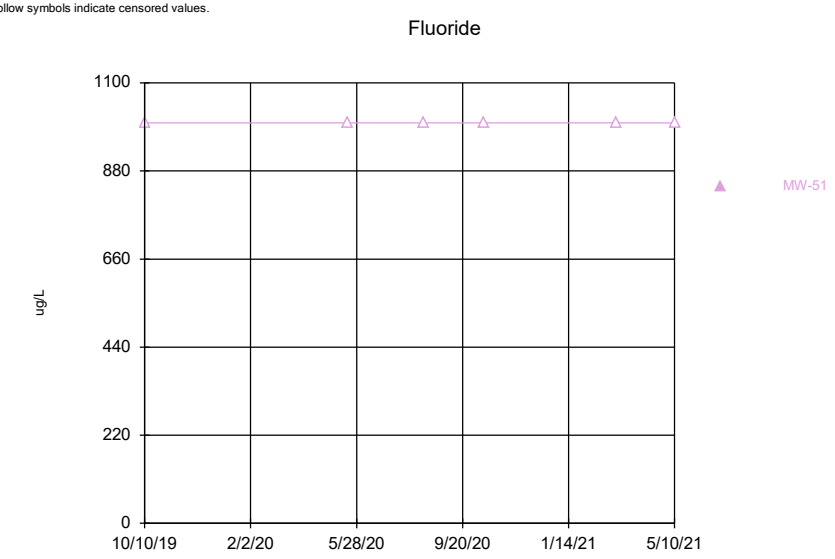

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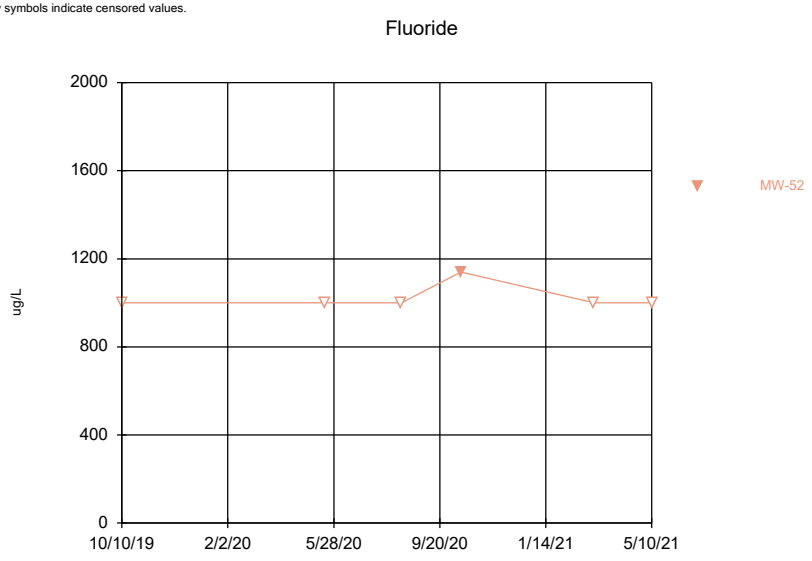

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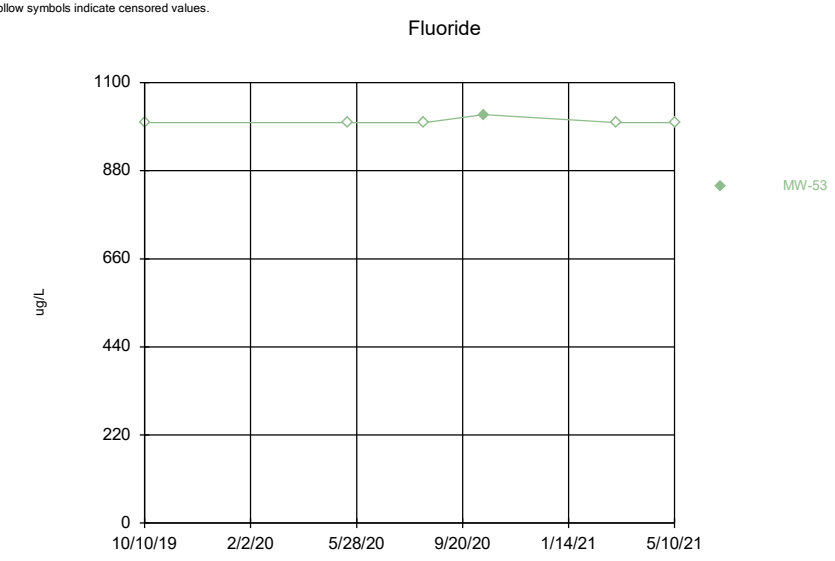

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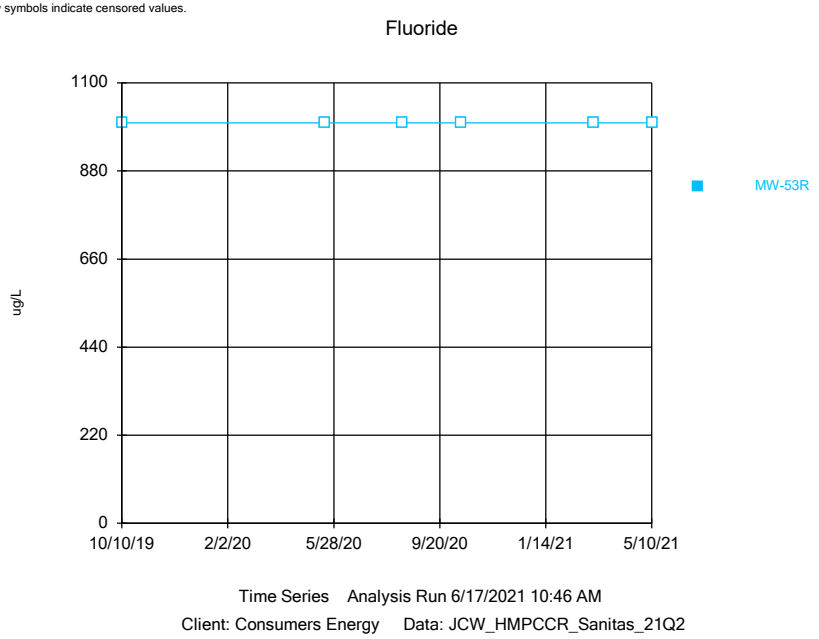

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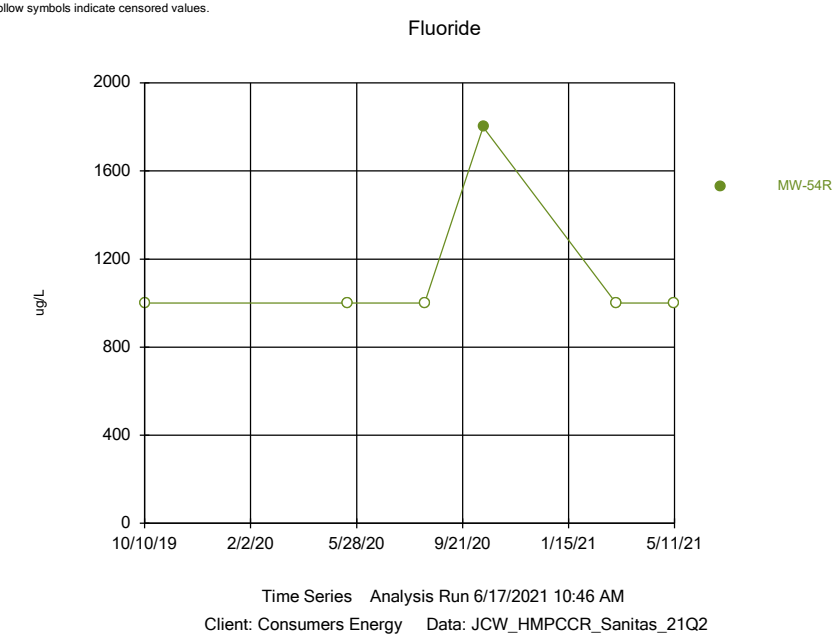

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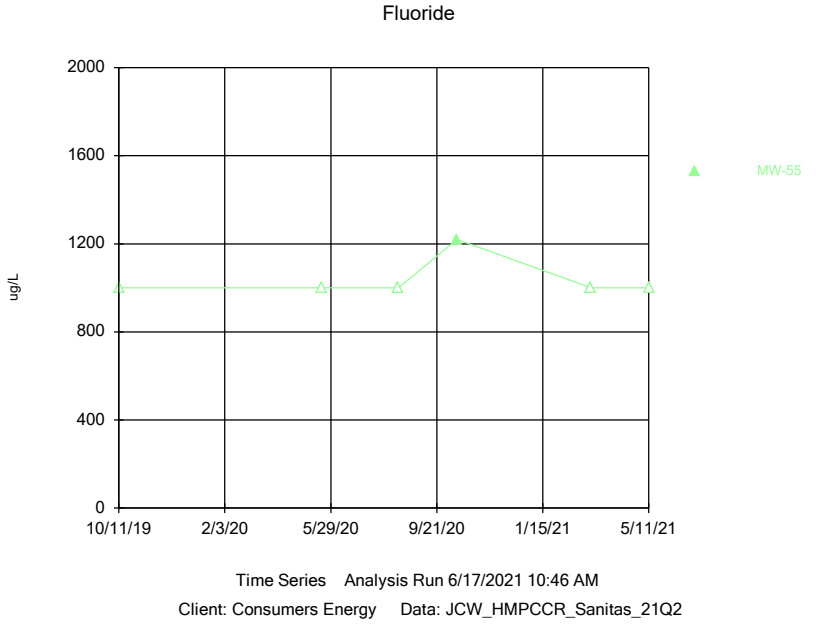

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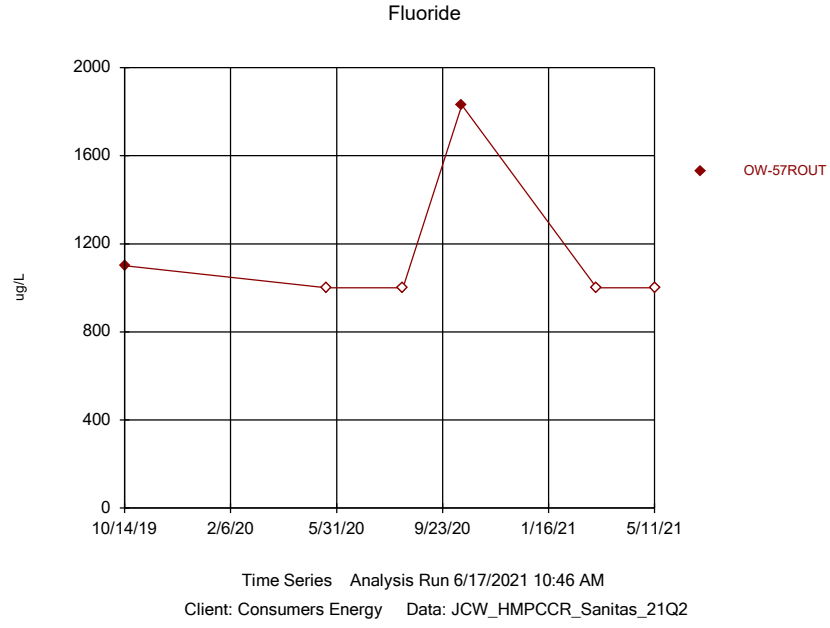

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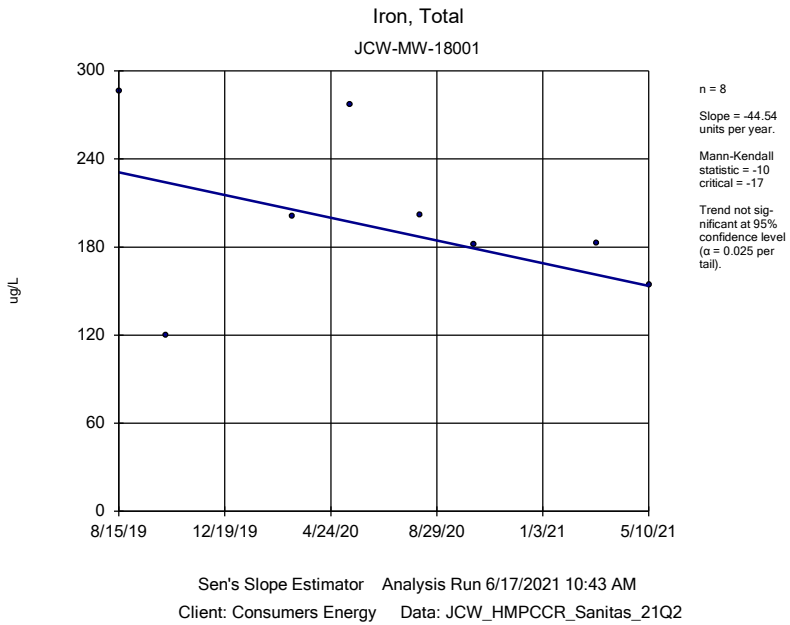

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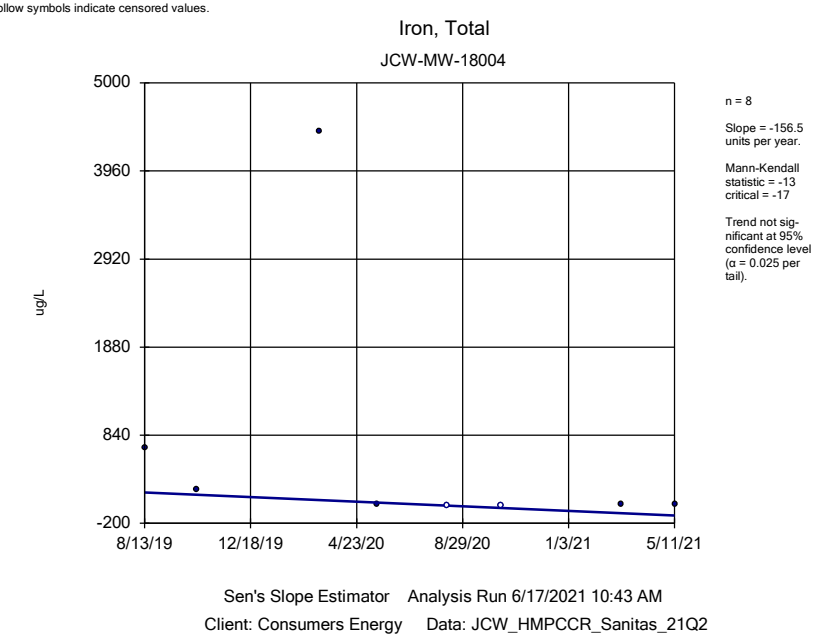

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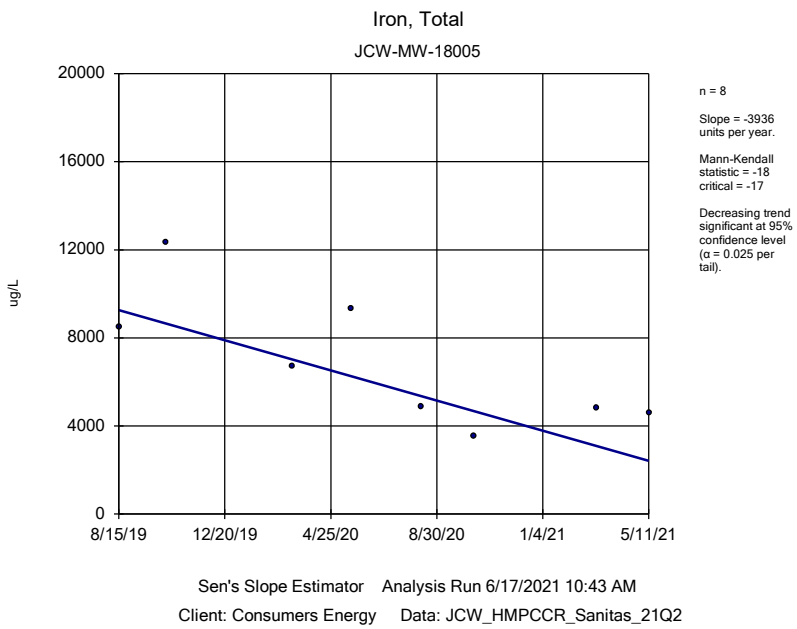

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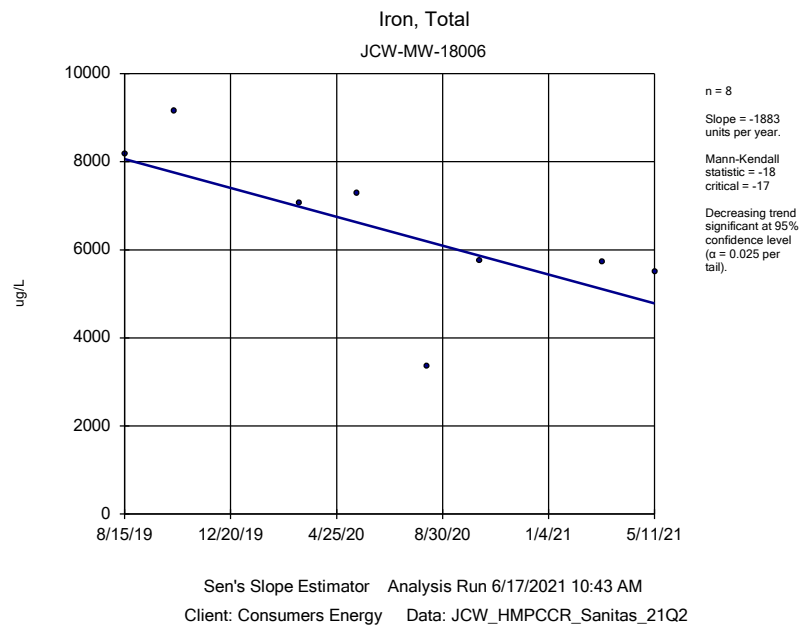

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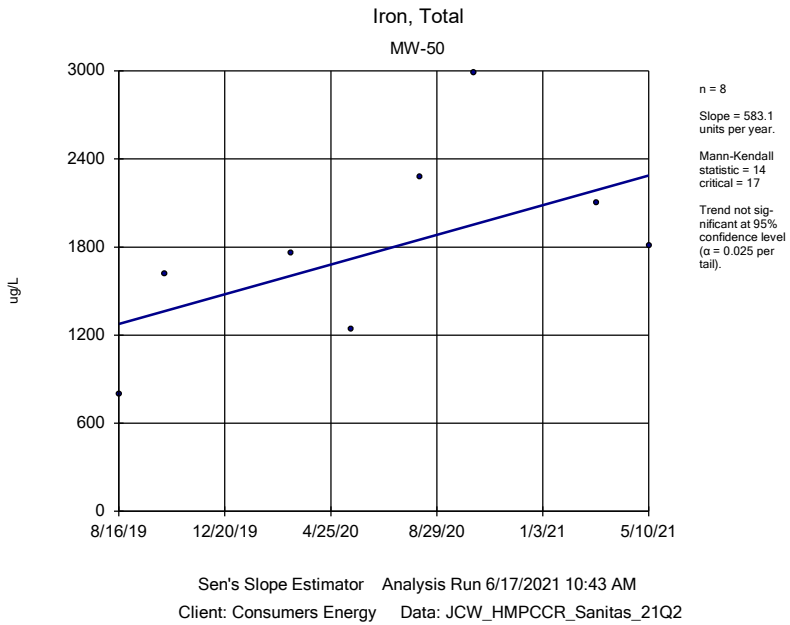

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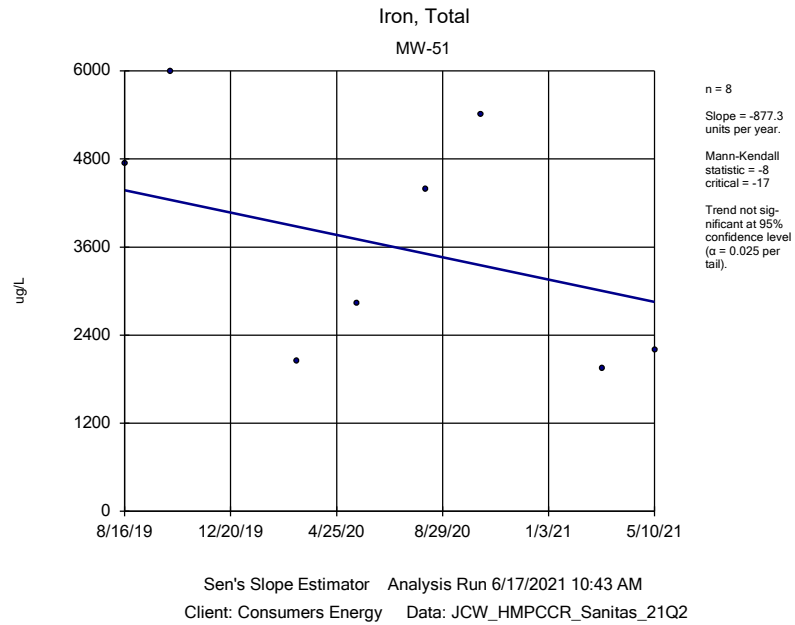

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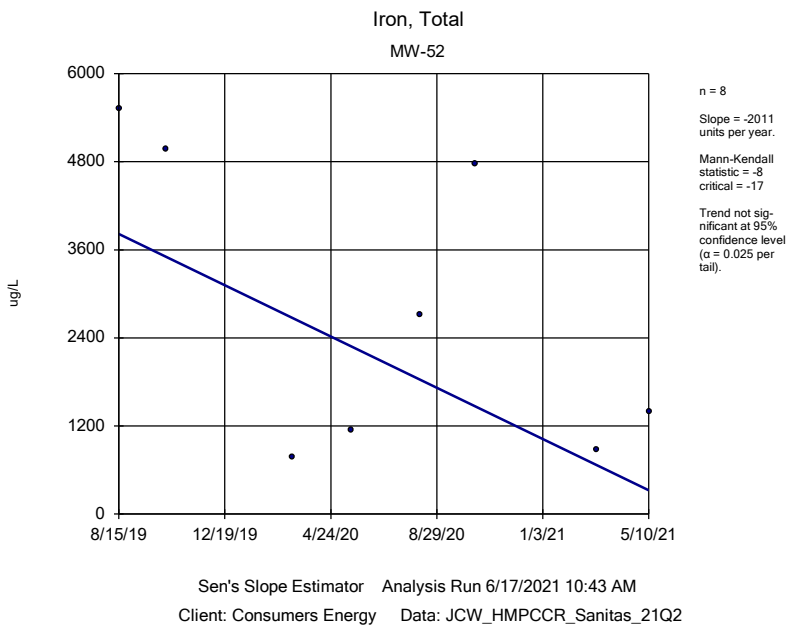

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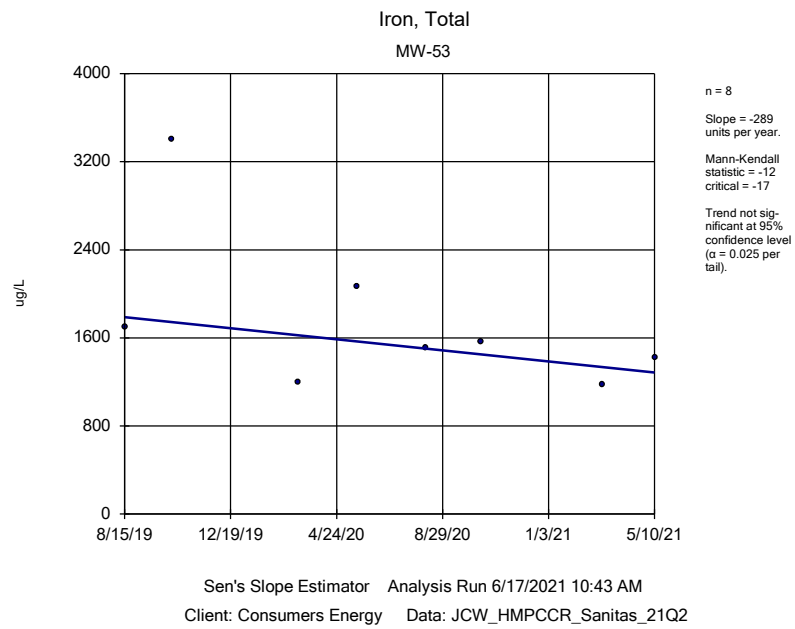

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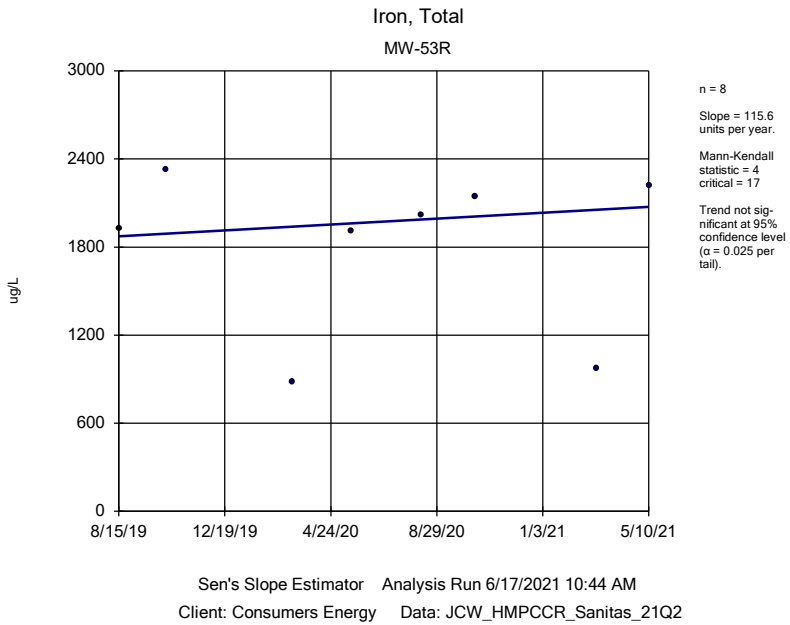

Sen's Slope Estimator Analysis Run 6/17/2021 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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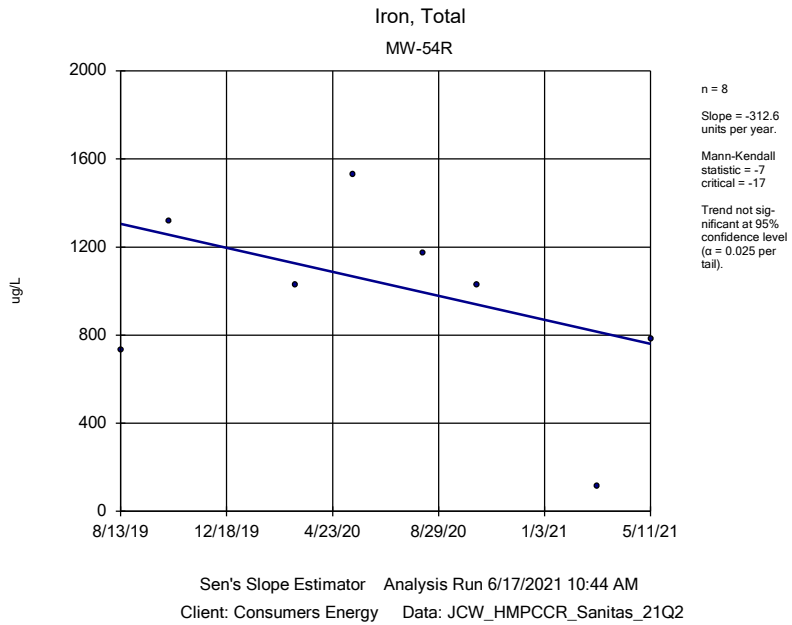

Sen's Slope Estimator Analysis Run 6/17/2021 10:44 AM

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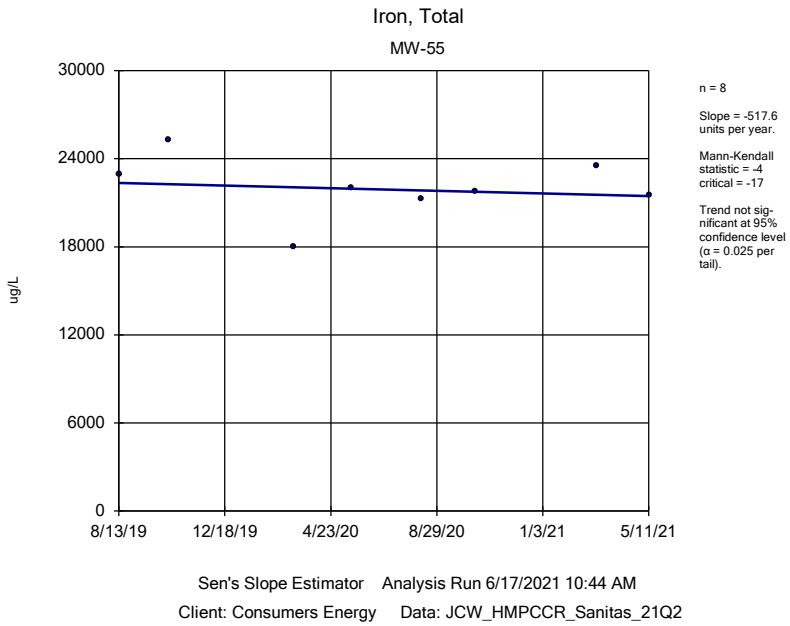
Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. UG



Sen's Slope Estimator Analysis Run 6/17/2021 10:44 AM

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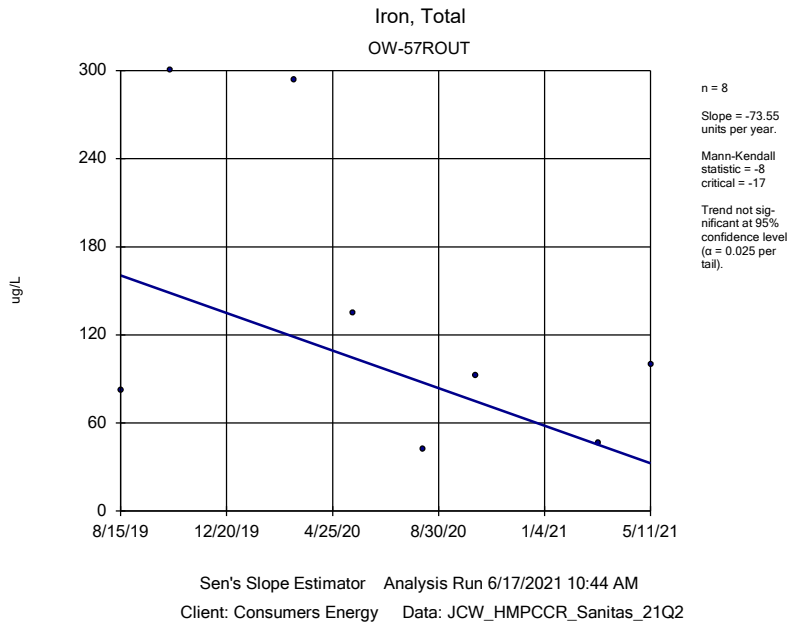

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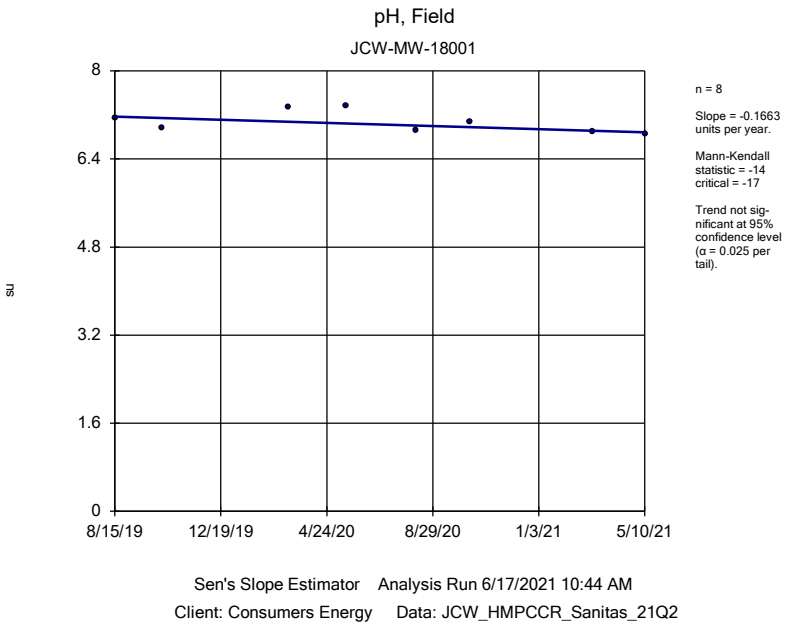

Sen's Slope Estimator Analysis Run 6/17/2021 10:44 AM

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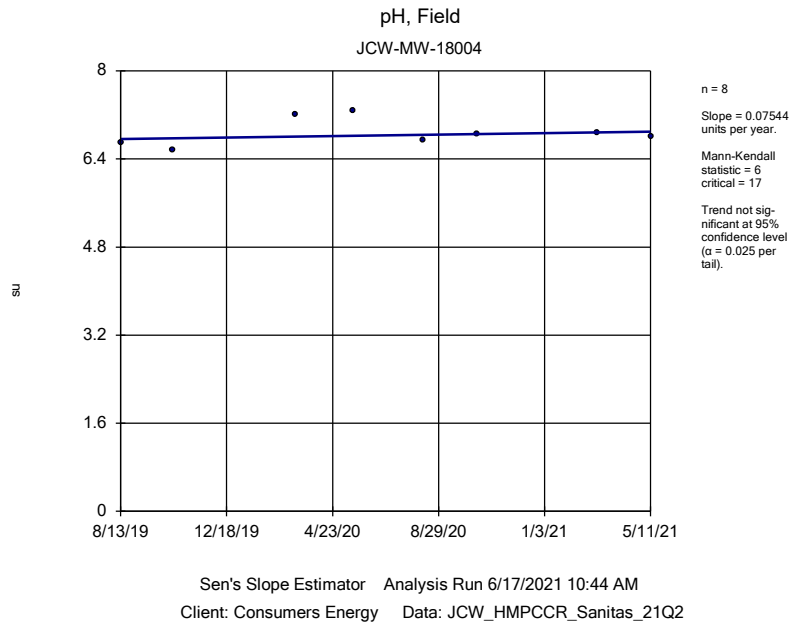

Sen's Slope Estimator Analysis Run 6/17/2021 10:44 AM

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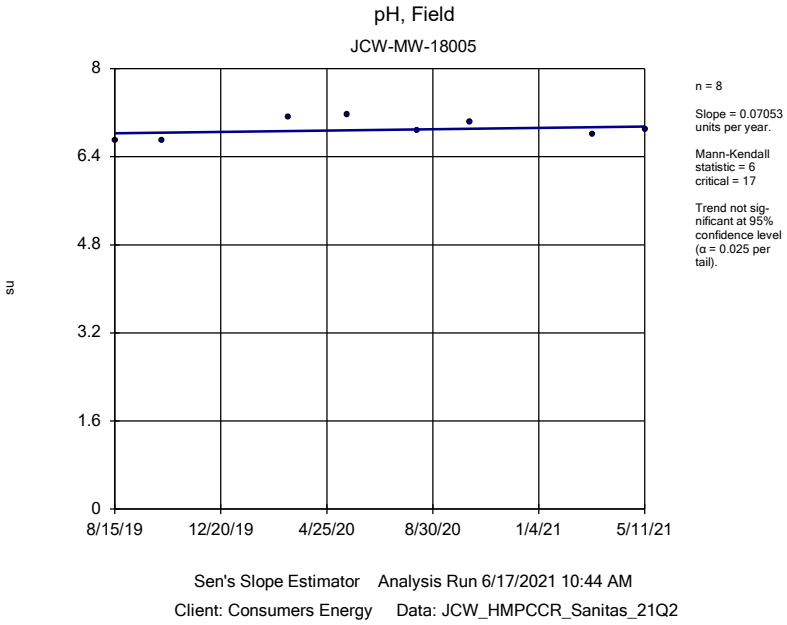

Sen's Slope Estimator Analysis Run 6/17/2021 10:44 AM

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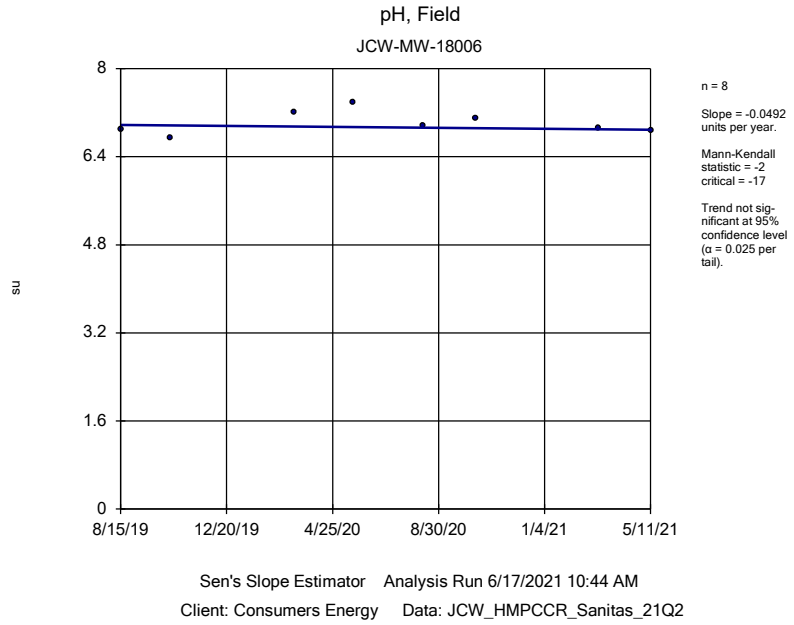

Sen's Slope Estimator Analysis Run 6/17/2021 10:44 AM

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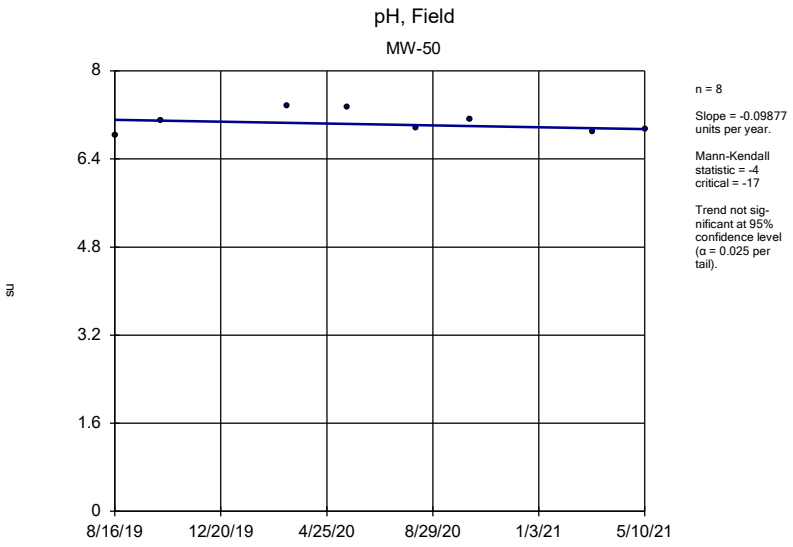

n = 8

Slope = -0.09877 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 6/17/2021 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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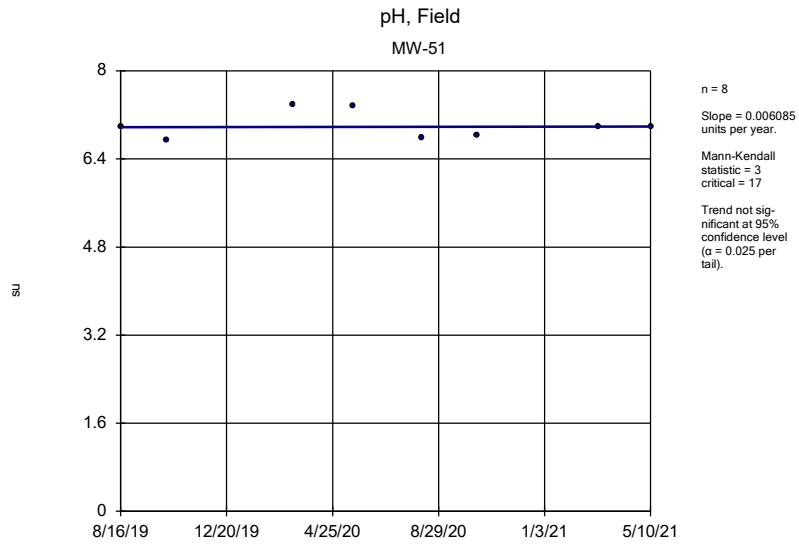

n = 8

Slope = 0.006085 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 6/17/2021 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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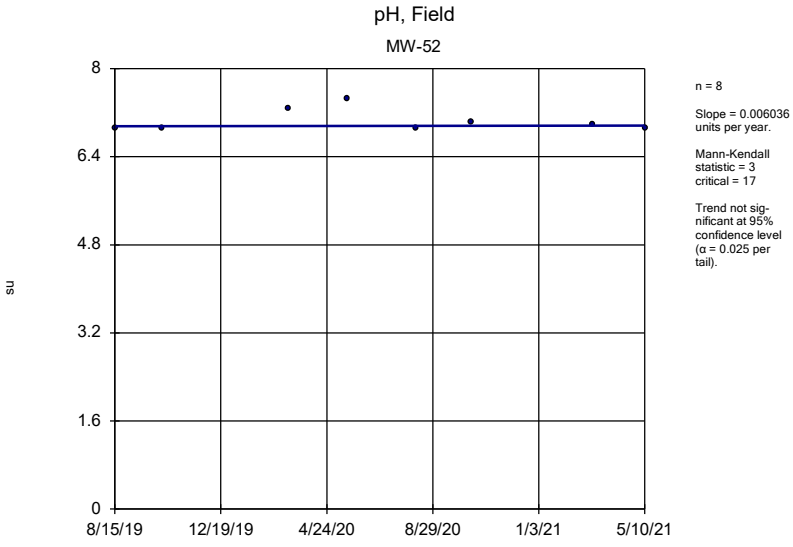

n = 8

Slope = 0.006036 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 6/17/2021 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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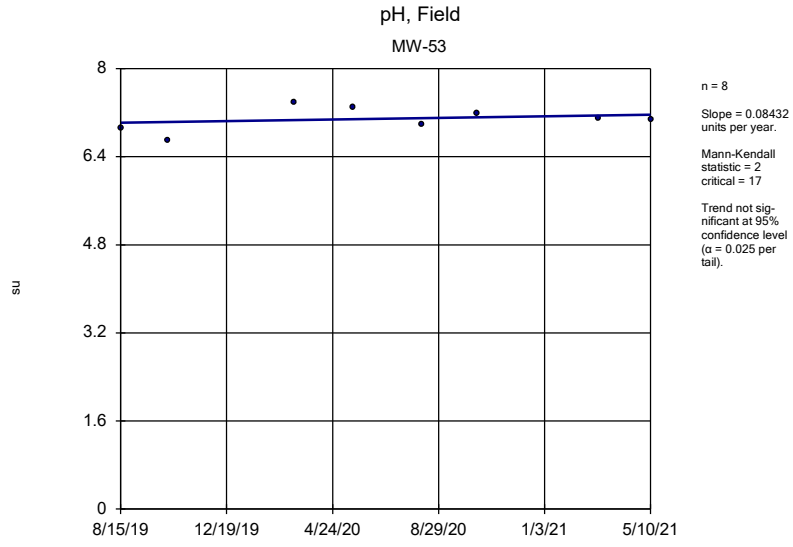

n = 8

Slope = 0.08432 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 6/17/2021 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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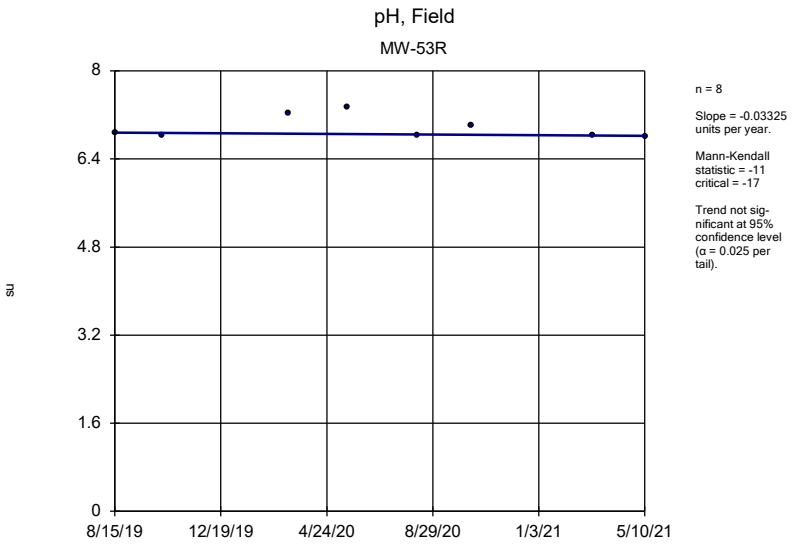

n = 8

Slope = -0.03325 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 6/17/2021 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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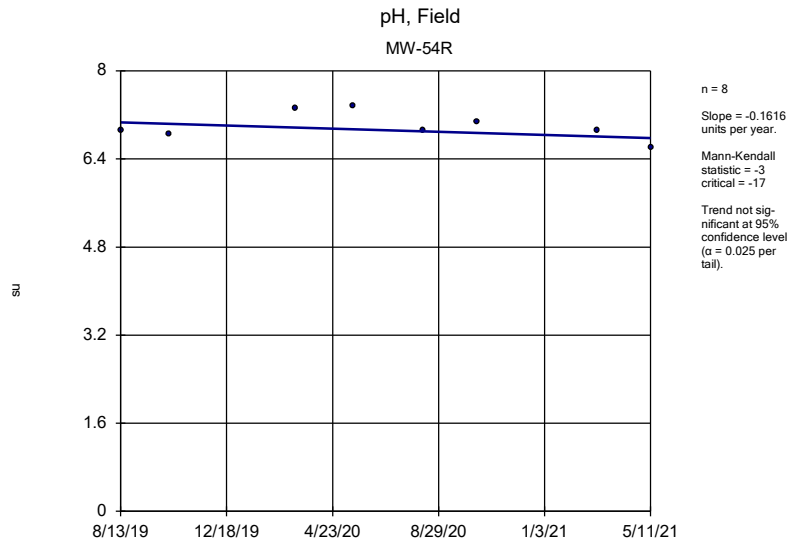

n = 8

Slope = -0.1616 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 6/17/2021 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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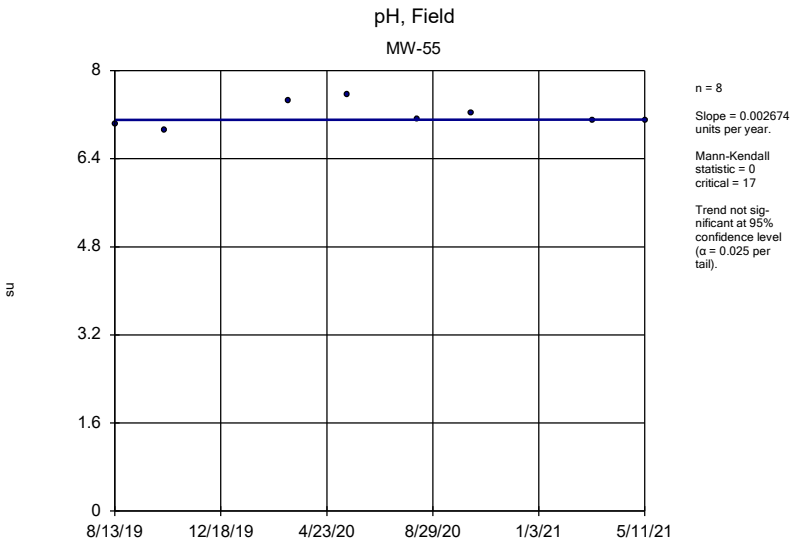

n = 8

Slope = 0.002674 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 6/17/2021 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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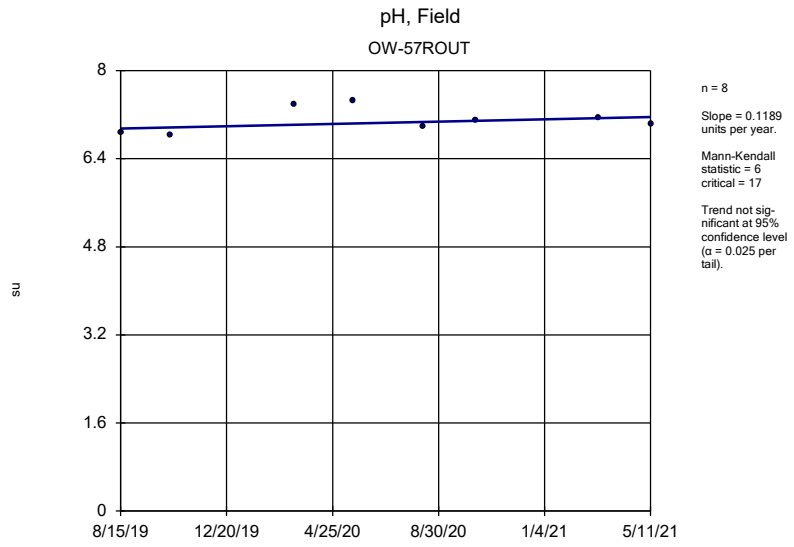

n = 8

Slope = 0.1189 units per year.

Mann-Kendall statistic = 6 critical = 17

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

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Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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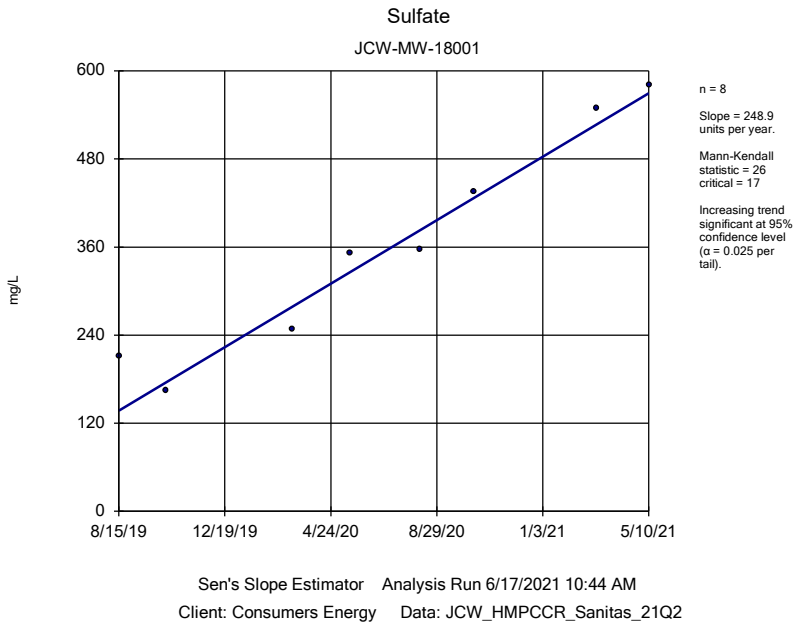

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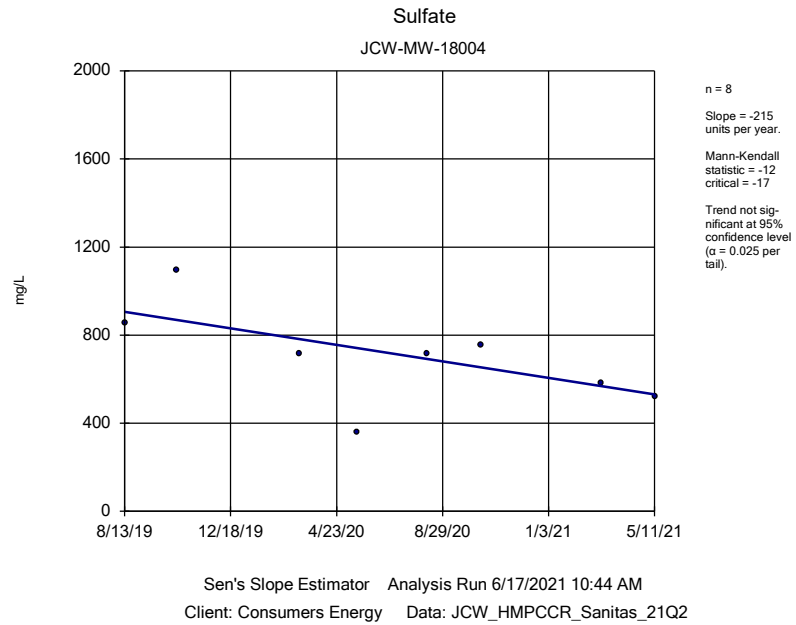

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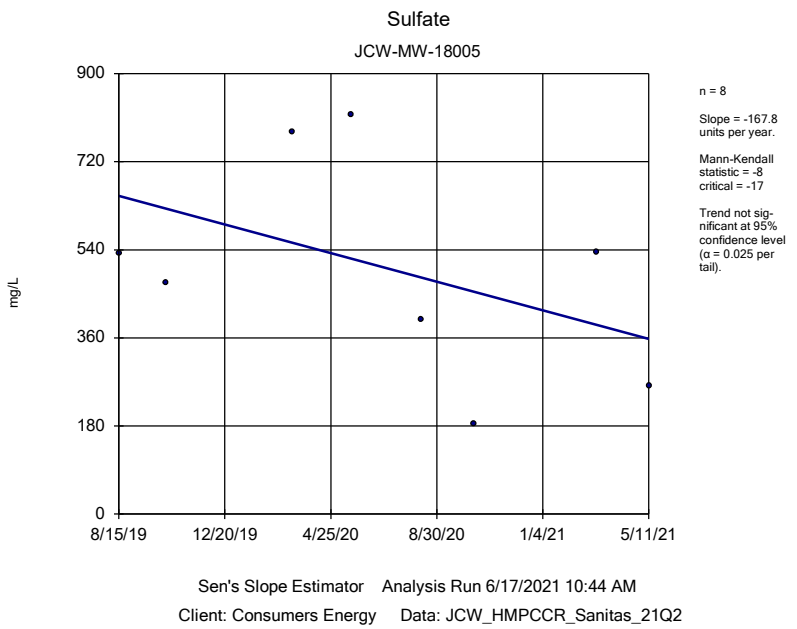

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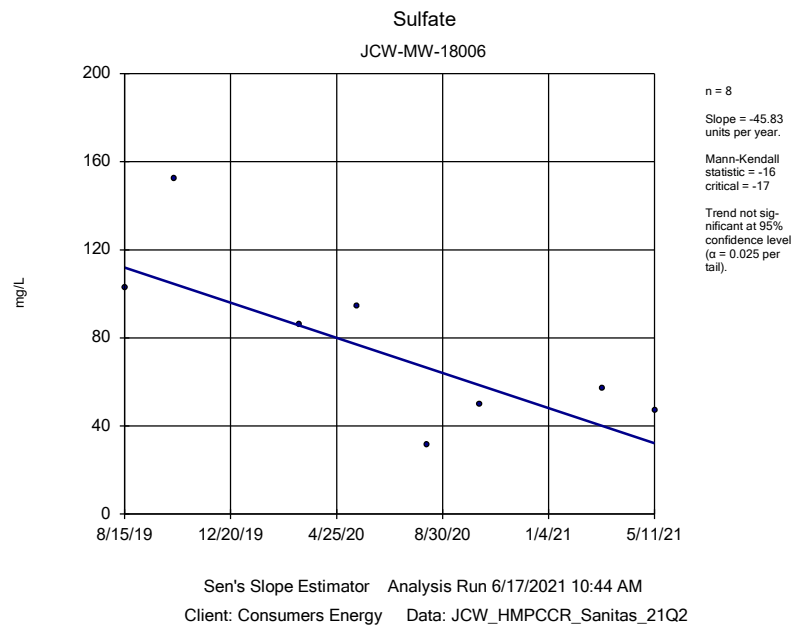

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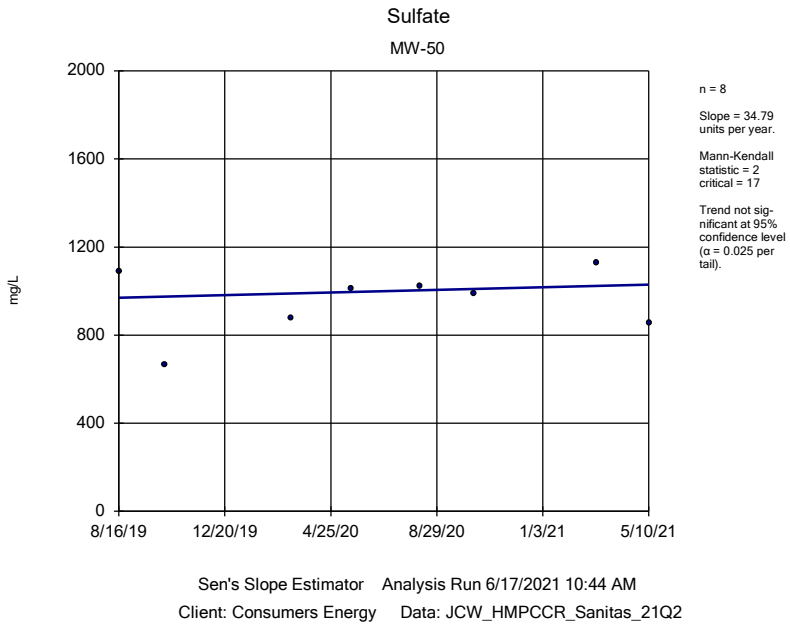

Sen's Slope Estimator Analysis Run 6/17/2021 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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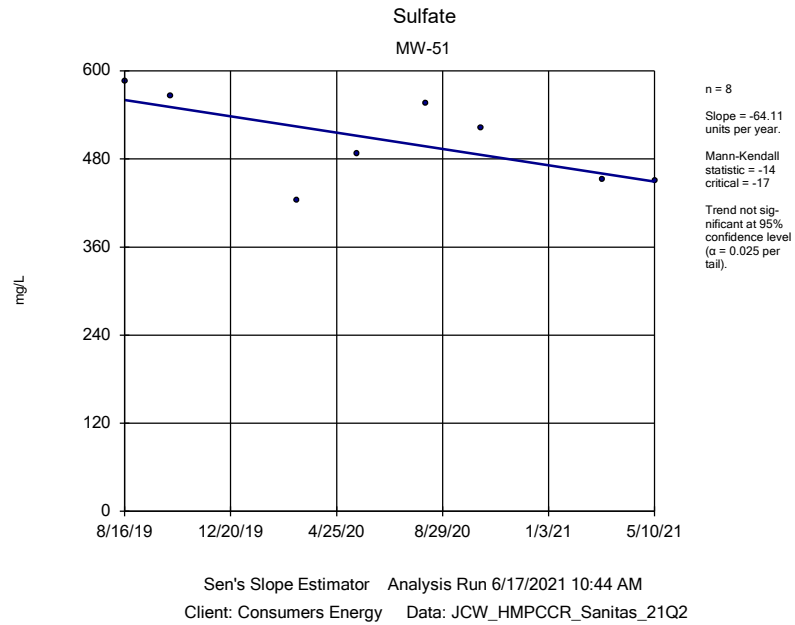

Sen's Slope Estimator Analysis Run 6/17/2021 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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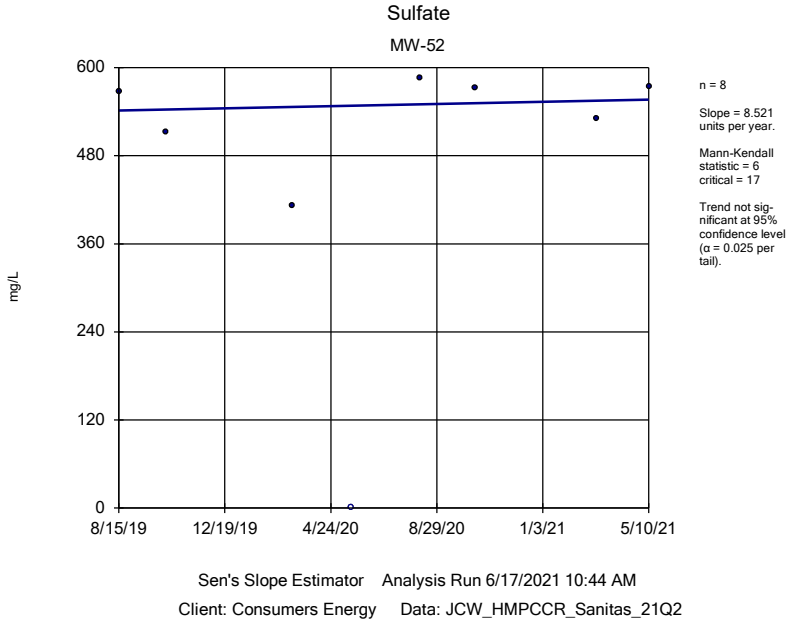
Hollow symbols indicate censored values.



Sen's Slope Estimator Analysis Run 6/17/2021 10:44 AM

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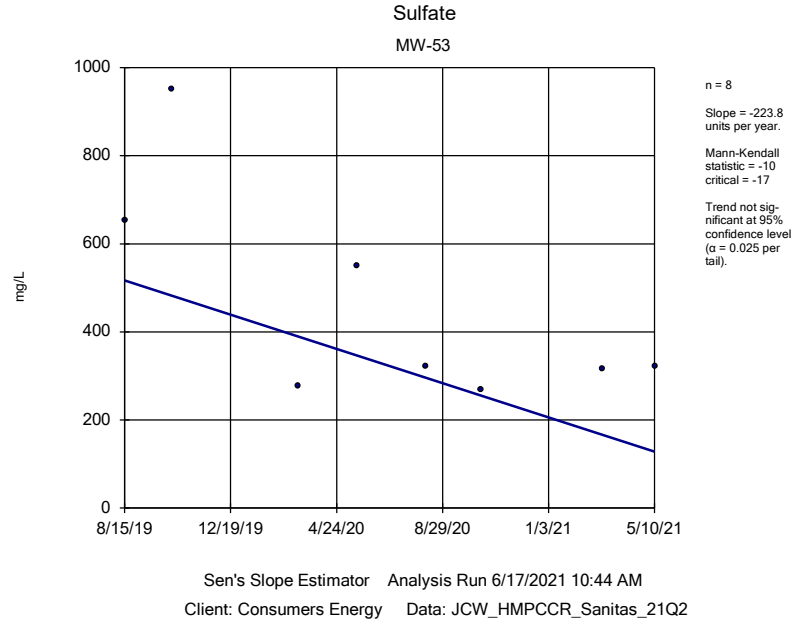

Sen's Slope Estimator Analysis Run 6/17/2021 10:44 AM

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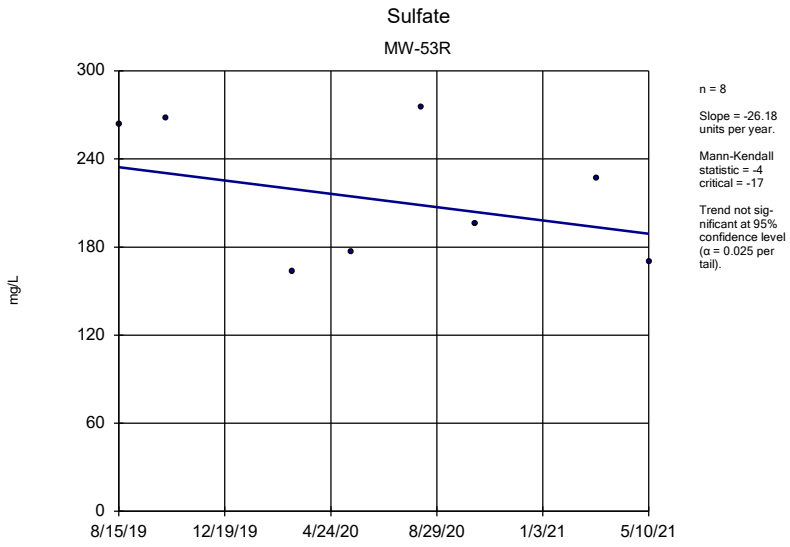

n = 8

Slope = -26.18 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 6/17/2021 10:44 AM

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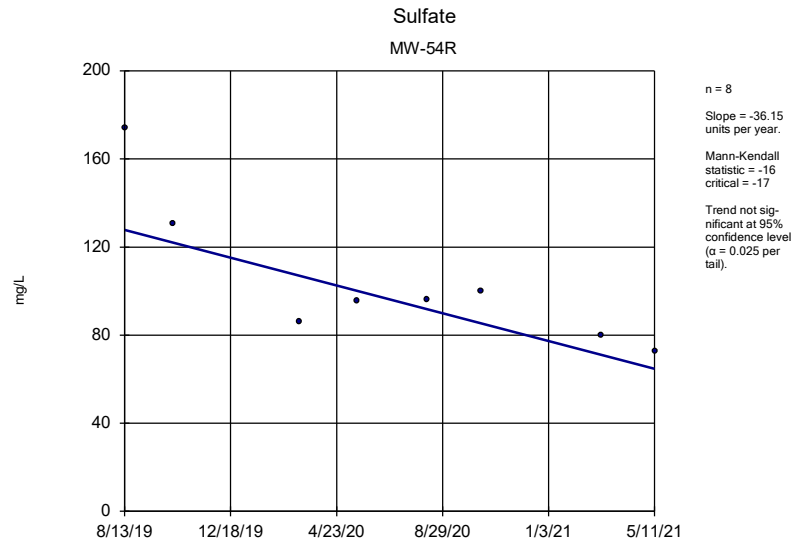

n = 8

Slope = -36.15 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 6/17/2021 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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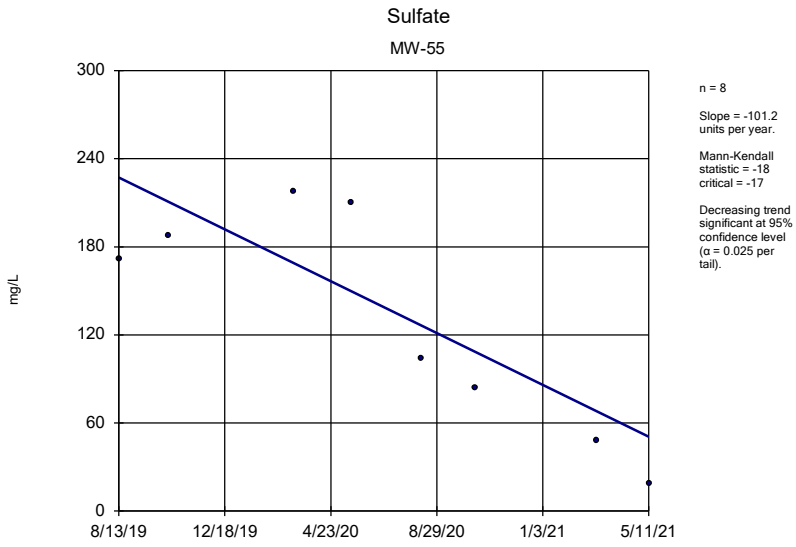

n = 8

Slope = -101.2 units per year.

Mann-Kendall statistic = -18 critical = -17

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

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Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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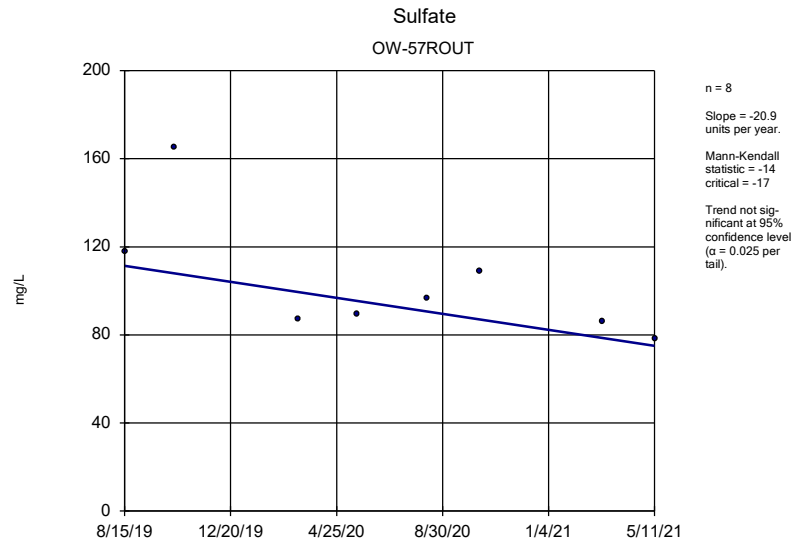

n = 8

Slope = -20.9 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 6/17/2021 10:44 AM

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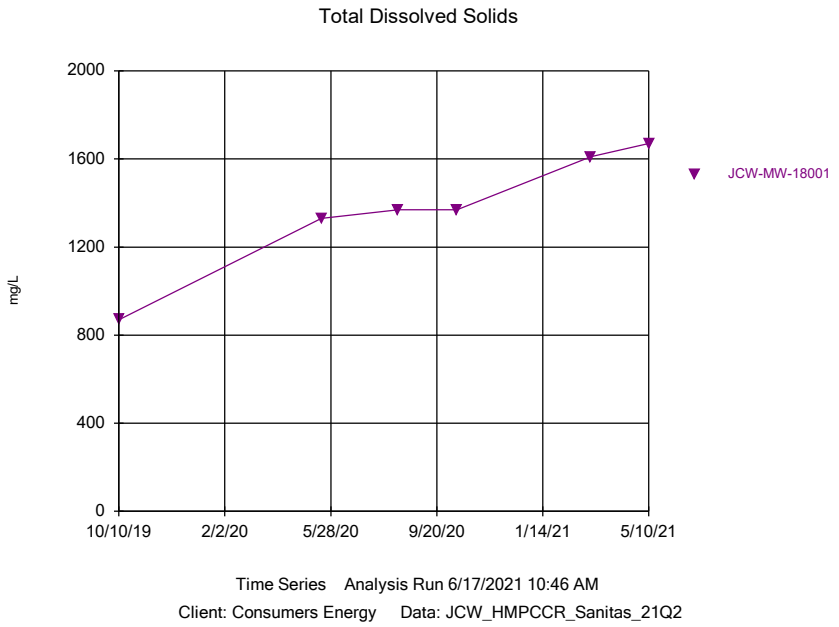

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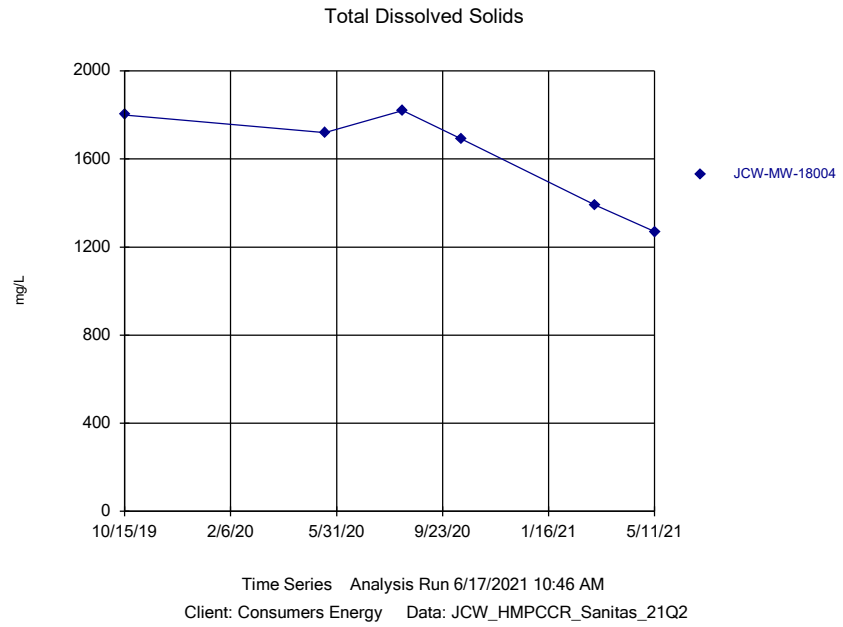

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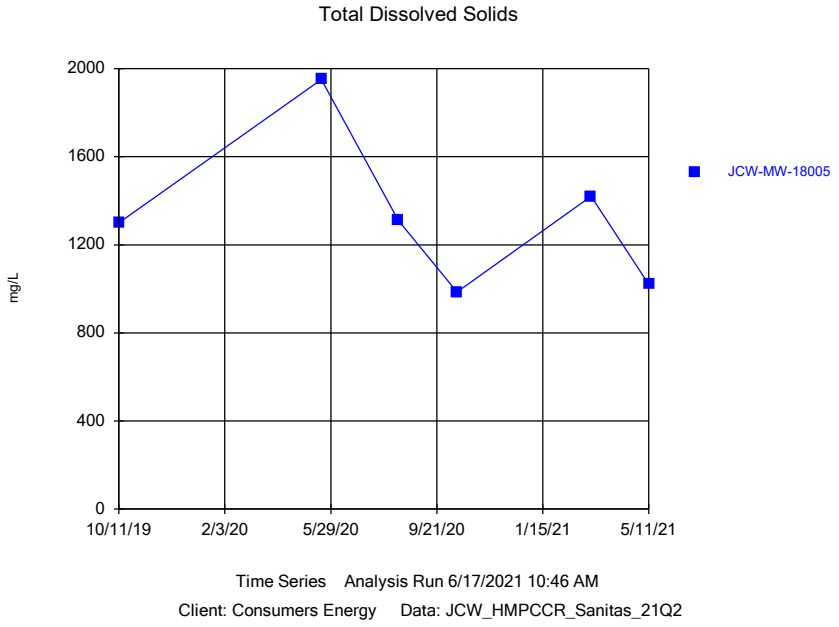

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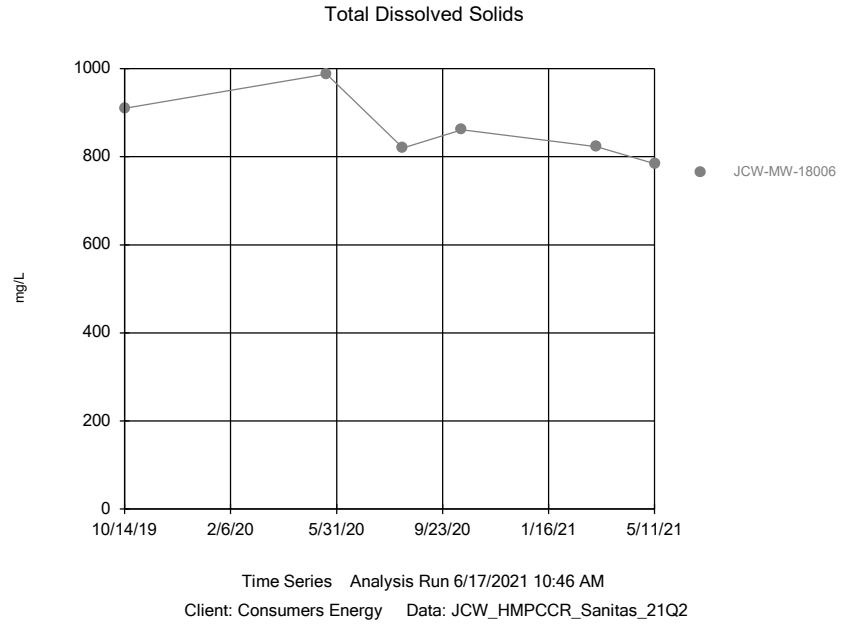

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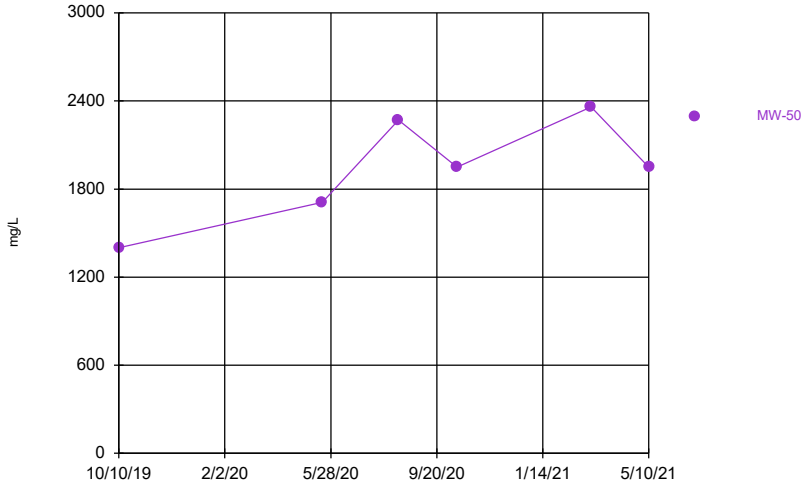
Total Dissolved Solids



Time Series Analysis Run 6/17/2021 10:46 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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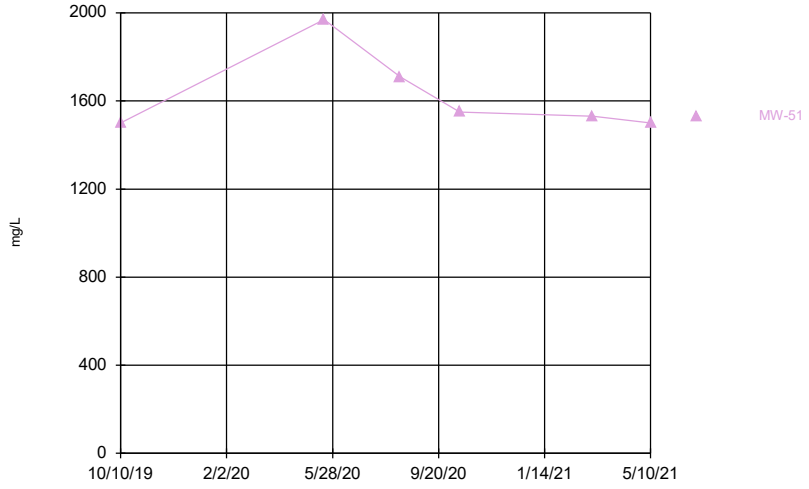
Total Dissolved Solids

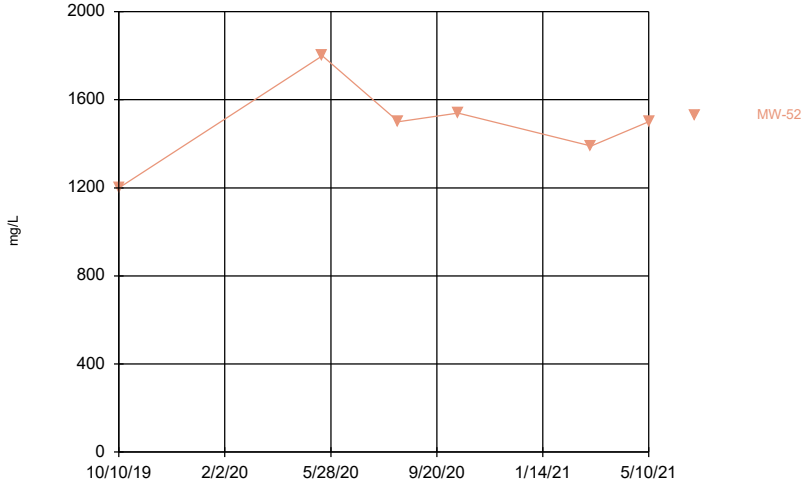


Time Series Analysis Run 6/17/2021 10:46 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids



Time Series Analysis Run 6/17/2021 10:46 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

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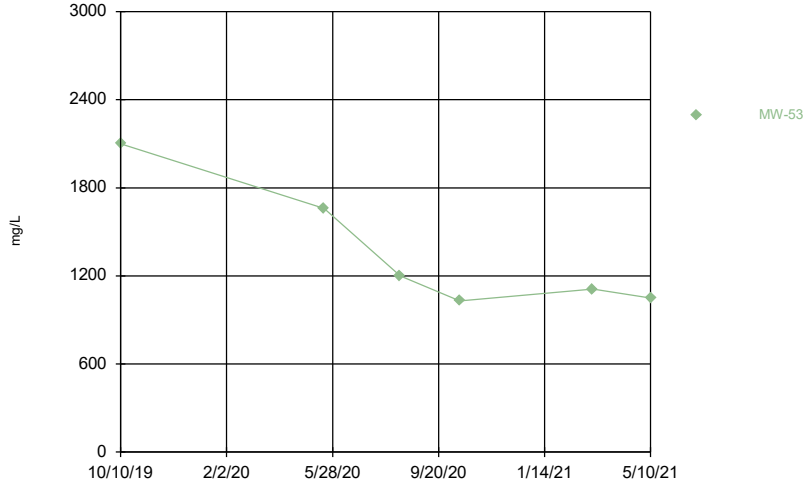
Total Dissolved Solids



Time Series Analysis Run 6/17/2021 10:46 AM

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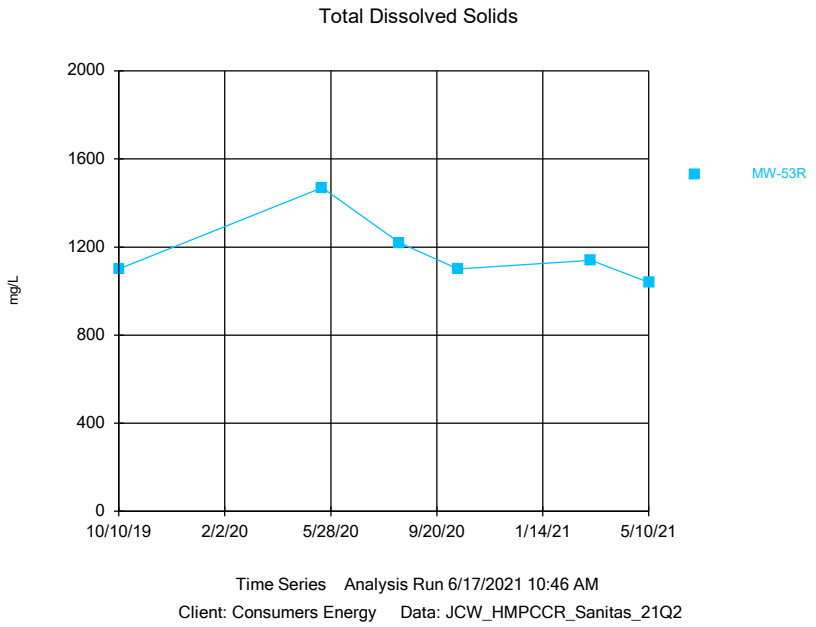

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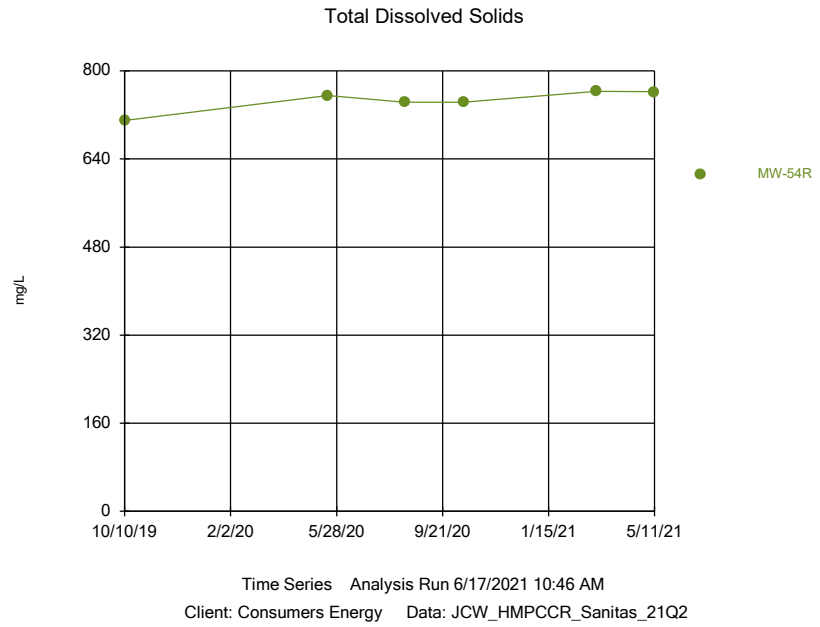

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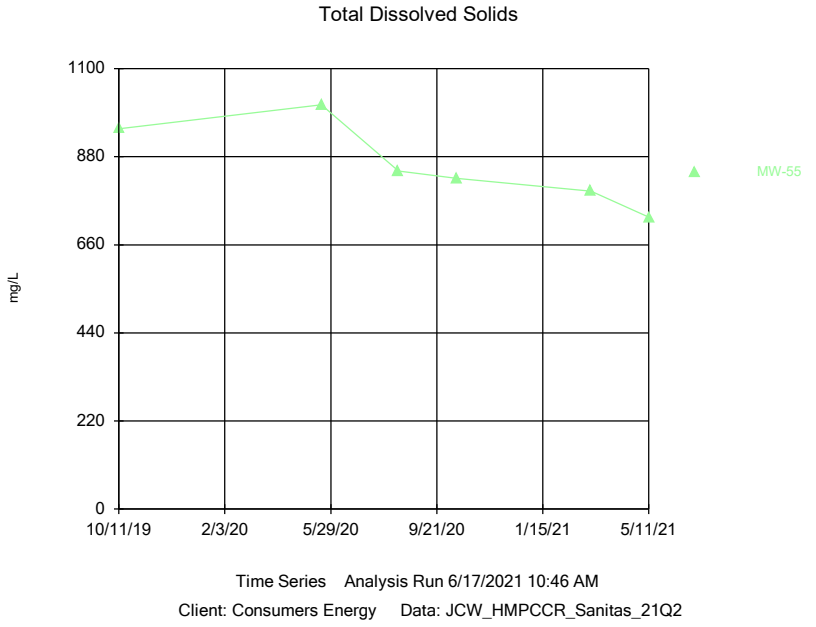

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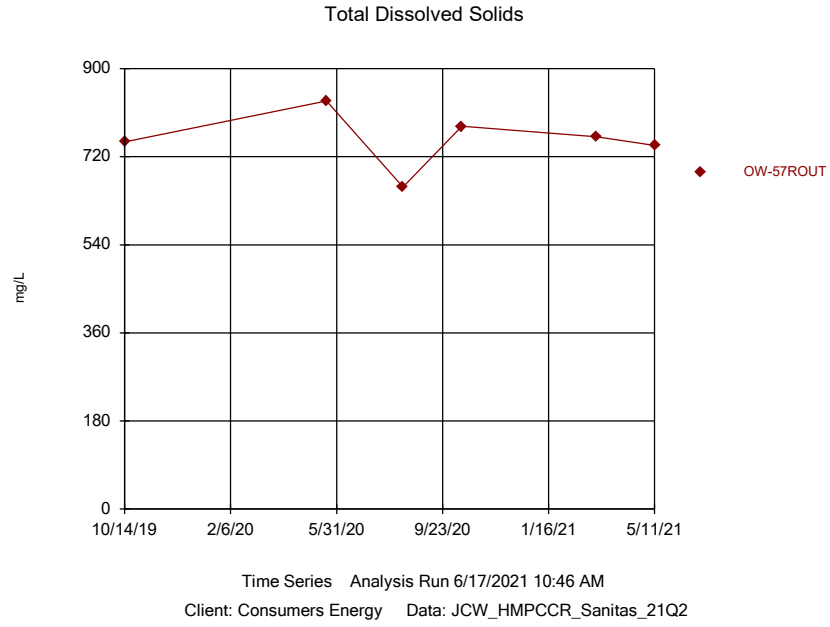

Appendix D
Assessment Monitoring and GSI Statistical Evaluation

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Technical Memorandum

Date:	July 9, 2021
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC Kristin Lowery, TRC Katy Reminga, TRC
Project No.:	418426.0000 Phase 002, Task 002
Subject:	Assessment Monitoring and GSI Statistical Evaluation of May 2021 Sampling Event JC Weadock Landfill, Consumers Energy Company, Essexville, Michigan

During the statistical evaluation of the initial assessment monitoring event (May 2018), arsenic was present in one or more downgradient monitoring wells at statistically significant levels exceeding the Groundwater Protection Standards (GWPSs). Therefore, Consumers Energy Company (Consumers Energy) initiated an Assessment of Corrective Measures (ACM) within 90 days from when the Appendix IV exceedance was determined. The ACM was completed on September 11, 2019.

Currently, Consumers Energy is continuing semiannual assessment monitoring in accordance with §257.95 of the CCR Rule[1] at the JC Weadock Power Plant Landfill and quarterly groundwater monitoring in accordance with the February 2021 Landfill Hydrogeological Monitoring Plan (HMP). The second quarter 2021 monitoring event was conducted on May 10 through 12, 2021. In accordance with §257.95 and the HMP, the assessment monitoring data must be compared to GWPSs to determine whether or not Appendix III and Appendix IV constituents, and additional Michigan Part 115 (as amended by PA 640) Section 11511a(3) and Section 11519b(2) constituents, are detected at statistically significant levels above the GWPSs. GWPSs were established in accordance with §257.95(h) and Part 115, as detailed in the April 23, 2021 Groundwater Protection Standards technical memorandum, which was also included in the First Quarter 2021 Hydrogeological Monitoring Report (TRC, April 2021).

The evaluation of the initial semiannual assessment monitoring event data (April and May 2018) indicated that arsenic was present at statistically significant levels above the GWPS at one of the three downgradient wells. The three downgradient wells were located within a vent (e.g., opening) of the perimeter soil/bentonite slurry wall to assess the quality of groundwater passing the waste boundary. As discussed in detail below, in July 2018, a vent (e.g., opening) in the perimeter soil/bentonite slurry wall was closed and the slurry wall is now continuous along the entire perimeter of the Weadock

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

Landfill. As a result of the change in groundwater flow conditions, the groundwater monitoring system was revised, as documented in the HMP. The monitoring well network now consists of eleven (11) downgradient monitoring wells and eight (8) groundwater-surface water (GSI) monitoring wells. The statistical evaluation of the second quarter 2021 assessment monitoring event data indicates that the following constituents are present at statistically significant levels above the GWPSs in downgradient monitoring wells at the Weadock Landfill:

Constituent	GWPS	#Downgradient Wells Observed
Boron	560 µg/L	10 of 12
Calcium	280 mg/L	1 of 12
Sulfate	780 mg/L	1 of 12

A new GWPS exceedance was noted for sulfate at MW-50. The new exceedance is the result of the addition of the Appendix III constituents to the assessment monitoring statistical evaluation program in accordance with the HMP. Corrective action has been triggered as a result of data collected during the initial assessment monitoring event. Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97 and execute the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

The statistical evaluation found that arsenic was present at statistically significant levels exceeding the site-specific GSI criterion.

Statistical Evaluation Procedures

Following each quarterly sampling event, compliance well data for the Weadock Landfill are evaluated in accordance with the Assessment Monitoring Statistical Data Evaluation and GSI Data Evaluation procedures in the HMP. The assessment monitoring and GSI monitoring programs were developed to evaluate concentrations of constituents present in the uppermost aquifer relative to acceptable levels (i.e., GWPSs or GSI criteria). To evaluate whether or not a criteria exceedance is statistically significant, the difference in concentration observed at the downgradient wells during a given monitoring event compared to the applicable criterion must be large enough, after accounting for variability in the sample data, that the result is unlikely to have occurred merely by chance. Consistent with the Unified Guidance [2], the preferred method for comparisons to a fixed standard are confidence limits. Based on the number of historical observations in the representative sample population, the population mean, the population standard deviation, and a selected confidence level (i.e., 99 percent), an upper and lower confidence limit is calculated. The true concentration, with 99 percent confidence, will fall between the lower and upper confidence limits.

The concentrations observed in the downgradient wells are deemed to be a statistically significant exceedance when the 99 percent lower confidence limit of the downgradient data exceeds the criterion. If the confidence interval straddles the criterion (i.e. the lower confidence level is below the criterion, but the upper confidence level is above), the statistical test result indicates that there is insufficient

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

confidence that the measured concentrations are different from the criterion and thus no compelling evidence that the measured concentration is a result of a release from the CCR unit versus the inherent variability of the sample data. This statistical approach is consistent with the statistical methods for assessment monitoring presented in §257.93(f) and (g). Statistical evaluation methodologies built into the CCR Rule and Part 115, and numerous other federal rules, are key in determining whether or not individually measured data points represent a concentration increase over the baseline or a fixed standard (such as a GWPS in an assessment monitoring program).

For each detected constituent, the concentrations for each well were first compared directly to the GWPS, as shown on Table 1, or the GSI criteria, as shown on Table 2. Parameter-well combinations that included a direct exceedance of the criteria within the most recent two years of sampling events (eight quarterly sampling events, August 2019 to May 2021) were retained for further analysis. Data collected under the previous HMP is used where available.

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

The statistical data evaluation included the following steps:

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

The results of these evaluations are presented and discussed below.

Data from each round were evaluated for completeness, overall quality, and usability and were deemed appropriate for the purposes of the assessment and GSI monitoring programs. Initially, the results were observed visually for potential trends. No outliers were identified in the data set.

The Sanitas™ software was then used to test compliance at the downgradient monitoring wells using the confidence interval method for the most recent eight sampling events. The tests were run with a per-test significance of α = 0.01. Non-detect data was handled in accordance with the HMP for the

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

purposes of calculating the confidence intervals.

The Sanitas™ software generates an output that includes graphs of the parametric or non-parametric confidence intervals for each well along with notes data transformations, as appropriate.

Assessment Monitoring Statistical Evaluation

The assessment monitoring statistical evaluation is performed on the downgradient monitoring wells in accordance with the HMP. The downgradient monitoring wells include:

- JCW-MW-18001
- JCW-MW-18004
- JCW-MW-18005
- JCW-MW-18006
- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- OW-57R Out

The concentrations from each well were first compared directly to the GWPS, as shown on Table 1. Constituent-well combinations that included a direct exceedance of the GWPS within the past eight[4] monitoring events were retained for further analysis (Attachment 1). Direct comparison GWPS exceedances include the following constituent well combinations:

- Boron in MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, MW-55, OW-57R OUT, JCW-MW-18001, JCW-MW-18005, and JCW-MW-18006;
- Calcium in MW-50, MW-51, MW-53, JCW-MW-18001, JCW-MW-18004, and JCW-MW-18005;
- Sulfate in MW-50, MW-53, JCW-MW-18004, and JCW-MW-18005;
- Arsenic in MW-53R, MW-55, and JCW-MW-18006;
- Molybdenum in MW-55;
- Iron in MW-55; and,
- Vanadium in JCW-MW-18004.

The concentrations of arsenic and molybdenum at MW-55 are not a result of a release from the unit, as detailed in the *Alternate Source Demonstration* (TRC, December 2019); therefore, confidence intervals were not calculated.

The software outputs for the assessment monitoring data evaluation are included in Attachment 1 along with data reports showing the values used for the evaluation. The percentage of non-detect observations are also included in Attachment 1. Visual trends were apparent in multiple wells for boron, calcium, and sulfate.

The Sanitas™ software generates an output that includes graphs of the parametric or non-parametric confidence intervals for each well along with notes on data transformations, as appropriate. The data distributions are as follows:

[4] The past two years of available data (six events total) were used for constituents that were not previously included in quarterly monitoring for the Weadock Landfill, i.e. calcium, chloride, fluoride, total dissolved solids, beryllium, cadmium, cobalt, mercury, radium, thallium, nickel, and zinc. Use of the most recent two years of data ensure the timeframe for analysis is consistent with other constituents and is representative of current site conditions.

Distribution	Constituent-Well Combinations
Normal	Boron at JCW-MW-18001, JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, MW-55 Calcium at JCW-MW-18001, JCW-MW-18004, JCW-MW-18005, MW-51 Sulfate at JCW-MW-18004, JCW-MW-18005, MW-50 Arsenic at JCW-MW-18006, MW-53R Iron at MW-55
Normalized by square root transformation	Boron at MW-54R
Non-Parametric (not able to be normalized)	Boron at OW-57R OUT Calcium at MW-50, MW-53 Sulfate at MW-53
Non-Parametric (over 50% non-detect)	Vanadium at JCW-MW-18004

The confidence interval test compares the lower confidence limit to the GWPS. Arsenic concentrations at JCW-MW-18006 were previously considered statistically significant; however arsenic concentrations appear to be decreasing and the lower confidence limit was below the GWPS in the second quarter 2021. Concentrations trends will continue to be monitored. Exceedances were noted for boron at JCW-MW-18001, JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and OW-57R OUT and calcium at MW-51 in first quarter 2021 and confirmed in second quarter 2021. A new exceedance for sulfate at MW-50 was observed in second quarter 2021. The new exceedances are the result of the addition of the Appendix III constituents to the assessment monitoring statistical evaluation program in accordance with the HMP. Corrective action has been triggered as a result of data collected during the initial May 2018 assessment monitoring event. Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97 and will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

GSI Statistical Evaluation

Eight monitoring wells located along the surface water features adjacent to the Weadock Landfill are included in the GSI monitoring program to meet the requirements of Part 31:

- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- JCW-MW-18004

The concentrations from each well were first compared directly to the GSI criteria, as shown on Table 2. Constituent-well combinations that included a direct exceedance of the GSI criteria within the past eight monitoring events were retained for further analysis (Attachment 2). Direct comparison GSI criteria exceedances include the following constituent well combinations:

- Sulfate in JCW-MW-18004;
- Arsenic in MW-55;

- Chromium in MW-54R and JCW-MW-18004; and
- Molybdenum in MW-55.

The software outputs for the assessment monitoring data evaluation are included in Attachment 2 along with data reports showing the values used for the evaluation. The percentage of non-detect observations are also included in Attachment 2.

Arsenic concentrations in MW-55 appear to exhibit an upward trend and molybdenum concentrations at MW-55 appear to exhibit a downward trend on the time series charts (Attachment 2). These data sets were tested further in Sanitas™ utilizing Sen's Slope to estimate the average rate of change in concentration over time and utilizing the Mann-Kendall trend test to test for significance of the trend at the 98% confidence level. The trend tests show that the downward trend for molybdenum at MW-55 was statistically significant (Attachment 2). The trends are causing the confidence intervals to widen. Calculating a confidence interval around a trending data set incorporates not only variability present naturally in the underlying dataset, but also incorporates variability due to the trend itself. Based on the observed trends, confidence bands were selected as a more appropriate assessment for arsenic and molybdenum at MW-55. Confidence bands are selected by the Unified Guidance as the appropriate method for calculating confidence intervals on trending data. A confidence band calculates upper and lower confidence limits at each point along the trend to reduce variability and create a narrower confidence interval.

The Sanitas™ software generates an output that includes graphs of the parametric or non-parametric confidence intervals for each well along with notes on data transformations, as appropriate. The data distributions are as follows:

Distribution	Constituent-Well Combinations
Normal	Sulfate at JCW-MW-18004
Non-Parametric (not able to be normalized)	Chromium at JCW-MW-18004 and MW-54R

The confidence interval test and confidence bands compare the lower confidence limit to the GSI. The statistical evaluation found that arsenic was present at statistically significant levels exceeding the site-specific GSI criterion.

Attachments

Table 1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2019 to March 2021

Table 2 Comparison of Groundwater Sampling Results to GSI – May 2019 to March 2021

Attachment 1 Assessment Monitoring Sanitas™ Output Files

Attachment 2 GSI Evaluation Sanitas™ Output Files

Tables

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2019 to May 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-50												
		Sample Date:	8/16/2019	10/10/2019(3)	10/10/2019(3)	3/9/2020	3/9/2020	5/19/2020	8/10/2020	8/10/2020	10/13/2020	3/8/2021	3/8/2021	5/10/2021	5/10/2021
Constituent	Unit	GWPS													
Appendix III(1)							Field Dup			Field Dup			Field Dup		Field Dup
Boron	ug/L	**560**	**1,220**	**1,700**	**1,590**	**1,530**	**1,500**	**1,300**	**1,430**	**1,360**	**1,470**	**1,510**	**1,610**	**1,380**	**1,320**
Calcium	mg/L	**280**	--	280	--	--	--	**380**	**382**	**382**	**368**	**386**	**375**	**363**	**370**
Chloride	mg/L	2,300	--	80	--	--	--	80.5	78.5	79.9	77.5	86.5	85.6	68.9	69.9
Fluoride	ug/L	4,000	--	< 1,000	--	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	**1,090**	660	677	**878**	**919**	**1,010**	**1,020**	**1,040**	**990**	**1,130**	**1,120**	**856**	**867**
Total Dissolved Solids	mg/L	4,700	--	1,400	--	--	--	1,710	2,270	2,820	1,950	2,360	2,380	1,950	1,970
pH, Field	SU	6.5 - 8.5	6.8	7.1	7.1	7.4	--	7.4	7.0	--	7.1	6.9	--	6.9	--
Appendix IV(1)															
Antimony	ug/L	6.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	3	2.8	3	1	1	1	2	2	3	1	1	1	1
Barium	ug/L	2,000	204	180	182	218	223	163	150	153	147	116	115	108	109
Beryllium	ug/L	4.0	--	< 1.0	--	--	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.20	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	1.4	< 1	1	< 1	< 1	< 1	< 1	< 1	1	1	< 1	< 1
Cobalt	ug/L	15	--	< 6.0	--	--	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	--	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	96	79	93	91	86	97	111	115	100	126	128	100	100
Mercury	ug/L	2.0	--	< 0.20	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	19	6.6	7	< 5	< 5	8	7	8	7	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	0.572	--	--	--	0.512	--	--	< 0.537	--	--	< 0.237	< 0.245
Radium-228	pCi/L	NA	--	1.49	--	--	--	< 0.402	--	--	0.613	--	--	0.557	0.607
Radium-226/228	pCi/L	5.0	--	2.06	--	--	--	0.814	--	--	1.01	--	--	0.650	0.671
Selenium	ug/L	50	2	< 1.0	< 1	2	2	2	< 1	< 1	1	1	1	< 1	1
Thallium	ug/L	2.0	--	< 2.0	--	--	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters(2)															
Iron	ug/L	**28,000**	801	1,800	1,440	1,760	1,730	1,240	2,280	2,230	2,990	2,100	2,190	1,810	1,810
Copper	ug/L	1,000	3	< 1.0	1	3	2	3	3	7	3	4	4	< 1	2
Nickel	ug/L	100	--	2.1	--	--	--	3	< 2	2	< 2	< 2	< 2	< 2	< 2
Silver	ug/L	34	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	--	--	--	< 10	< 30	< 30	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2019 to May 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-51												
		Sample Date:	8/16/2019	10/10/2019[3]	10/10/2019[3]	10/10/2019[3]	10/10/2019[3]	3/9/2020	5/19/2020	5/19/2020	8/10/2020	10/14/2020	10/14/2020	3/8/2021	5/10/2021
Constituent	Unit	GWPS													
Appendix III[1]					Field Dup		Field Dup			Field Dup			Field Dup		
Boron	ug/L	**560**	**782**	**890**	**900**	**843**	**819**	**967**	**944**	**967**	**758**	**739**	**798**	**1,040**	**1,040**
Calcium	mg/L	**280**	--	**340**	**350**	--	--	--	**331**	**322**	**341**	**330**	**337**	**293**	**303**
Chloride	mg/L	2,300	--	88	88	--	--	--	93.8	94.2	95.2	74.2	75.4	91.2	93.6
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	--	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	586	570	580	562	557	424	487	474	556	522	537	452	450
Total Dissolved Solids	mg/L	4,700	--	1,500	1,500	--	--	--	1,970	1,690	1,710	1,550	1,530	1,530	1,500
pH, Field	SU	6.5 - 8.5	7.0	6.7	--	6.7	--	7.4	7.4	--	6.8	6.8	--	7.0	7.0
Appendix IV[1]															
Antimony	ug/L	6.0	< 1	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	17	20	19	18	19	14	12	12	12	17	17	11	11
Barium	ug/L	2,000	175	180	180	184	181	158	150	153	153	147	150	143	148
Beryllium	ug/L	4.0	--	< 1.0	< 1.0	--	--	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.20	< 0.20	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1.0	< 1.0	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6.0	< 6.0	--	--	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	--	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	56	49	50	59	57	50	55	57	57	51	55	62	57
Mercury	ug/L	2.0	--	< 0.20	< 0.20				< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5.0	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	0.316	0.365	--	--	--	0.461	0.299	--	1.35	< 0.352	--	< 0.268
Radium-228	pCi/L	NA	--	1.68	1.26	--	--	--	0.719	0.745	--	< 0.588	0.776	--	0.626
Radium-226/228	pCi/L	5.0	--	1.99	1.63	--	--	--	1.18	1.04	--	1.43	1.11	--	0.851
Selenium	ug/L	50	1	< 1.0	< 1.0	< 1	< 1	1	1	< 1	< 1	< 1	< 1	1	< 1
Thallium	ug/L	2.0	--	< 2.0	< 2.0	--	--	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]															
Iron	ug/L	**28,000**	4,740	6,700	6,800	5,270	5,250	2,050	2,830	2,750	4,390	5,400	5,600	1,940	2,200
Copper	ug/L	1,000	2	< 1.0	< 1.0	2	2	1	2	2	2	2	2	2	< 1
Nickel	ug/L	100	--	< 2.0	< 2.0	--	--	--	2	< 2	2	< 2	< 2	< 2	< 2
Silver	ug/L	34	< 0.2	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	< 10	--	--	--	< 10	< 10	< 30	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2019 to May 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-52								
		Sample Date:	8/15/2019	10/10/2019[3]	10/10/2019[3]	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	**1,010**	**1,200**	**1,150**	**1,150**	**1,160**	**1,200**	**1,110**	**1,120**	**1,160**
Calcium	mg/L	**280**	--	220	--	--	226	238	256	211	244
Chloride	mg/L	2,300	--	89	--	--	15.1	72.0	73.3	51.8	53.9
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	1,140	< 1,000	< 1,000
Sulfate	mg/L	**780**	567	520	506	412	< 1	586	572	531	574
Total Dissolved Solids	mg/L	4,700	--	1,200	--	--	1,800	1,500	1,540	1,390	1,500
pH, Field	SU	6.5 - 8.5	6.9	6.9	6.9	7.3	7.5	6.9	7.0	7.0	6.9
Appendix IV[1]											
Antimony	ug/L	6.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	1	< 1.0	1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	129	120	125	120	144	144	139	123	132
Beryllium	ug/L	4.0	--	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	1,140	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	38	30	38	28	32	38	33	31	29
Mercury	ug/L	2.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	0.252	--	--	< 0.241	--	0.744	--	< 0.237
Radium-228	pCi/L	NA	--	< 0.772	--	--	0.626	--	0.636	--	< 0.407
Radium-226/228	pCi/L	5.0	--	1.01	--	--	0.740	--	1.38	--	< 0.407
Selenium	ug/L	50	2	< 1.0	1	< 1	< 1	< 1	1	1	1
Thallium	ug/L	2.0	--	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	5,530	5,600	4,350	782	1,140	2,720	4,770	879	1,400
Copper	ug/L	1,000	2	< 1.0	1	1	2	2	2	2	< 1
Nickel	ug/L	100	--	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2
Silver	ug/L	34	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	--	--	< 10	< 30	< 10	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2019 to May 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-53								
		Sample Date:	8/15/2019	10/10/2019(3)	10/10/2019(3)	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021
Constituent	Unit	GWPS									
Appendix III(1)											
Boron	ug/L	**560**	**1,810**	**900**	**840**	**2,530**	**1,750**	**2,760**	**2,720**	**3,920**	**3,790**
Calcium	mg/L	**280**	--	**420**	--	--	**308**	211	192	187	187
Chloride	mg/L	2,300	--	150	--	--	118	50.5	38.6	52.9	51.8
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	1,020	< 1,000	< 1,000
Sulfate	mg/L	**780**	653	**960**	**940**	278	549	321	269	317	322
Total Dissolved Solids	mg/L	4,700	--	2,100	--	--	1,660	1,200	1,030	1,110	1,050
pH, Field	SU	6.5 - 8.5	6.9	6.7	6.7	7.4	7.3	7.0	7.2	7.1	7.08
Appendix IV(1)											
Antimony	ug/L	6.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	3	2.9	3	< 1	2	2	2	< 1	< 1
Barium	ug/L	2,000	114	77	80	129	144	130	131	202	214
Beryllium	ug/L	4.0	--	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1.0	< 1	< 1	6	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	1,020	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	48	45	55	47	58	53	49	52	46
Mercury	ug/L	2.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	0.263	--	--	0.386	--	< 0.531	--	< 0.239
Radium-228	pCi/L	NA	--	< 0.750	--	--	< 0.385	--	0.503	--	0.455
Radium-226/228	pCi/L	5.0	--	0.962	--	--	0.725	--	0.823	--	0.684
Selenium	ug/L	50	2	< 1.0	< 1	1	2	< 1	< 1	< 1	2
Thallium	ug/L	2.0	--	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters(2)											
Iron	ug/L	**28,000**	1,700	3,700	3,100	1,200	2,070	1,510	1,560	1,180	1,420
Copper	ug/L	1,000	2	< 1.0	2	2	4	1	2	2	< 1
Nickel	ug/L	100	--	3.0	--	--	3	< 2	< 2	< 2	< 2
Silver	ug/L	34	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	--	--	< 10	< 30	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2019 to May 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-53R								
		Sample Date:	8/15/2019	10/10/2019[3]	10/10/2019[3]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/10/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	**1,390**	**1,800**	**1,680**	**1,590**	**1,460**	**1,540**	**1,780**	**1,510**	**1,580**
Calcium	mg/L	**280**	--	250	--	--	228	239	246	234	227
Chloride	mg/L	2,300	--	46	--	--	30.7	45.0	31.8	32.5	31.1
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	264	240	295	163	177	275	196	227	170
Total Dissolved Solids	mg/L	4,700	--	1,100	--	--	1,470	1,220	1,100	1,140	1,040
pH, Field	SU	6.5 - 8.5	6.9	6.8	6.8	7.2	7.4	6.8	7.0	6.8	6.8
Appendix IV[1]											
Antimony	ug/L	6.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**31**	**32**	**32**	19	**27**	**31**	**40**	19	18
Barium	ug/L	2,000	261	240	237	239	252	208	242	202	208
Beryllium	ug/L	4.0	--	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	1.7	1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	66	61	69	53	60	71	66	64	59
Mercury	ug/L	2.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	0.552	--	--	0.356	--	--	--	0.306
Radium-228	pCi/L	NA	--	< 0.700	--	--	0.846	--	--	--	0.822
Radium-226/228	pCi/L	5.0	--	1.02	--	--	1.20	--	--	--	1.13
Selenium	ug/L	50	1	< 1.0	< 1	< 1	< 1	< 1	1	< 1	< 1
Thallium	ug/L	2.0	--	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	1,930	2,600	2,050	881	1,910	2,020	2,140	971	2,220
Copper	ug/L	1,000	1	< 1.0	3	1	1	3	1	2	1
Nickel	ug/L	100	--	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2
Silver	ug/L	34	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	--	--	< 10	< 30	< 10	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2019 to May 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-54R								
		Sample Date:	8/13/2019	10/10/2019[3]	10/10/2019[3]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	**1,760**	**1,500**	**1,470**	**1,280**	**1,730**	**1,660**	**1,660**	**2,470**	**3,140**
Calcium	mg/L	**280**	--	180	--	--	181	168	174	178	196
Chloride	mg/L	2,300	--	18	--	--	20.4	18.5	23.9	28.0	32.7
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	1,800	< 1,000	< 1,000
Sulfate	mg/L	**780**	174	130	131	86.2	95.7	96.2	100	79.9	72.7
Total Dissolved Solids	mg/L	4,700	--	710	--	--	755	743	743	763	762
pH, Field	SU	6.5 - 8.5	6.9	6.9	6.9	7.3	7.4	6.9	7.1	6.9	6.6
Appendix IV[1]											
Antimony	ug/L	6.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	3	2.3	3	3	2	3	3	1	1
Barium	ug/L	2,000	28	88	93	87	95	104	103	118	122
Beryllium	ug/L	4.0	--	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	16	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	1,800	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	69	53	61	47	58	61	57	66	64
Mercury	ug/L	2.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	9	6.2	7	< 5	< 5	5	5	< 5	< 5
Radium-226	pCi/L	NA	--	0.328	--	--	< 0.192	--	< 0.334	--	< 0.255
Radium-228	pCi/L	NA	--	< 0.828	--	--	0.499	--	< 0.504	--	0.782
Radium-226/228	pCi/L	5.0	--	0.860	--	--	0.546	--	0.546	--	0.900
Selenium	ug/L	50	6	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2.0	--	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	731	1,400	1,240	1,030	1,530	1,170	1,030	115	782
Copper	ug/L	1,000	2	< 1.0	1	< 1	1	< 1	1	1	2
Nickel	ug/L	100	--	8.2	--	--	4	6	4	< 2	3
Silver	ug/L	34	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	--	--	< 10	< 30	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2019 to May 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-55								
		Sample Date:	8/13/2019	10/11/2019[3]	10/11/2019[3]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	**712**	**700**	**699**	481	441	**592**	**705**	**593**	**866**
Calcium	mg/L	**280**	--	190	--	--	188	178	170	151	147
Chloride	mg/L	2,300	--	19	--	--	14.6	16.7	18.0	16.7	19.5
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	1,220	< 1,000	< 1,000
Sulfate	mg/L	**780**	172	190	185	218	210	104	84.0	48.0	18.5
Total Dissolved Solids	mg/L	4,700	--	950	--	--	1,010	844	826	794	729
pH, Field	SU	6.5 - 8.5	7.0	6.9	6.9	7.5	7.6	7.1	7.2	7.1	7.1
Appendix IV[1]											
Antimony	ug/L	6.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**75**	**76**	**83**	**65**	**85**	**107**	**123**	**152**	**169**
Barium	ug/L	2,000	283	250	263	215	223	250	223	366	323
Beryllium	ug/L	4.0	--	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.20	--	--	0.4	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	1,220	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	28	27	33	21	27	33	33	28	24
Mercury	ug/L	2.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	**216**	**190**	**202**	**181**	**214**	**207**	**179**	**166**	**131**
Radium-226	pCi/L	NA	--	0.409	--	--	0.448	--	< 0.447	--	0.525
Radium-228	pCi/L	NA	--	1.05	--	--	< 0.460	--	0.566	--	0.896
Radium-226/228	pCi/L	5.0	--	1.45	--	--	0.858	--	0.798	--	1.42
Selenium	ug/L	50	1	< 1.0	< 1	1	< 1	2	1	< 1	1
Thallium	ug/L	2.0	--	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	22,900	**29,000**	21,600	18,000	22,000	21,300	21,800	23,500	21,500
Copper	ug/L	1,000	1	< 1.0	1	1	1	< 1	< 1	< 1	< 1
Nickel	ug/L	100	--	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2
Silver	ug/L	34	< 0.2	< 0.20	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	--	--	< 10	< 30	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2019 to May 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	OW-57R OUT								
		Sample Date:	8/15/2019	10/14/2019[3]	10/14/2019[3]	3/10/2020	5/20/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	**1,490**	**1,700**	**1,740**	**1,720**	**1,600**	**1,510**	**1,730**	**1,660**	**1,710**
Calcium	mg/L	**280**	--	130	--	--	130	132	144	128	133
Chloride	mg/L	2,300	--	58	--	--	64.9	53.9	49.4	59.0	62.9
Fluoride	ug/L	4,000	--	1,100	--	--	< 1,000	< 1,000	1,830	< 1,000	< 1,000
Sulfate	mg/L	**780**	118	110	220	87.2	89.4	96.8	109	86.0	78.3
Total Dissolved Solids	mg/L	4,700	--	750	--	--	834	658	782	761	743
pH, Field	SU	6.5 - 8.5	6.9	6.8	6.8	7.4	7.5	7.0	7.1	7.2	7.0
Appendix IV[1]											
Antimony	ug/L	6.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	1	1.7	2	1	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	77	73	74	74	72	77	73	70	73
Beryllium	ug/L	4.0	--	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	6	5.4	10	2	2	1	1	1	1
Cobalt	ug/L	15	--	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	1,100	--	--	< 1,000	< 1,000	1,830	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	24	25	27	22	24	27	24	26	24
Mercury	ug/L	2.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	8	7.4	8	7	7	7	8	7	6
Radium-226	pCi/L	NA	--	0.195	--	--	< 0.305	--	< 0.324	--	< 0.286
Radium-228	pCi/L	NA	--	< 0.373	--	--	0.468	--	< 0.463	--	0.606
Radium-226/228	pCi/L	5.0	--	< 0.373	--	--	0.688	--	0.499	--	0.615
Selenium	ug/L	50	1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2.0	--	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	82	280	320	294	135	42	92	46	100
Copper	ug/L	1,000	2	< 1.0	2	2	2	2	2	2	1
Nickel	ug/L	100	--	20	--	--	16	16	14	15	16
Silver	ug/L	34	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	--	--	< 10	< 30	16	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2019 to May 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18001								
		Sample Date:	8/15/2019	10/10/2019[3]	10/10/2019[3]	3/9/2020	5/18/2020	8/10/2020	10/13/2020	3/8/2021	5/10/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	**1,280**	**1,500**	**1,380**	**1,420**	**1,360**	**1,310**	**1,370**	**1,350**	**1,340**
Calcium	mg/L	**280**	--	170	--	--	232	237	**282**	270	**305**
Chloride	mg/L	2,300	--	58	--	--	71.5	70.8	73.8	72.1	77.3
Fluoride	ug/L	4,000	--	< 2,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	212	170	159	248	352	357	435	549	580
Total Dissolved Solids	mg/L	4,700	--	870	--	--	1330	1,370	1,370	1,610	1,670
pH, Field	SU	6.5 - 8.5	7.2	7.0	7.0	7.4	7.4	6.9	7.1	6.9	6.9
Appendix IV[1]											
Antimony	ug/L	6.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	2	2.5	2	3	3	3	3	2	2
Barium	ug/L	2,000	223	220	218	257	252	261	273	213	166
Beryllium	ug/L	4.0	--	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 2,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	52	53	58	56	60	69	66	69	68
Mercury	ug/L	2.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	0.434	--	--	0.372	--	< 0.423	--	< 0.378
Radium-228	pCi/L	NA	--	< 0.715	--	--	0.385	--	0.616	--	< 0.558
Radium-226/228	pCi/L	5.0	--	1.07	--	--	0.757	--	1.03	--	< 0.558
Selenium	ug/L	50	1	< 1.0	< 1	1	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2.0	--	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	286	130	110	201	277	202	182	183	154
Copper	ug/L	1,000	1	< 1.0	< 1	1	1	1	1	2	3
Nickel	ug/L	100	--	< 2.0	--	--	< 2	< 2	2	8	2
Silver	ug/L	34	< 0.2	< 0.20	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	2
Zinc	ug/L	2,400	--	< 10	--	--	< 10	< 30	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2019 to May 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18004								
		Sample Date:	8/13/2019	10/15/2019[3]	10/15/2019[3]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	344	430	479	274	265	347	410	232	246
Calcium	mg/L	**280**	--	270	--	--	**308**	**306**	**323**	252	266
Chloride	mg/L	2,300	--	39	--	--	10.9	25.6	22.6	17.9	12.4
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	**856**	**930**	**1,260**	714	361	718	756	581	523
Total Dissolved Solids	mg/L	4,700	--	1,800	--	--	1,720	1,820	1,690	1,390	1,270
pH, Field	SU	6.5 - 8.5	6.7	6.6	6.6	7.2	7.3	6.7	6.9	6.9	6.8
Appendix IV[1]											
Antimony	ug/L	6.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	< 1	< 1.0	< 1	3	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	45	43	46	47	28	36	34	20	27
Beryllium	ug/L	4.0	--	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	54	< 1.0	< 1	49	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1.0	< 1	2	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	32	37	39	29	31	39	37	35	36
Mercury	ug/L	2.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	< 0.135	--	--	< 0.256	--	< 0.424	--	< 0.271
Radium-228	pCi/L	NA	--	< 0.495	--	--	< 0.368	--	1.04	--	< 0.425
Radium-226/228	pCi/L	5.0	--	< 0.495	--	--	< 0.368	--	0.922	--	< 0.425
Selenium	ug/L	50	1	< 1.0	< 1	1	1	< 1	< 1	7	1
Thallium	ug/L	2.0	--	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	687	180	214	4,430	29	< 20	< 20	21	24
Copper	ug/L	1,000	7	< 1.0	3	5	3	2	3	3	2
Nickel	ug/L	100	--	< 2.0	--	--	< 2	< 2	4	< 2	2
Silver	ug/L	34	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	3	< 2.0	< 2	**10**	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	--	--	< 10	< 30	< 10	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2019 to May 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18005								
		Sample Date:	8/15/2019	10/11/2019[3]	10/11/2019[3]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	**1,310**	**1,700**	**1,480**	**1,230**	**1,150**	**1,100**	**1,090**	**987**	**919**
Calcium	mg/L	**280**	--	270	--	--	**419**	259	195	**286**	202
Chloride	mg/L	2,300	--	82	--	--	23.2	63.9	66.5	43.7	56.0
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	1,640	< 1,000	< 1,000
Sulfate	mg/L	**780**	533	470	476	**781**	**817**	398	185	535	263
Total Dissolved Solids	mg/L	4,700		1,300	--	--	1,950	1,310	986	1,420	1,020
pH, Field	SU	6.5 - 8.5	6.7	6.7	6.7	7.1	7.2	6.9	7.0	6.8	6.9
Appendix IV[1]											
Antimony	ug/L	6.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	8	11	10	7	12	8	8	7	9
Barium	ug/L	2,000	196	180	171	140	141	87	98	135	93
Beryllium	ug/L	4.0	--	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	27	12	7	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	1,640	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	62	50	59	47	53	45	33	39	30
Mercury	ug/L	2.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	0.397	--	--	0.381	--	1.07	--	< 0.224
Radium-228	pCi/L	NA	--	< 0.635	--	--	0.457	--	0.540	--	0.524
Radium-226/228	pCi/L	5.0	--	0.698	--	--	0.838	--	1.61	--	0.728
Selenium	ug/L	50	2	< 1.0	< 1	1	1	< 1	< 1	< 1	1
Thallium	ug/L	2.0	--	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	8,500	14,000	10,700	6,730	9,310	4,900	3,550	4,800	4,590
Copper	ug/L	1,000	3	< 1.0	1	2	3	2	1	2	1
Nickel	ug/L	100	--	12	--	--	4	9	11	8	10
Silver	ug/L	34	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	--	--	< 10	< 30	< 10	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2019 to May 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18006								
		Sample Date:	8/15/2019	10/14/2019[3]	10/14/2019[13]	3/11/2020	5/20/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	**2,750**	**2,800**	**2,830**	**3,110**	**3,030**	**2,040**	**2,610**	**2,650**	**2,720**
Calcium	mg/L	**280**	--	170	--	--	179	148	167	148	147
Chloride	mg/L	2,300	--	97	--	--	71.2	76.1	72.2	66.1	72.6
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	103	100	205	86.2	94.5	31.2	50.1	57.3	47.0
Total Dissolved Solids	mg/L	4,700	--	910	--	--	988	820	861	823	784
pH, Field	SU	6.5 - 8.5	6.9	6.8	6.8	7.2	7.4	7.0	7.1	6.9	6.9
Appendix IV[1]											
Antimony	ug/L	6.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**36**	**32**	**41**	**41**	**33**	12	**22**	**30**	**30**
Barium	ug/L	2,000	545	480	472	488	500	361	489	477	472
Beryllium	ug/L	4.0	--	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	2	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	73	72	77	65	70	41	59	58	53
Mercury	ug/L	2.0		< 0.20			< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	0.454	--	--	0.649	--	0.716	--	0.418
Radium-228	pCi/L	NA	--	0.500	--	--	0.346	--	0.853	--	< 0.483
Radium-226/228	pCi/L	5.0	--	0.954	--	--	0.995	--	1.57	--	0.888
Selenium	ug/L	50	1	< 1.0	1	1	< 1	< 1	< 1	< 1	1
Thallium	ug/L	2.0	--	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	8,170	9,900	8,400	7,060	7,280	3,360	5,760	5,730	5,490
Copper	ug/L	1,000	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	2
Nickel	ug/L	100	--	4.7	--	--	4	2	< 2	3	3
Silver	ug/L	34	< 0.2	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	4	3.4	4	4	3	< 2	3	3	3
Zinc	ug/L	2,400	--	< 10	--	--	< 10	< 30	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – August 2019 to May 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-50												
					Sample Date:	8/16/2019	10/10/2019(3)	10/10/2019(3)	3/9/2020	3/9/2020	5/19/2020	8/10/2020	8/10/2020	10/13/2020	3/8/2021	3/8/2021	5/10/2021	5/10/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**													
Appendix III(1)										Field Dup			Field Dup			Field Dup		Field Dup
Boron	ug/L	4,000	44,000	69,000	44,000	1,220	1,700	1,590	1,530	1,500	1,300	1,430	1,360	1,470	1,510	1,610	1,380	1,320
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	1,090	660	677	878	919	1,010	1,020	1,040	990	1,130	1,120	856	867
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.8	7.1	7.1	7.4	--	7.4	7.0	--	7.1	6.9	--	6.9	--
Appendix IV(1)																		
Arsenic	ug/L	10	100	680	**100**	3	2.8	3	1	1	1	2	2	3	1	1	1	1
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	1.4	< 1	1	< 1	< 1	< 1	< 1	< 1	1	1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	96	79	93	91	86	97	111	115	100	126	128	100	100
Molybdenum	ug/L	120	NC	NC	**120**	19	6.6	7	< 5	< 5	8	7	8	7	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	2	< 1.0	< 1	2	2	2	< 1	< 1	1	1	1	< 1	1
MI Part 115 Parameters(2)																		
Iron	ug/L	500,000[EE]	NC	NC	500,000	801	1,800	1,440	1,760	1,730	1,240	2,280	2,230	2,990	2,100	2,190	1,810	1,810
Vanadium	ug/L	27	NC	NC	27	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – August 2019 to May 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-51												
					Sample Date:	8/16/2019	10/10/2019(3)	10/10/2019(3)	10/10/2019(3)	10/10/2019(3)	3/9/2020	5/19/2020	5/19/2020	8/10/2020	10/14/2020	10/14/2020	3/8/2021	5/10/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**													
Appendix III(1)								Field Dup		Field Dup			Field Dup			Field Dup		
Boron	ug/L	4,000	44,000	69,000	44,000	782	890	900	843	819	967	944	967	758	739	798	1,040	1,040
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	586	570	580	562	557	424	487	474	556	522	537	452	450
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.0	6.7	--	6.7	--	7.4	7.4	--	6.8	6.8	--	7.0	7.0
Appendix IV(1)																		
Arsenic	ug/L	10	100	680	**100**	17	20	19	18	19	14	12	12	12	17	17	11	11
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	< 1.0	< 1.0	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	56	49	50	59	57	50	55	57	57	51	55	62	57
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5.0	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	1	< 1.0	< 1.0	< 1	< 1	1	1	< 1	< 1	< 1	< 1	1	< 1
MI Part 115 Parameters(2)																		
Iron	ug/L	500,000[EE]	NC	NC	500,000	4,740	6,700	6,800	5,270	5,250	2,050	2,830	2,750	4,390	5,400	5,600	1,940	2,200
Vanadium	ug/L	27	NC	NC	27	< 2	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – August 2019 to May 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-52								
					Sample Date:	8/15/2019	10/10/2019(3)	10/10/2019(3)	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III(1)														
Boron	ug/L	4,000	44,000	69,000	44,000	1,010	1,200	1,150	1,150	1,160	1,200	1,110	1,120	1,160
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	567	520	506	412	< 1	586	572	531	574
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.9	6.9	6.9	7.3	7.5	6.9	7.0	7.0	6.9
Appendix IV(1)														
Arsenic	ug/L	10	100	680	**100**	1	< 1.0	1	< 1	< 1	< 1	< 1	< 1	< 1
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	38	30	38	28	32	38	33	31	29
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	2	< 1.0	1	< 1	< 1	< 1	1	1	1
MI Part 115 Parameters(2)														
Iron	ug/L	500,000[EE]	NC	NC	500,000	5,530	5,600	4,350	782	1,140	2,720	4,770	879	1,400
Vanadium	ug/L	27	NC	NC	27	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – August 2019 to May 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-53								
					Sample Date:	8/15/2019	10/10/2019[3]	10/10/2019[3]	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III[1]														
Boron	ug/L	4,000	44,000	69,000	44,000	1,810	900	840	2,530	1,750	2,760	2,720	3,920	3,790
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	653	960	940	278	549	321	269	317	322
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.9	6.7	6.7	7.4	7.3	7.0	7.2	7.1	7.1
Appendix IV[1]														
Arsenic	ug/L	10	100	680	**100**	3	2.9	3	< 1	2	2	2	< 1	< 1
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	< 1.0	< 1	< 1	6	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	48	45	55	47	58	53	49	52	46
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	2	< 1.0	< 1	1	2	< 1	< 1	< 1	2
MI Part 115 Parameters[2]														
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,700	3,700	3,100	1,200	2,070	1,510	1,560	1,180	1,420
Vanadium	ug/L	27	NC	NC	27	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – August 2019 to May 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-53R								
					Sample Date:	8/15/2019	10/10/2019[3]	10/10/2019[3]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/10/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III[1]														
Boron	ug/L	4,000	44,000	69,000	44,000	1,390	1,800	1,680	1,590	1,460	1,540	1,780	1,510	1,580
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	264	240	295	163	177	275	196	227	170
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.9	6.8	6.8	7.2	7.4	6.8	7.0	6.8	6.8
Appendix IV[1]														
Arsenic	ug/L	10	100	680	**100**	31	32	32	19	27	31	40	19	18
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	1.7	1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	66	61	69	53	60	71	66	64	59
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	1	< 1.0	< 1	< 1	< 1	< 1	1	< 1	< 1
MI Part 115 Parameters[2]														
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,930	2,600	2,050	881	1,910	2,020	2,140	971	2,220
Vanadium	ug/L	27	NC	NC	27	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

NA - not applicable.

NC - no criteria.

-- - not analyzed.

^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.

* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.

** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.

[F] - Criterion is the Final Acute Value (FAV) .

[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.

[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

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

All metals were analyzed as total unless otherwise specified.

(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.

(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – August 2019 to May 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-54R								
					Sample Date:	8/13/2019	10/10/2019(3)	10/10/2019(3)	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III(1)														
Boron	ug/L	4,000	44,000	69,000	44,000	1,760	1,500	1,470	1,280	1,730	1,660	1,660	2,470	3,140
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	174	130	131	86.2	95.7	96.2	100	79.9	72.7
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.9	6.9	6.9	7.3	7.4	6.9	7.1	6.9	6.6
Appendix IV(1)														
Arsenic	ug/L	10	100	680	**100**	3	2.3	3	3	2	3	3	1	1
Chromium	ug/L	11[H]	NC	NC	**11**	**16**	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	69	53	61	47	58	61	57	66	64
Molybdenum	ug/L	120	NC	NC	**120**	9	6.2	7	< 5	< 5	5	5	< 5	< 5
Selenium	ug/L	50	55	120	55	6	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MI Part 115 Parameters(2)														
Iron	ug/L	500,000[EE]	NC	NC	500,000	731	1,400	1,240	1,030	1,530	1,170	1,030	115	782
Vanadium	ug/L	27	NC	NC	27	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – August 2019 to May 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-55								
					Sample Date:	8/13/2019	10/11/2019[3]	10/11/2019[3]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III[1]														
Boron	ug/L	4,000	44,000	69,000	44,000	712	700	699	481	441	592	705	593	866
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	172	190	185	218	210	104	84.0	48.0	18.5
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.0	6.9	6.9	7.5	7.6	7.1	7.2	7.1	7.1
Appendix IV[1]														
Arsenic	ug/L	10	100	680	**100**	75	76	83	65	85	**107**	**123**	**152**	**169**
Chromium	ug/L	11[H]	NC	NC	**11**	1	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	28	27	33	21	27	33	33	28	24
Molybdenum	ug/L	120	NC	NC	**120**	**216**	**190**	**202**	**181**	**214**	**207**	**179**	**166**	**131**
Selenium	ug/L	50	55	120	55	1	< 1.0	< 1	1	< 1	2	1	< 1	1
MI Part 115 Parameters[2]														
Iron	ug/L	500,000[EE]	NC	NC	500,000	22,900	29,000	21,600	18,000	22,000	21,300	21,800	23,500	21,500
Vanadium	ug/L	27	NC	NC	27	< 2	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – August 2019 to May 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	JCW-MW-18004								
					Sample Date:	8/13/2019	10/15/2019(3)	10/15/2019(3)	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III(1)														
Boron	ug/L	4,000	44,000	69,000	44,000	344	430	479	274	265	347	410	232	246
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	856	930	**1,260**	714	361	718	756	581	523
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.7	6.6	6.6	7.2	7.3	6.7	6.9	6.9	6.8
Appendix IV(1)														
Arsenic	ug/L	10	100	680	**100**	< 1	< 1.0	< 1	3	< 1	< 1	< 1	< 1	< 1
Chromium	ug/L	11[H]	NC	NC	**11**	**54**	< 1.0	< 1	**49**	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	32	37	39	29	31	39	37	35	36
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	1	< 1.0	< 1	1	1	< 1	< 1	7	1
MI Part 115 Parameters(2)														
Iron	ug/L	500,000[EE]	NC	NC	500,000	687	180	214	4,430	29	< 20	< 20	21	24
Vanadium	ug/L	27	NC	NC	27	3	< 2.0	< 2	10	< 2	< 2	< 2	< 2	< 2

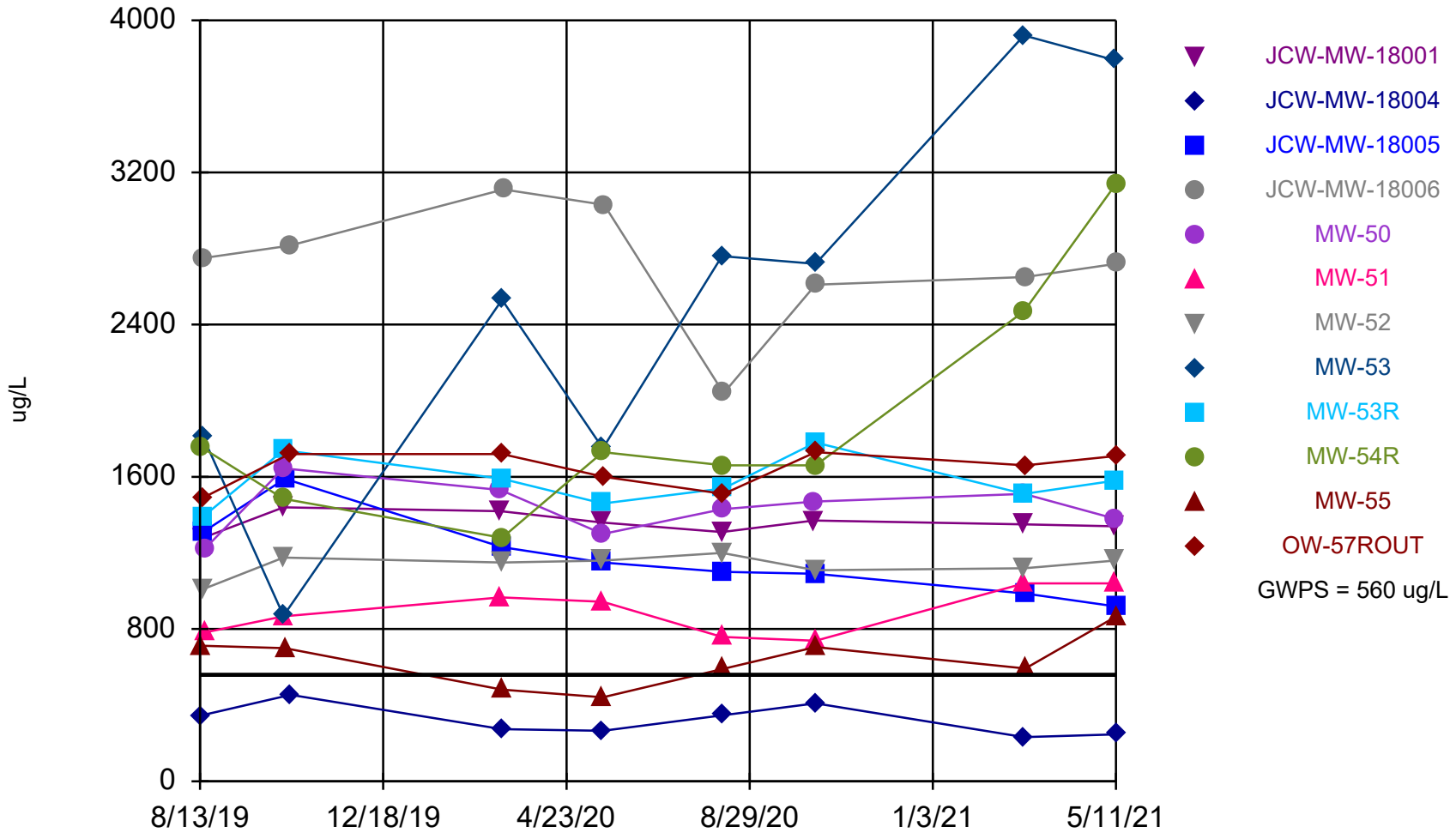
Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Attachment 1
Assessment Monitoring Sanitas™ Output Files

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. UG

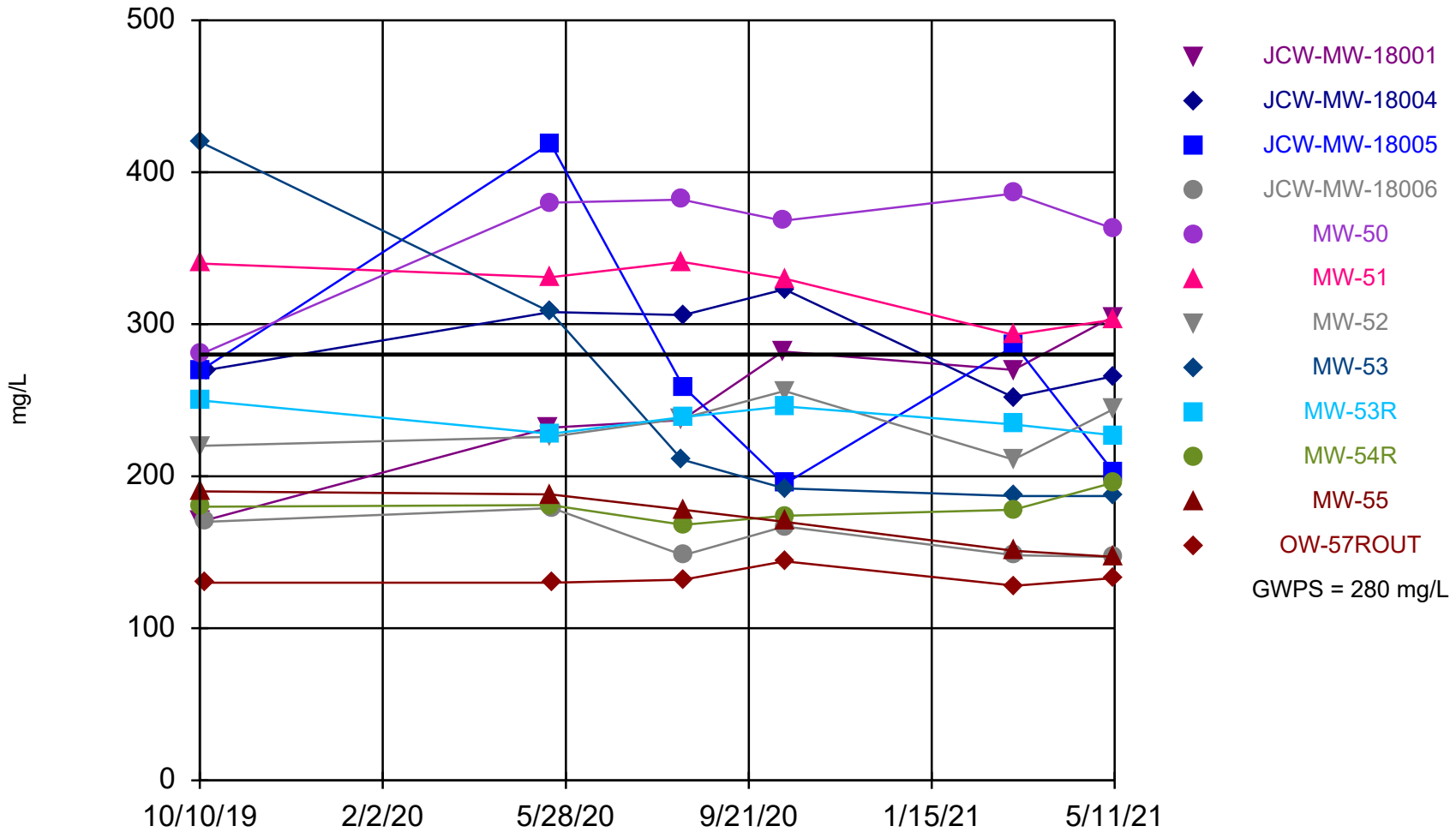
Boron Comparison to GWPS



Time Series Analysis Run 6/17/2021 2:28 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Calcium Comparison to GWPS

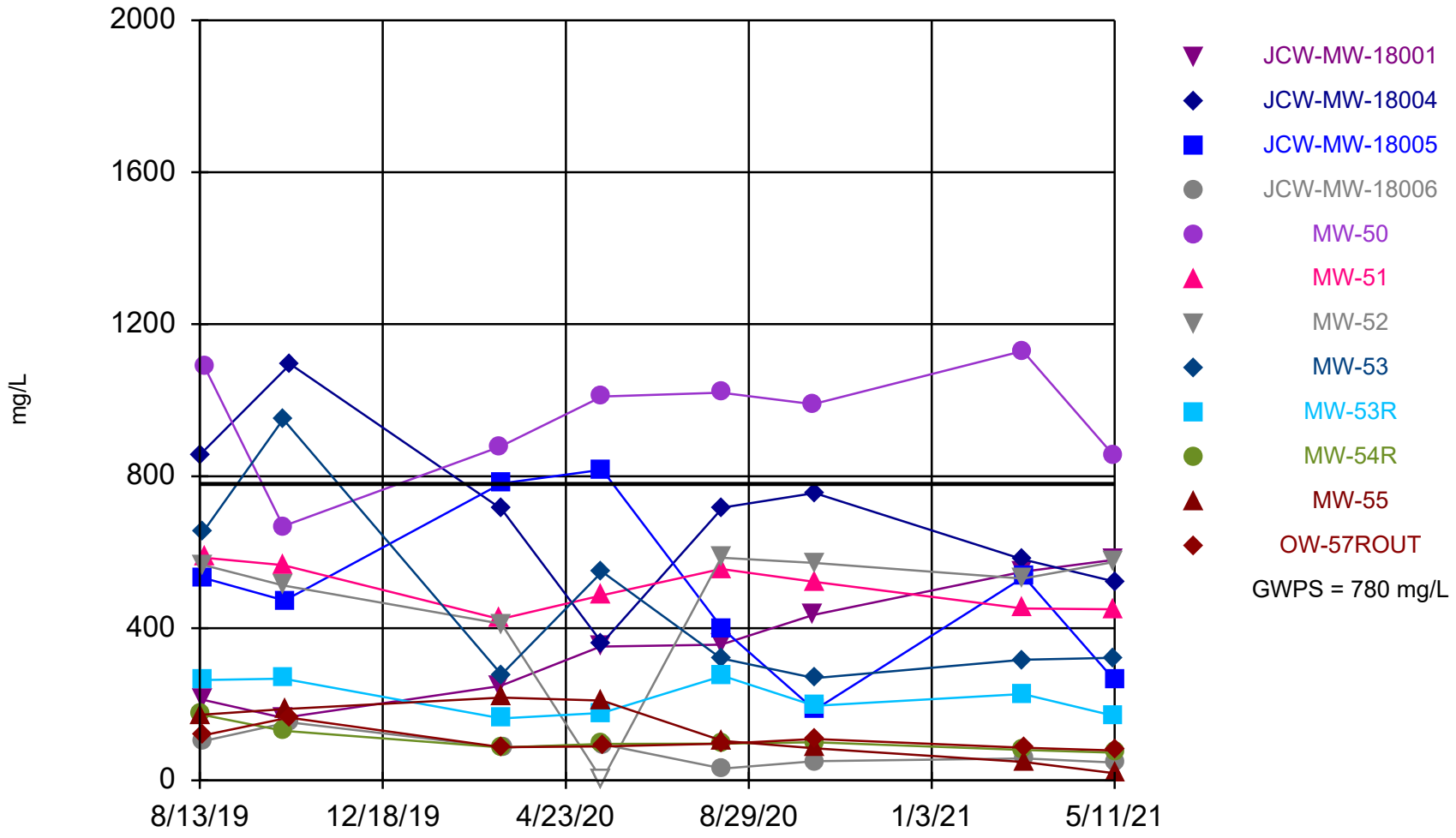


Time Series Analysis Run 6/17/2021 2:29 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Sulfate Comparison to GWPS

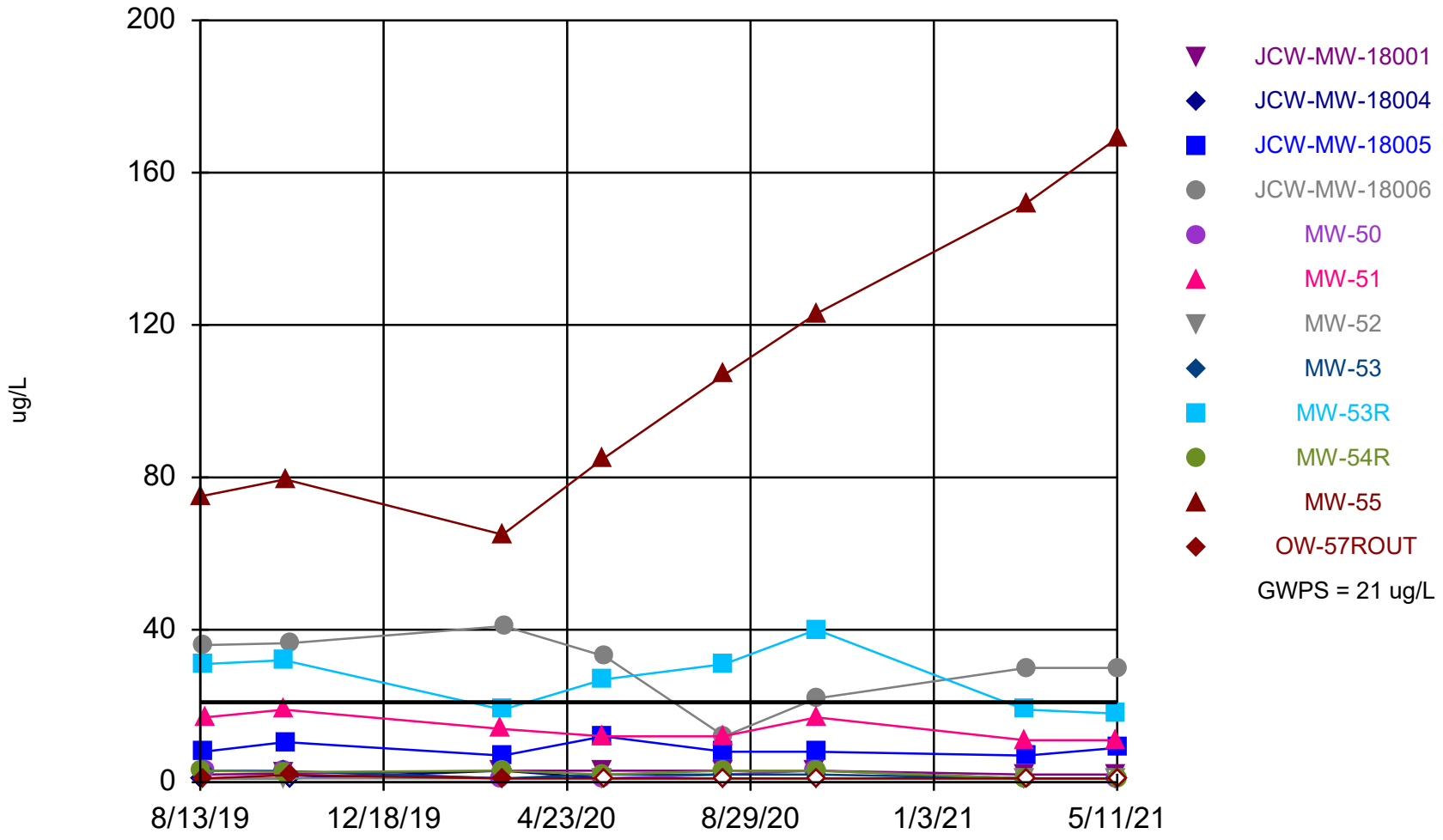


Time Series Analysis Run 6/17/2021 2:29 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Arsenic Comparison to GWPS

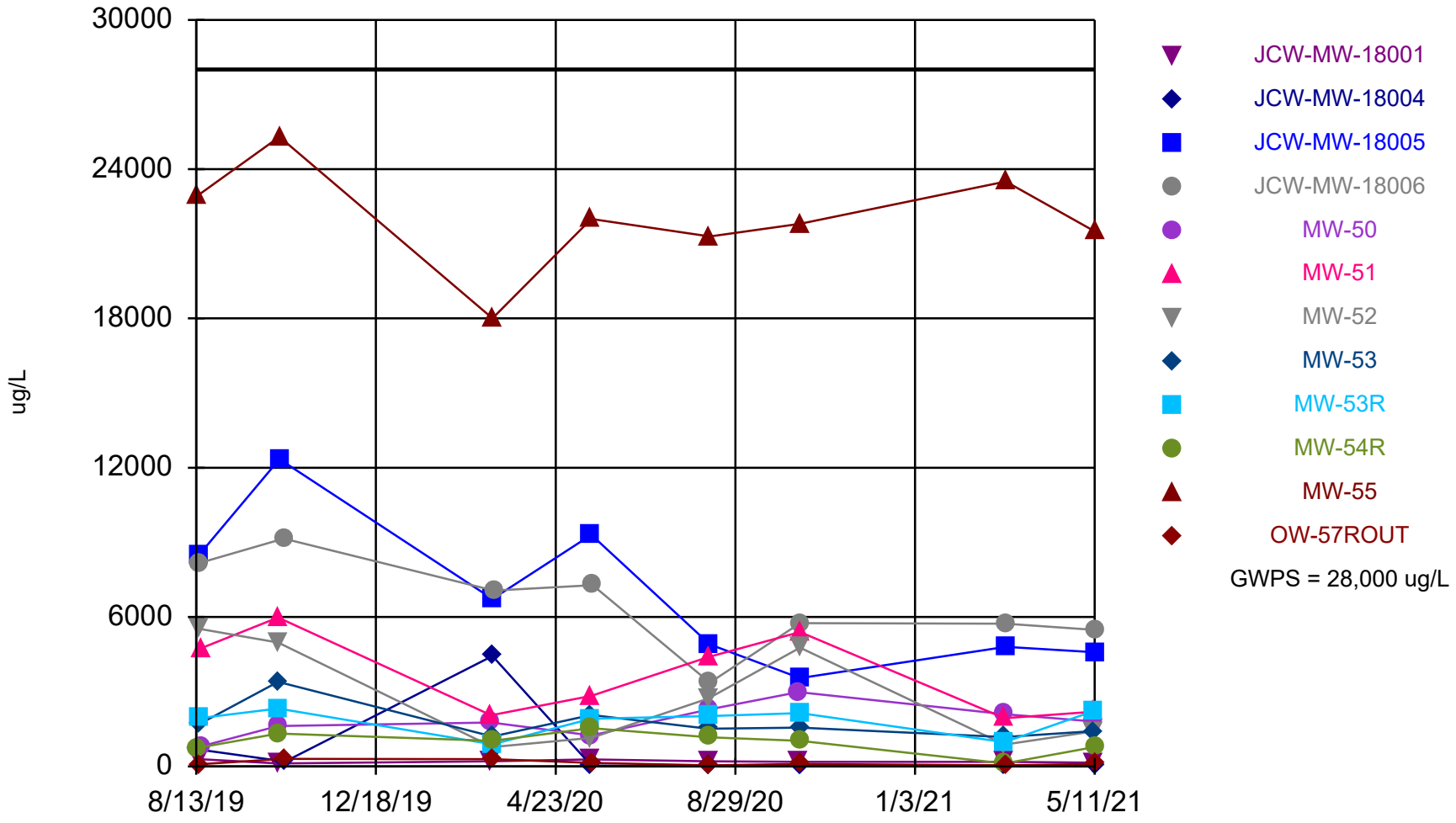


Time Series Analysis Run 6/17/2021 2:26 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Iron Comparison to GWPS

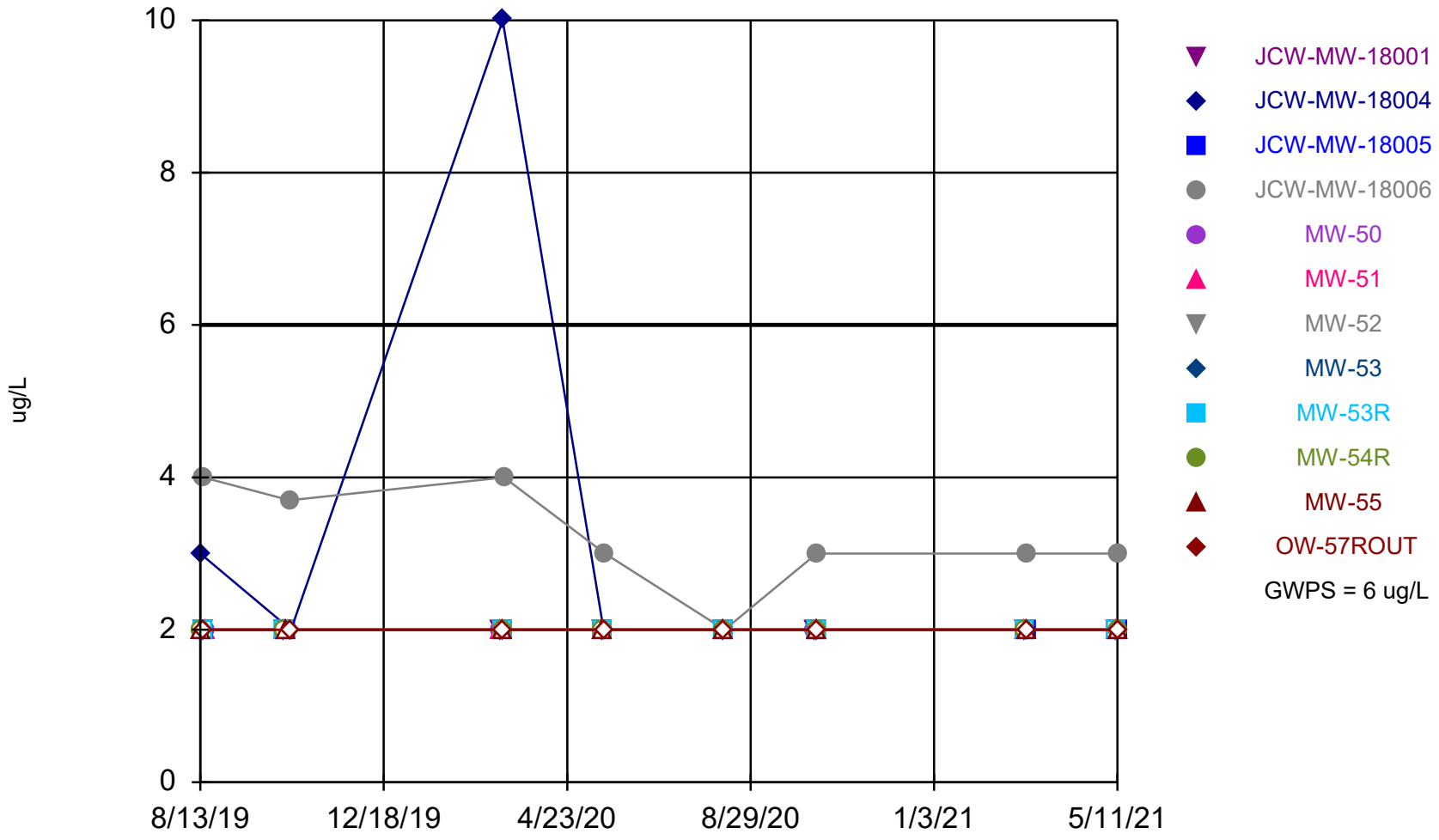


Time Series Analysis Run 6/17/2021 2:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Vanadium Comparison to GWPS



Time Series Analysis Run 6/17/2021 2:34 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Summary Report

Constituent: Boron, Total Analysis Run 6/17/2021 2:37 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

For observations made between 8/13/2019 and 5/11/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 0
Wells = 12
Minimum Value = 232
Maximum Value = 3920
Mean Value = 1442
Median Value = 1365
Standard Deviation = 762.2
Coefficient of Variation = 0.5287
Skewness = 0.9818

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	1280	1440	1359	1355	52.76	0.03883	0.1623
JCW-MW-18004	8	0	232	454.5	321.6	309	80.92	0.2516	0.4699
JCW-MW-18005	8	0	919	1590	1172	1125	209.7	0.1789	0.868
JCW-MW-18006	8	0	2040	3110	2716	2735	324.6	0.1195	-0.9668
MW-50	8	0	1220	1645	1436	1450	134.9	0.094	-0.138
MW-51	8	0	739	1040	892.1	905.3	123.2	0.1381	-0.02524
MW-52	8	0	1010	1200	1136	1155	58.28	0.05132	-1.268
MW-53	8	0	870	3920	2519	2625	1034	0.4107	-0.06406
MW-53R	8	0	1390	1780	1574	1560	132.2	0.08402	0.3567
MW-54R	8	0	1280	3140	1898	1695	607.4	0.32	1.2
MW-55	8	0	441	866	636.2	646.3	138	0.2169	0.1053
OW-57ROUT	8	0	1490	1730	1643	1685	97.94	0.05963	-0.656

Summary Report

Constituent: Calcium, Total Analysis Run 6/17/2021 2:37 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

For observations made between 10/10/2019 and 5/11/2021, a summary of the selected data set:

Observations = 72
ND/Trace = 0
Wells = 12
Minimum Value = 128
Maximum Value = 420
Mean Value = 237.9
Median Value = 230
Standard Deviation = 76.46
Coefficient of Variation = 0.3214
Skewness = 0.5515

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	6	0	170	305	249.3	253.5	47.62	0.191	-0.5887
JCW-MW-18004	6	0	252	323	287.5	288	28.47	0.09901	-0.003334
JCW-MW-18005	6	0	195	419	271.8	264.5	81	0.298	0.9868
JCW-MW-18006	6	0	147	179	159.8	157.5	13.91	0.087	0.2471
MW-50	6	0	280	386	359.8	374	40.08	0.1114	-1.603
MW-51	6	0	293	341	323	330.5	20.13	0.06232	-0.6285
MW-52	6	0	211	256	232.5	232	16.59	0.07134	0.12
MW-53	6	0	187	420	250.8	201.5	94.96	0.3786	1.085
MW-53R	6	0	227	250	237.3	236.5	9.416	0.03968	0.1927
MW-54R	6	0	168	196	179.5	179	9.375	0.05223	0.7457
MW-55	6	0	147	190	170.7	174	18.3	0.1073	-0.287
OW-57ROUT	6	0	128	144	132.8	131	5.742	0.04322	1.428

Summary Report

Constituent: Sulfate Analysis Run 6/17/2021 2:37 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

For observations made between 8/13/2019 and 5/11/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 1
Wells = 12
Minimum Value = 1
Maximum Value = 1130
Mean Value = 381.8
Median Value = 297.5
Standard Deviation = 295.3
Coefficient of Variation = 0.7734
Skewness = 0.7907

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	164.5	580	362.2	354.5	152.3	0.4206	0.2003
JCW-MW-18004	8	0	361	1095	700.5	716	221.8	0.3167	0.2645
JCW-MW-18005	8	0	185	817	498.1	503	223.1	0.4478	0.1436
JCW-MW-18006	8	0	31.2	152.5	77.73	71.75	39.41	0.507	0.6992
MW-50	8	0	668.5	1130	955.3	1000	148.9	0.1558	-0.777
MW-51	8	0	424	586	505.4	504.5	60.82	0.1203	0.009733
MW-52	8	1	1	586	469.5	549	197.5	0.4206	-1.943
MW-53	8	0	269	950	457.4	321.5	243.1	0.5315	1.144
MW-53R	8	0	163	275	217.4	211.5	46.89	0.2156	0.1096
MW-54R	8	0	72.7	174	104.4	95.95	33	0.3161	1.279
MW-55	8	0	18.5	218	130.3	138	76.68	0.5887	-0.2119
OW-57ROUT	8	0	78.3	165	103.7	93.1	27.96	0.2696	1.422

Summary Report

Constituent: Arsenic, Total Analysis Run 6/17/2021 2:37 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

For observations made between 8/13/2019 and 5/11/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 21
Wells = 12
Minimum Value = 1
Maximum Value = 169
Mean Value = 16.57
Median Value = 3
Standard Deviation = 31.1
Coefficient of Variation = 1.877
Skewness = 3.068

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	2	3	2.531	2.625	0.5078	0.2006	-0.07007
JCW-MW-18004	8	7	1	3	1.25	1	0.7071	0.5657	2.268
JCW-MW-18005	8	0	7	12	8.688	8	1.751	0.2016	0.9027
JCW-MW-18006	8	0	12	41	30.06	31.5	9.229	0.307	-0.8951
MW-50	8	0	1	3	1.863	1.5	0.9753	0.5237	0.2463
MW-51	8	0	11	19	14.13	13	3.137	0.2221	0.4115
MW-52	8	6	1	1	1	1	0	0	NaN
MW-53	8	3	1	3	1.869	2	0.825	0.4415	0.2044
MW-53R	8	0	18	40	27.13	29	7.882	0.2906	0.1665
MW-54R	8	0	1	3	2.331	2.825	0.89	0.3818	-0.7639
MW-55	8	0	65	169	106.9	96	38.08	0.3561	0.5451
OW-57ROUT	8	5	1	1.85	1.106	1	0.3005	0.2717	2.268

Summary Report

Constituent: Iron, Total Analysis Run 6/17/2021 2:37 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

For observations made between 8/13/2019 and 5/11/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 2
Wells = 12
Minimum Value = 20
Maximum Value = 25300
Mean Value = 4100
Median Value = 1860
Standard Deviation = 6012
Coefficient of Variation = 1.466
Skewness = 2.275

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	120	286	200.6	192	56.64	0.2823	0.3618
JCW-MW-18004	8	2	20	4430	678.5	26.5	1533	2.26	2.173
JCW-MW-18005	8	0	3550	12350	6841	5815	3001	0.4387	0.7001
JCW-MW-18006	8	0	3360	9150	6500	6410	1803	0.2774	-0.2328
MW-50	8	0	801	2990	1825	1785	663	0.3633	0.216
MW-51	8	0	1940	5985	3692	3610	1625	0.4403	0.1696
MW-52	8	0	782	5530	2775	2060	2019	0.7278	0.3309
MW-53	8	0	1180	3400	1755	1535	722.8	0.4119	1.643
MW-53R	8	0	881	2325	1800	1975	557.7	0.3099	-0.9433
MW-54R	8	0	115	1530	963.5	1030	432	0.4484	-0.7442
MW-55	8	0	18000	25300	22038	21900	2095	0.09506	-0.4633
OW-57ROUT	8	0	42	300	136.4	96	103.5	0.7587	0.8853

Summary Report

Constituent: Vanadium, Total Analysis Run 6/17/2021 2:37 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

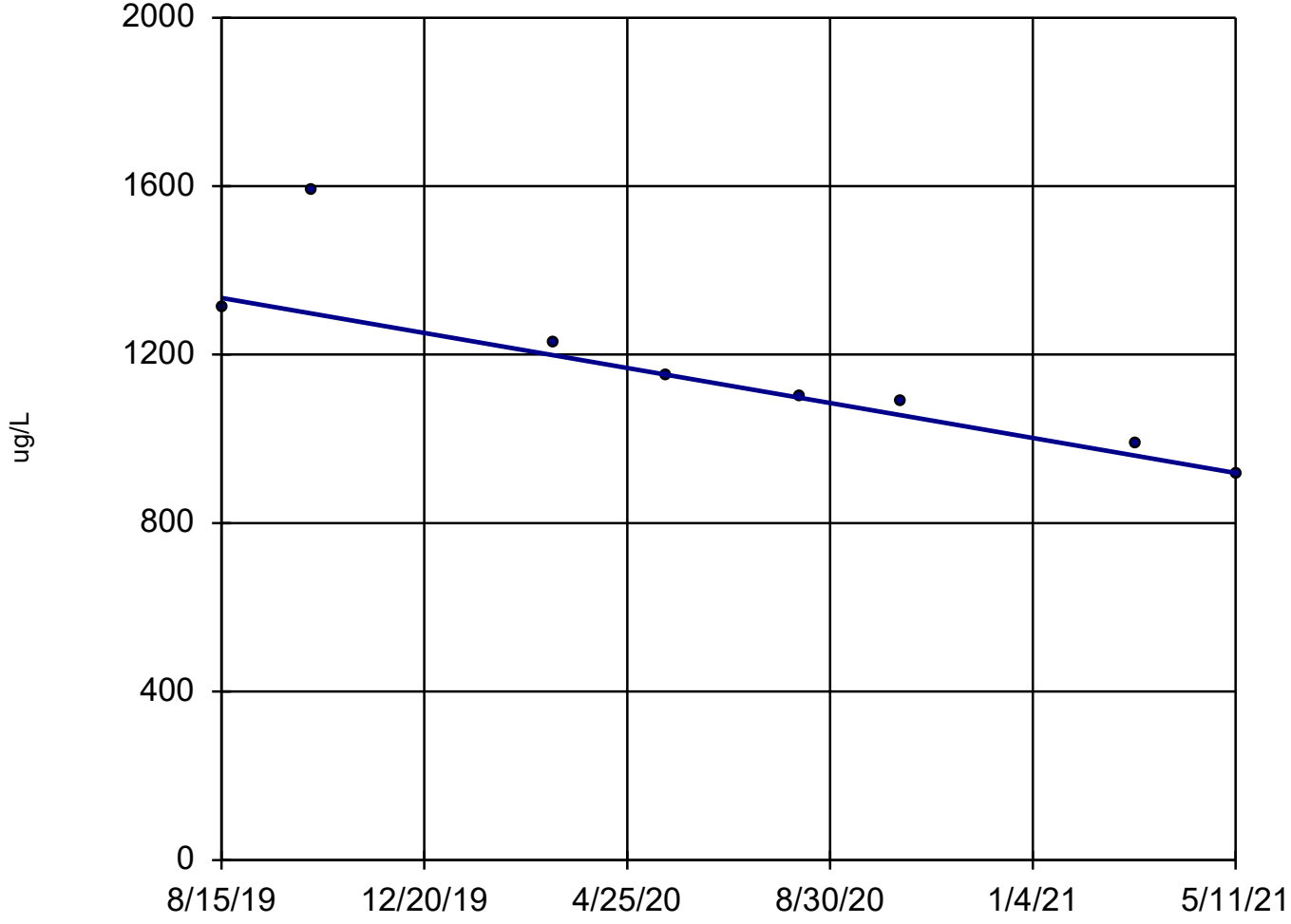
For observations made between 8/13/2019 and 5/11/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 86
Wells = 12
Minimum Value = 2
Maximum Value = 10
Mean Value = 2.195
Median Value = 2
Standard Deviation = 0.8959
Coefficient of Variation = 0.4082
Skewness = 7.25

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	7	2	2	2	2	0	0	NaN
JCW-MW-18004	8	6	2	10	3.125	2	2.8	0.896	2.202
JCW-MW-18005	8	8	2	2	2	2	0	0	NaN
JCW-MW-18006	8	1	2	4	3.213	3	0.6686	0.2081	-0.3722
MW-50	8	8	2	2	2	2	0	0	NaN
MW-51	8	8	2	2	2	2	0	0	NaN
MW-52	8	8	2	2	2	2	0	0	NaN
MW-53	8	8	2	2	2	2	0	0	NaN
MW-53R	8	8	2	2	2	2	0	0	NaN
MW-54R	8	8	2	2	2	2	0	0	NaN
MW-55	8	8	2	2	2	2	0	0	NaN
OW-57ROUT	8	8	2	2	2	2	0	0	NaN

Boron, Total

JCW-MW-18005



n = 8

Slope = -239.1 units per year.

Mann-Kendall statistic = -26
critical = -20

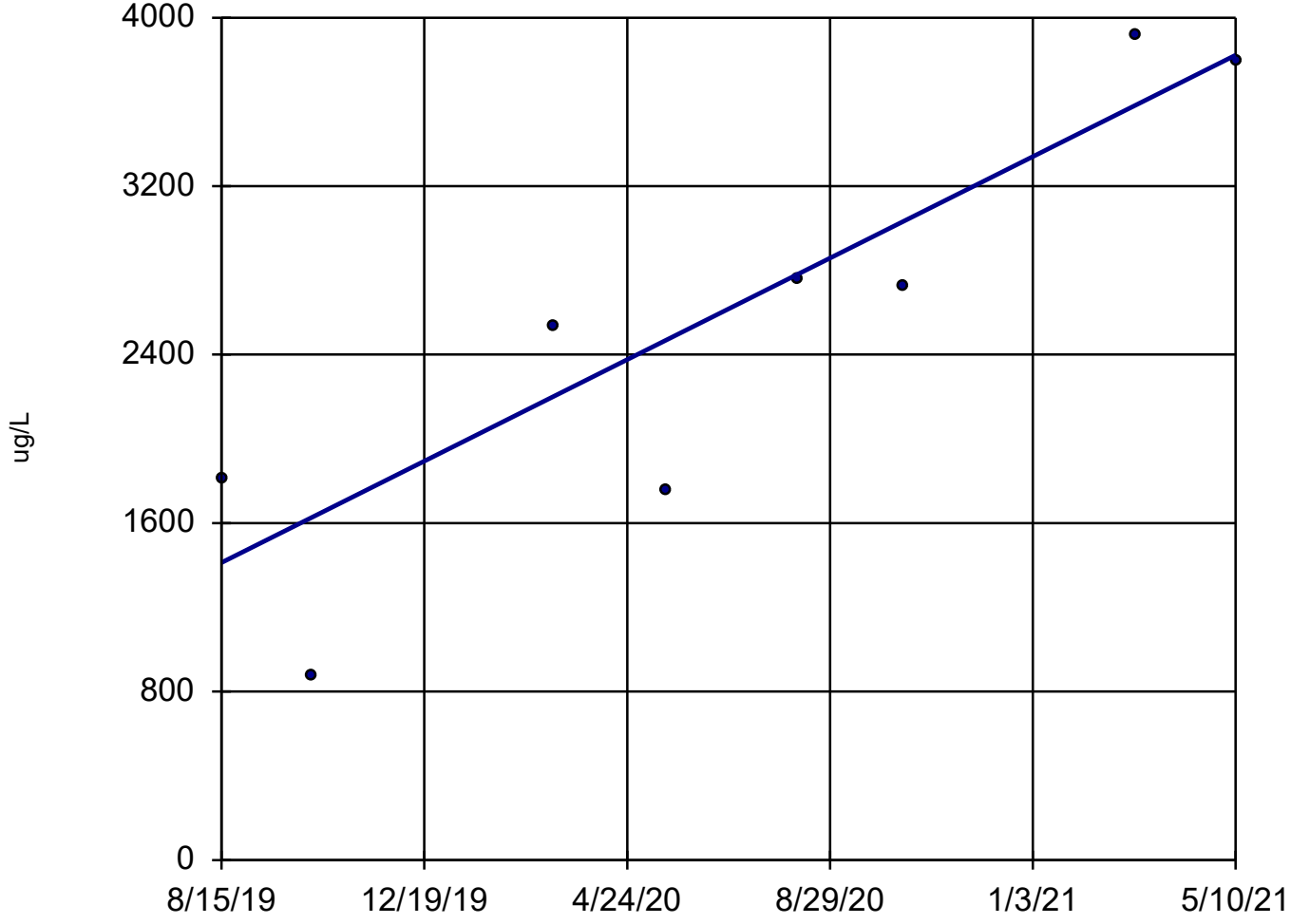
Decreasing trend significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/17/2021 3:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Boron, Total

MW-53



n = 8

Slope = 1387 units per year.

Mann-Kendall statistic = 18
critical = 20

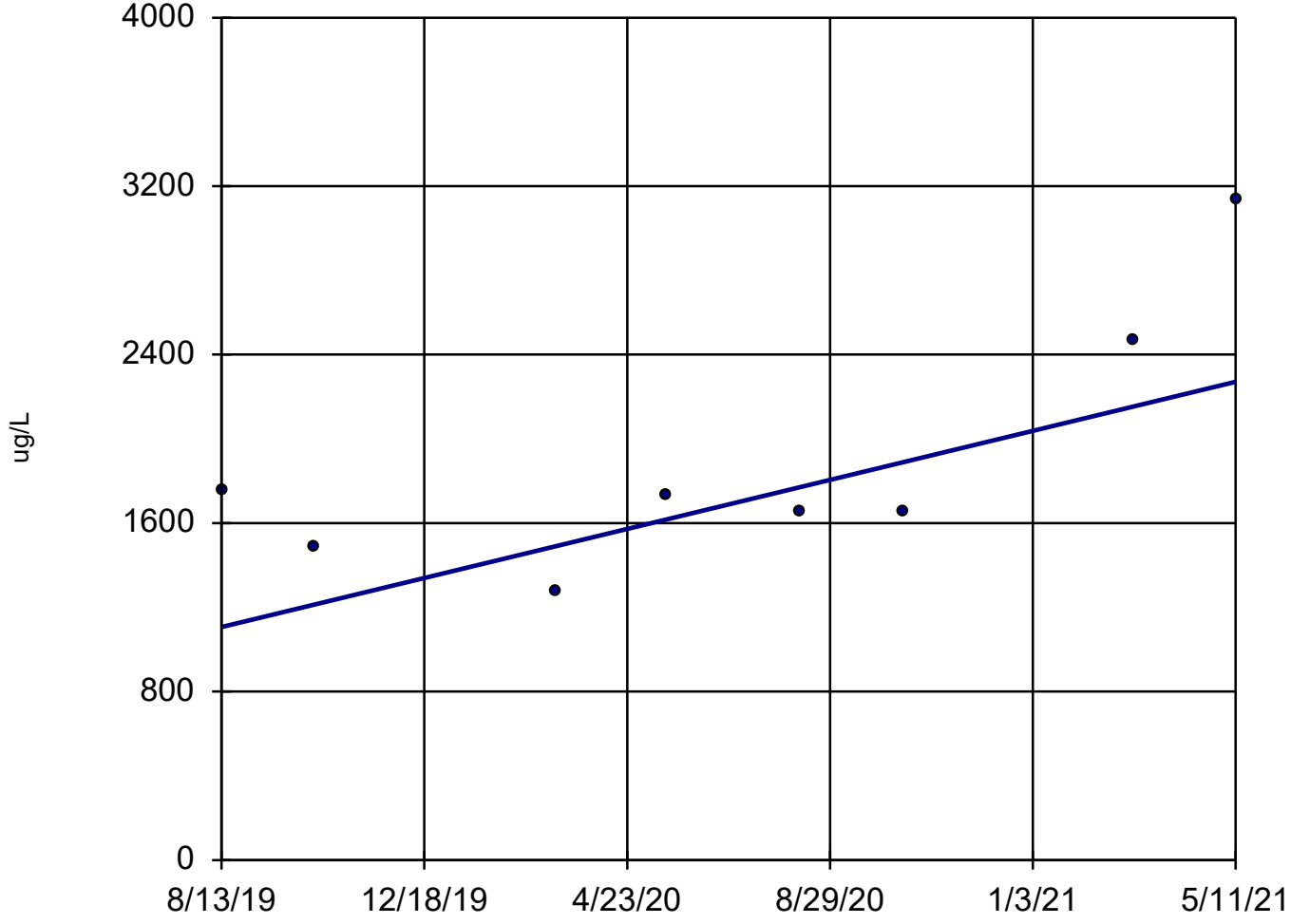
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/17/2021 3:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Boron, Total

MW-54R



n = 8

Slope = 667.2 units per year.

Mann-Kendall statistic = 11
critical = 20

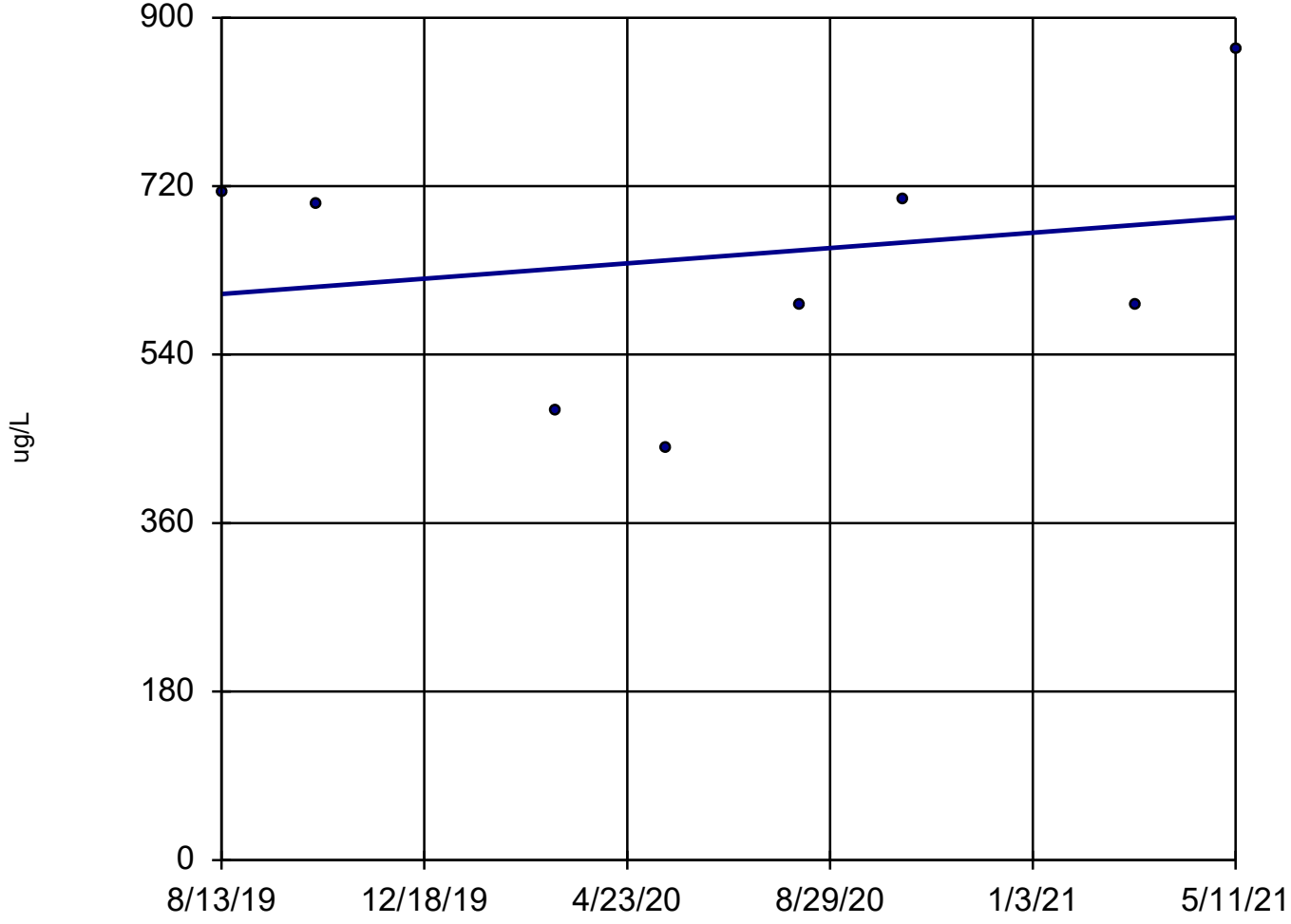
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/17/2021 3:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Boron, Total

MW-55



n = 8

Slope = 46.84 units per year.

Mann-Kendall statistic = 4
critical = 20

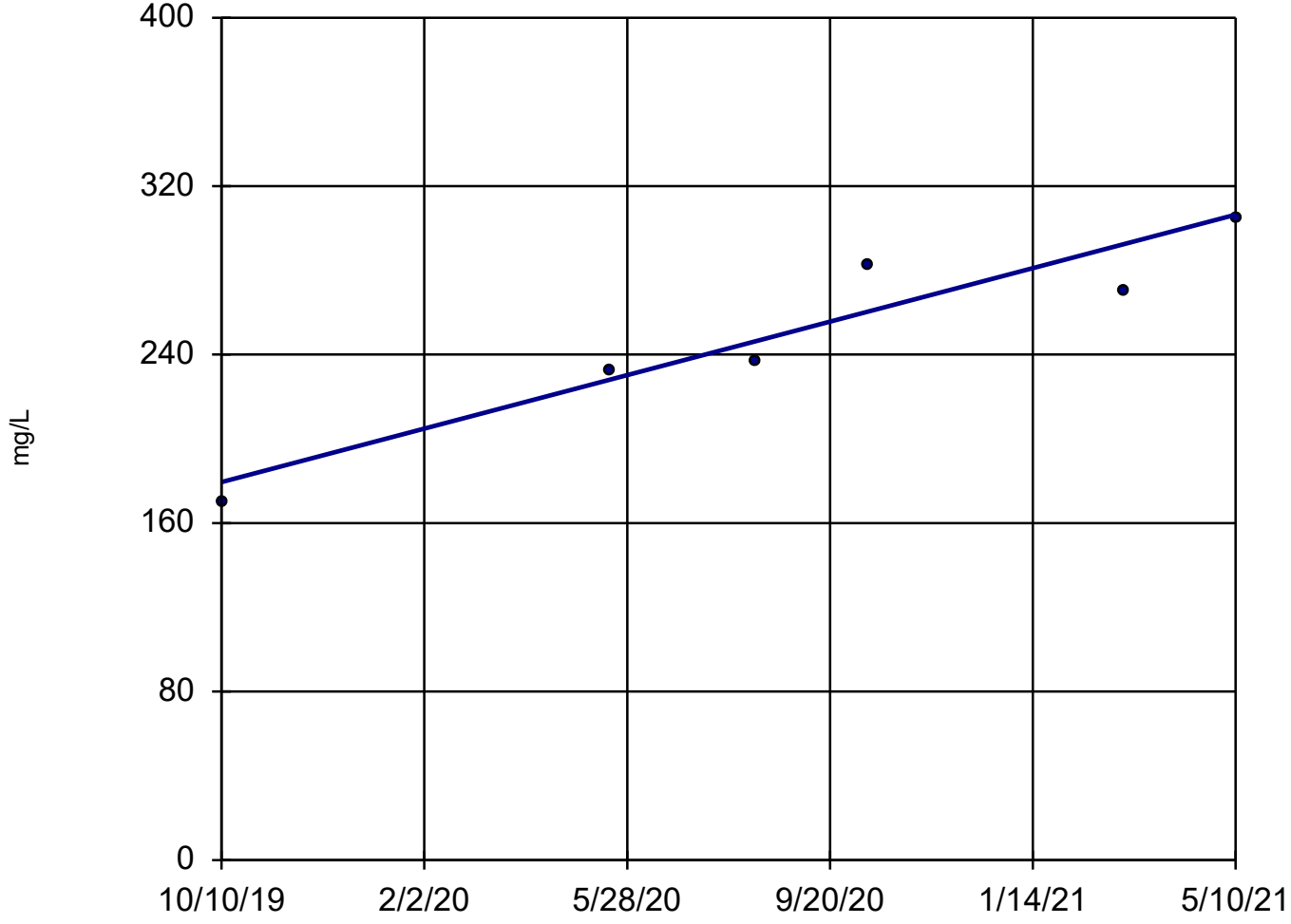
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/17/2021 3:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Calcium, Total

JCW-MW-18001



n = 6

Slope = 80.18 units per year.

Mann-Kendall statistic = 13
critical = 13

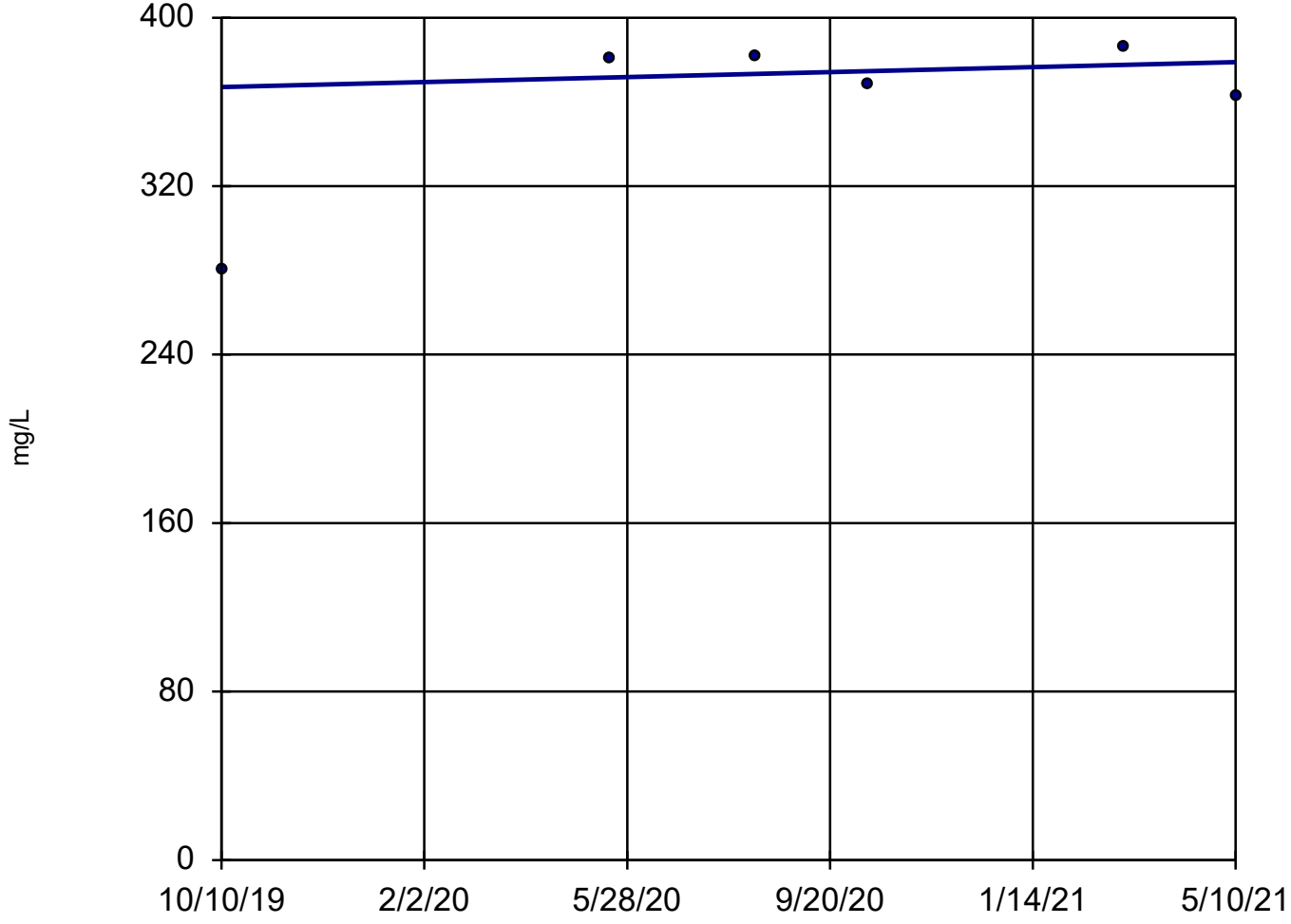
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/17/2021 3:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Calcium, Total

MW-50



n = 6

Slope = 7.474 units per year.

Mann-Kendall statistic = 3
critical = 13

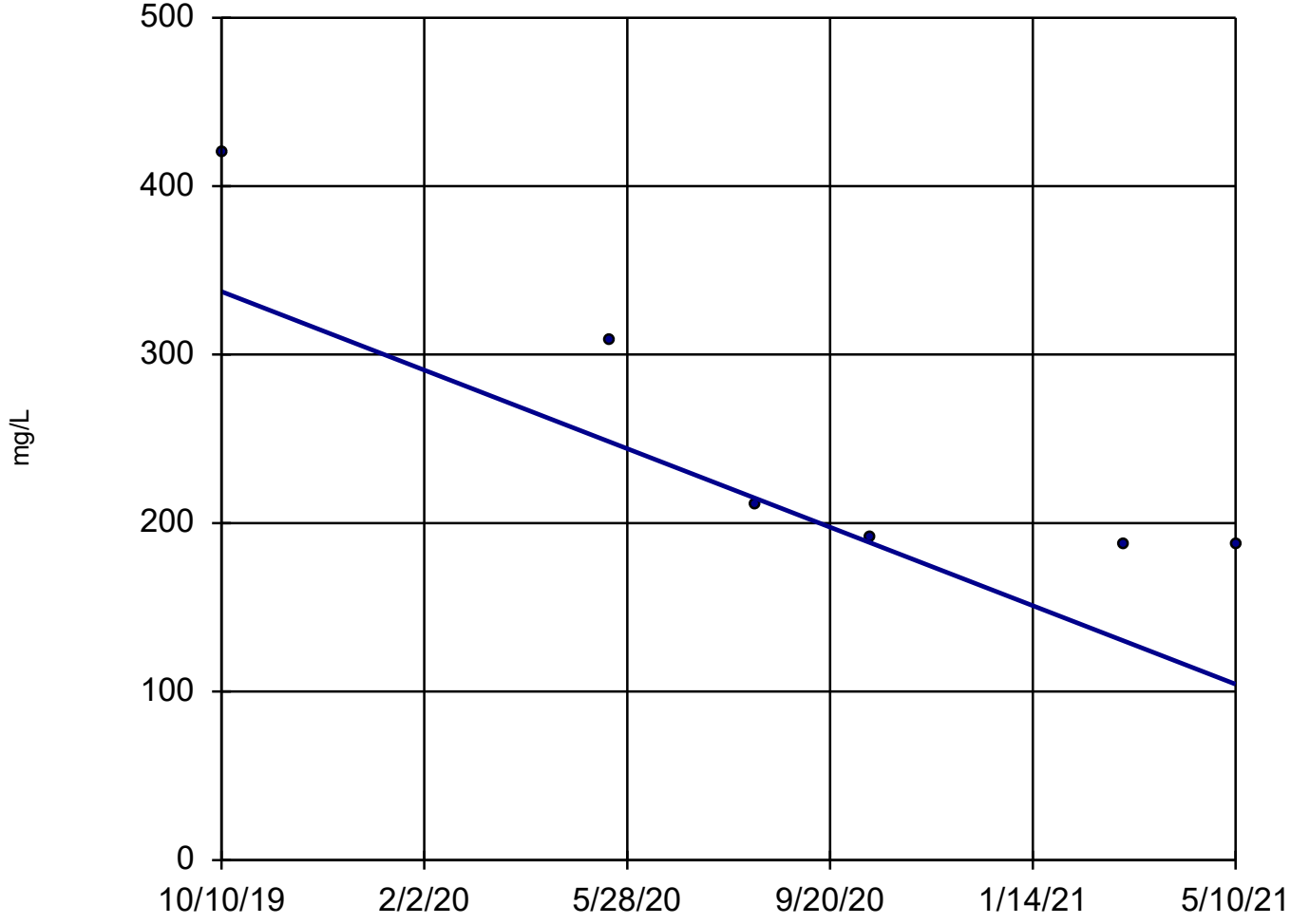
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/17/2021 3:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Calcium, Total

MW-53



n = 6

Slope = -147.1 units per year.

Mann-Kendall statistic = -14
critical = -13

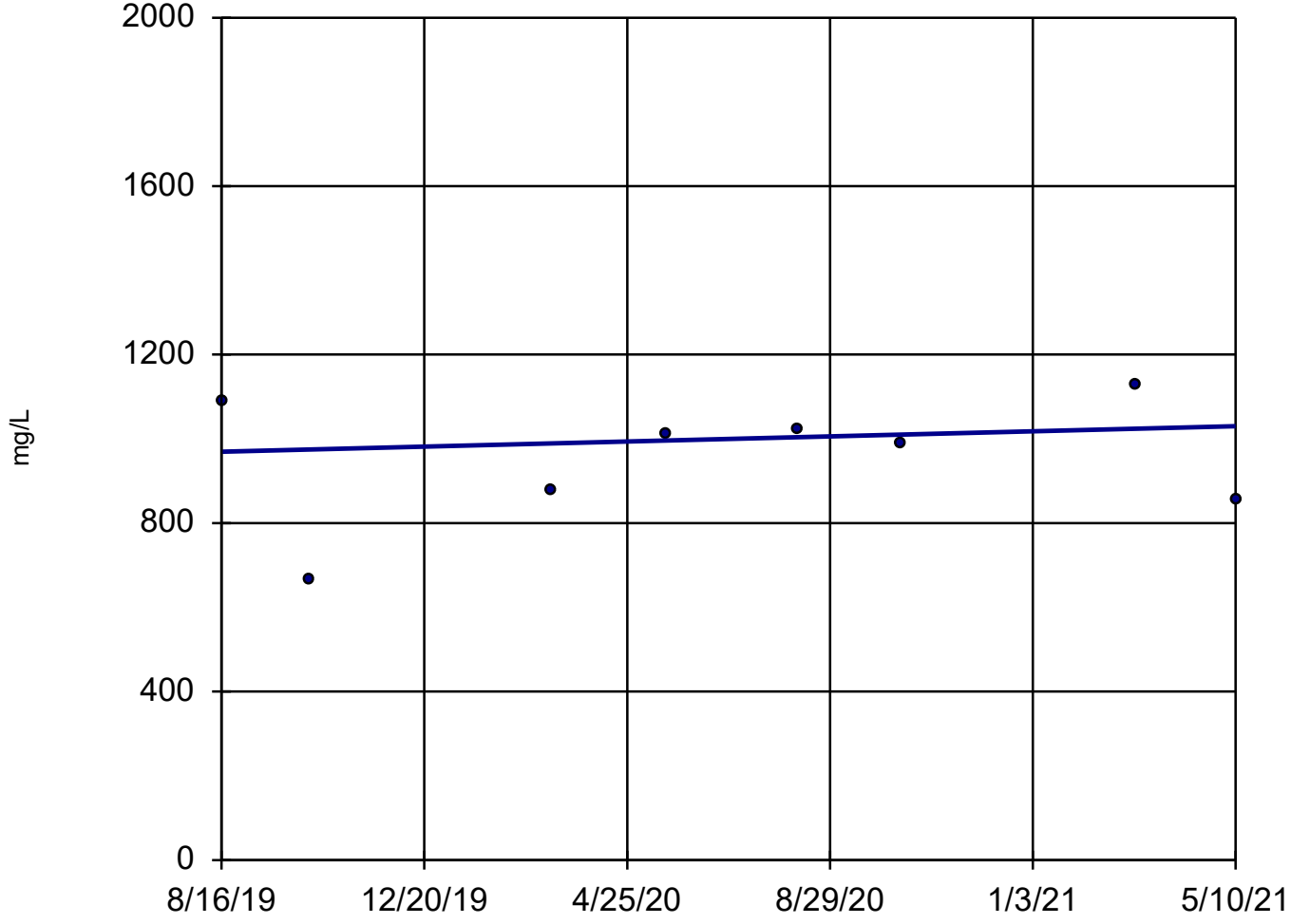
Decreasing trend significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/17/2021 3:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Sulfate

MW-50



n = 8

Slope = 34.79 units per year.

Mann-Kendall statistic = 2
critical = 20

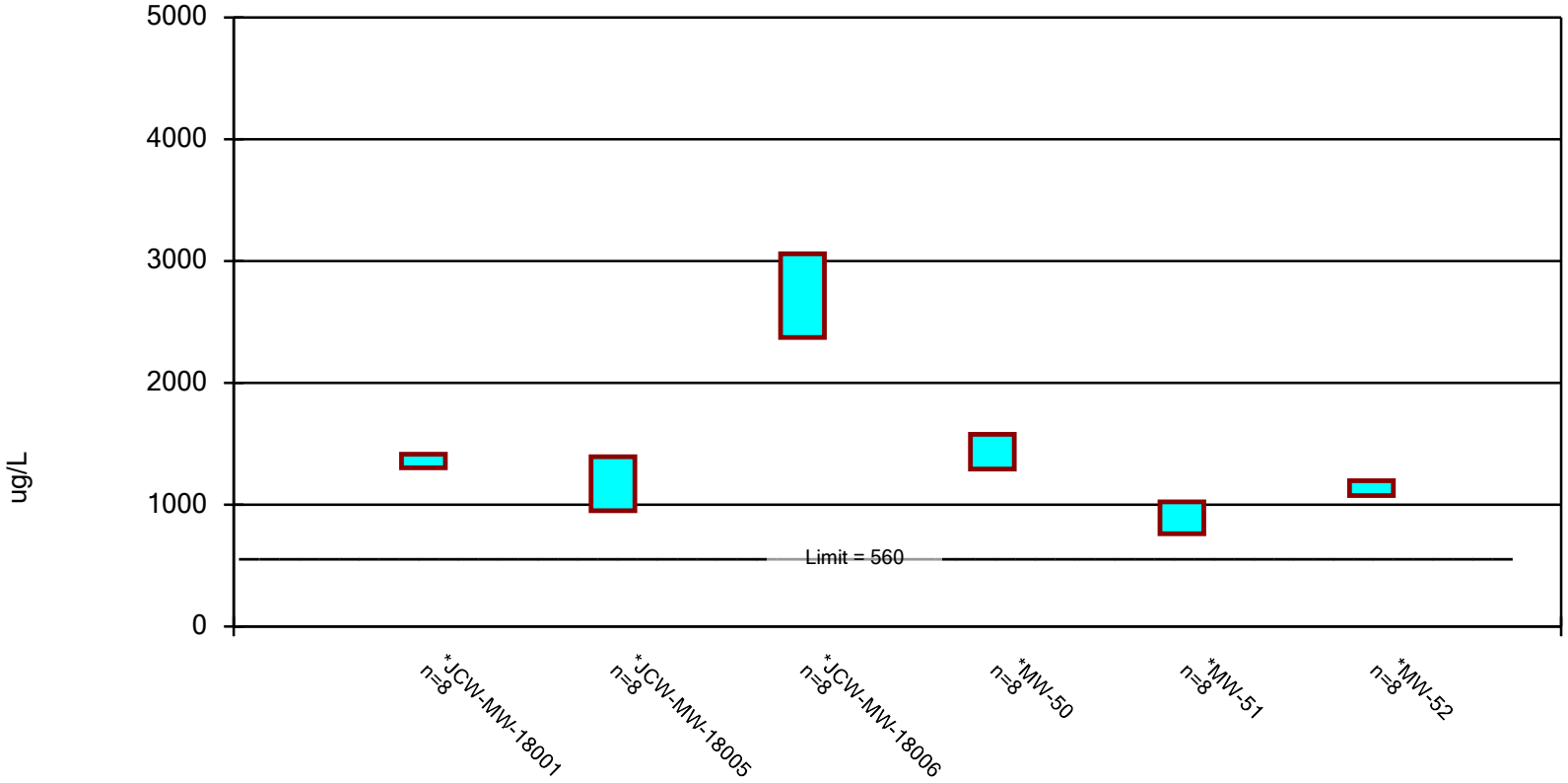
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/17/2021 3:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Parametric Confidence Interval

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



Constituent: Boron, Total Analysis Run 6/17/2021 4:14 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Confidence Interval

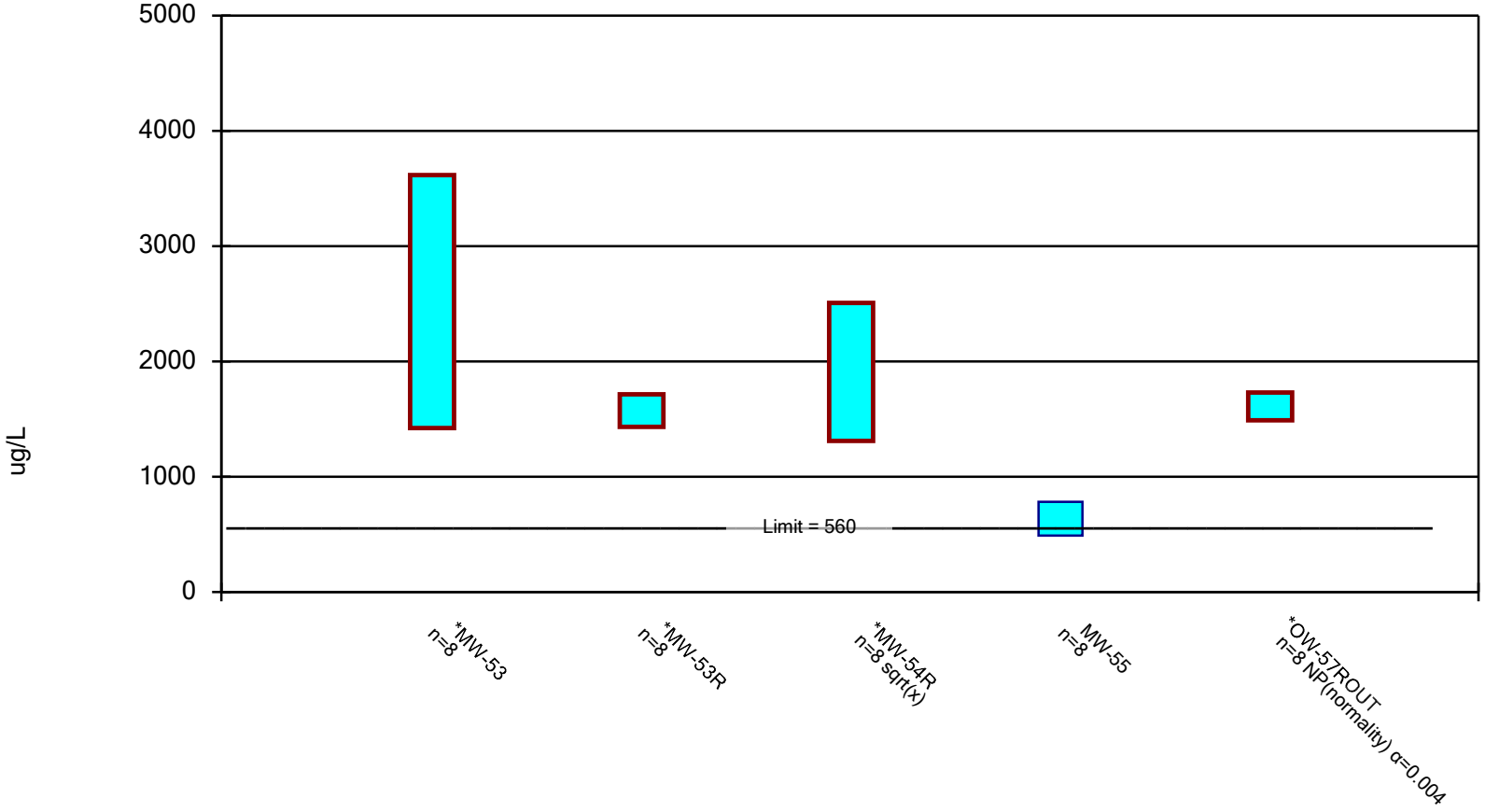
Constituent: Boron, Total (ug/L) Analysis Run 6/17/2021 4:15 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

	JCW-MW-18001	JCW-MW-18005	JCW-MW-18006	MW-50	MW-51	MW-52
8/15/2019	1280	1310	2750			1010
8/16/2019				1220	782	
10/10/2019	1440 (D)			1645 (D)	866.5 (D)	1175 (D)
10/11/2019		1590 (D)				
10/14/2019			2815 (D)			
3/9/2020	1420			1530	967	
3/10/2020		1230				1150
3/11/2020			3110			
5/18/2020	1360					
5/19/2020		1150		1300	944	1160
5/20/2020			3030			
8/10/2020	1310			1430	758	1200
8/11/2020		1100	2040			
10/13/2020	1370			1470		
10/14/2020		1090	2610		739	1110
3/8/2021	1350			1510	1040	1120
3/9/2021		987	2650			
5/10/2021	1340			1380	1040	1160
5/11/2021		919	2720			
Mean	1359	1172	2716	1436	892.1	1136
Std. Dev.	52.76	209.7	324.6	134.9	123.2	58.28
Upper Lim.	1415	1394	3060	1579	1023	1197
Lower Lim.	1303	949.8	2372	1293	761.5	1074

Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Boron, Total Analysis Run 6/17/2021 4:14 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Confidence Interval

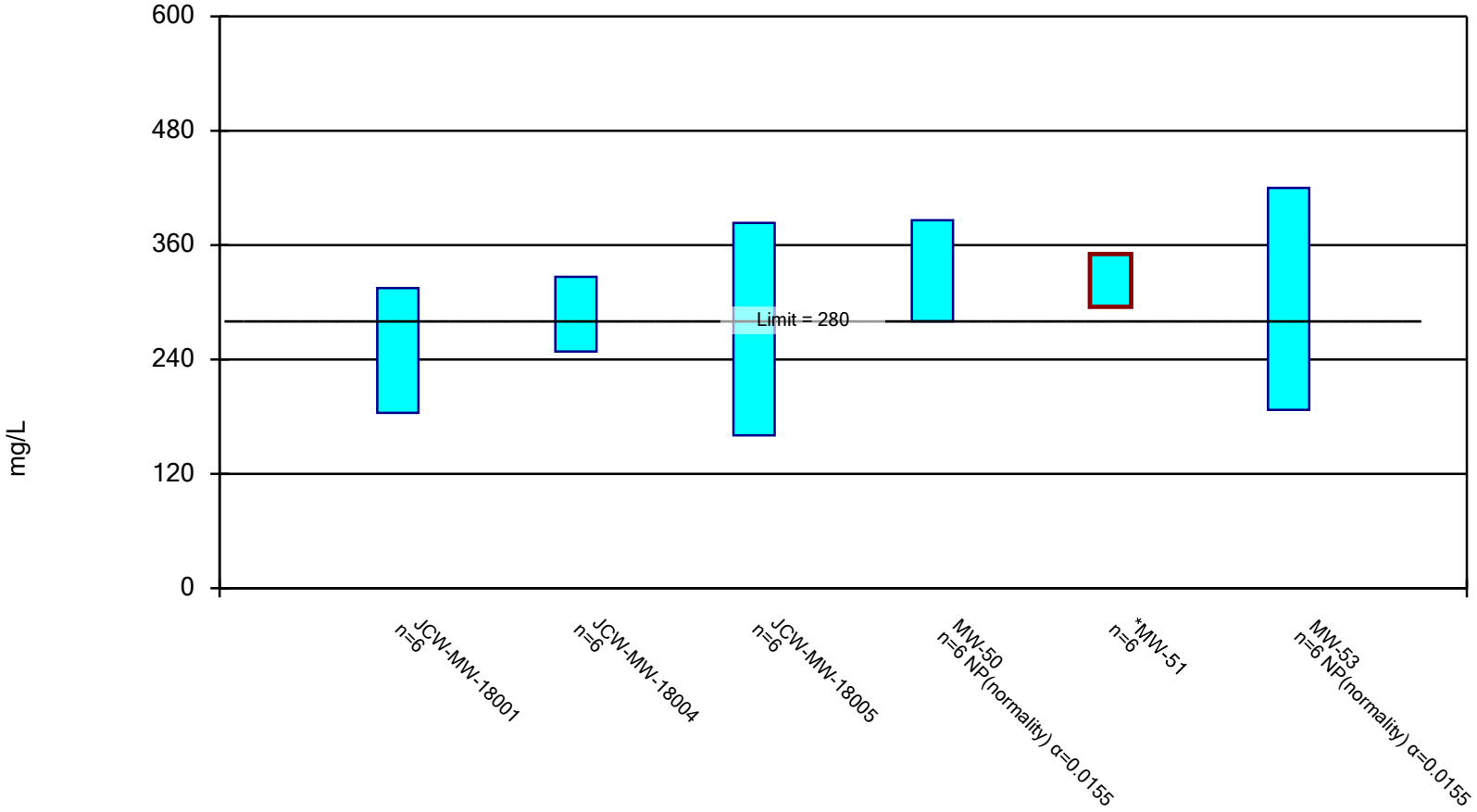
Constituent: Boron, Total (ug/L) Analysis Run 6/17/2021 4:15 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

	MW-53	MW-53R	MW-54R	MW-55	OW-57ROUT
8/13/2019			1760	712	
8/15/2019	1810	1390			1490
10/10/2019	870 (D)	1740 (D)	1485 (D)		
10/11/2019				699.5 (D)	
10/14/2019					1720 (D)
3/10/2020	2530	1590	1280	481	1720
5/19/2020	1750	1460	1730	441	
5/20/2020					1600
8/10/2020	2760				
8/11/2020		1540	1660	592	1510
10/14/2020	2720	1780	1660	705	1730
3/8/2021	3920	1510	2470		
3/9/2021				593	1660
5/10/2021	3790	1580			
5/11/2021			3140	866	1710
Mean	2519	1574	1898	636.2	1643
Std. Dev.	1034	132.2	607.4	138	97.94
Upper Lim.	3615	1714	2507	782.5	1730
Lower Lim.	1422	1434	1310	489.9	1490

Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Calcium, Total Analysis Run 6/17/2021 3:15 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Confidence Interval

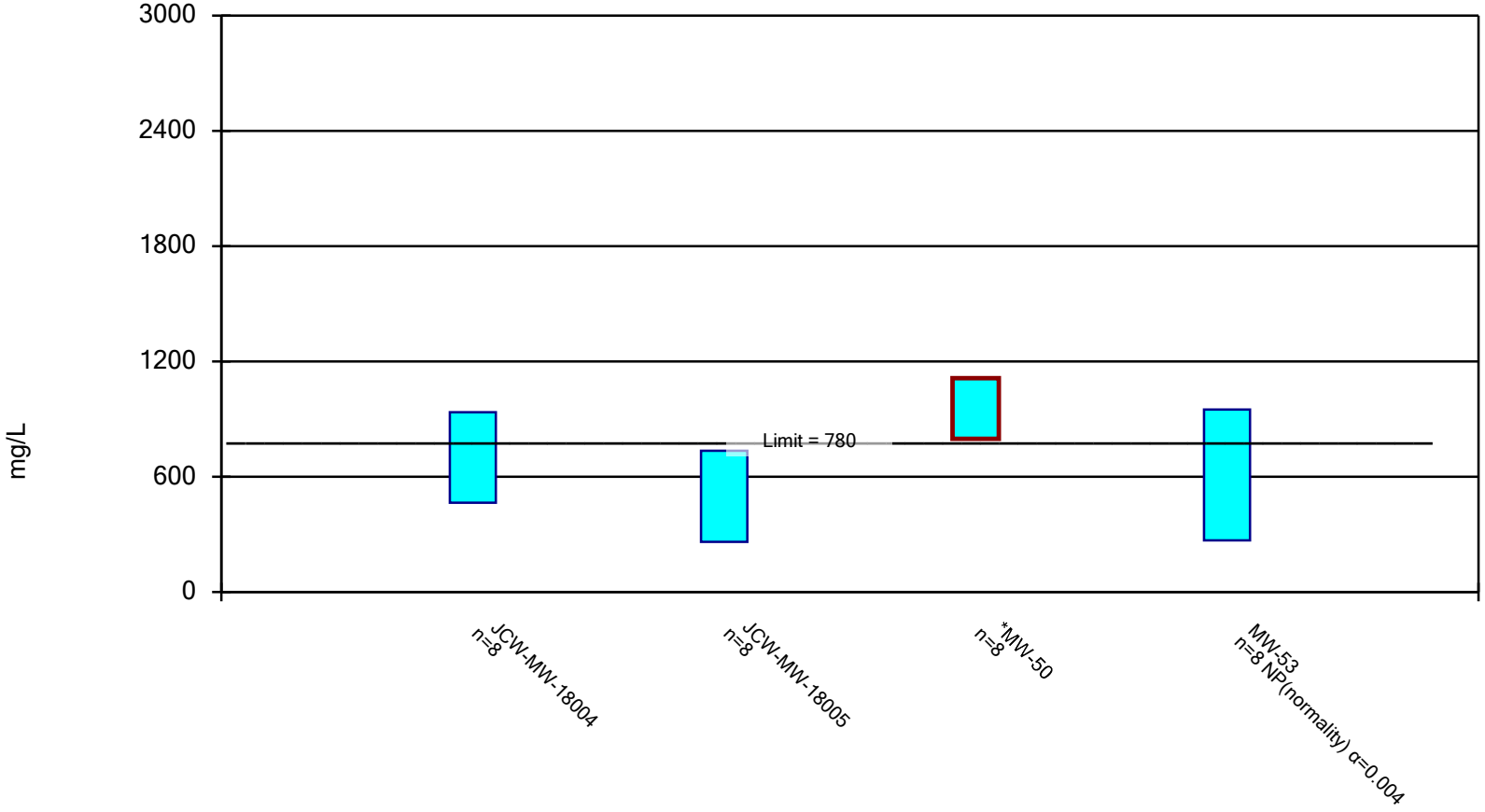
Constituent: Calcium, Total (mg/L) Analysis Run 6/17/2021 3:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

	JCW-MW-18001	JCW-MW-18004	JCW-MW-18005	MW-50	MW-51	MW-53
10/10/2019	170			280	340	420
10/11/2019			270			
10/15/2019		270				
5/18/2020	232					
5/19/2020		308	419	380	331	308
8/10/2020	237			382	341	211
8/11/2020		306	259			
10/13/2020	282			368		
10/14/2020		323	195		330	192
3/8/2021	270	252		386	293	187
3/9/2021			286			
5/10/2021	305			363	303	187
5/11/2021		266	202			
Mean	249.3	287.5	271.8	359.8	323	250.8
Std. Dev.	47.62	28.47	81	40.08	20.13	94.96
Upper Lim.	314.8	326.6	383.1	386	350.7	420
Lower Lim.	183.9	248.4	160.6	280	295.3	187

Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Sulfate Analysis Run 6/17/2021 4:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Confidence Interval

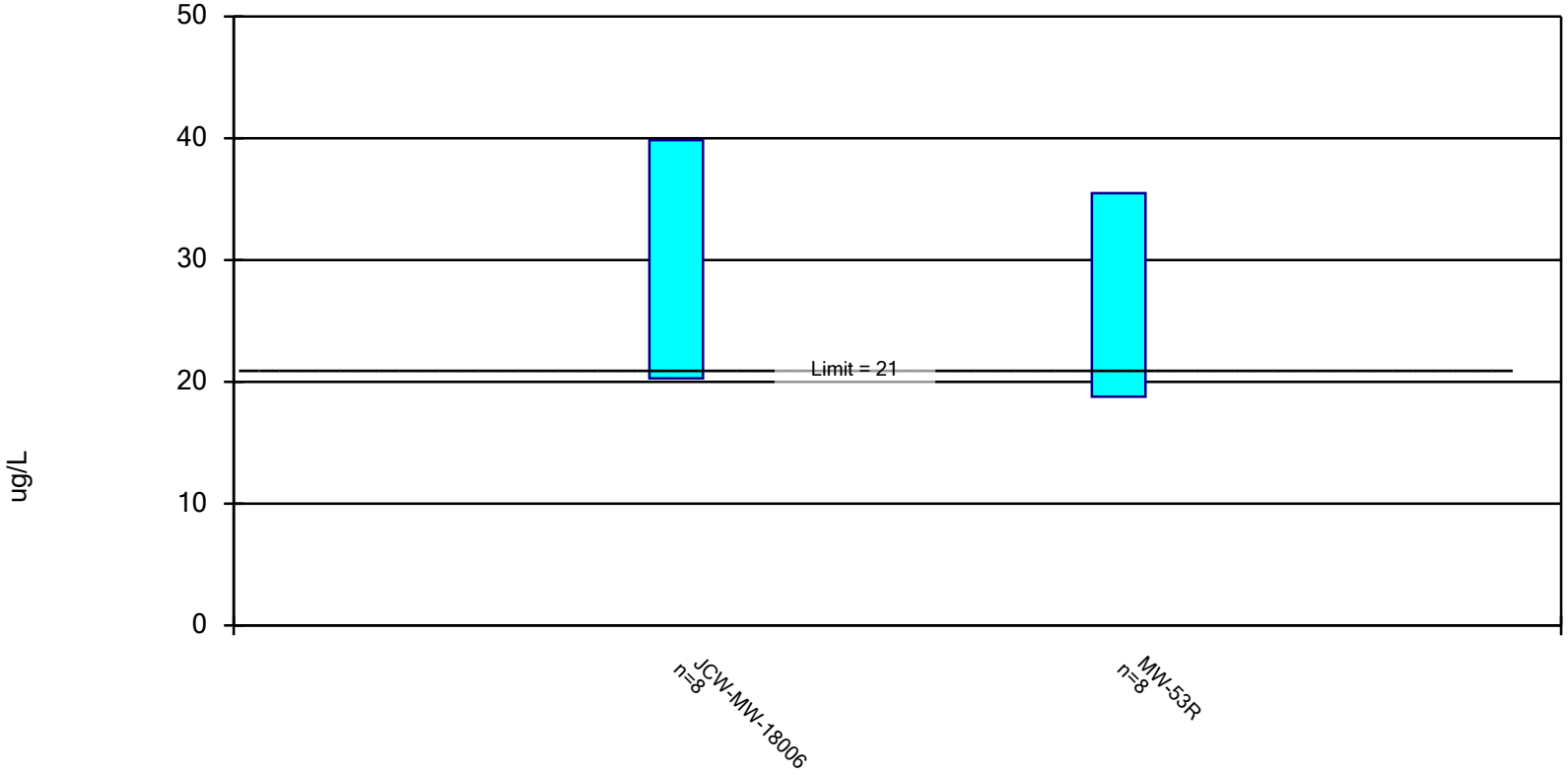
Constituent: Sulfate (mg/L) Analysis Run 6/17/2021 4:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

	JCW-MW-18004	JCW-MW-18005	MW-50	MW-53
8/13/2019	856			
8/15/2019		533		653
8/16/2019			1090	
10/10/2019			668.5 (D)	950 (D)
10/11/2019		473 (D)		
10/15/2019	1095 (D)			
3/9/2020			878	
3/10/2020	714	781		278
5/19/2020	361	817	1010	549
8/10/2020			1020	321
8/11/2020	718	398		
10/13/2020			990	
10/14/2020	756	185		269
3/8/2021	581		1130	317
3/9/2021		535		
5/10/2021			856	322
5/11/2021	523	263		
Mean	700.5	498.1	955.3	457.4
Std. Dev.	221.8	223.1	148.9	243.1
Upper Lim.	935.6	734.5	1113	950
Lower Lim.	465.4	261.7	797.5	269

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, Total Analysis Run 6/17/2021 3:15 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Confidence Interval

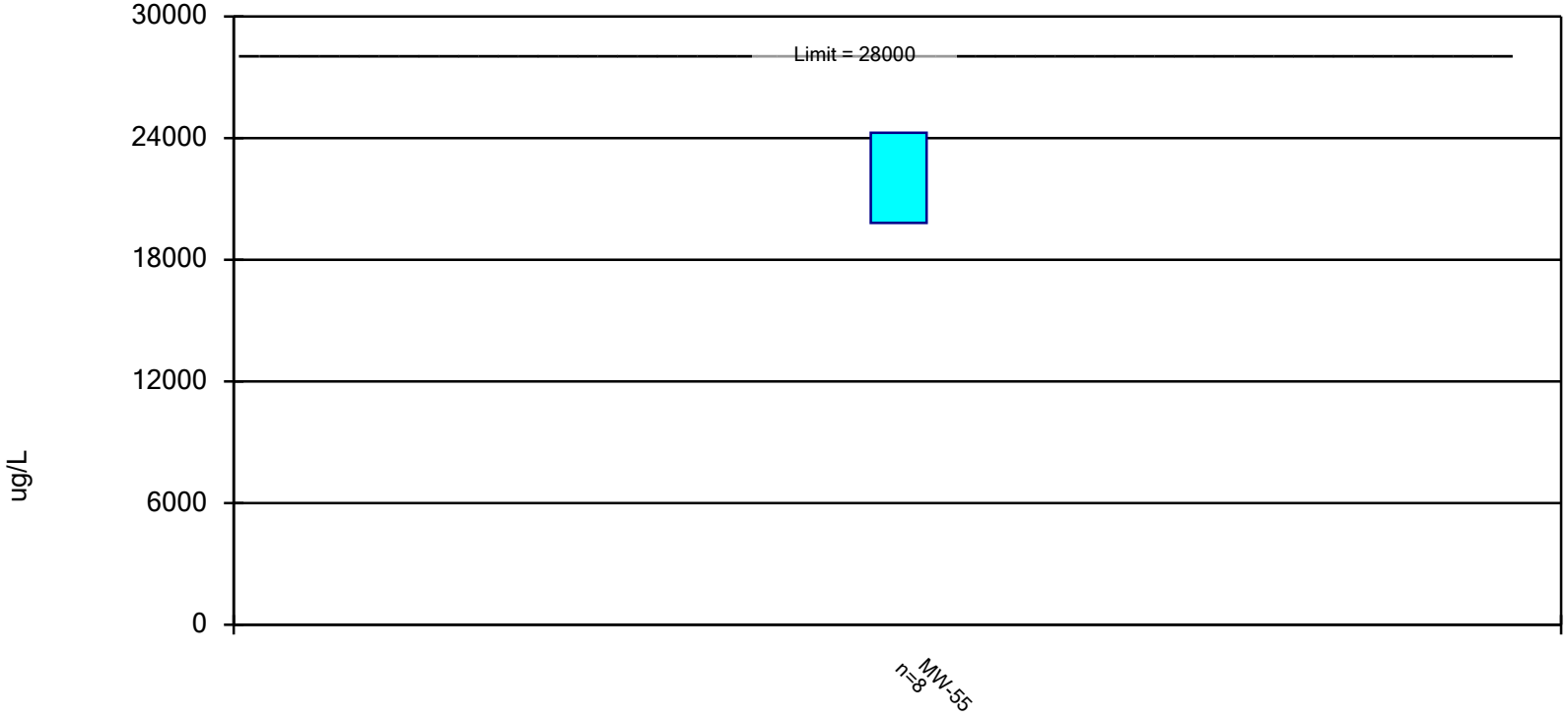
Constituent: Arsenic, Total (ug/L) Analysis Run 6/17/2021 3:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

	JCW-MW-18006	MW-53R
8/15/2019	36	31
10/10/2019		32 (D)
10/14/2019	36.5 (D)	
3/10/2020		19
3/11/2020	41	
5/19/2020		27
5/20/2020	33	
8/11/2020	12	31
10/14/2020	22	40
3/8/2021		19
3/9/2021	30	
5/10/2021		18
5/11/2021	30	
Mean	30.06	27.13
Std. Dev.	9.229	7.882
Upper Lim.	39.84	35.48
Lower Lim.	20.28	18.77

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Iron, Total Analysis Run 6/17/2021 3:15 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Confidence Interval

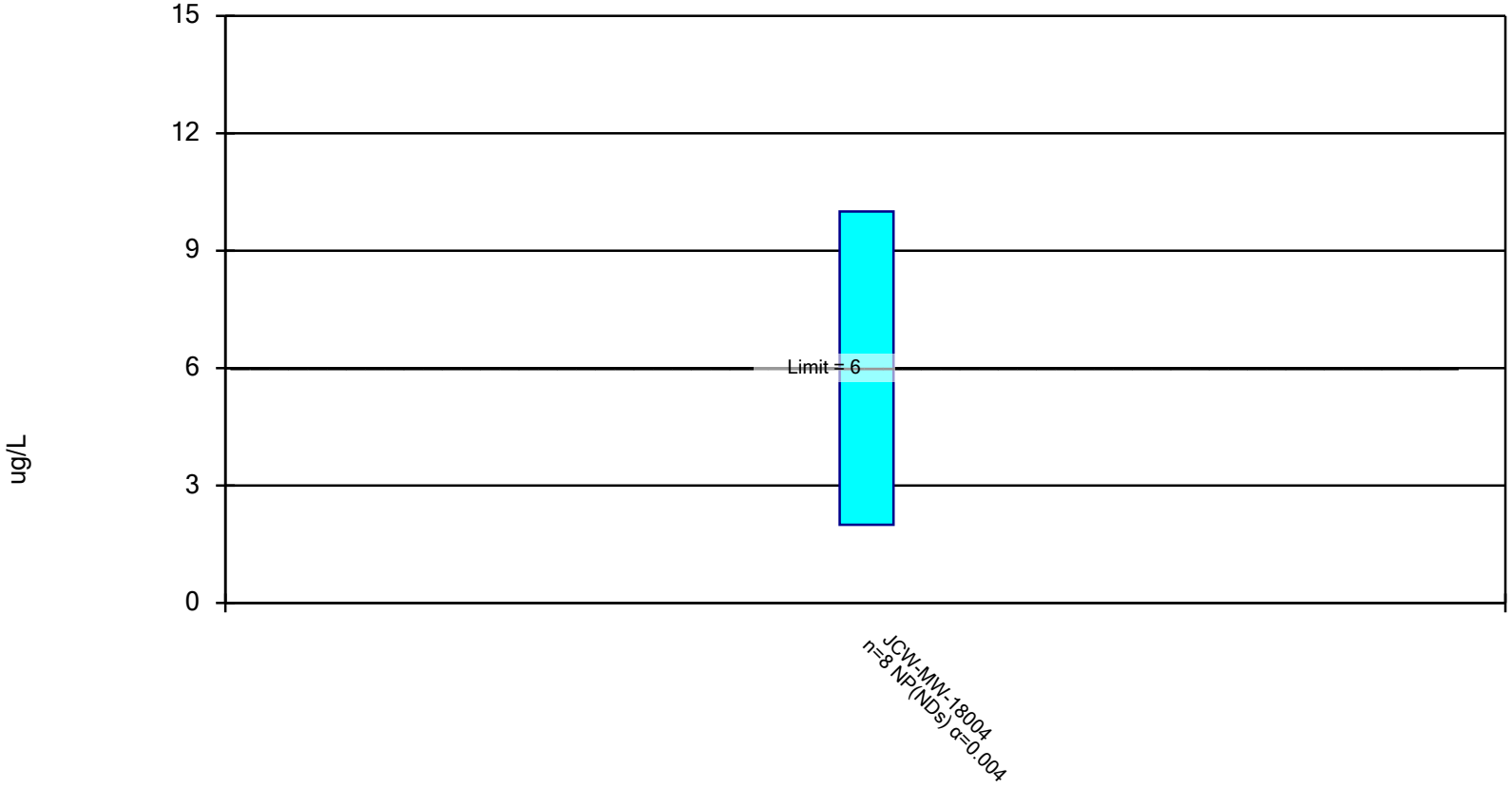
Constituent: Iron, Total (ug/L) Analysis Run 6/17/2021 3:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

	MW-55
8/13/2019	22900
10/11/2019	25300 (D)
3/10/2020	18000
5/19/2020	22000
8/11/2020	21300
10/14/2020	21800
3/9/2021	23500
5/11/2021	21500
Mean	22038
Std. Dev.	2095
Upper Lim.	24258
Lower Lim.	19817

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Vanadium, Total Analysis Run 6/17/2021 3:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Confidence Interval

Constituent: Vanadium, Total (ug/L) Analysis Run 6/17/2021 3:16 PM

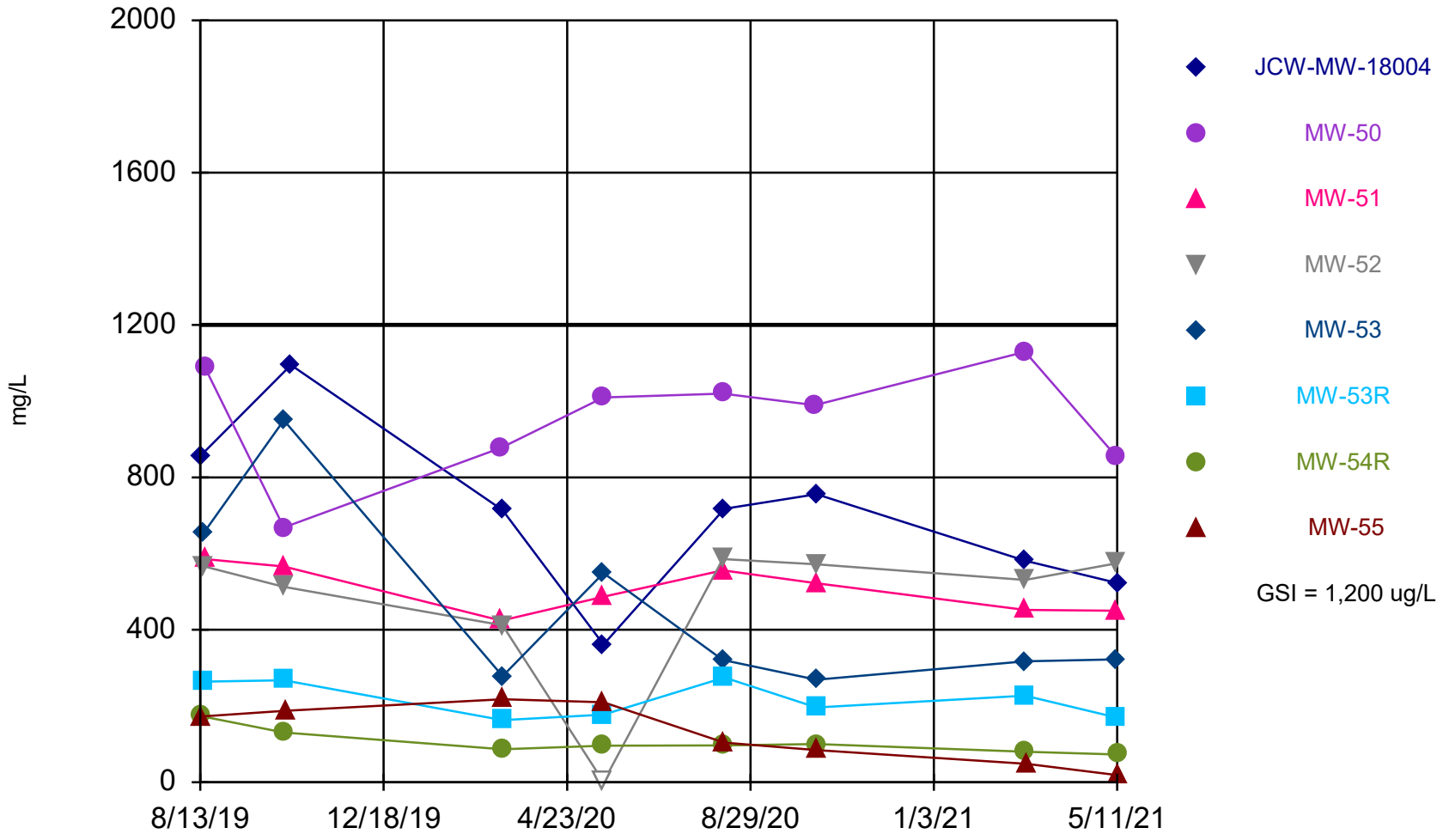
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

	JCW-MW-18004
8/13/2019	3
10/15/2019	<2 (D)
3/10/2020	10
5/19/2020	<2
8/11/2020	<2
10/14/2020	<2
3/8/2021	<2
5/11/2021	<2
Mean	3.125
Std. Dev.	2.8
Upper Lim.	10
Lower Lim.	2

Attachment 2
GSI Evaluation Sanitas™ Output Files

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Sulfate Comparison to GSI

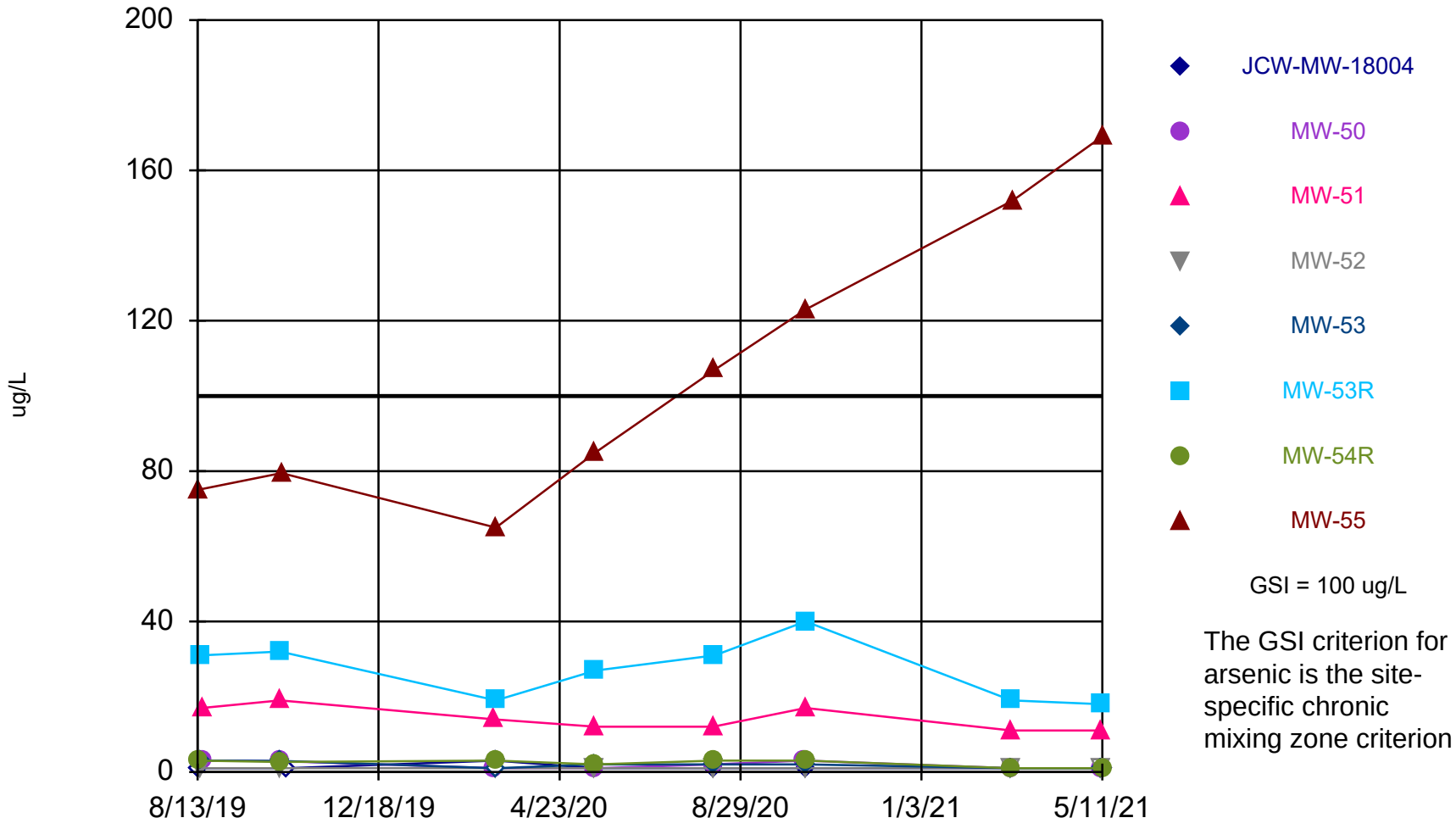


Time Series Analysis Run 6/17/2021 1:52 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Arsenic Comparison to GSI

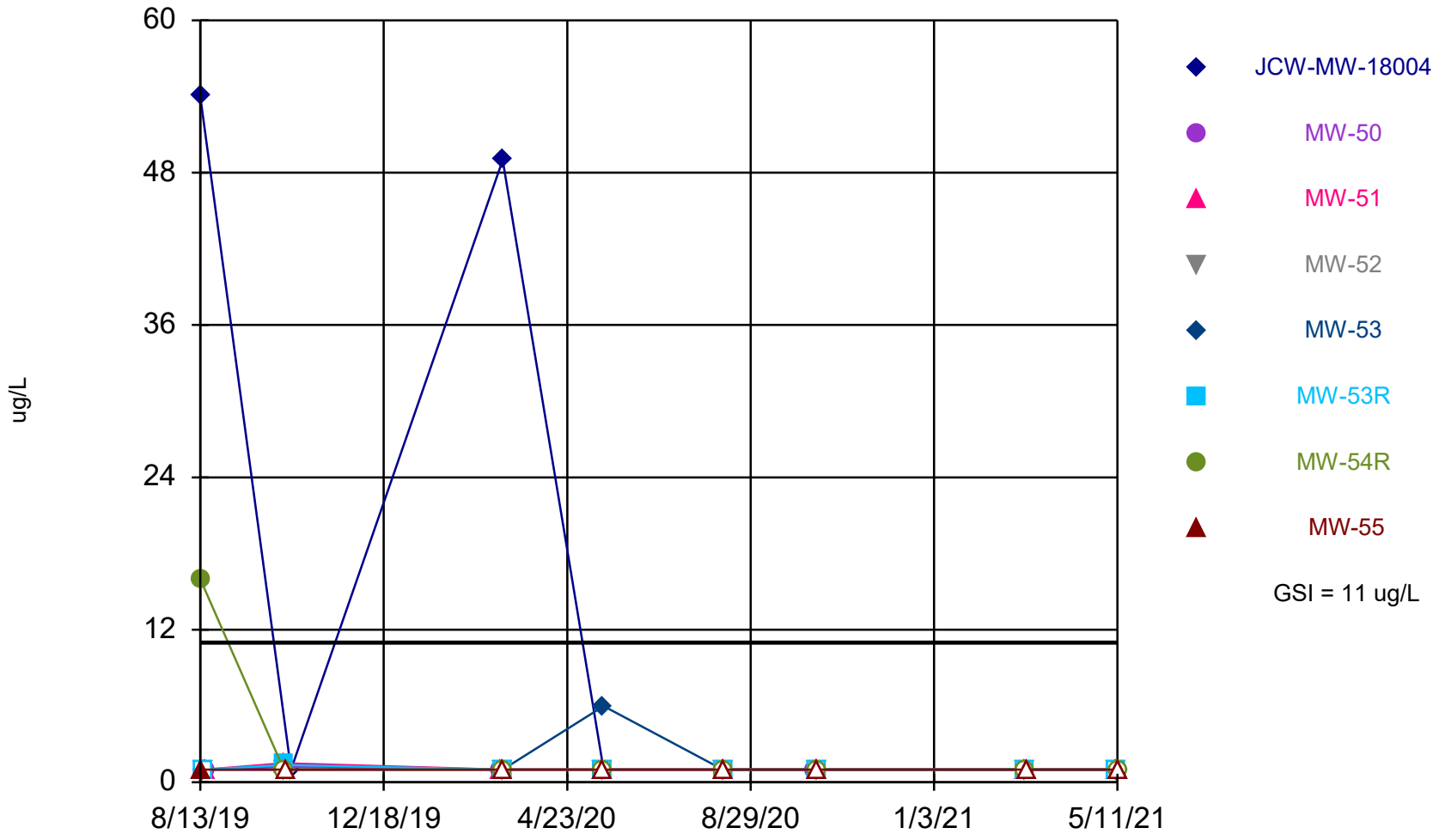


Time Series Analysis Run 6/17/2021 12:58 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Chromium Comparison to GSI

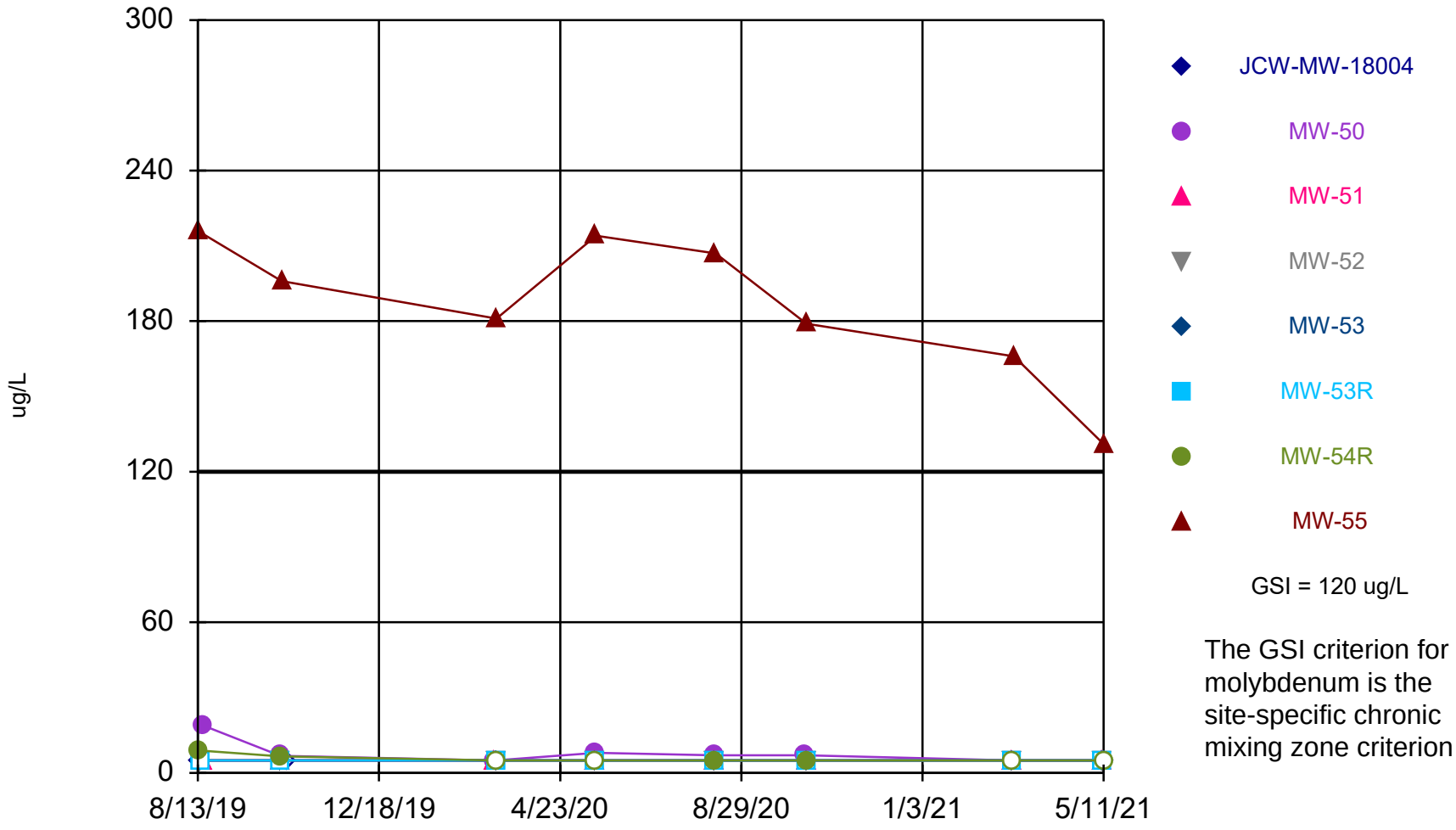


Time Series Analysis Run 6/17/2021 12:59 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Molybdenum Comparison to GSI



The GSI criterion for molybdenum is the site-specific chronic mixing zone criterion

Time Series Analysis Run 6/17/2021 1:00 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Summary Report

Constituent: Sulfate Analysis Run 6/17/2021 1:54 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

For observations made between 8/13/2019 and 5/11/2021, a summary of the selected data set:

Observations = 64
ND/Trace = 1
Wells = 8
Minimum Value = 0.5
Maximum Value = 1130
Mean Value = 442.5
Median Value = 418
Standard Deviation = 309.9
Coefficient of Variation = 0.7004
Skewness = 0.58

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	0	361	1095	700.5	716	221.8	0.3167	0.2645
MW-50	8	0	668.5	1130	955.3	1000	148.9	0.1558	-0.777
MW-51	8	0	424	586	505.4	504.5	60.82	0.1203	0.009733
MW-52	8	1	0.5	586	469.4	549	197.6	0.421	-1.944
MW-53	8	0	269	950	457.4	321.5	243.1	0.5315	1.144
MW-53R	8	0	163	275	217.4	211.5	46.89	0.2156	0.1096
MW-54R	8	0	72.7	174	104.4	95.95	33	0.3161	1.279
MW-55	8	0	18.5	218	130.3	138	76.68	0.5887	-0.2119

Summary Report

Constituent: Arsenic, Total Analysis Run 6/17/2021 1:54 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

For observations made between 8/13/2019 and 5/11/2021, a summary of the selected data set:

Observations = 64
ND/Trace = 16
Wells = 8
Minimum Value = 0.5
Maximum Value = 169
Mean Value = 19.43
Median Value = 2.975
Standard Deviation = 36.86
Coefficient of Variation = 1.897
Skewness = 2.556

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	7	0.5	3	0.8125	0.5	0.8839	1.088	2.268
MW-50	8	0	1	3	1.863	1.5	0.9753	0.5237	0.2463
MW-51	8	0	11	19	14.13	13	3.137	0.2221	0.4115
MW-52	8	6	0.5	1	0.5938	0.5	0.186	0.3133	1.564
MW-53	8	3	0.5	3	1.681	2	1.058	0.6295	-0.06595
MW-53R	8	0	18	40	27.13	29	7.882	0.2906	0.1665
MW-54R	8	0	1	3	2.331	2.825	0.89	0.3818	-0.7639
MW-55	8	0	65	169	106.9	96	38.08	0.3561	0.5451

Summary Report

Constituent: Chromium, Total Analysis Run 6/17/2021 1:54 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

For observations made between 8/13/2019 and 5/11/2021, a summary of the selected data set:

Observations = 64
ND/Trace = 54
Wells = 8
Minimum Value = 0.5
Maximum Value = 54
Mean Value = 2.485
Median Value = 0.5
Standard Deviation = 9.116
Coefficient of Variation = 3.668
Skewness = 5.056

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	6	0.5	54	13.25	0.5	23.65	1.785	1.166
MW-50	8	5	0.5	1.2	0.7125	0.5	0.2997	0.4206	0.6547
MW-51	8	7	0.5	1.5	0.625	0.5	0.3536	0.5657	2.268
MW-52	8	8	0.5	0.5	0.5	0.5	0	0	NaN
MW-53	8	7	0.5	6	1.188	0.5	1.945	1.638	2.268
MW-53R	8	7	0.5	1.35	0.6063	0.5	0.3005	0.4957	2.268
MW-54R	8	7	0.5	16	2.438	0.5	5.48	2.248	2.268
MW-55	8	7	0.5	1	0.5625	0.5	0.1768	0.3143	2.268

Summary Report

Constituent: Molybdenum, Total Analysis Run 6/17/2021 1:54 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

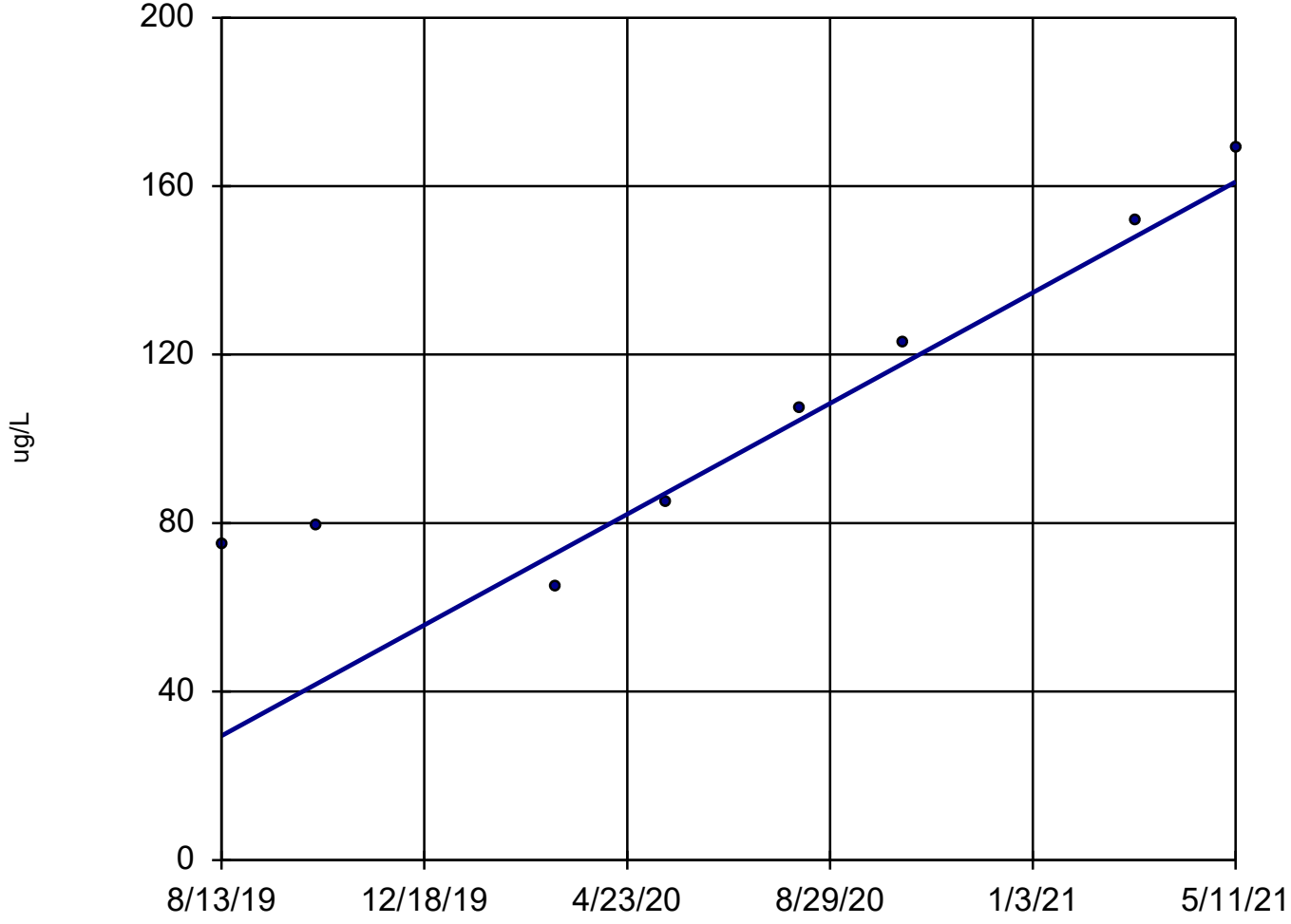
For observations made between 8/13/2019 and 5/11/2021, a summary of the selected data set:

Observations = 64
ND/Trace = 47
Wells = 8
Minimum Value = 2.5
Maximum Value = 216
Mean Value = 26.26
Median Value = 2.5
Standard Deviation = 61.74
Coefficient of Variation = 2.351
Skewness = 2.359

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	8	2.5	2.5	2.5	2.5	0	0	NaN
MW-50	8	3	2.5	19	6.913	6.9	5.421	0.7843	1.447
MW-51	8	8	2.5	2.5	2.5	2.5	0	0	NaN
MW-52	8	8	2.5	2.5	2.5	2.5	0	0	NaN
MW-53	8	8	2.5	2.5	2.5	2.5	0	0	NaN
MW-53R	8	8	2.5	2.5	2.5	2.5	0	0	NaN
MW-54R	8	4	2.5	9	4.45	3.75	2.424	0.5448	0.8019
MW-55	8	0	131	216	186.3	188.5	28.59	0.1535	-0.7833

Arsenic, Total

MW-55



n = 8

Slope = 75.36 units per year.

Mann-Kendall statistic = 24
critical = 20

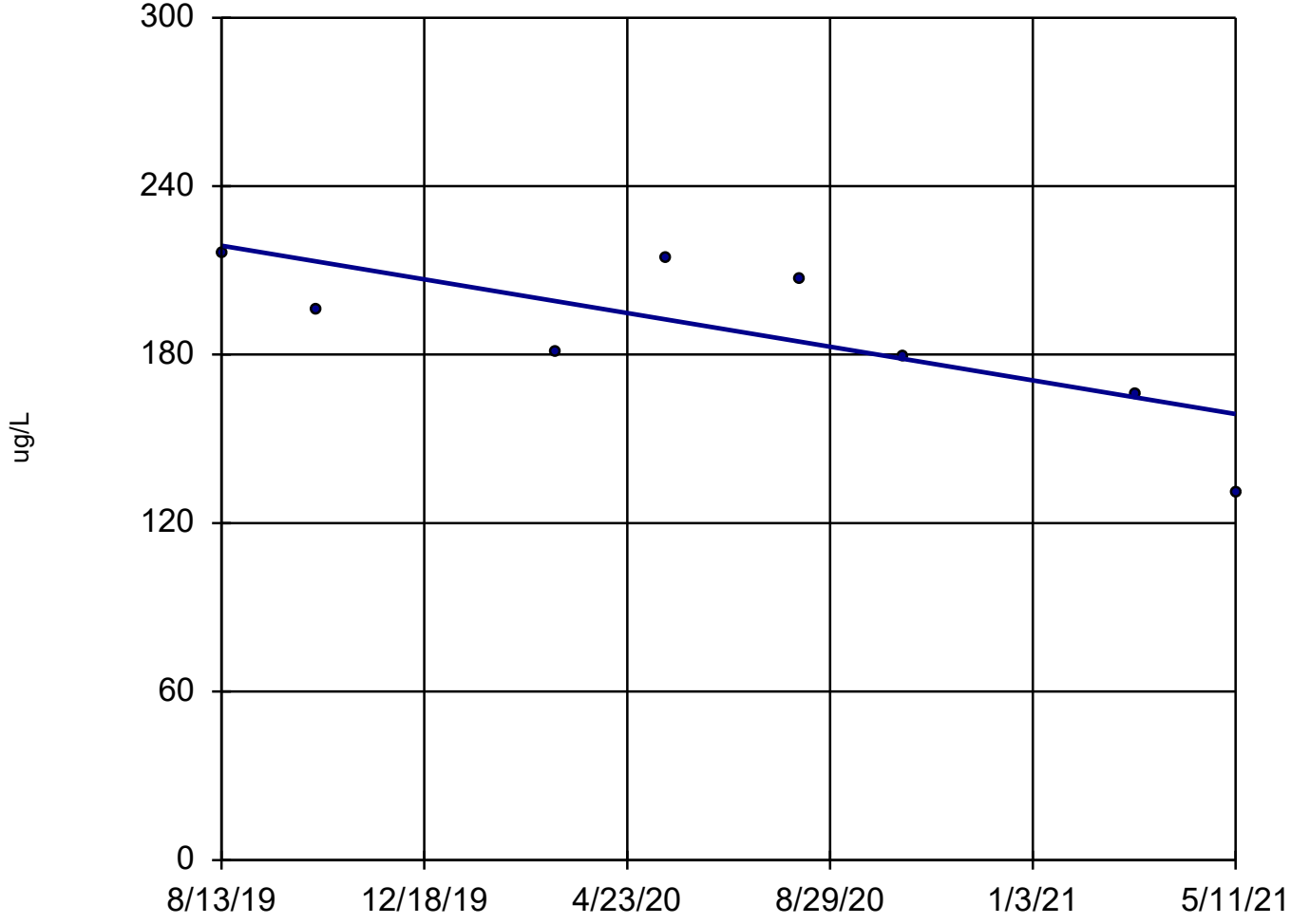
Increasing trend significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/17/2021 3:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Molybdenum, Total

MW-55



n = 8

Slope = -34.38 units per year.

Mann-Kendall statistic = -20
critical = -20

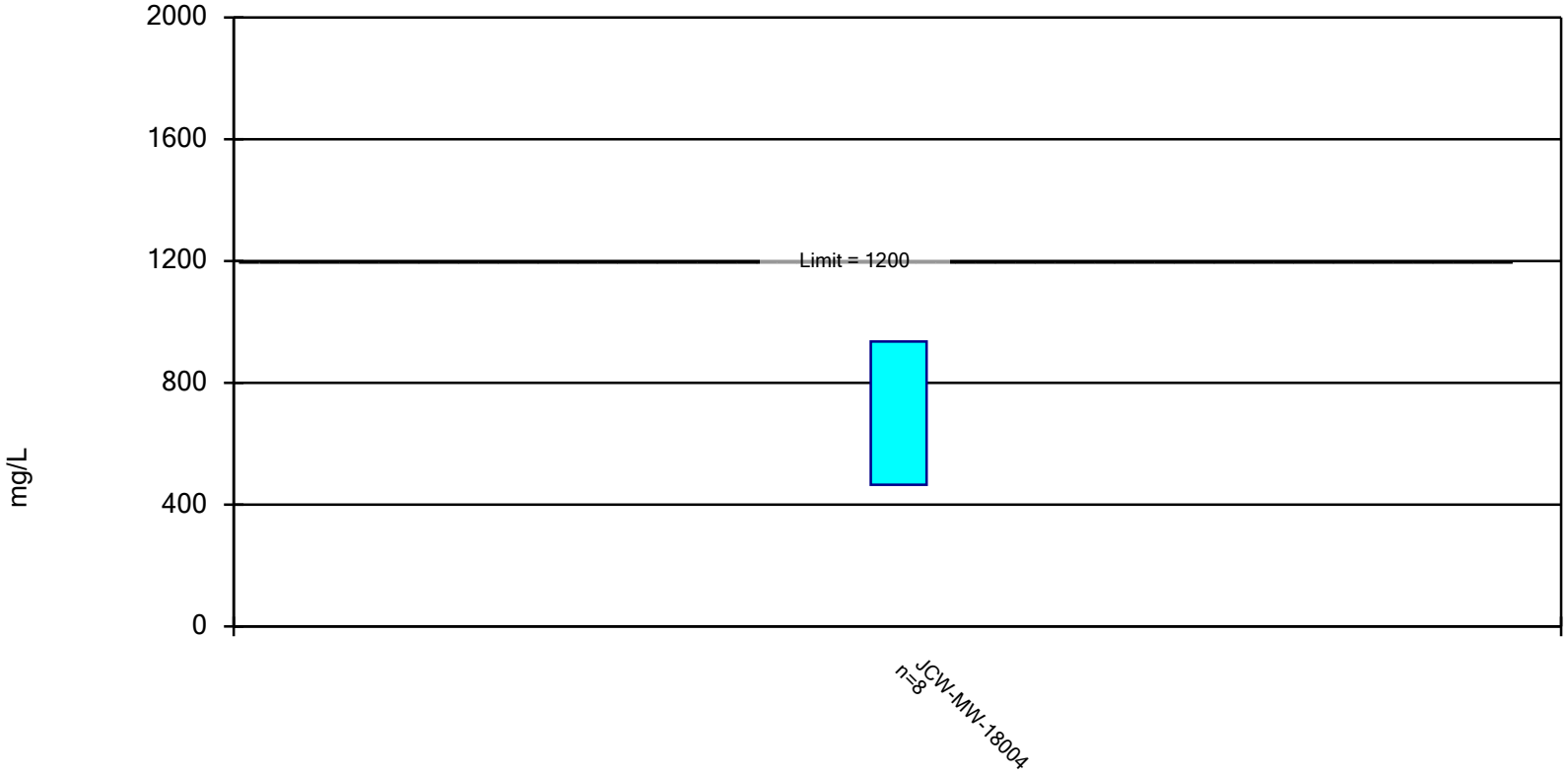
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/17/2021 3:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Sulfate Analysis Run 6/17/2021 2:00 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Confidence Interval

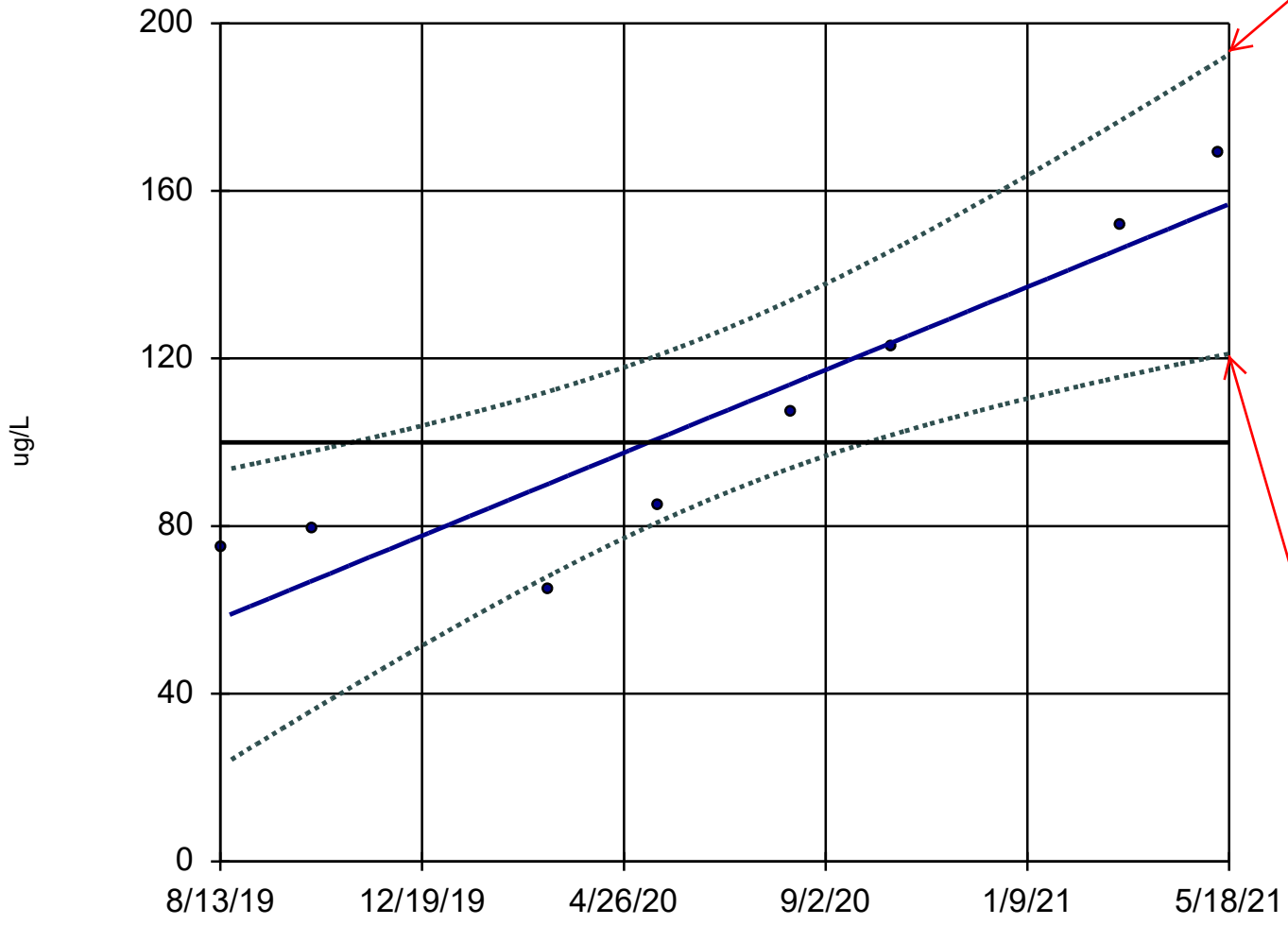
Constituent: Sulfate (mg/L) Analysis Run 6/17/2021 2:00 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

	JCW-MW-18004
8/13/2019	856
10/15/2019	1095 (D)
3/10/2020	714
5/19/2020	361
8/11/2020	718
10/14/2020	756
3/8/2021	581
5/11/2021	523
Mean	700.5
Std. Dev.	221.8
Upper Lim.	935.6
Lower Lim.	465.4

Arsenic, Total and 98% Confidence Band

MW-55



Upper Limit
5/18/2021 192.6

n = 8

Slope = 56.1
units/year.

alpha = 0.02
t = 5.678
critical = 2.612

Significant increasing trend.

Normality test on residuals:
Shapiro Wilk @alpha
= 0.1, calculated =
0.9324, critical =
0.851.

GSI = 100.

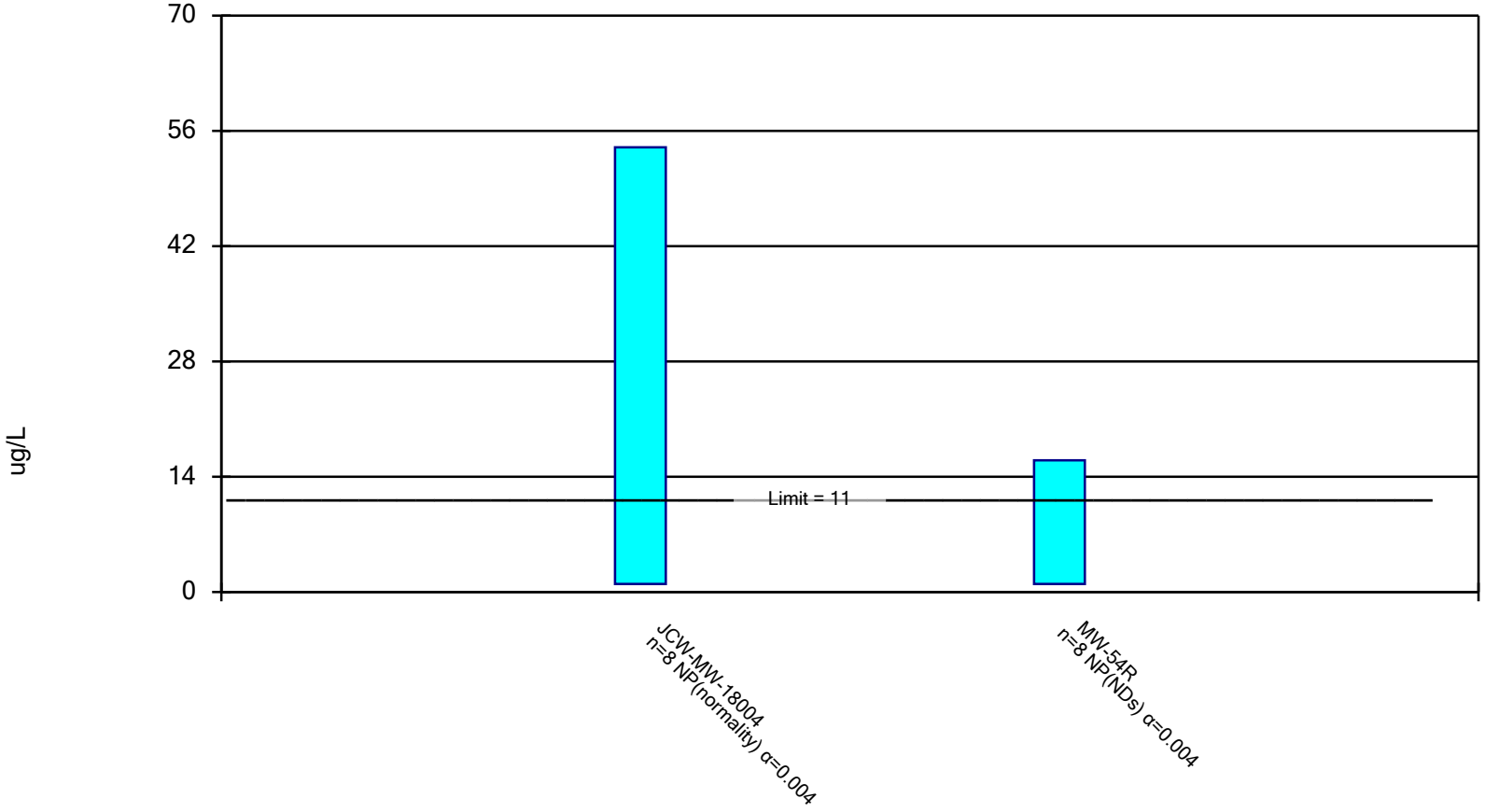
Lower Limit
5/18/2021 121.1

Linear Regression Analysis Run 7/1/2021 4:36 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2_backup

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Chromium, Total Analysis Run 6/17/2021 2:00 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

Confidence Interval

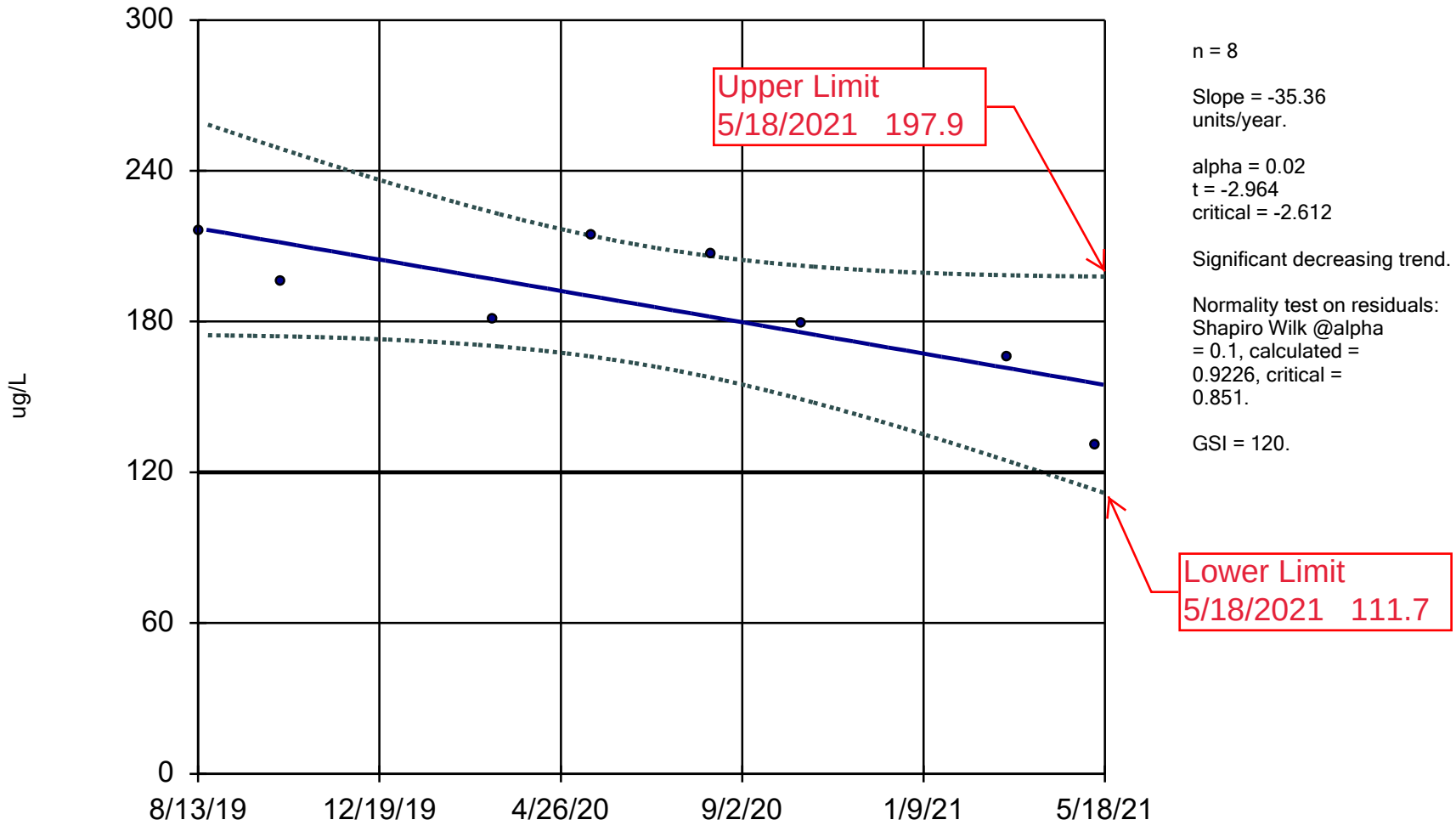
Constituent: Chromium, Total (ug/L) Analysis Run 6/17/2021 2:00 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2

	JCW-MW-18004	MW-54R
8/13/2019	54	16
10/10/2019		<1 (D)
10/15/2019	<1 (D)	
3/10/2020	49	<1
5/19/2020	<1	<1
8/11/2020	<1	<1
10/14/2020	<1	<1
3/8/2021	<1	<1
5/11/2021	<1	<1
Mean	13.63	2.875
Std. Dev.	23.42	5.303
Upper Lim.	54	16
Lower Lim.	1	1

Molybdenum, Total and 98% Confidence Band

MW-55



Linear Regression Analysis Run 7/1/2021 4:40 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q2_backup

Appendix E
Laboratory Analytical Report

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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 26, 2021

Subject: PART 115 GROUNDWATER MONITORING – JCW POREWATER – 2021 Q2

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

Darby Litz, Project Manager
TRC Environmental Corporation
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 21-0531

TRC Environmental, Inc. conducted groundwater monitoring at the JCWeadock site on 05/10/2021 and 05/11/2021, for the 2nd Quarter monitoring requirement, as specified in the Hydrogeological Monitoring Plan for the site. The samples were received for analysis by the Chemistry department of Laboratory Services on 05/12/2021.

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

Testing performed in accordance with the A2LA scope of accredidation specified in the listed certificate.
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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, latest edition.

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 JCW Part 115 & RCRA Porewater
Date Received: 5/12/2021
Chemistry Project: 21-0531

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-0531-01	JCW-MW-18001	Groundwater	05/10/2021 07:17 AM	JCW Solid Waste Disposal Area, Porewater
21-0531-02	JCW-OW-18001	Groundwater	05/10/2021 08:58 AM	JCW Solid Waste Disposal Area, Porewater
21-0531-03	JCW-OW-18002	Groundwater	05/10/2021 11:13 AM	JCW Solid Waste Disposal Area, Porewater
21-0531-04	JCW-MW-18004	Groundwater	05/11/2021 07:44 AM	JCW Solid Waste Disposal Area, Porewater
21-0531-05	JCW-OW-18004	Groundwater	05/11/2021 08:40 AM	JCW Solid Waste Disposal Area, Porewater
21-0531-06	JCW-MW-18005	Groundwater	05/11/2021 12:45 PM	JCW Solid Waste Disposal Area, Porewater
21-0531-07	JCW-MW-18006	Groundwater	05/11/2021 02:23 PM	JCW Solid Waste Disposal Area, Porewater
21-0531-08	MW-50	Groundwater	05/10/2021 09:53 AM	JCW Solid Waste Disposal Area, Porewater
21-0531-09	MW-51	Groundwater	05/10/2021 12:08 PM	JCW Solid Waste Disposal Area, Porewater
21-0531-10	MW-52	Groundwater	05/10/2021 01:10 PM	JCW Solid Waste Disposal Area, Porewater
21-0531-11	MW-53	Groundwater	05/10/2021 02:11 PM	JCW Solid Waste Disposal Area, Porewater
21-0531-12	MW-53R	Groundwater	05/10/2021 03:48 PM	JCW Solid Waste Disposal Area, Porewater
21-0531-13	MW-54R	Groundwater	05/11/2021 06:10 AM	JCW Solid Waste Disposal Area, Porewater
21-0531-14	MW-55	Groundwater	05/11/2021 10:20 AM	JCW Solid Waste Disposal Area, Porewater
21-0531-15	OW-55	Groundwater	05/11/2021 11:55 AM	JCW Solid Waste Disposal Area, Porewater
21-0531-16	MW-57R Out	Groundwater	05/11/2021 01:30 PM	JCW Solid Waste Disposal Area, Porewater
21-0531-17	MW-58	Sample Not Collected		JCW Solid Waste Disposal Area, Porewater
21-0531-18	LH-104	Groundwater	05/11/2021 09:28 AM	JCW Solid Waste Disposal Area, Porewater
21-0531-19	DUP-01	Groundwater	05/10/2021 12:00 AM	JCW Solid Waste Disposal Area, Porewater
21-0531-20	JCW-MW-18001 MS	Groundwater	05/10/2021 07:17 AM	JCW Solid Waste Disposal Area, Porewater
21-0531-21	JCW-MW-18001 MSD	Groundwater	05/10/2021 07:17 AM	JCW Solid Waste Disposal Area, Porewater
21-0531-22	FB-01	Water	05/11/2021 02:40 PM	JCW Solid Waste Disposal Area, Porewater
21-0531-23	EB-01	Water	05/11/2021 02:45 PM	JCW Solid Waste Disposal Area, Porewater

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-MW-18001**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-01	Collect Time:	07:17 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-01-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	2		ug/L	1	05/19/2021	AB21-0519-21
Barium	166		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	1340		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	305000		ug/L	1000	05/24/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	3		ug/L	1	05/19/2021	AB21-0519-21
Iron	154		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	68		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	68900		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	2		ug/L	2	05/19/2021	AB21-0519-21
Potassium	11100		ug/L	100	05/20/2021	AB21-0519-21
Selenium	ND		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	123000		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	2		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	77300		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	580000		ug/L	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-01-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	103		ug/L	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-MW-18001**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-01	Collect Time:	07:17 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-01-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1670		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-01-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	603000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Bicarbonate	603000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-11

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-OW-18001**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-02	Collect Time:	08:58 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-02-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	102		ug/L	1	05/19/2021	AB21-0519-21
Barium	349		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	1220		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	119000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	ND		ug/L	1	05/19/2021	AB21-0519-21
Iron	4040		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	45		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	21000		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	ND		ug/L	2	05/19/2021	AB21-0519-21
Potassium	8420		ug/L	100	05/20/2021	AB21-0519-21
Selenium	ND		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	52000		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	36900		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	86800		ug/L	1000	05/18/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-02-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	346		ug/L	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-OW-18001**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-02	Collect Time:	08:58 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-02-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	584		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-02-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	373000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Bicarbonate	373000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-11

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-OW-18002**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-03	Collect Time:	11:13 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-03-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	9		ug/L	1	05/19/2021	AB21-0519-21
Barium	200		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	1860		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	242000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	ND		ug/L	1	05/19/2021	AB21-0519-21
Iron	1910		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	64		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	58700		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	3		ug/L	2	05/19/2021	AB21-0519-21
Potassium	11600		ug/L	100	05/20/2021	AB21-0519-21
Selenium	1		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	58600		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	48000		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	366000		ug/L	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-03-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	144		ug/L	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-OW-18002**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-03	Collect Time:	11:13 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-03-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1200		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-03-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	520000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Bicarbonate	520000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-11

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-04	Collect Time:	07:44 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-04-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	ND		ug/L	1	05/19/2021	AB21-0519-21
Barium	27		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	246		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	266000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	2		ug/L	1	05/19/2021	AB21-0519-21
Iron	24		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	36		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	79500		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	2		ug/L	2	05/19/2021	AB21-0519-21
Potassium	1600		ug/L	100	05/20/2021	AB21-0519-21
Selenium	1		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	25600		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	12400		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	523000		ug/L	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-04-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	ND		ug/L	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-04	Collect Time:	07:44 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-04-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1270		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-04-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	431000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Bicarbonate	431000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-11

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-OW-18004**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-05	Collect Time:	08:40 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-05-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-05-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	ND		ug/L	1	05/19/2021	AB21-0519-21
Barium	69		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	689		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	168000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	1		ug/L	1	05/19/2021	AB21-0519-21
Iron	ND		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	ND		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	62800		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	ND		ug/L	2	05/19/2021	AB21-0519-21
Potassium	1680		ug/L	100	05/20/2021	AB21-0519-21
Selenium	2		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	65400		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	82200		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	199000		ug/L	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-05-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	ND		ug/L	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-OW-18004**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-05	Collect Time:	08:40 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-05-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	966		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-05-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	502000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Bicarbonate	502000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-11

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-06	Collect Time:	12:45 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-06-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-06-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	9		ug/L	1	05/19/2021	AB21-0519-21
Barium	93		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	919		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	202000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	1		ug/L	1	05/19/2021	AB21-0519-21
Iron	4590		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	30		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	57700		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	10		ug/L	2	05/19/2021	AB21-0519-21
Potassium	2110		ug/L	100	05/20/2021	AB21-0519-21
Selenium	1		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	57900		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	56000		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	263000		ug/L	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-06-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	12		ug/L	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-06	Collect Time:	12:45 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-06-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1020		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-06-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	502000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Bicarbonate	502000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-11

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-MW-18006**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-07	Collect Time:	02:23 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-07-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-07-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	30		ug/L	1	05/19/2021	AB21-0519-21
Barium	472		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	2720		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	147000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	2		ug/L	1	05/19/2021	AB21-0519-21
Iron	5490		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	53		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	42400		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	3		ug/L	2	05/19/2021	AB21-0519-21
Potassium	5930		ug/L	100	05/20/2021	AB21-0519-21
Selenium	1		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	76600		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	3		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-07-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	72600		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	47000		ug/L	1000	05/18/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-07-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	71		ug/L	10	05/17/2021	AB21-0517-06

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Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-MW-18006**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-07	Collect Time:	02:23 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-07-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	784		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-07-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	597000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Bicarbonate	597000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-11

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-50**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-08	Collect Time:	09:53 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-08-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-08-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	1		ug/L	1	05/19/2021	AB21-0519-21
Barium	108		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	1380		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	363000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	ND		ug/L	1	05/19/2021	AB21-0519-21
Iron	1810		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	100		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	98400		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	ND		ug/L	2	05/19/2021	AB21-0519-21
Potassium	19600		ug/L	100	05/20/2021	AB21-0519-21
Selenium	ND		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	87700		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-08-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	68900		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	856000		ug/L	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-08-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	34		ug/L	10	05/17/2021	AB21-0517-06

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Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-50**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-08	Collect Time:	09:53 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-08-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1950		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-08-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	538000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Bicarbonate	538000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-11

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-51**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-09	Collect Time:	12:08 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-09-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-09-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	11		ug/L	1	05/19/2021	AB21-0519-21
Barium	148		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	1040		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	303000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	ND		ug/L	1	05/19/2021	AB21-0519-21
Iron	2200		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	57		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	58300		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	ND		ug/L	2	05/19/2021	AB21-0519-21
Potassium	6470		ug/L	100	05/20/2021	AB21-0519-21
Selenium	ND		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	89500		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-09-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	93600		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	450000		ug/L	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-09-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	35		ug/L	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-51**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-09	Collect Time:	12:08 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-09-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1500		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-09-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	641000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Bicarbonate	641000		ug/L	10000	05/19/2021	AB21-0519-11
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-11

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-52**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-10	Collect Time:	01:10 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-10-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-10-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	ND		ug/L	1	05/19/2021	AB21-0519-21
Barium	132		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	1160		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	244000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	ND		ug/L	1	05/19/2021	AB21-0519-21
Iron	1400		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	29		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	92700		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	ND		ug/L	2	05/19/2021	AB21-0519-21
Potassium	3950		ug/L	100	05/20/2021	AB21-0519-21
Selenium	1		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	75600		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-10-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	53900		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	574000		ug/L	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-10-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	18		ug/L	10	05/17/2021	AB21-0517-06

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Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-52**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-10	Collect Time:	01:10 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-10-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1500		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-10-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	485000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Bicarbonate	485000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-12

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Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-53**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-11	Collect Time:	02:11 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-11-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-11-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	ND		ug/L	1	05/19/2021	AB21-0519-21
Barium	214		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	3790		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	187000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	ND		ug/L	1	05/19/2021	AB21-0519-21
Iron	1420		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	46		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	46600		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	ND		ug/L	2	05/19/2021	AB21-0519-21
Potassium	5840		ug/L	100	05/20/2021	AB21-0519-21
Selenium	2		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	83100		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-11-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	51800		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	322000		ug/L	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-11-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	89		ug/L	10	05/17/2021	AB21-0517-06

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Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-53**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-11	Collect Time:	02:11 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-11-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1050		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-11-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	474000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Bicarbonate	474000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-12

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Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-53R**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-12	Collect Time:	03:48 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-12-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-12-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	18		ug/L	1	05/19/2021	AB21-0519-21
Barium	208		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	1580		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	227000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	1		ug/L	1	05/19/2021	AB21-0519-21
Iron	2220		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	59		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	58200		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	ND		ug/L	2	05/19/2021	AB21-0519-21
Potassium	5530		ug/L	100	05/20/2021	AB21-0519-21
Selenium	ND		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	48100		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-12-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	31100		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	170000		ug/L	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-12-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	170		ug/L	10	05/17/2021	AB21-0517-06

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Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-53R**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-12	Collect Time:	03:48 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-12-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1040		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-12-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	712000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Bicarbonate	712000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-12

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Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-54R**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-13	Collect Time:	06:10 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-13-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-13-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	1		ug/L	1	05/19/2021	AB21-0519-21
Barium	122		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	3140		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	196000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	2		ug/L	1	05/19/2021	AB21-0519-21
Iron	782		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	64		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	43200		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	3		ug/L	2	05/19/2021	AB21-0519-21
Potassium	2250		ug/L	100	05/20/2021	AB21-0519-21
Selenium	ND		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	23700		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-13-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	32700		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	72700		ug/L	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-13-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	ND		ug/L	10	05/17/2021	AB21-0517-06

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Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-54R**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-13	Collect Time:	06:10 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-13-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	762		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-13-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	592000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Bicarbonate	592000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-12

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-55**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-14	Collect Time:	10:20 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-14-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-14-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	169		ug/L	1	05/19/2021	AB21-0519-21
Barium	323		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	866		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	147000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	ND		ug/L	1	05/19/2021	AB21-0519-21
Iron	21500		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	24		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	26100		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	131		ug/L	5	05/19/2021	AB21-0519-21
Nickel	ND		ug/L	2	05/19/2021	AB21-0519-21
Potassium	3160		ug/L	100	05/20/2021	AB21-0519-21
Selenium	1		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	105000		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-14-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	19500		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	18500		ug/L	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-14-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	447		ug/L	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-55**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-14	Collect Time:	10:20 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-14-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	729		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-14-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	652000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Bicarbonate	652000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-12

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**OW-55**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-15	Collect Time:	11:55 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-15-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-15-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	10		ug/L	1	05/19/2021	AB21-0519-21
Barium	333		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	1850		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	191000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	3		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	1		ug/L	1	05/19/2021	AB21-0519-21
Iron	2870		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	20		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	28900		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	ND		ug/L	2	05/19/2021	AB21-0519-21
Potassium	6450		ug/L	100	05/20/2021	AB21-0519-21
Selenium	ND		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	49400		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	2		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-15-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	19500		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	14200		ug/L	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-15-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	108		ug/L	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**OW-55**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-15	Collect Time:	11:55 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-15-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	724		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-15-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	645000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Bicarbonate	645000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-12

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-57R Out**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-16	Collect Time:	01:30 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-16-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-16-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	ND		ug/L	1	05/19/2021	AB21-0519-21
Barium	73		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	1710		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	133000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	1		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	1		ug/L	1	05/19/2021	AB21-0519-21
Iron	100		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	24		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	66800		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	6		ug/L	5	05/19/2021	AB21-0519-21
Nickel	16		ug/L	2	05/19/2021	AB21-0519-21
Potassium	2590		ug/L	100	05/20/2021	AB21-0519-21
Selenium	ND		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	51900		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-16-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	62900		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	78300		ug/L	1000	05/18/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-16-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	ND		ug/L	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**MW-57R Out**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-16	Collect Time:	01:30 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-16-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	743		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-16-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	535000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Bicarbonate	535000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-12

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**LH-104**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-18	Collect Time:	09:28 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-18-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-18-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	29		ug/L	1	05/19/2021	AB21-0519-21
Barium	287		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	12200		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	158000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	9		ug/L	1	05/19/2021	AB21-0519-21
Iron	480		ug/L	20	05/19/2021	AB21-0519-21
Lead	2		ug/L	1	05/19/2021	AB21-0519-21
Lithium	58		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	100000		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	59		ug/L	5	05/19/2021	AB21-0519-21
Nickel	8		ug/L	2	05/19/2021	AB21-0519-21
Potassium	9160		ug/L	100	05/20/2021	AB21-0519-21
Selenium	2		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	56700		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	3		ug/L	2	05/19/2021	AB21-0519-21
Zinc	35		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-18-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	70500		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	173000		ug/L	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-18-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	43		ug/L	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**LH-104**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-18	Collect Time:	09:28 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-18-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1050		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-18-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	683000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Bicarbonate	683000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-12

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**DUP-01**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-19	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-19-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-19-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	1		ug/L	1	05/19/2021	AB21-0519-21
Barium	109		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	1320		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	370000		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	2		ug/L	1	05/19/2021	AB21-0519-21
Iron	1810		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	100		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	94900		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	ND		ug/L	2	05/19/2021	AB21-0519-21
Potassium	19600		ug/L	100	05/20/2021	AB21-0519-21
Selenium	1		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	85200		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-19-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	69900		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	867000		ug/L	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-19-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	35		ug/L	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**DUP-01**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-19	Collect Time:	12:00 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot: 21-0531-19-C04-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1970		mg/L	10	05/13/2021	AB21-0514-01

Alkalinity by SM 2320B

Aliquot: 21-0531-19-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	539000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Bicarbonate	539000		ug/L	10000	05/19/2021	AB21-0519-12
Alkalinity Carbonate	ND		ug/L	10000	05/19/2021	AB21-0519-12

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-MW-18001 MS**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-20	Collect Time:	07:17 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-20-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	95.1		%	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-20-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	110		%	1	05/19/2021	AB21-0519-21
Arsenic	110		%	1	05/19/2021	AB21-0519-21
Barium	111		%	5	05/19/2021	AB21-0519-21
Beryllium	99		%	1	05/19/2021	AB21-0519-21
Boron	116		%	20	05/19/2021	AB21-0519-21
Cadmium	105		%	0.2	05/19/2021	AB21-0519-21
Calcium	104		%	1000	05/24/2021	AB21-0519-21
Chromium	93		%	1	05/19/2021	AB21-0519-21
Cobalt	94		%	6	05/19/2021	AB21-0519-21
Copper	89		%	1	05/19/2021	AB21-0519-21
Iron	110		%	20	05/19/2021	AB21-0519-21
Lead	98		%	1	05/19/2021	AB21-0519-21
Lithium	99		%	10	05/19/2021	AB21-0519-21
Magnesium	119		%	1000	05/20/2021	AB21-0519-21
Molybdenum	108		%	5	05/19/2021	AB21-0519-21
Nickel	91		%	2	05/19/2021	AB21-0519-21
Potassium	108		%	100	05/20/2021	AB21-0519-21
Selenium	98		%	1	05/19/2021	AB21-0519-21
Silver	94.4		%	0.2	05/19/2021	AB21-0519-21
Sodium	125		%	1000	05/20/2021	AB21-0519-21
Thallium	97		%	2	05/19/2021	AB21-0519-21
Vanadium	101		%	2	05/19/2021	AB21-0519-21
Zinc	95		%	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-20-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	114		%	1000	05/18/2021	AB21-0518-02
Fluoride	92		%	1000	05/18/2021	AB21-0518-02
Sulfate	92		%	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-20-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	104		%	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-MW-18001 MS**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-20	Collect Time:	07:17 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0531-20-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	91		%	10000	05/19/2021	AB21-0519-11

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-MW-18001 MSD**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-21	Collect Time:	07:17 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-21-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	96.8		%	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-21-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	112		%	1	05/19/2021	AB21-0519-21
Arsenic	111		%	1	05/19/2021	AB21-0519-21
Barium	113		%	5	05/19/2021	AB21-0519-21
Beryllium	97		%	1	05/19/2021	AB21-0519-21
Boron	104		%	20	05/19/2021	AB21-0519-21
Cadmium	105		%	0.2	05/19/2021	AB21-0519-21
Calcium	117		%	1000	05/24/2021	AB21-0519-21
Chromium	94		%	1	05/19/2021	AB21-0519-21
Cobalt	94		%	6	05/19/2021	AB21-0519-21
Copper	88		%	1	05/19/2021	AB21-0519-21
Iron	98		%	20	05/19/2021	AB21-0519-21
Lead	98		%	1	05/19/2021	AB21-0519-21
Lithium	97		%	10	05/19/2021	AB21-0519-21
Magnesium	122		%	1000	05/20/2021	AB21-0519-21
Molybdenum	110		%	5	05/19/2021	AB21-0519-21
Nickel	92		%	2	05/19/2021	AB21-0519-21
Potassium	114		%	100	05/20/2021	AB21-0519-21
Selenium	103		%	1	05/19/2021	AB21-0519-21
Silver	97.2		%	0.2	05/19/2021	AB21-0519-21
Sodium	129		%	1000	05/20/2021	AB21-0519-21
Thallium	97		%	2	05/19/2021	AB21-0519-21
Vanadium	99		%	2	05/19/2021	AB21-0519-21
Zinc	94		%	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-21-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	112		%	1000	05/18/2021	AB21-0518-02
Fluoride	90		%	1000	05/18/2021	AB21-0518-02
Sulfate	90		%	1000	05/19/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-21-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	105		%	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**JCW-MW-18001 MSD**	Collect Date:	05/10/2021
Lab Sample ID:	21-0531-21	Collect Time:	07:17 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0531-21-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	91		%	10000	05/19/2021	AB21-0519-11

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**FB-01**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-22	Collect Time:	02:40 PM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-22-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-22-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	ND		ug/L	1	05/19/2021	AB21-0519-21
Barium	ND		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	ND		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	ND		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	ND		ug/L	1	05/19/2021	AB21-0519-21
Iron	ND		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	ND		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	ND		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	ND		ug/L	2	05/19/2021	AB21-0519-21
Potassium	ND		ug/L	100	05/20/2021	AB21-0519-21
Selenium	ND		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	ND		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-22-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	ND		ug/L	1000	05/18/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-22-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	ND		ug/L	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**21-0531**
Field Sample ID:	**EB-01**	Collect Date:	05/11/2021
Lab Sample ID:	21-0531-23	Collect Time:	02:45 PM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0531-23-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	05/18/2021	AB21-0518-03

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

Aliquot: 21-0531-23-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	05/19/2021	AB21-0519-21
Arsenic	ND		ug/L	1	05/19/2021	AB21-0519-21
Barium	ND		ug/L	5	05/19/2021	AB21-0519-21
Beryllium	ND		ug/L	1	05/19/2021	AB21-0519-21
Boron	ND		ug/L	20	05/19/2021	AB21-0519-21
Cadmium	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Calcium	ND		ug/L	1000	05/20/2021	AB21-0519-21
Chromium	ND		ug/L	1	05/19/2021	AB21-0519-21
Cobalt	ND		ug/L	6	05/19/2021	AB21-0519-21
Copper	1		ug/L	1	05/19/2021	AB21-0519-21
Iron	ND		ug/L	20	05/19/2021	AB21-0519-21
Lead	ND		ug/L	1	05/19/2021	AB21-0519-21
Lithium	ND		ug/L	10	05/19/2021	AB21-0519-21
Magnesium	ND		ug/L	1000	05/20/2021	AB21-0519-21
Molybdenum	ND		ug/L	5	05/19/2021	AB21-0519-21
Nickel	ND		ug/L	2	05/19/2021	AB21-0519-21
Potassium	ND		ug/L	100	05/20/2021	AB21-0519-21
Selenium	ND		ug/L	1	05/19/2021	AB21-0519-21
Silver	ND		ug/L	0.2	05/19/2021	AB21-0519-21
Sodium	ND		ug/L	1000	05/20/2021	AB21-0519-21
Thallium	ND		ug/L	2	05/19/2021	AB21-0519-21
Vanadium	ND		ug/L	2	05/19/2021	AB21-0519-21
Zinc	ND		ug/L	10	05/19/2021	AB21-0519-21

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

Aliquot: 21-0531-23-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Fluoride	ND		ug/L	1000	05/18/2021	AB21-0518-02
Sulfate	ND		ug/L	1000	05/18/2021	AB21-0518-02

Total Phosphorus by SM 4500-P, B5-E, Low Level

Aliquot: 21-0531-23-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Phosphorus total	ND		ug/L	10	05/17/2021	AB21-0517-06

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Analytical Report

Report Date: 05/26/21

Data Qualifiers	Exception Summary
	No exceptions occured.

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-0531

Inspection Date: 05-13-21 **Inspection By:** CUH

Sample Origin/Project Name: JCW Porewater

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx _____ UPS _____ USPS _____ Airborne _____

Other/~~Hand Carry~~ (whom) EB-Consumers

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 1.2°C Samples Received on Ice: Yes ✓ No _____

M&TE # and Expiration 05402 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)	42				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	65				
24 mL vial (glass)					
250 ~~500~~ mL (plastic)	19				
Other _____					

PG. 2 of 2 not needed

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Consumers Energy

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

SAMPLING SITE: JCW Porewater – 2021 Q2

PROJECT NUMBER: 21-0531

SAMPLING TEAM:

DATE SHIPPED:

SITE SKETCHED ATTACHED? CIRCLE ONE: YES NO

SEND REPORT TO: CDBatts

HD Register, TRC

PHONE:

ANALYSIS REQUESTED

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	Total Phosphorus	TDS	Alkalinity				REMARKS
21-0531-01	5/10/21	0717	GW	JCW-MW-18001		6	x	x	x	x	x				
-02	" "	0858	GW	JCW-OW-18001		6	x	x	x	x	x				
-03	" "	1113	GW	JCW-OW-18002		6	x	x	x	x	x				
-04	5/11/21	0744	GW	JCW-MW-18004		6	x	x	x	x	x				
-05	5/11/21	0846	GW	JCW-OW-18004		6	x	x	x	x	x				
-06	5/11/21	1245	GW	JCW-MW-18005		6	x	x	x	x	x				
-07	5/11/21	1433	GW	JCW-MW-18006		6	x	x	x	x	x				
-08	5/10/21	0953	GW	MW-50		6	x	x	x	x	x				
-09	5/10/21	1202	GW	MW-51		6	x	x	x	x	x				
-10	5/10/21	1310	GW	MW-52		6	x	x	x	x	x				
-11	5/10/21	1411	GW	MW-53		6	x	x	x	x	x				
-12	5/10/21	1548	GW	MW-53R		6	x	x	x	x	x				

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
	5/12/21 1415	
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

COMMENTS: 4.2°C

#015402

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SAMPLING SITE: JCW Porewater – 2021 Q2

PROJECT NUMBER: 21-0531

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	Total Phosphorus	TDS	Alkalinity				REMARKS
21-0531-13	5/11/21	0920	GW	MW-54R		6	X	X	X	X	X				
-14	5/11/21	1030	GW	MW-55		6	X	X	X	X	X				
-15	5/11/21	1155	GW	OW-55		6	X	X	X	X	X				
-16	5/11/21	1330	GW	OW-57R OUT		6	X	X	X	X	X				
-17			GW	~~MW-58~~		6	X	X	X	X	X				
-18	5/11/21	0930	GW	LH-104		6	X	X	X	X	X				
-19	5/10/21	—	GW	DUP-01		6	X	X	X	X	X				
-20	5/10/21	0717	GW	JCW-MW-18001 MS		4	X	X	X		X				
-21	5/10/21	0717	GW	JCW-MW-18001 MSD		4	X	X	X		X				
-22	5/11/21	1440	W	FB-01		1	X								
-23	5/11/21	1445	W	EB-01		1	X								

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
	5/12/21 1415	
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

COMMENTS

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ANALYTICAL REPORT

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Tel: (330)497-9396

Laboratory Job ID: 240-149380-1
Client Project/Site: Karn/Weadock CCR JCW Landfill

For:
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

Attn: Darby Litz

Authorized for release by:
6/17/2021 9:19:31 PM

Kris Brooks, Project Manager II
(330)966-9790
Kris.Brooks@Eurofinset.com

LINKS

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www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

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: 240-149380-1

Laboratory: Eurofins TestAmerica, Canton

Narrative

Job Narrative
240-149380-1

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 5/13/2021 8:00 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 2 coolers at receipt time were 3.3º C and 7.5º C.

RAD
Method 903.0: Radium-226 prep batch 160-511204: 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. JCW-MW-18001 (240-149380-1), JCW-MW-18004 (240-149380-2), JCW-MW-18005 (240-149380-3), JCW-MW-18006 (240-149380-4), MW-50 (240-149380-5), MW-51 (240-149380-6), MW-52 (240-149380-7), MW-53 (240-149380-8), MW-53R (240-149380-9), MW-55 (240-149380-11), OW-57R OUT (240-149380-12), DUP-WEADOCK LF (240-149380-13), EB-WEADOCK LF (240-149380-14), (LCS 160-511204/1-A), (LCSD 160-511204/2-A) and (MB 160-511204/23-A)

Method 903.0: Radium-226 Batch 511204: 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. MW-54R (240-149380-10)

Method 904.0: Radium 228 prep batch 160-511205: 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. JCW-MW-18001 (240-149380-1), JCW-MW-18004 (240-149380-2), JCW-MW-18005 (240-149380-3), JCW-MW-18006 (240-149380-4), MW-50 (240-149380-5), MW-51 (240-149380-6), MW-52 (240-149380-7), MW-53 (240-149380-8), MW-53R (240-149380-9), MW-54R (240-149380-10), MW-55 (240-149380-11), OW-57R OUT (240-149380-12), DUP-WEADOCK LF (240-149380-13), EB-WEADOCK LF (240-149380-14), (LCS 160-511205/1-A), (LCSD 160-511205/2-A) and (MB 160-511205/23-A)

Method PrecSep_0: Ra-228 Batch 160-511205: Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: JCW-MW-18004 (240-149380-2), JCW-MW-18005 (240-149380-3), JCW-MW-18006 (240-149380-4), MW-50 (240-149380-5), MW-51 (240-149380-6), MW-52 (240-149380-7), MW-53 (240-149380-8), MW-53R (240-149380-9), MW-54R (240-149380-10), OW-57R OUT (240-149380-12), DUP-WEADOCK LF (240-149380-13) and EB-WEADOCK LF (240-149380-14). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

Method PrecSep_0: Ra-228 Batch 160-511205: The following sample was prepared at a reduced aliquot due to matrix. The sample was yellow.

Method PrecSep_0: Ra-228 Batch 160-511205: The following samples were prepared at a reduced aliquot due to Matrix: JCW-MW-18001 (240-149380-1) and MW-55 (240-149380-11). 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 160-511205: During the in-growth process, the following samples needed to be filtered due to sediment present in the sample: JCW-MW-18006 (240-149380-4) and MW-53R (240-149380-9). This is an indicator of matrix interference.

Method PrecSep STD: Ra-226 Batch 160-511204: Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: JCW-MW-18004 (240-149380-2), JCW-MW-18005 (240-149380-3), JCW-MW-18006 (240-149380-4), MW-50 (240-149380-5), MW-51 (240-149380-6), MW-52 (240-149380-7), MW-53 (240-149380-8), MW-53R (240-149380-9), MW-54R (240-149380-10), OW-57R OUT (240-149380-12), DUP-WEADOCK LF (240-149380-13) and EB-WEADOCK LF (240-149380-14). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

Method PrecSep STD: Ra-226 Batch 160-511204: The following samples were prepared at a reduced aliquot due to Matrix:

Job ID: 240-149380-1 (Continued)

Laboratory: Eurofins TestAmerica, Canton (Continued)

JCW-MW-18001 (240-149380-1) and MW-55 (240-149380-11). 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 160-511204: During the in-growth process, the following samples needed to be filtered due to sediment present in the sample: JCW-MW-18006 (240-149380-4) and MW-53R (240-149380-9). 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.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

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.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
240-149380-1	JCW-MW-18001	Water	05/10/21 07:17	05/14/21 08:00	
240-149380-2	JCW-MW-18004	Water	05/11/21 07:44	05/14/21 08:00	
240-149380-3	JCW-MW-18005	Water	05/11/21 12:45	05/14/21 08:00	
240-149380-4	JCW-MW-18006	Water	05/11/21 14:23	05/14/21 08:00	
240-149380-5	MW-50	Water	05/10/21 09:53	05/14/21 08:00	
240-149380-6	MW-51	Water	05/10/21 12:08	05/14/21 08:00	
240-149380-7	MW-52	Water	05/10/21 13:10	05/14/21 08:00	
240-149380-8	MW-53	Water	05/10/21 14:11	05/14/21 08:00	
240-149380-9	MW-53R	Water	05/10/21 15:48	05/14/21 08:00	
240-149380-10	MW-54R	Water	05/11/21 06:50	05/14/21 08:00	
240-149380-11	MW-55	Water	05/11/21 10:20	05/14/21 08:00	
240-149380-12	OW-57R OUT	Water	05/11/21 13:30	05/14/21 08:00	
240-149380-13	DUP-WEADOCK LF	Water	05/10/21 00:00	05/14/21 08:00	
240-149380-14	EB-WEADOCK LF	Water	05/11/21 14:40	05/14/21 08:00	

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: JCW-MW-18001

Lab Sample ID: 240-149380-1

Date Collected: 05/10/21 07:17
Date Received: 05/14/21 08:00

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	0.300	U	0.249	0.251	1.00	0.378	pCi/L	05/23/21 12:41	06/15/21 18:26	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*84.4*		*40 - 110*	*05/23/21 12:41*	*06/15/21 18:26*	*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	0.153	U	0.325	0.325	1.00	0.558	pCi/L	05/23/21 13:19	06/14/21 13:40	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*84.4*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*1*
Y Carrier	*82.2*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*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	0.453	U	0.409	0.411	5.00	0.558	pCi/L		06/16/21 17:23	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: JCW-MW-18004

Date Collected: 05/11/21 07:44
Date Received: 05/14/21 08:00

Lab Sample ID: 240-149380-2

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	0.171	U	0.171	0.171	1.00	0.271	pCi/L	05/23/21 12:41	06/15/21 18:27	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.0*		*40 - 110*	*05/23/21 12:41*	*06/15/21 18:27*	*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	-0.0966	U	0.227	0.227	1.00	0.425	pCi/L	05/23/21 13:19	06/14/21 13:40	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.0*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*1*
Y Carrier	*85.2*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*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	0.0742	U	0.284	0.284	5.00	0.425	pCi/L		06/16/21 17:23	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: JCW-MW-18005

Lab Sample ID: 240-149380-3

Date Collected: 05/11/21 12:45
Matrix: Water
Date Received: 05/14/21 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	0.204	U	0.156	0.157	1.00	0.224	pCi/L	05/23/21 12:41	06/15/21 18:27	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*40 - 110*	*05/23/21 12:41*	*06/15/21 18:27*	*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	**0.524**		0.277	0.281	1.00	0.409	pCi/L	05/23/21 13:19	06/14/21 13:40	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*1*
Y Carrier	*81.9*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:40*	*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	**0.728**		0.318	0.322	5.00	0.409	pCi/L		06/16/21 17:23	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: JCW-MW-18006

Lab Sample ID: 240-149380-4

Date Collected: 05/11/21 14:23
Matrix: Water
Date Received: 05/14/21 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	**0.418**		0.225	0.228	1.00	0.291	pCi/L	05/23/21 12:41	06/15/21 18:27	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*75.4*		*40 - 110*	*05/23/21 12:41*	*06/15/21 18:27*	*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	0.471	U	0.314	0.317	1.00	0.483	pCi/L	05/23/21 13:19	06/14/21 13:53	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*75.4*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:53*	*1*
Y Carrier	*83.0*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:53*	*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	**0.888**		0.386	0.390	5.00	0.483	pCi/L		06/16/21 17:23	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: MW-50

Date Collected: 05/10/21 09:53
Date Received: 05/14/21 08:00

Lab Sample ID: 240-149380-5

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	0.0936	U	0.138	0.139	1.00	0.237	pCi/L	05/23/21 12:41	06/15/21 18:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.3*		*40 - 110*	*05/23/21 12:41*	*06/15/21 18:29*	*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	**0.557**		0.307	0.311	1.00	0.456	pCi/L	05/23/21 13:19	06/14/21 13:54	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.3*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:54*	*1*
Y Carrier	*84.5*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:54*	*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	**0.650**		0.337	0.341	5.00	0.456	pCi/L		06/16/21 17:23	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: MW-51

Date Collected: 05/10/21 12:08
Date Received: 05/14/21 08:00

Lab Sample ID: 240-149380-6

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	0.225	U	0.179	0.180	1.00	0.268	pCi/L	05/23/21 12:41	06/15/21 18:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.7*		*40 - 110*	*05/23/21 12:41*	*06/15/21 18:29*	*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	**0.626**		0.300	0.306	1.00	0.442	pCi/L	05/23/21 13:19	06/14/21 13:54	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.7*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:54*	*1*
Y Carrier	*87.5*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:54*	*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	**0.851**		0.349	0.355	5.00	0.442	pCi/L		06/16/21 17:23	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: MW-52

Date Collected: 05/10/21 13:10
Date Received: 05/14/21 08:00

Lab Sample ID: 240-149380-7

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	0.211	U	0.162	0.163	1.00	0.237	pCi/L	05/23/21 12:41	06/15/21 18:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.5*		*40 - 110*	*05/23/21 12:41*	*06/15/21 18:29*	*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	0.106	U	0.237	0.237	1.00	0.407	pCi/L	05/23/21 13:19	06/14/21 13:54	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.5*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:54*	*1*
Y Carrier	*87.9*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:54*	*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	0.317	U	0.287	0.288	5.00	0.407	pCi/L		06/16/21 17:23	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: MW-53

Date Collected: 05/10/21 14:11
Date Received: 05/14/21 08:00

Lab Sample ID: 240-149380-8

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	0.228	U	0.167	0.168	1.00	0.239	pCi/L	05/23/21 12:41	06/15/21 18:30	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.5*		*40 - 110*	*05/23/21 12:41*	*06/15/21 18:30*	*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	**0.455**		0.255	0.259	1.00	0.379	pCi/L	05/23/21 13:19	06/14/21 13:54	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.5*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:54*	*1*
Y Carrier	*85.6*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:54*	*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	**0.684**		0.305	0.309	5.00	0.379	pCi/L		06/16/21 17:23	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: MW-53R

Date Collected: 05/10/21 15:48
Date Received: 05/14/21 08:00

Lab Sample ID: 240-149380-9

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	0.306		0.175	0.177	1.00	0.219	pCi/L	05/23/21 12:41	06/15/21 18:30	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.3*		*40 - 110*	*05/23/21 12:41*	*06/15/21 18:30*	*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	0.822		0.352	0.360	1.00	0.507	pCi/L	05/23/21 13:19	06/14/21 13:54	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.3*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:54*	*1*
Y Carrier	*84.9*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:54*	*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	1.13		0.393	0.401	5.00	0.507	pCi/L		06/16/21 17:23	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: MW-54R

Date Collected: 05/11/21 06:50
Date Received: 05/14/21 08:00

Lab Sample ID: 240-149380-10

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	0.118	U	0.153	0.154	1.00	0.255	pCi/L	05/23/21 12:41	06/16/21 15:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*77.2*		*40 - 110*	*05/23/21 12:41*	*06/16/21 15:20*	*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	**0.782**		0.337	0.345	1.00	0.482	pCi/L	05/23/21 13:19	06/14/21 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*77.2*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:55*	*1*
Y Carrier	*88.2*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:55*	*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	**0.900**		0.370	0.378	5.00	0.482	pCi/L		06/16/21 17:23	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: MW-55

Date Collected: 05/11/21 10:20
Date Received: 05/14/21 08:00

Lab Sample ID: 240-149380-11

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	0.525		0.269	0.273	1.00	0.321	pCi/L	05/23/21 12:41	06/15/21 22:05	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*74.5*		*40 - 110*	*05/23/21 12:41*	*06/15/21 22:05*	*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	0.896		0.484	0.491	1.00	0.727	pCi/L	05/23/21 13:19	06/14/21 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*74.5*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:55*	*1*
Y Carrier	*85.2*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:55*	*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	1.42		0.554	0.562	5.00	0.727	pCi/L		06/16/21 17:23	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: OW-57R OUT

Date Collected: 05/11/21 13:30
Date Received: 05/14/21 08:00

Lab Sample ID: 240-149380-12

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	0.00986	U	0.146	0.146	1.00	0.286	pCi/L	05/23/21 12:41	06/15/21 22:02	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*81.7*		*40 - 110*	*05/23/21 12:41*	*06/15/21 22:02*	*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	**0.606**		0.298	0.303	1.00	0.432	pCi/L	05/23/21 13:19	06/14/21 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*81.7*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:55*	*1*
Y Carrier	*86.7*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:55*	*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	**0.615**		0.332	0.336	5.00	0.432	pCi/L		06/16/21 17:23	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: DUP-WEADOCK LF

Lab Sample ID: 240-149380-13

Date Collected: 05/10/21 00:00
Matrix: Water
Date Received: 05/14/21 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	0.0633	U	0.136	0.136	1.00	0.245	pCi/L	05/23/21 12:41	06/15/21 22:02	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.2*		*40 - 110*	*05/23/21 12:41*	*06/15/21 22:02*	*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	**0.607**		0.298	0.303	1.00	0.438	pCi/L	05/23/21 13:19	06/14/21 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.2*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:55*	*1*
Y Carrier	*88.2*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:55*	*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	**0.671**		0.328	0.332	5.00	0.438	pCi/L		06/16/21 17:23	1

Client Sample Results

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: EB-WEADOCK LF

Date Collected: 05/11/21 14:40
Date Received: 05/14/21 08:00

Lab Sample ID: 240-149380-14

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	0.140	U	0.155	0.156	1.00	0.250	pCi/L	05/23/21 12:41	06/15/21 22:02	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*80.2*		*40 - 110*	*05/23/21 12:41*	*06/15/21 22:02*	*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	0.209	U	0.271	0.272	1.00	0.451	pCi/L	05/23/21 13:19	06/14/21 13:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*80.2*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:57*	*1*
Y Carrier	*89.0*		*40 - 110*	*05/23/21 13:19*	*06/14/21 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	0.348	U	0.312	0.314	5.00	0.451	pCi/L		06/16/21 17:23	1

Tracer/Carrier Summary

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Method: 903.0 - Radium-226 (GFPC)

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

		Percent Yield (Acceptance Limits)						
Lab Sample ID	Client Sample ID	Ba (40-110)						
240-149380-1	JCW-MW-18001	84.4						
240-149380-2	JCW-MW-18004	88.0						
240-149380-3	JCW-MW-18005	88.3						
240-149380-4	JCW-MW-18006	75.4						
240-149380-5	MW-50	79.3						
240-149380-6	MW-51	90.7						
240-149380-7	MW-52	92.5						
240-149380-8	MW-53	89.5						
240-149380-9	MW-53R	82.3						
240-149380-10	MW-54R	77.2						
240-149380-11	MW-55	74.5						
240-149380-12	OW-57R OUT	81.7						
240-149380-13	DUP-WEADOCK LF	86.2						
240-149380-14	EB-WEADOCK LF	80.2						
LCS 160-511204/1-A	Lab Control Sample	81.7						
LCSD 160-511204/2-A	Lab Control Sample Dup	79.9						
MB 160-511204/23-A	Method Blank	68.5						

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

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

		Percent Yield (Acceptance Limits)						
Lab Sample ID	Client Sample ID	Ba (40-110)	Y (40-110)					
240-149380-1	JCW-MW-18001	84.4	82.2					
240-149380-2	JCW-MW-18004	88.0	85.2					
240-149380-3	JCW-MW-18005	88.3	81.9					
240-149380-4	JCW-MW-18006	75.4	83.0					
240-149380-5	MW-50	79.3	84.5					
240-149380-6	MW-51	90.7	87.5					
240-149380-7	MW-52	92.5	87.9					
240-149380-8	MW-53	89.5	85.6					
240-149380-9	MW-53R	82.3	84.9					
240-149380-10	MW-54R	77.2	88.2					
240-149380-11	MW-55	74.5	85.2					
240-149380-12	OW-57R OUT	81.7	86.7					
240-149380-13	DUP-WEADOCK LF	86.2	88.2					
240-149380-14	EB-WEADOCK LF	80.2	89.0					
LCS 160-511205/1-A	Lab Control Sample	81.7	81.9					
LCSD 160-511205/2-A	Lab Control Sample Dup	79.9	86.0					
MB 160-511205/23-A	Method Blank	68.5	87.9					

Tracer/Carrier Legend

Ba = Ba Carrier
Y = Y Carrier

QC Sample Results

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-511204/23-A
Matrix: Water
Analysis Batch: 514476

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 511204

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.07694	U	0.0891	0.0894	1.00	0.247	pCi/L	05/23/21 12:41	06/15/21 22:03	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*68.5*		*40 - 110*	*05/23/21 12:41*	*06/15/21 22:03*	*1*

Lab Sample ID: LCS 160-511204/1-A
Matrix: Water
Analysis Batch: 514296

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 511204

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-226			11.3	11.90		1.41	1.00	0.303	pCi/L	105	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*81.7*		*40 - 110*

Lab Sample ID: LCSD 160-511204/2-A
Matrix: Water
Analysis Batch: 514296

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 511204

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-226			11.3	11.38		1.37	1.00	0.316	pCi/L	100	75 - 125	0.19	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*79.9*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-511205/23-A
Matrix: Water
Analysis Batch: 514248

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 511205

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.2797	U	0.309	0.310	1.00	0.506	pCi/L	05/23/21 13:19	06/14/21 13:57	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*68.5*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:57*	*1*
Y Carrier	*87.9*		*40 - 110*	*05/23/21 13:19*	*06/14/21 13:57*	*1*

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

Lab Sample ID: LCS 160-511205/1-A
Matrix: Water
Analysis Batch: 514268

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 511205

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-228			9.63	10.32		1.23	1.00	0.501	pCi/L	107	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*81.7*		*40 - 110*
Y Carrier	*81.9*		*40 - 110*

Lab Sample ID: LCSD 160-511205/2-A
Matrix: Water
Analysis Batch: 514268

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 511205

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-228			9.63	9.802		1.17	1.00	0.450	pCi/L	102	75 - 125	0.21	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*79.9*		*40 - 110*
Y Carrier	*86.0*		*40 - 110*

QC Association Summary

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Rad

Prep Batch: 511204

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-149380-1	JCW-MW-18001	Total/NA	Water	PrecSep STD	
240-149380-2	JCW-MW-18004	Total/NA	Water	PrecSep STD	
240-149380-3	JCW-MW-18005	Total/NA	Water	PrecSep STD	
240-149380-4	JCW-MW-18006	Total/NA	Water	PrecSep STD	
240-149380-5	MW-50	Total/NA	Water	PrecSep STD	
240-149380-6	MW-51	Total/NA	Water	PrecSep STD	
240-149380-7	MW-52	Total/NA	Water	PrecSep STD	
240-149380-8	MW-53	Total/NA	Water	PrecSep STD	
240-149380-9	MW-53R	Total/NA	Water	PrecSep STD	
240-149380-10	MW-54R	Total/NA	Water	PrecSep STD	
240-149380-11	MW-55	Total/NA	Water	PrecSep STD	
240-149380-12	OW-57R OUT	Total/NA	Water	PrecSep STD	
240-149380-13	DUP-WEADOCK LF	Total/NA	Water	PrecSep STD	
240-149380-14	EB-WEADOCK LF	Total/NA	Water	PrecSep STD	
MB 160-511204/23-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-511204/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
LCSD 160-511204/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	

Prep Batch: 511205

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-149380-1	JCW-MW-18001	Total/NA	Water	PrecSep_0	
240-149380-2	JCW-MW-18004	Total/NA	Water	PrecSep_0	
240-149380-3	JCW-MW-18005	Total/NA	Water	PrecSep_0	
240-149380-4	JCW-MW-18006	Total/NA	Water	PrecSep_0	
240-149380-5	MW-50	Total/NA	Water	PrecSep_0	
240-149380-6	MW-51	Total/NA	Water	PrecSep_0	
240-149380-7	MW-52	Total/NA	Water	PrecSep_0	
240-149380-8	MW-53	Total/NA	Water	PrecSep_0	
240-149380-9	MW-53R	Total/NA	Water	PrecSep_0	
240-149380-10	MW-54R	Total/NA	Water	PrecSep_0	
240-149380-11	MW-55	Total/NA	Water	PrecSep_0	
240-149380-12	OW-57R OUT	Total/NA	Water	PrecSep_0	
240-149380-13	DUP-WEADOCK LF	Total/NA	Water	PrecSep_0	
240-149380-14	EB-WEADOCK LF	Total/NA	Water	PrecSep_0	
MB 160-511205/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-511205/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-511205/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: JCW-MW-18001 — Lab Sample ID: 240-149380-1

Date Collected: 05/10/21 07:17
Date Received: 05/14/21 08:00
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514366	06/15/21 18:26	JCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514268	06/14/21 13:40	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Client Sample ID: JCW-MW-18004 — Lab Sample ID: 240-149380-2

Date Collected: 05/11/21 07:44
Date Received: 05/14/21 08:00
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514366	06/15/21 18:27	JCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514268	06/14/21 13:40	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Client Sample ID: JCW-MW-18005 — Lab Sample ID: 240-149380-3

Date Collected: 05/11/21 12:45
Date Received: 05/14/21 08:00
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514366	06/15/21 18:27	JCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514268	06/14/21 13:40	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Client Sample ID: JCW-MW-18006 — Lab Sample ID: 240-149380-4

Date Collected: 05/11/21 14:23
Date Received: 05/14/21 08:00
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514366	06/15/21 18:27	JCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514216	06/14/21 13:53	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Lab Chronicle

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: MW-50

Lab Sample ID: 240-149380-5
Date Collected: 05/10/21 09:53
Matrix: Water
Date Received: 05/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514476	06/15/21 18:29	SCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514216	06/14/21 13:54	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Client Sample ID: MW-51

Lab Sample ID: 240-149380-6
Date Collected: 05/10/21 12:08
Matrix: Water
Date Received: 05/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514476	06/15/21 18:29	SCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514216	06/14/21 13:54	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Client Sample ID: MW-52

Lab Sample ID: 240-149380-7
Date Collected: 05/10/21 13:10
Matrix: Water
Date Received: 05/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514476	06/15/21 18:29	SCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514216	06/14/21 13:54	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Client Sample ID: MW-53

Lab Sample ID: 240-149380-8
Date Collected: 05/10/21 14:11
Matrix: Water
Date Received: 05/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514476	06/15/21 18:30	SCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514216	06/14/21 13:54	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Lab Chronicle

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: MW-53R
Date Collected: 05/10/21 15:48
Date Received: 05/14/21 08:00

Lab Sample ID: 240-149380-9
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514476	06/15/21 18:30	SCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514216	06/14/21 13:54	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Client Sample ID: MW-54R
Date Collected: 05/11/21 06:50
Date Received: 05/14/21 08:00

Lab Sample ID: 240-149380-10
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514500	06/16/21 15:20	SCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514216	06/14/21 13:55	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Client Sample ID: MW-55
Date Collected: 05/11/21 10:20
Date Received: 05/14/21 08:00

Lab Sample ID: 240-149380-11
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514476	06/15/21 22:05	SCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514216	06/14/21 13:55	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Client Sample ID: OW-57R OUT
Date Collected: 05/11/21 13:30
Date Received: 05/14/21 08:00

Lab Sample ID: 240-149380-12
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514476	06/15/21 22:02	SCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514216	06/14/21 13:55	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Lab Chronicle

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

Client Sample ID: DUP-WEADOCK LF

Lab Sample ID: 240-149380-13

Date Collected: 05/10/21 00:00
Date Received: 05/14/21 08:00

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514476	06/15/21 22:02	SCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514216	06/14/21 13:55	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	GRW	TAL SL

Client Sample ID: EB-WEADOCK LF

Lab Sample ID: 240-149380-14

Date Collected: 05/11/21 14:40
Date Received: 05/14/21 08:00

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			511204	05/23/21 12:41	HRT	TAL SL
Total/NA	Analysis	903.0		1	514476	06/15/21 22:02	SCB	TAL SL
Total/NA	Prep	PrecSep_0			511205	05/23/21 13:19	HRT	TAL SL
Total/NA	Analysis	904.0		1	514248	06/14/21 13:57	SCB	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514555	06/16/21 17:23	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.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-149380-1

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

74/75
32/33

Chain of Custody Record

MICHIGAN
190

eurofins

Environment Testing America

Client Information	Sampler: Javier Jassy	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-82580-29048 1
Client Contact: Jacob Krenz	Phone: 734 904 3316	E-Mail: Kris Brooks@Eurofinset.com	State of Origin:	Page: Page 1 of 2
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 JCW Lanfill	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)	904.0, Ra226Ra228_GFPC	903.0 Standard Target List	Total Number of containers	Special Instructions/Note
			Preservation Code:		X	X	D	D	X	
JCW-MW 18001	5/10/21	0717	G	Water	N	N	X	X	2	
JCW-MW 18004	5/11/21	0744	G	Water	N	N	X	X	2	
JCW-MW 18005	5/11/21	1245	G	Water	N	N	X	X	2	
JCW-MW 18006	5/11/21	1423	G	Water	N	N	X	X	2	
MW-50	5/10/21	0953	G	Water	N	N	X	X	2	
MW-51	5/10/21	1202	G	Water	N	N	X	X	2	
MW-52	5/10/21	1316	G	Water	N	N	X	X	2	
MW-53	5/10/21	1411	G	Water	N	N	X	X	2	
MW-53R	5/10/21	1548	G	Water	N	N	X	X	2	
MW-54R	5/10/21	0648	G	Water	N	N	X	X	2	
MW-55	5/11/21	1020	G	Water	N	N	X	X	2	

240-149380 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]	5/12/21 1230	TRC	[signature]	5/12/21 1230	ETA
[signature]	5/12/21 1230	ETA	[signature]	5/14/21 0800	ETA
				13 [illegible] 5/17/21	

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

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton OH 44720
Phone 330-497-9396 Fax: 330-497-0772

7-41 TS
32133

Chain of Custody Record

MICHIGAN 190

eurofins

Environment Americas

Client Information	Sampler: JACOB TAJS	Lab PM: Brooks Kris M	Carrier Tracking No(s):	COC No: 240-82580-29048.2
Client Contact: Jacob Krenz	Phone:	E-Mail: Kris.Brooks@Eurofinset.com	State of Origin:	Page: Page 2 of 2
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 JCW Lanfill	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)	904.0, Ra226Ra228_GFPC	903.0 Standard Target List	Total Number of containers	Special Instructions/Note
				Preservation Code:	X	X	D	D	X	
OW-57R OUT	5/11/21	1330	G	Water	N	N	X	X	2	
DUP	5/10/21	—	G	Water	N	N	X	X	2	
EB	5/11/21	1440	G	Water	N	N	X	X	2	
~~JCWMW 18001 MS~~	~~5/10/21~~	~~0717~~	~~G~~	Water	N	N	X	X	2	
~~JCWMW 18001 MSD~~	~~[illegible]~~	~~0717~~	~~G~~	Water	N	N	X	X	2	
				Water						

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]	5/10/21 1230	TRC	[signature]	5/12/21 1250	ETA
[signature]	5/12/21 1250	ETA	[signature]	5-14-21 0800	ETA
				13 KMB 51721	

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 #** 149380
Canton Facility

Client TRC 13 vm351721 Site Name Karn/Weadock
Cooler Received on 5/14/21 Opened on 5-14-21
FedEx. 1st Grd Exp UPS FAS Clipper Client Drop Off TestAmerica Courier Other

Cooler unpacked by Me

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

TestAmerica Cooler # TA 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 ____ °C Corrected Cooler Temp ____ °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 2 1 on ea 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

One of the two Coolers arrived with an elevated temp.

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

Login # : 149380

Eurofins TestAmerica Canton Sample Receipt Multiple Cooler Form

Cooler Description (Circle)	IR Gun # (Circle)	Observed Temp °C	Corrected Temp °C	Coolant (Circle)
(TA) Client Box Other	(IR-11) IR-12	7 4	7.5	(Wet Ice) Blue Ice Dry Ice Water None
(TA) Client Box Other	(IR-11) IR-12	3.2	3 3	(Wet Ice) Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR 11 IR-12			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-11 IR-12			Wet Ice Blue Ice Dry Ice Water None

☐ See Temperature Excursion Form

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

Login Container Summary Report

Temperature readings _____

Client Sample ID	Lab ID	Container Type	Container pH	Container Temp	Preservative Added (mls)	Lot #
JCW-MW 18001	240-149380-A-1	Plastic 1 liter Nitric Acid	<2			
JCW-MW-18001	240-149380-B-1	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18004	240-149380-A-2	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18004	240-149380-B-2	Plastic 1 liter Nitric Acid	<2			
JCW-MW-18005	240-149380-A-3	Plastic 1 liter - Nitric Acid	<2			
JCW-MW 18005	240-149380-B-3	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18006	240-149380-A-4	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18006	240-149380-B-4	Plastic 1 liter - Nitric Acid	<2			
MW-50	240-149380-A 5	Plastic 1 liter - Nitric Acid	<2			
MW-50	240-149380-B-5	Plastic 1 liter - Nitric Acid	<2			
MW 51	240-149380-A-6	Plastic 1 liter Nitric Acid	<2			
MW-51	240-149380-B-6	Plastic 1 liter - Nitric Acid	<2			
MW-52	240-149380-A-7	Plastic 1 liter - Nitric Acid	<2			
MW-52	240-149380-B-7	Plastic 1 liter - Nitric Acid	<2			
MW-53	240-149380-A-8	Plastic 1 liter - Nitric Acid	<2			
MW 53	240-149380-B-8	Plastic 1 liter - Nitric Acid	<2			
MW-53R	240-149380-A-9	Plastic 1 liter - Nitric Acid	<2			
MW-53R	240-149380-B-9	Plastic 1 liter - Nitric Acid	<2			
MW-54R	240-149380-A-10	Plastic 1 liter - Nitric Acid	<2			
MW-54R	240-149380-B-10	Plastic 1 liter - Nitric Acid	<2			
MW-55	240-149380-A-11	Plastic 1 liter - Nitric Acid	<2			
MW-55	240-149380-B-11	Plastic 1 liter - Nitric Acid	<2			
OW-57R OUT	240-149380-A-12	Plastic 1 liter - Nitric Acid	<2			
OW-57R OUT	240-149380-B-12	Plastic 1 liter Nitric Acid	<2			
DUP	240-149380-A-13	Plastic 1 liter - Nitric Acid	<2			
DUP	240-149380-B-13	Plastic 1 liter - Nitric Acid	<2			
EB	240-149380-A 14	Plastic 1 liter Nitric Acid	<2			
EB	240-149380-B-14	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

eurofins Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-136755.1
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 #: 240-149380-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 6/15/2021			
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:								
JCW-MW-18001 (240-149380-1)	5/10/21	07:17 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-18004 (240-149380-2)	5/11/21	07:44 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-18005 (240-149380-3)	5/11/21	12:45 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-18006 (240-149380-4)	5/11/21	14:23 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-50 (240-149380-5)	5/10/21	09:53 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-51 (240-149380-6)	5/10/21	12:08 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-52 (240-149380-7)	5/10/21	13:10 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
Unconfirmed

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) Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: [signature]	Date/Time: 5-14-21 1700	Company: ETA	Received by: FED EX	Date/Time:	Company
Relinquished by: FED EX	Date/Time:	Company	Received by: [signature]	Date/Time: 5/15/21 0815	Company: ETA SJL
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
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: 240-136763.1
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 #: 240-149380-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 6/15/2021			
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:								
MW-53 (240-149380-8)	5/10/21	14:11 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-53R (240-149380-9)	5/10/21	15:48 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-54R (240-149380-10)	5/11/21	06:50 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-55 (240-149380-11)	5/11/21	10:50 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
OW-57R OUT (240-149380-12)	5/11/21	13:30 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP (240-149380-13)	5/10/21	Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
EB (240-149380-14)	5/11/21	14:40 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 *Unconfirmed*	***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) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:		Method of Shipment:	
Relinquished by:	Date/Time:	Company	Received by: FED EX	Date/Time:	Company
Relinquished by: FED EX	Date/Time:	Company	Received by:	Date/Time: 5/15/21 0815	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: 240-149380-1

Login Number: 149380
List Number: 2
Creator: Mazariegos, Leonel A

List Source: Eurofins TestAmerica, St. Louis
List Creation: 05/15/21 01:11 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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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 – DEK-JCW BACKGROUND 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: 21-0525

TRC Environmental, Inc. conducted groundwater monitoring at the Karn/Weadock Background 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 2009 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

Testing performed in accordance with the A2LA scope of accredidation specified in the listed certificate.
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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_2020 DEK & JCW RCRA Background Wells
Date Received: 5/5/2021
Chemistry Project: 21-0525

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-0525-01	MW-15002	Groundwater	05/03/2021 02:00 PM	DEK JCW Background
21-0525-02	MW-15008	Groundwater	05/03/2021 03:56 PM	DEK JCW Background
21-0525-03	MW-15016	Groundwater	05/03/2021 03:09 PM	DEK JCW Background
21-0525-04	MW-15019	Groundwater	05/03/2021 04:03 PM	DEK JCW Background
21-0525-05	DUP-04	Groundwater	05/03/2021 12:00 AM	DEK JCW Background
21-0525-06	FB-04	Water	05/03/2021 04:03 PM	DEK JCW Background

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Analytical Report

Report Date: 05/23/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15002**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-01	Collect Time:	02:00 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0525-01-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: 21-0525-01-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	1		ug/L	1	05/13/2021	AB21-0514-08
Barium	1040		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	102		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	364000		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	1		ug/L	1	05/13/2021	AB21-0514-08
Iron	14600		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	19		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	53200		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	ND		ug/L	5	05/13/2021	AB21-0514-08
Nickel	7		ug/L	2	05/13/2021	AB21-0514-08
Potassium	6120		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	1490000		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	12		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: 21-0525-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	2630000		ug/L	1000	05/17/2021	AB21-0506-07
Fluoride	ND		ug/L	1000	05/06/2021	AB21-0506-07
Sulfate	31300		ug/L	1000	05/06/2021	AB21-0506-07

Total Dissolved Solids by SM 2540C

Aliquot: 21-0525-01-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	5390		mg/L	10	05/07/2021	AB21-0507-02

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Analytical Report

Report Date: 05/23/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15002**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-01	Collect Time:	02:00 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0525-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	471000		ug/L	10000	05/11/2021	AB21-0511-11
Alkalinity Bicarbonate	471000		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 JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15008**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-02	Collect Time:	03:56 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0525-02-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: 21-0525-02-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	ND		ug/L	1	05/13/2021	AB21-0514-08
Barium	62		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	121		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	105000		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	1		ug/L	1	05/13/2021	AB21-0514-08
Iron	11300		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	15		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	15500		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	2450		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	167000		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	8		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: 21-0525-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	225000		ug/L	1000	05/17/2021	AB21-0506-07
Fluoride	ND		ug/L	1000	05/06/2021	AB21-0506-07
Sulfate	ND		ug/L	1000	05/06/2021	AB21-0506-07

Total Dissolved Solids by SM 2540C

Aliquot: 21-0525-02-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	822		mg/L	10	05/07/2021	AB21-0507-02

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Analytical Report

Report Date: 05/23/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15008**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-02	Collect Time:	03:56 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0525-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	360000		ug/L	10000	05/11/2021	AB21-0511-11
Alkalinity Bicarbonate	360000		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 JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15016**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-03	Collect Time:	03:09 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0525-03-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: 21-0525-03-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	53		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	349		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	219000		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	1		ug/L	1	05/13/2021	AB21-0514-08
Iron	1170		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	79		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	26500		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	ND		ug/L	5	05/13/2021	AB21-0514-08
Nickel	6		ug/L	2	05/13/2021	AB21-0514-08
Potassium	14600		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	58200		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	2		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: 21-0525-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	108000		ug/L	1000	05/17/2021	AB21-0506-07
Fluoride	ND		ug/L	1000	05/06/2021	AB21-0506-07
Sulfate	255000		ug/L	1000	05/17/2021	AB21-0506-07

Total Dissolved Solids by SM 2540C

Aliquot: 21-0525-03-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	979		mg/L	10	05/07/2021	AB21-0507-02

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Analytical Report

Report Date: 05/23/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15016**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-03	Collect Time:	03:09 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0525-03-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	372000		ug/L	10000	05/11/2021	AB21-0511-11
Alkalinity Bicarbonate	372000		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 JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15019**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-04	Collect Time:	04:03 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0525-04-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: 21-0525-04-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	1		ug/L	1	05/13/2021	AB21-0514-08
Barium	335		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	239		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	155000		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	14300		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	33400		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	ND		ug/L	5	05/13/2021	AB21-0514-08
Nickel	28		ug/L	2	05/13/2021	AB21-0514-08
Potassium	2350		ug/L	100	05/14/2021	AB21-0514-08
Selenium	4		ug/L	1	05/13/2021	AB21-0514-08
Silver	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Sodium	224000		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: 21-0525-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	344000		ug/L	1000	05/17/2021	AB21-0506-07
Fluoride	ND		ug/L	1000	05/06/2021	AB21-0506-07
Sulfate	52400		ug/L	1000	05/06/2021	AB21-0506-07

Total Dissolved Solids by SM 2540C

Aliquot: 21-0525-04-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	1160		mg/L	10	05/07/2021	AB21-0507-02

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Analytical Report

Report Date: 05/23/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**MW-15019**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-04	Collect Time:	04:03 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0525-04-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	440000		ug/L	10000	05/11/2021	AB21-0511-11
Alkalinity Bicarbonate	440000		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 JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**DUP-04**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-05	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0525-05-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: 21-0525-05-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	ND		ug/L	1	05/13/2021	AB21-0514-08
Barium	1090		ug/L	5	05/13/2021	AB21-0514-08
Beryllium	ND		ug/L	1	05/13/2021	AB21-0514-08
Boron	102		ug/L	20	05/13/2021	AB21-0514-08
Cadmium	ND		ug/L	0.2	05/13/2021	AB21-0514-08
Calcium	379000		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	1		ug/L	1	05/13/2021	AB21-0514-08
Iron	14600		ug/L	20	05/13/2021	AB21-0514-08
Lead	ND		ug/L	1	05/13/2021	AB21-0514-08
Lithium	19		ug/L	10	05/13/2021	AB21-0514-08
Magnesium	53700		ug/L	1000	05/14/2021	AB21-0514-08
Molybdenum	ND		ug/L	5	05/13/2021	AB21-0514-08
Nickel	7		ug/L	2	05/13/2021	AB21-0514-08
Potassium	6220		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	1510000		ug/L	1000	05/14/2021	AB21-0514-08
Thallium	ND		ug/L	2	05/13/2021	AB21-0514-08
Vanadium	13		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: 21-0525-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	2640000		ug/L	1000	05/18/2021	AB21-0506-07
Fluoride	ND		ug/L	1000	05/06/2021	AB21-0506-07
Sulfate	32000		ug/L	1000	05/06/2021	AB21-0506-07

Total Dissolved Solids by SM 2540C

Aliquot: 21-0525-05-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	5330		mg/L	10	05/07/2021	AB21-0507-02

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Analytical Report

Report Date: 05/23/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**DUP-04**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-05	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot: 21-0525-05-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity Total	475000		ug/L	10000	05/11/2021	AB21-0511-11
Alkalinity Bicarbonate	475000		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 JCW Background**	Laboratory Project:	**21-0525**
Field Sample ID:	**FB-04**	Collect Date:	05/03/2021
Lab Sample ID:	21-0525-06	Collect Time:	04:03 PM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous

Aliquot: 21-0525-06-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: 21-0525-06-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	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

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

Aliquot: 21-0525-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	05/06/2021	AB21-0506-07
Fluoride	ND		ug/L	1000	05/06/2021	AB21-0506-07
Sulfate	ND		ug/L	1000	05/06/2021	AB21-0506-07

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Analytical Report

Report Date: 05/23/21

Data Qualifiers	Exception Summary
	No exceptions occured.

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-0525

Inspection Date: 05/05/21 **Inspection By:** CUH

Sample Origin/Project Name: KIW Background

Shipment Delivered By: Enter the type of shipment carrier.

Pony ____ FedEx ✓ UPS ____ USPS ____ Airborne ____

Other/Hand Carry (whom) ____

Tracking Number: 786769796241 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
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)	10				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	12				
24 mL vial (glass)					
250 ~~500~~ mL (plastic)	5				
Other					

PG. 2 of 2 not needed

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SAMPLING SITE: DEK & JCW Background- 2021 Q2 RCRA

PROJECT NUMBER: 21-0525

SAMPLING TEAM: TRC

DATE SHIPPED: 5-4-21

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
21-0525-01	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)
[signature]	5-4-21 1630	Fedex
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
Fed Ex	5.5.21 1100	[signature] Hansen

COMMENTS: 0.3-1.6°C 015402

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ANALYTICAL REPORT

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Tel: (330)497-9396

Laboratory Job ID: 240-149188-1
Client Project/Site: Karn/Weadock CCR Background Wells

For:
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

Attn: Darby Litz

Authorized for release by:
6/17/2021 12:48:02 PM

Kris Brooks, Project Manager II
(330)966-9790
Kris.Brooks@Eurofinset.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

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

Job ID: 240-149188-1

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: 240-149188-1

Laboratory: Eurofins TestAmerica, Canton

Narrative

Job Narrative
240-149188-1

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 0.6º 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. MW-15002 (240-149188-1), MW-15008 (240-149188-2), MW-15016 (240-149188-3), MW-15019 (240-149188-4), DUP-BACKGROUND (240-149188-5), FB-BACKGROUND (240-149188-6), (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. MW-15002 (240-149188-1), MW-15008 (240-149188-2), MW-15016 (240-149188-3), MW-15019 (240-149188-4), DUP-BACKGROUND (240-149188-5), FB-BACKGROUND (240-149188-6), (LCS 160-510305/1-A), (LCSD 160-510305/2-A) and (MB 160-510305/22-A)

Method PrecSep_0:

Method PrecSep_0: Ra-228 Batch 160-510305:

Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: MW-15016 (240-149188-3) and FB-BACKGROUND (240-149188-6). 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: MW-15002 (240-149188-1), MW-15008 (240-149188-2), MW-15019 (240-149188-4) and DUP-BACKGROUND (240-149188-5). 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:

Method PrecSep STD: Ra-226 Batch 160-510304:

Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: MW-15016 (240-149188-3) and FB-BACKGROUND (240-149188-6). 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: MW-15002 (240-149188-1), MW-15008 (240-149188-2), MW-15019 (240-149188-4) and DUP-BACKGROUND (240-149188-5). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead of a sample duplicate (DUP) to demonstrate batch precision.

Job ID: 240-149188-1 (Continued)

Laboratory: Eurofins TestAmerica, Canton (Continued)

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

Method Summary

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

Job ID: 240-149188-1

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.
Project/Site: Karn/Weadock CCR Background Wells

Job ID: 240-149188-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
240-149188-1	MW-15002	Water	05/03/21 14:00	05/12/21 08:00	
240-149188-2	MW-15008	Water	05/03/21 15:56	05/12/21 08:00	
240-149188-3	MW-15016	Water	05/03/21 15:09	05/12/21 08:00	
240-149188-4	MW-15019	Water	05/03/21 16:03	05/12/21 08:00	
240-149188-5	DUP-BACKGROUND	Water	05/03/21 00:00	05/12/21 08:00	
240-149188-6	FB-BACKGROUND	Water	05/03/21 16:03	05/12/21 08:00	

Client Sample Results

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

Job ID: 240-149188-1

Client Sample ID: MW-15002

Date Collected: 05/03/21 14:00
Date Received: 05/12/21 08:00

Lab Sample ID: 240-149188-1

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	1.24		0.315	0.334	1.00	0.274	pCi/L	05/18/21 13:46	06/14/21 21:14	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*75.4*		*40 - 110*	*05/18/21 13:46*	*06/14/21 21:14*	*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	2.49		0.578	0.622	1.00	0.689	pCi/L	05/18/21 14:33	06/11/21 14:07	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*75.4*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:07*	*1*
Y Carrier	*92.3*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:07*	*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	3.72		0.658	0.706	5.00	0.689	pCi/L		06/15/21 21:24	1

Client Sample Results

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

Job ID: 240-149188-1

Client Sample ID: MW-15008

Date Collected: 05/03/21 15:56
Date Received: 05/12/21 08:00

Lab Sample ID: 240-149188-2

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	0.127	U	0.177	0.177	1.00	0.298	pCi/L	05/18/21 13:46	06/14/21 21:18	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*72.1*		*40 - 110*	*05/18/21 13:46*	*06/14/21 21:18*	*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	0.677	U	0.453	0.457	1.00	0.699	pCi/L	05/18/21 14:33	06/11/21 14:08	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*72.1*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:08*	*1*
Y Carrier	*89.7*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:08*	*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	**0.804**		0.486	0.490	5.00	0.699	pCi/L		06/15/21 21:24	1

Client Sample Results

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

Job ID: 240-149188-1

Client Sample ID: MW-15016

Date Collected: 05/03/21 15:09
Date Received: 05/12/21 08:00

Lab Sample ID: 240-149188-3

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	0.0524	U	0.121	0.122	1.00	0.218	pCi/L	05/18/21 13:46	06/14/21 21:18	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*73.6*		*40 - 110*	*05/18/21 13:46*	*06/14/21 21:18*	*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	**0.606**		0.327	0.332	1.00	0.480	pCi/L	05/18/21 14:33	06/11/21 14:08	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*73.6*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:08*	*1*
Y Carrier	*84.5*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:08*	*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	**0.658**		0.349	0.354	5.00	0.480	pCi/L		06/15/21 21:24	1

Client Sample Results

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

Job ID: 240-149188-1

Client Sample ID: MW-15019

Date Collected: 05/03/21 16:03
Date Received: 05/12/21 08:00

Lab Sample ID: 240-149188-4

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	0.302	U	0.212	0.214	1.00	0.309	pCi/L	05/18/21 13:46	06/14/21 21:18	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*71.8*		*40 - 110*	*05/18/21 13:46*	*06/14/21 21:18*	*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	0.600	U	0.451	0.454	1.00	0.707	pCi/L	05/18/21 14:33	06/11/21 14:08	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*71.8*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:08*	*1*
Y Carrier	*89.3*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:08*	*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	**0.902**		0.498	0.502	5.00	0.707	pCi/L		06/15/21 21:24	1

Client Sample Results

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

Job ID: 240-149188-1

Client Sample ID: DUP-BACKGROUND

Lab Sample ID: 240-149188-5

Date Collected: 05/03/21 00:00
Date Received: 05/12/21 08:00

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	1.01		0.280	0.294	1.00	0.277	pCi/L	05/18/21 13:46	06/14/21 21:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.8*		*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	3.43		0.617	0.694	1.00	0.684	pCi/L	05/18/21 14:33	06/11/21 14:07	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.8*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:07*	*1*
Y Carrier	*88.2*		*40 - 110*	*05/18/21 14:33*	*06/11/21 14:07*	*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	4.44		0.678	0.754	5.00	0.684	pCi/L		06/15/21 21:24	1

Client Sample Results

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

Job ID: 240-149188-1

Client Sample ID: FB-BACKGROUND

Lab Sample ID: 240-149188-6

Date Collected: 05/03/21 16:03
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	-0.0247	U	0.0896	0.0897	1.00	0.187	pCi/L	05/18/21 13:46	06/14/21 21:19	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*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	0.206	U	0.284	0.285	1.00	0.474	pCi/L	05/18/21 14:33	06/11/21 13:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*40 - 110*	*05/18/21 14:33*	*06/11/21 13:57*	*1*
Y Carrier	*91.2*		*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	0.181	U	0.298	0.299	5.00	0.474	pCi/L		06/15/21 21:24	1

Tracer/Carrier Summary

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

Job ID: 240-149188-1

Method: 903.0 - Radium-226 (GFPC)

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

		Percent Yield (Acceptance Limits)							
Lab Sample ID	Client Sample ID	Ba (40-110)							
240-149188-1	MW-15002	75.4							
240-149188-2	MW-15008	72.1							
240-149188-3	MW-15016	73.6							
240-149188-4	MW-15019	71.8							
240-149188-5	DUP-BACKGROUND	86.8							
240-149188-6	FB-BACKGROUND	88.3							
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)							
Lab Sample ID	Client Sample ID	Ba (40-110)	Y (40-110)						
240-149188-1	MW-15002	75.4	92.3						
240-149188-2	MW-15008	72.1	89.7						
240-149188-3	MW-15016	73.6	84.5						
240-149188-4	MW-15019	71.8	89.3						
240-149188-5	DUP-BACKGROUND	86.8	88.2						
240-149188-6	FB-BACKGROUND	88.3	91.2						
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
Matrix: Water
Analysis Batch: 514296

Client Sample ID: Method Blank
Prep Type: Total/NA
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
Matrix: Water
Analysis Batch: 514248

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
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
Matrix: Water
Analysis Batch: 514248

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
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
Matrix: Water
Analysis Batch: 513770

Client Sample ID: Method Blank
Prep Type: Total/NA
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
Matrix: Water
Analysis Batch: 513948

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
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
Matrix: Water
Analysis Batch: 513948

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
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.
Project/Site: Karn/Weadock CCR Background Wells

Job ID: 240-149188-1

Rad

Prep Batch: 510304

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-149188-1	MW-15002	Total/NA	Water	PrecSep STD	
240-149188-2	MW-15008	Total/NA	Water	PrecSep STD	
240-149188-3	MW-15016	Total/NA	Water	PrecSep STD	
240-149188-4	MW-15019	Total/NA	Water	PrecSep STD	
240-149188-5	DUP-BACKGROUND	Total/NA	Water	PrecSep STD	
240-149188-6	FB-BACKGROUND	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
240-149188-1	MW-15002	Total/NA	Water	PrecSep_0	
240-149188-2	MW-15008	Total/NA	Water	PrecSep_0	
240-149188-3	MW-15016	Total/NA	Water	PrecSep_0	
240-149188-4	MW-15019	Total/NA	Water	PrecSep_0	
240-149188-5	DUP-BACKGROUND	Total/NA	Water	PrecSep_0	
240-149188-6	FB-BACKGROUND	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.
Project/Site: Karn/Weadock CCR Background Wells

Job ID: 240-149188-1

Client Sample ID: MW-15002

Lab Sample ID: 240-149188-1
Date Collected: 05/03/21 14:00
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	514248	06/14/21 21:14	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513948	06/11/21 14:07	ANW	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Client Sample ID: MW-15008

Lab Sample ID: 240-149188-2
Date Collected: 05/03/21 15:56
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 21:18	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513948	06/11/21 14:08	ANW	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Client Sample ID: MW-15016

Lab Sample ID: 240-149188-3
Date Collected: 05/03/21 15:09
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 21:18	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513948	06/11/21 14:08	ANW	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Client Sample ID: MW-15019

Lab Sample ID: 240-149188-4
Date Collected: 05/03/21 16:03
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 21:18	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513948	06/11/21 14:08	ANW	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Lab Chronicle

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

Job ID: 240-149188-1

Client Sample ID: DUP-BACKGROUND

Lab Sample ID: 240-149188-5

Date Collected: 05/03/21 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 21:19	SCB	TAL SL
Total/NA	Prep	PrecSep_0			510305	05/18/21 14:33	MJ	TAL SL
Total/NA	Analysis	904.0		1	513948	06/11/21 14:07	ANW	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	514477	06/15/21 21:24	GRW	TAL SL

Client Sample ID: FB-BACKGROUND

Lab Sample ID: 240-149188-6

Date Collected: 05/03/21 16:03
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

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.
Project/Site: Karn/Weadock CCR Background Wells

Job ID: 240-149188-1

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

Chain of Custody Record

0-5/10-6

MICHIGAN 190

Eurofins | Environment Testing America

Client Information	Sampler: Jake Krenz	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-82579-29047.1
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 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:				D	D		
MW-15002	5-3-21	1400	G	Water	N	N	X	X		
MW-15008	5-3-21	1556	G	Water	N	N	X	X		
MW-15016	5-3-21	1509	G	Water	N	N	X	X		
MW-15019	5-3-21	1603	G	Water	N	N	X	X		
~~DUP-05~~ DUP-Background	5-3-21	—	G	Water	N	N	X	X		
~~FB-03~~ FB-Background	5-3-21	1603	G	Water	N	N	X	X		
				Water						

240-149188 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]	5-7-21/1538	TRC	[signature]	5/7/21 1545	ETA
[signature] - cold storage	5/7/21 1545	ETA	[signature]	5-12-21 800	ETA

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

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 # 1 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. 0.5 °C Corrected Cooler Temp. 0.6 °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: _____

WI-NC-099

Login Container Summary Report

Temperature readings: _____

Client Sample ID	Lab ID	Container Type	Container pH	Container Temp	Preservative Added (mls)	Lot #
MW-15002	240-149188-A-1	Plastic 1 liter - Nitric Acid	<2			
MW-15002	240-149188-B-1	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-149188-A-2	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-149188-B-2	Plastic 1 liter - Nitric Acid	<2			
MW-15016	240-149188-A-3	Plastic 1 liter - Nitric Acid	<2			
MW-15016	240-149188-B-3	Plastic 1 liter - Nitric Acid	<2			
MW-15019	240-149188-A-4	Plastic 1 liter - Nitric Acid	<2			
MW-15019	240-149188-B-4	Plastic 1 liter - Nitric Acid	<2			
DUP-BACKGROUND	240-149188-A-5	Plastic 1 liter - Nitric Acid	<2			
DUP-BACKGROUND	240-149188-B-5	Plastic 1 liter - Nitric Acid	<2			
FB-BACKGROUND	240-149188-A-6	Plastic 1 liter - Nitric Acid	<2			
FB-BACKGROUND	240-149188-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

eurofins | Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-136575.1
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 #: 240-149188-1
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	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
MW-15002 (240-149188-1)	5/3/21	14:00 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15008 (240-149188-2)	5/3/21	15:56 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15016 (240-149188-3)	5/3/21	15:09 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15019 (240-149188-4)	5/3/21	16:03 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-BACKGROUND (240-149188-5)	5/3/21	Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
FB-BACKGROUND (240-149188-6)	5/3/21	16:03 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
Unconfirmed

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) Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:		Method of Shipment:	
Relinquished by: [signature]	Date/Time: 5-12-21 1700	Company: ETA	Received by: FED EX	Date/Time:	Company
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: 240-149188-1

Login Number: 149188
List Number: 2
Creator: Worthington, Sierra M

List Source: Eurofins TestAmerica, St. Louis
List Creation: 05/13/21 11:28 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 F
Field Records

TRC

PROJECT NAME:	CEC WEADOCKLF 2021 GW COMPLIAN
PROJECT NUMBER:	418426.0001.0000
PROJECT MANAGER:	DARBY LITZ
SITE LOCATION:	2742 WEADOCK HWY ESSEXVILLE MI 48732
DATES OF FIELDWORK:	5/3/21 TO 5/3/21
PURPOSE OF FIELDWORK:	2021 GW SAMPLING
WORK PERFORMED BY:	JAVIER JASSO

SIGNED 5/14/21 DATE

CHECKED BY 5/17/21 DATE

TRC

GENERAL NOTES

PROJECT NAME:	CEC WEADOCK LF 2021 GW	DATE: 5/3/21	TIME ARRIVED: 0800
PROJECT NUMBER:	418426.0001.0000	AUTHOR: JJASSO	TIME LEFT: 0900

WEATHER

TEMPERATURE: 41 °F WIND: 10 MPH VISIBILITY: Cloudy + Rain

WORK / SAMPLING PERFORMED

WATER LEVELS

~~WELLS~~ SAMPLED

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
none	N/A

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Battle	CEC	check in / out

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
N/A		

5/14/21
SIGNED DATE

5/17/21
CHECKED BY DATE

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME: CEC Weadock LF; 2021 gw Co	DATE: 5/10/21	TIME ARRIVED: 0610
PROJECT NUMBER: 418426.0000.0000	AUTHOR: Javier Jasso	TIME LEFT: 1613

WEATHER

TEMPERATURE: 31 °F WIND: 15 MPH VISIBILITY: clear

WORK / SAMPLING PERFORMED

~~water levels~~

wells sampled JCW MW 18001, MS & MSD JCW-OW-18001, MW 50, Dup #01
JCW OW-18002, MW 51, MW 52, MW-53, MW-53R

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
none	

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Batts	~~[illegible]~~ CEC	on site
~~Jason~~	~~[illegible]~~	~~on site~~

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
Purge water	DNM	purged to ground

SIGNED [signature] 5/14/21 DATE

CHECKED BY [signature] 5/17/21 DATE

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME:	CEC WEADOCK LF 2021 GW	DATE:	5/11/21	TIME ARRIVED:	0550
PROJECT NUMBER:	418426.0001.0000	AUTHOR:	JJASSO	TIME LEFT:	1610

WEATHER

TEMPERATURE: 35 °F WIND: 15 MPH VISIBILITY: clear

WORK / SAMPLING PERFORMED

~~WATER LEVELS~~

WELLS SAMPLED MW-54R, JCWmw-18004, JCW-OW-18004, LH104
MW-50, OW 50, JCW-mw 18005, OW-57Rout, JCWmw18008
EB01, FB-01, JCW-mw-1501D
getting Supplys

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
NOW	

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Betts	CEC	check in/out

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
~~N/A~~		
purge water	DNM	purged to ground

SIGNED 5/14/21 DATE

CHECKED BY 5/17/21 DATE

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME:	CEC WEADOCK LF 2021 GW	DATE: 5/12/21	TIME ARRIVED: 0500
PROJECT NUMBER:	418426.0001.0000	AUTHOR: JJASSO	TIME LEFT: 0900

WEATHER

TEMPERATURE: 37 °F WIND: 10 MPH VISIBILITY: Clear

WORK / SAMPLING PERFORMED

~~WATER LEVELS~~

WELLS SAMPLED JCW-MW-15007, DUP 02, JCW MW-15028
JCW MW-15009, MS & MSD, EB02, FB02

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
~~N/A~~		
Purge water	DNM	purged to ground

5/12/21
SIGNED DATE

5/17/21
CHECKED BY DATE

REVISED 04/2019

TRC

EQUIPMENT SUMMARY

PROJECT NAME:	CEC WEADOCK LF 2021 G	SAMPLER NAME:	JJASS0
PROJECT NO.:	418426.0001.0000		

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)
HERON	TRC A2

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
NA	NA

TUBING TYPE: DEDICATED POLY TUBING

☑ LOW-FLOW SAMPLING EVENT

PURGE WATER DISPOSAL METHOD

☑ GROUND ☐ DRUM ☐ POTW ☐ POLYTANK ☐ OTHER _____

DECONTAMINATION AND FIELD BLANK WATER SOURCE

POTABLE WATER SOURCE	DI WATER SOURCE
LABORATORY PROVIDED	LABORATORY PROVIDED
SIGNED 5/14/21 DATE	CHECKED BY 5/17/21 DATE

REVISED 04/2019

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Weadock LF: 2021 GW Compliance	MODEL:	DO DSS	SAMPLER:	JJ
PROJECT NO.:	418426.0000.0000	SERIAL #:	AA	DATE:	5/20/21

PH CALIBRATION CHECK

pH 7 (LOT #) 00J 189 (EXP. DATE): 10/22	pH 4 / 10 (LOT #) 06K 004 (EXP. DATE): 11/22	CAL. RANGE	TIME
POST-CAL. READING / STANDARD	POST-CAL. READING / STANDARD		
700 / 700	400 / 400	☑ WITHIN RANGE	0820
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #) 06 1008 (EXP. DATE): 9/21	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING / STANDARD			
1413 / 1413	NA	☐ WITHIN RANGE	0820
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 20B 130038 (EXP. DATE) 08/21	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING / STANDARD			
223 / 223	17.0	☑ WITHIN RANGE	0825
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING /SATURATED AIR			
9.81 / 9.81	15.0	☑ WITHIN RANGE	0825
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A9317 (EXP. DATE): 11/21	(LOT #): (EXP. DATE):	CAL. RANGE	TIME
POST-CAL. READING / STANDARD	POST-CAL. READING / STANDARD		
0 / 0	/	☑ WITHIN RANGE	0830
20 / 20	/	☐ WITHIN RANGE	0830
/	/	☐ 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 [signature] 5/14/21 DATE

CHECKED BY [signature] 5/17/21 DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Weadock LF: 2021 GW Compliance	MODEL: Pro DSS	SAMPLER: JJ
PROJECT NO.:	418426.0000.0000	SERIAL #: AA	DATE: 5/11/21

PH CALIBRATION CHECK

pH 7.0 (LOT #): 06J169 (EXP. DATE): 10/22 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 06K004 (EXP. DATE): 11/22 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
700 / 700	400 / 400	☑ WITHIN RANGE	0510
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 06I1008 (EXP. DATE): 9/21 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1413 / 1413	NA	☑ WITHIN RANGE	0510
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 20B130028 (EXP. DATE): 2/25 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
223 / 223	20.0	☑ WITHIN RANGE	0510
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
9.21 / 9.21	18.0	☑ WITHIN RANGE	0510
/		☐ 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	0510
200 / 200	/	☑ WITHIN RANGE	0510
/	/	☐ 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 5/14/21 DATE

CHECKED BY 5/17/21 DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Weadock LF: 2021 GW Compliance	MODEL: PD DSS	SAMPLER: JJ
PROJECT NO.:	418426.0000.0000	SERIAL #: AA	DATE: 8/12/23

PH CALIBRATION CHECK

pH 7 (LOT #): 06J189 (EXP. DATE): 10/22 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 06K004 (EXP. DATE): 11/22 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
700 / 700	400 / 400	☑ WITHIN RANGE	0510
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 06I1008 (EXP. DATE): 9/21 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1413 / 1412	NA	☑ WITHIN RANGE	0510
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 20B130028 (EXP. DATE): 2/25 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
223 / 223	20.0	☑ WITHIN RANGE	0510
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
8.85 / 8.81	20.0	☑ WITHIN RANGE	0510
/		☐ 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	0510
200 / 200	/	☑ WITHIN RANGE	0510
/	/	☐ 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 [signature] 5/14/21 DATE

CHECKED BY [signature] 5/17/21 DATE

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC Weadock BAP: 2021 GW Compliance	DATE: 5/3/21	
PROJECT NUMBER:	418426.0001.0000	AUTHOR: Javier Jasso	

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
JC Weadock BAP						
JCW-MW-15007	0827		3.98	8.90		
JCW-MW-15009	0617		8.40	13.00		
JCW-MW-15010	0620		16.64	19.58		
JCW-MW-15028	0821		7.73	25.10		
Background						
MW-15002	0901		6.54	16.90		
MW-15008	0831		4.13	17.12		
MW-15016	0854		4.38	8.05		
MW-15019	0845		4.85	16.88		

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

SIGNED 5/14/21 DATE

CHECKED 5/17/21 DATE

TRC

WATER LEVEL DATA

PROJECT NAME:	DTE KARN/JCWEADOCK LANDFILL	DATE: 5/3/21
PROJECT NUMBER:	~~367388.0000.0000~~ 418426.0000	AUTHOR: JJASSO

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
LH-103	0804		16.20	22.17		
LH-104	0726		9.30	14.02		
~~JCWMW-15009~~						
JCWMW-15003						
JCWMW-15010						
JCWMW-18001	0624		15.98	23.74		
JCWOW-18001	0625		6.40	20.28		
JCWOW18002	0641		11.75	19.80		
M-50	0639		12.53	19.44		
MW-51	0645		13.30	20.00		
OW-51	0647		10.01	17.28		
JCWOW-18003	0654		10.28	18.61		
MW-52	0657		13.93	19.88		
JCWMW-15022	0656		15.20	DNM		
MW-53	0659		12.90	18.30		
OW-53	0702		8.62	18.02		
JCWMW15026	0705		12.58	DNM		
MW-53R	0706		13.40	18.74		
OW-54	0711		8.09	16.48		
MW-54R	0710		13.00	17.20		
MW-16R	0714		13.75	19.90		
OW-18004	0719		7.47	14.84		
JCWMW-18004	0718		11.65	14.73		
JCWMW-15021	0723		15.05	DNM		
OW-55	0731		6.80	18.86		

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

SIGNED 5/14/21 DATE

CHECKED 5/17/21 DATE

REVISED 04/2019

TRC

WATER LEVEL DATA

PROJECT NAME: DTE KARN/JCWEADOCK LANDFILL	DATE: 5/3/21
PROJECT NUMBER: ~~367388.0000.0000~~ 418426.0000	AUTHOR: JJASSO

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
MW-55	0730		12.93	16.40		
MW-20	0737		7.03	DNM		
JCWMW-18005	0735		8.80	16.33		
OW-56	0745		7.14	19.26		
OW-56R	0743		17.15	20.22		
OW-57R IN	0753		7.41	20.18		
OW-57 IN	0754		7.26	19.67		
OW-57 OUT	0748		10.80	19.49		
OW-57R OUT	0750		10.18	20.24		
JCWOW-18006	0759		11.42	23.48		
JCWMW-18006	0757		14.74	23.68		
JCWMW-15028	0821		7.73	25.10		
MW-106B	0823		7.94	41.18		
JCWMW15007	0827		3.98	8.90		
MW-109						
MW-58	0839		5.02	18.28		
MW-15008	0831		4.13	17.42		
MW-15019	0845		4.85	16.88		
MW-15002	0901		6.54	16.40		
MW-15016	0854		4.38	8.05		
OW-61	0833		21.98	37.08		
OW-63	0808		24.00	DNM		
MW-19	0816		9.63	20.85		
MW-15020	0835		4.70	17.28		
MW-116B	0837		4.38	DNM		

7.15 based on nearby wells and historical water level data - DJL 6/23

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

SIGNED 5/14/21 DATE

CHECKED 5/17/21 DATE

REVISED 04/2019

TRC

WATER LEVEL DATA

PROJECT NAME: CEC WEADOCK LF 2021 GW SAMPLING	DATE: 5/3/21
PROJECT NUMBER: 418426.0001.0000	AUTHOR: JJASSO

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
JCWMW1503	0815		9.15	DNM		
MW-1524	0842		5.33	17.18		
MW-15008	0848		5.11	10.05		
JCWMW15001	0904		7.85	DNM		

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

SIGNED 5/14/21 DATE

CHECKED 5/17/21 DATE

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER: 418426.0001.0000	BY: JJASS0	DATE: 5/14/21	BY: JK	DATE: 5/17/21

SAMPLE ID: JCWMW 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: 0637	DATE: 5/10/21	SAMPLE	TIME: 0717	DATE: 5/10/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.85 SU	CONDUCTIVITY: 2368 umhos/cm	
			ORP: 34.5 mV	DO: 2.10 mg/L	
DEPTH TO WATER: 15.98 T/ PVC			TURBIDITY: 022 NTU		
DEPTH TO BOTTOM: 23.74 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS			TEMPERATURE: 10.0 °C	OTHER:	
VOLUME REMOVED: ☑ LITERS ☐ GALLONS			COLOR: Clear	ODOR: Slight	
COLOR: Clear	ODOR: Slight		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)
0637	200	4.00	2268	145.0	10.0	50.0	8.6	1578	INITIAL
0642		6.61	2327	103.1	2.58	10.0	10.0	1587	1
0647		6.63	2330	87.9	2.33	3.30	9.8	1587	2
0652		6.62	2339	79.7	2.06	2.0	9.7	1587	3
0657		6.63	2351	62.0	2.16	0.49	9.8	1587	4
0702		6.63	2357	50.0	2.10	0.80	9.9	1587	5
0707		6.64	2361	40.0	2.10	0.33	9.9	1587	6
0712		6.65	2366	39.8	2.09	0.26	9.9	1587	7
0717		6.85	2368	34.5	2.10	0.22	10.0	1580	8

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~~ 60 mL	VOA	A	☐ Y ☑ N	~~3~~	~~125~~	~~PL~~	~~A~~	☐ Y ☑ N
3	125 mL	PLASTIC	A	☑ Y ☑ N	3	250	PL	A	☐ Y ☑ N
3	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
2	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
3	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/13/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/14/21	BY: JK	DATE: 5/17/21

SAMPLE ID: JCW-OW-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: 0813	DATE: 5/10/21	SAMPLE	TIME: 0858	DATE: 5/10/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.98 SU	CONDUCTIVITY: 1056 umhos/cm	
			ORP: -54.0 mV	DO: 2.06 mg/L	
DEPTH TO WATER: 6.46 T/ PVC			TURBIDITY: 3.75 NTU		
DEPTH TO BOTTOM: 20.08 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 10.1 °C	OTHER:	
VOLUME REMOVED: 9	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: none	
COLOR: Clear	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)
0813	200	7.10	850	41.0	10.70	100	9.8	6.41	INITIAL
0818		6.77	1077	13.0	2.78	6.40	9.6	6.60	1.0
0823		6.82	1073	-4.8	2.29	3.85	9.8	6.60	2
0828		6.85	1071	-20.4	219	5.00	9.9	6.60	3.0
0833		6.88	1072	-30.0	2.16	4.50	9.8	6.60	4
0838		6.91	1072	-40.0	2.10	10.10	9.9	6.60	5.5
0843		6.95	1069	-50.0	2.10	3.16	9.8	6.60	6
0848		6.97	1066	-55.8	2.06	4.01	10.0	6.60	7
0853		6.98	1059	-55.8	2.07	3.90	10.1	6.60	8
0858		6.98	1056	-54.0	2.06	3.75	10.1	6.60	9

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~~ 60 mL	VOA	A	☐ Y ☑ N		250	PI	A	☐ Y ☑ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/13/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER: 418426.0001.0000	BY: JJASS0	DATE: 5/14/21	BY: JK	DATE: 5/17/21

SAMPLE ID: MW-50 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0910	DATE: 5/10/21	SAMPLE	TIME: 0953	DATE: 5/10/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 12.53 T/ PVC

DEPTH TO BOTTOM: 19.44 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 7 ☑ LITERS ☐ GALLONS

COLOR: Clear ODOR: none

TURBIDITY: ☐ NONE ☑ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 6.94 SU CONDUCTIVITY: 2653 umhos/cm

ORP: -9.0 mV DO: 2.16 mg/L

TURBIDITY: 0.60 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 9.4 °C OTHER:

COLOR: Clear ODOR: none

FILTRATE (0.45 um) ☐ YES ☐ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☑ DUP-01

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)
0910	200	7.43	1216	38.9	8.65	21.0	8.8	12.50	INITIAL
0923		6.98	2669	36.5	2.63	6.60	9.0	12.55	1
0928		6.95	2675	30.0	2.37	2.57	9.2	12.55	2
0933		6.94	2679	24.3	2.28	2.46	9.2	12.55	3
0938		6.94	2675	14.0	2.19	0.96	9.2	12.55	4
0943		6.94	2666	-9.0	2.17	1.00	9.3	12.55	5
0948		6.94	2663	-8.9	2.16	0.95	9.3	12.55	6
0953		6.94	2653	-9.0	2.16	0.60	9.4	12.55	7
									~~8~~

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
4	~~125~~ 60 mL	VOA	A	☐ Y ☑ N	2	250	PI	A	☐ Y ☑ N
2	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
2	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
4	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
2	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/13/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/14/21	BY: SK	DATE: 5/17/21

SAMPLE ID: JCW-OW-1800J WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0833	DATE: 5/10/21	SAMPLE	TIME: 1113	DATE: 5/10/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.18 SU	CONDUCTIVITY: 1809 umhos/cm	
			ORP: -60.1 mV	DO: 2.02 mg/L	
DEPTH TO WATER: 16.75 T/ PVC			TURBIDITY: 6.00 NTU		
DEPTH TO BOTTOM: 19.80 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS			TEMPERATURE: 10.4 °C	OTHER:	
VOLUME REMOVED: 8 ☑ LITERS ☐ GALLONS			COLOR: Clear	ODOR: none	
COLOR: Brown	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)
1033	200	7.26	1764	16.4	10.0	300	11.2	1090	INITIAL
1038		7.14	1764	-15.3	2.65	32.0	10.2	1091	1
1043		7.11	1761	-39.7	2.22	14.38	10.1	1091	2
1048		7.16	1782	-50.0	2.14	10.40	10.2	1091	3
1053		7.17	1789	-53.0	2.11	9.80	10.3	1091	4
1058		7.17	1792	-55.9	2.00	9.80	10.3	1091	5
1103		7.17	1794	-59.8	2.00	6.08	10.3	1091	6
1108		7.18	1804	-60.0	2.04	6.15	10.4	1091	7
1113		7.18	1809	-60.1	2.02	6.00	10.4	1091	8

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~~ 60 mL	VOA	A	☐ Y ☑ N	1	250	PL	A	☐ Y ☑ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/17/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/12/21	BY: JK	DATE: 5/17/21

SAMPLE ID: MW-5P

WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1128	DATE: 5/10/21	SAMPLE	TIME: 1208	DATE: 5/10/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.99 SU	CONDUCTIVITY: 2258 umhos/cm	
			ORP: -28.5 mV	DO: 2.06 mg/L	
DEPTH TO WATER: 13.30 T/ PVC			TURBIDITY: 0.23 NTU		
DEPTH TO BOTTOM: 20.00 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 9.0 °C	OTHER:	
VOLUME REMOVED: 8	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: None	
COLOR: Brownish	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)
1128	200	7.30	2233	10.9	8.42	250.0	9.7	132	INITIAL
1133		7.06	2223	13.4	2.50	5.20	9.0	1340	1
1138		7.00	2249	1.5	2.19	0.97	9.0	1340	2
1143		6.99	2254	-6.1	2.14	0.85	9.0	1340	3
1148		6.99	2257	-13.0	2.10	0.44	9.0	1340	4
1153		6.99	2258	-19.0	2.09	0.23	9.0	1340	5
1158		6.99	2260	-28.0	2.08	0.16	9.0	1340	6
1203		6.99	2258	-28.0	2.07	0.15	9.0	1340	7
1208		6.99	2258	-28.5	2.06	0.23	9.0	1340	8

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~~ 60 mL	VOA	A	☐ Y	☑ N	1	250	PL	A	☐ 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	125 mL	PLASTIC	C	☐ Y	☑ N					☐ Y	☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/12/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/17/21	BY: JK	DATE: 5/17/21

SAMPLE ID: MW-52 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1235	DATE: 5/10/21	SAMPLE	TIME: 1310	DATE: 5/10/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.92 SU	CONDUCTIVITY: 2106 umhos/cm	
			ORP: 3.75 mV	DO: 2.07 mg/L	
DEPTH TO WATER: 13.93 T/ PVC			TURBIDITY: 045 NTU		
DEPTH TO BOTTOM: 19.00 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS			TEMPERATURE: 9.4 °C	OTHER:	
VOLUME REMOVED: 7 ☑ 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)
1235	200	7.37	2060	35.7	10.0	15.0	11.8	14.00	INITIAL
1240		7.00	2092	24.3	2.47	2.35	9.6	1415	1
1245		6.96	2102	17.0	2.27	080	9.6	1415	2
1250		6.94	2103	11.0	2.17	043	9.4	1415	3
1255		6.93	2104	6.5	2.10	010	9.4	1415	4
1300		6.92	2107	4.0	2.09	040	9.4	1415	5
1305		6.92	2107	3.99	2.08	040	9.3	1415	6
1310		6.92	2106	3.75	2.07	045	9.4	1415	7

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~~ 60 mL	VOA	A	☐ Y	☑ N	1	250	PL	A	☐ 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	125 mL	PLASTIC	C	☐ Y	☑ N					☐ Y	☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/10/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/14/21	BY: SK	DATE: 5/17/21

SAMPLE ID: MW-53 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1330	DATE: 5/10/21	SAMPLE	TIME: 1411	DATE: 5/10/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.08 SU	CONDUCTIVITY: 1649 umhos/cm	
			ORP: -19.3 mV	DO: 2.08 mg/L	
DEPTH TO WATER: 12.90 T/ PVC			TURBIDITY: 052 NTU		
DEPTH TO BOTTOM: 18.30 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 8.9 °C	OTHER:	
VOLUME REMOVED: 7	☑ 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)
1336	200	7.50	1601	47.3	886	7.0	10.1	1273	INITIAL
1341		7.14	1673	30.9	2.42	1.0	8.9	1284	1
1346		7.09	1670	18.0	2.27	047	8.8	1284	2
1351		7.08	1663	-7.6	219	040	8.7	1284	3
1356		7.07	1655	-7.0	2.12	052	8.7	1284	4
1401		7.08	1652	-18.0	2.10	050	8.8	1284	5
1406		7.08	1652	-19.0	209	053	8.8	1284	6
1411		7.08	1649	-19.3	208	052	8.9	1284	7

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
1	~~125~~ 60 mL	VOA	A	☐ Y ☑ N	1	250	P1	A	☐ 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	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/12/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/14/21	BY: SK	DATE: 5/17/21

SAMPLE ID: MW-53R

WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1433	DATE: 5/10/21	SAMPLE	TIME: 1548	DATE: 5/10/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.81 SU	CONDUCTIVITY: 1700 umhos/cm	
			ORP: -9.0 mV	DO: 2.07 mg/L	
DEPTH TO WATER: 13.46 T/ PVC			TURBIDITY: 1.40 NTU		
DEPTH TO BOTTOM: 14.74 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS			TEMPERATURE: 69 °C	OTHER:	
VOLUME REMOVED: 15 ☑ LITERS ☐ GALLONS			COLOR: Clear	ODOR: none	
COLOR: Brown	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)
1433	200	7.20	938	20.0	9.63	3500	11.5	1315	INITIAL
1438		6.81	1942	12.5	2.55	575	9.4	1331	1
1443		6.81	1925	12.4	2.49	800	9.6	1331	2
1448		6.80	1825	6.3	2.15	61.0	8.9	1331	3
1453		6.80	1794	3.1	2.10	23.0	8.9	1331	4
1458		6.80	1770	0.0	2.09	12.0	8.9	1331	5
1503		6.80	1755	-1.6	2.09	14.0	8.9	1331	6
1508		6.81	1756	-3.0	2.09	6.80	8.9	1331	7
1513		6.81	1741	-7.5	2.08	6.15	8.9	1331	8
1518		6.81	1738	-7.5	2.07	9.70	8.9	1331	9

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~~ 60 mL	VOA	A	☐ Y ☑ N	1	250	PL	A	☐ 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	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	____ FED EX	DATE SHIPPED: 5/12/21	AIRBILL NUMBER: N/A
COC NUMBER:	____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME:	CEC WEADOCKLF 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/14/21	BY: SK	DATE: 5/17/21

SAMPLE ID: MW 53R

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)
1523	200	6.81	1735	-7.7	2.06	11.0	8.9	1331	10
1528		6.81	1722	-10	2.06	9.0	9.0	1331	11
1533		6.81	1727	-7.3	2.18	5.50	8.9	1341	12
1538		6.81	1721	-8.5	2.08	1.50	8.9	1341	13
1543		6.81	1720	-9.0	2.07	1.50	8.9	1341	14
1548		6.81	1720	-9.0	2.07	1.40	8.9	1341	15

SIGNATURE: 5/14/21

DATE SIGNED:

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/14/21	BY: JK	DATE: 5/17/21

SAMPLE ID: MW 54R WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0600	DATE: 5/11/21	SAMPLE	TIME: 0610	DATE: 5/11/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.61 SU	CONDUCTIVITY: 1344 umhos/cm	
			ORP: 79.5 mV	DO: 2.43 mg/L	
DEPTH TO WATER: 130 T/ PVC			TURBIDITY: 0.61 NTU		
DEPTH TO BOTTOM: 135 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS			TEMPERATURE: 6.7 °C	OTHER:	
VOLUME REMOVED: 9 ☑ 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-		
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)
0600	200	400	1436	182.1	9.71	600	6.2	128.1	INITIAL
0610		6.57	1351	124.9	3.03	170.0	6.1	130	1
0611		6.61	1329	123.0	2.91	11.0	6.3	130	2
0620		6.61	1333	122.5	2.43	1.57	6.3	130	3
0625		6.61	1337	119.0	2.40	2.00	6.3	130	4
0630		6.61	1341	100.0	2.40	2.87	6.4	130	5
0635		6.61	1343	99.8	2.40	0.60	6.6	130	6
0640		6.60	1346	80.0	2.44	1.00	6.7	130	7
0645		6.61	1344	79.5	2.44	0.71	6.7	130	8
0610		6.61	1344	79.5	2.43	0.65	6.7	130	9

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~~ 60 mL	VOA	A	☐ Y	☑ N	1	250	PL	A	☐ 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	125 mL	PLASTIC	C	☐ Y	☑ N					☐ Y	☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/13/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER: 418426.0001.0000	BY: JJASS0	DATE: 5/14/21	BY: JK	DATE: 5/17/21

SAMPLE ID: JCW-MW18004 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0719	DATE: 5/11/21	SAMPLE	TIME: 0744	DATE: 5/11/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.80 SU	CONDUCTIVITY: 1746 umhos/cm	
			ORP: 64.0 mV	DO: 5.03 mg/L	
DEPTH TO WATER: 11.61 T/ PVC			TURBIDITY: 0.63 NTU		
DEPTH TO BOTTOM: 14.73 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 7.7 °C	OTHER:	
VOLUME REMOVED: 2.5	☑ 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-		
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)
0719	100	7.15	1843	87.5	10.20	22.0	7.0	11.73	INITIAL
0724		6.78	1802	60.3	4.93	2.95	7.5	11.93	.5
0729		6.78	1748	60.2	4.51	0.40	7.7	12.13	1
0734		6.80	1743	63.8	5.00	0.61	7.6	12.38	1.5
0739		6.80	1743	64.0	5.03	0.65	7.8	12.41	2
0744		6.80	1746	64.0	5.03	0.63	7.7	12.58	2.5
~~0749~~									~~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	250	PI	A	☐ 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	125 mL	PLASTIC	C	☐ Y	☑ N					☐ Y	☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/17/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/11/21	BY: JK	DATE: 5/17/21

SAMPLE ID: JCW-OW 18004 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0820	DATE: 5/11/21	SAMPLE	TIME: 0840	DATE: 5/11/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.90 SU	CONDUCTIVITY: 1613 umhos/cm	
			ORP: 92.0 mV	DO: 2.58 mg/L	
DEPTH TO WATER: 7.42 T/ PVC			TURBIDITY: 0.67 NTU		
DEPTH TO BOTTOM: 14.84 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 8.4 °C	OTHER:	
VOLUME REMOVED: 2	☑ 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)
0820	140	7.36	791	94.7	9.81	1.40	8.6	7.67	INITIAL
0825		6.93	1625	91.7	2.90	0.30	8.3	8.35	.5
0830		6.90	1619	91.7	2.60	0.47	8.4	8.95	1
0835		6.90	1618	91.8	2.58	0.13	8.4	9.58	1.1
0840		6.90	1613	92.0	2.58	0.67	8.4	10.0	2

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
3	~~125~~ 60 mL	VOA	A	☐ Y ☑ N	1	250	PL	A	☐ Y ☑ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	____ FED EX	DATE SHIPPED: 5/12/21	AIRBILL NUMBER: N/A
COC NUMBER:	____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/11/21	BY: SK	DATE: 5/17/21

SAMPLE ID: LH-104 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0858	DATE: 5/11/21	SAMPLE	TIME: 0928	DATE: 5/11/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.53 SU	CONDUCTIVITY: 1761 umhos/cm	
			ORP: 39.9 mV	DO: 2.19 mg/L	
DEPTH TO WATER: 9.30 T/ PVC			TURBIDITY: 031 NTU		
DEPTH TO BOTTOM: 14.03 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 8.1 °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-		
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)
0858	100	7.51	1693	98.1	11.0	060	8.1	9.13	INITIAL
0903		7.52	1730	93.0	3.0	010	8.3	9.70	.5
0908		7.53	1740	78.0	2.50	011	8.3	9.80	1
0913		7.53	1751	60.0	2.30	030	8.4	9.85	1.5
0918		7.52	1766	40.0	2.20	039	8.4	9.95	2
0923		7.53	1765	39.8	2.20	044	8.5	9.95	2.5
0928		7.53	1765	39.9	2.19	031	8.5	9.95	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~~ 60	VOA	A	☐ Y ☑ N	1	2L	PL	A	☐ Y ☒ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/12/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/11/21	BY: JK	DATE: 5/17/21

SAMPLE ID: MW-5E

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: 5/11/21	SAMPLE	TIME: 1030	DATE: 5/11/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 12.93 T/ PVC

DEPTH TO BOTTOM: 16.46 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 7 ☑ LITERS ☐ GALLONS

COLOR: Brown ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 7.09 SU CONDUCTIVITY: 1373 umhos/cm

ORP: -123.0 mV DO: 2.00 mg/L

TURBIDITY: 2.35 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 9.8 °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)
0945	200	6.94	1329	-17.6	10.65	90.0	9.7	12.80	INITIAL
0950		6.96	1318	-80.1	2.59	9.50	9.5	12.93	1
0955		7.06	1335	-105.0	2.19	7.30	9.6	12.93	2
1000		7.08	1341	-114.0	2.10	6.90	9.5	12.93	3
1005		7.09	1352	-123.0	2.06	7.00	9.7	12.93	4
1010		7.10	1364	-123.5	2.00	3.00	9.7	12.93	5
1015		7.09	1369	-123.5	2.01	2.50	9.8	12.93	6
1020		7.09	1373	-123.0	2.00	2.35	9.8	12.93	7

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	250	PI	A	☐ 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	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/12/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/17/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/14/21	BY: JK	DATE: 5/17/21

SAMPLE ID: GW-57 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1050	DATE: 5/11/21	SAMPLE	TIME: 1157	DATE: 5/11/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.20 SU	CONDUCTIVITY: 1308 umhos/cm	
			ORP: -66.3 mV	DO: 2.18 mg/L	
DEPTH TO WATER: 6.80 T/ PVC			TURBIDITY: 19.3 NTU		
DEPTH TO BOTTOM: 18.80 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS			TEMPERATURE: 10.1 °C	OTHER:	
VOLUME REMOVED: 6.15 ☑ LITERS ☐ GALLONS			COLOR: clear	ODOR: none	
COLOR: Brown	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)
1050	100	7.23	921	-10.6	9.70	1300	11.5	6.80	INITIAL
1055		7.23	1137	-37.2	2.37	1500	10.5	7.81	.5
1100		7.23	1234	-58.0	2.45	666	10.0	8.85	1
1105		7.25	1221	-66.4	1.75	765	11.0	9.35	1.5
1110		7.25	1224	-76.8	1.70	352	11.3	9.94	2
1115		7.25	1251	-79.0	1.79	1382	10.3	10.55	2.5
1120		7.26	1276	-59.9	3.50	140	10.4	10.75	3
1125		7.21	1279	-65.9	2.31	26.70	10.3	11.05	3.5
1130		7.20	1281	-67.0	2.21	24.0	10.5	11.30	4
1135		7.20	1292	-67.8	2.21	20.65	10.3	11.46	4.5

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~~ 60 mL	VOA	A	☐ Y ☑ N	1	250	PL	A	☐ Y ☑ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/12/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME:	CEC WEADOCKLF 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/14/21	BY: JK	DATE: 5/17/21

SAMPLE ID: OW-5S

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)
1140	100	7.20	1294	-67.1	2.18	21.0	10.3	1161	5
1145		7.20	1299	-66.0	2.17	18.8	10.1	11.78	5.5
1150		7.20	1301	-66.5	2.18	18.8	10.1	1180	6
1155		7.20	1308	-66.3	2.18	19.3	10.1	1183	6.5

SIGNATURE: 5/14/21

DATE SIGNED: _____

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/14/21	BY: JK	DATE: 5/17/21

SAMPLE ID: JCW-MW-18005 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1210	DATE: 5/11/21	SAMPLE	TIME: 1245	DATE: 5/11/21

PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER	PH: 6.90 SU	CONDUCTIVITY: 1556 umhos/cm
		ORP: -32.8 mV	DO: 2.19 mg/L
DEPTH TO WATER: 8.80 T/ PVC		TURBIDITY: 4.87 NTU	
DEPTH TO BOTTOM: 16.33 T/ PVC		☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY	
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS	TEMPERATURE: 9.4 °C	OTHER:
VOLUME REMOVED: 6	☑ 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-
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)
1210	100	7.40	877	-6.7	10.0	800	13.0	8.80	INITIAL
1215		6.91	1660	-26.7	3.05	80.0	10.0	9.28	.5
1220		6.91	1528	-26.4	2.45	16.85	9.8	9.38	1
1225	200	6.91	1480	-29.0	2.05	14.40	10.0	9.20	2.0
1230		6.91	1482	-29.5	2.22	10.0	9.4	9.50	3
1235		6.91	1518	-33.0	2.20	5.00	9.3	9.60	4.0
1240		6.90	1541	-32.8	2.19	4.75	9.3	9.00	5
1245		6.90	1556	-32.8	2.19	4.87	9.4	9.00	6.0

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~~ 60 mL	VOA	A	☐ Y ☑ N	1	250	P1	A	☐ 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	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/12/21	AIRBILL NUMBER: N/A	
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21	

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/14/21	BY: BK	DATE: 5/17/21

SAMPLE ID: OW-57 Rout | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1310	DATE: 5/11/21	SAMPLE	TIME: 1330	DATE: 5/11/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 10.00 T/ PVC

DEPTH TO BOTTOM: 20.24 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

PH: 7.02 SU CONDUCTIVITY: 1371 umhos/cm

ORP: 2.8 mV DO: 2.55 mg/L

TURBIDITY: 2.40 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 10.3 °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)
1310	100	7.38	1310	10.4	10.0	8.0	12.7	9.95	INITIAL
1315		7.03	1375	3.2	2.91	2.60	10.0	1111	.5
1320		7.02	1373	2.9	2.60	2.55	10.3	1191	1
1325		7.02	1372	2.8	2.55	2.30	10.3	1261	1.5
1330		7.02	1371	2.8	2.55	2.40	10.3	1295	2
~~1335~~									~~2.5~~

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~~ 60	VOA	A	☐ Y ☑ N	1	250	PL	A	☐ 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	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/12/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/12/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/14/21	BY: SK	DATE: 5/17/21

SAMPLE ID: JCW-MW-18006 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1403	DATE: 5/11/21	SAMPLE	TIME: 1423	DATE: 5/11/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.87 SU	CONDUCTIVITY: 1460 umhos/cm	
			ORP: -29.4 mV	DO: 2.08 mg/L	
DEPTH TO WATER: 14.28 T/ PVC			TURBIDITY: 036 NTU		
DEPTH TO BOTTOM: 23.68 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS			TEMPERATURE: 10.3 °C	OTHER:	
VOLUME REMOVED: 4 ☑ LITERS ☐ GALLONS			COLOR: clear	ODOR: none	
COLOR: cloudy	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)
1403	200	6.95	1527	-38.9	9.75	55.0	12.5	1470	INITIAL
1408		6.87	1418	-23.0	2.23	9.50	11.0	1490	1
1413		6.88	1418	-29.1	2.10	062	10.4	1490	2
1418		6.87	1448	-29.3	2.09	047	10.3	1490	3
1423		6.87	1460	-29.4	2.08	036	10.3	1490	4
									5
									6
									7

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	250	P1	A	☐ 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	125 mL	PLASTIC	C	☐ Y	☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/17/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/11/21	BY: JK	DATE: 5/17/21

SAMPLE ID: EB-01 | 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: 1440	DATE: 5/11/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER	PH: NA SU / CONDUCTIVITY: NA umhos/cm
	ORP: NA mV / DO: NA mg/L
DEPTH TO WATER: ____ T/ PVC	TURBIDITY: NA NTU
DEPTH TO BOTTOM: ____ T/ PVC	☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS	TEMPERATURE: NA °C / OTHER:
VOLUME REMOVED: ____ ☑ LITERS ☐ GALLONS	COLOR: clear / ODOR: none
COLOR: ____ ODOR: ____	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:

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.: +/- **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					☐ 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	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	____ FED EX	DATE SHIPPED:	5/10/21	AIRBILL NUMBER:	N/A
COC NUMBER:	____ N/A	SIGNATURE:	[signature]	DATE SIGNED:	5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/11/21	BY: BK	DATE: 5/17/21

SAMPLE ID: FB01 | 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: 1445	DATE: 5/11/21

PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER	PH: NA SU	CONDUCTIVITY: NA umhos/cm
		ORP: NA mV	DO: NA mg/L
DEPTH TO WATER: ____ T/ PVC		TURBIDITY: NA NTU	
DEPTH TO BOTTOM: ____ T/ PVC		☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY	
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS	TEMPERATURE: NA °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

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
	~~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
	~~1 L~~	~~PLASTIC~~	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/11/21	AIRBILL NUMBER: N/A	
COC NUMBER: ____ N/A	SIGNATURE: [signature]	DATE SIGNED: 5/14/21	

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/11/21	BY: JK	DATE: 5/17/21

SAMPLE ID: JCW MW 1500 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1458	DATE: 5/11/21	SAMPLE	TIME: 1533	DATE: 5/11/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 16.64 T/ PVC

DEPTH TO BOTTOM: 19.58 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 3.5 ☑ LITERS ☐ GALLONS

COLOR: clear ODOR: slight

TURBIDITY ☐ NONE ☑ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 7.24 SU CONDUCTIVITY: 1090 umhos/cm

ORP: ~~-19.3~~ 139.3 mV DO: 1.81 mg/L

TURBIDITY: 1.85 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 11.8 °C OTHER:

COLOR: clear ODOR: slight

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)
1458	200	7.58	541	18.5	10.0	13.50	14.6	16.8	INITIAL
1503		7.23	1095	-0.8	2.49	8.75	11.6	17.00	.5
1508		7.19	1090	-22.1	2.10	6.73	11.7	17.10	1
1513		7.18	1092	-49.0	1.94	5.45	11.8	17.13	1.5
1518		7.19	1091	-86.0	1.88	3.0	12.1	17.16	2
1523		7.25	1092	-130.8	1.80	2.0	11.8	17.18	2.5
1528		7.24	1095	-139.0	1.80	1.96	11.7	17.20	3
1533		7.24	1090	-139.3	1.81	1.85	11.8	17.20	3.5

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	250	PL	A	☐ 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~~	~~125 mL~~	~~PLASTIC~~	~~C~~	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	FED EX	DATE SHIPPED: 5/12/21	AIRBILL NUMBER: N/A
COC NUMBER:	N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/11/21	BY: SK	DATE: 5/17/21

SAMPLE ID: JW- MW1 S007 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0550	DATE: 5/12/21	SAMPLE	TIME: 0605	DATE: 5/12/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.08 SU	CONDUCTIVITY: 13475 umhos/cm	
			ORP: -38.3 mV	DO: 2.01 mg/L	
DEPTH TO WATER: 3.88 T/ PVC			TURBIDITY: 3.10 NTU		
DEPTH TO BOTTOM: 8.60 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 9.0 °C	OTHER:	
VOLUME REMOVED: 7	☑ 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)
0550	100	6.00	15779	127.76	5.00	30.0	8.9	3.71	INITIAL
0555		6.55	15834	105.9	2.27	18.50	8.7	4.30	1
0600		6.77	15560	24.0	2.20	14.0	8.8	4.30	1
0605	200	6.91	15000	-7.8	2.15	8.96	8.8	4.30	2.1
0610		6.98	14140	-23.0	2.07	4.0	9.0	4.35	4
0615		7.08	13500	-38.0	2.00	3.30	9.0	4.30	6.5
0620		7.09	13475	-38.1	2.00	3.15	9.1	4.30	8
0625		7.08	13475	-38.3	2.01	3.18	9.0	4.30	7.0

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
4	~~125~~ 60 mL	VOA	A	☐ Y ☑ N	2	250	PI	A	☐ Y ☒ N
2	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
2	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
4	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
~~2~~	~~125 mL~~	~~PLASTIC~~	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	____ FED EX	DATE SHIPPED: 5/12/21	AIRBILL NUMBER: N/A
COC NUMBER:	____ N/A	SIGNATURE:	DATE SIGNED: 5/13/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/14/21	BY: SK	DATE: 5/17/21

SAMPLE ID: JCW-MW 15028 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0701	DATE: 5/12/21	SAMPLE	TIME: 0731	DATE: 5/12/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.69 SU	CONDUCTIVITY: 3972 umhos/cm	
			ORP: -40.1 mV	DO: 2.18 mg/L	
DEPTH TO WATER: 7.73 T/ PVC			TURBIDITY: 0.39 NTU		
DEPTH TO BOTTOM: 25.10 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 9.9 °C	OTHER:	
VOLUME REMOVED: 6	☑ LITERS ☐ GALLONS		COLOR: clear	ODOR: non	
COLOR: clear	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)
0701	200	7.69	2230	-4.3	11.0	2.0	8.0	7.65	INITIAL
0706		7.75	3852	-11.8	3.06	0.30	9.5	7.70	1
0711		7.72	3873	-13.0	2.46	0.42	9.6	7.70	2
0716		7.70	3963	-25.0	2.30	0.46	9.8	7.70	3
0721		7.69	3980	-39.8	2.19	0.56	9.8	7.70	4
0726		7.69	3969	-40.0	2.18	0.54	9.9	7.70	5
0731		7.69	3972	-40.1	2.18	0.39	9.9	7.70	6

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
1	~~125~~ 60 mL	VOA	A	☐ Y ☑ N	1	250	PL	A	☐ 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
	~~125 mL~~	~~PLASTIC~~	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/12/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASSO	DATE: 5/14/21	BY: SK	DATE: 5/17/21

SAMPLE ID: JCW-MW1 S009 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0753	DATE: 5/12/21	SAMPLE	TIME: 0837	DATE: 5/12/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 5.63 SU	CONDUCTIVITY: 2601 umhos/cm	
			ORP: 62.3 mV	DO: 2.04 mg/L	
DEPTH TO WATER: 8.00 T/ PVC			TURBIDITY: 3.90 NTU		
DEPTH TO BOTTOM: 13.00 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS			TEMPERATURE: 9.7 °C	OTHER:	
VOLUME REMOVED: 9 ☑ LITERS ☐ GALLONS			COLOR: Clear	ODOR: Slight	
COLOR: Clear	ODOR: Slight		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)
0752	200	6.57	2778	-27.6	10.80	14.0	9.0	8.32	INITIAL
0757		5.64	2639	57.5	2.40	8.40	9.6	8.41	1
0802		5.60	2619	62.3	2.27	7.98	9.6	8.41	2
0807		5.58	2609	64.7	2.16	7.55	9.7	8.41	3
0812		5.58	2602	64.7	2.11	7.19	9.7	8.41	4
0817		5.59	2605	64.1	2.09	5.93	9.6	8.41	5
0822		5.60	2609	63.9	2.08	5.00	9.6	8.41	6
0827		5.63	2604	62.9	2.05	4.02	9.7	8.41	7
0832		5.62	2605	62.4	2.09	3.87	9.7	8.41	8
0837		5.62	2605	62.3	2.04	3.90	9.7	8.41	9

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~~ 60 mL	VOA	A	☐ Y ☑ N	1	250	PL	A	☐ Y ☑ N
3	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
3	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
2	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	~~125 mL~~	~~PLASTIC~~	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	____ FED EX	DATE SHIPPED: 5/12/21	AIRBILL NUMBER: N/A
COC NUMBER:	____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/11/21	BY: JK	DATE: 5/17/21

SAMPLE ID: CB 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: 0805	DATE: 5/11/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☑ BAILER

DEPTH TO WATER: _____ T/ PVC

DEPTH TO BOTTOM: _____ T/ PVC

WELL VOLUME: N/A ☐ 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.: +/- **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
	~~125 mL~~	VOA	A	☐ Y ☑ N					☐ Y ☐ N
	~~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
	~~125 mL~~	~~PLASTIC~~	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: _____ FED EX	DATE SHIPPED: 5/12/21	AIRBILL NUMBER: N/A
COC NUMBER: _____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 5/10/21	BY: SK	DATE: 5/17/21

SAMPLE ID: EB02 | 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: 0900	DATE: 5/10/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: T/ PVC

DEPTH TO BOTTOM: T/ PVC

WELL VOLUME: N/A ☐ 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.: +/- **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
	~~125 mL~~	VOA	A	☐ Y ☑ N					☐ Y ☐ N
	~~125 mL~~	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	~~1 L~~	~~PLA~~STIC	B	☐ Y ☑ N					☐ Y ☐ N
	~~125 mL~~	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 5/12/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 5/14/21

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

SAMPLING SITE: JCW Porewater – 2021 Q2

PROJECT NUMBER: 21-0531

SAMPLING TEAM:

DATE SHIPPED:

SITE SKETCHED ATTACHED? CIRCLE ONE YES NO

ANALYSIS REQUESTED

Page 1 of 2

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	Total Phosphorus	TDS	Alkalinity				REMARKS
21-0531-01	5/10/21	0717	GW	JCW-MW-18001		6	x	x	x	x	x				
-02	" "	0858	GW	JCW-OW-18001		6	x	x	x	x	x				
-03	" "	1113	GW	JCW-OW-18002		6	x	x	x	x	x				
-04	5/11/21	0744	GW	JCW-MW-18004		6	x	x	x	x	x				
-05	5/11/21	0846	GW	JCW-OW-18004		6	x	x	x	x	x				
-06	5/11/21	1245	GW	JCW-MW-18005		6	x	x	x	x	x				
-07	5/11/21	1433	GW	JCW-MW-18006		6	x	x	x	x	x				
-08	5/10/21	0953	GW	MW-50		6	x	x	x	x	x				
-09	5/10/21	1202	GW	MW-51		6	x	x	x	x	x				
-10	5/10/21	1310	GW	MW-52		6	x	x	x	x	x				
-11	5/10/21	1411	GW	MW-53		6	x	x	x	x	x				
-12	5/10/21	1548	GW	MW-53R		6	x	x	x	x	x				

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
	5/12/21 1415	
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

COMMENTS

4.2°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: JCW Porewater – 2021 Q2

PROJECT NUMBER: 21-0531

SAMPLING TEAM

DATE SHIPPED

SITE SKETCHED ATTACHED? CIRCLE ONE YES NO

ANALYSIS REQUESTED

Page 2 of 2

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	Total Phosphorus	TDS	Alkalinity				REMARKS
21-0531-13	5/11/21	0920	GW	MW-54R		6	X	X	X	X	X				
-14	5/11/21	1030	GW	MW-55		6	X	X	X	X	X				
-15	5/11/21	1155	GW	OW-55		6	X	X	X	X	X				
-16	5/11/21	1330	GW	OW-57R OUT		6	X	X	X	X	X				
-17			GW	~~MW-58~~		6	X	X	X	X	X				
-18	5/11/21	0930	GW	LH-104		6	X	X	X	X	X				
-19	5/10/21	—	GW	DUP-01		6	X	X	X	X	X				
-20	5/10/21	0717	GW	JCW-MW-18001 MS		4	X	X	X		X				
-21	5/10/21	0717	GW	JCW-MW-18001 MSD		4	X	X	X		X				
-22	5/11/21	1440	W	FB-01		1	X								
-23	5/11/21	1445	W	EB-01		1	X								

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
	5/12/21 1415	
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

COMMENTS

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

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: 240-136755.1
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 #: 240-149380-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 6/15/2021			
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:								
JCW-MW-18001 (240-149380-1)	5/10/21	07:17 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-18004 (240-149380-2)	5/11/21	07:44 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-18005 (240-149380-3)	5/11/21	12:45 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-18006 (240-149380-4)	5/11/21	14:23 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-50 (240-149380-5)	5/10/21	09:53 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-51 (240-149380-6)	5/10/21	12:08 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-52 (240-149380-7)	5/10/21	13:10 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
Unconfirmed

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) Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: [signature]	Date/Time: 5-14-21 1700	Company: ETA	Received by: FED EX	Date/Time:	Company
Relinquished by: FED EX	Date/Time:	Company	Received by: [signature]	Date/Time: 5/15/21 0815	Company: ETA SJL
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
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: 240-136763.1
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 #: 240-149380-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 6/15/2021			
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:								
MW-53 (240-149380-8)	5/10/21	14:11 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-53R (240-149380-9)	5/10/21	15:48 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-54R (240-149380-10)	5/11/21	06:50 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-55 (240-149380-11)	5/11/21	10:50 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
OW-57R OUT (240-149380-12)	5/11/21	13:30 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP (240-149380-13)	5/10/21	Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
EB (240-149380-14)	5/11/21	14:40 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 *Unconfirmed*	***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) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:		Method of Shipment:	
Relinquished by:	Date/Time:	Company	Received by: FED EX	Date/Time:	Company
Relinquished by: FED EX	Date/Time:	Company	Received by:	Date/Time: 5/15/21 0815	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

Appendix G
Alternate Source Demonstration Supporting Information

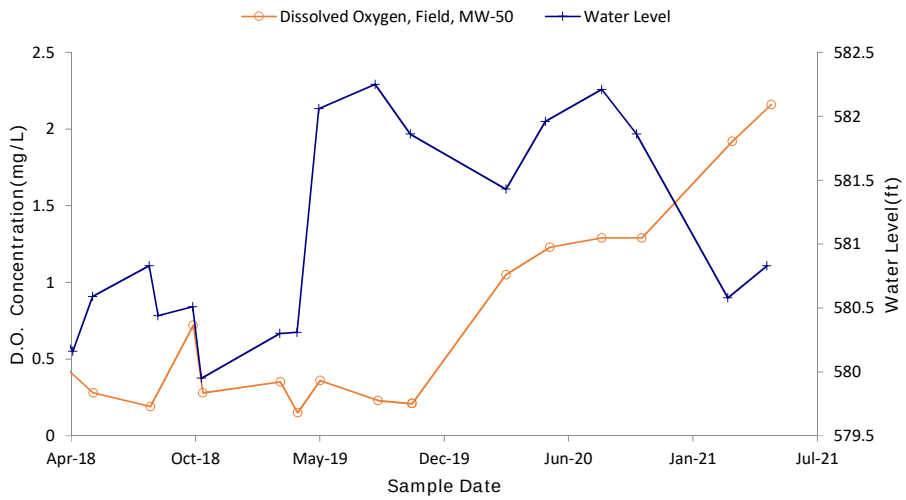
Table G1
Summary of Groundwater Sampling Results Near JCW-MW-18001
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

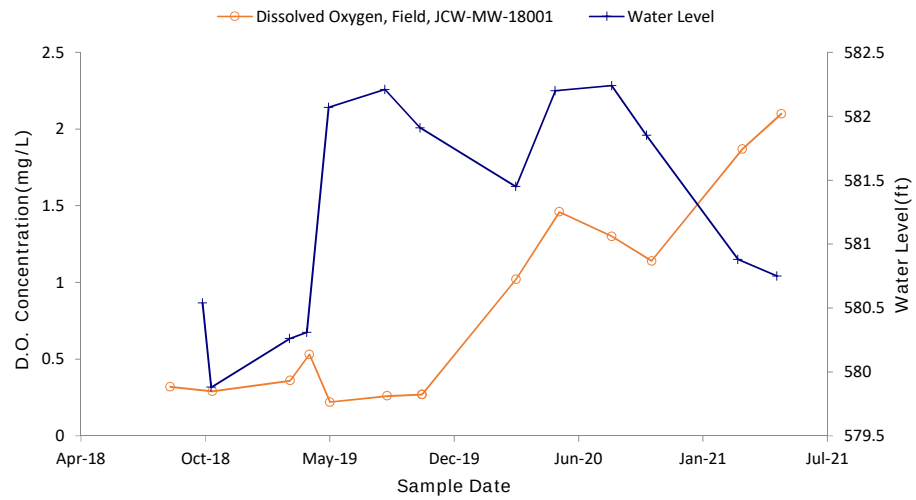
Constituent		Sulfate	Dissolved Oxygen, Field
Unit		ug/L	mg/L
Outside Slurry Wall			
JCW-MW-18001	5/10/2021	580,000	2.10
Inside Slurry Wall			
JCW-OW-18001	5/10/2021	86,800	2.06

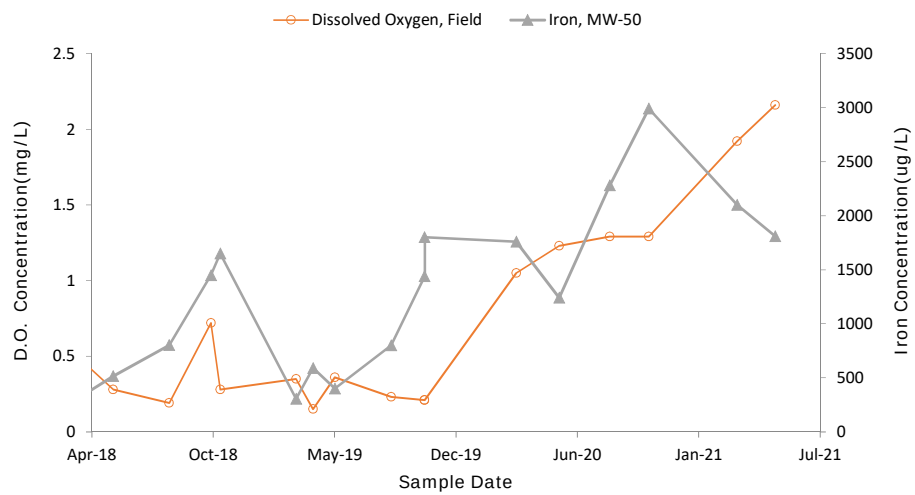
Notes:

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

Figure G1: Time Series Plots for MW-50 and JCW-MW-18001 ASD







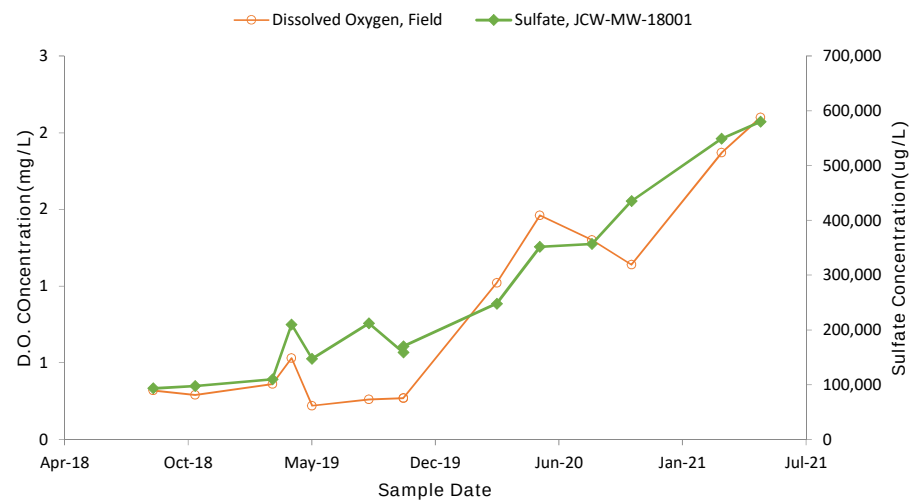
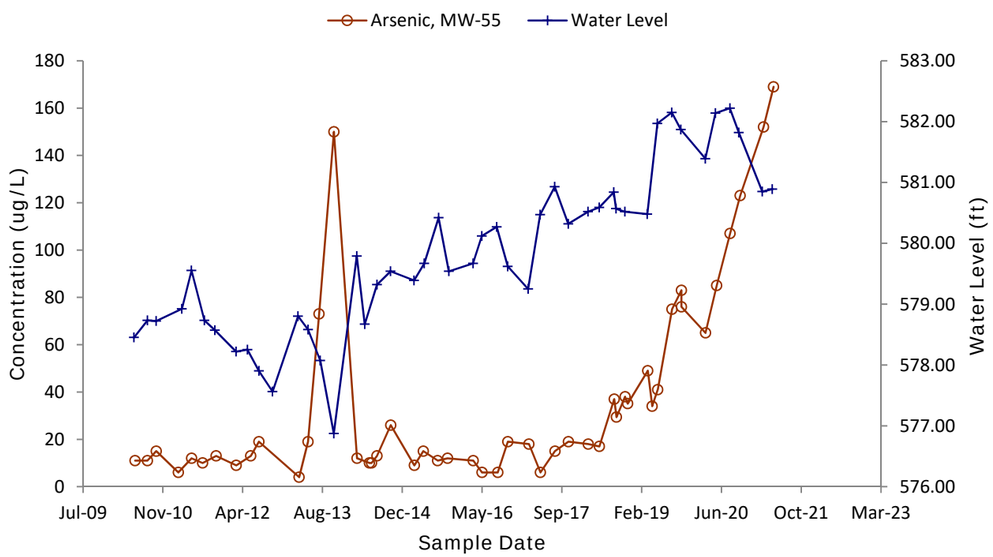


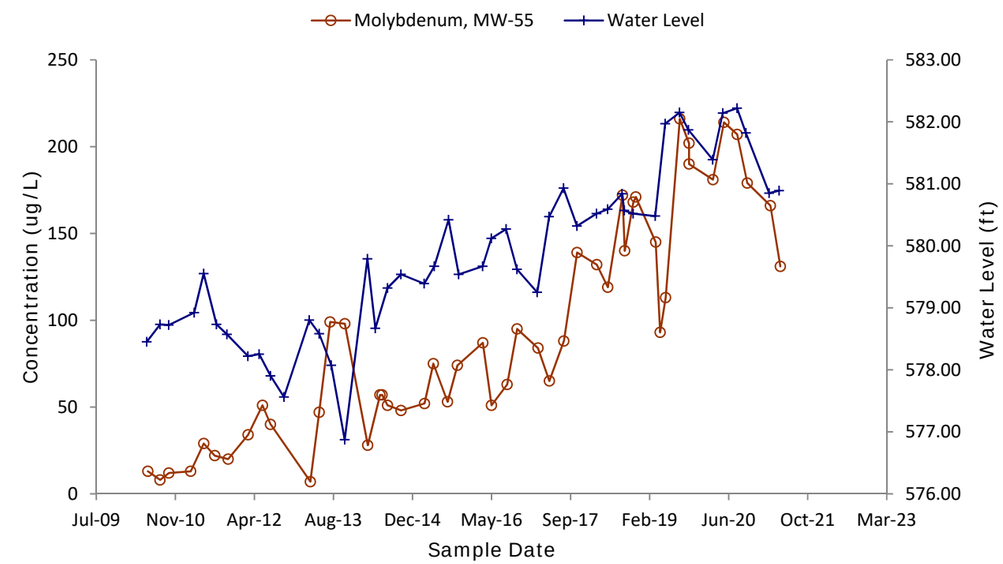
Table G2
Summary of Groundwater Sampling Results Near MW-55
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

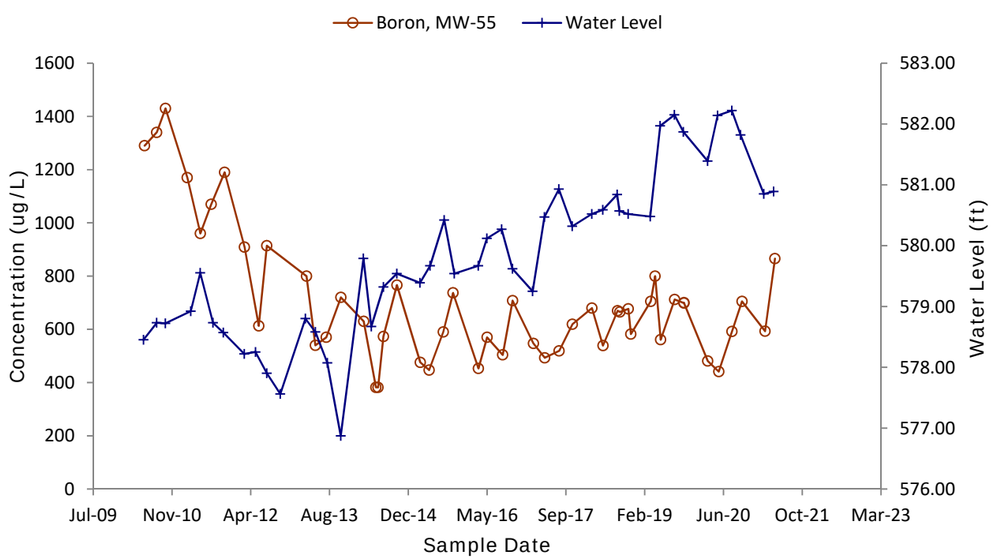
Constituent		Arsenic	Boron	Molybdenum	Oxidation Reduction Potential, Field
Unit		ug/L	ug/L	ug/L	mV
Outside Slurry Wall					
MW-55	5/11/2021	169	866	131	-123.0
Inside Slurry Wall					
OW-55	5/11/2021	10	1,850	< 5	-66.3
JCW-OW-18004	5/11/2021	< 1	689	< 5	92.0
LH-104	5/11/2021	29	12,200	59	39.9

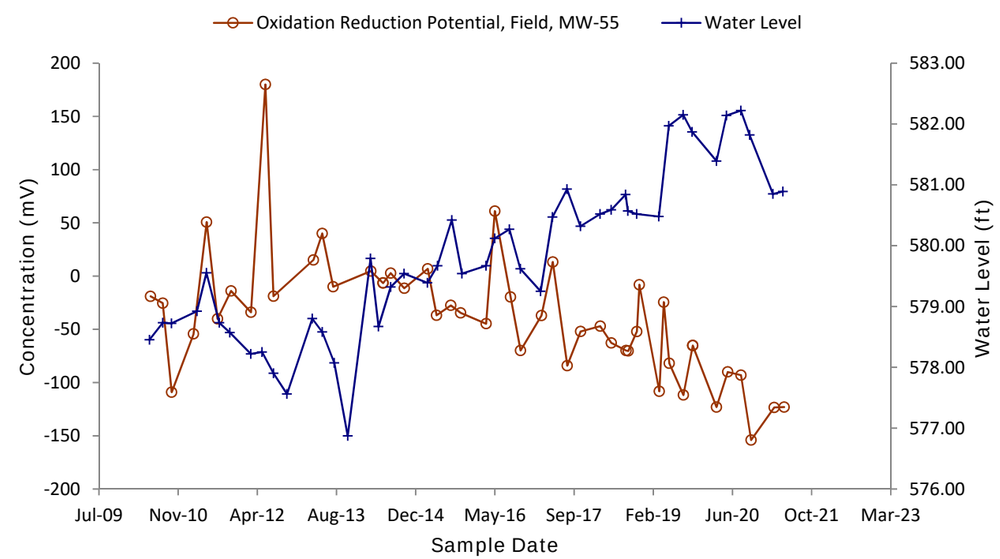
Notes:
ug/L - micrograms per liter; mV - millivolts

Figure G2: Time Series Plots for MW-55 ASD









Third Quarter 2021 Hydrogeological Monitoring Report

JC Weadock Solid Waste Disposal Area

Essexville, Michigan

October 2021

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1.0 Introduction

Consumers Energy implemented a comprehensive compliance monitoring plan documented in the *Revised Hydrogeological Monitoring Plan* (Natural Resource Technology, 2010) for the JC Weadock Solid Waste Disposal Area required by Special License Condition 20.b in Solid Waste Disposal Area Operating License No. 9233 issued on October 15, 2009. Since that time, 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) imposing groundwater monitoring and corrective action requirements that apply to the landfill (Weadock Landfill). Michigan amended Part 115 of the Natural Resources and Environmental Protection Act (NREPA) PA 451 of 1994, as amended (a.k.a., Michigan Part 115 Solid Waste Management) to provide a basis for establishing a groundwater monitoring system and initiating detection and assessment monitoring to conform requirements for any licensed coal ash impoundment or landfill after December 28, 2018 with Part 115 amendments and the CCR Rule.

On January 15, 2021, Consumers Energy submitted the *Landfill Hydrogeological Monitoring Plan, JC Weadock Power Plant, Essexville, Michigan* (Weadock Landfill HMP), which includes components for Detection Monitoring, Assessment Monitoring as well as Groundwater Surface Water Interface (GSI) Compliance Monitoring, to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) to comply with the requirements of Part 115 and the CCR Rule. The Weadock Landfill HMP (TRC, February 2021) was revised per EGLE comments, submitted, and approved by EGLE on February 19, 2021 and incorporated, by reference, in Solid Waste Disposal Area Operating License No. 9640 issued on March 11, 2021.

1.1 Statement of Adherence to Approved Hydrogeological Monitoring Plan

This Third Quarter 2021 JC Weadock 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 landfill. 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, dated July 5, 2013 *Format for Solid Waste Disposal Facility Monitoring Submittals*. All references herein to the EGLE are inclusive of the MDEQ. Information contained in this report was prepared in adherence to the approved Weadock Landfill HMP that was approved by the EGLE on February 19, 2021. The Weadock Landfill HMP is compliant with Public Act No. 640 of 2018 (PA 640) to amend the 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 JC Weadock Solid Waste Disposal Area located at 2742 Weadock Highway in Essexville, Michigan (Figure 1). This JC Weadock Disposal Area is currently authorized under a permit (Groundwater Discharge Authorization GWE-0005) issued pursuant to Part 31 to

discharge to the unusable aquifer directly underlying the solid waste that vents almost immediately to the Saginaw River and Saginaw Bay. The Weadock Landfill is currently in assessment monitoring pursuant to the CCR Rule, as discussed in the *2020 Annual Groundwater Monitoring and Corrective Action Report* (TRC, January 2021), after concentrations which were indicative of impact from landfill operations were observed in groundwater. Consumers Energy provided notice to the Department on January 14, 2019 that arsenic was detected at statistically significant levels above the federal groundwater protection standards (GWPS) established pursuant to §257.95(h) in one monitoring well at the JC Weadock Landfill (JCW-MW-15023), which was located downgradient of a 1,600 linear foot vent within the slurry wall enclosing the historical fly ash disposal area. The vent was designed to direct groundwater flow beneath the landfill to the discharge channel immediately upgradient from the National Pollutant Discharge Elimination System (NPDES) external outfall to prevent water from building up within the facility. In July 2018, this vent was closed (Golder, 2018) and the engineering improvement was approved the by the Department (MDEQ, 2018). Closing the vent and completely encircling the Weadock Landfill with a soil-bentonite slurry wall has demonstrated reduced groundwater flux around the entire perimeter of the landfill.

In March 2019, Consumers Energy submitted a Response Action Plan (Consumers, 2019), which identified interim response activities taken or to be taken to control possible sources of contamination. Consumers Energy further evaluated arsenic in groundwater at the Weadock Landfill as part of the nature and extent analysis and outlined potential remedies in the Assessment of Corrective Measures (TRC, 2019), which focused on materials management with an emphasis on improving source control through the closure plan.

Compliance monitoring is being implemented under the Weadock Landfill HMP dated February 2021 and approved by the EGLE on February 19, 2021. Groundwater data collected in accordance with the Weadock Landfill HMP are used to:

- Assess background groundwater quality for the purposes of establishing and updating GWPS (HMP Section 7.1 Background Determination)
- Perform detection monitoring to assess whether a new release has occurred during operation of the landfill (*i.e.* statistically significant increase (SSI) over background) (HMP Section 7.2 Detection Monitoring)
- Perform assessment monitoring to assess whether constituent concentrations in groundwater from prior operations are above a risk-based standard (*i.e.* statistically significant level over the GWPS) (HMP Section 7.3 Assessment Monitoring)
- Assess compliance with the GSI pathway (HMP Section 7.4)

Consumers Energy also continues to execute the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98, which includes semiannual assessment monitoring in accordance with §257.95. Assessment monitoring data collected in accordance with the CCR Rule is used to assess whether constituent concentrations in groundwater from prior operations are above a risk-based standard (*i.e.* statistically significant level over the Appendix IV GWPS).

1.3 Site Overview

The JC Weadock Solid Waste Disposal Area is located within the former JC Weadock Power Plant (Site), located south of the DE Karn Power Plant, east of the Saginaw River, west of Underwood Drain and Saginaw Bay, and north of Tacey Drain and agricultural land (Figure 1). In addition to the disposal area, the Site consists of the generating facility which retired eight coal-fired generating units and infrastructure and utilities that support electrical transmission. Units 1 to 6 commenced operation in 1940 and retired in 1980 and Units 7 and 8 were added in 1955 and 1958 continued to operate through April 15, 2016.

1.4 Geology/Hydrogeology

The majority of Weadock Landfill area is comprised of surficial CCR and sand fill, as described in the Weadock Landfill HMP. USGS topographic maps and aerial photographs dating back to 1950, 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 depth ranging from 25-75 ft bgs. A sandstone unit, which is part of the Saginaw Formation, was generally encountered at 80-90 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. Along the perimeter of the landfill, there is a well-graded sand present at depths ranging from 10 to 20 ft bgs. The sand is variable in thickness, ranging from <1 to ~6.5 feet, and is discontinuous along the landfill perimeter, as evidenced by the soil boring logs and slurry wall construction documentation.

The alluvium soils pinch out and are not observed in soil borings located south and east of the Weadock Bottom Ash Pond and Weadock Landfill, along the location of the historic shoreline. The non-water-bearing region south of these units extends for at least a mile south and southeast of the site.

Beneath the surficial fill and sand unit (where present) is 70 to 80 feet of clay till. Along the southern perimeter of the landfill, some of the upper portion of the clay till is sand-rich (generally greater than 20 ft bgs). The clay till acts as a hydraulic barrier that separates the shallow groundwater from the underlying sandstone. The sandstone unit, which is part of the Saginaw Formation, is generally encountered at 80-90 ft bgs.

The Weadock Landfill is bounded by several surface water features (Figures 1 and 2): the Saginaw River to the west, a discharge channel and Saginaw Bay (Lake Huron) to the north, Underwood Drain to the east, and Tacey Drain to the south. Groundwater flow in this water bearing zone is largely controlled by the surface water elevations of Saginaw River and Saginaw Bay.

2.0 Leachate Monitoring

The leachate monitoring program under this revised plan consists of an annual laboratory leachate sampling program (Q1) and an annual field leachate sampling program (Q4) per the Weadock Landfill HMP. This program was instituted to maintain the facility under the applicable portions of Part 115, Rule 311 – Leaching tests to evaluate potential for groundwater contamination at unlined industrial waste landfills. Specifically, Subrule (3) states that waste that is disposed of in an industrial waste landfill shall be retested to evaluate potential for groundwater contamination annually or on a more frequent schedule as specified by the solid waste control agency. The Weadock Landfill HMP includes laboratory leachate testing, which consists of four dry-handled Coal Combustion Residual (CCR) samples collected under normal plant operating conditions during the active life of the landfill.

Additional support for evaluating the potential for groundwater contamination at the unlined industrial waste landfill includes the field leachate monitoring program conducted during the fourth quarter of each year. This program consists of an annual sampling collection from two (2) leachate headwells; LH-103 and LH-104. This program was implemented to determine constituents in the leachate as measured under actual conditions in the field that need to be included as a part of the groundwater and GSI monitoring program. Constituents will be added to the GSI and groundwater monitoring program if detected and confirmed in a field-collected leachate sample at a concentration greater than its GSI criterion.

Laboratory leachate data was not collected during the third quarter.

3.0 Groundwater Monitoring

3.1 Monitoring Well Network

The groundwater monitoring system presented in the HMP has been established in accordance with R 299.4906 and the CCR Rule §257.91, which consists of 16 monitoring wells (four background monitoring wells and 12 downgradient monitoring wells) that are screened in the uppermost aquifer. The monitoring well network has been designed to provide appropriate coverage for water level and water quality data collection along the perimeter of the landfill. The monitoring well locations are shown on Figure 2. Monitoring well specifications and purpose (i.e. static water level monitoring, groundwater quality monitoring, or GSI monitoring) are included in Table 1.

The Weadock Landfill HMP groundwater monitoring system consists of the following:

- ***Background Groundwater Quality:*** Four monitoring wells located southwest of the Weadock Landfill provide data on background groundwater quality that has not been affected by the CCR unit (MW-15002, MW-15008, MW-15016, and MW-15019) and are used to establish groundwater protection standards (GWPSs) for the landfill:
  - MW-15002
  - MW-15008
  - MW-15016
  - MW-15019
- ***Downgradient Groundwater Quality:*** The twelve downgradient monitoring wells, located on the outside of the perimeter slurry wall include:
  - JCW-MW-18001
  - JCW-MW-18004
  - JCW-MW-18005
  - JCW-MW-18006
  - MW-50
  - MW-51
  - MW-52
  - MW-53
  - MW-53R
  - MW-54R
  - MW-55
  - OW-57R Out
- ***Groundwater-Surface Water Interface (GSI) Monitoring***: Monitoring wells located along the surface water features adjacent to the Weadock Landfill are included in the monitoring program to meet the requirements of Part 31. Locations and alignments were established in the Phase II Groundwater Discharge Evaluation, Figure: Appendix K (Natural Resource Technology, 2005) as a baseline for monitoring future results. These monitoring wells are screened across the water table of the uppermost aquifer and will serve as GSI monitoring wells to determine compliance with generic GSI criteria or site-specific mixing zone-based criteria as appropriate. The eight GSI compliance monitoring wells include:
  - MW-50
  - MW-51
  - MW-52
  - MW-53
  - MW-53R
  - MW-54R
  - MW-55
  - JCW-MW-18004

- ***Static Water Level Measurement Only:*** Eleven (11) monitoring wells, located on the inside of the perimeter slurry wall, at paired locations with several of the downgradient monitoring wells include:
  - JCW-OW-18001
  - JCW-OW-18002
  - JCW-MW-18003
  - JCW-MW-18004
  - JCW-MW-18005
  - JCW-MW-18006
  - MW-20
  - OW-51
  - OW-53
  - OW-54
  - OW-55
  - OW-56R
  - OW-57R IN
  - OW-61
  - OW-63

3.2 August 2021 Monitoring Event

In accordance with the Weadock Landfill HMP, TRC conducted the third quarter 2021 monitoring event for the Weadock Landfill on July 26, August 2 and 3, 2021. Groundwater monitoring was performed in accordance with the Weadock Landfill HMP. Samples that were collected during this event were submitted to Consumers Energy Laboratory Services in Jackson, Michigan for analysis of total metals and inorganic parameters. Quarterly monitoring constituents include:

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

Samples were also analyzed for additional constituents including magnesium, sodium, potassium, and bicarbonate, carbonate, and total alkalinity. Analytical results from the third quarter 2021 monitoring event are included in the attached laboratory reports (Appendix E).

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 Weadock Landfill 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 F).

Groundwater samples were collected using a peristaltic pump. The samples were collected in vendor-provided, nitric acid pre-preserved (metals only) and unpreserved sample containers and submitted to the laboratory for analysis. Groundwater 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 (MW-50), and field matrix spike/matrix spike duplicate samples collected at JCW-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 Weadock Landfill HMP. The data quality reviews for the JC Weadock Disposal Area network wells are summarized in Appendix B.

3.3 Groundwater Flow Rate and Direction

Potentiometric monitoring initiated in the unusable aquifer beneath the facility includes static water level data collected for development of water table contours and evaluation of the potential for discharge from the facility. The monitoring under this section will be conducted quarterly until closure, as approved by the Director, and semiannually during the 30-year post-closure period. Monitoring will continue until the end of post closure (30 years) or as otherwise approved by the Director.

The measurements for top of casing (TOC) and quarterly recorded depth to water (DTW) with corresponding calculated static water level (SWL) is tabulated and presented in Table 1. A potentiometric surface map is provided as Figure 2.

Groundwater elevations measured at the site in July 2021 are generally within the range of 580 to 593 feet above mean sea level (ft NAVD88). Groundwater elevations in monitoring wells located adjacent to Saginaw Bay and adjoining surface water bodies are typically encountered at a similar or slightly higher elevation relative to surrounding surface water features measured by the NOAA gauging station. A time-series plot included in Appendix A compares the groundwater elevation of MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, JCW-MW-18004, and MW-55 to the nearby NOAA staff gauge. Water levels in wells adjacent to surface water bodies (e.g. Saginaw Bay, Tacey Drain) closely mirror the surface water elevation. Such conditions would result in a minimal gradient to potentially a reverse gradient (i.e., toward the landfill) between the well and the drain which would result in minimal to zero mass flux to the drain (Appendix A: Table A1).The static water level elevations inside of the Weadock Landfill perimeter slurry wall are generally significantly different (>3 ft) than static water levels outside of the slurry wall, which demonstrates the presence of a low permeability feature between the well pairings inside and outside of the constructed slurry wall. The groundwater monitoring system

is structured such that there are eleven (11) monitoring well pairs used to evaluate the hydraulic gradient and potential for water flux across the slurry wall. Static water level observations from the paired wells are shown on time series charts in Appendix A. As such, the water level elevations indicate that the slurry wall is performing as designed. The general flow direction observed within the confinement of the slurry wall is similar to that identified in previous monitoring rounds. Due to the potential for radial flow, the downgradient wells are appropriately positioned to detect the presence of detection or assessment parameters that could potentially migrate from the Weadock Landfill.

As shown on Figure 3 and in Appendix A, the static water level outside of the slurry wall is lower than the static water level inside of the wall; therefore, the potential groundwater flux across the slurry wall was calculated and included in Table A-2 of Appendix A.

3.4 Groundwater Analytical Data and Relevant Screening Criteria

Groundwater analytical data are evaluated in accordance with the Weadock Landfill HMP for the purposes of solid waste license compliance as well as to determine compliance with applicable generic GSI and site-specific GSI mixing zone-based criteria. Data are evaluated by using a combination of screening against relevant criteria, as well as utilizing statistical analyses.

Analytical results from the third quarter 2021 monitoring event are included in the attached laboratory report (Appendix E). Groundwater analytical data from the third quarter 2021 monitoring event are summarized in Table 2 (Weadock Landfill monitoring wells), as well as the associated Part 201 generic GSI and site-specific mixing-zone GSI criteria. Field data are summarized in Table 3.

Mixing-zone criteria for arsenic, boron, and selenium are provided for the Karn-Weadock complex in the mixing zone determination, dated December 23, 2015 (MDEQ, 2015). 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. All data are screened against GSI criteria; however, compliance with GSI criteria is determined at select monitoring locations as noted in Section 3.4.4 below.

The mixing zone determination included both final acute values (FAV) and final chronic values (FCV). If a concentration of a constituent at a groundwater well exceeds the acute criteria, and the exceedances are upgradient of the GSI compliance monitoring wells, Consumers Energy must demonstrate that data from all of the compliance monitoring wells are, and will be, in compliance with acute mixing zone-based GSI criteria for those parameters. Averaging of groundwater data is not allowed for comparison to generic GSI or acute mixing zone-based GSI criteria. Acute mixing zoned-based or generic GSI criteria may not be exceeded in any individual GSI compliance monitoring well. If a concentration of a constituent at a well exceeds the chronic criterion, compliance can be demonstrated on a mass-flux basis. The facility can choose to demonstrate compliance by evaluating the total chronic loading based upon the contribution from each compliance well with respect to the total flux observed in the mixing zone.

Table 6 provides a summary of the statistically significant increases or exceedances over the most recent four quarters in accordance with the EGLE-prescribed format; only well/constituent pairs that exceed the relevant GSI criteria (within the last four quarters) are included.

3.4.1 Groundwater Monitoring Analytical Results

Groundwater monitoring is being conducted under Weadock Landfill HMP, which provides for sampling at historic wells (MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and MW-55) along with wells that were newly installed in 2018 (OW-57R OUT, JCW-MW-18001, JCW-MW-18004, JCW-MW-18005, and JCW-MW-18006). Data for these wells are tabulated in Table 2. Summaries of the statistical evaluations are provided in sections 3.4.2, 3.4.3, and 3.4.4 below.

Analytical results for these wells are being evaluated to determine the effectiveness of landfill structural and operational enhancement measures on the quality and quantity of groundwater flow beneath the footprint of the facility. Additionally, analytical results for these wells are being evaluated in support of GSI compliance. GSI criteria only apply to the designated compliance point as specified in Section 3.4.4 below; however, analytical results and data trends in groundwater collected from the perimeter dike wells are evaluated to identify potential GSI compliance issues.

Overall, observed trends and concentrations further demonstrate that constituents present in groundwater in the monitoring well system are not expected to result in adverse impacts at the GSI (Table 6). As discussed in the ASD presented in the third quarter 2018 Hydrogeological Monitoring Report, redox conditions are changing at MW-55, which could explain some of the changes in trends of redox-sensitive parameters such as arsenic and molybdenum at that location. Additionally, as detailed in Section 3.1, water levels have increased over 4 feet since 2010 (Appendix A), geochemistry is changing, and data trends will continue to be monitored and evaluated. Several of these newly observed trends, such as those observed for specific conductance, may be a result of increased lake levels rather than a change in flux from the landfill as the water level data demonstrate that the slurry wall is performing as designed.

3.4.2 Detection Monitoring

Detection monitoring is continuing through the active life of the Weadock Landfill to monitor for new releases from landfill operations. The detection monitoring program consists of potentiometric analysis and groundwater quality analysis. The potentiometric analysis, as discussed in Section 3.1, demonstrates that the slurry wall is performing as designed.

Analytical data for the detection monitoring program are tabulated in Table 2. In addition to the comparison of analytical data to relevant screening criteria, statistical trend analyses are used to evaluate groundwater quality each quarter. Consumers Energy manages and evaluates its groundwater data using Sanitas™ Statistical Software. Consumers Energy conducts intrawell trend analyses to examine data for a given well over time to determine if changes in water quality are occurring that may be associated with the landfill and to identify potential GSI compliance issues. Specifically, the Mann-Kendall test for trend was performed 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. Constituents that were added to the monitoring program by the Weadock Landfill HMP (i.e., calcium, chloride, fluoride, and total dissolved solids) had an insufficient amount of data to perform trend analysis. Trend analysis will be completed for these constituents following the collection of a minimum of eight sampling events.

Appendix C includes a table summarizing the results of the trend tests as well as the Sanitas™ output summary statistics and graphs. Data are stable or declining for the majority of the well/constituent pairs, with the following exceptions:

- A new increasing trend for boron at MW-53 was observed in second quarter 2021 and confirmed in the third quarter 2021.
- A new, unconfirmed increasing trend for boron at MW-54R was observed in third quarter 2021.
- A continuous increasing trend was observed for sulfate at JCW-MW-18001. Sulfate concentrations remain below the generic final acute value (FAV).

The potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill. Sulfate is a redox sensitive parameter and the increasing trend is attributed to localized changes in geochemistry near JCW-MW-18001 as a result of changing water levels, rather than a change in flux from the landfill, as discussed further in Section 3.5. Iron concentrations appear to be stabilizing, as evidenced by the lack of trend observed in second and third quarters of 2021. Consumers is further evaluating the cause of the increasing boron concentrations at MW-53 and MW-54R.

3.4.3 Assessment Monitoring Data Evaluation

Assessment monitoring is continuing at the Weadock Landfill in accordance with the Weadock Landfill HMP and §257.95. The assessment monitoring data were statistically evaluated in accordance with the procedures in the Weadock Landfill HMP. The statistical evaluation details are provided in Appendix C (*Assessment Monitoring and GSI Statistical Evaluation of August 2021 Sampling Event*). A summary of the confidence interval evaluation is provided in Table 5.

3.4.3.1 Establishing Groundwater Protection Standards

The GWPSs are used to assess constituent concentrations present in groundwater as a result of CCR Unit operations by statistically comparing concentrations in the downgradient wells to each of the respective GWPSs for each detection and assessment monitoring constituent. The calculation of the GWPSs in accordance with the Weadock Landfill HMP is documented in the *Groundwater Protection Standards* technical memorandum included as Appendix H of the *First Quarter 2021 Hydrogeological Monitoring Report* (TRC, April 2021). The Federal CCR Rule requires establishment of GWPSs for assessment monitoring (Appendix IV) constituents only. Part 115 requires establishment of GWPSs for both detection and assessment monitoring constituents.

3.4.3.2 Data Comparison to Groundwater Protection Standards

Consistent with the *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (Unified Guidance) (USEPA, 2009) and the Weadock Landfill HMP, the

preferred method for comparisons to a fixed standard are confidence limits. An exceedance of the standard occurs when the 99 percent lower confidence level of the downgradient data exceeds the GWPS.

Detection Monitoring Constituents: The third quarter 2021 statistical evaluation indicates that boron at JCW-MW-18001, JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and OW-57R OUT and calcium at MW-51 were present at statistically significant levels above the GWPSs. The GWPSs for calcium and boron were established based on background concentrations observed in wells unaffected by the Weadock Landfill or Weadock Bottom Ash Pond. Boron and calcium are detection monitoring (i.e., Appendix III) constituents that do not have associated health-based criteria and there is not a complete drinking water pathway on site. As such, the relevant Part 115 compliance pathway is the GSI pathway. Concentrations of boron and calcium are below relevant GSI criteria, as discussed in Section 3.4.4.

Assessment Monitoring Constituents: Based on the third quarter 2021 statistical evaluation, there are no assessment monitoring constituents present at statistically significant levels within the Weadock Landfill groundwater monitoring system. Although concentrations of arsenic and molybdenum at MW-55 observed during individual sampling events are above the GWPS, the elevated concentrations of those constituents are not a result of a release from the Weadock Landfill, as detailed in Section 3.5. The head differential of 6.64 feet between OW-55 inside the slurry wall and MW-55 outside of the slurry wall also suggests that the integrity of the slurry wall is maintained and groundwater flow from the landfill to the south is impeded by the low permeability of the slurry wall. Groundwater conditions at MW-55 will continue to be monitored.

3.4.4 GSI Compliance Monitoring

The GSI monitoring program consists of the eight monitoring points located along the surface water features:

- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- JCW-MW-18004

Third quarter 2021 data from the GSI monitoring points are tabulated in Table 2. Consistent with the Weadock Landfill HMP, confidence limits were established for the following GSI monitoring program constituents:

- Boron
- pH
- Arsenic
- Lithium
- Selenium
- Iron
- Sulfate
- Chromium
- Molybdenum
- Vanadium

The confidence interval calculations are provided in Appendix D (*Assessment Monitoring and GSI Statistical Evaluation of August 2021 Sampling Event*). The confidence interval test

compares the lower confidence limit to the GSI. Overall, data continue to demonstrate compliance with the applicable GSI criteria.

Arsenic: The statistical evaluation found that although arsenic was present at concentrations above the chronic-based mixing zone GSI criterion (100 ug/L) in monitoring well MW-55 for the past five quarterly events, the lower confidence limit was below 100 ug/L. Additionally, water levels in MW-55 closely mirror the surface water elevation measured at the NOAA gauging station, which indicates there is a minimal outward gradient to a potentially, modest reverse gradient (i.e., toward the landfill) between the monitoring well and the drain, resulting in a minimal to zero mass flux to the drain. The calculated mass-flux loading for arsenic based upon the contribution from each compliance point with respect to the total flux observed in the mixing zone has been evaluated and compared to the chronic loading limits (Table 5). Table 5 shows that the estimated mass flux of arsenic (1.7×10^{-4} lbs/day) is less than the mixing zone-based chronic loading limits of 1.2×10^{-3} lbs/day demonstrating compliance on a mass flux basis.

Boron: The assessment monitoring statistical evaluation found that boron was present at statistically significant levels above the GWPS at JCW-MW-18001, JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and OW-57R. Boron is a detection monitoring (i.e. Appendix III) constituent and there is not a complete drinking water pathway on site. As such, the relevant Part 115 compliance pathway is the GSI pathway. All observations of boron are less than the recommended mixing-zone based GSI value specified in Table 3 of the *Implementation of a Mixing Zone Request, Consumers Energy DE Karn/JC Weadock Complex* (MDEQ, 2015) (Appendix D: Table 2).

Molybdenum: The statistical evaluation found that molybdenum was present at concentrations above the generic GSI criterion of 120 ug/L in monitoring well MW-55, and the lower confidence limit of the decreasing trend over the past 8 events was above the GSI criteria. However, water levels in MW-55 closely mirror the surface water elevation measured at the NOAA gauging station, which indicates there is a minimal outward gradient to a potentially, modest reverse gradient (i.e., toward the landfill) between the monitoring well and the drain, resulting in a minimal to zero mass flux to the drain. The calculated mass-flux loading for molybdenum based upon the contribution from each compliance point with respect to the total flux observed in the mixing zone has been evaluated and compared to the chronic loading limits (Table 5). Table 5 shows that the estimated mass flux of molybdenum (7.7×10^{-5} lbs/day) is less than the loading limits of 1.4×10^{-3} lbs/day based on the generic GSI criterion, supporting compliance on a mass flux basis.

Sulfate: Sulfate concentrations are compared to the FAV of 1,200 mg/L (Rule 323.1057 [Toxic Substances; “Rule 57”] of the Part 4 Water Quality Standards). In the past 8 quarterly events, there has been one unconfirmed detection of sulfate above the FAV at JCW-18004. The exceedance occurred during the October 2019 sampling event, when the monitoring well was sampled simultaneously under the federal CCR program and the prior HMP (Rev 2; Consumers Energy, 2015). The reported sulfate concentrations were 1,260 ug/L and 930 ug/L, which average 1,095 ug/L. Sulfate concentrations observed in JCW-MW-18004 have been below the FAV since March 2020.

3.5 Alternate Source Demonstration

Although confirmed increasing trends were observed at JCW-MW-18001 for sulfate (through Q3 2021), the potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill (Appendix A) and these trends are not indicative of a new release from the landfill. Increases of sulfate concentrations at JCW-MW-18001 are attributed to changes occurring outside of the slurry wall as a result of changing water levels, rather than a change in flux from the landfill therefore Consumers Energy is presenting an Alternate Source Demonstration for these constituents. Additional time series charts are included in Appendix G to illustrate the correlation between the increased concentrations and the changing water levels.

- Dissolved oxygen is increasing at JCW-MW-18001 (Figure G1). Sulfate is used as an oxidizing agent when oxygen is not present. As groundwater is transitioning to a more oxygenated state from the rising adjacent surface water level, less sulfate is being reduced as an electron acceptor, causing increasing concentrations (i.e. less sulfate is being reduced to sulfide/sulfite/elemental sulfur, so the amount of sulfate present increases).
- Sulfate concentrations at JCW-MW-18001 (700 mg/L) are much higher than sulfate concentrations previously observed on the inside of the slurry wall at JCW-OW-18001 (86.8 mg/L in second quarter 2021), which further supports that the landfill is not the source of sulfate (Figure G1).

Additionally, Consumers Energy is continuing to assert an Alternate Source Demonstration (ASD) for a arsenic and of molybdenum at MW-55 indicating elevated levels of constituents at that location are not related to materials management of the Weadock Landfill (*2019 Annual Groundwater Monitoring and Corrective Action Report*; TRC, January 2020). The basis for this ASD is summarized below and updated time series plots in support of this ASD are included in Appendix G (Figure G2).

Data collected from the 2018 investigation as well as data collected during routine sampling events for Part 115 and Federal CCR groundwater compliance show the following:

- **Distinct Chemistry from Leachate –** The leachate chemistry from a monitoring well screened at the base of the ash fill (LH-104) is distinctly different from the groundwater chemistry near MW- 55 and the temporary monitoring wells installed by TRC in the investigation area, as illustrated Appendix G of the 2019 Annual Groundwater Monitoring and Corrective Action Report (TRC, January 2020). Additionally, Table G2 shows concentrations of arsenic, boron, and molybdenum within the landfill (OW-55, JCW-OW-18004 and LH-104) are noticeably different than arsenic and molybdenum concentrations observed in MW-55. Arsenic and molybdenum concentrations are generally much lower inside the slurry wall and boron concentrations are much higher.
- **Conservative Tracer –** Boron is a metalloid known to be present in coal ash and can be used as a conservative tracer in groundwater. Concentrations of boron in Leachate Headwell LH-104 are significantly higher than concentrations observed at any of the other location sampled as a part of this ASD. Additionally, boron concentrations at MW-55 have decreased since 2010, as evidenced by the time series plots in Figure G2. A downward trend in concentration for boron is strong evidence that the water quality at MW-55 is not directly affected by groundwater migrating from the landfill.
- **Reducing Conditions and Groundwater Head Levels –** Water levels for MW-55, as shown in Appendices A and G, are trending upwards and have increased over 4-ft since

2010. The oxidation-reduction potential (ORP) at MW-55 is generally lower (i.e., more reducing) than other wells along the southern and eastern portion of the landfill perimeter Table 4, Table G2). The lowering of ORP over time as a result of increased water levels has changed the geochemical conditions in the vicinity of MW-55 and has resulted in an increased solubility of arsenic and molybdenum.

4.0 Conclusions and Recommendations

Detection monitoring is continuing through the active life of the Weadock Landfill to monitor for new releases from landfill operations. The detection monitoring program consists of potentiometric analysis and groundwater quality analysis. Evaluation of the third quarter 2021 data demonstrate that the slurry wall is functioning as designed.

The Weadock Landfill is currently in assessment monitoring pursuant to the CCR Rule, as discussed in the *2020 Annual Groundwater Monitoring and Corrective Action Report*, due to observed groundwater concentrations that are indicative of impact from past landfill operations. Evaluation of the third quarter 2021 data in accordance with the Weadock Landfill HMP demonstrate that boron and calcium are present at concentrations above the GWPS. Boron and calcium are detection monitoring (i.e., Appendix III) constituents that do not have associated health-based criteria and there is not a complete drinking water pathway on site. As such, the relevant Part 115 compliance pathway is the GSI pathway. Concentrations of boron and calcium are below relevant GSI criteria, as discussed in Section 3.4.4.

The statistical evaluation found that molybdenum was present at a statistically significant levels above the generic GSI criterion of 120 ug/L. However, water levels in MW-55 closely mirror the surface water elevation measured at the NOAA gauging station, which indicates there is a minimal gradient to potentially a reverse gradient (i.e., toward the landfill) between the well and the drain, resulting in a minimal to zero mass flux to the drain. No other constituents were present at statistically significant levels above applicable GSI criteria.

Therefore, Consumers Energy will continue with the detection and assessment monitoring program at the Weadock Landfill unit in conformance with the JC Weadock Landfill HMP. The fourth quarter monitoring event for is scheduled for October 2021.

5.0 References

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Tables

Table 1
Summary of Groundwater Elevation Data: July 2021
Third Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, 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 Monitoring Wells							
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
Bottom Ash Pond: Downgradient Monitoring Wells							
JCW-MW-15007	587.40	Sand	582.7	to	579.2	3.68	583.72
JCW-MW-15009	589.64	Sand	581.9	to	576.9	7.75	581.89
JCW-MW-15010	597.76	Sand	579.7	to	578.2	16.25	581.51
JCW-MW-15028	589.64	Sand	567.7	to	564.7	6.53	583.11
Landfill: Downgradient Monitoring Wells (outside slurry wall)							
JCW-MW-18001	596.73	Sand and Sandy Clay	578.3	to	573.3	15.59	581.14
JCW-MW-18004	593.04	Sandy Clay	583.9	to	578.9	11.28	581.76
JCW-MW-18005	590.89	Sand and Sandy Clay	580.0	to	575.0	8.78	582.11
JCW-MW-18006	600.72	Fly Ash and Sandy Clay	582.8	to	577.8	14.83	585.89
MW-50	593.36	Sand	577.8	to	574.8	12.28	581.08
MW-51	594.29	Sand and Clay	577.8	to	574.8	12.11	582.18
MW-52	594.90	Sand	579.3	to	576.3	13.73	581.17
MW-53	593.68	Sand and Clay	579.1	to	576.1	12.63	581.05
MW-53R	594.25	Sand and Clay	580.4	to	575.4	13.18	581.07
MW-54R	593.89	Clay and Sand	581.3	to	576.3	12.70	581.19
MW-55	593.82	Sand	581.5	to	578.5	12.79	581.03
OW-57ROUT	591.00	Sandy Clay	577.0	to	572.0	9.89	581.11
Landfill: Static Water Level Only (inside slurry wall)							
JCW-OW-18001	595.84	Fly Ash and Sand	581.1	to	576.1	7.40	588.44
JCW-OW-18002	593.63	Sand	578.9	to	573.9	9.76	583.87
JCW-OW-18003	593.99	Sand and Clay	580.5	to	575.5	9.15	584.84
JCW-OW-18004	594.19	Sandy Clay	584.6	to	579.6	9.09	585.10
JCW-OW-18006	600.61	Fly Ash and Clay with Sand	582.9	to	577.9	11.20	589.41
MW-20	592.73	NR	~581.1	to	~578.1	7.02	585.71
OW-51	593.62	Clay and Sand	578.9	to	575.9	10.75	582.87
OW-53	593.64	Clay and Sand	579.0	to	576.0	7.88	585.76
OW-54	594.10	Clay and Sand	580.0	to	577.0	7.73	586.37
OW-55	594.67	Clay (or Sand and Clay)	580.9	to	577.9	7.00	587.67
OW-56R	592.01	Ash and Sand	577.5	to	572.5	6.29	585.73
OW-57R IN	590.86	Sandy Clay	575.7	to	570.7	6.95	583.91
OW-61	612.37	Ash and Sand	588.0	to	585.0	23.44	588.93
OW-63	612.53	Ash and Sand	594.2	to	591.2	26.52	586.01
Landfill: Leachate Headwells							
LH-103	603.49	Fly Ash	30.2	to	33.2	16.49	587.00
LH-104	596.56	Fly Ash	8.0	to	11.0	9.87	586.69

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 Groundwater Sampling Results (Analytical): August 2021
Third Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

							Sample Location:	**JCW-MW-18001**	**JCW-MW-18004**	**JCW-MW-18005**	**JCW-MW-18006**	**MW-50**	**MW-51**
							Sample Date:	8/2/2021	8/3/2021	8/3/2021	8/3/2021	8/2/2021	8/2/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Chronic-Based Mixing Zone GSI Criteria^	Acute-Based Mixing Zone GSI Criteria^	Downgradient	Downgradient/ GSI	Downgradient	Downgradient	Downgradient/ GSI	Downgradient/ GSI
Appendix III(1)													
Boron	ug/L	NC	**500**	**500**	4,000	44,000	69,000	**1,610**	304	**1,080**	**2,640**	**1,520**	**960**
Calcium	mg/L	NC	NC	NC	500EE	NC	NC	348	203	149	135	267	276
Chloride	mg/L	250**	250E	250E	**50**	NC	NC	**76.4**	6.65	**64.9**	**73.6**	**57.0**	**99.8**
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250E**	**250E**	**500EE**	NC	NC	**700**	**393**	190	29.7	**638**	**434**
Total Dissolved Solids	mg/L	**500****	**500E**	**500E**	**500**	NC	NC	**1,880**	**1,180**	**895**	**769**	**1,630**	**1,530**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5E	6.5 - 8.5E	6.5 - 9.0	NC	NC	6.9	6.8	7.0	6.9	7.0	6.9
Appendix IV(1)													
Antimony	ug/L	6	6.0	6.0	2.0	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	**100**	680	**38**	< 1	9	**25**	2	**14**
Barium	ug/L	2,000	2,000	2,000	1,200	NC	NC	199	36	98	492	91	148
Beryllium	ug/L	4	4.0	4.0	33	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	NC	NC	8	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	40	100	100	NC	NC	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	14	NC	NC	2	< 1	2	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	NC	NC	71	47	28	46	79	47
Mercury	ug/L	2	2.0	2.0	0.20#	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	**73**	210	**120**	NC	NC	9	< 5	< 5	< 5	< 5	< 5
Radium-226/228		5	NC	NC	NC	NC	NC	--	--	--	--	--	--
Selenium	ug/L	50	50	50	5.0	55	120	2	4	2	2	3	1
Thallium	ug/L	2	2.0	2.0	2.0	NC	NC	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115(2)													
Iron	ug/L	**300****	**300E**	**300E**	500,000EE	NC	NC	**13,600**	< 20	**5,350**	**7,790**	**3,000**	**5,080**
Copper	ug/L	1,000**	1,000E	1,000E	20	NC	NC	6	1	12	< 1	1	< 1
Nickel	ug/L	NC	100	100	120	NC	NC	16	9	29	6	11	11
Silver	ug/L	100**	34	98	0.2	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	62	27	NC	NC	**12**	< 2	< 2	4	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000	260	NC	NC	12	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
pCi/L - picocuries per liter; SU - standard units; pH is a field parameter.
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April, 2012.
NC - no criteria; -- - not analyzed.
* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020.
** - 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 2
Summary of Groundwater Sampling Results (Analytical): August 2021
Third Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

							Sample Location:	**MW-52**	**MW-53**	**MW-53R**	**MW-54R**	**MW-55**	**OW-57ROUT**
							Sample Date:	8/2/2021	8/2/2021	8/2/2021	8/3/2021	8/3/2021	8/3/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Chronic-Based Mixing Zone GSI Criteria^	Acute-Based Mixing Zone GSI Criteria^	Downgradient/ GSI	Downgradient/ GSI	Downgradient/ GSI	Downgradient/ GSI	Downgradient/ GSI	Downgradient
Appendix III(1)													
Boron	ug/L	NC	**500**	**500**	4,000	44,000	69,000	**1,140**	**3,820**	**1,710**	**3,530**	**873**	**1,730**
Calcium	mg/L	NC	NC	NC	500EE	NC	NC	196	162	203	163	126	118
Chloride	mg/L	250**	250E	250E	**50**	NC	NC	**56.5**	49.9	34.5	35.5	19.3	**53.1**
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250E**	**250E**	**500EE**	NC	NC	**501**	**279**	189	77.0	34.3	93.9
Total Dissolved Solids	mg/L	**500****	**500E**	**500E**	**500**	NC	NC	**1,340**	**1,020**	**1,040**	**786**	**743**	**725**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5E	6.5 - 8.5E	6.5 - 9.0	NC	NC	6.9	7.1	6.8	6.8	7.1	7.0
Appendix IV(1)													
Antimony	ug/L	6	6.0	6.0	2.0	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	**100**	680	< 1	2	**23**	2	**204**	1
Barium	ug/L	2,000	2,000	2,000	1,200	NC	NC	115	200	204	124	347	72
Beryllium	ug/L	4	4.0	4.0	33	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	NC	NC	< 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
Cobalt	ug/L	NC	40	100	100	NC	NC	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	14	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	NC	NC	21	38	56	60	25	20
Mercury	ug/L	2	2.0	2.0	0.20#	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	**73**	210	**120**	NC	NC	< 5	< 5	< 5	< 5	**157**	7
Radium-226/228		5	NC	NC	NC	NC	NC	--	--	--	--	--	--
Selenium	ug/L	50	50	50	5.0	55	120	1	3	2	1	1	< 1
Thallium	ug/L	2	2.0	2.0	2.0	NC	NC	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115(2)													
Iron	ug/L	**300****	**300E**	**300E**	500,000EE	NC	NC	**3,830**	**2,380**	**2,800**	**1,190**	**39,400**	56
Copper	ug/L	1,000**	1,000E	1,000E	20	NC	NC	< 1	< 1	1	1	< 1	2
Nickel	ug/L	NC	100	100	120	NC	NC	9	6	10	9	6	21
Silver	ug/L	100**	34	98	0.2	NC	NC	< 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	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000	260	NC	NC	< 10	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
pCi/L - picocuries per liter; SU - standard units; pH is a field parameter.
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April, 2012.
NC - no criteria; -- - not analyzed.
* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020.
** - 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 3
Summary of Field Parameters: August 2021
Third Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Sample Location	Sample Date	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (umhos/cm)	Temperature (°C)	Turbidity (NTU)
JCW Landfill							
JCW-MW-18001	8/2/2021	1.81	-53.5	6.9	2,543	14.4	2.00
JCW-MW-18004	8/3/2021	2.50	115.3	6.8	1,552	16.4	1.00
JCW-MW-18005	8/3/2021	2.05	-48.0	7.0	1,399	14.8	2.99
JCW-MW-18006	8/3/2021	1.99	-58.8	6.9	1,463	14.1	1.00
MW-50	8/2/2021	1.79	-59.0	7.0	2,183	15.2	3.00
MW-51	8/2/2021	1.88	-60.5	6.9	2,239	13.8	2.25
MW-52	8/2/2021	1.98	-52.6	6.9	1,894	14.4	2.00
MW-53	8/2/2021	1.89	-75.1	7.1	1,540	14.6	2.00
MW-53R	8/2/2021	1.78	-45.9	6.8	1,688	14.4	7.95
MW-54R	8/3/2021	2.10	10.0	6.8	1,386	13.7	3.09
MW-55	8/3/2021	1.80	-131.0	7.1	1,422	15.2	3.00
OW-57ROUT	8/3/2021	2.00	32.9	7.0	1,353	15.7	3.97

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

Table 4
Summary of Confidence Interval Evaluation: August 2021
Third Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Assessment Monitoring Statistical Evaluation

Constituent	Units	GWPS	MW-50		MW-51		MW-52		MW-53		MW-53R		MW-54R		MW-55		OW-57R OUT		JCW-MW-18001		JCW-MW-18004		JCW-MW-18005		JCW-MW-18006	
			UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL
Boron	ug/L	560	1,600	**1,300**	1,000	**800**	1,200	**1,100**	3,900	**1,600**	1,700	**1,500**	4,700	**1,700**	830	490	1,700	**1,500**	1,600	**1,300**	--	**--**	1,100	**690**	3,000	**2,400**
Calcium	mg/L	280	380	260	350	**290**	--	--	420	160	--	--	--	--	--	--	--	--	330	200	320	230	360	150	--	--
Sulfate	mg/L	780	1,100	720	--	--	--	--	590	270	--	--	--	--	--	--	--	--	--	--	890	390	720	190	--	--
Arsenic	ug/L	21	--	--	--	--	--	--	--	--	34	18	--	--	--(1)	--(1)	--	--	38	2.0	--	--	--	--	38	19
Molybdenum	ug/L	73	--	--	--	--	--	--	--	--	--	--	--	--	--(1)	--(1)	--	--	--	--	--	--	--	--	--	--
Iron	ug/L	28,000	--	--	--	--	--	--	--	--	--	--	--	--	39,000	18,000	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/L	6	--	--	--	--	--	--	--	--	--	--	--	--	--	**--**	--	--	12	2.0	10	2.0	--	--	--	--

GSI Statistical Evaluation

Constituent	Units	GSI	MW-55		JCW-MW-18004	
			UCL	LCL	UCL	LCL
Sulfate	mg/L	1,200	--	--	890	390
Arsenic	ug/L	100	270	96	--	**--**
Chromium	ug/L	11	--	--	49	1.0
Molybdenum	ug/L	120	210	**150**	--	--

Notes:

ug/L - micrograms per Liter

mg/L - milligrams per Liter

-- - Not Applicable; well/parameter pair did not directly exceed the applicable criterion and was not included in further analysis.

GWPS - Groundwater Protection Standard as established in TRC's Technical Memorandum dated April 23, 2021

GSI - Groundwater Surface Water Interface Criteria; GSI criteria is the generic Michigan Part 201 GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.

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

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

1,300	Indicates a statistically significant exceedance of the GWPS (detection monitoring constituent). An exceedance occurs when the LCL is greater than the criterion.
1,300	Indicates a statistically significant exceedance of the GWPS (assessment monitoring constituent). An exceedance occurs when the LCL is greater than the criterion.
1,300	Indicates a statistically significant exceedance of the applicable GSI criterion. An exceedance occurs when the LCL is greater than the criterion.

(1) The concentrations of arsenic and molybdenum at MW-55 are not a result of a release from the unit, as detailed in the Alternate Source Demonstration (TRC, December 2019); therefore, confidence intervals were not calculated

Table 5
Mass Flux Calculations
Third Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Karn-Weadock Mixing Zone Compliance

Saginaw Bay Static Water Elevation: 581.00 | 7/26/2021

Monitoring Well Segment[1]	Segment Width (ft)	Static Water Elevation (ft NAVD88)	Aquifer Base Elevation (ft NAVD88)	Average Thickness of Segment[2] (ft)	Distance from Well to Bay (ft)	Total Area (ft^2)	Hydraulic Conductivity[3] (ft/day)	Gradient (ft/ft)	Q=KIA Total Volume (ft^3/day)	Total Volume (liters/day)	Arsenic 100 µg/L total volume x concentration: Concentration[4] (µg/L)	Arsenic: Total Loading (µg/day)	Molybdenum 120 µg/L total volume x concentration: Concentration[4] (µg/L)	Molybdenum: Total Loading (µg/day)
Non-Adjacent Zone														
MW-54R	510	581.19	576.3	2.50	55	1,275		0.0035	3.13E+00	8.86E+01	2	1.77E+02	5	4.43E+02
JCW-MW-18004	820	581.76	579.9	1.86	45	1,525		0.0169	1.83E+01	5.18E+02	1	5.18E+02	5	2.59E+03
MW-55	1,220	581.03	578.0	3.03	45	3,697		0.0007	1.75E+00	4.96E+01	204	1.01E+04	157	7.78E+03
JCW-MW-18005	1,120	582.11	578.5	1.25	120	1,400		0.0093	9.19E+00	2.60E+02	9	2.34E+03	5	1.30E+03
Discharge Channel														
JCW-MW-18001	1,010	581.14	574.8	3.75	40	3,788	7.1E-01	0.0035	9.41E+00	2.67E+02	38	1.01E+04	9	2.40E+03
MW-50	970	581.08	574.31	4.50	45	4,365		0.0018	5.51E+00	1.56E+02	2	3.12E+02	5	7.80E+02
Adjacent Zone														
MW-51	1,850	582.18	575.3	5.00	60	9,250		0.0197	1.29E+02	3.66E+03	14	5.12E+04	5	1.83E+04
MW-52	740	581.17	575.79	4.50	55	3,330		0.0031	7.31E+00	2.07E+02	1	2.07E+02	5	1.03E+03
MW-53	730	581.05	577.84	2.25	35	1,643		0.0014	1.67E+00	4.72E+01	2	9.44E+01	5	2.36E+02

ft^3 to liter is (ft^3 x 28.32)

Total Volume: 1.85E+02 ft^3/day; 5.25E+03 liter/day; 2.15E-03 ft^3/sec

	Arsenic		Molybdenum	
Total (lbs/day):	1.65E-04		7.67E-05	
Total (µg/day):	75,099		34,853	
Chronic Loading Limits				
	1.16E-03	lb/day	1.39E-03	lb/day
	5.25E-04	kg/day	6.30E-04	kg/day
	5.25E-01	g/day	6.30E-01	g/day
	5.25E+02	mg/day	6.30E+02	mg/day
	525,099	µg/day	630,119	µg/day

Notes:

NM - Not Measured

(1) Monitoring Well Zones based on Phase II Evaluation, Appendix K Groundwater Discharge Calculations, September 30, 2005.
Representative wells based on the Landfill Hydrogeological Monitoring Plan, February 2021.

(2) Saturated thickness will be the thickness of the sand unit when the observed static water elevation is above the top of the sand unit, or the measured saturated thickness of the sand unit if the static water elevation is below the top of the sand unit.

(3) Hydraulic conductivity is the harmonic mean of the testing results, Phase II Evaluation, Appendix K Groundwater Discharge Calculations, September 30, 2005.

(4) Concentration reported as equal to the laboratory reporting limit for non detect sample results.

Green cells can be modified by the user.

Calculated red and yellow loadings are compared with the unit specific chronic loading limits.

Table 6
EGLE Exceedance Summary Table
Third Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, 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: JC Weadock – WDS# 395457

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)	4 Qtr. 2020 (**bold** >201)

No Exceedances at Compliance Locations

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:	A. ADAIR
CHECKED BY:	J. KRENZ
APPROVED BY:	D. LITZ
DATE:	OCTOBER 2021
PROJ. NO.:	418426.0000
FILE:	418426-301-001.mxd

FIGURE 1

S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\3_WEADOCK\2021_MXDs\2021_003_JULY\418426-301-001.mxd -- Saved By: AADAIR on 9/9/2021, 10:20:08 AM

LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING WELL
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL
- SLURRY WALL (APPROXIMATE)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).

N

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:

CONSUMERS ENERGY COMPANY
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:

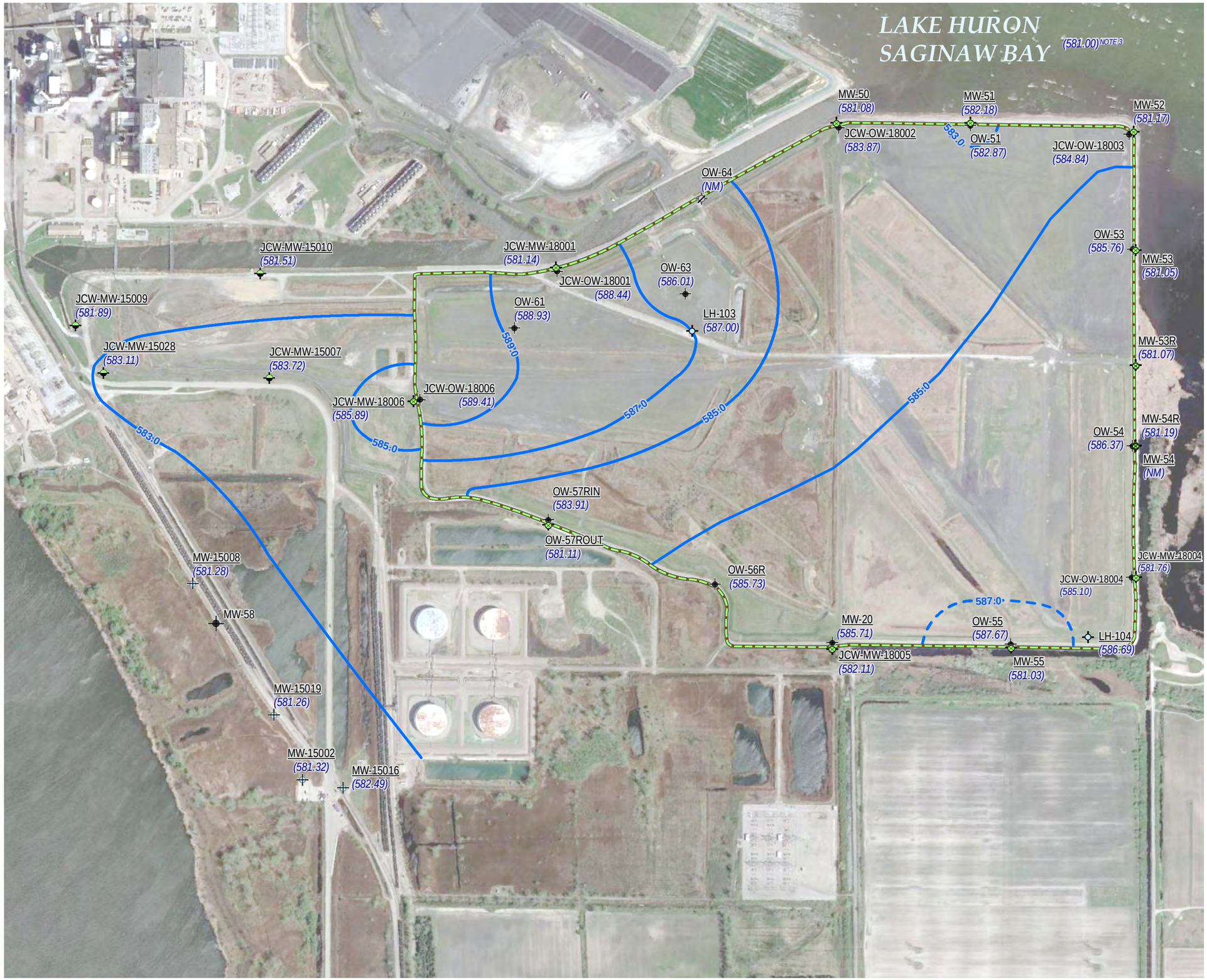
SITE MAP

DRAWN BY:	A. ADAIR	PROJ NO.:	418426.0000
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.trcsolutions.com

FILE NO.: 418426-301-002.mxd

Plot Date: 9/9/2021, 10:51:29 AM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 269767\3 WEADOCK\2021 MXDs\2021 003 JULY\418426-301-002.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS



LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING WELL
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL
- SLURRY WALL (APPROXIMATE)
- GROUNDWATER ELEVATION CONTOUR (2' INTERVAL, DASHED WHERE INFERRED)
- (580.85) GROUNDWATER ELEVATION (FEET)
- (NM) NOT MEASURED

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018.
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
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:
POTENTIOMETRIC SURFACE MAP
JULY 2021

DRAWN BY:	A. ADAIR	PROJ NO.:	418426.0000
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.: 418426-301-003.mxd

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Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

Appendix A
Static Water Level Evaluation

Table A1

Static Water Levels for Select Perimeter Dike Monitoring Wells and NOAA Staff Gauge

Third Quarter 2021 Quarterly Report

JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Well Location	Date Measured	Groundwater Water Elevation (GWE) (ft)	Saginaw Bay Surface Water Elevation (SWE) (ft)	Elevation Difference (GWE-SWE)(1)
MW-50	7/26/2021	581.08	581.00	0.08
MW-51	7/26/2021	582.18		1.18
MW-52	7/26/2021	581.17		0.17
MW-53	7/26/2021	581.05		0.05
MW-53R	7/26/2021	581.07		0.07
MW-54R	7/26/2021	581.19		0.19
MW-55	7/26/2021	581.03		0.03
JCW-MW-18004	7/26/2021	581.76		0.76
Average:		**581.32**		

Notes:

Elevation in feet above North American Vertical Datum 1988 (NAVD 88)

TOC: top of well casing

ft BTOC: feet below top of well casing

(1) Positive elevation difference indicates flow toward the surface water body.

Table A2
Slurry Wall Gradient and Flux
Third Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Monitoring Well Pair Discharge Channel	SWL Obs Well (ft NAVD 88)	SWL MW (ft NAVD 88)	x_{wells} (ft)	i (ft/ft)	Saturated Thickness (ft)	Mean Thickness (ft)	Section Length (ft)	K (cm/sec)	i (ft/ft)	Area (ft^2)	Flow ft^3/day	Flow Gal/day	Flow Gal/yr
JCW-OW-18001	588.44		22.37	3.26E-01	2.00	2.88	1,010	2.30E-08	0.33	2,904	6.18E-02	0.46	169
JCW-MW-18001		581.14			3.75								
JCW-OW-18002	583.87		28.87	9.66E-02	4.00	4.25	970		0.10	4,123	2.60E-02	0.19	71
MW-50		581.08			4.50								

Monitoring Well Pair Adjacent Zone	SWL Obs Well (ft NAVD 88)	SWL MW (ft NAVD 88)	x_{wells} (ft)	i (ft/ft)	Saturated Thickness (ft)	Mean Thickness (ft)	Section Length (ft)	K (cm/sec)	i (ft/ft)	Area (ft^2)	Flow ft^3/day	Flow Gal/day	Flow Gal/yr
OW-51	582.87		14.38	4.80E-02	4.00	4.50	1,850	2.30E-08	0.05	8,325	2.60E-02	0.19	71
MW-51		582.18			5.00								
JCW-OW-18003	584.84		33.85	1.08E-01	3.50	4.00	740		0.11	2,960	2.09E-02	0.16	57
MW-52		581.17			4.50								
OW-53	585.76		20.14	2.34E-01	1.25	1.75	730		0.23	1,278	1.95E-02	0.15	53
MW-53		581.05			2.25								

Monitoring Well Pair Non-Adjacent Zone	SWL Obs Well (ft NAVD 88)	SWL MW (ft NAVD 88)	x_{wells} (ft)	i (ft/ft)	Saturated Thickness (ft)	Mean Thickness (ft)	Section Length (ft)	K (cm/sec)	i (ft/ft)	Area (ft^2)	Flow ft^3/day	Flow Gal/day	Flow Gal/yr
OW-54	586.37		21.23	2.44E-01	2.00	2.25	510	2.30E-08	0.24	1,148	1.83E-02	0.14	50
MW-54R		581.19			2.50								
JCW-OW-18004	585.10		26.59	1.26E-01	8.00	4.93	820		0.13	4,043	3.31E-02	0.25	90
JCW-MW-18004		581.76			1.86								
OW-55	587.67		23.95	2.77E-01	2.00	2.51	1,220		0.28	3,068	5.55E-02	0.41	151
MW-55		581.03			3.03								
MW-20	585.71		40.93	8.80E-02	1.50	1.38	1,120		0.09	1,540	8.83E-03	0.07	24
JCW-MW-18005		582.11			1.25								

Calculated Groundwater Discharge from JC Weadock (gal per day)	**=**	**2.02**
(cubic ft per day)	**=**	**0.27**
(cubic ft per min)		**1.9E-04**
Calculated Groundwater Discharge from JC Weadock (gal per yr)	**=**	**737**
(cubic ft per yr)	**=**	**98**
Calculated Groundwater Discharge from JC Weadock (gal per year per linear foot of dike)	**=**	**0.08**
(cubic feet per year per linear foot of dike)	**=**	**1.10E-02**

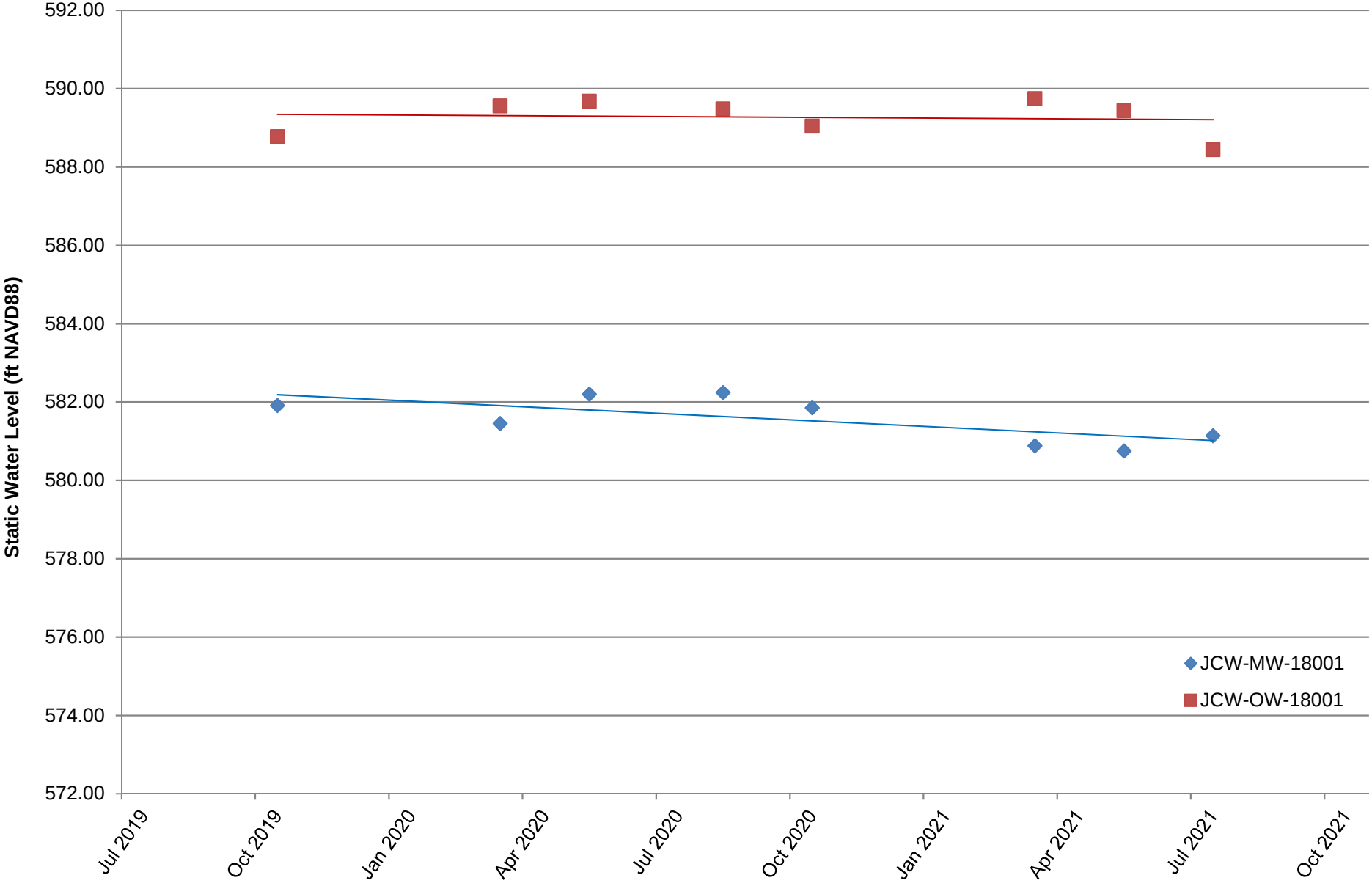
Notes:

Water level data collected on July 26, 2021 are shown by yellow cells:

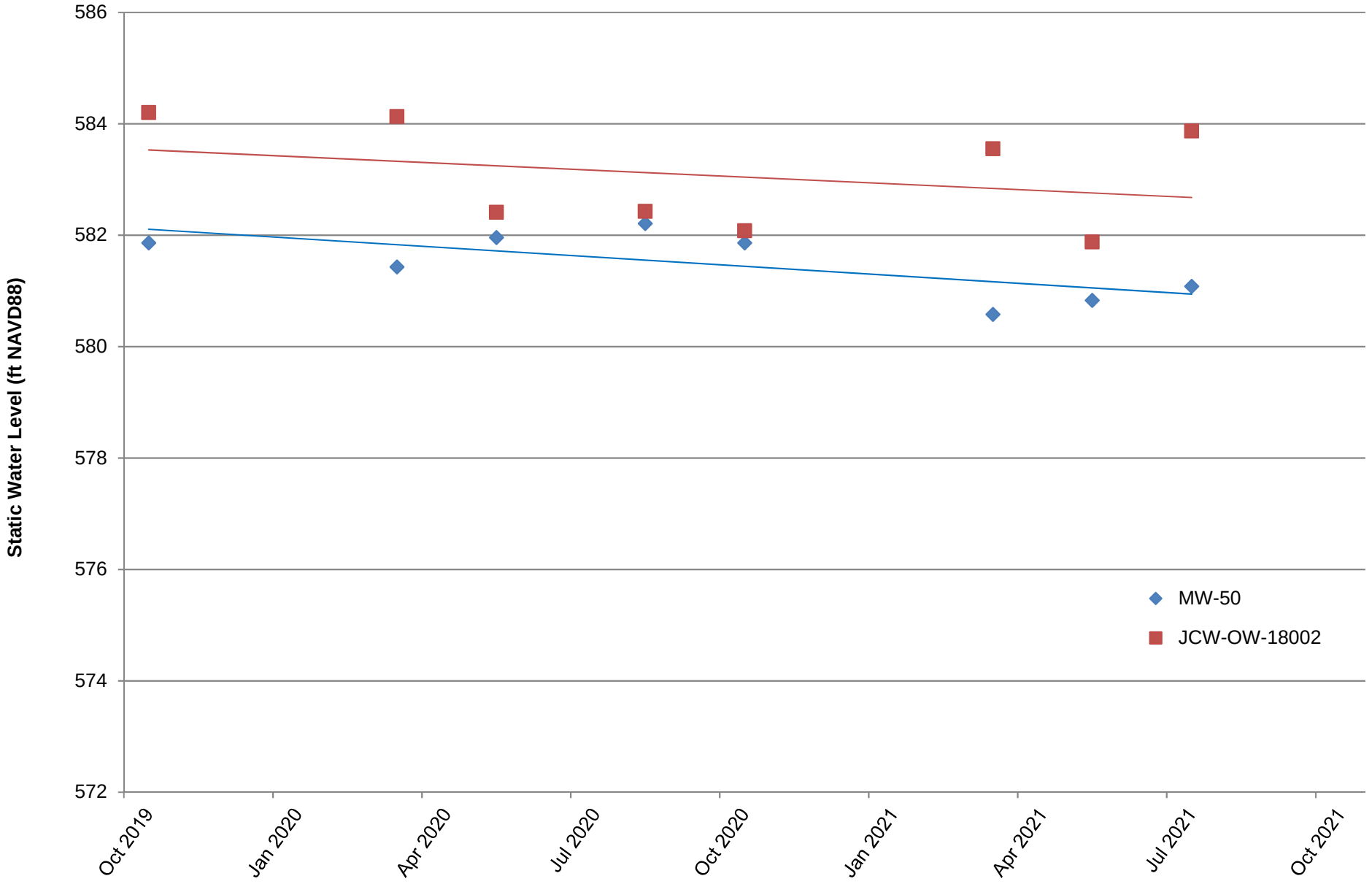
1. Monitoring Well Zones based on Phase II Evaluation, Appendix K Groundwater Discharge Calculations, September 30, 2005. Representative wells based on the Landfill Hydrogeological Monitoring Plan, February 2021.
2. Saturated thickness will be the thickness of the sand unit when the observed SWL is above the top of the sand unit, or the measured saturated thickness of the sand unit if the SWL is below the top of the sand unit.
3. Hydraulic conductivity taken as harmonic mean of laboratory tests done on in-place slurry wall from NTH Certified Quality Assurance Report, Appendix E, April 24, 2009
4. Arithmetic average used to develop geometric properties of each section/zone (e.g. discharge channel, adjacent, and non-adjacent)
5. If Obs well SWL < MW SWL calculated flow will be zero.

SWL = Static Water Level; Obs Well = Observation Well; MW= Monitoring Well; ft NAVD 88 = feet above North American Vertical Datum 1988
ft/ft = feet per foot; cm/sec = centimeters per second; ft^2 = square feet; ft^3/day = cubic feet per day; Gal/day = gallons per day; Gal/yr = gallons per year
i = hydraulic gradient; K = hydraulic conductivity; x_{wells} = distance between well pairs

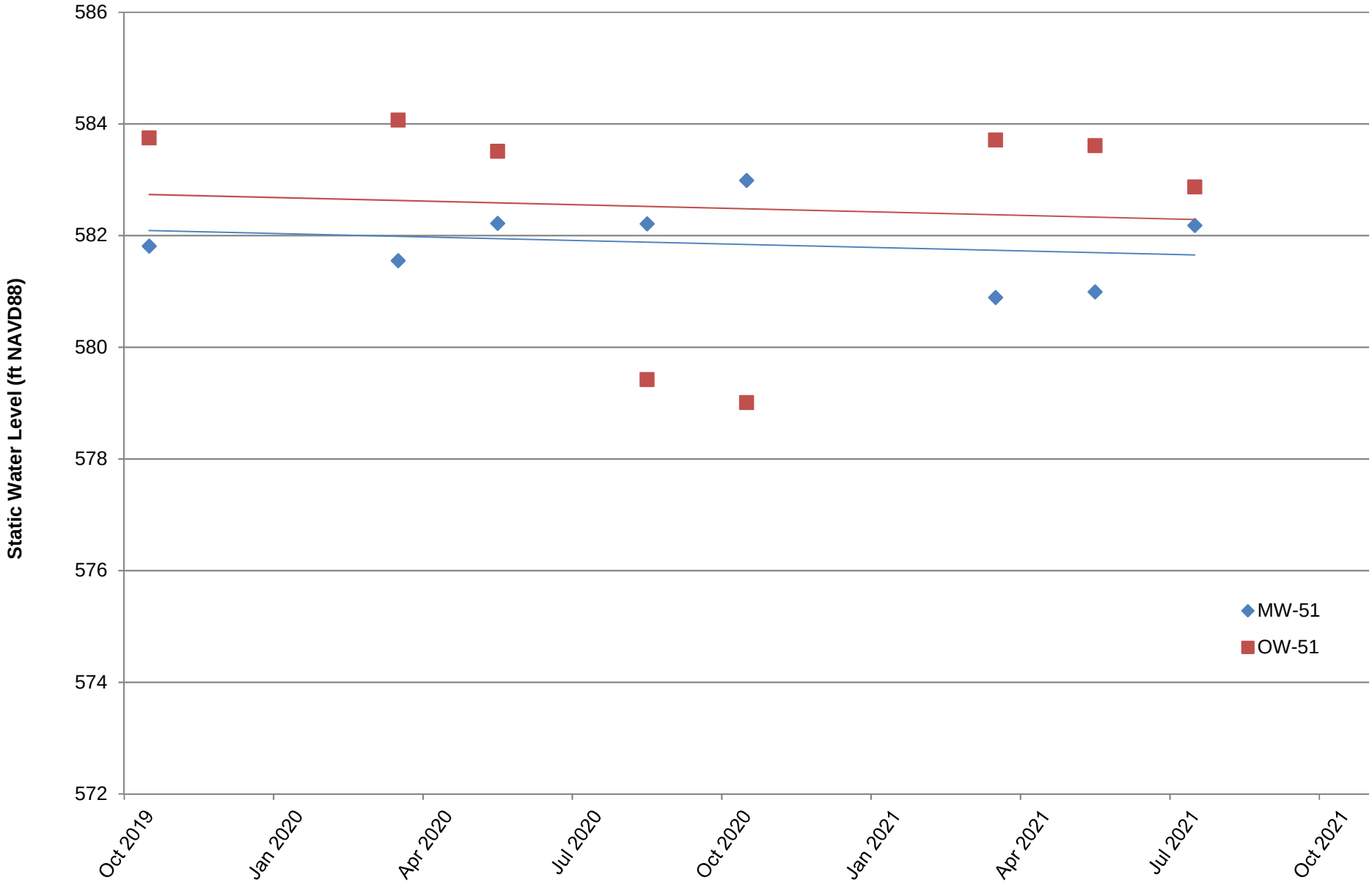
Appendix A
Static Water Level for JCW-MW-18001 and JCW-OW-18001



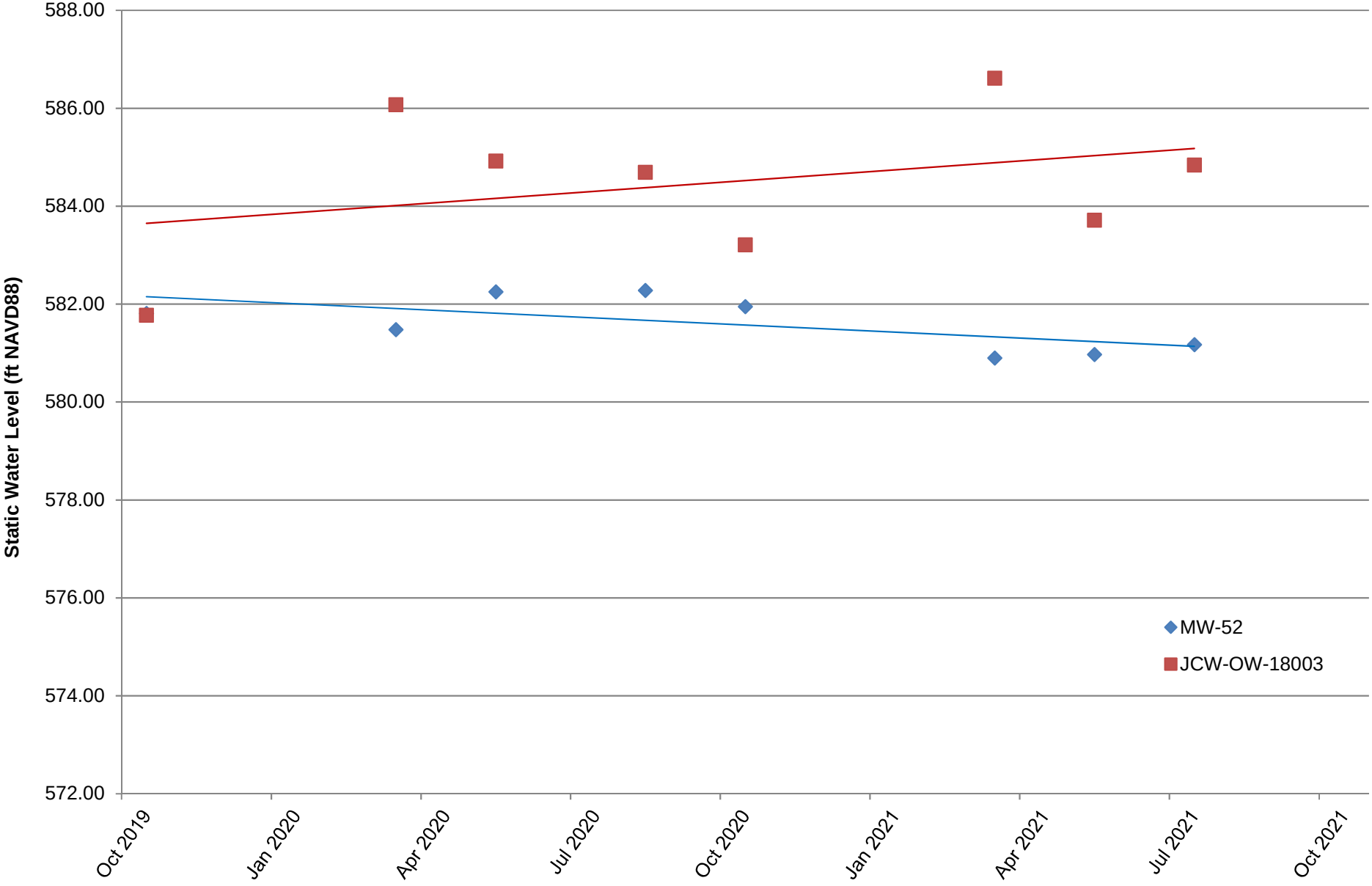
Appendix A
Static Water Level for MW-50 and JCW-OW-18002



Appendix A
Static Water Level for MW-51 and OW-51



Appendix A
Static Water Level for MW-52 and JCW-OW-18003



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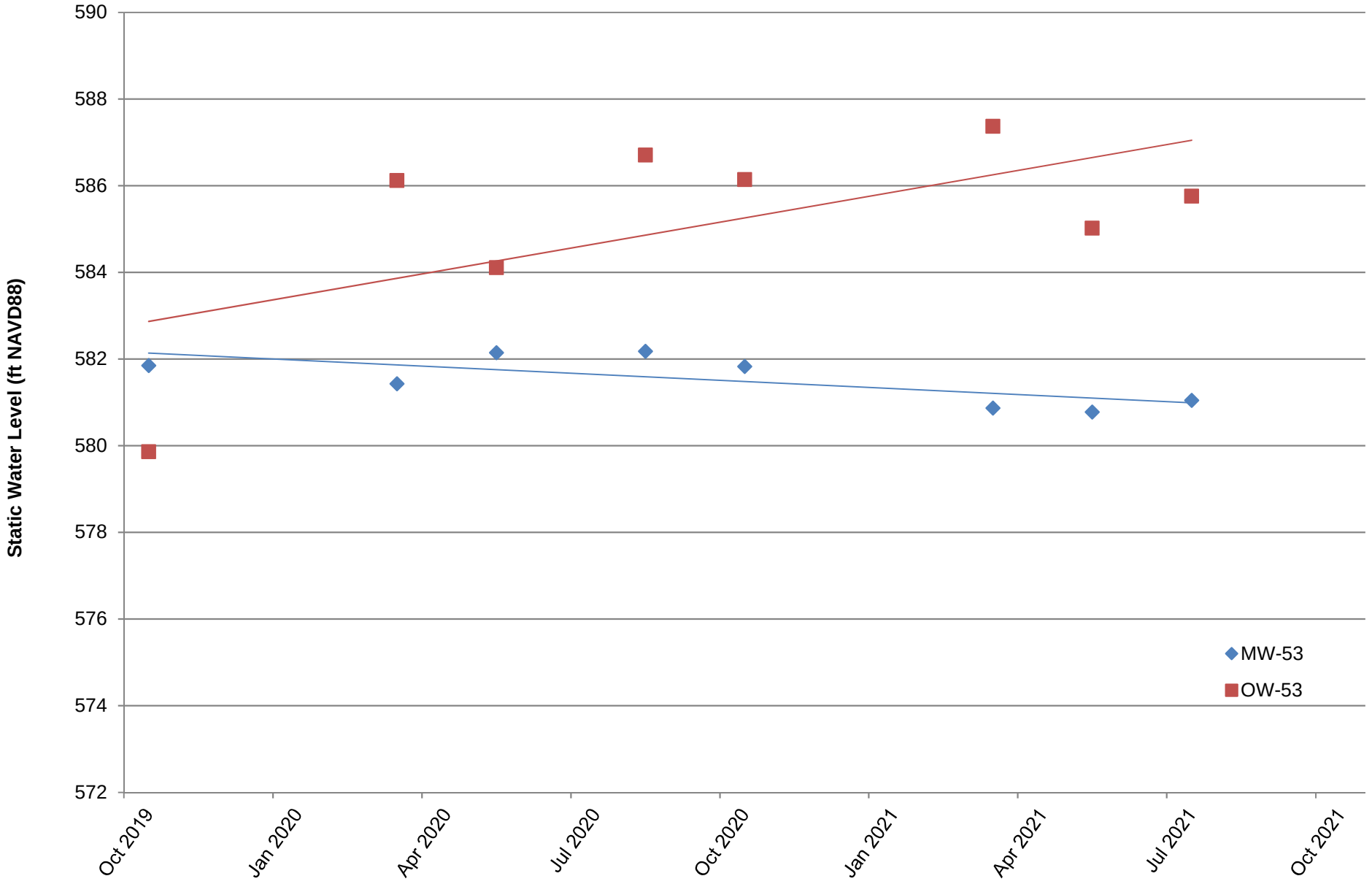
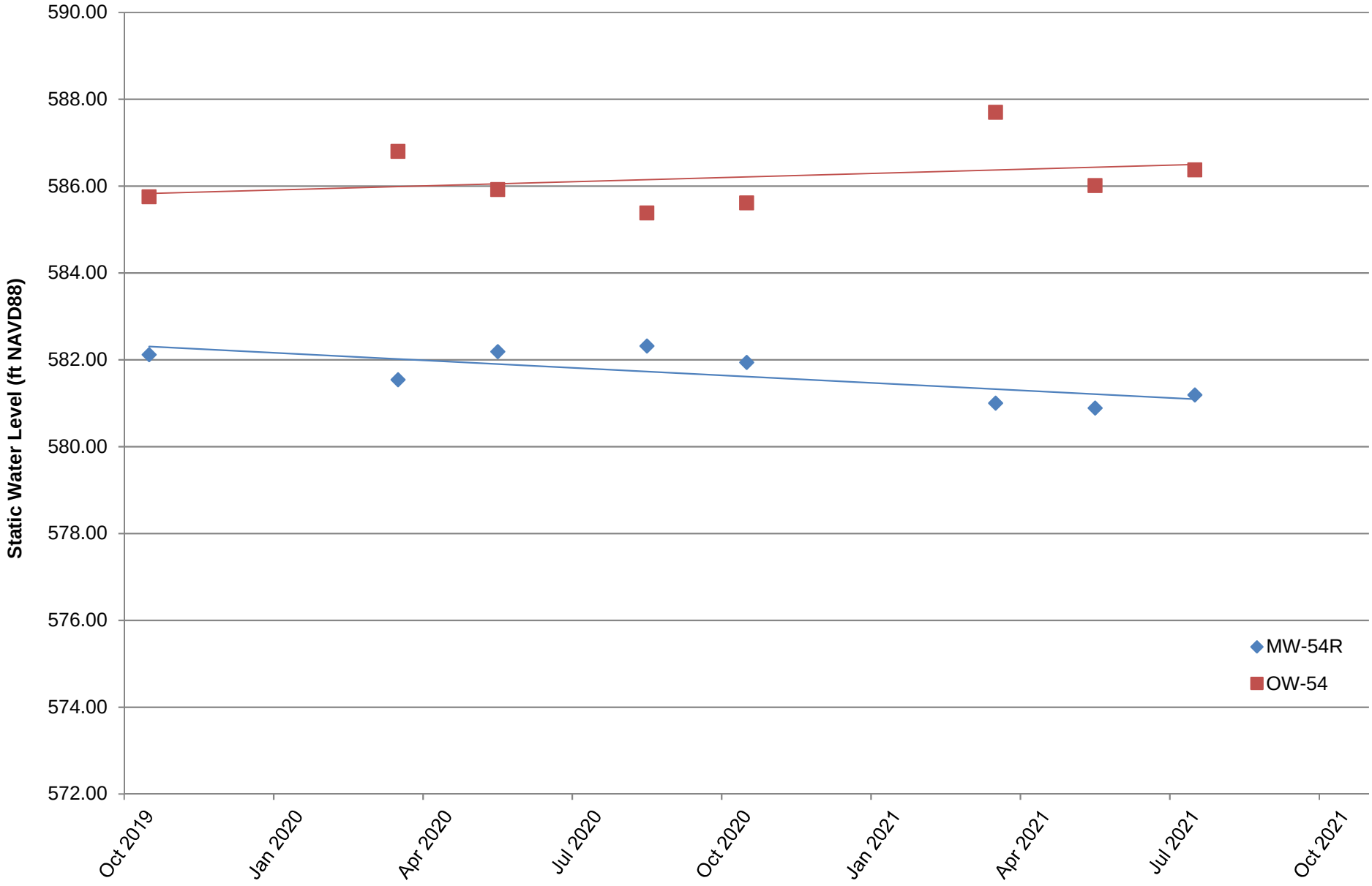
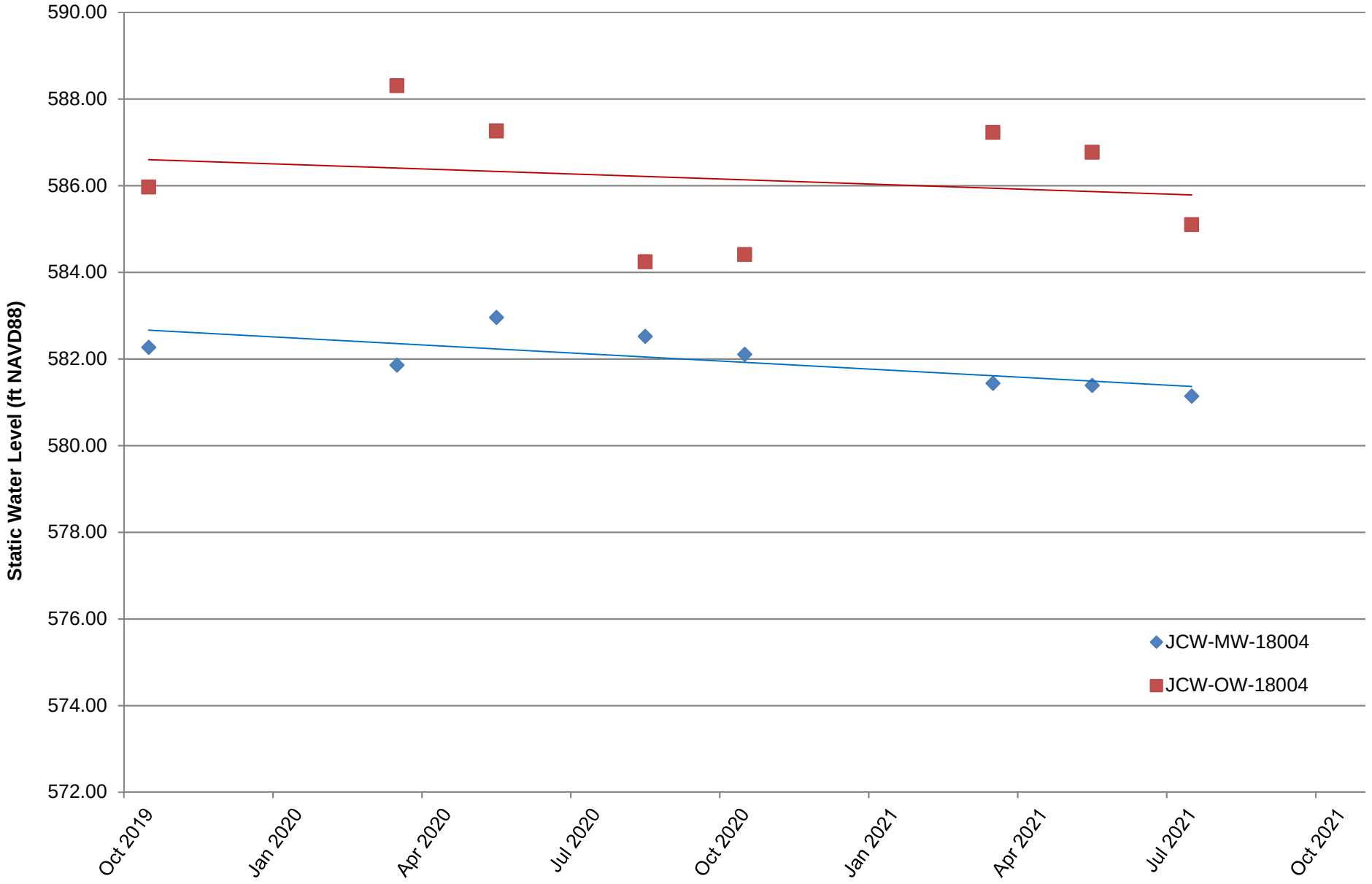
Static Water Level for MW-53 and OW-53



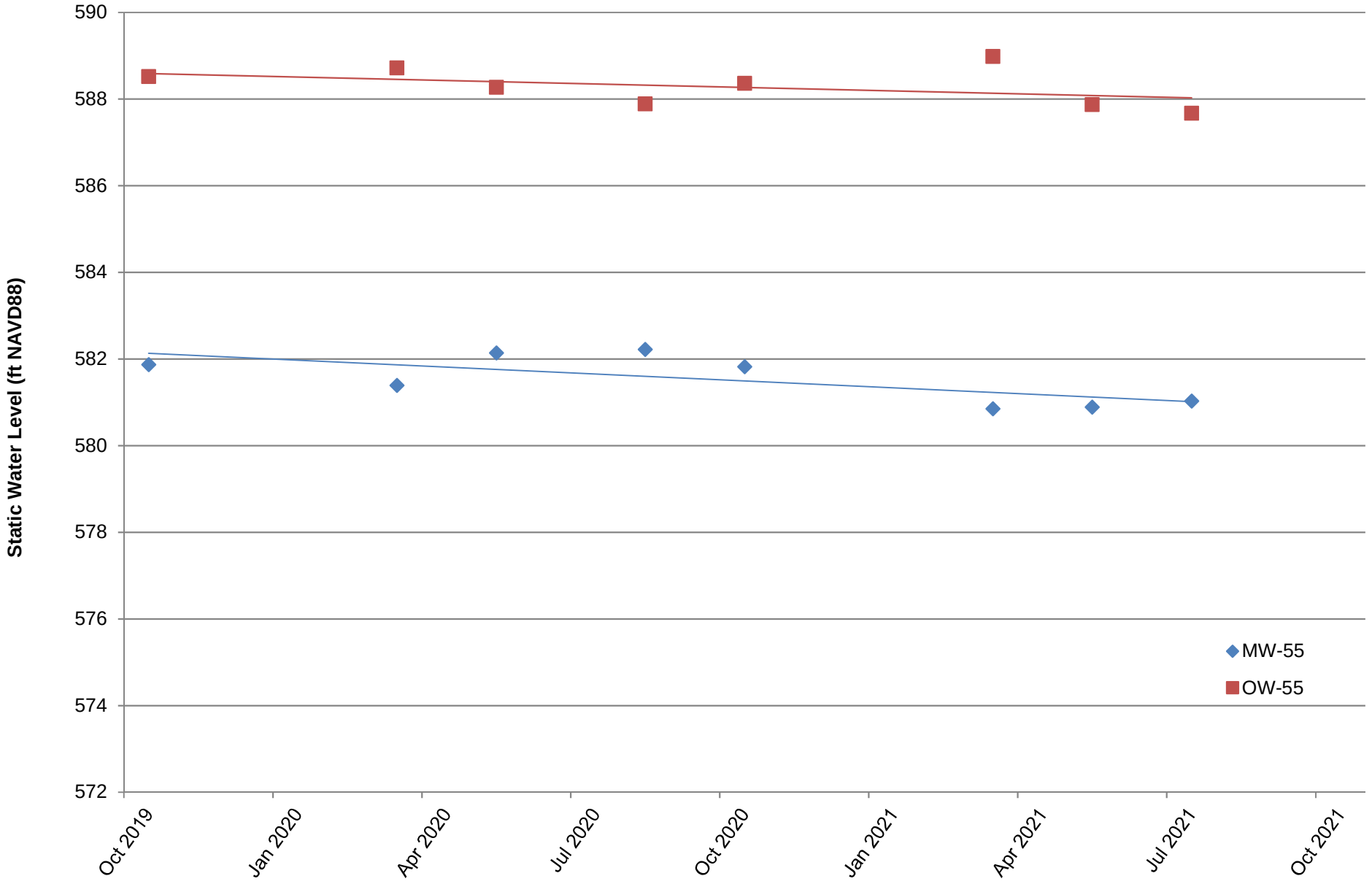
Appendix A
Static Water Level for MW-54R and OW-54



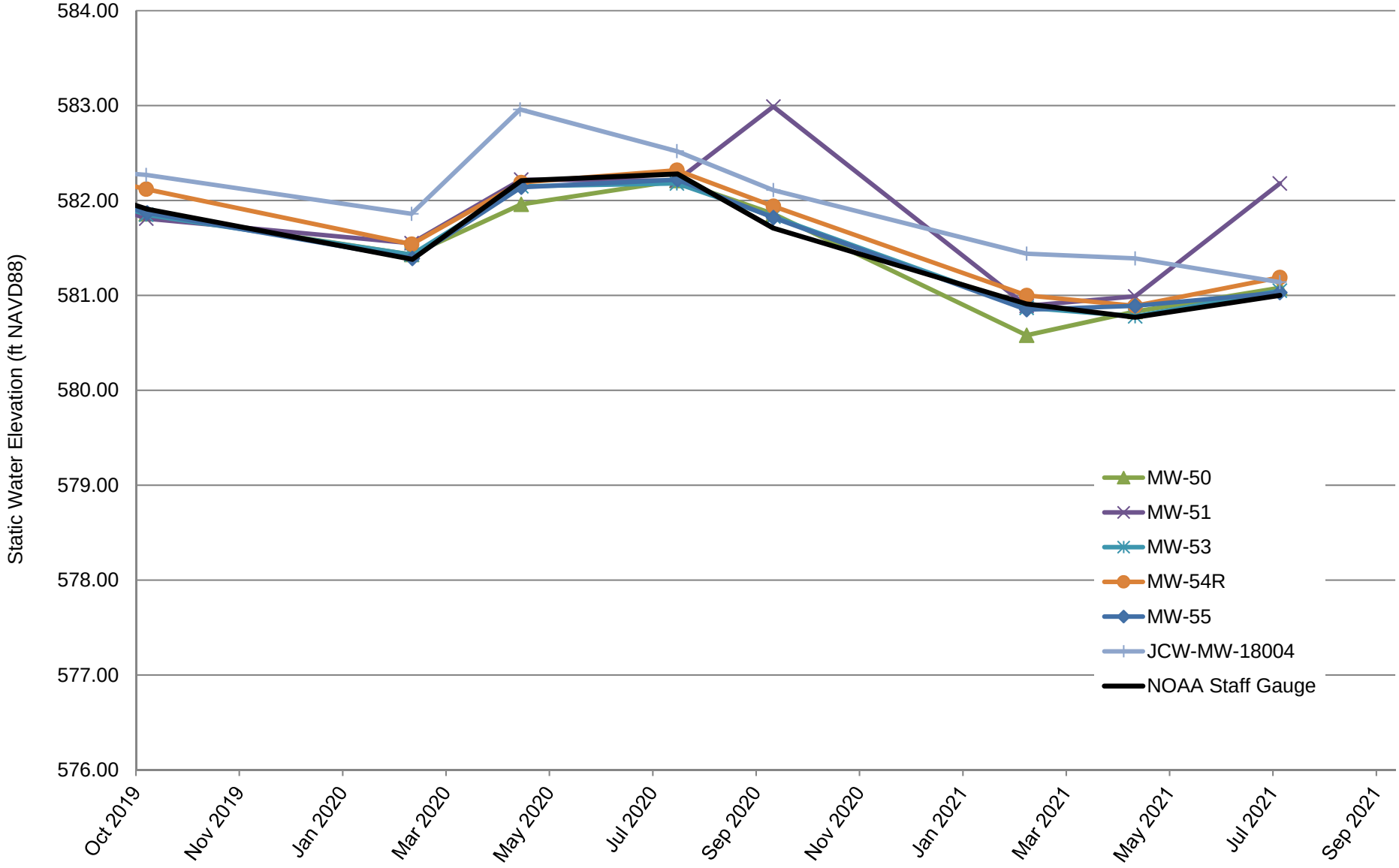
Appendix A
Static Water Level for JCW-MW-18004 and JCW-OW-18004



Appendix A
Static Water Level for MW-55 and OW-55



Appendix A
Static Water Elevations for Select Perimeter Dike Monitoring Wells and NOAA Staff Gauge



Appendix B
Data Quality Review

Laboratory Data Quality Review
Groundwater Monitoring Event August 2021
JC Weadock Landfill

Porewater samples were collected by TRC for the August 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) 21-0882.

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

- JCW-MW-18001
- JCW-MW-18004
- JCW-MW-18005
- JCW-MW-18006
- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- OW-55
- MW-57R OUT
- LH-104
- JCW-OW-18004
- MW-58

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Fluoride, Chloride, Sulfate)	EPA 300.0
Total Dissolved Solids (TDS)	SM 2540C
Total Metals	SW-846 6020B/7470A
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 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, alkalinity, and total phosphorus 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 assessment monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary:

- One field blank (FB-01) and one equipment blank (EB-01) sample were collected. Total metals and anions were not detected in these blank samples.
- MS and MSD analyses were performed on sample JCW-MW-18001 for total metals, anions, and alkalinity. The recoveries of arsenic, barium, calcium, magnesium, iron, potassium, and sodium were outside of the acceptance criteria in the MS and/or MSD analysis. The laboratory provided photographs of the samples and it was apparent that the sample bottle used for the MS had much more sediment than the other sample bottles and likely contributed to the heterogeneity. Since this appears to be an isolated incident for sample JCW-MW-18001, potential uncertainty exists for the positive results for arsenic,

barium, calcium, magnesium, iron, potassium, and sodium in only this sample, as summarized in Attachment 1. 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.

- The field duplicate pair samples were DUP-01 and MW-50; the 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.

Supplemental Review:
Given the discrepancy in high solids present in the JCW-MW-18001 parent and MS/MSD sample containers that were analyzed for total metals and the clear sample that was analyzed for anions, the laboratory preserved a portion of the anion sample on 8/10/21 and analyzed it as an additional MS/MSD sample for total metals. The recoveries of this additional MS/MSD sample were calculated with concentrations of total metals detected in the original parent sample from the sample bottle that contained high solids and was preserved in the field. With the exception of total iron, all recoveries of total metals were within criteria.

Attachment 1
Summary of Data Non-Conformances for Groundwater Analytical Data
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
JCW-MW-18001	8/2/2021	Arsenic, Barium, Calcium, Magnesium, Iron, Potassium, Sodium	MS and/ or MSD %R outside of criteria; potential uncertainty exists

Appendix C
Detection Monitoring Statistical Trend Tests

Appendix C
Detection Monitoring Statistical Summary for JC Weadock Facility
Third Quarter 2021 Quarterly Report
Data from October 2019 to August 2021

Porewater Monitoring Points						
PARAMETER	**JCW-MW-18001**	**JCW-MW-18004**	**JCW-MW-18005**	**JCW-MW-18006**	**MW-50**	**MW-51**
Boron	O	O	↓	O	O	O
Calcium	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Chloride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Fluoride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Iron	O	O	O	O	O	O
pH/Corrosivity	O	O	O	O	O	O
Sulfate	↑ ASD	O	O	↓*	O	O
Total Dissolved Solids	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events

Notes:

O* = Non-detect (70%)
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 Weadock Landfill, TRC, July 2021.)

Appendix C
Detection Monitoring Statistical Summary for JC Weadock Facility
Third Quarter 2021 Quarterly Report
Data from October 2019 to August 2021

Porewater Monitoring Points						
PARAMETER	**MW-52**	**MW-53**	**MW-53R**	**MW-54R**	**MW-55**	**OW-57R OUT**
Boron	O	↑	O	↑*	O	O
Calcium	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Chloride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Fluoride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Iron	O	O	O	O	O	O
pH/Corrosivity	O	O	O	O	O	O
Sulfate	O	O	O	O	↓	O
Total Dissolved Solids	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events

Notes:

O* = Non-detect (70%)
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 Weadock Landfill, TRC, July 2021.)

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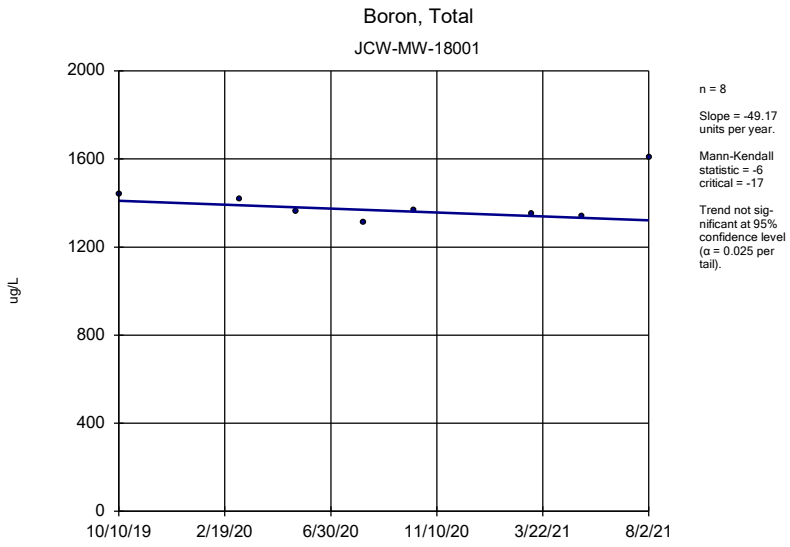

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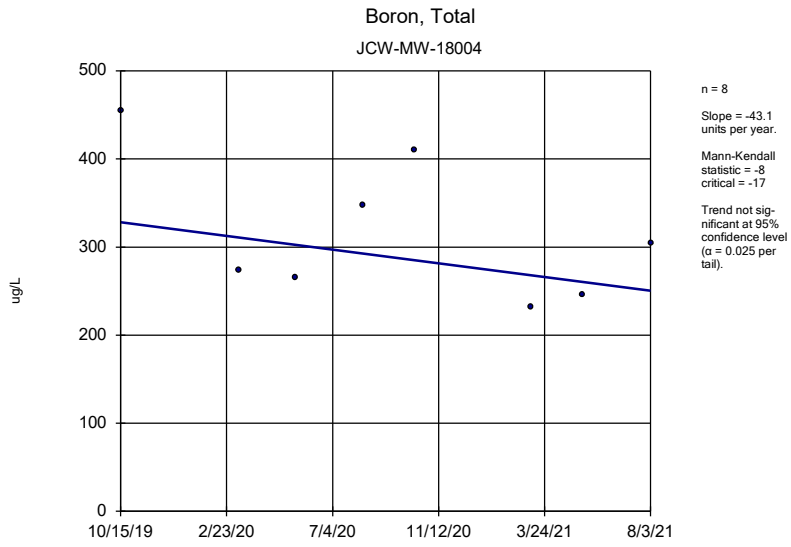

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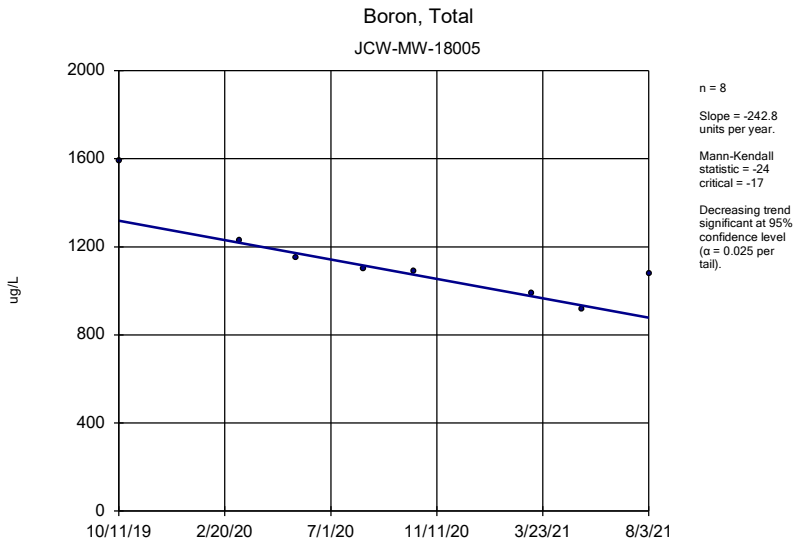

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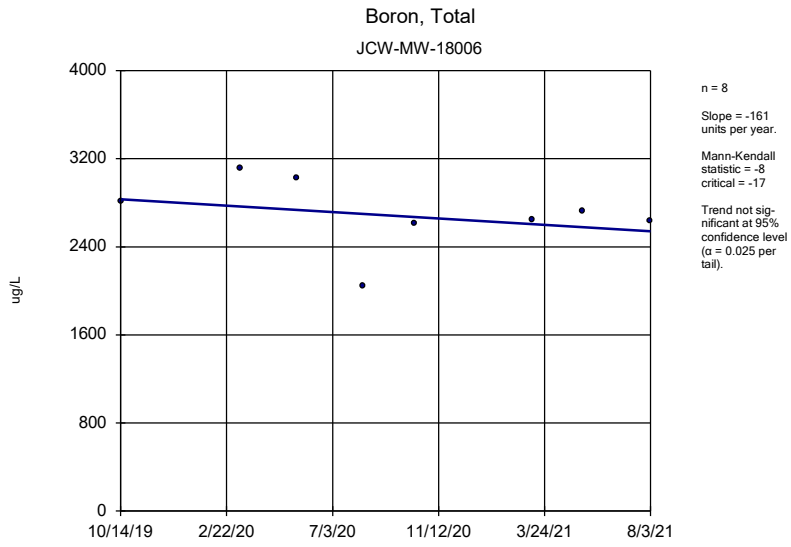

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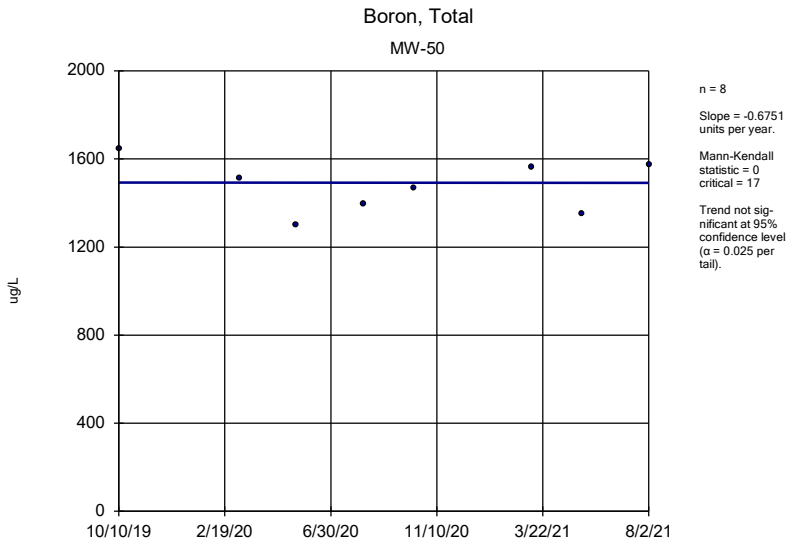

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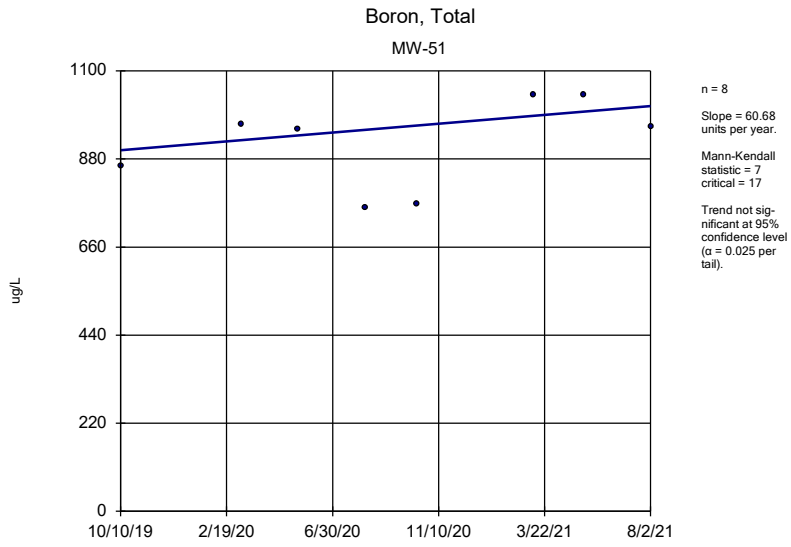

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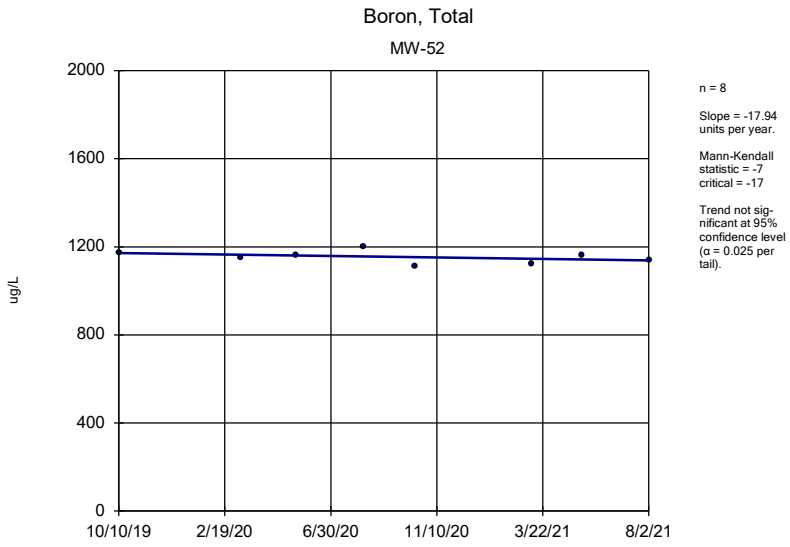

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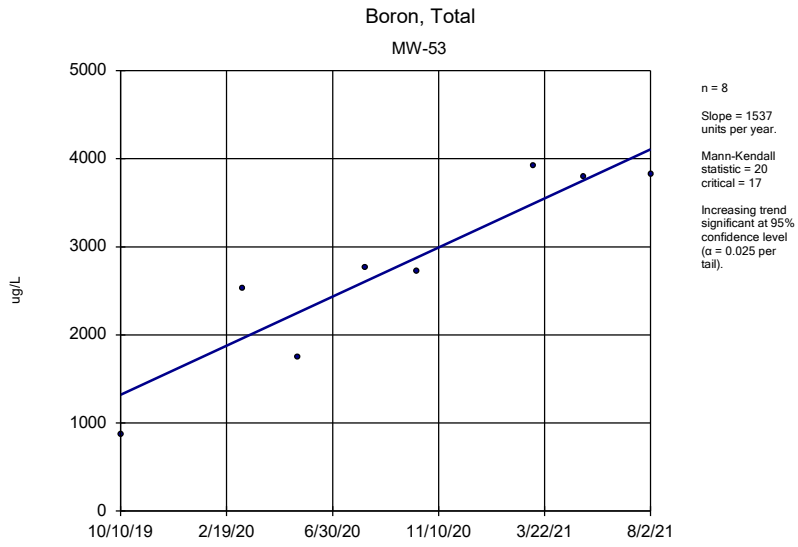

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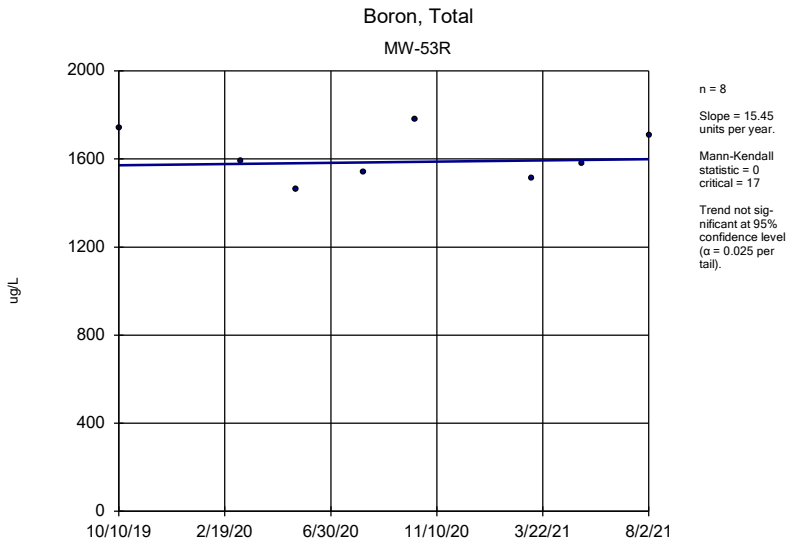

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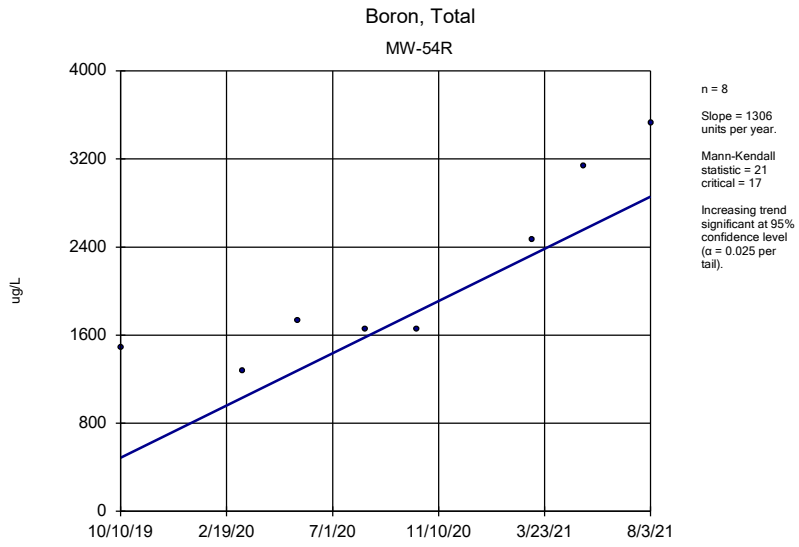

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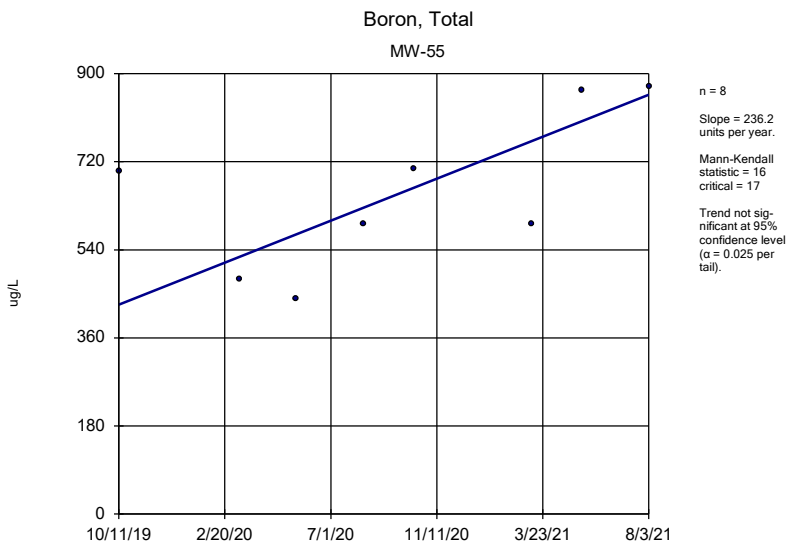

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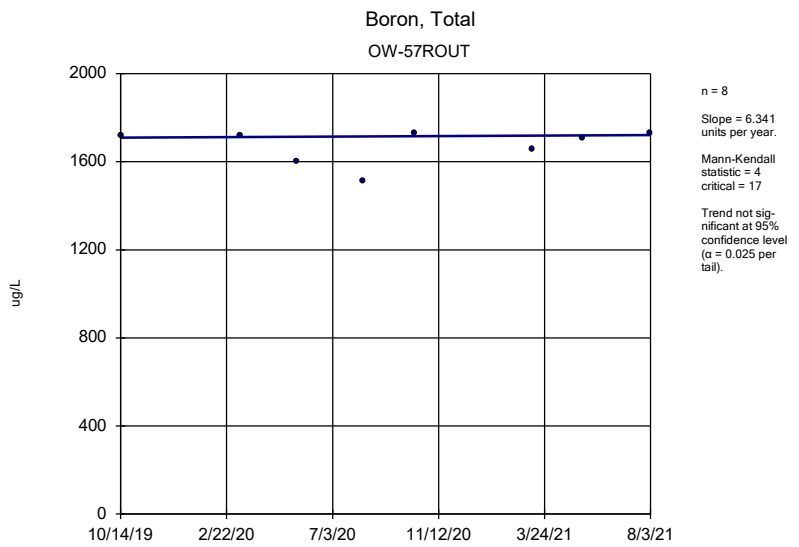

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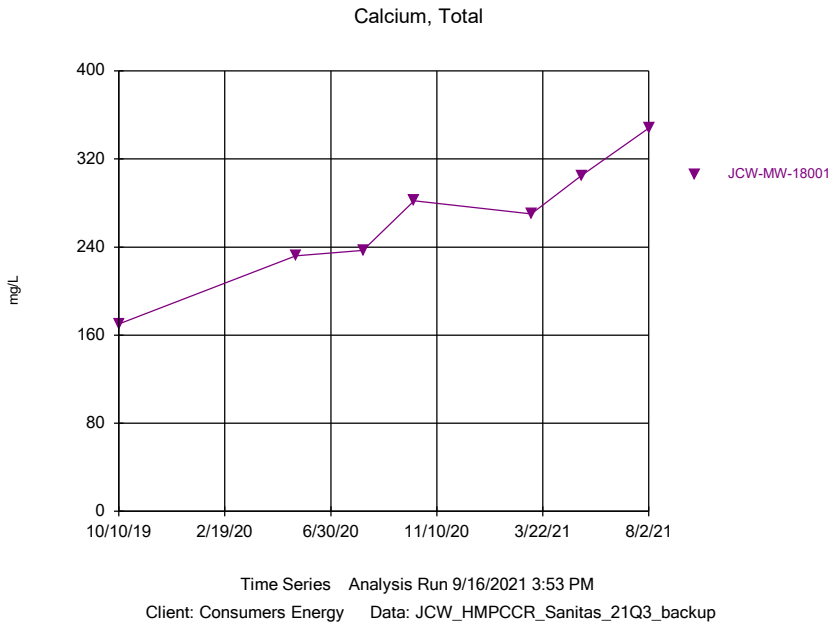

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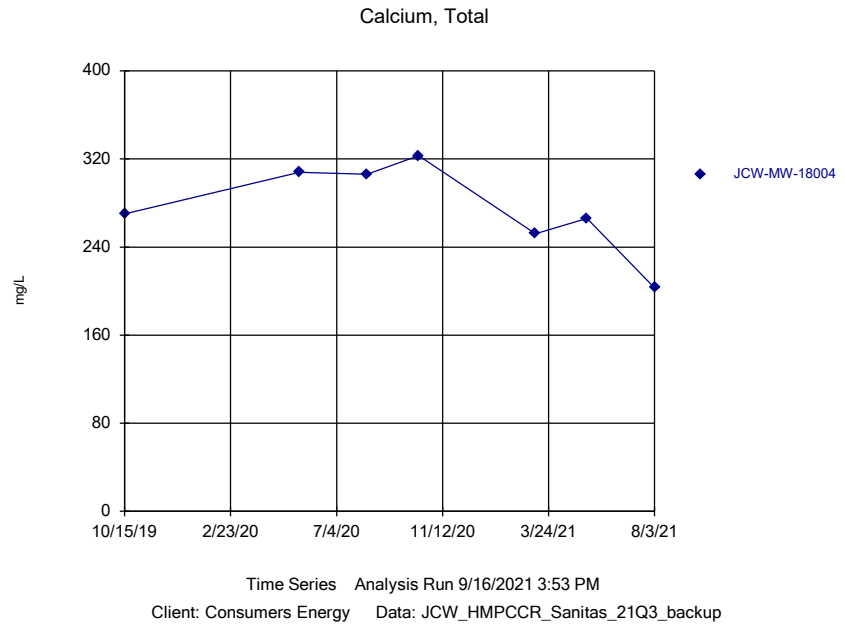

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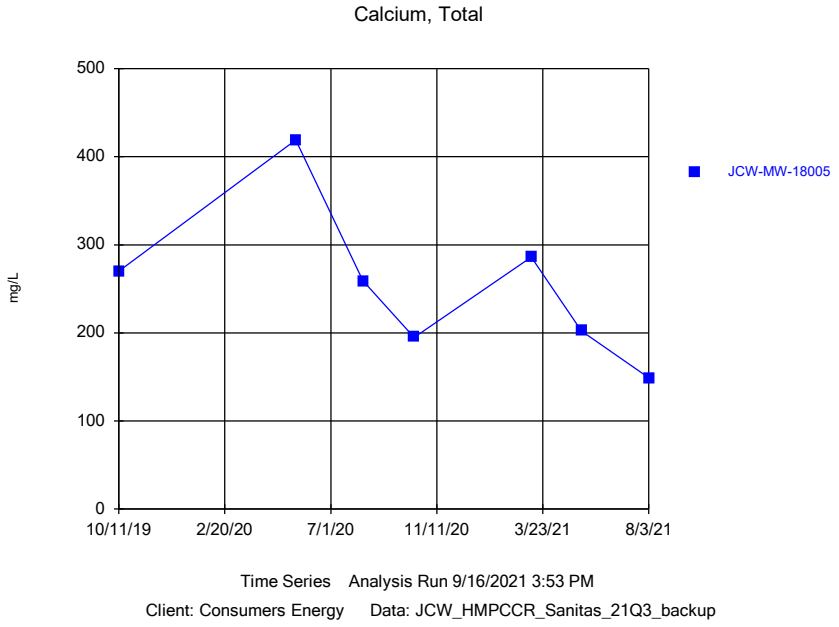

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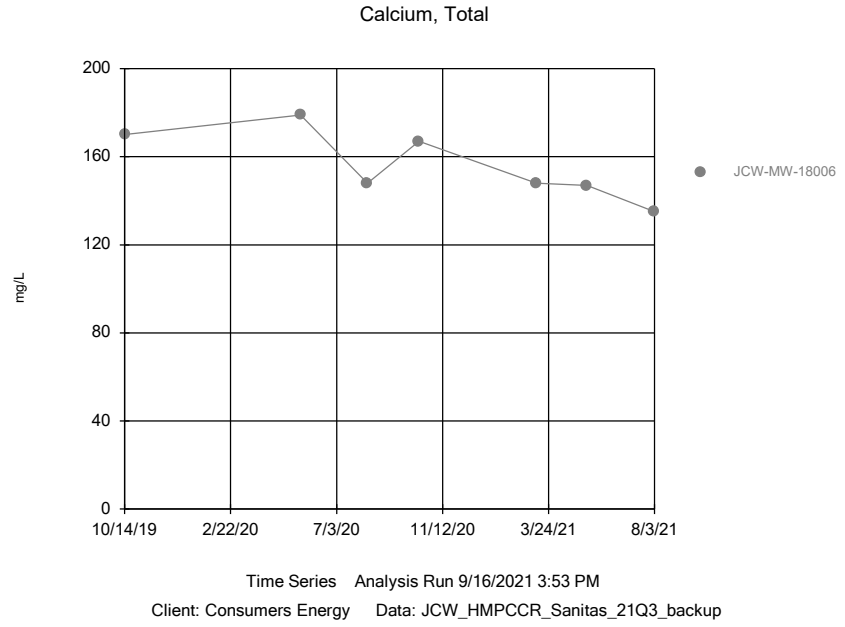

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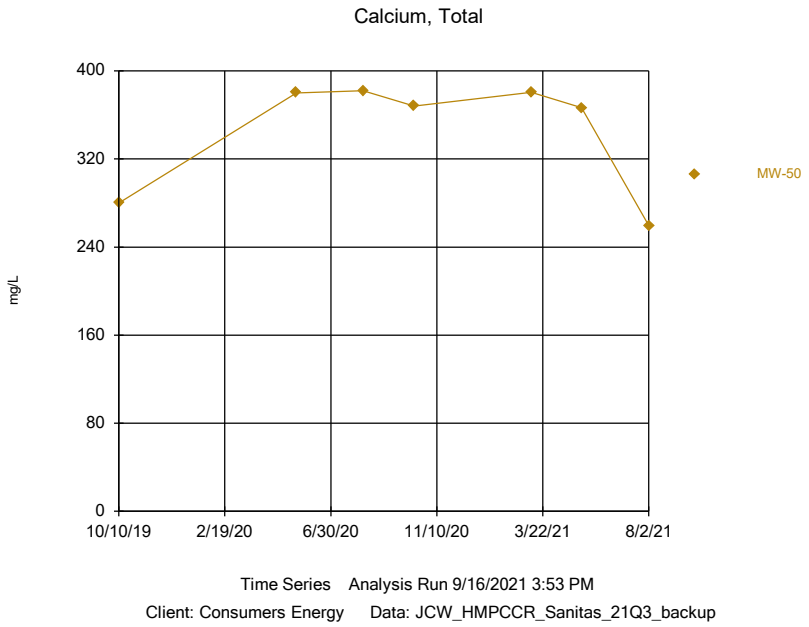

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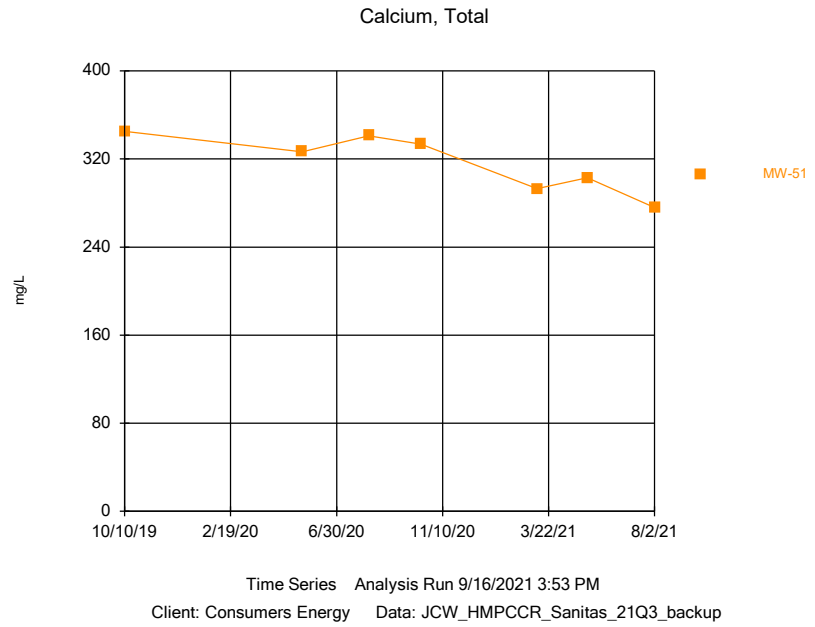

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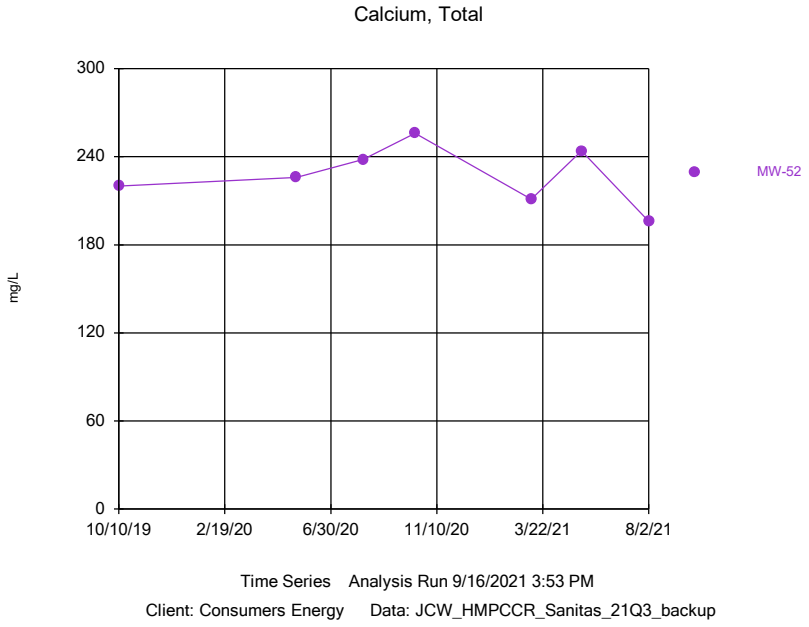

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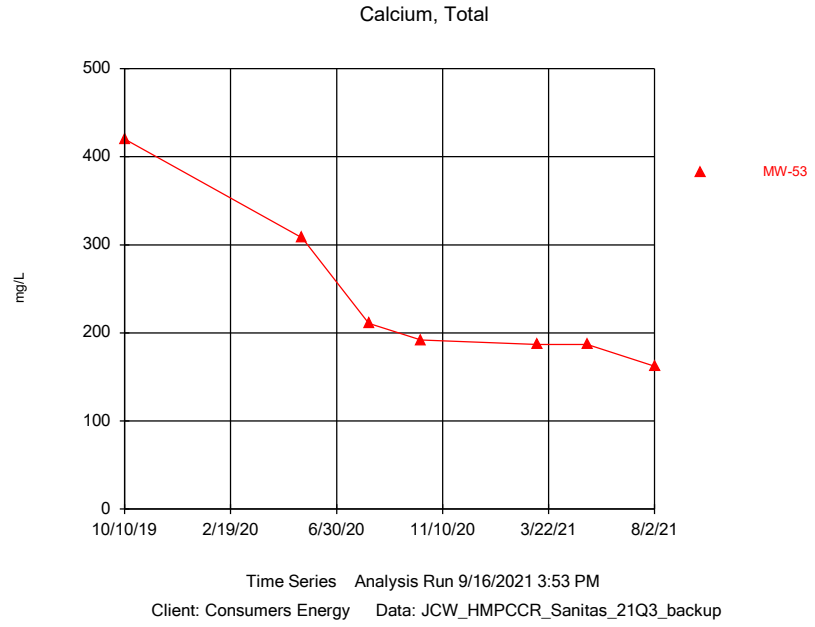

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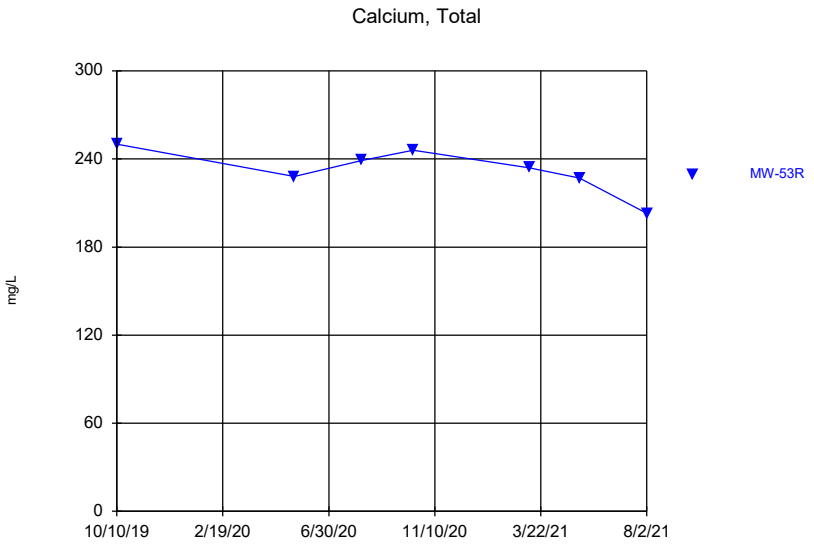

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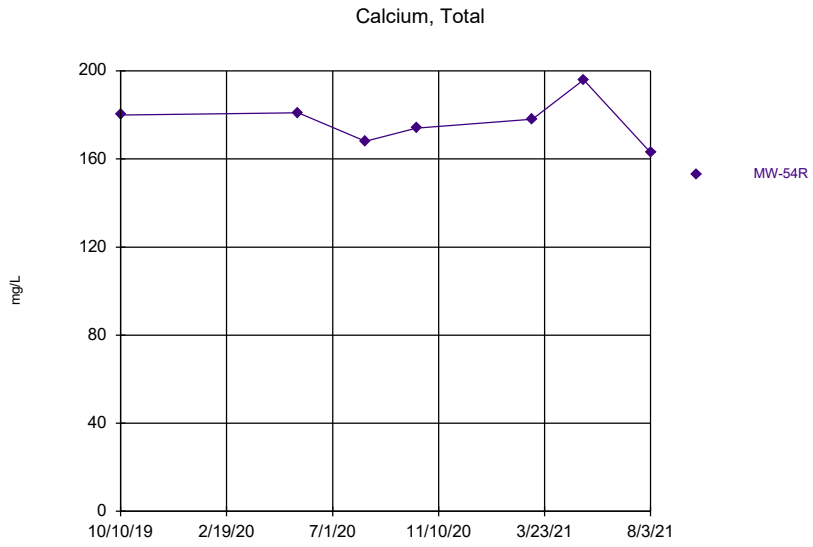

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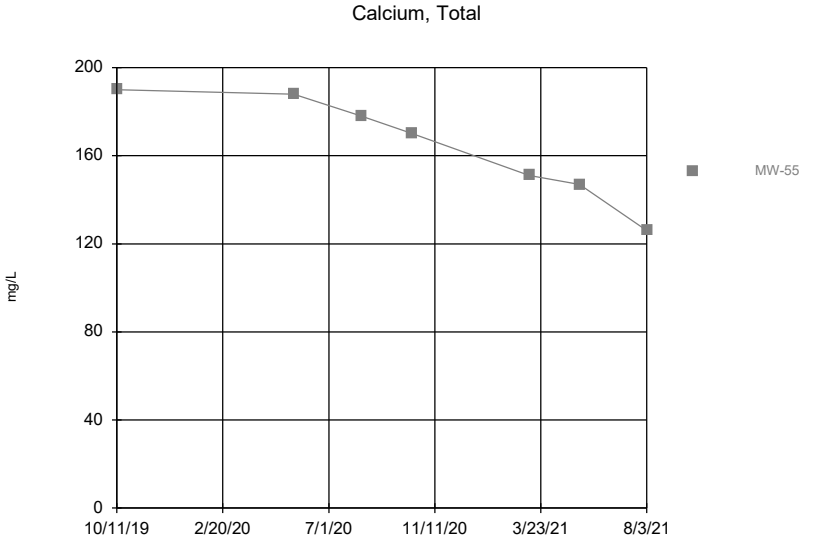

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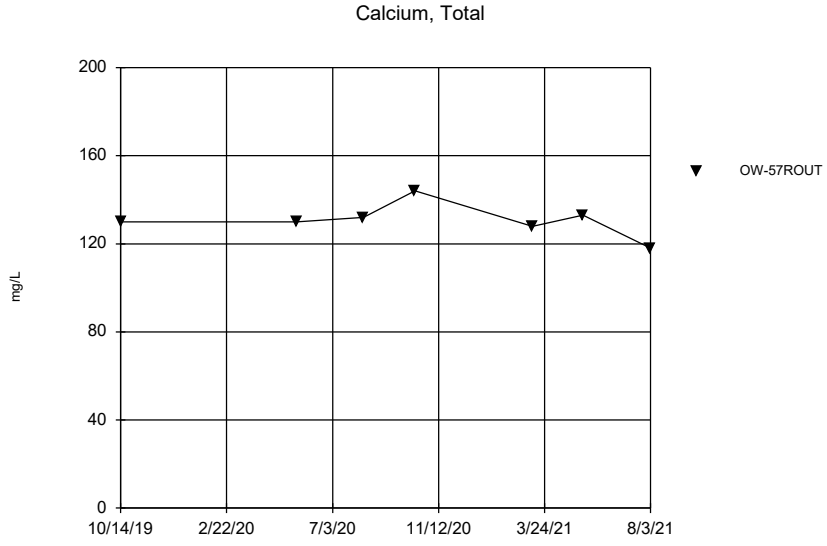

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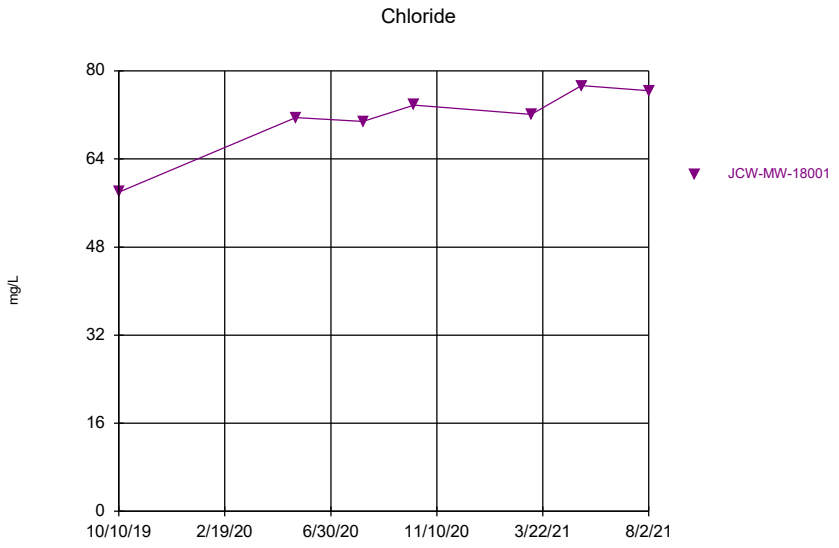

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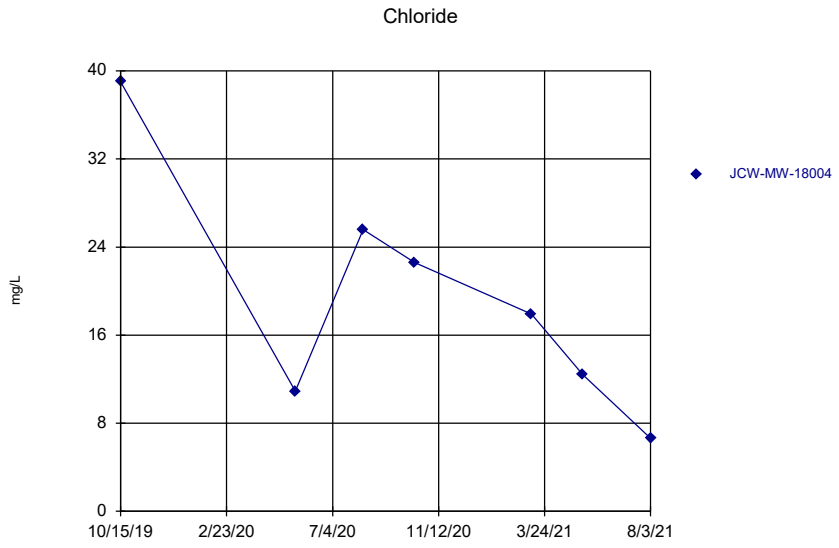

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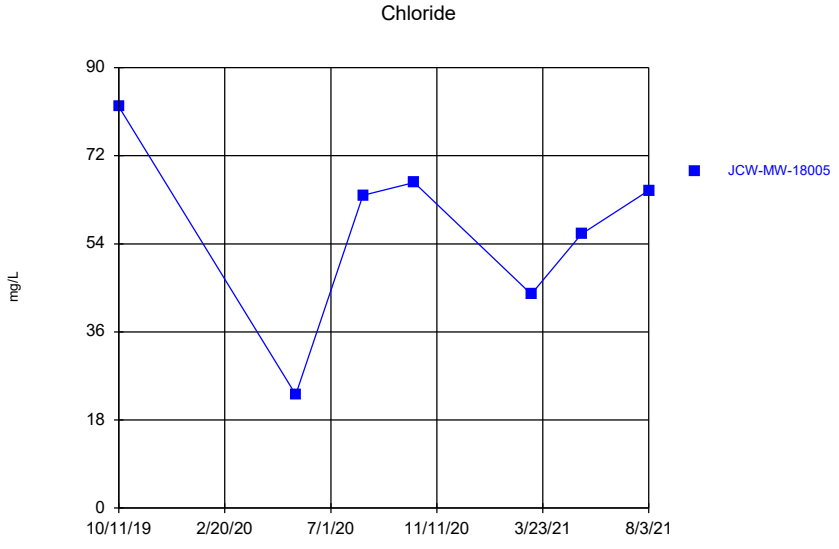

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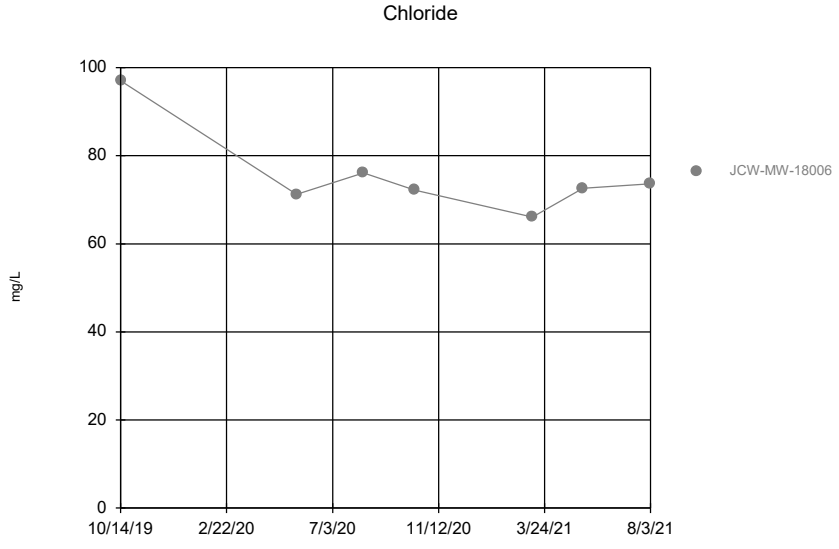

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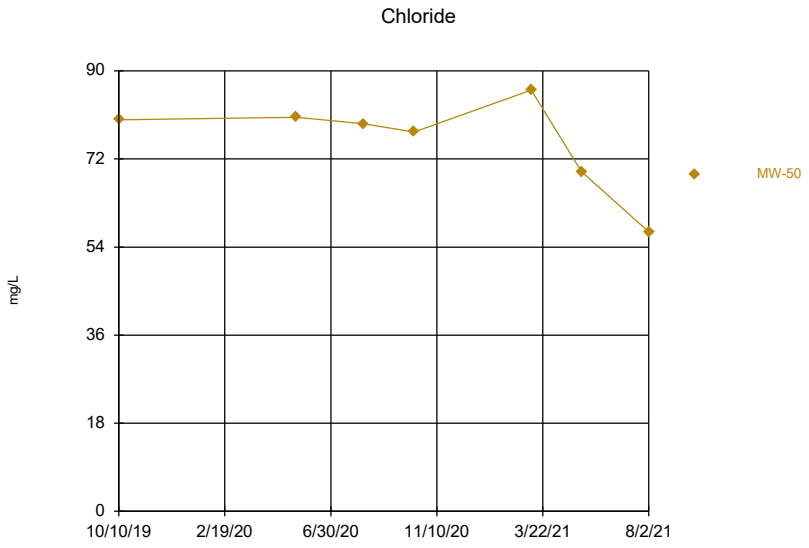

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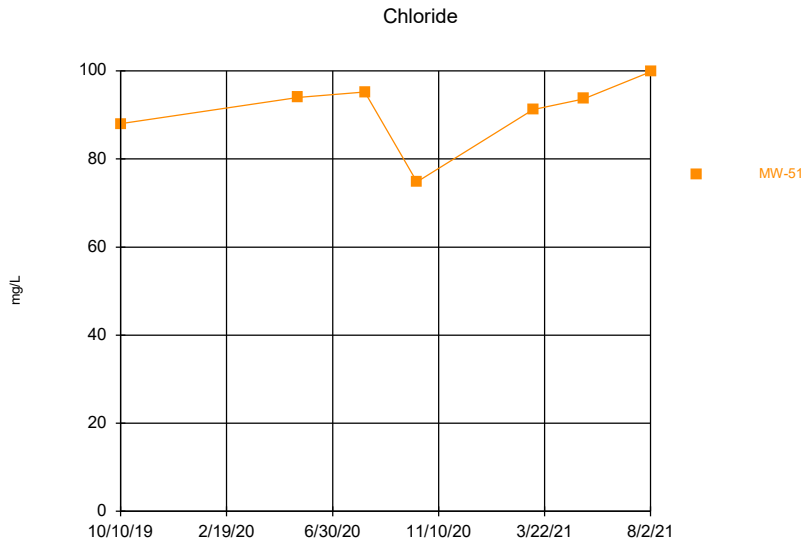

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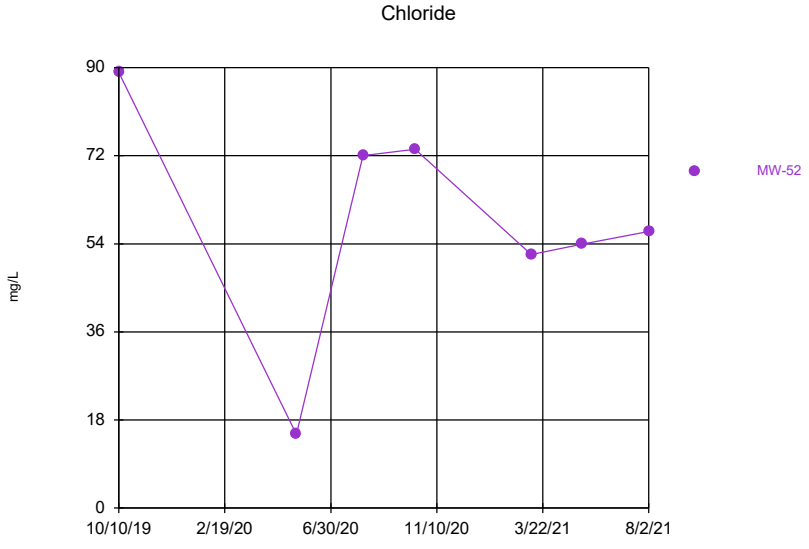

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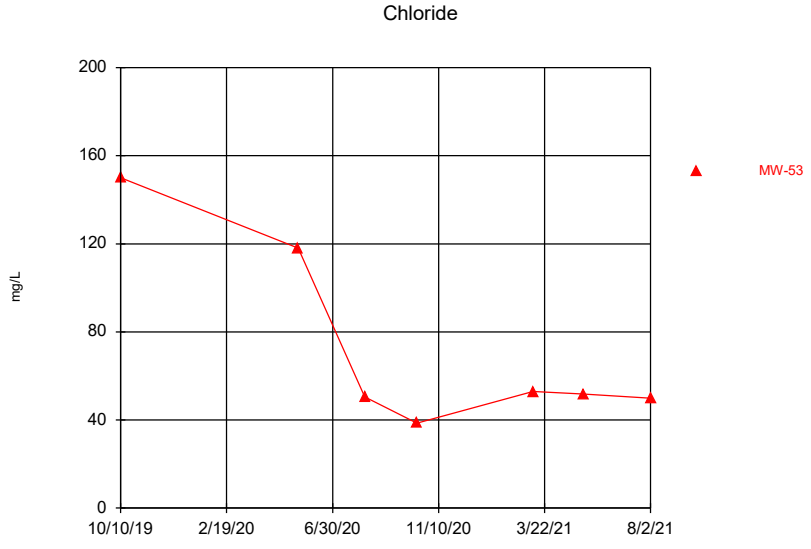

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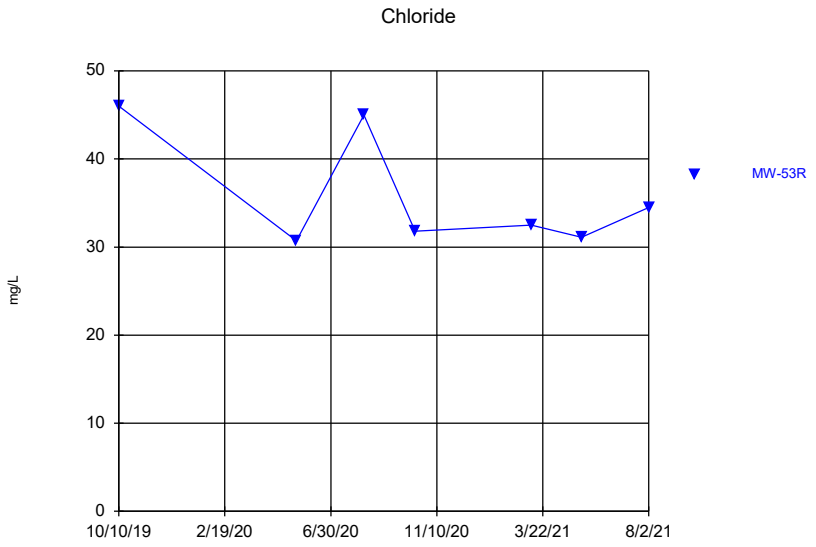

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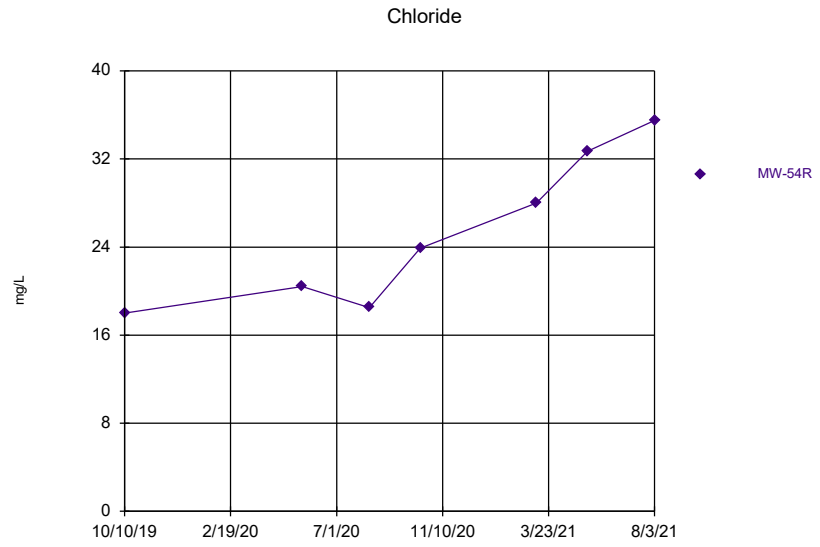

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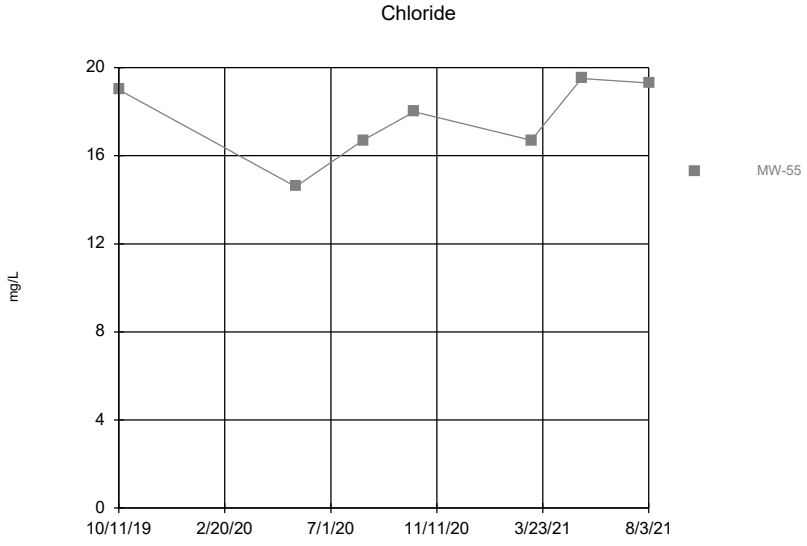

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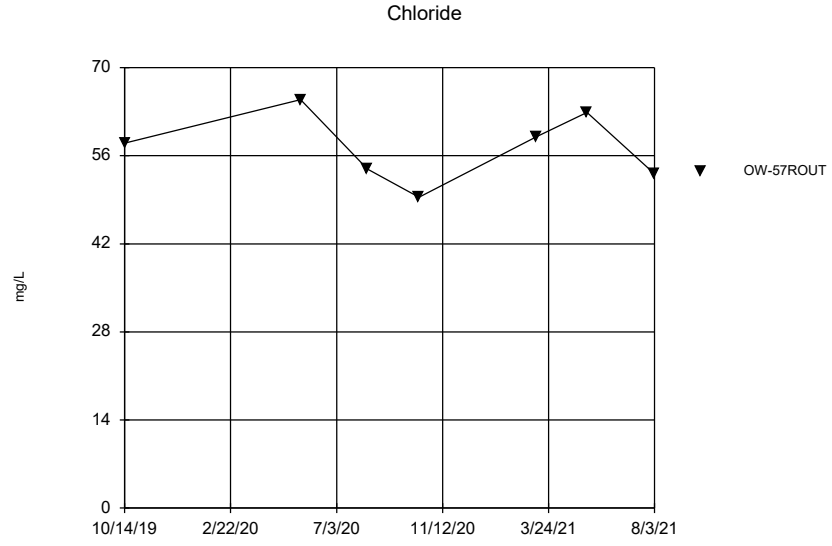

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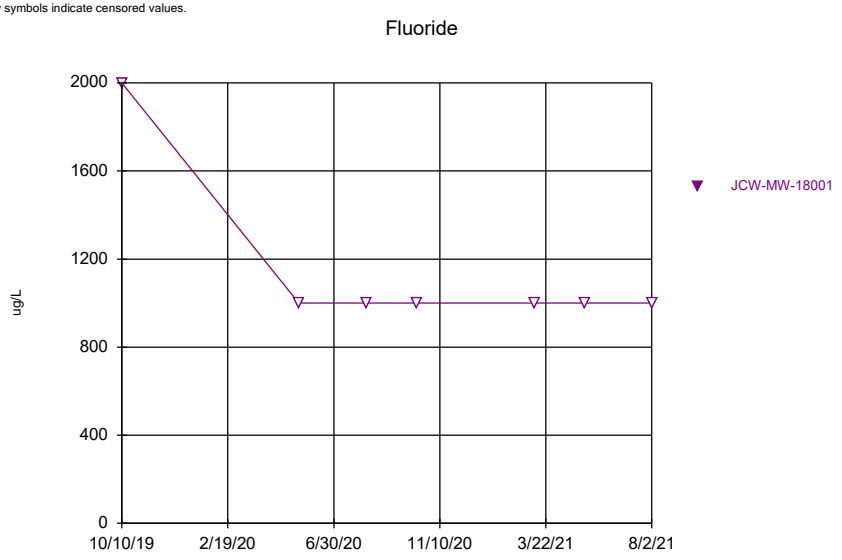

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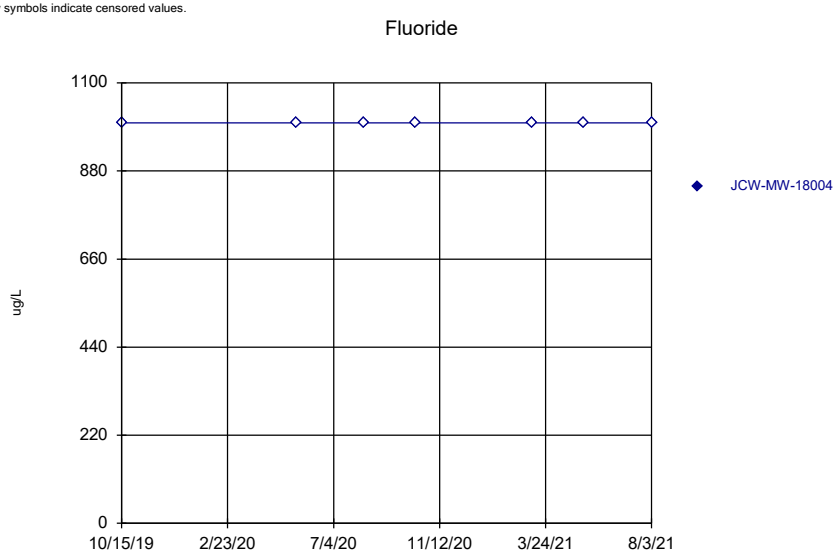

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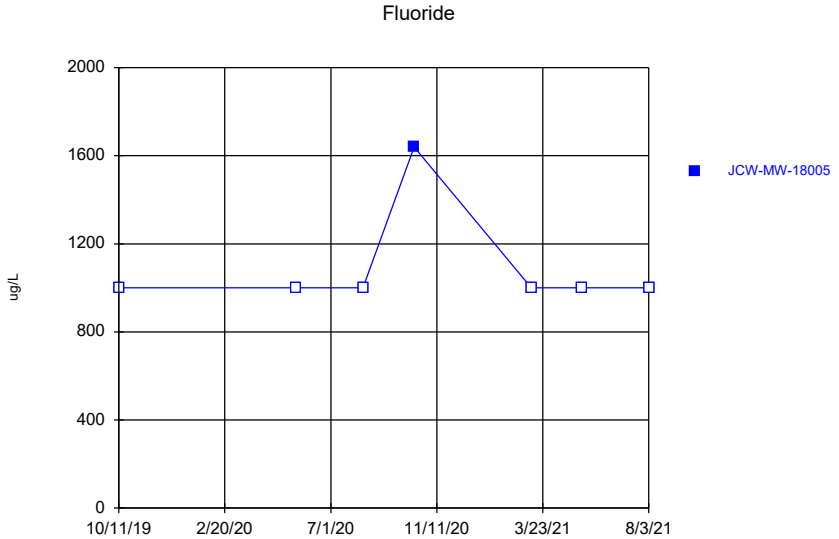

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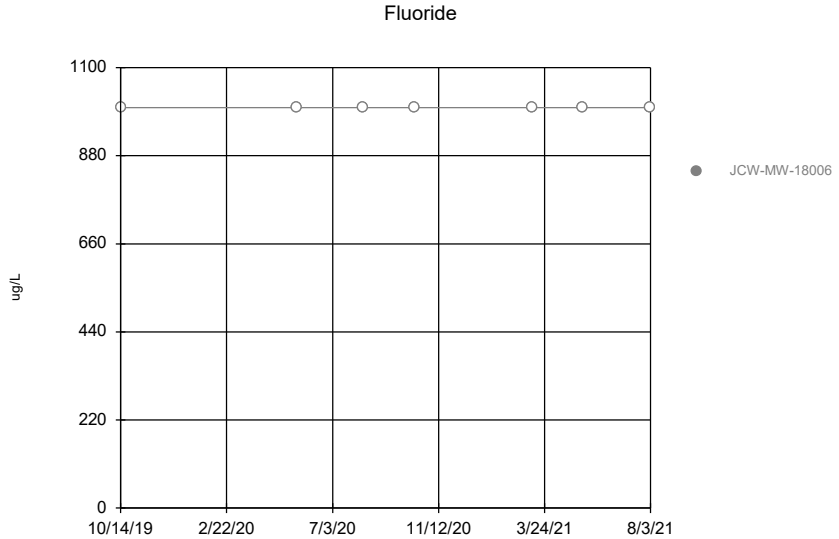

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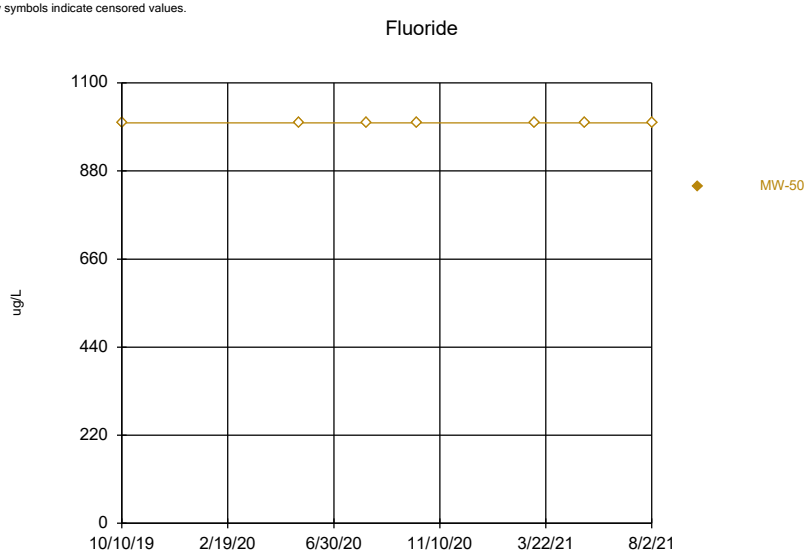

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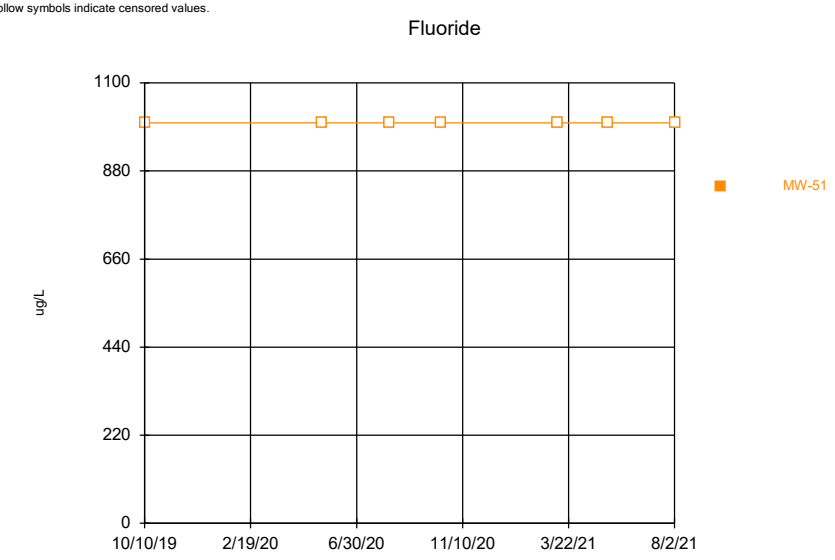

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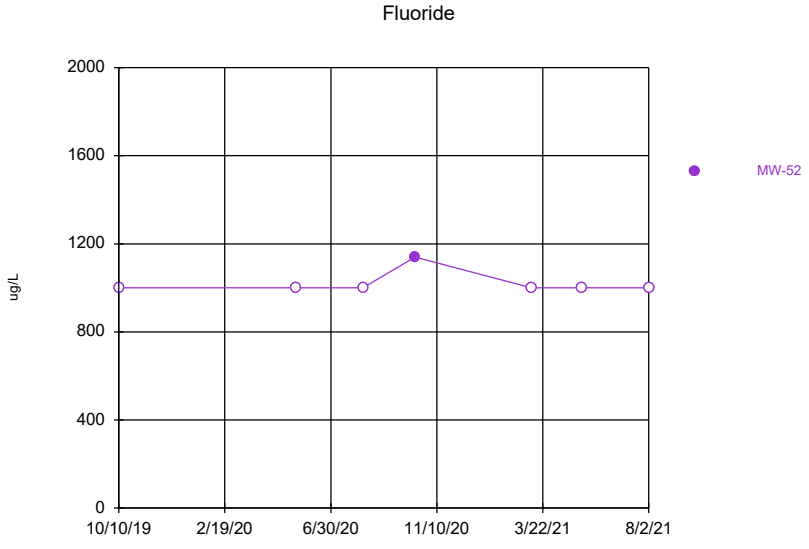

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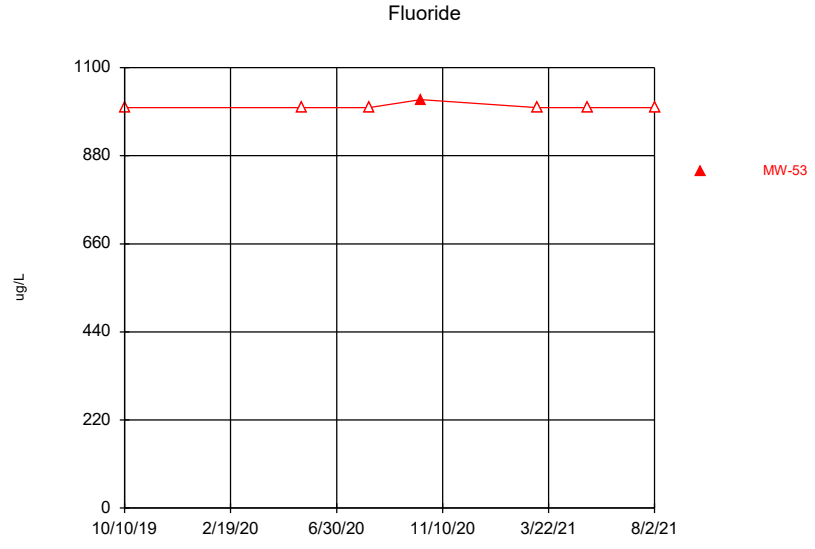

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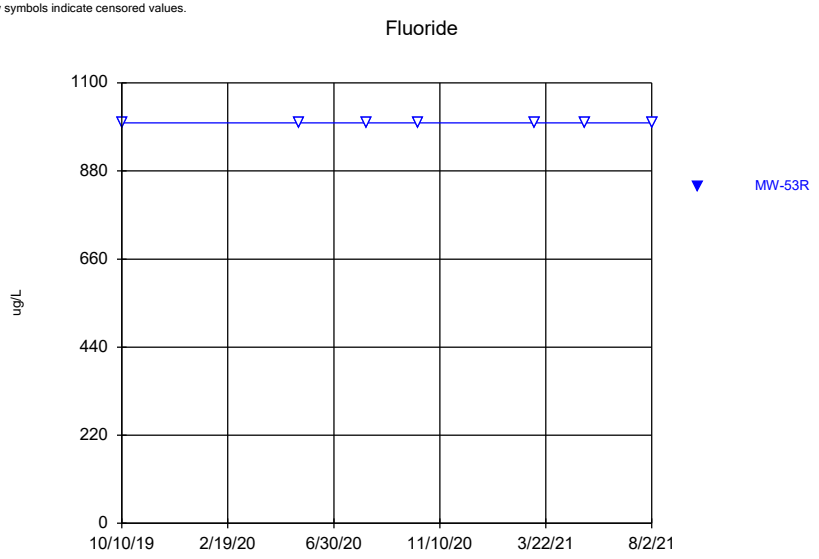

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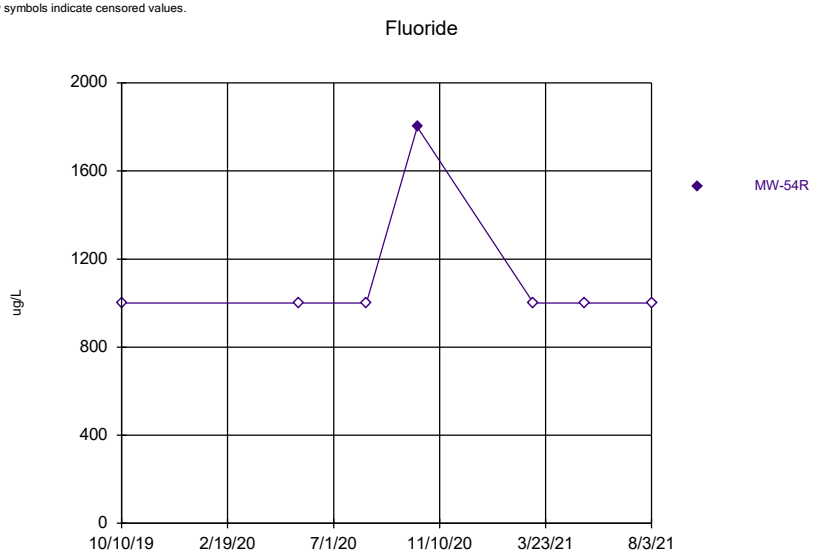

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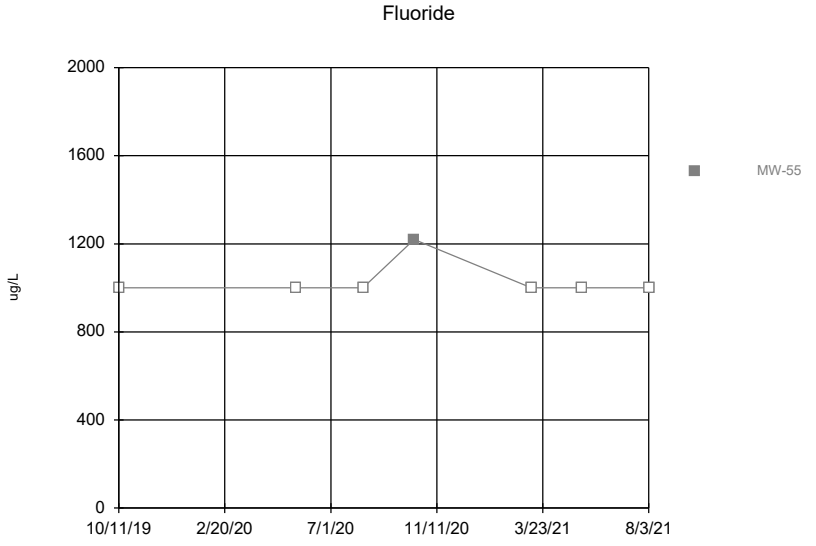

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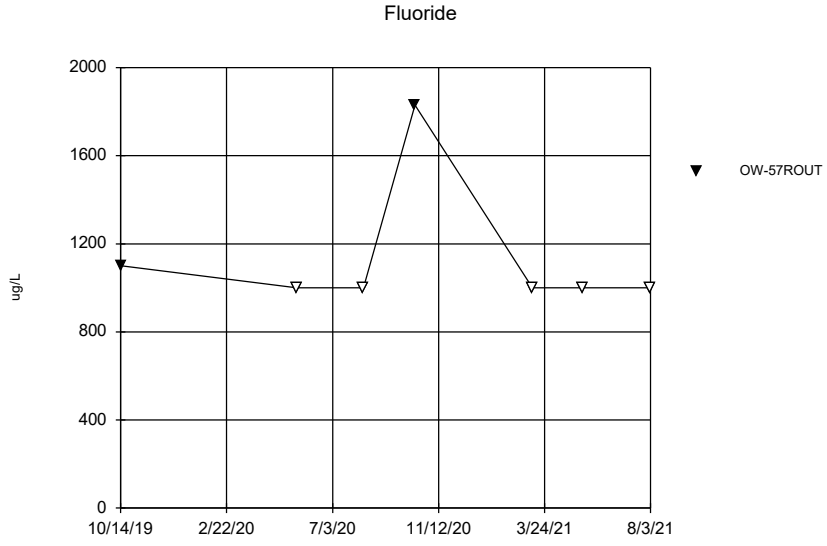

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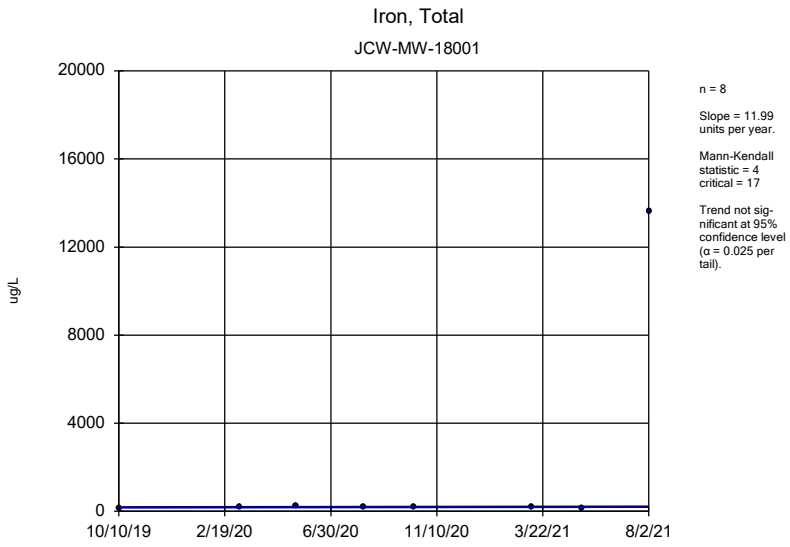

Sen's Slope Estimator Analysis Run 9/16/2021 3:48 PM

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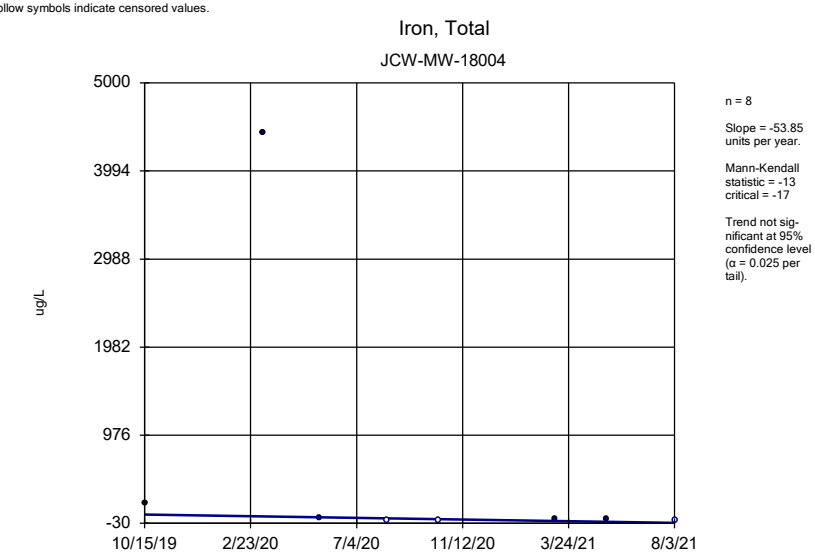

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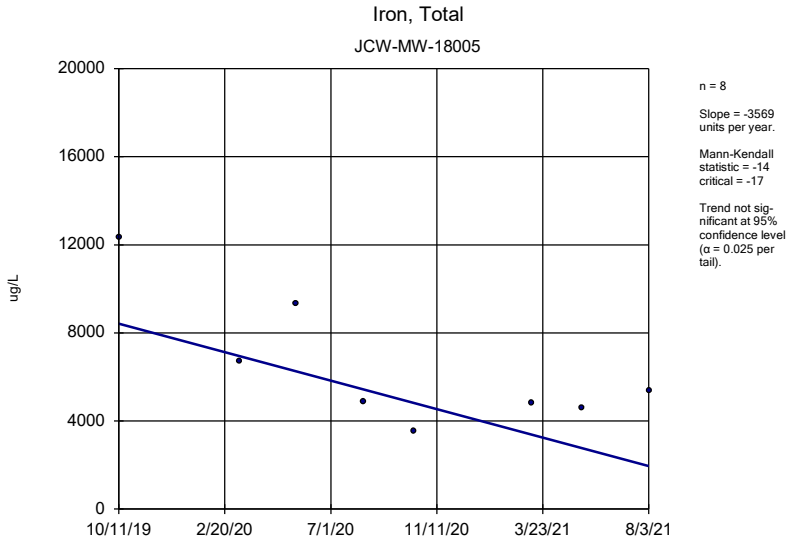

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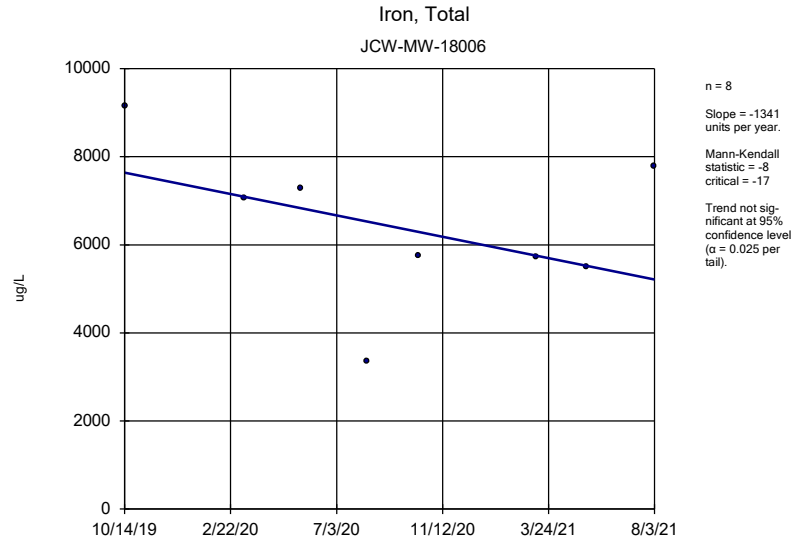

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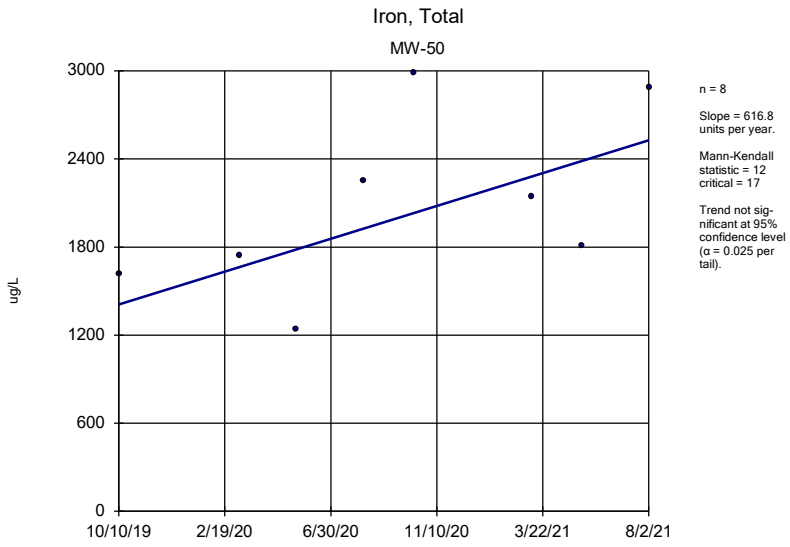

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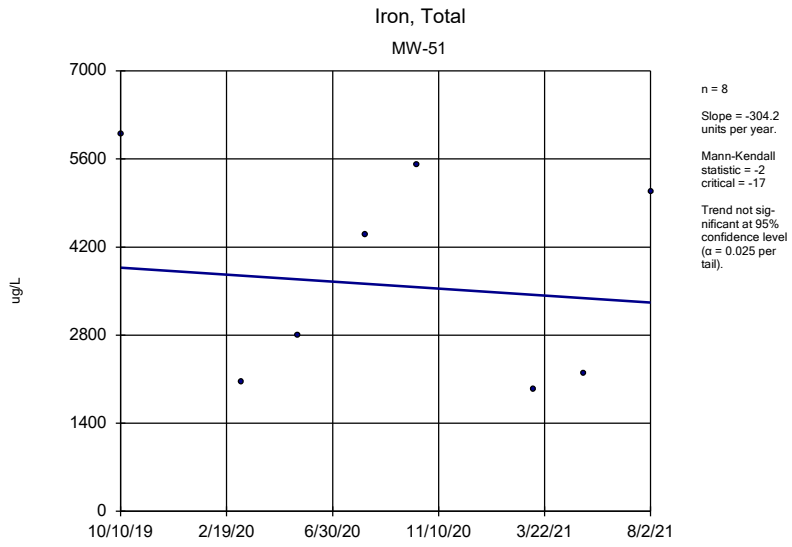

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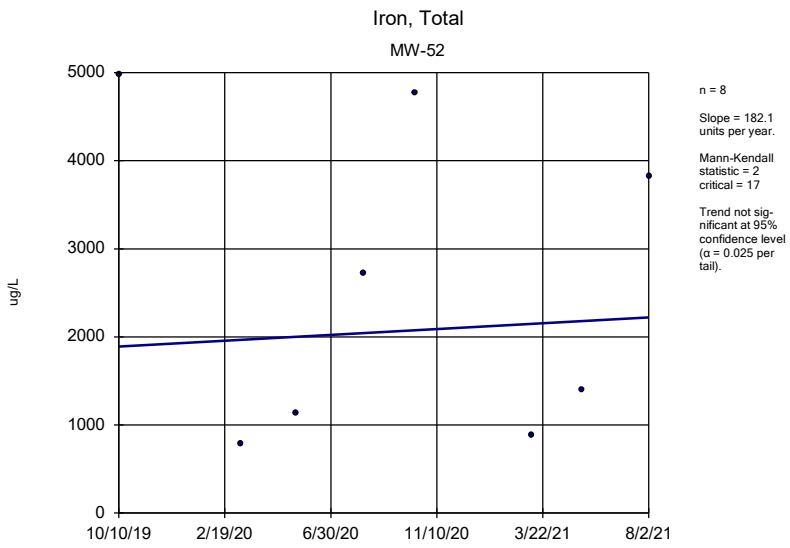

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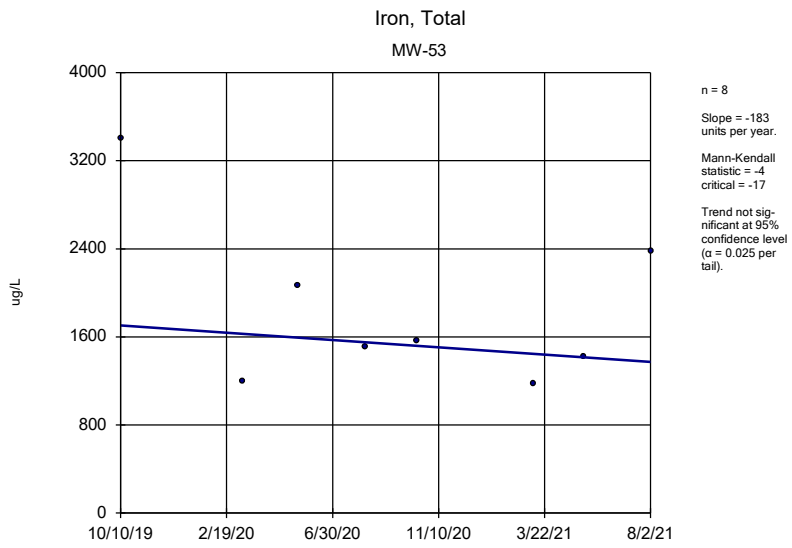

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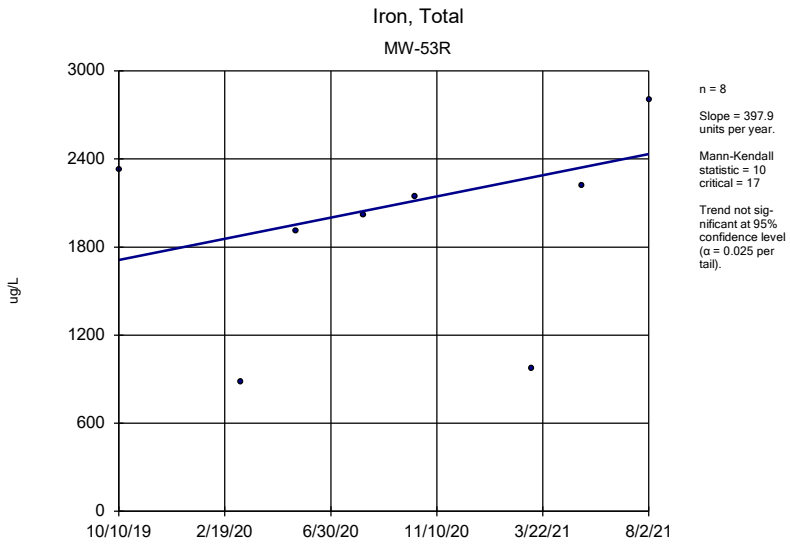

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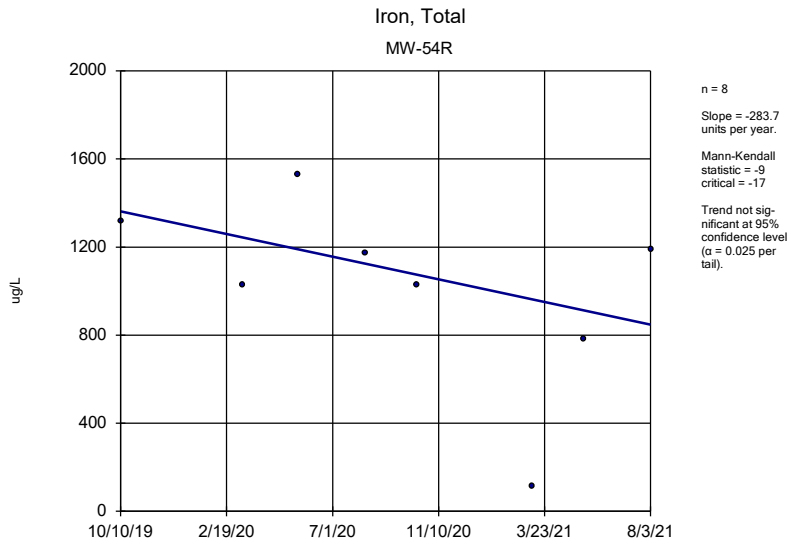

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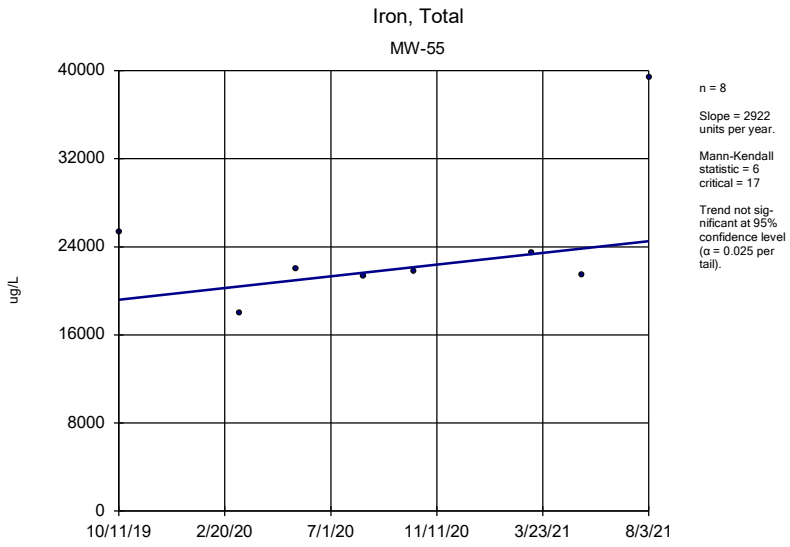

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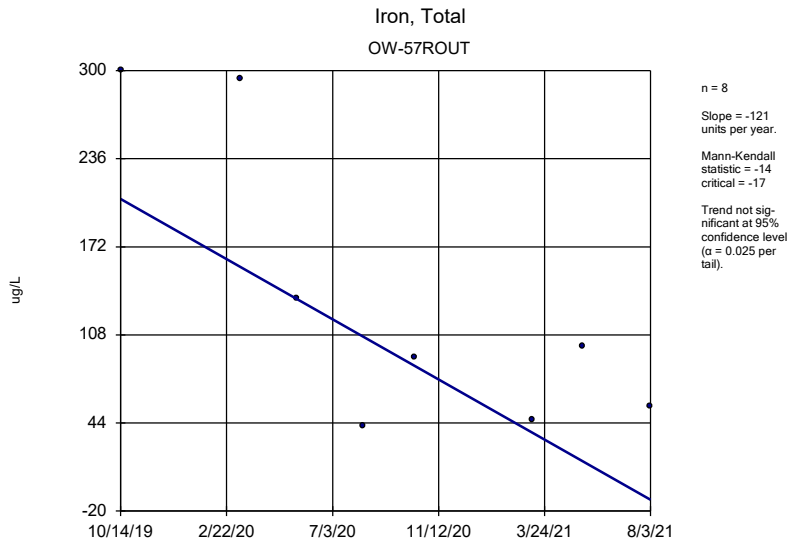

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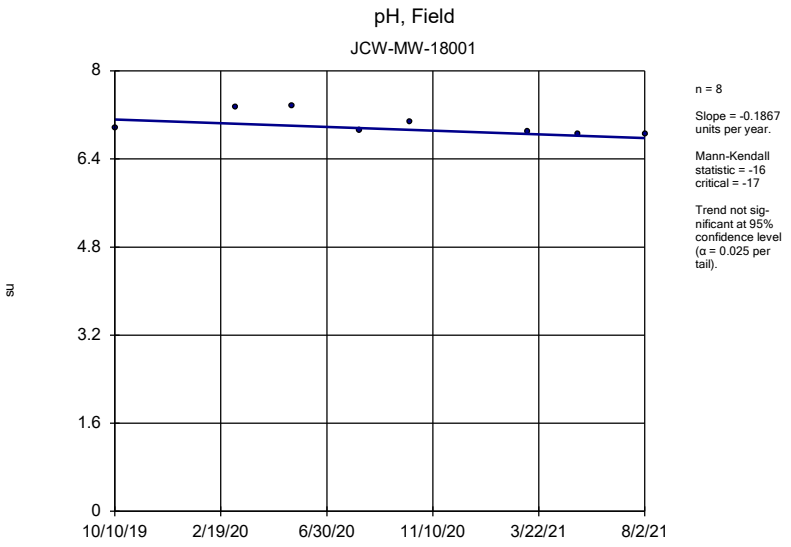

n = 8

Slope = -0.1867 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 3:48 PM

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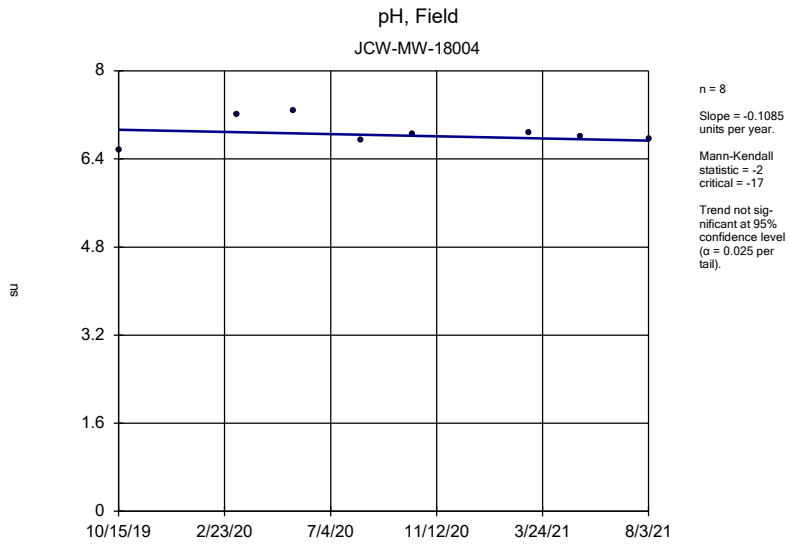

n = 8

Slope = -0.1085 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 3:48 PM

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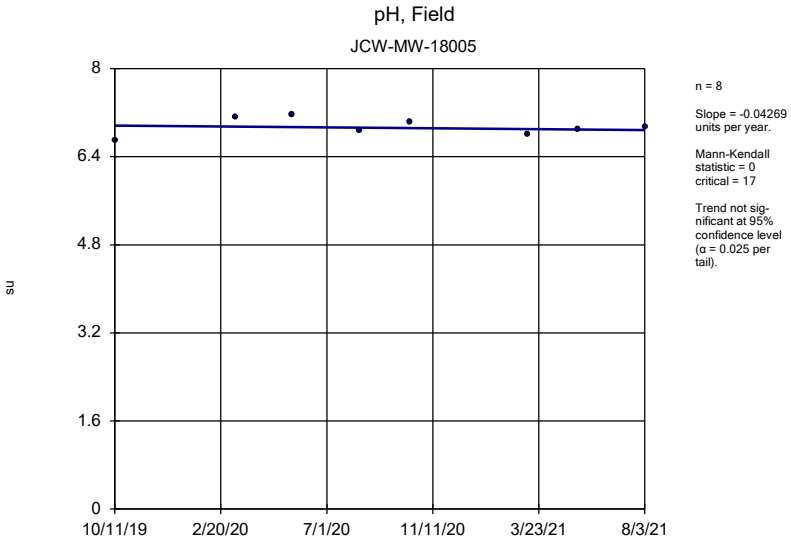

n = 8

Slope = -0.04269 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 3:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

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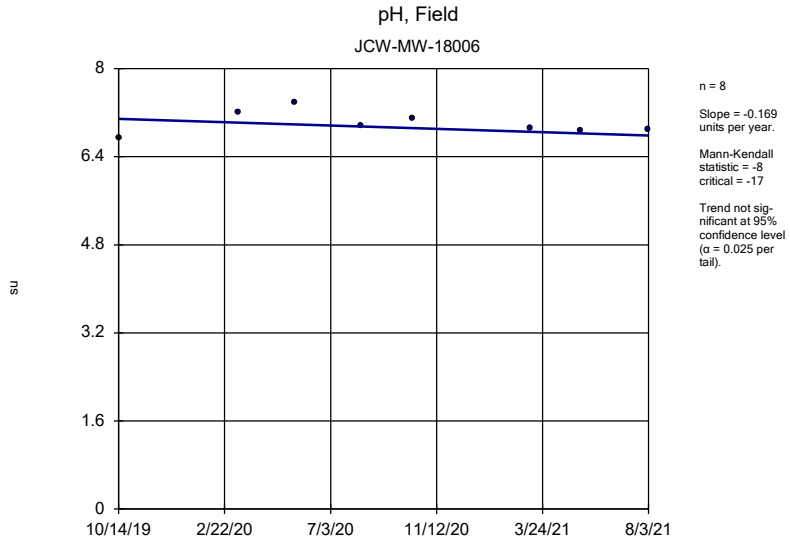

n = 8

Slope = -0.169 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 3:48 PM

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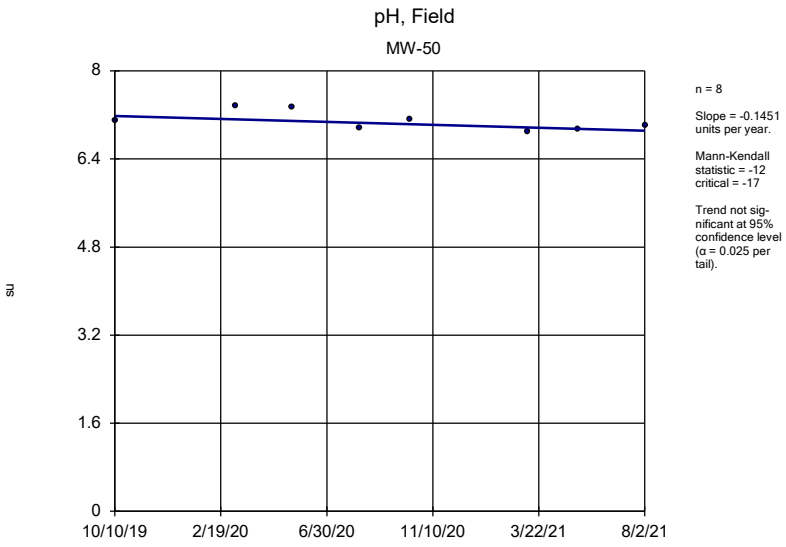

n = 8

Slope = -0.1451 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 9/16/2021 3:49 PM

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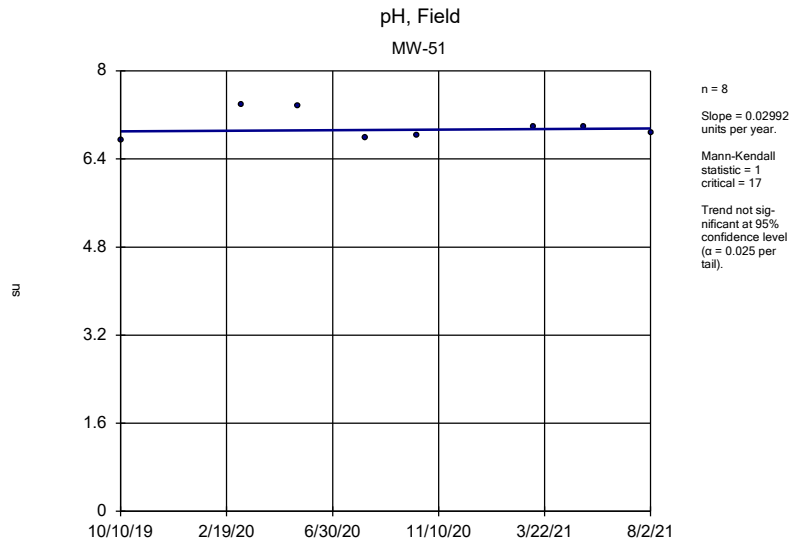

n = 8

Slope = 0.02992 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 3:49 PM

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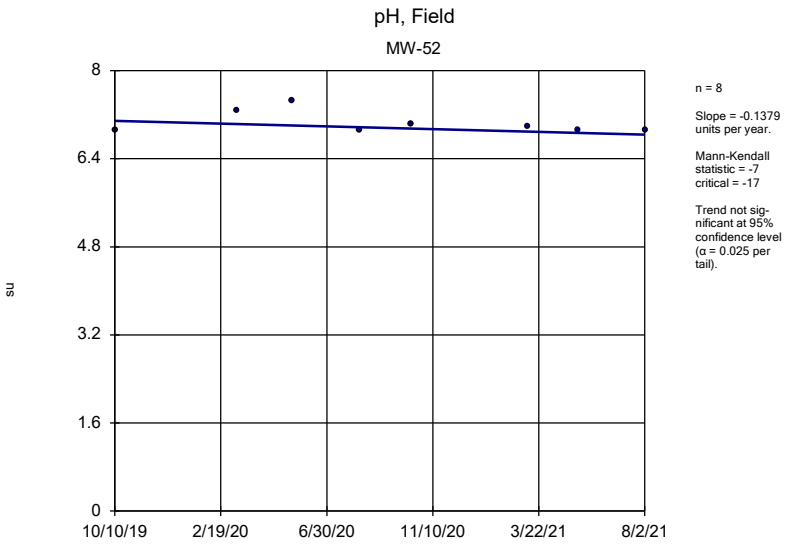

n = 8

Slope = -0.1379 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 9/16/2021 3:49 PM

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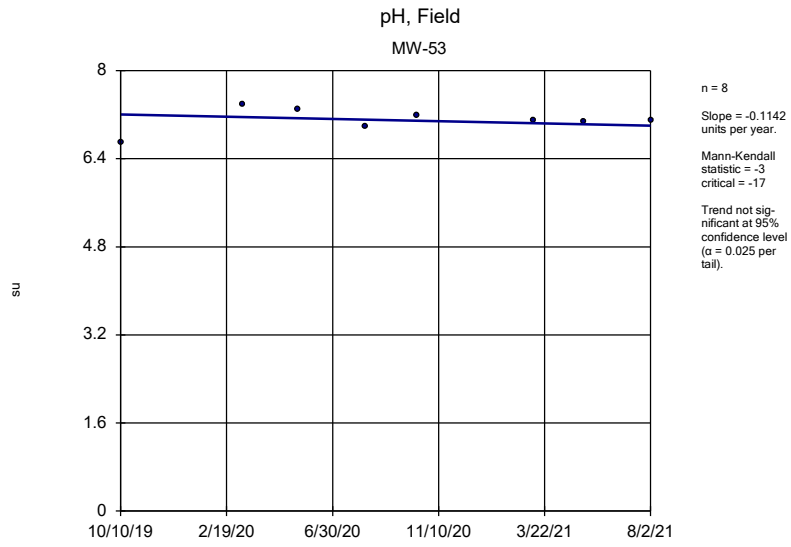

n = 8

Slope = -0.1142 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 3:49 PM

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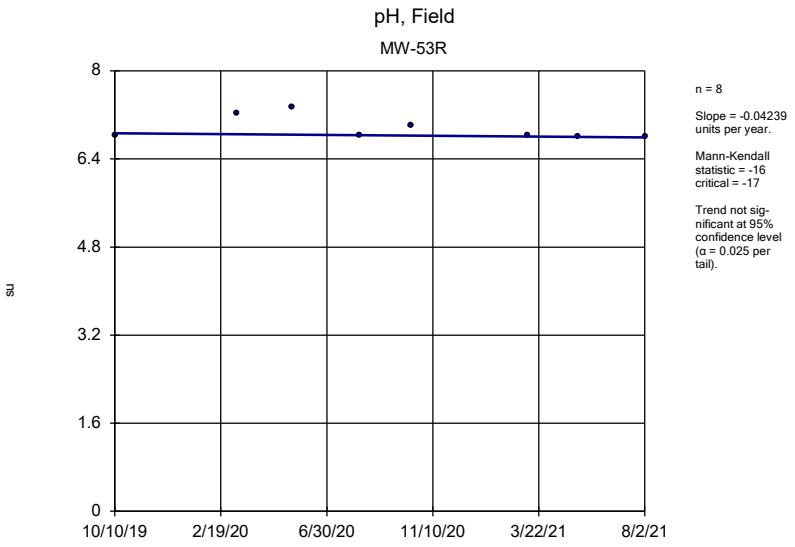

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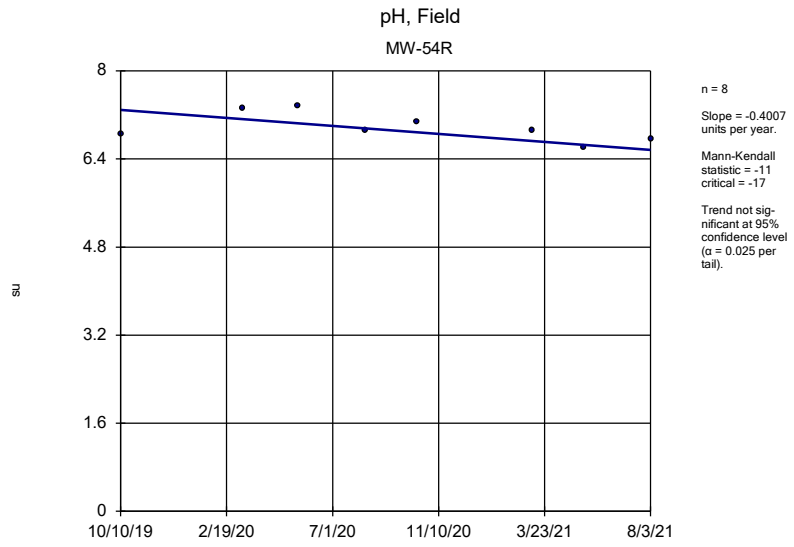

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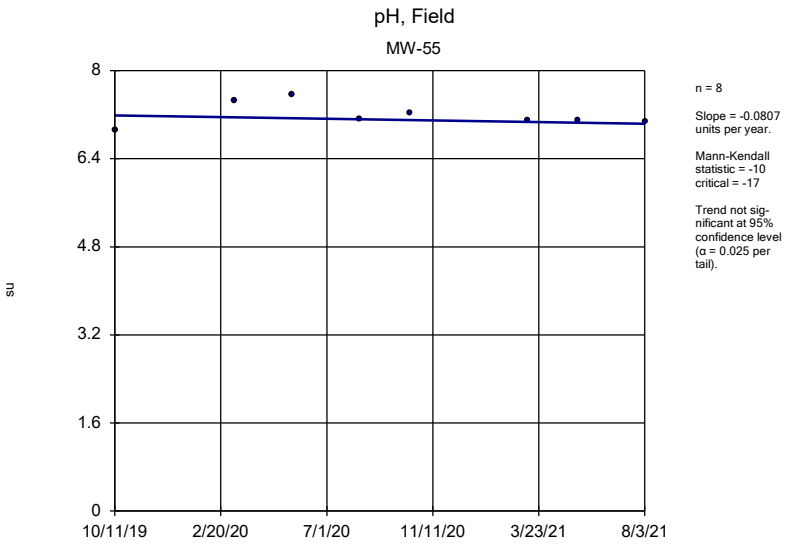

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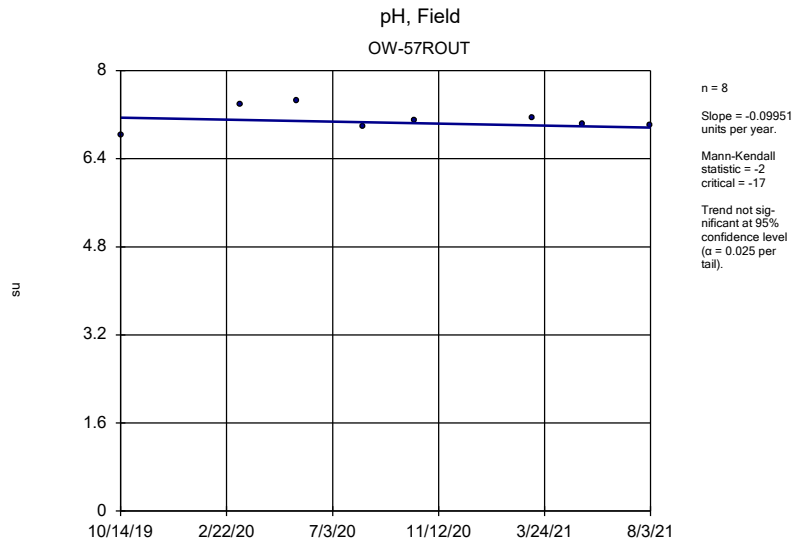

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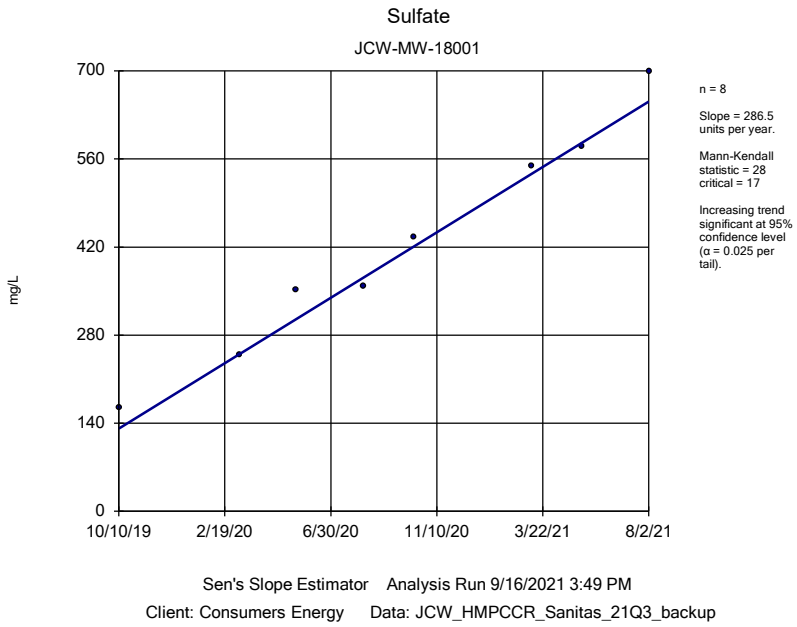

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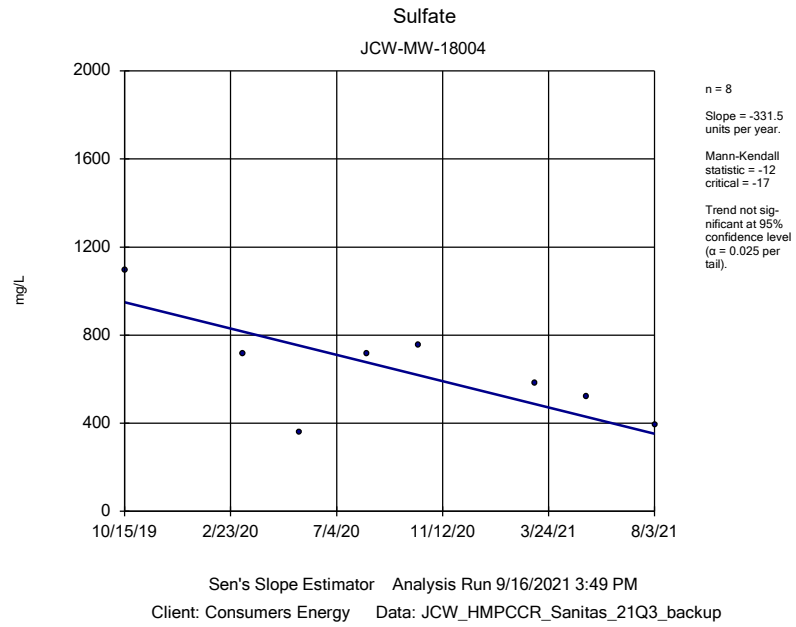

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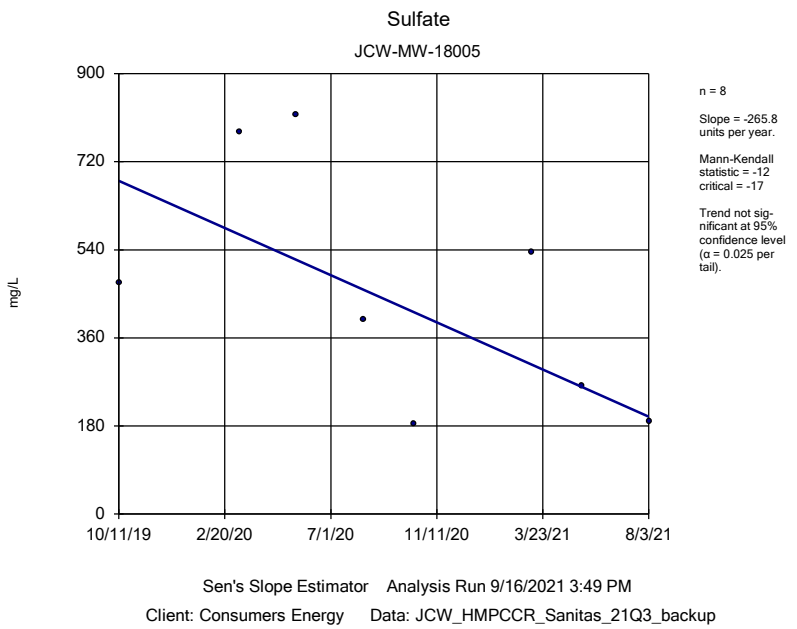

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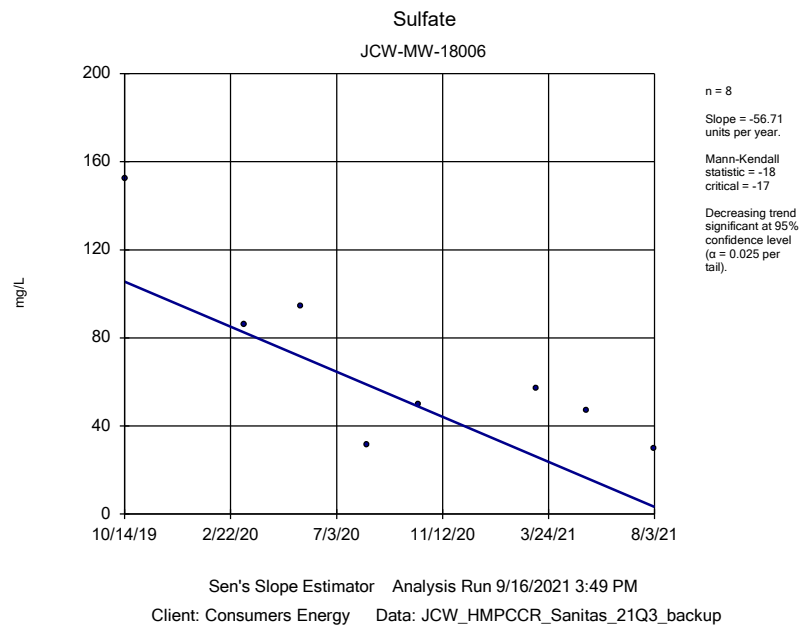

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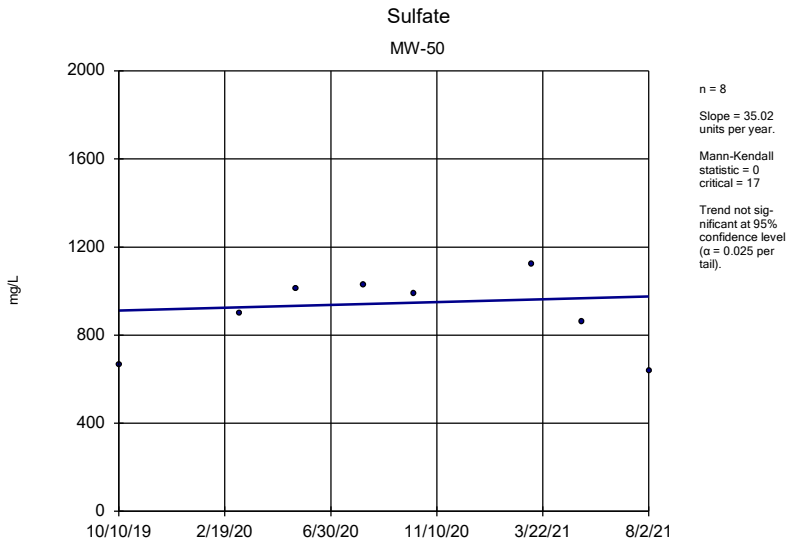

n = 8

Slope = 35.02 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 3:49 PM

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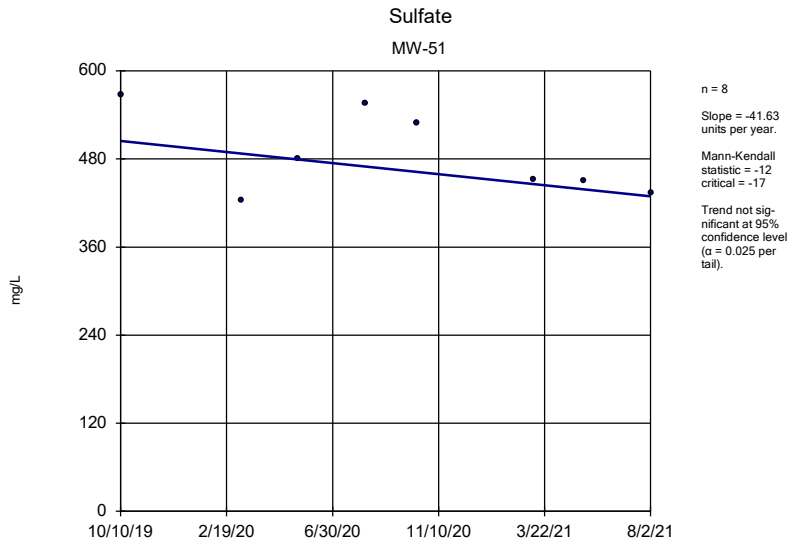

n = 8

Slope = -41.63 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 9/16/2021 3:49 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

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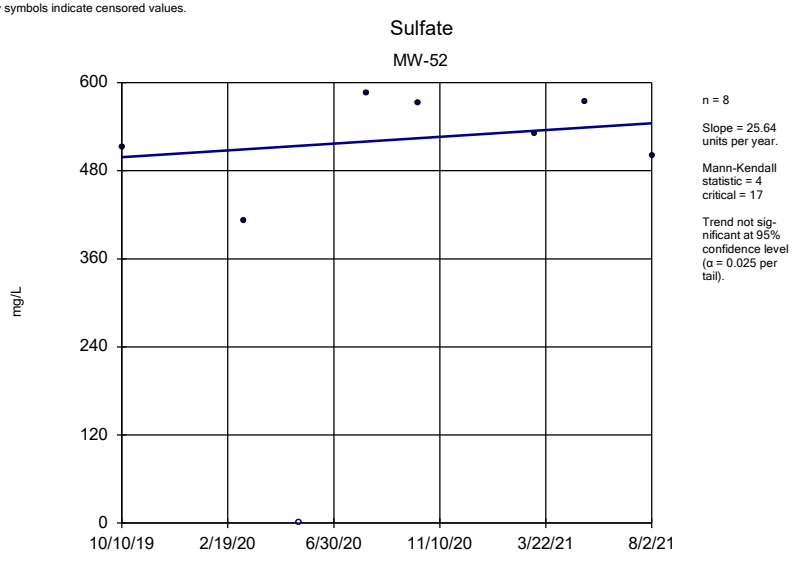
Hollow symbols indicate censored values.



n = 8

Slope = 25.64 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 3:49 PM

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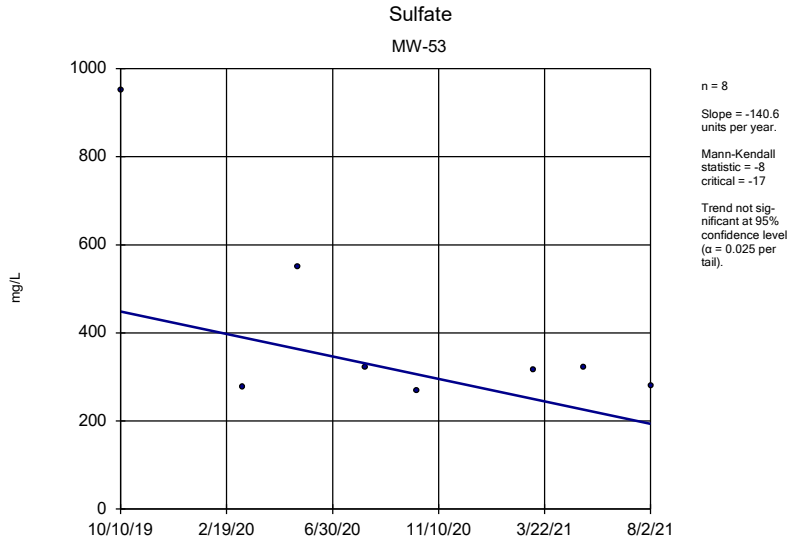

n = 8

Slope = -140.6 units per year.

Mann-Kendall statistic = -8 critical = -17

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

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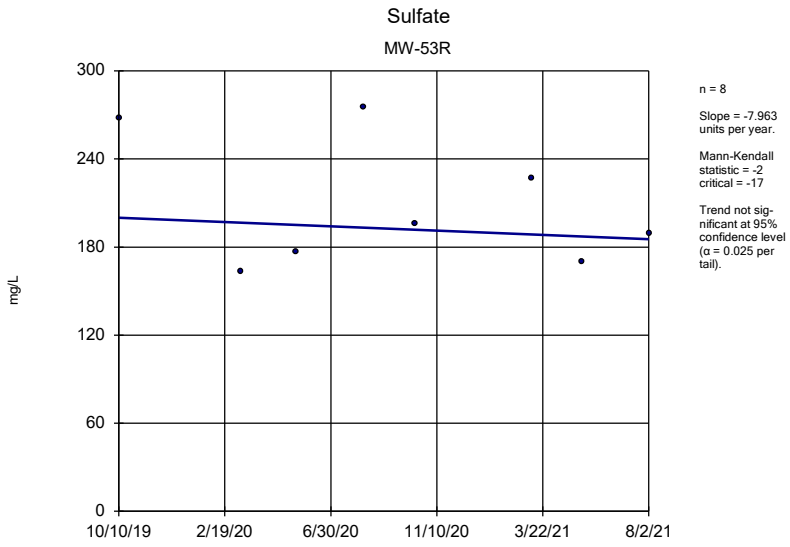

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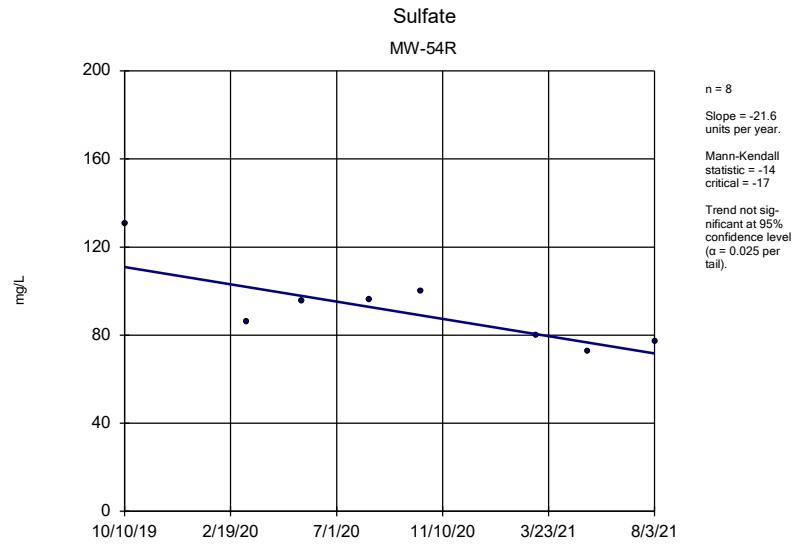

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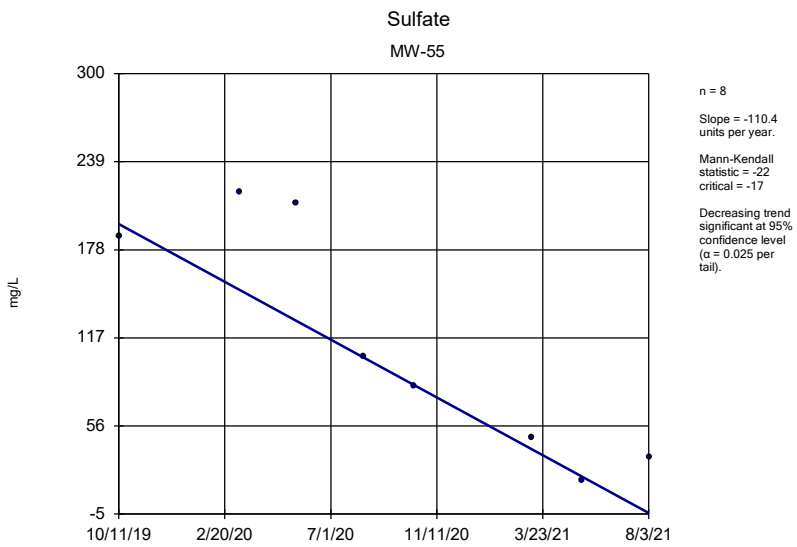

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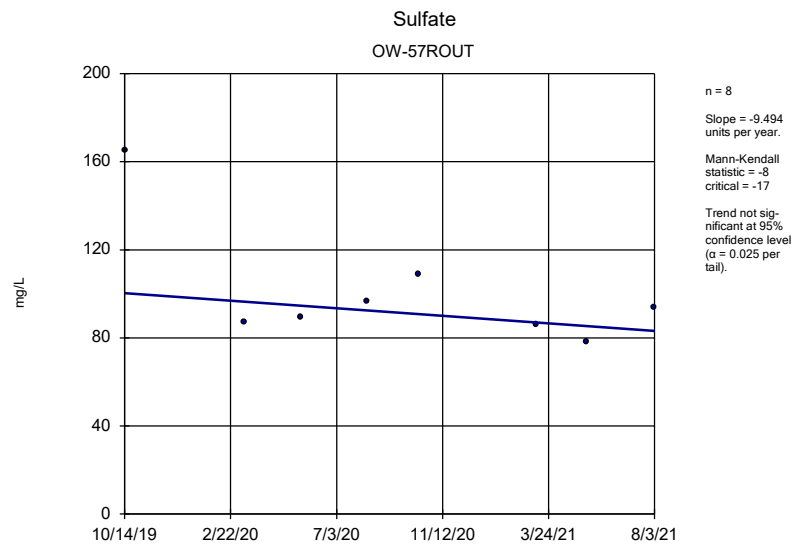

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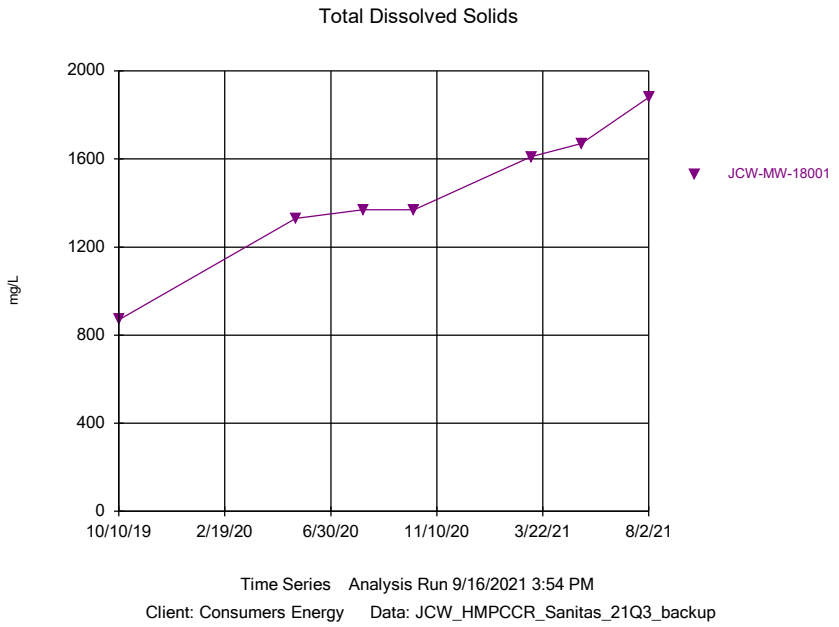

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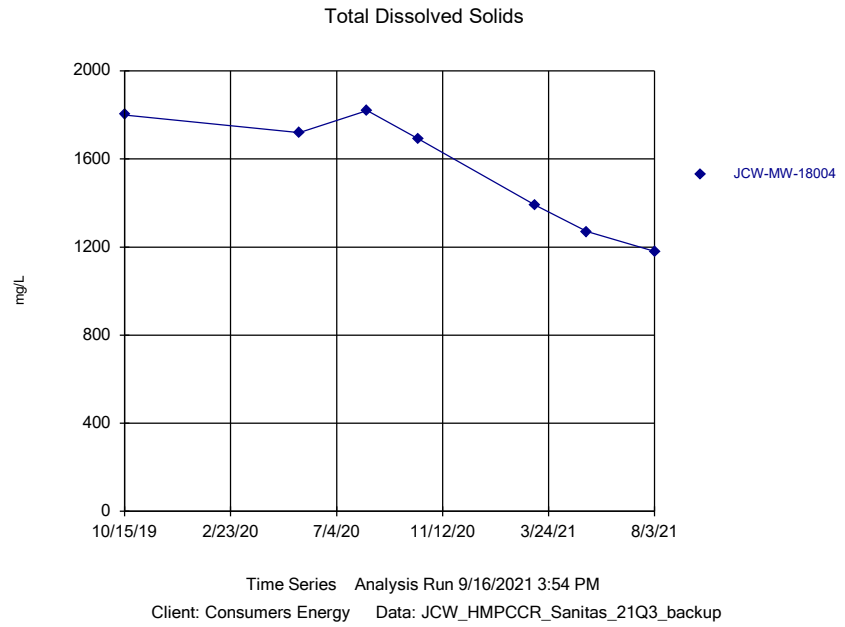

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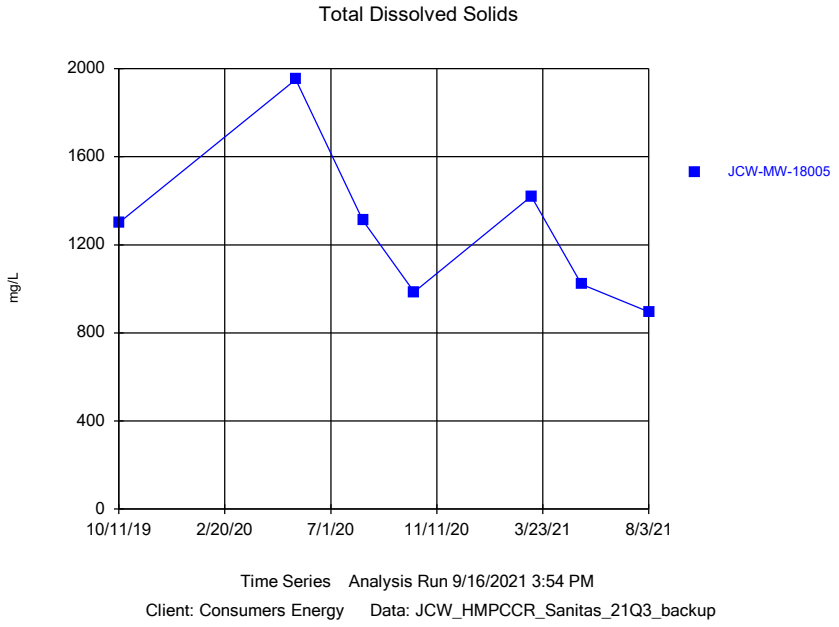

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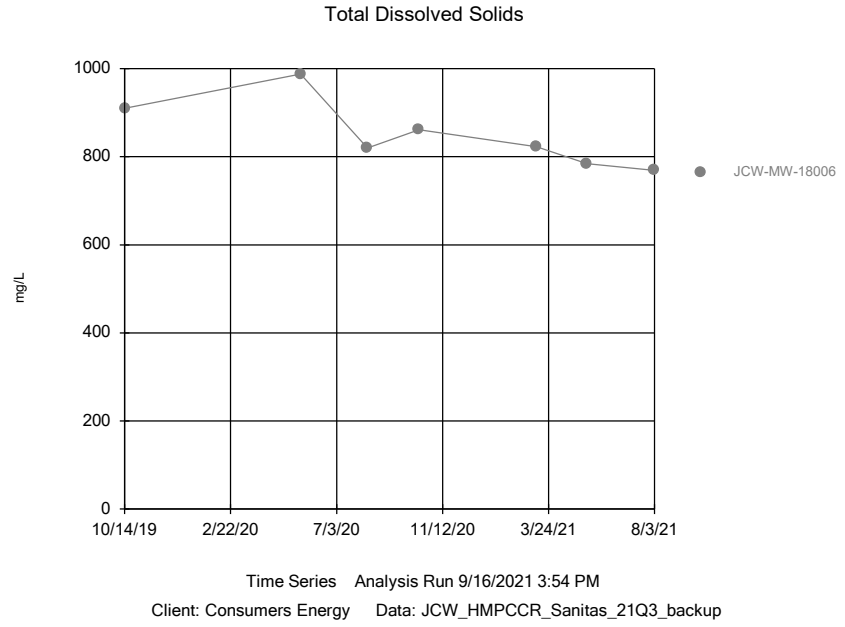

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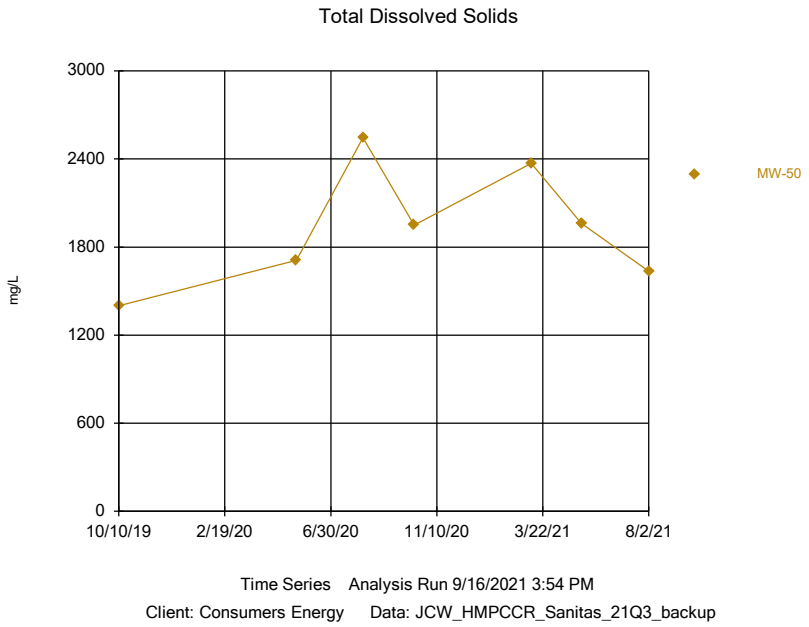

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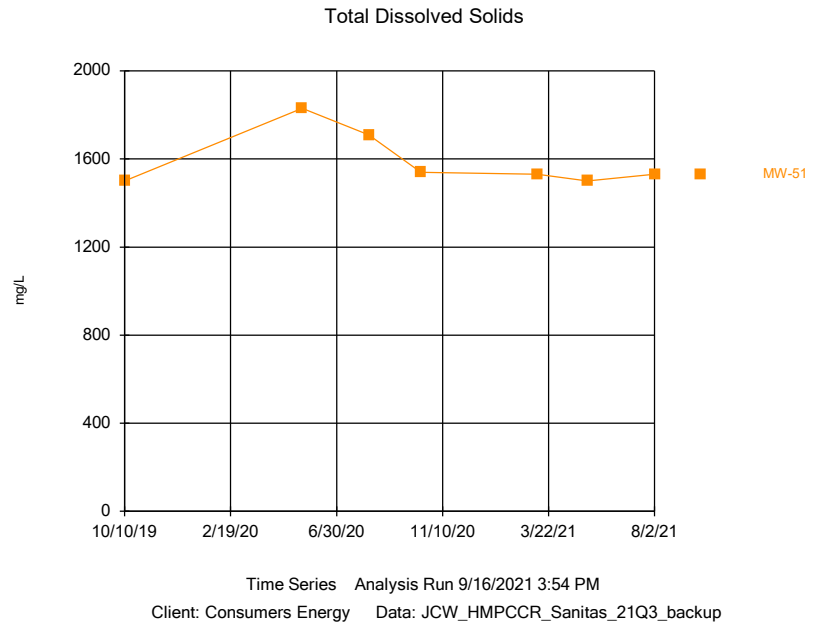

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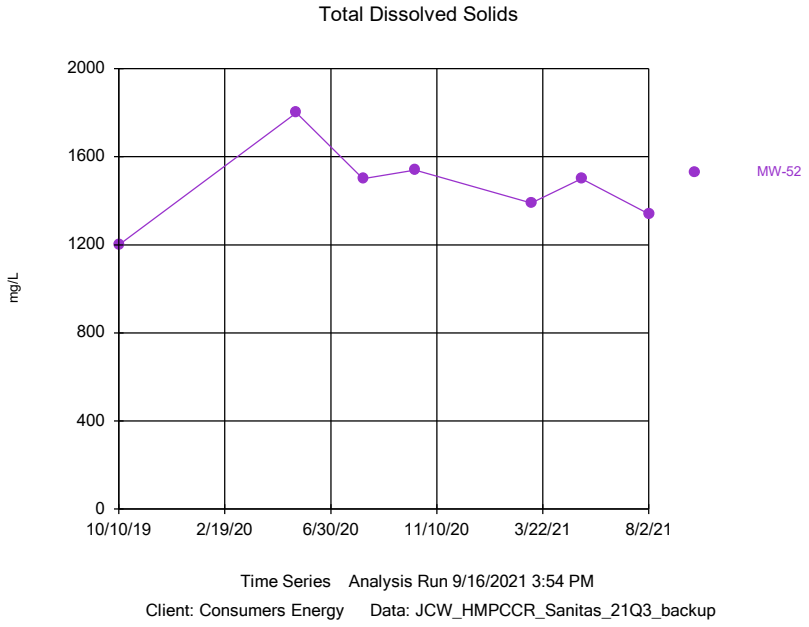

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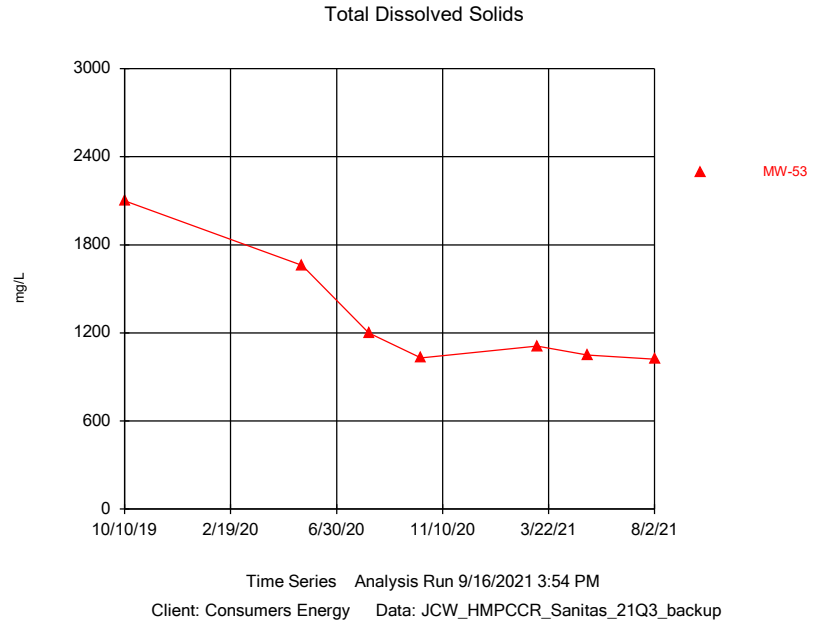

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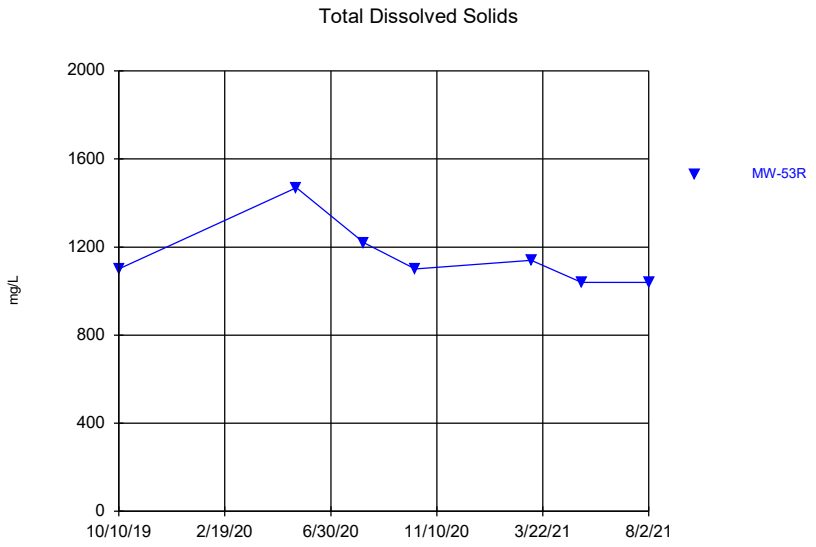

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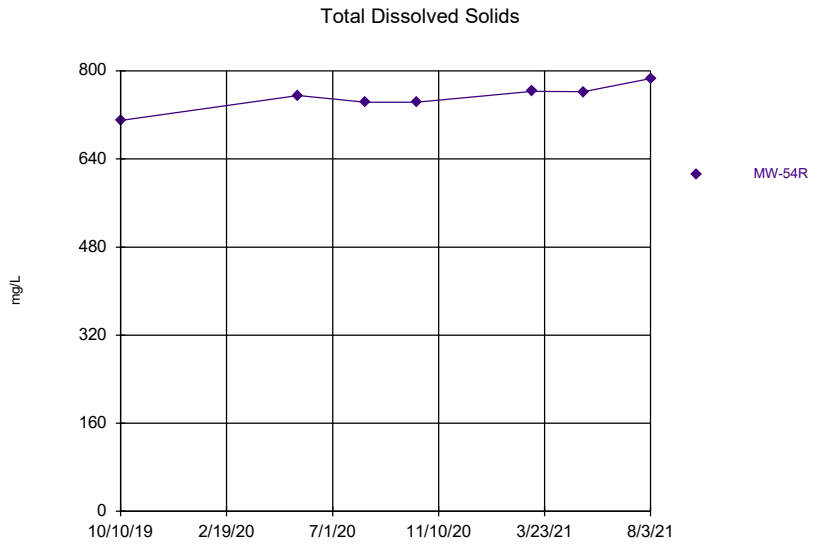

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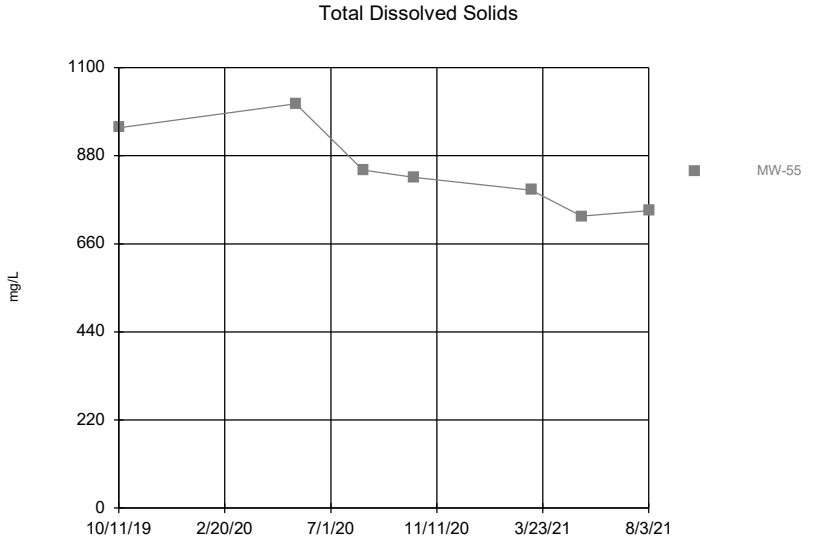

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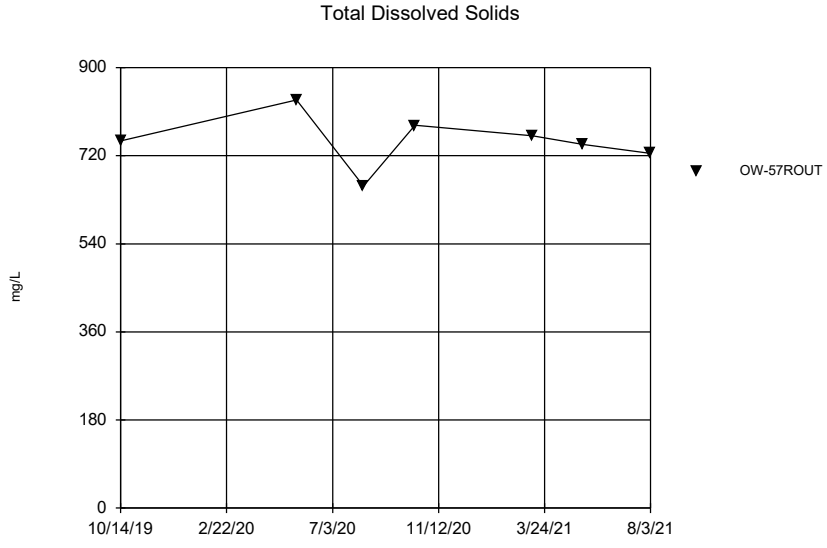

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Appendix D
Assessment Monitoring and GSI Statistical Evaluation

1540 Eisenhower Pl.
Ann Arbor, MI 48108

T 734.971.7080
TRCcompanies.com

Technical Memorandum

Date:	October 15, 2021
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC Kristin Lowery, TRC
Project No.:	418426.0000 Phase 002, Task 002
Subject:	Assessment Monitoring and GSI Statistical Evaluation of August 2021 Sampling Event JC Weadock Landfill, Consumers Energy Company, Essexville, Michigan

During the statistical evaluation of the initial assessment monitoring event (May 2018), arsenic was present in one or more downgradient monitoring wells at statistically significant levels exceeding the Groundwater Protection Standards (GWPSs). Therefore, Consumers Energy Company (Consumers Energy) initiated an Assessment of Corrective Measures (ACM) within 90 days from when the Appendix IV exceedance was determined. The ACM was completed on September 11, 2019.

Currently, Consumers Energy is continuing semiannual assessment monitoring in accordance with §257.95 of the CCR Rule[1] at the JC Weadock Power Plant Landfill and quarterly groundwater monitoring in accordance with the February 2021 Landfill Hydrogeological Monitoring Plan (HMP). The third quarter 2021 monitoring event was conducted on July 26 through August 3, 2021. In accordance with §257.95 and the HMP, the assessment monitoring data must be compared to GWPSs to determine whether or not Appendix III and Appendix IV constituents, and additional Michigan Part 115 (as amended by PA 640) Section 11511a(3) and Section 11519b(2) constituents, are detected at statistically significant levels above the GWPSs. GWPSs were established in accordance with §257.95(h) and Part 115, as detailed in the April 23, 2021 Groundwater Protection Standards technical memorandum, which was also included in the First Quarter 2021 Hydrogeological Monitoring Report (TRC, April 2021). In accordance with the HMP, groundwater monitoring data from the designated groundwater-surface water (GSI) monitoring wells must be also compared to the GSI criteria to determine whether or not the GSI monitoring constituents are detected at statistically significant levels above the GSI criteria.

The evaluation of the initial semiannual assessment monitoring event data (April and May 2018) indicated that arsenic was present at statistically significant levels above the GWPS at one of the three downgradient wells. The three downgradient wells were located within a vent (e.g., opening) of the perimeter soil/bentonite slurry wall to assess the quality of groundwater passing the waste boundary.

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

As discussed in detail below, in July 2018, the vent (e.g., opening) in the perimeter soil/bentonite slurry wall was closed and the slurry wall is now continuous along the entire perimeter of the Weadock Landfill. As a result of the change in groundwater flow conditions, the groundwater monitoring system was revised, as documented in the HMP. The monitoring well network now consists of twelve (12) downgradient monitoring wells and eight (8) GSI monitoring wells.

The statistical evaluation of the third quarter 2021 assessment monitoring event data indicates that the following constituents are present at statistically significant levels above the GWPSs in downgradient monitoring wells at the Weadock Landfill:

Constituent	GWPS	#Downgradient Wells Exceeded
Boron	560 µg/L	10 of 12
Calcium	280 mg/L	1 of 12

A new GWPS exceedance was noted for sulfate at MW-50 during the second quarter 2021 but was not confirmed in third quarter 2021. Corrective action has been triggered as a result of data collected during the initial assessment monitoring event. Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97 and execute the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

The statistical evaluation found that molybdenum at MW-55 was present at statistically significant levels exceeding the site-specific GSI criterion.

Statistical Evaluation Procedures

Following each quarterly sampling event, compliance well data for the Weadock Landfill are evaluated in accordance with the Assessment Monitoring Statistical Data Evaluation and GSI Data Evaluation procedures in the HMP. The assessment monitoring and GSI monitoring programs were developed to evaluate concentrations of constituents present in the uppermost aquifer relative to acceptable levels (i.e., GWPSs or GSI criteria). To evaluate whether or not a criterion exceedance is statistically significant, the difference in concentration observed at the downgradient wells during a given monitoring event compared to the applicable criterion must be large enough, after accounting for variability in the sample data, that the result is unlikely to have occurred merely by chance. Consistent with the Unified Guidance [2], the preferred method for comparisons to a fixed standard are confidence limits. Based on the number of historical observations in the representative sample population, the population mean, the population standard deviation, and a selected confidence level (i.e., 99 percent), an upper and lower confidence limit is calculated. The true concentration, with 99 percent confidence, will fall between the lower and upper confidence limits.

The concentrations observed in the downgradient wells are deemed to be a statistically significant exceedance when the 99 percent lower confidence limit of the downgradient data exceeds the criterion. If the confidence interval straddles the criterion (i.e. the lower confidence level is below the criterion, but the upper confidence level is above), the statistical test result indicates that there is insufficient

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

confidence that the measured concentrations are different from the criterion and thus no compelling evidence that the measured concentration is a result of a release from the CCR unit versus the inherent variability of the sample data. This statistical approach is consistent with the statistical methods for assessment monitoring presented in §257.93(f) and (g). Statistical evaluation methodologies built into the CCR Rule and Part 115, and numerous other federal rules, are key in determining whether or not individually measured data points represent a concentration increase over the baseline or a fixed standard (such as a GWPS in an assessment monitoring program).

For each detected constituent, the concentrations for each well were first compared directly to the GWPS, as shown on Table 1, or the GSI criteria, as shown on Table 2. Parameter-well combinations that included a direct exceedance of the criteria within the most recent two years of sampling events (eight quarterly sampling events, October 2019 to August 2021) were retained for further analysis. Data collected under the previous HMP is used where available.

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

The statistical data evaluation included the following steps:

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

The results of these evaluations are presented and discussed below.

Data from each round were evaluated for completeness, overall quality, and usability and were deemed appropriate for the purposes of the assessment and GSI monitoring programs. Initially, the results were observed visually for potential trends. No outliers were identified in the data set.

The Sanitas™ software was then used to test compliance at the downgradient monitoring wells using the confidence interval method for the most recent eight sampling events. The tests were run with a

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

per-test significance of α = 0.01. Non-detect data was handled in accordance with the HMP for the purposes of calculating the confidence intervals.

The Sanitas™ software generates an output that includes graphs of the parametric or non-parametric confidence intervals for each well along with notes data transformations, as appropriate.

Assessment Monitoring Statistical Evaluation

The assessment monitoring statistical evaluation is performed on the downgradient monitoring wells in accordance with the HMP. The downgradient monitoring wells include:

- JCW-MW-18001
- JCW-MW-18004
- JCW-MW-18005
- JCW-MW-18006
- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- OW-57R Out

The concentrations from each well were first compared directly to the GWPS, as shown on Table 1. Constituent-well combinations that included a direct exceedance of the GWPS within the past eight[4] monitoring events were retained for further analysis (Attachment 1). Direct comparison GWPS exceedances include the following constituent well combinations:

- Boron in MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, MW-55, OW-57R OUT, JCW-MW-18001, JCW-MW-18005, and JCW-MW-18006;
- Calcium in MW-50, MW-51, MW-53, JCW-MW-18001, JCW-MW-18004, and JCW-MW-18005;
- Sulfate in MW-50, MW-53, JCW-MW-18004, and JCW-MW-18005;
- Arsenic in MW-53R, MW-55, JCW-MW-18001, and JCW-MW-18006;
- Molybdenum in MW-55;
- Iron in MW-55; and,
- Vanadium in JCW-MW-18001 and JCW-MW-18004.

The purpose of assessment monitoring is to assess whether constituent concentrations in groundwater from prior operations are above a risk-based standard (i.e. GWPS). As detailed in the *Alternate Source Demonstration* (TRC, December 2019), the arsenic and molybdenum concentrations at MW-55 are not the result of a release from the unit; therefore, comparison of these concentrations to the GWPS is not appropriate and assessment monitoring confidence intervals were not calculated.

The software outputs for the assessment monitoring data evaluation are included in Attachment 1 along with data reports showing the values used for the evaluation. The percentage of non-detect observations are also included in Attachment 1. Visual trends were apparent in multiple wells for boron and sulfate. These data sets were tested further in Sanitas™ utilizing Sen's Slope to estimate the average rate of change in concentration over time and utilizing the Mann-Kendall trend test to test for significance of the trend at the 98% confidence level. The trend tests show that the downward trend for boron at JCW-MW-18005 and the upward trend for boron at MW-54R were statistically significant

[4] The past two years of available data (six events total) were used for constituents that were not previously included in quarterly monitoring for the Weadock Landfill, i.e. calcium, chloride, fluoride, total dissolved solids, beryllium, cadmium, cobalt, mercury, radium, thallium, nickel, and zinc. Use of the most recent two years of data ensure the timeframe for analysis is consistent with other constituents and is representative of current site conditions.

(Attachment 1). The trends are causing the confidence intervals to widen. Calculating a confidence interval around a trending data set incorporates not only variability present naturally in the underlying dataset, but also incorporates variability due to the trend itself. Based on the observed trends, confidence bands were selected as a more appropriate assessment for boron at JCW-MW-18005 and MW-54R. Confidence bands are selected by the Unified Guidance as the appropriate method for calculating confidence intervals on trending data. A confidence band calculates upper and lower confidence limits at each point along the trend to reduce variability and create a narrower confidence interval.

The Sanitas™ software generates an output that includes graphs of the parametric or non-parametric confidence intervals for each well along with notes on data transformations, as appropriate. The data distributions are as follows:

Distribution	Constituent-Well Combinations
Normal	Boron at JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, and MW-55 Calcium at JCW-MW-1001, JCW-MW-18004, JCW-MW-18005 and MW-51 Sulfate at JCW-MW-18004, JCW-MW-18005, and MW-50 Arsenic at JCW-MW-18006 and MW-53R
Non-Parametric (not able to be normalized)	Boron at JCW-MW-18001 and OW-57R OUT Calcium at MW-50 and MW-53 Sulfate at MW-53 Arsenic at JCW-MW-18001 Iron at MW-55
Non-Parametric (over 50% non-detect)	Vanadium at JCW-MW-18001 and JCW-MW-18004

The confidence interval test compares the lower confidence limit to the GWPS. Arsenic concentrations at JCW-MW-18006 were previously considered statistically significant; however arsenic concentrations appear to be decreasing and the lower confidence limit was below the GWPS in the second and third quarters of 2021. Concentrations trends will continue to be monitored. Exceedances were noted for boron at JCW-MW-18001, JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and OW-57R OUT and calcium at MW-51 in first quarter 2021, confirmed in second quarter 2021, and continued in third quarter 2021. A new exceedance for sulfate at MW-50 was observed in second quarter 2021 but was not confirmed in third quarter 2021. The boron and calcium exceedances are the result of the addition of the Appendix III constituents to the assessment monitoring statistical evaluation program in accordance with the HMP. Corrective action has been triggered for the site as a result of data collected during the initial May 2018 assessment monitoring event. Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97 and will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

GSI Statistical Evaluation

Eight monitoring wells located along the surface water features adjacent to the Weadock Landfill are included in the GSI monitoring program to meet the requirements of Part 31:

- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- JCW-MW-18004

The concentrations from each well were first compared directly to the GSI criteria, as shown on Table 2. Constituent-well combinations that included a direct exceedance of the GSI criteria within the past eight monitoring events were retained for further analysis (Attachment 2). Direct comparison GSI criteria exceedances include the following constituent well combinations:

- Sulfate in JCW-MW-18004;
- Arsenic in MW-55;
- Chromium in JCW-MW-18004; and
- Molybdenum in MW-55.

The purpose of the GSI statistical evaluation is to assess compliance with the GSI pathway. Although the *Alternate Source Demonstration* supports that the arsenic and molybdenum concentrations at MW-55 are not the result of a release from the unit, these concentrations still affect compliance with the GSI pathway. Therefore, it is appropriate to calculate confidence limits for arsenic and molybdenum at MW-55 for comparison to the GSI criteria.

The software outputs for the assessment monitoring data evaluation are included in Attachment 2 along with data reports showing the values used for the evaluation. The percentage of non-detect observations are also included in Attachment 2.

Arsenic concentrations in MW-55 appear to exhibit an upward trend and molybdenum concentrations at MW-55 appear to exhibit a downward trend on the time series charts (Attachment 2). These data sets were tested further in Sanitas™ utilizing Sen's Slope to estimate the average rate of change in concentration over time and utilizing the Mann-Kendall trend test to test for significance of the trend at the 98% confidence level. The trend tests show that the upward trend for arsenic at MW-55 was statistically significant (Attachment 2). The trends are causing the confidence intervals to widen. Calculating a confidence interval around a trending data set incorporates not only variability present naturally in the underlying dataset, but also incorporates variability due to the trend itself. Based on the observed trends, confidence bands were selected as a more appropriate assessment for arsenic at MW-55. Confidence bands are selected by the Unified Guidance as the appropriate method for calculating confidence intervals on trending data. A confidence band calculates upper and lower confidence limits at each point along the trend to reduce variability and create a narrower confidence interval.

The Sanitas™ software generates an output that includes graphs of the parametric or non-parametric confidence intervals for each well along with notes on data transformations, as appropriate. The data distributions are as follows:

Distribution	Constituent-Well Combinations
Normal	Sulfate at JCW-MW-18004 Molybdenum at MW-55
Non-Parametric (over 50% non-detect)	Chromium at JCW-MW-18004

The confidence interval test and confidence bands compare the lower confidence limit to the GSI. The statistical evaluation found that molybdenum at MW-55 is present at statistically significant levels exceeding the site-specific GSI criteria.

Attachments

Table 1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards – October 2019 to August 2021

Table 2 Comparison of Groundwater Sampling Results to GSI – October 2019 to August 2021

Attachment 1 Assessment Monitoring Sanitas™ Output Files

Attachment 2 GSI Evaluation Sanitas™ Output Files

Tables

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – October 2019 to August 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-50													
		Sample Date:	10/10/2019[3]	10/10/2019[3]	3/9/2020	3/9/2020	5/19/2020	8/10/2020	8/10/2020	10/13/2020	3/8/2021	3/8/2021	5/10/2021	5/10/2021	8/2/2021	8/2/2021
Constituent	Unit	GWPS														
Appendix III[1]						Field Dup			Field Dup			Field Dup		Field Dup		Field Dup
Boron	ug/L	**560**	**1,700**	**1,590**	**1,530**	**1,500**	**1,300**	**1,430**	**1,360**	**1,470**	**1,510**	**1,610**	**1,380**	**1,320**	**1,520**	**1,630**
Calcium	mg/L	**280**	280	--	--	--	**380**	**382**	**382**	**368**	**386**	**375**	**363**	**370**	267	252
Chloride	mg/L	2,300	80	--	--	--	80.5	78.5	79.9	77.5	86.5	85.6	68.9	69.9	57.0	57.2
Fluoride	ug/L	4,000	< 1,000	--	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	660	677	**878**	**919**	**1,010**	**1,020**	**1,040**	**990**	**1,130**	**1,120**	**856**	**867**	638	634
Total Dissolved Solids	mg/L	4,700	1,400	--	--	--	1,710	2,270	2,820	1,950	2,360	2,380	1,950	1,970	1,630	1,640
pH, Field	SU	6.5 - 8.5	7.1	7.1	7.4	--	7.4	7.0	--	7.1	6.9	--	6.9	--	7.0	--
Appendix IV[1]																
Antimony	ug/L	6.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	2.8	3	1	1	1	2	2	3	1	1	1	1	2	2
Barium	ug/L	2,000	180	182	218	223	163	150	153	147	116	115	108	109	91	97
Beryllium	ug/L	4.0	< 1.0	--	--	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	< 0.20	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	1.4	< 1	1	< 1	< 1	< 1	< 1	< 1	1	1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6.0	--	--	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	--	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	79	93	91	86	97	111	115	100	126	128	100	100	79	81
Mercury	ug/L	2.0	< 0.20	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	6.6	7	< 5	< 5	8	7	8	7	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	0.572	--	--	--	0.512	--	--	< 0.537	--	--	< 0.237	< 0.245	--	--
Radium-228	pCi/L	NA	1.49	--	--	--	< 0.402	--	--	0.613	--	--	0.557	0.607	--	--
Radium-226/228	pCi/L	5.0	2.06	--	--	--	0.814	--	--	1.01	--	--	0.650	0.671	--	--
Selenium	ug/L	50	< 1.0	< 1	2	2	2	< 1	< 1	1	1	1	< 1	1	3	2
Thallium	ug/L	2.0	< 2.0	--	--	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]																
Iron	ug/L	**28,000**	1,800	1,440	1,760	1,730	1,240	2,280	2,230	2,990	2,100	2,190	1,810	1,810	3,000	2,780
Copper	ug/L	1,000	< 1.0	1	3	2	3	3	7	3	4	4	< 1	2	1	< 1
Nickel	ug/L	100	2.1	--	--	--	3	< 2	2	< 2	< 2	< 2	< 2	< 2	11	12
Silver	ug/L	34	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	< 10	--	--	--	< 10	< 30	< 30	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – October 2019 to August 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-51												
		Sample Date:	10/10/2019[3]	10/10/2019[3]	10/10/2019[3]	10/10/2019[3]	3/9/2020	5/19/2020	5/19/2020	8/10/2020	10/14/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021
Constituent	Unit	GWPS													
Appendix III[1]				Field Dup		Field Dup			Field Dup			Field Dup			
Boron	ug/L	**560**	**890**	**900**	**843**	**819**	**967**	**944**	**967**	**758**	**739**	**798**	**1,040**	**1,040**	**960**
Calcium	mg/L	**280**	**340**	**350**	--	--	--	**331**	**322**	**341**	**330**	**337**	**293**	**303**	276
Chloride	mg/L	2,300	88	88	--	--	--	93.8	94.2	95.2	74.2	75.4	91.2	93.6	99.8
Fluoride	ug/L	4,000	< 1,000	< 1,000	--	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	570	580	562	557	424	487	474	556	522	537	452	450	434
Total Dissolved Solids	mg/L	4,700	1,500	1,500	--	--	--	1,970	1,690	1,710	1,550	1,530	1,530	1,500	1,530
pH, Field	SU	6.5 - 8.5	6.7	--	6.7	--	7.4	7.4	--	6.8	6.8	--	7.0	7.0	6.9
Appendix IV[1]															
Antimony	ug/L	6.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	20	19	18	19	14	12	12	12	17	17	11	11	14
Barium	ug/L	2,000	180	180	184	181	158	150	153	153	147	150	143	148	148
Beryllium	ug/L	4.0	< 1.0	< 1.0	--	--	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	< 0.20	< 0.20	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1.0	< 1.0	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6.0	< 6.0	--	--	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	< 1,000	--	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	49	50	59	57	50	55	57	57	51	55	62	57	47
Mercury	ug/L	2.0	< 0.20	< 0.20				< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5.0	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	0.316	0.365	--	--	--	0.461	0.299	--	1.35	< 0.352	--	< 0.268	--
Radium-228	pCi/L	NA	1.68	1.26	--	--	--	0.719	0.745	--	< 0.588	0.776	--	0.626	--
Radium-226/228	pCi/L	5.0	1.99	1.63	--	--	--	1.18	1.04	--	1.43	1.11	--	0.851	--
Selenium	ug/L	50	< 1.0	< 1.0	< 1	< 1	1	1	< 1	< 1	< 1	< 1	1	< 1	1
Thallium	ug/L	2.0	< 2.0	< 2.0	--	--	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]															
Iron	ug/L	**28,000**	6,700	6,800	5,270	5,250	2,050	2,830	2,750	4,390	5,400	5,600	1,940	2,200	5,080
Copper	ug/L	1,000	< 1.0	< 1.0	2	2	1	2	2	2	2	2	2	< 1	< 1
Nickel	ug/L	100	< 2.0	< 2.0	--	--	--	2	< 2	2	< 2	< 2	< 2	< 2	11
Silver	ug/L	34	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	< 10	< 10	--	--	--	< 10	< 10	< 30	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – October 2019 to August 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-52								
		Sample Date:	10/10/2019[3]	10/10/2019[3]	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	**1,200**	**1,150**	**1,150**	**1,160**	**1,200**	**1,110**	**1,120**	**1,160**	**1,140**
Calcium	mg/L	**280**	220	--	--	226	238	256	211	244	196
Chloride	mg/L	2,300	89	--	--	15.1	72.0	73.3	51.8	53.9	56.5
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	1,140	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	520	506	412	< 1	586	572	531	574	501
Total Dissolved Solids	mg/L	4,700	1,200	--	--	1,800	1,500	1,540	1,390	1,500	1,340
pH, Field	SU	6.5 - 8.5	6.9	6.9	7.3	7.5	6.9	7.0	7.0	6.9	6.9
Appendix IV[1]											
Antimony	ug/L	6.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	< 1.0	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	120	125	120	144	144	139	123	132	115
Beryllium	ug/L	4.0	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	1,140	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	30	38	28	32	38	33	31	29	21
Mercury	ug/L	2.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	0.252	--	--	< 0.241	--	0.744	--	< 0.237	--
Radium-228	pCi/L	NA	< 0.772	--	--	0.626	--	0.636	--	< 0.407	--
Radium-226/228	pCi/L	5.0	1.01	--	--	0.740	--	1.38	--	< 0.407	--
Selenium	ug/L	50	< 1.0	1	< 1	< 1	< 1	1	1	1	1
Thallium	ug/L	2.0	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	5,600	4,350	782	1,140	2,720	4,770	879	1,400	3,830
Copper	ug/L	1,000	< 1.0	1	1	2	2	2	2	< 1	< 1
Nickel	ug/L	100	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2	9
Silver	ug/L	34	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	< 10	--	--	< 10	< 30	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – October 2019 to August 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-53								
		Sample Date:	10/10/2019[3]	10/10/2019[3]	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	**900**	**840**	**2,530**	**1,750**	**2,760**	**2,720**	**3,920**	**3,790**	**3,820**
Calcium	mg/L	**280**	**420**	--	--	**308**	211	192	187	187	162
Chloride	mg/L	2,300	150	--	--	118	50.5	38.6	52.9	51.8	49.9
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	1,020	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	**960**	**940**	278	549	321	269	317	322	279
Total Dissolved Solids	mg/L	4,700	2,100	--	--	1,660	1,200	1,030	1,110	1,050	1,020
pH, Field	SU	6.5 - 8.5	6.7	6.7	7.4	7.3	7.0	7.2	7.1	7.1	7.1
Appendix IV[1]											
Antimony	ug/L	6.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	2.9	3	< 1	2	2	2	< 1	< 1	2
Barium	ug/L	2,000	77	80	129	144	130	131	202	214	200
Beryllium	ug/L	4.0	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1.0	< 1	< 1	6	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	1,020	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	45	55	47	58	53	49	52	46	38
Mercury	ug/L	2.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	0.263	--	--	0.386	--	< 0.531	--	< 0.239	--
Radium-228	pCi/L	NA	< 0.750	--	--	< 0.385	--	0.503	--	0.455	--
Radium-226/228	pCi/L	5.0	0.962	--	--	0.725	--	0.823	--	0.684	--
Selenium	ug/L	50	< 1.0	< 1	1	2	< 1	< 1	< 1	2	3
Thallium	ug/L	2.0	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	3,700	3,100	1,200	2,070	1,510	1,560	1,180	1,420	2,380
Copper	ug/L	1,000	< 1.0	2	2	4	1	2	2	< 1	< 1
Nickel	ug/L	100	3.0	--	--	3	< 2	< 2	< 2	< 2	6
Silver	ug/L	34	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	< 10	--	--	< 10	< 30	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – October 2019 to August 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-53R								
		Sample Date:	10/10/2019[3]	10/10/2019[3]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	**1,800**	**1,680**	**1,590**	**1,460**	**1,540**	**1,780**	**1,510**	**1,580**	**1,710**
Calcium	mg/L	**280**	250	--	--	228	239	246	234	227	203
Chloride	mg/L	2,300	46	--	--	30.7	45.0	31.8	32.5	31.1	34.5
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	240	295	163	177	275	196	227	170	189
Total Dissolved Solids	mg/L	4,700	1,100	--	--	1,470	1,220	1,100	1,140	1,040	1,040
pH, Field	SU	6.5 - 8.5	6.8	6.8	7.2	7.4	6.8	7.0	6.8	6.8	6.8
Appendix IV[1]											
Antimony	ug/L	6.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**32**	**32**	19	**27**	**31**	**40**	19	18	**23**
Barium	ug/L	2,000	240	237	239	252	208	242	202	208	204
Beryllium	ug/L	4.0	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	1.7	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	61	69	53	60	71	66	64	59	56
Mercury	ug/L	2.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	0.552	--	--	0.356	--	--	--	0.306	--
Radium-228	pCi/L	NA	< 0.700	--	--	0.846	--	--	--	0.822	--
Radium-226/228	pCi/L	5.0	1.02	--	--	1.20	--	--	--	1.13	--
Selenium	ug/L	50	< 1.0	< 1	< 1	< 1	< 1	1	< 1	< 1	2
Thallium	ug/L	2.0	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	2,600	2,050	881	1,910	2,020	2,140	971	2,220	2,800
Copper	ug/L	1,000	< 1.0	3	1	1	3	1	2	1	1
Nickel	ug/L	100	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2	10
Silver	ug/L	34	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	< 10	--	--	< 10	< 30	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – October 2019 to August 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-54R								
		Sample Date:	10/10/2019[3]	10/10/2019[3]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	**1,500**	**1,470**	**1,280**	**1,730**	**1,660**	**1,660**	**2,470**	**3,140**	**3,530**
Calcium	mg/L	**280**	180	--	--	181	168	174	178	196	163
Chloride	mg/L	2,300	18	--	--	20.4	18.5	23.9	28.0	32.7	35.5
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	1,800	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	130	131	86.2	95.7	96.2	100	79.9	72.7	77.0
Total Dissolved Solids	mg/L	4,700	710	--	--	755	743	743	763	762	786
pH, Field	SU	6.5 - 8.5	6.9	6.9	7.3	7.4	6.9	7.1	6.9	6.6	6.8
Appendix IV[1]											
Antimony	ug/L	6.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	2.3	3	3	2	3	3	1	1	2
Barium	ug/L	2,000	88	93	87	95	104	103	118	122	124
Beryllium	ug/L	4.0	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	1,800	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	53	61	47	58	61	57	66	64	60
Mercury	ug/L	2.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	6.2	7	< 5	< 5	5	5	< 5	< 5	< 5
Radium-226	pCi/L	NA	0.328	--	--	< 0.192	--	< 0.334	--	< 0.255	--
Radium-228	pCi/L	NA	< 0.828	--	--	0.499	--	< 0.504	--	0.782	--
Radium-226/228	pCi/L	5.0	0.860	--	--	0.546	--	0.546	--	0.900	--
Selenium	ug/L	50	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1
Thallium	ug/L	2.0	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	1,400	1,240	1,030	1,530	1,170	1,030	115	782	1,190
Copper	ug/L	1,000	< 1.0	1	< 1	1	< 1	1	1	2	1
Nickel	ug/L	100	8.2	--	--	4	6	4	< 2	3	9
Silver	ug/L	34	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	< 10	--	--	< 10	< 30	< 10	< 10	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – October 2019 to August 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-55								
		Sample Date:	10/11/2019[3]	10/11/2019[3]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	**700**	**699**	481	441	**592**	**705**	**593**	**866**	**873**
Calcium	mg/L	**280**	190	--	--	188	178	170	151	147	126
Chloride	mg/L	2,300	19	--	--	14.6	16.7	18.0	16.7	19.5	19.3
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	1,220	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	190	185	218	210	104	84.0	48.0	18.5	34.3
Total Dissolved Solids	mg/L	4,700	950	--	--	1,010	844	826	794	729	743
pH, Field	SU	6.5 - 8.5	6.9	6.9	7.5	7.6	7.1	7.2	7.1	7.1	7.1
Appendix IV[1]											
Antimony	ug/L	6.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**76**	**83**	**65**	**85**	**107**	**123**	**152**	**169**	**204**
Barium	ug/L	2,000	250	263	215	223	250	223	366	323	347
Beryllium	ug/L	4.0	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	< 0.20	--	--	0.4	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	1,220	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	27	33	21	27	33	33	28	24	25
Mercury	ug/L	2.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	**190**	**202**	**181**	**214**	**207**	**179**	**166**	**131**	**157**
Radium-226	pCi/L	NA	0.409	--	--	0.448	--	< 0.447	--	0.525	--
Radium-228	pCi/L	NA	1.05	--	--	< 0.460	--	0.566	--	0.896	--
Radium-226/228	pCi/L	5.0	1.45	--	--	0.858	--	0.798	--	1.42	--
Selenium	ug/L	50	< 1.0	< 1	1	< 1	2	1	< 1	1	1
Thallium	ug/L	2.0	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	**29,000**	21,600	18,000	22,000	21,300	21,800	23,500	21,500	**39,400**
Copper	ug/L	1,000	< 1.0	1	1	1	< 1	< 1	< 1	< 1	< 1
Nickel	ug/L	100	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2	6
Silver	ug/L	34	< 0.20	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	< 10	--	--	< 10	< 30	< 10	< 10	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – October 2019 to August 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	OW-57R OUT								
		Sample Date:	10/14/2019[3]	10/14/2019[3]	3/10/2020	5/20/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	**1,700**	**1,740**	**1,720**	**1,600**	**1,510**	**1,730**	**1,660**	**1,710**	**1,730**
Calcium	mg/L	**280**	130	--	--	130	132	144	128	133	118
Chloride	mg/L	2,300	58	--	--	64.9	53.9	49.4	59.0	62.9	53.1
Fluoride	ug/L	4,000	1,100	--	--	< 1,000	< 1,000	1,830	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	110	220	87.2	89.4	96.8	109	86.0	78.3	93.9
Total Dissolved Solids	mg/L	4,700	750	--	--	834	658	782	761	743	725
pH, Field	SU	6.5 - 8.5	6.8	6.8	7.4	7.5	7.0	7.1	7.2	7.0	7.0
Appendix IV[1]											
Antimony	ug/L	6.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	1.7	2	1	< 1	< 1	< 1	< 1	< 1	1
Barium	ug/L	2,000	73	74	74	72	77	73	70	73	72
Beryllium	ug/L	4.0	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	5.4	10	2	2	1	1	1	1	1
Cobalt	ug/L	15	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	1,100	--	--	< 1,000	< 1,000	1,830	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	25	27	22	24	27	24	26	24	20
Mercury	ug/L	2.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	7.4	8	7	7	7	8	7	6	7
Radium-226	pCi/L	NA	0.195	--	--	< 0.305	--	< 0.324	--	< 0.286	--
Radium-228	pCi/L	NA	< 0.373	--	--	0.468	--	< 0.463	--	0.606	--
Radium-226/228	pCi/L	5.0	< 0.373	--	--	0.688	--	0.499	--	0.615	--
Selenium	ug/L	50	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2.0	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	280	320	294	135	42	92	46	100	56
Copper	ug/L	1,000	< 1.0	2	2	2	2	2	2	1	2
Nickel	ug/L	100	20	--	--	16	16	14	15	16	21
Silver	ug/L	34	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	< 10	--	--	< 10	< 30	16	< 10	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – October 2019 to August 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18001								
		Sample Date:	10/10/2019(3)	10/10/2019(3)	3/9/2020	5/18/2020	8/10/2020	10/13/2020	3/8/2021	5/10/2021	8/2/2021
Constituent	Unit	GWPS									
Appendix III(1)											
Boron	ug/L	**560**	**1,500**	**1,380**	**1,420**	**1,360**	**1,310**	**1,370**	**1,350**	**1,340**	**1,610**
Calcium	mg/L	**280**	170	--	--	232	237	**282**	270	**305**	**348**
Chloride	mg/L	2,300	58	--	--	71.5	70.8	73.8	72.1	77.3	76.4
Fluoride	ug/L	4,000	< 2,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	170	159	248	352	357	435	549	580	700
Total Dissolved Solids	mg/L	4,700	870	--	--	1330	1,370	1,370	1,610	1,670	1,880
pH, Field	SU	6.5 - 8.5	7.0	7.0	7.4	7.4	6.9	7.1	6.9	6.9	6.9
Appendix IV(1)											
Antimony	ug/L	6.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	2.5	2	3	3	3	3	2	2	**38**
Barium	ug/L	2,000	220	218	257	252	261	273	213	166	199
Beryllium	ug/L	4.0	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	8
Cobalt	ug/L	15	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 2,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2
Lithium	ug/L	180	53	58	56	60	69	66	69	68	71
Mercury	ug/L	2.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	9
Radium-226	pCi/L	NA	0.434	--	--	0.372	--	< 0.423	--	< 0.378	--
Radium-228	pCi/L	NA	< 0.715	--	--	0.385	--	0.616	--	< 0.558	--
Radium-226/228	pCi/L	5.0	1.07	--	--	0.757	--	1.03	--	< 0.558	--
Selenium	ug/L	50	< 1.0	< 1	1	< 1	< 1	< 1	< 1	< 1	2
Thallium	ug/L	2.0	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters(2)											
Iron	ug/L	**28,000**	130	110	201	277	202	182	183	154	13,600
Copper	ug/L	1,000	< 1.0	< 1	1	1	1	1	2	3	6
Nickel	ug/L	100	< 2.0	--	--	< 2	< 2	2	8	2	16
Silver	ug/L	34	< 0.20	< 0.2	< 0.2	< 0.3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	2	**12**
Zinc	ug/L	2,400	< 10	--	--	< 10	< 30	< 10	< 10	< 10	12

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – October 2019 to August 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18004								
		Sample Date:	10/15/2019[3]	10/15/2019[3]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	430	479	274	265	347	410	232	246	304
Calcium	mg/L	**280**	270	--	--	**308**	**306**	**323**	252	266	203
Chloride	mg/L	2,300	39	--	--	10.9	25.6	22.6	17.9	12.4	6.65
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	**930**	**1,260**	714	361	718	756	581	523	393
Total Dissolved Solids	mg/L	4,700	1,800	--	--	1,720	1,820	1,690	1,390	1,270	1,180
pH, Field	SU	6.5 - 8.5	6.6	6.6	7.2	7.3	6.7	6.9	6.9	6.8	6.8
Appendix IV[1]											
Antimony	ug/L	6.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	< 1.0	< 1	3	< 1	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	43	46	47	28	36	34	20	27	36
Beryllium	ug/L	4.0	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1.0	< 1	49	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1.0	< 1	2	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	37	39	29	31	39	37	35	36	47
Mercury	ug/L	2.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	< 0.135	--	--	< 0.256	--	< 0.424	--	< 0.271	--
Radium-228	pCi/L	NA	< 0.495	--	--	< 0.368	--	1.04	--	< 0.425	--
Radium-226/228	pCi/L	5.0	< 0.495	--	--	< 0.368	--	0.922	--	< 0.425	--
Selenium	ug/L	50	< 1.0	< 1	1	1	< 1	< 1	7	1	4
Thallium	ug/L	2.0	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	180	214	4,430	29	< 20	< 20	21	24	< 20
Copper	ug/L	1,000	< 1.0	3	5	3	2	3	3	2	1
Nickel	ug/L	100	< 2.0	--	--	< 2	< 2	4	< 2	2	9
Silver	ug/L	34	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2.0	< 2	**10**	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	< 10	--	--	< 10	< 30	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – October 2019 to August 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18005								
		Sample Date:	10/11/2019(3)	10/11/2019(3)	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021
Constituent	Unit	GWPS									
Appendix III(1)											
Boron	ug/L	**560**	**1,700**	**1,480**	**1,230**	**1,150**	**1,100**	**1,090**	**987**	**919**	**1,080**
Calcium	mg/L	**280**	270	--	--	**419**	259	195	**286**	202	149
Chloride	mg/L	2,300	82	--	--	23.2	63.9	66.5	43.7	56.0	64.9
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	1,640	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	470	476	**781**	**817**	398	185	535	263	190
Total Dissolved Solids	mg/L	4,700	1,300	--	--	1,950	1,310	986	1,420	1,020	895
pH, Field	SU	6.5 - 8.5	6.7	6.7	7.1	7.2	6.9	7.0	6.8	6.9	7.0
Appendix IV(1)											
Antimony	ug/L	6.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	11	10	7	12	8	8	7	9	9
Barium	ug/L	2,000	180	171	140	141	87	98	135	93	98
Beryllium	ug/L	4.0	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	12	7	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	1,640	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2
Lithium	ug/L	180	50	59	47	53	45	33	39	30	28
Mercury	ug/L	2.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	0.397	--	--	0.381	--	1.07	--	< 0.224	--
Radium-228	pCi/L	NA	< 0.635	--	--	0.457	--	0.540	--	0.524	--
Radium-226/228	pCi/L	5.0	0.698	--	--	0.838	--	1.61	--	0.728	--
Selenium	ug/L	50	< 1.0	< 1	1	1	< 1	< 1	< 1	1	2
Thallium	ug/L	2.0	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters(2)											
Iron	ug/L	**28,000**	14,000	10,700	6,730	9,310	4,900	3,550	4,800	4,590	5,350
Copper	ug/L	1,000	< 1.0	1	2	3	2	1	2	1	12
Nickel	ug/L	100	12	--	--	4	9	11	8	10	29
Silver	ug/L	34	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	< 10	--	--	< 10	< 30	< 10	< 10	< 10	< 10

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – October 2019 to August 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18006								
		Sample Date:	10/14/2019[3]	10/14/2019[13]	3/11/2020	5/20/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021
Constituent	Unit	GWPS									
Appendix III[1]											
Boron	ug/L	**560**	**2,800**	**2,830**	**3,110**	**3,030**	**2,040**	**2,610**	**2,650**	**2,720**	**2,640**
Calcium	mg/L	**280**	170	--	--	179	148	167	148	147	135
Chloride	mg/L	2,300	97	--	--	71.2	76.1	72.2	66.1	72.6	73.6
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	100	205	86.2	94.5	31.2	50.1	57.3	47.0	29.7
Total Dissolved Solids	mg/L	4,700	910	--	--	988	820	861	823	784	769
pH, Field	SU	6.5 - 8.5	6.8	6.8	7.2	7.4	7.0	7.1	6.9	6.9	6.9
Appendix IV[1]											
Antimony	ug/L	6.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**32**	**41**	**41**	**33**	12	**22**	**30**	**30**	**25**
Barium	ug/L	2,000	480	472	488	500	361	489	477	472	492
Beryllium	ug/L	4.0	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	72	77	65	70	41	59	58	53	46
Mercury	ug/L	2.0	< 0.20			< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	0.454	--	--	0.649	--	0.716	--	0.418	--
Radium-228	pCi/L	NA	0.500	--	--	0.346	--	0.853	--	< 0.483	--
Radium-226/228	pCi/L	5.0	0.954	--	--	0.995	--	1.57	--	0.888	--
Selenium	ug/L	50	< 1.0	1	1	< 1	< 1	< 1	< 1	1	2
Thallium	ug/L	2.0	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	9,900	8,400	7,060	7,280	3,360	5,760	5,730	5,490	7,790
Copper	ug/L	1,000	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	2	< 1
Nickel	ug/L	100	4.7	--	--	4	2	< 2	3	3	6
Silver	ug/L	34	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	3.4	4	4	3	< 2	3	3	3	4
Zinc	ug/L	2,400	< 10	--	--	< 10	< 30	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – October 2019 to August 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-50													
					Sample Date:	10/10/2019(3)	10/10/2019(3)	3/9/2020	3/9/2020	5/19/2020	8/10/2020	8/10/2020	10/13/2020	3/8/2021	3/8/2021	5/10/2021	5/10/2021	8/2/2021	8/2/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**														
Appendix III(1)									Field Dup			Field Dup			Field Dup		Field Dup		Field Dup
Boron	ug/L	4,000	44,000	69,000	44,000	1,700	1,590	1,530	1,500	1,300	1,430	1,360	1,470	1,510	1,610	1,380	1,320	1,520	1,630
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	660	677	878	919	1,010	1,020	1,040	990	1,130	1,120	856	867	638	634
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.1	7.1	7.4	--	7.4	7.0	--	7.1	6.9	--	6.9	--	7.0	--
Appendix IV(1)																			
Arsenic	ug/L	10	100	680	**100**	2.8	3	1	1	1	2	2	3	1	1	1	1	2	2
Chromium	ug/L	11[H]	NC	NC	**11**	1.4	< 1	1	< 1	< 1	< 1	< 1	< 1	1	1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	79	93	91	86	97	111	115	100	126	128	100	100	79	81
Molybdenum	ug/L	120	NC	NC	**120**	6.6	7	< 5	< 5	8	7	8	7	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	< 1.0	< 1	2	2	2	< 1	< 1	1	1	1	< 1	1	3	2
MI Part 115 Parameters(2)																			
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,800	1,440	1,760	1,730	1,240	2,280	2,230	2,990	2,100	2,190	1,810	1,810	3,000	2,780
Vanadium	ug/L	27	NC	NC	27	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – October 2019 to August 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-51												
					Sample Date:	10/10/2019[3]	10/10/2019[3]	10/10/2019[3]	10/10/2019[3]	3/9/2020	5/19/2020	5/19/2020	8/10/2020	10/14/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**													
Appendix III[1]							Field Dup		Field Dup			Field Dup			Field Dup			
Boron	ug/L	4,000	44,000	69,000	44,000	890	900	843	819	967	944	967	758	739	798	1,040	1,040	960
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	570	580	562	557	424	487	474	556	522	537	452	450	434
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.7	--	6.7	--	7.4	7.4	--	6.8	6.8	--	7.0	7.0	6.9
Appendix IV[1]																		
Arsenic	ug/L	10	100	680	**100**	20	19	18	19	14	12	12	12	17	17	11	11	14
Chromium	ug/L	11[H]	NC	NC	**11**	< 1.0	< 1.0	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	49	50	59	57	50	55	57	57	51	55	62	57	47
Molybdenum	ug/L	120	NC	NC	**120**	< 5.0	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	< 1.0	< 1.0	< 1	< 1	1	1	< 1	< 1	< 1	< 1	1	< 1	1
MI Part 115 Parameters[2]																		
Iron	ug/L	500,000[EE]	NC	NC	500,000	6,700	6,800	5,270	5,250	2,050	2,830	2,750	4,390	5,400	5,600	1,940	2,200	5,080
Vanadium	ug/L	27	NC	NC	27	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – October 2019 to August 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-52								
					Sample Date:	10/10/2019[3]	10/10/2019[3]	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III[1]														
Boron	ug/L	4,000	44,000	69,000	44,000	1,200	1,150	1,150	1,160	1,200	1,110	1,120	1,160	1,140
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	520	506	412	< 1	586	572	531	574	501
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.9	6.9	7.3	7.5	6.9	7.0	7.0	6.9	6.9
Appendix IV[1]														
Arsenic	ug/L	10	100	680	**100**	< 1.0	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chromium	ug/L	11[H]	NC	NC	**11**	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	30	38	28	32	38	33	31	29	21
Molybdenum	ug/L	120	NC	NC	**120**	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	< 1.0	1	< 1	< 1	< 1	1	1	1	1
MI Part 115 Parameters[2]														
Iron	ug/L	500,000[EE]	NC	NC	500,000	5,600	4,350	782	1,140	2,720	4,770	879	1,400	3,830
Vanadium	ug/L	27	NC	NC	27	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – October 2019 to August 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-53								
					Sample Date:	10/10/2019[3]	10/10/2019[3]	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III[1]														
Boron	ug/L	4,000	44,000	69,000	44,000	900	840	2,530	1,750	2,760	2,720	3,920	3,790	3,820
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	960	940	278	549	321	269	317	322	279
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.7	6.7	7.4	7.3	7.0	7.2	7.1	7.1	7.1
Appendix IV[1]														
Arsenic	ug/L	10	100	680	**100**	2.9	3	< 1	2	2	2	< 1	< 1	2
Chromium	ug/L	11[H]	NC	NC	**11**	< 1.0	< 1	< 1	6	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	45	55	47	58	53	49	52	46	38
Molybdenum	ug/L	120	NC	NC	**120**	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	< 1.0	< 1	1	2	< 1	< 1	< 1	2	3
MI Part 115 Parameters[2]														
Iron	ug/L	500,000[EE]	NC	NC	500,000	3,700	3,100	1,200	2,070	1,510	1,560	1,180	1,420	2,380
Vanadium	ug/L	27	NC	NC	27	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – October 2019 to August 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-53R								
					Sample Date:	10/10/2019(3)	10/10/2019(3)	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III(1)														
Boron	ug/L	4,000	44,000	69,000	44,000	1,800	1,680	1,590	1,460	1,540	1,780	1,510	1,580	1,710
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	240	295	163	177	275	196	227	170	189
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.8	6.8	7.2	7.4	6.8	7.0	6.8	6.8	6.8
Appendix IV(1)														
Arsenic	ug/L	10	100	680	**100**	32	32	19	27	31	40	19	18	23
Chromium	ug/L	11[H]	NC	NC	**11**	1.7	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	61	69	53	60	71	66	64	59	56
Molybdenum	ug/L	120	NC	NC	**120**	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	< 1.0	< 1	< 1	< 1	< 1	1	< 1	< 1	2
MI Part 115 Parameters(2)														
Iron	ug/L	500,000[EE]	NC	NC	500,000	2,600	2,050	881	1,910	2,020	2,140	971	2,220	2,800
Vanadium	ug/L	27	NC	NC	27	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – October 2019 to August 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-54R								
					Sample Date:	10/10/2019(3)	10/10/2019(3)	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III(1)														
Boron	ug/L	4,000	44,000	69,000	44,000	1,500	1,470	1,280	1,730	1,660	1,660	2,470	3,140	3,530
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	130	131	86.2	95.7	96.2	100	79.9	72.7	77
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.9	6.9	7.3	7.4	6.9	7.1	6.9	6.6	6.8
Appendix IV(1)														
Arsenic	ug/L	10	100	680	**100**	2.3	3	3	2	3	3	1	1	2
Chromium	ug/L	11[H]	NC	NC	**11**	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	53	61	47	58	61	57	66	64	60
Molybdenum	ug/L	120	NC	NC	**120**	6.2	7	< 5	< 5	5	5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1
MI Part 115 Parameters(2)														
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,400	1,240	1,030	1,530	1,170	1,030	115	782	1190
Vanadium	ug/L	27	NC	NC	27	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – October 2019 to August 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-55								
					Sample Date:	10/11/2019[3]	10/11/2019[3]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III[1]														
Boron	ug/L	4,000	44,000	69,000	44,000	700	699	481	441	592	705	593	866	873
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	190	185	218	210	104	84.0	48.0	18.5	34.3
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.9	6.9	7.5	7.6	7.1	7.2	7.1	7.1	7.1
Appendix IV[1]														
Arsenic	ug/L	10	100	680	**100**	76	83	65	85	**107**	**123**	**152**	**169**	**204**
Chromium	ug/L	11[H]	NC	NC	**11**	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	27	33	21	27	33	33	28	24	25
Molybdenum	ug/L	120	NC	NC	**120**	**190**	**202**	**181**	**214**	**207**	**179**	**166**	**131**	**157**
Selenium	ug/L	50	55	120	55	< 1.0	< 1	1	< 1	2	1	< 1	1	1
MI Part 115 Parameters[2]														
Iron	ug/L	500,000[EE]	NC	NC	500,000	29,000	21,600	18,000	22,000	21,300	21,800	23,500	21,500	39,400
Vanadium	ug/L	27	NC	NC	27	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Table 2
Comparison of Groundwater Sampling Results to GSI – October 2019 to August 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

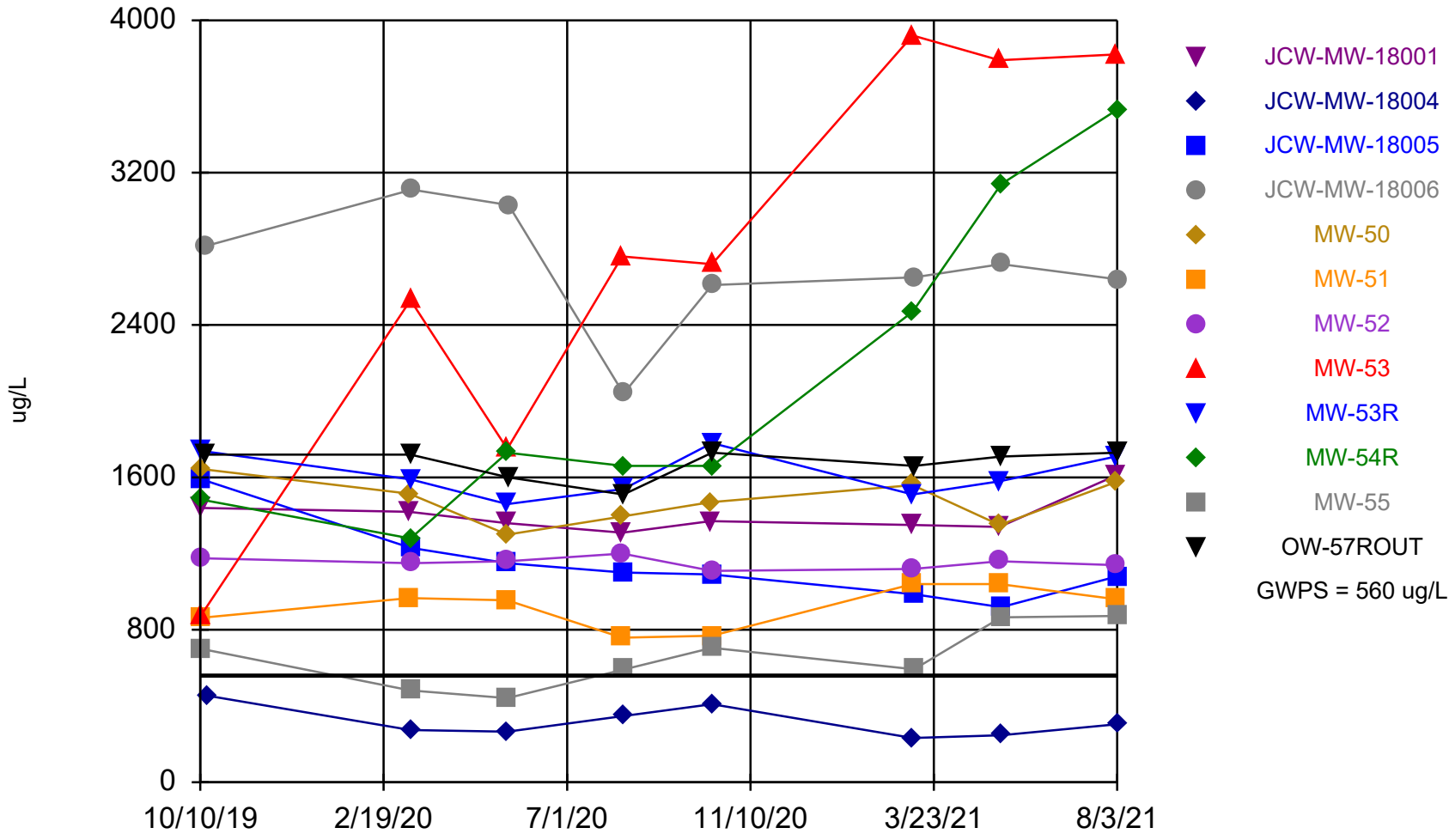
					Sample Location:	JCW-MW-18004								
					Sample Date:	10/15/2019[3]	10/15/2019[3]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III[1]														
Boron	ug/L	4,000	44,000	69,000	44,000	430	479	274	265	347	410	232	246	304
Sulfate	mg/L	1,200[F]	NC	NC	**1,200**	930	**1,260**	714	361	718	756	581	523	393
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.6	6.6	7.2	7.3	6.7	6.9	6.9	6.8	6.8
Appendix IV[1]														
Arsenic	ug/L	10	100	680	**100**	< 1.0	< 1	3	< 1	< 1	< 1	< 1	< 1	< 1
Chromium	ug/L	11[H]	NC	NC	**11**	< 1.0	< 1	**49**	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	37	39	29	31	39	37	35	36	47
Molybdenum	ug/L	120	NC	NC	**120**	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	< 1.0	< 1	1	1	< 1	< 1	7	1	4
MI Part 115 Parameters[2]														
Iron	ug/L	500,000[EE]	NC	NC	500,000	180	214	4,430	29	< 20	< 20	21	24	< 20
Vanadium	ug/L	27	NC	NC	27	< 2.0	< 2	10	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.
(3) Monitoring well was sampled simultaneously under the federal CCR program and the HMP (Rev 2) in October 2019. Results are averaged for statistical evaluation.

Attachment 1
Assessment Monitoring Sanitas™ Output Files

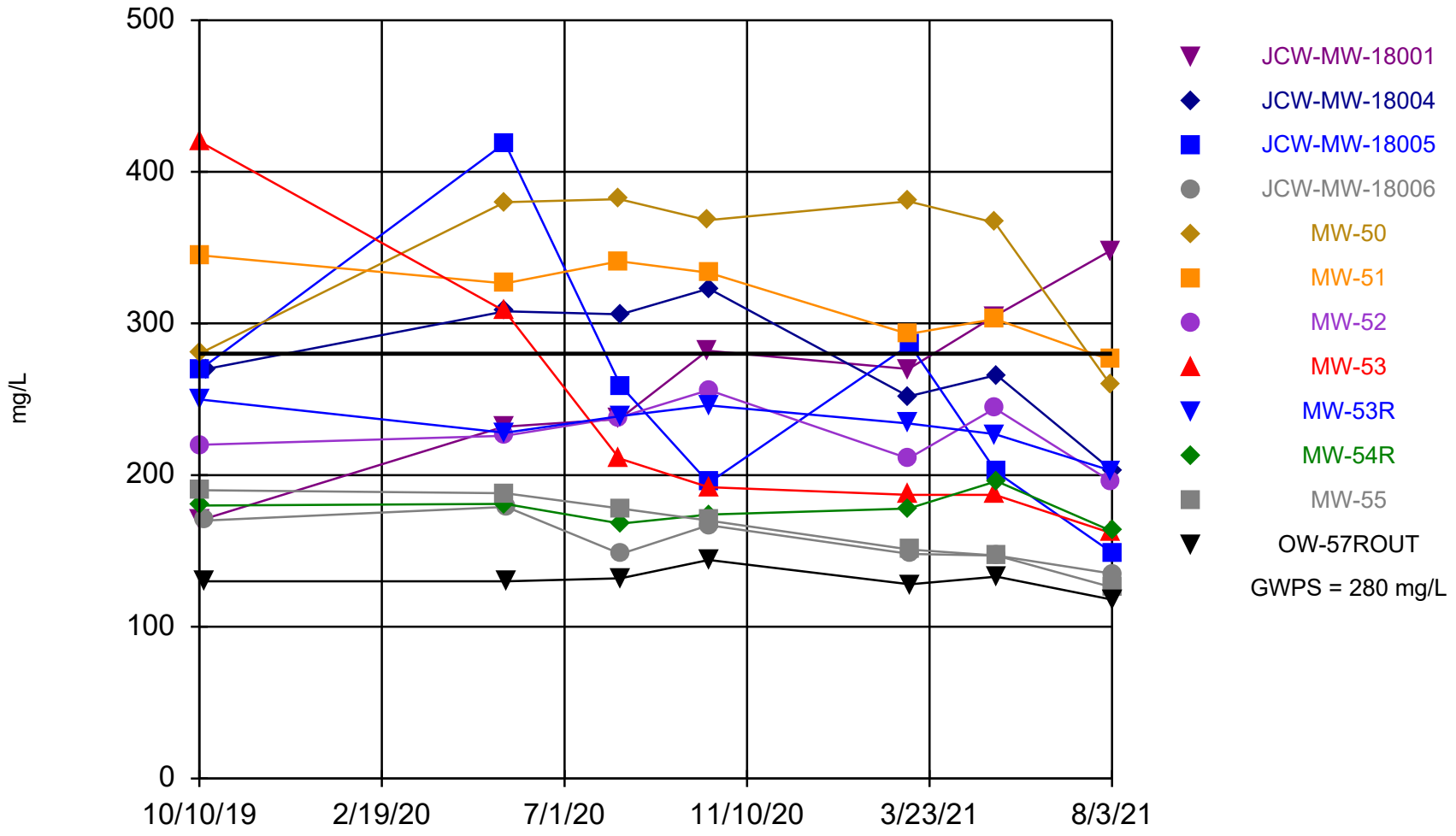
Boron Comparison to GWPS



Time Series Analysis Run 9/17/2021 11:02 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Calcium Comparison to GWPS

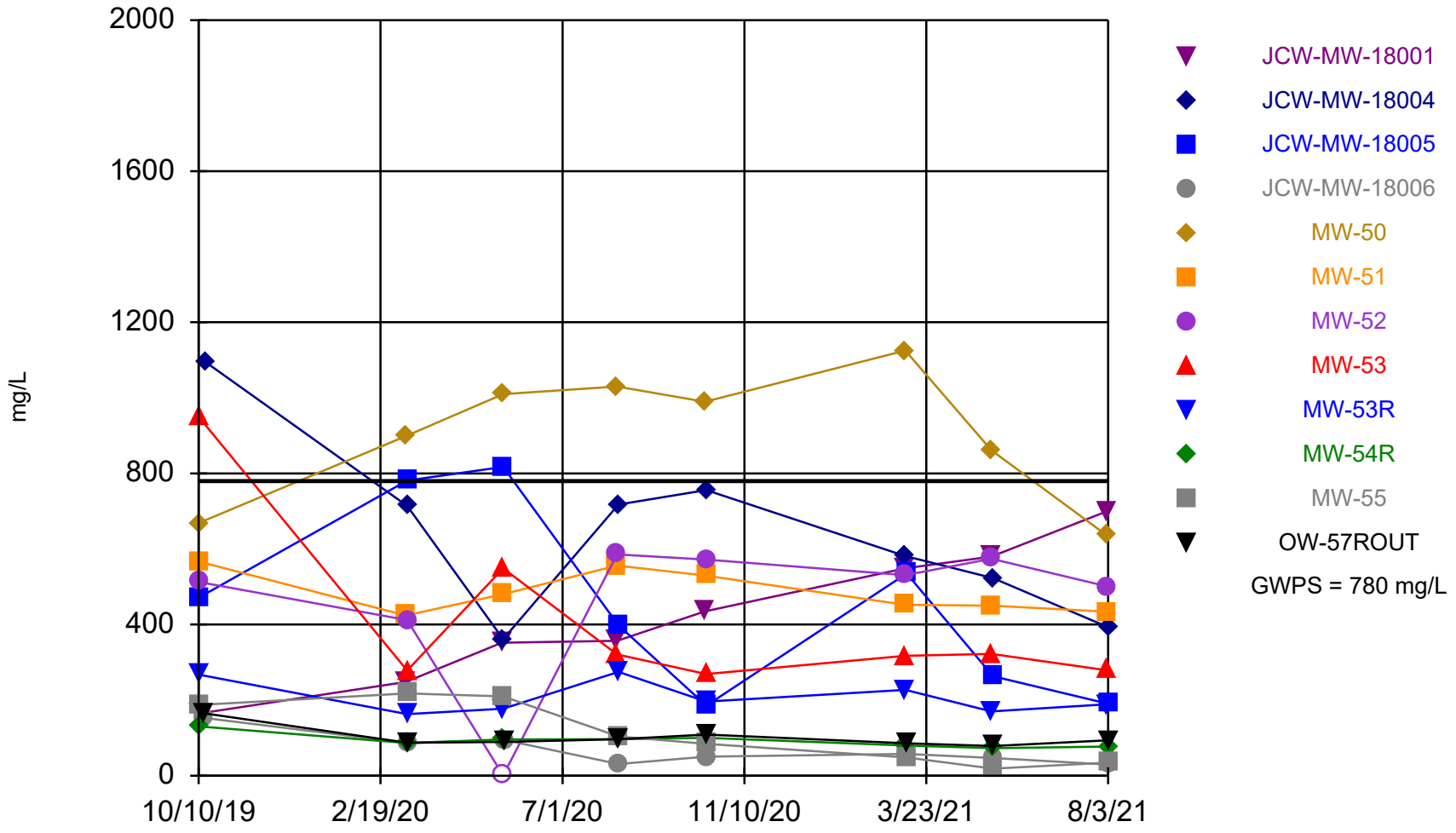


Time Series Analysis Run 9/17/2021 11:03 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Sulfate Comparison to GWPS

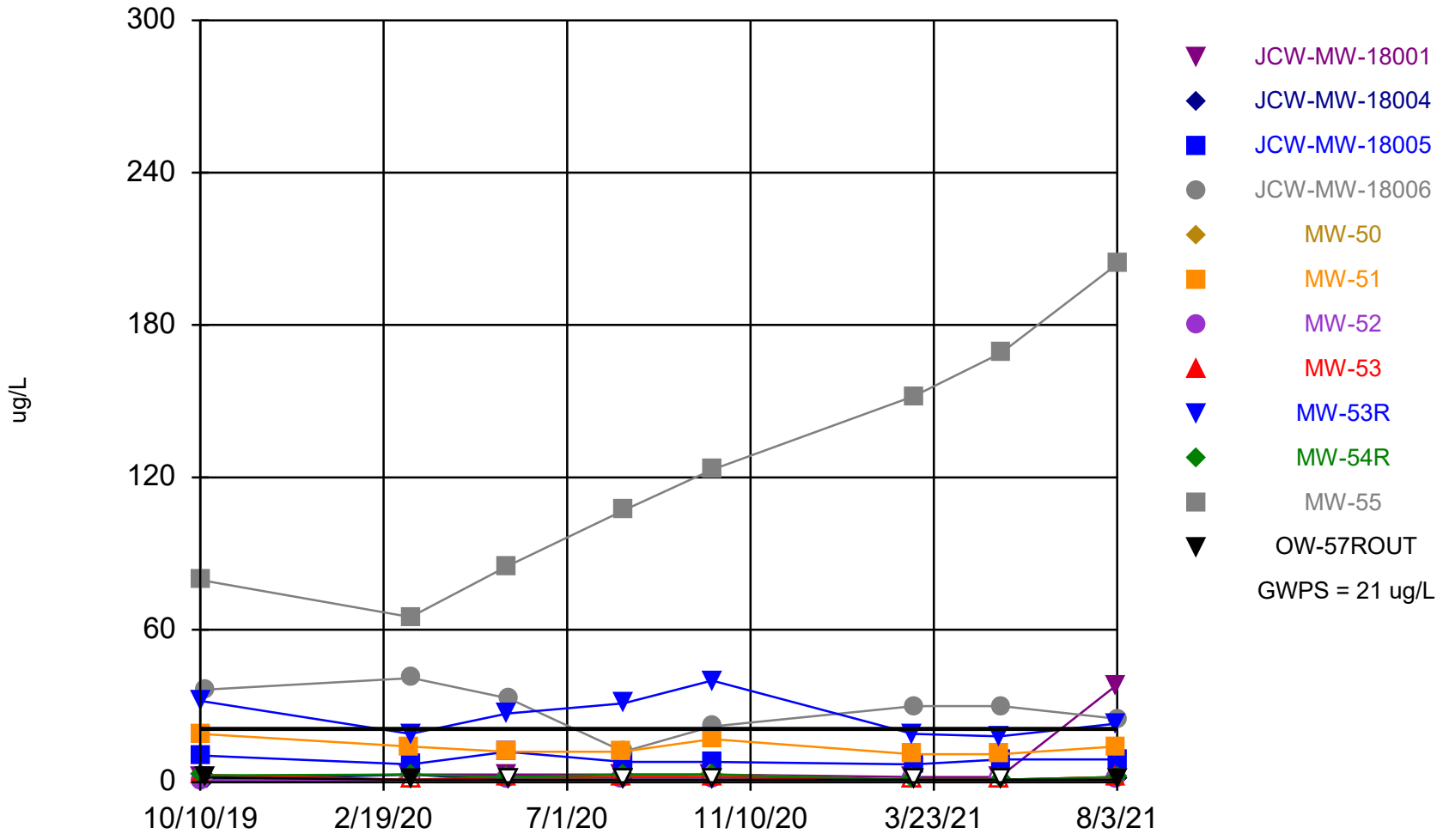


Time Series Analysis Run 9/17/2021 11:04 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Arsenic Comparison to GWPS

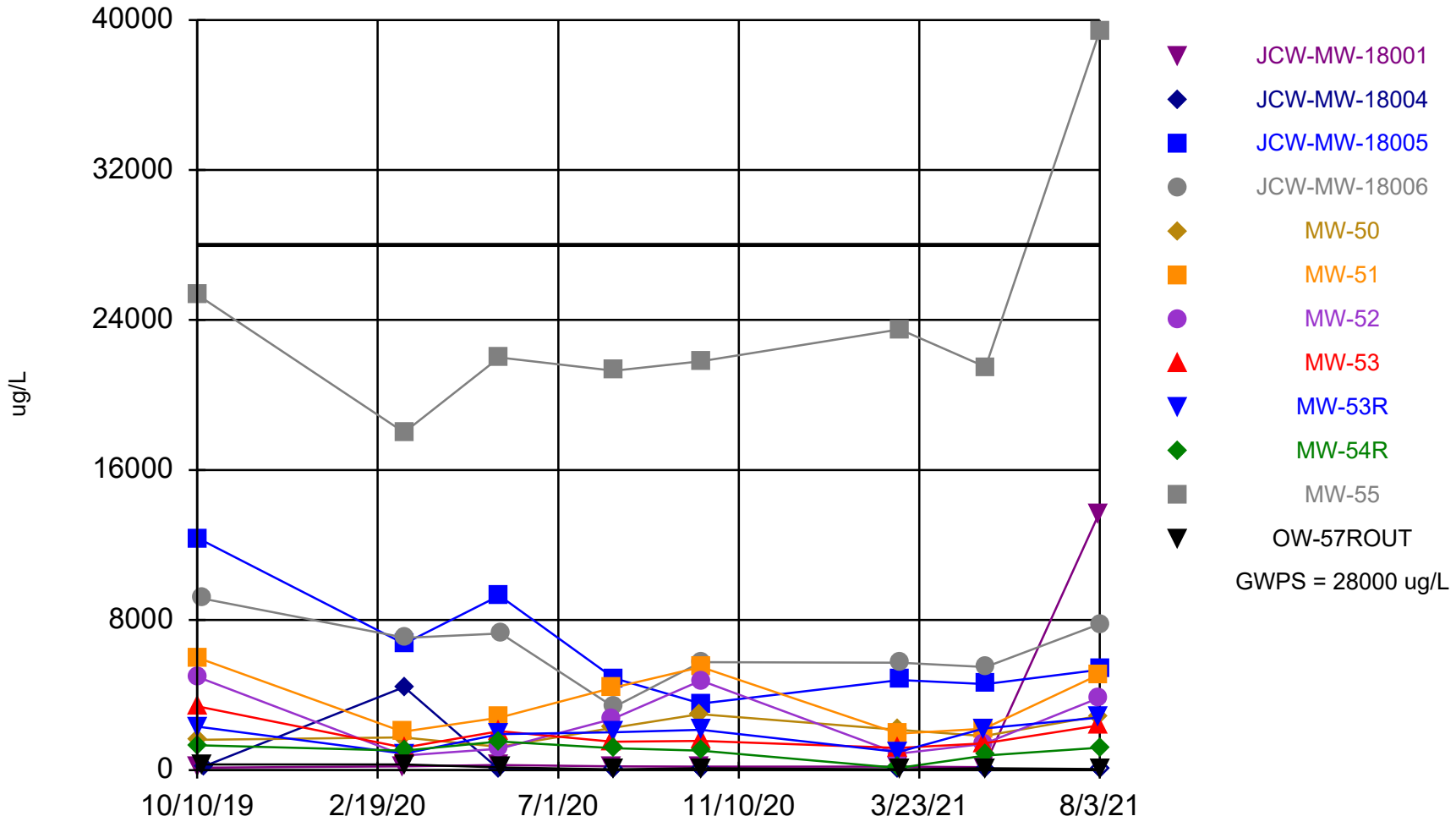


Time Series Analysis Run 9/17/2021 11:04 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Iron Comparison to GWPS

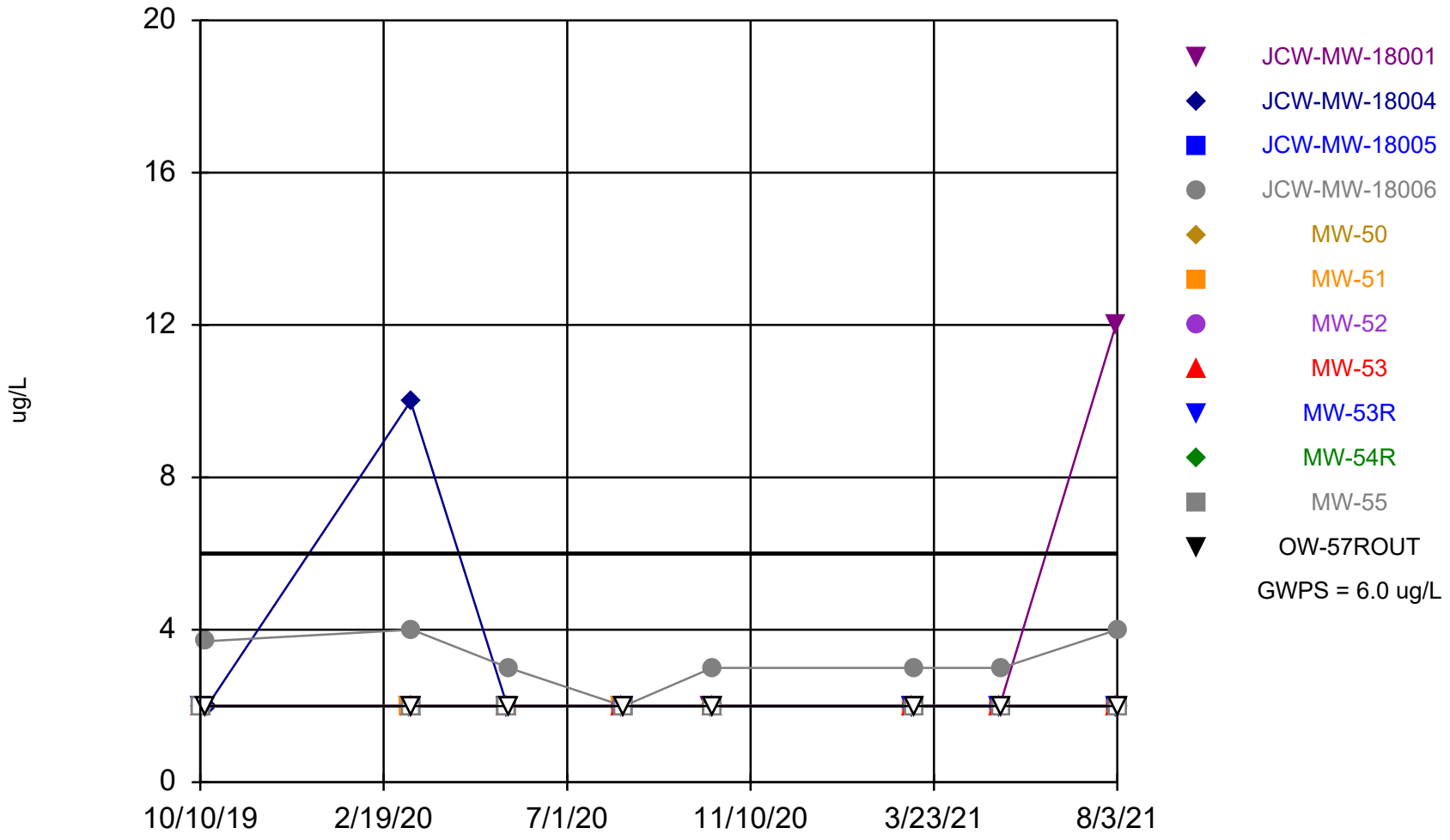


Time Series Analysis Run 9/17/2021 11:05 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Vanadium Comparison to GWPS



Time Series Analysis Run 9/17/2021 11:06 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Summary Report

Constituent: Boron, Total Analysis Run 9/17/2021 11:08 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

For observations made between 10/10/2019 and 8/3/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 0
Wells = 12
Minimum Value = 232
Maximum Value = 3920
Mean Value = 1495
Median Value = 1383
Standard Deviation = 822.1
Coefficient of Variation = 0.5499
Skewness = 1.011

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	1310	1610	1400	1365	94.72	0.06766	1.469
JCW-MW-18004	8	0	232	454.5	316.6	289	80.57	0.2545	0.6705
JCW-MW-18005	8	0	919	1590	1143	1095	203.7	0.1782	1.341
JCW-MW-18006	8	0	2040	3110	2702	2685	325.2	0.1204	-0.8273
MW-50	8	0	1300	1645	1476	1493	119.8	0.08112	-0.1432
MW-51	8	0	758	1040	919	957.8	111	0.1208	-0.4447
MW-52	8	0	1110	1200	1152	1155	29.02	0.0252	0.1087
MW-53	8	0	870	3920	2770	2740	1081	0.3902	-0.5075
MW-53R	8	0	1460	1780	1614	1585	116.1	0.07196	0.2238
MW-54R	8	0	1280	3530	2119	1695	831.1	0.3921	0.7485
MW-55	8	0	441	873	656.3	646.3	160.5	0.2446	0.1366
OW-57ROUT	8	0	1510	1730	1673	1715	79.6	0.04759	-1.219

Summary Report

Constituent: Calcium, Total Analysis Run 9/17/2021 11:08 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

For observations made between 10/10/2019 and 8/3/2021, a summary of the selected data set:

Observations = 84
ND/Trace = 0
Wells = 12
Minimum Value = 118
Maximum Value = 420
Mean Value = 231.8
Median Value = 223
Standard Deviation = 76.61
Coefficient of Variation = 0.3305
Skewness = 0.5872

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	7	0	170	348	263.4	270	57.28	0.2174	-0.174
JCW-MW-18004	7	0	203	323	275.4	270	41.17	0.1495	-0.5752
JCW-MW-18005	7	0	149	419	254.3	259	87.31	0.3434	0.8077
JCW-MW-18006	7	0	135	179	156.3	148	15.79	0.101	0.1805
MW-50	7	0	259.5	382	345.2	368	52.25	0.1514	-0.9463
MW-51	7	0	276	345	316.9	326.5	26.38	0.08325	-0.4175
MW-52	7	0	196	256	227.3	226	20.48	0.09012	-0.1206
MW-53	7	0	162	420	238.1	192	92.96	0.3903	1.239
MW-53R	7	0	203	250	232.4	234	15.57	0.06697	-0.8363
MW-54R	7	0	163	196	177.1	178	10.59	0.05978	0.4794
MW-55	7	0	126	190	164.3	170	23.75	0.1446	-0.41
OW-57ROUT	7	0	118	144	130.7	130	7.675	0.05872	0.1127

Summary Report

Constituent: Sulfate Analysis Run 9/17/2021 11:08 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

For observations made between 10/10/2019 and 8/3/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 1
Wells = 12
Minimum Value = 1
Maximum Value = 1125
Mean Value = 363.7
Median Value = 278.5
Standard Deviation = 286.5
Coefficient of Variation = 0.7877
Skewness = 0.8255

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	164.5	700	423.2	396	179	0.4229	0.09912
JCW-MW-18004	8	0	361	1095	642.6	647.5	235.4	0.3664	0.6435
JCW-MW-18005	8	0	185	817	455.3	435.5	247.1	0.5427	0.3719
JCW-MW-18006	8	0	29.7	152.5	68.56	53.7	41.18	0.6006	1.063
MW-50	8	0	636	1125	902.4	944.3	174.2	0.193	-0.4844
MW-51	8	0	424	567.3	486.7	466.3	56.59	0.1163	0.3812
MW-52	8	1	1	586	461.3	522	194.2	0.421	-1.926
MW-53	8	0	269	950	410.6	319	235.9	0.5746	1.743
MW-53R	8	0	163	275	208.1	192.5	43.63	0.2097	0.6094
MW-54R	8	0	72.7	130.5	92.28	90.95	18.34	0.1988	1.07
MW-55	8	0	18.5	218	113	94	81.29	0.7191	0.241
OW-57ROUT	8	0	78.3	165	100.7	91.65	27.5	0.2731	1.82

Summary Report

Constituent: Arsenic, Total Analysis Run 9/17/2021 11:08 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

For observations made between 10/10/2019 and 8/3/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 22
Wells = 12
Minimum Value = 1
Maximum Value = 204
Mean Value = 18.04
Median Value = 3
Standard Deviation = 36.02
Coefficient of Variation = 1.996
Skewness = 3.298

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	2	38	7.031	3	12.52	1.781	2.262
JCW-MW-18004	8	7	1	3	1.25	1	0.7071	0.5657	2.268
JCW-MW-18005	8	0	7	12	8.813	8.5	1.731	0.1964	0.7135
JCW-MW-18006	8	0	12	41	28.69	30	9.035	0.315	-0.5317
MW-50	8	0	1	3	1.738	1.5	0.8667	0.4988	0.4726
MW-51	8	0	11	19	13.75	13	2.915	0.212	0.7811
MW-52	8	7	1	1	1	1	0	0	NaN
MW-53	8	3	1	2.95	1.744	2	0.6946	0.3983	0.2681
MW-53R	8	0	18	40	26.13	25	7.827	0.2996	0.5414
MW-54R	8	0	1	3	2.206	2.325	0.8521	0.3862	-0.479
MW-55	8	0	65	204	123.1	115	48.51	0.3942	0.4196
OW-57ROUT	8	5	1	1.85	1.106	1	0.3005	0.2717	2.268

Summary Report

Constituent: Iron, Total Analysis Run 9/17/2021 11:08 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

For observations made between 10/10/2019 and 8/3/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 3
Wells = 12
Minimum Value = 20
Maximum Value = 39400
Mean Value = 4396
Median Value = 2035
Standard Deviation = 6773
Coefficient of Variation = 1.541
Skewness = 2.759

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	120	13600	1865	192	4742	2.543	2.267
JCW-MW-18004	8	3	20	4430	595.1	22.5	1551	2.606	2.261
JCW-MW-18005	8	0	3550	12350	6448	5125	2959	0.4589	1.114
JCW-MW-18006	8	0	3360	9150	6453	6410	1757	0.2723	-0.2355
MW-50	8	0	1240	2990	2087	1978	611.9	0.2932	0.3261
MW-51	8	0	1940	6005	3744	3590	1683	0.4493	0.1386
MW-52	8	0	782	4975	2562	2060	1761	0.6873	0.3358
MW-53	8	0	1180	3400	1840	1535	754.7	0.4102	1.167
MW-53R	8	0	881	2800	1908	2080	661.8	0.3468	-0.5705
MW-54R	8	0	115	1530	1021	1100	427.2	0.4184	-1.156
MW-55	8	0	18000	39400	24100	21900	6518	0.2705	1.817
OW-57ROUT	8	0	42	300	133.1	96	105.8	0.7948	0.8804

Summary Report

Constituent: Vanadium, Total Analysis Run 9/17/2021 11:08 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

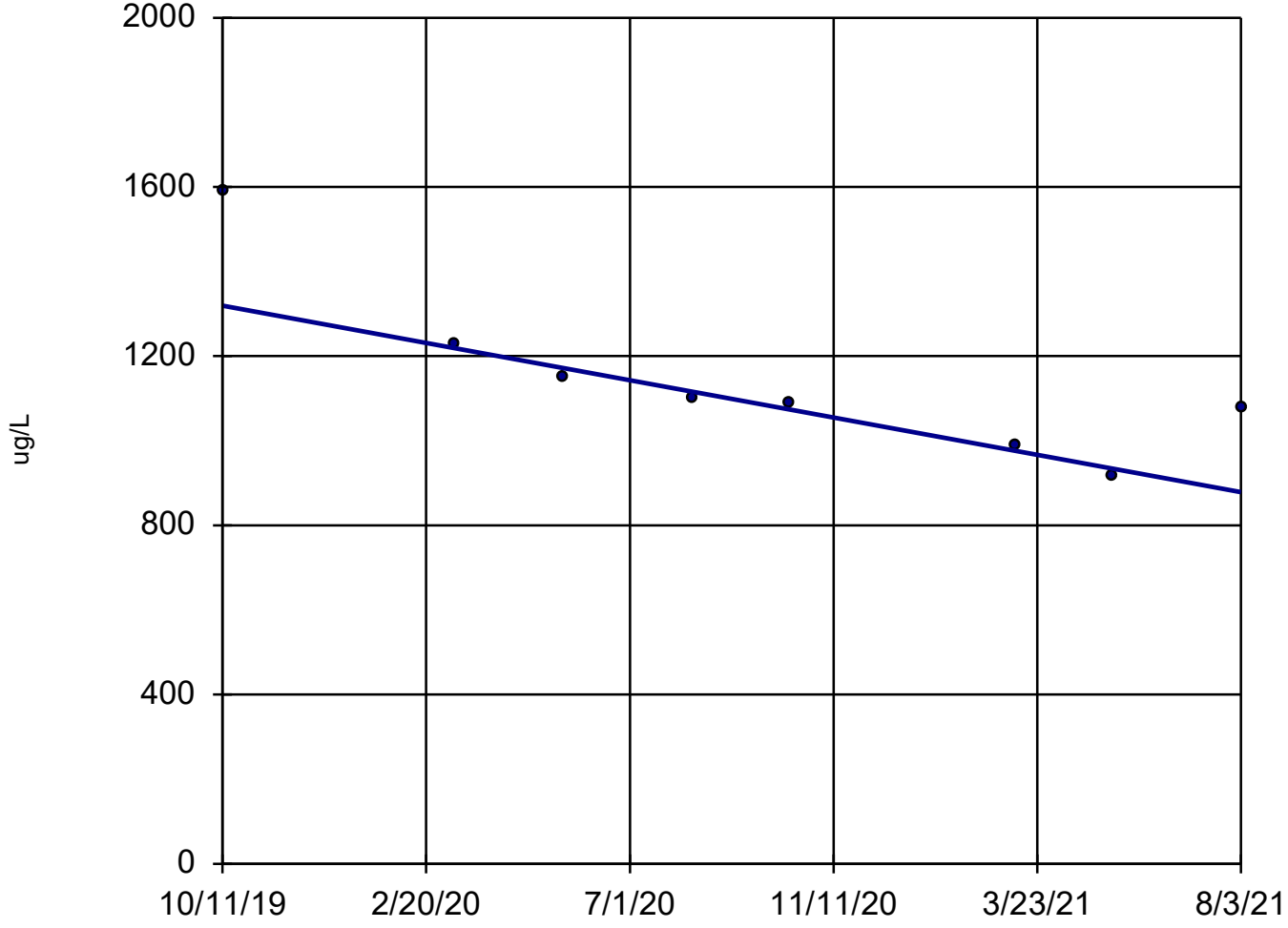
For observations made between 10/10/2019 and 8/3/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 86
Wells = 12
Minimum Value = 2
Maximum Value = 12
Mean Value = 2.289
Median Value = 2
Standard Deviation = 1.341
Coefficient of Variation = 0.5861
Skewness = 6.081

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	6	2	12	3.25	2	3.536	1.088	2.268
JCW-MW-18004	8	7	2	10	3	2	2.828	0.9428	2.268
JCW-MW-18005	8	8	2	2	2	2	0	0	NaN
JCW-MW-18006	8	1	2	4	3.213	3	0.6686	0.2081	-0.3722
MW-50	8	8	2	2	2	2	0	0	NaN
MW-51	8	8	2	2	2	2	0	0	NaN
MW-52	8	8	2	2	2	2	0	0	NaN
MW-53	8	8	2	2	2	2	0	0	NaN
MW-53R	8	8	2	2	2	2	0	0	NaN
MW-54R	8	8	2	2	2	2	0	0	NaN
MW-55	8	8	2	2	2	2	0	0	NaN
OW-57ROUT	8	8	2	2	2	2	0	0	NaN

Boron, Total

JCW-MW-18005



n = 8

Slope = -242.8 units per year.

Mann-Kendall statistic = -24
critical = -20

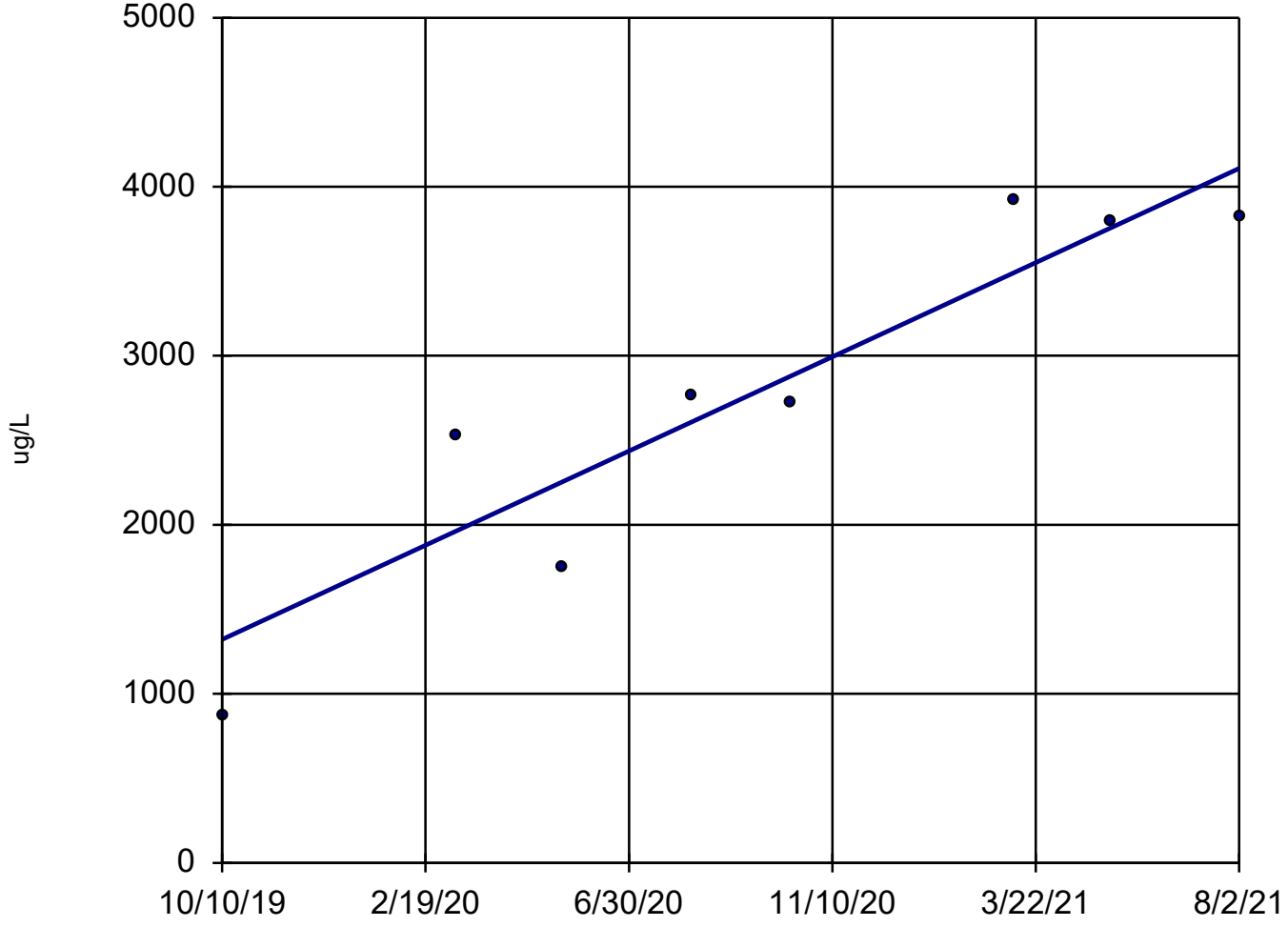
Decreasing trend significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 9/17/2021 11:24 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Boron, Total

MW-53



n = 8

Slope = 1537 units per year.

Mann-Kendall statistic = 20 critical = 20

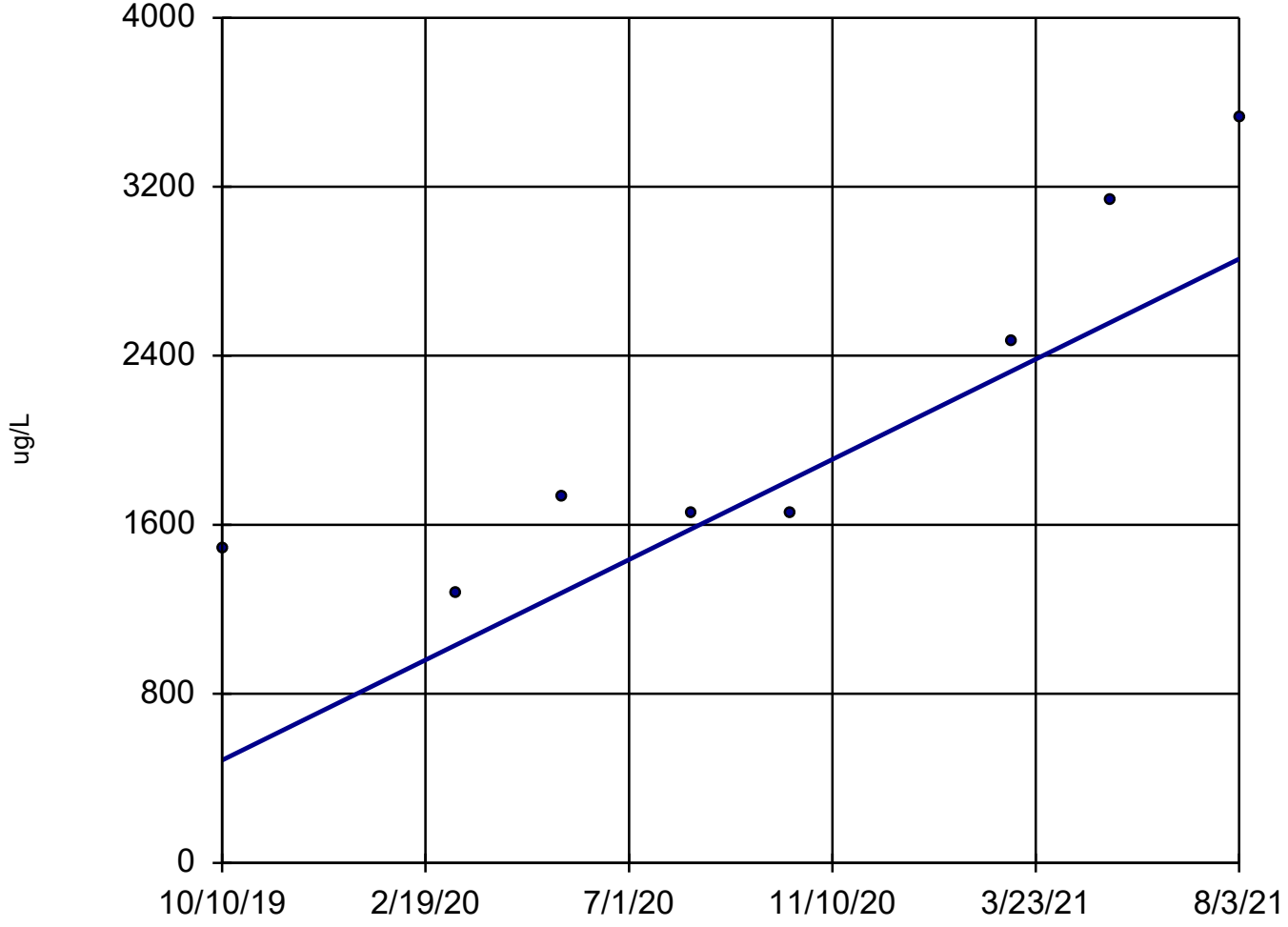
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 9/17/2021 11:24 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Boron, Total

MW-54R



n = 8

Slope = 1306 units per year.

Mann-Kendall statistic = 21
critical = 20

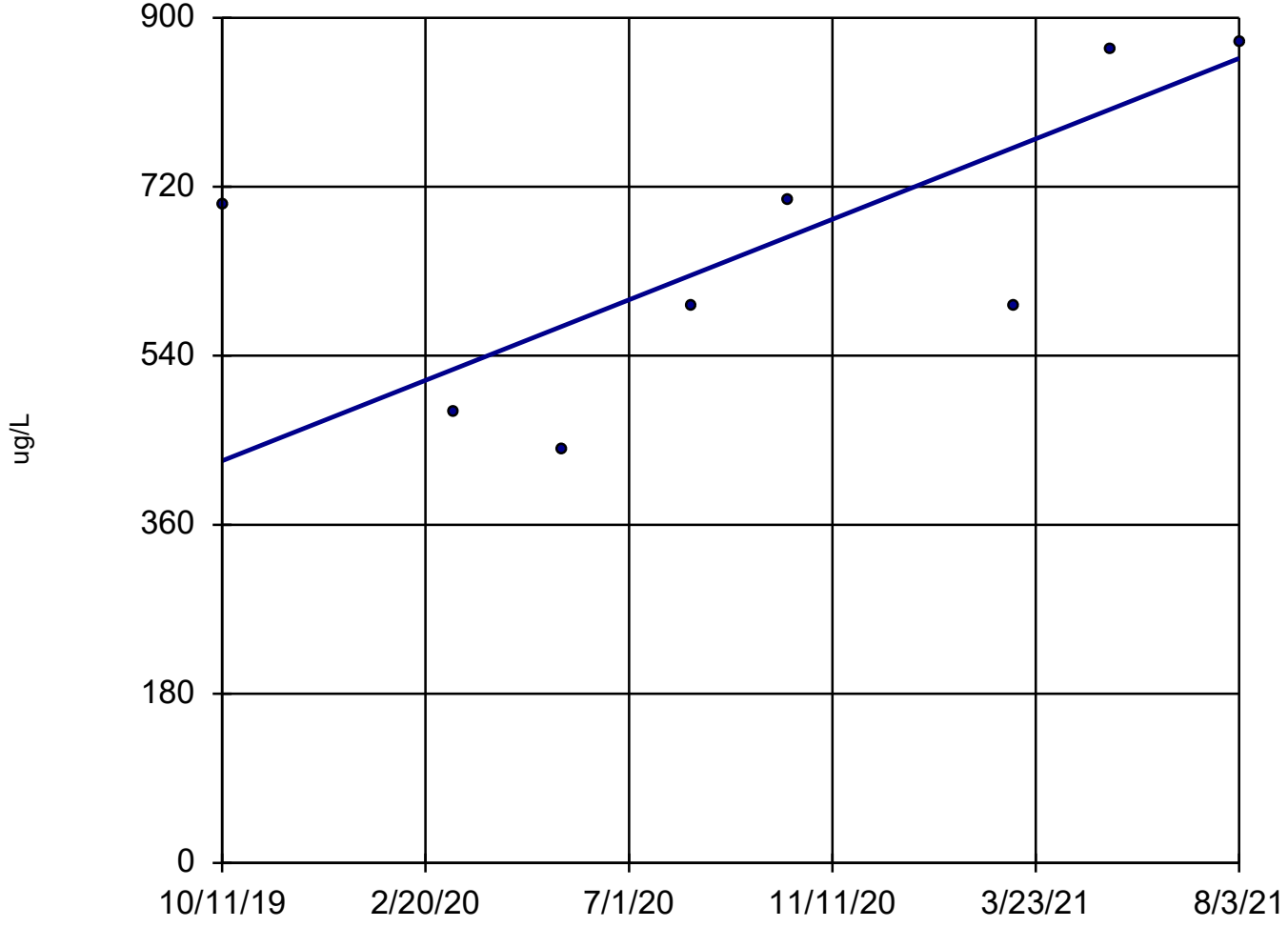
Increasing trend significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 9/17/2021 11:24 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Boron, Total

MW-55



n = 8

Slope = 236.2 units per year.

Mann-Kendall statistic = 16
critical = 20

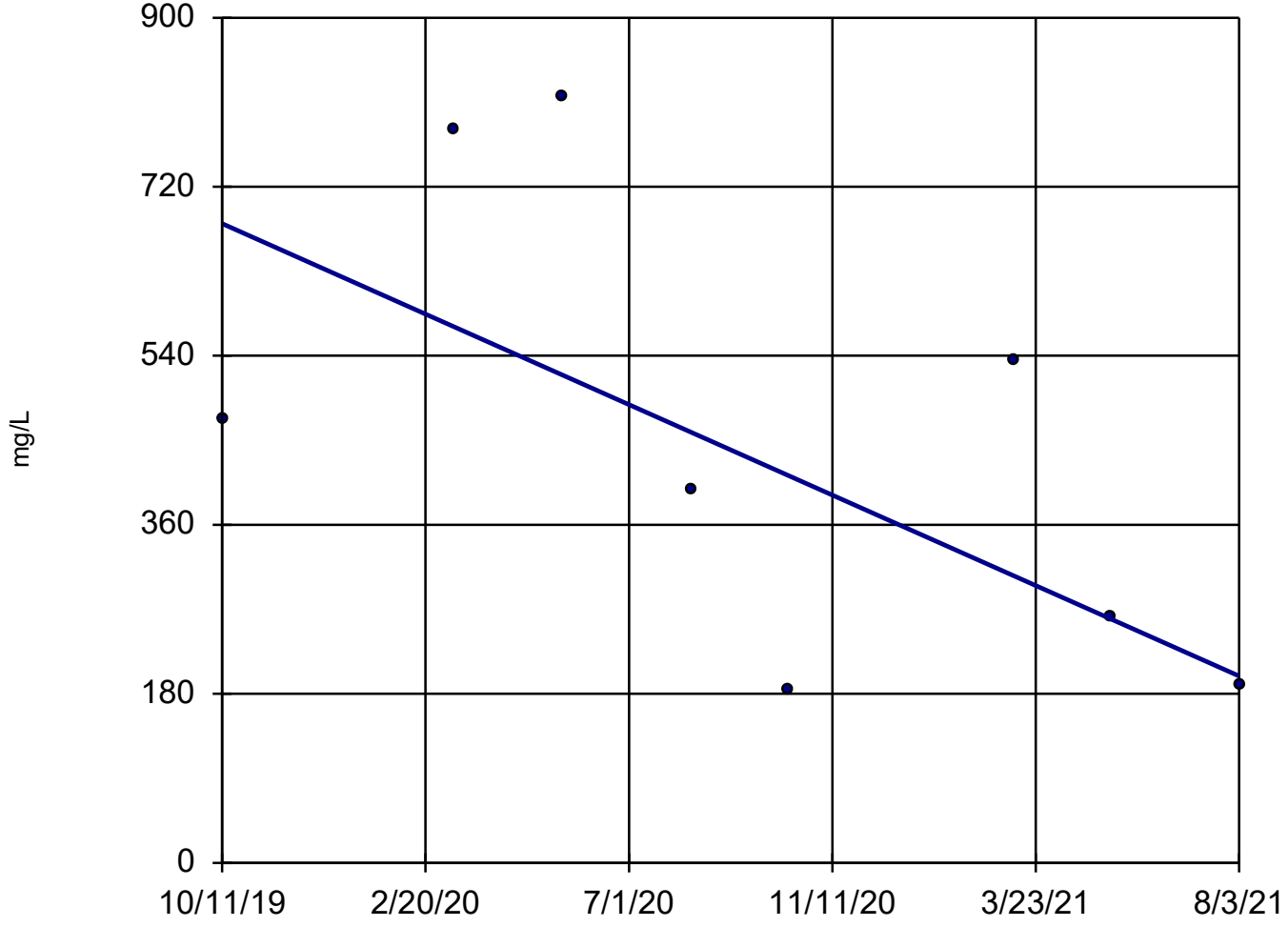
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 9/17/2021 11:24 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Sulfate

JCW-MW-18005



n = 8

Slope = -265.8 units per year.

Mann-Kendall statistic = -12
critical = -20

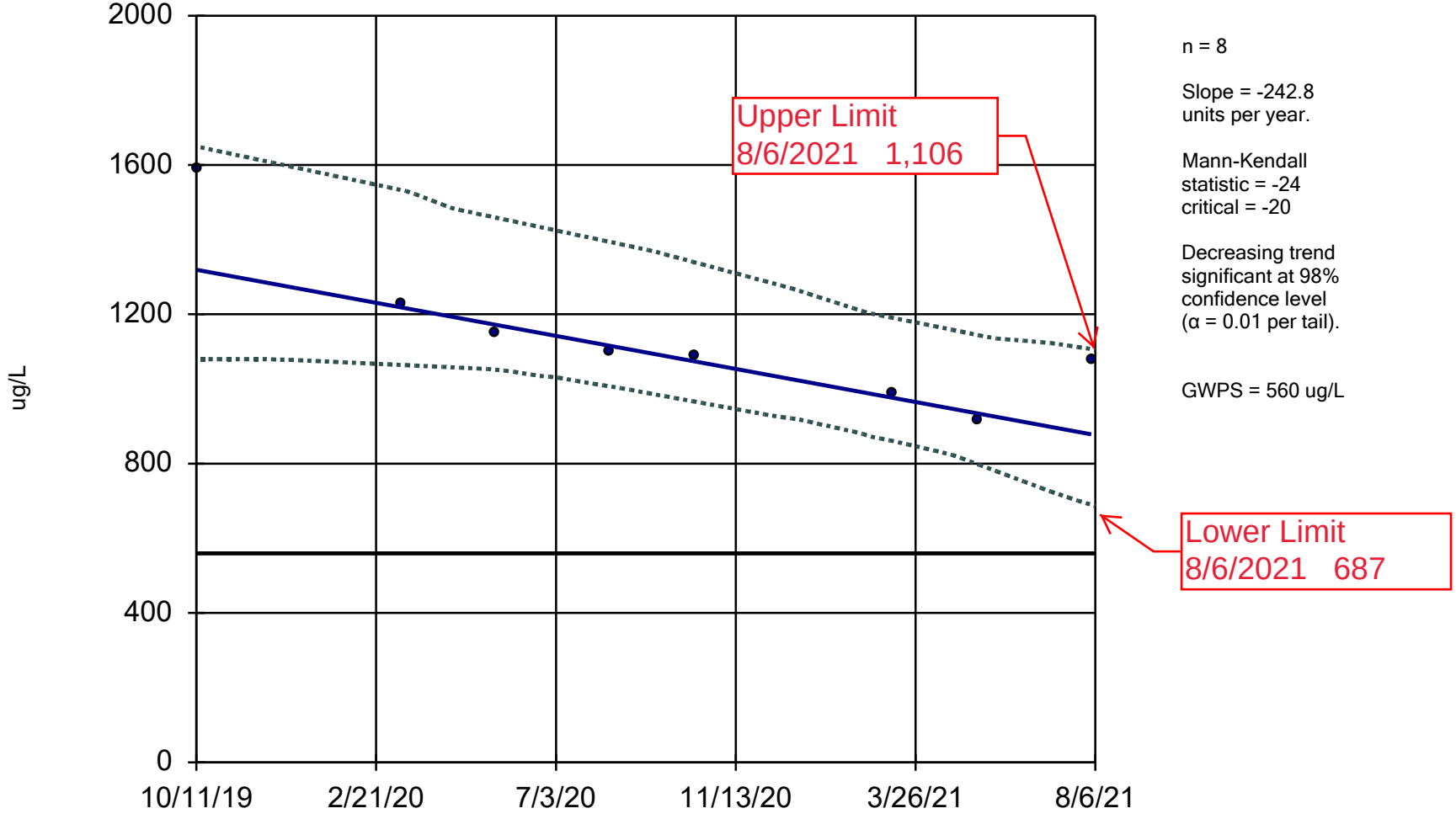
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 9/17/2021 11:24 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Boron with 98% Confidence Band

JCW-MW-18005

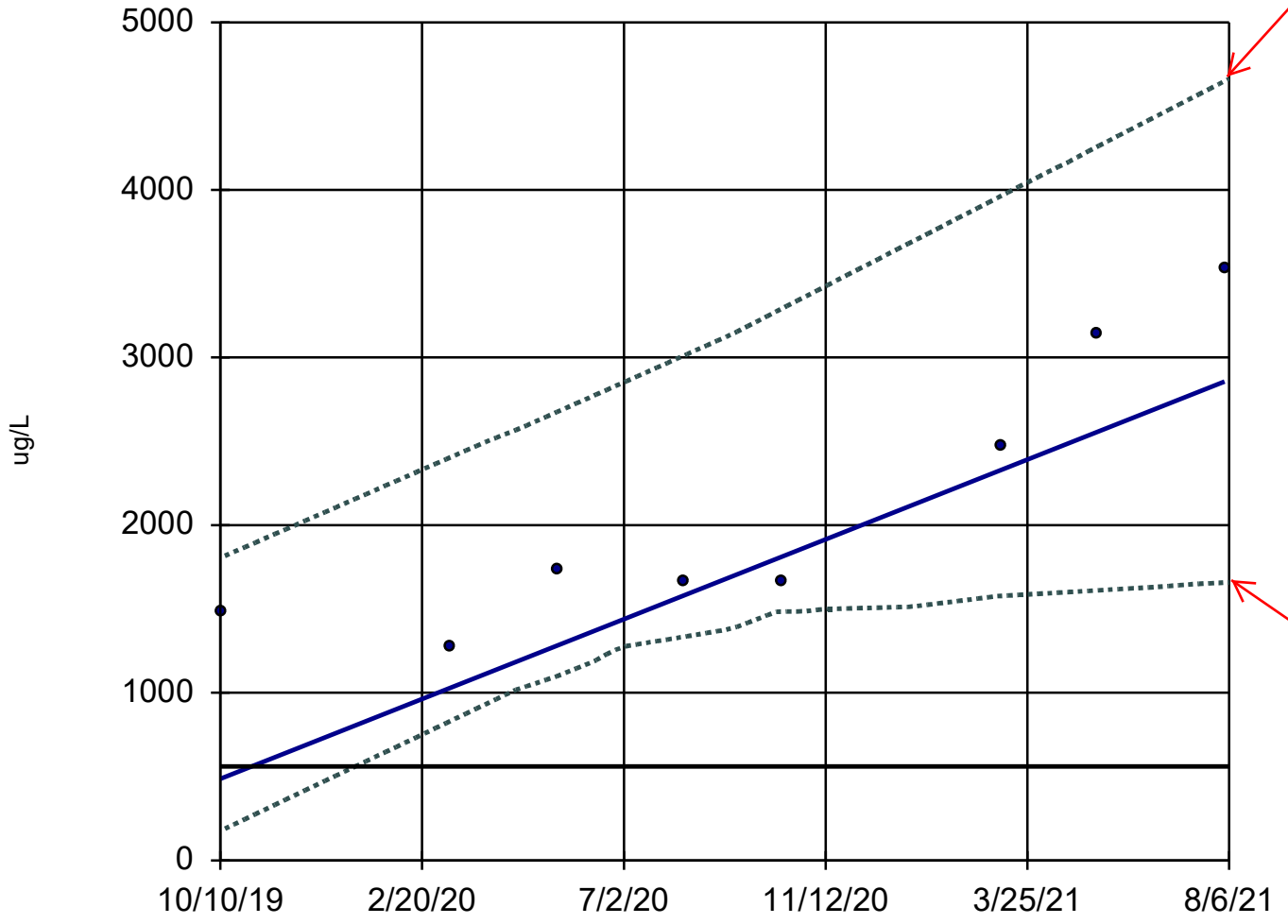


Sen's Slope and 98% Confidence Band Analysis Run 9/17/2021 11:27 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Boron with 98% Confidence Band

MW-54R



Upper Limit
8/6/2021 4,663

n = 8

Slope = 1306
units per year.

Mann-Kendall
statistic = 21
critical = 20

Increasing trend
significant at 98%
confidence level
(α = 0.01 per tail).

GWPS = 560 ug/L

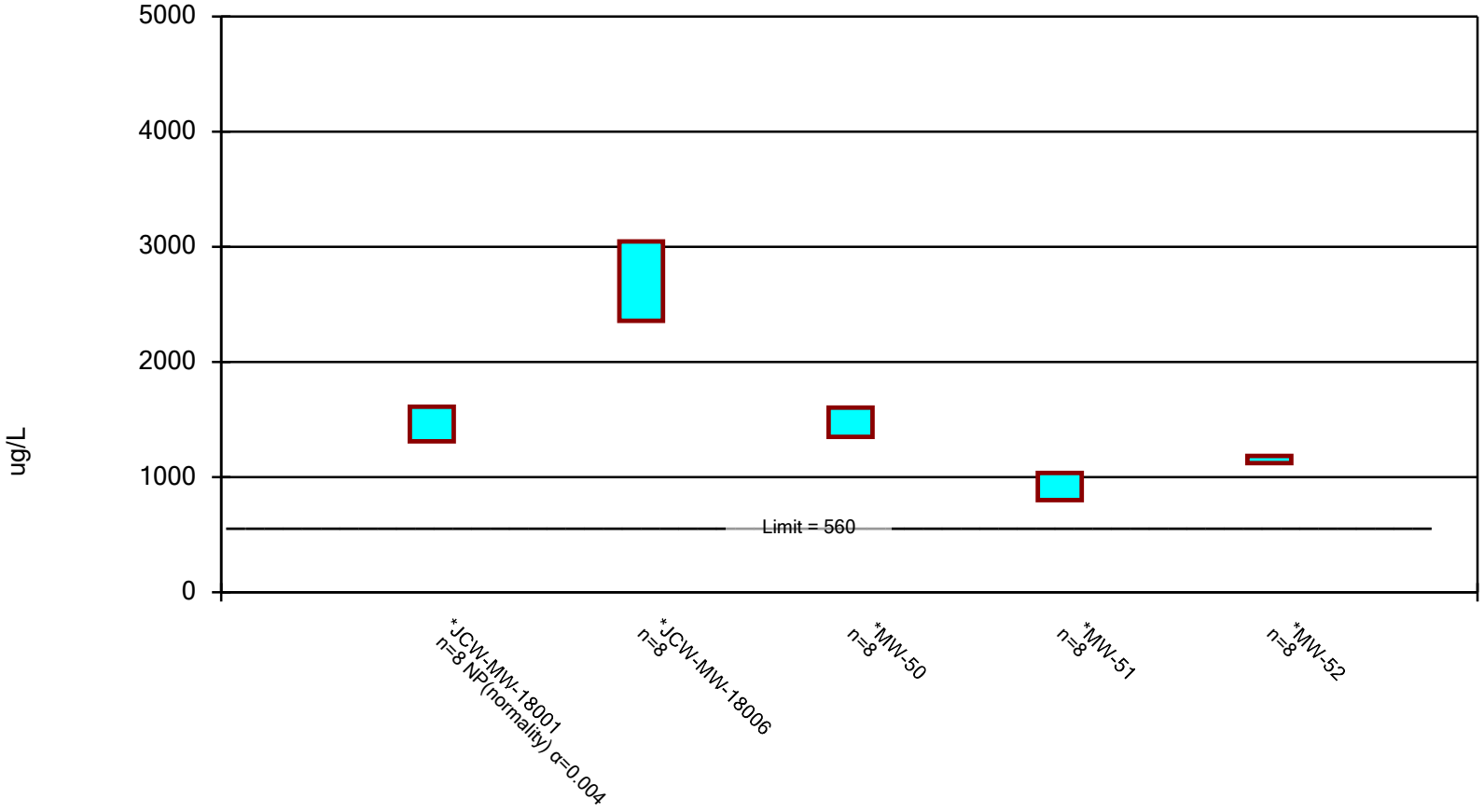
Lower Limit
8/6/2021 1,659

Sen's Slope and 98% Confidence Band Analysis Run 9/17/2021 11:28 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Boron, Total Analysis Run 9/23/2021 12:15 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Confidence Interval

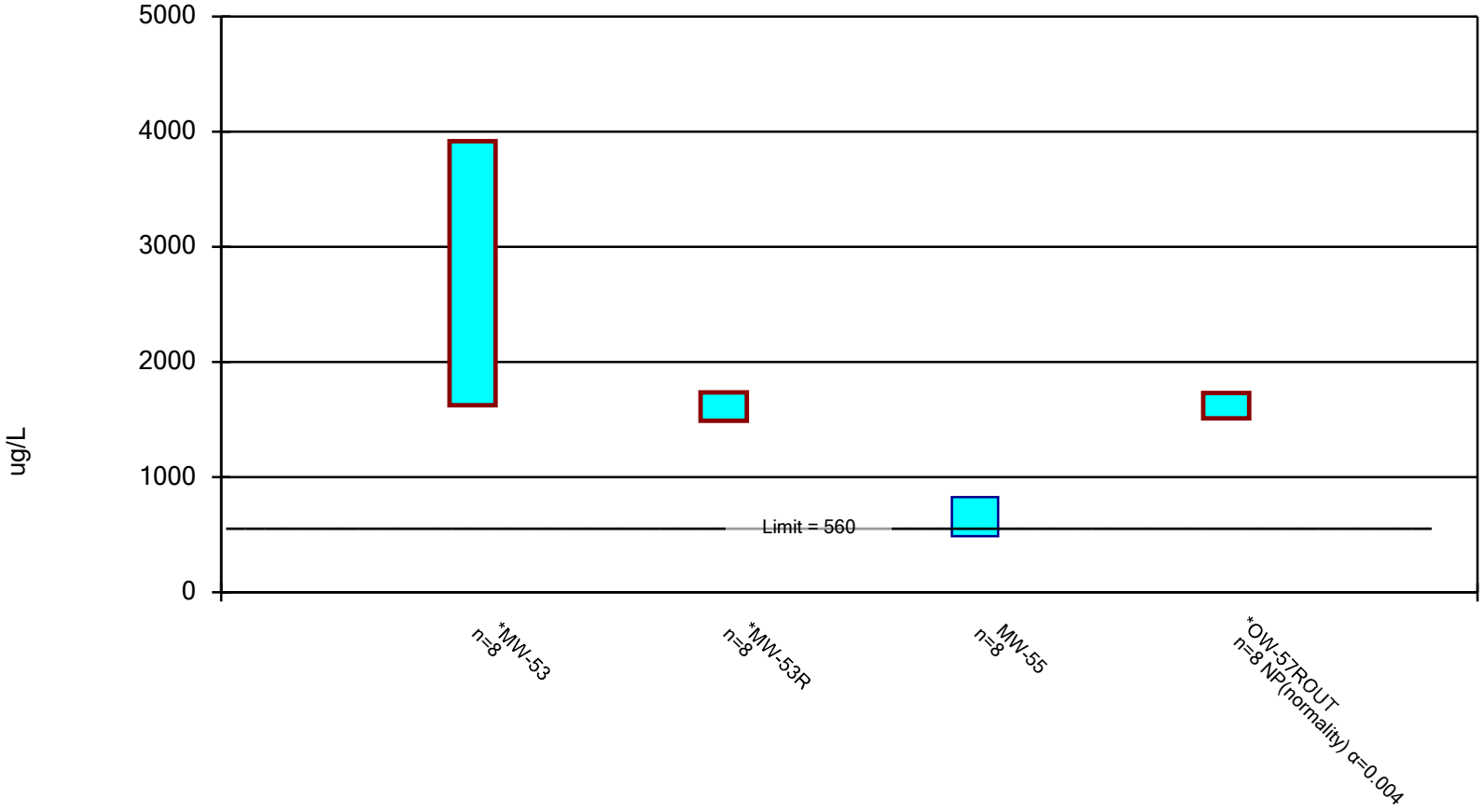
Constituent: Boron, Total (ug/L) Analysis Run 9/23/2021 12:15 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

	JCW-MW-18001	JCW-MW-18006	MW-50	MW-51	MW-52
10/10/2019	1440 (D)		1645 (D)	863 (D)	1175 (D)
10/14/2019		2815 (D)			
3/9/2020	1420		1515 (D)	967	
3/10/2020					1150
3/11/2020		3110			
5/18/2020	1360				
5/19/2020			1300	955.5 (D)	1160
5/20/2020		3030			
8/10/2020	1310		1395 (D)	758	1200
8/11/2020		2040			
10/13/2020	1370		1470		
10/14/2020		2610		768.5 (D)	1110
3/8/2021	1350		1560 (D)	1040	1120
3/9/2021		2650			
5/10/2021	1340		1350 (D)	1040	1160
5/11/2021		2720			
8/2/2021	1610		1575 (D)	960	1140
8/3/2021		2640			
Mean	1400	2702	1476	919	1152
Std. Dev.	94.72	325.2	119.8	111	29.02
Upper Lim.	1610	3047	1603	1037	1183
Lower Lim.	1310	2357	1349	801.3	1121

Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Boron, Total Analysis Run 9/23/2021 12:15 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Confidence Interval

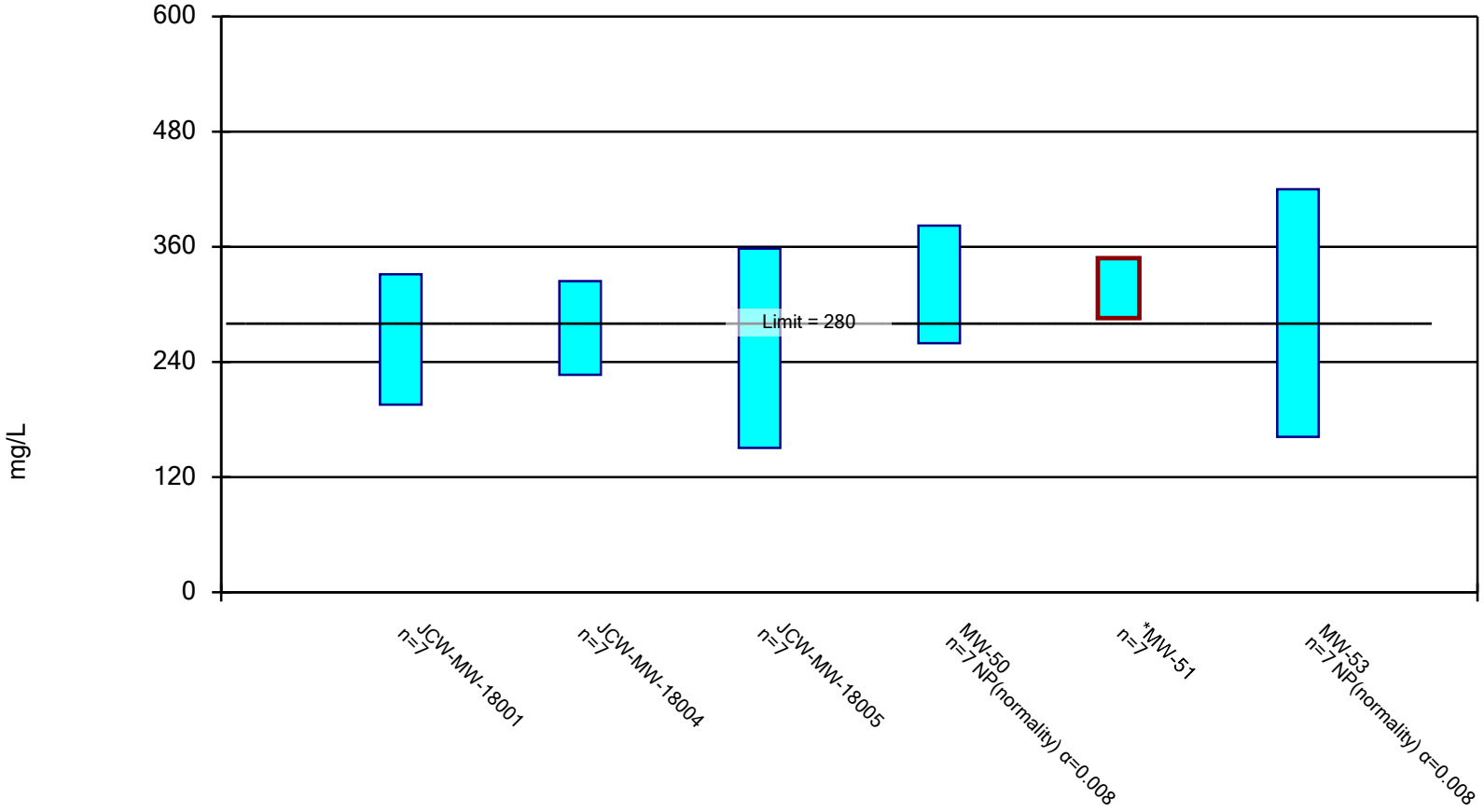
Constituent: Boron, Total (ug/L) Analysis Run 9/23/2021 12:15 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

	MW-53	MW-53R	MW-55	OW-57ROUT
10/10/2019	870 (D)	1740 (D)		
10/11/2019			699.5 (D)	
10/14/2019				1720 (D)
3/10/2020	2530	1590	481	1720
5/19/2020	1750	1460	441	
5/20/2020				1600
8/10/2020	2760			
8/11/2020		1540	592	1510
10/14/2020	2720	1780	705	1730
3/8/2021	3920	1510		
3/9/2021			593	1660
5/10/2021	3790	1580		
5/11/2021			866	1710
8/2/2021	3820	1710		
8/3/2021			873	1730
Mean	2770	1614	656.3	1673
Std. Dev.	1081	116.1	160.5	79.6
Upper Lim.	3916	1737	826.5	1730
Lower Lim.	1624	1491	486.2	1510

Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Calcium, Total Analysis Run 9/17/2021 11:20 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Confidence Interval

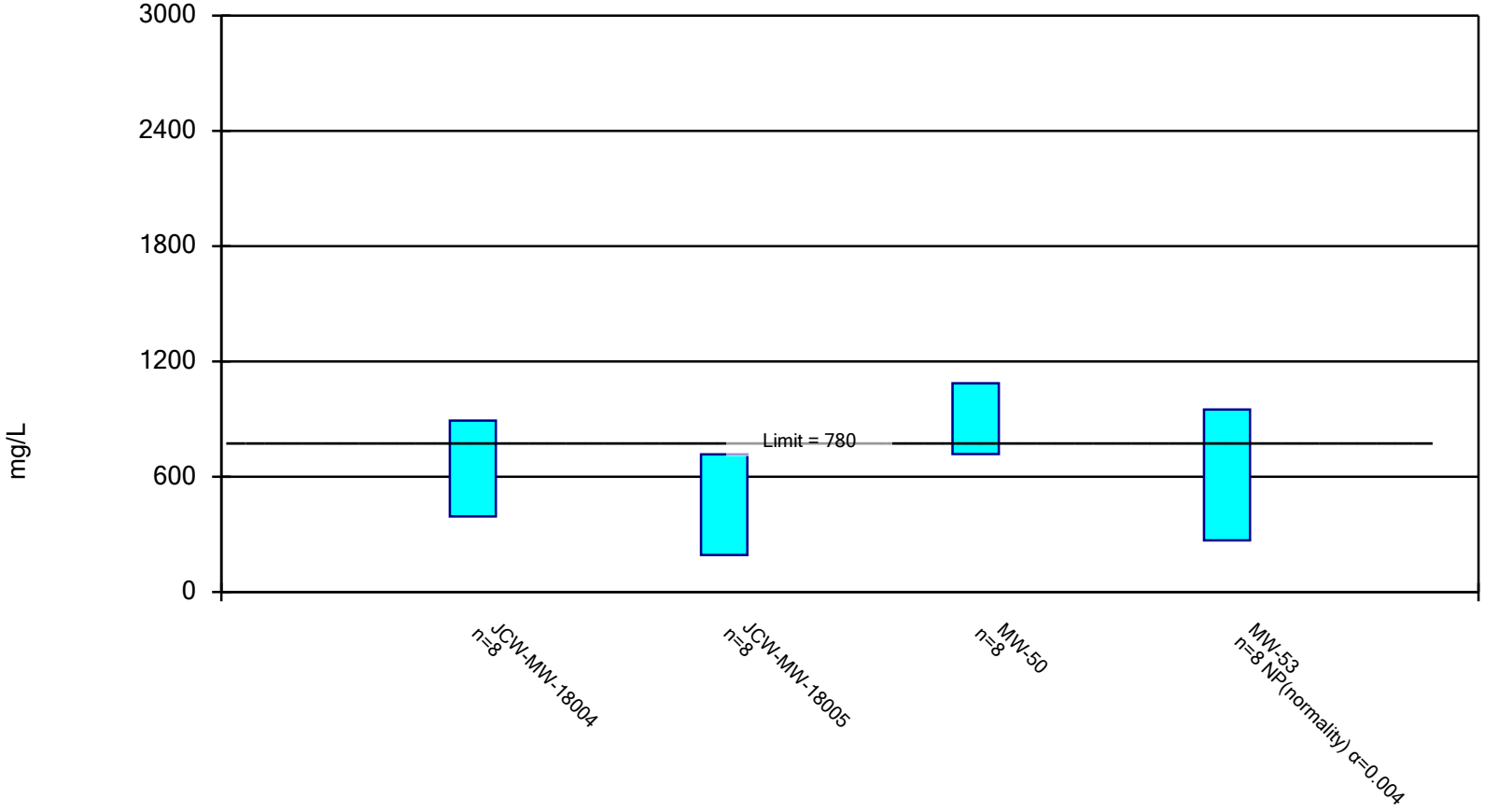
Constituent: Calcium, Total (mg/L) Analysis Run 9/17/2021 11:20 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

	JCW-MW-18001	JCW-MW-18004	JCW-MW-18005	MW-50	MW-51	MW-53
10/10/2019	170			280	345 (D)	420
10/11/2019			270			
10/15/2019		270				
5/18/2020	232					
5/19/2020		308	419	380	326.5 (D)	308
8/10/2020	237			382 (D)	341	211
8/11/2020		306	259			
10/13/2020	282			368		
10/14/2020		323	195		333.5 (D)	192
3/8/2021	270	252		380.5 (D)	293	187
3/9/2021			286			
5/10/2021	305			366.5 (D)	303	187
5/11/2021		266	202			
8/2/2021	348			259.5 (D)	276	162
8/3/2021		203	149			
Mean	263.4	275.4	254.3	345.2	316.9	238.1
Std. Dev.	57.28	41.17	87.31	52.25	26.38	92.96
Upper Lim.	331.5	324.3	358	382	348.2	420
Lower Lim.	195.4	226.5	150.6	259.5	285.5	162

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Sulfate Analysis Run 9/17/2021 11:20 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Confidence Interval

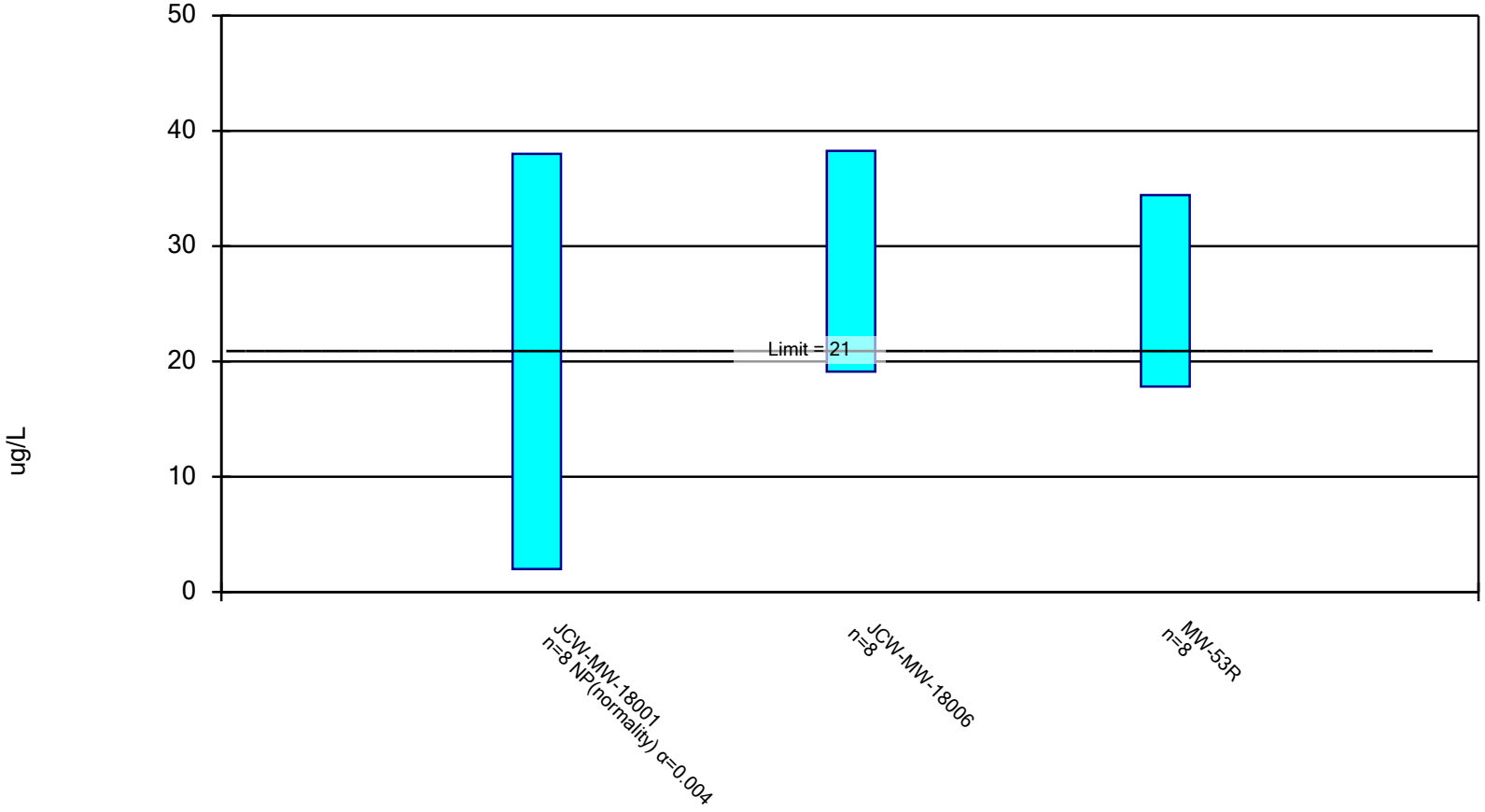
Constituent: Sulfate (mg/L) Analysis Run 9/17/2021 11:20 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

	JCW-MW-18004	JCW-MW-18005	MW-50	MW-53
10/10/2019			668.5 (D)	950 (D)
10/11/2019		473 (D)		
10/15/2019	1095 (D)			
3/9/2020			898.5 (D)	
3/10/2020	714	781		278
5/19/2020	361	817	1010	549
8/10/2020			1030 (D)	321
8/11/2020	718	398		
10/13/2020			990	
10/14/2020	756	185		269
3/8/2021	581		1125 (D)	317
3/9/2021		535		
5/10/2021			861.5 (D)	322
5/11/2021	523	263		
8/2/2021			636 (D)	279
8/3/2021	393	190		
Mean	642.6	455.3	902.4	410.6
Std. Dev.	235.4	247.1	174.2	235.9
Upper Lim.	892.2	717.1	1087	950
Lower Lim.	393.1	193.4	717.8	269

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, Total Analysis Run 9/17/2021 11:20 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Confidence Interval

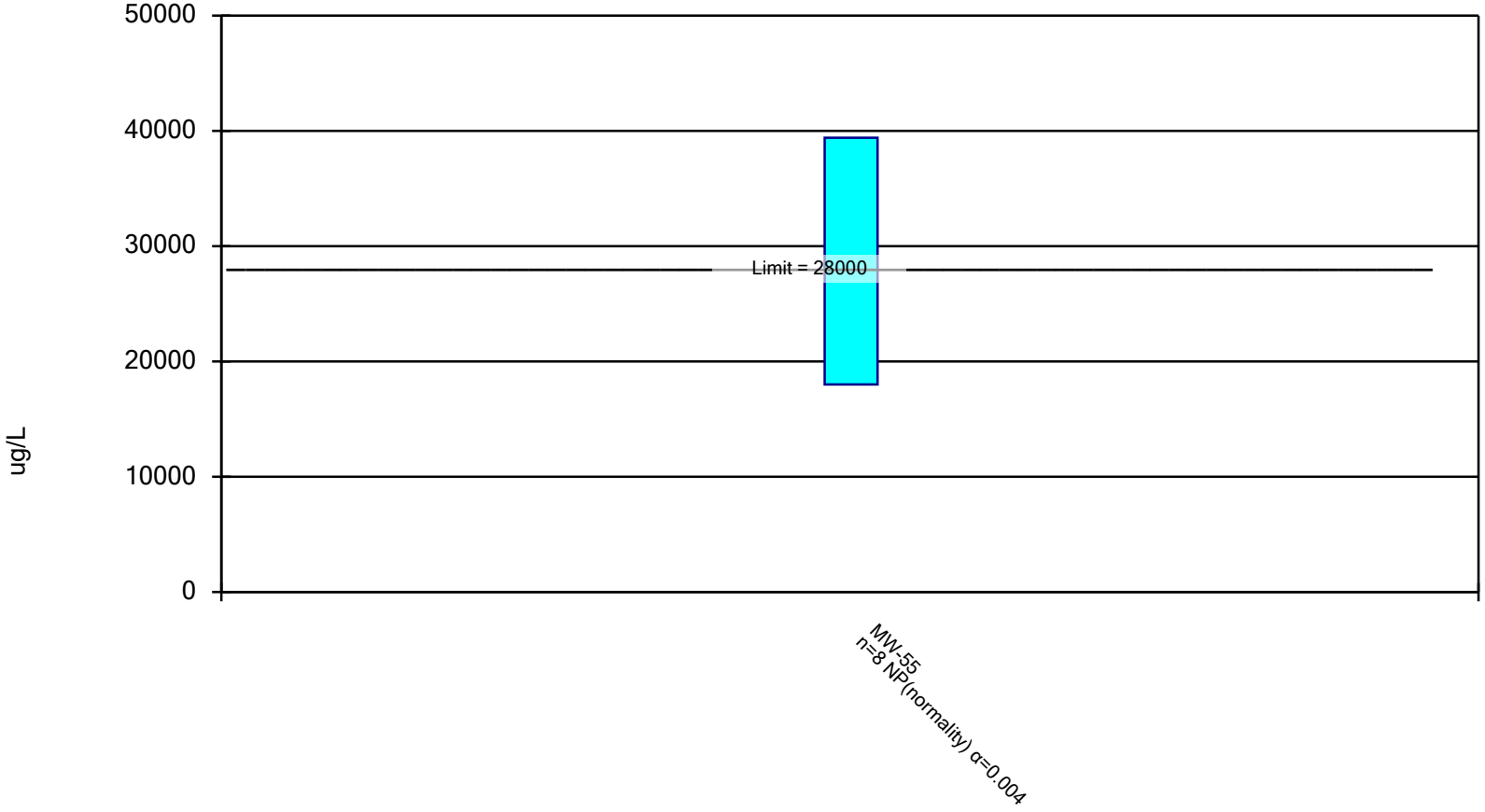
Constituent: Arsenic, Total (ug/L) Analysis Run 9/17/2021 11:20 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

	JCW-MW-18001	JCW-MW-18006	MW-53R
10/10/2019	2.25 (D)		32 (D)
10/14/2019		36.5 (D)	
3/9/2020	3		
3/10/2020			19
3/11/2020		41	
5/18/2020	3		
5/19/2020			27
5/20/2020		33	
8/10/2020	3		
8/11/2020		12	31
10/13/2020	3		
10/14/2020		22	40
3/8/2021	2		19
3/9/2021		30	
5/10/2021	2		18
5/11/2021		30	
8/2/2021	38		23
8/3/2021		25	
Mean	7.031	28.69	26.13
Std. Dev.	12.52	9.035	7.827
Upper Lim.	38	38.26	34.42
Lower Lim.	2	19.11	17.83

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Iron, Total Analysis Run 9/17/2021 11:20 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Confidence Interval

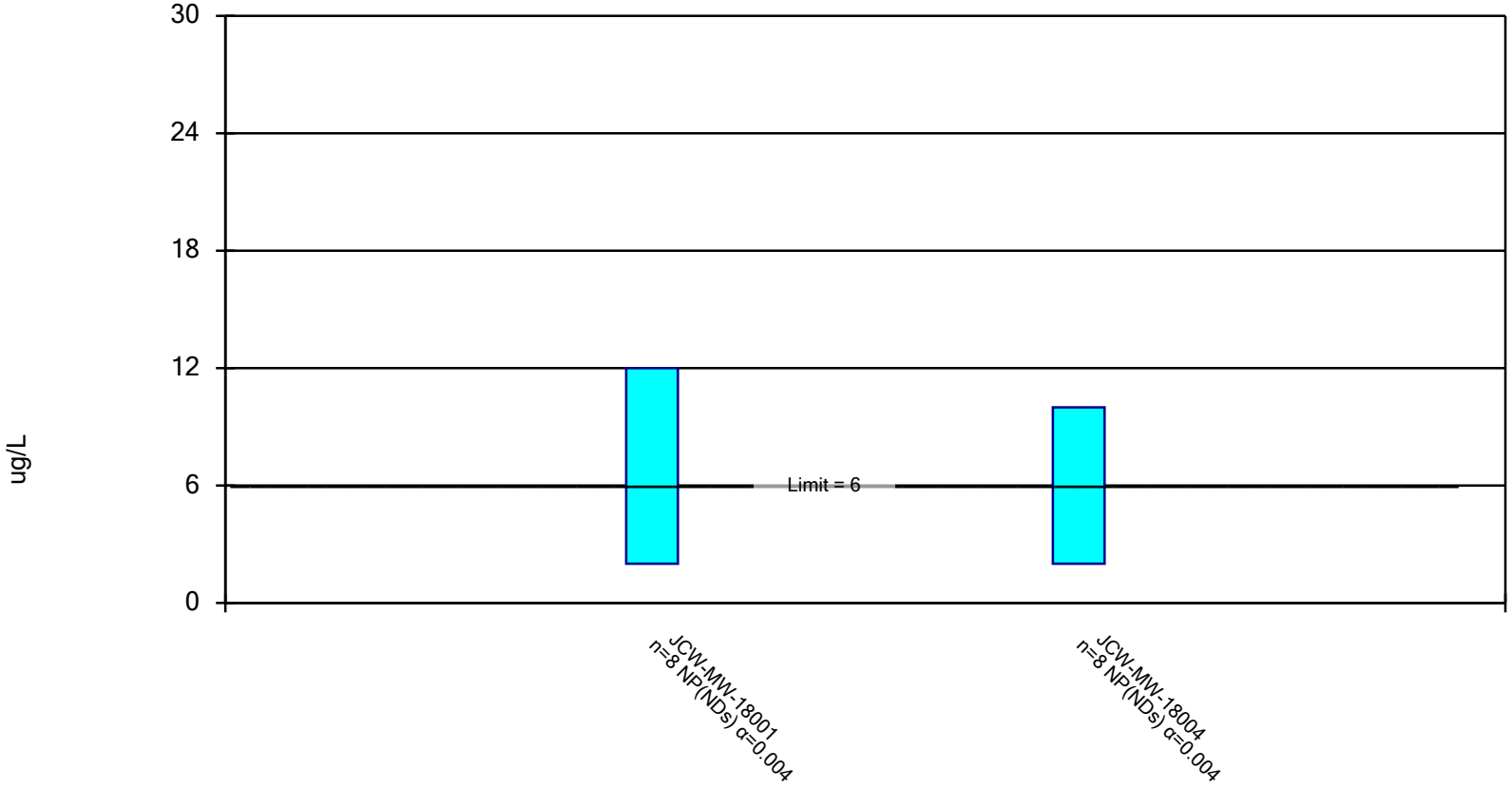
Constituent: Iron, Total (ug/L) Analysis Run 9/17/2021 11:20 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

	MW-55
10/11/2019	25300 (D)
3/10/2020	18000
5/19/2020	22000
8/11/2020	21300
10/14/2020	21800
3/9/2021	23500
5/11/2021	21500
8/3/2021	39400
Mean	24100
Std. Dev.	6518
Upper Lim.	39400
Lower Lim.	18000

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Vanadium, Total Analysis Run 9/17/2021 11:20 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Confidence Interval

Constituent: Vanadium, Total (ug/L) Analysis Run 9/17/2021 11:21 AM

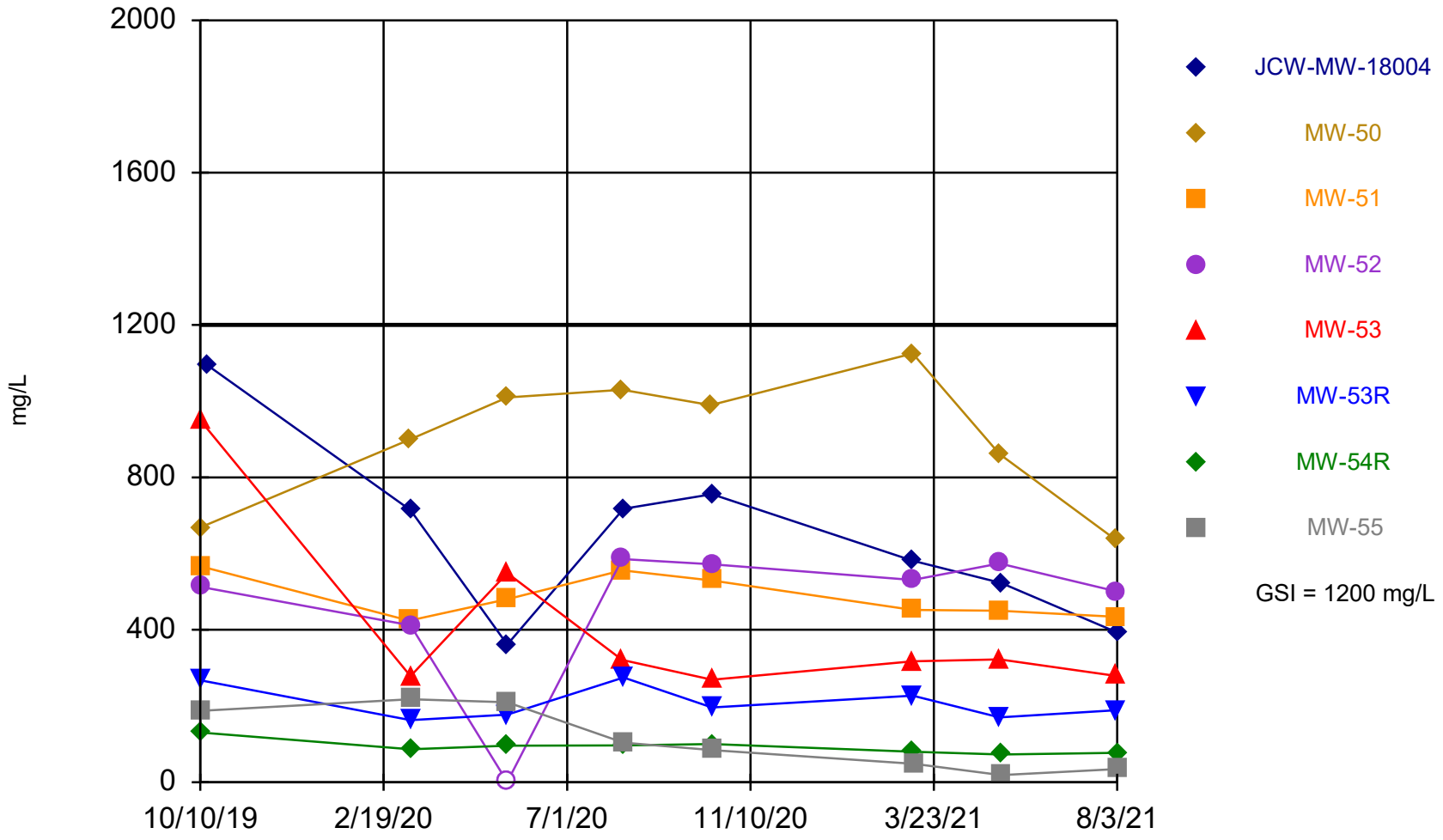
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

	JCW-MW-18001	JCW-MW-18004
10/10/2019	<2 (D)	
10/15/2019		<2 (D)
3/9/2020	<2	
3/10/2020		10
5/18/2020	<2	
5/19/2020		<2
8/10/2020	<2	
8/11/2020		<2
10/13/2020	<2	
10/14/2020		<2
3/8/2021	<2	<2
5/10/2021	2	
5/11/2021		<2
8/2/2021	12	
8/3/2021		<2
Mean	3.25	3
Std. Dev.	3.536	2.828
Upper Lim.	12	10
Lower Lim.	2	2

Attachment 2
GSI Evaluation Sanitas™ Output Files

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Sulfate Comparison to GSI

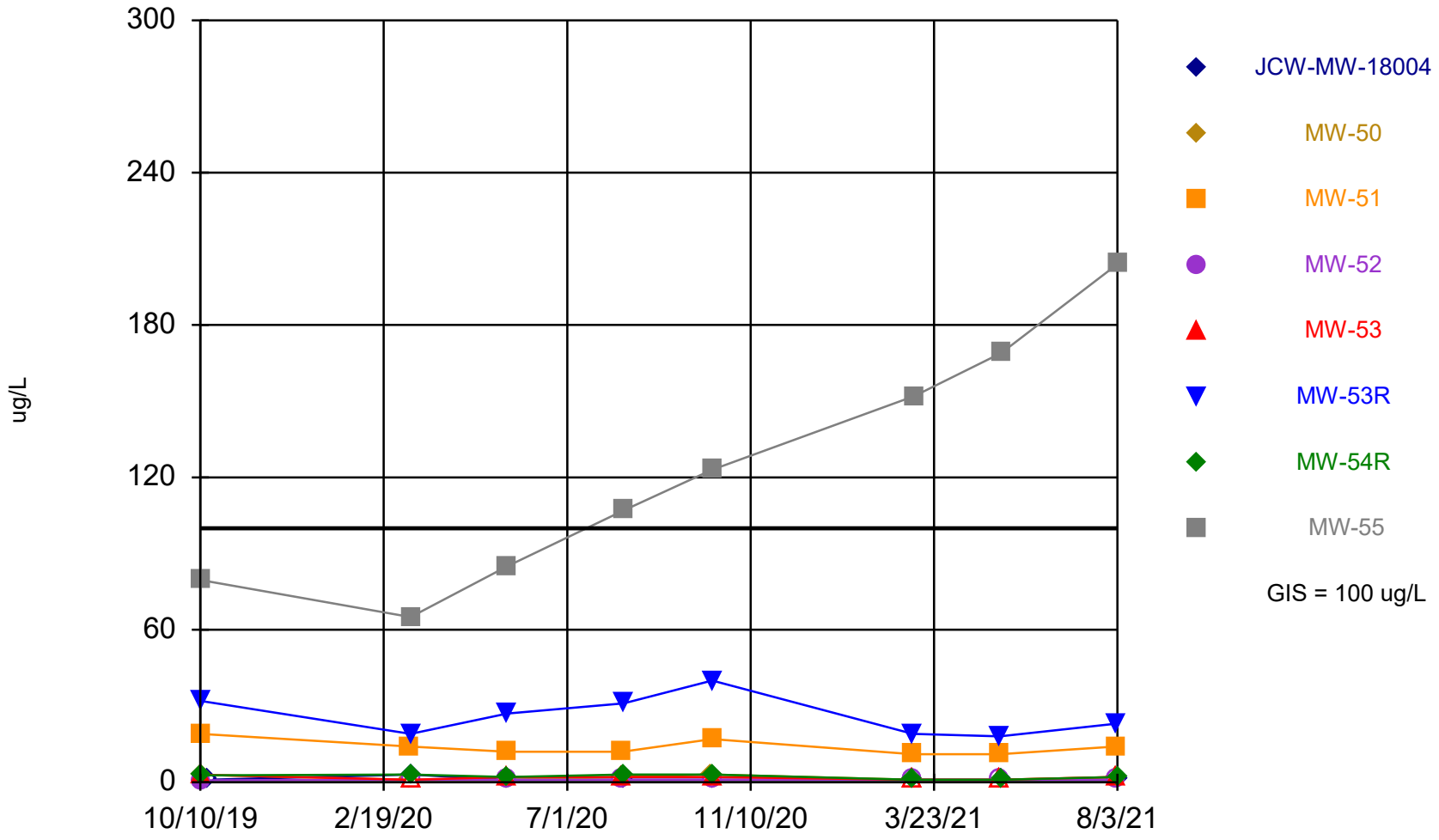


Time Series Analysis Run 9/17/2021 11:37 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Arsenic Comparison to GSI

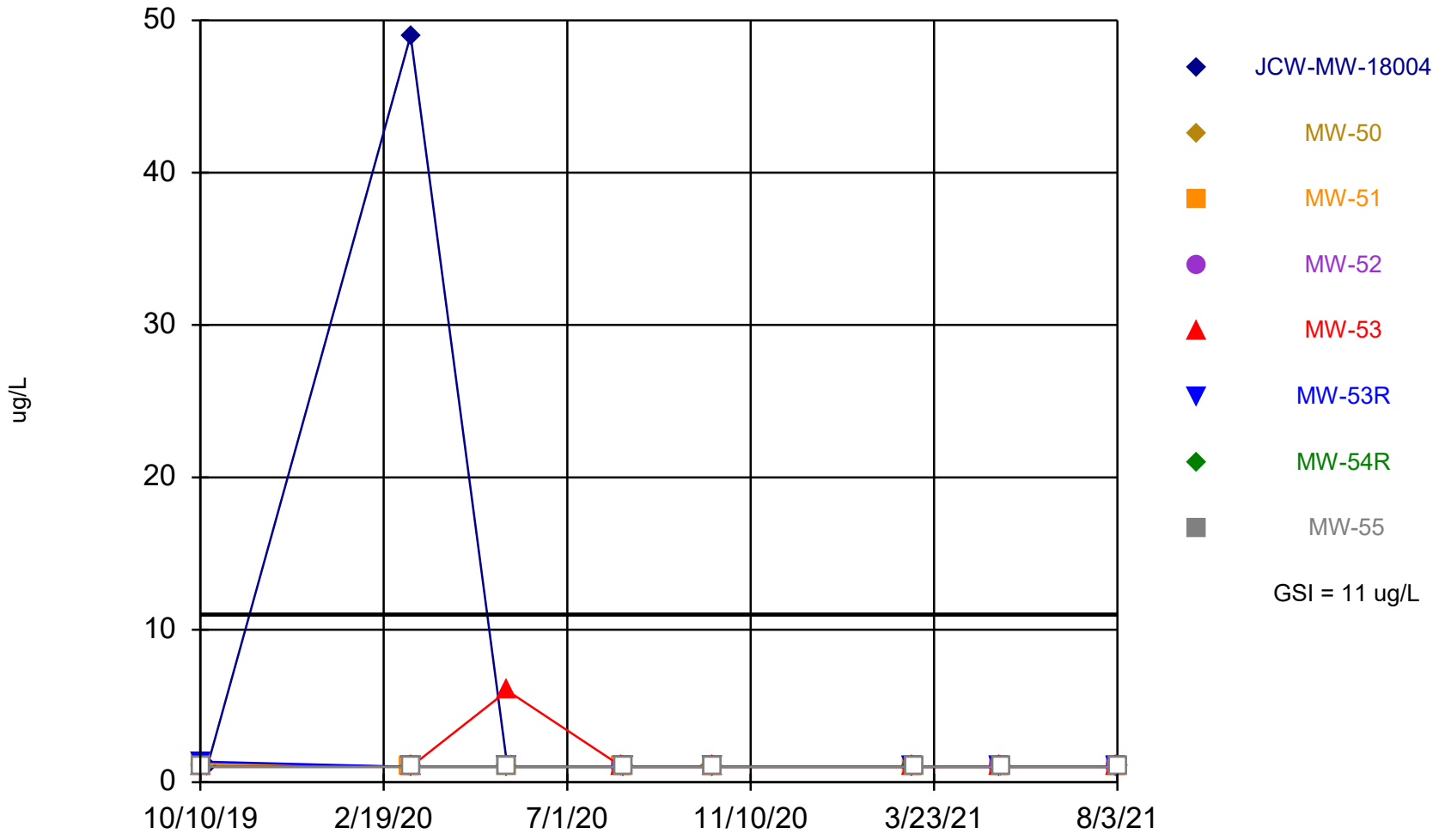


Time Series Analysis Run 9/17/2021 11:38 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Chromium Comparison to GSI

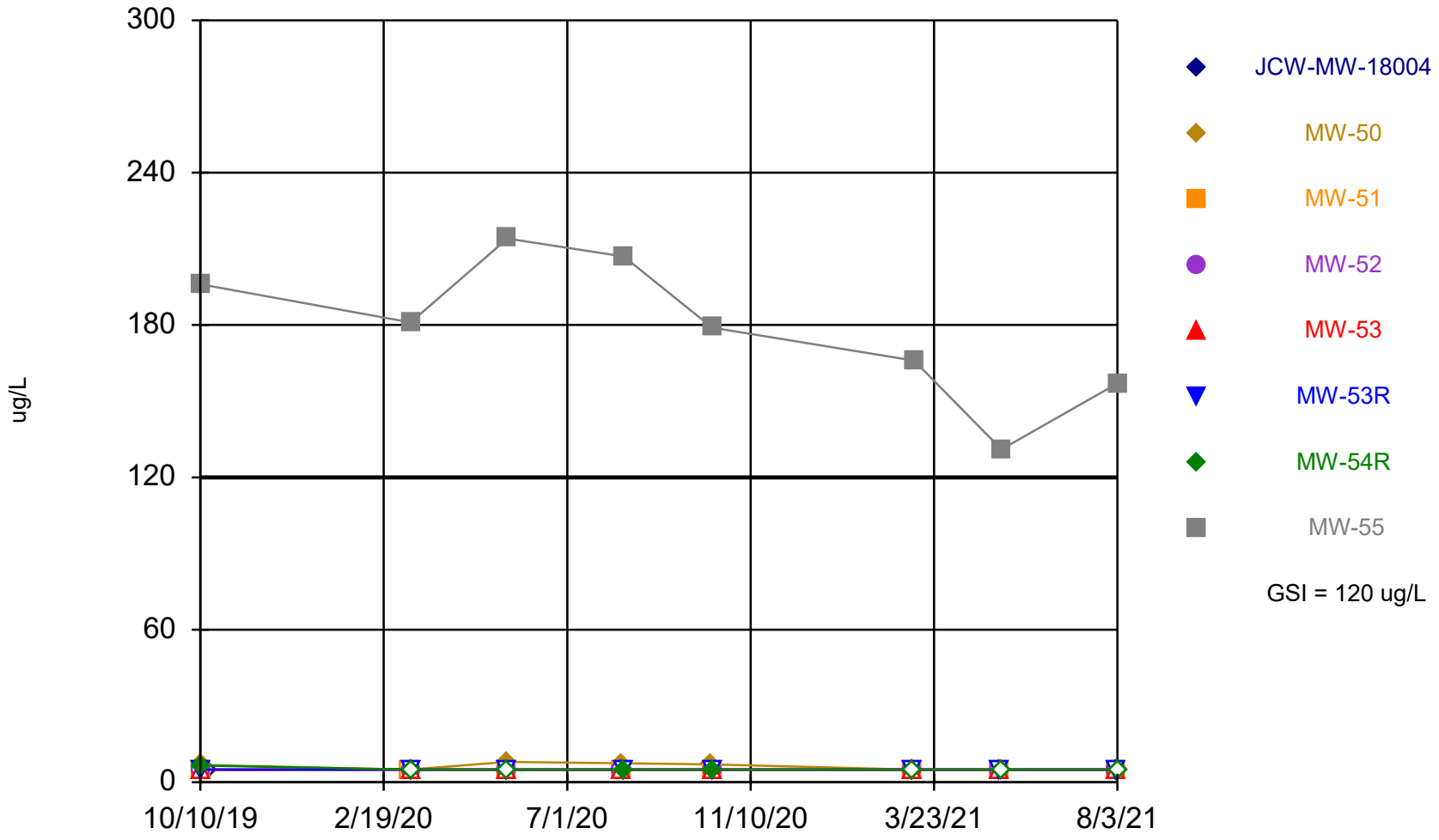


Time Series Analysis Run 9/17/2021 11:38 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Molybdenum Comparison to GSI



Time Series Analysis Run 9/17/2021 11:39 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Summary Report

Constituent: Sulfate Analysis Run 9/17/2021 11:40 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

For observations made between 10/10/2019 and 8/3/2021, a summary of the selected data set:

Observations = 64
ND/Trace = 1
Wells = 8
Minimum Value = 0.5
Maximum Value = 1125
Mean Value = 414.6
Median Value = 377
Standard Deviation = 298.6
Coefficient of Variation = 0.7202
Skewness = 0.6776

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	0	361	1095	642.6	647.5	235.4	0.3664	0.6435
MW-50	8	0	636	1125	902.4	944.3	174.2	0.193	-0.4844
MW-51	8	0	424	567.3	486.7	466.3	56.59	0.1163	0.3812
MW-52	8	1	0.5	586	461.2	522	194.3	0.4214	-1.927
MW-53	8	0	269	950	410.6	319	235.9	0.5746	1.743
MW-53R	8	0	163	275	208.1	192.5	43.63	0.2097	0.6094
MW-54R	8	0	72.7	130.5	92.28	90.95	18.34	0.1988	1.07
MW-55	8	0	18.5	218	113	94	81.29	0.7191	0.241

Summary Report

Constituent: Arsenic, Total Analysis Run 9/17/2021 11:40 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

For observations made between 10/10/2019 and 8/3/2021, a summary of the selected data set:

Observations = 64
ND/Trace = 17
Wells = 8
Minimum Value = 0.5
Maximum Value = 204
Mean Value = 21.23
Median Value = 2.325
Standard Deviation = 42.98
Coefficient of Variation = 2.025
Skewness = 2.718

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	7	0.5	3	0.8125	0.5	0.8839	1.088	2.268
MW-50	8	0	1	3	1.738	1.5	0.8667	0.4988	0.4726
MW-51	8	0	11	19	13.75	13	2.915	0.212	0.7811
MW-52	8	7	0.5	1	0.5625	0.5	0.1768	0.3143	2.268
MW-53	8	3	0.5	2.95	1.556	2	0.9318	0.5987	-0.09031
MW-53R	8	0	18	40	26.13	25	7.827	0.2996	0.5414
MW-54R	8	0	1	3	2.206	2.325	0.8521	0.3862	-0.479
MW-55	8	0	65	204	123.1	115	48.51	0.3942	0.4196

Summary Report

Constituent: Chromium, Total Analysis Run 9/17/2021 11:40 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

For observations made between 10/10/2019 and 8/3/2021, a summary of the selected data set:

Observations = 64
ND/Trace = 57
Wells = 8
Minimum Value = 0.5
Maximum Value = 49
Mean Value = 1.395
Median Value = 0.5
Standard Deviation = 6.086
Coefficient of Variation = 4.362
Skewness = 7.661

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	7	0.5	49	6.563	0.5	17.15	2.613	2.268
MW-50	8	5	0.5	1.2	0.7125	0.5	0.2997	0.4206	0.6547
MW-51	8	7	0.5	1.25	0.5938	0.5	0.2652	0.4466	2.268
MW-52	8	8	0.5	0.5	0.5	0.5	0	0	NaN
MW-53	8	7	0.5	6	1.188	0.5	1.945	1.638	2.268
MW-53R	8	7	0.5	1.35	0.6063	0.5	0.3005	0.4957	2.268
MW-54R	8	8	0.5	0.5	0.5	0.5	0	0	NaN
MW-55	8	8	0.5	0.5	0.5	0.5	0	0	NaN

Summary Report

Constituent: Molybdenum, Total Analysis Run 9/17/2021 11:40 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

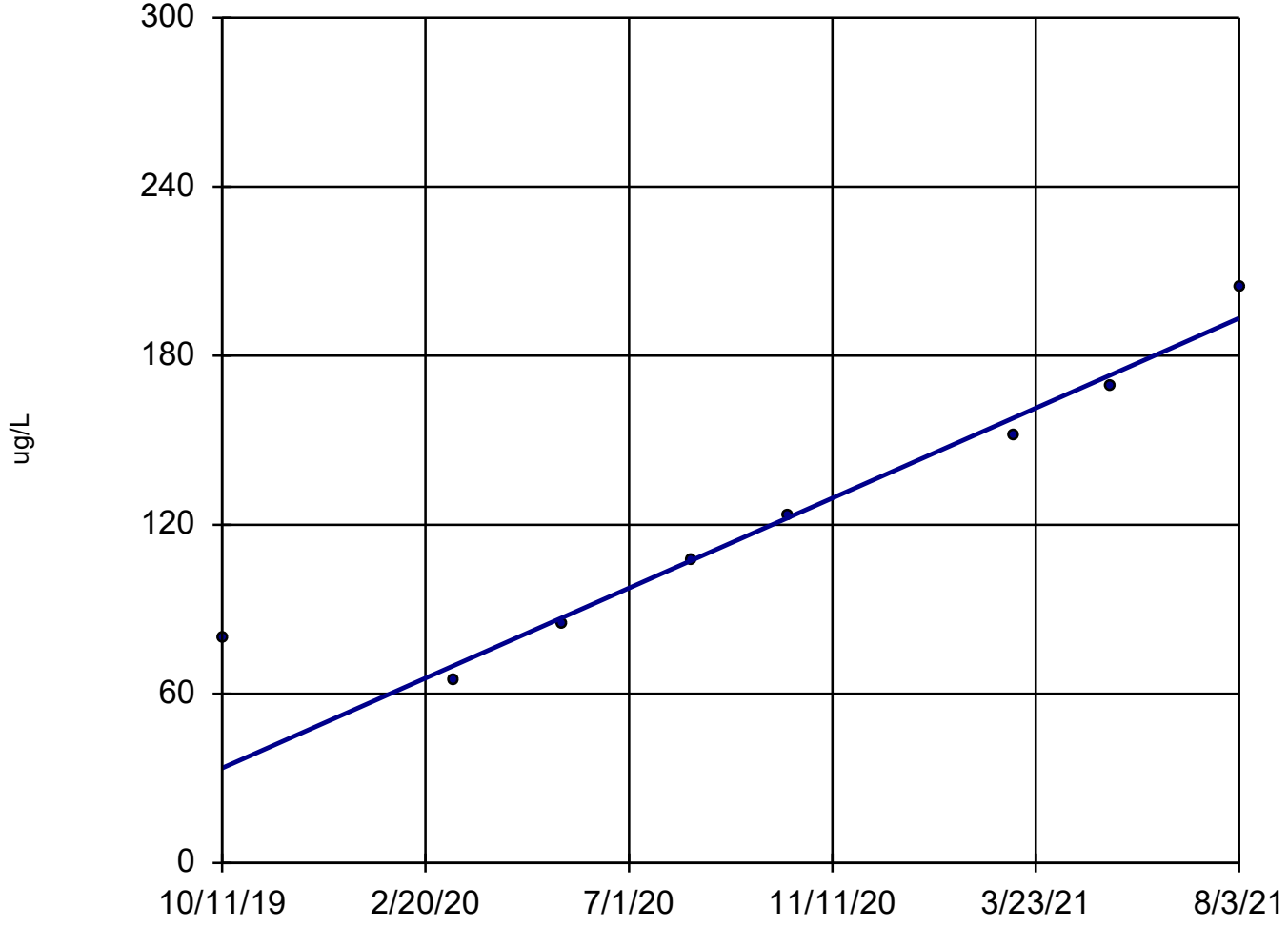
For observations made between 10/10/2019 and 8/3/2021, a summary of the selected data set:

Observations = 64
ND/Trace = 49
Wells = 8
Minimum Value = 2.5
Maximum Value = 214
Mean Value = 24.99
Median Value = 2.5
Standard Deviation = 59.34
Coefficient of Variation = 2.375
Skewness = 2.367

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	8	2.5	2.5	2.5	2.5	0	0	NaN
MW-50	8	4	2.5	8	4.913	4.65	2.603	0.5299	0.05553
MW-51	8	8	2.5	2.5	2.5	2.5	0	0	NaN
MW-52	8	8	2.5	2.5	2.5	2.5	0	0	NaN
MW-53	8	8	2.5	2.5	2.5	2.5	0	0	NaN
MW-53R	8	8	2.5	2.5	2.5	2.5	0	0	NaN
MW-54R	8	5	2.5	6.6	3.638	2.5	1.646	0.4524	0.812
MW-55	8	0	131	214	178.9	180	27.41	0.1532	-0.3836

Arsenic, Total

MW-55



n = 8

Slope = 88.07 units per year.

Mann-Kendall statistic = 26
critical = 20

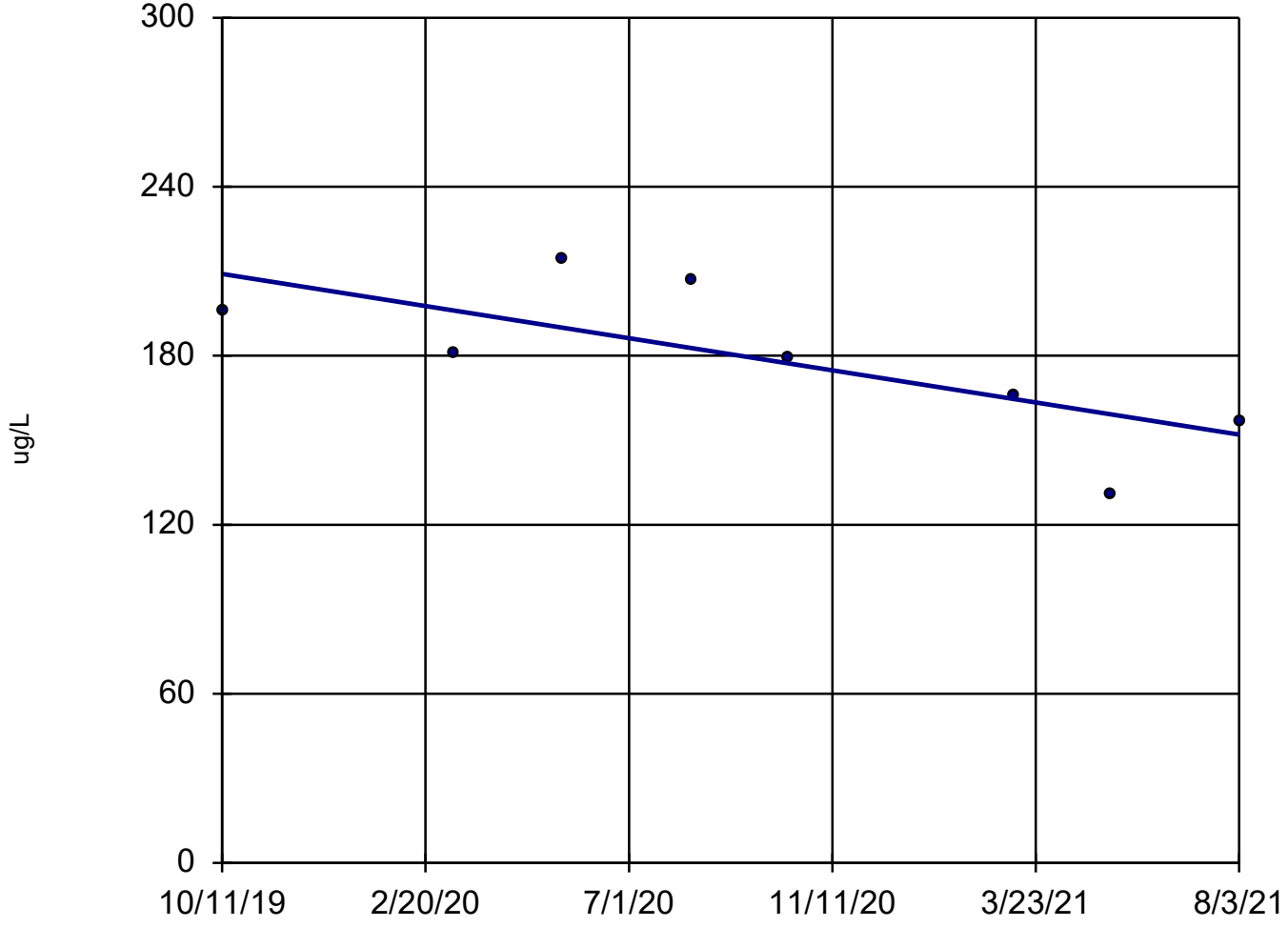
Increasing trend significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 9/17/2021 11:40 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Molybdenum, Total

MW-55



n = 8

Slope = -31.46 units per year.

Mann-Kendall statistic = -18
critical = -20

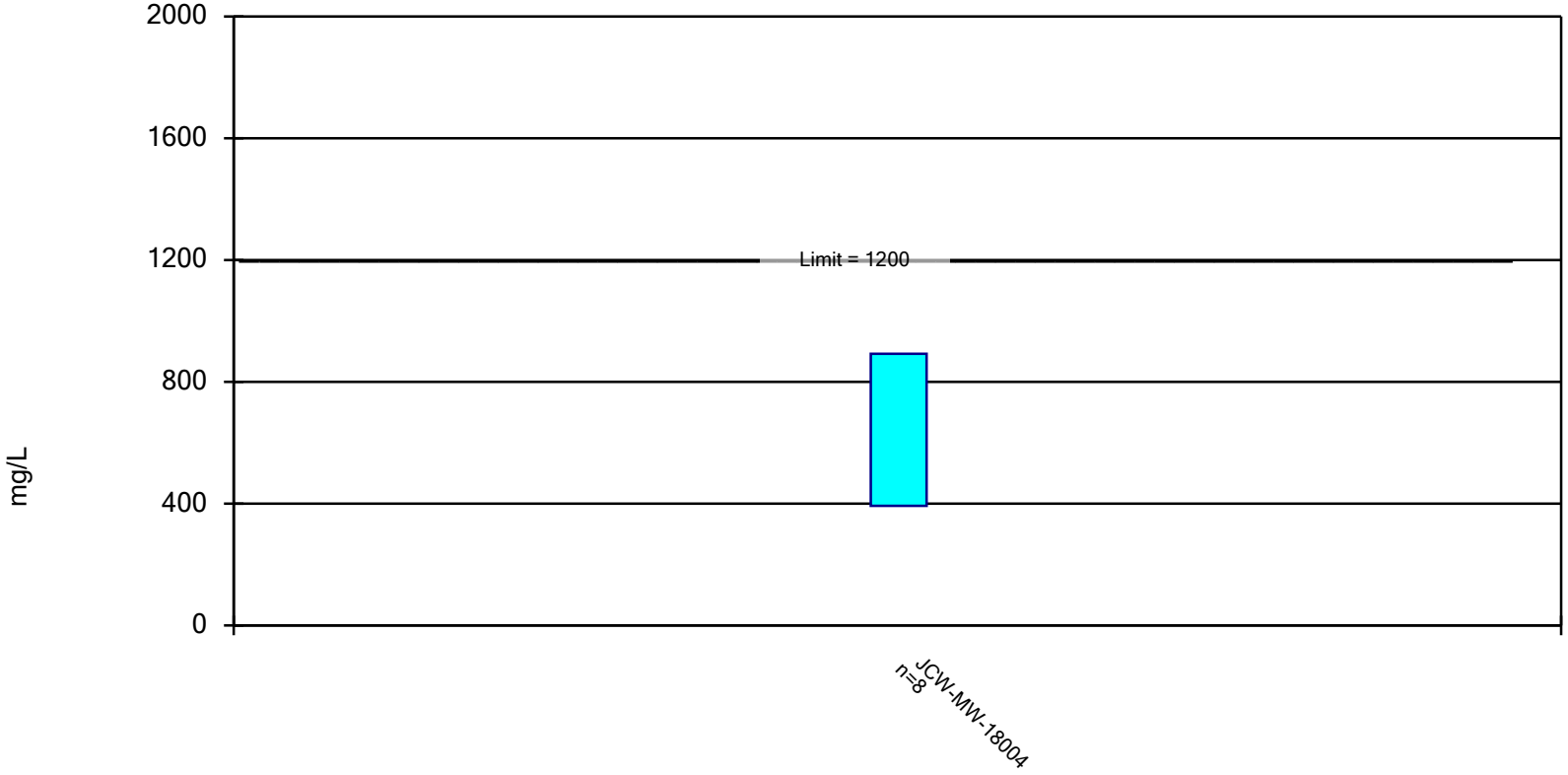
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 9/17/2021 11:40 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Sulfate Analysis Run 9/17/2021 11:46 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Confidence Interval

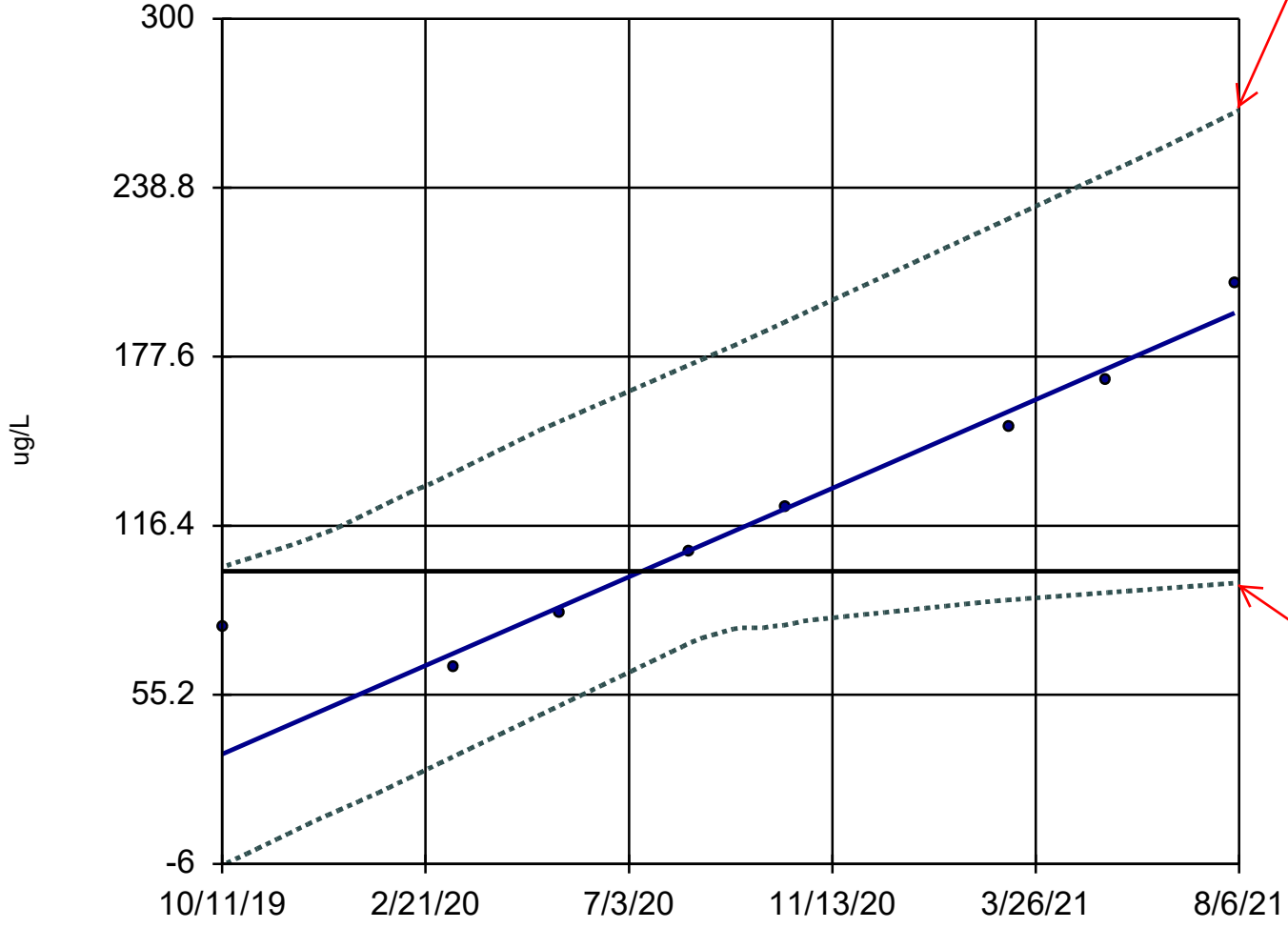
Constituent: Sulfate (mg/L) Analysis Run 9/17/2021 11:46 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

	JCW-MW-18004
10/15/2019	1095 (D)
3/10/2020	714
5/19/2020	361
8/11/2020	718
10/14/2020	756
3/8/2021	581
5/11/2021	523
8/3/2021	393
Mean	642.6
Std. Dev.	235.4
Upper Lim.	892.2
Lower Lim.	393.1

Arsenic with 98% Confidence Band

MW-55



Upper Limit
8/6/2021 266.8

n = 8

Slope = 88.07
units per year.

Mann-Kendall
statistic = 26
critical = 20

Increasing trend
significant at 98%
confidence level
(α = 0.01 per
tail).

GIS = 100.

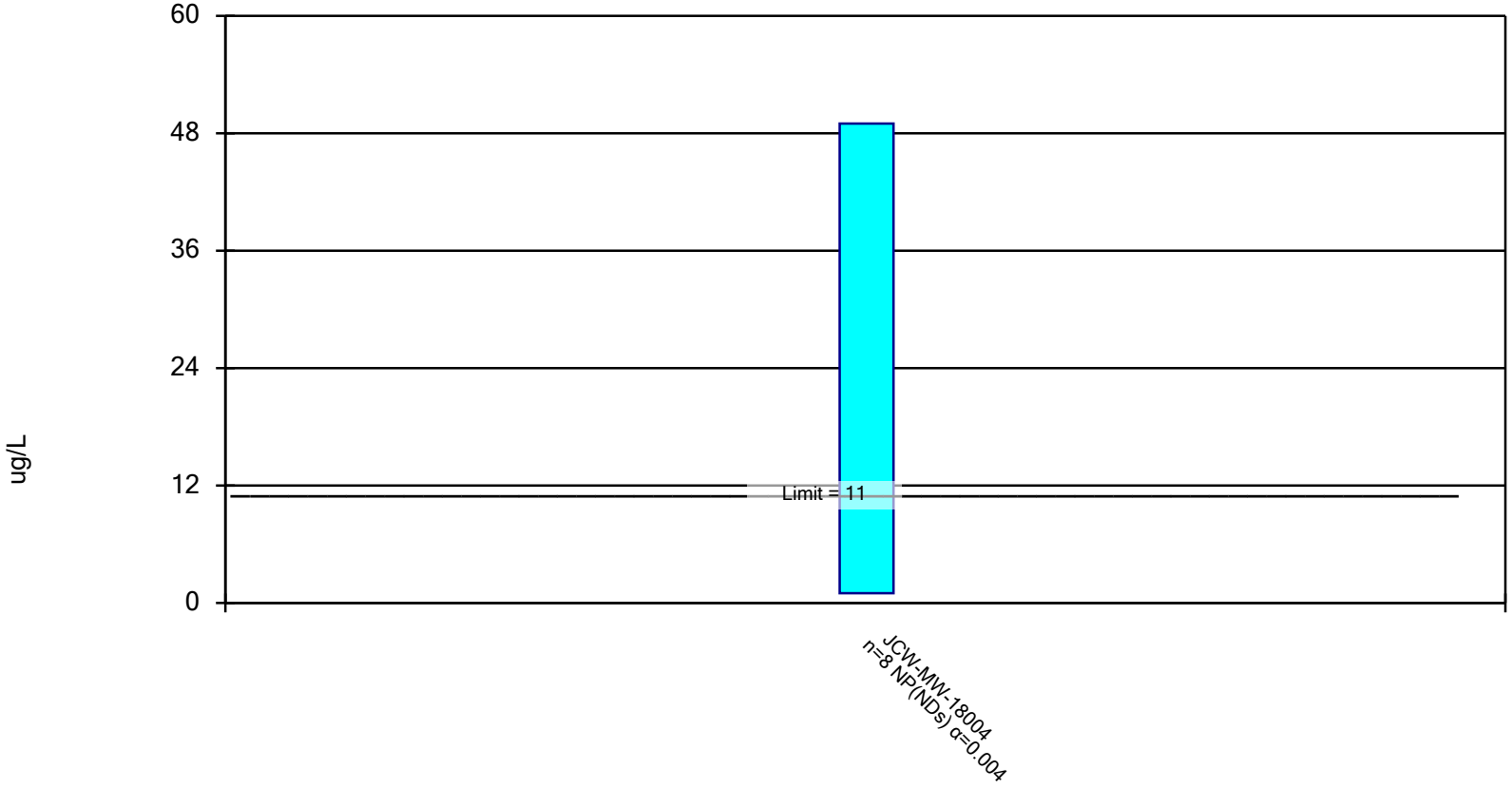
Lower Limit
8/6/2021 95.8

Sen's Slope and 98% Confidence Band Analysis Run 9/17/2021 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Chromium, Total Analysis Run 9/17/2021 11:46 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Confidence Interval

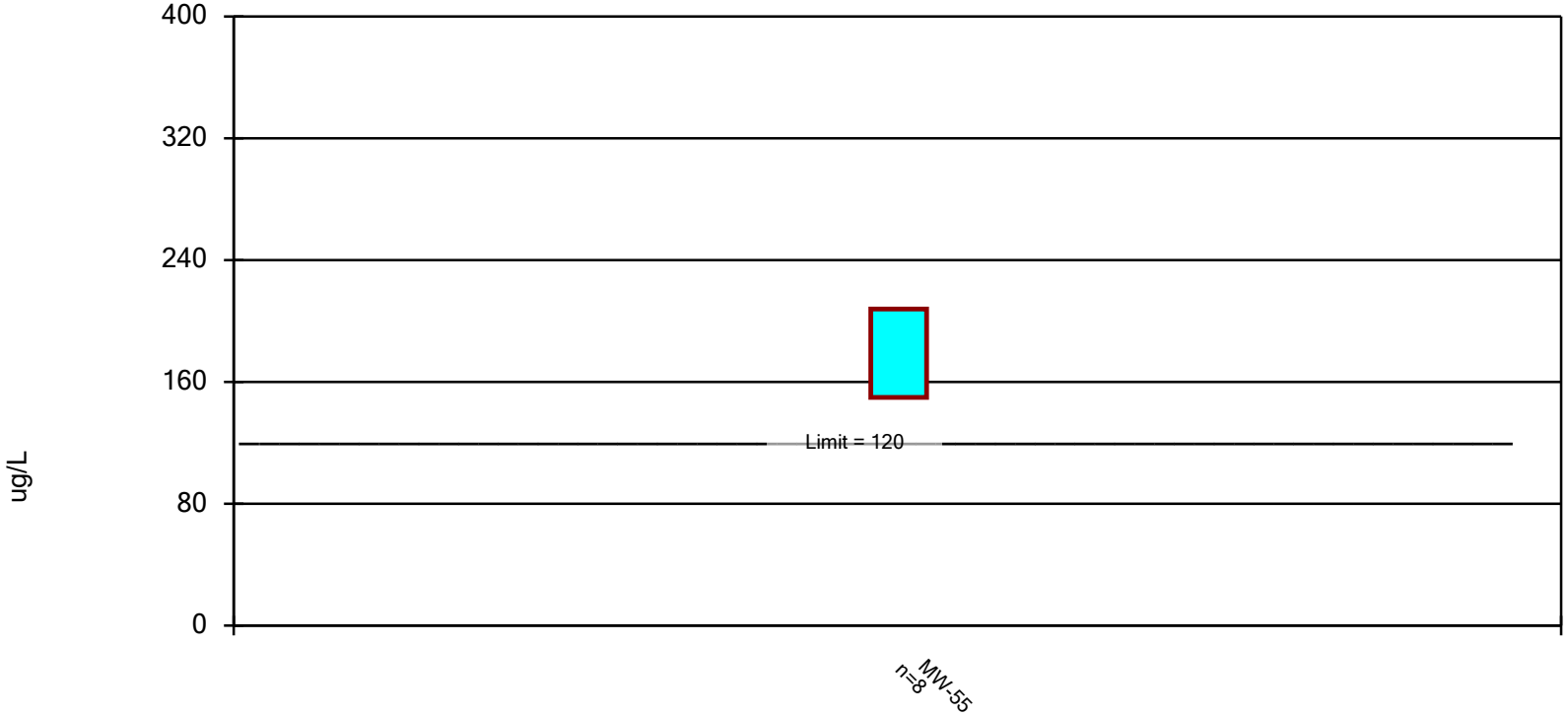
Constituent: Chromium, Total (ug/L) Analysis Run 9/17/2021 11:46 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

	JCW-MW-18004
10/15/2019	<1 (D)
3/10/2020	49
5/19/2020	<1
8/11/2020	<1
10/14/2020	<1
3/8/2021	<1
5/11/2021	<1
8/3/2021	<1
Mean	7
Std. Dev.	16.97
Upper Lim.	49
Lower Lim.	1

Parametric Confidence Interval

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



Constituent: Molybdenum, Total Analysis Run 9/17/2021 11:45 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

Confidence Interval

Constituent: Molybdenum, Total (ug/L) Analysis Run 9/17/2021 11:45 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q3_backup

	MW-55
10/11/2019	196 (D)
3/10/2020	181
5/19/2020	214
8/11/2020	207
10/14/2020	179
3/9/2021	166
5/11/2021	131
8/3/2021	157
Mean	178.9
Std. Dev.	27.41
Upper Lim.	207.9
Lower Lim.	149.8

Appendix E
Laboratory Analytical Report

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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: PART 115 GROUNDWATER MONITORING – JCW POREWATER – 2021 Q3

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

Darby Litz, Project Manager
TRC Environmental Corporation
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 21-0882

TRC Environmental, Inc. conducted groundwater monitoring at the JCWeadock site on 08/02/2021 and 08/03/2021, for the 3rd Quarter monitoring requirement, as specified in the Hydrogeological Monitoring Plan for the site. The samples were received for analysis by the Chemistry department of Laboratory Services on 08/04/2021.

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

Testing performed in accordance with the A2LA scope of accredidation specified in the listed certificate.
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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, latest edition.

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: Physical appearance inconsistencies were observed for the field matrix spike/matrix spike duplicate samples, and its corresponding parent sample. It is expected that these lead to MS/MSD recovery outliers for some metals analytes; all affected data has been flagged with "X" in the analytical results section. The following observation were noted:

- The sample bottle for metals MS has a lot of sediment/silt, while the parent and the MSD sample bottle looks clean; this likely caused a high bias on some analytes for the MS recovery (Figure 1).

- Within the same sample set collected for MS no sediments are present in the Alkalinity and/or Anions containers (Figure 2).

- A small amount of sediments are visible in the parent MW-18001 bottle collected for metals, while the Anions container has none; however the metals parent bottle has only a small fraction of what is visible in the metals MS bottle (Figure 3).

- For the Anions MS/MSD pair the sediments show a reversed pattern, with no sediments being present in the MS container, but some visible in the MSD container, but again, much smaller levels when compared to the metals MS bottle (Figure 4).

Figure 1 – MS versus MSD comparison

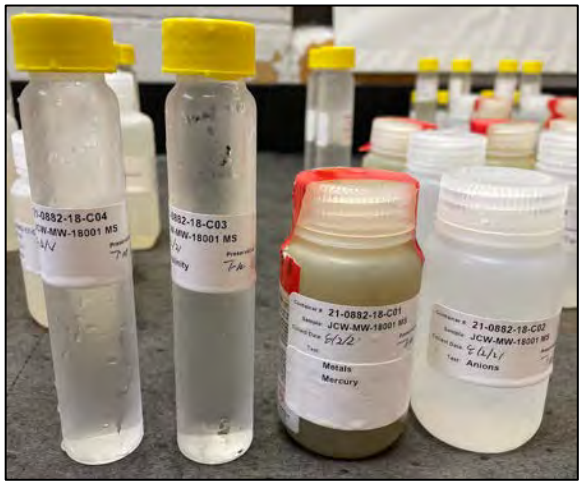

Figure 2 – Complete MS bottle set

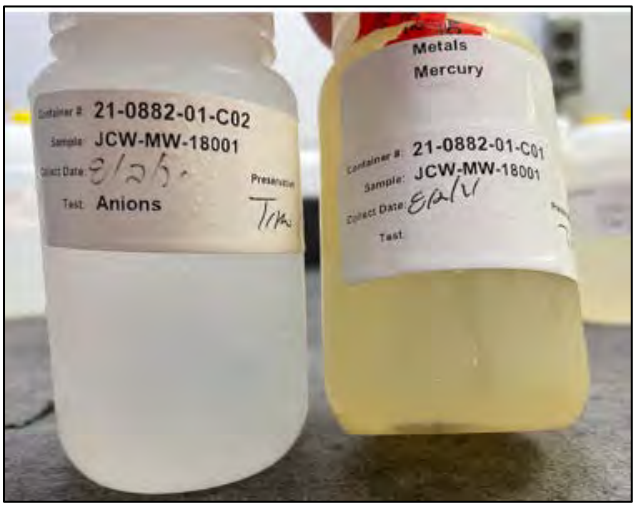

Figure 3 – Parent Anions and Metals

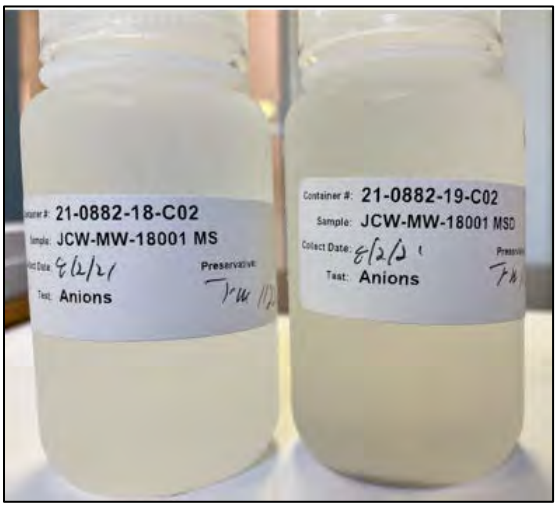

Figure 4 – Anions MS and MSD bottle

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 JCW Part 115 & RCRA Porewater
Date Received: 8/4/2021
Chemistry Project: 21-0882

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-0882-01	JCW-MW-18001	Groundwater	08/02/2021 11:22 AM	JCW Solid Waste Disposal Area, Porewater
21-0882-02	JCW-MW-18004	Groundwater	08/03/2021 07:10 AM	JCW Solid Waste Disposal Area, Porewater
21-0882-03	JCW-OW-18004	Groundwater	08/03/2021 07:45 AM	JCW Solid Waste Disposal Area, Porewater
21-0882-04	JCW-MW-18005	Groundwater	08/03/2021 10:15 AM	JCW Solid Waste Disposal Area, Porewater
21-0882-05	JCW-MW-18006	Groundwater	08/03/2021 11:35 AM	JCW Solid Waste Disposal Area, Porewater
21-0882-06	MW-50	Groundwater	08/02/2021 11:58 AM	JCW Solid Waste Disposal Area, Porewater
21-0882-07	MW-51	Groundwater	08/02/2021 12:40 PM	JCW Solid Waste Disposal Area, Porewater
21-0882-08	MW-52	Groundwater	08/02/2021 01:17 PM	JCW Solid Waste Disposal Area, Porewater
21-0882-09	MW-53	Groundwater	08/02/2021 01:50 PM	JCW Solid Waste Disposal Area, Porewater
21-0882-10	MW-53R	Groundwater	08/02/2021 02:40 PM	JCW Solid Waste Disposal Area, Porewater
21-0882-11	MW-54R	Groundwater	08/03/2021 06:37 AM	JCW Solid Waste Disposal Area, Porewater
21-0882-12	MW-55	Groundwater	08/03/2021 09:02 AM	JCW Solid Waste Disposal Area, Porewater
21-0882-13	OW-55	Groundwater	08/03/2021 09:40 AM	JCW Solid Waste Disposal Area, Porewater
21-0882-14	OW-57R OUT	Groundwater	08/03/2021 11:05 AM	JCW Solid Waste Disposal Area, Porewater
21-0882-15	MW-58	Groundwater	08/03/2021 12:15 PM	JCW Solid Waste Disposal Area, Porewater
21-0882-16	LH-104	Groundwater	08/03/2021 08:19 AM	JCW Solid Waste Disposal Area, Porewater
21-0882-17	DUP-01	Groundwater	08/02/2021 12:00 AM	JCW Solid Waste Disposal Area, Porewater
21-0882-18	JCW-MW-18001 Field MS	Groundwater	08/02/2021 11:22 AM	JCW Solid Waste Disposal Area, Porewater
21-0882-19	JCW-MW-18001 Field MSD	Groundwater	08/02/2021 11:22 AM	JCW Solid Waste Disposal Area, Porewater
21-0882-20	FB-01	Water	08/03/2021 12:20 PM	JCW Solid Waste Disposal Area, Porewater
21-0882-21	EB-01	Water	08/03/2021 12:23 PM	JCW Solid Waste Disposal Area, Porewater

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**JCW-MW-18001**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-01	Collect Time:	11:22 AM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-01-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	38		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	199		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	1610		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	348000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	8		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	6		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	13600		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	2		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	71		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	94100		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	9		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	16		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	13300		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	2		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	125000		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	12		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	12		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-01-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	76400		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	700000		ug/L	1000.0	08/11/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-01-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	662000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**JCW-MW-18001**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-01	Collect Time:	11:22 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-01-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	662000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-01-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1880		mg/L	10.0	08/04/2021	AB21-0805-01

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Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-02	Collect Time:	07:10 AM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-02-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	36		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	304		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	203000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	1		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	ND		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	47		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	67900		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	9		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	2240		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	4		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	16500		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-02-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	6650		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	393000		ug/L	1000.0	08/11/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-02-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	448000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-02	Collect Time:	07:10 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-02-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	448000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-02-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1180		mg/L	10.0	08/04/2021	AB21-0805-01

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Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**JCW-OW-18004**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-03	Collect Time:	07:45 AM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-03-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	1		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	71		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	801		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	154000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	1		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	ND		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	ND		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	65100		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	6		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	1980		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	70200		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-03-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	86100		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	211000		ug/L	1000.0	08/11/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-03-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	512000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**JCW-OW-18004**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-03	Collect Time:	07:45 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-03-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	512000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-03-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	971		mg/L	10.0	08/04/2021	AB21-0805-01

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-04	Collect Time:	10:15 AM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-04-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	9		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	98		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	1080		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	149000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	12		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	5350		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	2		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	28		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	60600		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	29		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	1830		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	2		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	63800		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-04-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	64900		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	190000		ug/L	1000.0	08/11/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-04-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	538000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-04	Collect Time:	10:15 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-04-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	538000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-04-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	895		mg/L	10.0	08/04/2021	AB21-0805-01

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**JCW-MW-18006**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-05	Collect Time:	11:35 AM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-05-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	25		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	492		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	2640		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	135000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	7790		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	46		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	46600		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	6		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	6820		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	2		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	85300		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	4		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-05-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	73600		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	29700		ug/L	1000.0	08/11/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-05-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	600000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**JCW-MW-18006**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-05	Collect Time:	11:35 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-05-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	600000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-05-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	769		mg/L	10.0	08/04/2021	AB21-0805-01

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-50**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-06	Collect Time:	11:58 AM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-06-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	2		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	91		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	1520		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	267000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	1		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	3000		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	79		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	76100		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	11		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	13800		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	3		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	82400		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-06-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	57000		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	638000		ug/L	1000.0	08/11/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-06-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	512000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-50**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-06	Collect Time:	11:58 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-06-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	512000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-06-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1630		mg/L	10.0	08/04/2021	AB21-0805-01

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-51**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-07	Collect Time:	12:40 PM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-07-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	14		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	148		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	960		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	276000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	5080		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	47		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	63200		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	11		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	6250		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	1		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	98300		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-07-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-07-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	99800		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	434000		ug/L	1000.0	08/11/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-07-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	403000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-51**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-07	Collect Time:	12:40 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-07-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	403000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-07-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1530		mg/L	10.0	08/04/2021	AB21-0805-01

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-52**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-08	Collect Time:	01:17 PM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-08-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	115		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	1140		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	196000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	3830		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	21		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	82600		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	9		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	3890		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	1		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	72900		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-08-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-08-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	56500		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	501000		ug/L	1000.0	08/12/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-08-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	465000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-52**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-08	Collect Time:	01:17 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-08-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	465000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-08-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1340		mg/L	10.0	08/04/2021	AB21-0805-01

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-53**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-09	Collect Time:	01:50 PM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-09-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	2		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	200		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	3820		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	162000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	2380		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	38		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	46500		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	6		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	5900		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	3		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	82700		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-09-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-09-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	49900		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	279000		ug/L	1000.0	08/12/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-09-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	471000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-53**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-09	Collect Time:	01:50 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-09-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	471000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-09-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1020		mg/L	10.0	08/04/2021	AB21-0805-01

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Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-53R**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-10	Collect Time:	02:40 PM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-10-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	23		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	204		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	1710		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	203000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	1		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	2800		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	56		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	60000		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	10		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	5190		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	2		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	53600		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-10-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-10-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	34500		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	189000		ug/L	1000.0	08/11/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-10-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	734000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-53R**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-10	Collect Time:	02:40 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-10-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	734000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-10-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1040		mg/L	10.0	08/04/2021	AB21-0805-01

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Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-54R**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-11	Collect Time:	06:37 AM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-11-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	2		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	124		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	3530		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	163000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	1		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	1190		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	60		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	43700		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	9		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	2130		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	1		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	27300		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-11-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-11-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	35500		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	77000		ug/L	1000.0	08/11/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-11-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	611000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-54R**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-11	Collect Time:	06:37 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-11-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	611000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-11-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	786		mg/L	10.0	08/04/2021	AB21-0805-01

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-55**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-12	Collect Time:	09:02 AM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-12-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	204		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	347		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	873		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	126000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	39400		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	25		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	26500		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	157		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	6		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	3170		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	1		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	102000		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-12-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-12-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	19300		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	34300		ug/L	1000.0	08/11/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-12-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	665000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-55**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-12	Collect Time:	09:02 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-12-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	665000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-12-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	743		mg/L	10.0	08/04/2021	AB21-0805-01

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Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**OW-55**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-13	Collect Time:	09:40 AM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-13-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	15		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	317		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	1890		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	157000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	3790		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	19		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	29400		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	7		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	6120		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	53200		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-13-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-13-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	20400		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	12900		ug/L	1000.0	08/11/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-13-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	652000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**OW-55**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-13	Collect Time:	09:40 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-13-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	652000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-13-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	714		mg/L	10.0	08/04/2021	AB21-0805-01

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**OW-57R OUT**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-14	Collect Time:	11:05 AM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-14-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	1		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	72		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	1730		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	118000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	1		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	2		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	56		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	20		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	66500		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	7		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	21		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	1780		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	49400		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-14-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-14-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	53100		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	93900		ug/L	1000.0	08/11/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-14-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	538000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**OW-57R OUT**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-14	Collect Time:	11:05 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-14-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	538000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-14-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	725		mg/L	10.0	08/04/2021	AB21-0805-01

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-58**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-15	Collect Time:	12:15 PM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-15-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	2		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	107		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	179		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	103000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	8150		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	19		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	18900		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	4		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	4130		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	179000		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	5		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-15-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-15-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	258000		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	9760		ug/L	1000.0	08/11/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-15-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	343000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**MW-58**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-15	Collect Time:	12:15 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-15-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	343000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-15-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	901		mg/L	10.0	08/04/2021	AB21-0805-01

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**LH-104**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-16	Collect Time:	08:19 AM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-16-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	21		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	368		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	9410		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	174000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	1		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	308		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	44		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	87400		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	10		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	7		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	11500		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	1		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	68700		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	20		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-16-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-16-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	74800		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	146000		ug/L	1000.0	08/11/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-16-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	782000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**LH-104**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-16	Collect Time:	08:19 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-16-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	782000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-16-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1130		mg/L	10.0	08/04/2021	AB21-0805-01

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**DUP-01**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-17	Collect Time:	12:00 AM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-17-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	2		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	97		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	1630		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	252000		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	1		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	2780		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	81		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	73900		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	12		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	13000		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	2		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	85700		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-17-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-17-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	57200		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	634000		ug/L	1000.0	08/12/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-17-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	512000		ug/L	10000.0	08/12/2021	AB21-0810-14

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**DUP-01**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-17	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-0882-17-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	512000		ug/L	10000.0	08/10/2021	AB21-0810-14
Alkalinity Carbonate	ND		ug/L	10000.0	08/10/2021	AB21-0810-14

Total Dissolved Solids by SM 2540C

Aliquot #: 21-0882-17-C05-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1640		mg/L	10.0	08/04/2021	AB21-0805-01

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**JCW-MW-18001 Field MS**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-18	Collect Time:	11:22 AM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-18-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	90		%	1.0	08/10/2021	AB21-0810-19
Arsenic	131	X	%	1.0	08/10/2021	AB21-0810-19
Barium	132	X	%	5.0	08/10/2021	AB21-0810-19
Beryllium	88		%	1.0	08/10/2021	AB21-0810-19
Boron	101		%	20.0	08/10/2021	AB21-0810-19
Cadmium	98.7		%	0.2	08/10/2021	AB21-0810-19
Calcium	262	X	%	1000.0	08/10/2021	AB21-0810-19
Chromium	113		%	1.0	08/10/2021	AB21-0810-19
Cobalt	103		%	6.0	08/10/2021	AB21-0810-19
Copper	100		%	1.0	08/10/2021	AB21-0810-19
Iron	1450		%	20.0	08/10/2021	AB21-0810-19
Lead	94		%	1.0	08/10/2021	AB21-0810-19
Lithium	83		%	10.0	08/10/2021	AB21-0810-19
Magnesium	162	X	%	1000.0	08/10/2021	AB21-0810-19
Molybdenum	112		%	5.0	08/10/2021	AB21-0810-19
Nickel	105		%	2.0	08/10/2021	AB21-0810-19
Potassium	106		%	100.0	08/10/2021	AB21-0810-19
Selenium	94		%	1.0	08/10/2021	AB21-0810-19
Silver	91.1		%	0.2	08/10/2021	AB21-0810-19
Sodium	104		%	1000.0	08/10/2021	AB21-0810-19
Thallium	99		%	2.0	08/10/2021	AB21-0810-19
Vanadium	119		%	2.0	08/10/2021	AB21-0810-19
Zinc	110		%	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-18-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	116		%	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-18-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	117		%	1000.0	08/11/2021	AB21-0810-23
Fluoride	93		%	1000.0	08/11/2021	AB21-0810-23
Sulfate	109		%	1000.0	08/12/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-18-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	94		%	10000.0	08/12/2021	AB21-0810-14

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**JCW-MW-18001 Field MSD**	Collect Date:	08/02/2021
Lab Sample ID:	21-0882-19	Collect Time:	11:22 AM
Matrix:	Groundwater		

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

Aliquot #: 21-0882-19-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	109		%	1.0	08/10/2021	AB21-0810-19
Arsenic	93		%	1.0	08/10/2021	AB21-0810-19
Barium	105		%	5.0	08/10/2021	AB21-0810-19
Beryllium	85		%	1.0	08/10/2021	AB21-0810-19
Boron	97		%	20.0	08/10/2021	AB21-0810-19
Cadmium	105		%	0.2	08/10/2021	AB21-0810-19
Calcium	131	X	%	1000.0	08/10/2021	AB21-0810-19
Chromium	92		%	1.0	08/10/2021	AB21-0810-19
Cobalt	88		%	6.0	08/10/2021	AB21-0810-19
Copper	88		%	1.0	08/10/2021	AB21-0810-19
Iron	-5.6		%	20.0	08/10/2021	AB21-0810-19
Lead	84		%	1.0	08/10/2021	AB21-0810-19
Lithium	79		%	10.0	08/10/2021	AB21-0810-19
Magnesium	139	X	%	1000.0	08/10/2021	AB21-0810-19
Molybdenum	113		%	5.0	08/10/2021	AB21-0810-19
Nickel	86		%	2.0	08/10/2021	AB21-0810-19
Potassium	145	X	%	100.0	08/10/2021	AB21-0810-19
Selenium	87		%	1.0	08/10/2021	AB21-0810-19
Silver	89.6		%	0.2	08/10/2021	AB21-0810-19
Sodium	142	X	%	1000.0	08/10/2021	AB21-0810-19
Thallium	89		%	2.0	08/10/2021	AB21-0810-19
Vanadium	99		%	2.0	08/10/2021	AB21-0810-19
Zinc	90		%	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-19-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	125		%	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-19-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	115		%	1000.0	08/11/2021	AB21-0810-23
Fluoride	92		%	1000.0	08/11/2021	AB21-0810-23
Sulfate	107		%	1000.0	08/12/2021	AB21-0810-23

Alkalinity by SM 2320B

Aliquot #: 21-0882-19-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	94		%	10000.0	08/12/2021	AB21-0810-14

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**FB-01**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-20	Collect Time:	12:20 PM
Matrix:	Water		

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

Aliquot #: 21-0882-20-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	ND		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	ND		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	ND		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	ND		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	ND		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	ND		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	ND		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-20-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-20-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	ND		ug/L	1000.0	08/11/2021	AB21-0810-23

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Analytical Report

Report Date: 08/15/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-0882**
Field Sample ID:	**EB-01**	Collect Date:	08/03/2021
Lab Sample ID:	21-0882-21	Collect Time:	12:23 PM
Matrix:	Water		

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

Aliquot #: 21-0882-21-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Arsenic	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Barium	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Beryllium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Boron	ND		ug/L	20.0	08/10/2021	AB21-0810-19
Cadmium	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Calcium	ND		ug/L	1000.0	08/10/2021	AB21-0810-19
Chromium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Cobalt	ND		ug/L	6.0	08/10/2021	AB21-0810-19
Copper	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Iron	ND		ug/L	20.0	08/10/2021	AB21-0810-19
Lead	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Lithium	ND		ug/L	10.0	08/10/2021	AB21-0810-19
Magnesium	ND		ug/L	1000.0	08/10/2021	AB21-0810-19
Molybdenum	ND		ug/L	5.0	08/10/2021	AB21-0810-19
Nickel	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Potassium	ND		ug/L	100.0	08/10/2021	AB21-0810-19
Selenium	ND		ug/L	1.0	08/10/2021	AB21-0810-19
Silver	ND		ug/L	0.2	08/10/2021	AB21-0810-19
Sodium	ND		ug/L	1000.0	08/10/2021	AB21-0810-19
Thallium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Vanadium	ND		ug/L	2.0	08/10/2021	AB21-0810-19
Zinc	ND		ug/L	10.0	08/10/2021	AB21-0810-19

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-0882-21-C01-A02 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/12/2021	AB21-0812-03

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

Aliquot #: 21-0882-21-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Fluoride	ND		ug/L	1000.0	08/11/2021	AB21-0810-23
Sulfate	ND		ug/L	1000.0	08/11/2021	AB21-0810-23

Data Qualifiers	Exception Summary
X= Other notation required; comment listed in sample notes and/or case narrative.	

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-0882

Inspection Date: 6 4 21 **Inspection By:** WH

Sample Origin/Project Name: JCW Porewater

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 (2) Cardboard Box _____ Custom Case _____ Envelope/Mailer _____

Loose/Unpackaged Containers _____ Other _____

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

Damaged Shipment Observed. None ✓ Dented _____ Leaking _____

Other _____

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

Shipping Containers Received. Opened _____ Sealed ✓

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

CoC ✓ Work Request _____ Air Data Sheet _____ Other _____

Temperature of Containers: Measure the temperature of several sample containers

As-Received Temperature Range 0.2-1.0 °C 0.2-1 °C Samples Received on Ice: Yes ✓ 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)	38				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	42				
24 mL vial (glass)					
250 ~~500~~ mL (plastic)	17				
Other _____					

PG 2 of 2 not needed

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: JCW Porewater – 2021 Q3

PROJECT NUMBER: 21-0882

SAMPLING TEAM:

DATE SHIPPED:

SITE SKETCHED ATTACHED? CIRCLE ONE: YES NO

SEND REPORT TO: CDBatts

HD Register, TRC

PHONE:

ANALYSIS REQUESTED

CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	DEPTH (ft)	# OF CONTAINERS	Total Metals	Anions	Alkalinity	TDS					REMARKS
21-0882-01	8/2/21	1125	GW	JCW-MW-18001		5	X	X	X	X					
-02	8/3/21	0710	GW	JCW-MW-18004		5	X	X	X	X					
-03	8/3/21	0745	GW	JCW-OW-18004		5	X	X	X	X					
-04	8/3/21	1015	GW	JCW-MW-18005		5	X	X	X	X					
-05	8/3/21	1135	GW	JCW-MW-18006		5	X	X	X	X					
-06	8/2/21	1158	GW	MW-50		5	X	X	X	X					
-07	8/2/21	1240	GW	MW-51		5	X	X	X	X					
-08	8/2/21	1317	GW	MW-52		5	X	X	X	X					
-09	8/2/21	1350	GW	MW-53		5	X	X	X	X					
-10	8/2/21	1440	GW	MW-53R		5	X	X	X	X					
-11	8/3/21	0637	GW	MW-54R		5	X	X	X	X					
-12	8/3/21	0902	GW	MW-55		5	X	X	X	X					

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
[signature]	8/4/21 0830	Casey Hennen
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

COMMENTS: 0.2-1.0°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: JCW Porewater – 2021 Q3

PROJECT NUMBER: 21-0882

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	Alkalinity	TDS					REMARKS
21-0882-13	8/3/21	0940	GW	OW-55		5	X	X	X	X					
-14	8/3/21	1105	GW	OW-57R OUT		5	X	X	X	X					
-15	8/3/21	1215	GW	MW-58		5	X	X	X	X					
-16	8/3/21	0819	GW	LH-104		5	X	X	X	X					
-17	8/2/21	—	GW	DUP-01		5	X	X	X	X					
-18	8/2/21	1137	GW	JCW-MW-18001 MS		4	X	X	X						
-19	8/2/21	1131	GW	JCW-MW-18001 MSD		4	X	X	X						
-20	8/3/21	1220	W	FB-01		2	X	X							
-21	8/3/21	1333	W	EB-01		2	X	X							

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
[signature]	8/4/21 0830	Casey Hansen
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

COMMENTS: 0.2-1.1°C 015402

ORIGINAL TO LAB COPY TO CUSTOMER

Appendix F
Field Records

TRC

PROJECT NAME:	CEC WEADOCKLF 2021 GW COMPLIAN
PROJECT NUMBER:	418426.0000.0000 ~~418426.0001.0000~~
PROJECT MANAGER:	DARBY LITZ
SITE LOCATION:	2742 WEADOCK HWY ESSEXVILLE MI 48732
DATES OF FIELDWORK:	8/2/21 TO 8/3/21
PURPOSE OF FIELDWORK:	2021 GW SAMPLING 3Q21 Sampling event
WORK PERFORMED BY:	JAVIER JASSO

SIGNED 8/4/21 DATE

CHECKED BY 8-10-21 DATE

TRC

GENERAL NOTES

PROJECT NAME: CEC WEADOCK LF 2021 GW	DATE: 8/2/21	TIME ARRIVED: 1030
PROJECT NUMBER: 418426.0001.0000	AUTHOR: JJASSO	TIME LEFT: 1455

WEATHER

TEMPERATURE: 70 °F WIND: 15 MPH VISIBILITY: clear

WORK / SAMPLING PERFORMED

WATER LEVELS

WELLS SAMPLED JCW. MW 1800, MS ~~SMS~~D, MW-50, DUP #01, 51, 52, 53, 53R,

Shipping Pump

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
non	

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
N/A		

[signature] 8/4/21
SIGNED DATE

[signature] 8-10-21
CHECKED BY DATE

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME: CEC WEADOCK LF 2021 GW	DATE: 8/3/21	TIME ARRIVED: 0900
PROJECT NUMBER: 418426.0001.0000	AUTHOR: JJASSO	TIME LEFT: 1505

WEATHER

TEMPERATURE: 58 °F WIND: 0 MPH VISIBILITY: Clear

WORK / SAMPLING PERFORMED

WATER LEVELS

WELLS SAMPLED MW-54R, 18004, OW-18004, LH-104, 55, OW-55, 18005, OW-57Rout, 18006, 58, EB#1, F.B#1

JCW-MW-15010 Dup#2, JCW-MW-15009, MS & MSD, JCW-MW-15020 JCW-MW-15007, EB#2 FB#2

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
N/A		

8/4/21
SIGNED DATE

8-10-21
CHECKED BY DATE

REVISED 04/2019

TRC

EQUIPMENT SUMMARY

PROJECT NAME:	CEC WEADOCK LF 2021 G	SAMPLER NAME:	JJASS0
PROJECT NO.:	418426.0001.0000		

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)
HERON	TRC A2

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
NA	NA
TUBING TYPE	
DEDICATED POLY TUBING	☑ LOW-FLOW SAMPLING EVENT

PURGE WATER DISPOSAL METHOD

☑ GROUND ☐ DRUM ☐ POTW ☐ POLYTANK ☐ OTHER _____

DECONTAMINATION AND FIELD BLANK WATER SOURCE

POTABLE WATER SOURCE	DI WATER SOURCE
LABORATORY PROVIDED	LABORATORY PROVIDED
SIGNED: 8/4/21 DATE	CHECKED BY: 8-10-21 DATE

REVISED 04/2019

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC WeadockLF;2021 GW Compliance	MODEL: YSI 556	SAMPLER: Jjasso
PROJECT NO.:	418426.0000.0000	SERIAL #: TRC A2	DATE: 8/3/21

PH CALIBRATION CHECK

pH 7 (LOT #): 16B200 (EXP. DATE): 2/23 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 16A843 (EXP. DATE): 2/23 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
700 / 700	400 / 400	☑ WITHIN RANGE	0500
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 16C106 (EXP. DATE): 3/22 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1413 / 1413	NA	☑ WITHIN RANGE	0500
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 19E100302 (EXP. DATE): 5/24 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
220 / 220	22.0	☑ WITHIN RANGE	0500
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
8.19 / 8.19	24.0	☑ WITHIN RANGE	0500
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A1007 (EXP. DATE): 1/23 POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
0 / 0	/	☑ WITHIN RANGE	0500
100 / 100	/	☑ WITHIN RANGE	0500
/	/	☐ 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 [signature] DATE 8/4/21

CHECKED BY [signature] DATE 8-10-21

TRC

WATER LEVEL DATA

PROJECT NAME:	DTE KARN/JCWEADOCK LANDFILL	DATE:	7/26/21
PROJECT NUMBER:	367388.0000.0000	AUTHOR:	JJASSO

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
LH-103	0745			16.49	22.16	
LH-104	0703			9.87	14.00	
JCWMW-15009	0554			7.75	13.00	
JCWMW-15003	0553			7.95	DNM	
JCWMW-15010	0610			16.25	19.57	
JCWMW-18001	0614			15.59	23.75	
JCWOW-18001	0615			7.40	20.25	
JCWOW18002	[illegible]			9.76	19.41	
M-50	0620			12.28	19.40	
MW-51	0626			12.11	20.80	
OW-51	0627			10.75	17.28	
JCWOW-18003	0633			9.15	18.62	
MW-52	0633			13.73	19.74	
JCWMW-15022	0635			15.05	100 plus	
MW-53	0639			12.63	18.18	
OW-53	0641			7.88	18.00	
JCWMW15026	0644			14.20	DNM	
MW-53R	0645			13.18	18.80	
OW-54	0651			7.73	16.48	
MW-54R	0649			12.70	17.77	
MW-16R	0650			12.95	19.87	
JCW – OW-18004	0656			9.09	14.87	
JCWMW-18004	0655			11.28	14.77	
JCWMW-15021	0659			13.30	DNM	
OW-55	0700			7.00	16.42	

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

SIGNED 8/4/21 DATE

CHECKED 8-10-21 DATE

REVISED 04/2019

TRC

WATER LEVEL DATA

PROJECT NAME:	DTE KARN/JCWEADOCK LANDFILL	DATE:	7/26/21
PROJECT NUMBER:	367388.0000.0000	AUTHOR:	JJASSO

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
MW-55	0707		12.79	16.34		
MW-20	0714		7.02	14.00		
JCWMW-18005	0712		8.78	16.28		
OW-56	0717		6.28	19.27		
OW-56R	0718		6.29	20.22		
OW-57R IN	0724		6.95	20.00		
OW-57 IN	0725		6.83	19.60		
OW-57 OUT	0726		10.51	19.46		
OW-57R OUT	0728		9.89	20.20		
JCWOW-18006	0734		11.20	23.47		
JCWMW-18006	0735		14.83	32.68		
JCWMW-15028	0813		6.53	25.10		
MW-106B	0815		7.48	41.15		
JCWMW15007	0818		3.68	8.75		
MW-109	0851		27.00	37.10		
MW-58	0830		5.01	18.20		
MW-15006	0824		4.08	17.40		
MW-15019	0838		4.91	8.10		
MW-15002	0847		6.39	16.88		
MW-15016	0850		4.00	8.10		
OW-61	0757		23.44	37.00		
OW-63	0746		26.52	37.07		
MW-19	0808		8.78	20.83		
MW-15020	0826		4.69	17.17		
MW-114B	0832		4.51	32.70		

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

SIGNED 8/4/21 DATE

CHECKED 8-10-21 DATE

REVISED 04/2019

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC WEADOCK LF 2021 GW SAMPLING	DATE:	7/30/21
PROJECT NUMBER:	418426.0001.0000	AUTHOR:	JJASSO

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
mw-15024	0834		5.71	17.17		
mw-15018	0843		5.02	10.05		
JCW-MW15001	0849		7.59	DNM		

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

8/4/21
SIGNED DATE

8-10-21
CHECKED DATE

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: JCW-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: 1052	DATE: 8/2/21	SAMPLE	TIME: 1123	DATE 8/2/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.84 SU	CONDUCTIVITY: 2543 umhos/cm	
			ORP: -53.5 mV	DO: 1.61 mg/L	
DEPTH TO WATER: 15.59 T/ PVC			TURBIDITY: 2.0 NTU		
DEPTH TO BOTTOM: 23.71 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 14.4 °C	OTHER:	
VOLUME REMOVED: 6	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: yes	
COLOR: Cloudy	ODOR: yes		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)
1052	200	6.88	2643	-31.4	8.0	250.0	16.1	15.52	INITIAL
1057		6.87	2644	-46.4	2.06	5.0	14.5	15.61	1
1102		6.86	2552	-49.7	1.96	2.82	14.3	15.63	2
1107		6.86	2546	-53.0	1.88	2.80	14.3	15.65	3
1112		6.86	2550	-53.0	1.80	2.0	14.3	15.61	4
1117		6.84	2546	-53.5	1.80	2.0	14.4	15.61	5
1122		6.86	2543	-53.5	1.61	2.0	14.4	15.65	6

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					☐ Y	☐ N
3	125 mL	PLASTIC	A	☑ Y	☑ N					☐ Y	☐ N
3	125 mL	PLASTIC	B	☐ Y	☑ N					☐ Y	☐ N
	1 L	PLASTIC	B	☐ Y	☑ N					☐ Y	☐ N
1	125 mL	PLASTIC	A	☐ Y	☑ N					☐ Y	☐ N

SHIPPING METHOD:	____ FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A
COC NUMBER:	____ N/A	SIGNATURE:	DATE SIGNED: 8/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: MW-50 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1138	DATE: 8/2/21	SAMPLE	TIME: 1158	DATE: 8/2/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.00 SU	CONDUCTIVITY: 2183 umhos/cm	
			ORP: -59.0 mV	DO: 1.79 mg/L	
DEPTH TO WATER: 12.28 T/ PVC			TURBIDITY: 3.0 NTU		
DEPTH TO BOTTOM: 19.00 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 15.2 °C	OTHER:	
VOLUME REMOVED: 4	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: none	
COLOR: Cloudy	ODOR: none		FILTRATE (0.45 um) ☐ YES ☒ NO		
TURBIDITY			FILTRATE COLOR:	FILTRATE ODOR:	
☐ NONE ☐ SLIGHT ~~☑ MODERATE~~ ~~☑ VERY~~			QC SAMPLE: ☐ MS/MSD ☑ DUP- #1		
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)
1138	200	7.50	1141	-52.4	8.0	60.0	18.8	12.2	INITIAL
1143		7.00	2208	-59.0	1.97	5.80	15.2	12.30	1.0
1148		7.00	2194	-58.8	1.80	3.0	15.2	12.30	2.0
1153		7.00	2187	-59.0	1.80	3.0	15.3	12.30	3.0
1158		7.00	2183	-59.0	1.79	3.0	15.2	12.30	4.0
									~~2.5~~
									~~6.~~

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
4	125 mL	VOA	A	☐ Y ☑ N					☐ Y ☐ N
2	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
2	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
2	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	____ FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A
COC NUMBER:	____ N/A	SIGNATURE:	DATE SIGNED: 8/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: MW-51 | 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: 8/2/21	SAMPLE	TIME: 1240	DATE: 8/2/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER	PH: 6.87 SU; CONDUCTIVITY: 2239 umhos/cm; ORP: -60.5 mV; DO: 1.88 mg/L
DEPTH TO WATER: 12.11 T/ PVC	TURBIDITY: 2.25 NTU
DEPTH TO BOTTOM: 20.40 T/ PVC	☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS	TEMPERATURE: 13.8 °C; OTHER:
VOLUME REMOVED: 5 ☑ LITERS ☐ GALLONS	COLOR: Clear; ODOR: none
COLOR: Brown; 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:

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)
1215	200	7.30	1124	-27.5	8.15	5.00	12.3	13.05	INITIAL
1220		6.89	2270	-63.1	2.00	3.75	13.8	13.15	1.0
1225		6.87	2251	-59.0	1.95	2.40	13.9	13.15	2.0
1230		6.87	2244	-59.8	1.89	2.35	13.8	13.15	3.0
1235		6.87	2239	-60.0	1.88	2.25	13.8	13.15	4.0
1240		6.87	2239	-60.5	1.88	2.25	13.8	13.15	5.0
~~1245~~									~~6.0~~

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					☐ Y ☐ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	~~125~~ mL	PLASTIC	~~A~~	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A	
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 8/4/21	

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: MW-52 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1252	DATE 8/2/21	SAMPLE	TIME: 1317	DATE 8/2/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.92 SU	CONDUCTIVITY: 1894 umhos/cm	
			ORP: -52.6 mV	DO: 1.98 mg/L	
DEPTH TO WATER: 13.73 T/ PVC			TURBIDITY: 2.0 NTU		
DEPTH TO BOTTOM: 19.74 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 14.0 °C	OTHER:	
VOLUME REMOVED: 2.5	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: none	
COLOR: cloudy	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)
1252	100	7.40	726	-58.2	8.25	350	17.1	13.70	INITIAL
1257		6.95	1890	-54.0	2.27	3.65	14.1	13.85	.5
1302		6.93	1893	-52.0	2.00	2.0	14.6	13.85	1
1307		6.92	1894	-52.8	1.99	2.0	14.5	13.85	1.5
1312		6.92	1897	-52.8	1.98	2.0	14.5	13.85	2
1317		6.92	1894	-52.6	1.98	2.0	14.4	13.85	2.5

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					☐ Y ☐ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A
COC NUMBER:	N/A	SIGNATURE:	DATE SIGNED: 8/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: MW 53 — WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1330	DATE: 8/2/21	SAMPLE	TIME: 1350	DATE: 8/2/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.10 SU	CONDUCTIVITY: 1540 umhos/cm	
			ORP: -75.1 mV	DO: 1.89 mg/L	
DEPTH TO WATER: 12.43 T/ PVC			TURBIDITY: 2.0 NTU		
DEPTH TO BOTTOM: 18.18 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS			TEMPERATURE: 14.6 °C	OTHER:	
VOLUME REMOVED: 4 ☑ 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)
1330	200	7.40	1641	-44.5	7.91	11.0	18.9	12.55	INITIAL
1335		7.11	1562	-68.7	2.18	3.60	14.6	12.68	1
1340		7.10	1545	-74.8	1.90	2.0	14.7	12.68	2
1345		7.10	1539	-75.0	1.89	1.99	14.6	12.68	3
1350		7.10	1540	-75.1	1.89	2.0	14.6	12.68	4

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					☐ Y ☐ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	____ FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A
COC NUMBER:	____ N/A	SIGNATURE:	DATE SIGNED: 8/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: MW-53R | 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: 8/2/21	SAMPLE	TIME: 1440	DATE: 8/2/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.81 SU	CONDUCTIVITY: 1688 umhos/cm	
			ORP: -45.9 mV	DO: 1.78 mg/L	
DEPTH TO WATER: 13.18 T/ PVC			TURBIDITY: 7.95 NTU		
DEPTH TO BOTTOM: 188c T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 14.4 °C	OTHER:	
VOLUME REMOVED: 6	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: none	
COLOR: Brown	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)
1400	200	7.45	1649	-60.5	8.65	1300	19.0	13.02	INITIAL
1405		6.82	1909	-42.7	2.28	1720	15.1	1320	1
1410		6.81	1873	-37.0	1.95	44.0	14.5	1320	2
1415		6.81	1781	-39.5	1.85	15.70	14.5	1320	3
1420		6.81	1729	-42.0	1.81	8.85	14.6	1320	4
1425		6.81	1702	-43.5	1.79	8.50	14.5	1320	5
1430		6.81	1692	-45.8	1.78	8.0	14.4	1320	6
1435		6.81	1690	-45.4	1.79	8.0	14.4	1320	7
1440		6.81	1688	-45.9	1.78	7.95	14.4	1320	8

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					☐ Y ☐ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A
COC NUMBER:	N/A	SIGNATURE:	DATE SIGNED: 8/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JJR	DATE: 8-10-21

SAMPLE ID: MW-54R | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0612	DATE: 8/3/21	SAMPLE	TIME: 0637	DATE: 8/3/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.76 SU	CONDUCTIVITY: 1384 umhos/cm	
			ORP: 9.91 mV	DO: 2.10 mg/L	
DEPTH TO WATER: 12.20 T/ PVC			TURBIDITY: 3.09 NTU		
DEPTH TO BOTTOM: 17.20 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 13.7 °C	OTHER:	
VOLUME REMOVED: 5	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: none	
COLOR: Brown	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)
0612	200	4.e	1401	220	8.2	800	14.9	1261	INITIAL
0617		6.61	1381	34.1	2.52	50.0	13.7	1280	1
0622		6.71	1379	26.0	2.10	6.85	13.6	1285	2
0627		6.76	1381	10.0	2.10	3.10	13.7	1281	3
0632		6.76	1383	9.95	2.10	3.10	13.6	1280	4
0637		6.76	1384	9.91	2.10	3.09	13.7	1280	5

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					☐ Y ☐ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	____ FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A
COC NUMBER:	____ N/A	SIGNATURE:	DATE SIGNED: 8/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: JLWMW 18004 — WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0650	DATE: 8/3/21	SAMPLE	TIME: 0710	DATE: 8/3/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.77 SU	CONDUCTIVITY: 1552 umhos/cm	
			ORP: 115.3 mV	DO: 2.50 mg/L	
DEPTH TO WATER: 11.26 T/ PVC			TURBIDITY: 1.0 NTU		
DEPTH TO BOTTOM: 14.72 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 16.4 °C	OTHER:	
VOLUME REMOVED: 2	☑ 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)
0650	100	7.14	1001	44.5	9.0	15.0	15.3	11.43	INITIAL
0655		6.80	1631	81.0	3.0	4.0	15.6	11.65	.5
0700		6.77	1542	115.0	2.58	1.0	16.4	11.88	1
0705		6.77	1539	115.3	2.55	1.0	16.3	12.05	1.5
0710		6.77	1552	115.3	2.50	1.0	16.4	12.25	2

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					☐ Y ☐ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 8/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: JCW OW 18004 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0720	DATE: 8/3/21	SAMPLE	TIME: 0745	DATE: 8/3/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER	PH: 6.85 SU; CONDUCTIVITY: 1645 umhos/cm; ORP: 148.3 mV; DO: 2.10 mg/L
DEPTH TO WATER: 9.09 T/ PVC	TURBIDITY: 1.63 NTU
DEPTH TO BOTTOM: 14.67 T/ PVC	☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS	TEMPERATURE: 15.0 °C; OTHER:
VOLUME REMOVED: 2.5 ☑ LITERS ☐ GALLONS	COLOR: clear; ODOR: none
COLOR: cloudy; ODOR: none	FILTRATE (0.45 um) ☐ YES ☑ NO
TURBIDITY ☐ NONE ☐ SLIGHT ☑ MODERATE ☐ VERY	FILTRATE COLOR: ; FILTRATE ODOR:
DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER	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)
0720	100	7.05	1106	101.5	80	75.0	15.6	8.81	INITIAL
0725		6.85	1670	100.0	2.39	2.0	14.1	9.90	.5
0730		6.84	1663	120.0	2.20	1.80	14.4	10.16	1
0735		6.84	1658	148.0	2.10	1.65	14.9	10.30	1.5
0740		6.85	1652	148.3	2.16	1.60	15.0	10.55	2
0745		6.85	1645	148.3	2.10	1.63	15.0	10.62	2.5

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					☐ Y ☐ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	250mL	PLASTIC	AC	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A	
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 8/4/21	

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: LH-104 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0804	DATE: 8/3/21	SAMPLE	TIME: 0814	DATE: 8/3/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 9.67 T/ PVC

DEPTH TO BOTTOM: 14.00 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 1.1 ☑ LITERS ☐ GALLONS

COLOR: Clear ODOR: Slight

TURBIDITY ☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 7.12 SU CONDUCTIVITY: 1950 umhos/cm

ORP: -27.8 mV DO: 2.80 mg/L

TURBIDITY: 1.48 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 13.1 °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)
0804	100	7.19	1824	67.1	9.0	2.30	14.2	11.30	INITIAL
0809		7.12	1972	-24.9	2.80	1.50	13.2	11.76	.5
0814		7.13	1958	-27.8	2.80	1.45	13.2	12.20	1
0819		7.12	1950	-27.8	2.80	1.48	13.1	13.10	1.5
									2

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					☐ Y ☐ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	____ FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A
COC NUMBER:	____ N/A	SIGNATURE:	DATE SIGNED: 8/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: SK	DATE: 8-10-21

SAMPLE ID: MW-55 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0832	DATE: 8/3/21	SAMPLE	TIME: 0902	DATE: 8/3/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.07 SU	CONDUCTIVITY: 1408 umhos/cm	
			ORP: -131.0 mV	DO: 1.80 mg/L	
DEPTH TO WATER: 12.79 T/ PVC			TURBIDITY: 3.0 NTU		
DEPTH TO BOTTOM: 16.38 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS			TEMPERATURE: 15.2 °C	OTHER:	
VOLUME REMOVED: 10 ☑ LITERS ☐ GALLONS			COLOR: Clear	ODOR: none	
COLOR: Brown	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:		

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)
0832	200	7.27	1297	-114.5	9.95	90.0	18.1	12.75	INITIAL
0837		7.00	1405	-118.5	2.13	7.15	15.1	12.82	1
0842		7.04	1416	-124.0	1.96	6.60	15.1	12.82	2
0847		7.06	1416	-130.0	1.87	4.0	15.1	12.82	3
0852		7.07	1418	-130.5	1.80	3.0	15.2	12.82	4
0857		7.07	1423	-130.5	1.80	3.0	15.2	12.82	5
0902		7.07	1423	-131.0	1.80	3.0	15.2	12.82	6

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					☐ Y ☐ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	____ FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A
COC NUMBER:	____ N/A	SIGNATURE:	DATE SIGNED: 8/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: OW-55 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0910	DATE: 8/3/21	SAMPLE	TIME: 0940	DATE: 8/3/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.19 SU	CONDUCTIVITY: 1310 umhos/cm	
			ORP: -82.1 mV	DO: 1.93 mg/L	
DEPTH TO WATER: 7.02 T/ PVC			TURBIDITY: 9.99 NTU		
DEPTH TO BOTTOM: 15.42 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS			TEMPERATURE: 15.0 °C	OTHER:	
VOLUME REMOVED: 3 ☑ LITERS ☐ GALLONS			COLOR: Clear	ODOR: none	
COLOR: Cloudy 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)
0910	100	7.23	624	-55.2	7.43	71.0	17.5	7.90	INITIAL
0915		7.21	1308	-76.0	2.26	8.0	14.9	9.31	.5
0920		7.21	1306	-81.8	2.80	10.85	15.1	10.46	1
0925		7.20	1316	-82.0	2.99	10.0	15.1	11.12	1.5
0930		7.19	1318	-82.7	1.93	10.0	15.0	12.23	2
0935		7.19	1314	-82.4	1.92	10.0	15.0	13.15	2.5
0940		7.19	1310	-82.1	1.93	9.99	15.0	14.25	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					☐ Y ☐ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	____ FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A
COC NUMBER:	____ N/A	SIGNATURE:	DATE SIGNED: 8/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: JCWmw 18005 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0950	DATE: 8/3/21	SAMPLE	TIME: 1015	DATE: 8/3/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.95 SU	CONDUCTIVITY: 1399 umhos/cm	
			ORP: -48.0 mV	DO: 2.05 mg/L	
DEPTH TO WATER: 8.78 T/ PVC			TURBIDITY: 2.99 NTU		
DEPTH TO BOTTOM: 16.78 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 14.8 °C	OTHER:	
VOLUME REMOVED: 2.5	☑ LITERS ☐ GALLONS		COLOR: clear	ODOR: none	
COLOR: Brown	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:		

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)
0950	100	7.30	980	-22.1	7.60	300	18.2	9.25	INITIAL
0955		6.99	1421	-49.2	2.46	15.0	14.2	9.83	.5
1000		6.96	1392	-42.0	2.18	4.90	14.3	10.0	1
1005		6.96	1388	-48.0	2.05	3.00	14.8	10.06	1.5
1010		6.95	1398	-48.0	2.04	2.95	14.7	10.12	2
1015		6.95	1399	-48.0	2.05	2.99	14.8	10.15	2.5

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					☐ Y ☐ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A
COC NUMBER:	N/A	SIGNATURE:	DATE SIGNED: 8/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: OW-57R out | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1035	DATE: 8/3/21	SAMPLE	TIME: 1105	DATE: 8/3/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER	PH: 7.00 SU / CONDUCTIVITY: 1353 umhos/cm
	ORP: 32.9 mV / DO: 2.0 mg/L
DEPTH TO WATER: 9.89 T/ PVC	TURBIDITY: 3.97 NTU
DEPTH TO BOTTOM: 20.24 T/ PVC	☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS	TEMPERATURE: 15.7 °C / OTHER:
VOLUME REMOVED: 3 ☑ 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:

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)
1035	100	7.20	689	2.9	70	13.0	21.7	10.78	INITIAL
1040		6.99	1502	14.6	2.53	8.0	16.2	11.15	.5
1045		6.94	1453	28.5	2.10	5.50	15.9	12.0	1
1050		6.97	1401	33.5	2.0	4.0	15.7	12.74	1.5
1055		6.99	1360	33.0	2.0	3.98	15.7	13.55	2
1100		7.00	1356	32.8	2.0	3.95	15.7	14.65	2.5
1105		7.00	1353	32.9	2.0	3.97	15.7	15.25	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					☐ Y ☐ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	FED EX	DATE SHIPPED:	8/4/21	AIRBILL NUMBER:	N/A
COC NUMBER:	N/A	SIGNATURE:		DATE SIGNED:	8/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: JCW MW 18006 — WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1115	DATE: 8/3/21	SAMPLE	TIME: 1135	DATE: 8/3/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.90 SU	CONDUCTIVITY: 1463 umhos/cm	
			ORP: -58.8 mV	DO: 1.99 mg/L	
DEPTH TO WATER: 14.83 T/ PVC			TURBIDITY: 1.0 NTU		
DEPTH TO BOTTOM: 32.68 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 14.1 °C	OTHER:	
VOLUME REMOVED: 4	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: none	
COLOR: Brownish	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)
1115	200	7.15	1469	-6.7	8.85	200.	22.3	14.83	INITIAL
1120		6.93	1454	-49.3	2.20	12.0	14.5	150	1
1125		6.90	1445	-59.0	2.0	1.0	14.2	1505	2
1130		6.90	1458	-58.8	1.99	1.0	14.1	1505	3
1135		6.90	1463	-58.8	1.99	1.0	14.1	1505	4
~~1140~~									~~5~~
									~~6~~

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					☐ Y ☐ N
1	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	~~125~~ mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A
COC NUMBER:	N/A	SIGNATURE:	DATE SIGNED: 8/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: MW-58 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1150	DATE: 8/3/21	SAMPLE	TIME: 1215	DATE: 8/3/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.89 SU	CONDUCTIVITY: 1750 umhos/cm	
			ORP: -61.0 mV	DO: 1.89 mg/L	
DEPTH TO WATER: 5.01 T/ PVC			TURBIDITY: 4.99 NTU		
DEPTH TO BOTTOM: 18.28 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 19.7 °C	OTHER:	
VOLUME REMOVED: 5	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: none	
COLOR: Brown	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)
1150	200	7.04	1246	-36.0	9.45	270.0	21.5	5.08	INITIAL
1155		6.87	2607	-73.0	2.0	690	15.7	5.10	1
1200		6.89	1792	-64.0	1.95	9.45	15.6	5.10	2
1205		6.89	1758	-60.8	1.90	50	19.7	5.10	3
1210		6.89	1791	-61.0	1.89	4.95	19.7	5.10	4
1215		6.89	1750	-61.0	1.89	4.99	19.7	5.10	5

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					☐ Y ☐ N
2	125 mL	PLASTIC	A	☑ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 8/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: EB-A01 | 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: 1220	DATE: 8/3/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: NA SU	CONDUCTIVITY: NA umhos/cm	
			ORP: NA mV	DO: NA mg/L	
DEPTH TO WATER:	T/ PVC		TURBIDITY: NA NTU		
DEPTH TO BOTTOM:	T/ PVC		☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: NA °C	OTHER:	
VOLUME REMOVED:	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: non	
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

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
	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
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	____ FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A
COC NUMBER:	____ N/A	SIGNATURE:	DATE SIGNED: 8/4/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 8/4/21	BY: JK	DATE: 8-10-21

SAMPLE ID: E.B #01 | 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: 1233	DATE: 8/3/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: UN SU	CONDUCTIVITY: UN umhos/cm	
			ORP: UN mV	DO: UN mg/L	
DEPTH TO WATER:	T/ PVC		TURBIDITY: UN NTU		
DEPTH TO BOTTOM:	T/ PVC		☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: UN °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

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
	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
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: 8/4/21	AIRBILL NUMBER: N/A
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 8/4/21

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

SAMPLING SITE: JCW Porewater – 2021 Q3

PROJECT NUMBER: 21-0882

SAMPLING TEAM:

DATE SHIPPED:

SITE SKETCHED ATTACHED? CIRCLE ONE: YES NO

ANALYSIS REQUESTED

Page 1 of 2

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					REMARKS
21-0882-01	8/2/21	1125	GW	JCW-MW-18001		5	X	X	X	X					
-02	8/3/21	0710	GW	JCW-MW-18004		5	X	X	X	X					
-03	8/3/21	0745	GW	JCW-OW-18004		5	X	X	X	X					
-04	8/3/21	1015	GW	JCW-MW-18005		5	X	X	X	X					
-05	8/3/21	1135	GW	JCW-MW-18006		5	X	X	X	X					
-06	8/2/21	1158	GW	MW-50		5	X	X	X	X					
-07	8/2/21	1240	GW	MW-51		5	X	X	X	X					
-08	8/2/21	1317	GW	MW-52		5	X	X	X	X					
-09	8/2/21	1350	GW	MW-53		5	X	X	X	X					
-10	8/2/21	1440	GW	MW-53R		5	X	X	X	X					
-11	8/3/21	0637	GW	MW-54R		5	X	X	X	X					
-12	8/3/21	0902	GW	MW-55		5	X	X	X	X					

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
[signature]	8/4/21 0830	Casey Hennen
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

COMMENTS: 0.2-1.0°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: JCW Porewater – 2021 Q3

PROJECT NUMBER: 21-0882

SAMPLING TEAM

DATE SHIPPED

SITE SKETCHED ATTACHED? CIRCLE ONE YES NO

ANALYSIS REQUESTED

Page 2 of 2

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					REMARKS
21-0882-13	8/3/21	0940	GW	OW-55		5	X	X	X	X					
-14	8/3/21	1105	GW	OW-57R OUT		5	X	X	X	X					
-15	8/3/21	1215	GW	MW-58		5	X	X	X	X					
-16	8/3/21	0819	GW	LH-104		5	X	X	X	X					
-17	8/2/21	—	GW	DUP-01		5	X	X	X	X					
-18	8/2/21	1137	GW	JCW-MW-18001 MS		4	X	X	X						
-19	8/2/21	1131	GW	JCW-MW-18001 MSD		4	X	X	X						
-20	8/3/21	1220	W	FB-01		2	X	X							
-21	8/3/21	1333	W	EB-01		2	X	X							

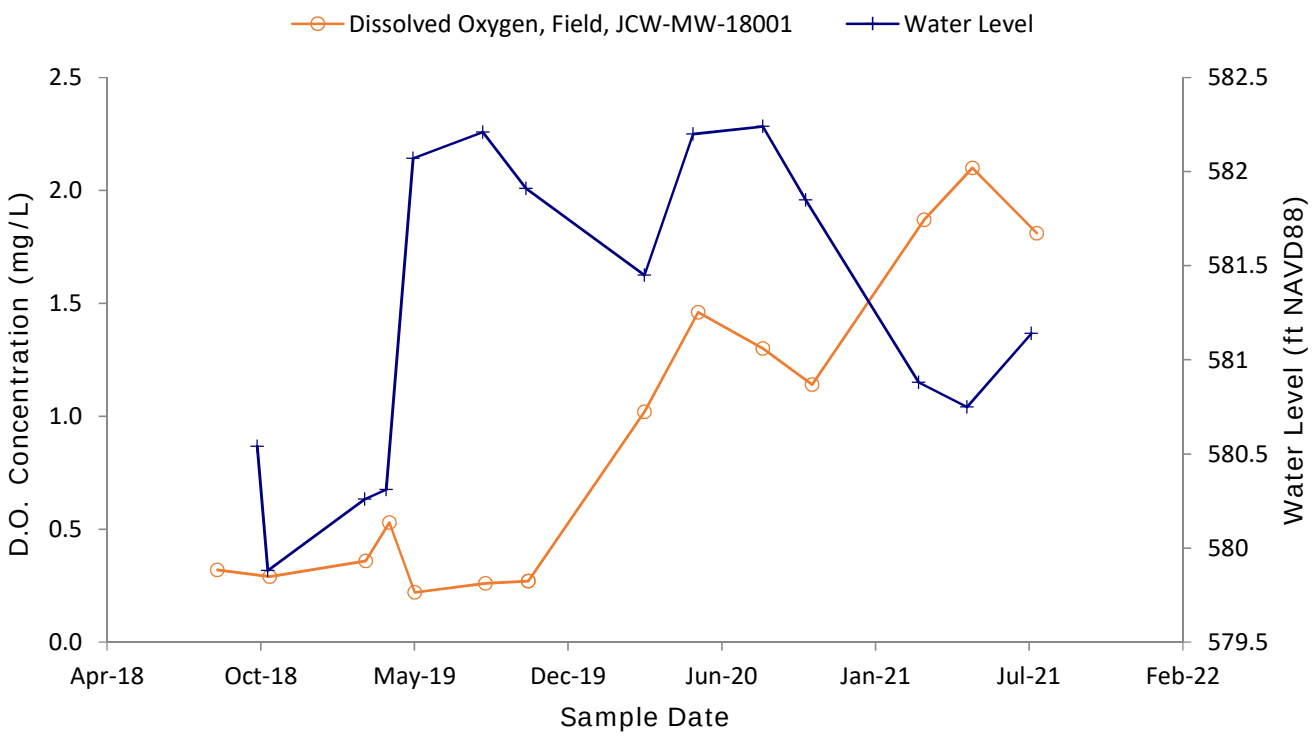
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
[signature]	8/4/21 0830	Casey Hansen
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)

COMMENTS: 0.2-1.1°C 015402

ORIGINAL TO LAB COPY TO CUSTOMER

Appendix G
Alternate Source Demonstration Supporting Information

Figure G1: Time Series Plots for Sulfate at JCW-MW-18001 ASD



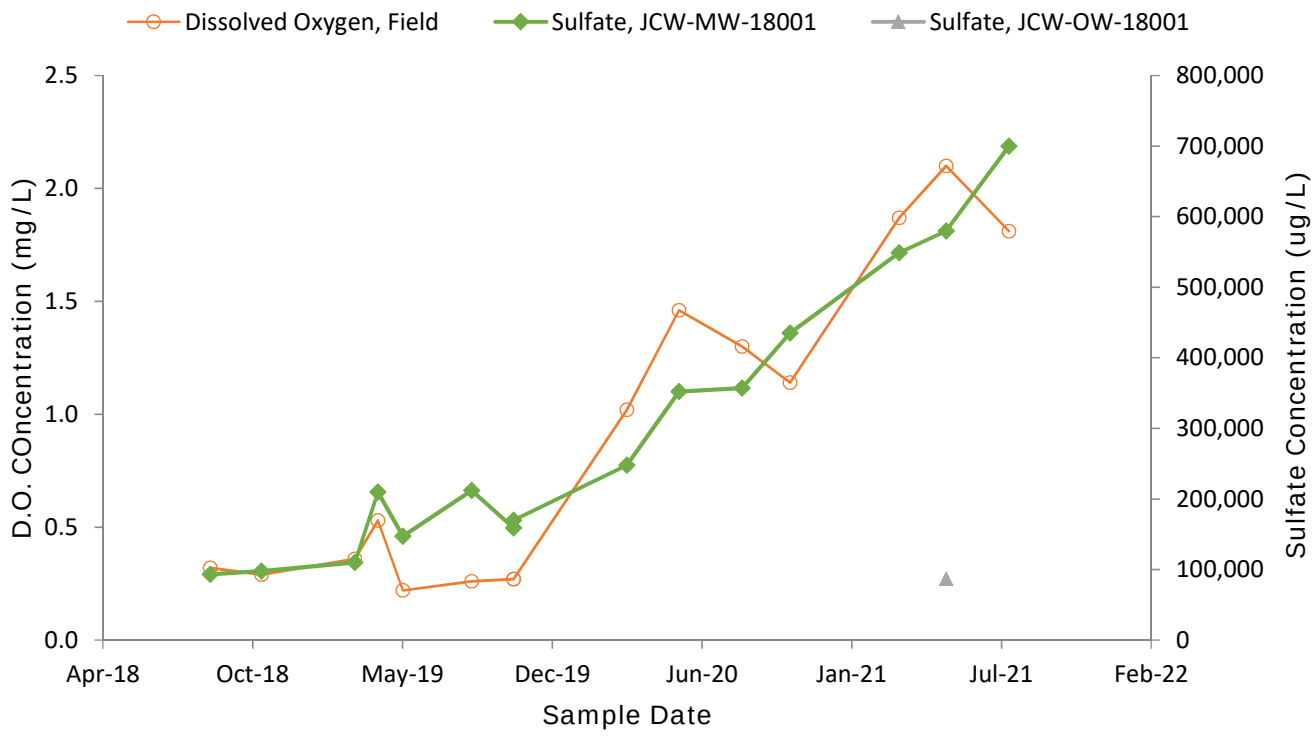
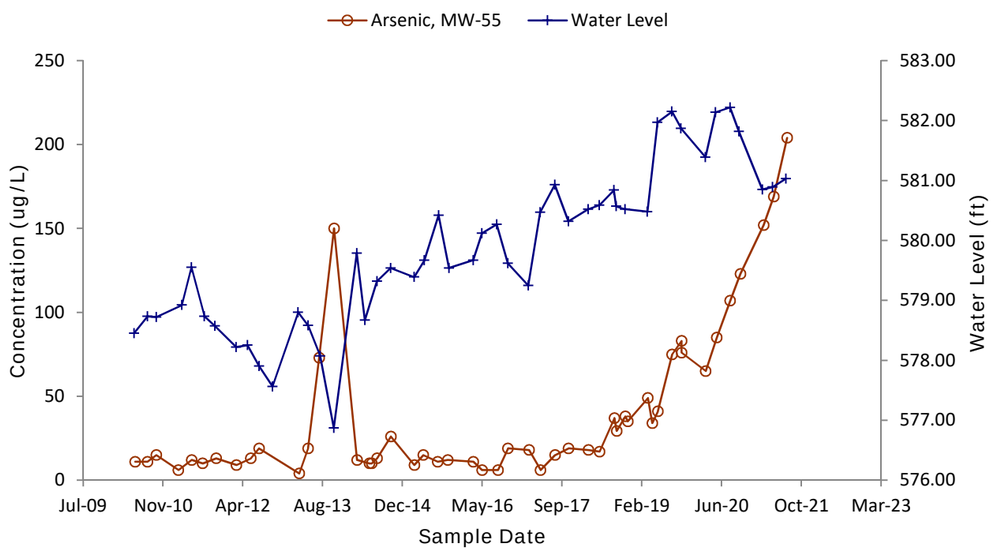


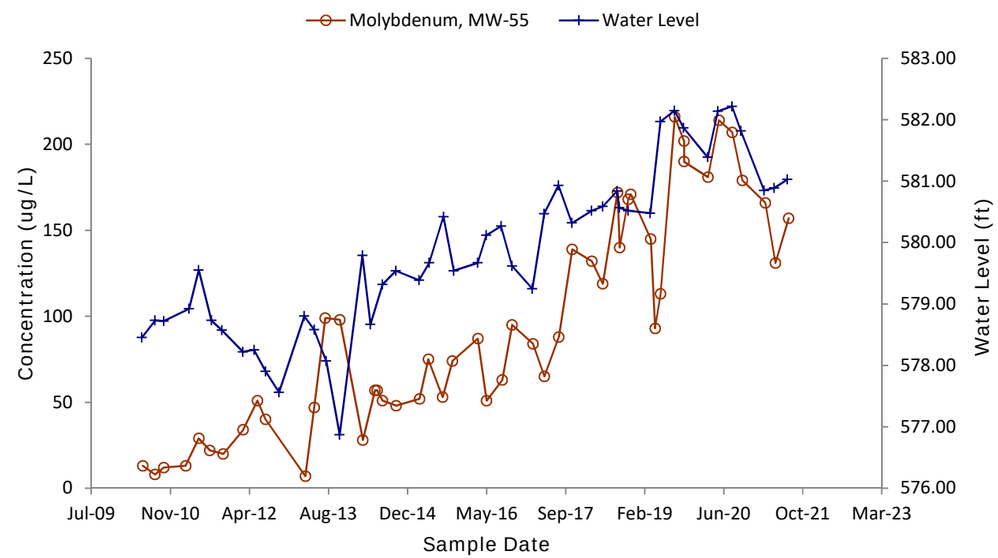
Table G2
Summary of Groundwater Sampling Results Near MW-55
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

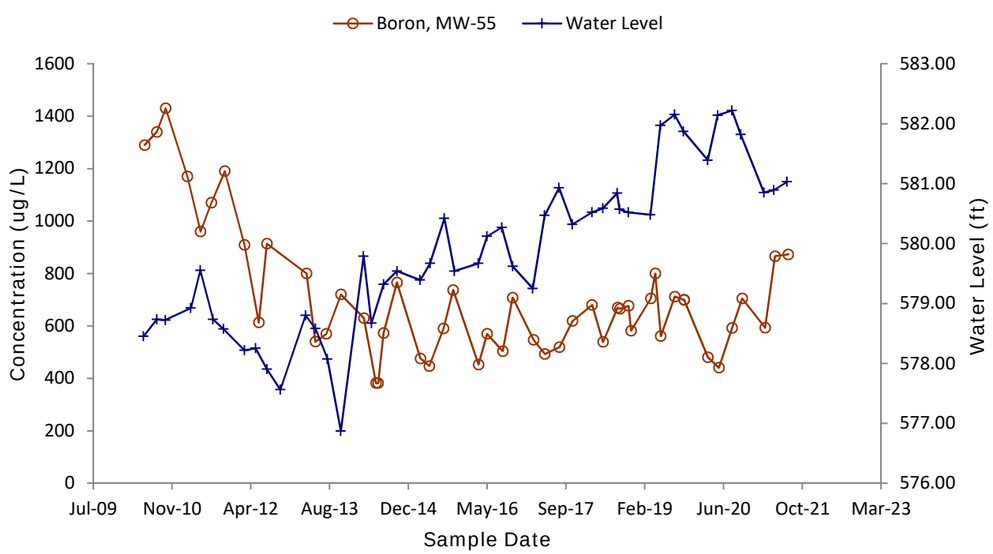
Constituent		Arsenic	Boron	Molybdenum	Oxidation Reduction Potential, Field
Unit		ug/L	ug/L	ug/L	mV
Outside Slurry Wall					
MW-55	5/11/2021	169	866	131	-123.0
	8/3/2021	204	873	157	-131.0
Inside Slurry Wall					
OW-55	5/11/2021	10	1,850	< 5	-66.3
	8/3/2021	15	1,890	< 5	-82.1
JCW-OW-18004	5/11/2021	< 1	689	< 5	92.0
	8/3/2021	1	801	< 5	148.3
LH-104	5/11/2021	29	12,200	59	39.9
	8/3/2021	21	9,410	10	-27.8

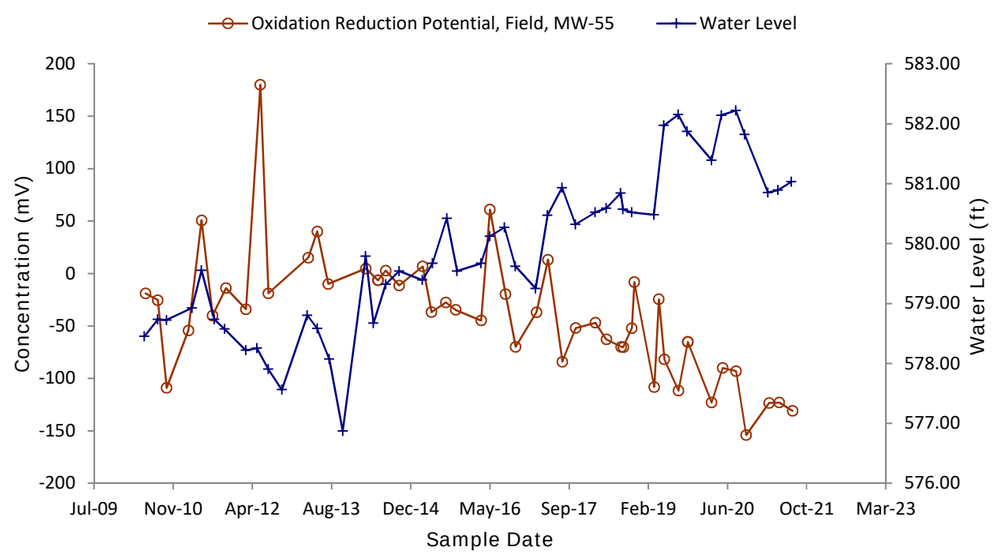
Notes:
ug/L - micrograms per liter; mV - millivolts

Figure G2: Time Series Plots for MW-55 ASD









2021 Semiannual Groundwater Monitoring Report and Fourth Quarter 2021 Hydrogeological Monitoring Report

JC Weadock Solid Waste Disposal Area

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

Kristin Lowery, E.I.T.
Project Engineer

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1.0 Introduction

Consumers Energy implemented a comprehensive compliance monitoring plan documented in the *Revised Hydrogeological Monitoring Plan* (Natural Resource Technology, 2010) for the JC Weadock Solid Waste Disposal Area required by Special License Condition 20.b in Solid Waste Disposal Area Operating License No. 9233 issued on October 15, 2009. Since that time, 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) imposing groundwater monitoring and corrective action requirements that apply to the landfill (Weadock Landfill). Michigan amended Part 115 of the Natural Resources and Environmental Protection Act (NREPA) PA 451 of 1994, as amended (a.k.a., Michigan Part 115 Solid Waste Management) to provide a basis for establishing a groundwater monitoring system and initiating detection and assessment monitoring to conform requirements for any licensed coal ash impoundment or landfill after December 28, 2018 with Part 115 amendments and the CCR Rule.

On January 15, 2021, Consumers Energy submitted the *Landfill Hydrogeological Monitoring Plan, JC Weadock Power Plant, Essexville, Michigan* (Weadock Landfill HMP), which includes components for Detection Monitoring, Assessment Monitoring as well as Groundwater Surface Water Interface (GSI) Compliance Monitoring, to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) to comply with the requirements of Part 115 and the CCR Rule. The Weadock Landfill HMP (TRC, February 2021) was revised per EGLE comments, submitted, and approved by EGLE on February 19, 2021 and incorporated, by reference, in Solid Waste Disposal Area Operating License No. 9640 issued on March 11, 2021.

1.1 Statement of Adherence to Approved Hydrogeological Monitoring Plan

This 2021 Semiannual Groundwater Monitoring Report and Fourth Quarter 2021 JC Weadock 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 landfill. 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, dated July 5, 2013 *Format for Solid Waste Disposal Facility Monitoring Submittals*. All references herein to the EGLE are inclusive of the MDEQ. Information contained in this report was prepared in adherence to the approved Weadock Landfill HMP that was approved by the EGLE on February 19, 2021. The Weadock Landfill HMP is compliant with Public Act No. 640 of 2018 (PA 640) to amend the 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 JC Weadock Solid Waste Disposal Area located at 2742 Weadock Highway in Essexville, Michigan (Figure 1). This JC Weadock Disposal Area is currently authorized under a permit (Groundwater Discharge Authorization GWE-0005) issued pursuant to Part 31 to

discharge to the unusable aquifer directly underlying the solid waste that vents almost immediately to the Saginaw River and Saginaw Bay.

The Weadock Landfill is currently in assessment monitoring pursuant to the CCR Rule. Consumers Energy first reported the potential for statistically significant increases (SSIs) for Appendix III constituents in the *Annual Groundwater Monitoring Report JC Weadock Power Plant Bottom Ash Pond CCR Unit* (TRC, January 2018). The statistical evaluation of the Appendix III indicator parameters confirming SSIs over background were as follows:

- Boron at JCW-MW-15011, JCW-MW-15012, JCW-MW-15023; and
- Field pH at JCW-MW-15023 (high).

On April 25, 2018, Consumers Energy entered assessment monitoring upon determining that an Alternate Source Demonstration for the Appendix III constituents was not successful. After subsequent sampling for Appendix IV constituents, Consumers Energy provided notice to the Department on January 14, 2019 that arsenic was detected at statistically significant levels above the federal groundwater protection standards (GWPS) established pursuant to §257.95(h) in one monitoring well at the JC Weadock Landfill (JCW-MW-15023), which was located downgradient of a 1,600 linear foot vent within the slurry wall enclosing the historical fly ash disposal area. The vent was designed to direct groundwater flow beneath the landfill to the discharge channel immediately upgradient from the National Pollutant Discharge Elimination System (NPDES) external outfall to prevent water from building up within the facility. In July 2018, this vent was closed (Golder, 2018) and the engineering improvement was approved the by the Department (MDEQ, 2018). As a part of the vent closure, monitoring wells JCW-MW-15011, JCW-MW-15012, and JCW-MW-15023 were decommissioned by overdrilling, removing the well material, and sealing the borehole in order to allow for the slurry wall construction as discussed in the *2018 Annual Groundwater Monitoring Report for the JC Weadock Landfill CCR Unit* (TRC, 2019a). Consumers Energy installed an additional nine monitoring wells in August 2018 to supplement the preexisting Michigan Part 115 compliance groundwater well network and provide appropriate coverage for the collection of groundwater levels and water quality data along the perimeter of the Weadock Landfill, as discussed in the Weadock Landfill HMP. Closing the vent and completely encircling the Weadock Landfill with a soil-bentonite slurry wall has demonstrated reduced groundwater flux around the entire perimeter of the landfill.

In March 2019, Consumers Energy submitted a Response Action Plan (Consumers, 2019), which identified interim response activities taken or to be taken to control possible sources of contamination. Consumers Energy further evaluated arsenic in groundwater at the Weadock Landfill as part of the nature and extent analysis and outlined potential remedies in the Assessment of Corrective Measures (TRC, 2019b), which was initiated on April 14, 2019 and completed on September 11, 2019, and focused on materials management with an emphasis on improving source control through the closure plan.

Compliance monitoring is being implemented under the Weadock Landfill HMP dated February 2021 and approved by the EGLE on February 19, 2021. Groundwater data collected in accordance with the Weadock Landfill HMP are used to:

- Assess background groundwater quality for the purposes of establishing and updating GWPS (HMP Section 7.1 Background Determination)
- Perform detection monitoring to assess whether a new release has occurred during operation of the landfill (*i.e.* statistically significant increase (SSI) over background) (HMP Section 7.2 Detection Monitoring)
- Perform assessment monitoring to assess whether constituent concentrations in groundwater from prior operations are above a risk-based standard (*i.e.* statistically significant level over the GWPS) (HMP Section 7.3 Assessment Monitoring)
- Assess compliance with the GSI pathway (HMP Section 7.4)

Consumers Energy also continues to execute the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98, which includes semiannual assessment monitoring in accordance with §257.95. Assessment monitoring data collected in accordance with the CCR Rule is used to assess whether constituent concentrations in groundwater from prior operations are above a risk-based standard (*i.e.* statistically significant level over the Appendix IV GWPS).

1.3 Site Overview

The JC Weadock Solid Waste Disposal Area is located within the former JC Weadock Power Plant (Site), located south of the DE Karn Power Plant, east of the Saginaw River, west of Underwood Drain and Saginaw Bay, and north of Tacey Drain and agricultural land (Figure 1). In addition to the disposal area, the Site consists of the generating facility which retired eight coal-fired generating units and infrastructure and utilities that support electrical transmission. Units 1 to 6 commenced operation in 1940 and retired in 1980 and Units 7 and 8 were added in 1955 and 1958 continued to operate through April 15, 2016.

1.4 Geology/Hydrogeology

The majority of Weadock Landfill area is comprised of surficial CCR and sand fill, as described in the Weadock Landfill HMP. USGS topographic maps and aerial photographs dating back to 1950, 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 depth ranging from 25-75 ft bgs. A sandstone unit, which is part of the Saginaw Formation, was generally encountered at 80-90 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. Along the perimeter of the landfill, there is a well-graded sand present at depths ranging from 10 to 20 ft bgs. The sand is variable in thickness, ranging from <1 to ~6.5 feet, and is discontinuous along the landfill perimeter, as evidenced by the soil boring logs and slurry wall construction documentation.

The alluvium soils pinch out and are not observed in soil borings located south and east of the Weadock Bottom Ash Pond and Weadock Landfill, along the location of the historic shoreline. The non-water-bearing region south of these units extends for at least a mile south and southeast of the site.

Beneath the surficial fill and sand unit (where present) is 70 to 80 feet of clay till. Along the southern perimeter of the landfill, some of the upper portion of the clay till is sand-rich (generally greater than 20 ft bgs). The clay till acts as a hydraulic barrier that separates the shallow groundwater from the underlying sandstone. The sandstone unit, which is part of the Saginaw Formation, is generally encountered at 80-90 ft bgs.

The Weadock Landfill is bounded by several surface water features (Figures 1 and 2): the Saginaw River to the west, a discharge channel and Saginaw Bay (Lake Huron) to the north, Underwood Drain to the east, and Tacey Drain to the south. Groundwater flow in this water bearing zone is largely controlled by the surface water elevations of Saginaw River and Saginaw Bay.

2.0 Leachate Monitoring

The leachate monitoring program under this revised plan consists of an annual laboratory leachate sampling program (Q1) and an annual field leachate sampling program (Q4) per the Weadock Landfill HMP. This program was instituted to maintain the facility under the applicable portions of Part 115, Rule 311 – Leaching tests to evaluate potential for groundwater contamination at unlined industrial waste landfills. Specifically, Subrule (3) states that waste that is disposed of in an industrial waste landfill shall be retested to evaluate potential for groundwater contamination annually or on a more frequent schedule as specified by the solid waste control agency. The Weadock Landfill HMP includes laboratory leachate testing, which consists of four dry-handled Coal Combustion Residual (CCR) samples collected under normal plant operating conditions during the active life of the landfill.

Additional support for evaluating the potential for groundwater contamination at the unlined industrial waste landfill includes the field leachate monitoring program conducted during the fourth quarter of each year. This program consists of an annual sampling collection from two (2) leachate headwells; LH-103 and LH-104. This program was implemented to determine constituents in the leachate as measured under actual conditions in the field that need to be included as a part of the groundwater and GSI monitoring program. Constituents will be added to the GSI and groundwater monitoring program if detected and confirmed in a field-collected leachate sample at a concentration greater than its GSI criterion.

Field leachate data for leachate headwells LH-103 and LH-104 (2019 through 2021) are shown in Table 1. In 2021, leachate headwell LH-103 was damaged; therefore, a sample could not be collected. The 2021 field leachate data for LH-104 are generally consistent with data collected in previous years and concentrations of low-level mercury were below the GSI criterion of 1.3 nanograms per liter (ng/L).

3.0 Groundwater Monitoring

3.1 Monitoring Well Network

The groundwater monitoring system presented in the HMP has been established in accordance with R 299.4906 and the CCR Rule §257.91, which consists of 16 monitoring wells (four background monitoring wells and 12 downgradient monitoring wells) that are screened in the uppermost aquifer. The monitoring well network has been designed to provide appropriate coverage for water level and water quality data collection along the perimeter of the landfill. The monitoring well locations are shown on Figure 2. Monitoring well specifications and purpose (i.e. static water level monitoring, groundwater quality monitoring, or GSI monitoring) are included in Table 1.

The Weadock Landfill HMP groundwater monitoring system consists of the following:

- ***Background Groundwater Quality:*** Four monitoring wells located southwest of the Weadock Landfill provide data on background groundwater quality that has not been affected by the CCR unit (MW-15002, MW-15008, MW-15016, and MW-15019) and are used to establish groundwater protection standards (GWPSs) for the landfill:
  - MW-15002
  - MW-15008
  - MW-15016
  - MW-15019
- ***Downgradient Groundwater Quality:*** The twelve downgradient monitoring wells, located on the outside of the perimeter slurry wall include:
  - JCW-MW-18001
  - JCW-MW-18004
  - JCW-MW-18005
  - JCW-MW-18006
  - MW-50
  - MW-51
  - MW-52
  - MW-53
  - MW-53R
  - MW-54R
  - MW-55
  - OW-57R Out
- ***Groundwater-Surface Water Interface (GSI) Monitoring***: Monitoring wells located along the surface water features adjacent to the Weadock Landfill are included in the monitoring program to meet the requirements of Part 31. Locations and alignments were established in the Phase II Groundwater Discharge Evaluation, Figure: Appendix K (Natural Resource Technology, 2005) as a baseline for monitoring future results. These monitoring wells are screened across the water table of the uppermost aquifer and will serve as GSI monitoring wells to determine compliance with generic GSI criteria or site-specific mixing zone-based criteria as appropriate. The eight GSI compliance monitoring wells include:
  - MW-50
  - MW-51
  - MW-52
  - MW-53
  - MW-53R
  - MW-54R
  - MW-55
  - JCW-MW-18004

- ***Static Water Level Measurement Only:*** Eleven (11) monitoring wells, located on the inside of the perimeter slurry wall, at paired locations with several of the downgradient monitoring wells include:
  - JCW-OW-18001
  - JCW-OW-18002
  - JCW-MW-18003
  - JCW-MW-18004
  - JCW-MW-18005
  - JCW-MW-18006
  - MW-20
  - OW-51
  - OW-53
  - OW-54
  - OW-55
  - OW-56R
  - OW-57R IN
  - OW-61
  - OW-63

3.2 October 2021 Monitoring Event

In accordance with the Weadock Landfill HMP, TRC conducted the fourth quarter 2021 monitoring event for the Weadock Landfill on October 4 through 13, 2021. Groundwater monitoring was performed in accordance with the Weadock Landfill HMP. Samples that were collected during this event were submitted to Consumers Energy Laboratory Services in Jackson, Michigan for analysis of total metals and inorganic parameters. Radium analysis was performed by Eurofins TestAmerica in St Louis Missouri. Semiannual monitoring constituents include:

Section 11511a(3)(c) – Detection Monitoring Constituents	Section 11519b(2) – Assessment Monitoring Constituents	
Boron	Antimony	Lithium
Calcium	Arsenic	Mercury
Chloride	Barium	Molybdenum
Fluoride	Beryllium	Nickel
Iron	Cadmium	Selenium
pH	Chromium, total	Silver
Sulfate	Cobalt	Thallium
Total Dissolved Solids (TDS)	Copper	Vanadium
	Fluoride	Zinc
	Lead	Radium 226 and 228

Samples were also analyzed for additional constituents including magnesium, sodium, potassium, and bicarbonate, carbonate, and total alkalinity. Analytical results from the fourth quarter 2021 monitoring event are included in the attached laboratory reports (Appendix E).

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 Weadock Landfill 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 F).

Groundwater samples were collected using a peristaltic pump. The samples were collected in vendor-provided, nitric acid pre-preserved (metals only) and unpreserved sample containers and submitted to the laboratory for analysis. Groundwater 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 (MW-50), and field matrix spike/matrix spike duplicate samples collected at JCW-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 Weadock Landfill HMP. The data quality reviews for the JC Weadock Disposal Area network wells are summarized in Appendix B.

3.3 Groundwater Flow Rate and Direction

Potentiometric monitoring initiated in the unusable aquifer beneath the facility includes static water level data collected for development of water table contours and evaluation of the potential for discharge from the facility. The monitoring under this section will be conducted quarterly until closure, as approved by the Director, and semiannually during the 30-year post-closure period. Monitoring will continue until the end of post closure (30 years) or as otherwise approved by the Director.

The measurements for top of casing (TOC) and quarterly recorded depth to water (DTW) with corresponding calculated static water level (SWL) is tabulated and presented in Table 2. A potentiometric surface map is provided as Figure 2.

Groundwater elevations measured at the site in October 2021 are generally within the range of 580 to 593 feet above mean sea level (ft NAVD88). Groundwater elevations in monitoring wells located adjacent to Saginaw Bay and adjoining surface water bodies are typically encountered at a similar or slightly higher elevation relative to surrounding surface water features measured by the NOAA gauging station. A time-series plot included in Appendix A compares the groundwater elevation of MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, JCW-MW-18004, and MW-55 to the nearby NOAA staff gauge. Water levels in wells adjacent to surface water bodies (e.g. Saginaw Bay, Tacey Drain) closely mirror the surface water elevation. Such conditions would result in a minimal gradient to potentially a reverse gradient (i.e., toward the landfill) between the well and the drain which would result in minimal to zero mass flux to the drain (Appendix A: Table A1).The static water level elevations inside of the Weadock Landfill perimeter slurry wall are generally significantly different (>3 ft) than static water levels outside of the slurry wall, which demonstrates the presence of a low permeability feature between the well pairings inside and outside of the constructed slurry wall. The groundwater monitoring system is structured such that there are eleven (11) monitoring well pairs used to evaluate the hydraulic

gradient and potential for water flux across the slurry wall. Static water level observations from the paired wells are shown on time series charts in Appendix A. As such, the water level elevations indicate that the slurry wall is performing as designed. The general flow direction observed within the confinement of the slurry wall is similar to that identified in previous monitoring rounds. Due to the potential for radial flow, the downgradient wells are appropriately positioned to detect the presence of detection or assessment parameters that could potentially migrate from the Weadock Landfill.

As shown on Figure 3 and in Appendix A, the static water level outside of the slurry wall is lower than the static water level inside of the wall; therefore, the potential groundwater flux across the slurry wall was calculated and included in Table A-2 of Appendix A.

3.4 Groundwater Analytical Data and Relevant Screening Criteria

Groundwater analytical data are evaluated in accordance with the Weadock Landfill HMP for the purposes of solid waste license compliance as well as to determine compliance with applicable generic GSI and site-specific GSI mixing zone-based criteria. Data are evaluated by using a combination of screening against relevant criteria, as well as utilizing statistical analyses.

Analytical results from the fourth quarter 2021 monitoring event are included in the attached laboratory report (Appendix E). Groundwater analytical data from the fourth quarter 2021 monitoring event are summarized in Table 3 (Weadock Landfill monitoring wells) and Table 4 (background monitoring wells), as well as the associated Part 201 generic GSI and site-specific mixing-zone GSI criteria. Field data are summarized in Table 5.

Mixing-zone criteria for arsenic, boron, and selenium are provided for the Karn-Weadock complex in the mixing zone determination, dated December 23, 2015 (MDEQ, 2015). 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. All data are screened against GSI criteria; however, compliance with GSI criteria is determined at select monitoring locations as noted in Section 3.4.4 below.

The mixing zone determination included both final acute values (FAV) and final chronic values (FCV). If a concentration of a constituent at a groundwater well exceeds the acute criteria, and the exceedances are upgradient of the GSI compliance monitoring wells, Consumers Energy must demonstrate that data from all of the compliance monitoring wells are, and will be, in compliance with acute mixing zone-based GSI criteria for those parameters. Averaging of groundwater data is not allowed for comparison to generic GSI or acute mixing zone-based GSI criteria. Acute mixing zoned-based or generic GSI criteria may not be exceeded in any individual GSI compliance monitoring well. If a concentration of a constituent at a well exceeds the chronic criterion, compliance can be demonstrated on a mass-flux basis. The facility can choose to demonstrate compliance by evaluating the total chronic loading based upon the contribution from each compliance well with respect to the total flux observed in the mixing zone.

Table 8 provides a summary of the statistically significant increases or exceedances over the most recent four quarters in accordance with the EGLE-prescribed format; only well/constituent pairs that exceed the relevant GSI criteria (within the last four quarters) are included.

3.4.1 Groundwater Monitoring Analytical Results

Groundwater monitoring is being conducted under Weadock Landfill HMP, which provides for sampling at historic wells (MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and MW-55) along with wells that were newly installed in 2018 (OW-57R OUT, JCW-MW-18001, JCW-MW-18004, JCW-MW-18005, and JCW-MW-18006). Data for these wells are tabulated in Table 3. Summaries of the statistical evaluations are provided in sections 3.4.2, 3.4.3, and 3.4.4 below.

Analytical results for these wells are being evaluated to determine the effectiveness of landfill structural and operational enhancement measures on the quality and quantity of groundwater flow beneath the footprint of the facility. Additionally, analytical results for these wells are being evaluated in support of GSI compliance. GSI criteria only apply to the designated compliance point as specified in Section 3.4.4 below; however, analytical results and data trends in groundwater collected from the perimeter dike wells are evaluated to identify potential GSI compliance issues.

Overall, observed trends and concentrations further demonstrate that constituents present in groundwater in the monitoring well system are not expected to result in adverse impacts at the GSI (Table 6). As discussed in the alternate source demonstration (ASD) presented in the third quarter 2018 Hydrogeological Monitoring Report, redox conditions are changing at MW-55, which could explain some of the changes in trends of redox-sensitive parameters such as arsenic and molybdenum at that location. Additionally, as detailed in Section 3.1, water levels have increased over 4 feet since 2010 (Appendix A), geochemistry is changing, and data trends will continue to be monitored and evaluated. Several of these newly observed trends, such as those observed for specific conductance, may be a result of increased lake levels rather than a change in flux from the landfill as the water level data demonstrate that the slurry wall is performing as designed.

3.4.2 Detection Monitoring

Detection monitoring is continuing through the active life of the Weadock Landfill to monitor for new releases from landfill operations. The detection monitoring program consists of potentiometric analysis and groundwater quality analysis. The potentiometric analysis, as discussed in Section 3.1, demonstrates that the slurry wall is performing as designed.

Analytical data for the detection monitoring program are tabulated in Table 3. In addition to the comparison of analytical data to relevant screening criteria, statistical trend analyses are used to evaluate groundwater quality each quarter. Consumers Energy manages and evaluates its groundwater data using Sanitas™ Statistical Software. Consumers Energy conducts intrawell trend analyses to examine data for a given well over time to determine if changes in water quality are occurring that may be associated with the landfill and to identify potential GSI compliance issues. Specifically, the Mann-Kendall test for trend was performed 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. Constituents that were added to the monitoring program by the Weadock Landfill HMP (i.e., calcium, chloride, fluoride, and total dissolved solids) had an insufficient amount of data to perform trend analysis. Trend analysis will be completed for these constituents following the collection of a minimum of eight sampling events.

Appendix C includes a table summarizing the results of the trend tests as well as the Sanitas™ output summary statistics and graphs. Data are stable or declining for the majority of the well/constituent pairs, with the following exceptions:

- A new increasing trend for boron at MW-53 was observed in second quarter 2021 and confirmed in the third quarter 2021, but the increasing trend did not continue in fourth quarter 2021.
- A new increasing trend for boron at MW-54R was observed in third quarter 2021 and confirmed in fourth quarter 2021.
- A new, unconfirmed increasing trend for boron at MW-55 was observed in fourth quarter 2021.
- New, unconfirmed increasing trends for iron at MW-53R and MW-55 were observed in fourth quarter 2021.
- A continuous increasing trend was observed for sulfate at JCW-MW-18001. Sulfate concentrations remain below the generic final acute value (FAV).

The potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill. Sulfate is a redox sensitive parameter and the increasing trend is attributed to localized changes in geochemistry near JCW-MW-18001 as a result of changing water levels, rather than a change in flux from the landfill, as discussed further in Section 3.5. Consumers is further evaluating the cause of the increasing boron concentrations at MW-53 and MW-54R. Statistical significance above background has been established for these monitoring wells relative to boron satisfying the CCR Rule groundwater monitoring program requirements. Observed concentrations of boron in each of the monitoring wells is also less than the GSI pathway standard, so continued monitoring and assessment for potential future actions is warranted at this time.

3.4.3 Assessment Monitoring Data Evaluation

Assessment monitoring is continuing at the Weadock Landfill in accordance with the Weadock Landfill HMP and §257.95. The assessment monitoring data were statistically evaluated in accordance with the procedures in the Weadock Landfill HMP. The statistical evaluation details are provided in Appendix C (*Assessment Monitoring and GSI Statistical Evaluation of October 2021 Sampling Event*). A summary of the confidence interval evaluation is provided in Table 6.

3.4.3.1 Establishing Groundwater Protection Standards

The GWPSs are used to assess constituent concentrations present in groundwater as a result of CCR Unit operations by statistically comparing concentrations in the downgradient wells to each of the respective GWPSs for each detection and assessment monitoring constituent. The calculation of the GWPSs in accordance with the Weadock Landfill HMP is documented in the *Groundwater Protection Standards* technical memorandum included as Appendix H of the *First*

Quarter 2021 Hydrogeological Monitoring Report (TRC, April 2021). The Federal CCR Rule requires establishment of GWPSs for assessment monitoring (Appendix IV) constituents only. Part 115 requires establishment of GWPSs for both detection and assessment monitoring constituents.

3.4.3.2 Data Comparison to Groundwater Protection Standards

Consistent with the *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (Unified Guidance) (USEPA, 2009) and the Weadock Landfill HMP, the preferred method for comparisons to a fixed standard are confidence limits. An exceedance of the standard occurs when the 99 percent lower confidence level of the downgradient data exceeds the GWPS.

Detection Monitoring Constituents: The fourth quarter 2021 statistical evaluation indicates that boron at JCW-MW-18001, JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and OW-57R OUT and calcium at MW-51 were present at statistically significant levels above the GWPSs. The GWPSs for calcium and boron were established based on background concentrations observed in wells unaffected by the Weadock Landfill or Weadock Bottom Ash Pond. Boron and calcium are detection monitoring (i.e., Appendix III) constituents that do not have associated health-based criteria and there is not a complete drinking water pathway on site. As such, the relevant Part 115 compliance pathway is the GSI pathway. Concentrations of boron and calcium are below relevant GSI criteria, as discussed in Section 3.4.4.

Assessment Monitoring Constituents: Based on the fourth quarter 2021 statistical evaluation, there are no assessment monitoring constituents present at statistically significant levels within the Weadock Landfill groundwater monitoring system. Although concentrations of arsenic and molybdenum at MW-55 observed during individual sampling events are above the GWPS, the elevated concentrations of those constituents are not a result of a release from the Weadock Landfill, as detailed in Section 3.5. The head differential of 6.83 feet between OW-55 inside the slurry wall and MW-55 outside of the slurry wall also suggests that the integrity of the slurry wall is maintained and groundwater flow from the landfill to the south is impeded by the low permeability of the slurry wall. Groundwater conditions at MW-55 will continue to be monitored.

3.4.4 GSI Compliance Monitoring

The GSI monitoring program consists of the eight monitoring points located along the surface water features:

- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- JCW-MW-18004

Fourth quarter 2021 data from the GSI monitoring points are tabulated in Table 3. Consistent with the Weadock Landfill HMP, confidence limits were established for the following GSI monitoring program constituents:

- Boron
- pH
- Arsenic
- Lithium
- Selenium
- Iron
- Sulfate
- Chromium
- Molybdenum
- Vanadium

The confidence interval calculations are provided in Appendix D (*Assessment Monitoring and GSI Statistical Evaluation of October 2021 Sampling Event*). The confidence interval test compares the lower confidence limit to the GSI. Overall, data continue to demonstrate compliance with the applicable GSI criteria.

Arsenic: The statistical evaluation found that arsenic was present at above the chronic-based mixing zone GSI criterion (100 ug/L) in monitoring well MW-55, and the lower confidence limit of the increasing trend over the past 8 events was above 100 ug/L. However, water levels in MW-55 closely mirror the surface water elevation measured at the NOAA gauging station, which indicates there is a minimal outward gradient to a potentially, modest reverse gradient (i.e., toward the landfill) between the monitoring well and the drain, resulting in a minimal to zero mass flux to the drain. The calculated mass-flux loading for arsenic based upon the contribution from each compliance point with respect to the total flux observed in the mixing zone has been evaluated and compared to the chronic loading limits (Table 7). Table 7 shows that the estimated mass flux of arsenic (4.8×10^{-6} lbs/day) is less than the mixing zone-based chronic loading limits of 1.2×10^{-4} lbs/day demonstrating compliance on a mass flux basis.

Boron: The assessment monitoring statistical evaluation found that boron was present at statistically significant levels above the GWPS at JCW-MW-18001, JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and OW-57R. Boron is a detection monitoring (i.e. Appendix III) constituent and there is not a complete drinking water pathway on site. As such, the relevant Part 115 compliance pathway is the GSI pathway. All observations of boron are less than the recommended mixing-zone based GSI value specified in Table 3 of the *Implementation of a Mixing Zone Request, Consumers Energy DE Karn/JC Weadock Complex* (MDEQ, 2015) (Appendix D: Table 2).

Molybdenum: The statistical evaluation found that molybdenum was present at concentrations above the generic GSI criterion of 120 ug/L in monitoring well MW-55, and the lower confidence limit of the data over the past 8 events was above the GSI criteria. However, water levels in MW-55 closely mirror the surface water elevation measured at the NOAA gauging station, which indicates there is a minimal outward gradient to a potentially, modest reverse gradient (i.e., toward the landfill) between the monitoring well and the drain, resulting in a minimal to zero mass flux to the drain. The calculated mass-flux loading for molybdenum based upon the contribution from each compliance point with respect to the total flux observed in the mixing zone has been evaluated and compared to the chronic loading limits (Table 7). Table 7 shows that the estimated mass flux of molybdenum (6.6×10^{-6} lbs/day) is less than the loading limits of 1.5×10^{-4} lbs/day based on the generic GSI criterion, supporting compliance on a mass flux basis.

3.5 Alternate Source Demonstration

3.5.1 Monitoring Well JCW-MW-18001: Sulfate

Although confirmed increasing trends were observed at JCW-MW-18001 for sulfate (through Q4 2021), the potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill (Appendix A) and these trends are not indicative of a new release from the landfill. Increases of sulfate concentrations at JCW-MW-18001 are attributed to changes occurring outside of the slurry wall as a result of changing water levels, rather than a change in flux from the landfill therefore Consumers Energy is presenting an Alternate Source Demonstration for these constituents. Additional time series charts are included in Appendix G to illustrate the correlation between the increased concentrations and the changing water levels.

- Dissolved oxygen is increasing at JCW-MW-18001 (Figure G1). Sulfate is used as an oxidizing agent when oxygen is not present. As groundwater is transitioning to a more oxygenated state from the rising adjacent surface water level, less sulfate is being reduced as an electron acceptor, causing increasing concentrations (i.e. less sulfate is being reduced to sulfide/sulfite/elemental sulfur, so the amount of sulfate present increases).
- Sulfate concentrations at JCW-MW-18001 (777 mg/L) are much higher than sulfate concentrations previously observed on the inside of the slurry wall at JCW-OW-18001 (86.8 mg/L in second quarter 2021), which further supports that the landfill is not the source of sulfate (Figure G1).

3.5.2 Monitoring Well MW-55: Arsenic and Molybdenum

Additionally, Consumers Energy is continuing to assert an Alternate Source Demonstration (ASD) for a arsenic and of molybdenum at MW-55 indicating elevated levels of constituents at that location are not related to materials management of the Weadock Landfill (*2019 Annual Groundwater Monitoring and Corrective Action Report*; TRC, January 2020). The basis for this ASD is summarized below and updated time series plots in support of this ASD are included in Appendix G (Figure G2).

Data collected from the 2018 investigation as well as data collected during routine sampling events for Part 115 and Federal CCR groundwater compliance show the following:

- **Distinct Chemistry from Leachate –** The leachate chemistry from a monitoring well screened at the base of the ash fill (LH-104) is distinctly different from the groundwater chemistry near MW- 55 and the temporary monitoring wells installed by TRC in the investigation area, as illustrated Appendix G of the 2019 Annual Groundwater Monitoring and Corrective Action Report (TRC, January 2020). Additionally, Table G2 shows concentrations of arsenic, boron, and molybdenum within the landfill (OW-55, JCW-OW-18004 and LH-104) are noticeably different than arsenic and molybdenum concentrations observed in MW-55. Arsenic and molybdenum concentrations are generally much lower inside the slurry wall and boron concentrations are much higher.
- **Conservative Tracer –** Boron is a metalloid known to be present in coal ash and can be used as a conservative tracer in groundwater. Concentrations of boron in Leachate Headwell LH-104 are significantly higher than concentrations observed at any of the other location sampled as a part of this ASD. Additionally, boron concentrations at MW-55 have decreased since 2010, as evidenced by the time series plots in Figure G2. A downward

trend in concentration for boron is strong evidence that the water quality at MW-55 is not directly affected by groundwater migrating from the landfill.

- **Reducing Conditions and Groundwater Head Levels –** Water levels for MW-55, as shown in Appendices A and G, are trending upwards and have increased over 4-ft since 2010. The oxidation-reduction potential (ORP) at MW-55 is generally lower (i.e., more reducing) than other wells along the southern and eastern portion of the landfill perimeter Table 5, Table G2). The lowering of ORP over time as a result of increased water levels has changed the geochemical conditions in the vicinity of MW-55 and has resulted in an increased solubility of arsenic and molybdenum.

4.0 Conclusions and Recommendations

Detection monitoring is continuing through the active life of the Weadock Landfill to monitor for new releases from landfill operations. The detection monitoring program consists of potentiometric analysis and groundwater quality analysis. Evaluation of the fourth quarter 2021 data demonstrate that the slurry wall is functioning as designed.

The Weadock Landfill is currently in assessment monitoring pursuant to the CCR Rule, as discussed in the *2020 Annual Groundwater Monitoring and Corrective Action Report*, due to observed groundwater concentrations that are indicative of impact from past landfill operations. Evaluation of the fourth quarter 2021 data in accordance with the Weadock Landfill HMP demonstrate that boron and calcium are present at concentrations above the GWPS. Boron and calcium are detection monitoring (i.e., Appendix III) constituents that do not have associated health-based criteria and there is not a complete drinking water pathway on site. As such, the relevant Part 115 compliance pathway is the GSI pathway. Concentrations of boron and calcium are below relevant GSI criteria, as discussed in Section 3.4.4.

The statistical evaluation found that arsenic was present at a statistically significant level above the site-specific chronic mixing zone criteria of 100 ug/L and molybdenum was present at a statistically significant level above the generic GSI criterion of 120 ug/L at MW-55. However, water levels in MW-55 closely mirror the surface water elevation measured at the NOAA gauging station, which indicates there is a minimal gradient to potentially a reverse gradient (i.e., toward the landfill) between the well and the drain, resulting in a minimal to zero mass flux to the drain. No other constituents were present at statistically significant levels above applicable GSI criteria.

Therefore, Consumers Energy will continue with the detection and assessment monitoring as required by the CCR rule as well as the monitoring program relative to the implementation of the site-specific mixing zone authorization at the Weadock Landfill unit in conformance with the JC Weadock Landfill HMP. The first quarter monitoring event for is scheduled for March 2022.

5.0 References

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Tables

Table 1
Leachate Headwell Results
Fourth Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Parameter	Reporting Limit	Units	2021 Field Leachate	2020 Field Leachate		2019 Field Leachate	
			LH104	LH103	LH104	LH103	LH104
Indicator Parameters							
Alkalinity, Bicarbonate	10,000	µg/L	351,000	202,000	886,000	189,000	194,000
Dissolved Oxygen	0.1	mg/L	0.49	1.35	1.32	0.26	0.36
O.R.P.	1	mV	-119.6	-137.1	-88.8	-101.8	5.1
pH	0.05	S.U.	7.47	7.52	7.39	7.21	7.50
Specific Conductance	1	µS/cm	1,715	805	2,000	647	1,092
Metals							
Antimony	1	µg/L	2	<1	<1	<1	5
Arsenic	1	µg/L	26	394	23	501	13
Barium	5	µg/L	266	334	474	246	116
Beryllium	1	µg/L	<1	<1	<1	<1	<1
Boron	20	µg/L	11,200	5,370	13,900	4,320	9,360
Cadmium	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium	1	µg/L	<1	<1	<1	3	<1
Cobalt	15	µg/L	<6	<6	<6	<15	<15
Copper	1	µg/L	1	<1	1	<1	3
Iron	20	µg/L	285	5,220	414	3,480	51
Lead	1	µg/L	<1	<1	<1	<1	<1
Lithium	10	µg/L	58	84	61	63	23
Mercury (low-level)	0.5	ng/L	0.58	0.86	0.69	1.40	1.04
Molybdenum	5	µg/L	40	132	21	187	175
Nickel	2	µg/L	8	<2	6	2	<2
Phosphorus	10	µg/L	--	656	41	965	406
Selenium	1	µg/L	5	2	2	2	45
Silver	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2
Sodium	1,000	µg/L	80,500	72,300	59,500	59,200	52,400
Sulfate	1,000	µg/L	178,000	<1,000	62,900	1,050	346,000
Thallium	2	µg/L	<2	<2	<2	<2	<2
Vanadium	2	µg/L	28	<2	11	<2	59
Zinc	10	µg/L	<10	<10	<10	<10	<10

Notes:

µg/L = micrograms per liter

ng/L = nanograms per liter

mg/L = milligrams per liter

mV = Millivolts

S.U. = standard units

µS/cm = microSiemens per centimeter

O.R.P. = Oxidation-Reduction Potential

-- = not analyzed

Table 2
Summary of Groundwater Elevation Data: October 2021
Fourth Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, 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 Monitoring Wells							
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
Bottom Ash Pond: Downgradient Monitoring Wells							
JCW-MW-15007	587.40	Sand	582.7	to	579.2	3.43	583.97
JCW-MW-15009	589.64	Sand	581.9	to	576.9	8.18	581.46
JCW-MW-15010	597.76	Sand	579.7	to	578.2	16.52	581.24
JCW-MW-15028	589.64	Sand	567.7	to	564.7	7.16	582.48
Landfill: Downgradient Monitoring Wells (outside slurry wall)							
JCW-MW-18001	596.73	Sand and Sandy Clay	578.3	to	573.3	15.76	580.97
JCW-MW-18004	593.04	Sandy Clay	583.9	to	578.9	11.72	581.32
JCW-MW-18005	590.89	Sand and Sandy Clay	580.0	to	575.0	9.25	581.64
JCW-MW-18006	600.72	Fly Ash and Sandy Clay	582.8	to	577.8	13.98	586.74
MW-50	593.36	Sand	577.8	to	574.8	12.47	580.89
MW-51	594.29	Sand and Clay	577.8	to	574.8	13.45	580.84
MW-52	594.90	Sand	579.3	to	576.3	14.00	580.90
MW-53	593.68	Sand and Clay	579.1	to	576.1	12.97	580.71
MW-53R	594.25	Sand and Clay	580.4	to	575.4	13.28	580.97
MW-54R	593.89	Clay and Sand	581.3	to	576.3	12.78	581.11
MW-55	593.82	Sand	581.5	to	578.5	13.15	580.67
OW-57ROUT	591.00	Sandy Clay	577.0	to	572.0	9.64	581.36
Landfill: Static Water Level Only (inside slurry wall)							
JCW-OW-18001	595.84	Fly Ash and Sand	581.1	to	576.1	7.90	587.94
JCW-OW-18002	593.63	Sand	578.9	to	573.9	10.64	582.99
JCW-OW-18003	593.99	Sand and Clay	580.5	to	575.5	9.20	584.79
JCW-OW-18004	594.19	Sandy Clay	584.6	to	579.6	8.65	585.54
JCW-OW-18006	600.61	Fly Ash and Clay with Sand	582.9	to	577.9	11.22	589.39
MW-20	592.73	NR	~581.1	to	~578.1	7.10	585.63
OW-51	593.62	Clay and Sand	578.9	to	575.9	10.60	583.02
OW-53	593.64	Clay and Sand	579.0	to	576.0	8.03	585.61
OW-54	594.10	Clay and Sand	580.0	to	577.0	7.90	586.20
OW-55	594.67	Clay (or Sand and Clay)	580.9	to	577.9	7.17	587.50
OW-56R	592.01	Ash and Sand	577.5	to	572.5	6.73	585.28
OW-57R IN	590.86	Sandy Clay	575.7	to	570.7	6.90	583.96
OW-61	612.37	Ash and Sand	588.0	to	585.0	22.65	589.72
OW-63	612.53	Ash and Sand	594.2	to	591.2	26.36	586.17
Landfill: Leachate Headwells							
LH-103	603.49	Fly Ash	30.2	to	33.2	NM	NM
LH-104	596.56	Fly Ash	8.0	to	11.0	9.88	586.68

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

NM: Not Measured

Table 3
Summary of Groundwater Sampling Results (Analytical): October 2021
Fourth Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

							Sample Location:	**JCW-MW-18001**	**JCW-MW-18004**	**JCW-MW-18005**	**JCW-MW-18006**	**MW-50**	**MW-51**
							Sample Date:	10/11/2021	10/12/2021	10/12/2021	10/12/2021	10/11/2021	10/11/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Chronic-Based Mixing Zone GSI Criteria^	Acute-Based Mixing Zone GSI Criteria^	Downgradient	Downgradient/ GSI	Downgradient	Downgradient	Downgradient/ GSI	Downgradient/ GSI
Appendix III(1)													
Boron	ug/L	NC	**500**	**500**	**4,000**	44,000	69,000	**1,670**	389	**1,190**	**2,600**	**1,830**	**1,140**
Calcium	mg/L	NC	NC	NC	500EE	NC	NC	373	264	193	152	274	316
Chloride	mg/L	250**	250E	250E	**50**	NC	NC	**68.3**	7.45	**63.6**	**77.0**	**51.0**	**97.1**
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250E**	**250E**	**500EE**	NC	NC	**777**	**493**	227	34.7	**496**	**418**
Total Dissolved Solids	mg/L	**500****	**500E**	**500E**	**500**	NC	NC	**2,000**	**1,240**	**1,020**	**802**	**1,440**	**1,500**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5E	6.5 - 8.5E	6.5 - 9.0	NC	NC	6.8	6.8	6.9	7.0	7.1	6.9
Appendix IV(1)													
Antimony	ug/L	6	6.0	6.0	2.0	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	**100**	680	1	< 1	9	**21**	3	**20**
Barium	ug/L	2,000	2,000	2,000	1,200	NC	NC	184	41	124	351	102	197
Beryllium	ug/L	4	4.0	4.0	33	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	NC	NC	< 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
Cobalt	ug/L	NC	40	100	100	NC	NC	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	14	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	NC	NC	103	63	39	47	93	64
Mercury	ug/L	2	2.0	2.0	0.20#	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	**73**	210	120	NC	NC	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226/228	pCi/L	5	NC	NC	NC	NC	NC	1.39	0.978	1.16	1.14	1.21	2.46
Selenium	ug/L	50	50	50	5.0	55	120	3	3	4	4	4	3
Thallium	ug/L	2	2.0	2.0	2.0	NC	NC	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115(2)													
Iron	ug/L	**300****	**300E**	**300E**	500,000EE	NC	NC	91	39	**5,840**	**6,200**	**2,500**	**5,130**
Copper	ug/L	1,000**	1,000E	1,000E	20	NC	NC	2	2	1	< 1	1	1
Nickel	ug/L	NC	100	100	120	NC	NC	20	16	22	10	16	18
Silver	ug/L	100**	34	98	0.20	NC	NC	< 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	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000E	260	NC	NC	< 10	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
pCi/L - picocuries per liter; SU - standard units; pH is a field parameter.
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April, 2012.
NC - no criteria.
* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020.
** - 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 3
Summary of Groundwater Sampling Results (Analytical): October 2021
Fourth Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

							Sample Location:	**MW-52**	**MW-53**	**MW-53R**	**MW-54R**	**MW-55**	**OW-57ROUT**
							Sample Date:	10/11/2021	10/11/2021	10/11/2021	10/11/2021	10/12/2021	10/12/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Chronic-Based Mixing Zone GSI Criteria^	Acute-Based Mixing Zone GSI Criteria^	Downgradient/ GSI	Downgradient/ GSI	Downgradient/ GSI	Downgradient/ GSI	Downgradient/ GSI	Downgradient
Appendix III(1)													
Boron	ug/L	NC	**500**	**500**	**4,000**	44,000	69,000	**1,280**	**3,820**	**2,060**	**4,270**	**788**	**1,880**
Calcium	mg/L	NC	NC	NC	500EE	NC	NC	237	166	232	187	198	140
Chloride	mg/L	250**	250E	250E	**50**	NC	NC	**59.4**	**55.5**	36.6	34.7	16.5	46.9
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250E**	**250E**	**500EE**	NC	NC	110	111	166	75.7	80.7	93.1
Total Dissolved Solids	mg/L	**500****	**500E**	**500E**	**500**	NC	NC	**1,360**	**896**	**1,060**	**772**	**844**	**737**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5E	6.5 - 8.5E	6.5 - 9.0	NC	NC	6.9	7.1	6.8	6.9	7.0	7.0
Appendix IV(1)													
Antimony	ug/L	6	6.0	6.0	2.0	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	**100**	680	1	2	**25**	4	**198**	< 1
Barium	ug/L	2,000	2,000	2,000	1,200	NC	NC	152	212	189	129	330	75
Beryllium	ug/L	4	4.0	4.0	33	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	NC	NC	< 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
Cobalt	ug/L	NC	40	100	100	NC	NC	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	14	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	NC	NC	31	53	57	59	34	21
Mercury	ug/L	2	2.0	2.0	0.20#	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	**73**	210	120	NC	NC	< 5	< 5	< 5	7	**206**	9
Radium-226/228	pCi/L	5	NC	NC	NC	NC	NC	1.03	1.38	1.40	0.965	1.56	1.26
Selenium	ug/L	50	50	50	5.0	55	120	3	< 1	3	2	2	2
Thallium	ug/L	2	2.0	2.0	2.0	NC	NC	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115(2)													
Iron	ug/L	**300****	**300E**	**300E**	500,000EE	NC	NC	**4,880**	**1,760**	**2,170**	**2,280**	**40,500**	68
Copper	ug/L	1,000**	1,000E	1,000E	20	NC	NC	1	< 1	< 1	< 1	< 1	1
Nickel	ug/L	NC	100	100	120	NC	NC	14	10	2	< 2	8	12
Silver	ug/L	100**	34	98	0.20	NC	NC	< 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	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000E	260	NC	NC	< 10	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
pCi/L - picocuries per liter; SU - standard units; pH is a field parameter.
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April, 2012.
NC - no criteria.
* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020.
** - 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 Groundwater Sampling Results (Analytical): October 2021
Fourth Quarter 2021 Quarterly Report
DE Karn & JC Weadock Background, Essexville, Michigan

					Sample Location:	**MW-15002**	**MW-15008**	**MW-15016**	**MW-15019**
					Sample Date:	10/7/2021	10/6/2021	10/7/2021	10/7/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Background			
Appendix III[(1)]									
Boron	ug/L	NC	**500**	**500**	4,000	51	204	**661**	351
Calcium	mg/L	NC	NC	NC	500[EE]	76.8	116	236	165
Chloride	mg/L	**250****	**250[E]**	**250[E]**	**50**	**146**	**197**	**138**	**363**
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	500[EE]	3.76	11.6	**433**	58.3
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	290	**810**	**1,140**	**1,130**
pH, Field	SU	**6.5 - 8.5****	**6.5 - 8.5[E]**	**6.5 - 8.5[E]**	**6.5 - 9.0**	7.0	6.6	6.9	**6.4**
Appendix IV[(1)]									
Antimony	ug/L	6	6.0	6.0	2.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	10	10	10	3	3	8	3
Barium	ug/L	2,000	2,000	2,000	1,200	85	65	63	283
Beryllium	ug/L	4	4.0	4.0	33	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	< 1	2	< 1	< 1
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	14	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	< 10	30	85	15
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	120	< 5	< 5	7	< 5
Radium-226/228	pCi/L	5	NC	NC	NC	1.00	2.16	1.33	1.72
Selenium	ug/L	50	50	50	5.0	< 1	< 1	2	< 1
Thallium	ug/L	2	2.0	2.0	2.0	< 2	< 2	< 2	< 2
Additional MI Part 115[(2)]									
Iron	ug/L	**300****	**300[E]**	**300[E]**	500,000[EE]	**2,810**	**14,500**	**2,670**	**20,900**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	< 1	< 1	1	< 1
Nickel	ug/L	NC	100	100	120	4	6	14	7
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	62	27	< 2	**6**	< 2	2
Zinc	ug/L	5,000**	2,400	5,000[E]	260	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter.
pCi/L - picocuries per liter; SU - standard units; pH is a field parameter.
MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April, 2012.
NC - no criteria.
* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020.
** - 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 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}.
(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 5
Summary of Field Parameters: October 2021
Fourth Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Sample Location	Sample Date	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (umhos/cm)	Temperature (°C)	Turbidity (NTU)
Background							
MW-15002	10/7/2021	0.50	-101.9	7.0	919	16.5	3.23
MW-15008	10/6/2021	0.46	-93.6	6.6	1,202	16.0	10.70
MW-15016	10/7/2021	0.54	-71.2	6.9	1,498	17.4	1.47
MW-15019	10/7/2021	0.48	-72.2	6.4	1,829	15.2	1.22
JCW Landfill							
JCW-MW-18001	10/11/2021	0.52	-151.0	6.8	2,682	16.5	2.30
JCW-MW-18004	10/12/2021	1.75	23.9	6.8	1,695	17.9	3.00
JCW-MW-18005	10/12/2021	0.45	-104.0	6.9	1,515	15.0	3.92
JCW-MW-18006	10/12/2021	0.48	-118.0	7.0	1,441	13.8	1.80
MW-50	10/11/2021	0.36	-124.0	7.1	1,983	16.9	6.20
MW-51	10/11/2021	0.32	-122.0	6.9	2,254	15.7	9.15
MW-52	10/11/2021	0.32	-108.1	6.9	2,021	16.0	3.30
MW-53	10/11/2021	0.32	-135.0	7.1	1,489	16.5	3.00
MW-53R	10/11/2021	0.31	-117.9	6.8	1,715	16.4	3.55
MW-54R	10/11/2021	0.31	-119.5	6.9	1,309	16.9	3.10
MW-55	10/12/2021	0.35	-156.0	7.0	1,543	16.6	2.00
OW-57ROUT	10/12/2021	0.55	-77.8	7.0	1,316	16.3	2.95

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

Table 6
Summary of Confidence Interval Evaluation: October 2021
Fourth Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Assessment Monitoring Statistical Evaluation

Constituent	Units	GWPS	MW-50		MW-51		MW-52		MW-53		MW-53R		MW-54R		MW-55		OW-57R OUT		JCW-MW-18001		JCW-MW-18004		JCW-MW-18005		JCW-MW-18006	
			UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL
Boron	ug/L	560	1,700	**1,300**	1,100	**810**	1,200	**1,100**	3,900	**1,800**	1,900	**1,400**	5,600	**1,700**	840	490	1,800	**1,600**	1,700	**1,300**	--	**--**	1,200	**980**	3,000	**2,300**
Calcium	mg/L	280	380	260	340	**290**	--	--	310	160	--	--	--	--	--	--	--	--	360	230	320	230	350	140	--	--
Sulfate	mg/L	780	1,100	660	--	--	--	--	--	**--**	--	--	--	--	--	--	--	--	--	--	--	**--**	690	180	--	--
Arsenic	ug/L	21	--	--	--	--	--	--	--	--	33	17	--	--	--(1)	--(1)	--	--	38	1.0	--	--	--	--	36	17
Molybdenum	ug/L	73	--	--	--	--	--	--	--	--	--	--	--	--	--(1)	--(1)	--	--	--	--	--	--	--	--	--	--
Iron	ug/L	28,000	--	--	--	--	--	--	--	--	--	--	--	--	41,000	18,000	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/L	6	--	--	--	--	--	--	--	--	--	--	--	--	--	**--**	--	--	12	2.0	10	2.0	--	--	--	--

GSI Statistical Evaluation

Constituent	Units	GSI	MW-55		JCW-MW-18004	
			UCL	LCL	UCL	LCL
Arsenic	ug/L	100	260	**160**	--	**--**
Chromium	ug/L	11	--	--	49	1.0
Molybdenum	ug/L	120	210	**150**	--	--

Notes:

ug/L - micrograms per Liter

mg/L - milligrams per Liter

-- - Not Applicable; well/parameter pair did not directly exceed the applicable criterion and was not included in further analysis.

GWPS - Groundwater Protection Standard as established in TRC's Technical Memorandum dated April 23, 2021

GSI - Groundwater Surface Water Interface Criteria; GSI criteria is the generic Michigan Part 201 GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.

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

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

1,300	Indicates a statistically significant exceedance of the GWPS (detection monitoring constituent). An exceedance occurs when the LCL is greater than the criterion.
1,300	Indicates a statistically significant exceedance of the GWPS (assessment monitoring constituent). An exceedance occurs when the LCL is greater than the criterion.
1,300	Indicates a statistically significant exceedance of the applicable GSI criterion. An exceedance occurs when the LCL is greater than the criterion.

(1) The concentrations of arsenic and molybdenum at MW-55 are not a result of a release from the unit, as detailed in the Alternate Source Demonstration (TRC, December 2019); therefore, confidence intervals were not calculated

Table 7
Mass Flux Calculations
Fourth Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Karn-Weadock Mixing Zone Compliance

Saginaw Bay Static Water Elevation: 580.92 | 10/4/2021

Monitoring Well Segment[1]	Segment Width (ft)	Static Water Elevation (ft NAVD88)	Aquifer Base Elevation (ft NAVD88)	Average Thickness of Segment[2] (ft)	Distance from Well to Bay (ft)	Total Area (ft^2)	Hydraulic Conductivity[3] (ft/day)	Gradient (ft/ft)	Q=KIA Total Volume (ft^3/day)	Total Volume (liters/day)	Arsenic 100 µg/L total volume x concentration: Concentration[4] (µg/L)	Arsenic: Total Loading (µg/day)	Molybdenum 120 µg/L total volume x concentration: Concentration[4] (µg/L)	Molybdenum: Total Loading (µg/day)
Non-Adjacent Zone														
MW-54R	510	581.11	576.3	2.50	55	1,275		0.0035	3.13E+00	8.86E+01	4	3.54E+02	7	6.20E+02
JCW-MW-18004	820	581.32	579.9	1.42	45	1,164		0.0089	7.35E+00	2.08E+02	1	2.08E+02	5	1.04E+03
MW-55	1,220	580.67	578.0	2.67	45	3,257		-0.0056	0.00E+00	0.00E+00	198	0.00E+00	206	0.00E+00
JCW-MW-18005	1,120	581.64	578.5	1.25	120	1,400		0.0060	5.96E+00	1.69E+02	9	1.52E+03	5	8.45E+02
Discharge Channel														
JCW-MW-18001	1,010	580.97	574.8	3.75	40	3,788	7.1E-01	0.0013	3.36E+00	9.52E+01	1	9.52E+01	5	4.76E+02
MW-50	970	580.89	574.31	4.50	45	4,365		-0.0007	0.00E+00	0.00E+00	3	0.00E+00	5	0.00E+00
Adjacent Zone														
MW-51	1,850	580.84	575.3	5.00	60	9,250		-0.0013	0.00E+00	0.00E+00	20	0.00E+00	5	0.00E+00
MW-52	740	580.90	575.79	4.50	55	3,330		-0.0004	0.00E+00	0.00E+00	1	0.00E+00	5	0.00E+00
MW-53	730	580.71	577.84	2.25	35	1,643		-0.0060	0.00E+00	0.00E+00	2	0.00E+00	5	0.00E+00

ft^3 to liter is (ft^3 x 28.32)

Total Volume:	1.98E+01 ft^3/day	Total (lbs/day):	4.79E-06	Total (lbs/day):	6.56E-06
	5.61E+02 liter/day	Total (µg/day):	2,178	Total (µg/day):	2,981
	2.29E-04 ft^3/sec				

Chronic Loading Limits		Chronic Loading Limits	
1.23E-04	lb/day	1.48E-04	lb/day
5.61E-05	kg/day	6.73E-05	kg/day
5.61E-02	g/day	6.73E-02	g/day
5.61E+01	mg/day	6.73E+01	mg/day
56,077	µg/day	67,293	µg/day

Notes:

NM - Not Measured

(1) Monitoring Well Zones based on Phase II Evaluation, Appendix K Groundwater Discharge Calculations, September 30, 2005.
Representative wells based on the Landfill Hydrogeological Monitoring Plan, February 2021.

(2) Saturated thickness will be the thickness of the sand unit when the observed static water elevation is above the top of the sand unit, or the measured saturated thickness of the sand unit if the static water elevation is below the top of the sand unit.

(3) Hydraulic conductivity is the harmonic mean of the testing results, Phase II Evaluation, Appendix K Groundwater Discharge Calculations, September 30, 2005.

(4) Concentration reported as equal to the laboratory reporting limit for non detect sample results.

Green cells can be modified by the user.

Calculated red and yellow loadings are compared with the unit specific chronic loading limits.

Table 8
EGLE Exceedance Summary Table
Fourth Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, 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: JC Weadock – WDS# 395457

Well #	Location	Parameter	Part 201 GRCC	Statistical Limit (or 'CC' for Control Charts)	4 Qtr. 2021 (**bold** >201)	3 Qtr. 2021 (**bold** >201)	2 Qtr. 2021 (**bold** >201)	1 Qtr. 2021 (**bold** >201)

No Exceedances at Compliance Locations

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:	A. ADAIR
CHECKED BY:	J. KRENZ
APPROVED BY:	D. LITZ
DATE:	OCTOBER 2021
PROJ. NO.:	418426.0000
FILE:	418426-301-001.mxd

FIGURE 1

S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\3_WEADOCK\2021_MXDs\2021_003_JULY\418426-301-001.mxd -- Saved By: AADAIR on 9/9/2021, 10:20:08 AM

LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING WELL
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL
- SLURRY WALL (APPROXIMATE)

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018.
3. NOAA/NATIONAL OCEANIC SERVICE GREAT LAKES GAUGING STATION, ESSEXVILLE, MI (ID: 9075035).

N

0 600 1,200 Feet

1 " = 600 '

1:7,200

PROJECT:

CONSUMERS ENERGY COMPANY
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:

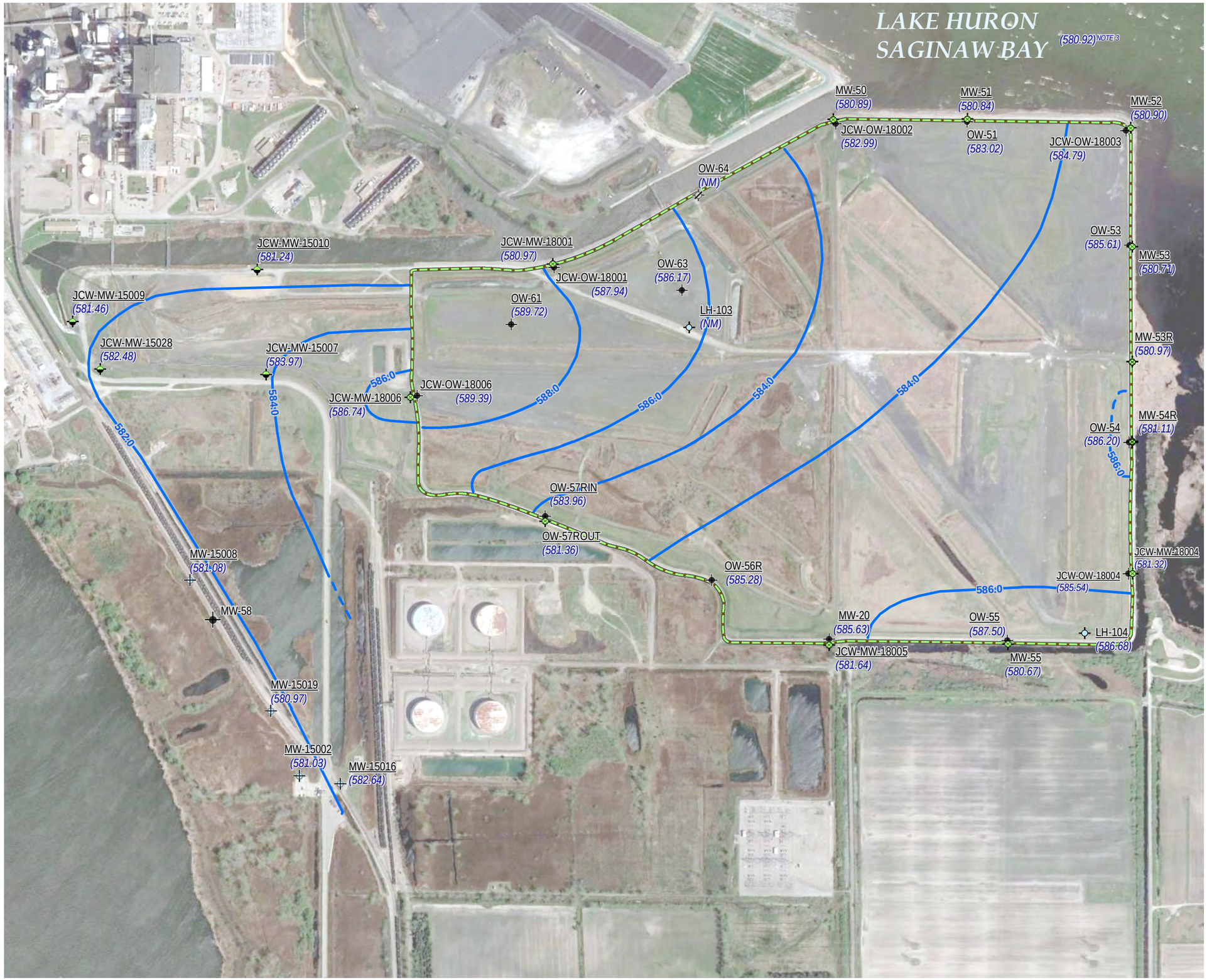
SITE MAP

DRAWN BY:	A. ADAIR	PROJ NO.:	418426.0000
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.trcsolutions.com

FILE NO.: 418426-301-002.mxd

Plot Date: 9/9/2021, 10:51:29 AM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 269767\3 WEADOCK\2021 MXDs\2021 003 JULY\418426-301-002.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS



LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVELS ONLY)
- DECOMMISSIONED MONITORING WELL
- SLURRY WALL (APPROXIMATE)
- GROUNDWATER ELEVATION CONTOUR (2' INTERVAL, DASHED WHERE INFERRED)
- (580.85) GROUNDWATER ELEVATION (FEET)
- (NM) NOT MEASURED

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018.
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
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:

POTENTIOMETRIC SURFACE MAP
OCTOBER 2021

DRAWN BY:	A. ADAIR	PROJ NO.:	418426.0000
CHECKED BY:	J. KRENZ		**FIGURE 3**
APPROVED BY:	D. LITZ		
DATE:	JANUARY 2022		

TRC

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FILE NO.: 418426-401-003_af.mxd

Plot Date: 1/27/2022, 15:00:09 PM by AFOJTIK -- LAYOUT: ANSI B(11"x17")
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Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

Appendix A
Static Water Level Evaluation

Table A1

Static Water Levels for Select Perimeter Dike Monitoring Wells and NOAA Staff Gauge

Fourth Quarter 2021 Quarterly Report

JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Well Location	Date Measured	Groundwater Water Elevation (GWE) (ft)	Saginaw Bay Surface Water Elevation (SWE) (ft)	Elevation Difference (GWE-SWE)(1)
MW-50	10/4/2021	580.89	580.92	-0.03
MW-51	10/4/2021	580.84		-0.08
MW-52	10/4/2021	580.90		-0.02
MW-53	10/4/2021	580.71		-0.21
MW-53R	10/4/2021	580.97		0.05
MW-54R	10/4/2021	581.11		0.19
MW-55	10/4/2021	580.67		-0.25
JCW-MW-18004	10/4/2021	581.32		0.40
Average:		**580.93**		

Notes:

Elevation in feet above North American Vertical Datum 1988 (NAVD 88)

TOC: top of well casing

ft BTOC: feet below top of well casing

(1) Positive elevation difference indicates flow toward the surface water body.

Table A2
Slurry Wall Gradient and Flux
Fourth Quarter 2021 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Monitoring Well Pair Discharge Channel	SWL Obs Well (ft NAVD 88)	SWL MW (ft NAVD 88)	x_{wells} (ft)	i (ft/ft)	Saturated Thickness (ft)	Mean Thickness (ft)	Section Length (ft)	K (cm/sec)	i (ft/ft)	Area (ft^2)	Flow ft^3/day	Flow Gal/day	Flow Gal/yr
JCW-OW-18001	587.94		22.37	3.12E-01	2.00	2.88	1,010	2.30E-08	0.31	2,904	5.90E-02	0.44	161
JCW-MW-18001		580.97			3.75								
JCW-OW-18002	582.99		28.87	7.27E-02	4.00	4.25	970		0.07	4,123	1.96E-02	0.15	53
MW-50		580.89			4.50								

Monitoring Well Pair Adjacent Zone	SWL Obs Well (ft NAVD 88)	SWL MW (ft NAVD 88)	x_{wells} (ft)	i (ft/ft)	Saturated Thickness (ft)	Mean Thickness (ft)	Section Length (ft)	K (cm/sec)	i (ft/ft)	Area (ft^2)	Flow ft^3/day	Flow Gal/day	Flow Gal/yr
OW-51	583.02		14.38	1.52E-01	4.00	4.50	1,850	2.30E-08	0.15	8,325	8.23E-02	0.62	225
MW-51		580.84			5.00								
JCW-OW-18003	584.79		33.85	1.15E-01	3.50	4.00	740		0.11	2,960	2.22E-02	0.17	61
MW-52		580.90			4.50								
OW-53	585.61		20.14	2.43E-01	1.25	1.75	730		0.24	1,278	2.03E-02	0.15	55
MW-53		580.71			2.25								

Monitoring Well Pair Non-Adjacent Zone	SWL Obs Well (ft NAVD 88)	SWL MW (ft NAVD 88)	x_{wells} (ft)	i (ft/ft)	Saturated Thickness (ft)	Mean Thickness (ft)	Section Length (ft)	K (cm/sec)	i (ft/ft)	Area (ft^2)	Flow ft^3/day	Flow Gal/day	Flow Gal/yr
OW-54	586.20		21.23	2.40E-01	2.00	2.25	510	2.30E-08	0.24	1,148	1.79E-02	0.13	49
MW-54R		581.11			2.50								
JCW-OW-18004	585.54		26.59	1.59E-01	8.00	4.71	820		0.16	3,862	4.00E-02	0.30	109
JCW-MW-18004		581.32			1.42								
OW-55	587.50		23.95	2.85E-01	2.00	2.33	1,220		0.29	2,849	5.30E-02	0.40	145
MW-55		580.67			2.67								
MW-20	585.63		40.93	9.75E-02	1.50	1.38	1,120		0.10	1,540	9.79E-03	0.07	27
JCW-MW-18005		581.64			1.25								

Calculated Groundwater Discharge from JC Weadock (gal per day)	**=**	**2.42**
(cubic ft per day)	**=**	**0.32**
(cubic ft per min)		**2.2E-04**
Calculated Groundwater Discharge from JC Weadock (gal per yr)	**=**	**884**
(cubic ft per yr)	**=**	**118**
Calculated Groundwater Discharge from JC Weadock (gal per year per linear foot of dike)	**=**	**0.10**
(cubic feet per year per linear foot of dike)	**=**	**1.32E-02**

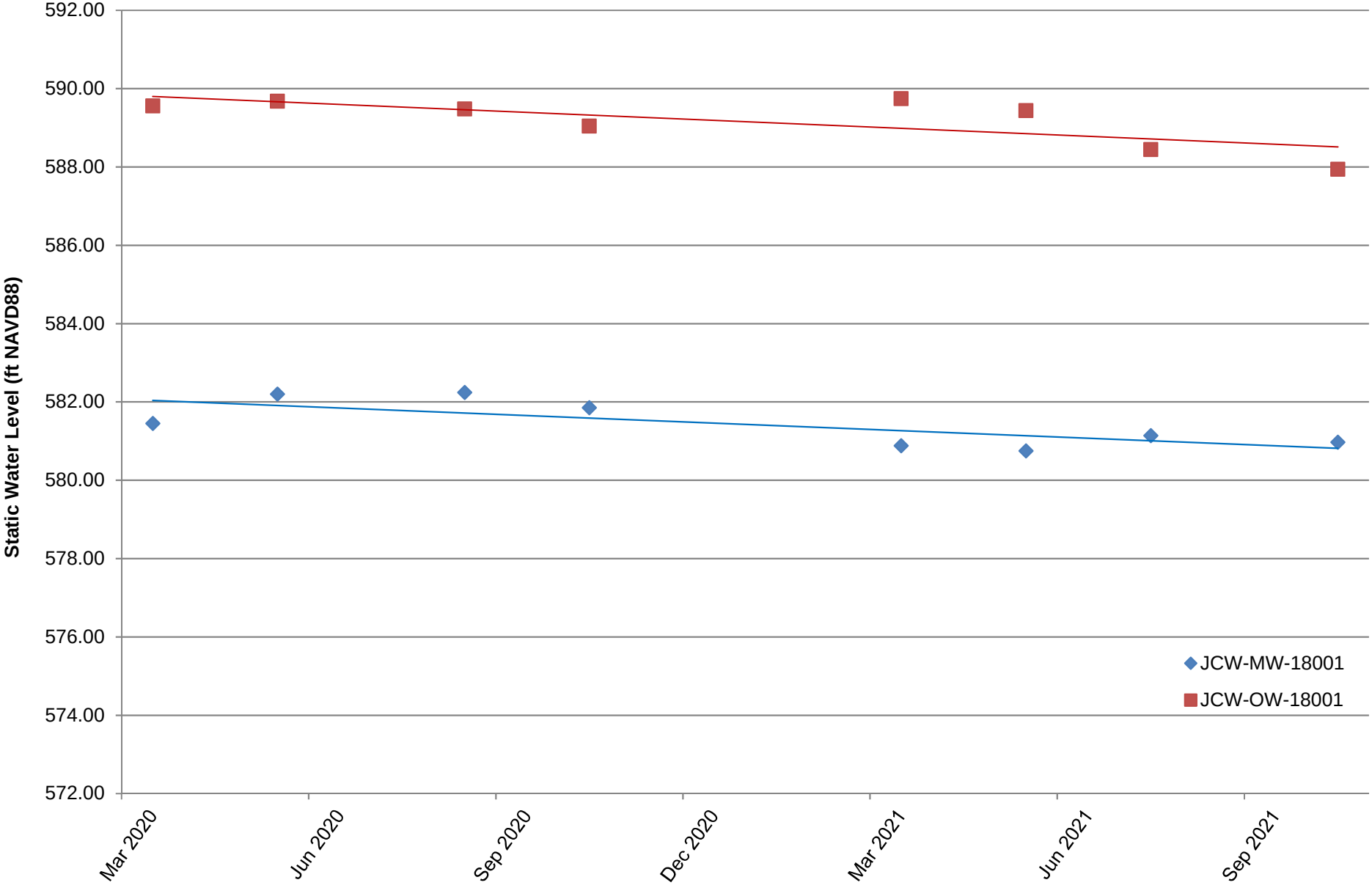
Notes:

Water level data collected on July 26, 2021 are shown by yellow cells:

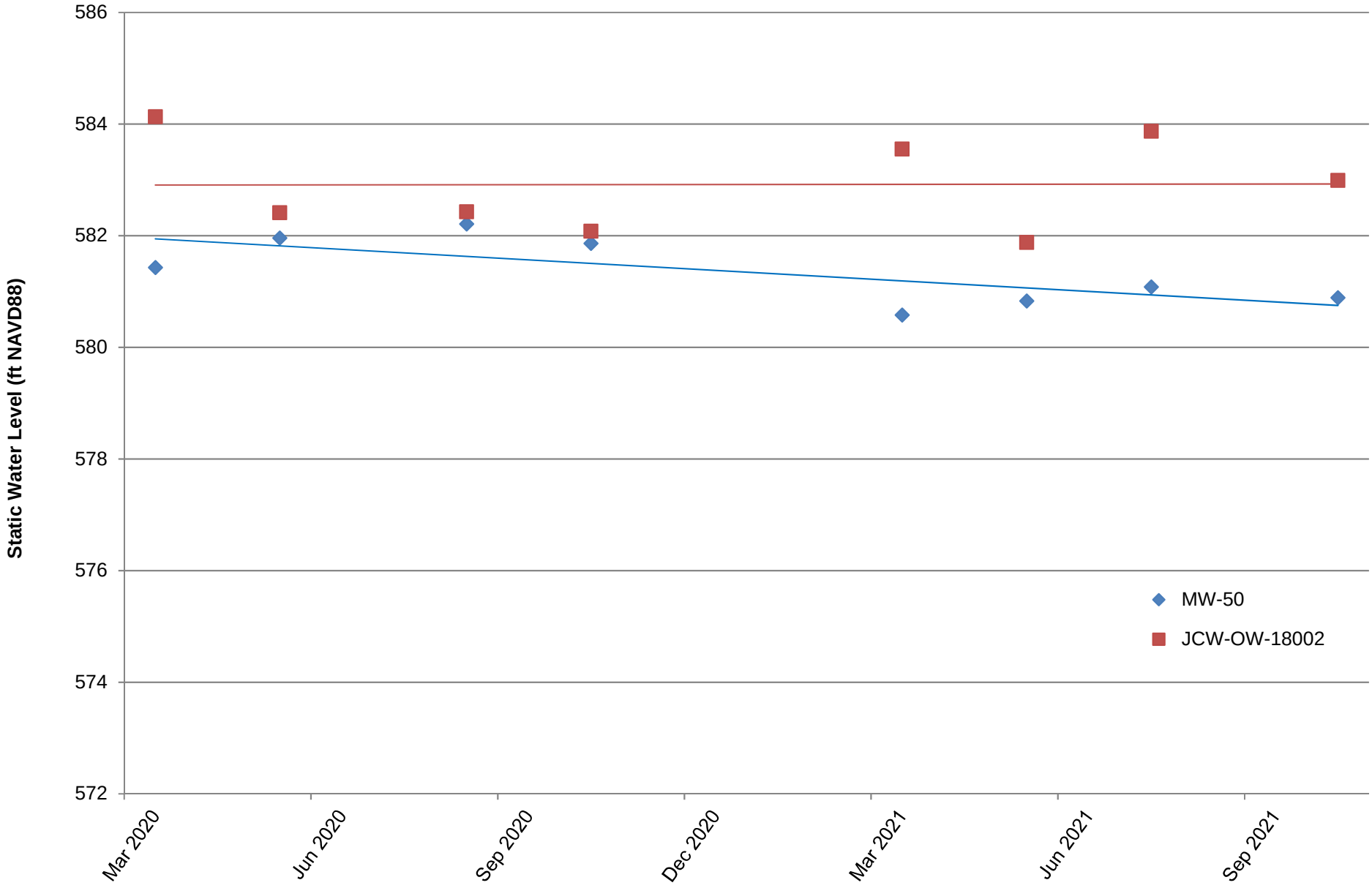
1. Monitoring Well Zones based on Phase II Evaluation, Appendix K Groundwater Discharge Calculations, September 30, 2005. Representative wells based on the Landfill Hydrogeological Monitoring Plan, February 2021.
2. Saturated thickness will be the thickness of the sand unit when the observed SWL is above the top of the sand unit, or the measured saturated thickness of the sand unit if the SWL is below the top of the sand unit.
3. Hydraulic conductivity taken as harmonic mean of laboratory tests done on in-place slurry wall from NTH Certified Quality Assurance Report, Appendix E, April 24, 2009
4. Arithmetic average used to develop geometric properties of each section/zone (e.g. discharge channel, adjacent, and non-adjacent)
5. If Obs well SWL < MW SWL calculated flow will be zero.

SWL = Static Water Level; Obs Well = Observation Well; MW= Monitoring Well; ft NAVD 88 = feet above North American Vertical Datum 1988
ft/ft = feet per foot; cm/sec = centimeters per second; ft^2 = square feet; ft^3/day = cubic feet per day; Gal/day = gallons per day; Gal/yr = gallons per year
i = hydraulic gradient; K = hydraulic conductivity; x_{wells} = distance between well pairs

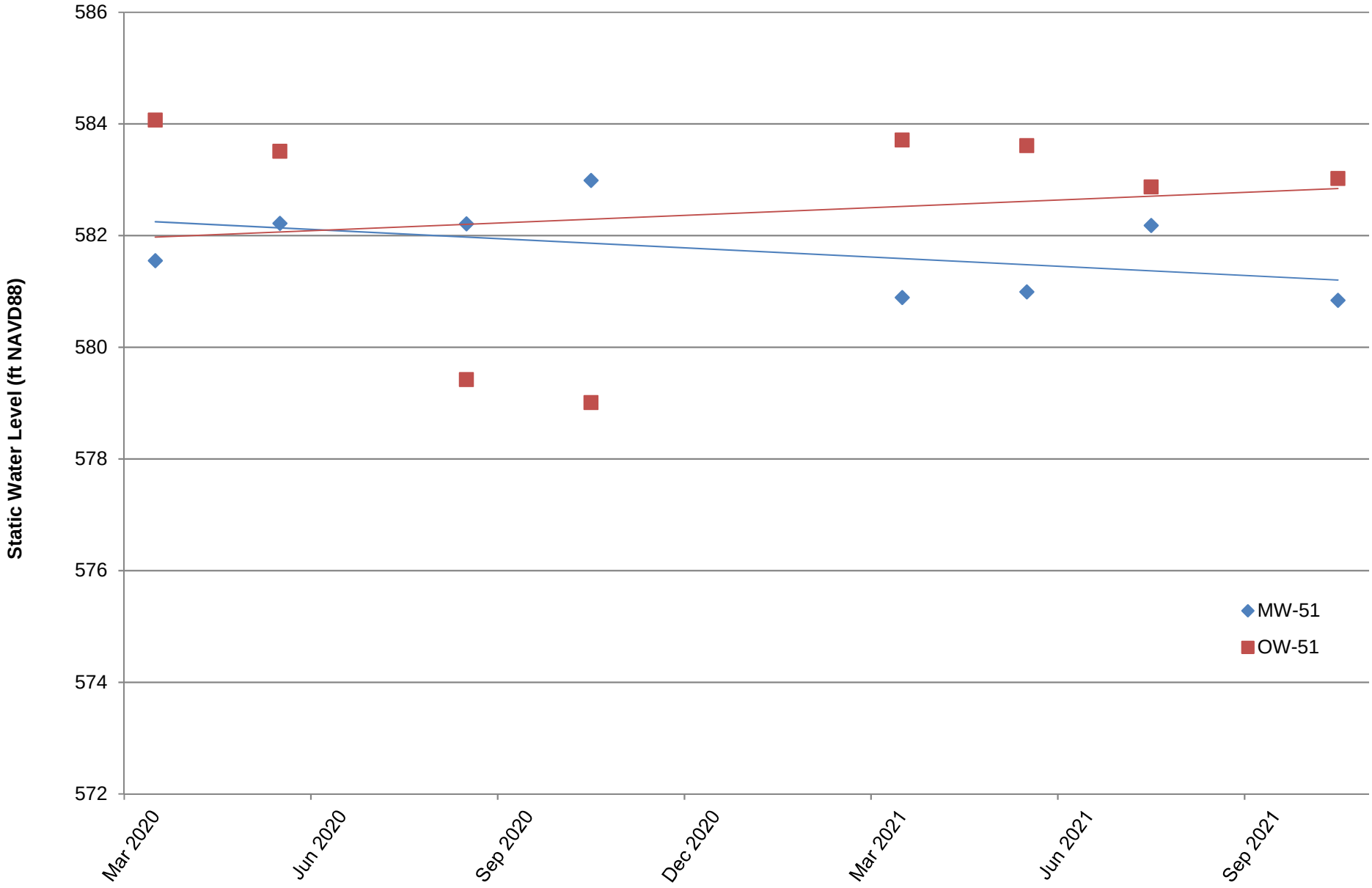
Appendix A
Static Water Level for JCW-MW-18001 and JCW-OW-18001



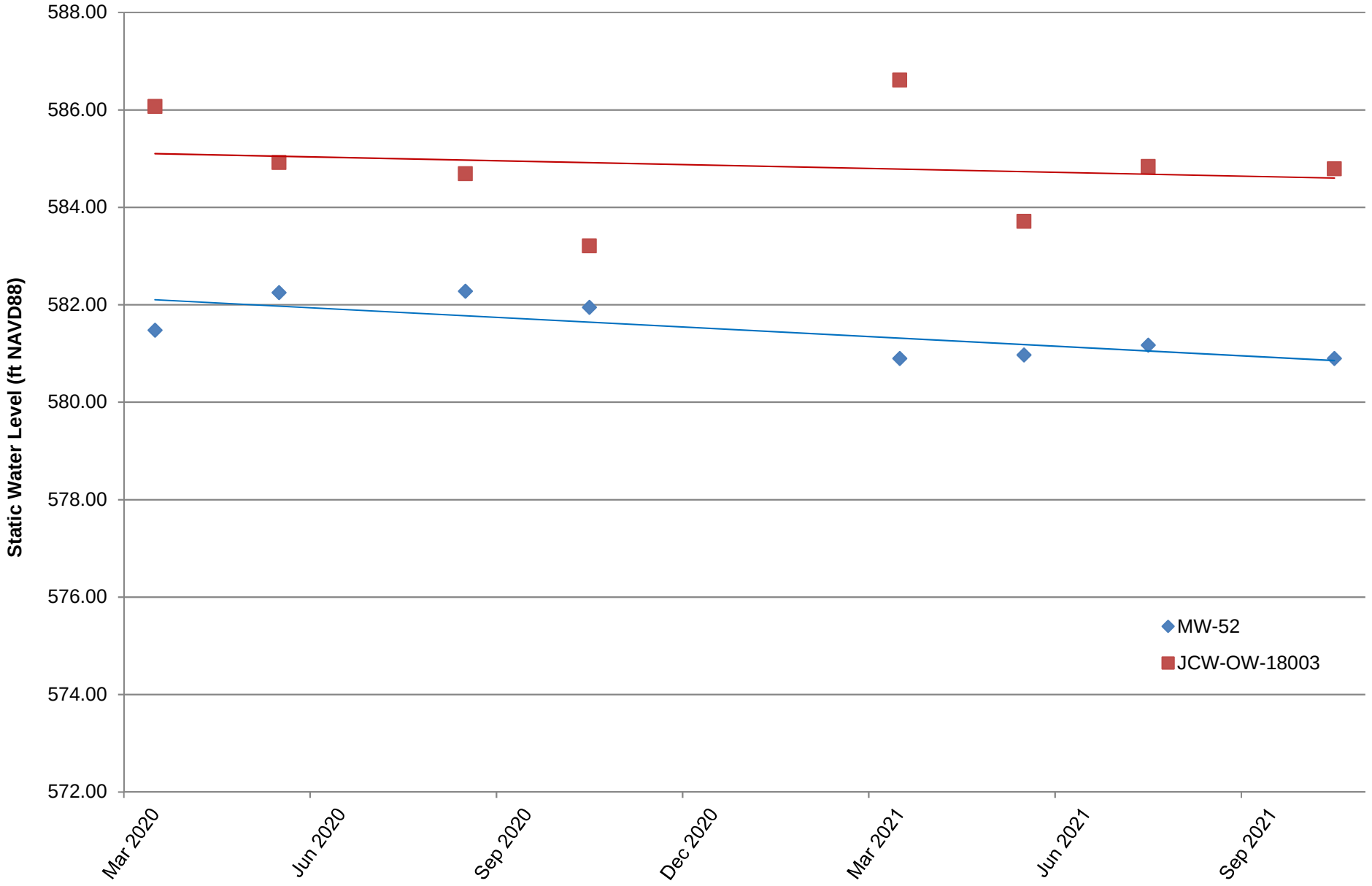
Appendix A
Static Water Level for MW-50 and JCW-OW-18002



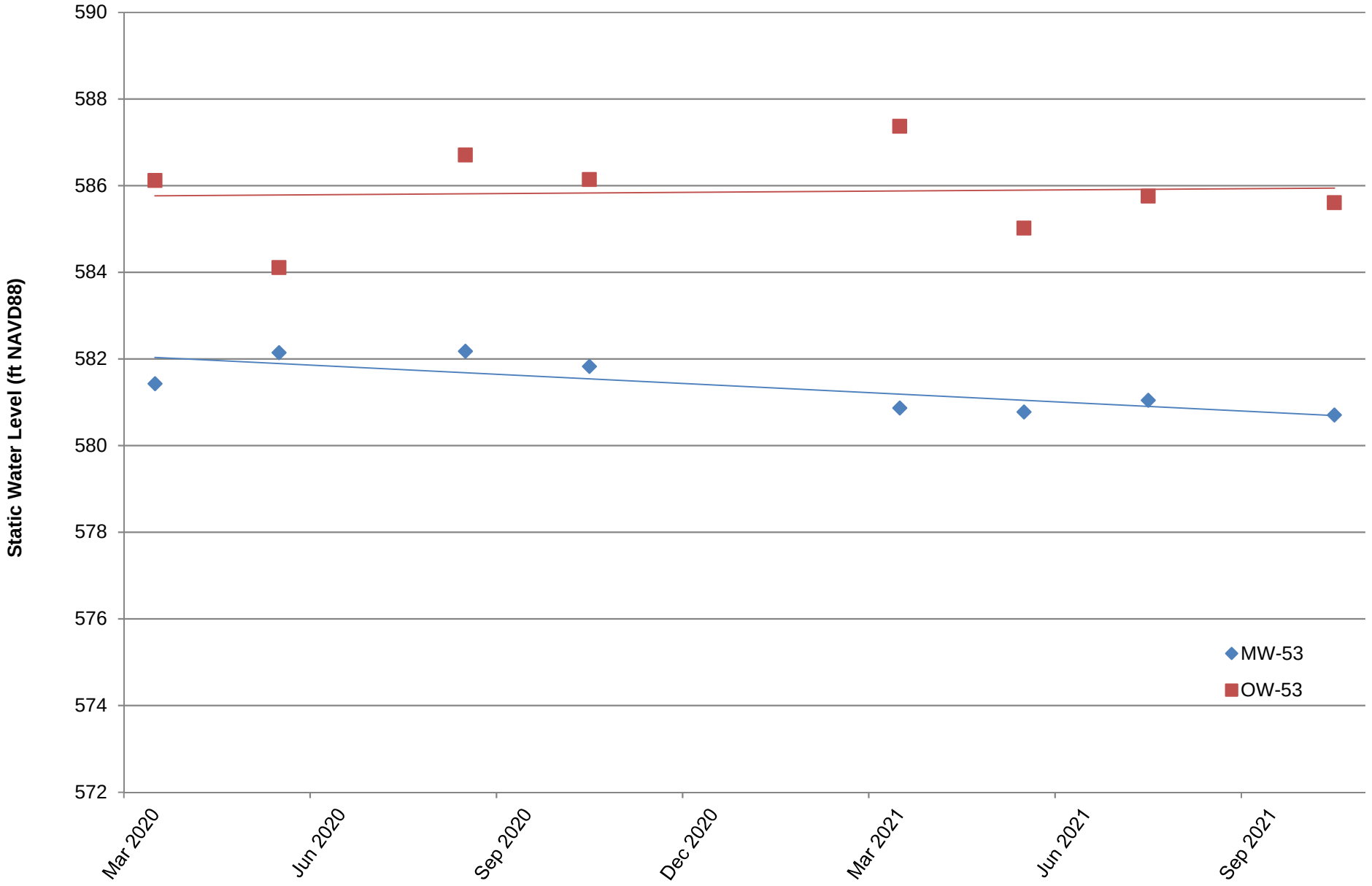
Appendix A
Static Water Level for MW-51 and OW-51



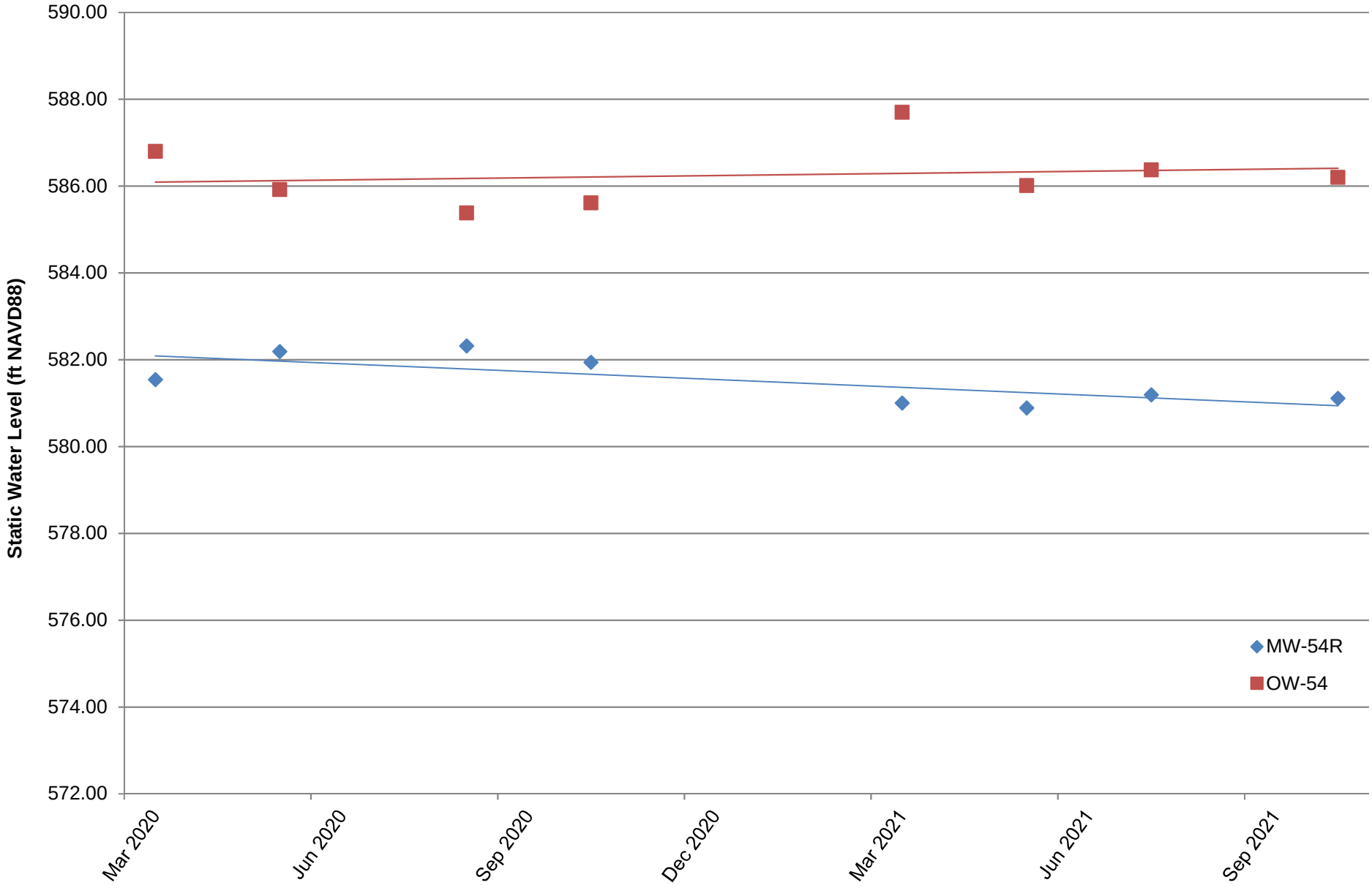
Appendix A
Static Water Level for MW-52 and JCW-OW-18003



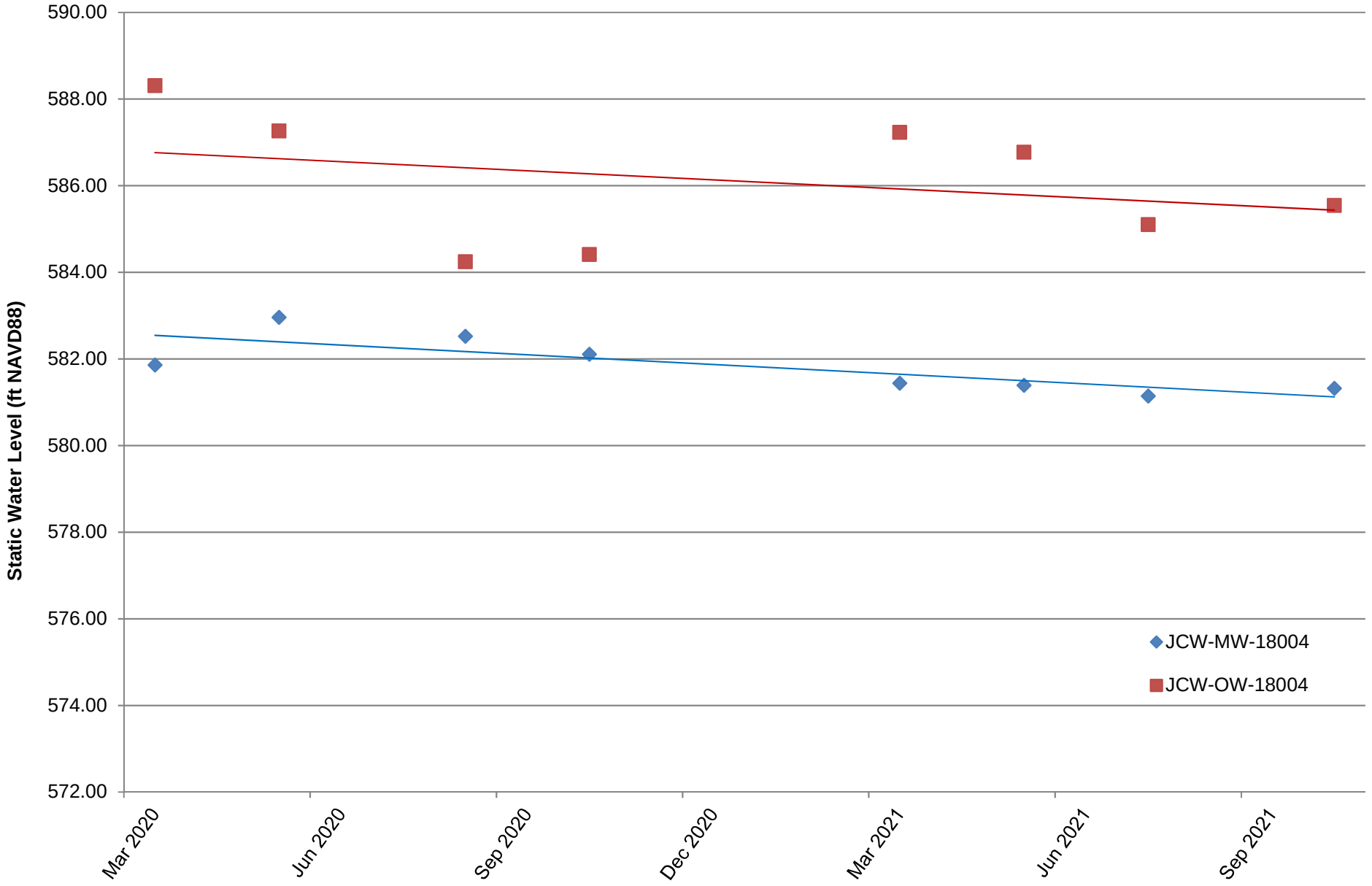
Appendix A
Static Water Level for MW-53 and OW-53



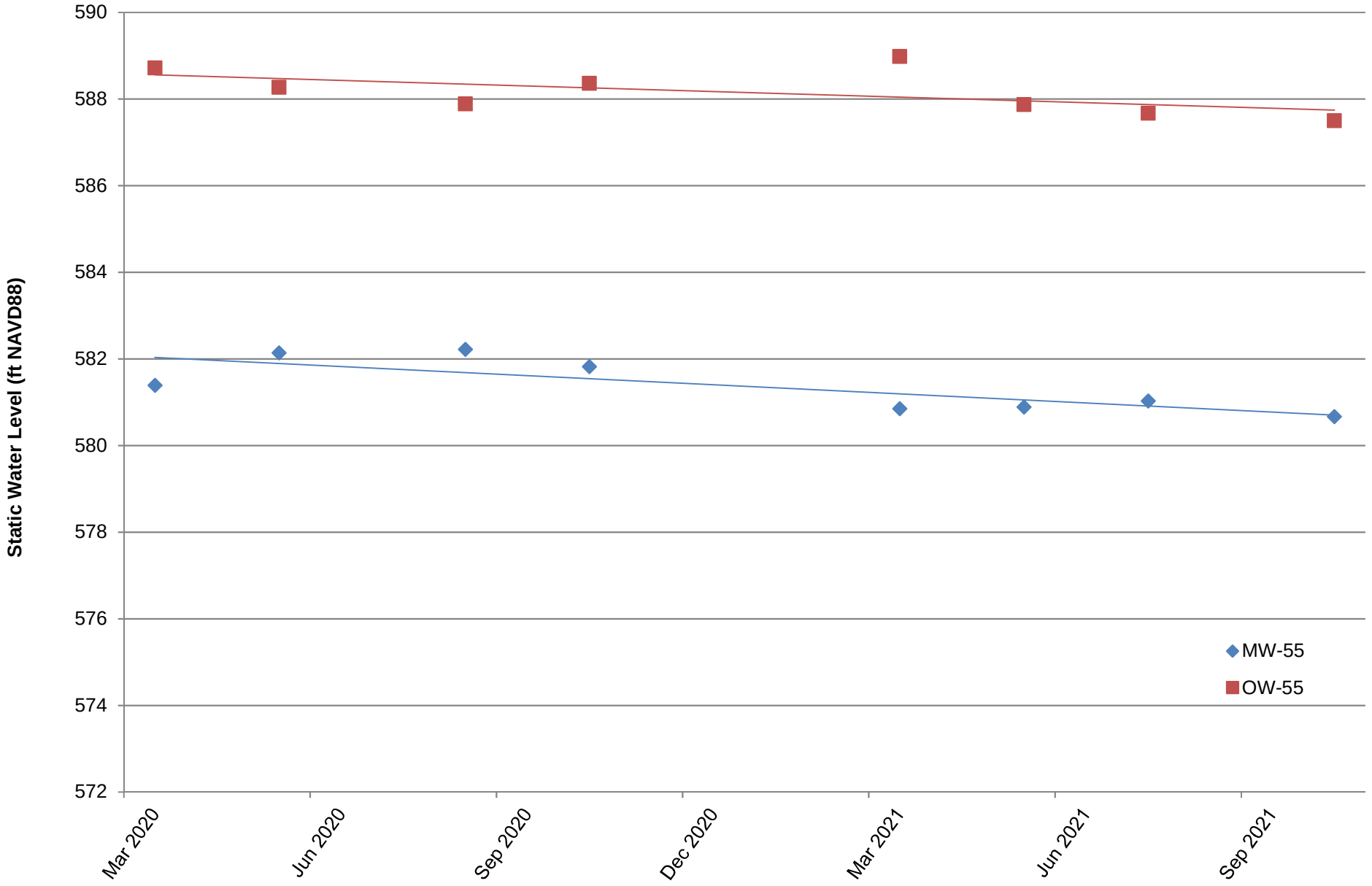
Appendix A
Static Water Level for MW-54R and OW-54



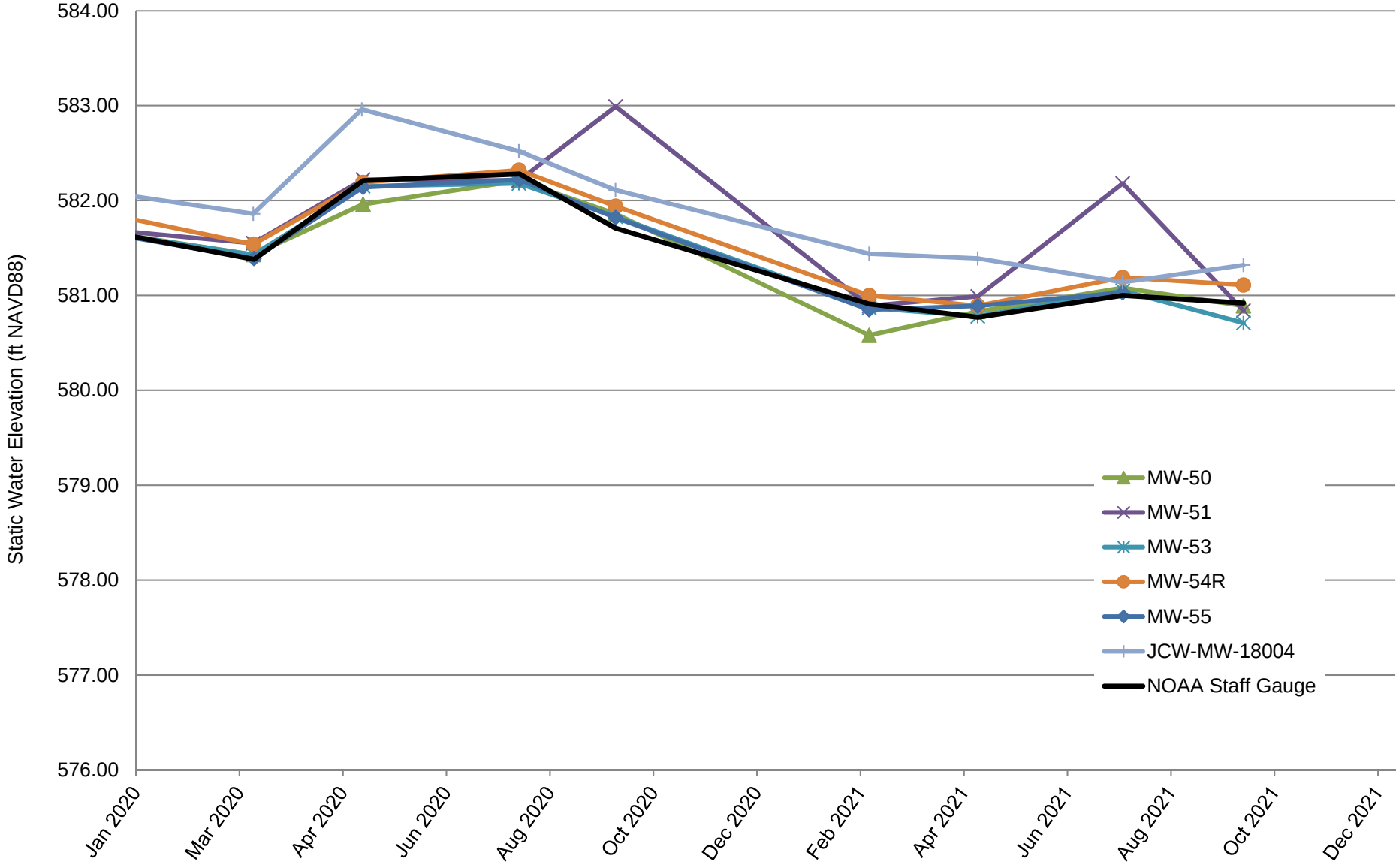
Appendix A
Static Water Level for JCW-MW-18004 and JCW-OW-18004



Appendix A
Static Water Level for MW-55 and OW-55



Appendix A
Static Water Elevations for Select Perimeter Dike Monitoring Wells and NOAA Staff Gauge



Appendix B
Data Quality Review

Laboratory Data Quality Review
Groundwater Monitoring Event October 2021
JC Weadock Landfill

Porewater 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) 21-1173 and 240-157995-1.

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

- JCW-MW-18001
- JCW-MW-18004
- JCW-MW-18005
- JCW-MW-18006
- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- OW-55
- OW-57R OUT
- LH-104
- MW-58
- JCW-OW-18004

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 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 the 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. Radium was not detected in the method blanks.
- LCS/LCSDs were analyzed with each batch for radium. All criteria were met.

- One field blank (FB-01) and one equipment blank (EB-01) sample were collected. Total metals and anions were not detected in these blank samples. Radium 228 (0.398 pCi/L) and combined radium (0.437 pCi/L) were detected in EB-01; radium 228 and combined radium detected in all porewater samples except MW-51 are either potentially false positive results or potentially biased high as summarized in the attached table, Attachment 1.
- MS and MSD analyses were performed on sample JCW-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.
- The field duplicate pair samples were DUP-01 and MW-50; all criteria between the parent and duplicate samples were within the QC limits with the following exceptions.
  - The RPD for lithium (31%) was above the acceptance criteria; detections of lithium in all porewater samples are estimated as summarized in the attached table, Attachment 1.
  - The RPD for nickel (37%) was above the acceptance criteria; detections of nickel in porewater samples are estimated as summarized in the attached table, Attachment 1.
- 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 Porewater Analytical Data
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
JCW-MW-18001	10/11/2021	Radium 228, Combined Radium	Potential false positive results due to equipment blank contamination.
JCW-MW-18004	10/12/2021		
JCW-MW-18005	10/12/2021		
JCW-MW-18006	10/12/2021		
MW-50	10/11/2021		
MW-52	10/11/2021		
MW-53	10/11/2021		
MW-53R	10/11/2021		
MW-54R	10/11/2021		
OW-57R OUT	10/12/2021		
DUP-01	10/11/2021		
MW-55	10/12/2021	Radium 228	Potential false positive results due to equipment blank contamination.
MW-55	10/12/2021	Combined Radium	Potential high bias due to equipment blank contamination.
JCW-MW-18001	10/11/2021	Lithium, Nickel	Potential uncertainty due to field duplicate variability.
JCW-MW-18004	10/12/2021		
JCW-OW-18004	10/12/2021		
JCW-MW-18005	10/12/2021		
JCW-MW-18006	10/12/2021		
MW-50	10/11/2021		
MW-51	10/11/2021		
MW-52	10/11/2021		
MW-53	10/11/2021		
MW-53R	10/11/2021		
MW-55	10/12/2021		
OW-55	10/12/2021		
OW-57R OUT	10/12/2021		
MW-58	10/12/2021		
LH-104	10/7/2021		
DUP-01	10/11/2021		
MW-54R	10/11/2021	Lithium	Potential uncertainty due to field duplicate variability.

Laboratory Data Quality Review
Groundwater Monitoring Event October 2021
JC Weadock/Karn DEK Background

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, located 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) 21-1171 and 240-157750-1.

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

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

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Chloride, Fluoride, Sulfate)	EPA 300.0
Total Dissolved Solids	SM 2540C
Total Metals	SW-846 6020B/7470A
Alkalinity	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 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, field blanks, and equipment 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 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. Radium was not detected in the method blanks.
- One equipment blank (EB-04) and one field blank (FB-MW-15002) were collected. Total metals and anions were not detected in the field blank sample. Radium 226 (0.666 pCi/L), radium 228 (0.649 pCi/L), and combined radium (1.31 pCi/L) were detected in EB-04; positive detections for radium 226, radium 228, and combined radium in groundwater

samples are potentially false positive results as summarized in the attached table, Attachment 1.

- 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 (72-125%); 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.
- The field duplicate pair samples were DUP-Background/DUP-04 and MW-15019; all criteria were met.
- 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 Porewater Analytical Data
DE Karn & JC Weadock – Background Wells
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
MW-15002	10/7/2021	Radium 226, Combined Radium	Potential false positive results due to equipment blank contamination.
MW-15008	10/6/2021		
MW-15016	10/7/2021		
MW-15019	10/7/2021		
DUP-04	10/7/2021		
MW-15008	10/6/2021	Radium 228	Potential false positive results due to equipment blank contamination.
EB-04	10/7/2021	Radium 228	Percent recovery in LCS above criteria; results are potentially biased high.
MW-15008	10/6/2021		

Appendix C
Detection Monitoring Statistical Trend Tests

Appendix C
Detection Monitoring Statistical Summary for JC Weadock Facility
Fourth Quarter 2021 Quarterly Report
Data from March 2020 to October 2021

Porewater Monitoring Points						
PARAMETER	**JCW-MW-18001**	**JCW-MW-18004**	**JCW-MW-18005**	**JCW-MW-18006**	**MW-50**	**MW-51**
Boron	O	O	O	O	O	O
Calcium	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Chloride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Fluoride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Iron	O	O	O	O	O	O
pH/Corrosivity	↓*	O	O	O	O	O
Sulfate	↑ ASD	O	O	O	O	O
Total Dissolved Solids	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events

Notes:

O* = Non-detect (70%)
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 Weadock Landfill, TRC, July 2021.)

Appendix C
Detection Monitoring Statistical Summary for JC Weadock Facility
Fourth Quarter 2021 Quarterly Report
Data from March 2020 to October 2021

Porewater Monitoring Points						
PARAMETER	**MW-52**	**MW-53**	**MW-53R**	**MW-54R**	**MW-55**	**OW-57R OUT**
Boron	O	O	O	↑	↑*	O
Calcium	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Chloride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Fluoride	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events
Iron	O	O	↑*	O	↑*	O
pH/Corrosivity	↓*	O	O	O	↓*	O
Sulfate	O	O	O	O	↓	O
Total Dissolved Solids	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events	n < 8 events

Notes:

O* = Non-detect (70%)
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 Weadock Landfill, TRC, July 2021.)

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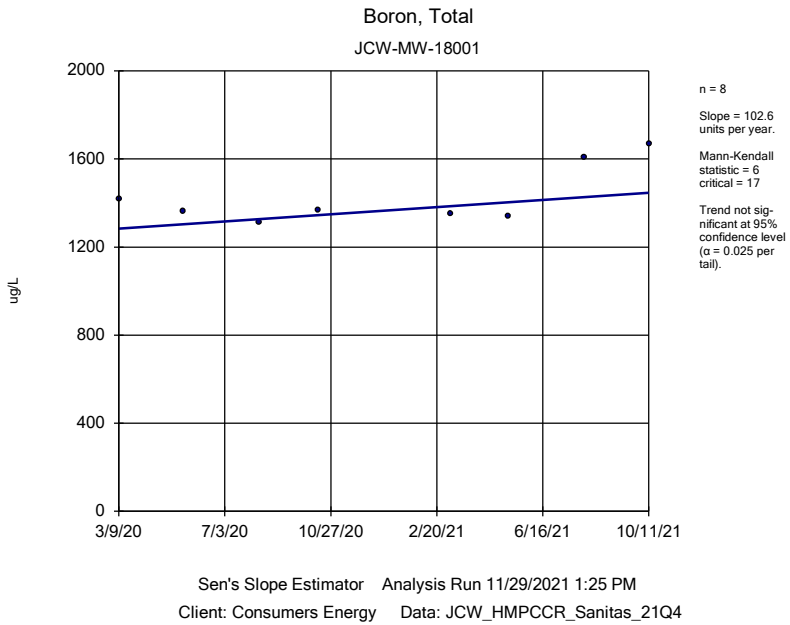

Sen's Slope Estimator Analysis Run 11/29/2021 1:25 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

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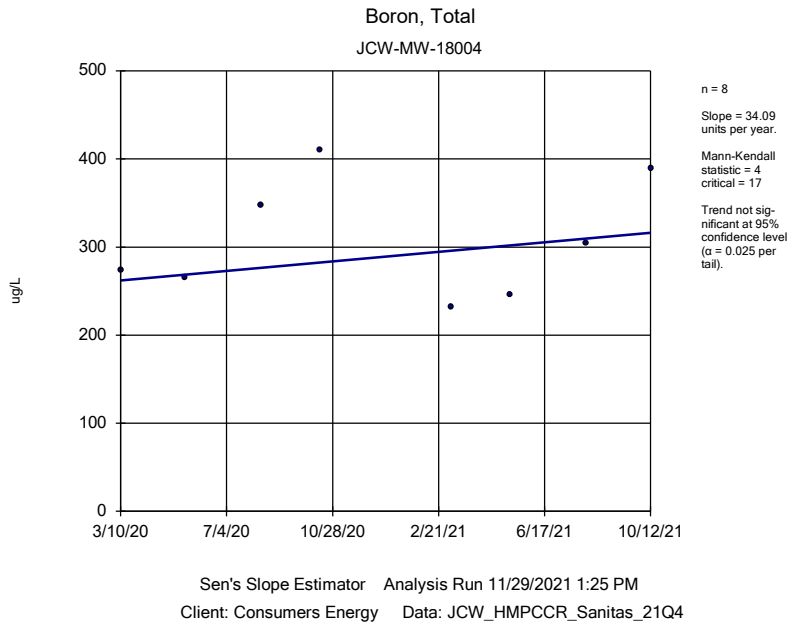

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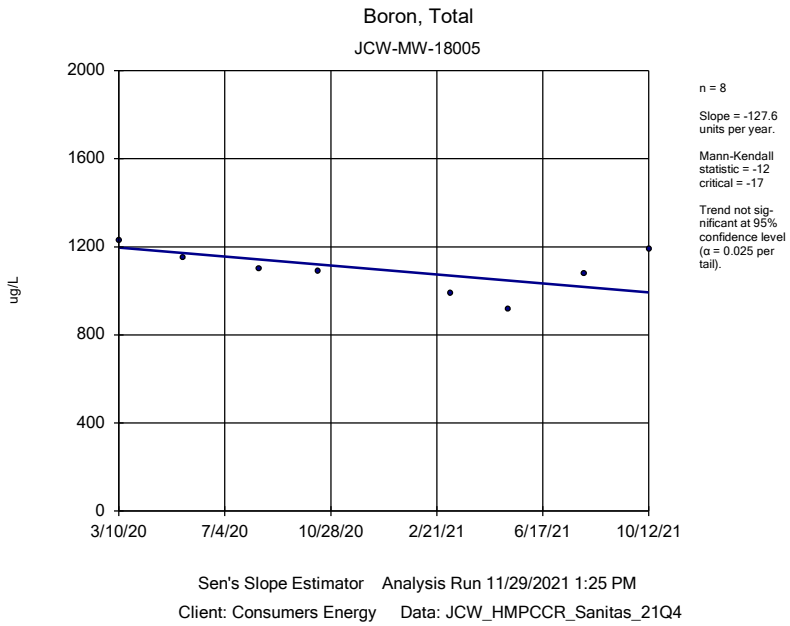

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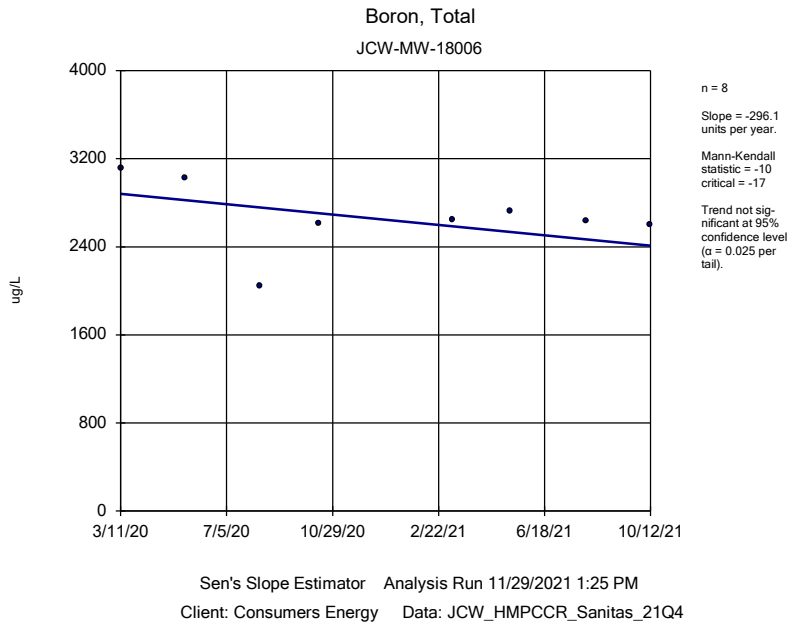

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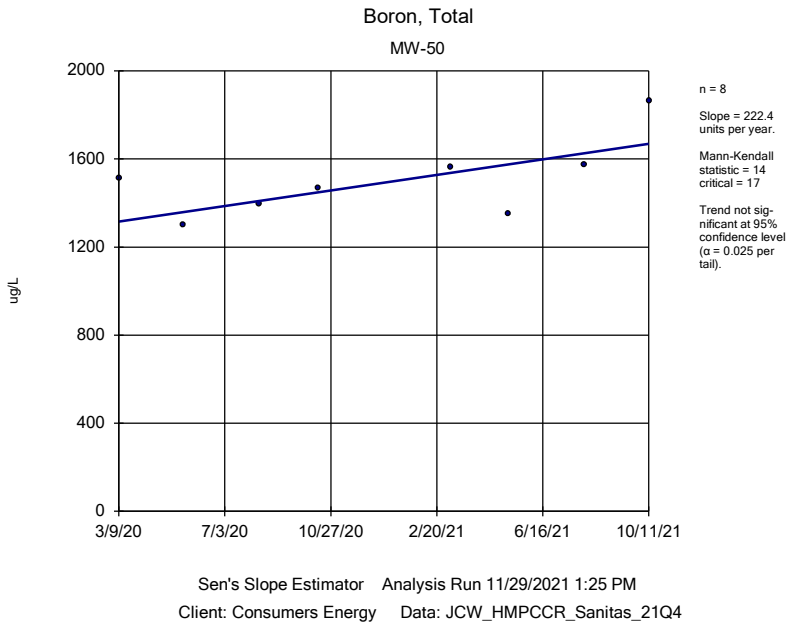

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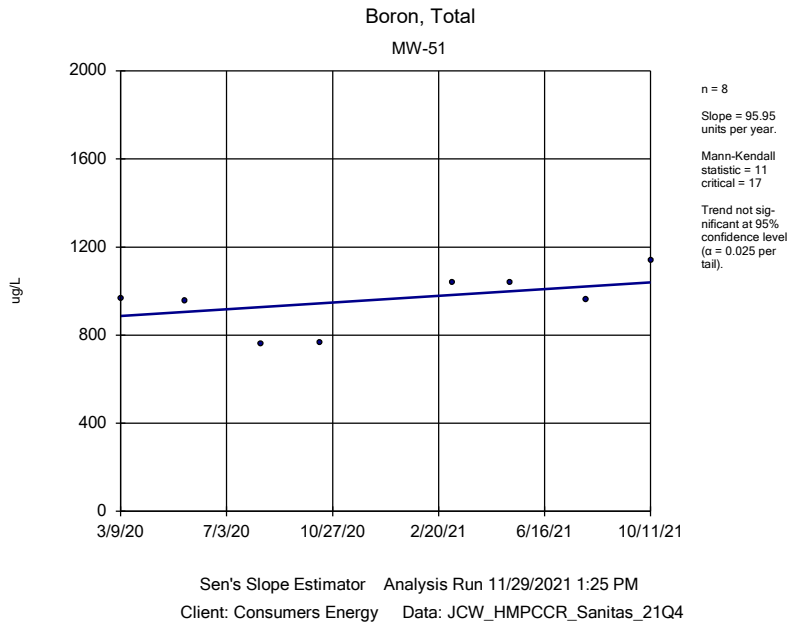

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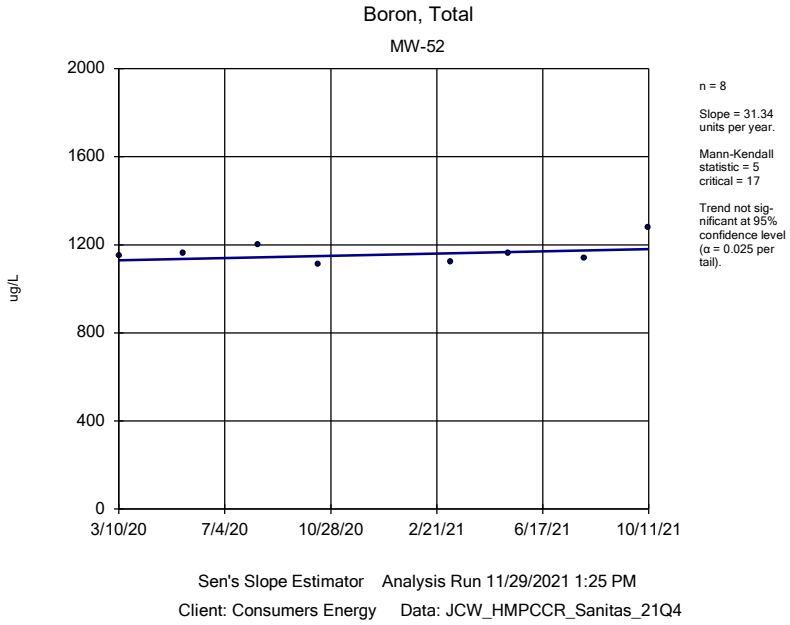

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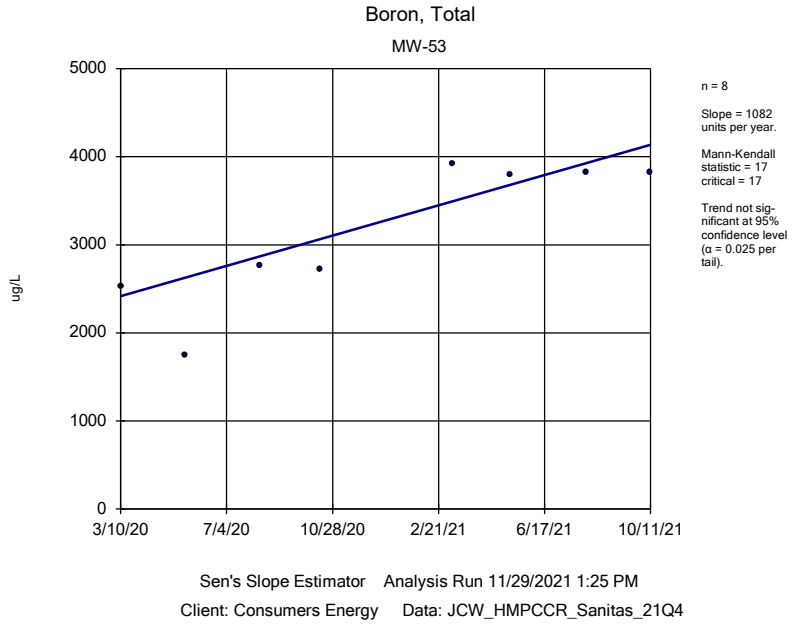

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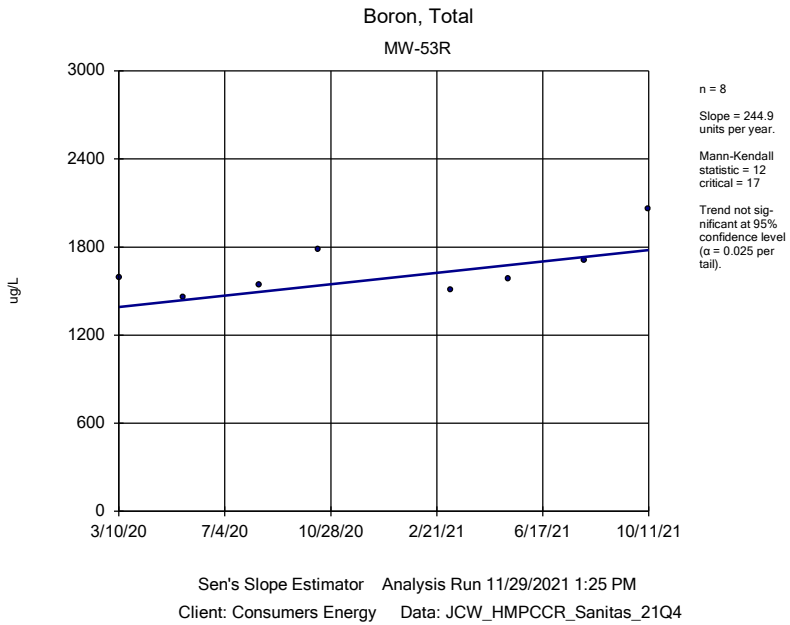

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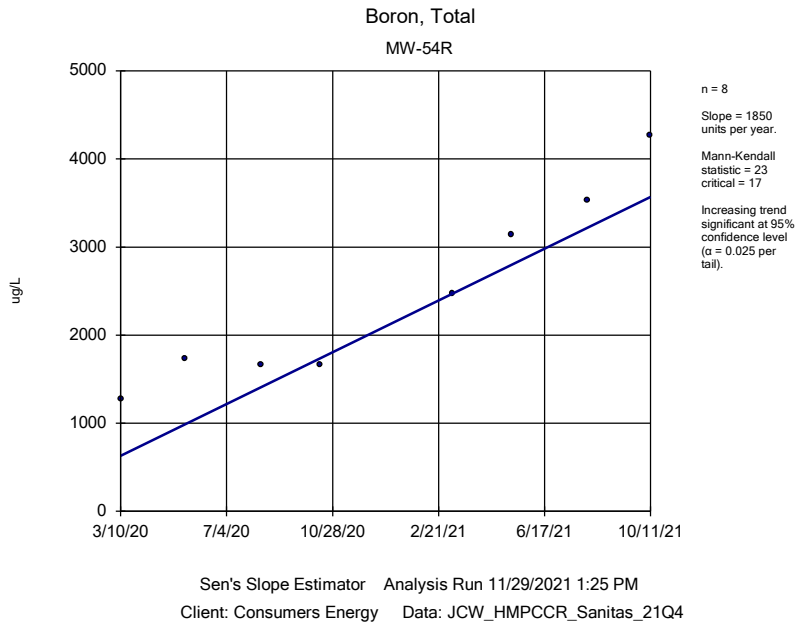

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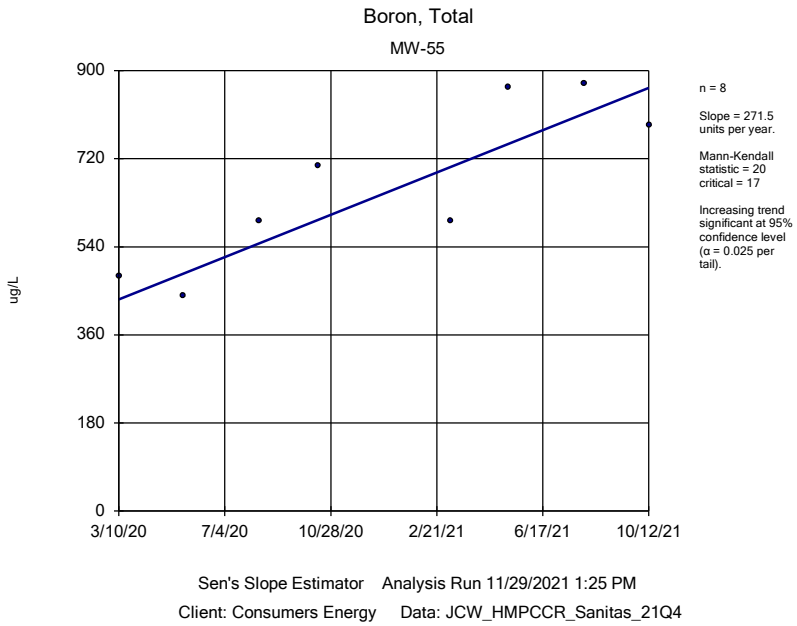

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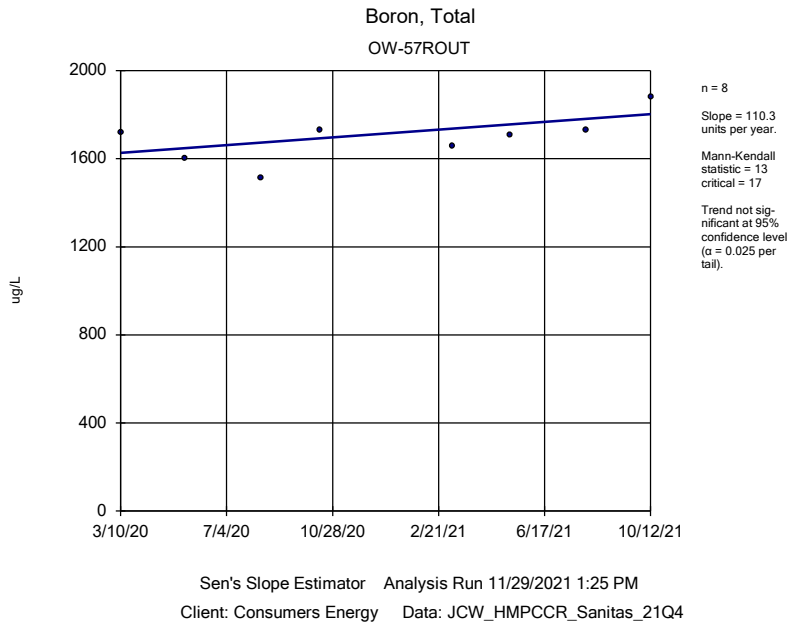

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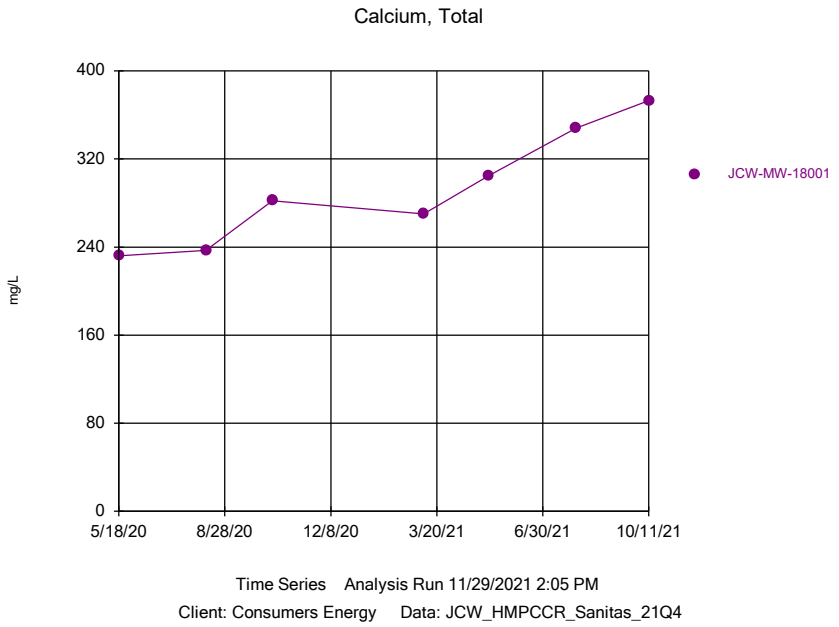

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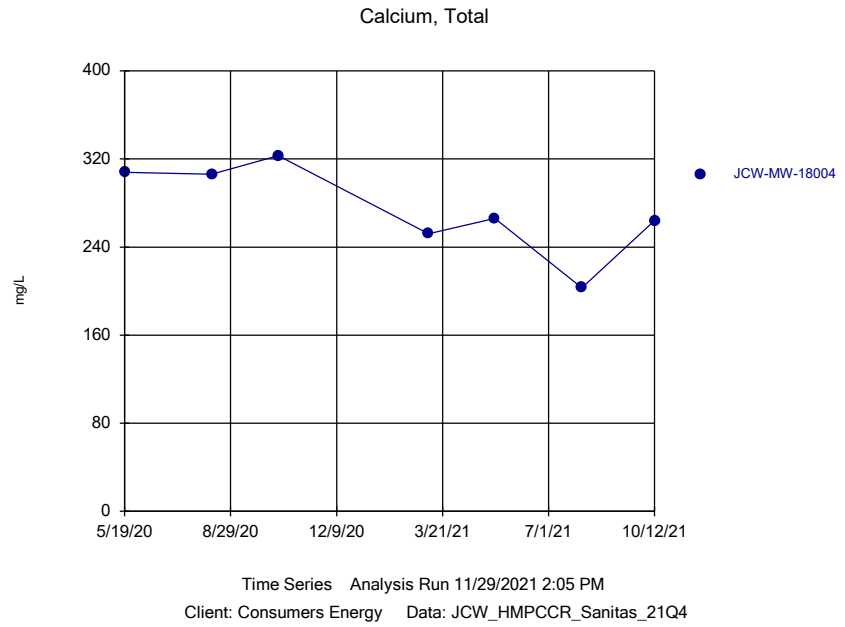

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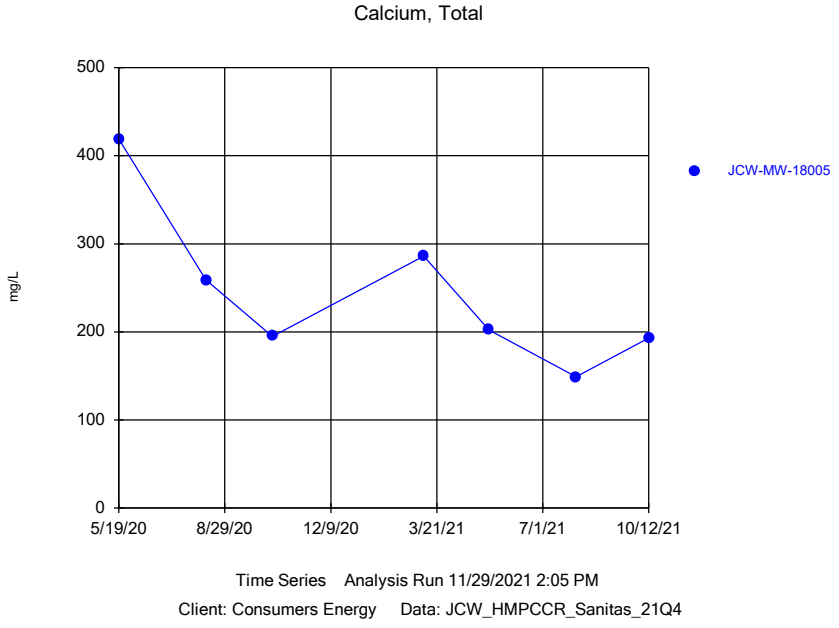

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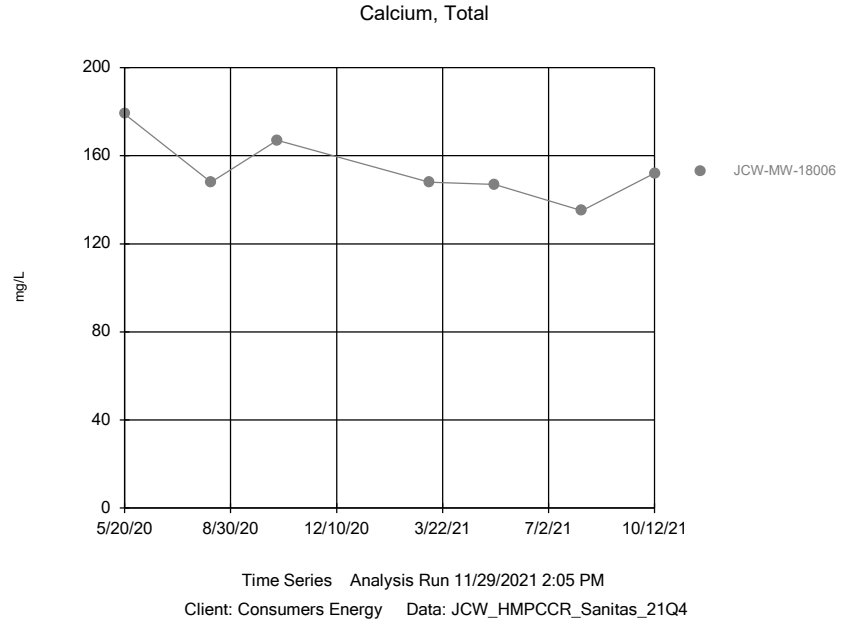

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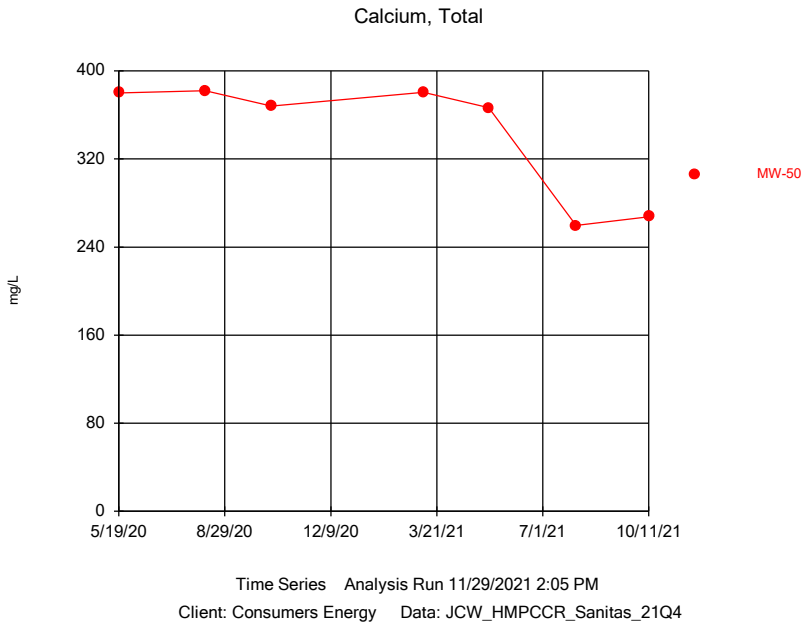

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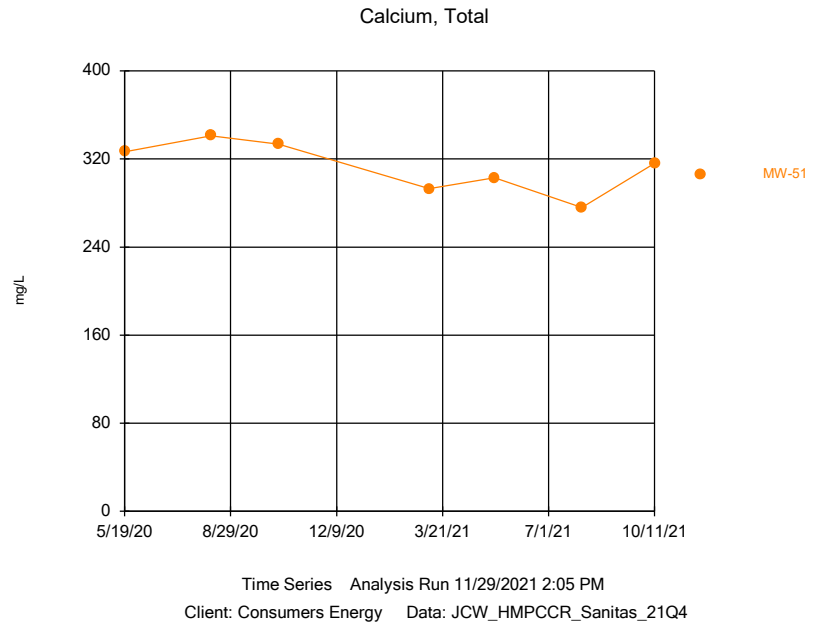

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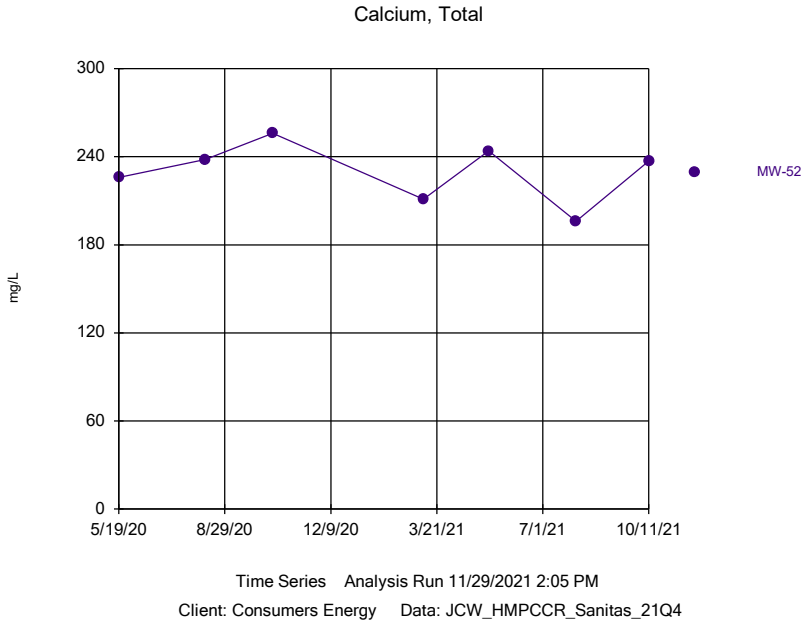

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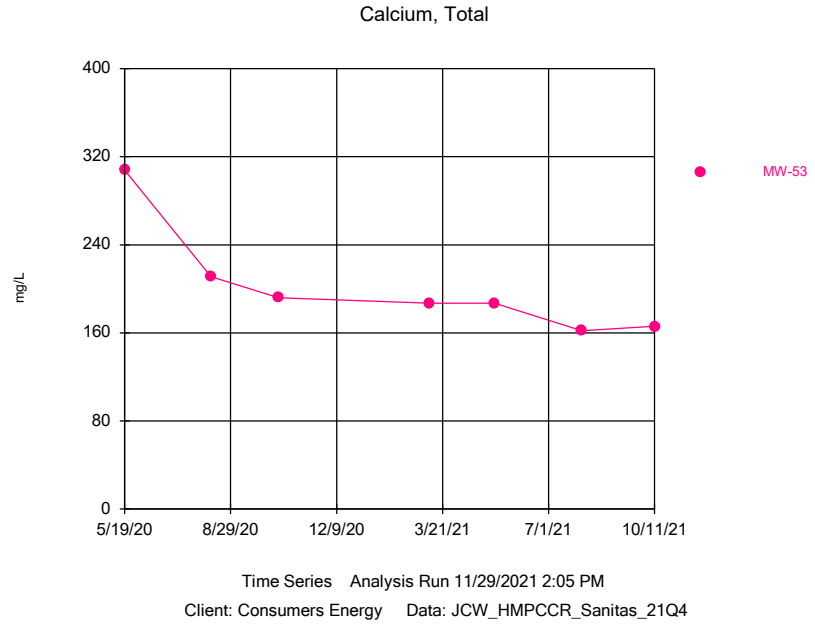

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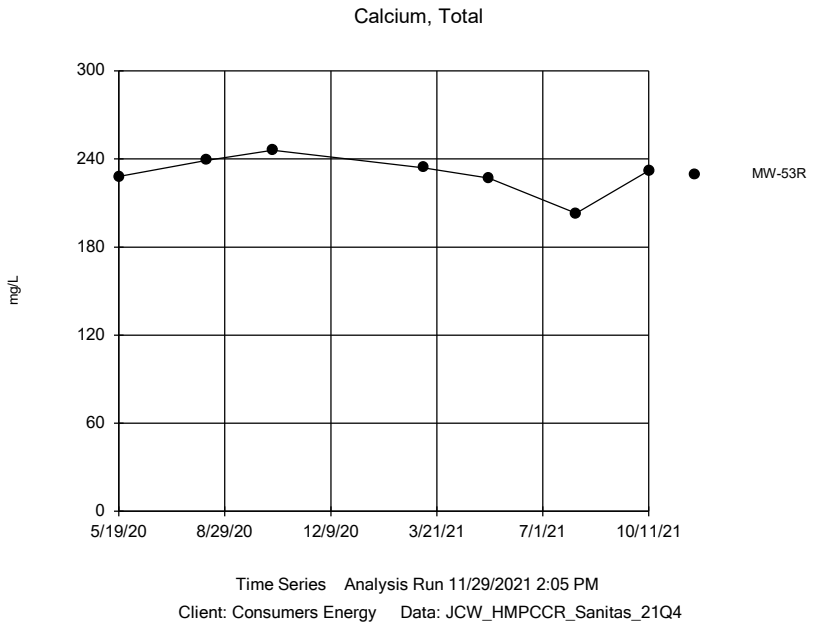

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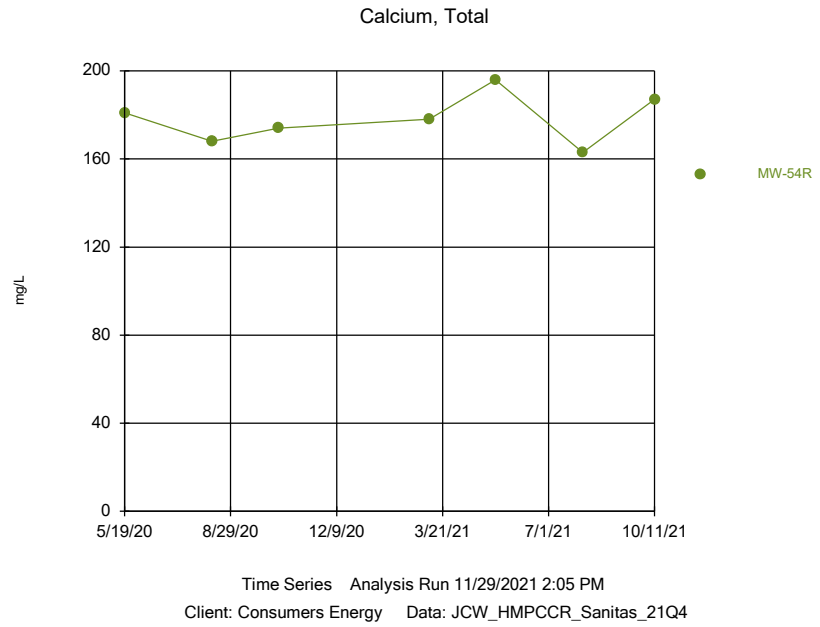

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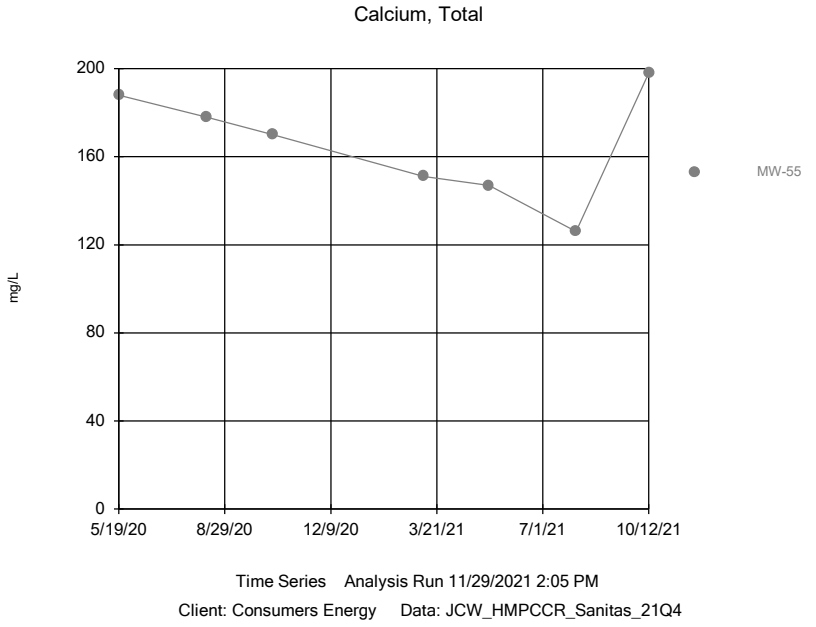

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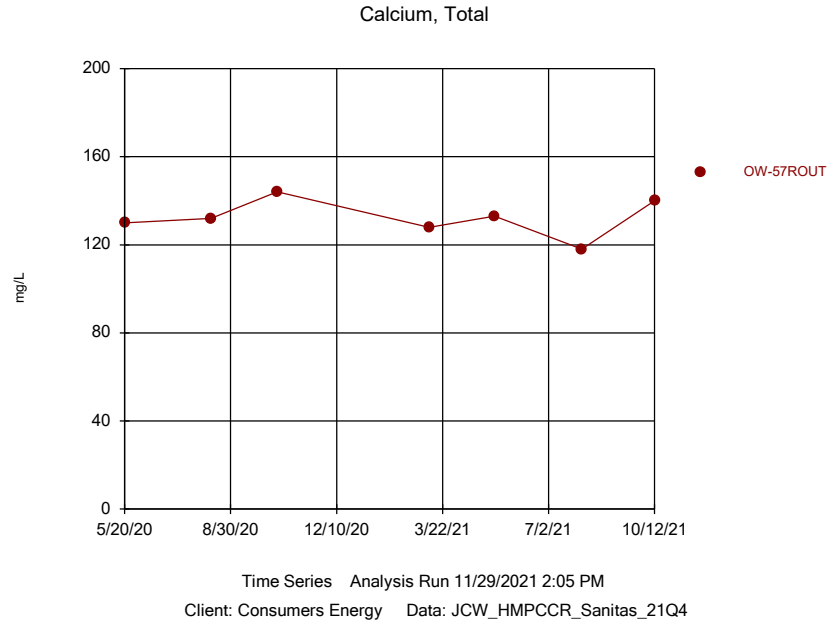

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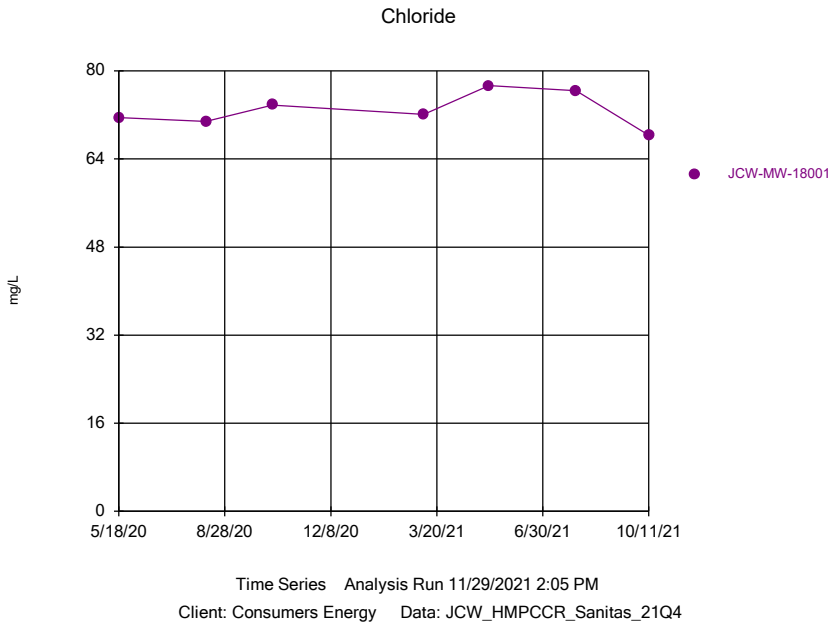

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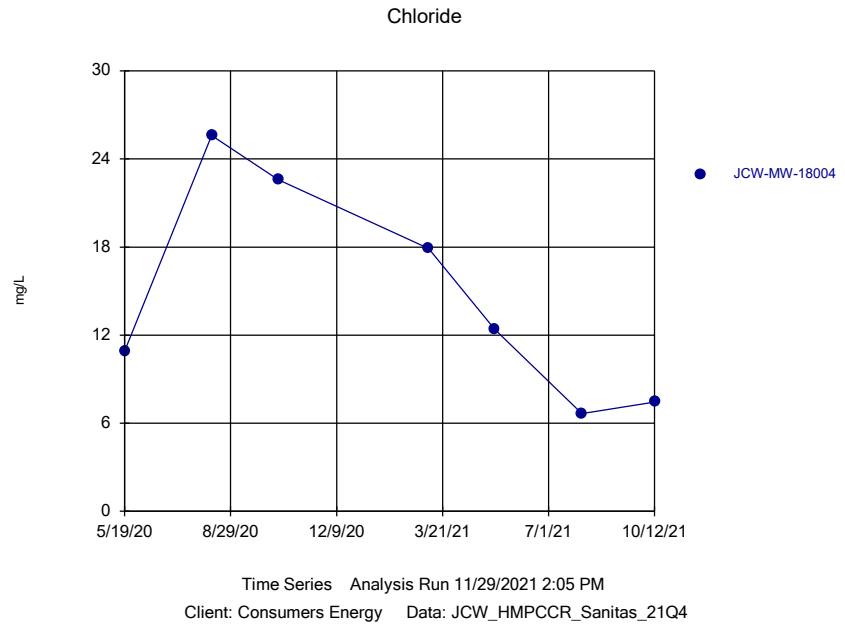

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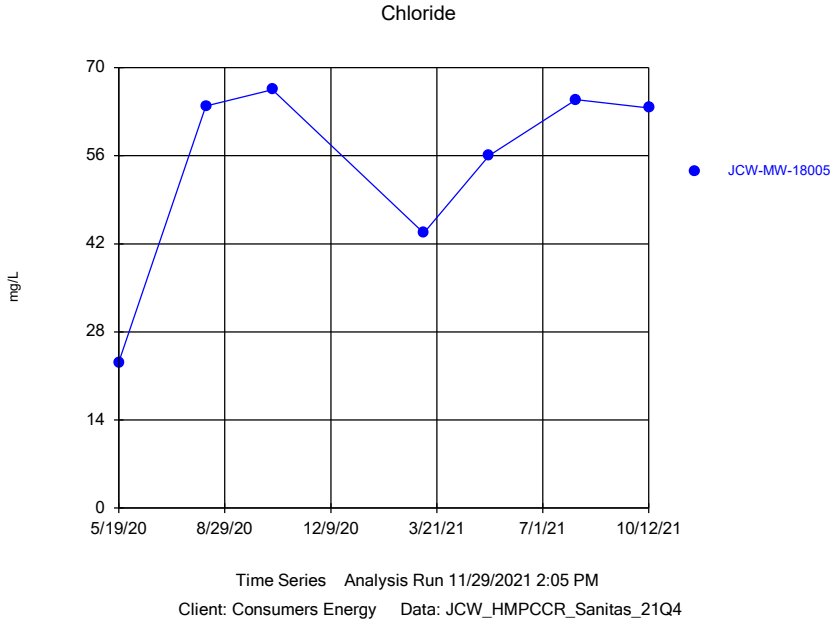

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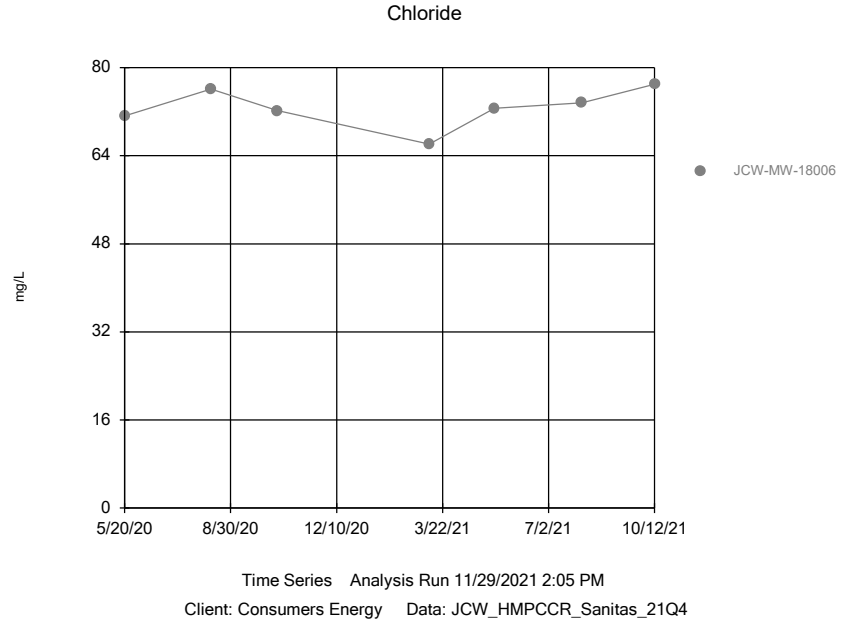

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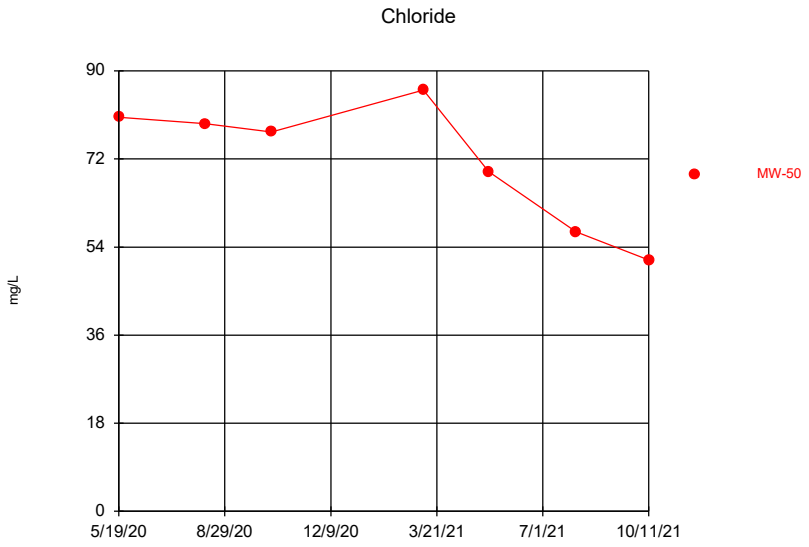

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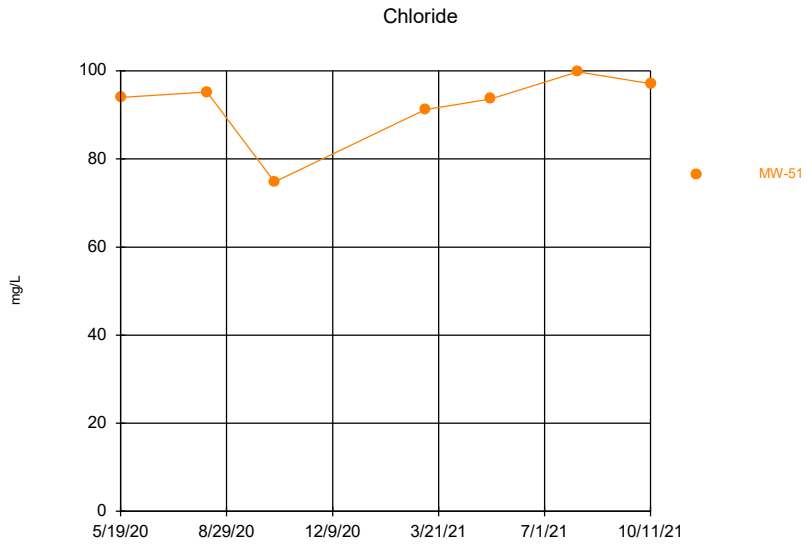

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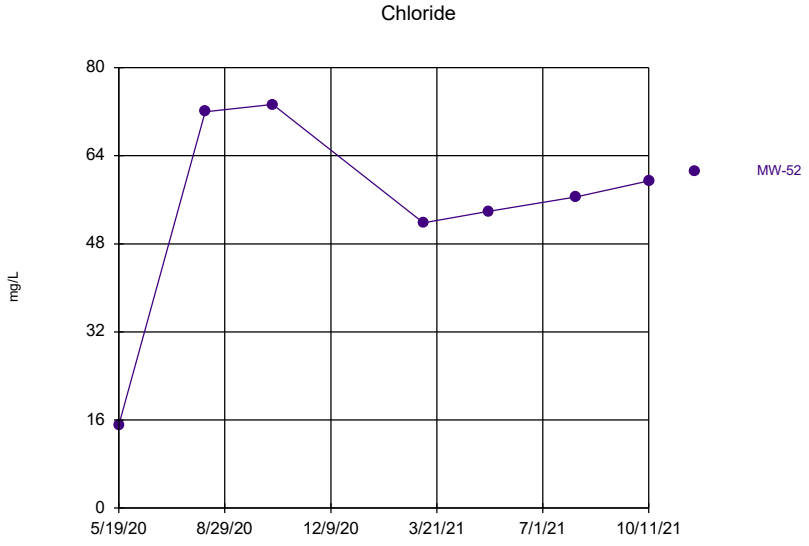

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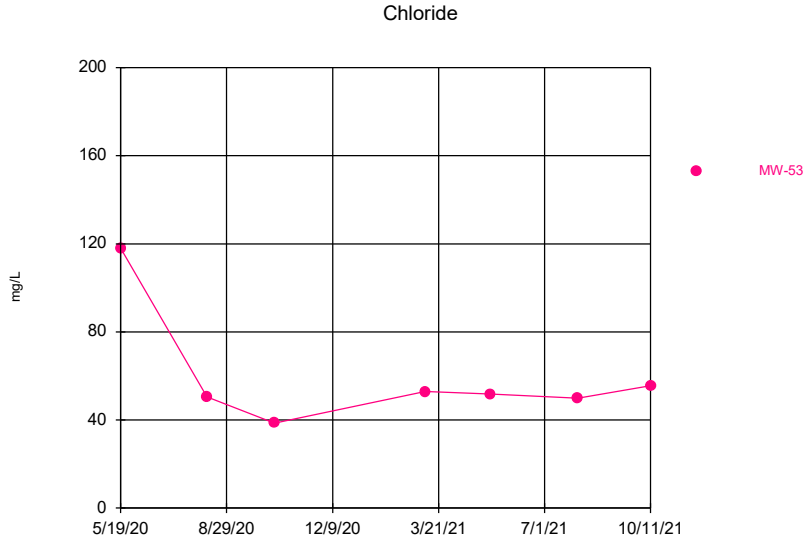

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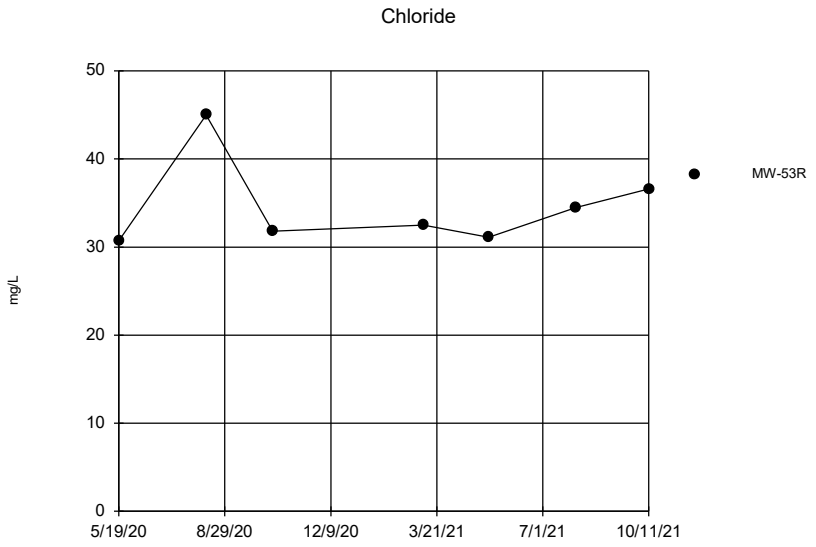

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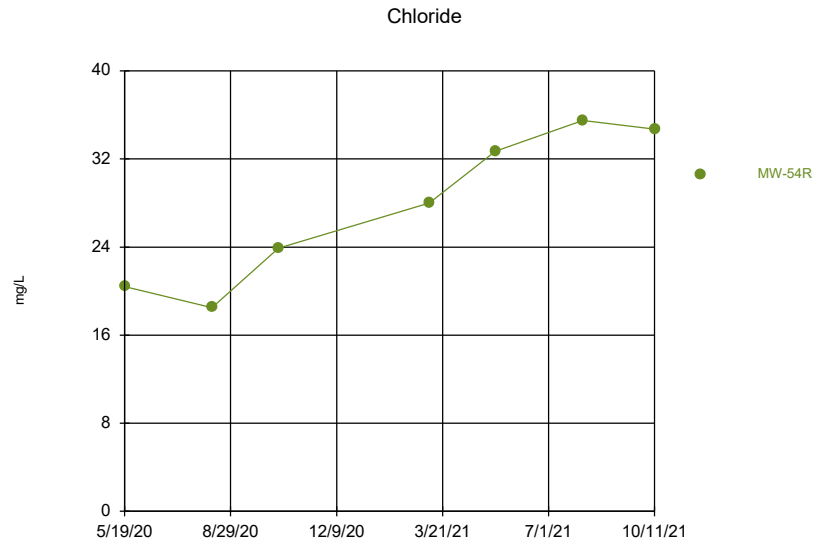

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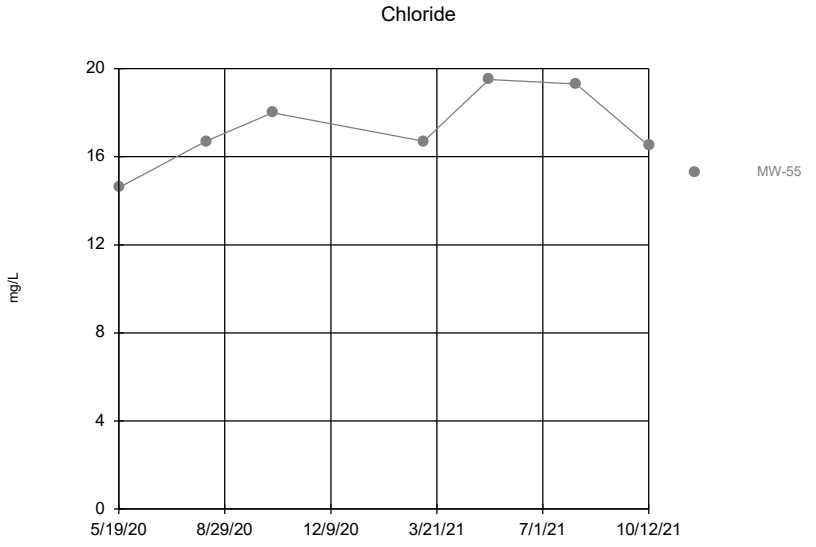

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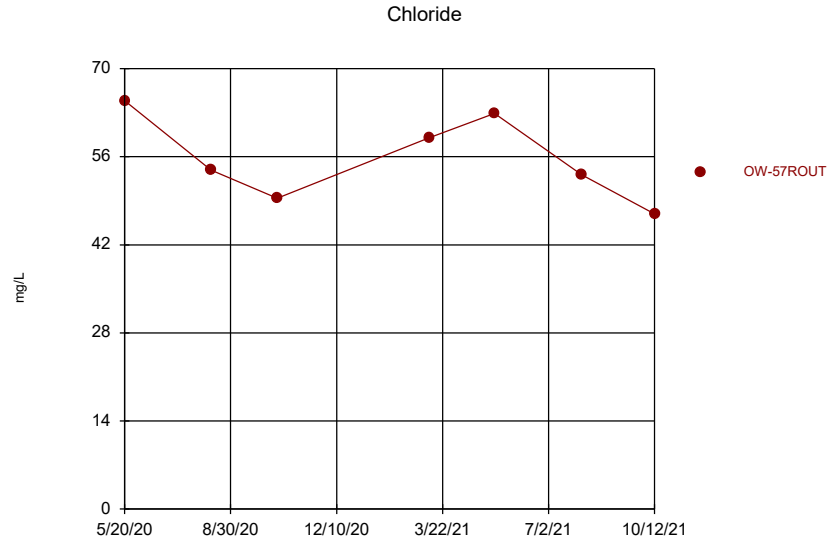

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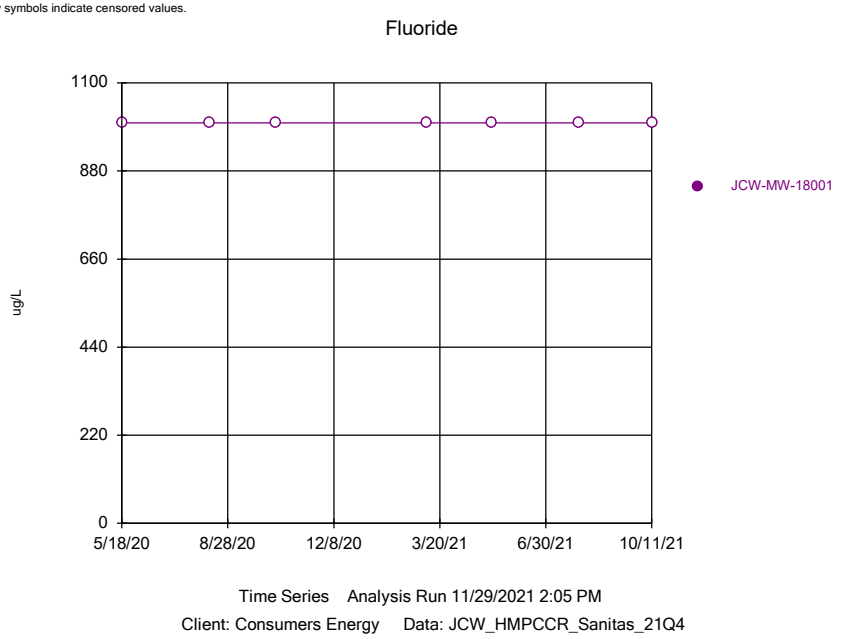

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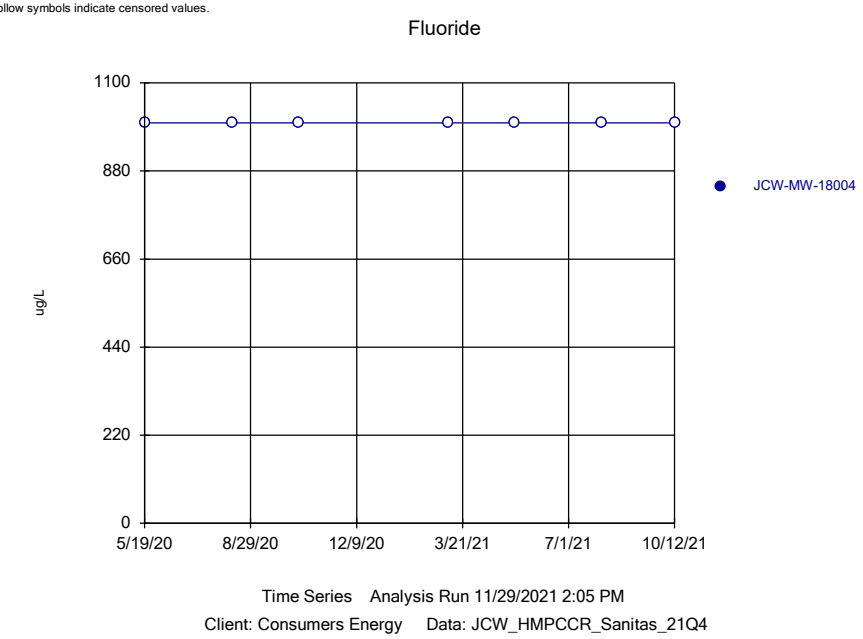

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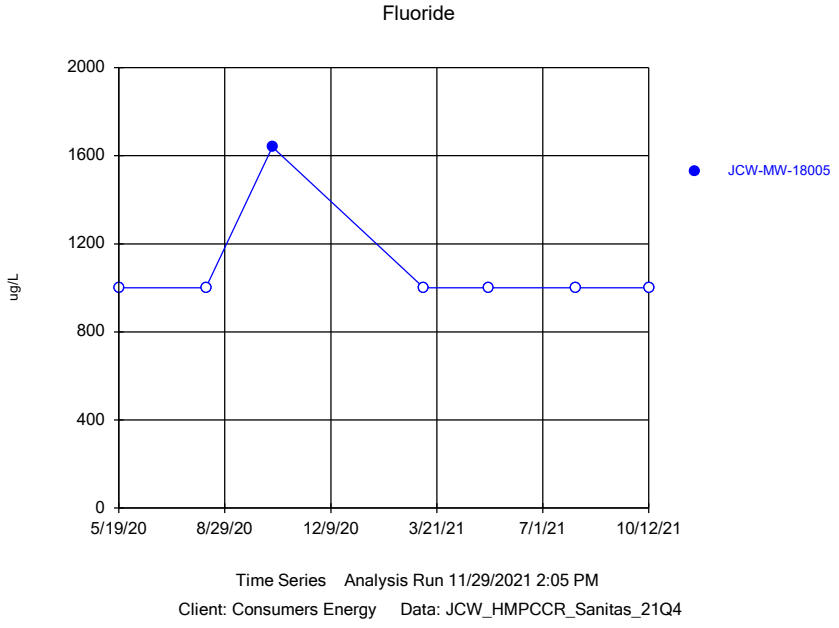

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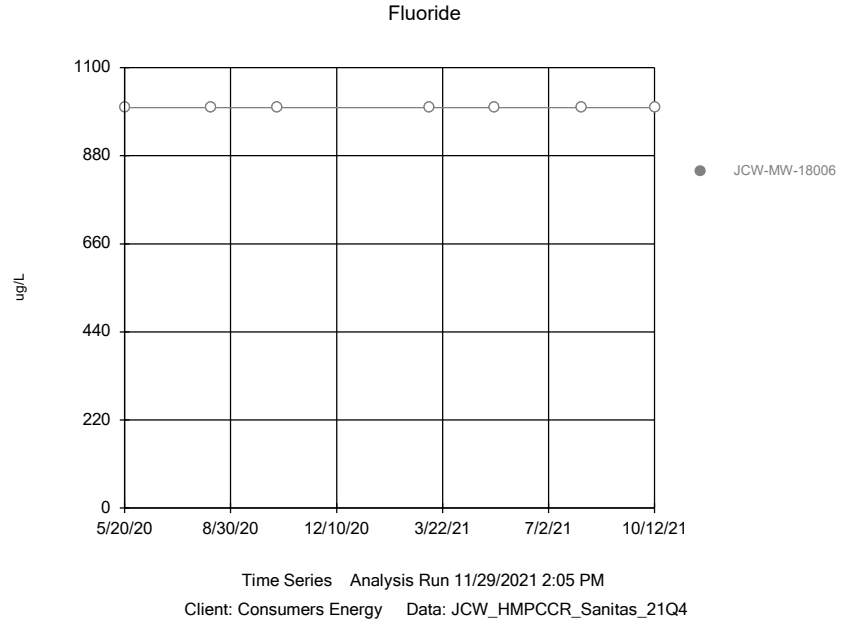

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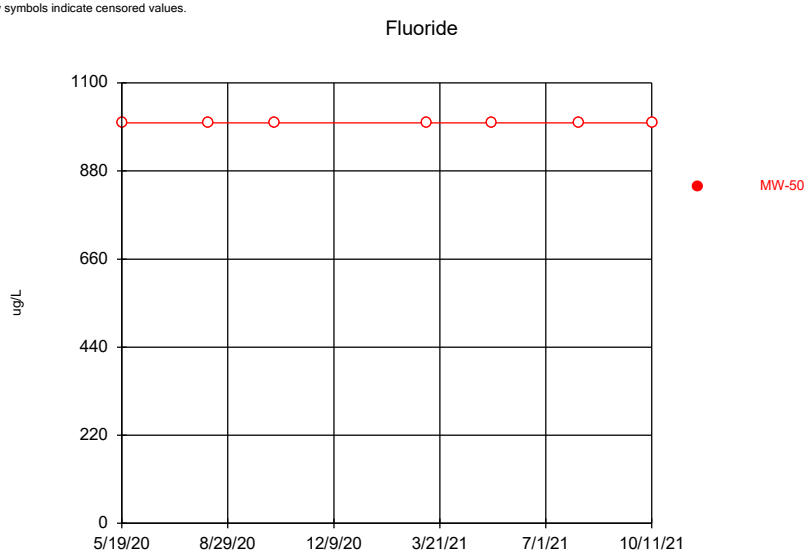

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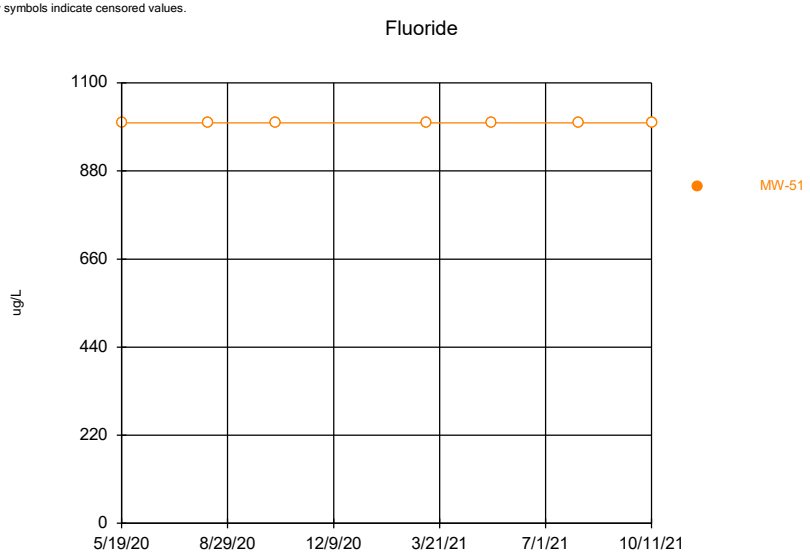

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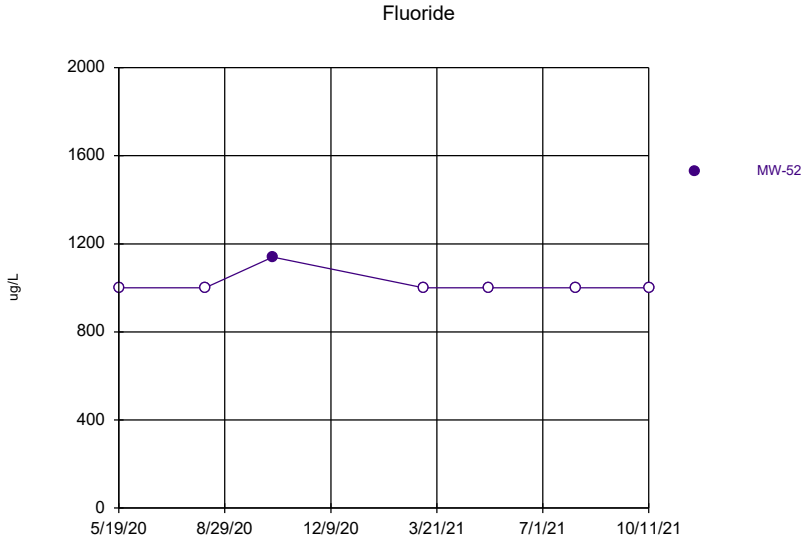

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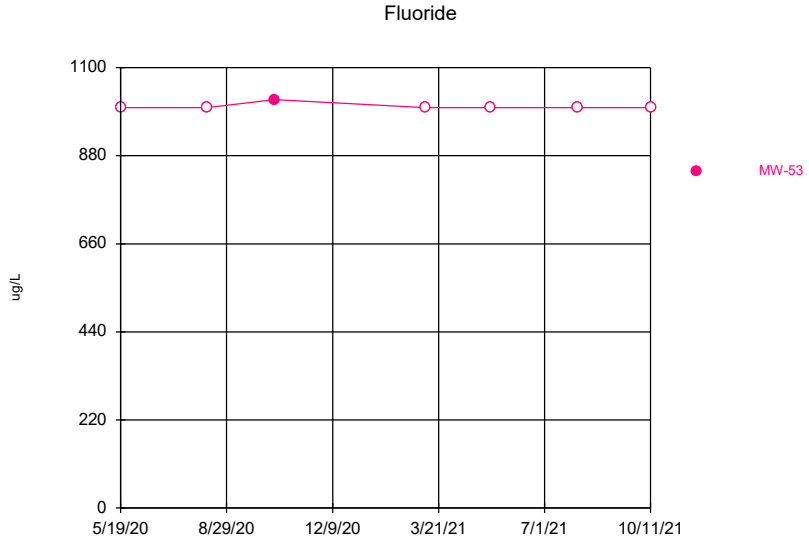

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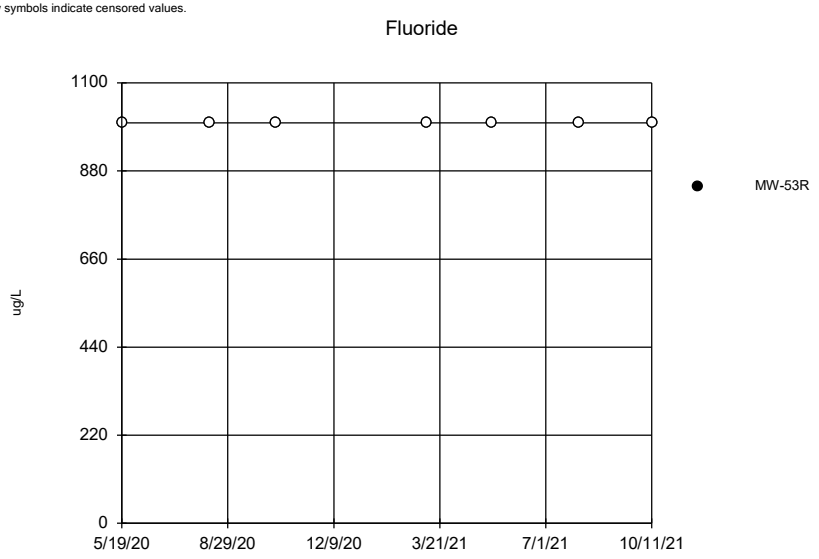

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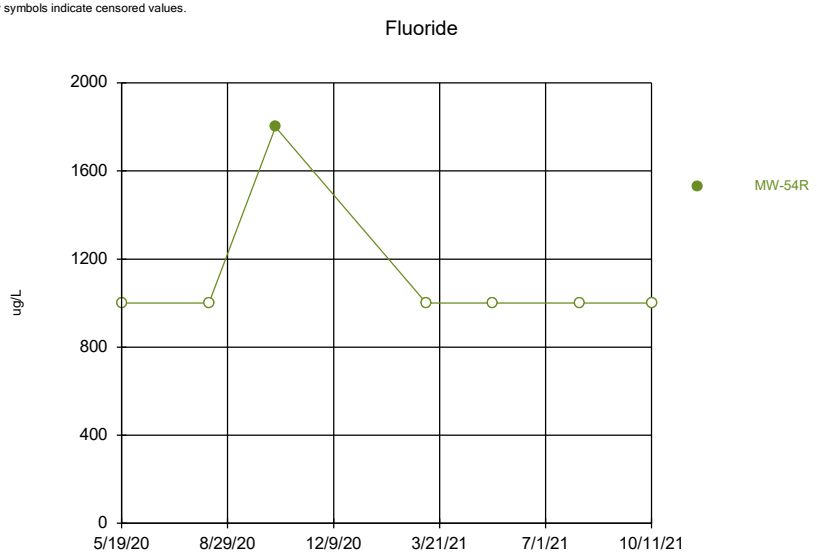

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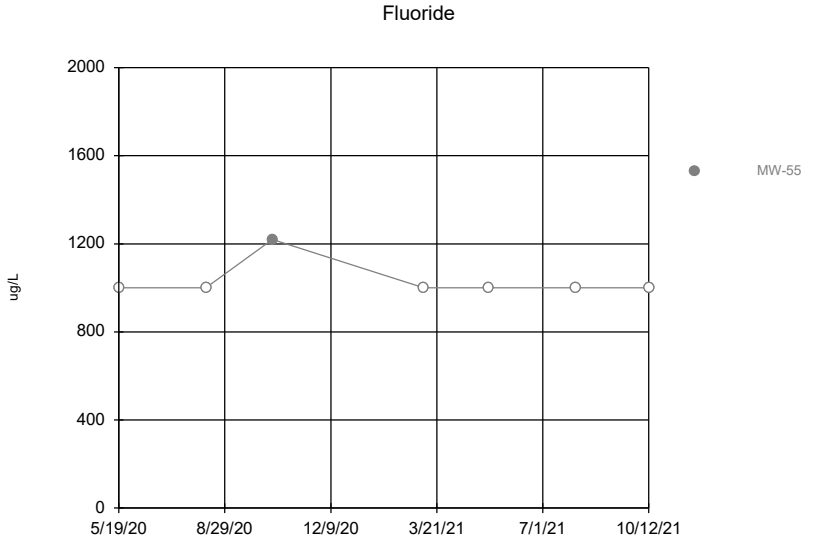

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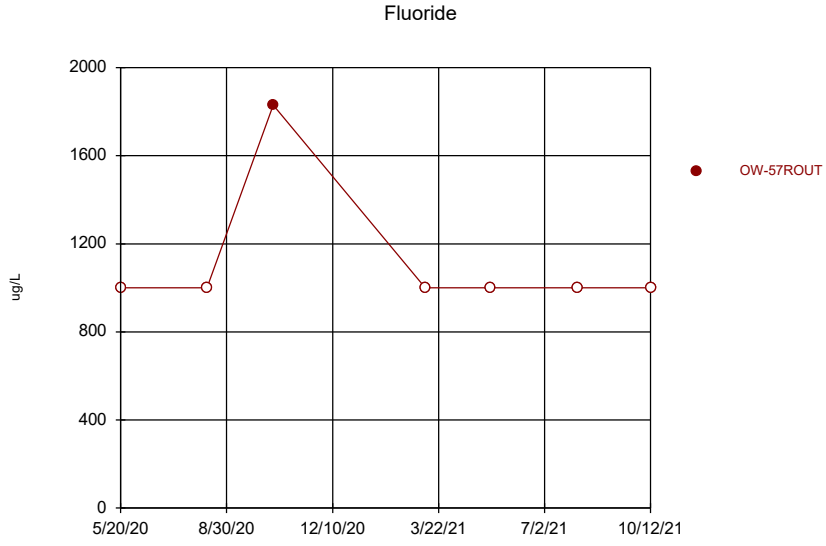

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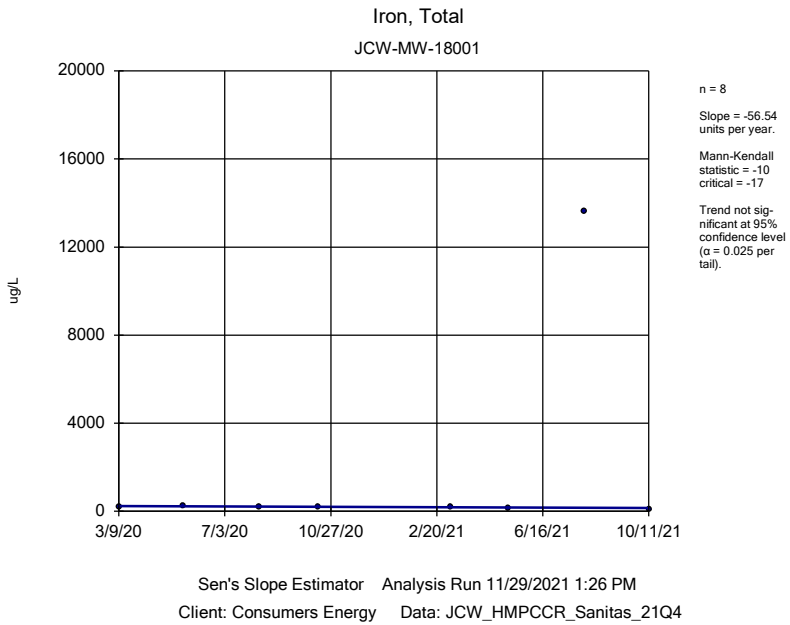

Sen's Slope Estimator Analysis Run 11/29/2021 1:26 PM

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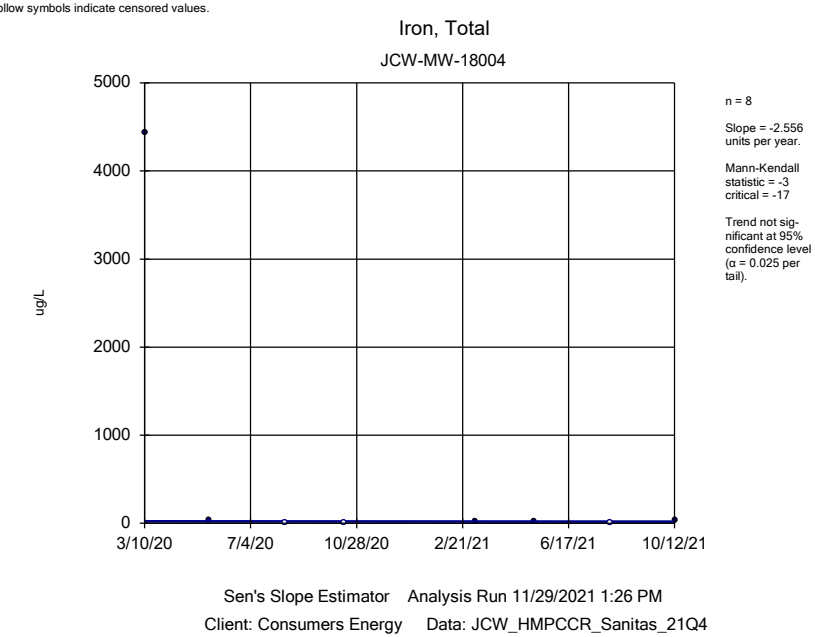

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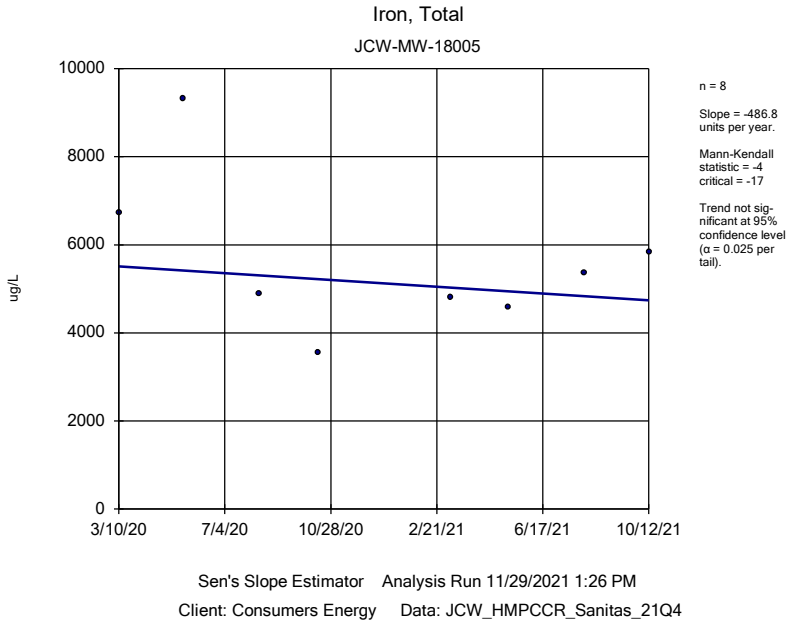

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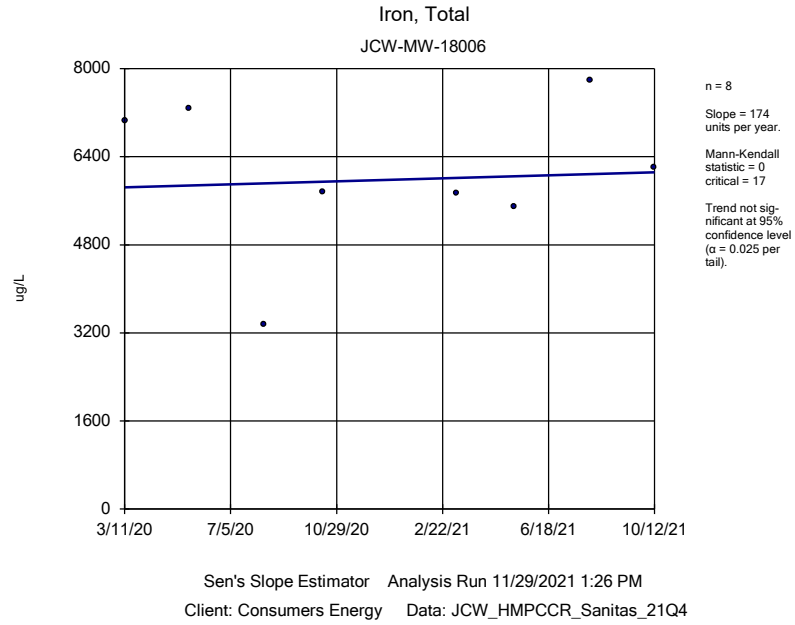

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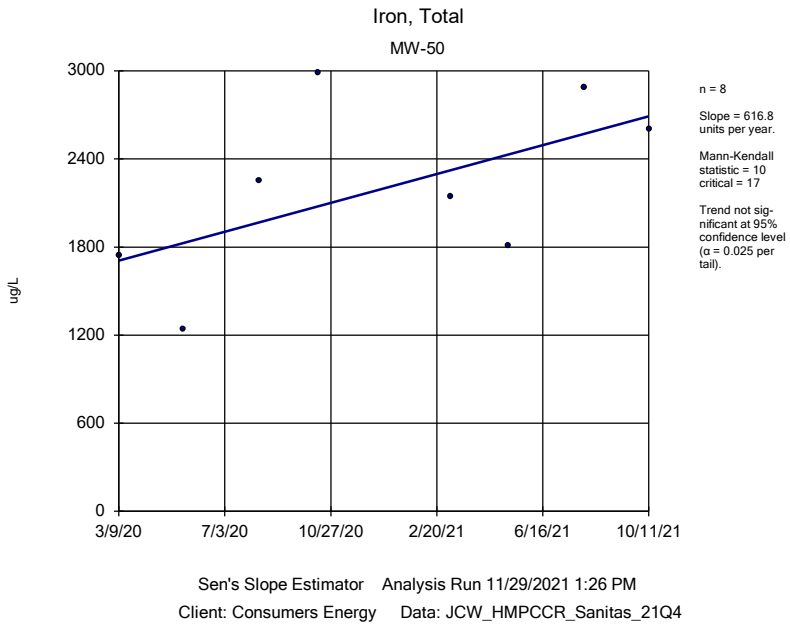

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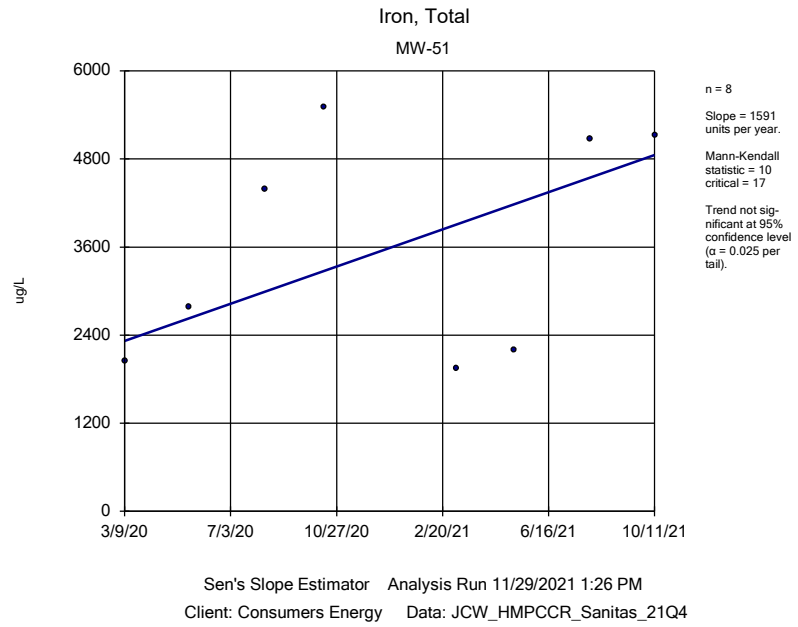

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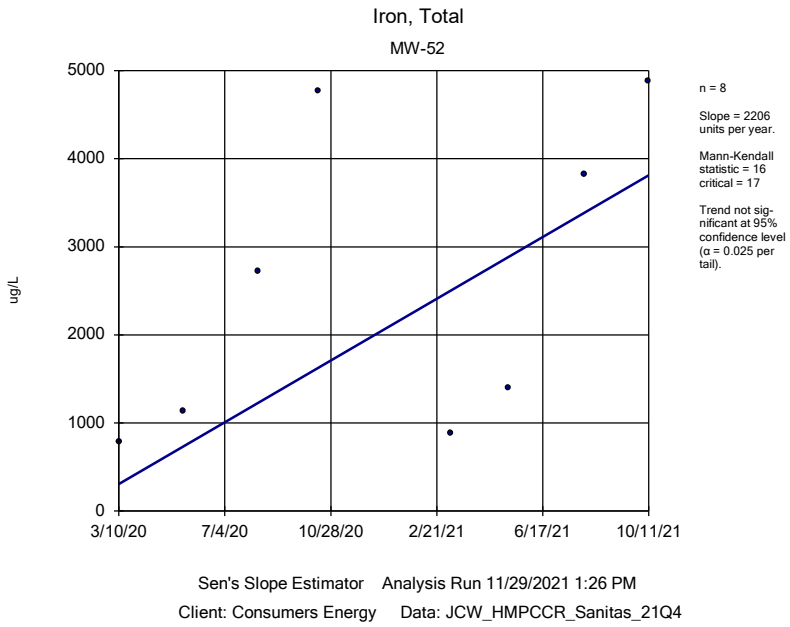

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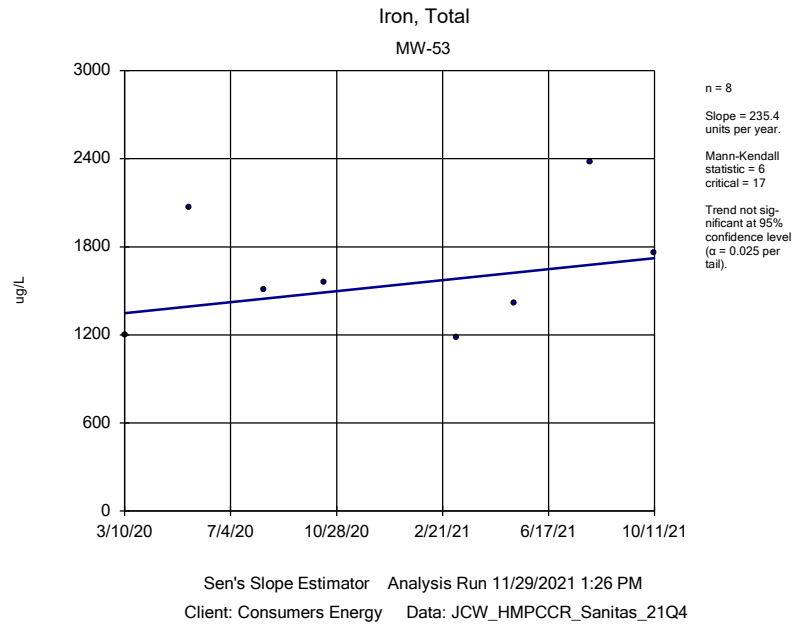

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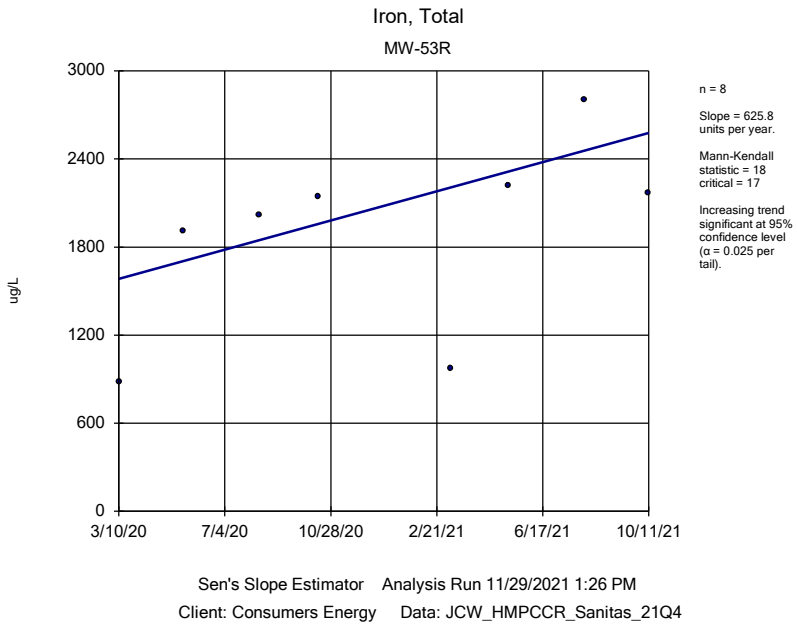

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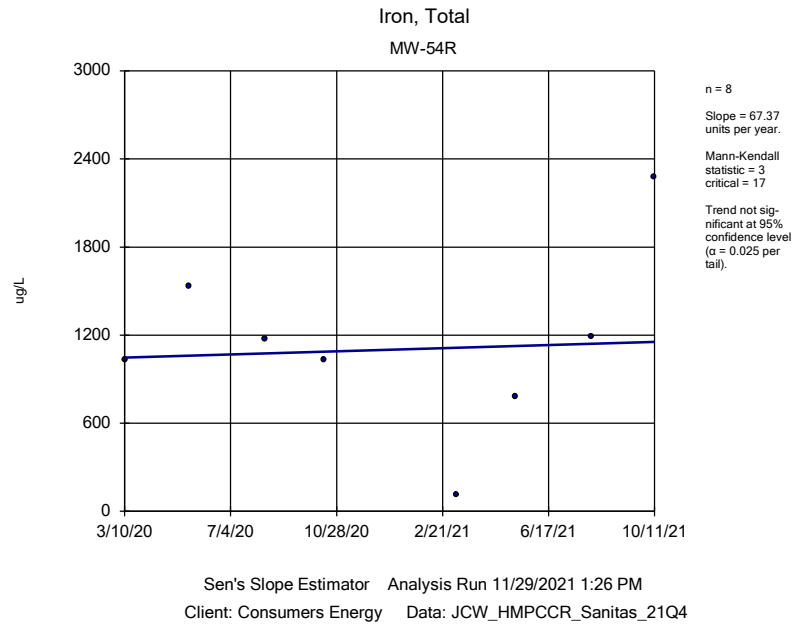

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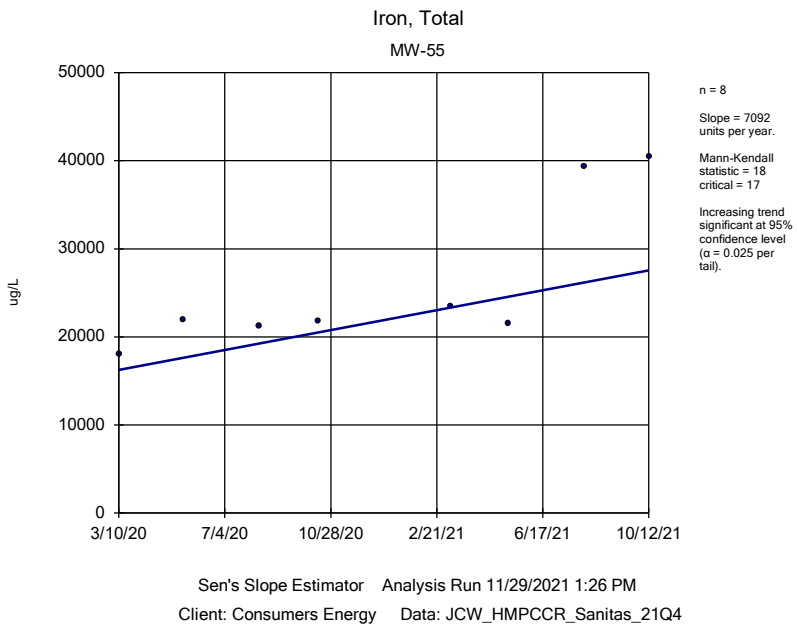

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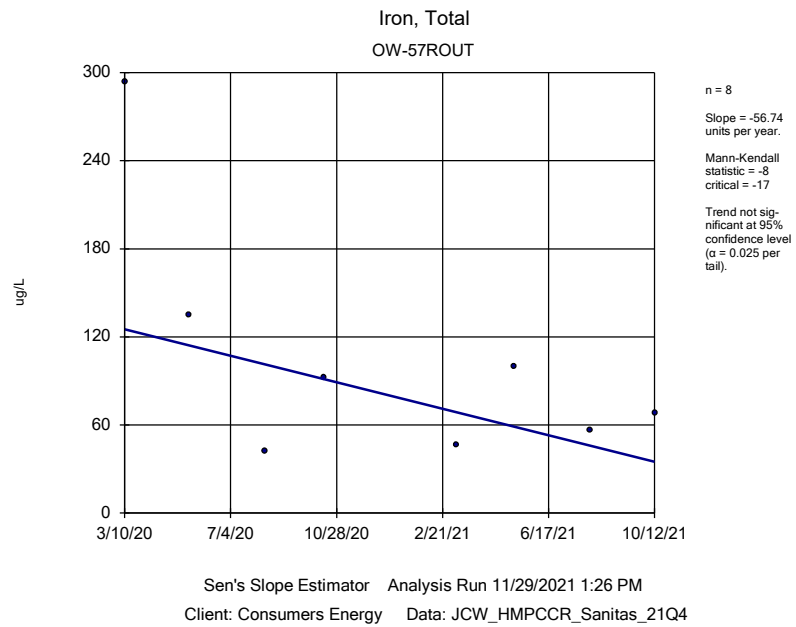

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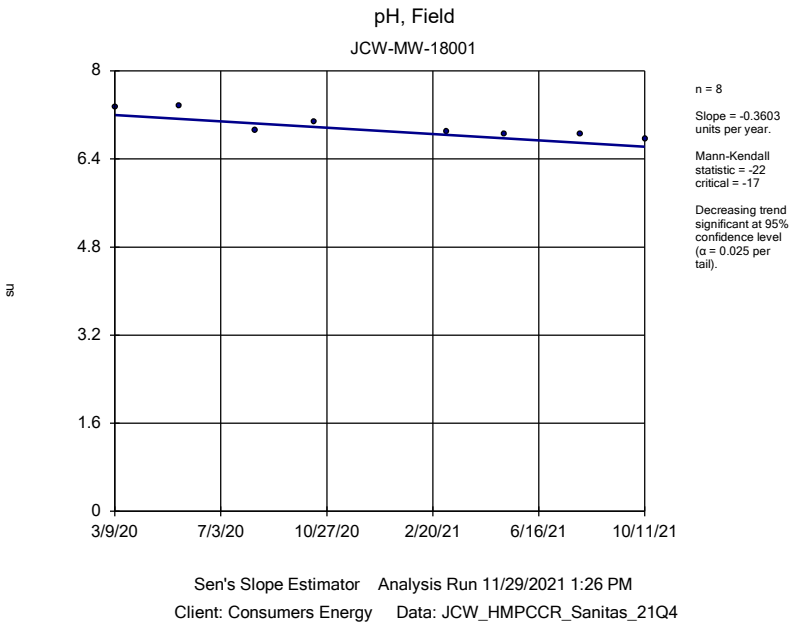

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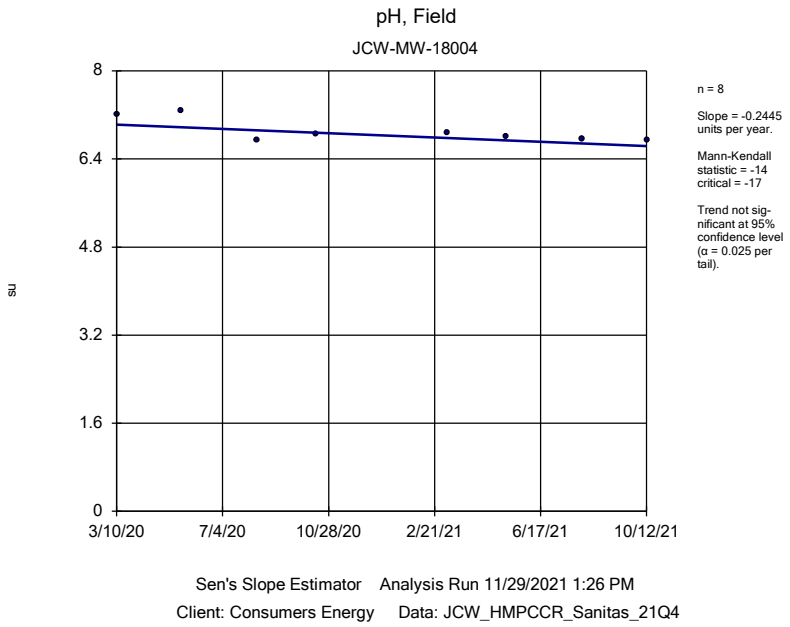

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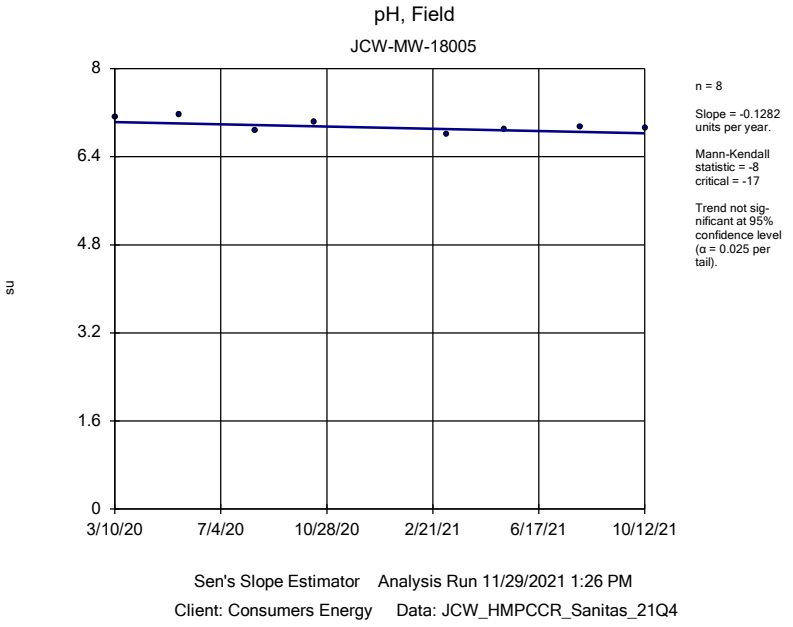

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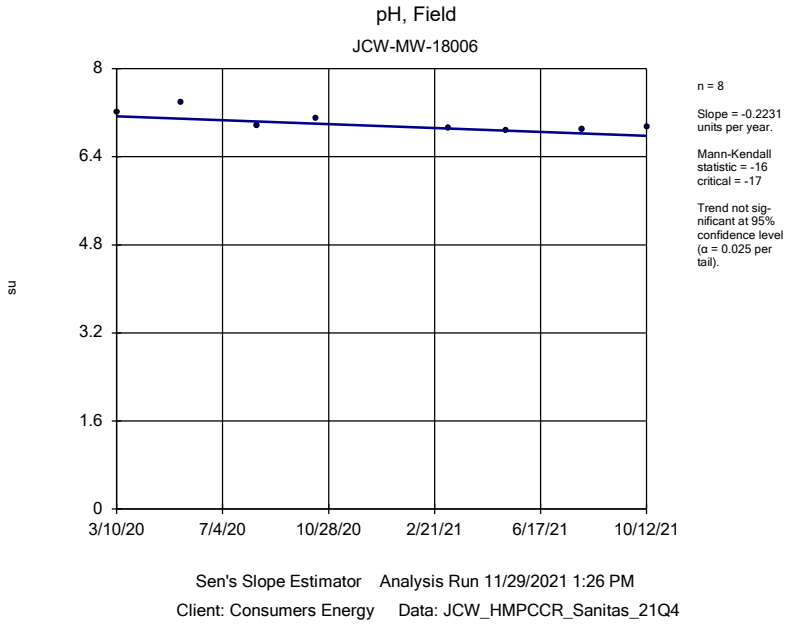

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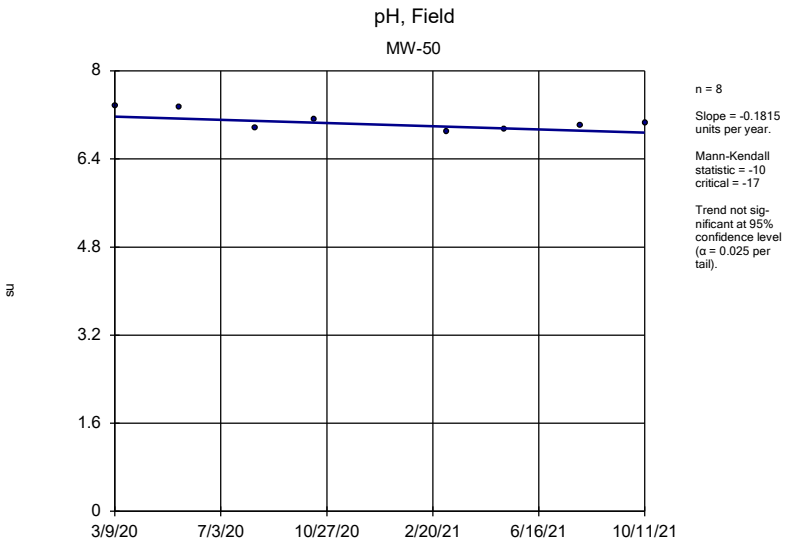

n = 8

Slope = -0.1815 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 11/29/2021 1:26 PM

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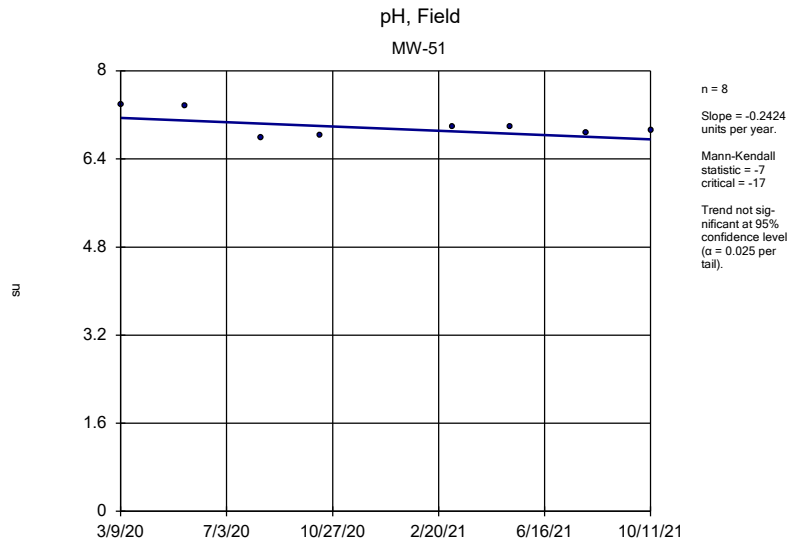

n = 8

Slope = -0.2424 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 11/29/2021 1:26 PM

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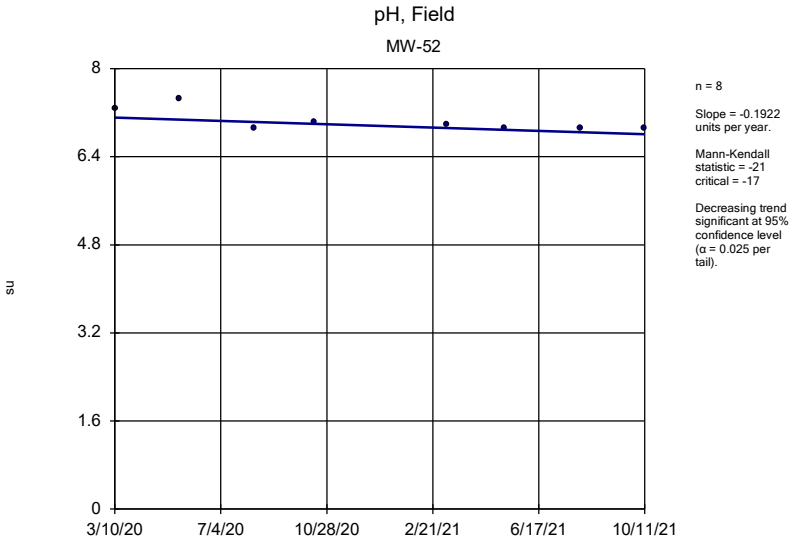

n = 8

Slope = -0.1922 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 11/29/2021 1:26 PM

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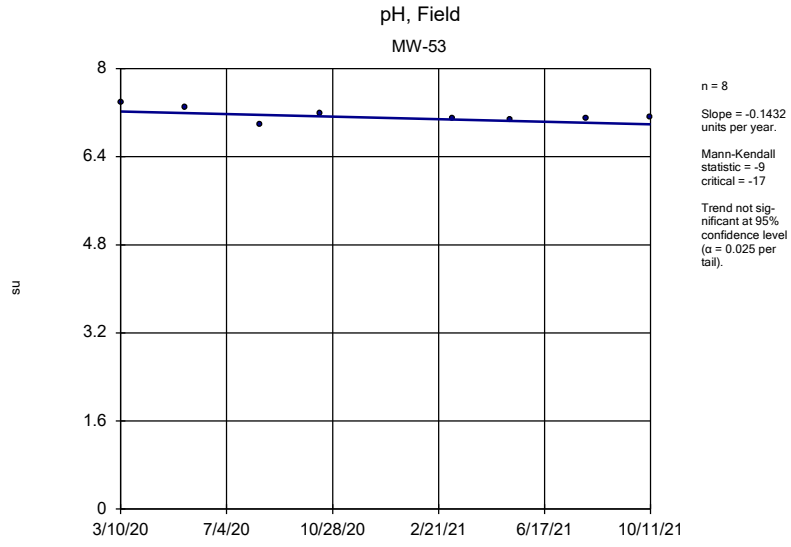

n = 8

Slope = -0.1432 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 11/29/2021 1:26 PM

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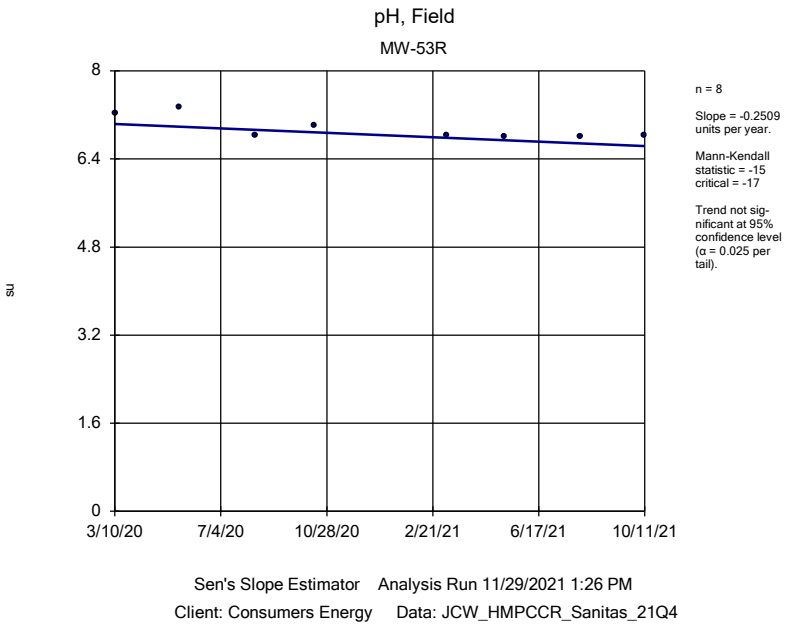

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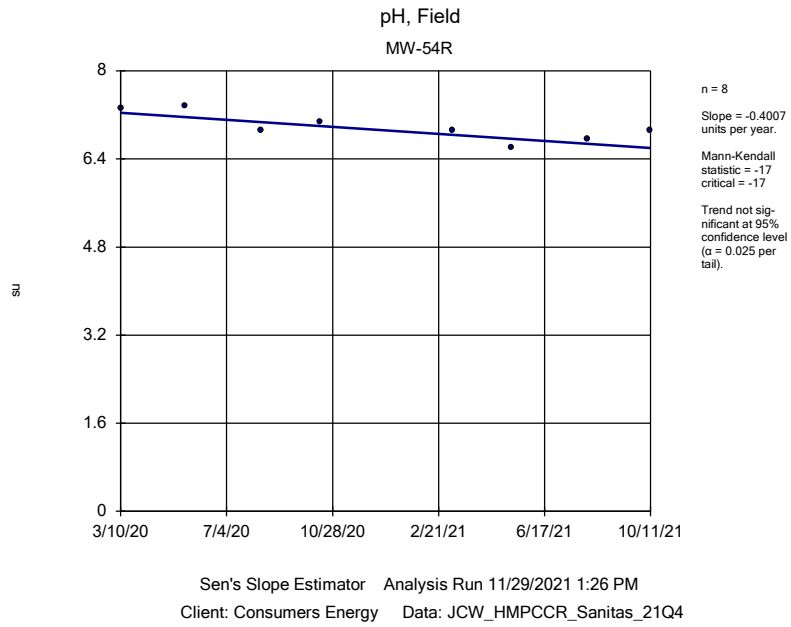

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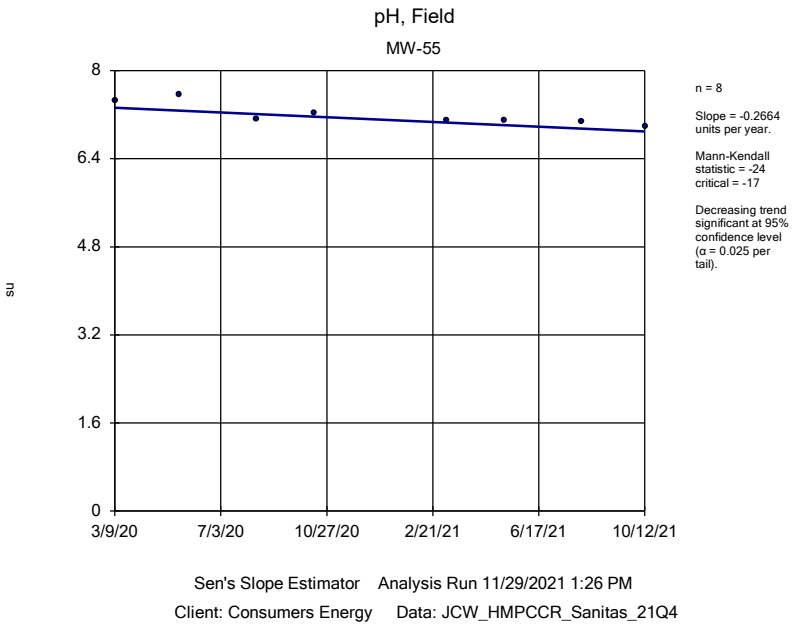

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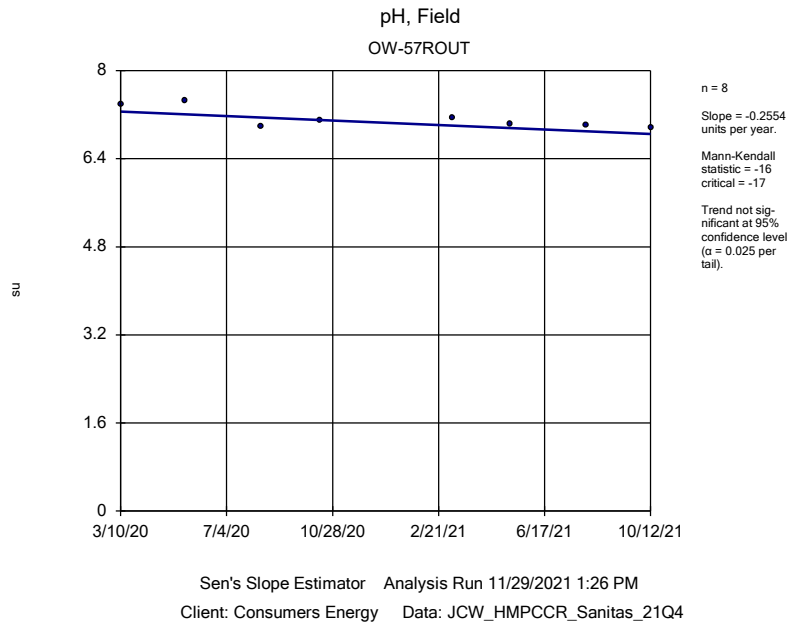

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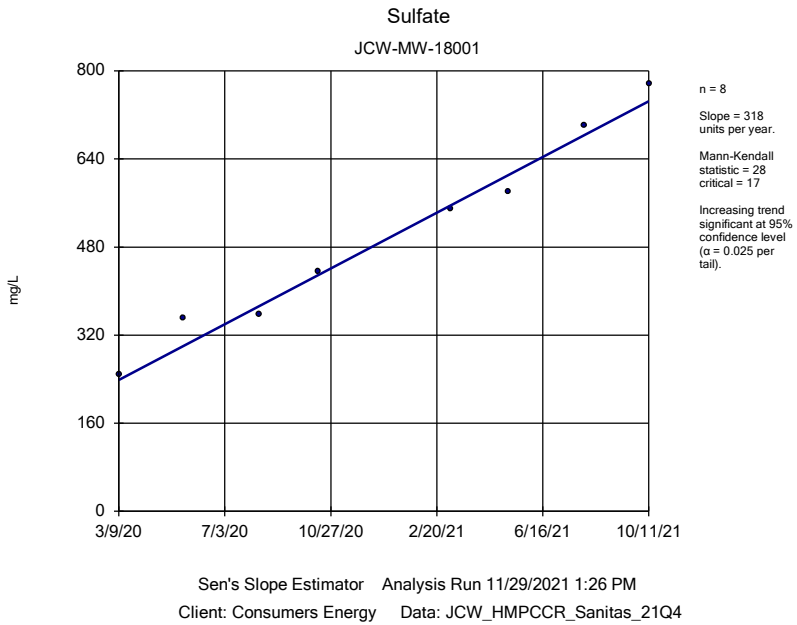

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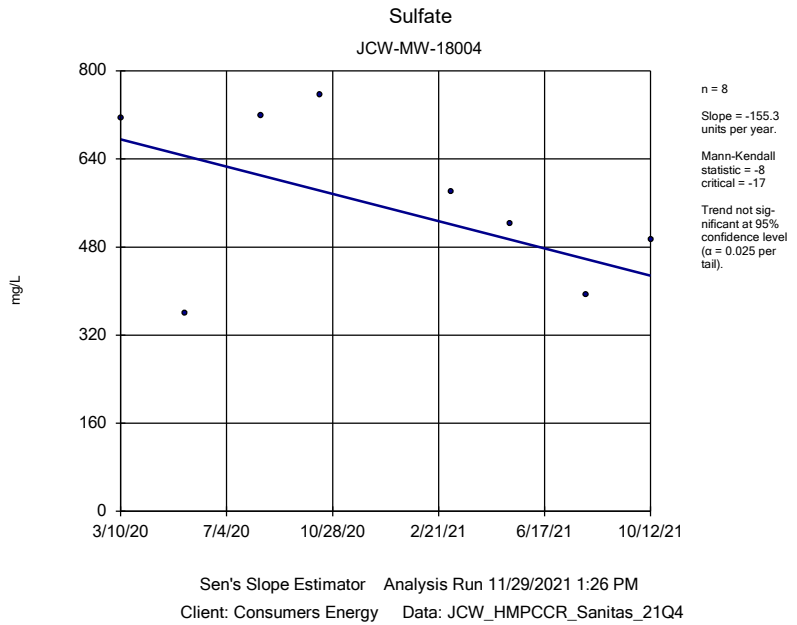

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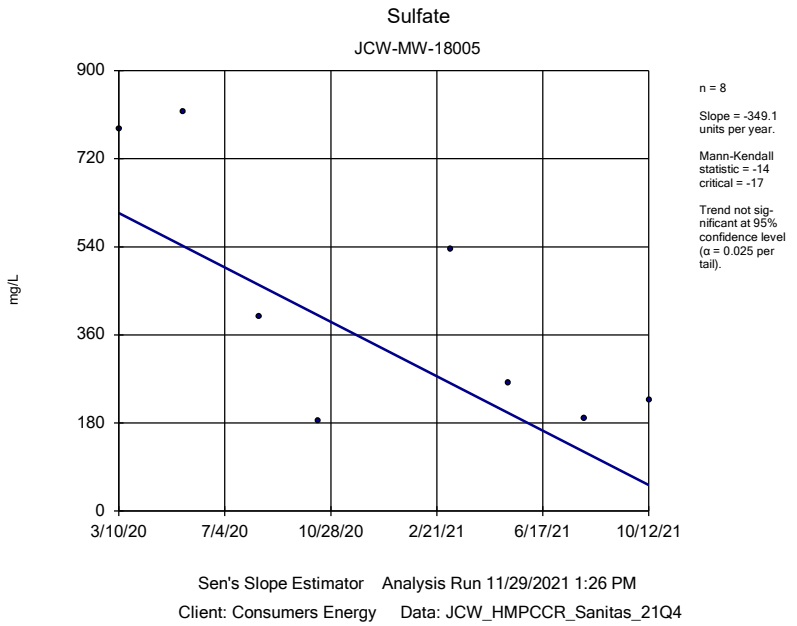

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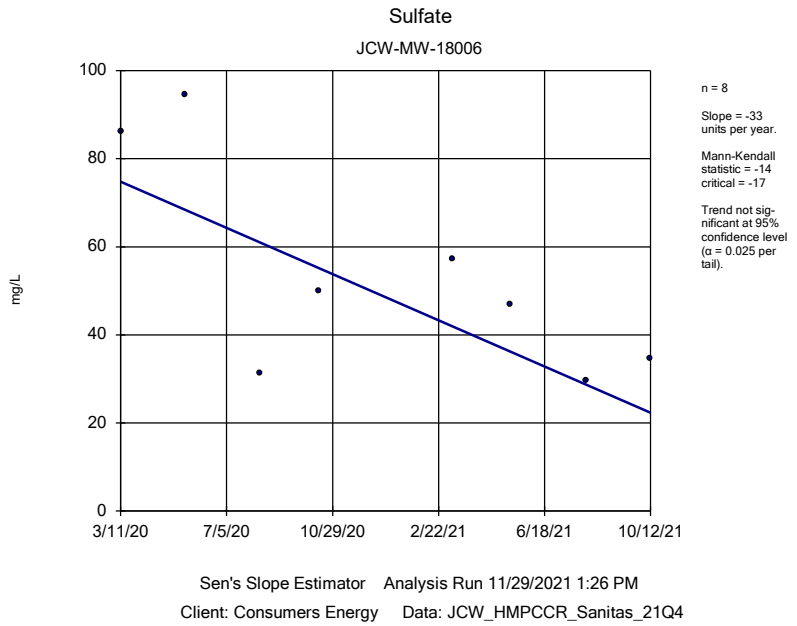

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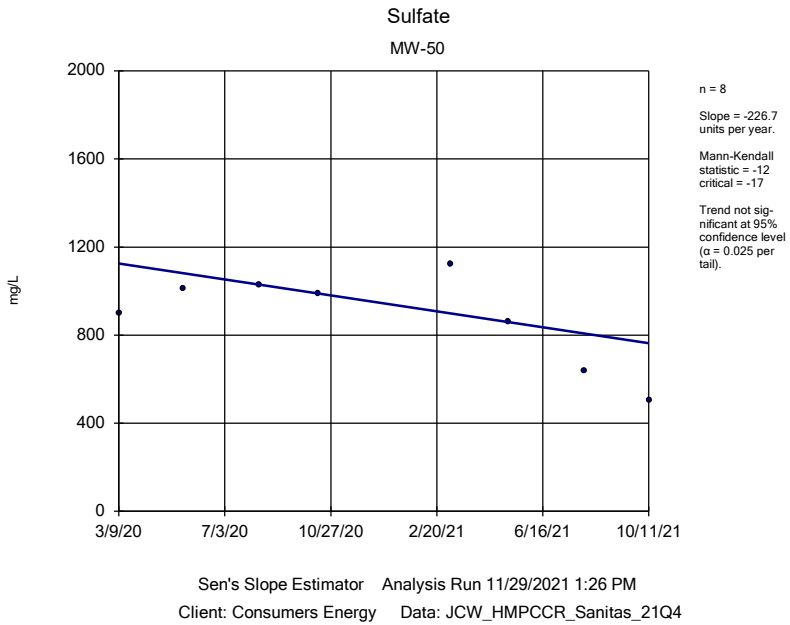

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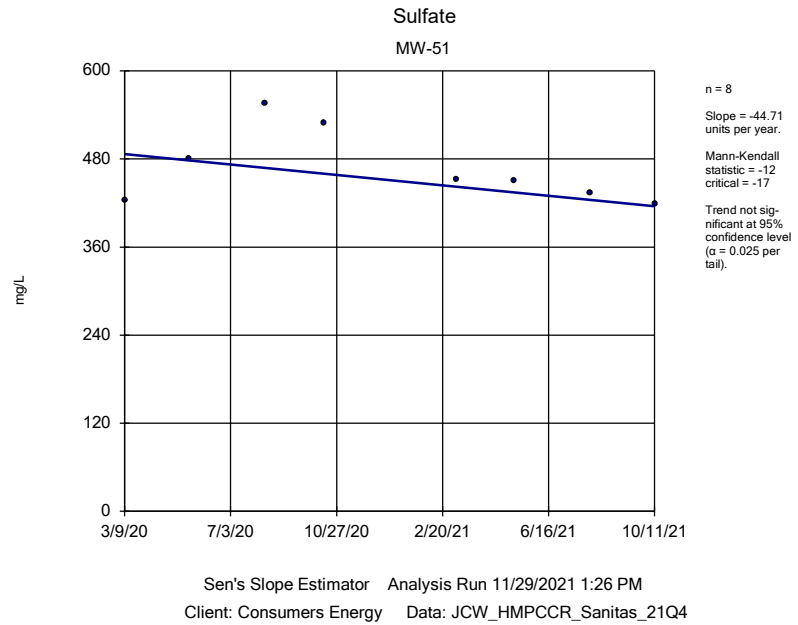

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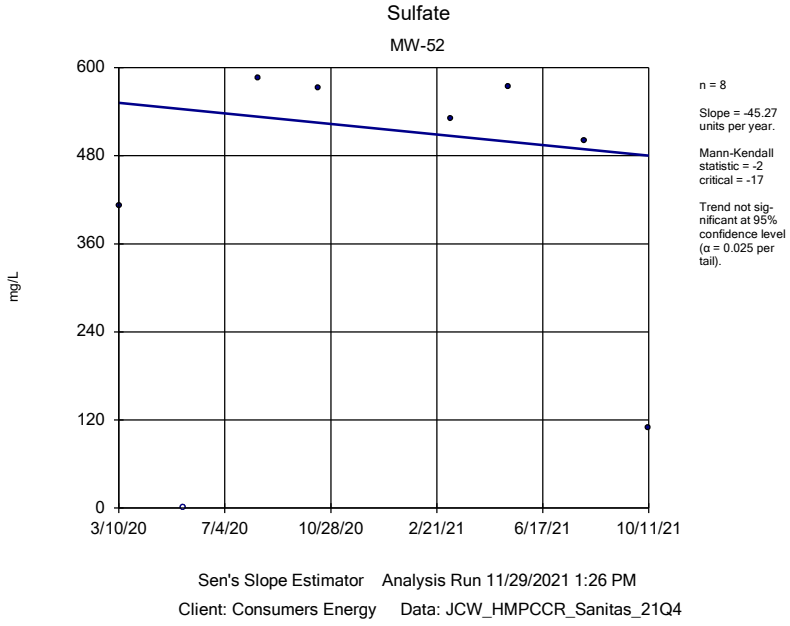

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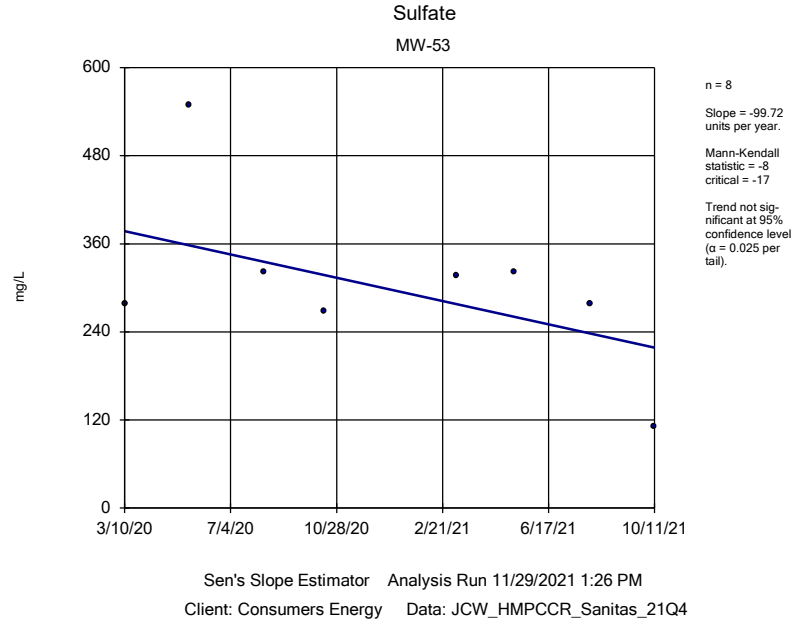

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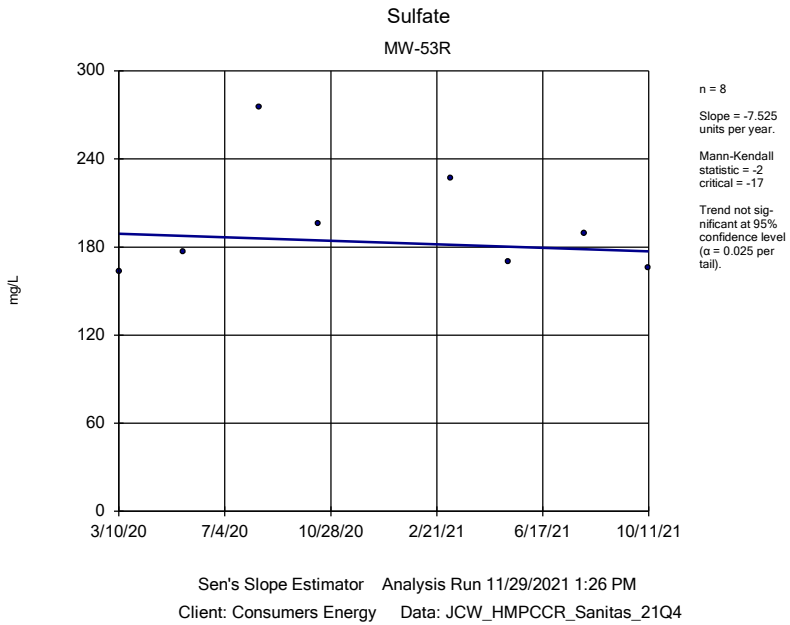

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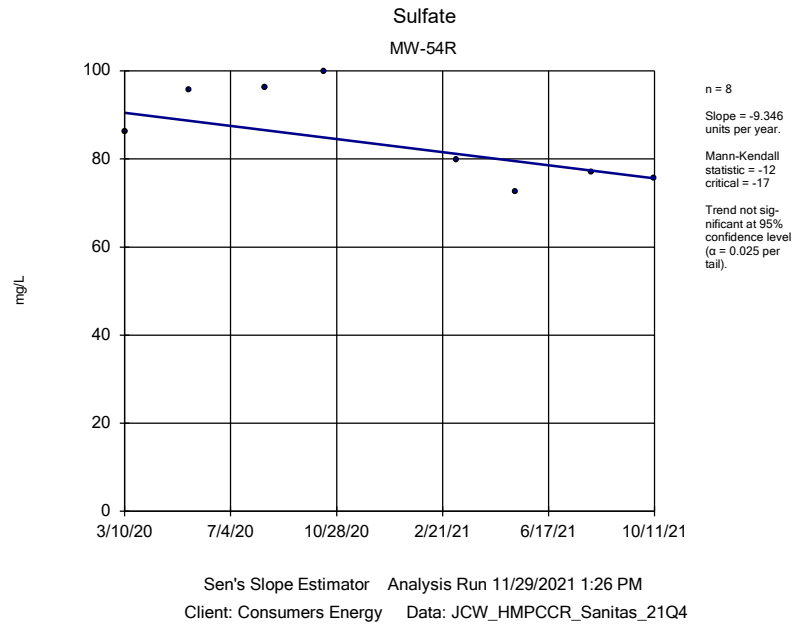

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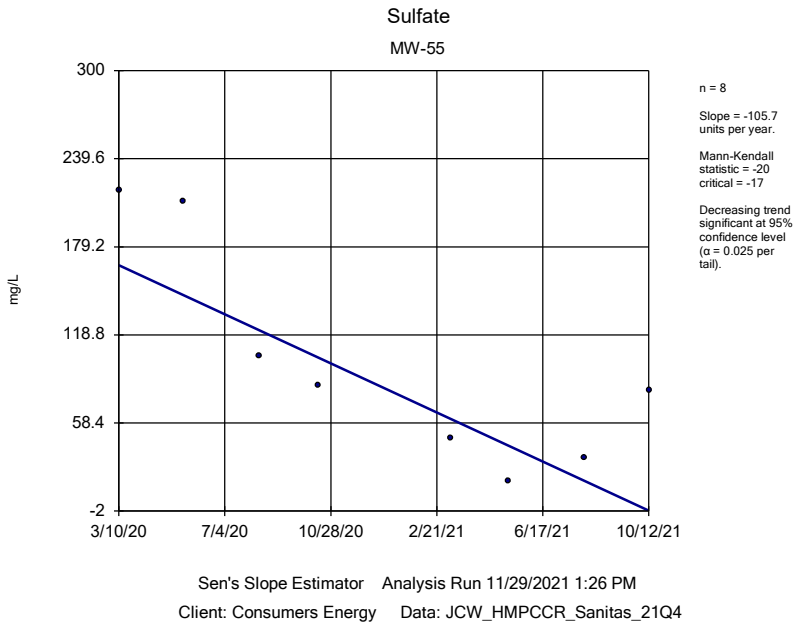

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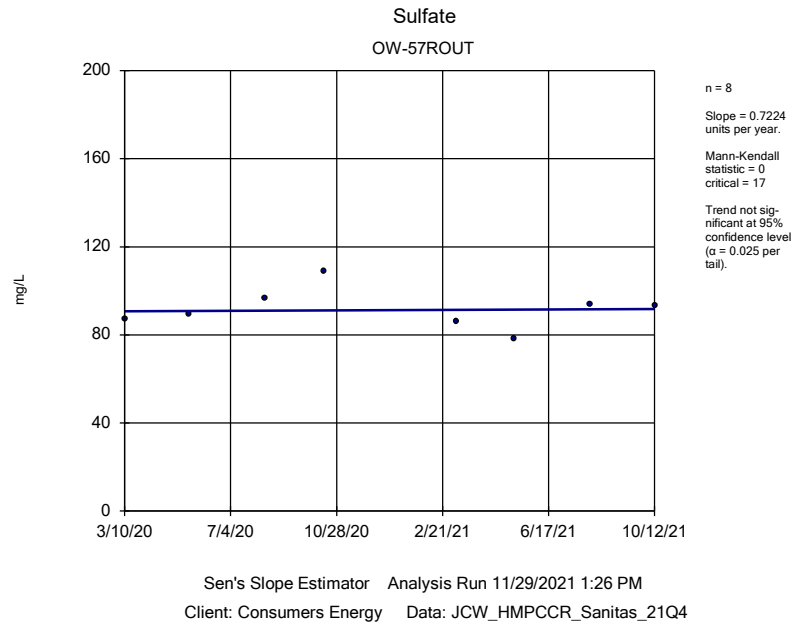

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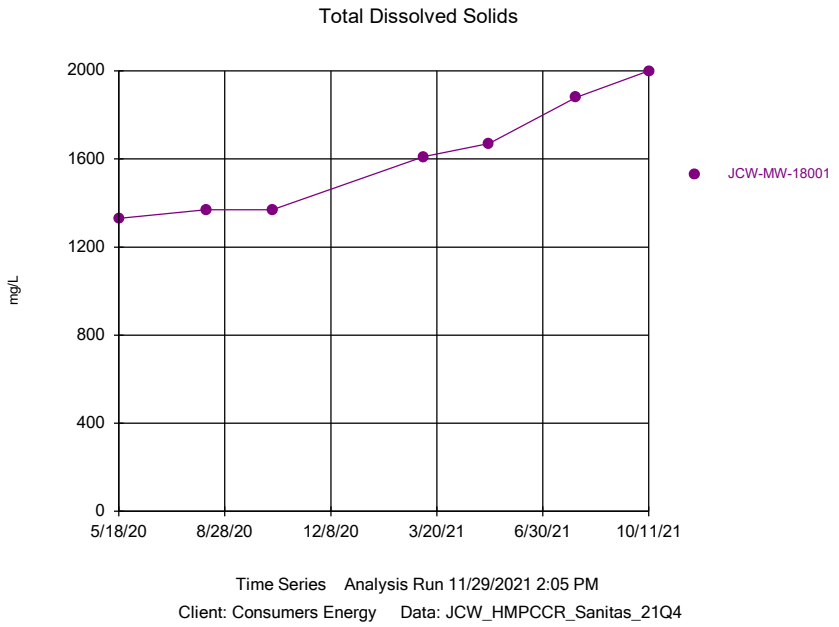

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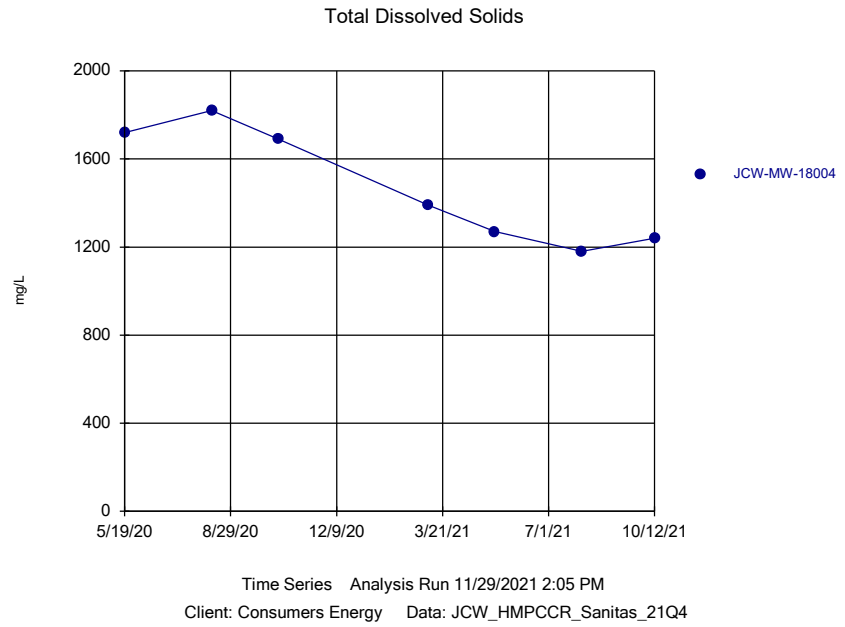

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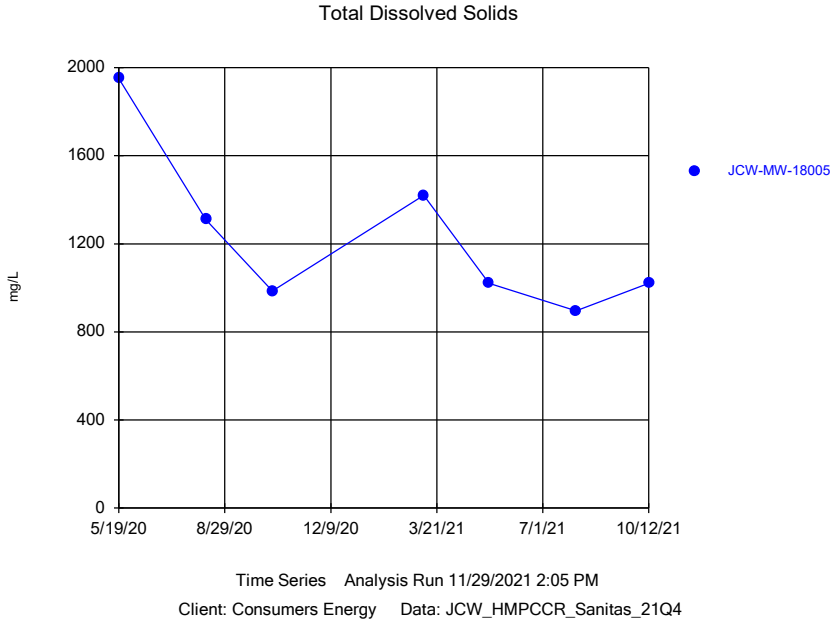

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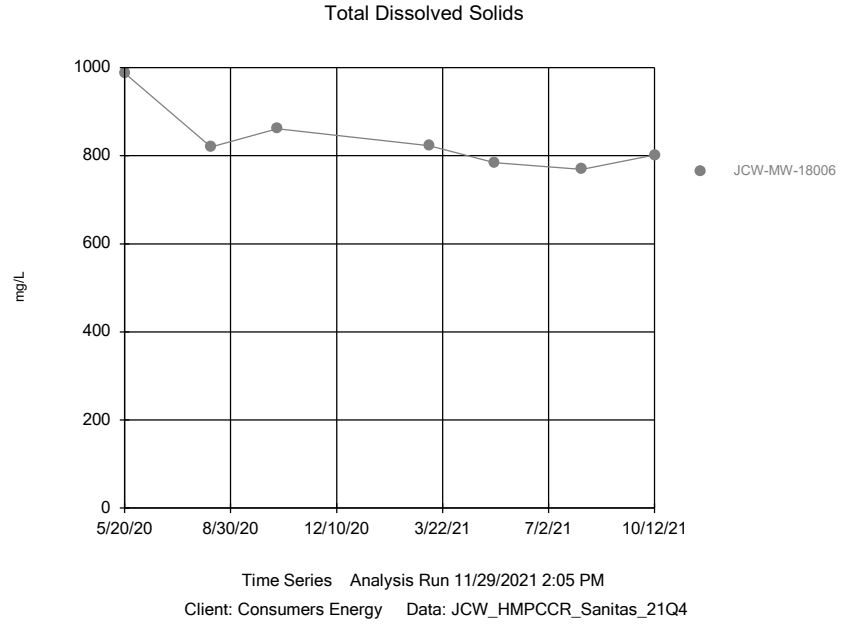

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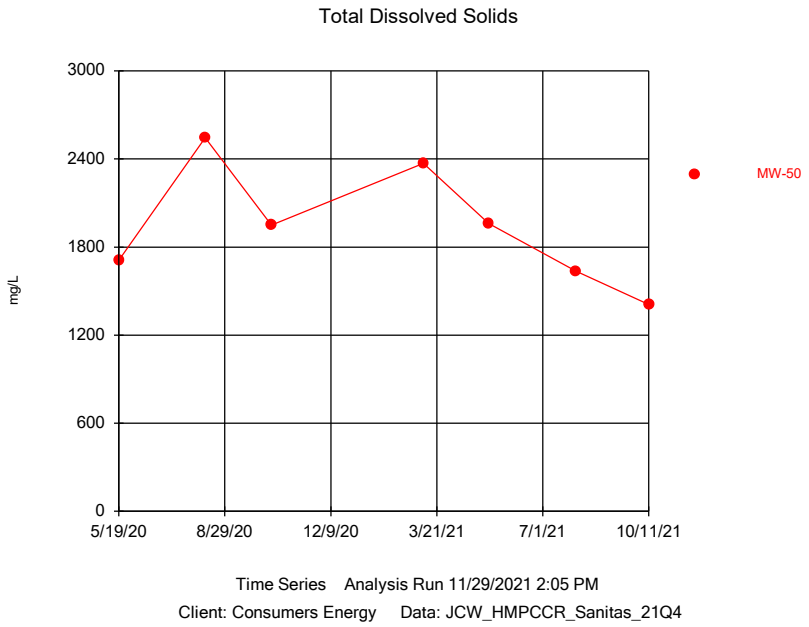

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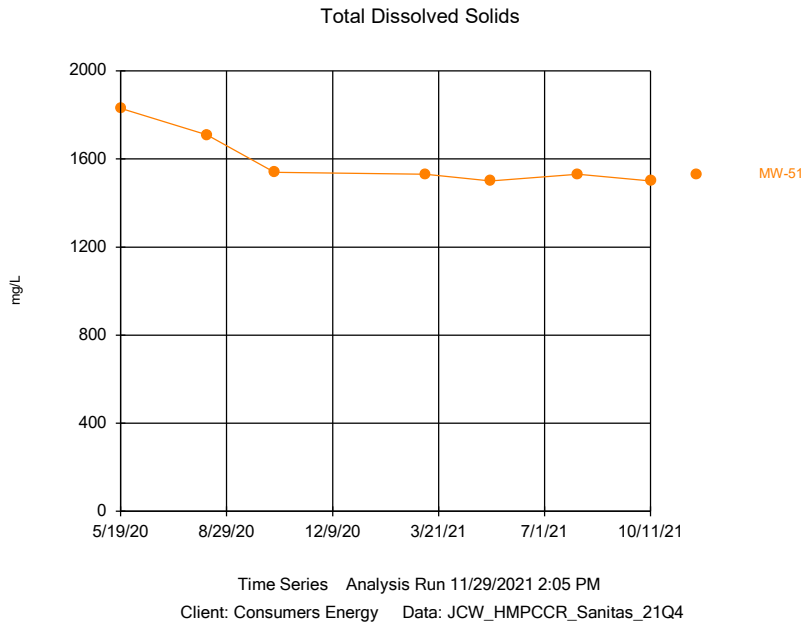

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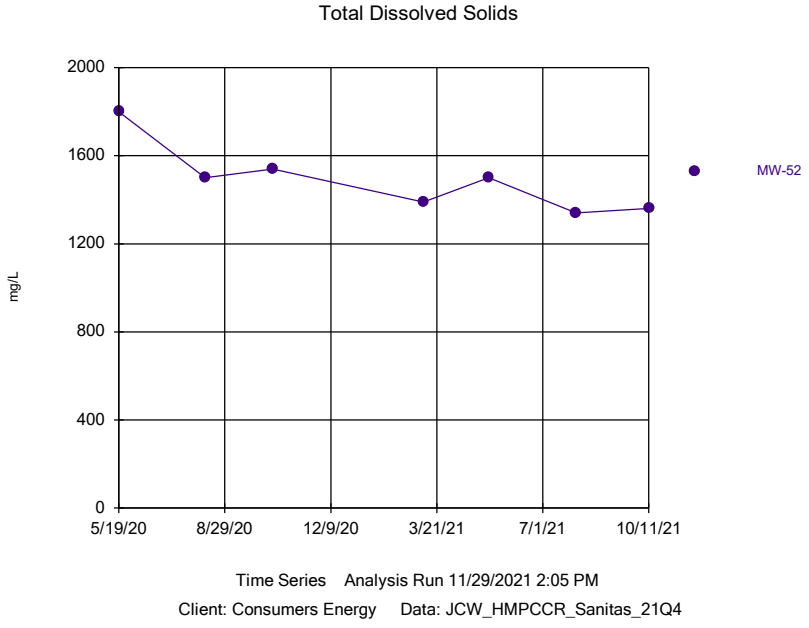

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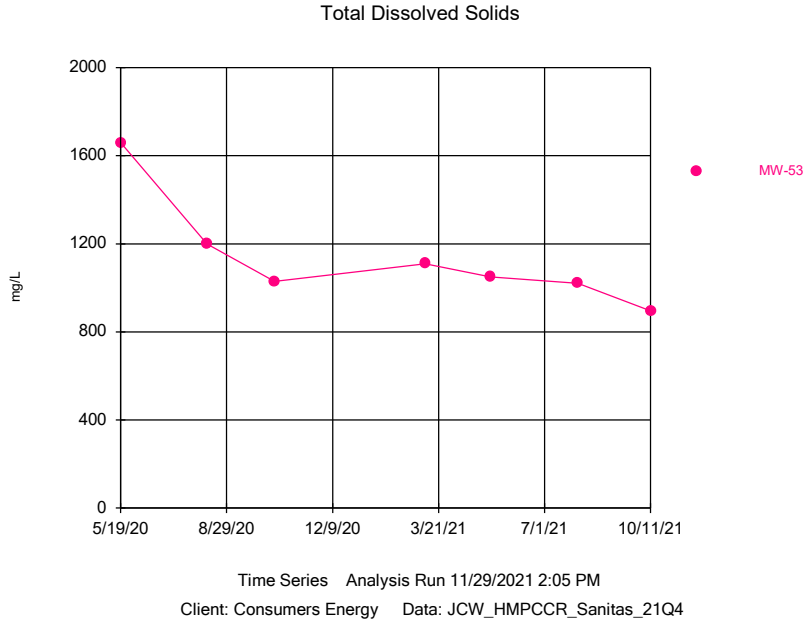

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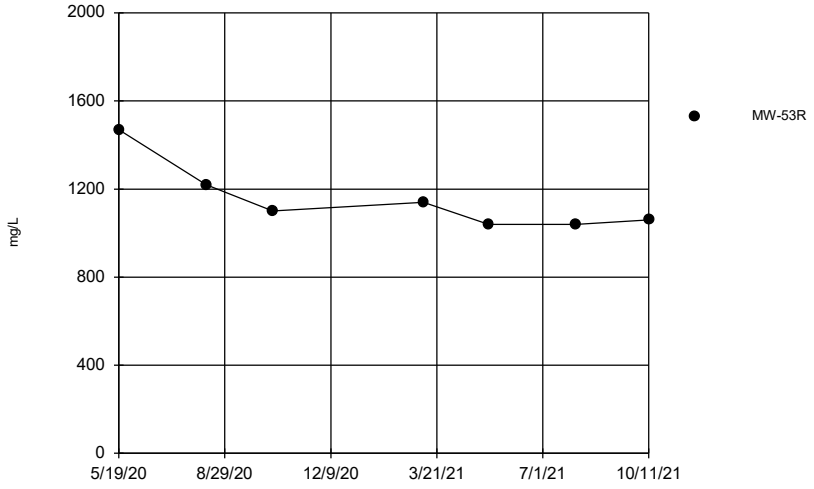
Total Dissolved Solids



Time Series Analysis Run 11/29/2021 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

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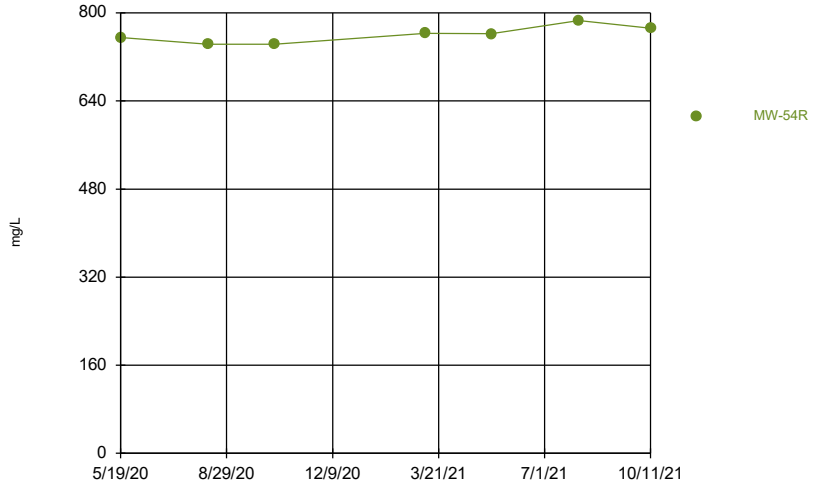
Total Dissolved Solids



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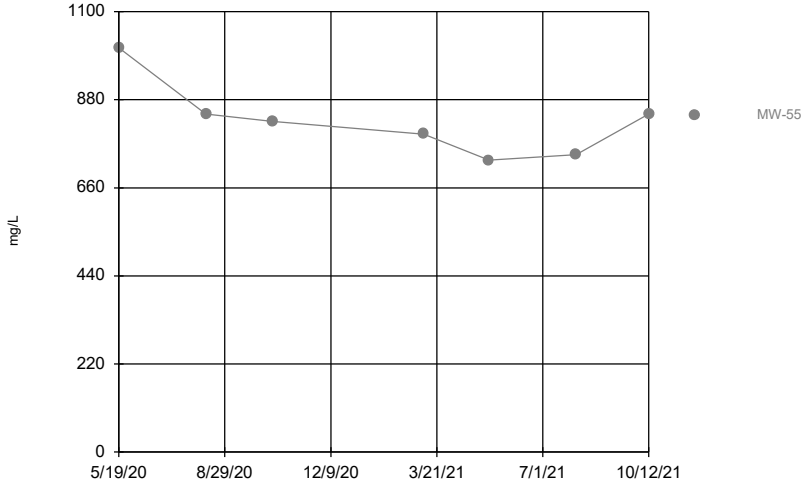
Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids



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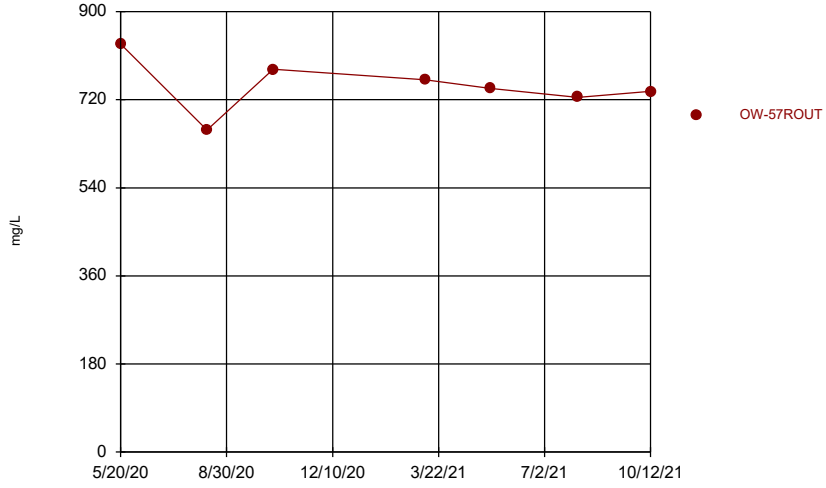
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids



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Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Appendix D
Assessment Monitoring and GSI Statistical Evaluation

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Technical Memorandum

Date:	January 10, 2022
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC Kristin Lowery, TRC
Project No.:	418426.0000 Phase 002, Task 002
Subject:	Assessment Monitoring and GSI Statistical Evaluation of October 2021 Sampling Event JC Weadock Landfill, Consumers Energy Company, Essexville, Michigan

During the statistical evaluation of the initial assessment monitoring event (May 2018), arsenic was present in one or more downgradient monitoring wells at statistically significant levels exceeding the Groundwater Protection Standards (GWPSs). Therefore, Consumers Energy Company (Consumers Energy) initiated an Assessment of Corrective Measures (ACM) within 90 days from when the Appendix IV exceedance was determined. The ACM was completed on September 11, 2019.

Currently, Consumers Energy is continuing semiannual assessment monitoring in accordance with §257.95 of the CCR Rule[1] at the JC Weadock Power Plant Landfill and quarterly groundwater monitoring in accordance with the February 2021 Landfill Hydrogeological Monitoring Plan (HMP). The fourth quarter 2021 monitoring event was conducted on October 4 through 13, 2021. In accordance with §257.95 and the HMP, the assessment monitoring data must be compared to GWPSs to determine whether or not Appendix III and Appendix IV constituents, and additional Michigan Part 115 (as amended by PA 640) Section 11511a(3) and Section 11519b(2) constituents, are detected at statistically significant levels above the GWPSs. GWPSs were established in accordance with §257.95(h) and Part 115, as detailed in the April 23, 2021 Groundwater Protection Standards technical memorandum, which was also included in the First Quarter 2021 Hydrogeological Monitoring Report (TRC, April 2021). In accordance with the HMP, groundwater monitoring data from the designated groundwater-surface water (GSI) monitoring wells must be also compared to the GSI criteria to determine whether or not the GSI monitoring constituents are detected at statistically significant levels above the GSI criteria.

The evaluation of the initial semiannual assessment monitoring event data (April and May 2018) indicated that arsenic was present at statistically significant levels above the GWPS at one of the three downgradient wells. The three downgradient wells were located within a vent (e.g., opening) of the

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

perimeter soil/bentonite slurry wall to assess the quality of groundwater passing the waste boundary. As discussed in detail below, in July 2018, the vent (e.g., opening) in the perimeter soil/bentonite slurry wall was closed and the slurry wall is now continuous along the entire perimeter of the Weadock Landfill. As a result of the change in groundwater flow conditions, the groundwater monitoring system was revised, as documented in the HMP. The monitoring well network now consists of twelve (12) downgradient monitoring wells and eight (8) GSI monitoring wells.

The statistical evaluation of the fourth quarter 2021 assessment monitoring event data indicates that the following constituents are present at statistically significant levels above the GWPSs in downgradient monitoring wells at the Weadock Landfill:

Constituent	GWPS	#Downgradient Wells Exceeded
Boron	560 µg/L	10 of 12
Calcium	280 mg/L	1 of 12

Corrective action has been triggered as a result of data collected during the initial assessment monitoring event. Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97 and execute the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

The statistical evaluation found that arsenic and molybdenum at MW-55 were present at statistically significant levels exceeding the site-specific GSI criteria.

Statistical Evaluation Procedures

Following each quarterly sampling event, compliance well data for the Weadock Landfill are evaluated in accordance with the Assessment Monitoring Statistical Data Evaluation and GSI Data Evaluation procedures in the HMP. The assessment monitoring and GSI monitoring programs were developed to evaluate concentrations of constituents present in the uppermost aquifer relative to acceptable levels (i.e., GWPSs or GSI criteria). To evaluate whether or not a criterion exceedance is statistically significant, the difference in concentration observed at the downgradient wells during a given monitoring event compared to the applicable criterion must be large enough, after accounting for variability in the sample data, that the result is unlikely to have occurred merely by chance. Consistent with the Unified Guidance [2], the preferred method for comparisons to a fixed standard is confidence limits. Based on the number of historical observations in the representative sample population, the sample mean, the sample standard deviation, and a selected confidence level (i.e., 99 percent), an upper and lower confidence limit is calculated. The true concentration, with 99 percent confidence, will fall between the lower and upper confidence limits.

The concentrations observed in the downgradient wells are deemed to be a statistically significant exceedance when the 99 percent lower confidence limit of the downgradient data exceeds the criterion. If the confidence interval straddles the criterion (i.e. the lower confidence level is below the criterion, but the upper confidence level is above), the statistical test result indicates that there is insufficient

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

confidence that the measured concentrations are different from the criterion and thus no compelling evidence that the measured concentration is a result of a release from the CCR unit versus the inherent variability of the sample data. This statistical approach is consistent with the statistical methods for assessment monitoring presented in §257.93(f) and (g). Statistical evaluation methodologies built into the CCR Rule and Part 115, and numerous other federal rules, are key in determining whether or not individually measured data points represent a concentration increase over the baseline or a fixed standard (such as a GWPS in an assessment monitoring program).

For each detected constituent, the concentrations for each well were first compared directly to the GWPS, as shown on Table 1, or the GSI criteria, as shown on Table 2. Parameter-well combinations that included a direct exceedance of the criteria within the most recent two years of sampling events (eight quarterly sampling events, March 2020 through October 2021) were retained for further analysis. Data collected under the previous HMP is used where available.

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

The statistical data evaluation included the following steps:

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

The results of these evaluations are presented and discussed below.

Data from each round were evaluated for completeness, overall quality, and usability and were deemed appropriate for the purposes of the assessment and GSI monitoring programs. Initially, the results were observed visually for potential trends. No outliers were identified in the data set.

The Sanitas™ software was then used to test compliance at the downgradient monitoring wells using the confidence interval method for the most recent eight sampling events. The tests were run with a

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

per-test significance of α = 0.01. Non-detect data was handled in accordance with the HMP for the purposes of calculating the confidence intervals.

The Sanitas™ software generates an output that includes graphs of the parametric or non-parametric confidence intervals for each well along with notes data transformations, as appropriate.

Assessment Monitoring Statistical Evaluation

The assessment monitoring statistical evaluation is performed on the downgradient monitoring wells in accordance with the HMP. The downgradient monitoring wells include:

- JCW-MW-18001
- JCW-MW-18004
- JCW-MW-18005
- JCW-MW-18006
- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- OW-57R Out

The concentrations from each well were first compared directly to the GWPS, as shown on Table 1. Constituent-well combinations that included a direct exceedance of the GWPS within the past eight[4] monitoring events were retained for further analysis (Attachment 1). Direct comparison GWPS exceedances include the following constituent well combinations:

- Boron in MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, MW-55, OW-57R OUT, JCW-MW-18001, JCW-MW-18005, and JCW-MW-18006;
- Calcium in MW-50, MW-51, MW-53, JCW-MW-18001, JCW-MW-18004, and JCW-MW-18005;
- Sulfate in MW-50 and JCW-MW-18005;
- Arsenic in MW-53R, MW-55, JCW-MW-18001, and JCW-MW-18006;
- Molybdenum in MW-55;
- Iron in MW-55; and,
- Vanadium in JCW-MW-18001 and JCW-MW-18004.

The purpose of assessment monitoring is to assess whether constituent concentrations in groundwater from prior operations are above a risk-based standard (i.e. GWPS). As detailed in the *Alternate Source Demonstration* (TRC, December 2019), the arsenic and molybdenum concentrations at MW-55 are not the result of a release from the unit; therefore, comparison of these concentrations to the GWPS is not appropriate and assessment monitoring confidence intervals were not calculated.

The software outputs for the assessment monitoring data evaluation are included in Attachment 1 along with data reports showing the values used for the evaluation. The percentage of non-detect observations are also included in Attachment 1. Visual trends were apparent in multiple wells for boron and sulfate. These data sets were tested further in Sanitas™ utilizing Sen's Slope to estimate the average rate of change in concentration over time and utilizing the Mann-Kendall trend test to test for significance of the trend at the 98% confidence level. The trend tests show that the upward trend for boron at MW-54R is statistically significant (Attachment 1). The trend is causing the confidence

[4] The past two years of available data (six events total) were used for constituents that were not previously included in quarterly monitoring for the Weadock Landfill, i.e. calcium, chloride, fluoride, total dissolved solids, beryllium, cadmium, cobalt, mercury, radium, thallium, nickel, and zinc. Use of the most recent two years of data ensure the timeframe for analysis is consistent with other constituents and is representative of current site conditions.

intervals to widen. Calculating a confidence interval around a trending data set incorporates not only variability present naturally in the underlying dataset, but also incorporates variability due to the trend itself. Based on the observed trends, confidence bands were selected as a more appropriate assessment for boron at MW-54R. Confidence bands are selected by the Unified Guidance as the appropriate method for calculating confidence intervals on trending data. A confidence band calculates upper and lower confidence limits at each point along the trend to reduce variability and create a narrower confidence interval.

The Sanitas™ software generates an output that includes graphs of the parametric or non-parametric confidence intervals for each well along with notes on data transformations, as appropriate. The data distributions are as follows:

Distribution	Constituent-Well Combinations
Normal	Boron at JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53R, MW-55, and OW-57R OUT Calcium at JCW-MW-18001, JCW-MW-18004, JCW-MW-18005, and MW-51 Sulfate at MW-50 Arsenic at JCW-MW-18006 and MW-53R
Normalized by square root transformation	Sulfate at JCW-MW-18005
Non-Parametric (not able to be normalized)	Boron at JCW-MW-18001 and MW-53 Calcium at MW-50 and MW-53 Arsenic at JCW-MW-18001 Iron at MW-55
Non-Parametric (over 50% non-detect)	Vanadium at JCW-MW-18001 and JCW-MW-18004

The confidence interval test compares the lower confidence limit to the GWPS. Arsenic concentrations at JCW-MW-18006 were previously considered statistically significant; however arsenic concentrations appear to be decreasing and the lower confidence limit has been below the GWPS since the second quarter 2021. Concentrations trends will continue to be monitored. Exceedances were noted for boron at JCW-MW-18001, JCW-MW-18005, JCW-MW-18006, MW-50, MW-51, MW-52, MW-53, MW-53R, MW-54R, and OW-57R OUT and calcium at MW-51 in first quarter 2021, confirmed in second quarter 2021, and continued in third quarter 2021. The boron and calcium exceedances are the result of the addition of the Appendix III constituents to the assessment monitoring statistical evaluation program in accordance with the HMP. Corrective action has been triggered for the site as a result of data collected during the initial May 2018 assessment monitoring event. Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97 and will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

GSI Statistical Evaluation

Eight monitoring wells located along the surface water features adjacent to the Weadock Landfill are included in the GSI monitoring program to meet the requirements of Part 31:

- MW-50
- MW-51
- MW-52
- MW-53
- MW-53R
- MW-54R
- MW-55
- JCW-MW-18004

The concentrations from each well were first compared directly to the GSI criteria, as shown on Table 2. Constituent-well combinations that included a direct exceedance of the GSI criteria within the past eight monitoring events were retained for further analysis (Attachment 2). Direct comparison GSI criteria exceedances include the following constituent well combinations:

- Arsenic in MW-55;
- Chromium in JCW-MW-18004; and
- Molybdenum in MW-55.

The purpose of the GSI statistical evaluation is to assess compliance with the GSI pathway. Although the *Alternate Source Demonstration* supports that the arsenic and molybdenum concentrations at MW-55 are not the result of a release from the unit, these concentrations still affect compliance with the GSI pathway. Therefore, it is appropriate to calculate confidence limits for arsenic and molybdenum at MW-55 for comparison to the GSI criteria.

The software outputs for the assessment monitoring data evaluation are included in Attachment 2 along with data reports showing the values used for the evaluation. The percentage of non-detect observations are also included in Attachment 2.

Arsenic concentrations in MW-55 appear to exhibit an upward trend on the time series charts (Attachment 2). This data set was tested further in Sanitas™ utilizing Sen's Slope to estimate the average rate of change in concentration over time and utilizing the Mann-Kendall trend test to test for significance of the trend at the 98% confidence level. The trend tests show that the upward trend for arsenic at MW-55 was statistically significant (Attachment 2). The trend is causing the confidence intervals to widen. Calculating a confidence interval around a trending data set incorporates not only variability present naturally in the underlying dataset, but also incorporates variability due to the trend itself. Based on the observed trends, confidence bands were selected as a more appropriate assessment for arsenic at MW-55. Confidence bands are selected by the Unified Guidance as the appropriate method for calculating confidence intervals on trending data. A confidence band calculates upper and lower confidence limits at each point along the trend to reduce variability and create a narrower confidence interval.

The Sanitas™ software generates an output that includes graphs of the parametric or non-parametric confidence intervals for each well along with notes on data transformations, as appropriate. The data distributions are as follows:

Distribution	Constituent-Well Combinations
Normal	Molybdenum at MW-55
Non-Parametric (over 50% non-detect)	Chromium at JCW-MW-18004

The confidence interval test and confidence bands compare the lower confidence limit to the GSI. The statistical evaluation found that arsenic and molybdenum at MW-55 are present at statistically significant levels exceeding the site-specific GSI criteria.

Attachments

Table 1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards – March 2020 to October 2021

Table 2 Comparison of Groundwater Sampling Results to GSI – March 2020 to October 2021

Attachment 1 Assessment Monitoring Sanitas™ Output Files

Attachment 2 GSI Evaluation Sanitas™ Output Files

Tables

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – March 2020 to October 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-50													
		Sample Date:	3/9/2020	3/9/2020	5/19/2020	8/10/2020	8/10/2020	10/13/2020	3/8/2021	3/8/2021	5/10/2021	5/10/2021	8/2/2021	8/2/2021	10/11/2021	10/11/2021
Constituent	Unit	GWPS														
Appendix III[(1)]				Field Dup			Field Dup			Field Dup		Field Dup		Field Dup		Field Dup
Boron	ug/L	**560**	**1,530**	**1,500**	**1,300**	**1,430**	**1,360**	**1,470**	**1,510**	**1,610**	**1,380**	**1,320**	**1,520**	**1,630**	**1,830**	**1,900**
Calcium	mg/L	**280**	--	--	**380**	**382**	**382**	**368**	**386**	**375**	**363**	**370**	267	252	274	261
Chloride	mg/L	2,300	--	--	80.5	78.5	79.9	77.5	86.5	85.6	68.9	69.9	57.0	57.2	51.0	51.7
Fluoride	ug/L	4,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	**878**	**919**	**1,010**	**1,020**	**1,040**	**990**	**1,130**	**1,120**	**856**	**867**	638	634	496	512
Total Dissolved Solids	mg/L	4,700	--	--	1,710	2,270	2,820	1,950	2,360	2,380	1,950	1,970	1,630	1,640	1,440	1,380
pH, Field	SU	6.5 - 8.5	7.4	--	7.4	7.0	--	7.1	6.9	--	6.9	--	7.0	--	7.1	--
Appendix IV[(1)]																
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	1	1	1	2	2	3	1	1	1	1	2	2	3	3
Barium	ug/L	2,000	218	223	163	150	153	147	116	115	108	109	91	97	102	89
Beryllium	ug/L	4.0	--	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	1	< 1	< 1	< 1	< 1	< 1	1	1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	91	86	97	111	115	100	126	128	100	100	79	81	93	68
Mercury	ug/L	2.0	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	8	7	8	7	< 5	< 5	< 5	< 5	< 5	< 5	< 5	6
Radium-226	pCi/L	NA	--	--	0.512	--	--	< 0.537	--	--	< 0.237	< 0.245	--	--	< 0.215	0.243
Radium-228	pCi/L	NA	--	--	< 0.402	--	--	0.613	--	--	0.557	0.607	--	--	1.15	1.22
Radium-226/228	pCi/L	5.0	--	--	0.814	--	--	1.01	--	--	0.650	0.671	--	--	1.21	1.46
Selenium	ug/L	50	2	2	2	< 1	< 1	1	1	1	< 1	1	3	2	4	4
Thallium	ug/L	2.0	--	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]																
Iron	ug/L	**28,000**	1,760	1,730	1,240	2,280	2,230	2,990	2,100	2,190	1,810	1,810	3,000	2,780	2,500	2,710
Copper	ug/L	1,000	3	2	3	3	7	3	4	4	< 1	2	1	< 1	1	< 1
Nickel	ug/L	100	--	--	3	< 2	2	< 2	< 2	< 2	< 2	< 2	11	12	16	11
Silver	ug/L	34	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	--	< 10	< 30	< 30	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – March 2020 to October 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-51									
		Sample Date:	3/9/2020	5/19/2020	5/19/2020	8/10/2020	10/14/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021
Constituent	Unit	GWPS										
Appendix III[(1)]					Field Dup			Field Dup				
Boron	ug/L	**560**	**967**	**944**	**967**	**758**	**739**	**798**	**1,040**	**1,040**	**960**	**1,140**
Calcium	mg/L	**280**	--	**331**	**322**	**341**	**330**	**337**	**293**	**303**	276	**316**
Chloride	mg/L	2,300	--	93.8	94.2	95.2	74.2	75.4	91.2	93.6	99.8	97.1
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	424	487	474	556	522	537	452	450	434	418
Total Dissolved Solids	mg/L	4,700	--	1,970	1,690	1,710	1,550	1,530	1,530	1,500	1,530	1,500
pH, Field	SU	6.5 - 8.5	7.4	7.4	--	6.8	6.8	--	7.0	7.0	6.9	6.9
Appendix IV[(1)]												
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	14	12	12	12	17	17	11	11	14	20
Barium	ug/L	2,000	158	150	153	153	147	150	143	148	148	197
Beryllium	ug/L	4.0	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	50	55	57	57	51	55	62	57	47	64
Mercury	ug/L	2.0		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	0.461	0.299	--	1.35	< 0.352	--	< 0.268	--	0.451
Radium-228	pCi/L	NA	--	0.719	0.745	--	< 0.588	0.776	--	0.626	--	2.01
Radium-226/228	pCi/L	5.0	--	1.18	1.04	--	1.43	1.11	--	0.851	--	2.46
Selenium	ug/L	50	1	1	< 1	< 1	< 1	< 1	1	< 1	1	3
Thallium	ug/L	2.0	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]												
Iron	ug/L	**28,000**	2,050	2,830	2,750	4,390	5,400	5,600	1,940	2,200	5,080	5,130
Copper	ug/L	1,000	1	2	2	2	2	2	2	< 1	< 1	1
Nickel	ug/L	100	--	2	< 2	2	< 2	< 2	< 2	< 2	11	18
Silver	ug/L	34	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	< 10	< 30	< 10	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – March 2020 to October 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-52							
		Sample Date:	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,150**	**1,160**	**1,200**	**1,110**	**1,120**	**1,160**	**1,140**	**1,280**
Calcium	mg/L	**280**	--	226	238	256	211	244	196	237
Chloride	mg/L	2,300	--	15.1	72.0	73.3	51.8	53.9	56.5	59.4
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	1,140	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	412	< 1	586	572	531	574	501	110
Total Dissolved Solids	mg/L	4,700	--	1,800	1,500	1,540	1,390	1,500	1,340	1,360
pH, Field	SU	6.5 - 8.5	7.3	7.5	6.9	7.0	7.0	6.9	6.9	6.9
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1
Barium	ug/L	2,000	120	144	144	139	123	132	115	152
Beryllium	ug/L	4.0	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	1,140	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	28	32	38	33	31	29	21	31
Mercury	ug/L	2.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	< 0.241	--	0.744	--	< 0.237	--	< 0.274
Radium-228	pCi/L	NA	--	0.626	--	0.636	--	< 0.407	--	0.778
Radium-226/228	pCi/L	5.0	--	0.740	--	1.38	--	< 0.407	--	1.03
Selenium	ug/L	50	< 1	< 1	< 1	1	1	1	1	3
Thallium	ug/L	2.0	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	782	1,140	2,720	4,770	879	1,400	3,830	4,880
Copper	ug/L	1,000	1	2	2	2	2	< 1	< 1	1
Nickel	ug/L	100	--	< 2	< 2	< 2	< 2	< 2	9	14
Silver	ug/L	34	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	< 30	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – March 2020 to October 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-53							
		Sample Date:	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**2,530**	**1,750**	**2,760**	**2,720**	**3,920**	**3,790**	**3,820**	**3,820**
Calcium	mg/L	**280**	--	**308**	211	192	187	187	162	166
Chloride	mg/L	2,300	--	118	50.5	38.6	52.9	51.8	49.9	55.5
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	1,020	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	278	549	321	269	317	322	279	111
Total Dissolved Solids	mg/L	4,700	--	1,660	1,200	1,030	1,110	1,050	1,020	896
pH, Field	SU	6.5 - 8.5	7.4	7.3	7.0	7.2	7.1	7.1	7.1	7.1
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	< 1	2	2	2	< 1	< 1	2	2
Barium	ug/L	2,000	129	144	130	131	202	214	200	212
Beryllium	ug/L	4.0	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	6	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	1,020	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	47	58	53	49	52	46	38	53
Mercury	ug/L	2.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	0.386	--	< 0.531	--	< 0.239	--	0.399
Radium-228	pCi/L	NA	--	< 0.385	--	0.503	--	0.455	--	0.979
Radium-226/228	pCi/L	5.0	--	0.725	--	0.823	--	0.684	--	1.38
Selenium	ug/L	50	1	2	< 1	< 1	< 1	2	3	< 1
Thallium	ug/L	2.0	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	1,200	2,070	1,510	1,560	1,180	1,420	2,380	1,760
Copper	ug/L	1,000	2	4	1	2	2	< 1	< 1	< 1
Nickel	ug/L	100	--	3	< 2	< 2	< 2	< 2	6	10
Silver	ug/L	34	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	< 30	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – March 2020 to October 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-53R									
		Sample Date:	10/10/2019[3]	10/10/2019[3]	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021
Constituent	Unit	GWPS										
Appendix III[1]												
Boron	ug/L	**560**	**1,800**	**1,680**	**1,590**	**1,460**	**1,540**	**1,780**	**1,510**	**1,580**	**1,710**	**2,060**
Calcium	mg/L	**280**	250	--	--	228	239	246	234	227	203	232
Chloride	mg/L	2,300	46	--	--	30.7	45.0	31.8	32.5	31.1	34.5	36.6
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	240	295	163	177	275	196	227	170	189	166
Total Dissolved Solids	mg/L	4,700	1,100	--	--	1,470	1,220	1,100	1,140	1,040	1,040	1,060
pH, Field	SU	6.5 - 8.5	6.8	6.8	7.2	7.4	6.8	7.0	6.8	6.8	6.8	6.8
Appendix IV[1]												
Antimony	ug/L	6.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**32**	**32**	19	**27**	**31**	**40**	19	18	**23**	**25**
Barium	ug/L	2,000	240	237	239	252	208	242	202	208	204	189
Beryllium	ug/L	4.0	< 1.0	--	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	1.7	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6.0	--	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	--	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	61	69	53	60	71	66	64	59	56	57
Mercury	ug/L	2.0	< 0.20	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	0.552	--	--	0.356	--	--	--	0.306	--	0.344
Radium-228	pCi/L	NA	< 0.700	--	--	0.846	--	--	--	0.822	--	1.05
Radium-226/228	pCi/L	5.0	1.02	--	--	1.20	--	--	--	1.13	--	1.40
Selenium	ug/L	50	< 1.0	< 1	< 1	< 1	< 1	1	< 1	< 1	2	3
Thallium	ug/L	2.0	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]												
Iron	ug/L	**28,000**	2,600	2,050	881	1,910	2,020	2,140	971	2,220	2,800	2,170
Copper	ug/L	1,000	< 1.0	3	1	1	3	1	2	1	1	< 1
Nickel	ug/L	100	< 2.0	--	--	< 2	< 2	< 2	< 2	< 2	10	2
Silver	ug/L	34	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	< 10	--	--	< 10	< 30	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – March 2020 to October 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-54R							
		Sample Date:	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/11/2021
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,280**	**1,730**	**1,660**	**1,660**	**2,470**	**3,140**	**3,530**	**4,270**
Calcium	mg/L	**280**	--	181	168	174	178	196	163	187
Chloride	mg/L	2,300	--	20.4	18.5	23.9	28.0	32.7	35.5	34.7
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	1,800	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	86.2	95.7	96.2	100	79.9	72.7	77.0	75.7
Total Dissolved Solids	mg/L	4,700	--	755	743	743	763	762	786	772
pH, Field	SU	6.5 - 8.5	7.3	7.4	6.9	7.1	6.9	6.6	6.8	6.9
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	3	2	3	3	1	1	2	4
Barium	ug/L	2,000	87	95	104	103	118	122	124	129
Beryllium	ug/L	4.0	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	1,800	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	47	58	61	57	66	64	60	59
Mercury	ug/L	2.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	5	5	< 5	< 5	< 5	7
Radium-226	pCi/L	NA	--	< 0.192	--	< 0.334	--	< 0.255	--	< 0.231
Radium-228	pCi/L	NA	--	0.499	--	< 0.504	--	0.782	--	0.759
Radium-226/228	pCi/L	5.0	--	0.546	--	0.546	--	0.900	--	0.965
Selenium	ug/L	50	< 1	< 1	< 1	< 1	< 1	< 1	1	2
Thallium	ug/L	2.0	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	1,030	1,530	1,170	1,030	115	782	1,190	2,280
Copper	ug/L	1,000	< 1	1	< 1	1	1	2	1	< 1
Nickel	ug/L	100	--	4	6	4	< 2	3	9	< 2
Silver	ug/L	34	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	< 30	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – March 2020 to October 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-55							
		Sample Date:	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	481	441	**592**	**705**	**593**	**866**	**873**	**788**
Calcium	mg/L	**280**	--	188	178	170	151	147	126	198
Chloride	mg/L	2,300	--	14.6	16.7	18.0	16.7	19.5	19.3	16.5
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	1,220	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	218	210	104	84.0	48.0	18.5	34.3	80.7
Total Dissolved Solids	mg/L	4,700	--	1,010	844	826	794	729	743	844
pH, Field	SU	6.5 - 8.5	7.5	7.6	7.1	7.2	7.1	7.1	7.1	7.0
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**65**	**85**	**107**	**123**	**152**	**169**	**204**	**198**
Barium	ug/L	2,000	215	223	250	223	366	323	347	330
Beryllium	ug/L	4.0	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	0.4	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	1,220	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	21	27	33	33	28	24	25	34
Mercury	ug/L	2.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	**181**	**214**	**207**	**179**	**166**	**131**	**157**	**206**
Radium-226	pCi/L	NA	--	0.448	--	< 0.447	--	0.525	--	0.467
Radium-228	pCi/L	NA	--	< 0.460	--	0.566	--	0.896	--	1.10
Radium-226/228	pCi/L	5.0	--	0.858	--	0.798	--	1.42	--	1.56
Selenium	ug/L	50	1	< 1	2	1	< 1	1	1	2
Thallium	ug/L	2.0	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	18,000	22,000	21,300	21,800	23,500	21,500	**39,400**	**40,500**
Copper	ug/L	1,000	1	1	< 1	< 1	< 1	< 1	< 1	< 1
Nickel	ug/L	100	--	< 2	< 2	< 2	< 2	< 2	6	8
Silver	ug/L	34	< 0.2	< 0.3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	< 30	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – March 2020 to October 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	OW-57R OUT							
		Sample Date:	3/10/2020	5/20/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,720**	**1,600**	**1,510**	**1,730**	**1,660**	**1,710**	**1,730**	**1,880**
Calcium	mg/L	**280**	--	130	132	144	128	133	118	140
Chloride	mg/L	2,300	--	64.9	53.9	49.4	59.0	62.9	53.1	46.9
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	1,830	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	87.2	89.4	96.8	109	86.0	78.3	93.9	93.1
Total Dissolved Solids	mg/L	4,700	--	834	658	782	761	743	725	737
pH, Field	SU	6.5 - 8.5	7.4	7.5	7.0	7.1	7.2	7.0	7.0	7.0
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	1	< 1	< 1	< 1	< 1	< 1	1	< 1
Barium	ug/L	2,000	74	72	77	73	70	73	72	75
Beryllium	ug/L	4.0	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	2	2	1	1	1	1	1	< 1
Cobalt	ug/L	15	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	1,830	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	22	24	27	24	26	24	20	21
Mercury	ug/L	2.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	7	7	7	8	7	6	7	9
Radium-226	pCi/L	NA	--	< 0.305	--	< 0.324	--	< 0.286	--	< 0.227
Radium-228	pCi/L	NA	--	0.468	--	< 0.463	--	0.606	--	1.12
Radium-226/228	pCi/L	5.0	--	0.688	--	0.499	--	0.615	--	1.26
Selenium	ug/L	50	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2
Thallium	ug/L	2.0	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	294	135	42	92	46	100	56	68
Copper	ug/L	1,000	2	2	2	2	2	1	2	1
Nickel	ug/L	100	--	16	16	14	15	16	21	12
Silver	ug/L	34	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	< 30	16	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – March 2020 to October 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18001							
		Sample Date:	3/9/2020	5/18/2020	8/10/2020	10/13/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,420**	**1,360**	**1,310**	**1,370**	**1,350**	**1,340**	**1,610**	**1,670**
Calcium	mg/L	**280**	--	232	237	**282**	270	**305**	**348**	**373**
Chloride	mg/L	2,300	--	71.5	70.8	73.8	72.1	77.3	76.4	68.3
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	248	352	357	435	549	580	700	777
Total Dissolved Solids	mg/L	4,700	--	1330	1,370	1,370	1,610	1,670	1,880	2,000
pH, Field	SU	6.5 - 8.5	7.4	7.4	6.9	7.1	6.9	6.9	6.9	6.8
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	3	3	3	3	2	2	**38**	1
Barium	ug/L	2,000	257	252	261	273	213	166	199	184
Beryllium	ug/L	4.0	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	8	< 1
Cobalt	ug/L	15	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	2	< 1
Lithium	ug/L	180	56	60	69	66	69	68	71	103
Mercury	ug/L	2.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5	< 5	< 5	< 5	9	< 5
Radium-226	pCi/L	NA	--	0.372	--	< 0.423	--	< 0.378	--	0.337
Radium-228	pCi/L	NA	--	0.385	--	0.616	--	< 0.558	--	1.05
Radium-226/228	pCi/L	5.0	--	0.757	--	1.03	--	< 0.558	--	1.39
Selenium	ug/L	50	1	< 1	< 1	< 1	< 1	< 1	2	3
Thallium	ug/L	2.0	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	201	277	202	182	183	154	13,600	91
Copper	ug/L	1,000	1	1	1	1	2	3	6	2
Nickel	ug/L	100	--	< 2	< 2	2	8	2	16	20
Silver	ug/L	34	< 0.2	< 0.3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2	< 2	< 2	2	**12**	< 2
Zinc	ug/L	2,400	--	< 10	< 30	< 10	< 10	< 10	12	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – March 2020 to October 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18004							
		Sample Date:	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/12/2021
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	274	265	347	410	232	246	304	389
Calcium	mg/L	**280**	--	**308**	**306**	**323**	252	266	203	264
Chloride	mg/L	2,300	--	10.9	25.6	22.6	17.9	12.4	6.65	7.45
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	714	361	718	756	581	523	393	493
Total Dissolved Solids	mg/L	4,700	--	1,720	1,820	1,690	1,390	1,270	1,180	1,240
pH, Field	SU	6.5 - 8.5	7.2	7.3	6.7	6.9	6.9	6.8	6.8	6.8
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	3	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	47	28	36	34	20	27	36	41
Beryllium	ug/L	4.0	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	49	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	29	31	39	37	35	36	47	63
Mercury	ug/L	2.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	< 0.256	--	< 0.424	--	< 0.271	--	0.182
Radium-228	pCi/L	NA	--	< 0.368	--	1.04	--	< 0.425	--	0.796
Radium-226/228	pCi/L	5.0	--	< 0.368	--	0.922	--	< 0.425	--	0.978
Selenium	ug/L	50	1	1	< 1	< 1	7	1	4	3
Thallium	ug/L	2.0	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	4,430	29	< 20	< 20	21	24	< 20	39
Copper	ug/L	1,000	5	3	2	3	3	2	1	2
Nickel	ug/L	100	--	< 2	< 2	4	< 2	2	9	16
Silver	ug/L	34	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	**10**	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	< 30	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – March 2020 to October 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18005							
		Sample Date:	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,230**	**1,150**	**1,100**	**1,090**	**987**	**919**	**1,080**	**1,190**
Calcium	mg/L	**280**	--	**419**	259	195	**286**	202	149	193
Chloride	mg/L	2,300	--	23.2	63.9	66.5	43.7	56.0	64.9	63.6
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	1,640	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	**781**	**817**	398	185	535	263	190	227
Total Dissolved Solids	mg/L	4,700	--	1,950	1,310	986	1,420	1,020	895	1,020
pH, Field	SU	6.5 - 8.5	7.1	7.2	6.9	7.0	6.8	6.9	7.0	6.9
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	7	12	8	8	7	9	9	9
Barium	ug/L	2,000	140	141	87	98	135	93	98	124
Beryllium	ug/L	4.0	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	1,640	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	2	< 1
Lithium	ug/L	180	47	53	45	33	39	30	28	39
Mercury	ug/L	2.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	0.381	--	1.07	--	< 0.224	--	< 0.262
Radium-228	pCi/L	NA	--	0.457	--	0.540	--	0.524	--	0.984
Radium-226/228	pCi/L	5.0	--	0.838	--	1.61	--	0.728	--	1.16
Selenium	ug/L	50	1	1	< 1	< 1	< 1	1	2	4
Thallium	ug/L	2.0	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	6,730	9,310	4,900	3,550	4,800	4,590	5,350	5,840
Copper	ug/L	1,000	2	3	2	1	2	1	12	1
Nickel	ug/L	100	--	4	9	11	8	10	29	22
Silver	ug/L	34	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	--	< 10	< 30	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – March 2020 to October 2021
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18006							
		Sample Date:	3/11/2020	5/20/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**3,110**	**3,030**	**2,040**	**2,610**	**2,650**	**2,720**	**2,640**	**2,600**
Calcium	mg/L	**280**	--	179	148	167	148	147	135	152
Chloride	mg/L	2,300	--	71.2	76.1	72.2	66.1	72.6	73.6	77.0
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	86.2	94.5	31.2	50.1	57.3	47.0	29.7	34.7
Total Dissolved Solids	mg/L	4,700	--	988	820	861	823	784	769	802
pH, Field	SU	6.5 - 8.5	7.2	7.4	7.0	7.1	6.9	6.9	6.9	7.0
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**41**	**33**	12	**22**	**30**	**30**	**25**	21
Barium	ug/L	2,000	488	500	361	489	477	472	492	351
Beryllium	ug/L	4.0	--	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5.0	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	--	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	--	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	65	70	41	59	58	53	46	47
Mercury	ug/L	2.0		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	0.649	--	0.716	--	0.418	--	0.268
Radium-228	pCi/L	NA	--	0.346	--	0.853	--	< 0.483	--	0.872
Radium-226/228	pCi/L	5.0	--	0.995	--	1.57	--	0.888	--	1.14
Selenium	ug/L	50	1	< 1	< 1	< 1	< 1	1	2	4
Thallium	ug/L	2.0	--	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	7,060	7,280	3,360	5,760	5,730	5,490	7,790	6,200
Copper	ug/L	1,000	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1
Nickel	ug/L	100	--	4	2	< 2	3	3	6	10
Silver	ug/L	34	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	4	3	< 2	3	3	3	4	2
Zinc	ug/L	2,400	--	< 10	< 30	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
pCi/L - picocuries per liter.
-- - not analyzed.
GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL, applicable Michigan Part 201 criteria, and UTL as established in TRC's Technical Memorandum dated April 23, 2021.
Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules and the HMP.
All metals were analyzed as total unless otherwise specified.
(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.

Table 2
Comparison of Groundwater Sampling Results to GSI – March 2020 to October 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-50													
					Sample Date:	3/9/2020	3/9/2020	5/19/2020	8/10/2020	8/10/2020	10/13/2020	3/8/2021	3/8/2021	5/10/2021	5/10/2021	8/2/2021	8/2/2021	10/11/2021	10/11/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**														
Appendix III(1)							Field Dup			Field Dup			Field Dup		Field Dup		Field Dup		Field Dup
Boron	ug/L	4,000	44,000	69,000	44,000	1,530	1,500	1,300	1,430	1,360	1,470	1,510	1,610	1,380	1,320	1,520	1,630	1,830	1,900
Sulfate	mg/L	1,200[F]	NC	NC	1,200	878	919	1,010	1,020	1,040	990	1,130	1,120	856	867	638	634	496	512
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.4	--	7.4	7.0	--	7.1	6.9	--	6.9	--	7.0	--	7.1	--
Appendix IV(1)																			
Arsenic	ug/L	10	100	680	**100**	1	1	1	2	2	3	1	1	1	1	2	2	3	3
Chromium	ug/L	11[H]	NC	NC	**11**	1	< 1	< 1	< 1	< 1	< 1	1	1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	91	86	97	111	115	100	126	128	100	100	79	81	93	68
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	8	7	8	7	< 5	< 5	< 5	< 5	< 5	< 5	< 5	6
Selenium	ug/L	50	55	120	55	2	2	2	< 1	< 1	1	1	1	< 1	1	3	2	4	4
MI Part 115 Parameters(2)																			
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,760	1,730	1,240	2,280	2,230	2,990	2,100	2,190	1,810	1,810	3,000	2,780	2,500	2,710
Vanadium	ug/L	27	NC	NC	27	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.

Table 2
Comparison of Groundwater Sampling Results to GSI – March 2020 to October 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-51									
					Sample Date:	3/9/2020	5/19/2020	5/19/2020	8/10/2020	10/14/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**										
Appendix III(1)								Field Dup			Field Dup				
Boron	ug/L	4,000	44,000	69,000	44,000	967	944	967	758	739	798	1,040	1,040	960	1,140
Sulfate	mg/L	1,200[F]	NC	NC	1,200	424	487	474	556	522	537	452	450	434	418
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.4	7.4	--	6.8	6.8	--	7.0	7.0	6.9	6.9
Appendix IV(1)															
Arsenic	ug/L	10	100	680	**100**	14	12	12	12	17	17	11	11	14	20
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	50	55	57	57	51	55	62	57	47	64
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	1	1	< 1	< 1	< 1	< 1	1	< 1	1	3
MI Part 115 Parameters(2)															
Iron	ug/L	500,000[EE]	NC	NC	500,000	2,050	2,830	2,750	4,390	5,400	5,600	1,940	2,200	5,080	5,130
Vanadium	ug/L	27	NC	NC	27	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.

Table 2
Comparison of Groundwater Sampling Results to GSI – March 2020 to October 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-52							
					Sample Date:	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**								
Appendix III(1)													
Boron	ug/L	4,000	44,000	69,000	44,000	1,150	1,160	1,200	1,110	1,120	1,160	1,140	1,280
Sulfate	mg/L	1,200[F]	NC	NC	1,200	412	< 1	586	572	531	574	501	110
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.3	7.5	6.9	7.0	7.0	6.9	6.9	6.9
Appendix IV(1)													
Arsenic	ug/L	10	100	680	**100**	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	28	32	38	33	31	29	21	31
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	< 1	< 1	< 1	1	1	1	1	3
MI Part 115 Parameters(2)													
Iron	ug/L	500,000[EE]	NC	NC	500,000	782	1,140	2,720	4,770	879	1,400	3,830	4,880
Vanadium	ug/L	27	NC	NC	27	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.

Table 2
Comparison of Groundwater Sampling Results to GSI – March 2020 to October 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-53							
					Sample Date:	3/10/2020	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**								
Appendix III(1)													
Boron	ug/L	4,000	44,000	69,000	44,000	2,530	1,750	2,760	2,720	3,920	3,790	3,820	3,820
Sulfate	mg/L	1,200[F]	NC	NC	1,200	278	549	321	269	317	322	279	111
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.4	7.3	7.0	7.2	7.1	7.1	7.1	7.1
Appendix IV(1)													
Arsenic	ug/L	10	100	680	**100**	< 1	2	2	2	< 1	< 1	2	2
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	6	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	47	58	53	49	52	46	38	53
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	1	2	< 1	< 1	< 1	2	3	< 1
MI Part 115 Parameters(2)													
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,200	2,070	1,510	1,560	1,180	1,420	2,380	1,760
Vanadium	ug/L	27	NC	NC	27	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.

Table 2
Comparison of Groundwater Sampling Results to GSI – March 2020 to October 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-53R							
					Sample Date:	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**								
Appendix III(1)													
Boron	ug/L	4,000	44,000	69,000	44,000	1,590	1,460	1,540	1,780	1,510	1,580	1,710	2,060
Sulfate	mg/L	1,200[F]	NC	NC	1,200	163	177	275	196	227	170	189	166
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.2	7.4	6.8	7.0	6.8	6.8	6.8	6.8
Appendix IV(1)													
Arsenic	ug/L	10	100	680	**100**	19	27	31	40	19	18	23	25
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	53	60	71	66	64	59	56	57
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	< 1	< 1	< 1	1	< 1	< 1	2	3
MI Part 115 Parameters(2)													
Iron	ug/L	500,000[EE]	NC	NC	500,000	881	1,910	2,020	2,140	971	2,220	2,800	2,170
Vanadium	ug/L	27	NC	NC	27	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.

Table 2
Comparison of Groundwater Sampling Results to GSI – March 2020 to October 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-54R							
					Sample Date:	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/11/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**								
Appendix III(1)													
Boron	ug/L	4,000	44,000	69,000	44,000	1,280	1,730	1,660	1,660	2,470	3,140	3,530	4,270
Sulfate	mg/L	1,200[F]	NC	NC	1,200	86.2	95.7	96.2	100	79.9	72.7	77	75.7
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.3	7.4	6.9	7.1	6.9	6.6	6.8	6.9
Appendix IV(1)													
Arsenic	ug/L	10	100	680	**100**	3	2	3	3	1	1	2	4
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	47	58	61	57	66	64	60	59
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	5	5	< 5	< 5	< 5	7
Selenium	ug/L	50	55	120	55	< 1	< 1	< 1	< 1	< 1	< 1	1	2
MI Part 115 Parameters(2)													
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,030	1,530	1,170	1,030	115	782	1,190	2,280
Vanadium	ug/L	27	NC	NC	27	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:
ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.

Table 2
Comparison of Groundwater Sampling Results to GSI – March 2020 to October 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-55							
					Sample Date:	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**								
Appendix III(1)													
Boron	ug/L	4,000	44,000	69,000	44,000	481	441	592	705	593	866	873	788
Sulfate	mg/L	1,200[F]	NC	NC	1,200	218	210	104	84.0	48.0	18.5	34.3	80.7
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.5	7.6	7.1	7.2	7.1	7.1	7.1	7.0
Appendix IV(1)													
Arsenic	ug/L	10	100	680	**100**	65	85	**107**	**123**	**152**	**169**	**204**	**198**
Chromium	ug/L	11[H]	NC	NC	**11**	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	21	27	33	33	28	24	25	34
Molybdenum	ug/L	120	NC	NC	**120**	**181**	**214**	**207**	**179**	**166**	**131**	**157**	**206**
Selenium	ug/L	50	55	120	55	1	< 1	2	1	< 1	1	1	2
MI Part 115 Parameters(2)													
Iron	ug/L	500,000[EE]	NC	NC	500,000	18,000	22,000	21,300	21,800	23,500	21,500	39,400	40,500
Vanadium	ug/L	27	NC	NC	27	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.

Table 2
Comparison of Groundwater Sampling Results to GSI – March 2020 to October 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	JCW-MW-18004							
					Sample Date:	3/10/2020	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/12/2021
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**								
Appendix III[(1)]													
Boron	ug/L	4,000	44,000	69,000	44,000	274	265	347	410	232	246	304	389
Sulfate	mg/L	1,200[F]	NC	NC	1,200	714	361	718	756	581	523	393	493
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.2	7.3	6.7	6.9	6.9	6.8	6.8	6.8
Appendix IV[(1)]													
Arsenic	ug/L	10	100	680	**100**	3	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Chromium	ug/L	11[H]	NC	NC	**11**	**49**	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	29	31	39	37	35	36	47	63
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	1	1	< 1	< 1	7	1	4	3
MI Part 115 Parameters[(2)]													
Iron	ug/L	500,000[EE]	NC	NC	500,000	4,430	29	< 20	< 20	21	24	< 20	39
Vanadium	ug/L	27	NC	NC	27	10	< 2	< 2	< 2	< 2	< 2	< 2	< 2

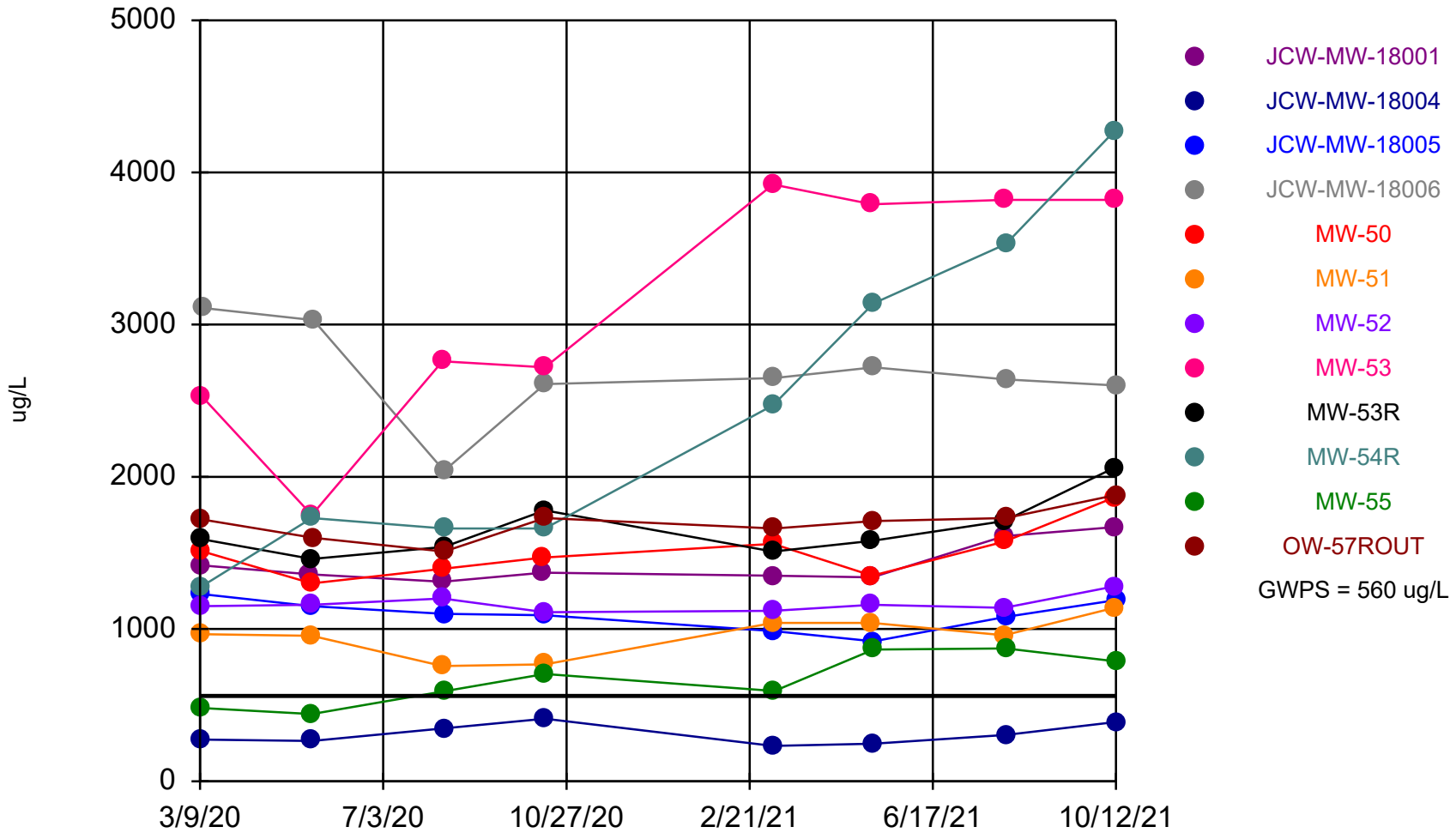
Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
NA - not applicable.
NC - no criteria.
-- - not analyzed.
^ - 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. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}.
* Mixing Zone GSI Criteria from Michigan Department of Environmental Quality (MDEQ) approval letter dated December 23, 2015.
** GSI criteria is the generic GSI criteria or the Chronic-Based Mixing Zone criteria, if applicable.
[F] - Criterion is the Final Acute Value (FAV) .
[H] - Chromium GSI criterion based on hexavalent chromium per footnote {H}.
[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.
Bold value indicates an exceedance of the GSI. Data from downgradient monitoring wells are screened against the GSI for evaluation purposes only. Confidence intervals will be used to determine compliance per the HMP.
All metals were analyzed as total unless otherwise specified.
(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 11519b(2) addtional assessment monitoring constituents (vanadium and zinc) are reported.

Attachment 1
Assessment Monitoring Sanitas™ Output Files

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. EPA

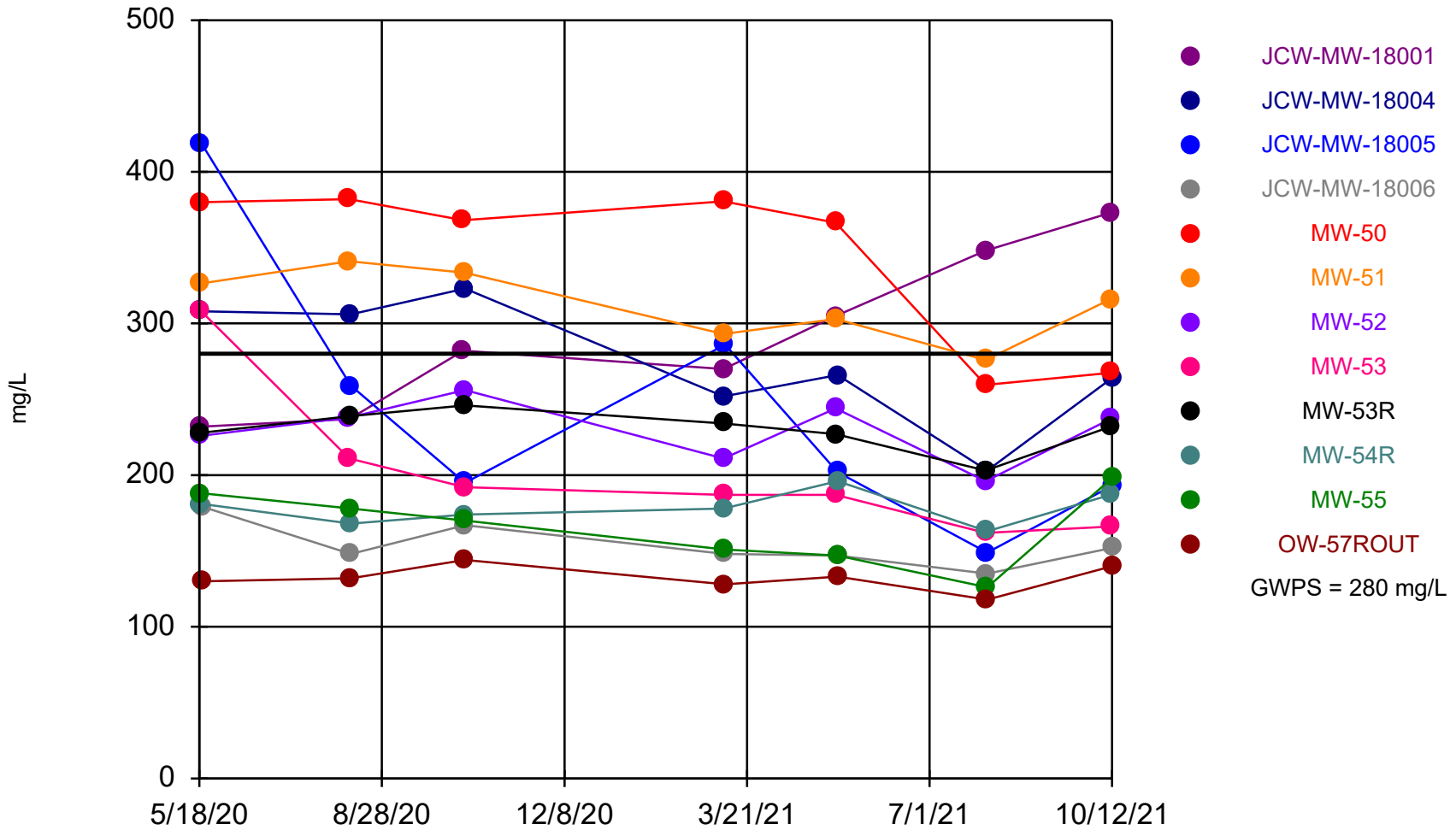
Boron Comparison to GWPS



Time Series Analysis Run 11/29/2021 3:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Calcium Comparison to GWPS

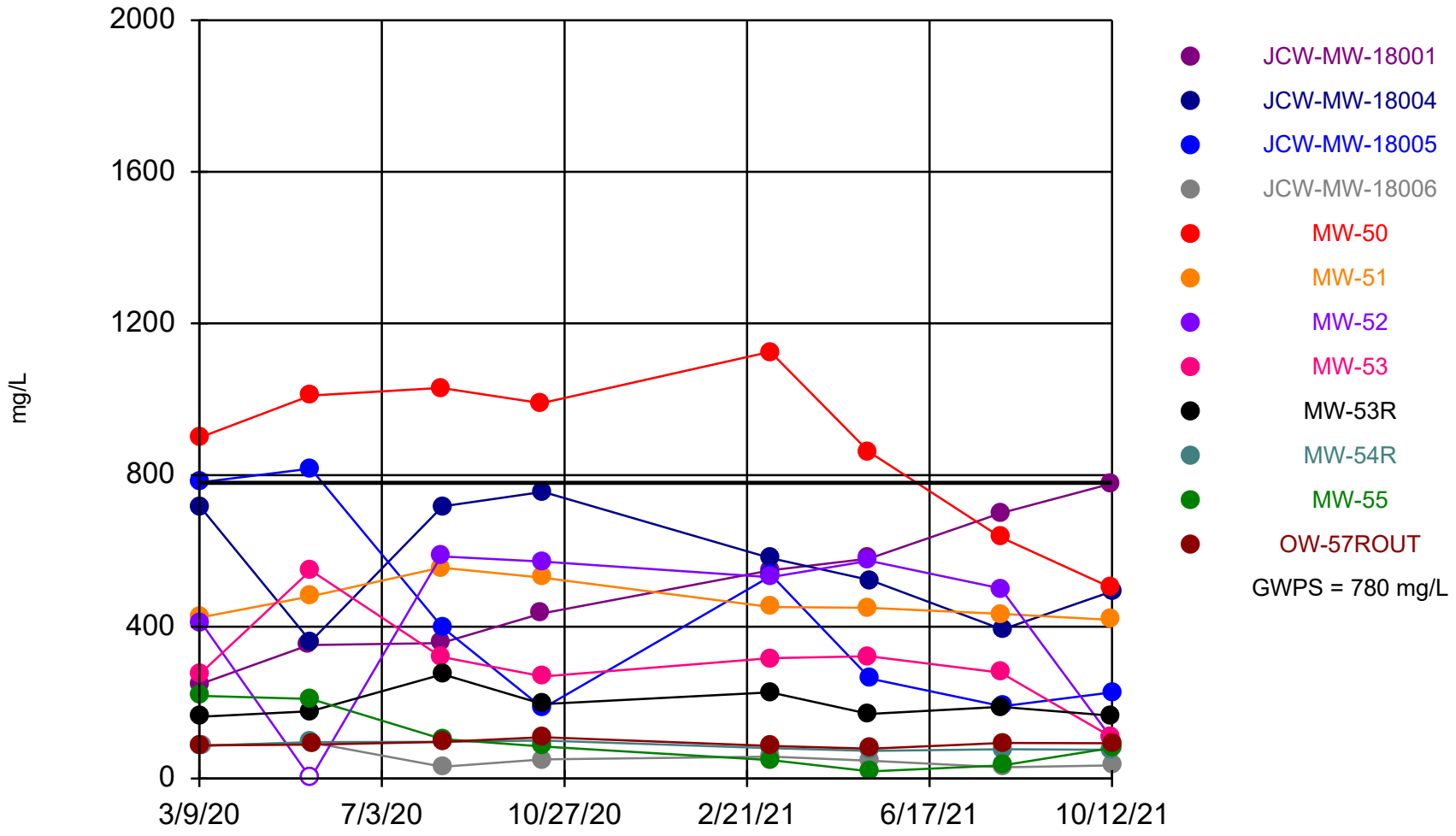


Time Series Analysis Run 11/29/2021 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Sulfate Comparison to GWPS

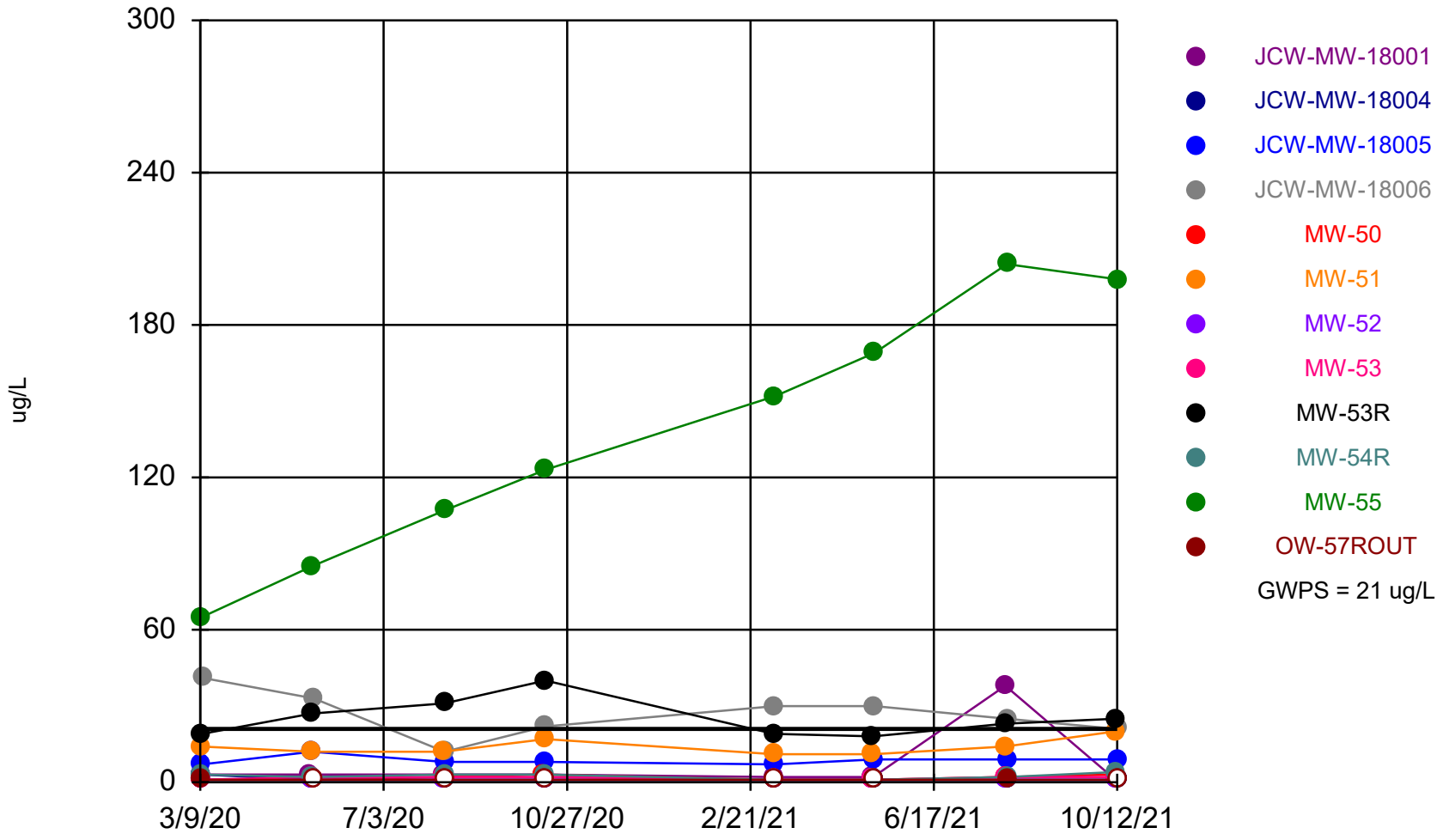


Time Series Analysis Run 11/29/2021 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Arsenic Comparison to GWPS



Time Series Analysis Run 11/29/2021 3:11 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

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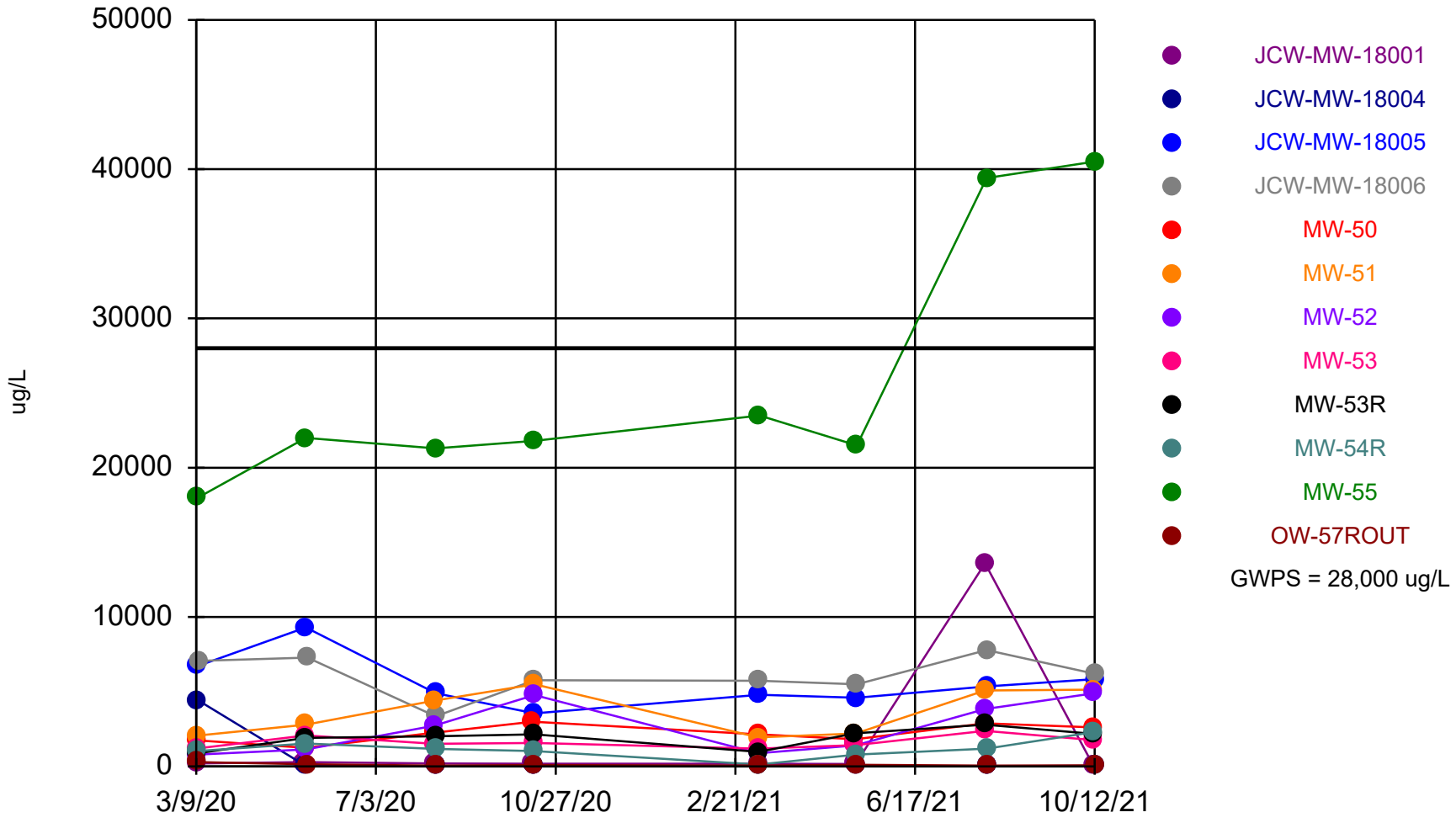
Hollow symbols indicate censored values.

Iron Comparison to GWPS

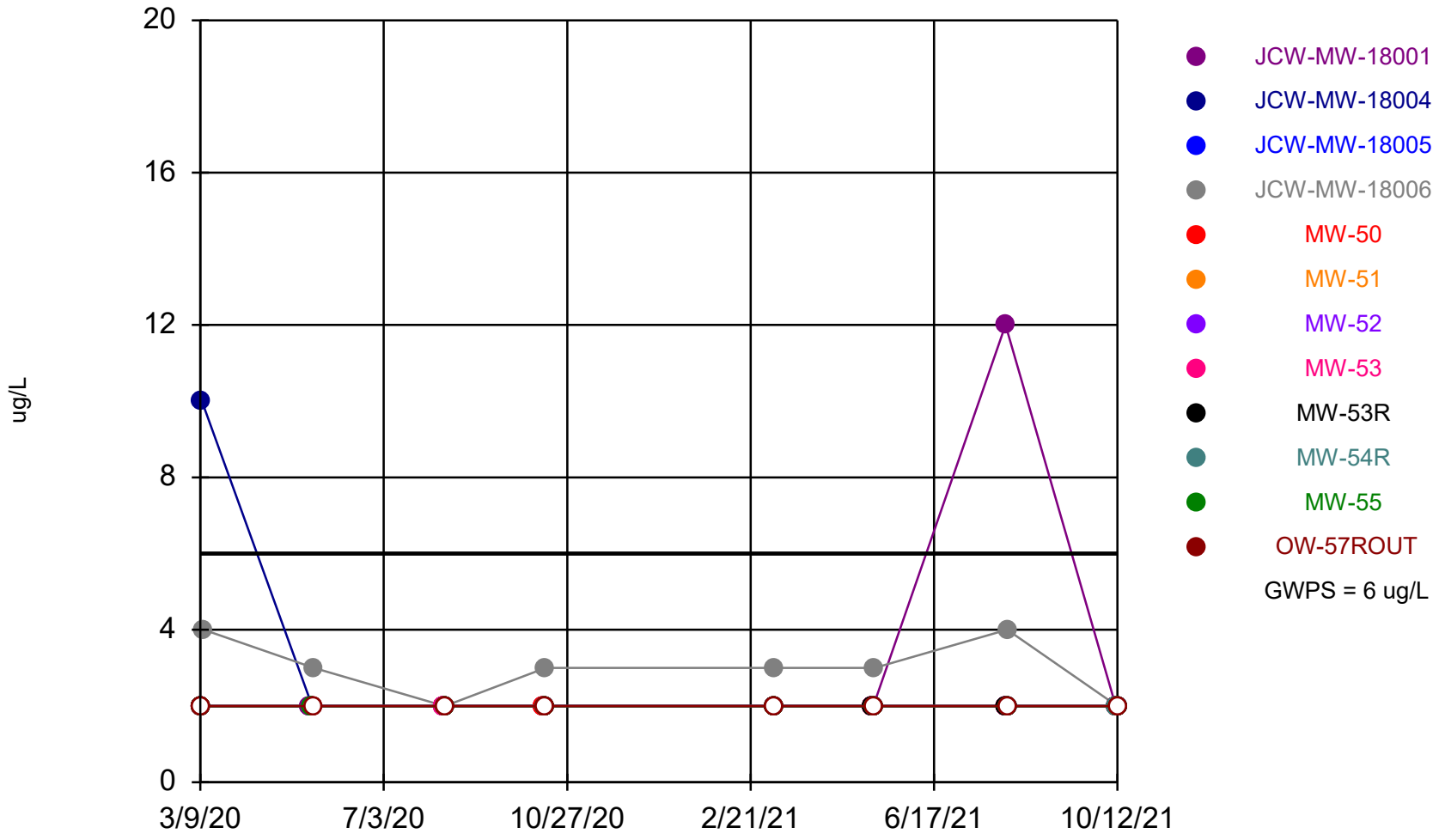


Time Series Analysis Run 11/29/2021 3:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Vanadium Comparison to GWPS



Time Series Analysis Run 11/29/2021 3:14 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Summary Report

Constituent: Boron, Total Analysis Run 11/29/2021 3:15 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

For observations made between 3/9/2020 and 10/12/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 0
Wells = 12
Minimum Value = 232
Maximum Value = 4270
Mean Value = 1562
Median Value = 1383
Standard Deviation = 895.7
Coefficient of Variation = 0.5733
Skewness = 1.05

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	1310	1670	1429	1365	135	0.09446	1.032
JCW-MW-18004	8	0	232	410	308.4	289	66.68	0.2162	0.4228
JCW-MW-18005	8	0	919	1230	1093	1095	102.2	0.09352	-0.4068
JCW-MW-18006	8	0	2040	3110	2675	2645	323.4	0.1209	-0.5853
MW-50	8	0	1300	1865	1504	1493	176.1	0.1171	0.9589
MW-51	8	0	758	1140	953.6	963.5	132.2	0.1387	-0.4005
MW-52	8	0	1110	1280	1165	1155	53.98	0.04634	1.249
MW-53	8	0	1750	3920	3139	3275	808.9	0.2577	-0.475
MW-53R	8	0	1460	2060	1654	1585	194.5	0.1176	1.18
MW-54R	8	0	1280	4270	2468	2100	1075	0.4356	0.5203
MW-55	8	0	441	873	667.4	649	166.9	0.25	-0.01892
OW-57ROUT	8	0	1510	1880	1693	1715	108.2	0.06393	-0.02179

Summary Report

Constituent: Calcium, Total Analysis Run 11/29/2021 3:15 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

For observations made between 5/18/2020 and 10/12/2021, a summary of the selected data set:

Observations = 84
ND/Trace = 0
Wells = 12
Minimum Value = 118
Maximum Value = 419
Mean Value = 229.8
Median Value = 218.5
Standard Deviation = 74.73
Coefficient of Variation = 0.3252
Skewness = 0.5727

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	7	0	232	373	292.4	282	53.34	0.1824	0.3478
JCW-MW-18004	7	0	203	323	274.6	266	41.37	0.1507	-0.5034
JCW-MW-18005	7	0	149	419	243.3	202	89.82	0.3692	1.083
JCW-MW-18006	7	0	135	179	153.7	148	14.6	0.095	0.6519
MW-50	7	0	259.5	382	343.4	368	54.99	0.1601	-0.9142
MW-51	7	0	276	341	312.7	316	23.32	0.07458	-0.3377
MW-52	7	0	196	256	229.7	237	20.48	0.08917	-0.4796
MW-53	7	0	162	308	201.9	187	49.6	0.2457	1.593
MW-53R	7	0	203	246	229.9	232	13.53	0.05888	-1.042
MW-54R	7	0	163	196	178.1	178	11.22	0.06296	0.2329
MW-55	7	0	126	198	165.4	170	25.34	0.1532	-0.2482
OW-57ROUT	7	0	118	144	132.1	132	8.415	0.06368	-0.2287

Summary Report

Constituent: Sulfate Analysis Run 11/29/2021 3:15 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

For observations made between 3/9/2020 and 10/12/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 1
Wells = 12
Minimum Value = 1
Maximum Value = 1125
Mean Value = 340.3
Median Value = 272
Standard Deviation = 275.7
Coefficient of Variation = 0.81
Skewness = 0.85

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	248	777	499.8	492	183.5	0.3671	0.1884
JCW-MW-18004	8	0	361	756	567.4	552	151.4	0.2668	-0.05753
JCW-MW-18005	8	0	185	817	424.5	330.5	259.5	0.6114	0.5989
JCW-MW-18006	8	0	29.7	94.5	53.84	48.55	24.6	0.4569	0.6992
MW-50	8	0	504	1125	881.9	944.3	211.5	0.2398	-0.7723
MW-51	8	0	418	556	468	451	50.5	0.1079	0.7785
MW-52	8	1	1	586	410.9	516	228.1	0.5552	-1.026
MW-53	8	0	111	549	305.8	298	119.9	0.392	0.6143
MW-53R	8	0	163	275	195.4	183	38.31	0.1961	1.234
MW-54R	8	0	72.7	100	85.43	83.05	10.64	0.1246	0.2136
MW-55	8	0	18.5	218	99.69	82.35	75.9	0.7614	0.7107
OW-57ROUT	8	0	78.3	109	91.71	91.25	9.021	0.09837	0.5425

Summary Report

Constituent: Arsenic, Total Analysis Run 11/29/2021 3:15 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

For observations made between 3/9/2020 and 10/12/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 23
Wells = 12
Minimum Value = 1
Maximum Value = 204
Mean Value = 19.02
Median Value = 3
Standard Deviation = 39.92
Coefficient of Variation = 2.099
Skewness = 3.278

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	1	38	6.875	3	12.6	1.832	2.252
JCW-MW-18004	8	7	1	3	1.25	1	0.7071	0.5657	2.268
JCW-MW-18005	8	0	7	12	8.625	8.5	1.598	0.1853	1.105
JCW-MW-18006	8	0	12	41	26.75	27.5	8.779	0.3282	-0.0689
MW-50	8	0	1	3	1.75	1.5	0.8864	0.5065	0.4934
MW-51	8	0	11	20	13.88	13	3.182	0.2293	0.9461
MW-52	8	7	1	1	1	1	0	0	NaN
MW-53	8	3	1	2	1.625	2	0.5175	0.3185	-0.5164
MW-53R	8	0	18	40	25.25	24	7.459	0.2954	0.9286
MW-54R	8	0	1	4	2.375	2.5	1.061	0.4466	-0.036
MW-55	8	0	65	204	137.9	137.5	51.32	0.3722	-0.03177
OW-57ROUT	8	6	1	1	1	1	0	0	NaN

Summary Report

Constituent: Iron, Total Analysis Run 11/29/2021 3:15 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

For observations made between 3/9/2020 and 10/12/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 3
Wells = 12
Minimum Value = 20
Maximum Value = 40500
Mean Value = 4443
Median Value = 2060
Standard Deviation = 7358
Coefficient of Variation = 1.656
Skewness = 3.124

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	91	13600	1861	192	4743	2.549	2.267
JCW-MW-18004	8	3	20	4430	575.4	22.5	1558	2.707	2.268
JCW-MW-18005	8	0	3550	9310	5634	5125	1753	0.3111	1.13
JCW-MW-18006	8	0	3360	7790	6084	5980	1379	0.2267	-0.7504
MW-50	8	0	1240	2990	2210	2200	603.6	0.2731	-0.1575
MW-51	8	0	1940	5500	3635	3590	1537	0.4227	0.03644
MW-52	8	0	782	4880	2550	2060	1742	0.6833	0.3224
MW-53	8	0	1180	2380	1635	1535	418.1	0.2557	0.6456
MW-53R	8	0	881	2800	1889	2080	650	0.3441	-0.5367
MW-54R	8	0	115	2280	1141	1100	616.2	0.5401	0.2667
MW-55	8	0	18000	40500	26000	21900	8751	0.3366	1.047
OW-57ROUT	8	0	42	294	104.1	80	82.83	0.7955	1.687

Summary Report

Constituent: Vanadium, Total Analysis Run 11/29/2021 3:15 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

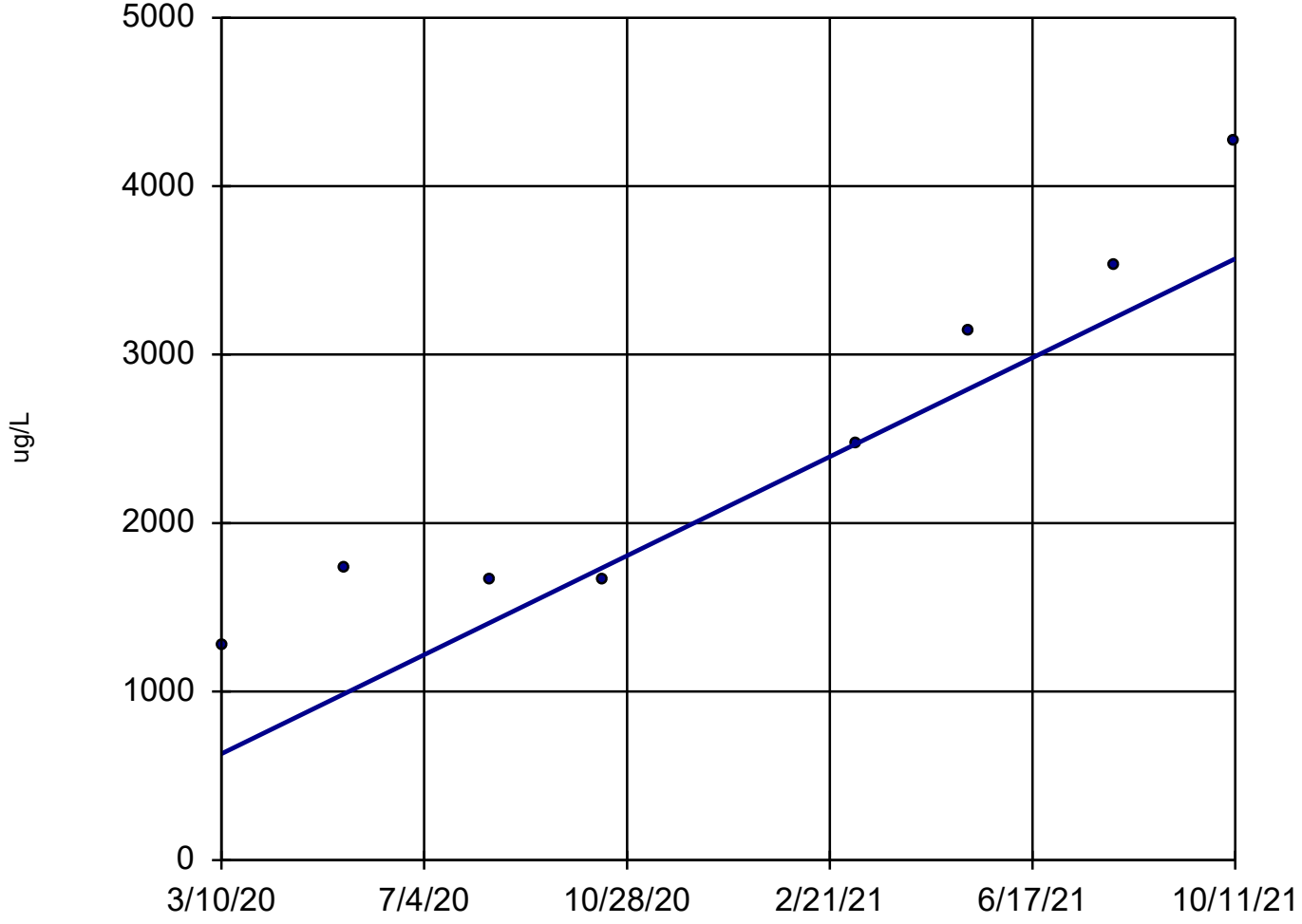
For observations made between 3/9/2020 and 10/12/2021, a summary of the selected data set:

Observations = 96
ND/Trace = 86
Wells = 12
Minimum Value = 2
Maximum Value = 12
Mean Value = 2.271
Median Value = 2
Standard Deviation = 1.334
Coefficient of Variation = 0.5873
Skewness = 6.214

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	6	2	12	3.25	2	3.536	1.088	2.268
JCW-MW-18004	8	7	2	10	3	2	2.828	0.9428	2.268
JCW-MW-18005	8	8	2	2	2	2	0	0	NaN
JCW-MW-18006	8	1	2	4	3	3	0.7559	0.252	0
MW-50	8	8	2	2	2	2	0	0	NaN
MW-51	8	8	2	2	2	2	0	0	NaN
MW-52	8	8	2	2	2	2	0	0	NaN
MW-53	8	8	2	2	2	2	0	0	NaN
MW-53R	8	8	2	2	2	2	0	0	NaN
MW-54R	8	8	2	2	2	2	0	0	NaN
MW-55	8	8	2	2	2	2	0	0	NaN
OW-57ROUT	8	8	2	2	2	2	0	0	NaN

Boron, Total

MW-54R



n = 8

Slope = 1850 units per year.

Mann-Kendall statistic = 23
critical = 20

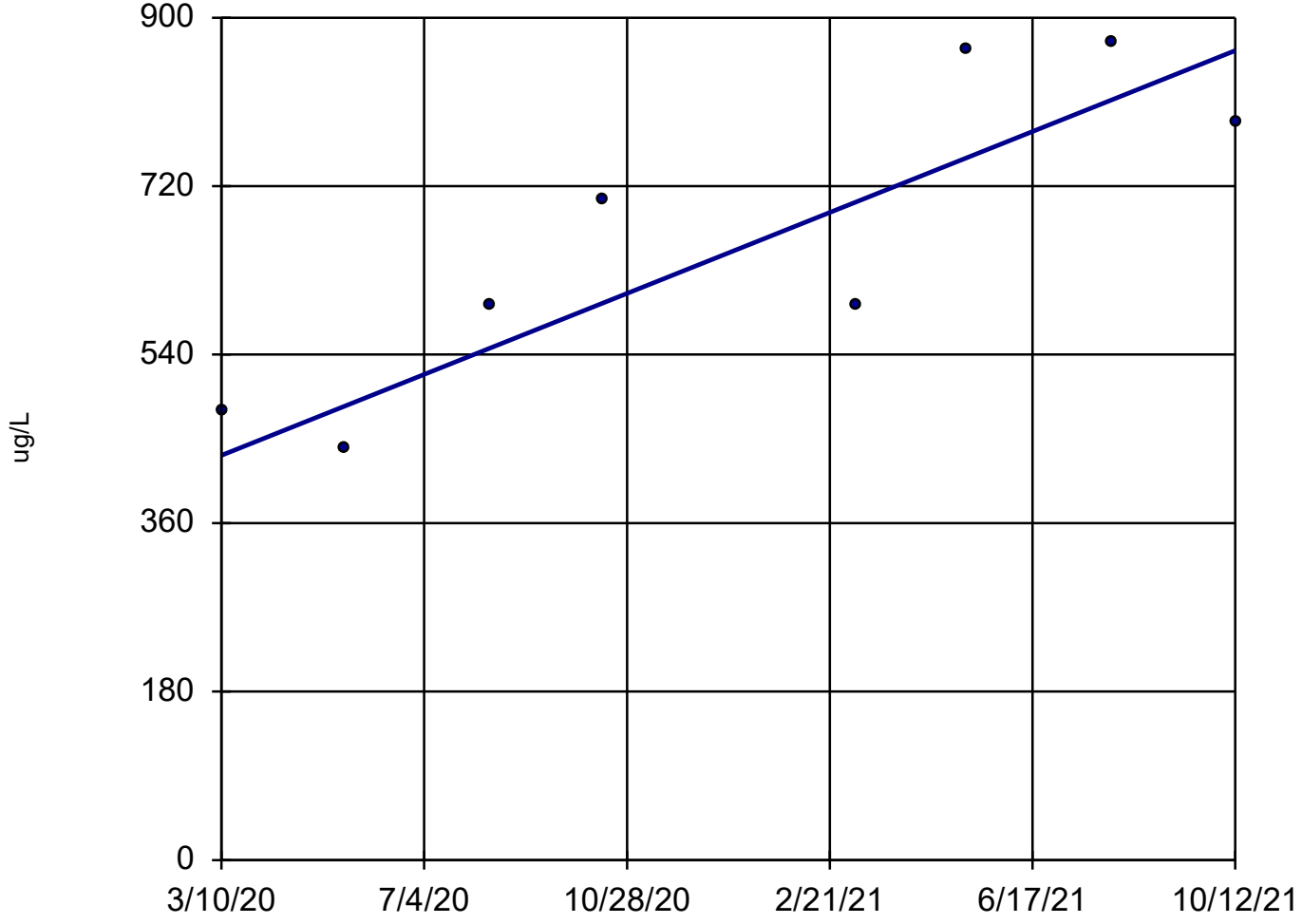
Increasing trend significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/29/2021 3:26 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Boron, Total

MW-55



n = 8

Slope = 271.5 units per year.

Mann-Kendall statistic = 20
critical = 20

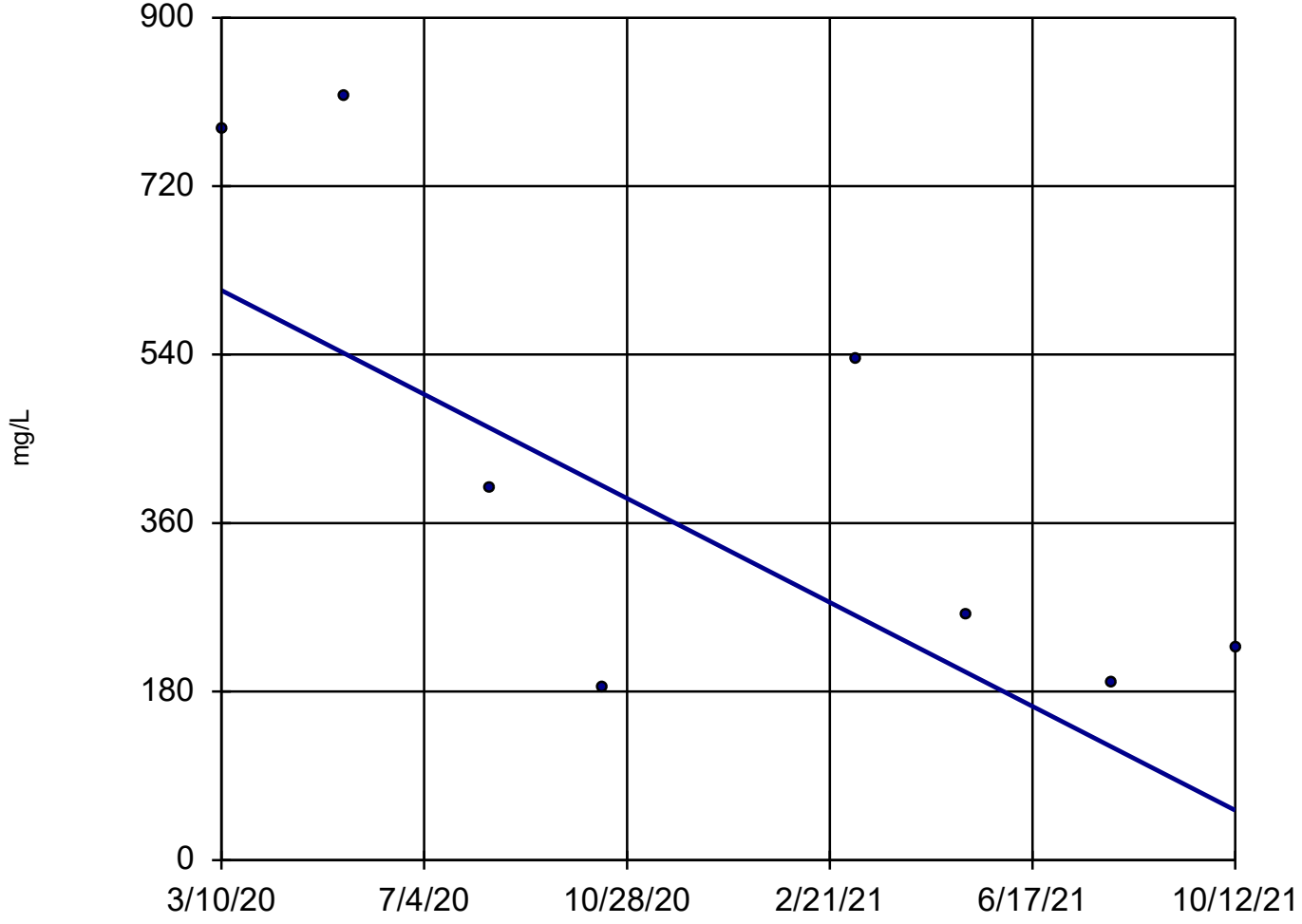
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/29/2021 3:26 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Sulfate

JCW-MW-18005



n = 8

Slope = -349.1 units per year.

Mann-Kendall statistic = -14
critical = -20

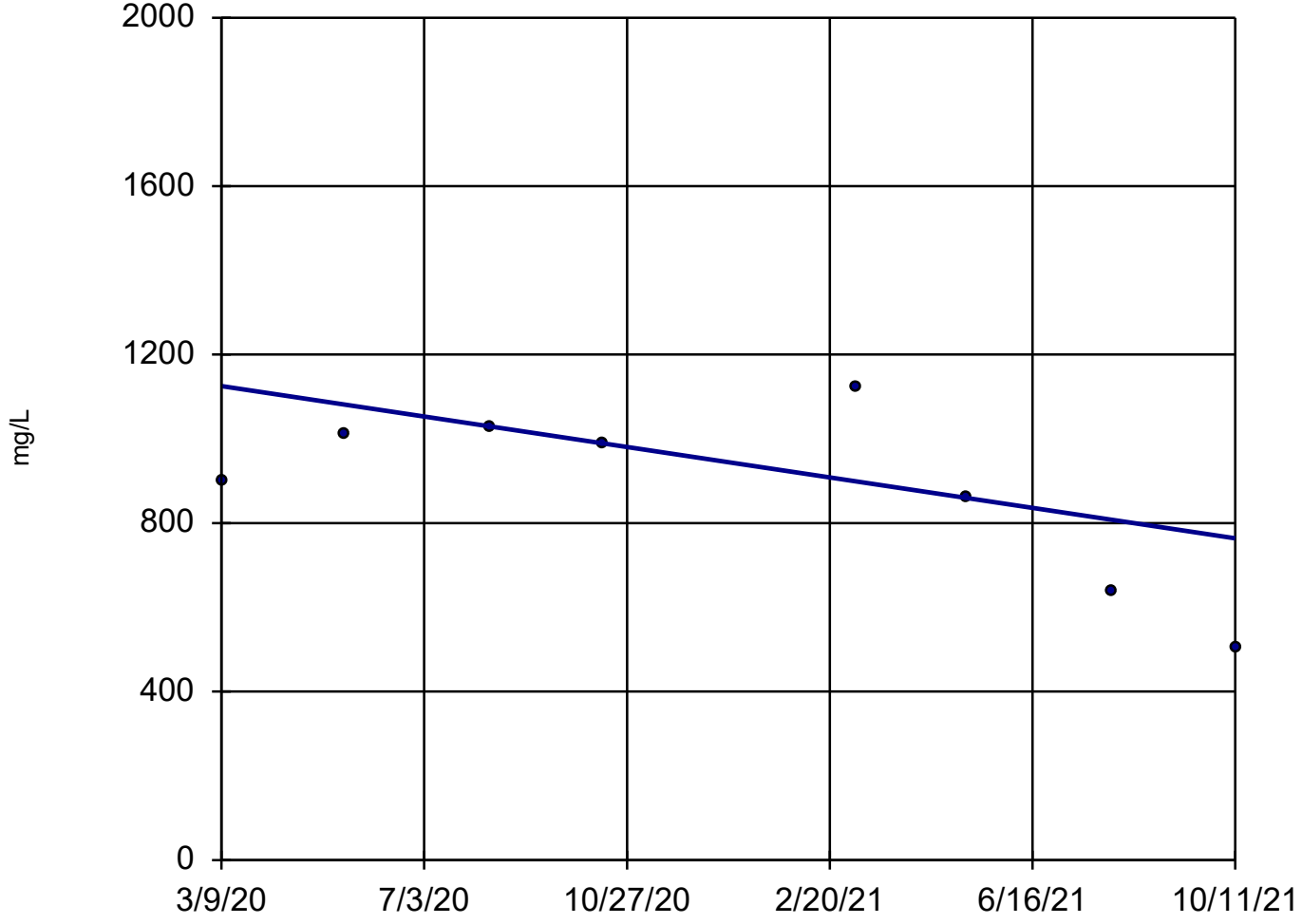
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/29/2021 3:27 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Sulfate

MW-50



n = 8

Slope = -226.7 units per year.

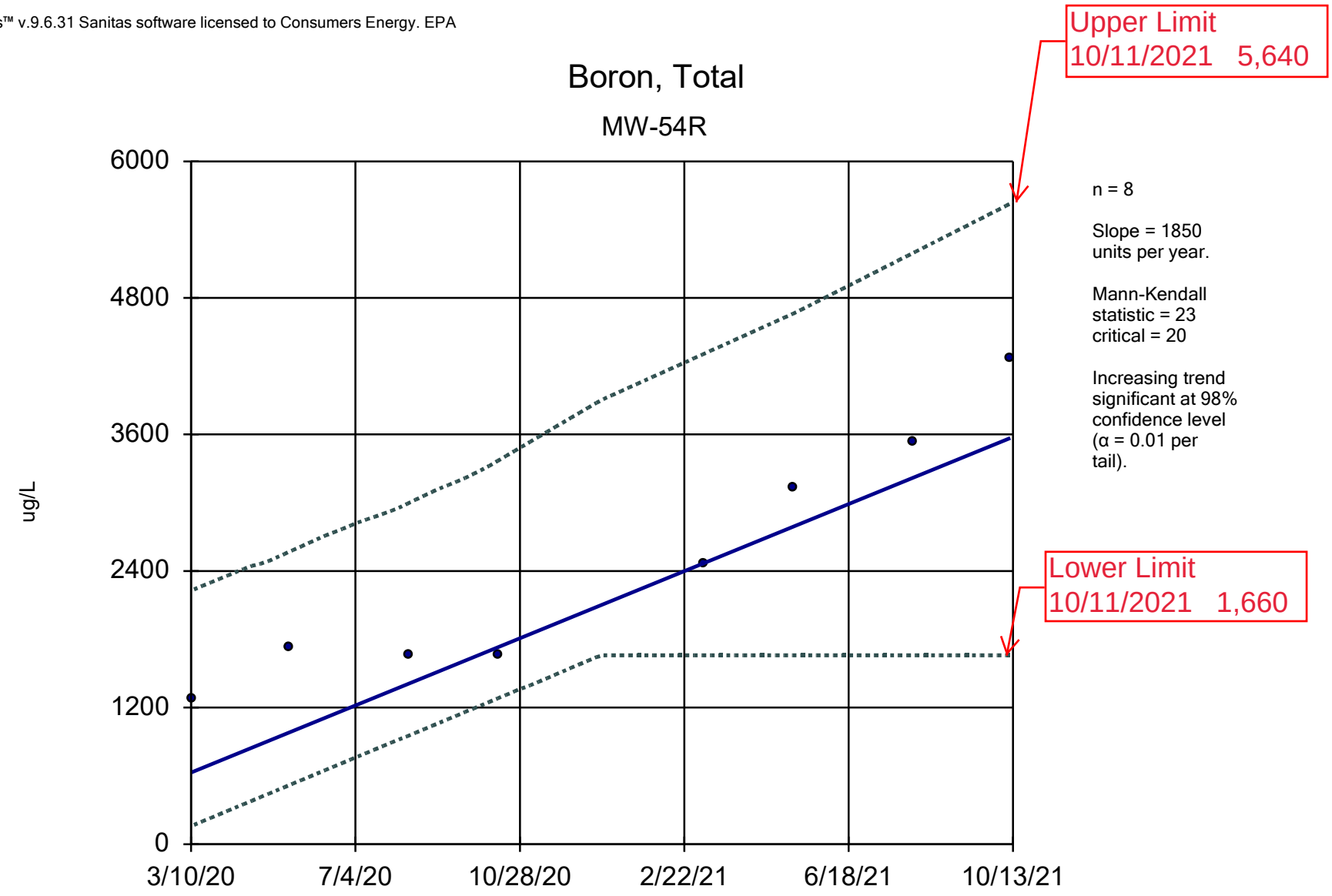
Mann-Kendall statistic = -12
critical = -20

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

Sen's Slope Estimator Analysis Run 11/29/2021 3:27 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. EPA

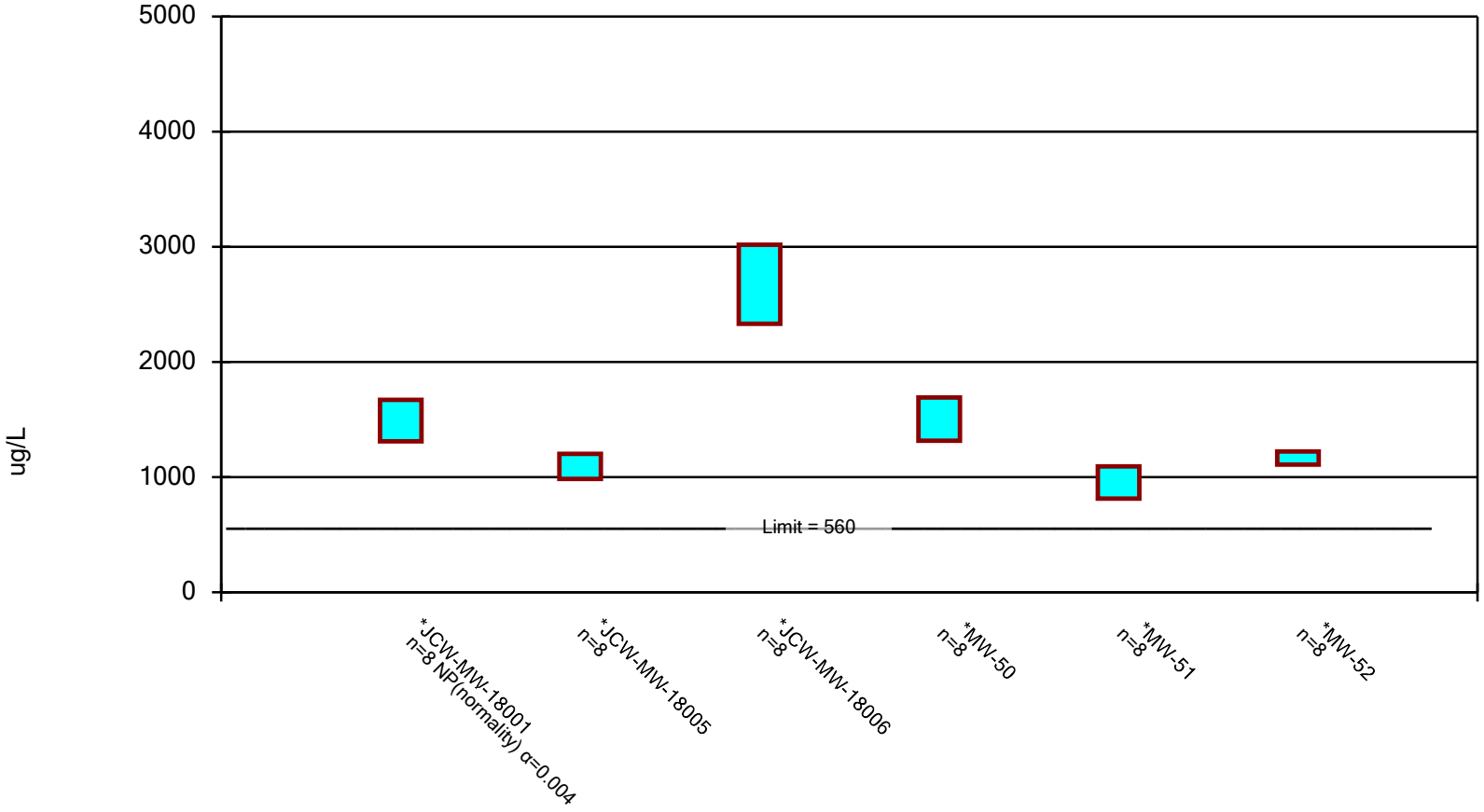


Sen's Slope and 98% Confidence Band Analysis Run 11/29/2021 4:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Boron, Total Analysis Run 11/29/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Confidence Interval

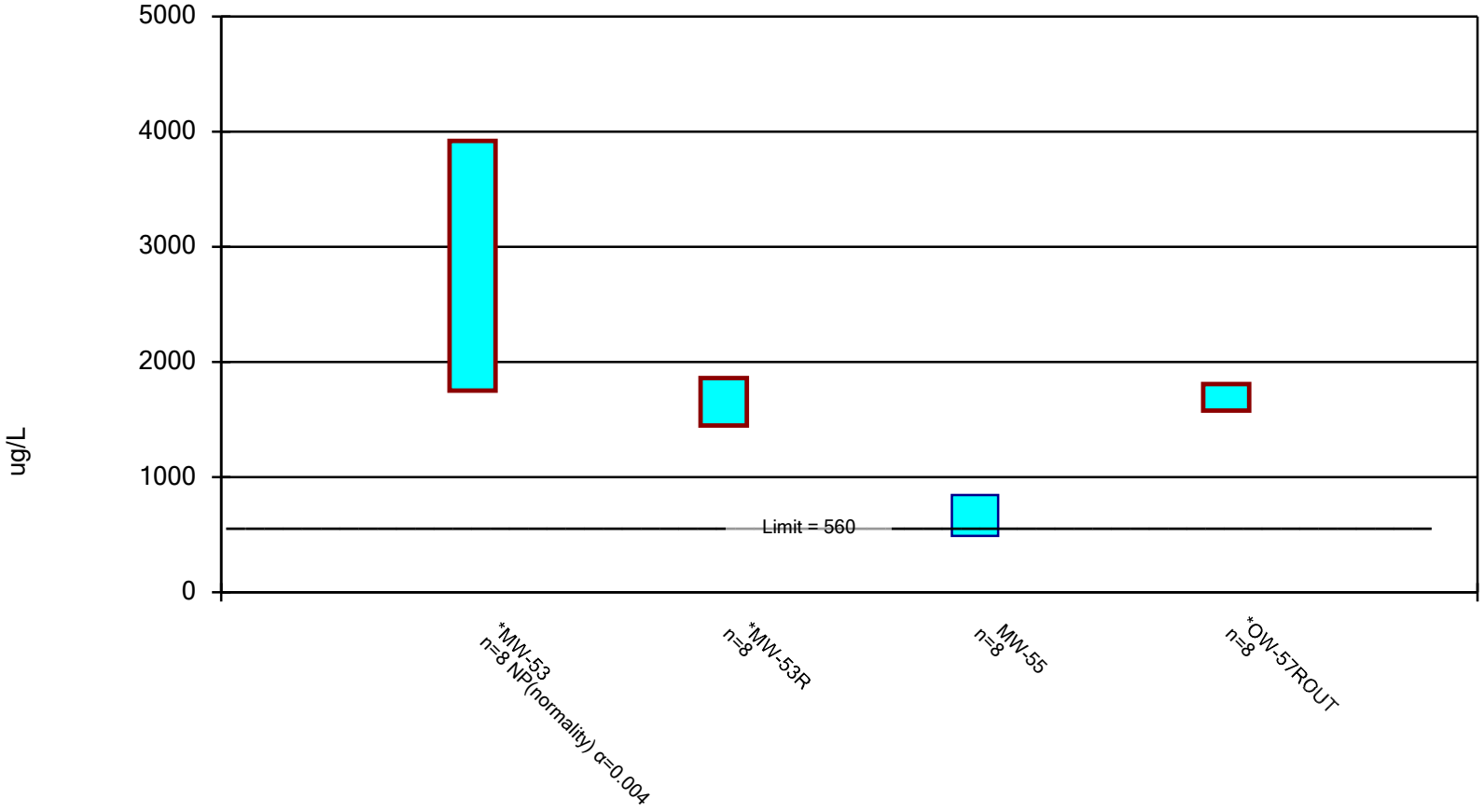
Constituent: Boron, Total (ug/L) Analysis Run 11/29/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

	JCW-MW-18001	JCW-MW-18005	JCW-MW-18006	MW-50	MW-51	MW-52
3/9/2020	1420			1515 (D)	967	
3/10/2020		1230				1150
3/11/2020			3110			
5/18/2020	1360					
5/19/2020		1150		1300	955.5 (D)	1160
5/20/2020			3030			
8/10/2020	1310			1395 (D)	758	1200
8/11/2020		1100	2040			
10/13/2020	1370			1470		
10/14/2020		1090	2610		768.5 (D)	1110
3/8/2021	1350			1560 (D)	1040	1120
3/9/2021		987	2650			
5/10/2021	1340			1350 (D)	1040	1160
5/11/2021		919	2720			
8/2/2021	1610			1575 (D)	960	1140
8/3/2021		1080	2640			
10/11/2021	1670			1865 (D)	1140	1280
10/12/2021		1190	2600			
Mean	1429	1093	2675	1504	953.6	1165
Std. Dev.	135	102.2	323.4	176.1	132.2	53.98
Upper Lim.	1670	1202	3018	1690	1094	1222
Lower Lim.	1310	984.9	2332	1317	813.5	1108

Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Boron, Total Analysis Run 11/29/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Confidence Interval

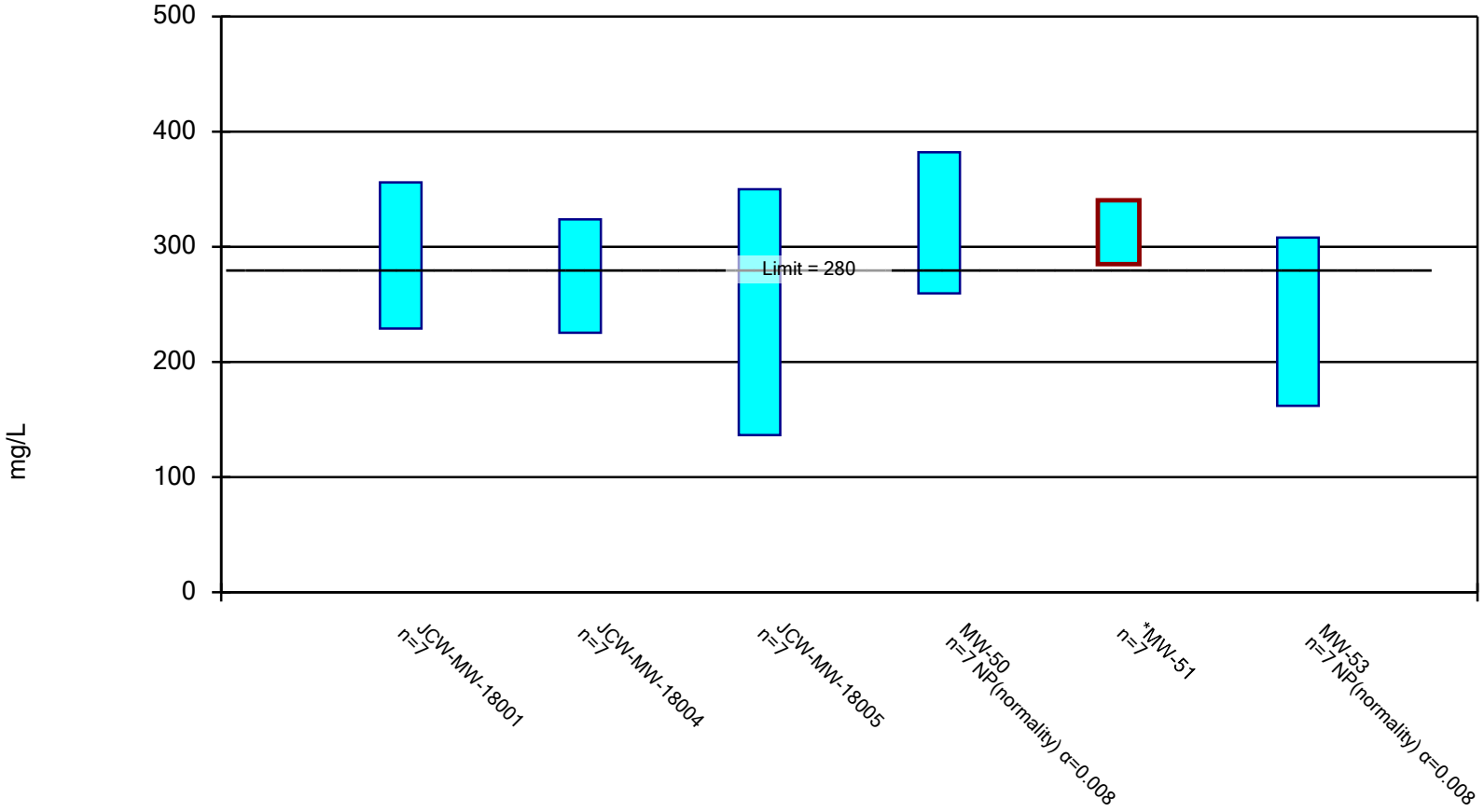
Constituent: Boron, Total (ug/L) Analysis Run 11/29/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

	MW-53	MW-53R	MW-55	OW-57ROUT
3/10/2020	2530	1590	481	1720
5/19/2020	1750	1460	441	
5/20/2020				1600
8/10/2020	2760			
8/11/2020		1540	592	1510
10/14/2020	2720	1780	705	1730
3/8/2021	3920	1510		
3/9/2021			593	1660
5/10/2021	3790	1580		
5/11/2021			866	1710
8/2/2021	3820	1710		
8/3/2021			873	1730
10/11/2021	3820	2060		
10/12/2021			788	1880
Mean	3139	1654	667.4	1693
Std. Dev.	808.9	194.5	166.9	108.2
Upper Lim.	3920	1860	844.2	1807
Lower Lim.	1750	1448	490.5	1578

Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Calcium, Total Analysis Run 11/29/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Confidence Interval

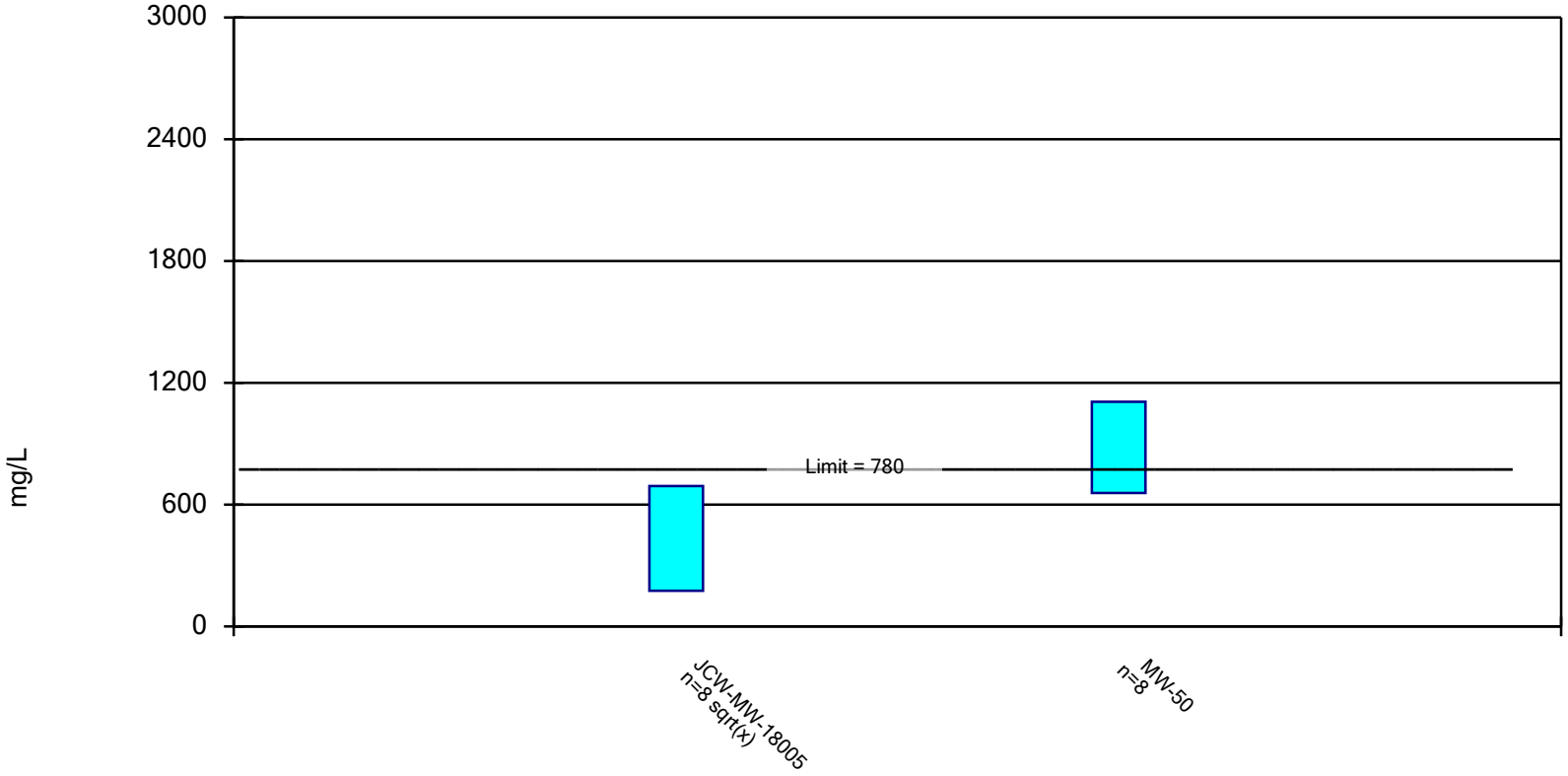
Constituent: Calcium, Total (mg/L) Analysis Run 11/29/2021 4:17 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

	JCW-MW-18001	JCW-MW-18004	JCW-MW-18005	MW-50	MW-51	MW-53
5/18/2020	232					
5/19/2020		308	419	380	326.5 (D)	308
8/10/2020	237			382 (D)	341	211
8/11/2020		306	259			
10/13/2020	282			368		
10/14/2020		323	195		333.5 (D)	192
3/8/2021	270	252		380.5 (D)	293	187
3/9/2021			286			
5/10/2021	305			366.5 (D)	303	187
5/11/2021		266	202			
8/2/2021	348			259.5 (D)	276	162
8/3/2021		203	149			
10/11/2021	373			267.5 (D)	316	166
10/12/2021		264	193			
Mean	292.4	274.6	243.3	343.4	312.7	201.9
Std. Dev.	53.34	41.37	89.82	54.99	23.32	49.6
Upper Lim.	355.8	323.7	350	382	340.4	308
Lower Lim.	229.1	225.4	136.6	259.5	285	162

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Sulfate Analysis Run 11/29/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Confidence Interval

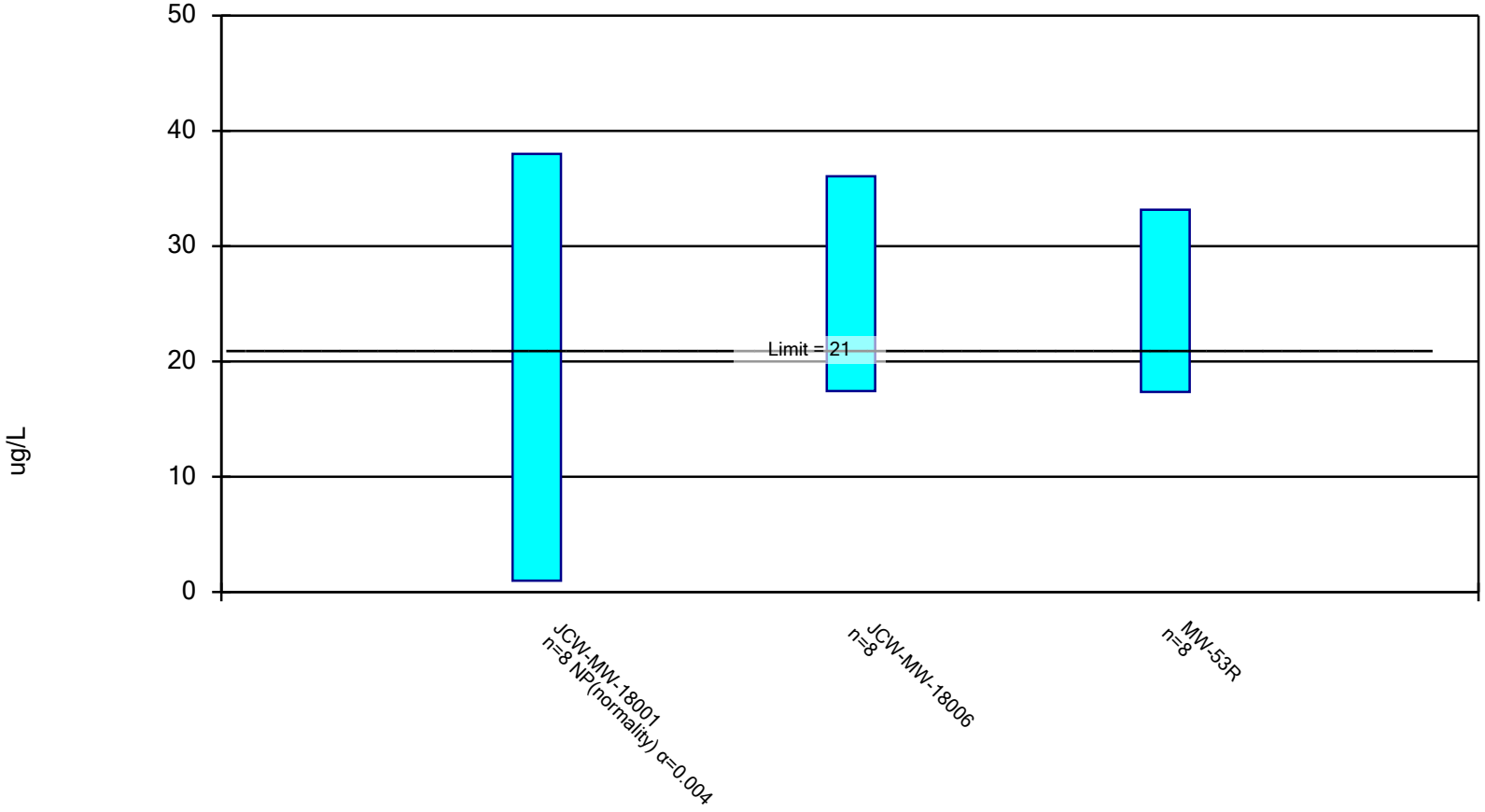
Constituent: Sulfate (mg/L) Analysis Run 11/29/2021 4:17 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

	JCW-MW-18005	MW-50
3/9/2020		898.5 (D)
3/10/2020	781	
5/19/2020	817	1010
8/10/2020		1030 (D)
8/11/2020	398	
10/13/2020		990
10/14/2020	185	
3/8/2021		1125 (D)
3/9/2021	535	
5/10/2021		861.5 (D)
5/11/2021	263	
8/2/2021		636 (D)
8/3/2021	190	
10/11/2021		504 (D)
10/12/2021	227	
Mean	424.5	881.9
Std. Dev.	259.5	211.5
Upper Lim.	691.7	1106
Lower Lim.	176.1	657.7

Parametric and Non-Parametric (NP) Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, Total Analysis Run 11/29/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Confidence Interval

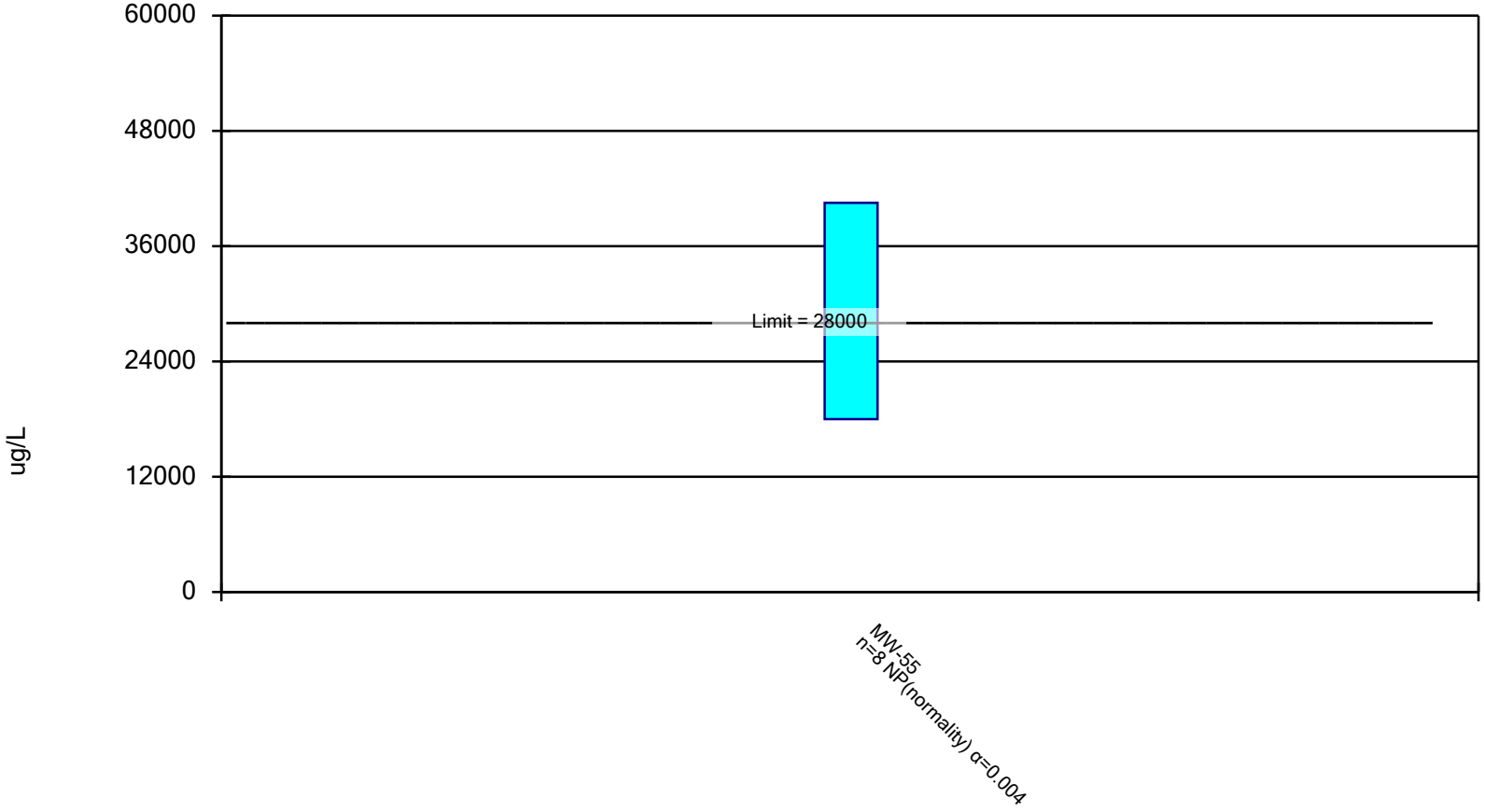
Constituent: Arsenic, Total (ug/L) Analysis Run 11/29/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

	JCW-MW-18001	JCW-MW-18006	MW-53R
3/9/2020	3		
3/10/2020			19
3/11/2020		41	
5/18/2020	3		
5/19/2020			27
5/20/2020		33	
8/10/2020	3		
8/11/2020		12	31
10/13/2020	3		
10/14/2020		22	40
3/8/2021	2		19
3/9/2021		30	
5/10/2021	2		18
5/11/2021		30	
8/2/2021	38		23
8/3/2021		25	
10/11/2021	1		25
10/12/2021		21	
Mean	6.875	26.75	25.25
Std. Dev.	12.6	8.779	7.459
Upper Lim.	38	36.06	33.16
Lower Lim.	1	17.44	17.34

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Iron, Total Analysis Run 11/29/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Confidence Interval

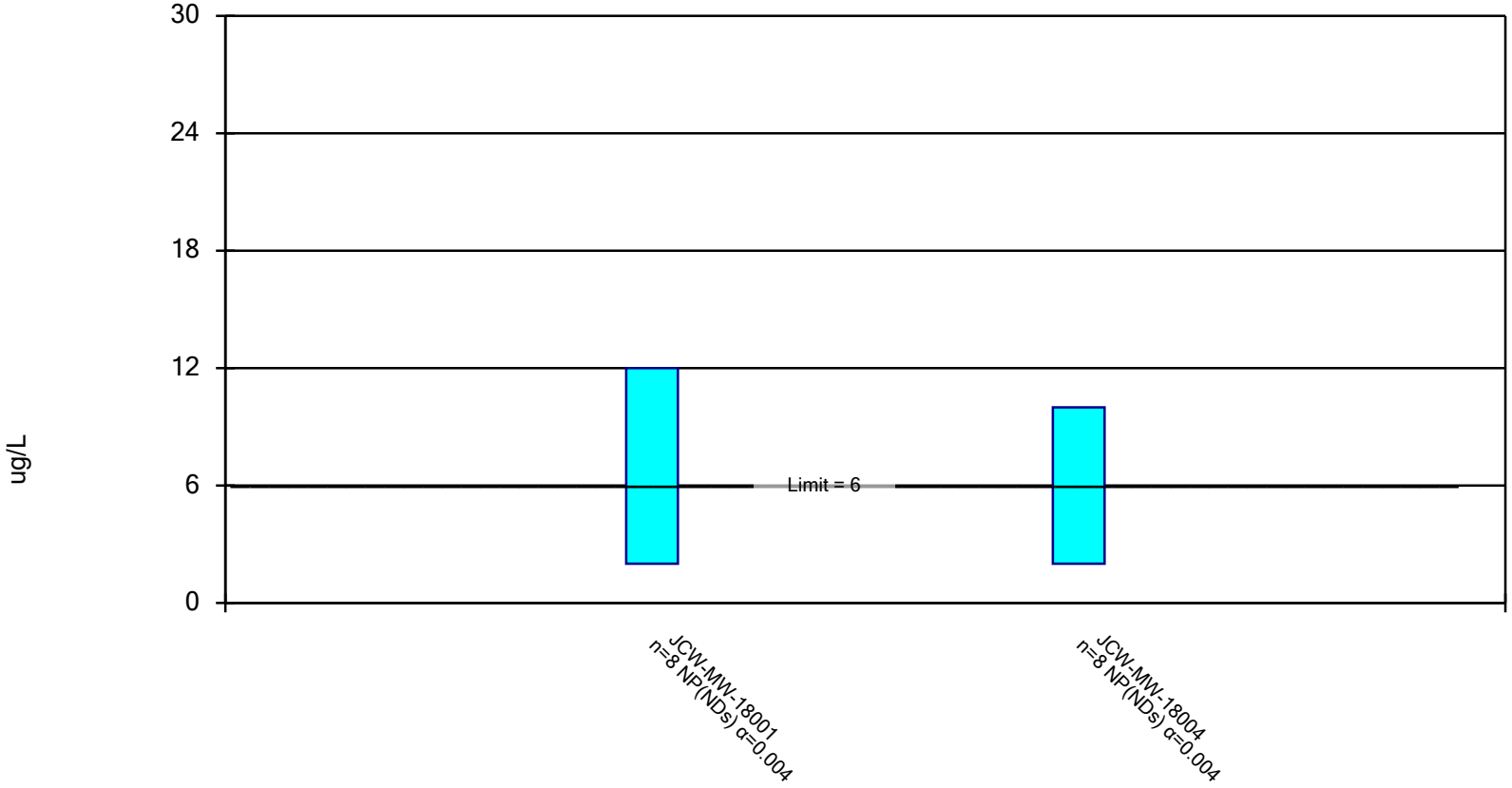
Constituent: Iron, Total (ug/L) Analysis Run 11/29/2021 4:17 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

	MW-55
3/10/2020	18000
5/19/2020	22000
8/11/2020	21300
10/14/2020	21800
3/9/2021	23500
5/11/2021	21500
8/3/2021	39400
10/12/2021	40500
Mean	26000
Std. Dev.	8751
Upper Lim.	40500
Lower Lim.	18000

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Vanadium, Total Analysis Run 11/29/2021 4:16 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Confidence Interval

Constituent: Vanadium, Total (ug/L) Analysis Run 11/29/2021 4:17 PM

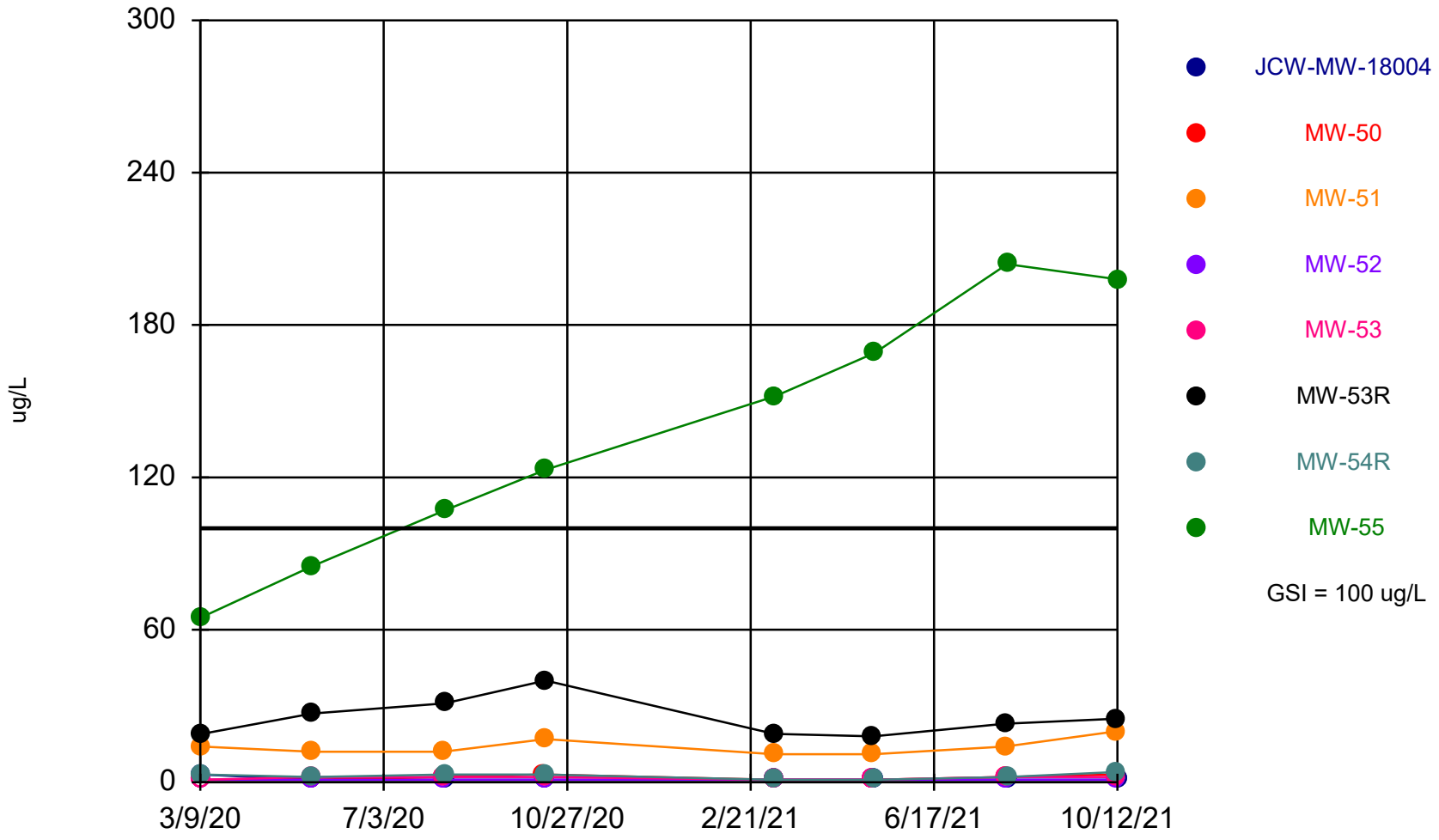
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

	JCW-MW-18001	JCW-MW-18004
3/9/2020	<2	
3/10/2020		10
5/18/2020	<2	
5/19/2020		<2
8/10/2020	<2	
8/11/2020		<2
10/13/2020	<2	
10/14/2020		<2
3/8/2021	<2	<2
5/10/2021	2	
5/11/2021		<2
8/2/2021	12	
8/3/2021		<2
10/11/2021	<2	
10/12/2021		<2
Mean	3.25	3
Std. Dev.	3.536	2.828
Upper Lim.	12	10
Lower Lim.	2	2

Attachment 2
GSI Evaluation Sanitas™ Output Files

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Arsenic Comparison to GSI

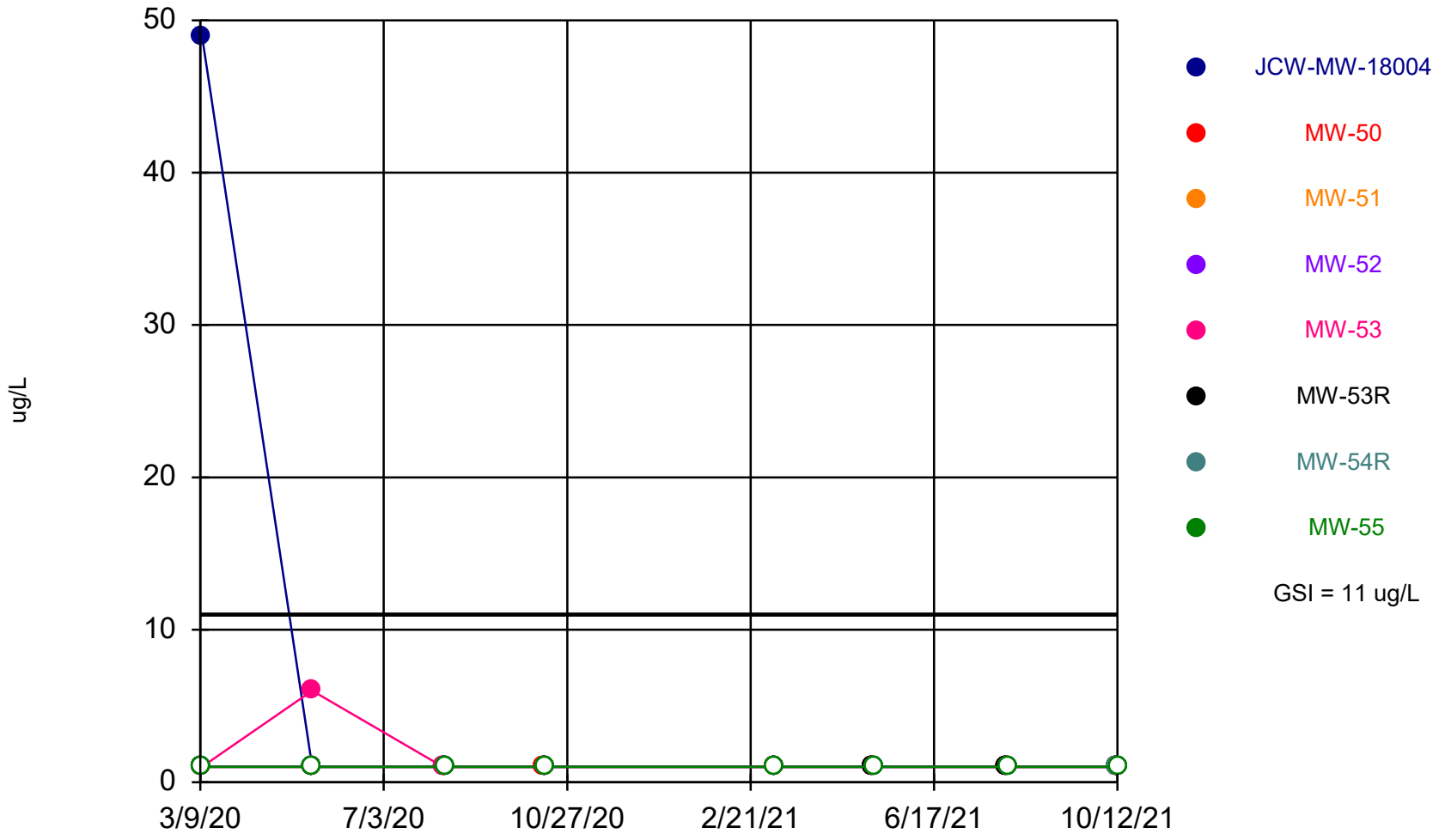


Time Series Analysis Run 11/29/2021 4:23 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Chromium Comparison to GSI

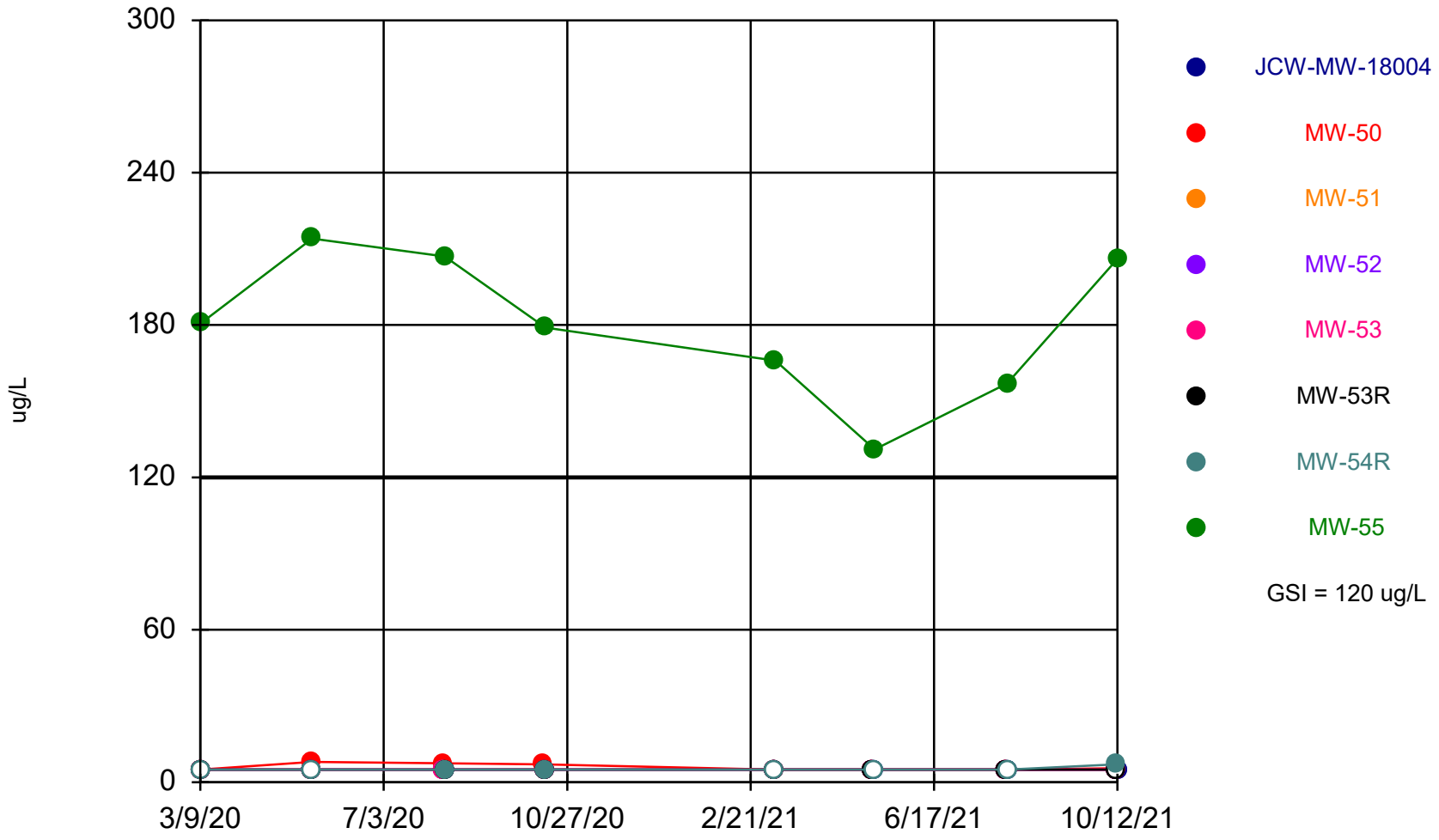


Time Series Analysis Run 11/29/2021 4:24 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Sanitas™ v.9.6.31 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Molybdenum Comparison to GSI



Time Series Analysis Run 11/29/2021 4:24 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Summary Report

Constituent: Arsenic, Total Analysis Run 11/29/2021 4:25 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

For observations made between 3/9/2020 and 10/12/2021, a summary of the selected data set:

Observations = 64
ND/Trace = 17
Wells = 8
Minimum Value = 1
Maximum Value = 204
Mean Value = 23.13
Median Value = 2
Standard Deviation = 47.73
Coefficient of Variation = 2.064
Skewness = 2.649

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	7	1	3	1.25	1	0.7071	0.5657	2.268
MW-50	8	0	1	3	1.75	1.5	0.8864	0.5065	0.4934
MW-51	8	0	11	20	13.88	13	3.182	0.2293	0.9461
MW-52	8	7	1	1	1	1	0	0	NaN
MW-53	8	3	1	2	1.625	2	0.5175	0.3185	-0.5164
MW-53R	8	0	18	40	25.25	24	7.459	0.2954	0.9286
MW-54R	8	0	1	4	2.375	2.5	1.061	0.4466	-0.036
MW-55	8	0	65	204	137.9	137.5	51.32	0.3722	-0.03177

Summary Report

Constituent: Chromium, Total Analysis Run 11/29/2021 4:25 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

For observations made between 3/9/2020 and 10/12/2021, a summary of the selected data set:

Observations = 64
ND/Trace = 60
Wells = 8
Minimum Value = 1
Maximum Value = 49
Mean Value = 1.828
Median Value = 1
Standard Deviation = 6.023
Coefficient of Variation = 3.294
Skewness = 7.69

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	7	1	49	7	1	16.97	2.424	2.268
MW-50	8	6	1	1	1	1	0	0	NaN
MW-51	8	8	1	1	1	1	0	0	NaN
MW-52	8	8	1	1	1	1	0	0	NaN
MW-53	8	7	1	6	1.625	1	1.768	1.088	2.268
MW-53R	8	8	1	1	1	1	0	0	NaN
MW-54R	8	8	1	1	1	1	0	0	NaN
MW-55	8	8	1	1	1	1	0	0	NaN

Summary Report

Constituent: Molybdenum, Total Analysis Run 11/29/2021 4:25 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

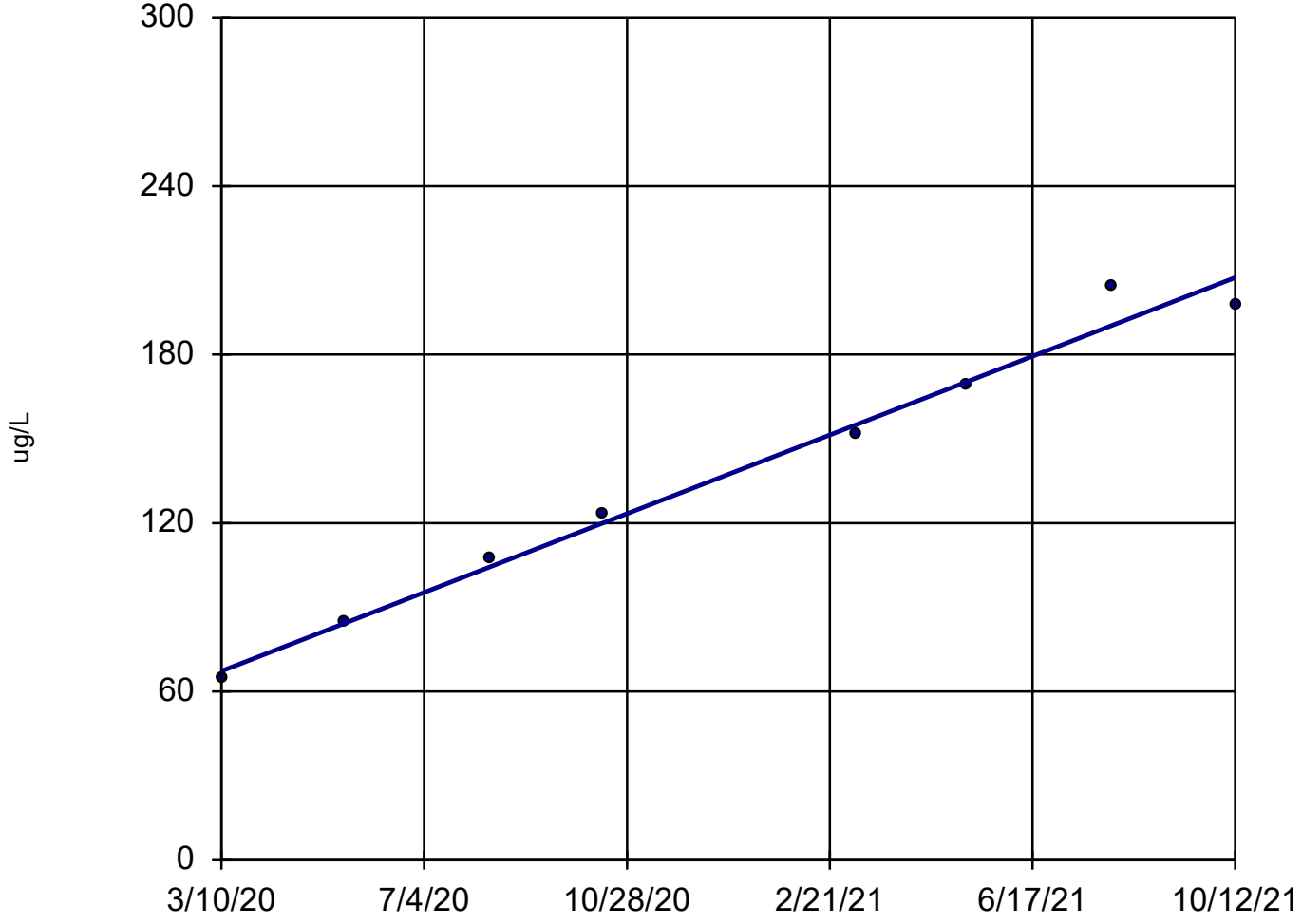
For observations made between 3/9/2020 and 10/12/2021, a summary of the selected data set:

Observations = 64
ND/Trace = 49
Wells = 8
Minimum Value = 5
Maximum Value = 214
Mean Value = 27.05
Median Value = 5
Standard Deviation = 59.09
Coefficient of Variation = 2.185
Skewness = 2.378

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	8	5	5	5	5	0	0	NaN
MW-50	8	4	5	8	6	5.25	1.282	0.2136	0.5983
MW-51	8	8	5	5	5	5	0	0	NaN
MW-52	8	8	5	5	5	5	0	0	NaN
MW-53	8	8	5	5	5	5	0	0	NaN
MW-53R	8	8	5	5	5	5	0	0	NaN
MW-54R	8	5	5	7	5.25	5	0.7071	0.1347	2.268
MW-55	8	0	131	214	180.1	180	28.51	0.1583	-0.3832

Arsenic, Total

MW-55



n = 8

Slope = 88.07 units per year.

Mann-Kendall statistic = 26
critical = 20

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/29/2021 4:26 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

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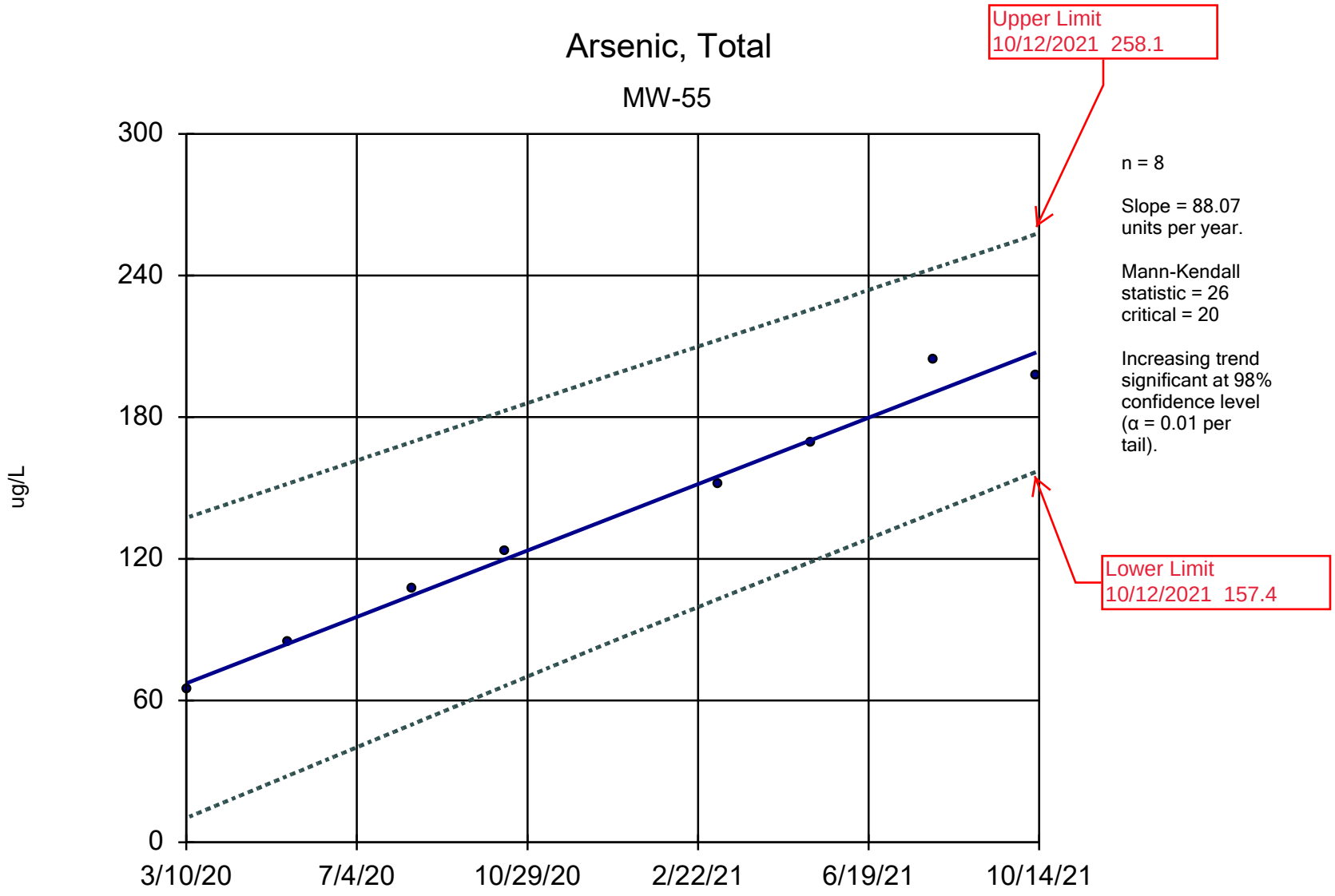
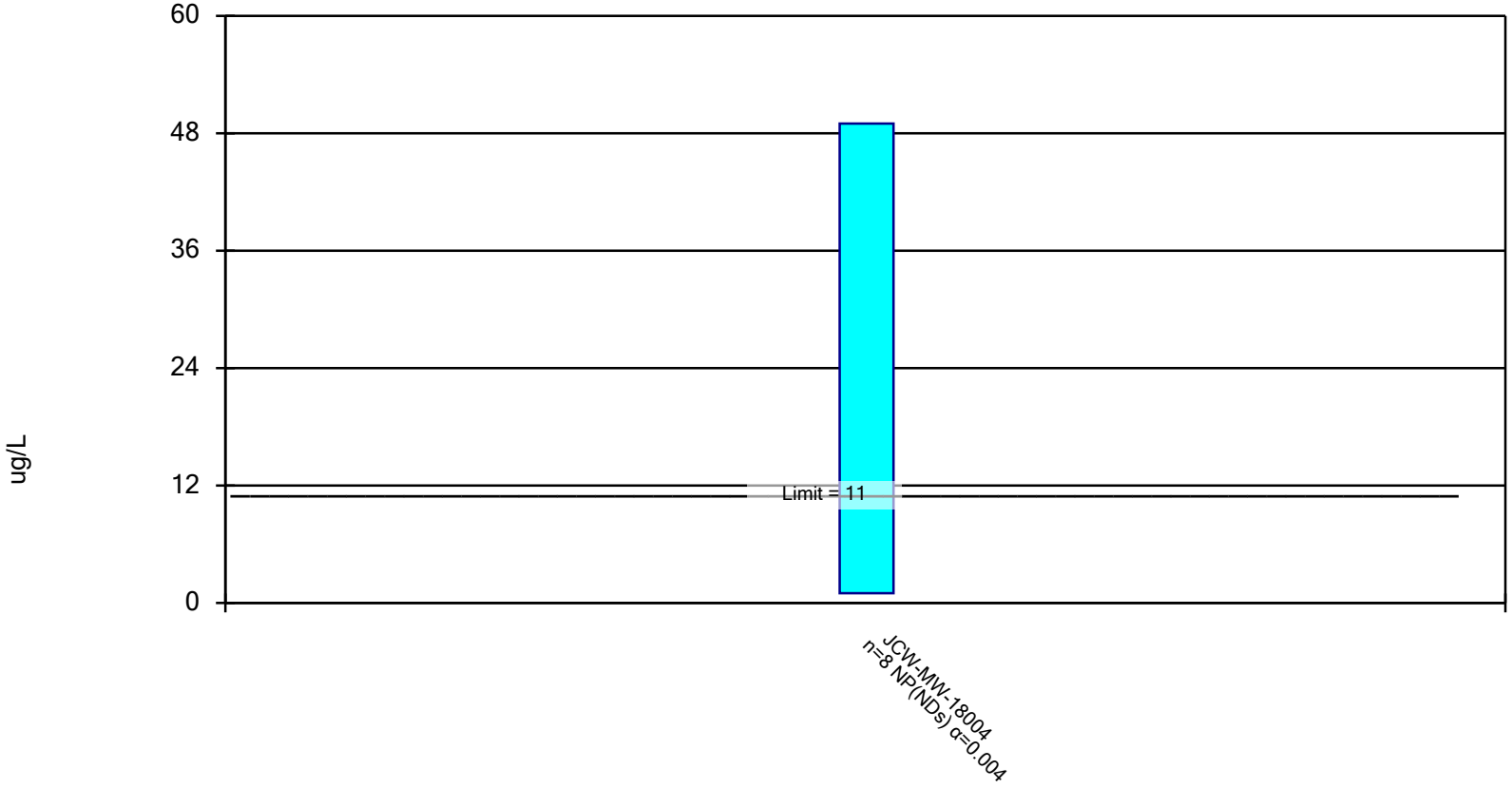


Sen's Slope and 98% Confidence Band Analysis Run 11/29/2021 4:26 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Chromium, Total Analysis Run 11/29/2021 4:28 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Confidence Interval

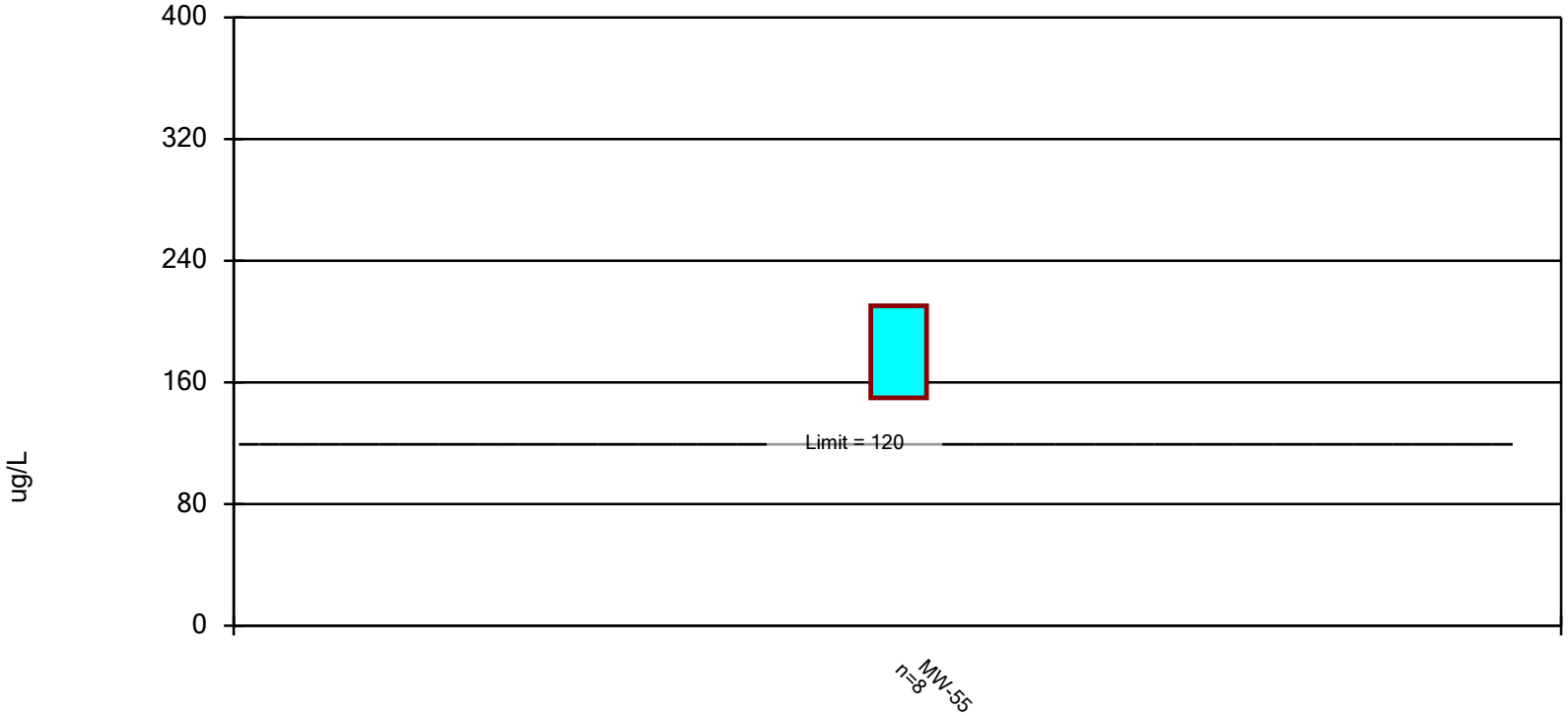
Constituent: Chromium, Total (ug/L) Analysis Run 11/29/2021 4:29 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

	JCW-MW-18004
3/10/2020	49
5/19/2020	<1
8/11/2020	<1
10/14/2020	<1
3/8/2021	<1
5/11/2021	<1
8/3/2021	<1
10/12/2021	<1
Mean	7
Std. Dev.	16.97
Upper Lim.	49
Lower Lim.	1

Parametric Confidence Interval

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



Constituent: Molybdenum, Total Analysis Run 11/29/2021 4:28 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

Confidence Interval

Constituent: Molybdenum, Total (ug/L) Analysis Run 11/29/2021 4:29 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_21Q4

	MW-55
3/10/2020	181
5/19/2020	214
8/11/2020	207
10/14/2020	179
3/9/2021	166
5/11/2021	131
8/3/2021	157
10/12/2021	206
Mean	180.1
Std. Dev.	28.51
Upper Lim.	210.3
Lower Lim.	149.9

Appendix E
Laboratory Analytical Report

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: November 01, 2021

Subject: PART 115 GROUNDWATER MONITORING – JCW POREWATER – 2021 Q4

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

Darby Litz, Project Manager
TRC Environmental Corporation
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 21-1173

TRC Environmental, Inc. conducted groundwater monitoring at the JCWeadock site on 10/11/2021 and 10/12/2021, for the 4th Quarter monitoring requirement, as specified in the Hydrogeological Monitoring Plan for the site. The samples were received for analysis by the Chemistry department of Laboratory Services on 10/13/2021.

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

Testing performed in accordance with the A2LA scope of accredidation specified in the listed certificate.
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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, latest edition.

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 JCW Part 115 & RCRA Porewater
Date Received: 10/13/2021
Chemistry Project: 21-1173

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-1173-01	JCW-MW-18001	Groundwater	10/11/2021 06:57 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-02	JCW-MW-18004	Groundwater	10/12/2021 06:35 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-03	JCW-OW-18004	Groundwater	10/12/2021 07:20 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-04	JCW-MW-18005	Groundwater	10/12/2021 10:00 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-05	JCW-MW-18006	Groundwater	10/12/2021 11:51 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-06	MW-50	Groundwater	10/11/2021 07:30 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-07	MW-51	Groundwater	10/11/2021 08:50 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-08	MW-52	Groundwater	10/11/2021 09:58 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-09	MW-53	Groundwater	10/11/2021 10:54 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-10	MW-53R	Groundwater	10/11/2021 12:20 PM	JCW Solid Waste Disposal Area, Porewater
21-1173-11	MW-54R	Groundwater	10/11/2021 01:22 PM	JCW Solid Waste Disposal Area, Porewater
21-1173-12	MW-55	Groundwater	10/12/2021 08:10 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-13	OW-55	Groundwater	10/12/2021 09:15 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-14	OW-57R OUT	Groundwater	10/12/2021 10:56 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-15	MW-58	Groundwater	10/12/2021 12:45 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-16	LH-104	Groundwater	10/07/2021 12:15 PM	JCW Solid Waste Disposal Area, Porewater
21-1173-17	DUP-01	Groundwater	10/11/2021 12:00 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-18	JCW-MW-18001 Field MS	Groundwater	10/11/2021 06:57 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-19	JCW-MW-18001 Field MSD	Groundwater	10/11/2021 06:57 AM	JCW Solid Waste Disposal Area, Porewater
21-1173-20	FB-01	Water	10/12/2021 12:50 PM	JCW Solid Waste Disposal Area, Porewater
21-1173-21	EB-01	Water	10/12/2021 12:55 PM	JCW Solid Waste Disposal Area, Porewater

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**JCW-MW-18001**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-01	Collect Time:	06:57 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-01-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-01-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	1		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	184		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	1670		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	373000		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	2		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	91		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	103		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	90700		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	20		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	15900		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	3		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	127000		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 #: 21-1173-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	68300		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	777000		ug/L	1000.0	10/18/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-01-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	661000		ug/L	10000.0	10/18/2021	AB21-1018-06

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Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**JCW-MW-18001**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-01	Collect Time:	06:57 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-01-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	661000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-01-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	2000		mg/L	10.0	10/14/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-02	Collect Time:	06:35 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-02-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-02-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	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	41		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	389		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	264000		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	2		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	39		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	63		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	83300		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	16		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	2530		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	3		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	20000		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 #: 21-1173-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	7450		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	493000		ug/L	1000.0	10/18/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-02-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	457000		ug/L	10000.0	10/18/2021	AB21-1018-06

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Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-02	Collect Time:	06:35 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-02-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	457000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-02-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1240		mg/L	10.0	10/14/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**JCW-OW-18004**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-03	Collect Time:	07:20 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-03-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-03-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	1		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	83		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	857		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	185000		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	2		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	31		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	11		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	74500		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	11		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	2350		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	80100		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 #: 21-1173-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	88900		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	214000		ug/L	1000.0	10/18/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-03-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	502000		ug/L	10000.0	10/18/2021	AB21-1018-06

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Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**JCW-OW-18004**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-03	Collect Time:	07:20 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-03-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	502000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-03-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	989		mg/L	10.0	10/14/2021	AB21-1014-07

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Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-04	Collect Time:	10:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-04-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-04-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	9		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	124		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	1190		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	193000		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	1		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	5840		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	39		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	68800		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	22		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	2530		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	68300		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 #: 21-1173-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	63600		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	227000		ug/L	1000.0	10/18/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-04-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	542000		ug/L	10000.0	10/18/2021	AB21-1018-06

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Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-04	Collect Time:	10:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-04-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	542000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-04-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1020		mg/L	10.0	10/14/2021	AB21-1014-07

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Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**JCW-MW-18006**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-05	Collect Time:	11:51 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-05-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-05-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	21		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	351		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	2600		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	152000		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	6200		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	47		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	46900		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	10		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	4950		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	88800		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	2		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 #: 21-1173-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	77000		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	34700		ug/L	1000.0	10/14/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-05-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	597000		ug/L	10000.0	10/18/2021	AB21-1018-06

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**JCW-MW-18006**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-05	Collect Time:	11:51 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-05-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	597000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-05-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	802		mg/L	10.0	10/14/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-50**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-06	Collect Time:	07:30 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-06-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-06-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	102		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	1830		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	274000		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	1		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	2500		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	93		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	73300		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	16		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	10700		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	75000		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 #: 21-1173-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	51000		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	496000		ug/L	1000.0	10/19/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-06-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	508000		ug/L	10000.0	10/18/2021	AB21-1018-06

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-50**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-06	Collect Time:	07:30 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-06-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	508000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-06-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1440		mg/L	10.0	10/14/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-51**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-07	Collect Time:	08:50 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-07-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-07-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	20		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	197		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	1140		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	316000		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	1		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	5130		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	64		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	67800		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	18		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	6580		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	3		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	107000		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 #: 21-1173-07-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	97100		ug/L	1000.0	10/19/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/15/2021	AB21-1014-08
Sulfate	418000		ug/L	1000.0	10/19/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-07-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	647000		ug/L	10000.0	10/18/2021	AB21-1018-06

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-51**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-07	Collect Time:	08:50 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-07-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	647000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-07-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1500		mg/L	10.0	10/14/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-52**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-08	Collect Time:	09:58 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-08-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-08-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	1		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	152		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	1280		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	237000		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	1		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	4880		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	31		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	96600		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	14		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	3680		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	3		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	80000		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 #: 21-1173-08-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	59400		ug/L	1000.0	10/15/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/15/2021	AB21-1014-08
Sulfate	110000		ug/L	1000.0	10/19/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-08-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	470000		ug/L	10000.0	10/18/2021	AB21-1018-06

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-52**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-08	Collect Time:	09:58 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-08-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	470000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-08-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1360		mg/L	10.0	10/15/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-53**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-09	Collect Time:	10:54 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-09-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-09-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	212		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	3820		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	166000		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	1760		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	53		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	42500		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	10		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	6310		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	86700		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 #: 21-1173-09-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	55500		ug/L	1000.0	10/15/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/15/2021	AB21-1014-08
Sulfate	111000		ug/L	1000.0	10/15/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-09-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	603000		ug/L	10000.0	10/18/2021	AB21-1018-06

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-53**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-09	Collect Time:	10:54 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-09-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	603000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-09-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	896		mg/L	10.0	10/14/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-53R**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-10	Collect Time:	12:20 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-10-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-10-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Arsenic	25		ug/L	1.0	10/29/2021	AB21-1029-14
Barium	189		ug/L	5.0	10/29/2021	AB21-1029-14
Beryllium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Boron	2060		ug/L	20.0	11/01/2021	AB21-1029-14
Cadmium	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Calcium	232000		ug/L	1000.0	11/01/2021	AB21-1029-14
Chromium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Cobalt	ND		ug/L	6.0	10/29/2021	AB21-1029-14
Copper	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Iron	2170		ug/L	20.0	11/01/2021	AB21-1029-14
Lead	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Lithium	57		ug/L	10.0	10/29/2021	AB21-1029-14
Magnesium	64100		ug/L	1000.0	11/01/2021	AB21-1029-14
Molybdenum	ND		ug/L	5.0	10/29/2021	AB21-1029-14
Nickel	2		ug/L	2.0	10/29/2021	AB21-1029-14
Potassium	6170		ug/L	100.0	11/01/2021	AB21-1029-14
Selenium	3		ug/L	1.0	10/29/2021	AB21-1029-14
Silver	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Sodium	61800		ug/L	1000.0	11/01/2021	AB21-1029-14
Thallium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Vanadium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Zinc	ND		ug/L	10.0	10/29/2021	AB21-1029-14

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

Aliquot #: 21-1173-10-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	36600		ug/L	1000.0	10/15/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/15/2021	AB21-1014-08
Sulfate	166000		ug/L	1000.0	10/15/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-10-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	715000		ug/L	10000.0	10/18/2021	AB21-1018-06

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-53R**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-10	Collect Time:	12:20 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-10-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	715000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-10-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1060		mg/L	10.0	10/14/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-54R**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-11	Collect Time:	01:22 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-11-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-11-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Arsenic	4		ug/L	1.0	10/29/2021	AB21-1029-14
Barium	129		ug/L	5.0	10/29/2021	AB21-1029-14
Beryllium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Boron	4270		ug/L	20.0	11/01/2021	AB21-1029-14
Cadmium	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Calcium	187000		ug/L	1000.0	11/01/2021	AB21-1029-14
Chromium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Cobalt	ND		ug/L	6.0	10/29/2021	AB21-1029-14
Copper	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Iron	2280		ug/L	20.0	11/01/2021	AB21-1029-14
Lead	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Lithium	59		ug/L	10.0	10/29/2021	AB21-1029-14
Magnesium	46500		ug/L	1000.0	11/01/2021	AB21-1029-14
Molybdenum	7		ug/L	5.0	10/29/2021	AB21-1029-14
Nickel	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Potassium	2260		ug/L	100.0	11/01/2021	AB21-1029-14
Selenium	2		ug/L	1.0	10/29/2021	AB21-1029-14
Silver	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Sodium	31900		ug/L	1000.0	11/01/2021	AB21-1029-14
Thallium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Vanadium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Zinc	ND		ug/L	10.0	10/29/2021	AB21-1029-14

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

Aliquot #: 21-1173-11-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	34700		ug/L	1000.0	10/15/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/15/2021	AB21-1014-08
Sulfate	75700		ug/L	1000.0	10/15/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-11-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	568000		ug/L	10000.0	10/18/2021	AB21-1018-06

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-54R**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-11	Collect Time:	01:22 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-11-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	568000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-11-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	772		mg/L	10.0	10/14/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-55**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-12	Collect Time:	08:10 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-12-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-12-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Arsenic	198		ug/L	1.0	10/29/2021	AB21-1029-14
Barium	330		ug/L	5.0	10/29/2021	AB21-1029-14
Beryllium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Boron	788		ug/L	20.0	11/01/2021	AB21-1029-14
Cadmium	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Calcium	198000		ug/L	1000.0	11/01/2021	AB21-1029-14
Chromium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Cobalt	ND		ug/L	6.0	10/29/2021	AB21-1029-14
Copper	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Iron	40500		ug/L	20.0	11/01/2021	AB21-1029-14
Lead	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Lithium	34		ug/L	10.0	10/29/2021	AB21-1029-14
Magnesium	35500		ug/L	1000.0	11/01/2021	AB21-1029-14
Molybdenum	206		ug/L	5.0	10/29/2021	AB21-1029-14
Nickel	8		ug/L	2.0	10/29/2021	AB21-1029-14
Potassium	4300		ug/L	100.0	11/01/2021	AB21-1029-14
Selenium	2		ug/L	1.0	10/29/2021	AB21-1029-14
Silver	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Sodium	103000		ug/L	1000.0	11/01/2021	AB21-1029-14
Thallium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Vanadium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Zinc	ND		ug/L	10.0	10/29/2021	AB21-1029-14

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

Aliquot #: 21-1173-12-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	16500		ug/L	1000.0	10/15/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/15/2021	AB21-1014-08
Sulfate	80700		ug/L	1000.0	10/15/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-12-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	700000		ug/L	10000.0	10/19/2021	AB21-1019-01

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-55**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-12	Collect Time:	08:10 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-12-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	700000		ug/L	10000.0	10/19/2021	AB21-1019-01
Alkalinity Carbonate	ND		ug/L	10000.0	10/19/2021	AB21-1019-01

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-12-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	844		mg/L	10.0	10/14/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**OW-55**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-13	Collect Time:	09:15 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-13-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-13-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Arsenic	10		ug/L	1.0	10/29/2021	AB21-1029-14
Barium	296		ug/L	5.0	10/29/2021	AB21-1029-14
Beryllium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Boron	2300		ug/L	20.0	11/01/2021	AB21-1029-14
Cadmium	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Calcium	188000		ug/L	1000.0	11/01/2021	AB21-1029-14
Chromium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Cobalt	ND		ug/L	6.0	10/29/2021	AB21-1029-14
Copper	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Iron	3600		ug/L	20.0	11/01/2021	AB21-1029-14
Lead	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Lithium	22		ug/L	10.0	10/29/2021	AB21-1029-14
Magnesium	32000		ug/L	1000.0	11/01/2021	AB21-1029-14
Molybdenum	ND		ug/L	5.0	10/29/2021	AB21-1029-14
Nickel	5		ug/L	2.0	10/29/2021	AB21-1029-14
Potassium	6980		ug/L	100.0	11/01/2021	AB21-1029-14
Selenium	1		ug/L	1.0	10/29/2021	AB21-1029-14
Silver	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Sodium	57600		ug/L	1000.0	11/01/2021	AB21-1029-14
Thallium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Vanadium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Zinc	ND		ug/L	10.0	10/29/2021	AB21-1029-14

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

Aliquot #: 21-1173-13-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	21800		ug/L	1000.0	10/15/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/15/2021	AB21-1014-08
Sulfate	11700		ug/L	1000.0	10/15/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-13-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	666000		ug/L	10000.0	10/19/2021	AB21-1019-01

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**OW-55**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-13	Collect Time:	09:15 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-13-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	666000		ug/L	10000.0	10/19/2021	AB21-1019-01
Alkalinity Carbonate	ND		ug/L	10000.0	10/19/2021	AB21-1019-01

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-13-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	739		mg/L	10.0	10/14/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**OW-57R OUT**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-14	Collect Time:	10:56 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-14-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-14-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Arsenic	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Barium	75		ug/L	5.0	10/29/2021	AB21-1029-14
Beryllium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Boron	1880		ug/L	20.0	11/01/2021	AB21-1029-14
Cadmium	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Calcium	140000		ug/L	1000.0	11/01/2021	AB21-1029-14
Chromium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Cobalt	ND		ug/L	6.0	10/29/2021	AB21-1029-14
Copper	1		ug/L	1.0	10/29/2021	AB21-1029-14
Iron	68		ug/L	20.0	11/01/2021	AB21-1029-14
Lead	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Lithium	21		ug/L	10.0	10/29/2021	AB21-1029-14
Magnesium	71400		ug/L	1000.0	11/01/2021	AB21-1029-14
Molybdenum	9		ug/L	5.0	10/29/2021	AB21-1029-14
Nickel	12		ug/L	2.0	10/29/2021	AB21-1029-14
Potassium	1980		ug/L	100.0	11/01/2021	AB21-1029-14
Selenium	2		ug/L	1.0	10/29/2021	AB21-1029-14
Silver	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Sodium	51500		ug/L	1000.0	11/01/2021	AB21-1029-14
Thallium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Vanadium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Zinc	ND		ug/L	10.0	10/29/2021	AB21-1029-14

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

Aliquot #: 21-1173-14-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	46900		ug/L	1000.0	10/15/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/15/2021	AB21-1014-08
Sulfate	93100		ug/L	1000.0	10/15/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-14-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	533000		ug/L	10000.0	10/19/2021	AB21-1019-01

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**OW-57R OUT**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-14	Collect Time:	10:56 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-14-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	533000		ug/L	10000.0	10/19/2021	AB21-1019-01
Alkalinity Carbonate	ND		ug/L	10000.0	10/19/2021	AB21-1019-01

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-14-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	737		mg/L	10.0	10/14/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-58**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-15	Collect Time:	12:45 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-15-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-15-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Arsenic	2		ug/L	1.0	10/29/2021	AB21-1029-14
Barium	101		ug/L	5.0	10/29/2021	AB21-1029-14
Beryllium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Boron	238		ug/L	20.0	11/01/2021	AB21-1029-14
Cadmium	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Calcium	120000		ug/L	1000.0	11/01/2021	AB21-1029-14
Chromium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Cobalt	ND		ug/L	6.0	10/29/2021	AB21-1029-14
Copper	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Iron	7300		ug/L	20.0	11/01/2021	AB21-1029-14
Lead	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Lithium	20		ug/L	10.0	10/29/2021	AB21-1029-14
Magnesium	19200		ug/L	1000.0	11/01/2021	AB21-1029-14
Molybdenum	ND		ug/L	5.0	10/29/2021	AB21-1029-14
Nickel	5		ug/L	2.0	10/29/2021	AB21-1029-14
Potassium	4480		ug/L	100.0	11/01/2021	AB21-1029-14
Selenium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Silver	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Sodium	162000		ug/L	1000.0	11/01/2021	AB21-1029-14
Thallium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Vanadium	3		ug/L	2.0	10/29/2021	AB21-1029-14
Zinc	ND		ug/L	10.0	10/29/2021	AB21-1029-14

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

Aliquot #: 21-1173-15-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	246000		ug/L	1000.0	10/19/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/15/2021	AB21-1014-08
Sulfate	21700		ug/L	1000.0	10/15/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-15-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	312000		ug/L	10000.0	10/19/2021	AB21-1019-01

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**MW-58**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-15	Collect Time:	12:45 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-15-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	312000		ug/L	10000.0	10/19/2021	AB21-1019-01
Alkalinity Carbonate	ND		ug/L	10000.0	10/19/2021	AB21-1019-01

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-15-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	882		mg/L	10.0	10/14/2021	AB21-1014-07

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**LH-104**	Collect Date:	10/07/2021
Lab Sample ID:	21-1173-16	Collect Time:	12:15 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-16-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-16-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	2		ug/L	1.0	10/29/2021	AB21-1029-14
Arsenic	26		ug/L	1.0	10/29/2021	AB21-1029-14
Barium	266		ug/L	5.0	10/29/2021	AB21-1029-14
Beryllium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Boron	11200		ug/L	20.0	11/01/2021	AB21-1029-14
Cadmium	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Calcium	164000		ug/L	1000.0	11/01/2021	AB21-1029-14
Chromium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Cobalt	ND		ug/L	6.0	10/29/2021	AB21-1029-14
Copper	1		ug/L	1.0	10/29/2021	AB21-1029-14
Iron	285		ug/L	20.0	11/01/2021	AB21-1029-14
Lead	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Lithium	58		ug/L	10.0	10/29/2021	AB21-1029-14
Magnesium	87100		ug/L	1000.0	11/01/2021	AB21-1029-14
Molybdenum	40		ug/L	5.0	10/29/2021	AB21-1029-14
Nickel	8		ug/L	2.0	10/29/2021	AB21-1029-14
Potassium	10200		ug/L	100.0	11/01/2021	AB21-1029-14
Selenium	5		ug/L	1.0	10/29/2021	AB21-1029-14
Silver	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Sodium	80500		ug/L	1000.0	11/01/2021	AB21-1029-14
Thallium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Vanadium	28		ug/L	2.0	10/29/2021	AB21-1029-14
Zinc	ND		ug/L	10.0	10/29/2021	AB21-1029-14

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

Aliquot #: 21-1173-16-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	74100		ug/L	1000.0	10/15/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/15/2021	AB21-1014-08
Sulfate	178000		ug/L	1000.0	10/15/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-16-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	351000		ug/L	10000.0	10/19/2021	AB21-1019-01

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Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**LH-104**	Collect Date:	10/07/2021
Lab Sample ID:	21-1173-16	Collect Time:	12:15 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-16-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	351000		ug/L	10000.0	10/19/2021	AB21-1019-01
Alkalinity Carbonate	ND		ug/L	10000.0	10/19/2021	AB21-1019-01

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-16-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	985		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**DUP-01**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-17	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-17-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-17-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Arsenic	3		ug/L	1.0	10/29/2021	AB21-1029-14
Barium	89		ug/L	5.0	10/29/2021	AB21-1029-14
Beryllium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Boron	1900		ug/L	20.0	11/01/2021	AB21-1029-14
Cadmium	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Calcium	261000		ug/L	1000.0	11/01/2021	AB21-1029-14
Chromium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Cobalt	ND		ug/L	6.0	10/29/2021	AB21-1029-14
Copper	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Iron	2710		ug/L	20.0	11/01/2021	AB21-1029-14
Lead	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Lithium	68		ug/L	10.0	10/29/2021	AB21-1029-14
Magnesium	73300		ug/L	1000.0	11/01/2021	AB21-1029-14
Molybdenum	6		ug/L	5.0	10/29/2021	AB21-1029-14
Nickel	11		ug/L	2.0	10/29/2021	AB21-1029-14
Potassium	11700		ug/L	100.0	11/01/2021	AB21-1029-14
Selenium	4		ug/L	1.0	10/29/2021	AB21-1029-14
Silver	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Sodium	74200		ug/L	1000.0	11/01/2021	AB21-1029-14
Thallium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Vanadium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Zinc	ND		ug/L	10.0	10/29/2021	AB21-1029-14

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

Aliquot #: 21-1173-17-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	51700		ug/L	1000.0	10/15/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/15/2021	AB21-1014-08
Sulfate	512000		ug/L	1000.0	10/19/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-17-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	511000		ug/L	10000.0	10/18/2021	AB21-1018-06

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**DUP-01**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-17	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1173-17-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Bicarbonate	511000		ug/L	10000.0	10/18/2021	AB21-1018-06
Alkalinity Carbonate	ND		ug/L	10000.0	10/18/2021	AB21-1018-06

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1173-17-C05-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1380		mg/L	10.0	10/14/2021	AB21-1014-07

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Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**JCW-MW-18001 Field MS**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-18	Collect Time:	06:57 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-18-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	98.8		%	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-18-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	84		%	1.0	10/29/2021	AB21-1029-14
Arsenic	118		%	1.0	10/29/2021	AB21-1029-14
Barium	104		%	5.0	10/29/2021	AB21-1029-14
Beryllium	95		%	1.0	10/29/2021	AB21-1029-14
Boron	107		%	20.0	11/01/2021	AB21-1029-14
Cadmium	81.4		%	0.2	10/29/2021	AB21-1029-14
Calcium	117		%	1000.0	11/01/2021	AB21-1029-14
Chromium	100		%	1.0	10/29/2021	AB21-1029-14
Cobalt	99		%	6.0	10/29/2021	AB21-1029-14
Copper	87		%	1.0	10/29/2021	AB21-1029-14
Iron	106		%	20.0	11/01/2021	AB21-1029-14
Lead	80		%	1.0	10/29/2021	AB21-1029-14
Lithium	106		%	10.0	10/29/2021	AB21-1029-14
Magnesium	121		%	1000.0	11/01/2021	AB21-1029-14
Molybdenum	101		%	5.0	10/29/2021	AB21-1029-14
Nickel	84		%	2.0	10/29/2021	AB21-1029-14
Potassium	109		%	100.0	11/01/2021	AB21-1029-14
Selenium	106		%	1.0	10/29/2021	AB21-1029-14
Silver	84.0		%	0.2	10/29/2021	AB21-1029-14
Sodium	117		%	1000.0	11/01/2021	AB21-1029-14
Thallium	87		%	2.0	10/29/2021	AB21-1029-14
Vanadium	110		%	2.0	10/29/2021	AB21-1029-14
Zinc	91		%	10.0	10/29/2021	AB21-1029-14

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

Aliquot #: 21-1173-18-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	110		%	1000.0	10/15/2021	AB21-1014-08
Fluoride	97		%	1000.0	10/15/2021	AB21-1014-08
Sulfate	95		%	1000.0	10/19/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-18-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	91.8		%	10000.0	10/18/2021	AB21-1018-06

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**JCW-MW-18001 Field MSD**	Collect Date:	10/11/2021
Lab Sample ID:	21-1173-19	Collect Time:	06:57 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-19-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	96.0		%	0.2	10/15/2021	AB21-1015-02

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

Aliquot #: 21-1173-19-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	84		%	1.0	10/29/2021	AB21-1029-14
Arsenic	118		%	1.0	10/29/2021	AB21-1029-14
Barium	104		%	5.0	10/29/2021	AB21-1029-14
Beryllium	96		%	1.0	10/29/2021	AB21-1029-14
Boron	110		%	20.0	11/01/2021	AB21-1029-14
Cadmium	80.7		%	0.2	10/29/2021	AB21-1029-14
Calcium	118		%	1000.0	11/01/2021	AB21-1029-14
Chromium	103		%	1.0	10/29/2021	AB21-1029-14
Cobalt	100		%	6.0	10/29/2021	AB21-1029-14
Copper	87		%	1.0	10/29/2021	AB21-1029-14
Iron	105		%	20.0	11/01/2021	AB21-1029-14
Lead	79		%	1.0	10/29/2021	AB21-1029-14
Lithium	114		%	10.0	10/29/2021	AB21-1029-14
Magnesium	123		%	1000.0	11/01/2021	AB21-1029-14
Molybdenum	102		%	5.0	10/29/2021	AB21-1029-14
Nickel	87		%	2.0	10/29/2021	AB21-1029-14
Potassium	109		%	100.0	11/01/2021	AB21-1029-14
Selenium	107		%	1.0	10/29/2021	AB21-1029-14
Silver	85.8		%	0.2	10/29/2021	AB21-1029-14
Sodium	119		%	1000.0	11/01/2021	AB21-1029-14
Thallium	87		%	2.0	10/29/2021	AB21-1029-14
Vanadium	112		%	2.0	10/29/2021	AB21-1029-14
Zinc	92		%	10.0	10/29/2021	AB21-1029-14

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

Aliquot #: 21-1173-19-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	110		%	1000.0	10/15/2021	AB21-1014-08
Fluoride	89		%	1000.0	10/15/2021	AB21-1014-08
Sulfate	98		%	1000.0	10/19/2021	AB21-1014-08

Alkalinity by SM 2320B

Aliquot #: 21-1173-19-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	95.2		%	10000.0	10/18/2021	AB21-1018-06

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Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**FB-01**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-20	Collect Time:	12:50 PM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-20-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-03

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

Aliquot #: 21-1173-20-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Arsenic	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Barium	ND		ug/L	5.0	10/29/2021	AB21-1029-14
Beryllium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Boron	ND		ug/L	20.0	11/01/2021	AB21-1029-14
Cadmium	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Calcium	ND		ug/L	1000.0	11/01/2021	AB21-1029-14
Chromium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Cobalt	ND		ug/L	6.0	10/29/2021	AB21-1029-14
Copper	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Iron	ND		ug/L	20.0	11/01/2021	AB21-1029-14
Lead	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Lithium	ND		ug/L	10.0	10/29/2021	AB21-1029-14
Magnesium	ND		ug/L	1000.0	11/01/2021	AB21-1029-14
Molybdenum	ND		ug/L	5.0	10/29/2021	AB21-1029-14
Nickel	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Potassium	ND		ug/L	100.0	11/01/2021	AB21-1029-14
Selenium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Silver	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Sodium	ND		ug/L	1000.0	11/01/2021	AB21-1029-14
Thallium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Vanadium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Zinc	ND		ug/L	10.0	10/29/2021	AB21-1029-14

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

Aliquot #: 21-1173-20-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	ND		ug/L	1000.0	10/15/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/15/2021	AB21-1014-08
Sulfate	ND		ug/L	1000.0	10/15/2021	AB21-1014-08

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Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (39**	Laboratory Project:	**21-1173**
Field Sample ID:	**EB-01**	Collect Date:	10/12/2021
Lab Sample ID:	21-1173-21	Collect Time:	12:55 PM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1173-21-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/15/2021	AB21-1015-03

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

Aliquot #: 21-1173-21-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Arsenic	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Barium	ND		ug/L	5.0	10/29/2021	AB21-1029-14
Beryllium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Boron	ND		ug/L	20.0	11/01/2021	AB21-1029-14
Cadmium	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Calcium	ND		ug/L	1000.0	11/01/2021	AB21-1029-14
Chromium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Cobalt	ND		ug/L	6.0	10/29/2021	AB21-1029-14
Copper	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Iron	ND		ug/L	20.0	11/01/2021	AB21-1029-14
Lead	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Lithium	ND		ug/L	10.0	10/29/2021	AB21-1029-14
Magnesium	ND		ug/L	1000.0	11/01/2021	AB21-1029-14
Molybdenum	ND		ug/L	5.0	10/29/2021	AB21-1029-14
Nickel	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Potassium	ND		ug/L	100.0	11/01/2021	AB21-1029-14
Selenium	ND		ug/L	1.0	10/29/2021	AB21-1029-14
Silver	ND		ug/L	0.2	10/29/2021	AB21-1029-14
Sodium	ND		ug/L	1000.0	11/01/2021	AB21-1029-14
Thallium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Vanadium	ND		ug/L	2.0	10/29/2021	AB21-1029-14
Zinc	ND		ug/L	10.0	10/29/2021	AB21-1029-14

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

Aliquot #: 21-1173-21-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	ND		ug/L	1000.0	10/15/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/15/2021	AB21-1014-08
Sulfate	ND		ug/L	1000.0	10/15/2021	AB21-1014-08

Analytical Report

Report Date: 11/01/21

Data Qualifiers	Exception Summary
	No exceptions occured.

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-1173

Inspection Date: 10/8/21 **Inspection By** LH

Sample Origin/Project Name: JCW Porewater

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°C Samples Received on Ice: Yes ✓ No _____

M&TE # and Expiration D6402 | 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)	2				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	2				
24 mL vial (glass)					
250 ~~500~~ mL (plastic)	1				
Other _____					

PG. 2 & 2 not needed

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-1173

Inspection Date: 10/13/21 **Inspection By:** CWH

Sample Origin/Project Name: JCW Porewater Q4-2021

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 3.2 – 4.9°C Samples Received on Ice: Yes ✓ 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)	36				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	40				
24 mL vial (glass)					
250 ~~500~~ mL (plastic)	16				
Other _____					

PG. 2 & 2 not needed!

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: JCW Porewater – 2021 Q4

PROJECT NUMBER: 21-1173

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					REMARKS
21-1173-01	10/4/21	0627	GW	JCW-MW-18001		5	x	x	x	x					
-02	10/12/21	0635	GW	JCW-MW-18004		5	x	x	x	x					
-03	10/12/21	0730	GW	JCW-OW-18004		5	x	x	x	x					
-04	10/12/21	1000	GW	JCW-MW-18005		5	x	x	x	x					
-05	10/12/21	1151	GW	JCW-MW-18006		5	x	x	x	x					
-06	10/11/21	0730	GW	MW-50		5	x	x	x	x					
-07	10/11/21	0850	GW	MW-51		5	x	x	x	x					
-08	10/11/21	0958	GW	MW-52		5	x	x	x	x					
-09	10/11/21	1054	GW	MW-53		5	x	x	x	x					
-10	10/11/21	1220	GW	MW-53R		5	x	x	x	x					
-11	10/11/21	1322	GW	MW-54R		5	x	x	x	x					
-12	10/12/21	0810	GW	MW-55		5	x	x	x	x					

ANALYSIS REQUESTED

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
[signature]	10/13/21 1110	[signature]
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)

COMMENTS

3.2-4.9°C
015402

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Consumers Energy

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

SAMPLING SITE: JCW Porewater – 2021 Q4

PROJECT NUMBER: 21-1173

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					REMARKS
21-1173-13	10/12/21	0915	GW	OW-55		5	X	X	X	X					
-14	10/12/21	1056	GW	OW-57R OUT		5	X	X	X	X					
-15	10/12/21	1245	GW	MW-58		5	X	X	X	X					
-16			GW	~~LH-104~~		5	X	X	X	X					
-17	10/11/21	—	GW	DUP-01		5	X	X	X	X					
-18	10/11/21	0657	GW	JCW-MW-18001 MS		4	X	X	X						
-19	10/11/21	0657	GW	JCW-MW-18001 MSD		4	X	X	X						
-20	10/12/21	1250	W	FB-01		2	X	X							
-21	10/12/21	1255	W	EB-01		2	X	X							

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
[signature]	10/13/21 1110	[signature]
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)

COMMENTS

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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: JCW Porewater – 2021 Q4

PROJECT NUMBER: 21-1173

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					REMARKS
21-1173-13			GW	OW-55		5	X	X	X	X					
-14			GW	OW-57R OUT		5	X	X	X	X					
-15			GW	MW-58		5	X	X	X	X					
-16	10/6/21	1215	GW	LH-104		5	X	X	X	X					
-17			GW	DUP-01		5	X	X	X	X					
-18			GW	JCW-MW-18001 MS		4	X	X	X						
-19			GW	JCW-MW-18001 MSD		4	X	X	X						
-20			W	FB-01		2	X	X							
-21			W	EB-01		2	X	X							

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
	10/7/21 1536	
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)

COMMENTS

2.4°C
#015402

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eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Tel: (330)497-9396

Laboratory Job ID: 240-157995-1
Client Project/Site: Karn/Weadock CCR JCW Ash Pond

For:
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

Attn: Darby Litz

Authorized for release by:
11/22/2021 1:00:10 PM

Kris Brooks, Project Manager II
(330)966-9790
Kris.Brooks@Eurofinset.com

LINKS

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Have a Question? Ask The Expert

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

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

Job ID: 240-157995-1

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: 240-157995-1

Laboratory: Eurofins TestAmerica, Canton

Narrative

Job Narrative
240-157995-1

Comments
The EPA Method 903.0 Radium-226, EPA Method 904.0 Radium-228, 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 10/14/2021 8:00 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 1.0º C, 1.1º C and 1.1º C.

RAD
Method 903.0: 160-533149:
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.

Method 904.0: Radium 228 batch 533167
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.
JCW-MW-18001 (240-157995-1), JCW-MW-18004 (240-157995-2), JCW-MW-18005 (240-157995-3), JCW-MW-18006 (240-157995-4), MW-50 (240-157995-5), MW-51 (240-157995-6), MW-52 (240-157995-7), MW-53 (240-157995-8), MW-53R (240-157995-9), MW-54R (240-157995-10), MW-55 (240-157995-11), OW-57R OUT (240-157995-12), DUP-01 (240-157995-13), EB-01 (240-157995-14), (LCS 160-533167/1-A), (LCSD 160-533167/2-A) and (MB 160-533167/23-A)

Method PrecSep_0: Radium-228 Prep Batch 160-533167
The following samples were prepared at a reduced aliquot due to Matrix: JCW-MW-18001 (240-157995-1), JCW-MW-18005 (240-157995-3), JCW-MW-18006 (240-157995-4), MW-50 (240-157995-5), MW-51 (240-157995-6), MW-52 (240-157995-7), MW-53 (240-157995-8), MW-53R (240-157995-9), MW-54R (240-157995-10), MW-55 (240-157995-11), OW-57R OUT (240-157995-12) and DUP-01 (240-157995-13). 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: Radium-226 Prep Batch 160-533149
The following samples were prepared at a reduced aliquot due to Matrix: JCW-MW-18001 (240-157995-1), JCW-MW-18005 (240-157995-3), JCW-MW-18006 (240-157995-4), MW-50 (240-157995-5), MW-51 (240-157995-6), MW-52 (240-157995-7), MW-53 (240-157995-8), MW-53R (240-157995-9), MW-54R (240-157995-10), MW-55 (240-157995-11), OW-57R OUT (240-157995-12) and DUP-01 (240-157995-13). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead of a sample duplicate (DUP) to demonstrate batch precision.

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

Method Summary

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

Job ID: 240-157995-1

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.
Project/Site: Karn/Weadock CCR JCW Ash Pond

Job ID: 240-157995-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-157995-1	JCW-MW-18001	Water	10/11/21 06:00	10/14/21 08:00
240-157995-2	JCW-MW-18004	Water	10/12/21 06:31	10/14/21 08:00
240-157995-3	JCW-MW-18005	Water	10/12/21 10:00	10/14/21 08:00
240-157995-4	JCW-MW-18006	Water	10/12/21 11:51	10/14/21 08:00
240-157995-5	MW-50	Water	10/11/21 07:38	10/14/21 08:00
240-157995-6	MW-51	Water	10/11/21 08:00	10/14/21 08:00
240-157995-7	MW-52	Water	10/11/21 09:58	10/14/21 08:00
240-157995-8	MW-53	Water	10/11/21 10:54	10/14/21 08:00
240-157995-9	MW-53R	Water	10/11/21 12:20	10/14/21 08:00
240-157995-10	MW-54R	Water	10/11/21 13:22	10/14/21 08:00
240-157995-11	MW-55	Water	10/12/21 08:10	10/14/21 08:00
240-157995-12	OW-57R OUT	Water	10/12/21 10:56	10/14/21 08:00
240-157995-13	DUP-01	Water	10/11/21 00:00	10/14/21 08:00
240-157995-14	EB-01	Water	10/12/21 00:00	10/14/21 08:00

Client Sample Results

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

Job ID: 240-157995-1

Client Sample ID: JCW-MW-18001

Date Collected: 10/11/21 06:00
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-1

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	0.337		0.164	0.167	1.00	0.205	pCi/L	10/22/21 09:08	11/15/21 11:34	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*103*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:34*	*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	1.05		0.407	0.418	1.00	0.578	pCi/L	10/22/21 09:51	11/11/21 12:53	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*103*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:53*	*1*
Y Carrier	*83.0*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:53*	*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	1.39		0.439	0.450	5.00	0.578	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157995-1

Client Sample ID: JCW-MW-18004

Date Collected: 10/12/21 06:31
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-2

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	0.182		0.118	0.119	1.00	0.166	pCi/L	10/22/21 09:08	11/15/21 11:34	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.5*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:34*	*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	0.796		0.300	0.309	1.00	0.416	pCi/L	10/22/21 09:51	11/11/21 12:54	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.5*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:54*	*1*
Y Carrier	*83.4*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:54*	*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	0.978		0.322	0.331	5.00	0.416	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157995-1

Client Sample ID: JCW-MW-18005

Lab Sample ID: 240-157995-3

Date Collected: 10/12/21 10:00
Matrix: Water
Date Received: 10/14/21 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	0.176	U	0.166	0.167	1.00	0.262	pCi/L	10/22/21 09:08	11/15/21 11:34	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.8*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:34*	*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	**0.984**		0.391	0.401	1.00	0.547	pCi/L	10/22/21 09:51	11/11/21 12:54	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.8*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:54*	*1*
Y Carrier	*82.6*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:54*	*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	**1.16**		0.425	0.434	5.00	0.547	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157995-1

Client Sample ID: JCW-MW-18006

Date Collected: 10/12/21 11:51
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-4

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	0.268		0.167	0.169	1.00	0.233	pCi/L	10/22/21 09:08	11/15/21 11:34	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*100*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:34*	*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	0.872		0.397	0.405	1.00	0.570	pCi/L	10/22/21 09:51	11/11/21 12:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*100*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:55*	*1*
Y Carrier	*71.4*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:55*	*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	1.14		0.431	0.439	5.00	0.570	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157995-1

Client Sample ID: MW-50

Date Collected: 10/11/21 07:38
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-5

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	0.0613	U	0.121	0.121	1.00	0.215	pCi/L	10/22/21 09:08	11/15/21 11:34	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.3*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:34*	*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	**1.15**		0.404	0.418	1.00	0.541	pCi/L	10/22/21 09:51	11/11/21 12:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.3*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:55*	*1*
Y Carrier	*82.2*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:55*	*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	**1.21**		0.422	0.435	5.00	0.541	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157995-1

Client Sample ID: MW-51

Date Collected: 10/11/21 08:00
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-6

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	0.451		0.188	0.192	1.00	0.219	pCi/L	10/22/21 09:08	11/15/21 11:35	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.5*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:35*	*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	2.01		0.461	0.496	1.00	0.528	pCi/L	10/22/21 09:51	11/11/21 12:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.5*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:55*	*1*
Y Carrier	*81.5*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:55*	*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	2.46		0.498	0.532	5.00	0.528	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157995-1

Client Sample ID: MW-52

Date Collected: 10/11/21 09:58
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-7

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	0.249	U	0.184	0.185	1.00	0.274	pCi/L	10/22/21 09:08	11/15/21 11:35	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.3*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:35*	*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	**0.778**		0.409	0.415	1.00	0.611	pCi/L	10/22/21 09:51	11/11/21 12:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.3*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:57*	*1*
Y Carrier	*78.5*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:57*	*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	**1.03**		0.448	0.454	5.00	0.611	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157995-1

Client Sample ID: MW-53

Date Collected: 10/11/21 10:54
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-8

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	0.399		0.207	0.210	1.00	0.272	pCi/L	10/22/21 09:08	11/15/21 11:35	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.5*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:35*	*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	0.979		0.396	0.406	1.00	0.551	pCi/L	10/22/21 09:51	11/11/21 12:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.5*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:57*	*1*
Y Carrier	*87.5*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:57*	*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	1.38		0.447	0.457	5.00	0.551	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157995-1

Client Sample ID: MW-53R

Date Collected: 10/11/21 12:20
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-9

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	0.344		0.196	0.198	1.00	0.271	pCi/L	10/22/21 09:08	11/15/21 11:35	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*97.3*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:35*	*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	1.05		0.378	0.390	1.00	0.519	pCi/L	10/22/21 09:51	11/11/21 12:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*97.3*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*1*
Y Carrier	*88.2*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*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	1.40		0.426	0.437	5.00	0.519	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157995-1

Client Sample ID: MW-54R

Date Collected: 10/11/21 13:22
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-10

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	0.205	U	0.155	0.156	1.00	0.231	pCi/L	10/22/21 09:08	11/15/21 11:39	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.0*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:39*	*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	**0.759**		0.409	0.415	1.00	0.616	pCi/L	10/22/21 09:51	11/11/21 12:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.0*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*1*
Y Carrier	*79.3*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*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	**0.965**		0.437	0.443	5.00	0.616	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157995-1

Client Sample ID: MW-55

Date Collected: 10/12/21 08:10
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-11

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	0.467		0.196	0.201	1.00	0.239	pCi/L	10/22/21 09:08	11/15/21 11:39	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.5*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:39*	*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	1.10		0.387	0.400	1.00	0.522	pCi/L	10/22/21 09:51	11/11/21 12:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.5*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*1*
Y Carrier	*83.7*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*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	1.56		0.434	0.448	5.00	0.522	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157995-1

Client Sample ID: OW-57R OUT

Date Collected: 10/12/21 10:56
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-12

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	0.139	U	0.142	0.143	1.00	0.227	pCi/L	10/22/21 09:08	11/15/21 11:39	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.3*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:39*	*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	**1.12**		0.380	0.394	1.00	0.511	pCi/L	10/22/21 09:51	11/11/21 12:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.3*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*1*
Y Carrier	*86.0*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*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	**1.26**		0.406	0.419	5.00	0.511	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157995-1

Client Sample ID: DUP-01

Date Collected: 10/11/21 00:00
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-13

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	0.243		0.164	0.165	1.00	0.237	pCi/L	10/22/21 09:08	11/15/21 11:39	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*98.5*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:39*	*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	1.22		0.426	0.440	1.00	0.592	pCi/L	10/22/21 09:51	11/11/21 12:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*98.5*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*1*
Y Carrier	*86.7*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*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	1.46		0.456	0.470	5.00	0.592	pCi/L		11/15/21 15:35	1

Client Sample Results

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

Job ID: 240-157995-1

Client Sample ID: EB-01

Date Collected: 10/12/21 00:00
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-14

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	0.0383	U	0.102	0.102	1.00	0.184	pCi/L	10/22/21 09:08	11/15/21 11:39	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*97.0*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:39*	*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	**0.398**		0.250	0.253	1.00	0.383	pCi/L	10/22/21 09:51	11/11/21 12:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*97.0*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*1*
Y Carrier	*87.1*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*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	**0.437**		0.270	0.273	5.00	0.383	pCi/L		11/15/21 15:35	1

Tracer/Carrier Summary

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

Job ID: 240-157995-1

Method: 903.0 - Radium-226 (GFPC)

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

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits) Ba (40-110)
240-157995-1	JCW-MW-18001	103
240-157995-2	JCW-MW-18004	95.5
240-157995-3	JCW-MW-18005	95.8
240-157995-4	JCW-MW-18006	100
240-157995-5	MW-50	92.3
240-157995-6	MW-51	95.5
240-157995-7	MW-52	95.3
240-157995-8	MW-53	85.5
240-157995-9	MW-53R	97.3
240-157995-10	MW-54R	94.0
240-157995-11	MW-55	95.5
240-157995-12	OW-57R OUT	99.3
240-157995-13	DUP-01	98.5
240-157995-14	EB-01	97.0
LCS 160-533149/1-A	Lab Control Sample	104
LCSD 160-533149/2-A	Lab Control Sample Dup	99.8
MB 160-533149/23-A	Method Blank	80.3

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

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

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits) Ba (40-110)	Y (40-110)
240-157995-1	JCW-MW-18001	103	83.0
240-157995-2	JCW-MW-18004	95.5	83.4
240-157995-3	JCW-MW-18005	95.8	82.6
240-157995-4	JCW-MW-18006	100	71.4
240-157995-5	MW-50	92.3	82.2
240-157995-6	MW-51	95.5	81.5
240-157995-7	MW-52	95.3	78.5
240-157995-8	MW-53	85.5	87.5
240-157995-9	MW-53R	97.3	88.2
240-157995-10	MW-54R	94.0	79.3
240-157995-11	MW-55	95.5	83.7
240-157995-12	OW-57R OUT	99.3	86.0
240-157995-13	DUP-01	98.5	86.7
240-157995-14	EB-01	97.0	87.1
LCS 160-533167/1-A	Lab Control Sample	104	79.6
LCSD 160-533167/2-A	Lab Control Sample Dup	99.8	81.1
MB 160-533167/23-A	Method Blank	80.3	86.4

Tracer/Carrier Legend

Ba = Ba Carrier
Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-533149/23-A
Matrix: Water
Analysis Batch: 536662

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 533149

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.005876	U	0.138	0.138	1.00	0.273	pCi/L	10/22/21 09:08	11/15/21 11:39	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*80.3*		*40 - 110*	*10/22/21 09:08*	*11/15/21 11:39*	*1*

Lab Sample ID: LCS 160-533149/1-A
Matrix: Water
Analysis Batch: 536661

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 533149

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-226			15.1	12.44		1.37	1.00	0.214	pCi/L	82	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*104*		*40 - 110*

Lab Sample ID: LCSD 160-533149/2-A
Matrix: Water
Analysis Batch: 536661

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 533149

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-226			15.1	13.44		1.47	1.00	0.236	pCi/L	89	75 - 125	0.35	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*99.8*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-533167/23-A
Matrix: Water
Analysis Batch: 536046

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 533167

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.3359	U	0.379	0.380	1.00	0.623	pCi/L	10/22/21 09:51	11/11/21 12:58	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*80.3*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*1*
Y Carrier	*86.4*		*40 - 110*	*10/22/21 09:51*	*11/11/21 12:58*	*1*

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

Lab Sample ID: LCS 160-533167/1-A
Matrix: Water
Analysis Batch: 536205

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 533167

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-228			12.2	11.13		1.44	1.00	0.713	pCi/L	91	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*104*		*40 - 110*
Y Carrier	*79.6*		*40 - 110*

Lab Sample ID: LCSD 160-533167/2-A
Matrix: Water
Analysis Batch: 536205

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 533167

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-228			12.2	12.44		1.47	1.00	0.575	pCi/L	102	75 - 125	0.45	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*99.8*		*40 - 110*
Y Carrier	*81.1*		*40 - 110*

QC Association Summary

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

Job ID: 240-157995-1

Rad

Prep Batch: 533149

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-157995-1	JCW-MW-18001	Total/NA	Water	PrecSep STD	
240-157995-2	JCW-MW-18004	Total/NA	Water	PrecSep STD	
240-157995-3	JCW-MW-18005	Total/NA	Water	PrecSep STD	
240-157995-4	JCW-MW-18006	Total/NA	Water	PrecSep STD	
240-157995-5	MW-50	Total/NA	Water	PrecSep STD	
240-157995-6	MW-51	Total/NA	Water	PrecSep STD	
240-157995-7	MW-52	Total/NA	Water	PrecSep STD	
240-157995-8	MW-53	Total/NA	Water	PrecSep STD	
240-157995-9	MW-53R	Total/NA	Water	PrecSep STD	
240-157995-10	MW-54R	Total/NA	Water	PrecSep STD	
240-157995-11	MW-55	Total/NA	Water	PrecSep STD	
240-157995-12	OW-57R OUT	Total/NA	Water	PrecSep STD	
240-157995-13	DUP-01	Total/NA	Water	PrecSep STD	
240-157995-14	EB-01	Total/NA	Water	PrecSep STD	
MB 160-533149/23-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-533149/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
LCSD 160-533149/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	

Prep Batch: 533167

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-157995-1	JCW-MW-18001	Total/NA	Water	PrecSep_0	
240-157995-2	JCW-MW-18004	Total/NA	Water	PrecSep_0	
240-157995-3	JCW-MW-18005	Total/NA	Water	PrecSep_0	
240-157995-4	JCW-MW-18006	Total/NA	Water	PrecSep_0	
240-157995-5	MW-50	Total/NA	Water	PrecSep_0	
240-157995-6	MW-51	Total/NA	Water	PrecSep_0	
240-157995-7	MW-52	Total/NA	Water	PrecSep_0	
240-157995-8	MW-53	Total/NA	Water	PrecSep_0	
240-157995-9	MW-53R	Total/NA	Water	PrecSep_0	
240-157995-10	MW-54R	Total/NA	Water	PrecSep_0	
240-157995-11	MW-55	Total/NA	Water	PrecSep_0	
240-157995-12	OW-57R OUT	Total/NA	Water	PrecSep_0	
240-157995-13	DUP-01	Total/NA	Water	PrecSep_0	
240-157995-14	EB-01	Total/NA	Water	PrecSep_0	
MB 160-533167/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-533167/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-533167/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Lab Chronicle

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

Job ID: 240-157995-1

Client Sample ID: JCW-MW-18001 — Lab Sample ID: 240-157995-1

Date Collected: 10/11/21 06:00 — **Matrix: Water**
Date Received: 10/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536661	11/15/21 11:34	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536055	11/11/21 12:53	MLK	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Client Sample ID: JCW-MW-18004 — Lab Sample ID: 240-157995-2

Date Collected: 10/12/21 06:31 — **Matrix: Water**
Date Received: 10/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536661	11/15/21 11:34	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536055	11/11/21 12:54	MLK	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Client Sample ID: JCW-MW-18005 — Lab Sample ID: 240-157995-3

Date Collected: 10/12/21 10:00 — **Matrix: Water**
Date Received: 10/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536661	11/15/21 11:34	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536055	11/11/21 12:54	MLK	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Client Sample ID: JCW-MW-18006 — Lab Sample ID: 240-157995-4

Date Collected: 10/12/21 11:51 — **Matrix: Water**
Date Received: 10/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536661	11/15/21 11:34	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536055	11/11/21 12:55	MLK	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Lab Chronicle

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

Job ID: 240-157995-1

Client Sample ID: MW-50
Date Collected: 10/11/21 07:38
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536661	11/15/21 11:34	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536055	11/11/21 12:55	MLK	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Client Sample ID: MW-51
Date Collected: 10/11/21 08:00
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-6
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536661	11/15/21 11:35	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536055	11/11/21 12:55	MLK	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Client Sample ID: MW-52
Date Collected: 10/11/21 09:58
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-7
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536661	11/15/21 11:35	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536046	11/11/21 12:57	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Client Sample ID: MW-53
Date Collected: 10/11/21 10:54
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536661	11/15/21 11:35	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536046	11/11/21 12:57	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Lab Chronicle

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

Job ID: 240-157995-1

Client Sample ID: MW-53R
Date Collected: 10/11/21 12:20
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-9
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536661	11/15/21 11:35	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536046	11/11/21 12:58	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Client Sample ID: MW-54R
Date Collected: 10/11/21 13:22
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-10
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536662	11/15/21 11:39	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536046	11/11/21 12:58	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Client Sample ID: MW-55
Date Collected: 10/12/21 08:10
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-11
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536662	11/15/21 11:39	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536046	11/11/21 12:58	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Client Sample ID: OW-57R OUT
Date Collected: 10/12/21 10:56
Date Received: 10/14/21 08:00

Lab Sample ID: 240-157995-12
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536662	11/15/21 11:39	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536046	11/11/21 12:58	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Lab Chronicle

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

Job ID: 240-157995-1

Client Sample ID: DUP-01

Lab Sample ID: 240-157995-13

Date Collected: 10/11/21 00:00
Matrix: Water
Date Received: 10/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536662	11/15/21 11:39	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536046	11/11/21 12:58	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	TAL SL

Client Sample ID: EB-01

Lab Sample ID: 240-157995-14

Date Collected: 10/12/21 00:00
Matrix: Water
Date Received: 10/14/21 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			533149	10/22/21 09:08	BMP	TAL SL
Total/NA	Analysis	903.0		1	536662	11/15/21 11:39	MLK	TAL SL
Total/NA	Prep	PrecSep_0			533167	10/22/21 09:51	BMP	TAL SL
Total/NA	Analysis	904.0		1	536046	11/11/21 12:58	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	536825	11/15/21 15:35	MLK	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.
Project/Site: Karn/Weadock CCR JCW Ash Pond

Job ID: 240-157995-1

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	06-30-22
California	State	2886	06-30-21 *
Connecticut	State	PH-0241	03-31-23
Florida	NELAP	E87689	06-30-22
HI - RadChem Recognition	State	n/a	06-30-22
Illinois	NELAP	200023	11-30-22
Iowa	State	373	12-01-22
Kansas	NELAP	E-10236	10-31-22
Kentucky (DW)	State	KY90125	01-01-22
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-21
Louisiana	NELAP	04080	06-30-22
Louisiana (DW)	State	LA011	12-31-21
Maryland	State	310	09-30-22
MI - RadChem Recognition	State	9005	06-30-22
Missouri	State	780	06-30-22
Nevada	State	MO000542020-1	07-31-22
New Jersey	NELAP	MO002	06-30-22
New York	NELAP	11616	04-01-22
North Dakota	State	R-207	06-30-22
NRC	NRC	24-24817-01	12-31-22
Oklahoma	State	9997	08-31-22
Oregon	NELAP	4157	09-01-22
Pennsylvania	NELAP	68-00540	03-01-22
South Carolina	State	85002001	06-30-22
Texas	NELAP	T104704193	07-31-22
US Fish & Wildlife	US Federal Programs	058448	07-31-22
USDA	US Federal Programs	P330-17-00028	03-11-23
Utah	NELAP	MO000542021-14	08-01-22
Virginia	NELAP	10310	06-14-22
Washington	State	C592	08-30-22
West Virginia DEP	State	381	10-31-22

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

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: Jacob Krenz	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-87170-33306.1
Client Contact: Jacob Krenz	Phone: 734 904 3316	E-Mail: Kris.Brooks@Eurofinset.com	State of Origin:	Page: Page 1 of 2
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 JCW Ash Pond	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:				D	D		
JCW-MW-18001	10/11/21	0625	G	Water	N	N	X	X	2	
JCW-MW-18004	10/12/21	0635	G	Water	N	N	X	X	2	
JCW-MW-18005	10/12/21	1000	G	Water	N	N	X	X	2	
JCW-MW-18006	10/12/21	1151	G	Water	N	N	X	X	2	
MW-50	10/11/21	0734	G	Water	N	N	X	X	2	
MW-51	10/11/21	0656	G	Water	N	N	X	X	2	
MW-52	10/11/21	0958	G	Water	N	N	X	X	2	
MW-53	10/11/21	1054	G	Water	N	N	X	X	2	
MW-53R	10/11/21	1230	G	Water	N	N	X	X	2	
MW-54R	10/11/21	1332	G	Water	N	N	X	X	2	
MW-55	10/13/21	0806	G	Water	N	N	X	X	2	

240-157995 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]	10/12/21 1011	TRC	[signature]	10/13/21 1015	ETA
[signature]	10/13/21 1020	ETA	[signature]	10/14/21 ECC	

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

.ins TestAmerica, Canton
Shuffel Street NW
orth 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 JASSO	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-87170-33306.2
Client Contact: Jacob Krenz	Phone: 7344904316	E-Mail: Kris.Brooks@Eurofinset.com	State of Origin:	Page: Page 2 of 2
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 JCW Ash Pond	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:				D	D		
OW-57R OUT	10/12/21	1056	G	Water	N	N	+	+	2	
DUP-01	10/12/21	—	G	Water	N	N	+	+	2	
EB-01	10/12/21	1257	G	Water	N	N	X	+	2	
				Water						
				Water						
				Water						

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: 10/13/21 1017	Company: TRC	Received by:	Date/Time: 10/13/21 1015	Company: ETA
Relinquished by:	Date/Time: 10/13/21 1020	Company: ETA	Received by:	Date/Time: 10/14/21 800	Company: ETA
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 Sample Receipt Form/Narrative
Canton Facility

Login # : 157995

Client TRC Site Name _____ Cooler unpacked by: Trent

Cooler Received on 10/14/21 Opened on 10/14/21

FedEx: 1st Grd Exp UPS FAS Clipper Client Drop Off TestAmerica Courier Other _____

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

TestAmerica Cooler # TA 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-14 (CF +0.1 °C) Observed Cooler Temp._____°C Corrected Cooler Temp._____°C
   IR GUN #IR-15 (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# **HC157842**
14. Were VOAs on the COC? Yes No
15. Were air bubbles >6 mm in any VOA vials? ● ⬅ Larger than this. Yes No NA
16. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot #_____ Yes No
17. Was a LL Hg or Me Hg trip blank present? _____ Yes No

Tests that are not checked for pH by Receiving:
VOAs
Oil and Grease
TOC

Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other

Concerning _____

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

Samples processed by:

19. SAMPLE CONDITION

Sample(s) _____ were received after the recommended holding time had expired.
Sample(s) _____ were received in a broken container.
Sample(s) _____ were received with bubble >6 mm in diameter. (Notify PM)

20. SAMPLE PRESERVATION

Sample(s) _____ were further preserved in the laboratory.
Time preserved: _____ Preservative(s) added/Lot number(s): _____

VOA Sample Preservation - Date/Time VOAs Frozen: _____

Login # : _____

Eurofins TestAmerica Canton Sample Receipt Multiple Cooler Form				
Cooler Description (Circle)	IR Gun # (Circle)	Observed Temp °C	Corrected Temp °C	Coolant (Circle)
TA Client Box Other	IR-14 IR-15	1.0	1.1	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15	0.9	1.0	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15	1.0	1.1	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
				☐ See Temperature Excursion Form

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

Login Container Summary Report

Temperature readings: _____

Client Sample ID	Lab ID	Container Type	Container pH	Container Temp	Preservative Added (mls)	Lot #
JCW-MW-18001	240-157995-A-1	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18001	240-157995-B-1	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18004	240-157995-A-2	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18004	240-157995-B-2	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18005	240-157995-A-3	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18005	240-157995-B-3	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18006	240-157995-A-4	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18006	240-157995-B-4	Plastic 1 liter - Nitric Acid	<2			
MW-50	240-157995-A-5	Plastic 1 liter - Nitric Acid	<2			
MW-50	240-157995-B-5	Plastic 1 liter - Nitric Acid	<2			
MW-51	240-157995-A-6	Plastic 1 liter - Nitric Acid	<2			
MW-51	240-157995-B-6	Plastic 1 liter - Nitric Acid	<2			
MW-52	240-157995-A-7	Plastic 1 liter - Nitric Acid	<2			
MW-52	240-157995-B-7	Plastic 1 liter - Nitric Acid	<2			
MW-53	240-157995-A-8	Plastic 1 liter - Nitric Acid	<2			
MW-53	240-157995-B-8	Plastic 1 liter - Nitric Acid	<2			
MW-53R	240-157995-A-9	Plastic 1 liter - Nitric Acid	<2			
MW-53R	240-157995-B-9	Plastic 1 liter - Nitric Acid	<2			
MW-54R	240-157995-A-10	Plastic 1 liter - Nitric Acid	<2			
MW-54R	240-157995-B-10	Plastic 1 liter - Nitric Acid	<2			
MW-55	240-157995-A-11	Plastic 1 liter - Nitric Acid	<2			
MW-55	240-157995-B-11	Plastic 1 liter - Nitric Acid	<2			
OW-57R OUT	240-157995-A-12	Plastic 1 liter - Nitric Acid	<2			
OW-57R OUT	240-157995-B-12	Plastic 1 liter - Nitric Acid	<2			
DUP-01	240-157995-A-13	Plastic 1 liter - Nitric Acid	<2			
DUP-01	240-157995-B-13	Plastic 1 liter - Nitric Acid	<2			
EB-01	240-157995-A-14	Plastic 1 liter - Nitric Acid	<2			
EB-01	240-157995-B-14	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

eurofins Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-144145.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@Eurofinset.com	State of Origin: Michigan	Page: Page 1 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-157995-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 11/14/2021			
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:								
JCW-MW-18001 (240-157995-1)	10/11/21	06:00 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-18004 (240-157995-2)	10/12/21	06:31 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-18005 (240-157995-3)	10/12/21	10:00 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-18006 (240-157995-4)	10/12/21	11:51 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-50 (240-157995-5)	10/11/21	07:38 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-51 (240-157995-6)	10/11/21	08:00 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-52 (240-157995-7)	10/11/21	09:58 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-53 (240-157995-8)	10/11/21	10:54 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-53R (240-157995-9)	10/11/21	12:20 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 *Unconfirmed*	***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) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:		Method of Shipment:	
Relinquished by:	Date/Time: 10-14-21 1748	Company: ETA	Received by: FED EX	Date/Time:	Company:
Relinquished by: FED EX	Date/Time:	Company:	Received by:	Date/Time: OCT 15 2021 0932	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: 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

eurofins Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-144145.2
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@Eurofinset.com	State of Origin: Michigan	Page: Page 2 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-157995-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 11/14/2021			
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:								
MW-54R (240-157995-10)	10/11/21	13:22 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-55 (240-157995-11)	10/12/21	08:10 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
OW-57R OUT (240-157995-12)	10/12/21	10:56 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-01 (240-157995-13)	10/11/21	Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
EB-01 (240-157995-14)	10/12/21	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 *Unconfirmed*	***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) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:		Method of Shipment:	
Relinquished by: RH	Date/Time: 10-14-21 1748	Company: ETA	Received by: FED EX	Date/Time:	Company:
Relinquished by: FED EX	Date/Time:	Company:	Received by:	Date/Time: OCT 15 2021 0932	Company: ETA
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:

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

Ver: 06/08/2021

Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

Job Number: 240-157995-1

Login Number: 157995
List Number: 2
Creator: Johnson, Autumn R

List Source: Eurofins TestAmerica, St. Louis
List Creation: 10/15/21 12:25 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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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: November 01, 2021

Subject: PART 115 GROUNDWATER MONITORING – LEACHATE WELLS – MERCURY, 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: 21-1174

TRC Environmental, Inc. conducted groundwater monitoring at the JC Weadock solid waste disposal area on 10/07/2021 for the 4th Quarter Low Level Mercury monitoring requirement, as specified in the Hydrogeological Monitoring 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

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

CASE NARRATIVE

I. Sample Receipt

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

II. Methodology

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

III. Results/Quality Control

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

DEFINITIONS / QUALIFIERS

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

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

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

Consumers Energy
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Laboratory Services
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Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q4-2021 JCW Part 115 Leachate Headwells Low Level Mercury
Date Received: 10/7/2021
Chemistry Project: 21-1174

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-1174-01	LH-104	Groundwater	10/07/2021 12:15 PM	JCW Solid Waste Disposal Area
21-1174-02	LH-104 Dup	Groundwater	10/07/2021 12:15 PM	JCW Solid Waste Disposal Area
21-1174-03	LH-104 MS	Groundwater	10/07/2021 12:15 PM	JCW Solid Waste Disposal Area
21-1174-04	LH-104 MSD	Groundwater	10/07/2021 12:15 PM	JCW Solid Waste Disposal Area
21-1174-05	FB	Water	10/07/2021 12:21 PM	JCW Solid Waste Disposal Area
21-1174-06	EB	Water	10/07/2021 12:22 PM	JCW Solid Waste Disposal Area
21-1174-07	TB	Water	10/07/2021 12:00 PM	JCW Solid Waste Disposal Area

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**21-1174**
Field Sample ID:	**LH-104**	Collect Date:	10/07/2021
Lab Sample ID:	21-1174-01	Collect Time:	12:15 PM
Matrix:	Groundwater		

Mercury, Low Level by EPA 1631E

Aliquot #: 21-1174-01-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	0.58		ng/L	0.5	10/14/2021	AB21-1014-11

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**21-1174**
Field Sample ID:	**LH-104 Dup**	Collect Date:	10/07/2021
Lab Sample ID:	21-1174-02	Collect Time:	12:15 PM
Matrix:	Groundwater		

Mercury, Low Level by EPA 1631E

Aliquot #: 21-1174-02-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	0.59		ng/L	0.5	10/14/2021	AB21-1014-11

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**21-1174**
Field Sample ID:	**LH-104 MS**	Collect Date:	10/07/2021
Lab Sample ID:	21-1174-03	Collect Time:	12:15 PM
Matrix:	Groundwater		

Mercury, Low Level by EPA 1631E

Aliquot #: 21-1174-03-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	88.0		%	0.5	10/14/2021	AB21-1014-11

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**21-1174**
Field Sample ID:	**LH-104 MSD**	Collect Date:	10/07/2021
Lab Sample ID:	21-1174-04	Collect Time:	12:15 PM
Matrix:	Groundwater		

Mercury, Low Level by EPA 1631E

Aliquot #: 21-1174-04-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	88.0		%	0.5	10/14/2021	AB21-1014-11

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**21-1174**
Field Sample ID:	**FB**	Collect Date:	10/07/2021
Lab Sample ID:	21-1174-05	Collect Time:	12:21 PM
Matrix:	Water		

Mercury, Low Level by EPA 1631E

Aliquot #: 21-1174-05-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	ND		ng/L	0.5	10/14/2021	AB21-1014-11

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**21-1174**
Field Sample ID:	**EB**	Collect Date:	10/07/2021
Lab Sample ID:	21-1174-06	Collect Time:	12:22 PM
Matrix:	Water		

Mercury, Low Level by EPA 1631E

Aliquot #: 21-1174-06-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	ND		ng/L	0.5	10/14/2021	AB21-1014-11

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Analytical Report

Report Date: 11/01/21

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**21-1174**
Field Sample ID:	**TB**	Collect Date:	10/07/2021
Lab Sample ID:	21-1174-07	Collect Time:	12:00 PM
Matrix:	Water		

Mercury, Low Level by EPA 1631E

Aliquot #: 21-1174-07-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	ND		ng/L	0.5	10/14/2021	AB21-1014-11

Analytical Report

Report Date: 11/01/21

Data Qualifiers	Exception Summary
	No exceptions occured.

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-1174

Inspection Date: 10/07/21 **Inspection By:** EB

Sample Origin/Project Name: JCW LL Mercury

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 N/A Samples Received on Ice: Yes N/A No N/A

M&TE # and Expiration N/A

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

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or 60mL)					
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)					
24 mL vial (glass)					
500 mL (plastic)					
Other 8-oz glass	7				

CHAIN OF CUSTODY

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Consumers Energy

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

SAMPLING SITE: JCW Leachate Headwell – 2021 Q4

PROJECT NUMBER: 21-1174

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	Low Level Mercury								REMARKS
21-1174-01	10-7-21	1215	GW	LH-104		1	X								
-02	10-7-21	~~1215~~	GW	LH-104 Dup		1	X								
-03	10-7-21	1215	GW	LH-104 MS		1	X								
-04	10-7-21	1215	GW	LH-104 MSD		1	X								
-05	10-7-21	1221	W	FB		1	X								
-06	10-7-21	1222	W	EB		1	X								
-07	10-7-21	—	W	TB		1	X								

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
	10/7/21 1530	
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)

COMMENTS

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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: November 01, 2021

Subject: RCRA GROUNDWATER MONITORING – DEK-JCW BACKGROUND 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: 21-1171

TRC Environmental, Inc. conducted groundwater monitoring at the Karn/Weadock Background Wells 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

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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 & JCW RCRA Background Wells
Date Received: 10/7/2021
Chemistry Project: 21-1171

Sample #	Field Sample ID	Matrix	Sample Date	Site
21-1171-01	MW-15002	Groundwater	10/07/2021 09:08 AM	DEK JCW Background
21-1171-02	MW-15008	Groundwater	10/06/2021 04:02 PM	DEK JCW Background
21-1171-03	MW-15016	Groundwater	10/07/2021 10:10 AM	DEK JCW Background
21-1171-04	MW-15019	Groundwater	10/07/2021 08:10 AM	DEK JCW Background
21-1171-05	DUP-Background	Groundwater	10/07/2021 12:00 AM	DEK JCW Background
21-1171-06	FB-MW-15002	Water	10/07/2021 09:08 AM	DEK JCW Background

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Analytical Report

Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15002**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-01	Collect Time:	09:08 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1171-01-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 #: 21-1171-01-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	3		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	85		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	51		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	76800		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	2810		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	8530		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	1240		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	138000		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 #: 21-1171-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	146000		ug/L	1000.0	10/18/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	3760		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1171-01-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	290		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15002**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-01	Collect Time:	09:08 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1171-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	277000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Bicarbonate	277000		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: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15008**	Collect Date:	10/06/2021
Lab Sample ID:	21-1171-02	Collect Time:	04:02 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1171-02-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 #: 21-1171-02-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	3		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	204		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	116000		ug/L	1000.0	10/28/2021	AB21-1028-02
Chromium	2		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	14500		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	30		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	15800		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	6		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	3170		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	168000		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	6		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 #: 21-1171-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	197000		ug/L	1000.0	10/18/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	11600		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1171-02-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	810		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15008**	Collect Date:	10/06/2021
Lab Sample ID:	21-1171-02	Collect Time:	04:02 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1171-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	361000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Bicarbonate	361000		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: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15016**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-03	Collect Time:	10:10 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1171-03-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 #: 21-1171-03-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	8		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	63		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	661		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	236000		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	1		ug/L	1.0	10/28/2021	AB21-1028-02
Iron	2670		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	85		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	26400		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	7		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	14		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	20800		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	96000		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 #: 21-1171-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	138000		ug/L	1000.0	10/18/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	433000		ug/L	1000.0	10/18/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1171-03-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1140		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15016**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-03	Collect Time:	10:10 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1171-03-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	214000		ug/L	10000.0	10/14/2021	AB21-1014-10
Alkalinity Bicarbonate	214000		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: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15019**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-04	Collect Time:	08:10 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1171-04-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 #: 21-1171-04-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	3		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	283		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	351		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	165000		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	20900		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	15		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	35200		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	7		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	2120		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	238000		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	2		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 #: 21-1171-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	363000		ug/L	1000.0	10/18/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	58300		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1171-04-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1130		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**MW-15019**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-04	Collect Time:	08:10 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1171-04-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	432000		ug/L	10000.0	10/15/2021	AB21-1015-20
Alkalinity Bicarbonate	432000		ug/L	10000.0	10/15/2021	AB21-1015-20
Alkalinity Carbonate	ND		ug/L	10000.0	10/15/2021	AB21-1015-20

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Analytical Report

Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**DUP-Background**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-05	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1171-05-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-06

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

Aliquot #: 21-1171-05-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	305		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	338		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	170000		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	21200		ug/L	20.0	10/28/2021	AB21-1028-02
Lead	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Lithium	16		ug/L	10.0	10/28/2021	AB21-1028-02
Magnesium	34700		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	2340		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	240000		ug/L	1000.0	10/28/2021	AB21-1028-02
Thallium	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Vanadium	2		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 #: 21-1171-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	350000		ug/L	1000.0	10/18/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	54700		ug/L	1000.0	10/14/2021	AB21-1014-08

Total Dissolved Solids by SM 2540C

Aliquot #: 21-1171-05-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1220		mg/L	10.0	10/11/2021	AB21-1011-04

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Analytical Report

Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**DUP-Background**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-05	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 21-1171-05-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	438000		ug/L	10000.0	10/15/2021	AB21-1015-20
Alkalinity Bicarbonate	438000		ug/L	10000.0	10/15/2021	AB21-1015-20
Alkalinity Carbonate	ND		ug/L	10000.0	10/15/2021	AB21-1015-20

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Analytical Report

Report Date: 11/01/21

Sample Site:	**DEK JCW Background**	Laboratory Project:	**21-1171**
Field Sample ID:	**FB-MW-15002**	Collect Date:	10/07/2021
Lab Sample ID:	21-1171-06	Collect Time:	09:08 AM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 21-1171-06-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/14/2021	AB21-1014-06

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

Aliquot #: 21-1171-06-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	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Barium	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Beryllium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Boron	ND		ug/L	20.0	10/28/2021	AB21-1028-02
Cadmium	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Calcium	ND		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	ND		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	ND		ug/L	1000.0	10/28/2021	AB21-1028-02
Molybdenum	ND		ug/L	5.0	10/28/2021	AB21-1028-02
Nickel	ND		ug/L	2.0	10/28/2021	AB21-1028-02
Potassium	ND		ug/L	100.0	10/28/2021	AB21-1028-02
Selenium	ND		ug/L	1.0	10/28/2021	AB21-1028-02
Silver	ND		ug/L	0.2	10/28/2021	AB21-1028-02
Sodium	ND		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 #: 21-1171-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Fluoride	ND		ug/L	1000.0	10/14/2021	AB21-1014-08
Sulfate	ND		ug/L	1000.0	10/14/2021	AB21-1014-08

Analytical Report

Report Date: 11/01/21

Data Qualifiers	Exception Summary
	No exceptions occured.

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 21-1171

Inspection Date: 10·8·21 **Inspection By:** CLH

Sample Origin/Project Name: Background

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx _____ UPS _____ USPS _____ Airborne _____

Other/Hand Carry (whom) TRC

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

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

Cooler (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 0154.02 | 6·3·22 Samples Received on Ice: Yes ✓ No _____

M&TE # and Expiration 5.8°C

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

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or 60mL)	10				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	12				
24 mL vial (glass)					
250 ~~500~~ mL (plastic)	5				
Other					

7G.2q2 not needed

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SAMPLING SITE: DEK & JCW Background- 2021 Q4

PROJECT NUMBER: 21-1171

SAMPLING TEAM: Andrew cs.

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
21-1171-01	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)
	10/07/21 1530	
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)

COMMENTS

5.8°c

#015402

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ANALYTICAL REPORT

Eurofins TestAmerica, Canton
4101 Shuffel Street NW
North Canton, OH 44720
Tel: (330)497-9396

Laboratory Job ID: 240-157750-1
Client Project/Site: Karn/Weadock CCR Background Wells

For:
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

Attn: Darby Litz

Authorized for release by:
11/19/2021 8:10:30 PM

Kris Brooks, Project Manager II
(330)966-9790
Kris.Brooks@Eurofinset.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Definitions/Glossary

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

Job ID: 240-157750-1

Qualifiers

Rad

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
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: 240-157750-1

Laboratory: Eurofins TestAmerica, Canton

Narrative

Job Narrative
240-157750-1

Comments
The EPA Method 903.0 Radium-226, EPA Method 904.0 Radium-228, 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 10/9/2021 10:10 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 3 coolers at receipt time were 1.9º C, 2.5º C and 3.1º C.

RAD
Method 903.0: Radium 226 batch 531995
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. MW-15002 (240-157750-1), MW-15008 (240-157750-2), MW-15016 (240-157750-3), MW-15019 (240-157750-4), DUP-04 (240-157750-5), EB-04 (240-157750-6), (LCS 160-531995/1-A), (LCSD 160-531995/2-A) and (MB 160-531995/20-A)

Method 904.0: Radium 228 batch 531998
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. MW-15002 (240-157750-1), MW-15008 (240-157750-2), MW-15016 (240-157750-3), MW-15019 (240-157750-4), DUP-04 (240-157750-5), EB-04 (240-157750-6), (LCS 160-531998/1-A), (LCSD 160-531998/2-A) and (MB 160-531998/20-A)

Method PrecSep_0: Radium-228 Prep Batch 160-531998
The following samples were prepared at a reduced aliquot due to Matrix: MW-15002 (240-157750-1), MW-15008 (240-157750-2), MW-15016 (240-157750-3), MW-15019 (240-157750-4) and DUP-04 (240-157750-5). 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: 160-531995
The following samples were prepared at a reduced aliquot due to Matrix: MW-15002 (240-157750-1), MW-15008 (240-157750-2), MW-15016 (240-157750-3), MW-15019 (240-157750-4) and DUP-04 (240-157750-5). As a result a laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead of a sample duplicate (DUP) to demonstrate batch precision. MW-15002 (240-157750-1), MW-15008 (240-157750-2), MW-15016 (240-157750-3), MW-15019 (240-157750-4) and DUP-04 (240-157750-5)

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

Method Summary

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

Job ID: 240-157750-1

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.
Project/Site: Karn/Weadock CCR Background Wells

Job ID: 240-157750-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-157750-1	MW-15002	Water	10/07/21 09:08	10/09/21 10:10
240-157750-2	MW-15008	Water	10/06/21 16:02	10/09/21 10:10
240-157750-3	MW-15016	Water	10/07/21 10:10	10/09/21 10:10
240-157750-4	MW-15019	Water	10/07/21 08:10	10/09/21 10:10
240-157750-5	DUP-04	Water	10/07/21 00:00	10/09/21 10:10
240-157750-6	EB-04	Water	10/07/21 10:10	10/09/21 10:10

Client Sample Results

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

Job ID: 240-157750-1

Client Sample ID: MW-15002

Date Collected: 10/07/21 09:08
Date Received: 10/09/21 10:10

Lab Sample ID: 240-157750-1

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	**0.775**		0.361	0.367	1.00	0.415	pCi/L	10/15/21 11:10	11/08/21 17:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*96.1*		*40 - 110*	*10/15/21 11:10*	*11/08/21 17:29*	*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	0.225	U	0.347	0.347	1.00	0.582	pCi/L	10/15/21 11:44	11/08/21 13:12	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*96.1*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:12*	*1*
Y Carrier	*81.5*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:12*	*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	**1.00**		0.501	0.505	5.00	0.582	pCi/L		11/18/21 22:40	1

Client Sample Results

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

Job ID: 240-157750-1

Client Sample ID: MW-15008

Date Collected: 10/06/21 16:02
Date Received: 10/09/21 10:10

Lab Sample ID: 240-157750-2

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	1.05		0.410	0.421	1.00	0.455	pCi/L	10/15/21 11:10	11/08/21 17:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*102*		*40 - 110*	*10/15/21 11:10*	*11/08/21 17:29*	*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	1.11	*	0.371	0.385	1.00	0.493	pCi/L	10/15/21 11:44	11/08/21 13:12	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*102*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:12*	*1*
Y Carrier	*80.4*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:12*	*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	2.16		0.553	0.570	5.00	0.493	pCi/L		11/18/21 22:40	1

Client Sample Results

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

Job ID: 240-157750-1

Client Sample ID: MW-15016

Date Collected: 10/07/21 10:10
Date Received: 10/09/21 10:10

Lab Sample ID: 240-157750-3

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	**0.934**		0.379	0.388	1.00	0.406	pCi/L	10/15/21 11:10	11/08/21 17:29	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*101*		*40 - 110*	*10/15/21 11:10*	*11/08/21 17:29*	*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	0.393	U	0.304	0.306	1.00	0.478	pCi/L	10/15/21 11:44	11/08/21 13:12	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*101*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:12*	*1*
Y Carrier	*83.7*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:12*	*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	**1.33**		0.486	0.494	5.00	0.478	pCi/L		11/18/21 22:40	1

Client Sample Results

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

Job ID: 240-157750-1

Client Sample ID: MW-15019

Date Collected: 10/07/21 08:10
Date Received: 10/09/21 10:10

Lab Sample ID: 240-157750-4

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	**1.42**		0.469	0.486	1.00	0.494	pCi/L	10/15/21 11:10	11/08/21 17:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*101*		*40 - 110*	*10/15/21 11:10*	*11/08/21 17:32*	*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	0.308	U	0.267	0.268	1.00	0.424	pCi/L	10/15/21 11:44	11/08/21 13:13	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*101*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:13*	*1*
Y Carrier	*84.5*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:13*	*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	**1.72**		0.540	0.555	5.00	0.494	pCi/L		11/18/21 22:40	1

Client Sample Results

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

Job ID: 240-157750-1

Client Sample ID: DUP-04

Date Collected: 10/07/21 00:00
Date Received: 10/09/21 10:10

Lab Sample ID: 240-157750-5

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	**0.723**		0.374	0.379	1.00	0.485	pCi/L	10/15/21 11:10	11/08/21 17:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*103*		*40 - 110*	*10/15/21 11:10*	*11/08/21 17:32*	*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	0.0453	U	0.221	0.221	1.00	0.395	pCi/L	10/15/21 11:44	11/08/21 13:15	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*103*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:15*	*1*
Y Carrier	*86.0*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:15*	*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	**0.769**		0.434	0.439	5.00	0.485	pCi/L		11/18/21 22:40	1

Client Sample Results

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

Job ID: 240-157750-1

Client Sample ID: EB-04

Date Collected: 10/07/21 10:10
Date Received: 10/09/21 10:10

Lab Sample ID: 240-157750-6

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	0.666		0.322	0.328	1.00	0.408	pCi/L	10/15/21 11:10	11/08/21 17:32	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.3*		*40 - 110*	*10/15/21 11:10*	*11/08/21 17:32*	*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	0.649	*	0.247	0.254	1.00	0.327	pCi/L	10/15/21 11:44	11/08/21 13:15	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.3*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:15*	*1*
Y Carrier	*83.7*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:15*	*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	1.31		0.406	0.415	5.00	0.408	pCi/L		11/18/21 22:40	1

Tracer/Carrier Summary

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

Job ID: 240-157750-1

Method: 903.0 - Radium-226 (GFPC)

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

		Percent Yield (Acceptance Limits)							
Lab Sample ID	Client Sample ID	Ba (40-110)							
240-157750-1	MW-15002	96.1							
240-157750-2	MW-15008	102							
240-157750-3	MW-15016	101							
240-157750-4	MW-15019	101							
240-157750-5	DUP-04	103							
240-157750-6	EB-04	93.3							
LCS 160-531995/1-A	Lab Control Sample	96.4							
LCSD 160-531995/2-A	Lab Control Sample Dup	90.4							
MB 160-531995/20-A	Method Blank	82.4							

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

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

		Percent Yield (Acceptance Limits)							
Lab Sample ID	Client Sample ID	Ba (40-110)	Y (40-110)						
240-157750-1	MW-15002	96.1	81.5						
240-157750-2	MW-15008	102	80.4						
240-157750-3	MW-15016	101	83.7						
240-157750-4	MW-15019	101	84.5						
240-157750-5	DUP-04	103	86.0						
240-157750-6	EB-04	93.3	83.7						
LCS 160-531998/1-A	Lab Control Sample	96.4	60.2						
LCSD 160-531998/2-A	Lab Control Sample Dup	90.4	84.9						
MB 160-531998/20-A	Method Blank	82.4	89.0						

Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-531995/20-A
Matrix: Water
Analysis Batch: 536236

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 531995

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.04114	U	0.120	0.120	1.00	0.258	pCi/L	10/15/21 11:10	11/12/21 10:22	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.4*		*40 - 110*	*10/15/21 11:10*	*11/12/21 10:22*	*1*

Lab Sample ID: LCS 160-531995/1-A
Matrix: Water
Analysis Batch: 535397

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 531995

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-226			15.1	14.43		1.84	1.00	0.468	pCi/L	95	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*96.4*		*40 - 110*

Lab Sample ID: LCSD 160-531995/2-A
Matrix: Water
Analysis Batch: 535397

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 531995

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-226			15.1	12.63		1.71	1.00	0.582	pCi/L	84	75 - 125	0.51	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*90.4*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-531998/20-A
Matrix: Water
Analysis Batch: 535405

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 531998

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.5019	U	0.341	0.344	1.00	0.526	pCi/L	10/15/21 11:44	11/08/21 13:16	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.4*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:16*	*1*
Y Carrier	*89.0*		*40 - 110*	*10/15/21 11:44*	*11/08/21 13:16*	*1*

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

Lab Sample ID: LCS 160-531998/1-A
Matrix: Water
Analysis Batch: 535393

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 531998

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Radium-228			12.2	15.51		1.85	1.00	0.733	pCi/L	127	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*96.4*		*40 - 110*
Y Carrier	*60.2*		*40 - 110*

Lab Sample ID: LCSD 160-531998/2-A
Matrix: Water
Analysis Batch: 535393

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 531998

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits	RER	RER Limit
Radium-228			12.2	13.75		1.59	1.00	0.509	pCi/L	112	75 - 125	0.51	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*90.4*		*40 - 110*
Y Carrier	*84.9*		*40 - 110*

QC Association Summary

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

Job ID: 240-157750-1

Rad

Prep Batch: 531995

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-157750-1	MW-15002	Total/NA	Water	PrecSep STD	
240-157750-2	MW-15008	Total/NA	Water	PrecSep STD	
240-157750-3	MW-15016	Total/NA	Water	PrecSep STD	
240-157750-4	MW-15019	Total/NA	Water	PrecSep STD	
240-157750-5	DUP-04	Total/NA	Water	PrecSep STD	
240-157750-6	EB-04	Total/NA	Water	PrecSep STD	
MB 160-531995/20-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-531995/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
LCSD 160-531995/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	

Prep Batch: 531998

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-157750-1	MW-15002	Total/NA	Water	PrecSep_0	
240-157750-2	MW-15008	Total/NA	Water	PrecSep_0	
240-157750-3	MW-15016	Total/NA	Water	PrecSep_0	
240-157750-4	MW-15019	Total/NA	Water	PrecSep_0	
240-157750-5	DUP-04	Total/NA	Water	PrecSep_0	
240-157750-6	EB-04	Total/NA	Water	PrecSep_0	
MB 160-531998/20-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-531998/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-531998/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Lab Chronicle

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

Job ID: 240-157750-1

Client Sample ID: MW-15002 — Lab Sample ID: 240-157750-1

Date Collected: 10/07/21 09:08
Date Received: 10/09/21 10:10
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			531995	10/15/21 11:10	BMP	TAL SL
Total/NA	Analysis	903.0		1	535397	11/08/21 17:29	FLC	TAL SL
Total/NA	Prep	PrecSep_0			531998	10/15/21 11:44	BMP	TAL SL
Total/NA	Analysis	904.0		1	535390	11/08/21 13:12	JLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	537496	11/18/21 22:40	EMH	TAL SL

Client Sample ID: MW-15008 — Lab Sample ID: 240-157750-2

Date Collected: 10/06/21 16:02
Date Received: 10/09/21 10:10
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			531995	10/15/21 11:10	BMP	TAL SL
Total/NA	Analysis	903.0		1	535397	11/08/21 17:29	FLC	TAL SL
Total/NA	Prep	PrecSep_0			531998	10/15/21 11:44	BMP	TAL SL
Total/NA	Analysis	904.0		1	535390	11/08/21 13:12	JLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	537496	11/18/21 22:40	EMH	TAL SL

Client Sample ID: MW-15016 — Lab Sample ID: 240-157750-3

Date Collected: 10/07/21 10:10
Date Received: 10/09/21 10:10
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			531995	10/15/21 11:10	BMP	TAL SL
Total/NA	Analysis	903.0		1	535397	11/08/21 17:29	FLC	TAL SL
Total/NA	Prep	PrecSep_0			531998	10/15/21 11:44	BMP	TAL SL
Total/NA	Analysis	904.0		1	535390	11/08/21 13:12	JLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	537496	11/18/21 22:40	EMH	TAL SL

Client Sample ID: MW-15019 — Lab Sample ID: 240-157750-4

Date Collected: 10/07/21 08:10
Date Received: 10/09/21 10:10
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			531995	10/15/21 11:10	BMP	TAL SL
Total/NA	Analysis	903.0		1	535393	11/08/21 17:32	FLC	TAL SL
Total/NA	Prep	PrecSep_0			531998	10/15/21 11:44	BMP	TAL SL
Total/NA	Analysis	904.0		1	535390	11/08/21 13:13	JLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	537496	11/18/21 22:40	EMH	TAL SL

Lab Chronicle

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

Job ID: 240-157750-1

Client Sample ID: DUP-04

Lab Sample ID: 240-157750-5

Date Collected: 10/07/21 00:00
Matrix: Water
Date Received: 10/09/21 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			531995	10/15/21 11:10	BMP	TAL SL
Total/NA	Analysis	903.0		1	535393	11/08/21 17:32	FLC	TAL SL
Total/NA	Prep	PrecSep_0			531998	10/15/21 11:44	BMP	TAL SL
Total/NA	Analysis	904.0		1	535405	11/08/21 13:15	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	537496	11/18/21 22:40	EMH	TAL SL

Client Sample ID: EB-04

Lab Sample ID: 240-157750-6

Date Collected: 10/07/21 10:10
Matrix: Water
Date Received: 10/09/21 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			531995	10/15/21 11:10	BMP	TAL SL
Total/NA	Analysis	903.0		1	535393	11/08/21 17:32	FLC	TAL SL
Total/NA	Prep	PrecSep_0			531998	10/15/21 11:44	BMP	TAL SL
Total/NA	Analysis	904.0		1	535405	11/08/21 13:15	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	537496	11/18/21 22:40	EMH	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.
Project/Site: Karn/Weadock CCR Background Wells

Job ID: 240-157750-1

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	06-30-22
California	State	2886	06-30-21 *
Connecticut	State	PH-0241	03-31-23
Florida	NELAP	E87689	06-30-22
HI - RadChem Recognition	State	n/a	06-30-22
Illinois	NELAP	200023	11-30-22
Iowa	State	373	12-01-22
Kansas	NELAP	E-10236	10-31-22
Kentucky (DW)	State	KY90125	01-01-22
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-21
Louisiana	NELAP	04080	06-30-22
Louisiana (DW)	State	LA011	12-31-21
Maryland	State	310	09-30-22
MI - RadChem Recognition	State	9005	06-30-22
Missouri	State	780	06-30-22
Nevada	State	MO000542020-1	07-31-22
New Jersey	NELAP	MO002	06-30-22
New York	NELAP	11616	04-01-22
North Dakota	State	R-207	06-30-22
NRC	NRC	24-24817-01	12-31-22
Oklahoma	State	9997	08-31-22
Oregon	NELAP	4157	09-01-22
Pennsylvania	NELAP	68-00540	03-01-22
South Carolina	State	85002001	06-30-22
Texas	NELAP	T104704193	07-31-22
US Fish & Wildlife	US Federal Programs	058448	07-31-22
USDA	US Federal Programs	P330-17-00028	03-11-23
Utah	NELAP	MO000542021-14	08-01-22
Virginia	NELAP	10310	06-14-22
Washington	State	C592	08-30-22
West Virginia DEP	State	381	10-31-22

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

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 Amer a

Client Information	Sampler: Andrew W	Lab PM: Brooks, Kris M	Car ier 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			
Emai 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:				D	D		
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
	10/7/21	TRC		10/7/21 1714	TRC
BY	10.8.21 1152			10/8/21 1152	
	10/8/21 1345			10/9/21 1010	

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.

Cooler Temperature(s) °C and Other Remarks.

Ver: 06/08/2021

Eurofins TestAmerica Canton Sample Receipt Form/Narrative
Canton Facility

Login # : 157750

Client TRC Site Name _____ Cooler unpacked by: Trent

Cooler Received on 10/9/21 Opened on 10/9/21

FedEx 1st Grd ~~Exp~~ UPS FAS Clipper Client Drop Off TestAmerica Courier Other _____

Receipt After-hours Drop-off Date/Time TC 10-9-21 Storage Location _____

TestAmerica Cooler # 155 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-14 (CF +0.1 °C) Observed Cooler Temp _____ °C Corrected Cooler Temp. _____ °C

IR GUN #IR-15 (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# **HC157842**

14 Were VOAs on the COC? Yes No

15 Were air bubbles >6 mm in any VOA vials? ● ⬅ Larger than this. Yes No NA

16 Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # _____ Yes No

17 Was a LL Hg or Me Hg trip blank present? _____ Yes No

Tests that are not checked for pH by Receiving:

VOAs
Oil and Grease
TOC

Contacted PM _____ Date _____ by _____ via Verbal Voice Mail Other

Concerning _____

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

Samples processed by:

_____

_____

_____

_____

19 SAMPLE CONDITION

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

Sample(s) _____ were received in a broken container

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

20. SAMPLE PRESERVATION

Sample(s) _____ were further preserved in the laboratory

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

VOA Sample Preservation Date/Time VOAs Frozen. _____

Login # _____

Eurofins TestAmerica Canton Sample Receipt Multiple Cooler Form				
Cooler Description (Circle)	IR Gun # (Circle)	Observed Temp °C	Corrected Temp °C	Coolant (Circle)
TA Client Box Other	IR-14 IR-15	3.0	3.1	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15	2.4	2.5	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15	1.8	1.9	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-14 IR-15			Wet Ice Blue Ice Dry Ice Water None
				☐ See Temperature Excursion Form

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

Login Container Summary Report

Temperature readings _____

Client Sample ID	Lab ID	Container Type	Container pH	Container Temp	Preservative Added (mls)	Lot #
MW 15002	240-157750-A 1	Plastic 1 liter Nitric Acid	<2			
MW-15002	240-157750-B 1	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-157750-A-2	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-157750-B 2	Plastic 1 liter - Nitric Acid	<2			
MW 15016	240-157750-A-3	Plastic 1 liter Nitric Acid	<2			
MW-15016	240-157750-B-3	Plastic 1 liter Nitric Acid	<2			
MW 15019	240-157750-A-4	Plastic 1 liter Nitric Acid	<2			
MW 15019	240-157750-B-4	Plastic 1 liter Nitric Acid	<2			
DUP-04	240-157750-A 5	Plastic 1 liter - Nitric Acid	<2			
DUP-04	240-157750-B-5	Plastic 1 liter - Nitric Acid	<2			
EB-04	240-157750-A-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

eurofins Environment Testing America

Client Information (Sub Contract Lab)	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-143998.1
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 #: 240-157750-1
Address: 13715 Rider Trail North,	Due Date Requested: 11/9/2021			
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	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
MW-15002 (240-157750-1)	10/7/21	09:08 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15008 (240-157750-2)	10/6/21	16:02 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15016 (240-157750-3)	10/7/21	10:10 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15019 (240-157750-4)	10/7/21	08:10 Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-04 (240-157750-5)	10/7/21	Eastern		Water			X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
EB-04 (240-157750-6)	10/7/21	10:10 Eastern		Water			X	X	1	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
Unconfirmed

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) Primary Deliverable Rank: 2

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: [signature]	Date/Time: 10-11-21 1039	Company: ETA	Received by: FED EX	Date/Time:	Company
Relinquished by: FED EX	Date/Time:	Company	Received by: Micha Kominkinger	Date/Time: OCT 12 2021 09:05	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:

Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

Job Number: 240-157750-1

Login Number: 157750
List Number: 2
Creator: Korrinhizer, Micha L

List Source: Eurofins TestAmerica, St. Louis
List Creation: 10/12/21 05:16 PM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Appendix F
Field Records

TRC

PROJECT NAME:	CEC WEADOCKLF 2021 GW COMPLIAN
PROJECT NUMBER:	418426.0001.0000
PROJECT MANAGER:	DARBY LITZ
SITE LOCATION:	2742 WEADOCK HWY ESSEXVILLE MI 48732
DATES OF FIELDWORK:	10/11/21 TO 10/13/21
PURPOSE OF FIELDWORK:	2021 GW SAMPLING
WORK PERFORMED BY:	JAVIER JASSO

SIGNED 10/14/21 DATE

CHECKED BY 10-20-21 DATE

TRC

GENERAL NOTES

PROJECT NAME: CEC WEADOCK LF 2021 GW	DATE: 10/14/21	TIME ARRIVED: 0535
PROJECT NUMBER: 418426.0001.0000	AUTHOR: JJASSO	TIME LEFT: 0900

WEATHER

TEMPERATURE: 64 °F WIND: 15 MPH VISIBILITY: overcast Rain

WORK / SAMPLING PERFORMED

WATER LEVELS

WELLS SAMPLED ~~JCW-MW-18001, MS+MSD, MW50, DUP 1, MW51, MW52~~
~~MW-53,~~

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
None	

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Batts	CEC	Check in/out

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
N/A		

SIGNED [signature] DATE 10/14/21

CHECKED BY [signature] DATE 10-20-21

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME: CEC WEADOCK LF 2021 GW	DATE: 10/11/21	TIME ARRIVED: 0570
PROJECT NUMBER: 418426.0001.0000	AUTHOR: JJASSO	TIME LEFT: 1340

WEATHER

TEMPERATURE: 69 °F WIND: 15 MPH VISIBILITY: Overcast

WORK / SAMPLING PERFORMED

~~WATER LEVELS~~

WELLS SAMPLED JCW-MW 180R, MS+MSD, MW50, Dup 1, MW 51, MW52 MW 53, MW 53R, MW 54R getting supplys

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
NOO	

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
C. Batts	CEC	Check in/out

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
~~N/A~~		
purge water	NM	purged to ground

SIGNED [signature] DATE 10/14/21

CHECKED BY [signature] DATE 10-20-21

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME: CEC WEADOCK LF 2021 GW	DATE: 10/12/21	TIME ARRIVED: 0551
PROJECT NUMBER: 418426.0001.0000	AUTHOR: JJASSO	TIME LEFT: 1157

WEATHER

TEMPERATURE: 62 °F WIND: 15 MPH VISIBILITY: overcast Rain

WORK / SAMPLING PERFORMED

~~WATER LEVELS~~

WELLS SAMPLED JCWMW-18004, JCWOW-18004, MW-55, OW-55
JCWMW-18005, OW-57R, JCW-MW-18006, ~~MW~~ OW 58
JCW-MW-15007, Dup02, JCW-MW-15028

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
~~N/A~~		
purge water	Nm	purged to ground

SIGNED 10/14/21 DATE

CHECKED BY 10-20-21 DATE

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME: CEC WEADOCK LF 2021 GW	DATE: 10/13/21	TIME ARRIVED: 0600
PROJECT NUMBER: 418426.0001.0000	AUTHOR: JJASSO	TIME LEFT: 0810

WEATHER

TEMPERATURE: 64 °F WIND: 15 MPH VISIBILITY: overcast

WORK / SAMPLING PERFORMED

~~WATER LEVELS~~

WELLS SAMPLED JCW-MW-15010, JCW-MW-15009 (MS dmsi)
FIB,02 EB,02

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
~~N/A~~		
purge water	NM	purged to ground

SIGNED 10/14/21 DATE

CHECKED BY 10-20-21 DATE

REVISED 04/2019

TRC

EQUIPMENT SUMMARY

PROJECT NAME:	CEC WEADOCK LF 2021 G	SAMPLER NAME:	JJASS0
PROJECT NO.:	418426.0001.0000		

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	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)
NA	NA
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

LABORATORY PROVIDED	LABORATORY PROVIDED
POTABLE WATER SOURCE	DI WATER SOURCE
10/14/21	10-20-21
SIGNED / DATE	CHECKED BY / DATE

REVISED 04/2019

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC WEADOCK LF 2021 GW COMPL	MODEL: ~~YSI 556~~ YSI Pro DSS		SAMPLER:	JJASSO
PROJECT NO.:	418426.0001.0000	SERIAL #:	TRC A2	DATE:	10/11/21

PH CALIBRATION CHECK

pH 7 (LOT #): 16D360 (EXP. DATE): 4/23 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 16D600 (EXP. DATE): 4/22 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
700 / 700	400 / 400	☒ WITHIN RANGE	0532
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): KCE 2603 (EXP. DATE): 5/22 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1413 / 1413	NA	☒ WITHIN RANGE	0532
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 20B130078 (EXP. DATE): 2/25 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
220 / 220	21.6	☒ WITHIN RANGE	0532
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
8.91 / 8.51	22.0	☒ WITHIN RANGE	0532
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A1007 (EXP. DATE): 1/23 POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
0 / 0	/	☒ WITHIN RANGE	0532
100 / 100	/	☒ WITHIN RANGE	0532
/	/	☐ 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 10/14/21 DATE

CHECKED BY 10-20-21 DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC WEADOCK LF 2021 GW COMPL	MODEL: ~~YSI 556~~ YSI Pro DSS		SAMPLER:	JJASSO
PROJECT NO.:	418426.0001.0000	SERIAL #:	TRC A2	DATE:	10/12/21

PH CALIBRATION CHECK

pH 7 (LOT #): 1603CO (EXP. DATE): 4/23 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 160680 (EXP. DATE): 4/23 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
700 / 700	400 / 400	☑ WITHIN RANGE	0511
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 16E2603 (EXP. DATE): 9/22 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1413 / 1413	NA	☑ WITHIN RANGE	0511
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 20B30058 (EXP. DATE): 2/22 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
220 / 220	21.0	☑ WITHIN RANGE	0511
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
8.67 / 8.67	21.0	☑ WITHIN RANGE	0511
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A1007 (EXP. DATE): 1/23 POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
0 / 0	/	☑ WITHIN RANGE	0511
100 / 100	/	☑ WITHIN RANGE	0511
/	/	☐ 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 [signature] 10/14/21 DATE

CHECKED BY [signature] 10-20-21 DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC WEADOCK LF 2021 GW COMPL	MODEL: ~~YSI 556~~ YSI Pro DSS		SAMPLER:	JJASSO
PROJECT NO.:	418426.0001.0000	SERIAL #:	TRC A2	DATE:	10/13/21

PH CALIBRATION CHECK

pH 7 (LOT #): 16D3600 (EXP. DATE): 4/23 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 16D2680 (EXP. DATE): 4/23 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
7.00 / 7.00	4.00 / 4.00	☒ WITHIN RANGE	0515
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 16E2603 (EXP. DATE): 5/22 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1413 / 1413	NA	☒ WITHIN RANGE	0515
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 20B1300 (EXP. DATE): 2/25 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
220 / 220	21.0	☒ WITHIN RANGE	0515
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
8.67 / 8.67	21.0	☒ WITHIN RANGE	0515
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A1007 (EXP. DATE): 1/23 POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
0 / 0	/	☒ WITHIN RANGE	0515
100 / 100	/	☒ WITHIN RANGE	0515
/	/	☐ 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 [signature] DATE 10/14/21

CHECKED BY [signature] DATE 10-20-21

TRC

WATER LEVEL DATA

Consumers Weadock LF

PROJECT NAME:	~~DTE KARN/JCWEADOCK LANDFILL~~	DATE:	10/4/21
PROJECT NUMBER:	~~367388.0000.0000~~ 418426.0000	AUTHOR:	JJASSO

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
LH-103	0732	Run over bent				
LH-104	0653		9.68	14.00		
JCWMW-15009	0553		8.18	13.00		
JCWMW-15003	0554		8.50	100 Plus		
JCWMW-15010	0600		16.53	19.57		
JCWMW-18001	0603		15.76	23.75		
JCWOW-18001	0604		7.90	20.35		
JCWOW18002	0611		10.64	19.41		
M-50	0610		12.47	19.40		
MW-51	0615		13.45	20.00		
OW-51	0616		10.60	17.28		
JCWOW-18003	0621		9.20	18.63		
MW-52	0620		14.00	19.74		
JCWMW-15022	0623		14.28	100 Plus		
MW-53	0626		12.97	18.18		
OW-53	0627		8.03	18.00		
JCWMW15026	0633		13.98	100 plus		
MW-53R	0632		13.28	18.80		
OW-54	0643		7.90	16.48		
MW-54R	0639		12.78	17.73		
MW-16R	0641		13.11	19.67		
OW-18004	0645		8.65	14.85		
JCWMW-18004	0644		11.73	14.72		
JCWMW-15021	0649		15.00	100 plus		
OW-55	0657		7.17	18.43		

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

SIGNED 10/14/21 DATE

CHECKED 10-20-21 DATE

REVISED 04/2019

TRC

WATER LEVEL DATA

PROJECT NAME:	Consumers Weadock LF ~~DTE KARN/JCW/EADOCK LANDFILL~~	DATE:	10/4/21
PROJECT NUMBER:	~~367388.0000.0000~~ 418426.0000	AUTHOR:	JJASSO

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
MW-55	0700		13.15	16.38		
MW-20	0704		~~9.40~~	14.00		
JCWMW-18005	0702		9.05	16.08		
OW-56	0708		6.71	19.27		
OW-56R	0707		6.73	20.07		
OW-57R IN	0714		6.90	20.10		
OW-57 IN	0713		7.07	19.60		
OW-57 OUT	0715		10.30	20.20		
OW-57R OUT	0716		9.64	19.40		
JCWOW-18006	0720		11.22	23.47		
JCWMW-18006	0721		13.98	23.60		
JCWMW-15028	0755		7.16	25.10		
~~MW-106B~~						
JCWMW15007	0801		3.43	8.75		
~~MW-109~~						
MW-58	0819		5.26	18.28		
MW-15008	0807		4.28	17.40		
MW-15019	0832		5.20	16.85		
MW-15002	0845		6.68	19.95		
MW-15016	0852		3.85	8.10		
OW-61	0743		12.65	37.10		
OW-63	0737		26.26	37.07		
MW-19	0750		9.49	20.83		
MW-106B	0757		7.60	41.15		
MW 15020	0810		4.96	17.17		

22.65 based on nearby wells and historical water level data - KL 12/21/2021

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

SIGNED 10/14/21 DATE

CHECKED 10-20-21 DATE

REVISED 04/2019

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC WEADOCK LF 2021 GW SAMPLING	DATE:	10/4/21
PROJECT NUMBER:	418426.0001.0000	AUTHOR:	JJASSO

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
MW-11CB	0820		4.83	11.10		
MW-15024	0829		5.60	17.17		
MW-15048	0837		4.50	9.94		
JCW-MW15001	0848		4.97	100 Plus		

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

SIGNED 10/14/21 DATE

CHECKED 10-20-21 DATE

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF; 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0000.0000	BY: Jjasso	DATE: 10/14/21	BY: SK	DATE: 10-20-21

SAMPLE ID: L-H104 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1145	DATE: 10/7/21	SAMPLE	TIME: 1215	DATE: 10/7/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 9.88 T/ PVC

DEPTH TO BOTTOM: 14.00 T/ PVC

WELL VOLUME: n/a ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 3 ☑ LITERS ☐ GALLONS

COLOR: clear ODOR: non

TURBIDITY ☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 7.47 SU CONDUCTIVITY: 1715 umhos/cm

ORP: -119.4 mV DO: 0.49 mg/L

TURBIDITY: 2.11 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 15.0 °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)
1145	100	7.37	1719	-94.6	0.54	6.44	16.9	9.34	INITIAL
1150		7.18	1837	-111.3	2.09	2.96	15.0	9.98	.5
1155		7.31	1812	-114.3	1.13	2.58	15.3	10.0	1
1200		7.38	1788	-118.4	0.70	2.40	14.9	10.30	1.5
1205		7.44	1749	-120.8	0.55	2.16	15.0	10.48	2
1210		7.46	1723	-118.7	0.51	2.10	15.0	10.55	2.5
1215		7.47	1715	-119.4	0.49	2.15	15.0	10.60	3
~~1220~~									~~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%~~ 13 TURB: +/- ~~10%~~ 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	GLASS	A	☐ Y ☑ N		1 L	PLASTIC	B	☐ Y ☑ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N
1	250 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: fed ex or drop o DATE SHIPPED: 10/7/21 AIRBILL NUMBER: n/a

COC NUMBER: n/a SIGNATURE: DATE SIGNED: 10/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASS0 DATE 10/14/21	BY: SK DATE 10-20-21

SAMPLE ID: JCW-MW1 8001 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0557	DATE: 10/14/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 15.76 T/ PVC

DEPTH TO BOTTOM: 23.71 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 6 ☑ LITERS ☐ GALLONS

COLOR: clear ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☑ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 0607	DATE: 10/14/21

PH: 6.76 SU CONDUCTIVITY: 2687 umhos/cm

ORP: -151.0 mV DO: 0.57 mg/L

TURBIDITY: 2.20 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 16.1 °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)
0557	200	4.0	1343	9.6	8.2	48.6	18.6	1635	INITIAL
0602		6.74	2743	-107.6	0.67	13.10	16.7	1641	1.0
0607		6.76	2691	-144.6	0.85	2.60	16.5	1645	2.0
0612		6.76	2669	-148.6	0.74	2.50	16.6	1645	3.0
0617		6.76	2674	-151	0.57	2.37	16.5	1645	4
0622		6.76	2682	-151	0.51	2.27	16.5	1645	5.0
0627		6.76	2683	-151.6	0.53	2.29	16.5	1645	6.0

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
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
2	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	~~125~~ mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX DATE SHIPPED: AIRBILL NUMBER: N/A

COC NUMBER: ____ N/A SIGNATURE: DATE SIGNED: 10/14/21

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASSO DATE: 10/14/21	BY: SK DATE: 10-20-21

SAMPLE ID: MW-50 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME 0658	DATE 10/14/21	SAMPLE	TIME: 0738	DATE: 10/14/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER	PH: 7.01 SU CONDUCTIVITY: 1983 umhos/cm
	ORP: -124.0 mV DO: 0.36 mg/L
DEPTH TO WATER: 12.47 T/ PVC	TURBIDITY: 6.15 NTU
DEPTH TO BOTTOM: 19.46 T/ PVC	☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS	TEMPERATURE: 16.9 °C OTHER:
VOLUME REMOVED: 8 ☑ 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- 1
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)
0658	200	7.13	2104	-92.7	9.0	31.0	18.0	13.10	INITIAL
0703		7.03	2035	-105.0	0.84	11.41	16.9	13.15	1
0708		7.04	2007	-115.0	0.54	8.18	16.9	13.15	2
0713		7.04	2001	-116.5	0.48	6.76	16.9	13.15	3
0718		7.01	1997	-121.0	0.43	7.35	16.9	13.15	4
0723		7.01	1989	-121.0	0.39	7.15	16.8	13.15	5
0728		7.01	1985	-124.0	0.39	6.28	16.8	13.15	6
0733		7.01	1987	-124.0	0.38	6.31	16.8	13.15	7
0738		7.01	1983	-124.0	0.36	6.15	16.9	13.11	8

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%~~ 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
4	125 mL	VOA	A	☐ Y ☑ N					☐ Y ☐ N
2	125 mL	PLASTIC	A	~~☑ Y~~ ☑ N					☐ Y ☐ N
2	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
4	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	~~125~~ mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: NA	AIRBILL NUMBER: N/A	
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 10/14/21	

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASS0 DATE 10/11/21	BY: JK DATE: 10-20-21

SAMPLE ID: MW 51 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME 0815	DATE: 10/11/21	SAMPLE	TIME: 0850	DATE: 10/11/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.91 SU	CONDUCTIVITY: 2254 umhos/cm	
			ORP: -122.0 mV	DO: 0.37 mg/L	
DEPTH TO WATER: 13.45 T/ PVC			TURBIDITY: 9.15 NTU		
DEPTH TO BOTTOM: 20.00 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: 15.7 °C	OTHER:	
VOLUME REMOVED: 7	☑ LITERS ☐ GALLONS		COLOR: Clear	ODOR: none	
COLOR: Brown	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)
0815	200	7.09	2321	-82.1	8.41	430	17.0	1396	INITIAL
0830		6.88	2266	-100.8	0.62	5.28	15.6	1397	1
0835		6.88	2273	-108.6	0.46	7.26	15.7	1397	2
0840		6.90	2270	-113.5	0.40	10.0	15.7	1397	3
0845		6.90	2265	-118.0	0.37	9.60	15.7	1397	4
0848		6.91	2261	-121.5	0.35	9.45	15.7	1397	5
0849		6.91	2260	-121.6	0.33	9.15	15.7	1397	6
0850		6.91	2254	-122.0	0.32	9.15	15.7	1397	7

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
1	~~250~~ 125 mL	PLASTIC	~~A~~	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX DATE SHIPPED: N/A AIRBILL NUMBER: N/A

COC NUMBER: ____ N/A SIGNATURE: [signature] DATE SIGNED: 10/11/21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASS0 DATE 10/11/21	BY: JK DATE: 10-2021

SAMPLE ID: MW 52 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0910	DATE: 10/11/21	SAMPLE	TIME: 0958	DATE: 10/11/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 14.00 T/ PVC

DEPTH TO BOTTOM: 19.74 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 8 ☑ LITERS ☐ GALLONS

COLOR: clear ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☑ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 6.91 SU CONDUCTIVITY: 2021 umhos/cm

ORP: -108.1 mV DO: 0.32 mg/L

TURBIDITY: 3.25 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 16.0 °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)
0918	200	7.10	2003	-69.1	086	34.0	18.6	14.60	INITIAL
0923		6.93	2033	-107.0	072	3.98	16.0	1475	1
0928		6.92	2038	-111.3	049	3.15	16.0	1475	2
0933		6.93	2033	-110.6	042	3.0	15.9	1475	3
0938		6.93	2034	-110.7	037	3.13	15.9	1475	4
0943		6.92	2028	-116.7	035	3.16	15.9	1475	5
0948		6.91	2030	-108.0	034	3.28	16.0	1475	6
0953		6.91	2029	-108.1	033	3.30	16.0	1475	7
0958		6.91	2021	-108.1	032	3.25	16.0	1475	8
								1475	9

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
1	~~250~~ 125 mL	PLASTIC	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

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASS0 DATE: 10/14/21	BY: JK DATE: 10-20-21

SAMPLE ID: MW-53 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1024	DATE: 10/11/21	SAMPLE	TIME: 1054	DATE: 10/11/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 12.97 T/ PVC

DEPTH TO BOTTOM: 18.18 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 6 ☑ LITERS ☐ GALLONS

COLOR: clear ODOR: none

TURBIDITY: ☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 7.11 SU CONDUCTIVITY: 1489 umhos/cm

ORP: -135.0 mV DO: 0.37 mg/L

TURBIDITY: 3.0 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 16.1 °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)
1024	200	7.26	1643	-85.9	8.75	11.0	19.8	1338	INITIAL
1029		7.12	1497	-114.5	0.60	3.86	16.0	1354	1
1034		7.12	1496	-123.0	0.50	2.92	16.6	1356	2
1039		7.11	1496	-127.0	0.39	2.54	16.1	1356	3
1044		7.11	1497	-135.0	0.37	2.64	16.1	1356	4
1049		7.11	1495	-135.1	0.34	2.75	16.1	1356	5
1054		7.11	1489	-135.0	0.37	3.0	16.1	1356	6

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
1	~~250~~ mL	PLASTIC	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

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASSO DATE: 10/11/21	BY: JK DATE: 10-20-21

SAMPLE ID: MW-53R WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1120	DATE: 10/11/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER	
DEPTH TO WATER: 13.28 T/ PVC		
DEPTH TO BOTTOM: 18.80 T/ PVC		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS	
VOLUME REMOVED: 12	☑ LITERS ☐ GALLONS	
COLOR: Dark Brown	ODOR: none	
TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY		
DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER		

SAMPLE	TIME: 1220	DATE: 10/11/21
PH: 6.84 SU	CONDUCTIVITY: 1715 umhos/cm	
ORP: -117.9 mV	DO: 0.31 mg/L	
TURBIDITY: 3.55 NTU		
☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
TEMPERATURE: 16.4 °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)
1120	200	6.88	2194	-76.3	8.66	3700	18.5	13.94	INITIAL
1125		6.81	2269	-106.7	077	375	16.9	1412	1
1130		6.85	2180	-100.0	051	249.5	16.6	1412	2
1135		6.82	1969	-108.0	042	300.0	16.1	1412	3
1140		6.83	1887	-103.5	047	46.75	16.5	1412	4
1145		6.83	1819	-110.0	038	40.0	16.6	1412	5
1150		6.83	1806	-110.4	037	30.0	16.6	1412	6
1155		6.83	1782	-117.0	034	15.50	16.6	1412	7
1200		6.83	1754	-117.9	032	5.10	16.5	1412	8
1205		6.83	1735	-116.0	031	40	16.4	1412	9

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

pH: +/- 0.1 COND.: +/- ~~10%~~ 5% 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
1	~~125~~ mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX DATE SHIPPED: N/A AIRBILL NUMBER: N/A

COC NUMBER: ____ N/A SIGNATURE: [signature] DATE SIGNED: 10/14/21

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME:	CEC WEADOCKLF 2021 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASS0	DATE: 10/14/21	BY: SK	DATE: 10-20-21

SAMPLE ID: MW 53R

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)
1210	200	6.84	1726	-118.5	031	3.85	16.0	1412	10
1215	↓	6.84	1716	-117.9	031	3.75	16.4	1412	11
1220		6.84	1715	-117.9	031	3.55	16.4	1412	12

SIGNATURE: 10/14/21

DATE SIGNED: AW 10.29.21

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASS0 DATE: 10/14/21	BY: JK DATE: 10-20-21

SAMPLE ID: MW 54R WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1242	DATE: 10/11/21	SAMPLE	TIME: 1322	DATE: 10/11/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 12.78 T/ PVC

DEPTH TO BOTTOM: 17.72 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 8 ☑ LITERS ☐ GALLONS

COLOR: Tanish ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 6.91 SU CONDUCTIVITY: 1309 umhos/cm

ORP: -119.1 mV DO: 031 mg/L

TURBIDITY: 3.10 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)
1242	200	6.97	1377	-83.0	8.31	570.0	19.4	1345	INITIAL
1247		6.94	1329	-111.7	063	7.70	17.2	1365	1
1252		6.94	1324	-115.2	046	5.84	17.1	1365	2
1257		6.93	1318	-113.3	042	3.83	17.2	1365	3
1302		6.92	1316	-114.5	040	4.53	17.2	1365	4
1307		6.92	1313	-115.3	036	4.0	17.0	1365	5
1312		6.91	1311	-119.5	034	3.71	17.0	1365	6
1317		6.91	1308	-119.5	032	3.16	16.9	1365	7
1322		6.91	1309	-119.1	031	3.10	16.9	1375	8

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 %~~ 13 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	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX DATE SHIPPED: [signature] AIRBILL NUMBER: N/A

COC NUMBER: ____ N/A SIGNATURE: [signature] DATE SIGNED: 10/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASS0 DATE: 10/14/21	BY: SK DATE: 10-20-21

SAMPLE ID: JCW MW 18004 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0615	DATE: 10/12/21	SAMPLE	TIME: 0635	DATE: 10/12/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER	PH: 6.71 SU CONDUCTIVITY: 1645 umhos/cm
	ORP: 23.9 mV DO: 1.75 mg/L
DEPTH TO WATER: 1172 T/ PVC	TURBIDITY: 3.0 NTU
DEPTH TO BOTTOM: 1477 T/ PVC	☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS	TEMPERATURE: 12.9 °C OTHER:
VOLUME REMOVED: 2 ☑ LITERS ☐ GALLONS	COLOR: clear ODOR: non
COLOR: clear 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)
0615	100	4.00	842	60	8.0	250	19.3	1164	INITIAL
0620		6.66	1677	-33.0	1.70	3.0	17.8	1213	.1
0625		6.75	1673	-23.8	1.74	3.0	12.9	1245	1
0630		6.71	1673	-24.0	1.75	3.0	12.9	1275	1.5
0635		6.75	1645	23.9	1.75	3.0	12.9	1295	2
									~~2.5~~

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
1	125 mL	PLASTIC	E	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX	DATE SHIPPED: NA	AIRBILL NUMBER: N/A	
COC NUMBER: ____ N/A	SIGNATURE:	DATE SIGNED: 10/14/21	

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASS0 DATE: 10/20/21	BY: SK DATE: 10-20-21

SAMPLE ID: JCW 04-18004 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0700	DATE: 10/20/21	SAMPLE	TIME: 0720	DATE: 10/20/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 8.61 T/ PVC

DEPTH TO BOTTOM: 14.81 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 2 ☑ LITERS ☐ GALLONS

COLOR: clear ODOR: non

TURBIDITY: ☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 6.84 SU CONDUCTIVITY: 1626 umhos/cm

ORP: -20.0 mV DO: 0.64 mg/L

TURBIDITY: 2.57 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 16.1 °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)
0700	100	6.83	1646	-21.7	8.0	6.0	16.4	8.10	INITIAL
0705		6.82	1644	-8.8	0.66	2.95	15.8	9.41	.1
0710		6.83	1634	-20.0	0.67	3.15	15.9	10.00	1
0715		6.84	1631	-20.0	0.64	3.25	16.0	10.35	1.5
0720		6.84	1626	-20.0	0.64	2.57	16.1	10.60	2
									~~2.5~~

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
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX DATE SHIPPED: ____ AIRBILL NUMBER: N/A

COC NUMBER: ____ N/A SIGNATURE: ____ DATE SIGNED: 10/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASS0 DATE: 10/14/21	BY: SK DATE: 10-20-21

SAMPLE ID: MW 55 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0740	DATE: 10/12/21	SAMPLE	TIME: 0810	DATE: 10/13/21
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 6.98 SU	CONDUCTIVITY: 1543 umhos/cm	
			ORP: -156.0 mV	DO: 0.35 mg/L	
DEPTH TO WATER: 13.15 T/ PVC			TURBIDITY: 1.91 NTU		
DEPTH TO BOTTOM: 16.35 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A ☐ LITERS ☐ GALLONS			TEMPERATURE: 16.6 °C	OTHER:	
VOLUME REMOVED: 6 ☑ LITERS ☐ GALLONS			COLOR: Clear	ODOR: none	
COLOR: cloudy 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)
0740	200	7.09	758	-101.2	9.0	50.0	17.5	13.35	INITIAL
0745		6.97	1572	-122.7	0.99	3.78	16.7	13.42	10
0750		6.97	1570	-130.0	0.55	1.85	16.6	13.43	20
0755		6.98	1560	-145.0	0.43	1.88	16.6	13.44	30
0800		6.98	1551	-155.8	0.40	1.92	16.6	13.44	40
0805		6.98	1544	-156.0	0.35	1.95	16.6	13.44	50
0810		6.98	1543	-156.0	0.35	1.95	16.6	13.44	6

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 %~~ 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	~~☑ Y~~ ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
2	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	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

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASSO DATE: 10/14/21	BY: SK DATE: 10-20-21

SAMPLE ID: OW-55 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0830	DATE: 10/12/21	SAMPLE	TIME: 0915	DATE: 10/12/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 7.17 T/ PVC

DEPTH TO BOTTOM: 18.47 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 4.5 ☑ LITERS ☐ GALLONS

COLOR: Brown ODOR: slight

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 7.15 SU CONDUCTIVITY: 1319 umhos/cm

ORP: -147.0 mV DO: 0.43 mg/L

TURBIDITY: 10.0 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 15.7 °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)
0830	100	7.26	1267	-104.5	0.96	375.0	17.4	6.70	INITIAL
0835		7.26	1296	-134.8	0.90	20.85	15.7	8.28	.5
0840		7.19	1286	-140.0	0.63	12.83	15.7	9.34	1
0845		7.19	1292	-140.0	0.55	13.00	15.8	10.10	1.5
0850		7.19	1299	-133.0	0.50	13.47	15.8	10.80	2
0855		7.18	1303	-145.8	0.47	13.0	15.7	11.40	2.5
0900		7.17	1308	-146.0	0.45	13.0	15.7	11.85	3
0905		7.16	1309	-146.7	0.44	10.0	15.8	12.26	3.5
0910		7.15	1316	-147.0	0.43	10.0	15.7	12.54	4
0915		7.15	1319	-147.0	0.43	10.0	15.7	12.83	4.5

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
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	125 mL	PLASTIC	A	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX DATE SHIPPED: ____ AIRBILL NUMBER: N/A

COC NUMBER: ____ N/A SIGNATURE: ____ DATE SIGNED: 10/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASSO DATE 10/14/21	BY: SK DATE: 10-20-21

SAMPLE ID: JCW-MW18009 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0930	DATE: 10/12/21	SAMPLE	TIME: 1000	DATE: 10/12/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 9.25 T/ PVC

DEPTH TO BOTTOM: 16.26 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 3 ☑ LITERS ☐ GALLONS

COLOR: orange ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 6.91 SU CONDUCTIVITY: 1515 umhos/cm

ORP: -104.0 mV DO: 0.45 mg/L

TURBIDITY: 3.92 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 15.0 °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)
0930	100	7.16	1513	-89.6	9.23	900	16.6	9.38	INITIAL
0935		6.95	1387	-94.5	0.97	21.35	14.6	10.10	.5
0940		6.95	1358	-96.1	0.63	4.70	14.7	10.30	1
0945		6.94	1359	-99.0	0.53	4.06	14.8	10.41	1.5
0950		6.93	1480	-104.0	0.47	3.80	15.0	10.48	2
0955		6.91	1487	-103.9	0.47	3.95	15.0	10.58	2.5
1000		6.91	1515	-104.0	0.45	3.92	15.0	10.55	3

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
1	125 mL	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX DATE SHIPPED: NA AIRBILL NUMBER: N/A

COC NUMBER: ____ N/A SIGNATURE: DATE SIGNED: 10/14/21

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASS0 DATE: 10/14/21	BY: SK DATE: 10-20-21

SAMPLE ID: OW-57R WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1031	DATE: 10/12/21	SAMPLE	TIME: 1056	DATE: 10/12/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 9.64 T/ PVC

DEPTH TO BOTTOM: 19.46 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

PH: 6.96 SU CONDUCTIVITY: 1316 umhos/cm

ORP: -77.8 mV DO: 0.51 mg/L

TURBIDITY: 2.95 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 16.3 °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)
1031	100	7.13	1061	-80.4	0.75	11.25	19.0	9.22	INITIAL
1036		6.95	1473	-81.5	1.23	6.33	16.2	10.20	.5
1041		6.92	1418	-76.0	0.74	3.0	16.1	11.15	1
1046		6.95	1364	-78.0	0.64	3.20	16.3	11.79	1.5
1051		6.96	1320	-77.5	0.56	3.12	16.3	12.49	2
1056		6.96	1316	-77.8	0.51	2.95	16.3	13.05	2.5
									~~3~~

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
1	~~250~~ mL	PLASTIC	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

REVISED 04/2019

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASS0 DATE: 10/14/21	BY: JK DATE: 10-20-21

SAMPLE ID: JCW-MW 18006 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1126	DATE: 10/12/21	SAMPLE	TIME: 1151	DATE: 10/12/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 13.98 T/ PVC

DEPTH TO BOTTOM: 23.68 T/ PVC

WELL VOLUME: N/A ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 2.5 ☑ LITERS ☐ GALLONS

COLOR: Cloudy ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 6.95 SU CONDUCTIVITY: 1441 umhos/cm

ORP: -118.0 mV DO: 0.48 mg/L

TURBIDITY: 1.75 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 13.8 °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)
1126	100	7.10	1500	-140.5	0.72	80.6	18.4	13.81	INITIAL
1131		7.00	1478	-134.6	1.47	8.81	14.3	13.95	.5
1136		6.95	1405	-120.0	0.60	1.63	14.0	13.95	1
1141		6.95	1404	-118.6	0.57	1.39	14.0	13.95	1.5
1146		6.95	1429	-118.5	0.52	1.55	13.9	13.95	2
1151		6.95	1441	-118.0	0.48	1.75	13.8	13.95	2.5

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
1	~~125~~ mL	PLASTIC	~~A~~	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX DATE SHIPPED: NA AIRBILL NUMBER: N/A

COC NUMBER: ____ N/A SIGNATURE: DATE SIGNED: 10/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASS0 DATE: 10/14/21	BY: JK DATE: 10-20-21

SAMPLE ID: MW-58 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1200	DATE: 10/12/21	SAMPLE	TIME: 1245	DATE: 10/12/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 5.26 T/ PVC

DEPTH TO BOTTOM: 18.38 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

PH: 6.92 SU CONDUCTIVITY: 1577 umhos/cm

ORP: -120.3 mV DO: 0.41 mg/L

TURBIDITY: 3.00 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 16.2 °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)
1200	200	7.30	1767	-112.7	8.95	8.01	18.7	5.34	INITIAL
1205		6.89	1865	-120.5	0.75	2.87	16.6	5.46	1
1210		6.93	1664	-119.8	0.60	2.93	16.1	5.46	2
1215		6.92	1611	-120.8	0.46	3.0	16.1	5.46	3
1220		6.92	1600	-120.9	0.44	2.85	16.1	5.46	4
1225		6.92	1577	-120.3	0.41	3.00	16.2	5.46	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
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
1	~~125~~ 250 mL	PLASTIC	N	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX DATE SHIPPED: N/A AIRBILL NUMBER: N/A

COC NUMBER: ____ N/A SIGNATURE: [signature] DATE SIGNED: 10/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC WEADOCKLF 2021 GW (	PREPARED	CHECKED
PROJECT NUMBER: 418426.0001.0000	BY: JJASS0 DATE: 10/14/21	BY: JK DATE: 10-20-21

SAMPLE ID: F.B. 01 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: 1250	DATE: 10/12/21
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: NA SU	CONDUCTIVITY: NA umhos/cm	
			ORP: NA mV	DO: NA mg/L	
DEPTH TO WATER:	T/ PVC		TURBIDITY: NA NTU		
DEPTH TO BOTTOM:	T/ PVC		☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: N/A	☐ LITERS ☐ GALLONS		TEMPERATURE: NA °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: Dup JCW-MW-58		

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.: +/- 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
	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
	1 L	PLASTIC	B	☐ Y ☑ N					☐ Y ☐ N
	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: ____ FED EX DATE SHIPPED: NA AIRBILL NUMBER: N/A

COC NUMBER: ____ N/A SIGNATURE: DATE SIGNED: 10/14/21

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC WEADOCKLF 2021 GW (	PREPARED		CHECKED	
PROJECT NUMBER:	418426.0001.0000	BY: JJASSO	DATE: 10/14/21	BY: SK	DATE: 10-20-21

SAMPLE ID: E.B 01 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: 1255	DATE: 10/10/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: T/ PVC

DEPTH TO BOTTOM: T/ PVC

WELL VOLUME: N/A ☐ 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: non

FILTRATE (0.45 um) ☐ YES ☑ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS: by JCW MW SE

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.: +/- 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
	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
	125 mL	PLASTIC	C	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: _____ FED EX DATE SHIPPED: NA AIRBILL NUMBER: N/A

COC NUMBER: _____ N/A SIGNATURE: DATE SIGNED: 10/14/21

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: JCW Porewater – 2021 Q4

PROJECT NUMBER: 21-1173

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	Alkalinity	TDS					REMARKS
21-1173-01	10/4/21	0627	GW	JCW-MW-18001		5	x	x	x	x					
-02	10/12/21	0635	GW	JCW-MW-18004		5	x	x	x	x					
-03	10/12/21	0730	GW	JCW-OW-18004		5	x	x	x	x					
-04	10/12/21	1000	GW	JCW-MW-18005		5	x	x	x	x					
-05	10/12/21	1151	GW	JCW-MW-18006		5	x	x	x	x					
-06	10/11/21	0730	GW	MW-50		5	x	x	x	x					
-07	10/11/21	0850	GW	MW-51		5	x	x	x	x					
-08	10/11/21	0958	GW	MW-52		5	x	x	x	x					
-09	10/11/21	1054	GW	MW-53		5	x	x	x	x					
-10	10/11/21	1320	GW	MW-53R		5	x	x	x	x					
-11	10/11/21	1322	GW	MW-54R		5	x	x	x	x					
-12	10/12/21	0810	GW	MW-55		5	x	x	x	x					

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
[signature]	10/13/21 1110	[signature]
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)

COMMENTS

3.2-4.9°C
015402

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

SAMPLING SITE: JCW Porewater – 2021 Q4

PROJECT NUMBER: 21-1173

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	Alkalinity	TDS					REMARKS
21-1173-13	10/12/21	0915	GW	OW-55		5	x	x	x	x					
-14	10/12/21	1056	GW	OW-57R OUT		5	x	x	x	x					
-15	10/12/21	1245	GW	MW-58		5	x	x	x	x					
-16			GW	~~LH-104~~		5	x	x	x	x					
-17	10/11/21	—	GW	DUP-01		5	x	x	x	x					
-18	10/11/21	0637	GW	JCW-MW-18001 MS		4	x	x	x						
-19	10/11/21	0637	GW	JCW-MW-18001 MSD		4	x	x	x						
-20	10/12/21	1250	W	FB-01		2	x	x							
-21	10/12/21	1255	W	EB-01		2	x	x							

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
[signature]	10/13/21 1110	[signature]
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)

COMMENTS

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

SAMPLING SITE: JCW Porewater – 2021 Q4

PROJECT NUMBER: 21-1173

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	Alkalinity	TDS					REMARKS
21-1173-13			GW	OW-55		5	x	x	x	x					
-14			GW	OW-57R OUT		5	x	x	x	x					
-15			GW	MW-58		5	x	x	x	x					
-16	10/8/21	1215	GW	LH-104		5	x	x	x	x					
-17			GW	DUP-01		5	x	x	x	x					
-18			GW	JCW-MW-18001 MS		4	x	x	x						
-19			GW	JCW-MW-18001 MSD		4	x	x	x						
-20			W	FB-01		2	x	x							
-21			W	EB-01		2	x	x							

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
	10/7/21 1536	
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)

COMMENTS

2.4°C

#015402

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

SAMPLING SITE: JCW Leachate Headwell – 2021 Q4

PROJECT NUMBER: 21-1174

SAMPLING TEAM:

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	Low Level Mercury								REMARKS
21-1174-01	10-7-21	1215	GW	LH-104		1	x								
-02	10-7-21	~~1215~~	GW	LH-104 Dup		1	x								
-03	10-7-21	1215	GW	LH-104 MS		1	x								
-04	10-7-21	1215	GW	LH-104 MSD		1	x								
-05	10-7-21	1221	W	FB		1	x								
-06	10-7-21	1222	W	EB		1	x								
-07	10-7-21	—	W	TB		1	x								

RELINQUISHED BY: (SIGNATURE)	DATE/TIME	RECEIVED BY: (SIGNATURE)
	10/7/21 1530	
RELINQUISHED BY: (SIGNATURE)	DATE/TIME:	RECEIVED BY: (SIGNATURE)

COMMENTS

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

Chain of Custody Record

MICHIGAN 190

eurofins Environment Testing America

Client Information	Sampler:	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-87170-33306.1
Client Contact: Jacob Krenz	Phone:	E-Mail: Kris.Brooks@Eurofinset.com	State of Origin:	Page: Page 1 of 2
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 JCW Ash Pond	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=soil, 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		
JCW-MW-18001	10/11/21	0637	G	Water	N	N	X	X	2	
JCW-MW-18004	10/12/21	0635	G	Water	N	N	X	X	2	
JCW-MW-18005	10/12/21	1000	G	Water	N	N	X	X	2	
JCW-MW-18006	10/12/21	1151	G	Water	N	N	X	X	2	
MW-50	10/11/21	0735	G	Water	N	N	X	X	2	
MW-51	10/11/21	0656	G	Water	N	N	X	X	2	
MW-52	10/11/21	0956	G	Water	N	N	X	X	2	
MW-53	10/11/21	1054	G	Water	N	N	X	X	2	
MW-53R	10/11/21	1220	G	Water	N	N	X	X	2	
MW-54R	10/11/21	1332	G	Water	N	N	X	X	2	
MW-55	10/12/21	0840	G	Water	N	N	X	X	2	

240-157995 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 1011	TRC	[signature]	10/13/21 1015	ETA
[signature]	10/13/21 1020	ETA	[signature]	10/14/21 800	

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

.ins TestAmerica, Canton
Shuffel Street NW
orth Canton, OH 44720
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

MICHIGAN 190

eurofins Environment Testing America

37/37

Client Information	Sampler: JAVIER JASSO	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-87170-33306.2
Client Contact: Jacob Krenz	Phone: 3490439 LC	E-Mail: Kris.Brooks@Eurofinset.com	State of Origin:	Page: Page 2 of 2
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 JCW Ash Pond	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	
OW-57R OUT	10/12/21	1056	G	Water	N	N	+	+	2	
DUP-01	10/12/21	—	G	Water	N	N	+	+	2	
EB-01	10/12/21	1250	G	Water	N	N	X	+	2	
				Water						
				Water						
				Water						

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]	10/13/21 1015	TM	[signature]	10/13/21 1015	ETA
[signature]	10/13/21 1020	ETA	[signature]	10/14/21 800	ETA
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

Appendix G
Alternate Source Demonstration Supporting Information

Consumers Energy
Count on Us®

A CMS Energy Company

Date: January 24, 2022

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 Fourth Quarter 2021 Hydrogeological Monitoring Report for the JC Weadock Landfill 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.

Harold D. Register Jr.

Signature

January 24, 2022

Date of Certification

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

Name

6201056266

Professional Engineer Certification Number

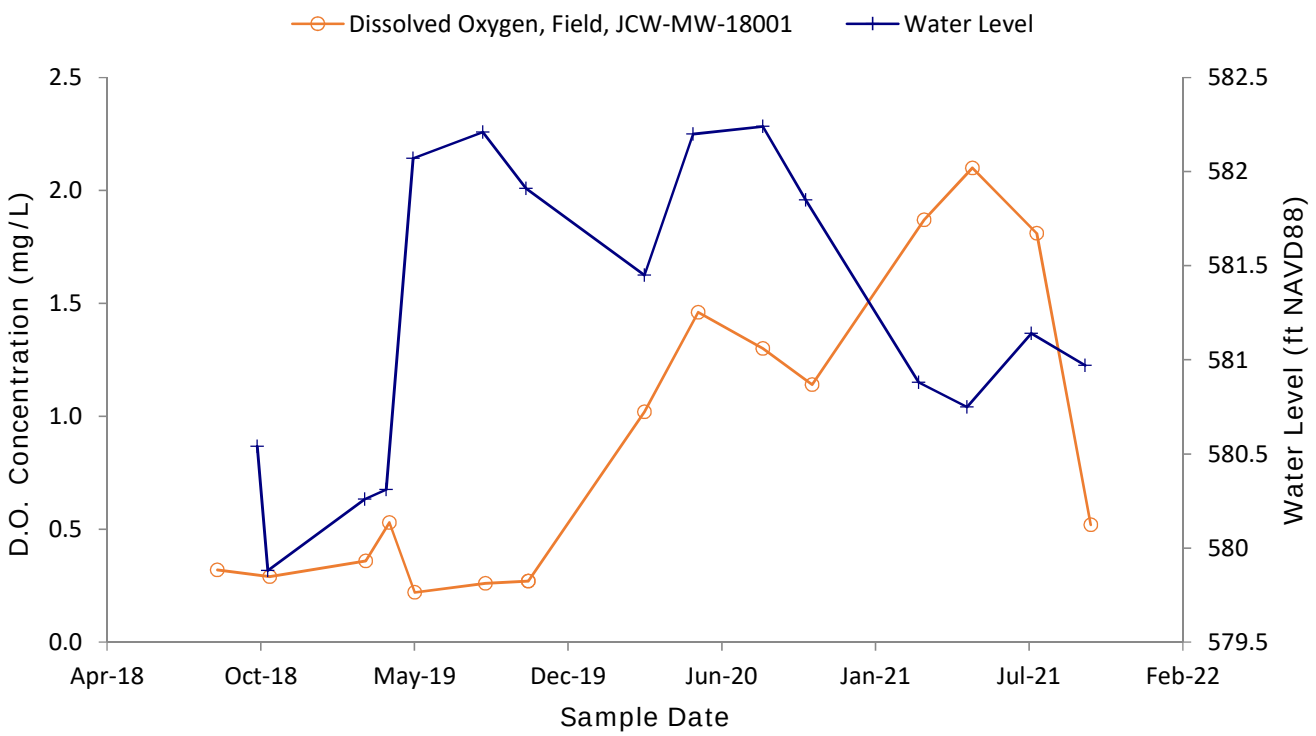
STATE OF MICHIGAN
HAROLD D. REGISTER, JR.
ENGINEER
No. 6201056266
LICENSED PROFESSIONAL ENGINEER

01/24/2022

References

TRC (January 2022). *Fourth Quarter 2021 Hydrogeological Monitoring Report, JC Weadock Landfill CCR Unit, Essexville, Michigan*

Figure G1: Time Series Plots for Sulfate at JCW-MW-18001 ASD



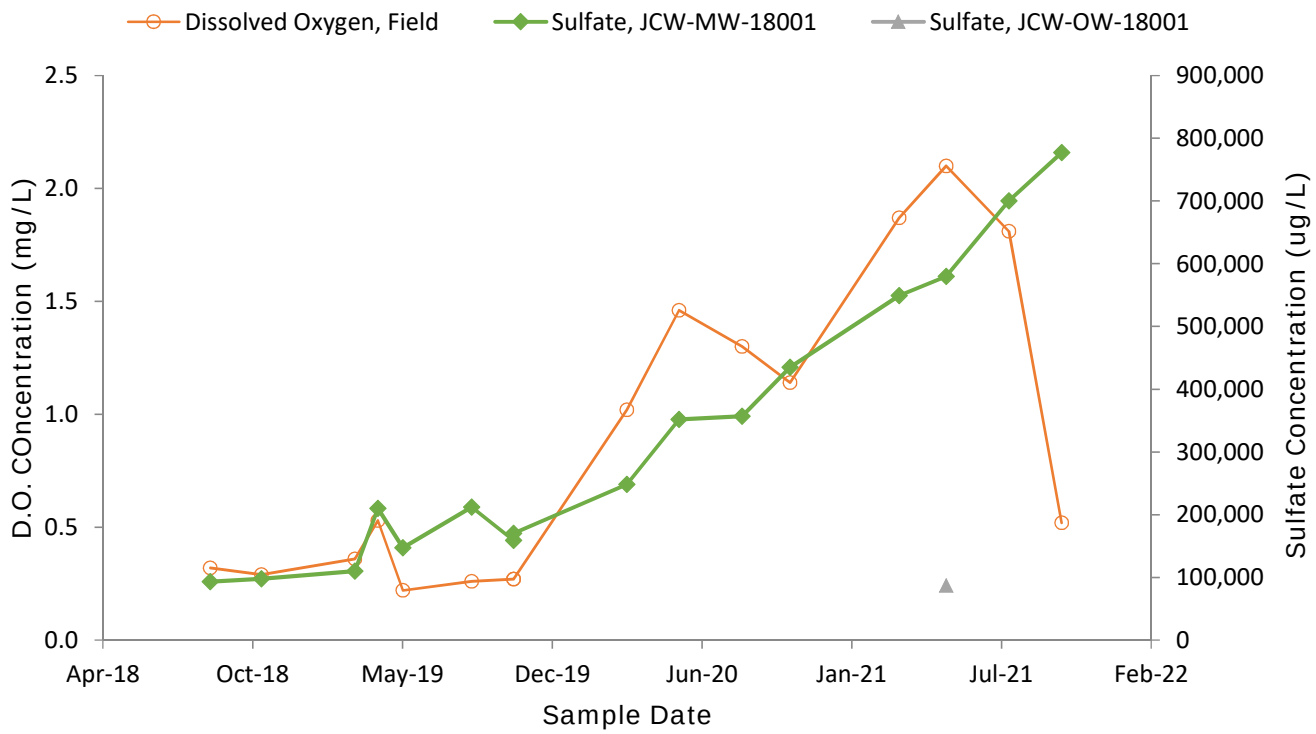
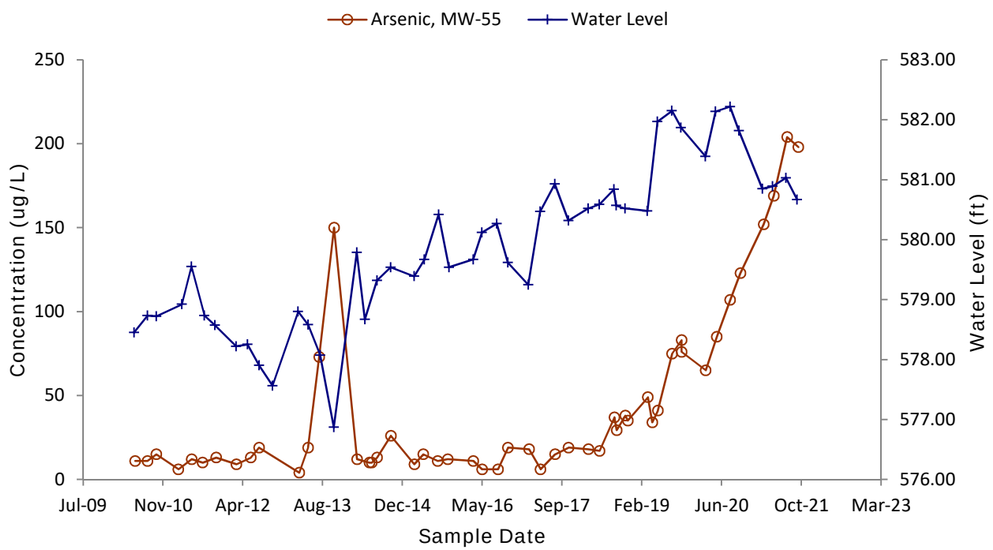


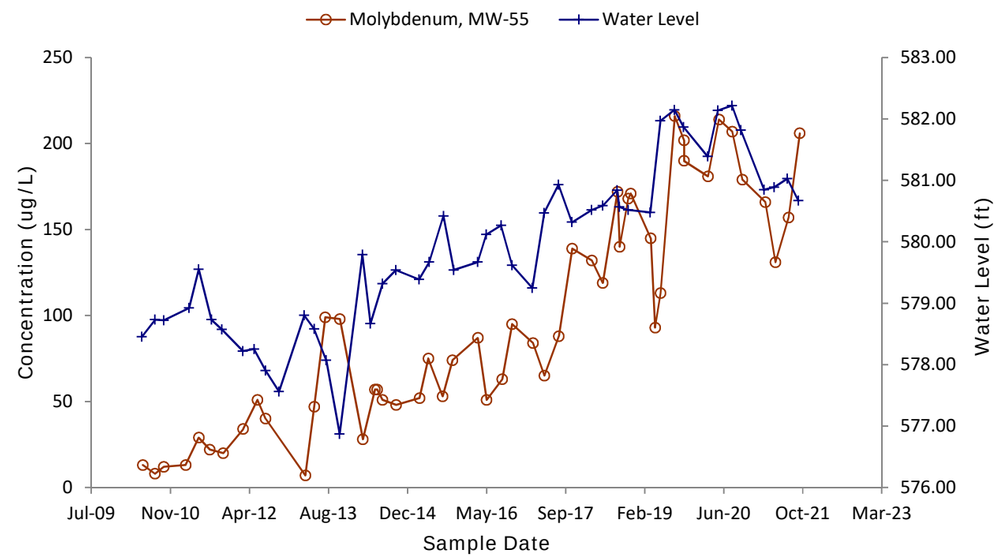
Table G2
Summary of Groundwater Sampling Results Near MW-55
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

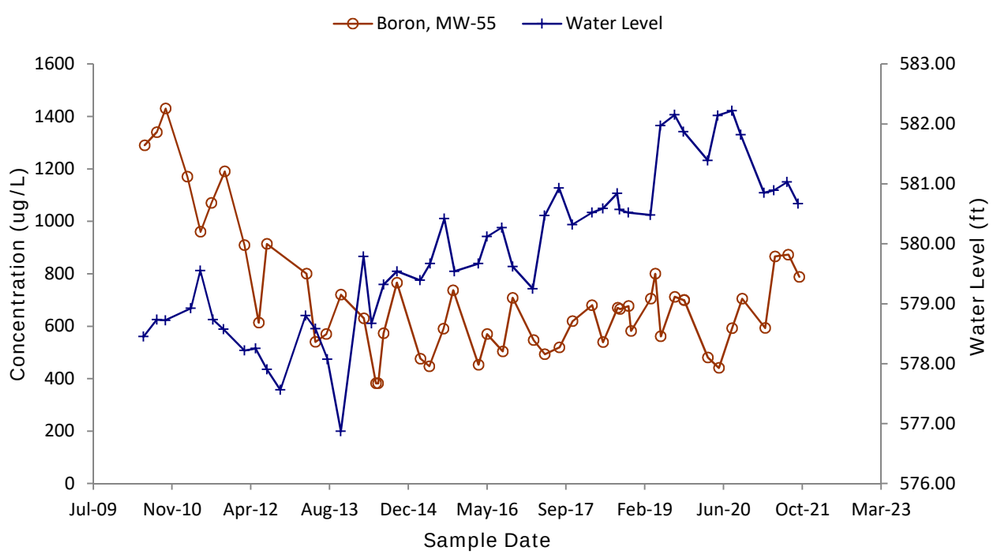
Constituent		Arsenic	Boron	Molybdenum	Oxidation Reduction Potential, Field
Unit		ug/L	ug/L	ug/L	mV
Outside Slurry Wall					
MW-55	5/11/2021	169	866	131	-123.0
	8/3/2021	204	873	157	-131.0
	10/12/2021	198	788	206	-156.0
Inside Slurry Wall					
OW-55	5/11/2021	10	1,850	< 5	-66.3
	8/3/2021	15	1,890	< 5	-82.1
	10/12/2021	10	2,300	< 5	-147.0
JCW-OW-18004	5/11/2021	< 1	689	< 5	92.0
	8/3/2021	1	801	< 5	148.3
	10/12/2021	1	857	< 5	-20.0
LH-104	5/11/2021	29	12,200	59	39.9
	8/3/2021	21	9,410	10	-27.8
	10/7/2021	26	11,200	40	-119.6

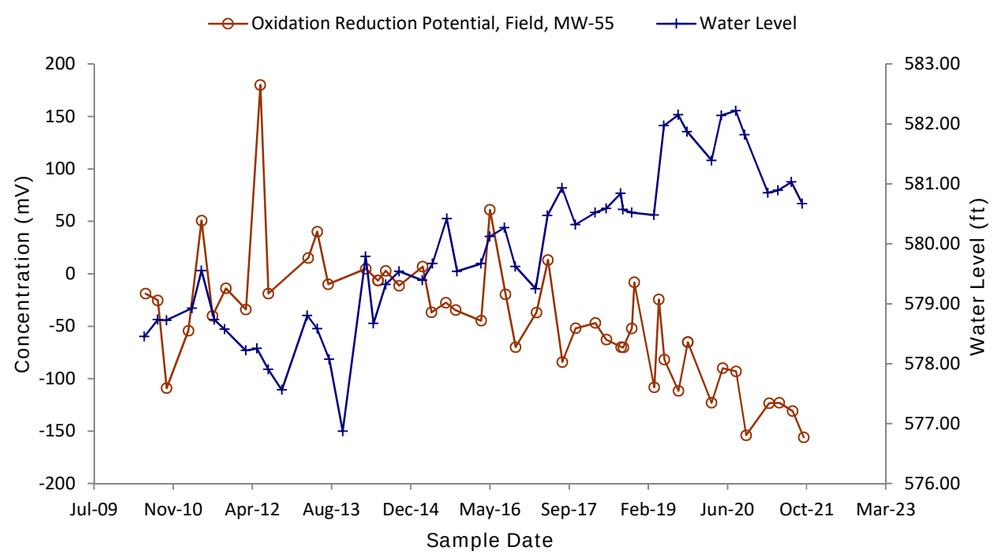
Notes:
ug/L - micrograms per liter; mV - millivolts

Figure G2: Time Series Plots for MW-55 ASD









1540 Eisenhower Pl.
Ann Arbor, MI 48108

T 734.971.7080
TRCcompanies.com

Technical Memorandum

Date:	January 28, 2022
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC
Project No.:	418426.0000.0000 Phase 2 Task 2, 418426.0001.0000 Phase 2 Task 2
Subject:	Second Semiannual 2021 Nature and Extent Data Summary, JC Weadock, Consumers Energy, Essexville, Michigan

In response to the United States Environmental Protection Agency's (U.S. EPA's) Resource Conservation and Recovery Act (RCRA) Coal Combustion Residual rule ("CCR Rule") promulgated on April 17, 2015, as amended, Consumers Energy Company (Consumers Energy) has conducted groundwater monitoring at the JC Weadock Bottom Ash Pond and Landfill CCR Units. During the statistical evaluation of the initial assessment monitoring event (May 2018), arsenic was present in one or more downgradient monitoring well(s) at statistically significant levels exceeding the Groundwater Protection Standards (GWPSs) at the Weadock Landfill[1] and beryllium and lithium were present in one or more downgradient monitoring well(s) at statistically significant levels exceeding the GWPSs at the Weadock Bottom Ash Pond[2].

The CCR Rule 40 CFR §257.96(a) requires that an owner or operator initiate an assessment of corrective measures (ACM) to prevent further release, to remediate any releases, and to restore impacted areas to original conditions if any Appendix IV constituent has been detected at a statistically significant level exceeding a GWPS. The *Assessment of Corrective Measures* (ACM) (TRC, September 2019) was initiated on April 14, 2019 and was certified and submitted to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) on September 11, 2019 in accordance with the schedule in §257.96.

Per §257.95(g)(1), in the event that the facility determines, pursuant to §257.93(h), that there is a statistical exceedance of the GWPSs for one or more of the Appendix IV constituents, the facility must characterize the nature and extent of the release of CCR as well as any site conditions that may affect the remedy selected. The nature and extent characterization was performed using data collected from existing site wells. Installation of additional monitoring wells at locations downgradient of the CCR units was not necessary or feasible due to the proximity of the surface water bodies and the lack of a shallow water-bearing unit to the south demonstrated by site hydrogeological investigations. Monitoring wells are shown on Figure 1.

[1] TRC. 2019. *Statistical Evaluation of Initial Assessment Monitoring Sampling Event, JC Weadock Landfill, Consumers Energy Company, Essexville, Michigan*. January 14.

[2] TRC. 2019. *Statistical Evaluation of Initial Assessment Monitoring Sampling Event, JC Weadock Bottom Ash Pond, Consumers Energy Company, Essexville, Michigan*. January 14.

Given the proximity of the Weadock Bottom Ash Pond to the Weadock Landfill at the Weadock property, the nature and extent of contamination was assessed from a site-wide perspective rather than on a per CCR unit basis. The nature and extent of groundwater impacted by a release from the Weadock Bottom Ash Pond overlaps with groundwater impacted by operation of the Weadock Landfill. Additionally, looking at impacted groundwater on a site-wide basis was more practical from a risk mitigation standpoint, given:

- the likely age of the release(s);
- a long operational history of ash management
- the historical use of CCR as fill; and
- The influence of geochemistry on several of the Appendix IV constituent concentrations in groundwater.

As discussed in the ACM, the nature and extent of contamination (e.g. arsenic, beryllium, and lithium) in groundwater relative to GWPSs has been defined per the RCRA CCR Rule requirements based on the site-specific hydrogeology. Although arsenic, beryllium, and lithium concentrations exceed the GWPS within the groundwater monitoring system wells, these constituents are delineated within the limits of the property owned by Consumers Energy and there are currently no adverse effects on human health or the environment from either surface water or groundwater due to CCR management at the Weadock Bottom Ash Pond or Weadock Landfill. The property is owned and operated by Consumers Energy and groundwater is not used for drinking water. There are no on-site drinking water wells and there are no surface water potable water intakes within 3 miles of the site, so the drinking water pathway is not complete. A shallow water-bearing unit is not observed to the south of the landfill, which prevents offsite migration of Appendix III and Appendix IV constituents.

The distribution of arsenic, beryllium, and lithium relative to the Weadock Landfill and Weadock Bottom Ash Pond in the shallow water-bearing unit as compared to the GWPS is presented in Figure 1. Three categories were assigned to groundwater data collected from May 2018 to October 2021, as follows:

- White – No Exceedances: all concentrations were below the GWPS
- Yellow – Two or More Exceedances: individual observations above the GWPS[3]
- Orange – Statistically Significant GWPS Exceedances[4]

As shown on Figure 1, the following is a summary of the RCRA Appendix IV nature and extent evaluation[5] organized by constituent:

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[3] Although an exceedance is defined as a single detection above the GWPS, confidence intervals will be used to determine compliance per the CCR Rule. Compliance with the GWPSs established under § 257.95(h) will be achieved by demonstrating that concentrations of constituents listed in Appendix IV to this part have not exceeded the GWPSs for a period of three consecutive years using the statistical procedures and performance standards in § 257.93(f) and (g)

[4] Lower confidence limit is above the GWPS based upon most recent assessment monitoring statistical evaluation.

[5] Comparison and discussion based on constituents that triggered corrective measures under the RCRA CCR program.

Arsenic

Although the lower confidence limits of arsenic did not exceed the GWPS of 21 ug/L at the Weadock Bottom Ash Pond during the statistical evaluation of the October 2021 semiannual data, the observed upper confidence limit is above the GWPS at one well near the Weadock Bottom Ash Pond (JCW-MW-15007). During the statistical evaluation of the May 2020 semiannual event, monitoring well JCW-MW-15010 also exhibited an upper confidence limit at or above the GWPS for arsenic; however, since sluicing to the Weadock Bottom Ash Pond ceased in April 2016, concentrations of arsenic in JCW-MW-15010 appear to exhibit a downward trend and the arsenic concentrations at JCW-MW-15010 were below the GWPS from April 2018 to May 2021 and the upper confidence limit in October 2021 remained below the GWPS. The influence of the source removal combined with changes in redox geochemistry impacted by the cessation of sluice water loading to the Weadock Bottom Ash Pond is still being evaluated as additional data collection events are completed.

Additionally, arsenic concentrations have at times exceeded the GWPS in four groundwater monitoring wells located along the Weadock Landfill perimeter (MW-51, MW-53R, MW-55, and JCW-MW-18006). These areas of elevated arsenic concentrations are limited in extent and are dependent upon geochemical conditions, which are changing either due to lake levels rising or in the case of JCW-MW-18006, activities related to the Weadock Bottom Ash Pond closure. Also, an Alternate Source Demonstration (ASD) for arsenic at MW-55 was included in Appendix G of the 2019 *Annual Groundwater Monitoring and Corrective Action Report for the Weadock Landfill* (TRC, January 2020). The basis for this ASD is summarized below and updated time series plots in support of this ASD are included in the *2021 Semiannual Groundwater Monitoring Report and Fourth Quarter 2021 Hydrogeological Monitoring Report* for the JC Weadock Solid Waste Disposal Area (TRC, January 2022).

Data collected from the 2018 investigation as well as data collected during routine sampling events for Part 115 and Federal CCR groundwater compliance show the following:

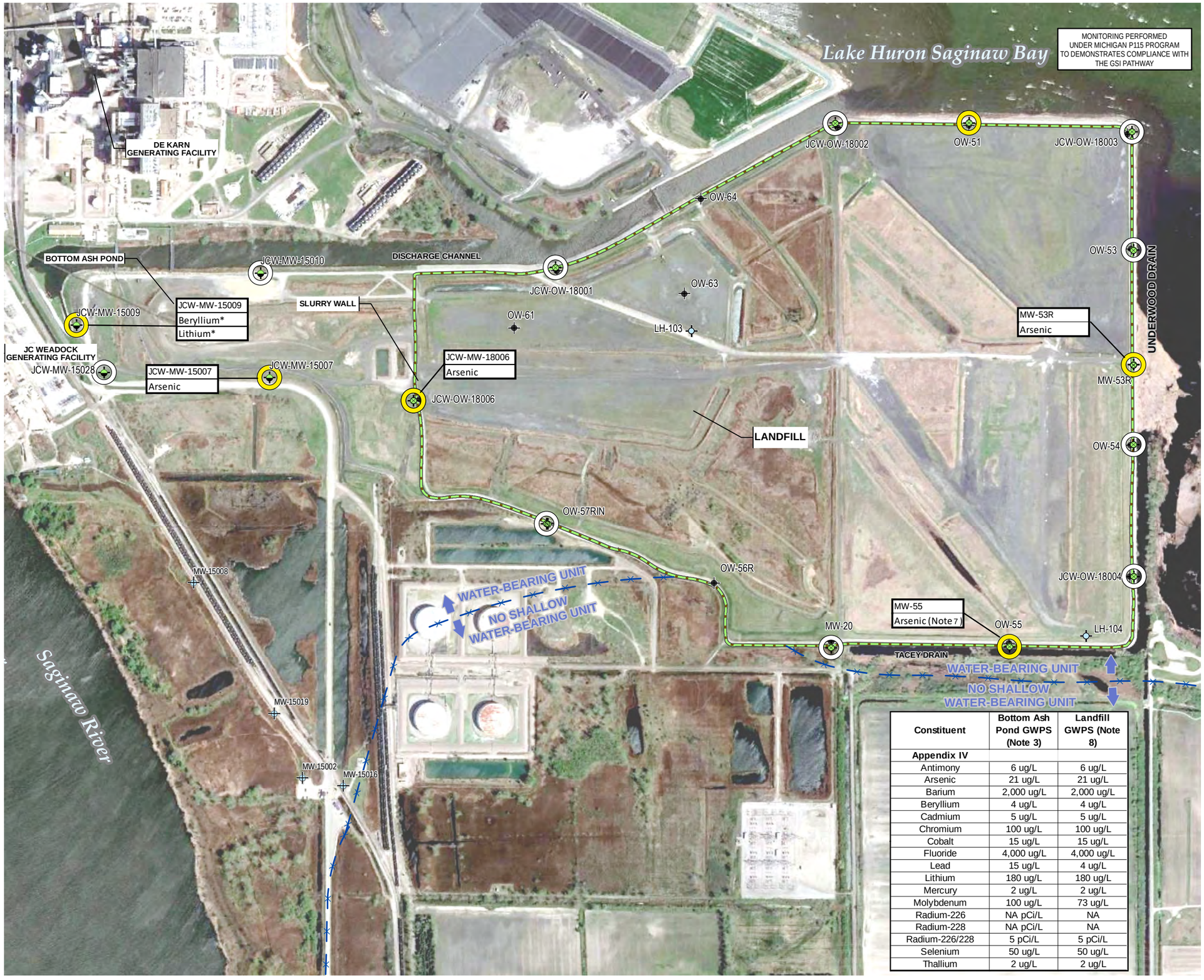
- **Distinct Chemistry from Leachate** – The leachate chemistry from a monitoring well screened at the base of the ash fill (LH-104) is distinctly different from the groundwater chemistry near MW- 55 and the temporary monitoring wells installed by TRC in the investigation area, as illustrated Appendix G of the *2020 Annual Groundwater Monitoring and Corrective Action Report* (TRC, January 2020).
- **Conservative Tracer** – Boron is a metalloid known to be present in coal ash and can be used as a conservative tracer in groundwater to indicate whether elevated concentrations of constituents (i.e. arsenic) are consistent with coal ash. Concentrations of boron in Leachate Headwell LH-104 are significantly higher than concentrations observed at any of the other location sampled as a part of this ASD. Additionally, boron concentrations at MW-55 have decreased since 2010, as evidenced by the time series plots in Appendix G of the *2021 Semiannual Groundwater Monitoring Report and Fourth Quarter 2021 Hydrogeological Monitoring Report* for the JC Weadock Solid Waste Disposal Area (TRC, January 2022). A downward trend in concentration for boron is strong evidence that the water quality at MW-55 is not directly affected by groundwater migrating from the landfill.

- **Reducing Conditions and Groundwater Head Levels** – Water levels for MW-55, as shown in Appendix G of the *2021 Semiannual Groundwater Monitoring Report and Fourth Quarter 2021 Hydrogeological Monitoring Report* for the JC Weadock Solid Waste Disposal Area (TRC, January 2022), are trending upwards and have increased over 4-ft since 2010. The oxidation-reduction potential (ORP) at MW-55 is generally lower (i.e., more reducing) than other wells along the southern and eastern portion of the landfill perimeter. The lowering of ORP over time as a result of increased water levels has changed the geochemical conditions in the vicinity of MW-55 and has resulted in an increased solubility of arsenic and molybdenum.

Beryllium and Lithium

Beryllium and lithium were present at statistically significant levels above their respective GWPSs at JCW-MW-15009 at the Weadock Bottom Ash Pond when the groundwater monitoring program started in December 2015. Since sluicing to the Weadock Bottom Ash Pond ceased in April 2016, concentrations of beryllium and lithium appear to exhibit a downward trend. The influence of the bottom ash sluice water loading or changes in redox geochemistry impacted by the cessation of sluice water loading to the Weadock Bottom Ash Pond is still being evaluated as additional data collection events are completed after the source removal activity was completed and certified in August 2020. Lithium and beryllium concentrations have remained below the GWPS at other monitoring wells in the groundwater monitoring system and concentrations in JCW-MW-15009 have been below the GWPS for the past five semiannual sampling events.

Figure



Constituent	Bottom Ash Pond GWPS (Note 3)	Landfill GWPS (Note 8)
Appendix IV		
Antimony	6 ug/L	6 ug/L
Arsenic	21 ug/L	21 ug/L
Barium	2,000 ug/L	2,000 ug/L
Beryllium	4 ug/L	4 ug/L
Cadmium	5 ug/L	5 ug/L
Chromium	100 ug/L	100 ug/L
Cobalt	15 ug/L	15 ug/L
Fluoride	4,000 ug/L	4,000 ug/L
Lead	15 ug/L	4 ug/L
Lithium	180 ug/L	180 ug/L
Mercury	2 ug/L	2 ug/L
Molybdenum	100 ug/L	73 ug/L
Radium-226	NA pCi/L	NA
Radium-228	NA pCi/L	NA
Radium-226/228	5 pCi/L	5 pCi/L
Selenium	50 ug/L	50 ug/L
Thallium	2 ug/L	2 ug/L

LEGEND

- BACKGROUND MONITORING WELL
- JCW LANDFILL MONITORING WELL
- JCW BOTTOM ASH POND MONITORING WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- LEACHATE HEADWELL
- NO EXCEEDANCES
- TWO OR MORE EXCEEDANCES (NOTES 4 & 5)
- STATISTICALLY SIGNIFICANT GWPS EXCEEDANCE (NOTE 6)
- SLURRY WALL (APPROXIMATE)
- APPROXIMATE WATER-BEARING UNIT BOUNDARY

WELL ID
CONSTITUENT(S) EXCEEDING GWPS

* GWPS EXCEEDANCE TRIGGERING ASSESSMENT OF CORRECTIVE MEASURES PURSUANT TO §257.96

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018
3. GWPS (GROUNDWATER PROTECTION STANDARD) IS THE HIGHER OF THE MAXIMUM CONTAMINANT LEVEL (MCL)/REGIONAL SCREENING LEVEL FROM 83 FR 36435 (RSL) AND UPPER TOLERANCE LIMIT (UTL) AS ESTABLISHED IN TRC'S TECHNICAL MEMORANDUM DATED OCTOBER 15, 2018.
4. GROUNDWATER DATA FROM MAY 2018 TO OCTOBER 2021 ARE SCREENED AGAINST THE GWPS FOR EVALUATION PURPOSES ONLY. AN EXCEEDANCE IS DEFINED AS A SINGLE DETECTION ABOVE THE GWPS, HOWEVER, CONFIDENCE INTERVALS WILL BE USED TO DETERMINE COMPLIANCE PER THE CCR RULES.
5. AN EXCEEDANCE OF THE GWPS DOES NOT INDICATE UNACCEPTABLE RISK FROM GROUNDWATER EXPOSURE; THE DRINKING WATER PATHWAY IS NOT COMPLETE ON THE PROPERTY. GROUNDWATER CONDITIONS CONTINUE TO BE MONITORED TO INFORM THE JCW BOTTOM ASH POND AND LANDFILL REMEDY SELECTION.
6. LOWER CONFIDENCE LIMIT IS ABOVE GWPS.
7. ALTERNATE SOURCE DEMONSTRATION INCLUDED IN 2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT (TRC, JANUARY 2020).
8. GWPS IS THE HIGHER OF THE MCL/RSL, APPLICABLE MICHIGAN PART 201 CRITERIA, AND UTL AS ESTABLISHED IN TRC'S TECHNICAL MEMORANDUM DATED APRIL 23, 2021.

0 600 1,200 Feet

1 " = 600 '
1:7,200

PROJECT:
CONSUMERS ENERGY COMPANY
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:
NATURE AND EXTENT SUMMARY GWPS EXCEEDANCES

DRAWN BY:	S. MAJOR	PROJ NO.:	367389.0001
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		**FIGURE 1**
DATE:	JANUARY 2022		

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FILE NO.: 418426-ExceedancesNE_ACM_20210719.mxd

TRC - GIS
Plot Date: 1/25/2022, 15:13:58 PM by AFOJTIK -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\418426-ExceedancesNE_ACM_20210719.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0