January 30, 2023 ***TRANSMITTAL VIA EMAIL 01/30/2023***

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: 2022 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 2022 through December 2022.

This letter along with the May 2022 and October 2022 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 *2022 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 was 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 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 2022 and October 2022 Sampling Events

Statistical analysis from the May and October 2022 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 2022 Assessment Monitoring Data Summary and Statistical Evaluation Consumers Energy, JC Weadock Site, Bottom Ash Pond CCR Unit* (TRC, 2022) and *October 2022 Assessment Monitoring Data Summary and Statistical Evaluation Consumers Energy, JC Weadock Site, Bottom Ash Pond CCR Unit* (TRC, 2023).

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 seven 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 GWPSs for the Weadock Bottom Ash Pond groundwater monitoring system since Assessment Monitoring commenced in April 2018; 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, 2023).

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 2022 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* (TRC, April 29, 2022)
- *Second Quarter 2022 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* (TRC, July 27, 2022)
- *Third Quarter 2022 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* (TRC, October 27, 2022)

- *Fourth Quarter 2022 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* (TRC, January 30, 2023)

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 *2022 Semiannual Groundwater Monitoring Report and Fourth Quarter 2022 Hydrogeological Monitoring Report; JC Weadock Solid Waste Disposal Area* (TRC, January 2023) indicating elevated levels of constituents at that location are not related to materials management within the Weadock Landfill;
- An Alternate Source Demonstration included in this annual groundwater monitoring report asserts that increasing trends in Appendix III constituents, including sulfate and total dissolved solids at JCW-MW-18001 and chloride in MW-53R and MW-54R, are not attributable to potential releases from the JC Weadock Landfill based on the evidence presented in Appendix G of the report; 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 2022 Nature and Extent Data Summary, JC Weadock, Consumers Energy, Essexville, Michigan* (TRC, January 2023).

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. The Appendix IV constituents that have triggered corrective action, beryllium and lithium, have been documented to have constituent concentrations reduced to beneath their respective GWPS since source removal activities were completed. Consumers Energy will begin developing the remedy selection materials in anticipation of a public meeting to review the source removal activities, results since source removal activities were completed, and remedy recommendation based on the results-to-date. Sampling events completed since source removal activities were completed 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.

Additionally, the Weadock Bottom Ash Pond is located with the licensed acreage of the Weadock Solid Waste Disposal Area. Now that the final closure plan for the Weadock Landfill has been approved by EGLE, Consumers Energy can also proceed with the recommendations for the final long-term stewardship of acreage outside of the soil-bentonite slurry wall that is included within the licensed acreage, inclusive of the former Weadock Bottom Ash Pond. Consumers Energy will continue monitoring conditions during the execution of the final closure construction including performance of the soil-bentonite slurry wall. 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 28, 2023. Please feel free to contact me with any questions or clarifications.

Sincerely,

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

cc: Mr. Phil Roycraft, EGLE Saginaw Bay District Office
Mr. Mike Quigg, EGLE Saginaw Bay District Office
Ms. Margie Ring, EGLE Lansing Office
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 2022 Assessment Monitoring Data Summary and Statistical Evaluation Consumers Energy, JC Weadock Site, Bottom Ash Pond CCR Unit. (TRC, July 27, 2022).
4) October 2022 Assessment Monitoring Data Summary and Statistical Evaluation Consumers Energy, JC Weadock Site, Bottom Ash Pond CCR Unit. (TRC, January 30, 2023).
5) First Quarter 2022 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan. (TRC, April 29, 2022).
6) Second Quarter 2022 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan. (TRC, July 27, 2022).
7) Third Quarter 2022 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan. (TRC, October 27, 2022).
8) Fourth Quarter 2022 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan. (TRC, January 30, 2023).
9) Second Semiannual 2022 Nature and Extent Data Summary, JC Weadock, Consumers Energy, Essexville, Michigan. (TRC, January 30, 2023).

CCR Annual Groundwater Report Requirements: § 257.90(e)
Checklist for the Weadock Bottom Ash Pond CCR Unit
2022 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 decommissioning
(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 Assessment Monitoring [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 [2],[3]
(B) Provide the date when the assessment of corrective measures was initiated for the CCR unit;	Section 1.1 Program Summary [2],[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) *2022 Annual Groundwater Monitoring and Corrective Action Report JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residuals CCR Units.* Consumers Energy. January 30, 2023.

(2) *May 2022 Assessment Monitoring Data Summary and Statistical Evaluation Consumers Energy, JC Weadock Site, Bottom Ash Pond CCR Unit.* TRC. July 29, 2022.

(3) *October 2022 Assessment Monitoring Data Summary and Statistical Evaluation Consumers Energy, JC Weadock Site, Bottom Ash Pond CCR Unit*. TRC. January 30, 2023.

(4) *Second Semiannual 2022 Nature and Extent Data Summary, JC Weadock, Consumers Energy, Essexville, Michigan*. TRC. January 30, 2023.

CCR Annual Groundwater Report Requirements: § 257.90(e)
Checklist for the Weadock Landfill CCR Unit
2022 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;	Section 2.0 Leachate Monitoring [2]; Appendix H [2]
(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[3][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 [2],[3],[4],[5]; Certified ASD [3][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 [2],[3],[4],[5]; Certified ASD [3][5]
(B) Provide the date when the assessment monitoring program was initiated for the CCR unit.	Section 1.2 Program Summary [2],[3],[4],[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 [2],[3],[4],[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) *2022 Annual Groundwater Monitoring and Corrective Action Report JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residuals CCR Units.* Consumers Energy. January 30, 2023.

(2) *First Quarter 2022 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* TRC. April 29, 2022.

(3) *Second Quarter 2022 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* TRC. July 27, 2022.

(4) *Third Quarter 2022 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* TRC. October 27, 2022.

(5) *Fourth Quarter 2022 Hydrogeological Monitoring Report, JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* TRC. January 30, 2023.

(6) *Second Semiannual 2022 Nature and Extent Data Summary, JC Weadock, Consumers Energy, Essexville, Michigan*. TRC. January 30, 2023.

May 2022 Assessment Monitoring Data Summary and Statistical Evaluation

JC Weadock, Bottom Ash Pond CCR Unit

Essexville, Michigan

July 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

TABLE OF CONTENTS

1.0 Introduction 1

1.1 Program Summary 1
1.2 Site Overview 3
1.3 Geology/Hydrogeology 3

2.0 Groundwater Monitoring 6

2.1 Monitoring Well Network 6
2.2 May 2022 Assessment Monitoring 6
2.2.1 Groundwater Flow Rate and Direction 7
2.2.2 Data Quality 7

3.0 Assessment Monitoring Statistical Evaluation 8

3.1 Establishing Groundwater Protection Standards 8
3.2 Data Comparison to Groundwater Protection Standards 8

4.0 Conclusions and Recommendations 10

5.0 References 11

TABLES

Table 1 Summary of Groundwater Elevation Data: May 2022
Table 2 Summary of Field Parameter Results: May 2022
Table 3 Summary of Background Well Groundwater Sampling Results (Analytical): May 2022
Table 4 Summary of Groundwater Sampling Results (Analytical) – JC Weadock Bottom Ash Pond: May 2022
Table 5 Summary of Groundwater Protection Standard Exceedances – May 2022

FIGURES

Figure 1 Site Location Map
Figure 2 Site Map
Figure 3 Potentiometric Surface Map – May 2022

APPENDICES

Appendix A Data Quality Reviews
Appendix B Statistical Evaluation of May 2022 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 May 2022 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 May 2022 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 2022 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 2 through 10, 2022. 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 2022 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 May 2022 monitoring event are included in the attached laboratory reports (Appendix C).

2.2.1 Groundwater Flow Rate and Direction

Groundwater elevation data collected during the May 2022 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 580 to 586 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 2022 event is estimated at 0.0053 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 2022 is 0.28 ft/day or 100 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 2022 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 2022 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 six 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 2022 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 2022 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 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.

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

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

Golder Associates Inc. August 2020. J.C. Weadock Generating Facility Bottom Ash Pond CCR Removal Documentation Report, Essexville, Michigan. Prepared for Consumers Energy Company.

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.

TRC Environmental Corporation. January 2019. 2018 Annual Groundwater Monitoring Report – JC Weadock Power Plant, Bottom Ash Pond CCR Unit. Prepared for Consumers Energy Company.

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: May 2022

Second Quarter 2022 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 2, 2022	
						Depth to Water (ft BTOC)	Groundwater Elevation (ft)
Background Monitoring Wells							
MW-15002	587.71	Sand	580.9	to	570.9	6.61	581.10
MW-15008	585.36	Sand with clay	578.7	to	568.7	4.38	580.98
MW-15016	586.49	Sand	581.2	to	578.2	3.66	582.83
MW-15019	586.17	Sand and Sand/Clay	579.5	to	569.5	5.31	580.86
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	8.70	580.94
JCW-MW-15010	597.76	Sand	579.7	to	578.2	17.25	580.51
JCW-MW-15028	589.64	Sand	567.7	to	564.7	7.28	582.36
Landfill: Downgradient Monitoring Wells (outside slurry wall)							
JCW-MW-18001	596.73	Sand and Sandy Clay	578.3	to	573.3	16.78	579.95
JCW-MW-18004	593.04	Sandy Clay	583.9	to	578.9	12.28	580.76
JCW-MW-18005	590.89	Sand and Sandy Clay	580.0	to	575.0	8.33	582.56
JCW-MW-18006	600.72	Fly Ash and Sandy Clay	582.8	to	577.8	12.91	587.81
MW-50	593.36	Sand	577.8	to	574.8	13.49	579.87
MW-51	594.29	Sand and Clay	577.8	to	574.8	14.33	579.96
MW-52	594.90	Sand	579.3	to	576.3	14.13	580.77
MW-53	593.68	Sand and Clay	579.1	to	576.1	13.72	579.96
MW-53R	594.25	Sand and Clay	580.4	to	575.4	14.23	580.02
MW-54R	593.89	Clay and Sand	581.3	to	576.3	13.80	580.09
MW-55	593.82	Sand	581.5	to	578.5	14.00	579.82
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	17.08	578.76
JCW-OW-18002	593.63	Sand	578.9	to	573.9	10.94	582.69
JCW-OW-18003	593.99	Sand and Clay	580.5	to	575.5	8.55	585.44
JCW-OW-18004	594.19	Sandy Clay	584.6	to	579.6	6.27	587.92
JCW-OW-18006	600.61	Fly Ash and Clay with Sand	582.9	to	577.9	9.20	591.41
MW-20	592.73	NR	~581.1	to	~578.1	6.53	586.20
OW-51	593.62	Clay and Sand	578.9	to	575.9	10.08	583.54
OW-53	593.64	Clay and Sand	579.0	to	576.0	7.58	586.06
OW-54	594.10	Clay and Sand	580.0	to	577.0	6.81	587.29
OW-55	594.67	Clay (or Sand and Clay)	580.9	to	577.9	6.18	588.49
OW-56R	592.01	Ash and Sand	577.5	to	572.5	5.95	586.06
OW-57R IN	590.86	Sandy Clay	575.7	to	570.7	6.08	584.78
OW-61	602.15	Ash and Sand	588.0	to	585.0	9.66	592.49
OW-63	612.53	Ash and Sand	594.2	to	591.2	NM	NM
Landfill: Leachate Headwells							
LH-103R	612.70	Fly Ash	30.2	to	33.2	23.58	589.12
LH-104	596.56	Fly Ash	8.0	to	11.0	7.48	589.08

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: May 2022

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	5/2/2022	0.00	-49.7	6.5	5,911	9.2	10.0
MW-15008	5/2/2022	0.05	-73.2	6.4	1,347	8.5	9.5
MW-15016	5/3/2022	0.01	-84.0	6.7	1,390	8.1	10.0
MW-15019	5/2/2022	0.01	-71.1	6.5	1,414	7.3	4.0
Weadock Bottom Ash Pond							
JCW-MW-15007	5/10/2022	--	-100.5	7.2	16,955	12.0	7.8
JCW-MW-15009	5/10/2022	--	-40.8	5.9	2,480	12.0	10.0
JCW-MW-15010	5/10/2022	--	-56.0	7.1	1,240	16.0	9.0
JCW-MW-15028	5/10/2022	--	-53.8	7.7	4,295	12.7	2.9

Notes:

mg/L - Milligrams per Liter.

mV - Millivolts.

SU - Standard Units.

umhos/cm - Micromhos per centimeter.

°C - Degrees Celsius.

NTU - Nephelometric Turbidity Unit.

-- = Parameter Not Measured. The dissolved oxygen sensor on the water quality meter was not functioning.

Table 3
Summary of Groundwater Sampling Results (Analytical): May 2022
DE Karn & JC Weadock Background – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	**MW-15002**	**MW-15008**	**MW-15016**	**MW-15019**
					Sample Date:	5/2/2022	5/2/2022	5/3/2022	5/2/2022
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Background			
Appendix III(1)									
Boron	ug/L	NC	**500**	**500**	4,000	103	112	329	236
Calcium	mg/L	NC	NC	NC	500EE	238	89.5	216	139
Chloride	mg/L	**250****	**250E**	**250E**	**50**	**2,210**	**197**	**243**	**324**
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250E**	**250E**	500EE	6	4.99	**267**	62.5
Total Dissolved Solids	mg/L	**500****	**500E**	**500E**	**500**	**4,240**	**783**	**1,390**	**1,200**
pH, Field	SU	**6.5 - 8.5****	**6.5 - 8.5E**	**6.5 - 8.5E**	**6.5 - 9.0**	6.5	**6.4**	6.7	6.5
Appendix IV(1)									
Antimony	ug/L	6	6.0	6.0	2.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	**14**	2	8	2
Barium	ug/L	2,000	2,000	2,000	1,200	682	52	72	308
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	3	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	16	16	80	12
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	120	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NC	NC	NC	1.37	< 0.447	< 0.368	< 0.579
Radium-228	pCi/L	NC	NC	NC	NC	3.30	< 0.588	< 0.611	1.83
Radium-226/228	pCi/L	5	NC	NC	NC	4.68	0.826	0.624	2.11
Selenium	ug/L	**50**	**50**	**50**	**5**	**54**	< 1	2	2
Thallium	ug/L	2	2.0	2.0	2.0	< 2	< 2	< 2	< 2
Additional MI Part 115(2)									
Iron	ug/L	**300****	**300E**	**300E**	500,000EE	**16,100**	**15,500**	**8,020**	**21,000**
Copper	ug/L	1,000**	1,000E	1,000E	20	3	< 1	5	< 1
Nickel	ug/L	NC	100	100	120	14	5	13	8
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	62	27	**15**	**6**	3	3
Zinc	ug/L	5,000**	2,400	5,000E	260	23	< 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): May 2022
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:	5/10/2022	5/10/2022	5/10/2022	5/10/2022
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^					
Appendix III[(1)]										
Boron	ug/L	NC	**500**	**500**	4,000		255	202	**1,200**	**633**
Calcium	mg/L	NC	NC	NC	**500**[EE]		275	**526**	165	199
Chloride	mg/L	**250****	**250**[E]	**250**[E]	**50**		**3,470**	34.5	41.7	**1,070**
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]		28.4	**1,310**	167	93.7
Total Dissolved Solids	mg/L	**500****	**500**[E]	**500**[E]	**500**		**7,000**	**2,270**	**838**	**2,500**
pH, Field	SU	**6.5 - 8.5****	**6.5 - 8.5**[E]	**6.5 - 8.5**[E]	**6.5 - 9.0**		7.2	**5.9**	7.1	7.7
Appendix IV[(1)]										
Antimony	ug/L	6	6.0	6.0	2.0		< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**		**24**	< 1	5	< 1
Barium	ug/L	2,000	2,000	2,000	**1,200**		**1,540**	17	219	351
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		3	1	< 1	2
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		81	80	74	54
Mercury	ug/L	2	2.0	2.0	0.20#		< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	120		5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NC	NC	NC		1.09	< 0.601	< 0.488	0.490
Radium-228	pCi/L	NC	NC	NC	NC		1.21	1.11	0.932	0.944
Radium-226/228	pCi/L	5	NC	NC	NC		2.30	1.45	0.952	1.43
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]		**9,530**	**15,700**	**400**	**399**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20		3	3	< 1	1
Nickel	ug/L	NC	100	100	120		18	29	8	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**		**28**	3	< 2	**11**
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 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 – May 2022

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	--	--	3.0	17
Barium	ug/L	2,000	900	1,900	--	--	--	--
Beryllium	ug/L	4	--	--	1.0	6.6	--	--
Lithium	ug/L	180	--	--	33	176	--	--

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 2022
PROJ. NO.:	464096
FILE:	464096-101-001.mxd

FIGURE 1

S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\3_WEADOCK\2022_MXDs\MAY_2022\464096-101-001.mxd -- Saved By: AADAIR on 5/25/2022, 12:20:11 PM

LEGEND

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

0 600 1,200 Feet

1 " = 600 '
1:7,200

N

PROJECT:
CONSUMERS ENERGY COMPANY
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:
SITE MAP

DRAWN BY:	A. ADAIR	PROJ NO.:	464096
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		**FIGURE 2**
DATE:	JULY 2022		

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

FILE NO.: 464096-102-002.mxd

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 5/25/2022, 12:28:12 PM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\11-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 2697613 WEADOCK\2022 MXDs\MAY 2022\464096-102-002.mxd

LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING WELL
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- JCW LANDFILL SOIL BORING
- DECOMMISSIONED 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.

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 2022

DRAWN BY:	A. ADAIR	PROJ NO.:	464096
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		**FIGURE 3**
DATE:	JULY 2022		

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

FILE NO.: 464096-103-003.mxd

Plot Date: 6/29/2022, 10:19:31 AM by AADAIR -- LAYOUT: ANSI B (11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 2697673 WEADOCK\2022 MXDs\MAY 2022\464096-103-003.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 2022
JC Weadock Bottom Ash Pond

Groundwater samples were collected by TRC for the May 2022 sampling event. Samples were analyzed for total 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) 22-0440.

During the May 2022 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

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 MS and MSD recoveries were within the acceptance criteria. 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 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-15010; all criteria were met.
- Laboratory duplicate analyses were not performed on a sample from this data set.

Attachment A

Summary of Data Non-Conformances for Groundwater Analytical Data
JC Weadock and DE Karn Background Wells – CCR Monitoring Program
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
MW-15002	5/2/2022	Radium 228	Detected results should be considered estimated due to LCS/LCSD Relative Error Ratio (RER) outside of criteria.
MW-15019	5/2/2022		
DUP-04	5/2/2022		

Laboratory Data Quality Review
Groundwater Monitoring Event May 2022
JC Weadock Bottom Ash Pond

Groundwater samples were collected by TRC for the May 2022 sampling event. Samples were analyzed for radium by Eurofins-TestAmerica in St. Louis, Missouri (Eurofins TA – St. Louis). The laboratory analytical results were reported in laboratory sample delivery group (SDG) 240-166414-1.

During the May 2022 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 (Ra-226, Ra-228, Combined Ra-226 & Ra-228)	EPA 903.0, EPA 904.0

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

Data Usability Review Procedure

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

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

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

This data usability report addresses the following items:

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

Review Summary

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

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

QA/QC Sample Summary:

- Target analytes were not detected in the method blanks.
- One equipment blank (EB-02) was collected. Target analytes were not detected in the equipment blank sample.
- LCS/LCSD recoveries and relative percent differences (RPDs) or relative error ratios (RER) for all target analytes were within laboratory control limits.
- MS/MSD duplicate analyses were not performed on a sample from this SDG.
- The field duplicate pair samples were DUP-02/JCW-MW-15010. All criteria were met.
- Carrier recoveries were within 40-110%.

Laboratory Data Quality Review
Groundwater Monitoring Event May 2022
JC Weadock/DE Karn Background

Groundwater samples were collected by TRC for the May 2022 sampling event. Samples were analyzed for total metals, anions, and total dissolved solids by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 22-0443.

During the May 2022 sampling event, a groundwater sample was collected from each of the following wells:

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

Each sample was analyzed for the following constituents:

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

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

Data Usability Review Procedure

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

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

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

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

This data usability report addresses the following items:

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

Review Summary

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

- The reviewed Appendix III, IV, and additional Part 115 constituents 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 were not detected in this blank sample.
- MS and MSD analyses were not performed on a sample from this data set.
- The field duplicate pair samples were DUP-Background and MW-15008; 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 2022
JC Weadock/Karn DEK Background

Groundwater samples were collected by TRC for the May 2022 sampling event. Samples were analyzed for radium by Eurofins-TestAmerica in St. Louis, Missouri (Eurofins TA – St. Louis). The laboratory analytical results were reported in laboratory sample delivery group (SDG) 240-166150-1.

During the May 2022 sampling event, a groundwater sample was collected from each of the following wells:

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

Each sample was analyzed for the following constituents:

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

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

Data Usability Review Procedure

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

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

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

This data usability report addresses the following items:

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

Review Summary

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

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

QA/QC Sample Summary:

- Target analytes were not detected in the method blanks.
- One equipment blank (EB-04) was collected. Target analytes were not detected in the equipment blank sample.
- LCS/LCSD recoveries and relative percent differences or relative error ratios (RER) for all target analytes were within laboratory control limits with the following exception.
    - The RER (1.12) for radium 228 was outside of the laboratory control limit (1.0) in the LCS/LCSD associated with all samples. Positive detections of radium 228 in select samples should be considered estimated as summarized in the attached table, Attachment A.
- MS/MSD and laboratory duplicate analyses were not performed on a sample from this SDG.
- The field duplicate pair samples were DUP-04/MW-15008. All criteria were met.
- Carrier recoveries were within 40-110%.

Appendix B
Statistical Evaluation of May 2022 Assessment Monitoring Sampling Event

1540 Eisenhower Pl.
Ann Arbor, MI 48108

T 734.971.7080
TRCcompanies.com

Technical Memorandum

Date:	June 29, 2022
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC Alex Eklund, TRC
Project No.:	464096.0001 Phase 002, Task 002
Subject:	Statistical Evaluation of May 2022 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 2022 was conducted on May 2 through 10, 2022. 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 2022 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 May 2022 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 (November 2018 through May 2022) 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 and the results obtained. 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 (November 2018 through May 2022) 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, barium at JCW-MW-15007, and lithium at JCW-MW-15009 were found to be normally distributed. 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 (October 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 – November 2018 to May 2022

Attachment 1 Sanitas™ Output Files

Table

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – November 2018 to May 2022
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

						Sample Location:	JCW-MW-15007										
						Sample Date:	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	5/10/2022
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS					Field Dup				Field Dup		Field Dup	
Appendix III																	
Boron	ug/L	NC	NA	619	NA		656	290	470	460	335	329	233	240	503	532	255
Calcium	mg/L	NC	NA	302	NA		153	200	130	120	217	413	280	294	265	267	275
Chloride	mg/L	250*	NA	2,440	NA		788	1,600	1,200	1,200	2,870	5,810	3,780	3,830	2,820	2,790	3,470
Fluoride	ug/L	4,000	NA	1,000	NA		< 1,000	< 10,000 (1)	< 5,000(1)	< 5,000(1)	< 1,000	1,160	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA		23.9	< 20	44	43	57.2	4.47	29.0	29.8	82.1	82.5	28.4
Total Dissolved Solids	mg/L	500*	NA	4,600	NA		1,790	3,400	2,300	2,400	5,080	11,200	7,200	7,280	5,070	4,920	7,000
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA		7.1	7.2	7.1	--	7.6	7.3	7.1	--	7.0	--	7.2
Appendix IV																	
Antimony	ug/L	6	NA	1	6		< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**		**46.3**	9.8	**34**	**35**	19	**61**	**31**	**31**	17	**45**	**24**
Barium	ug/L	2,000	NA	1,300	**2,000**		1,060	950	970	970	1,180	**2,400**	1,680	1,670	1,620	1,590	1,540
Beryllium	ug/L	4	NA	1	**4**		< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5		< 1.0	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100		< 5.0	< 1.0	< 1.0	< 1.0	< 1	1	< 1	< 1	1	1	3
Cobalt	ug/L	NC	6	15	15		< 30.0 (1)	< 6.0	< 6.0	< 6.0	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000		< 1,000	< 10,000 (1)	< 5,000(1)	< 5,000(1)	< 1,000	1,160	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15		< 5.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	**180**		87	67	70	67	103	94	70	69	144	151	81
Mercury	ug/L	2	NA	0.2	2		< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100		< 25.0	6.2	9.7	9.6	< 5	< 5	8	8	7	7	5
Radium-226	pCi/L	NC	NA	NA	NA		1.33	0.628	0.659	0.442	0.728	1.71	1.32	1.01	1.35	1.02	1.09
Radium-228	pCi/L	NC	NA	NA	NA		0.975	0.492	0.796	0.543	0.698	1.67	1.27	1.43	1.63	1.66	1.21
Radium-226/228	pCi/L	5	NA	3.32	5		2.31	1.12	1.45	0.986	1.43	3.38	2.59	2.45	2.98	2.68	2.30
Selenium	ug/L	50	NA	2	50		< 1.0	3.2	< 1.0	< 1.0	< 1	< 1	4	3	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2		< 10.0 (1)	< 2.0	< 2.0	< 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.
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 – November 2018 to May 2022
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

						Sample Location:	JCW-MW-15009						
						Sample Date:	11/7/2018	4/9/2019	10/15/2019	5/14/2020	10/13/2020	5/12/2021	10/13/2021	5/10/2022
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS									
Appendix III														
Boron	ug/L	NC	NA	619	NA		422	290	330	141	263	255	289	202
Calcium	mg/L	NC	NA	302	NA		589	510	520	314	560	574	615	526
Chloride	mg/L	250*	NA	2,440	NA		64.9	43	18	3.19	5.96	14.8	28.7	34.5
Fluoride	ug/L	4,000	NA	1,000	NA		< 1,000	< 2,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA		1,980	1,600	1,400	611	1,060	1,450	1,410	1,310
Total Dissolved Solids	mg/L	500*	NA	4,600	NA		2,620	2,400	2,100	1,370	1,910	2,230	2,400	2,270
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA		4.8	5.4	6.1	7.2	6.6	5.6	6.0	5.9
Appendix IV														
Antimony	ug/L	6	NA	1	6		< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**		< 5.0	< 1.0	< 1.0	< 1	1	< 1	3	< 1
Barium	ug/L	2,000	NA	1,300	**2,000**		14.8	14	66	58	51	23	23	17
Beryllium	ug/L	4	NA	1	**4**		**6.6**	**4.3**	< 1.0	< 1	< 1	< 1	< 1	1
Cadmium	ug/L	5	NA	0.2	5		< 1.0	0.24	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100		< 5.0	1.4	< 1.0	2	< 1	< 1	< 1	1
Cobalt	ug/L	NC	6	15	15		< 30.0 (1)	< 6.0	< 6.0	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000		< 1,000	< 2,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15		< 5.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	**180**		**240**	150	94	18	53	89	112	80
Mercury	ug/L	2	NA	0.2	2		< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100		< 25.0	< 5.0	9.3	10	9	< 5	< 5	< 5
Radium-226	pCi/L	NC	NA	NA	NA		< 0.803	< 0.0879	0.175	< 0.125	< 0.352	0.333	0.388	< 0.601
Radium-228	pCi/L	NC	NA	NA	NA		1.25	< 0.411	0.548	< 0.491	< 0.495	0.720	0.922	1.11
Radium-226/228	pCi/L	5	NA	3.32	5		< 1.54	< 0.411	0.723	< 0.491	< 0.495	1.05	1.31	1.45
Selenium	ug/L	50	NA	2	50		< 5.0	2.0	2.0	1	< 1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2		< 10.0 (1)	< 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 – November 2018 to May 2022
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

						Sample Location:	JCW-MW-15010									
						Sample Date:	11/7/2018	4/9/2019	10/14/2019	5/14/2020	10/13/2020	10/13/2020	5/11/2021	10/13/2021	5/10/2022	5/10/2022
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS											
Appendix III												Field Dup				Field Dup
Boron	ug/L	NC	NA	619	NA		1,360	1,400	1,400	2,070	2,000	2,030	1,080	1,190	1,200	1,200
Calcium	mg/L	NC	NA	302	NA		84.4	120	110	286	218	204	128	142	165	165
Chloride	mg/L	250*	NA	2,440	NA		96.5	140	140	90.4	105	106	67.8	50.7	41.7	41.9
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		22.3	36	30	553	254	255	74.7	77.0	167	167
Total Dissolved Solids	mg/L	500*	NA	4,600	NA		492	670	600	1,500	982	997	607	667	838	806
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA		7.4	7.6	7.3	7.7	7.1	--	7.2	7.1	7.1	--
Appendix IV																
Antimony	ug/L	6	NA	1	6		< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**		9.5	16	13	4	4	4	6	**22**	5	5
Barium	ug/L	2,000	NA	1,300	**2,000**		114	190	180	400	220	221	148	221	219	220
Beryllium	ug/L	4	NA	1	**4**		< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5		< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100		1.2	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	1
Cobalt	ug/L	NC	6	15	15		< 6.0	< 6.0	< 6.0	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000		< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15		< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	**180**		70	73	84	116	96	97	70	92	74	73
Mercury	ug/L	2	NA	0.2	2		< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100		< 5.0	< 5.0	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NA	NA	NA		< 0.879	0.215	< 0.134	0.409	< 0.442	< 0.445	< 0.410	0.389	< 0.488	< 0.415
Radium-228	pCi/L	NC	NA	NA	NA		< 0.776	0.424	0.412	< 0.467	< 0.493	< 0.566	0.700	0.858	0.932	1.37
Radium-226/228	pCi/L	5	NA	3.32	5		< 1.66	0.639	0.536	0.781	< 0.493	< 0.566	0.898	1.25	0.952	1.50
Selenium	ug/L	50	NA	2	50		< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2		< 2.0	< 2.0	< 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.
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 – November 2018 to May 2022
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

						Sample Location:	JCW-MW-15028										
						Sample Date:	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	5/10/2022
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS												
Appendix III								Field Dup		Field Dup			Field Dup				
Boron	ug/L	NC	NA	619	NA		517	525	530	560	550	570	562	644	563	620	633
Calcium	mg/L	NC	NA	302	NA		153	153	170	180	170	205	204	221	235	205	199
Chloride	mg/L	250*	NA	2,440	NA		352	347	660	650	640	823	806	811	921	974	1,070
Fluoride	ug/L	4,000	NA	1,000	NA		< 1,000	< 1,000	< 2,000	< 2,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA		111	110	120	120	120	128	122	99.8	102	97	93.7
Total Dissolved Solids	mg/L	500*	NA	4,600	NA		976	966	1,800	1,800	1,500	2,210	2,240	2,070	2,130	2,360	2,500
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA		7.9	--	8.0	--	7.8	8.1	--	7.9	7.7	7.8	7.7
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**		< 1.0	1.1	1.1	1.1	< 1.0	< 1	1	< 1	3	11	< 1
Barium	ug/L	2,000	NA	1,300	**2,000**		156	158	250	240	230	324	331	332	342	363	351
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	< 0.20	< 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	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	2
Cobalt	ug/L	NC	6	15	15		< 6.0	< 6.0	< 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	< 2,000	< 2,000	< 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	2	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	**180**		51	49	53	51	48	60	60	53	51	66	54
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		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NA	NA	NA		1.13	0.786	0.621	0.384	0.576	0.515	< 0.136	0.697	0.621	0.819	0.49
Radium-228	pCi/L	NC	NA	NA	NA		< 0.685	<0.591	0.729	0.658	0.585	0.733	< 0.399	< 0.468	0.997	1.19	0.944
Radium-226/228	pCi/L	5	NA	3.32	5		1.60	1.26	1.35	1.04	1.16	1.25	< 0.399	1.15	1.62	2.00	1.43
Selenium	ug/L	50	NA	2	50		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 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	< 2

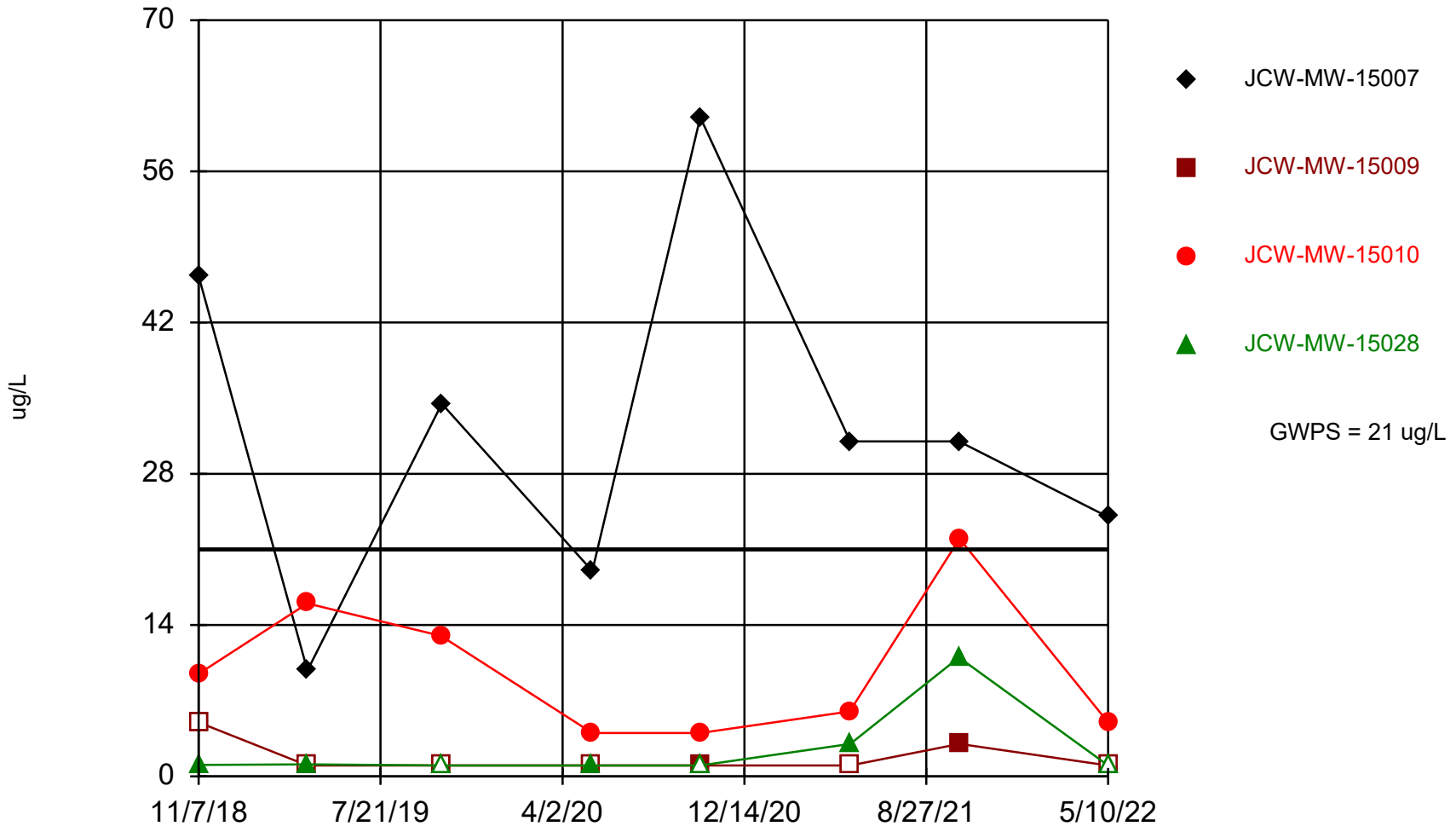
Notes:

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. UG
Hollow symbols indicate censored values.

Arsenic Comparison to GWPS

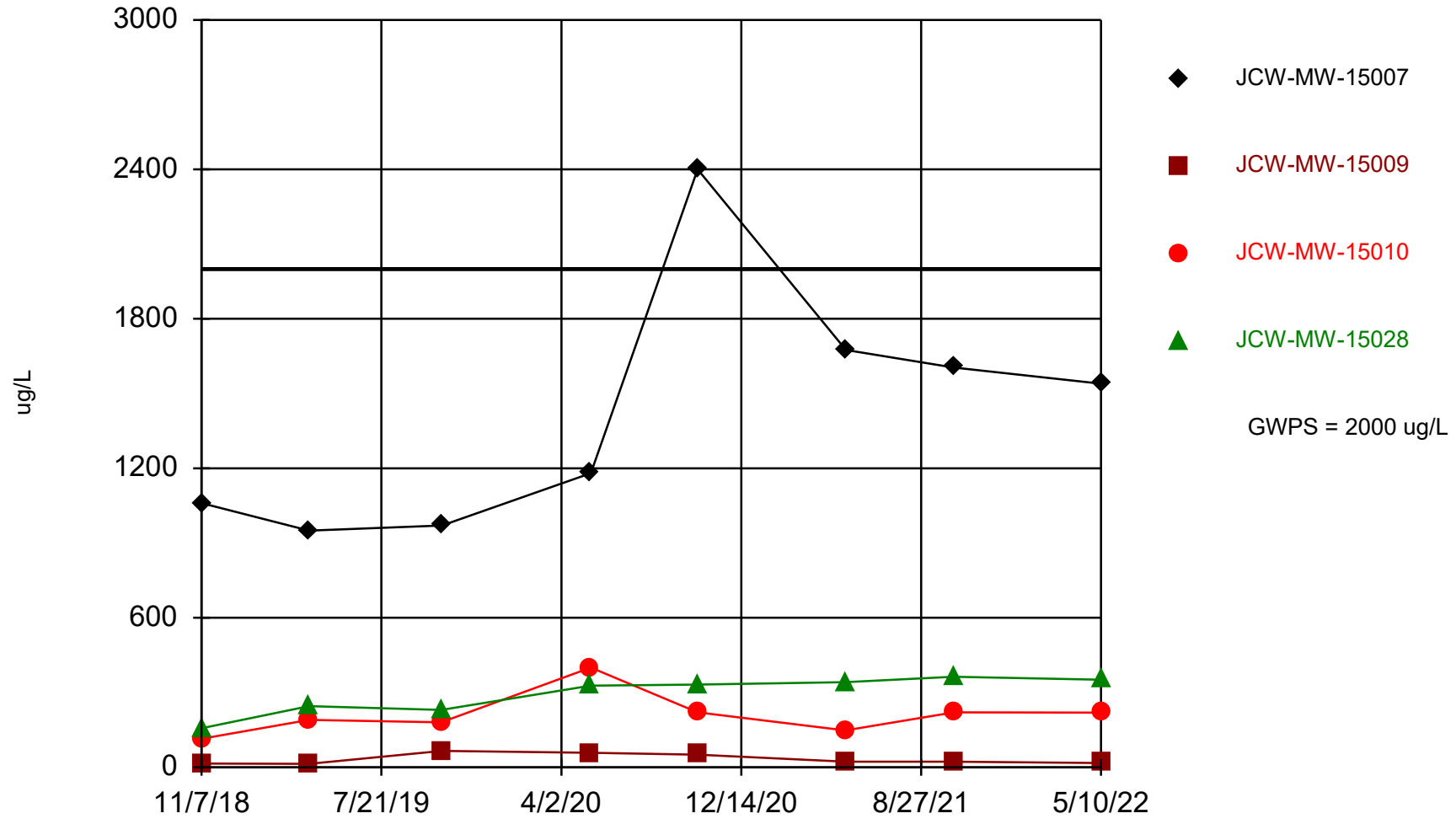


Time Series Analysis Run 6/10/2022 10:50 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Barium Comparison to GWPS

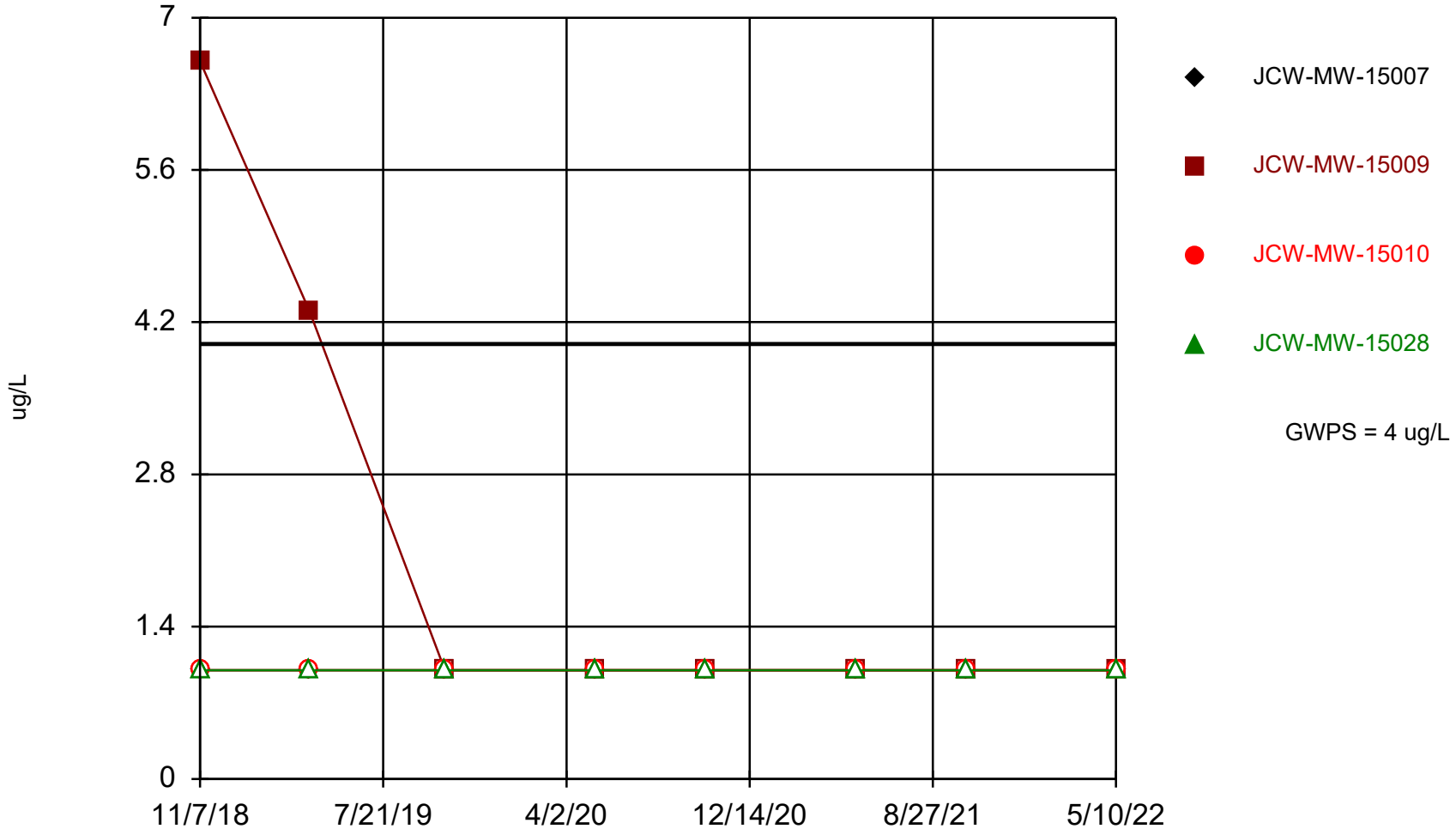


Time Series Analysis Run 6/10/2022 10:51 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Beryllium Comparison to GWPS

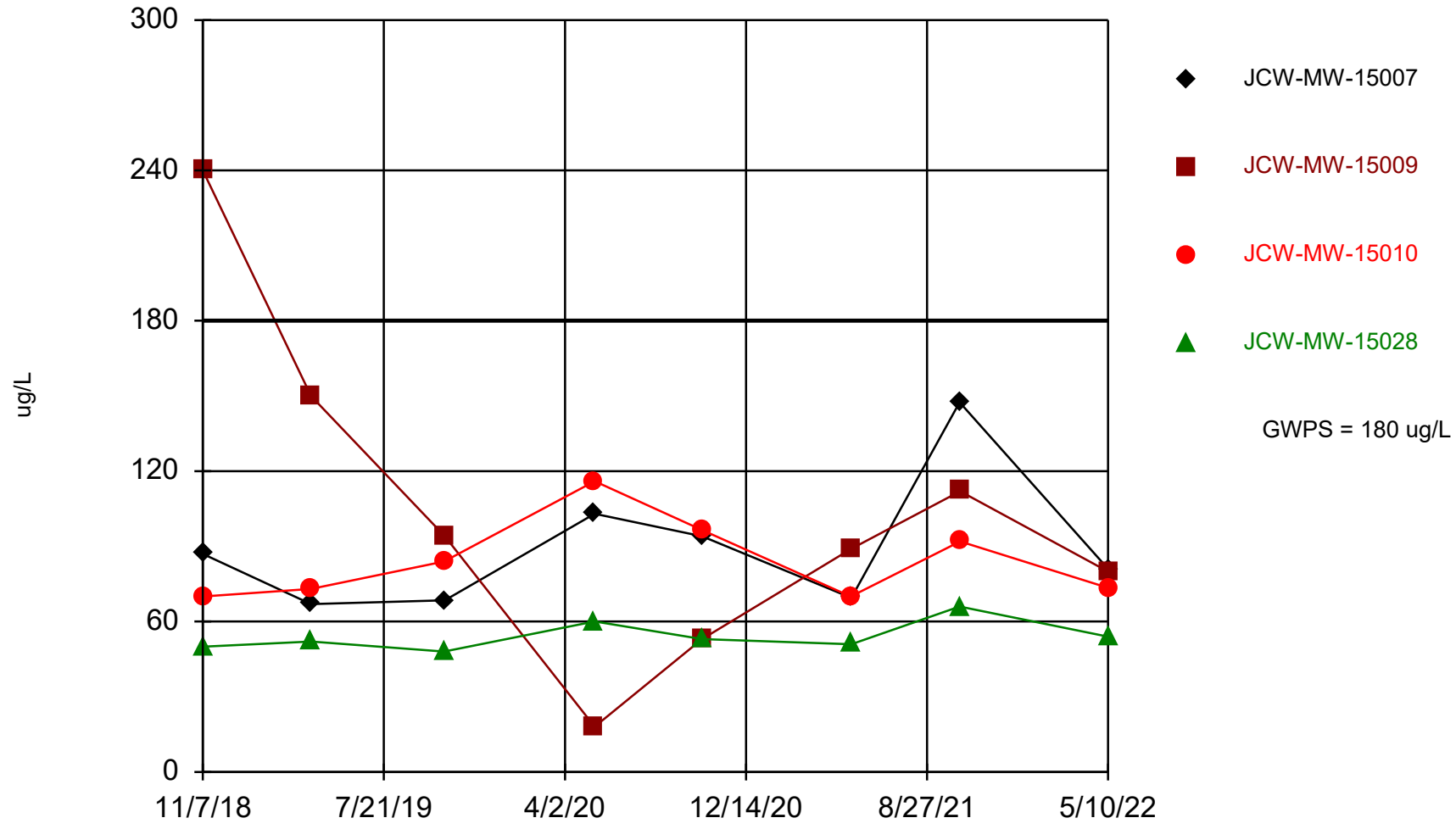


Time Series Analysis Run 6/10/2022 10:52 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Lithium Comparison to GWPS



Time Series Analysis Run 6/10/2022 10:53 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Arsenic, Total Analysis Run 6/10/2022 10:54 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

For observations made between 11/7/2018 and 5/10/2022, a summary of the selected data set:

Observations = 32
ND/Trace = 9
Wells = 4
Minimum Value = 1
Maximum Value = 61
Mean Value = 11.57
Median Value = 4.5
Standard Deviation = 15.02
Coefficient of Variation = 1.298
Skewness = 1.701

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-15007	8	0	9.8	61	32.08	31	15.94	0.4971	0.5002
JCW-MW-15009	8	6	1	5	1.75	1	1.488	0.8503	1.564
JCW-MW-15010	8	0	4	22	9.938	7.75	6.571	0.6612	0.7572
JCW-MW-15028	8	3	1	11	2.519	1.025	3.496	1.388	2.109

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Barium, Total Analysis Run 6/10/2022 10:54 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

For observations made between 11/7/2018 and 5/10/2022, a summary of the selected data set:

Observations = 32
ND/Trace = 0
Wells = 4
Minimum Value = 14
Maximum Value = 2400
Mean Value = 490.2
Median Value = 225.5
Standard Deviation = 604.6
Coefficient of Variation = 1.233
Skewness = 1.606

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-15007	8	0	950	2400	1423	1360	490.6	0.3449	0.9026
JCW-MW-15009	8	0	14	66	33.35	23	21.33	0.6396	0.5517
JCW-MW-15010	8	0	114	400	211.6	204.8	85.16	0.4024	1.35
JCW-MW-15028	8	0	157	363	293.4	329.8	73.82	0.2516	-0.8239

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Beryllium, Total Analysis Run 6/10/2022 10:54 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

For observations made between 11/7/2018 and 5/10/2022, a summary of the selected data set:

Observations = 32
ND/Trace = 29
Wells = 4
Minimum Value = 1
Maximum Value = 6.6
Mean Value = 1.278
Median Value = 1
Standard Deviation = 1.133
Coefficient of Variation = 0.8862
Skewness = 4.007

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	5	1	6.6	2.113	1	2.15	1.018	1.423
JCW-MW-15010	8	8	1	1	1	1	0	0	NaN
JCW-MW-15028	8	8	1	1	1	1	0	0	NaN

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Lithium, Total Analysis Run 6/10/2022 10:54 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

For observations made between 11/7/2018 and 5/10/2022, a summary of the selected data set:

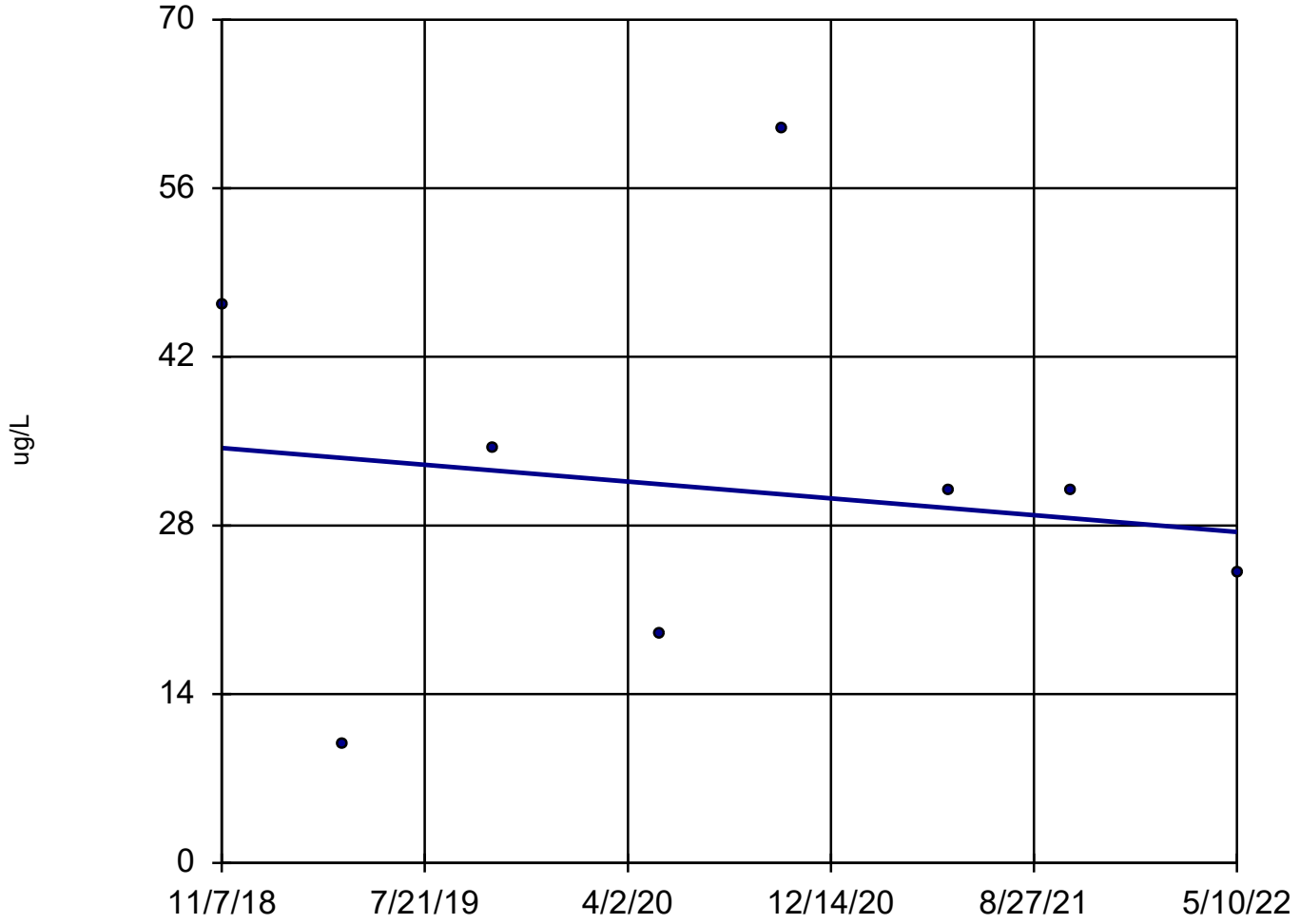
Observations = 32
ND/Trace = 0
Wells = 4
Minimum Value = 18
Maximum Value = 240
Mean Value = 83.2
Median Value = 73.25
Standard Deviation = 39.9
Coefficient of Variation = 0.4796
Skewness = 2.041

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-15007	8	0	67	147.5	89.69	84	26.7	0.2978	1.328
JCW-MW-15009	8	0	18	240	104.5	91.5	67.16	0.6427	0.897
JCW-MW-15010	8	0	70	116	84.38	78.75	16.33	0.1935	0.8825
JCW-MW-15028	8	0	48	66	54.25	52.5	5.922	0.1092	1.062

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Arsenic, Total

JCW-MW-15007



n = 8

Slope = -1.988 units per year.

Mann-Kendall statistic = -3
critical = -20

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

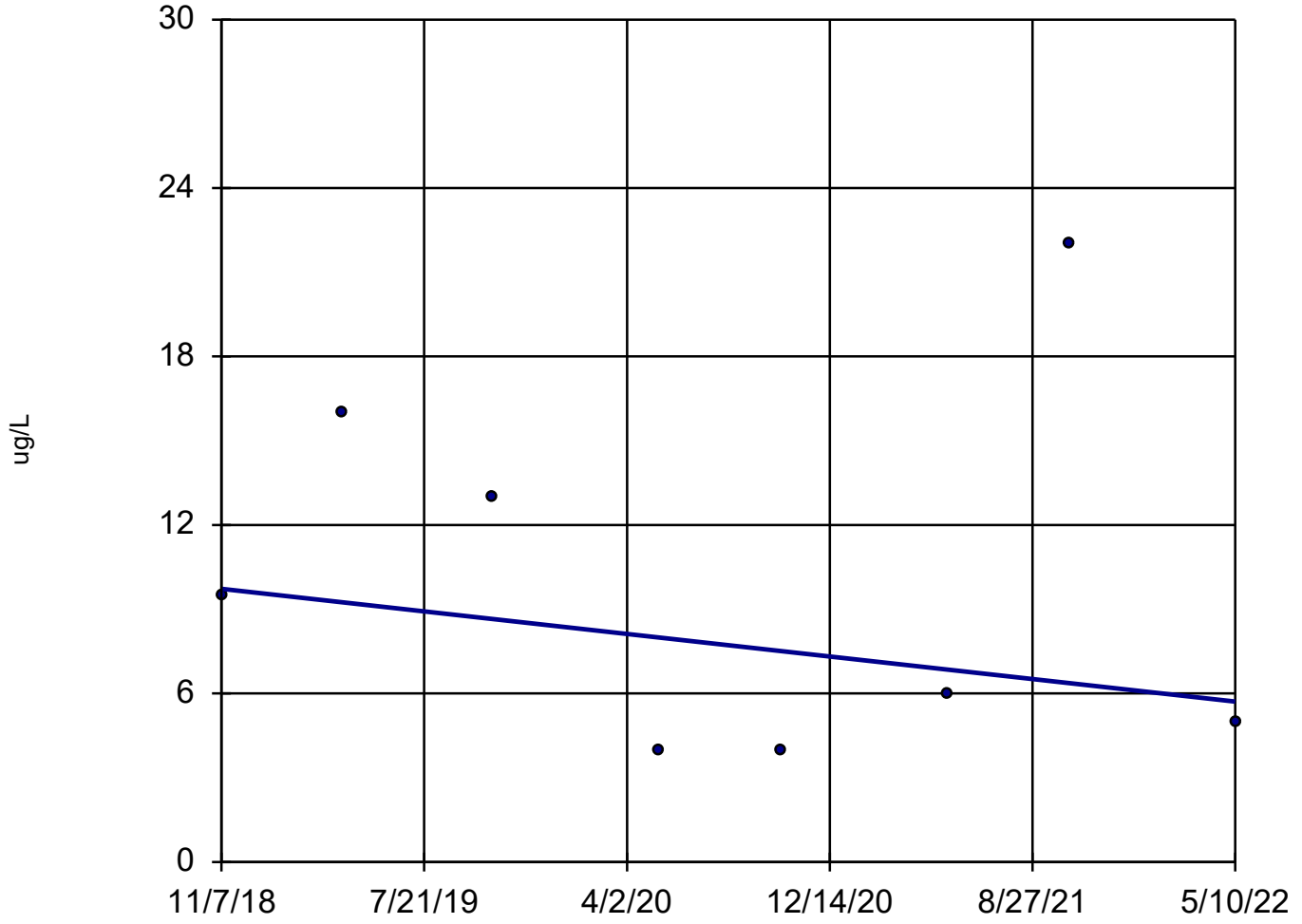
Sen's Slope Estimator Analysis Run 6/10/2022 10:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Arsenic, Total

JCW-MW-15010



n = 8

Slope = -1.143 units per year.

Mann-Kendall statistic = -3
critical = -20

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

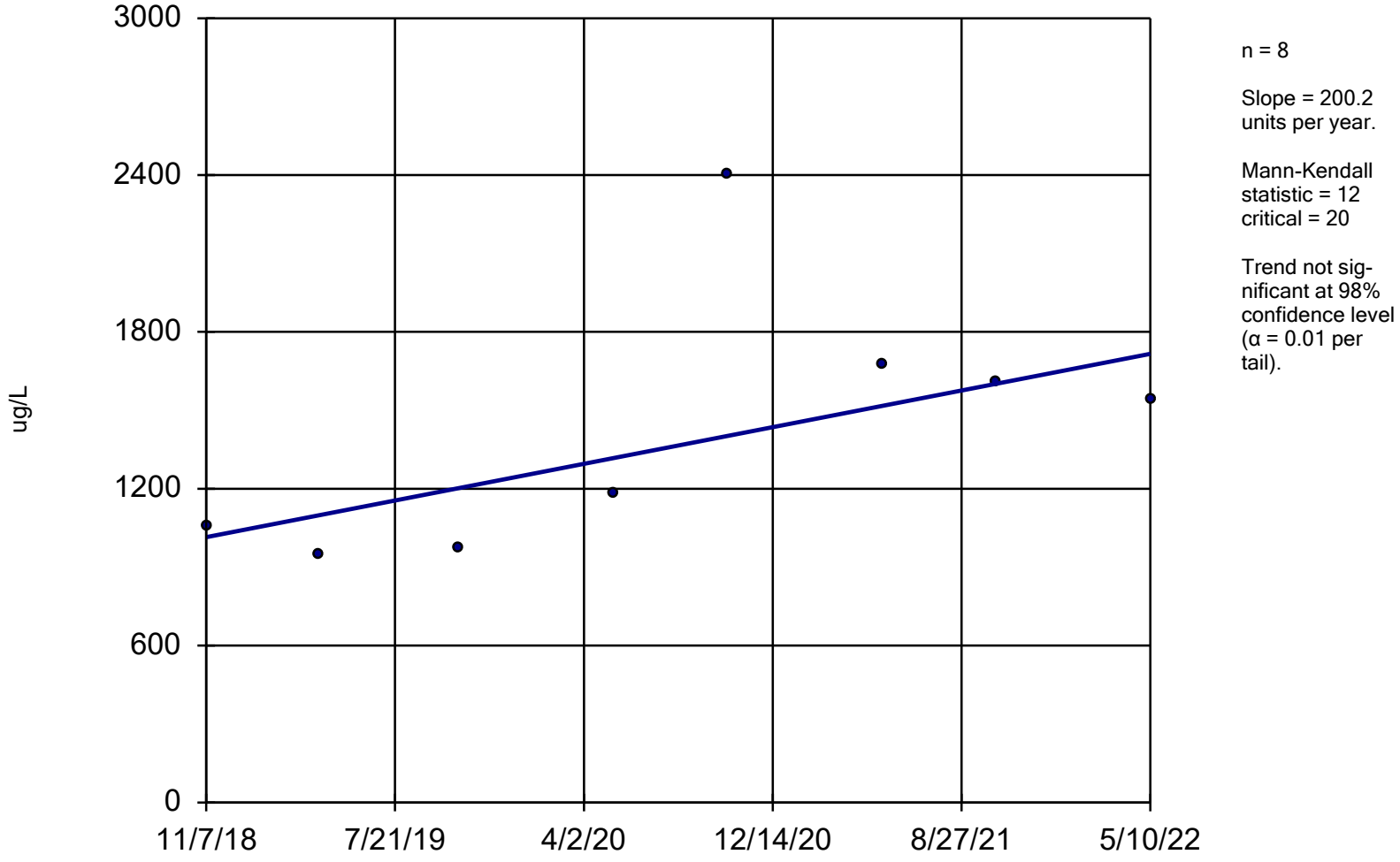
Sen's Slope Estimator Analysis Run 6/10/2022 10:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Barium, Total

JCW-MW-15007



n = 8

Slope = 200.2 units per year.

Mann-Kendall statistic = 12
critical = 20

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

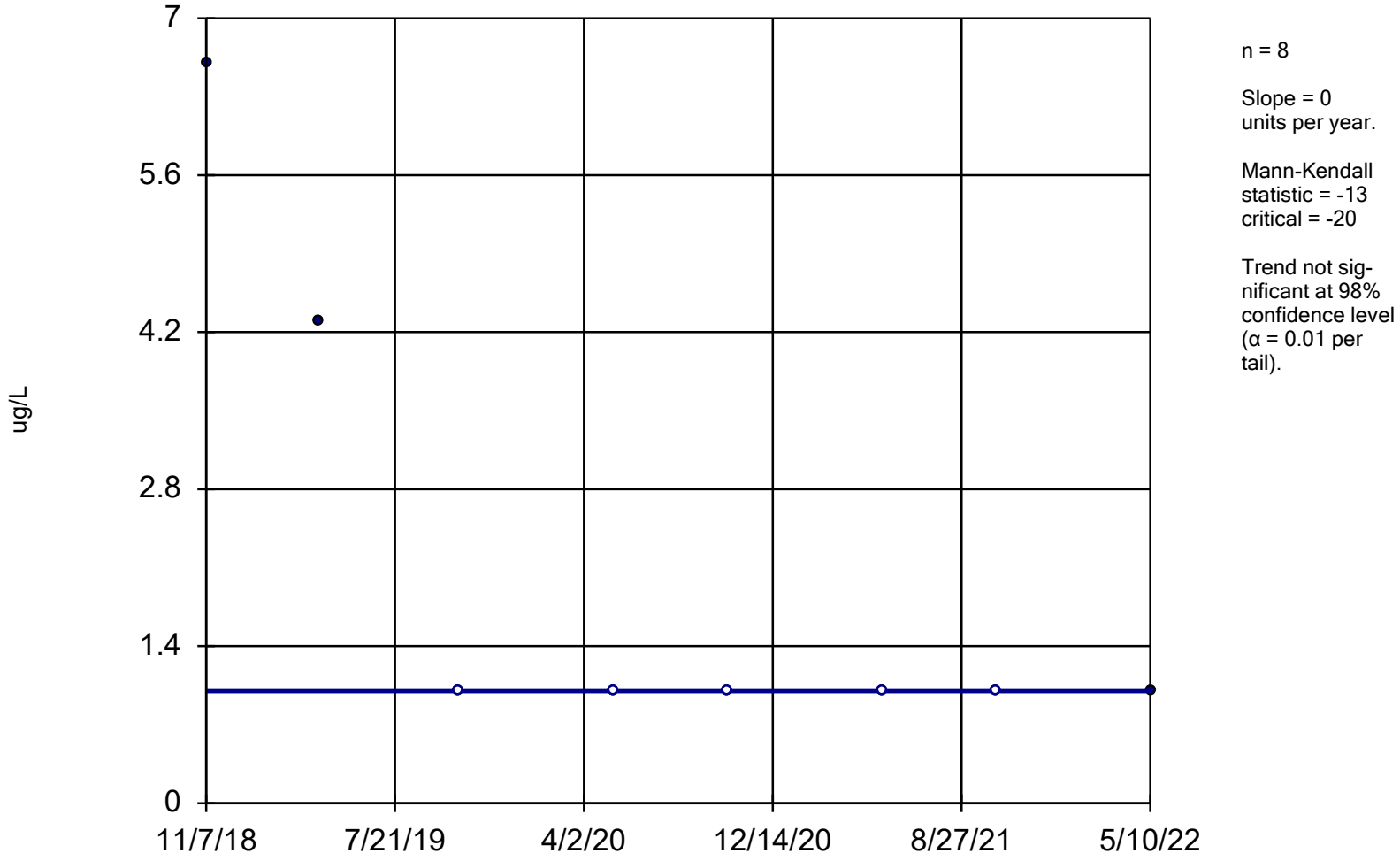
Sen's Slope Estimator Analysis Run 6/10/2022 10:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Beryllium, Total

JCW-MW-15009



n = 8

Slope = 0
units per year.

Mann-Kendall
statistic = -13
critical = -20

Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).

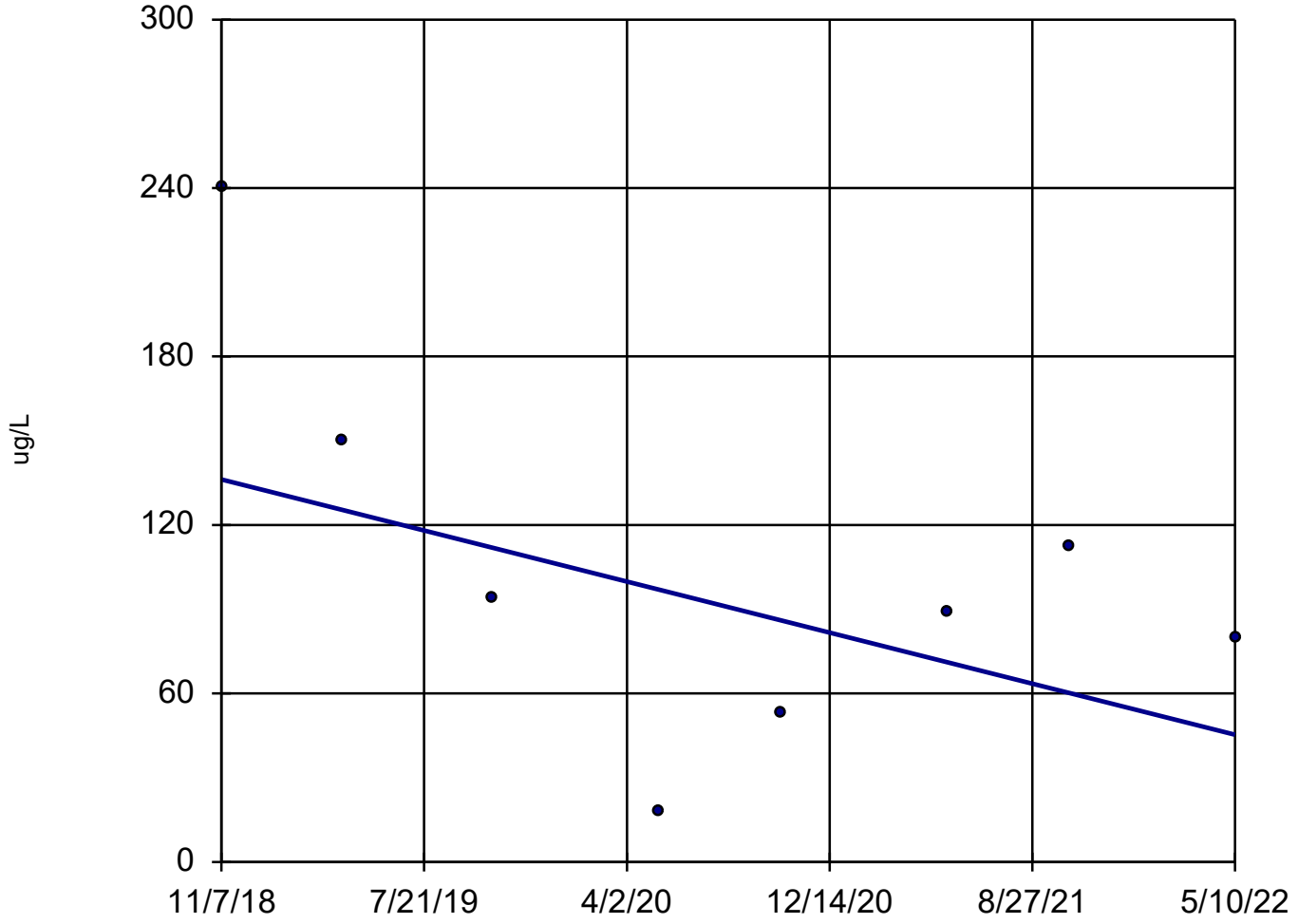
Sen's Slope Estimator Analysis Run 6/10/2022 10:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Lithium, Total

JCW-MW-15009



n = 8

Slope = -25.91 units per year.

Mann-Kendall statistic = -10
critical = -20

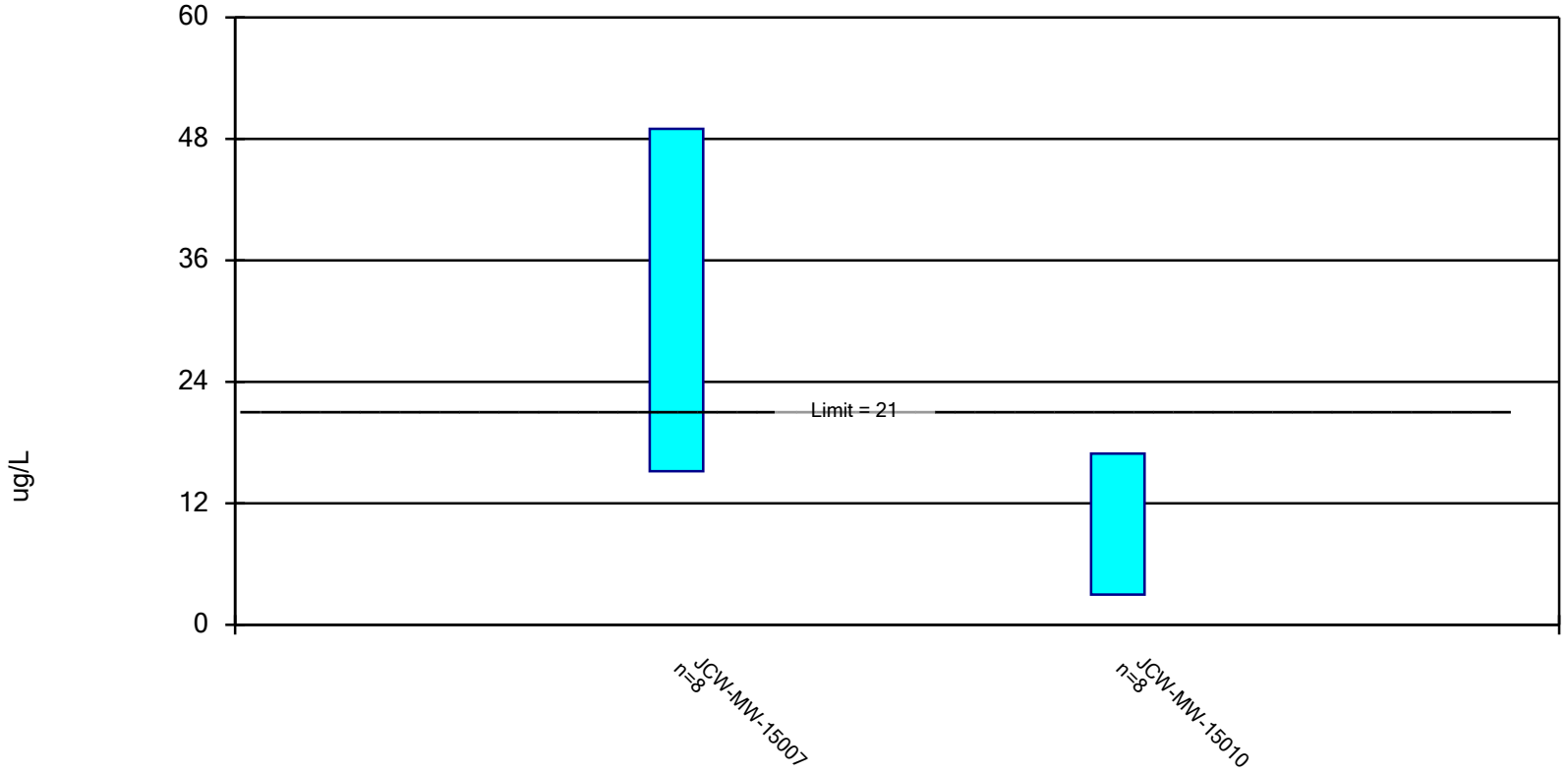
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/10/2022 10:56 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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 6/10/2022 11:01 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Confidence Interval

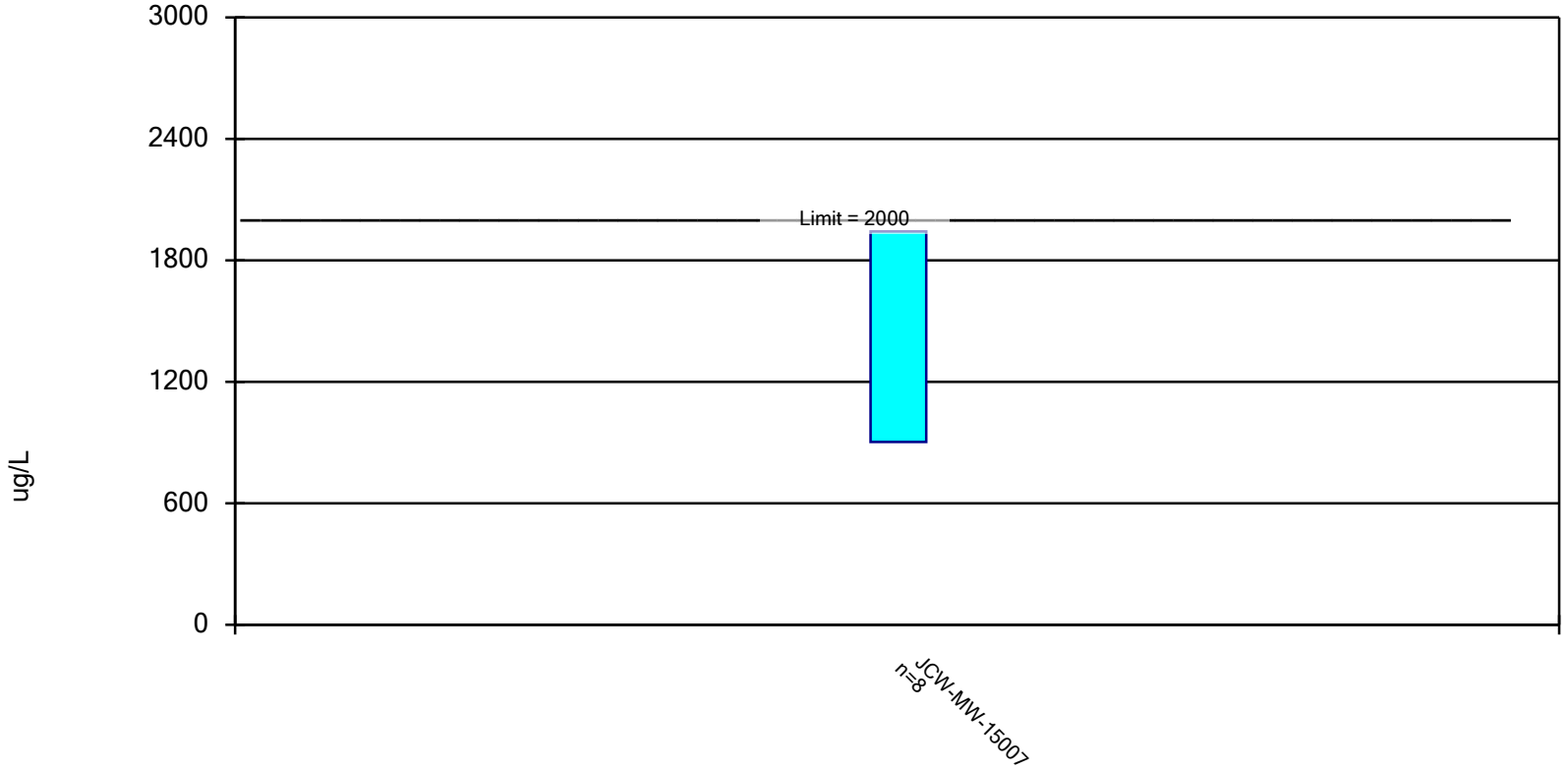
Constituent: Arsenic, Total (ug/L) Analysis Run 6/10/2022 11:02 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

	JCW-MW-15007	JCW-MW-15010
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
5/10/2022	24	5 (D)
Mean	32.08	9.938
Std. Dev.	15.94	6.571
Upper Lim.	48.97	16.9
Lower Lim.	15.18	2.973

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 6/10/2022 11:01 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Confidence Interval

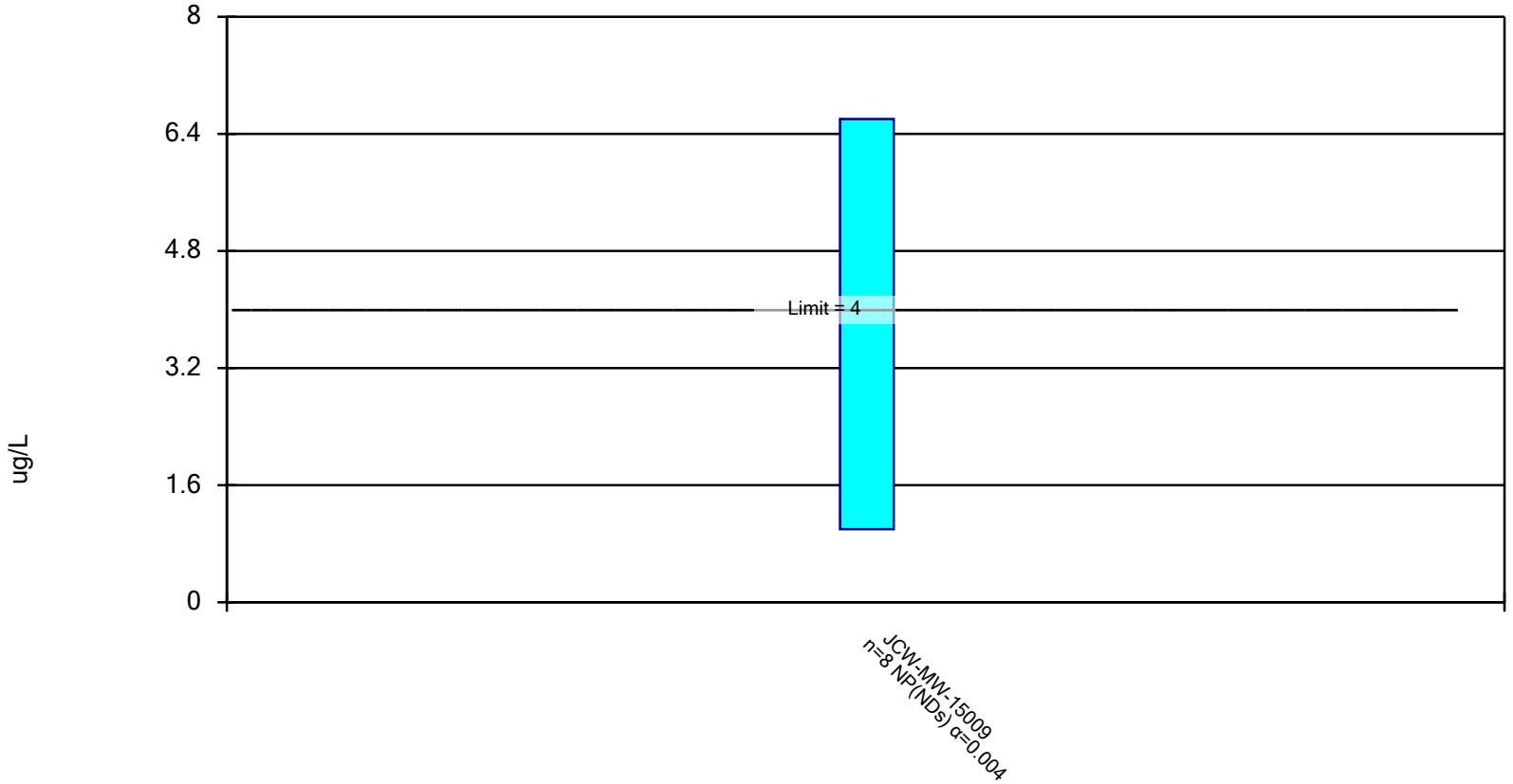
Constituent: Barium, Total (ug/L) Analysis Run 6/10/2022 11:02 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

	JCW-MW-15007
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)
5/10/2022	1540
Mean	1423
Std. Dev.	490.6
Upper Lim.	1942
Lower Lim.	902.5

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Beryllium, Total Analysis Run 6/16/2022 10:16 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Confidence Interval

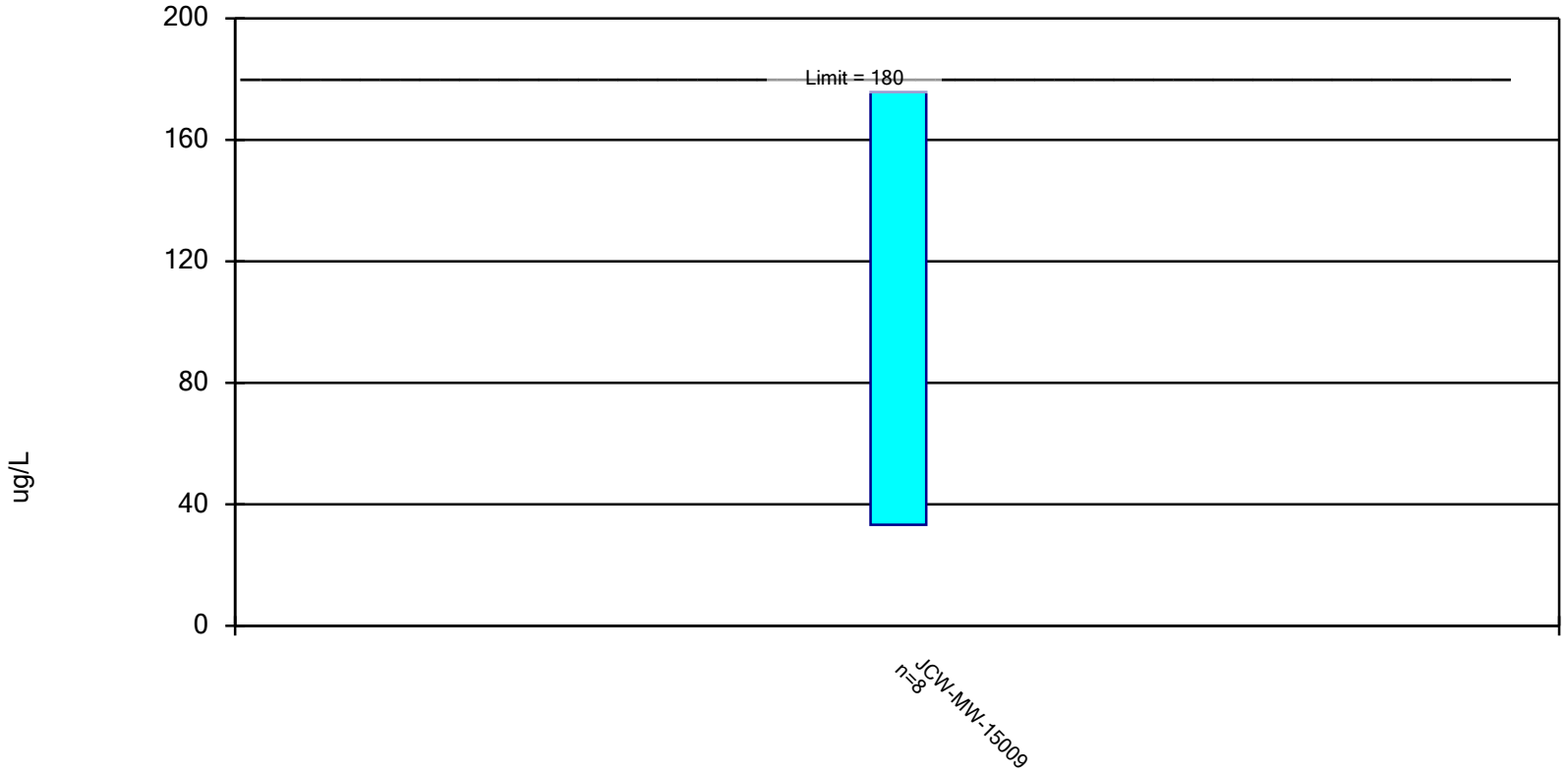
Constituent: Beryllium, Total (ug/L) Analysis Run 6/16/2022 10:16 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

	JCW-MW-15009
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
5/10/2022	1
Mean	2.113
Std. Dev.	2.15
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 6/10/2022 11:01 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Confidence Interval

Constituent: Lithium, Total (ug/L) Analysis Run 6/10/2022 11:02 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

	JCW-MW-15009
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
5/10/2022	80
Mean	104.5
Std. Dev.	67.16
Upper Lim.	175.7
Lower Lim.	33.32

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: May 25, 2022

Subject: RCRA GROUNDWATER MONITORING – JCW BOTTOM ASH POND WELLS – 2022 Q2

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

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

Chemistry Project: 22-0440

TRC Environmental, Inc. conducted groundwater monitoring at the DEKarn Bottom Ash Pond Wells area on 05/10/2022 for the 2nd Quarter requirement, as specified in the Sampling and Analysis Plan for the site. The samples were received for analysis by the Chemistry department of Laboratory Services on 05/11/2022.

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. As appropriate, 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

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q2-2022 JCW Bottom Ash Pond
Date Received: 5/11/2022
Chemistry Project: 22-0440

Sample #	Field Sample ID	Matrix	Sample Date	Site
22-0440-01	JCW-MW-15007	Groundwater	05/10/2022 03:40 PM	JCW Bottom Ash Pond
22-0440-02	JCW-MW-15009	Groundwater	05/10/2022 02:15 PM	JCW Bottom Ash Pond
22-0440-03	JCW-MW-15010	Groundwater	05/10/2022 12:25 PM	JCW Bottom Ash Pond
22-0440-04	JCW-MW-15028	Groundwater	05/10/2022 02:58 PM	JCW Bottom Ash Pond
22-0440-05	DUP-JCW-BAP	Groundwater	05/10/2022 12:00 AM	JCW Bottom Ash Pond
22-0440-06	JCW-MW-15009 MS	Groundwater	05/10/2022 02:15 PM	JCW Bottom Ash Pond
22-0440-07	JCW-MW-15009 MSD	Groundwater	05/10/2022 02:15 PM	JCW Bottom Ash Pond
22-0440-08	EB-JCW-BAP	Water	05/10/2022 03:57 PM	JCW Bottom Ash Pond
22-0440-09	FB-JCW-BAP	Water	05/10/2022 04:02 PM	JCW Bottom Ash Pond

Analytical Report

Report Date: 05/25/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **JCW-MW-15007**
Lab Sample ID: 22-0440-01
Matrix: Groundwater

Laboratory Project: **22-0440**
Collect Date: 05/10/2022
Collect Time: 03:40 PM

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

Aliquot #: 22-0440-01-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Arsenic	24		ug/L	1.0	05/13/2022	AB22-0513-11
Barium	1540		ug/L	5.0	05/13/2022	AB22-0513-11
Beryllium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Boron	255		ug/L	20.0	05/13/2022	AB22-0513-11
Cadmium	ND		ug/L	0.2	05/13/2022	AB22-0513-11
Calcium	275000		ug/L	1000.0	05/13/2022	AB22-0513-11
Chromium	3		ug/L	1.0	05/13/2022	AB22-0513-11
Cobalt	ND		ug/L	6.0	05/13/2022	AB22-0513-11
Copper	3		ug/L	1.0	05/13/2022	AB22-0513-11
Iron	9530		ug/L	20.0	05/13/2022	AB22-0513-11
Lead	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Lithium	81		ug/L	10.0	05/13/2022	AB22-0513-11
Magnesium	33200		ug/L	1000.0	05/13/2022	AB22-0513-11
Molybdenum	5		ug/L	5.0	05/13/2022	AB22-0513-11
Nickel	18		ug/L	2.0	05/13/2022	AB22-0513-11
Potassium	11600		ug/L	100.0	05/13/2022	AB22-0513-11
Selenium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Silver	ND		ug/L	0.2	05/13/2022	AB22-0513-11
Sodium	2310000		ug/L	1000.0	05/13/2022	AB22-0513-11
Thallium	ND		ug/L	2.0	05/13/2022	AB22-0513-11
Vanadium	28		ug/L	2.0	05/13/2022	AB22-0513-11
Zinc	ND		ug/L	10.0	05/13/2022	AB22-0513-11

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0440-01-C01-A02 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/17/2022	AB22-0517-07

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

Aliquot #: 22-0440-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	3470000		ug/L	1000.0	05/19/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	28400		ug/L	1000.0	05/18/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0440-01-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	7000		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**22-0440**
Field Sample ID:	**JCW-MW-15007**	Collect Date:	05/10/2022
Lab Sample ID:	22-0440-01	Collect Time:	03:40 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-0440-01-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	459000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Bicarbonate	459000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-04

Analytical Report

Report Date: 05/25/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **JCW-MW-15009**
Lab Sample ID: 22-0440-02
Matrix: Groundwater

Laboratory Project: **22-0440**
Collect Date: 05/10/2022
Collect Time: 02:15 PM

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

Aliquot #: 22-0440-02-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Arsenic	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Barium	17		ug/L	5.0	05/13/2022	AB22-0513-11
Beryllium	1		ug/L	1.0	05/13/2022	AB22-0513-11
Boron	202		ug/L	20.0	05/13/2022	AB22-0513-11
Cadmium	ND		ug/L	0.2	05/13/2022	AB22-0513-11
Calcium	526000		ug/L	1000.0	05/13/2022	AB22-0513-11
Chromium	1		ug/L	1.0	05/13/2022	AB22-0513-11
Cobalt	ND		ug/L	6.0	05/13/2022	AB22-0513-11
Copper	3		ug/L	1.0	05/13/2022	AB22-0513-11
Iron	15700		ug/L	20.0	05/13/2022	AB22-0513-11
Lead	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Lithium	80		ug/L	10.0	05/13/2022	AB22-0513-11
Magnesium	27400		ug/L	1000.0	05/13/2022	AB22-0513-11
Molybdenum	ND		ug/L	5.0	05/13/2022	AB22-0513-11
Nickel	29		ug/L	2.0	05/13/2022	AB22-0513-11
Potassium	11000		ug/L	100.0	05/13/2022	AB22-0513-11
Selenium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Silver	ND		ug/L	0.2	05/13/2022	AB22-0513-11
Sodium	24200		ug/L	1000.0	05/13/2022	AB22-0513-11
Thallium	ND		ug/L	2.0	05/13/2022	AB22-0513-11
Vanadium	3		ug/L	2.0	05/13/2022	AB22-0513-11
Zinc	ND		ug/L	10.0	05/13/2022	AB22-0513-11

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0440-02-C01-A02 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/17/2022	AB22-0517-07

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

Aliquot #: 22-0440-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	34500		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	1310000		ug/L	1000.0	05/19/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0440-02-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	2270		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**22-0440**
Field Sample ID:	**JCW-MW-15009**	Collect Date:	05/10/2022
Lab Sample ID:	22-0440-02	Collect Time:	02:15 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-0440-02-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	114000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Bicarbonate	114000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-04

Analytical Report

Report Date: 05/25/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **JCW-MW-15010**
Lab Sample ID: 22-0440-03
Matrix: Groundwater

Laboratory Project: **22-0440**
Collect Date: 05/10/2022
Collect Time: 12:25 PM

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

Aliquot #: 22-0440-03-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Arsenic	5		ug/L	1.0	05/13/2022	AB22-0513-11
Barium	219		ug/L	5.0	05/13/2022	AB22-0513-11
Beryllium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Boron	1200		ug/L	20.0	05/13/2022	AB22-0513-11
Cadmium	ND		ug/L	0.2	05/13/2022	AB22-0513-11
Calcium	165000		ug/L	1000.0	05/13/2022	AB22-0513-11
Chromium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Cobalt	ND		ug/L	6.0	05/13/2022	AB22-0513-11
Copper	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Iron	400		ug/L	20.0	05/13/2022	AB22-0513-11
Lead	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Lithium	74		ug/L	10.0	05/13/2022	AB22-0513-11
Magnesium	24800		ug/L	1000.0	05/13/2022	AB22-0513-11
Molybdenum	ND		ug/L	5.0	05/13/2022	AB22-0513-11
Nickel	8		ug/L	2.0	05/13/2022	AB22-0513-11
Potassium	10300		ug/L	100.0	05/13/2022	AB22-0513-11
Selenium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Silver	ND		ug/L	0.2	05/13/2022	AB22-0513-11
Sodium	49000		ug/L	1000.0	05/13/2022	AB22-0513-11
Thallium	ND		ug/L	2.0	05/13/2022	AB22-0513-11
Vanadium	ND		ug/L	2.0	05/13/2022	AB22-0513-11
Zinc	ND		ug/L	10.0	05/13/2022	AB22-0513-11

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0440-03-C01-A02 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/17/2022	AB22-0517-07

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

Aliquot #: 22-0440-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	41700		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	167000		ug/L	1000.0	05/18/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0440-03-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	838		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**22-0440**
Field Sample ID:	**JCW-MW-15010**	Collect Date:	05/10/2022
Lab Sample ID:	22-0440-03	Collect Time:	12:25 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-0440-03-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	424000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Bicarbonate	424000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-04

Analytical Report

Report Date: 05/25/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **JCW-MW-15028**
Lab Sample ID: 22-0440-04
Matrix: Groundwater

Laboratory Project: **22-0440**
Collect Date: 05/10/2022
Collect Time: 02:58 PM

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

Aliquot #: 22-0440-04-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Arsenic	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Barium	351		ug/L	5.0	05/13/2022	AB22-0513-11
Beryllium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Boron	633		ug/L	20.0	05/13/2022	AB22-0513-11
Cadmium	ND		ug/L	0.2	05/13/2022	AB22-0513-11
Calcium	199000		ug/L	1000.0	05/13/2022	AB22-0513-11
Chromium	2		ug/L	1.0	05/13/2022	AB22-0513-11
Cobalt	ND		ug/L	6.0	05/13/2022	AB22-0513-11
Copper	1		ug/L	1.0	05/13/2022	AB22-0513-11
Iron	399		ug/L	20.0	05/13/2022	AB22-0513-11
Lead	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Lithium	54		ug/L	10.0	05/13/2022	AB22-0513-11
Magnesium	36700		ug/L	1000.0	05/13/2022	AB22-0513-11
Molybdenum	ND		ug/L	5.0	05/13/2022	AB22-0513-11
Nickel	11		ug/L	2.0	05/13/2022	AB22-0513-11
Potassium	10500		ug/L	100.0	05/13/2022	AB22-0513-11
Selenium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Silver	ND		ug/L	0.2	05/13/2022	AB22-0513-11
Sodium	605000		ug/L	1000.0	05/13/2022	AB22-0513-11
Thallium	ND		ug/L	2.0	05/13/2022	AB22-0513-11
Vanadium	11		ug/L	2.0	05/13/2022	AB22-0513-11
Zinc	ND		ug/L	10.0	05/13/2022	AB22-0513-11

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0440-04-C01-A02 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/17/2022	AB22-0517-07

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

Aliquot #: 22-0440-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	1070000		ug/L	1000.0	05/19/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	93700		ug/L	1000.0	05/18/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0440-04-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	2500		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**22-0440**
Field Sample ID:	**JCW-MW-15028**	Collect Date:	05/10/2022
Lab Sample ID:	22-0440-04	Collect Time:	02:58 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-0440-04-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	323000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Bicarbonate	323000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-04

Analytical Report

Report Date: 05/25/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **DUP-JCW-BAP**
Lab Sample ID: 22-0440-05
Matrix: Groundwater

Laboratory Project: **22-0440**
Collect Date: 05/10/2022
Collect Time: 12:00 AM

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

Aliquot #: 22-0440-05-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Arsenic	5		ug/L	1.0	05/13/2022	AB22-0513-11
Barium	220		ug/L	5.0	05/13/2022	AB22-0513-11
Beryllium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Boron	1200		ug/L	20.0	05/13/2022	AB22-0513-11
Cadmium	ND		ug/L	0.2	05/13/2022	AB22-0513-11
Calcium	165000		ug/L	1000.0	05/13/2022	AB22-0513-11
Chromium	1		ug/L	1.0	05/13/2022	AB22-0513-11
Cobalt	ND		ug/L	6.0	05/13/2022	AB22-0513-11
Copper	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Iron	372		ug/L	20.0	05/13/2022	AB22-0513-11
Lead	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Lithium	73		ug/L	10.0	05/13/2022	AB22-0513-11
Magnesium	24600		ug/L	1000.0	05/13/2022	AB22-0513-11
Molybdenum	ND		ug/L	5.0	05/13/2022	AB22-0513-11
Nickel	8		ug/L	2.0	05/13/2022	AB22-0513-11
Potassium	10500		ug/L	100.0	05/13/2022	AB22-0513-11
Selenium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Silver	ND		ug/L	0.2	05/13/2022	AB22-0513-11
Sodium	49700		ug/L	1000.0	05/13/2022	AB22-0513-11
Thallium	ND		ug/L	2.0	05/13/2022	AB22-0513-11
Vanadium	ND		ug/L	2.0	05/13/2022	AB22-0513-11
Zinc	ND		ug/L	10.0	05/13/2022	AB22-0513-11

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0440-05-C01-A02 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/17/2022	AB22-0517-07

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

Aliquot #: 22-0440-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	41900		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	167000		ug/L	1000.0	05/18/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0440-05-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	806		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**22-0440**
Field Sample ID:	**DUP-JCW-BAP**	Collect Date:	05/10/2022
Lab Sample ID:	22-0440-05	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-0440-05-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	424000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Bicarbonate	424000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-04

Analytical Report

Report Date: 05/25/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **JCW-MW-15009 MS**
Lab Sample ID: 22-0440-06
Matrix: Groundwater

Laboratory Project: **22-0440**
Collect Date: 05/10/2022
Collect Time: 02:15 PM

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

Aliquot #: 22-0440-06-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	103		%	1.0	05/13/2022	AB22-0513-11
Arsenic	109		%	1.0	05/13/2022	AB22-0513-11
Barium	106		%	5.0	05/13/2022	AB22-0513-11
Beryllium	90		%	1.0	05/13/2022	AB22-0513-11
Boron	100		%	20.0	05/13/2022	AB22-0513-11
Cadmium	102		%	0.2	05/13/2022	AB22-0513-11
Calcium	102		%	1000.0	05/13/2022	AB22-0513-11
Chromium	107		%	1.0	05/13/2022	AB22-0513-11
Cobalt	106		%	6.0	05/13/2022	AB22-0513-11
Copper	96		%	1.0	05/13/2022	AB22-0513-11
Iron	111		%	20.0	05/13/2022	AB22-0513-11
Lead	95		%	1.0	05/13/2022	AB22-0513-11
Lithium	93		%	10.0	05/13/2022	AB22-0513-11
Magnesium	107		%	1000.0	05/13/2022	AB22-0513-11
Molybdenum	113		%	5.0	05/13/2022	AB22-0513-11
Nickel	98		%	2.0	05/13/2022	AB22-0513-11
Potassium	105		%	100.0	05/13/2022	AB22-0513-11
Selenium	79		%	1.0	05/13/2022	AB22-0513-11
Silver	98.0		%	0.2	05/13/2022	AB22-0513-11
Sodium	107		%	1000.0	05/13/2022	AB22-0513-11
Thallium	97		%	2.0	05/13/2022	AB22-0513-11
Vanadium	112		%	2.0	05/13/2022	AB22-0513-11
Zinc	97		%	10.0	05/13/2022	AB22-0513-11

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0440-06-C01-A02 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	100.0		%	0.2	05/17/2022	AB22-0517-07

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

Aliquot #: 22-0440-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	102		%	1000.0	05/18/2022	AB22-0518-14
Fluoride	84		%	1000.0	05/18/2022	AB22-0518-14
Sulfate	97		%	1000.0	05/19/2022	AB22-0518-14

Alkalinity by SM 2320B

Aliquot #: 22-0440-06-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	96.3		%	10000.0	05/17/2022	AB22-0517-04

Analytical Report

Report Date: 05/25/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **JCW-MW-15009 MSD**
Lab Sample ID: 22-0440-07
Matrix: Groundwater

Laboratory Project: **22-0440**
Collect Date: 05/10/2022
Collect Time: 02:15 PM

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

Aliquot #: 22-0440-07-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	99		%	1.0	05/13/2022	AB22-0513-11
Arsenic	112		%	1.0	05/13/2022	AB22-0513-11
Barium	98		%	5.0	05/13/2022	AB22-0513-11
Beryllium	91		%	1.0	05/13/2022	AB22-0513-11
Boron	95		%	20.0	05/13/2022	AB22-0513-11
Cadmium	93.9		%	0.2	05/13/2022	AB22-0513-11
Calcium	102		%	1000.0	05/13/2022	AB22-0513-11
Chromium	113		%	1.0	05/13/2022	AB22-0513-11
Cobalt	109		%	6.0	05/13/2022	AB22-0513-11
Copper	99		%	1.0	05/13/2022	AB22-0513-11
Iron	108		%	20.0	05/13/2022	AB22-0513-11
Lead	94		%	1.0	05/13/2022	AB22-0513-11
Lithium	97		%	10.0	05/13/2022	AB22-0513-11
Magnesium	110		%	1000.0	05/13/2022	AB22-0513-11
Molybdenum	112		%	5.0	05/13/2022	AB22-0513-11
Nickel	103		%	2.0	05/13/2022	AB22-0513-11
Potassium	105		%	100.0	05/13/2022	AB22-0513-11
Selenium	83		%	1.0	05/13/2022	AB22-0513-11
Silver	98.6		%	0.2	05/13/2022	AB22-0513-11
Sodium	109		%	1000.0	05/13/2022	AB22-0513-11
Thallium	98		%	2.0	05/13/2022	AB22-0513-11
Vanadium	117		%	2.0	05/13/2022	AB22-0513-11
Zinc	101		%	10.0	05/13/2022	AB22-0513-11

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0440-07-C01-A02 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	108		%	0.2	05/17/2022	AB22-0517-07

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

Aliquot #: 22-0440-07-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	102		%	1000.0	05/18/2022	AB22-0518-14
Fluoride	82		%	1000.0	05/18/2022	AB22-0518-14
Sulfate	99		%	1000.0	05/19/2022	AB22-0518-14

Alkalinity by SM 2320B

Aliquot #: 22-0440-07-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	97.7		%	10000.0	05/17/2022	AB22-0517-04

Analytical Report

Report Date: 05/25/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **EB-JCW-BAP**
Lab Sample ID: 22-0440-08
Matrix: Water

Laboratory Project: **22-0440**
Collect Date: 05/10/2022
Collect Time: 03:57 PM

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

Aliquot #: 22-0440-08-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Arsenic	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Barium	ND		ug/L	5.0	05/13/2022	AB22-0513-11
Beryllium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Boron	ND		ug/L	20.0	05/13/2022	AB22-0513-11
Cadmium	ND		ug/L	0.2	05/13/2022	AB22-0513-11
Calcium	ND		ug/L	1000.0	05/13/2022	AB22-0513-11
Chromium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Cobalt	ND		ug/L	6.0	05/13/2022	AB22-0513-11
Copper	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Iron	ND		ug/L	20.0	05/13/2022	AB22-0513-11
Lead	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Lithium	ND		ug/L	10.0	05/13/2022	AB22-0513-11
Magnesium	ND		ug/L	1000.0	05/13/2022	AB22-0513-11
Molybdenum	ND		ug/L	5.0	05/13/2022	AB22-0513-11
Nickel	ND		ug/L	2.0	05/13/2022	AB22-0513-11
Potassium	ND		ug/L	100.0	05/13/2022	AB22-0513-11
Selenium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Silver	ND		ug/L	0.2	05/13/2022	AB22-0513-11
Sodium	ND		ug/L	1000.0	05/13/2022	AB22-0513-11
Thallium	ND		ug/L	2.0	05/13/2022	AB22-0513-11
Vanadium	ND		ug/L	2.0	05/13/2022	AB22-0513-11
Zinc	ND		ug/L	10.0	05/13/2022	AB22-0513-11

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0440-08-C01-A02 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/17/2022	AB22-0517-07

Analytical Report

Report Date: 05/25/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **FB-JCW-BAP**
Lab Sample ID: 22-0440-09
Matrix: Water

Laboratory Project: **22-0440**
Collect Date: 05/10/2022
Collect Time: 04:02 PM

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

Aliquot #: 22-0440-09-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Arsenic	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Barium	ND		ug/L	5.0	05/13/2022	AB22-0513-11
Beryllium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Boron	ND		ug/L	20.0	05/13/2022	AB22-0513-11
Cadmium	ND		ug/L	0.2	05/13/2022	AB22-0513-11
Calcium	ND		ug/L	1000.0	05/13/2022	AB22-0513-11
Chromium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Cobalt	ND		ug/L	6.0	05/13/2022	AB22-0513-11
Copper	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Iron	ND		ug/L	20.0	05/13/2022	AB22-0513-11
Lead	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Lithium	ND		ug/L	10.0	05/13/2022	AB22-0513-11
Magnesium	ND		ug/L	1000.0	05/13/2022	AB22-0513-11
Molybdenum	ND		ug/L	5.0	05/13/2022	AB22-0513-11
Nickel	ND		ug/L	2.0	05/13/2022	AB22-0513-11
Potassium	ND		ug/L	100.0	05/13/2022	AB22-0513-11
Selenium	ND		ug/L	1.0	05/13/2022	AB22-0513-11
Silver	ND		ug/L	0.2	05/13/2022	AB22-0513-11
Sodium	ND		ug/L	1000.0	05/13/2022	AB22-0513-11
Thallium	ND		ug/L	2.0	05/13/2022	AB22-0513-11
Vanadium	ND		ug/L	2.0	05/13/2022	AB22-0513-11
Zinc	ND		ug/L	10.0	05/13/2022	AB22-0513-11

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0440-09-C01-A02 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/17/2022	AB22-0517-07

Analytical Report

Report Date: 05/25/22

Data Qualifiers	Exception Summary
	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-0440

Inspection Date: 5-11-22 **Inspection By:** TmR

Sample Origin/Project Name: JCW Bottom Ash pond

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 _____

pH Paper
Lot # 222420
Exp 8-1-23

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

As-Received Temperature Range 2.2-4.6°C Samples Received on Ice: Yes X No _____

M&TE # and Expiration 015484 | 10.14.22

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)					
500 mL (plastic)					
Other 250mL Plastic	5				

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

SAMPLING SITE / CUSTOMER: Q2-2022 JCW Bottom Ash Pond

PROJECT NUMBER: **22-0440**

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

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

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

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

ANALYSIS REQUESTED (Attach List if More Space is Needed)

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

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0440-01	5/10/22	1546	GW	JCW-MW-15007	5	4	1						x	x	x	x	
-02	5/10/22	1415	GW	JCW-MW-15009	5	4	1						x	x	x	x	
-03	5/10/22	1237	GW	JCW-MW-15010	5	4	1						x	x	x	x	
-04	5/10/22	1458	GW	JCW-MW-15028	5	4	1						x	x	x	x	
-05	5/10/22	—	GW	DUP-JCW-BAP	5	4	1						x	x	x	x	
-06	5/10/22	1415	GW	JCW-MW-15009 MS	4	3	1						x	x		x	
-07	5/10/22	1415	GW	JCW-MW-15009 MSD	4	3	1						x	x		x	
-08	5/10/22	1557	W	EB-JCW-BAP	1		1						x				
-09	5/10/22	1602	W	FB-JCW-BAP	1		1						x				

RELINQUISHED BY: [signature] DATE/TIME: 5/11/22 0935 RECEIVED BY: [signature]

RELINQUISHED BY: [signature] DATE/TIME: RECEIVED BY:

COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015484

Temperature: 2.2-4.6 °C Cal. Due Date: 10-14-22

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: May 25, 2022

Subject: RCRA GROUNDWATER MONITORING – DEK-JCW BACKGROUND WELLS – 2022 Q2

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

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

Chemistry Project: 22-0443

TRC Environmental, Inc. conducted groundwater monitoring at the Karn/Weadock Background Wells area on 05/02/2022 and 05/03/2022, 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 05/04/2022.

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, when applicable; all other quality control data is listed in the Quality Control Summary associated with the particular test method, as appropriate. Unless specifically noted in the case narrative, all method quality control requirements have been met. If any results are qualified, the corresponding data flags/qualifiers are listed on the last page of the results section. Any additional information on method performance, when applicable, is presented in this section of the case narrative. When data flags are not needed, the qualifiers text box on the last page is left blank, and a statement confirms that no exceptions occurred.

DEFINITIONS / QUALIFIERS

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

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

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

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q2-2022 JCW-DEK Background Wells
Date Received: 5/04/2022
Chemistry Project: 22-0443

Sample #	Field Sample ID	Matrix	Sample Date	Site
22-0443-01	MW-15002	Groundwater	05/02/2022 05:24 PM	DEK JCW Background
22-0443-02	MW-15008	Groundwater	05/02/2022 01:45 PM	DEK JCW Background
22-0443-03	MW-15016	Groundwater	05/03/2022 08:37 AM	DEK JCW Background
22-0443-04	MW-15019	Groundwater	05/02/2022 03:20 PM	DEK JCW Background
22-0443-05	DUP-Background	Groundwater	05/02/2022 12:00 AM	DEK JCW Background
22-0443-06	FB- Background	Water	05/02/2022 01:45 PM	DEK JCW Background

Analytical Report

Report Date: 05/25/22

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15002**
Lab Sample ID: 22-0443-01
Matrix: Groundwater

Laboratory Project: **22-0443**
Collect Date: 05/02/2022
Collect Time: 05:24 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0443-01-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/10/2022	AB22-0510-04

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

Aliquot #: 22-0443-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Arsenic	14		ug/L	1.0	05/11/2022	AB22-0511-14
Barium	682		ug/L	5.0	05/11/2022	AB22-0511-14
Beryllium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Boron	103		ug/L	20.0	05/11/2022	AB22-0511-14
Cadmium	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Calcium	238000		ug/L	1000.0	05/12/2022	AB22-0511-14
Chromium	3		ug/L	1.0	05/11/2022	AB22-0511-14
Cobalt	ND		ug/L	6.0	05/11/2022	AB22-0511-14
Copper	3		ug/L	1.0	05/11/2022	AB22-0511-14
Iron	16100		ug/L	20.0	05/11/2022	AB22-0511-14
Lead	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Lithium	16		ug/L	10.0	05/11/2022	AB22-0511-14
Molybdenum	ND		ug/L	5.0	05/11/2022	AB22-0511-14
Nickel	14		ug/L	2.0	05/11/2022	AB22-0511-14
Selenium	54		ug/L	1.0	05/11/2022	AB22-0511-14
Silver	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Thallium	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Vanadium	15		ug/L	2.0	05/11/2022	AB22-0511-14
Zinc	23		ug/L	10.0	05/11/2022	AB22-0511-14

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

Aliquot #: 22-0443-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	2210000		ug/L	1000.0	05/17/2022	AB22-0509-05
Fluoride	ND		ug/L	1000.0	05/16/2022	AB22-0509-05
Sulfate	6000		ug/L	1000.0	05/16/2022	AB22-0509-05

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0443-01-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	4240		mg/L	10.0	05/05/2022	AB22-0505-01

Analytical Report

Report Date: 05/25/22

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15008**
Lab Sample ID: 22-0443-02
Matrix: Groundwater

Laboratory Project: **22-0443**
Collect Date: 05/02/2022
Collect Time: 01:45 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0443-02-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/10/2022	AB22-0510-04

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

Aliquot #: 22-0443-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Arsenic	2		ug/L	1.0	05/11/2022	AB22-0511-14
Barium	52		ug/L	5.0	05/11/2022	AB22-0511-14
Beryllium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Boron	112		ug/L	20.0	05/11/2022	AB22-0511-14
Cadmium	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Calcium	89500		ug/L	1000.0	05/12/2022	AB22-0511-14
Chromium	1		ug/L	1.0	05/11/2022	AB22-0511-14
Cobalt	ND		ug/L	6.0	05/11/2022	AB22-0511-14
Copper	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Iron	15500		ug/L	20.0	05/11/2022	AB22-0511-14
Lead	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Lithium	16		ug/L	10.0	05/11/2022	AB22-0511-14
Molybdenum	ND		ug/L	5.0	05/11/2022	AB22-0511-14
Nickel	5		ug/L	2.0	05/11/2022	AB22-0511-14
Selenium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Silver	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Thallium	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Vanadium	6		ug/L	2.0	05/11/2022	AB22-0511-14
Zinc	ND		ug/L	10.0	05/11/2022	AB22-0511-14

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

Aliquot #: 22-0443-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	197000		ug/L	1000.0	05/17/2022	AB22-0509-05
Fluoride	ND		ug/L	1000.0	05/16/2022	AB22-0509-05
Sulfate	4990		ug/L	1000.0	05/16/2022	AB22-0509-05

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0443-02-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	783		mg/L	10.0	05/05/2022	AB22-0505-02

Analytical Report

Report Date: 05/25/22

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15016**
Lab Sample ID: 22-0443-03
Matrix: Groundwater

Laboratory Project: **22-0443**
Collect Date: 05/03/2022
Collect Time: 08:37 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0443-03-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/10/2022	AB22-0510-04

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

Aliquot #: 22-0443-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Arsenic	8		ug/L	1.0	05/11/2022	AB22-0511-14
Barium	72		ug/L	5.0	05/11/2022	AB22-0511-14
Beryllium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Boron	329		ug/L	20.0	05/11/2022	AB22-0511-14
Cadmium	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Calcium	216000		ug/L	1000.0	05/12/2022	AB22-0511-14
Chromium	1		ug/L	1.0	05/11/2022	AB22-0511-14
Cobalt	ND		ug/L	6.0	05/11/2022	AB22-0511-14
Copper	5		ug/L	1.0	05/11/2022	AB22-0511-14
Iron	8020		ug/L	20.0	05/11/2022	AB22-0511-14
Lead	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Lithium	80		ug/L	10.0	05/11/2022	AB22-0511-14
Molybdenum	ND		ug/L	5.0	05/11/2022	AB22-0511-14
Nickel	13		ug/L	2.0	05/11/2022	AB22-0511-14
Selenium	2		ug/L	1.0	05/11/2022	AB22-0511-14
Silver	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Thallium	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Vanadium	3		ug/L	2.0	05/11/2022	AB22-0511-14
Zinc	ND		ug/L	10.0	05/11/2022	AB22-0511-14

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

Aliquot #: 22-0443-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	243000		ug/L	1000.0	05/17/2022	AB22-0509-05
Fluoride	ND		ug/L	1000.0	05/16/2022	AB22-0509-05
Sulfate	267000		ug/L	1000.0	05/17/2022	AB22-0509-05

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0443-03-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1390		mg/L	10.0	05/05/2022	AB22-0505-02

Analytical Report

Report Date: 05/25/22

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15019**
Lab Sample ID: 22-0443-04
Matrix: Groundwater

Laboratory Project: **22-0443**
Collect Date: 05/02/2022
Collect Time: 03:20 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0443-04-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/10/2022	AB22-0510-04

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

Aliquot #: 22-0443-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Arsenic	2		ug/L	1.0	05/11/2022	AB22-0511-14
Barium	308		ug/L	5.0	05/11/2022	AB22-0511-14
Beryllium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Boron	236		ug/L	20.0	05/11/2022	AB22-0511-14
Cadmium	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Calcium	139000		ug/L	1000.0	05/12/2022	AB22-0511-14
Chromium	1		ug/L	1.0	05/11/2022	AB22-0511-14
Cobalt	ND		ug/L	6.0	05/11/2022	AB22-0511-14
Copper	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Iron	21000		ug/L	20.0	05/11/2022	AB22-0511-14
Lead	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Lithium	12		ug/L	10.0	05/11/2022	AB22-0511-14
Molybdenum	ND		ug/L	5.0	05/11/2022	AB22-0511-14
Nickel	8		ug/L	2.0	05/11/2022	AB22-0511-14
Selenium	2		ug/L	1.0	05/11/2022	AB22-0511-14
Silver	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Thallium	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Vanadium	3		ug/L	2.0	05/11/2022	AB22-0511-14
Zinc	ND		ug/L	10.0	05/11/2022	AB22-0511-14

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

Aliquot #: 22-0443-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	324000		ug/L	1000.0	05/17/2022	AB22-0509-05
Fluoride	ND		ug/L	1000.0	05/16/2022	AB22-0509-05
Sulfate	62500		ug/L	1000.0	05/16/2022	AB22-0509-05

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0443-04-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1200		mg/L	10.0	05/05/2022	AB22-0505-02

Analytical Report

Report Date: 05/25/22

Sample Site: **DEK JCW Background**
Field Sample ID: **DUP-Background**
Lab Sample ID: 22-0443-05
Matrix: Groundwater

Laboratory Project: **22-0443**
Collect Date: 05/02/2022
Collect Time: 12:00 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0443-05-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/10/2022	AB22-0510-04

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

Aliquot #: 22-0443-05-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Arsenic	2		ug/L	1.0	05/11/2022	AB22-0511-14
Barium	58		ug/L	5.0	05/11/2022	AB22-0511-14
Beryllium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Boron	125		ug/L	20.0	05/11/2022	AB22-0511-14
Cadmium	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Calcium	103000		ug/L	1000.0	05/12/2022	AB22-0511-14
Chromium	2		ug/L	1.0	05/11/2022	AB22-0511-14
Cobalt	ND		ug/L	6.0	05/11/2022	AB22-0511-14
Copper	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Iron	16600		ug/L	20.0	05/11/2022	AB22-0511-14
Lead	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Lithium	17		ug/L	10.0	05/11/2022	AB22-0511-14
Molybdenum	ND		ug/L	5.0	05/11/2022	AB22-0511-14
Nickel	5		ug/L	2.0	05/11/2022	AB22-0511-14
Selenium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Silver	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Thallium	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Vanadium	6		ug/L	2.0	05/11/2022	AB22-0511-14
Zinc	ND		ug/L	10.0	05/11/2022	AB22-0511-14

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

Aliquot #: 22-0443-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	198000		ug/L	1000.0	05/17/2022	AB22-0509-05
Fluoride	ND		ug/L	1000.0	05/16/2022	AB22-0509-05
Sulfate	4950		ug/L	1000.0	05/16/2022	AB22-0509-05

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0443-05-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	786		mg/L	10.0	05/05/2022	AB22-0505-02

Analytical Report

Report Date: 05/25/22

Sample Site:	**DEK JCW Background**	Laboratory Project:	**22-0443**
Field Sample ID:	**FB- Background**	Collect Date:	05/02/2022
Lab Sample ID:	22-0443-06	Collect Time:	01:45 PM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0443-06-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/10/2022	AB22-0510-04

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

Aliquot #: 22-0443-06-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Arsenic	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Barium	ND		ug/L	5.0	05/11/2022	AB22-0511-14
Beryllium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Boron	ND		ug/L	20.0	05/11/2022	AB22-0511-14
Cadmium	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Calcium	ND		ug/L	1000.0	05/12/2022	AB22-0511-14
Chromium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Cobalt	ND		ug/L	6.0	05/11/2022	AB22-0511-14
Copper	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Iron	ND		ug/L	20.0	05/11/2022	AB22-0511-14
Lead	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Lithium	ND		ug/L	10.0	05/11/2022	AB22-0511-14
Molybdenum	ND		ug/L	5.0	05/11/2022	AB22-0511-14
Nickel	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Selenium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Silver	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Thallium	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Vanadium	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Zinc	ND		ug/L	10.0	05/11/2022	AB22-0511-14

Analytical Report

Report Date: 05/25/22

Data Qualifiers	Exception Summary
	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-0443

Inspection Date: 5.4.22 **Inspection By:** dmw

Sample Origin/Project Name: Q2-2022 JCN-DEK Background Wells

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx ✓ UPS _____ USPS _____ Airborne _____

Other/Hand Carry (whom) _____

Tracking Number: 272724708310 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 2.9 - 4.7°C Samples Received on Ice: Yes ✓ No _____

METER Exp. Date: 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)					
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	11				
24 mL vial (glass)					
500 mL (plastic)					
Other 250 ml plastic	5				

pH paper

COA NO: 13-640-508

0.0 - 14.0

Lot: 222420

Exp: 8.1.23

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

SAMPLING SITE / CUSTOMER: Q2-2022 JCW-DEK Background Wells

PROJECT NUMBER: 22-0443

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

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

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

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

ANALYSIS REQUESTED (Attach List if More Space is Needed): Total Metals; Anions; TDS

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

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	REMARKS
22-0443-01	5/2/22	1724	GW	MW-15002	4	3	1						x	x	x	
-02	5/2/22	1345	GW	MW-15008	4	3	1						x	x	x	
-03	5/3/22	837	GW	MW-15016	4	3	1						x	x	x	
-04	5/2/22	1520	GW	MW-15019	4	3	1						x	x	x	
-05	5/2/22	—	GW	DUP-Background	4	3	1						x	x	x	
-06	5/2/22	1345	W	FB- Background	1								x			

RELINQUISHED BY: Mallory Schwandt — DATE/TIME: 5/3/22 — RECEIVED BY: FedEx

RELINQUISHED BY: Fed Ex — DATE/TIME: 05-04-2022 10:25 — RECEIVED BY:

COMMENTS:

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

Temperature: 2.4-4.6 °C — Cal. Due Date: 6-3-22

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Tel: (330)497-9396

Laboratory Job ID: 240-166414-1
Client Project/Site: Karn/Weadock CCR Bottom Ash Pond

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

Attn: Darby Litz

Authorized for release by:
6/23/2022 8:26:30 PM

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

Links

Review your project results through my EOL

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.

Table of Contents

Cover Page 1
Table of Contents 2
Definitions/Glossary 3
Case Narrative 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Tracer Carrier Summary 13
QC Sample Results 14
QC Association Summary 16
Lab Chronicle 17
Certification Summary 19
Chain of Custody 20
Receipt Checklists 25

Definitions/Glossary

Client: TRC Environmental Corporation. Job ID: 240-166414-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Qualifiers

Rad

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

Glossary

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

Case Narrative

Client: TRC Environmental Corporation. Job ID: 240-166414-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Job ID: 240-166414-1

Laboratory: Eurofins Canton

Narrative

Job Narrative
240-166414-1

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 St. Louis laboratory.

Receipt
The samples were received on 5/12/2022 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 0.8º C, 0.9º C and 1.8º C.

RAD
Method 903.0: Radium-226 batch 565788: 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 (240-166414-1), JCW-MW-15009 (240-166414-2), JCW-MW-15010 (240-166414-3), JCW-MW-15028 (240-166414-4), DUP-02 (240-166414-5), EB-02 (240-166414-6), (LCS 160-565788/1-A), (LCSD 160-565788/2-A) and (MB 160-565788/23-A)

Methods 904.0, 9320: Radium 228 Batch 160-569957: 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 (240-166414-1), JCW-MW-15009 (240-166414-2), JCW-MW-15010 (240-166414-3), JCW-MW-15028 (240-166414-4), DUP-02 (240-166414-5), EB-02 (240-166414-6), (LCS 160-569957/2-A), (LCSD 160-569957/3-A) and (MB 160-569957/1-A)

Methods 904.0, 9320, ST-RC-0058: Total Strontium Batch 160-567639: 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 PrecSep_0: Radium-228 Prep Batch 160-565793: The following samples were prepared at a reduced aliquot due to Matrix: JCW-MW-15009 (240-166414-2) and DUP-02 (240-166414-5). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead of a sample duplicate (DUP) to demonstrate batch precision.

Method PrecSep_0: The following samples are being re-extracted due to LCS/LCSD failure (low). Original batch 565793. JCW-MW-15007 (240-166414-1), JCW-MW-15009 (240-166414-2), JCW-MW-15010 (240-166414-3), JCW-MW-15028 (240-166414-4), DUP-02 (240-166414-5) and EB-02 (240-166414-6)

Method PrecSep STD: Radium-226 Prep Batch 160-565788. The following samples were prepared at a reduced aliquot due to Matrix: JCW-MW-15009 (240-166414-2) and DUP-02 (240-166414-5). 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.
Job ID: 240-166414-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

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

Protocol References:

EPA = US Environmental Protection Agency

None = None

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

Laboratory References:

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

Sample Summary

Client: TRC Environmental Corporation.
Job ID: 240-166414-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-166414-1	JCW-MW-15007	Water	05/10/22 15:40	05/12/22 08:00
240-166414-2	JCW-MW-15009	Water	05/10/22 14:15	05/12/22 08:00
240-166414-3	JCW-MW-15010	Water	05/10/22 12:00	05/12/22 08:00
240-166414-4	JCW-MW-15028	Water	05/10/22 14:50	05/12/22 08:00
240-166414-5	DUP-02	Water	05/10/22 00:00	05/12/22 08:00
240-166414-6	EB-02	Water	05/10/22 15:57	05/12/22 08:00

Client Sample Results

Client: TRC Environmental Corporation. Job ID: 240-166414-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Client Sample ID: JCW-MW-15007 Lab Sample ID: 240-166414-1

Date Collected: 05/10/22 15:40 **Matrix: Water**
Date Received: 05/12/22 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	1.09		0.349	0.362	1.00	0.342	pCi/L	05/16/22 12:29	06/09/22 19:38	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*96.0*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:38*	*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	1.21		0.371	0.387	1.00	0.421	pCi/L	06/14/22 10:02	06/20/22 14:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*102*		*40 - 110*	*06/14/22 10:02*	*06/20/22 14:20*	*1*
Y Carrier	*88.2*		*40 - 110*	*06/14/22 10:02*	*06/20/22 14:20*	*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	2.30		0.509	0.530	5.00	0.421	pCi/L		06/20/22 19:47	1

Client Sample ID: JCW-MW-15009 — Lab Sample ID: 240-166414-2

Date Collected: 05/10/22 14:15 — **Matrix: Water**
Date Received: 05/12/22 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	0.334	U	0.370	0.371	1.00	0.601	pCi/L	05/16/22 12:29	06/09/22 19:38	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.0*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:38*	*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**		0.428	0.440	1.00	0.527	pCi/L	06/14/22 10:02	06/20/22 14:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.5*		*40 - 110*	*06/14/22 10:02*	*06/20/22 14:20*	*1*
Y Carrier	*86.0*		*40 - 110*	*06/14/22 10:02*	*06/20/22 14:20*	*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	**1.45**		0.566	0.576	5.00	0.601	pCi/L		06/20/22 19:47	1

Client Sample ID: JCW-MW-15010 Lab Sample ID: 240-166414-3

Date Collected: 05/10/22 12:00 **Matrix: Water**
Date Received: 05/12/22 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	0.0202	U	0.249	0.249	1.00	0.488	pCi/L	05/16/22 12:29	06/09/22 19:39	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*64.3*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:39*	*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	**0.932**		0.374	0.384	1.00	0.474	pCi/L	06/14/22 10:02	06/20/22 14:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.0*		*40 - 110*	*06/14/22 10:02*	*06/20/22 14:20*	*1*
Y Carrier	*86.4*		*40 - 110*	*06/14/22 10:02*	*06/20/22 14:20*	*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	**0.952**		0.449	0.458	5.00	0.488	pCi/L		06/20/22 19:47	1

Client Sample ID: JCW-MW-15028 — Lab Sample ID: 240-166414-4

Date Collected: 05/10/22 14:50 — **Matrix: Water**
Date Received: 05/12/22 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	0.490		0.274	0.277	1.00	0.357	pCi/L	05/16/22 12:29	06/09/22 19:40	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.0*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:40*	*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	0.944		0.399	0.408	1.00	0.520	pCi/L	06/14/22 10:02	06/20/22 14:21	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.0*		*40 - 110*	*06/14/22 10:02*	*06/20/22 14:21*	*1*
Y Carrier	*85.2*		*40 - 110*	*06/14/22 10:02*	*06/20/22 14:21*	*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	1.43		0.484	0.493	5.00	0.520	pCi/L		06/20/22 19:47	1

Client Sample ID: DUP-02
Date Collected: 05/10/22 00:00
Date Received: 05/12/22 08:00

Lab Sample ID: 240-166414-5
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	0.138	U	0.235	0.235	1.00	0.415	pCi/L	05/16/22 12:29	06/09/22 21:13	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*75.8*		*40 - 110*	*05/16/22 12:29*	*06/09/22 21:13*	*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	**1.37**		0.640	0.652	1.00	0.892	pCi/L	06/14/22 10:02	06/20/22 14:21	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*61.3*		*40 - 110*	*06/14/22 10:02*	*06/20/22 14:21*	*1*
Y Carrier	*85.6*		*40 - 110*	*06/14/22 10:02*	*06/20/22 14:21*	*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	**1.50**		0.682	0.693	5.00	0.892	pCi/L		06/20/22 19:47	1

Client Sample ID: EB-02 — Lab Sample ID: 240-166414-6

Date Collected: 05/10/22 15:57 — **Matrix: Water**
Date Received: 05/12/22 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	0.0170	U	0.168	0.168	1.00	0.341	pCi/L	05/16/22 12:29	06/09/22 21:14	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*78.6*		*40 - 110*	*05/16/22 12:29*	*06/09/22 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	0.245	U	0.301	0.302	1.00	0.498	pCi/L	06/14/22 10:02	06/20/22 14:21	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.0*		*40 - 110*	*06/14/22 10:02*	*06/20/22 14:21*	*1*
Y Carrier	*85.2*		*40 - 110*	*06/14/22 10:02*	*06/20/22 14:21*	*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	0.262	U	0.345	0.346	5.00	0.498	pCi/L		06/20/22 19:47	1

Tracer/Carrier Summary

Client: TRC Environmental Corporation. Job ID: 240-166414-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Method: 903.0 - Radium-226 (GFPC)

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

		Percent Yield (Acceptance Limits)
		Ba
Lab Sample ID	Client Sample ID	(40-110)
240-166414-1	JCW-MW-15007	96.0
240-166414-2	JCW-MW-15009	87.0
240-166414-3	JCW-MW-15010	64.3
240-166414-4	JCW-MW-15028	88.0
240-166414-5	DUP-02	75.8
240-166414-6	EB-02	78.6
LCS 160-565788/1-A	Lab Control Sample	99.0
LCSD 160-565788/2-A	Lab Control Sample Dup	96.8
MB 160-565788/23-A	Method Blank	69.1

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

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

		Percent Yield (Acceptance Limits)	
		Ba	Y
Lab Sample ID	Client Sample ID	(40-110)	(40-110)
240-166414-1	JCW-MW-15007	102	88.2
240-166414-2	JCW-MW-15009	82.5	86.0
240-166414-3	JCW-MW-15010	92.0	86.4
240-166414-4	JCW-MW-15028	90.0	85.2
240-166414-5	DUP-02	61.3	85.6
240-166414-6	EB-02	93.0	85.2
LCS 160-569957/2-A	Lab Control Sample	98.3	86.7
LCSD 160-569957/3-A	Lab Control Sample Dup	95.3	86.7
MB 160-569957/1-A	Method Blank	101	86.7

Tracer/Carrier Legend

Ba = Ba Carrier
Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-565788/23-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 569248 — **Prep Batch: 565788**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.03434	U	0.165	0.165	1.00	0.332	pCi/L	05/16/22 12:29	06/09/22 21:14	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*69.1*		*40 - 110*	*05/16/22 12:29*	*06/09/22 21:14*	*1*

Lab Sample ID: LCS 160-565788/1-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 569248 — **Prep Batch: 565788**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	9.157		1.21	1.00	0.269	pCi/L	81	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*99.0*		*40 - 110*

Lab Sample ID: LCSD 160-565788/2-A — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 569248 — **Prep Batch: 565788**

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RER	RER Limit
Radium-226			11.3	8.743		1.18	1.00	0.355	pCi/L	77	75 - 125	0.17	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*96.8*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-569957/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 570883 — **Prep Batch: 569957**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.07254	U	0.235	0.235	1.00	0.461	pCi/L	06/14/22 10:02	06/20/22 14:20	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*101*		*40 - 110*	*06/14/22 10:02*	*06/20/22 14:20*	*1*
Y Carrier	*86.7*		*40 - 110*	*06/14/22 10:02*	*06/20/22 14:20*	*1*

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

Lab Sample ID: LCS 160-569957/2-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 570883 **Prep Batch: 569957**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			8.52	8.193		1.13	1.00	0.524	pCi/L	96	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*98.3*		*40 - 110*
Y Carrier	*86.7*		*40 - 110*

Lab Sample ID: LCSD 160-569957/3-A **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 570883 **Prep Batch: 569957**

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RER	RER Limit
Radium-228			8.52	8.363		1.16	1.00	0.508	pCi/L	98	75 - 125	0.07	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*95.3*		*40 - 110*
Y Carrier	*86.7*		*40 - 110*

QC Association Summary

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

Job ID: 240-166414-1

Rad

Prep Batch: 565788

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-166414-1	JCW-MW-15007	Total/NA	Water	PrecSep STD	
240-166414-2	JCW-MW-15009	Total/NA	Water	PrecSep STD	
240-166414-3	JCW-MW-15010	Total/NA	Water	PrecSep STD	
240-166414-4	JCW-MW-15028	Total/NA	Water	PrecSep STD	
240-166414-5	DUP-02	Total/NA	Water	PrecSep STD	
240-166414-6	EB-02	Total/NA	Water	PrecSep STD	
MB 160-565788/23-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-565788/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
LCSD 160-565788/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	

Prep Batch: 569957

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-166414-1	JCW-MW-15007	Total/NA	Water	PrecSep_0	
240-166414-2	JCW-MW-15009	Total/NA	Water	PrecSep_0	
240-166414-3	JCW-MW-15010	Total/NA	Water	PrecSep_0	
240-166414-4	JCW-MW-15028	Total/NA	Water	PrecSep_0	
240-166414-5	DUP-02	Total/NA	Water	PrecSep_0	
240-166414-6	EB-02	Total/NA	Water	PrecSep_0	
MB 160-569957/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-569957/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-569957/3-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-166414-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Client Sample ID: JCW-MW-15007 — Lab Sample ID: 240-166414-1

Date Collected: 05/10/22 15:40 — **Matrix: Water**
Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569247	06/09/22 19:38	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569957	06/14/22 10:02	MS	TAL SL
Total/NA	Analysis	904.0		1	570883	06/20/22 14:20	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570890	06/20/22 19:47	EMH	TAL SL

Client Sample ID: JCW-MW-15009 — Lab Sample ID: 240-166414-2

Date Collected: 05/10/22 14:15 — **Matrix: Water**
Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569247	06/09/22 19:38	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569957	06/14/22 10:02	MS	TAL SL
Total/NA	Analysis	904.0		1	570883	06/20/22 14:20	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570890	06/20/22 19:47	EMH	TAL SL

Client Sample ID: JCW-MW-15010 — Lab Sample ID: 240-166414-3

Date Collected: 05/10/22 12:00 — **Matrix: Water**
Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569248	06/09/22 19:39	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569957	06/14/22 10:02	MS	TAL SL
Total/NA	Analysis	904.0		1	570883	06/20/22 14:20	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570890	06/20/22 19:47	EMH	TAL SL

Client Sample ID: JCW-MW-15028 — Lab Sample ID: 240-166414-4

Date Collected: 05/10/22 14:50 — **Matrix: Water**
Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569248	06/09/22 19:40	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569957	06/14/22 10:02	MS	TAL SL
Total/NA	Analysis	904.0		1	570883	06/20/22 14:21	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570890	06/20/22 19:47	EMH	TAL SL

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-166414-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Client Sample ID: DUP-02 — Lab Sample ID: 240-166414-5

Date Collected: 05/10/22 00:00 — **Matrix: Water**
Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569248	06/09/22 21:13	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569957	06/14/22 10:02	MS	TAL SL
Total/NA	Analysis	904.0		1	570883	06/20/22 14:21	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570890	06/20/22 19:47	EMH	TAL SL

Client Sample ID: EB-02 — Lab Sample ID: 240-166414-6

Date Collected: 05/10/22 15:57 — **Matrix: Water**
Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569248	06/09/22 21:14	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569957	06/14/22 10:02	MS	TAL SL
Total/NA	Analysis	904.0		1	570883	06/20/22 14:21	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570890	06/20/22 19:47	EMH	TAL SL

Laboratory References:

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

Accreditation/Certification Summary

Client: TRC Environmental Corporation. Job ID: 240-166414-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Laboratory: Eurofins St. Louis

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

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-06-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-22
California	Los Angeles County Sanitation Districts	10259	06-30-22
California	State	2886	07-01-22
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	12-31-22
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-22
Louisiana	NELAP	04080	06-30-22
Louisiana (DW)	State	LA011	12-31-22
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	04-01-23
North Dakota	State	R-207	06-30-22
NRC	NRC	24-24817-01	12-31-22
Oklahoma	NELAP	9997	08-31-22
Oregon	NELAP	4157	09-01-22
Pennsylvania	NELAP	68-00540	02-28-23
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	06-14-23
Washington	State	C592	08-30-22
West Virginia DEP	State	381	10-31-22

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

Chain of Custody Record

MICHIGAN 190

eurofins | Environment Testing America

Client Information	Sampler: JAVier JASS	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-94786-29049.1
Client Contact: Jacob Krenz	Phone: 734 904 3316	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin:	Page: Page 1 of 1
Company: TRC Environmental Corporation.	PWSID:			Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: Δ Yes Δ No			
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: TBD			
Email: JKrenz@trccompanies.com	WO #:			
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:				D	D		
JCW-MW-15007	5/10/22	1540	G	Water	N	Y	X	X	2	
JCW-MW-15009	5/10/22	1415	G	Water	N	Y	X	X	2	
JCW-MW-15010	5/10/22	1207	G	Water	N	Y	X	X	2	
JCW-MW-15028	5/10/22	1458	G	Water	N	Y	X	X	2	
DUP-02	5/10/22	—	G	Water	N	Y	X	X	2	
EB-02	5/10/22	1557	G	DI Water	N	N	X	X	2	
				Water						

240-166414 Chain of Custody

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

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

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

Special Instructions/QC Requirements:

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

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1		5/11/22 0830	TC		5/11/22 0830	EETA
2		5/11/22			5-12-22 800	EETLE
3						

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 # : 166414**
Canton Facility

Client TRC Site Name _____ Cooler unpacked by: Matt

Cooler Received on 5-12-22 Opened on 5-12-22

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-13 (CF **0.0** °C) Observed Cooler Temp._____ °C Corrected Cooler Temp._____ °C
   IR GUN #IR-15 (CF **-0.7**°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:

Received 2 sets of samples labled 1800 one with time 1004 one 1333. matched times with COC. Same with samples MW-50.

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 # : ______________

Eurofins - 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-13 IR-15	1.8	1.8	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15	0.9	0.9	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15	0.8	0.8	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 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	240-166414-A-1	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15007	240-166414-B-1	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15008	240-166414-A-2	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15008	240-166414-B-2	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15009	240-166414-A-3	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15009	240-166414-B-3	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15028	240-166414-A-4	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15028	240-166414-B-4	Plastic 1 liter - Nitric Acid	<2			
DUP-02	240-166414-A-5	Plastic 1 liter - Nitric Acid	<2			
DUP-02	240-166414-B-5	Plastic 1 liter - Nitric Acid	<2			
EB-02	240-166414-A-6	Plastic 1 liter - Nitric Acid	<2			
EB-02	240-166414-B-6	Plastic 1 liter - Nitric Acid	<2			

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
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: 240-151953.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: Michigan	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-166414-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 6/13/2022			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Kam/Weadock CCR Groundwater Monitoring	Project #: 24024154			
Site:	SSOW#:			

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_STD Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
JCW-MW-15007 (240-166414-1)	5/10/22	15:40 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-15009 (240-166414-2)	5/10/22	14:15 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-15010 (240-166414-3)	5/10/22	12:00 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-15028 (240-166414-4)	5/10/22	14:50 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-02 (240-166414-5)	5/10/22	Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
EB-02 (240-166414-6)	5/10/22	15:57 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte & accreditation compliance upon 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 Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing North Central, LLC

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

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

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1	[signature]	5-12-22 1446	ETA	FED EX		
2	FED EX			[signature] Sierra Worthington	MAY 13 2022 0850	ETASR
3						

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: 240-166414-1

Login Number: 166414
List Number: 2
Creator: Worthington, Sierra M

List Source: Eurofins St. Louis
List Creation: 05/13/22 11:49 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Tel: (330)497-9396

Laboratory Job ID: 240-166150-1
Client Project/Site: CCR Background Well

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

Attn: Darby Litz

Authorized for release by:
6/12/2022 7:33:54 PM

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

LINKS

Review your project results through my EOL

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.

Table of Contents

Cover Page 1
Table of Contents 2
Definitions/Glossary 3
Case Narrative 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Tracer Carrier Summary 13
QC Sample Results 14
QC Association Summary 16
Lab Chronicle 17
Certification Summary 19
Chain of Custody 20
Receipt Checklists 25

Definitions/Glossary

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

Job ID: 240-166150-1

Qualifiers

Rad

Qualifier	Qualifier Description
*	RPD of the LCS and LCSD exceeds the control 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: 240-166150-1

Laboratory: Eurofins Canton

Narrative

Job Narrative
240-166150-1

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 St. Louis laboratory.

Receipt
The samples were received on 5/6/2022 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 0.9º C, 1.3º C and 1.4º C.

RAD
Method 903.0: Radium-226 batch 564568
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 (240-166150-1), MW-15008 (240-166150-2), MW-15016 (240-166150-3), MW-15019 (240-166150-4), DUP-04 (240-166150-5), EB-04 (240-166150-6), (LCS 160-564568/1-A), (LCSD 160-564568/2-A) and (MB 160-564568/23-A)

Method 904.0: Radium-228 batch 564569
The RER/DER of the laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) was outside control limits. However the recovery for the LCS/LCSD passed and the RPD was <40% demonstrating acceptable method performance. Original results will be reported. (LCSD 160-564569/2-A)

Method 904.0: Radium-228 batch 564569
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 (240-166150-1), MW-15008 (240-166150-2), MW-15016 (240-166150-3), MW-15019 (240-166150-4), DUP-04 (240-166150-5), EB-04 (240-166150-6), (LCS 160-564569/1-A), (LCSD 160-564569/2-A) and (MB 160-564569/23-A)

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: CCR Background Well

Job ID: 240-166150-1

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

Sample Summary

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

Job ID: 240-166150-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-166150-1	MW-15002	Water	05/02/22 17:24	05/06/22 08:00
240-166150-2	MW-15008	Water	05/02/22 13:45	05/06/22 08:00
240-166150-3	MW-15016	Water	05/03/22 08:37	05/06/22 08:00
240-166150-4	MW-15019	Water	05/02/22 15:20	05/06/22 08:00
240-166150-5	DUP-04	Water	05/02/22 00:00	05/06/22 08:00
240-166150-6	EB-04	Water	05/02/22 13:45	05/06/22 08:00

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

Job ID: 240-166150-1

Client Sample ID: MW-15002

Date Collected: 05/02/22 17:24
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-1

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	1.37		0.522	0.536	1.00	0.574	pCi/L	05/10/22 09:51	06/07/22 18:11	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.3*		*40 - 110*	*05/10/22 09:51*	*06/07/22 18:11*	*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	3.30	*	0.757	0.816	1.00	0.785	pCi/L	05/10/22 10:04	06/07/22 15:33	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.3*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*1*
Y Carrier	*86.7*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*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	4.68		0.920	0.976	5.00	0.785	pCi/L		06/08/22 13:03	1

Client Sample ID: MW-15008

Date Collected: 05/02/22 13:45
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-2

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	0.317	U	0.294	0.295	1.00	0.447	pCi/L	05/10/22 09:51	06/07/22 18:35	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.8*		*40 - 110*	*05/10/22 09:51*	*06/07/22 18:35*	*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	0.509	U *	0.388	0.391	1.00	0.588	pCi/L	05/10/22 10:04	06/07/22 15:33	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.8*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*1*
Y Carrier	*86.4*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*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	**0.826**		0.487	0.490	5.00	0.588	pCi/L		06/08/22 13:03	1

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

Job ID: 240-166150-1

Client Sample ID: MW-15016

Date Collected: 05/03/22 08:37
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-3

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	0.0815	U	0.195	0.195	1.00	0.368	pCi/L	05/10/22 09:51	06/07/22 18:11	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.0*		*40 - 110*	*05/10/22 09:51*	*06/07/22 18:11*	*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	0.542	U *	0.403	0.406	1.00	0.611	pCi/L	05/10/22 10:04	06/07/22 15:33	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.0*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*1*
Y Carrier	*84.5*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*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	**0.624**		0.448	0.450	5.00	0.611	pCi/L		06/08/22 13:03	1

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

Job ID: 240-166150-1

Client Sample ID: MW-15019

Date Collected: 05/02/22 15:20
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-4

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	0.278	U	0.349	0.350	1.00	0.579	pCi/L	05/10/22 09:51	06/07/22 18:05	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.8*		*40 - 110*	*05/10/22 09:51*	*06/07/22 18:05*	*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	**1.83**	*	0.601	0.625	1.00	0.742	pCi/L	05/10/22 10:04	06/07/22 15:33	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.8*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*1*
Y Carrier	*86.7*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*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	**2.11**		0.695	0.716	5.00	0.742	pCi/L		06/08/22 13:03	1

Client Sample ID: DUP-04

Date Collected: 05/02/22 00:00
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-5

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	0.650		0.422	0.426	1.00	0.599	pCi/L	05/10/22 09:51	06/07/22 18:05	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*40 - 110*	*05/10/22 09:51*	*06/07/22 18:05*	*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	0.938	*	0.482	0.490	1.00	0.675	pCi/L	05/10/22 10:04	06/07/22 15:34	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:34*	*1*
Y Carrier	*89.0*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:34*	*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	1.59		0.641	0.649	5.00	0.675	pCi/L		06/08/22 13:03	1

Client Sample ID: EB-04

Date Collected: 05/02/22 13:45
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-6

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	-0.0315	U	0.209	0.209	1.00	0.466	pCi/L	05/10/22 09:51	06/07/22 18:05	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*57.6*		*40 - 110*	*05/10/22 09:51*	*06/07/22 18:05*	*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	0.292	U *	0.488	0.488	1.00	0.832	pCi/L	05/10/22 10:04	06/07/22 15:35	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*57.6*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:35*	*1*
Y Carrier	*87.9*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:35*	*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	0.260	U	0.531	0.531	5.00	0.832	pCi/L		06/08/22 13:03	1

Tracer/Carrier Summary

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

Job ID: 240-166150-1

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)
		Ba
Lab Sample ID	Client Sample ID	(40-110)
240-166150-1	MW-15002	82.3
240-166150-2	MW-15008	89.8
240-166150-3	MW-15016	93.0
240-166150-4	MW-15019	89.8
240-166150-5	DUP-04	88.3
240-166150-6	EB-04	57.6
LCS 160-564568/1-A	Lab Control Sample	94.3
LCSD 160-564568/2-A	Lab Control Sample Dup	82.3
MB 160-564568/23-A	Method Blank	99.3

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
		Ba	Y
Lab Sample ID	Client Sample ID	(40-110)	(40-110)
240-166150-1	MW-15002	82.3	86.7
240-166150-2	MW-15008	89.8	86.4
240-166150-3	MW-15016	93.0	84.5
240-166150-4	MW-15019	89.8	86.7
240-166150-5	DUP-04	88.3	89.0
240-166150-6	EB-04	57.6	87.9
LCS 160-564569/1-A	Lab Control Sample	94.3	84.9
LCSD 160-564569/2-A	Lab Control Sample Dup	82.3	84.5
MB 160-564569/23-A	Method Blank	99.3	91.2

Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-564568/23-A
Matrix: Water
Analysis Batch: 569008

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 564568

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.002143	U	0.135	0.135	1.00	0.285	pCi/L	05/10/22 09:51	06/07/22 20:02	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.3*		*40 - 110*	*05/10/22 09:51*	*06/07/22 20:02*	*1*

Lab Sample ID: LCS 160-564568/1-A
Matrix: Water
Analysis Batch: 568823

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 564568

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	9.625		1.28	1.00	0.274	pCi/L	85	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*94.3*		*40 - 110*

Lab Sample ID: LCSD 160-564568/2-A
Matrix: Water
Analysis Batch: 568823

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 564568

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RER	RER Limit
Radium-226			11.3	9.709		1.34	1.00	0.405	pCi/L	86	75 - 125	0.03	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*82.3*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-564569/23-A
Matrix: Water
Analysis Batch: 568850

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 564569

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.03881	U	0.215	0.215	1.00	0.396	pCi/L	05/10/22 10:04	06/07/22 15:38	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.3*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:38*	*1*
Y Carrier	*91.2*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:38*	*1*

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

Lab Sample ID: LCS 160-564569/1-A
Matrix: Water
Analysis Batch: 569007

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 564569

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			8.55	6.624		1.00	1.00	0.571	pCi/L	77	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*94.3*		*40 - 110*
Y Carrier	*84.9*		*40 - 110*

Lab Sample ID: LCSD 160-564569/2-A
Matrix: Water
Analysis Batch: 569007

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 564569

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RER	RER Limit
Radium-228			8.55	9.176	*	1.28	1.00	0.579	pCi/L	107	75 - 125	1.12	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*82.3*		*40 - 110*
Y Carrier	*84.5*		*40 - 110*

QC Association Summary

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

Job ID: 240-166150-1

Rad

Prep Batch: 564568

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-166150-1	MW-15002	Total/NA	Water	PrecSep STD	
240-166150-2	MW-15008	Total/NA	Water	PrecSep STD	
240-166150-3	MW-15016	Total/NA	Water	PrecSep STD	
240-166150-4	MW-15019	Total/NA	Water	PrecSep STD	
240-166150-5	DUP-04	Total/NA	Water	PrecSep STD	
240-166150-6	EB-04	Total/NA	Water	PrecSep STD	
MB 160-564568/23-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-564568/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
LCSD 160-564568/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	

Prep Batch: 564569

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-166150-1	MW-15002	Total/NA	Water	PrecSep_0	
240-166150-2	MW-15008	Total/NA	Water	PrecSep_0	
240-166150-3	MW-15016	Total/NA	Water	PrecSep_0	
240-166150-4	MW-15019	Total/NA	Water	PrecSep_0	
240-166150-5	DUP-04	Total/NA	Water	PrecSep_0	
240-166150-6	EB-04	Total/NA	Water	PrecSep_0	
MB 160-564569/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-564569/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-564569/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Lab Chronicle

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

Job ID: 240-166150-1

Client Sample ID: MW-15002
Date Collected: 05/02/22 17:24
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			564568	05/10/22 09:51	LPS	TAL SL
Total/NA	Analysis	903.0		1	568823	06/07/22 18:11	FLC	TAL SL
Total/NA	Prep	PrecSep_0			564569	05/10/22 10:04	LPS	TAL SL
Total/NA	Analysis	904.0		1	568823	06/07/22 15:33	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	569042	06/08/22 13:03	SCB	TAL SL

Client Sample ID: MW-15008
Date Collected: 05/02/22 13:45
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			564568	05/10/22 09:51	LPS	TAL SL
Total/NA	Analysis	903.0		1	568823	06/07/22 18:35	FLC	TAL SL
Total/NA	Prep	PrecSep_0			564569	05/10/22 10:04	LPS	TAL SL
Total/NA	Analysis	904.0		1	568823	06/07/22 15:33	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	569042	06/08/22 13:03	SCB	TAL SL

Client Sample ID: MW-15016
Date Collected: 05/03/22 08:37
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			564568	05/10/22 09:51	LPS	TAL SL
Total/NA	Analysis	903.0		1	568823	06/07/22 18:11	FLC	TAL SL
Total/NA	Prep	PrecSep_0			564569	05/10/22 10:04	LPS	TAL SL
Total/NA	Analysis	904.0		1	568823	06/07/22 15:33	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	569042	06/08/22 13:03	SCB	TAL SL

Client Sample ID: MW-15019
Date Collected: 05/02/22 15:20
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			564568	05/10/22 09:51	LPS	TAL SL
Total/NA	Analysis	903.0		1	569008	06/07/22 18:05	FLC	TAL SL
Total/NA	Prep	PrecSep_0			564569	05/10/22 10:04	LPS	TAL SL
Total/NA	Analysis	904.0		1	568823	06/07/22 15:33	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	569042	06/08/22 13:03	SCB	TAL SL

Lab Chronicle

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

Job ID: 240-166150-1

Client Sample ID: DUP-04

Lab Sample ID: 240-166150-5

Date Collected: 05/02/22 00:00

Matrix: Water

Date Received: 05/06/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			564568	05/10/22 09:51	LPS	TAL SL
Total/NA	Analysis	903.0		1	569008	06/07/22 18:05	FLC	TAL SL
Total/NA	Prep	PrecSep_0			564569	05/10/22 10:04	LPS	TAL SL
Total/NA	Analysis	904.0		1	568823	06/07/22 15:34	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	569042	06/08/22 13:03	SCB	TAL SL

Client Sample ID: EB-04

Lab Sample ID: 240-166150-6

Date Collected: 05/02/22 13:45

Matrix: Water

Date Received: 05/06/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			564568	05/10/22 09:51	LPS	TAL SL
Total/NA	Analysis	903.0		1	569008	06/07/22 18:05	FLC	TAL SL
Total/NA	Prep	PrecSep_0			564569	05/10/22 10:04	LPS	TAL SL
Total/NA	Analysis	904.0		1	568835	06/07/22 15:35	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	569042	06/08/22 13:03	SCB	TAL SL

Laboratory References:

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

Accreditation/Certification Summary

Client: TRC Environmental Corporation. Job ID: 240-166150-1
Project/Site: CCR Background Well

Laboratory: Eurofins St. Louis

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

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-06-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-22
California	Los Angeles County Sanitation Districts	10259	06-30-22
California	State	2886	07-01-22
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	12-31-22
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-22
Louisiana	NELAP	04080	06-30-22
Louisiana (DW)	State	LA011	12-31-22
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	04-01-23
North Dakota	State	R-207	06-30-22
NRC	NRC	24-24817-01	12-31-22
Oklahoma	NELAP	9997	08-31-22
Oregon	NELAP	4157	09-01-22
Pennsylvania	NELAP	68-00540	02-28-23
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

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

Chain of Custody Record

MICHIGAN 190

eurofins | Environment Testing America

Client Information	Sampler: Henry Schmidt	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-94785-33282.1
Client Contact: Jacob Krenz	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin:	Page: Page 1 of 1
Company: TRC Environmental Corporation.	PWSID:			Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: Δ Yes Δ No			
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: TBD			
Email: JKrenz@trccompanies.com	WO #:			
Project Name: Karn/Weadock CCR Background Well	Project #: 24024154			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, Ra226Ra228_GFPC	904.0 - Standard Target List	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	D		
MW-15002	5/2/22	1724	G	Water	N	N	X	X		
MW-15008	5/2/22	1345	G	Water	N	N	X	X		
MW-15016	5/3/22	837	G	Water	N	N	X	X		
MW-15019	5/2/22	1520	G	Water	N	N	X	X		
DUP-04	5/2/22	—	G	Water	N	N	X	X		
EB-04	5/2/22	1045	G	Water	N	N	X	X		
				Water						

240-166150 Chain of Custody

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

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

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

Special Instructions/QC Requirements:

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

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1	Henry Schmidt	5/3/22/1600	TRC		5-3-22/1600	TRC
2		5-5-22/1330	TRC		5/5/22 1330	FEDEX
3		5/5/22 1335	FEDEX		5-6-22 0800	EEDNC

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

6/12/2022

Eurofins TestAmerica Canton Sample Receipt Form/Narrative Login # : 166150
Canton Facility

Client TRC Site Name

Cooler Received on 5-6-22 Opened on 5-6-22

Cooler unpacked by: TME

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-13 (CF 0.0 °C) Observed Cooler Temp._____°C Corrected Cooler Temp._____°C
   IR GUN #IR-15 (CF -0.7°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 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)? (Y)
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:

Containers for DUP-04 and EB-04 are labeled as DUP-Background and EB-Background. Dates and times match COC. Samples are logged per the COC. TME 5-6-22

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 # : 166150

Eurofins - 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-13 IR-15	1.3	1.3	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15	1.4	1.4	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15	0.9	0.9	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 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	240-166150-A-1	Plastic 1 liter - Nitric Acid	<2			
MW-15002	240-166150-B-1	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-166150-A-2	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-166150-B-2	Plastic 1 liter - Nitric Acid	<2			
MW-15016	240-166150-A-3	Plastic 1 liter - Nitric Acid	<2			
MW-15016	240-166150-B-3	Plastic 1 liter - Nitric Acid	<2			
MW-15019	240-166150-A-4	Plastic 1 liter - Nitric Acid	<2			
MW-15019	240-166150-B-4	Plastic 1 liter - Nitric Acid	<2			
DUP-04	240-166150-A-5	Plastic 1 liter - Nitric Acid	<2			
DUP-04	240-166150-B-5	Plastic 1 liter - Nitric Acid	<2			
EB-04	240-166150-A-6	Plastic 1 liter - Nitric Acid	<2			
EB-04	240-166150-B-6	Plastic 1 liter - Nitric Acid	<2			

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
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: 240-151693.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: Michigan	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-166150-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 6/7/2022			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: 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 - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_STD Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
MW-15002 (240-166150-1)	5/2/22	17:24 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15008 (240-166150-2)	5/2/22	13:45 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15016 (240-166150-3)	5/3/22	08:37 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15019 (240-166150-4)	5/2/22	15:20 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-04 (240-166150-5)	5/2/22	Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
EB-04 (240-166150-6)	5/2/22	13:45 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte & accreditation compliance upon 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 Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing North Central, LLC.

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

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

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	5-6-22 1428	ETA	FED EX		
Relinquished by: FED EX	Date/Time:	Company	Received by: Dina Worthington	Date/Time: MAY 0 9 2022 0835	Company ETASL
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: 240-166150-1
SDG Number:

Login Number: 166150
List Number: 2
Creator: Worthington, Sierra M

List Source: Eurofins St. Louis
List Creation: 05/09/22 02:40 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.	False	

October 2022 Assessment Monitoring Data Summary and Statistical Evaluation

JC Weadock, Bottom Ash Pond CCR Unit

Essexville, Michigan

January 2023

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

TABLE OF CONTENTS

1.0 Introduction 1

1.1 Program Summary 1
1.2 Site Overview 3
1.3 Geology/Hydrogeology 3

2.0 Groundwater Monitoring 6

2.1 Monitoring Well Network 6
2.2 October 2022 Assessment Monitoring 6
2.2.1 Groundwater Flow Rate and Direction 7
2.2.2 Data Quality 7

3.0 Assessment Monitoring Statistical Evaluation 8

3.1 Establishing Groundwater Protection Standards 8
3.2 Data Comparison to Groundwater Protection Standards 8

4.0 Conclusions and Recommendations 10

5.0 References 11

TABLES

Table 1 Summary of Groundwater Elevation Data
Table 2 Summary of Field Parameters
Table 3 Summary of Background Well Groundwater Sampling Results (Analytical)
Table 4 Summary of Groundwater Sampling Results (Analytical) – JC Weadock Bottom Ash Pond
Table 5 Summary of Assessment Monitoring Statistical Evaluation – October 2022

FIGURES

Figure 1 Site Location Map
Figure 2 Site Map
Figure 3 Potentiometric Surface Map – October 2022

APPENDICES

Appendix A Data Quality Reviews
Appendix B Statistical Evaluation of October 2022 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 2022 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 2022 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 2022 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 3 through 5, 2022. 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 2022 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 Environment Testing 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 2022 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 2022 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 578 to 583 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 2022 event is estimated at 0.0028 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 2022 is 0.15 ft/day or 55 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 2022 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 2022 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.

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. 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

currently 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

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. Beryllium concentrations have been below the GWPS at JCW-MW-15009 for the past seven semi-annual sampling events. Lithium concentrations have been below the GWPS at JCW-MW-15009 for the past eight 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 2022 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 2022 assessment monitoring event is presented in this report. Overall, the statistical assessments have confirmed that there are no 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 2023.

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.

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

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

Golder Associates Inc. August 2020. J.C. Weadock Generating Facility Bottom Ash Pond CCR Removal Documentation Report, Essexville, Michigan. Prepared for Consumers Energy Company.

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.

TRC Environmental Corporation. January 2019. 2018 Annual Groundwater Monitoring Report – JC Weadock Power Plant, Bottom Ash Pond CCR Unit. Prepared for Consumers Energy Company.

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
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

Well Location	TOC Elevation (ft)	Geologic Unit of Screen Interval	Screen Interval Elevation (ft)			October 3, 2022	
						Depth to Water (ft BTOC)	Groundwater Elevation (ft)
Background Monitoring Wells							
MW-15002	587.71	Sand	580.9	to	570.9	7.06	580.65
MW-15008	585.36	Sand with clay	578.7	to	568.7	4.75	578.61
MW-15016	586.49	Sand	581.2	to	578.2	4.84	581.63
MW-15019	586.17	Sand and Sand/Clay	579.5	to	569.5	5.68	580.49
Bottom Ash Pond: Downgradient Monitoring Wells							
JCW-MW-15007	587.40	Sand	582.7	to	579.2	4.37	583.03
JCW-MW-15009	589.64	Sand	581.9	to	576.9	8.59	581.05
JCW-MW-15010	597.76	Sand	579.7	to	578.2	17.35	580.41
JCW-MW-15028	589.64	Sand	567.7	to	564.7	8.32	581.32
Landfill: Downgradient Monitoring Wells (outside slurry wall)							
JCW-MW-18001	596.73	Sand and Sandy Clay	578.3	to	573.3	16.80	579.93
JCW-MW-18004	593.04	Sandy Clay	583.9	to	578.9	12.11	580.93
JCW-MW-18005	590.89	Sand and Sandy Clay	580.0	to	575.0	9.15	581.74
JCW-MW-18006	600.72	Fly Ash and Sandy Clay	582.8	to	577.8	15.05	585.67
MW-50	593.36	Sand	577.8	to	574.8	13.37	579.99
MW-51	594.29	Sand and Clay	577.8	to	574.8	14.10	580.19
MW-52	594.90	Sand	579.3	to	576.3	14.75	580.15
MW-53	593.68	Sand and Clay	579.1	to	576.1	13.85	579.83
MW-53R	594.25	Sand and Clay	580.4	to	575.4	14.30	579.95
MW-54R	593.89	Clay and Sand	581.3	to	576.3	14.25	579.64
MW-55	593.82	Sand	581.5	to	578.5	13.65	580.17
OW-57ROUT	591.00	Sandy Clay	577.0	to	572.0	10.00	581.00
Landfill: Static Water Level Only (inside slurry wall)							
JCW-OW-18001	595.84	Fly Ash and Sand	581.1	to	576.1	8.85	586.99
JCW-OW-18002	593.63	Sand	578.9	to	573.9	10.53	583.10
JCW-OW-18003	593.99	Sand and Clay	580.5	to	575.5	8.20	585.79
JCW-OW-18004	594.19	Sandy Clay	584.6	to	579.6	7.14	587.05
JCW-OW-18006	600.61	Fly Ash and Clay with Sand	582.9	to	577.9	11.00	589.61
MW-20	592.73	NR	~581.1	to	~578.1	7.31	585.42
OW-51	593.62	Clay and Sand	578.9	to	575.9	9.74	583.88
OW-53	593.64	Clay and Sand	579.0	to	576.0	7.15	586.49
OW-54	594.10	Clay and Sand	580.0	to	577.0	6.78	587.32
OW-55	594.67	Clay (or Sand and Clay)	580.9	to	577.9	7.63	587.04
OW-56R	592.01	Ash and Sand	577.5	to	572.5	5.83	586.18
OW-57R IN	590.86	Sandy Clay	575.7	to	570.7	6.00	584.86
OW-61	602.15	Ash and Sand	588.0	to	585.0	11.78	590.37
Landfill: Leachate Headwells							
LH-103R	612.70	Fly Ash	30.2	to	33.2	24.15	588.55
LH-104	596.56	Fly Ash	8.0	to	11.0	11.13	585.43

Notes:

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

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

TOC: Top of well casing.

ft BTOC: Feet below top of well casing.

NR: Not Recorded

Table 2
Summary of Field Parameters
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	10/5/2022	0.90	-66.7	6.7	4,577	14.9	2.0
MW-15008	10/4/2022	0.80	-93.0	6.7	1,474	15.6	1.6
MW-15016	10/5/2022	0.90	12.1	6.9	1,817	15.7	1.7
MW-15019	10/4/2022	0.80	-88.2	6.8	1,961	15.8	0.9
Weadock Bottom Ash Pond							
JCW-MW-15007	10/4/2022	0.27	-90.7	6.9	10,845	17.4	9.9
JCW-MW-15009	10/4/2022	0.17	-134.5	6.3	2,539	17.6	4.8
JCW-MW-15010	10/4/2022	0.20	-291.5	7.1	1,183	15.5	1.6
JCW-MW-15028	10/4/2022	0.15	-148.8	7.7	4,340	13.7	3.0

Notes:

mg/L - Milligrams per Liter.

mV - Millivolts.

SU - Standard Units.

umhos/cm - Micromhos per centimeter.

°C - Degrees Celsius.

NTU - Nephelometric Turbidity Unit.

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

					Sample Location:	**MW-15002**	**MW-15008**	**MW-15016**	**MW-15019**
					Sample Date:	10/5/2022	10/4/2022	10/5/2022	10/4/2022
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Background			
Appendix III[(1)]									
Boron	ug/L	NC	**500**	**500**	4,000	147	175	**690**	297
Calcium	mg/L	NC	NC	NC	500[EE]	214	113	289	139
Chloride	mg/L	**250****	**250**[E]**	**250**[E]**	**50**	**1,820**	**261**	**236**	**355**
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]**	2.66	19.3	**639**	59.7
Total Dissolved Solids	mg/L	**500****	**500**[E]**	**500**[E]**	**500**	**4,210**	**901**	**1,760**	**1,190**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	6.7	6.7	6.9	6.8
Appendix IV[(1)]									
Antimony	ug/L	6	6.0	6.0	2.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	10	10	10	9	2	3	2
Barium	ug/L	2,000	2,000	2,000	1,200	600	70	115	308
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	2	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	16	21	91	12
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	6	< 5
Radium-226	pCi/L	NC	NC	NC	NC	0.850	0.265	< 0.158	0.478
Radium-228	pCi/L	NC	NC	NC	NC	2.69	1.62	1.56	2.11
Radium-226/228	pCi/L	5	NC	NC	NC	3.54	1.88	1.71	2.59
Selenium	ug/L	50	50	50	**5.0**	**36**	< 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]	**15,300**	**17,500**	**427**	**20,700**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	2	1	3	1
Nickel	ug/L	NC	100	100	120	7	4	12	5
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	62	27	**11**	**6**	2	3
Zinc	ug/L	5,000**	2,400	5,000[E]	260	< 10	< 10	11	< 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 Amendment - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) addtional detection monitoring constituent (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

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

RED value indicates an exceedance of the MCL.

All metals were analyzed as total unless otherwise specified.

Table 4
Summary of Groundwater Sampling Results (Analytical)
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:	10/4/2022	10/4/2022	10/4/2022	10/4/2022
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^				
Appendix III[1]									
Boron	ug/L	NC	**500**	**500**	4,000	**570**	239	**1,080**	**547**
Calcium	mg/L	NC	NC	NC	**500**[EE]	493	**566**	170	192
Chloride	mg/L	**250****	**250**[E]	**250**[E]	**50**	**2,880**	32.6	30.5	**1,350**
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]	**773**	**1,460**	207	106
Total Dissolved Solids	mg/L	**500****	**500**[E]	**500**[E]	**500**	**6,910**	**2,380**	**836**	**2,460**
pH, Field	SU	**6.5 - 8.5****	**6.5 - 8.5**[E]	**6.5 - 8.5**[E]	**6.5 - 9.0**	6.9	**6.3**	7.1	7.7
Appendix IV[1]									
Antimony	ug/L	6	6.0	6.0	2.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	**67**	< 1	**13**	9
Barium	ug/L	2,000	2,000	2,000	1,200	412	23	276	385
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	2	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	147	92	71	52
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	120	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NC	NC	NC	< 0.184	0.174	0.318	0.646
Radium-228	pCi/L	NC	NC	NC	NC	< 0.585	0.753	0.652	1.23
Radium-226/228	pCi/L	5	NC	NC	NC	< 0.585	0.927	0.97	1.87
Selenium	ug/L	**50**	**50**	**50**	**5.0**	**68**	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]	**11,800**	**17,000**	73	**659**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	2	2	< 1	< 1
Nickel	ug/L	NC	100	100	120	25	8	5	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	**22**	< 2	< 2	**13**
Zinc	ug/L	5,000**	2,400	5,000[E]	260	< 10	< 10	< 10	< 10

Notes:

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

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

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

NC - no criteria; -- - not analyzed.

* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 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 Amendment - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) addtional detection monitoring constituent (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

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

RED value indicates an exceedance of the MCL.

All metals were analyzed as total unless otherwise specified.

Table 5
Summary of Assessment Monitoring Statistical Evaluation – October 2022
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	14	56	--	--	3.3	17
Barium	ug/L	2,000	710	2,000	--	--	--	--
Beryllium	ug/L	4	--	--	1.0	4.3	--	--
Selenium	ug/L	50	1.0	68	--	--	--	--

Notes:

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

ug/L - micrograms per Liter

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

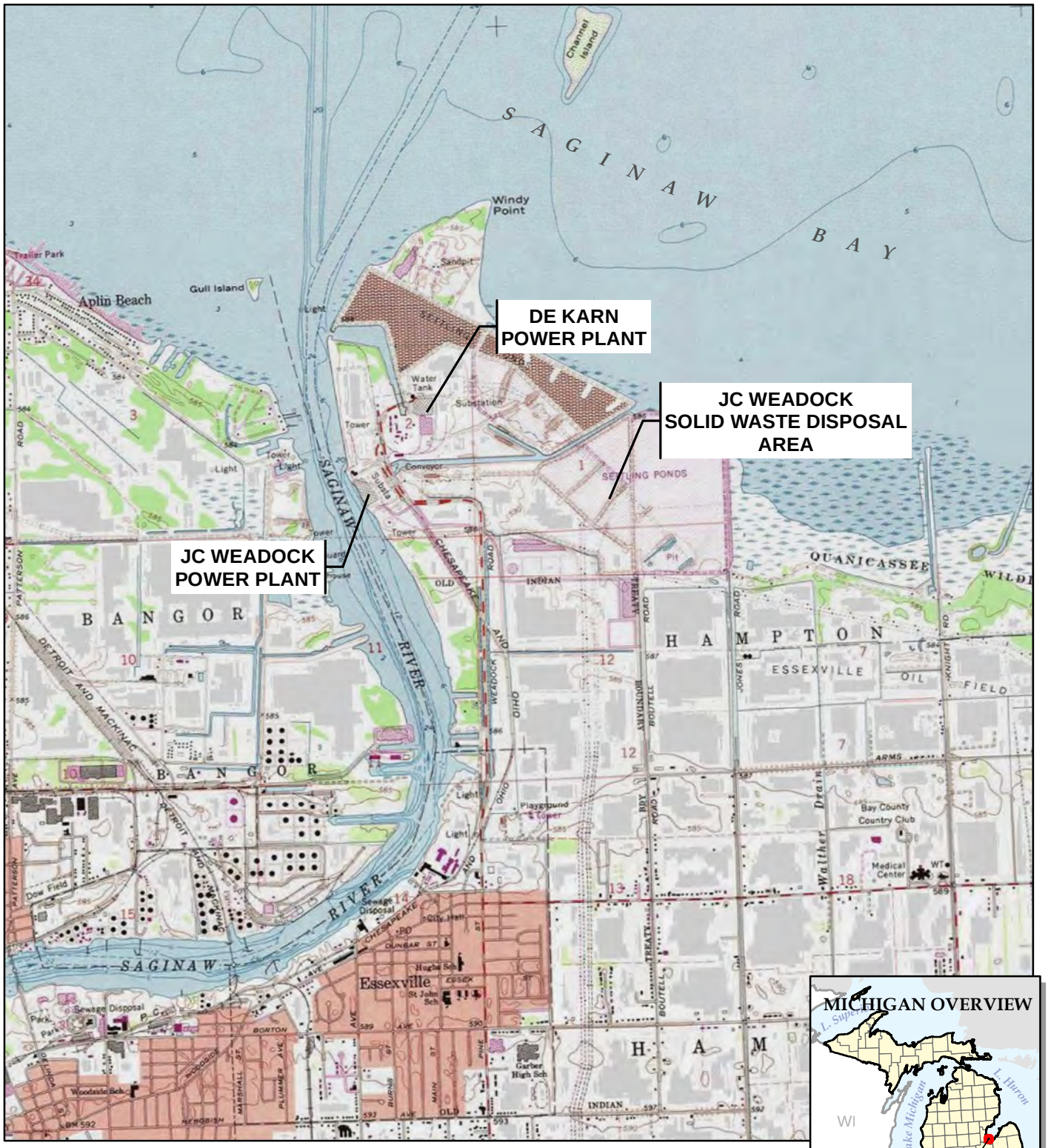
UCL - Upper Confidence Limit (α = 0.01) of the downgradient data set.

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

-- - Not Applicable; constituent concentrations for the 8 most recent semiannual sampling events were below the GWPS.

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

TRC - GIS

PROJECT:

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

TITLE:

SITE LOCATION MAP

DRAWN BY:	B. TRACY
CHECKED BY:	J. KRENZ
APPROVED BY:	D. LITZ
DATE:	JANUARY 2023
PROJ. NO.:	464096
FILE:	464096-001-001.mxd

FIGURE 1

S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\3_WEADOCK\2022_MXDs\Q3_2022_OCTOBER\464096-001-001.mxd -- Saved By: BTRACY on 11/21/2022, 09:56:51 AM

LEGEND

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

NOTES

1. BASE MAP IMAGERY FROM NEARMAP, (5/4/2022).
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).

1:7,200
1" = 600'

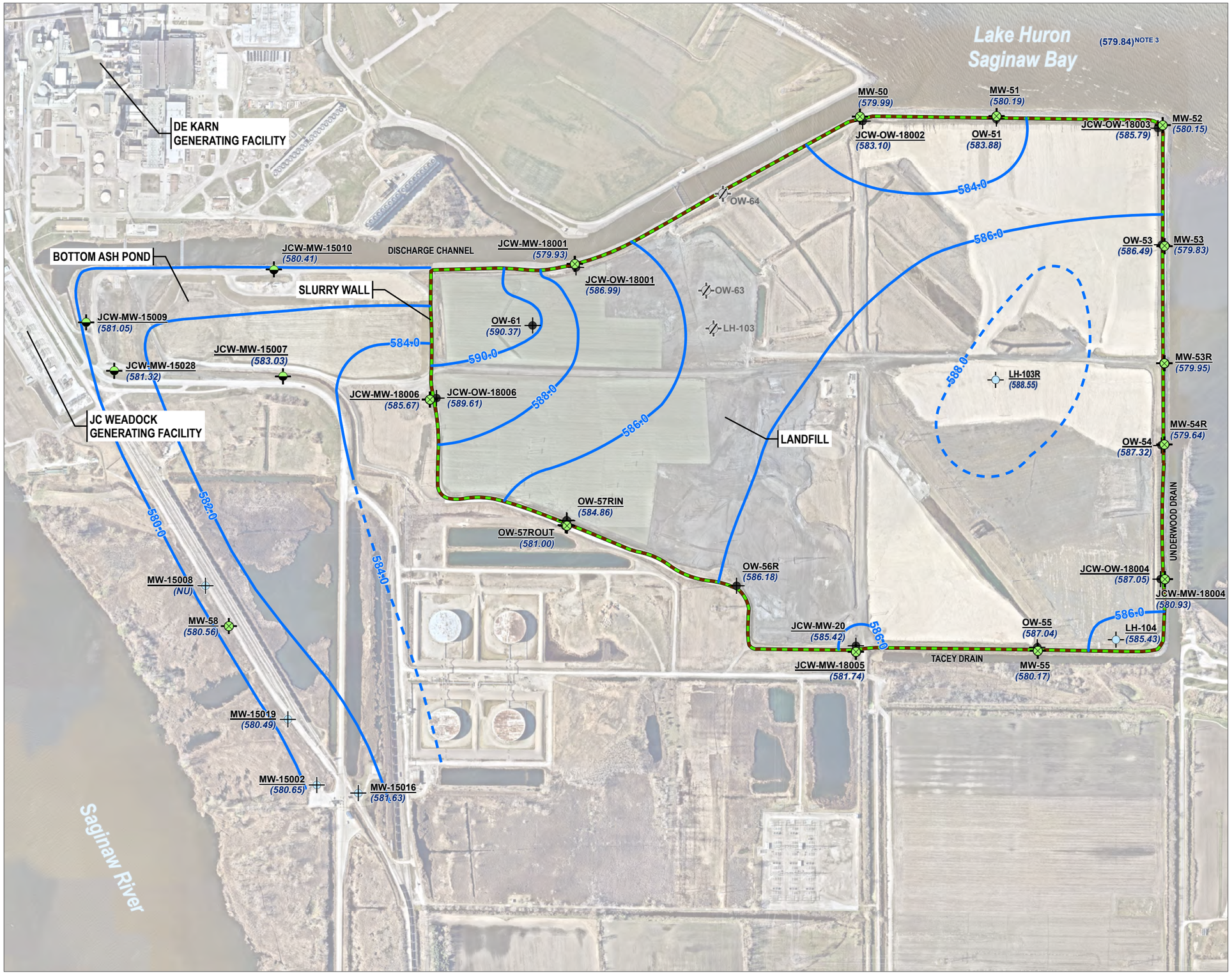
0 600 1,200 FEET

PROJECT:	CONSUMERS ENERGY COMPANY JC WEADOCK POWER PLANT ESSEXVILLE, MICHIGAN
TITLE:	SITE MAP
DRAWN BY: B. TRACY	PROJ. NO.: 464096
CHECKED BY: J. KRENZ	FIGURE 2
APPROVED BY: D. LITZ	
DATE: JANUARY 2023	

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

FILE: 464096_Weadock.aprx

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl; Map Rotation: 0
Saved By: BTRACY on 1/10/2023 - 10:34:54 PM; File Path: T:\PROJECT\Consumers_Energy\464096_Weadock\2-APRX\464096_Weadock.aprx; Layout Name: 464096-001-002



LEGEND

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

NOTES

1. BASE MAP IMAGERY FROM NEARMAP, (5/4/2022).
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.

1:7,200
1" = 600'

0 600 1,200 FEET

PROJECT: CONSUMERS ENERGY COMPANY
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE: POTENTIOMETRIC SURFACE MAP
OCTOBER 2022

DRAWN BY:	B. TRACY	PROJ. NO.:	464096
CHECKED BY:	J. KRENZ		FIGURE 3
APPROVED BY:	D. LITZ		
DATE:	JANUARY 2023		

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

FILE: 464096_Weadock.aprx

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl - Map Rotation: 0
Saved By: BTRACY on 1/10/2023 - 10:34:54 PM - File Path: T:\PROJECTS\Consumers_Energy\464096_Weadock\2-4.RPX\464096_Weadock.aprx - Layout Name: 464096-001-003

Appendix A
Data Quality Reviews

Laboratory Data Quality Review
Groundwater Monitoring Event October 2022
JC Weadock/DE Karn Background

Groundwater samples were collected by TRC for the October 2022 sampling event. Samples were analyzed for total metals, anions, and total dissolved solids by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 22-1023.

During the October 2022 sampling event, a groundwater sample was collected from each of the following wells:

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

Each sample was analyzed for the following constituents:

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

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

Data Usability Review Procedure

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

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

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

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

This data usability report addresses the following items:

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

Review Summary

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

- The reviewed Appendix III, IV, and additional Part 115 constituents 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 were not detected in this blank sample.
- MS and MSD analyses were not performed on a sample from this data set.
- The field duplicate pair samples were DUP-Background and MW-15008; all criteria were met.
- Laboratory duplicate analyses were not performed on a sample from this data set.

Laboratory Data Quality Review
Groundwater Monitoring Event October 2022
JC Weadock Bottom Ash Pond

Groundwater samples were collected by TRC for the October 2022 sampling event. Samples were analyzed for total 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) 22-1020.

During the October 2022 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

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 MS and MSD recoveries were within the acceptance criteria with the following exception. The MS recovery for calcium (127%) was greater than the QC limits (75-125%). The positive results for calcium in all groundwater samples in this data set should be estimated with a potential high bias as summarized in the attached table, Attachment A. 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-JCW-BAP and JCW-MW-15028; all criteria were met.
- Laboratory duplicate analyses were not performed on a sample from this data set.

Attachment A
Summary of Data Non-Conformances for Impoundment Groundwater Analytical Data
JC Weadock Bottom Ash Pond
Essexville Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
JCW-MW-15007	10/4/2022	Calcium	The positive result for calcium should be considered estimated with a potential high bias due to high matrix spike recovery.
JCW-MW-15009			
JCW-MW-15010			
JCW-MW-15028			

Laboratory Data Quality Review
Groundwater Monitoring Event October 2022
JC Weadock/Karn DEK Background

Groundwater samples were collected by TRC for the October 2022 sampling event. Samples were analyzed for radium by Eurofins in St. Louis, Missouri (Eurofins – St. Louis). The laboratory analytical results were reported in laboratory sample delivery group (SDG) 240-174329-1.

During the October 2022 sampling event, a groundwater sample was collected from each of the following wells:

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

Each sample was analyzed for the following constituents:

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

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

Data Usability Review Procedure

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

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

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

This data usability report addresses the following items:

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

Review Summary

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

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

QA/QC Sample Summary

- Target analytes were not detected in the method blanks with the following exception.
  - Radium-228 was detected in MB 160-586571/1-A at 1.001 +/- 0.433 pCi/L. Potential false positive exists for radium-228 results with normalized absolute differences (NADs) <1.96 and potential high bias exists for radium-228 results with NADs >1.96 but $\leq$2.48, as summarized in attachment A.
- One field blank (FB-Background) was collected. Target analytes were not detected in the field blank sample with the following exceptions.
  - Radium-228 was detected in FB-Background at 1.51 +/- 0.478 pCi/L. Associated samples are already qualified as potential false positive detections and potential high bias, as summarized in attachment A.
  - Combined radium 226+228 was detected in FB-Background at 1.55 +/- 0.483 pCi/L. Potential false positive exists for combined radium 226+228 results with NADs <1.96 and potential high bias exists for combined radium 226+228 results with NADs >1.96 but $\leq$2.48, as summarized in attachment A.
- LCS recoveries for all target analytes were within laboratory control limits.
- MS/MSD and laboratory duplicate analyses were not performed on a sample from this SDG.
- The field duplicate pair samples were DUP-Background/MW-15019. All criteria were met.
- Carrier recoveries were within 40-110%.

Attachment A
Summary of Data Non-Conformances for Landfill Groundwater Analytical Data
JC Weadock and DE Karn Background Wells– CCR Monitoring Program
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
MW-15008	10/4/2022	Radium 228	Detected result is potentially a false positive due to method blank contamination.
MW-15016	10/5/2022		
MW-15019	10/4/2022		
DUP-Background	10/4/2022		
FB-Background	10/5/2022		
MW-15002	10/5/2022	Radium 228	Detected result is potentially biased high due to method blank contamination.
MW-15008	10/4/2022	Combined Radium 226+228	Detected result is potentially a false positive due to field blank contamination.
MW-15016	10/5/2022		
MW-15019	10/4/2022		
DUP-Background	10/4/2022		
MW-15002	10/5/2022	Combined Radium 226+228	Detected result is potentially biased high due to field blank contamination.

Laboratory Data Quality Review
Groundwater Monitoring Event October 2022
JC Weadock Bottom Ash Pond

Groundwater samples were collected by TRC for the October 2022 sampling event. Samples were analyzed for radium by Eurofins in St. Louis, Missouri (Eurofins – St. Louis). The laboratory analytical results were reported in laboratory sample delivery group (SDG) 240-174332-1.

During the October 2022 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 (Ra-226, Ra-228, Combined Ra-226 & Ra-228)	EPA 903.0, EPA 904.0

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

Data Usability Review Procedure

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

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

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

This data usability report addresses the following items:

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

Review Summary

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

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

QA/QC Sample Summary

- Target analytes were not detected in the method blanks.
- One equipment blank (EB-JCW-BAP) was collected. Target analytes were not detected in the equipment blank sample.
- LCS recoveries for all target analytes were within laboratory control limits.
- MS/MSD duplicate analyses were not performed on a sample from this SDG.
- The field duplicate pair samples were DUP-JCW-BAP/JCW-MW-15028. All criteria were met.
- Laboratory duplicate analysis was performed on sample JCW-MW-15007 for radium-226 and radium-228. All criteria were met.
- Carrier recoveries were within 40-110%.

Appendix B
Statistical Evaluation of October 2022 Assessment Monitoring Sampling Event

1540 Eisenhower Pl.
Ann Arbor, MI 48108

T 734.971.7080
TRCcompanies.com

Technical Memorandum

Date:	January 20, 2023
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC Alex Eklund, TRC
Project No.:	464096.0001 Phase 002, Task 002
Subject:	Statistical Evaluation of October 2022 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 2022 was conducted on October 4, 2022. 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 2022 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 2022 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 (April 2019 through October 2022) were retained for further analysis. Arsenic at JCW-MW-15007 and JCW-MW-15010, barium at JCW-MW-15007, beryllium at JCW-MW-15009, and selenium at JCW-MW-15007 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 and the results obtained. 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 2019 through October 2022) were observed visually for potential trends. No outliers or visual trends were identified.

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 α = 0.01. The software outputs are included in Attachment 1 along with data reports showing the values used for the evaluation. The percentage of non-detect observations 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.

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

The Sanitas™ software generates an output that includes graphs of the parametric or non-parametric confidence intervals for each well along with notes about data transformations, as appropriate. The data sets for arsenic at JCW-MW-15007 and JCW-MW-15010, and barium at JCW-MW-15007 were found to be normally distributed. Non-parametric confidence intervals were used for beryllium at JCW-MW-15009 and selenium at JCW-MW-15007 due to a high percentage of non-detects in the 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 (May 2022) 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

Attachment 1 Sanitas™ Output Files

Table

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

						Sample Location:	JCW-MW-15007										
						Sample Date:	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	5/10/2022	10/4/2022
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS				Field Dup				Field Dup		Field Dup		
Appendix III																	
Boron	ug/L	NC	NA	619	NA		290	470	460	335	329	233	240	503	532	255	570
Calcium	mg/L	NC	NA	302	NA		200	130	120	217	413	280	294	265	267	275	493
Chloride	mg/L	250*	NA	2,440	NA		1,600	1,200	1,200	2,870	5,810	3,780	3,830	2,820	2,790	3,470	2,880
Fluoride	ug/L	4,000	NA	1,000	NA		< 10,000 (1)	< 5,000(1)	< 5,000(1)	< 1,000	1,160	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA		< 20	44	43	57.2	4.47	29.0	29.8	82.1	82.5	28.4	773
Total Dissolved Solids	mg/L	500*	NA	4,600	NA		3,400	2,300	2,400	5,080	11,200	7,200	7,280	5,070	4,920	7,000	6,910
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA		7.2	7.1	--	7.6	7.3	7.1	--	7.0	--	7.2	6.9
Appendix IV																	
Antimony	ug/L	6	NA	1	6		< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**		9.8	**34**	**35**	19	**61**	**31**	**31**	17	**45**	**24**	**67**
Barium	ug/L	2,000	NA	1,300	**2,000**		950	970	970	1,180	**2,400**	1,680	1,670	1,620	1,590	1,540	412
Beryllium	ug/L	4	NA	1	**4**		< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5		< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100		< 1.0	< 1.0	< 1.0	< 1	1	< 1	< 1	1	1	3	2
Cobalt	ug/L	NC	6	15	15		< 6.0	< 6.0	< 6.0	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000		< 10,000 (1)	< 5,000(1)	< 5,000(1)	< 1,000	1,160	< 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	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	180		67	70	67	103	94	70	69	144	151	81	147
Mercury	ug/L	2	NA	0.2	2		< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100		6.2	9.7	9.6	< 5	< 5	8	8	7	7	5	< 5
Radium-226	pCi/L	NC	NA	NA	NA		0.628	0.659	0.442	0.728	1.71	1.32	1.01	1.35	1.02	1.09	< 0.184
Radium-228	pCi/L	NC	NA	NA	NA		0.492	0.796	0.543	0.698	1.67	1.27	1.43	1.63	1.66	1.21	< 0.585
Radium-226/228	pCi/L	5	NA	3.32	5		1.12	1.45	0.986	1.43	3.38	2.59	2.45	2.98	2.68	2.30	< 0.585
Selenium	ug/L	50	NA	2	**50**		3.2	< 1.0	< 1.0	< 1	< 1	4	3	< 1	< 1	< 1	**68**
Thallium	ug/L	2	NA	2	2		< 2.0	< 2.0	< 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.
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
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

						Sample Location:	JCW-MW-15009						
						Sample Date:	4/9/2019	10/15/2019	5/14/2020	10/13/2020	5/12/2021	10/13/2021	5/10/2022	10/4/2022
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS									
Appendix III														
Boron	ug/L	NC	NA	619	NA		290	330	141	263	255	289	202	239
Calcium	mg/L	NC	NA	302	NA		510	520	314	560	574	615	526	566
Chloride	mg/L	250*	NA	2,440	NA		43	18	3.19	5.96	14.8	28.7	34.5	32.6
Fluoride	ug/L	4,000	NA	1,000	NA		< 2,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA		1,600	1,400	611	1,060	1,450	1,410	1,310	1,460
Total Dissolved Solids	mg/L	500*	NA	4,600	NA		2,400	2,100	1,370	1,910	2,230	2,400	2,270	2,380
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA		5.4	6.1	7.2	6.6	5.6	6.0	5.9	6.3
Appendix IV														
Antimony	ug/L	6	NA	1	6		< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**		< 1.0	< 1.0	< 1	1	< 1	3	< 1	< 1
Barium	ug/L	2,000	NA	1,300	**2,000**		14	66	58	51	23	23	17	23
Beryllium	ug/L	4	NA	1	**4**		**4.3**	< 1.0	< 1	< 1	< 1	< 1	1	< 1
Cadmium	ug/L	5	NA	0.2	5		0.24	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100		1.4	< 1.0	2	< 1	< 1	< 1	1	1
Cobalt	ug/L	NC	6	15	15		< 6.0	< 6.0	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000		< 2,000	< 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	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	180		150	94	18	53	89	112	80	92
Mercury	ug/L	2	NA	0.2	2		< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100		< 5.0	9.3	10	9	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NA	NA	NA		< 0.0879	0.175	< 0.125	< 0.352	0.333	0.388	< 0.601	0.174
Radium-228	pCi/L	NC	NA	NA	NA		< 0.411	0.548	< 0.491	< 0.495	0.720	0.922	1.11	0.753
Radium-226/228	pCi/L	5	NA	3.32	5		< 0.411	0.723	< 0.491	< 0.495	1.05	1.31	1.45	0.927
Selenium	ug/L	50	NA	2	**50**		2.0	2.0	1	< 1	< 1	< 1	< 1	1
Thallium	ug/L	2	NA	2	2		< 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
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS	Sample Location: JCW-MW-15010									
						Sample Date: 4/9/2019	10/14/2019	5/14/2020	10/13/2020	10/13/2020	5/11/2021	10/13/2021	5/10/2022	5/10/2022	10/4/2022
										Field Dup				Field Dup	
Appendix III															
Boron	ug/L	NC	NA	619	NA	1,400	1,400	2,070	2,000	2,030	1,080	1,190	1,200	1,200	1,080
Calcium	mg/L	NC	NA	302	NA	120	110	286	218	204	128	142	165	165	170
Chloride	mg/L	250*	NA	2,440	NA	140	140	90.4	105	106	67.8	50.7	41.7	41.9	30.5
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	36	30	553	254	255	74.7	77.0	167	167	207
Total Dissolved Solids	mg/L	500*	NA	4,600	NA	670	600	1,500	982	997	607	667	838	806	836
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA	7.6	7.3	7.7	7.1	--	7.2	7.1	7.1	--	7.1
Appendix IV															
Antimony	ug/L	6	NA	1	6	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**	16	13	4	4	4	6	**22**	5	5	13
Barium	ug/L	2,000	NA	1,300	**2,000**	190	180	400	220	221	148	221	219	220	276
Beryllium	ug/L	4	NA	1	**4**	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	1	< 1
Cobalt	ug/L	NC	6	15	15	< 6.0	< 6.0	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	180	73	84	116	96	97	70	92	74	73	71
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100	< 5.0	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NA	NA	NA	0.215	< 0.134	0.409	< 0.442	< 0.445	< 0.410	0.389	< 0.488	< 0.415	0.318
Radium-228	pCi/L	NC	NA	NA	NA	0.424	0.412	< 0.467	< 0.493	< 0.566	0.700	0.858	0.932	1.37	0.652
Radium-226/228	pCi/L	5	NA	3.32	5	0.639	0.536	0.781	< 0.493	< 0.566	0.898	1.25	0.952	1.50	0.970
Selenium	ug/L	50	NA	2	**50**	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2.0	< 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.
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
JC Weadock Bottom Ash Pond – RCRA CCR Monitoring Program
Essexville, Michigan

						Sample Location:	JCW-MW-15028								
						Sample Date:	4/9/2019	4/9/2019	10/14/2019	5/14/2020	5/14/2020	10/13/2020	5/12/2021	10/12/2021	5/10/2022	10/4/2022
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS											
Appendix III								Field Dup			Field Dup					
Boron	ug/L	NC	NA	619	NA		530	560	550	570	562	644	563	620	633	547
Calcium	mg/L	NC	NA	302	NA		170	180	170	205	204	221	235	205	199	192
Chloride	mg/L	250*	NA	2,440	NA		660	650	640	823	806	811	921	974	1,070	1,350
Fluoride	ug/L	4,000	NA	1,000	NA		< 2,000	< 2,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	407	NA		120	120	120	128	122	99.8	102	97	93.7	106
Total Dissolved Solids	mg/L	500*	NA	4,600	NA		1,800	1,800	1,500	2,210	2,240	2,070	2,130	2,360	2,500	2,460
pH, Field	SU	6.5 - 8.5*	NA	6.5-7.3	NA		8.0	--	7.8	8.1	--	7.9	7.7	7.8	7.7	7.7
Appendix IV																
Antimony	ug/L	6	NA	1	6		< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	21	**21**		1.1	1.1	< 1.0	< 1	1	< 1	3	11	< 1	9
Barium	ug/L	2,000	NA	1,300	**2,000**		250	240	230	324	331	332	342	363	351	385
Beryllium	ug/L	4	NA	1	**4**		< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5		< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	3	100		< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	2	1
Cobalt	ug/L	NC	6	15	15		< 6.0	< 6.0	< 6.0	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000		< 2,000	< 2,000	< 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	< 1	2	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	180	180		53	51	48	60	60	53	51	66	54	52
Mercury	ug/L	2	NA	0.2	2		< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	6	100		< 5.0	< 5.0	< 5.0	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NA	NA	NA		0.621	0.384	0.576	0.515	< 0.136	0.697	0.621	0.819	0.49	0.646
Radium-228	pCi/L	NC	NA	NA	NA		0.729	0.658	0.585	0.733	< 0.399	< 0.468	0.997	1.19	0.944	1.23
Radium-226/228	pCi/L	5	NA	3.32	5		1.35	1.04	1.16	1.25	< 0.399	1.15	1.62	2.00	1.43	1.87
Selenium	ug/L	50	NA	2	**50**		< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2		< 2.0	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2

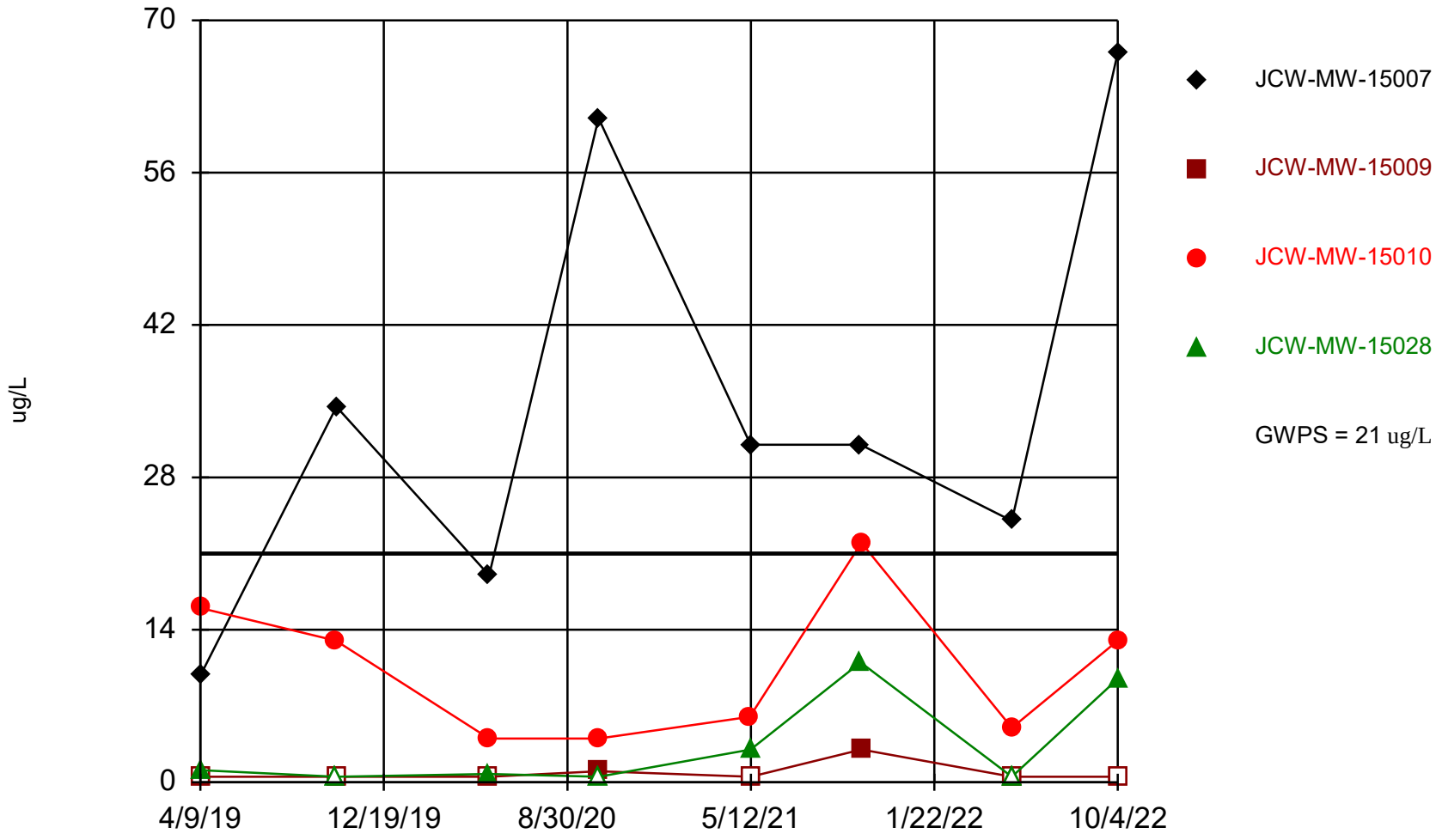
Notes:

ug/L - micrograms per liter.
mg/L - milligrams per liter.
SU - standard units; pH is a field parameter.
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. UG
Hollow symbols indicate censored values.

Arsenic Comparison to GWPS

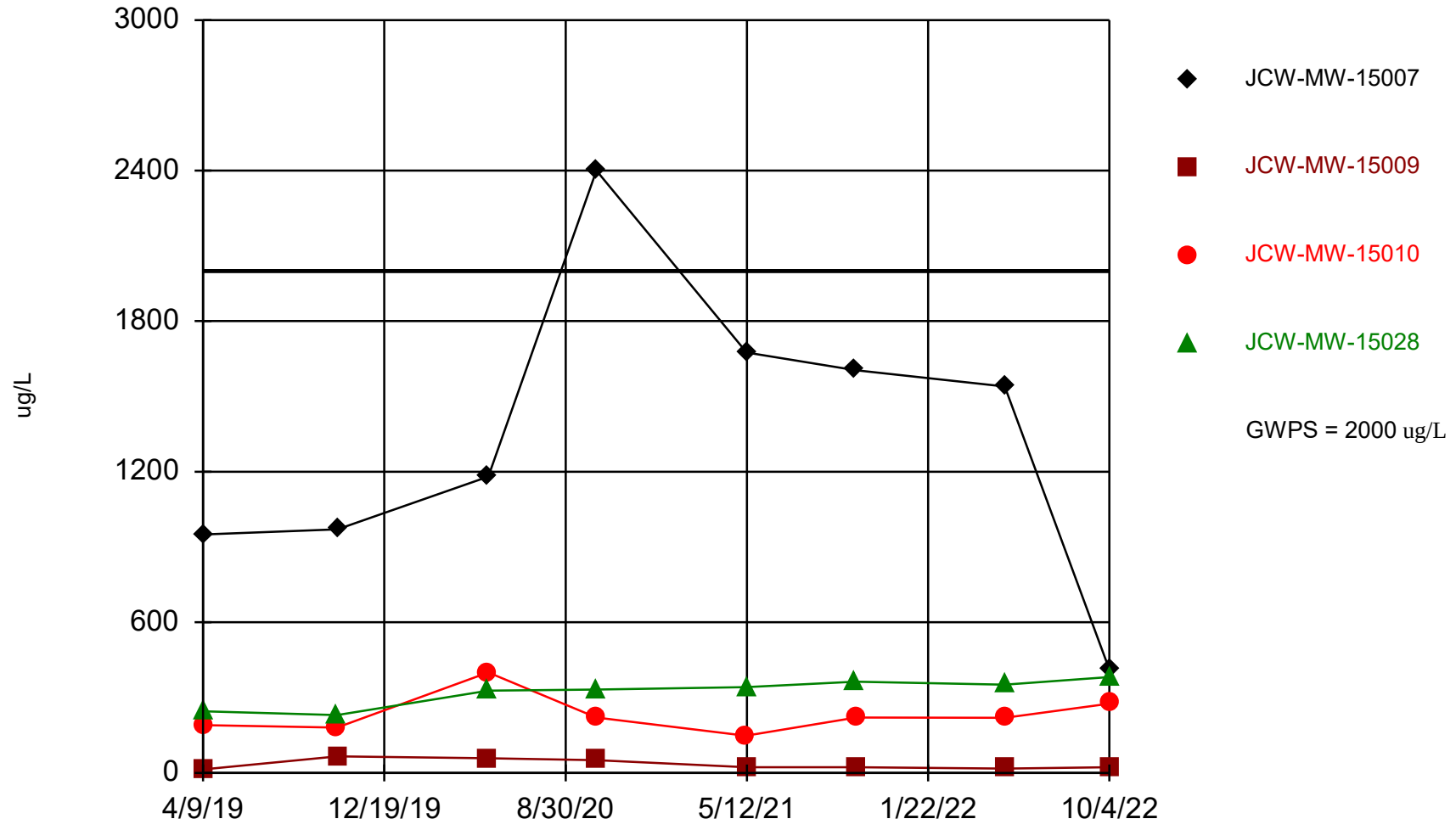


Time Series Analysis Run 11/22/2022 10:46 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Barium Comparison to GWPS

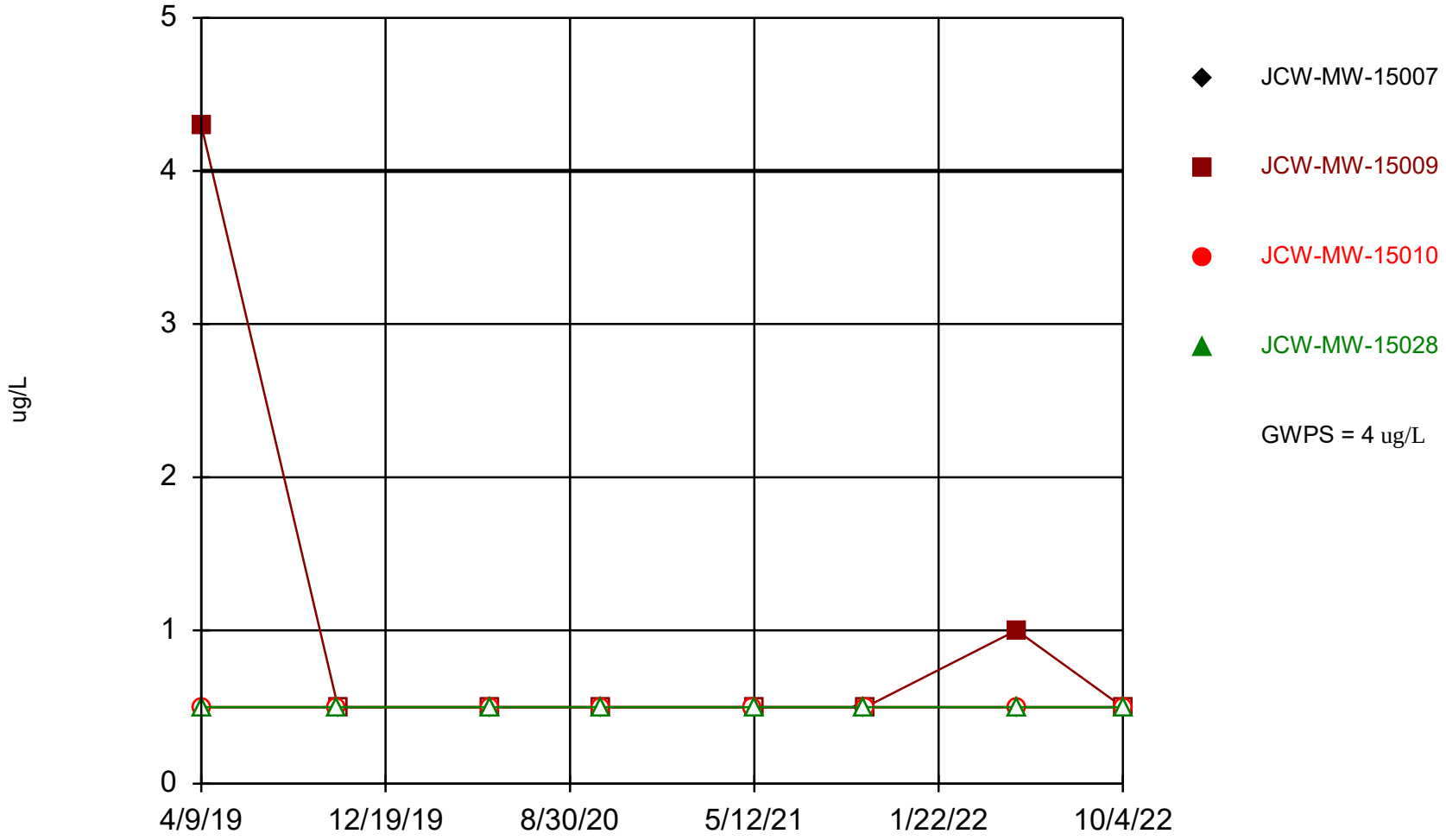


Time Series Analysis Run 11/22/2022 10:46 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

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

Beryllium Comparison to GWPS

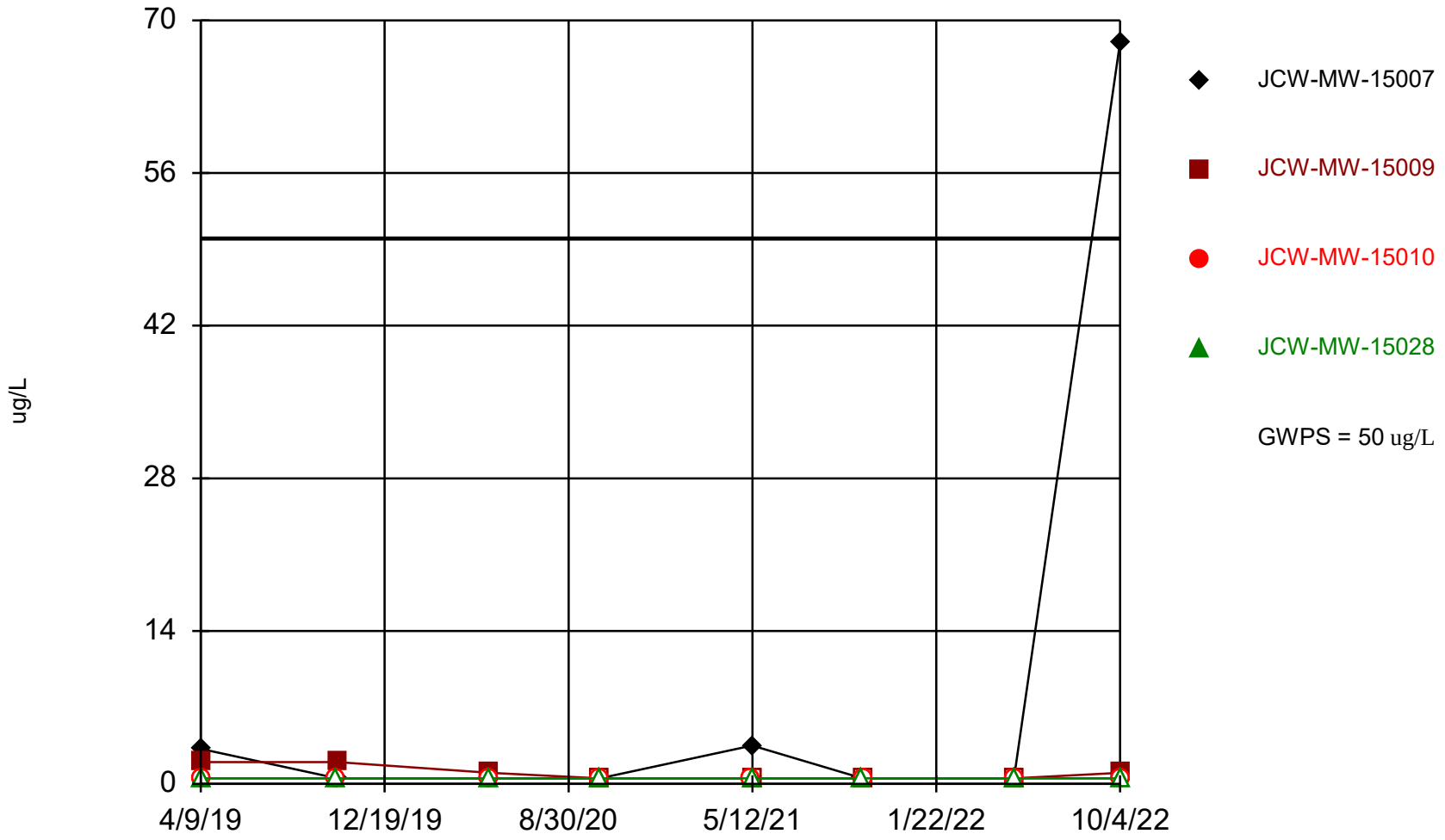


Time Series Analysis Run 11/22/2022 10:47 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

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

Selenium Comparison to GWPS



Time Series Analysis Run 11/22/2022 10:48 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Arsenic, Total Analysis Run 11/22/2022 10:45 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

For observations made between 4/9/2019 and 10/4/2022, a summary of the selected data set:

Observations = 32
ND/Trace = 9
Wells = 4
Minimum Value = 0.5
Maximum Value = 67
Mean Value = 12.32
Median Value = 4.5
Standard Deviation = 16.95
Coefficient of Variation = 1.376
Skewness = 1.905

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-15007	8	0	9.8	67	34.66	31	19.8	0.5711	0.6213
JCW-MW-15009	8	6	0.5	3	0.875	0.5	0.8763	1.001	2.107
JCW-MW-15010	8	0	4	22	10.38	9.5	6.653	0.6413	0.533
JCW-MW-15028	8	3	0.5	11	3.356	0.925	4.353	1.297	1.073

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Barium, Total Analysis Run 11/22/2022 10:45 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

For observations made between 4/9/2019 and 10/4/2022, a summary of the selected data set:

Observations = 32
ND/Trace = 0
Wells = 4
Minimum Value = 14
Maximum Value = 2400
Mean Value = 482.3
Median Value = 260.5
Standard Deviation = 590.4
Coefficient of Variation = 1.224
Skewness = 1.749

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-15007	8	0	412	2400	1342	1360	600.2	0.4474	0.2335
JCW-MW-15009	8	0	14	66	34.38	23	20.49	0.5962	0.5552
JCW-MW-15010	8	0	148	400	231.9	220	77.55	0.3344	1.32
JCW-MW-15028	8	0	230	381.5	321.5	337	54.75	0.1703	-0.8287

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Beryllium, Total Analysis Run 11/22/2022 10:45 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

For observations made between 4/9/2019 and 10/4/2022, a summary of the selected data set:

Observations = 32
ND/Trace = 30
Wells = 4
Minimum Value = 0.5
Maximum Value = 4.3
Mean Value = 0.6344
Median Value = 0.5
Standard Deviation = 0.6747
Coefficient of Variation = 1.064
Skewness = 5.253

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	6	0.5	4.3	1.038	0.5	1.33	1.282	2.195
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

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Selenium, Total Analysis Run 11/22/2022 10:45 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

For observations made between 4/9/2019 and 10/4/2022, a summary of the selected data set:

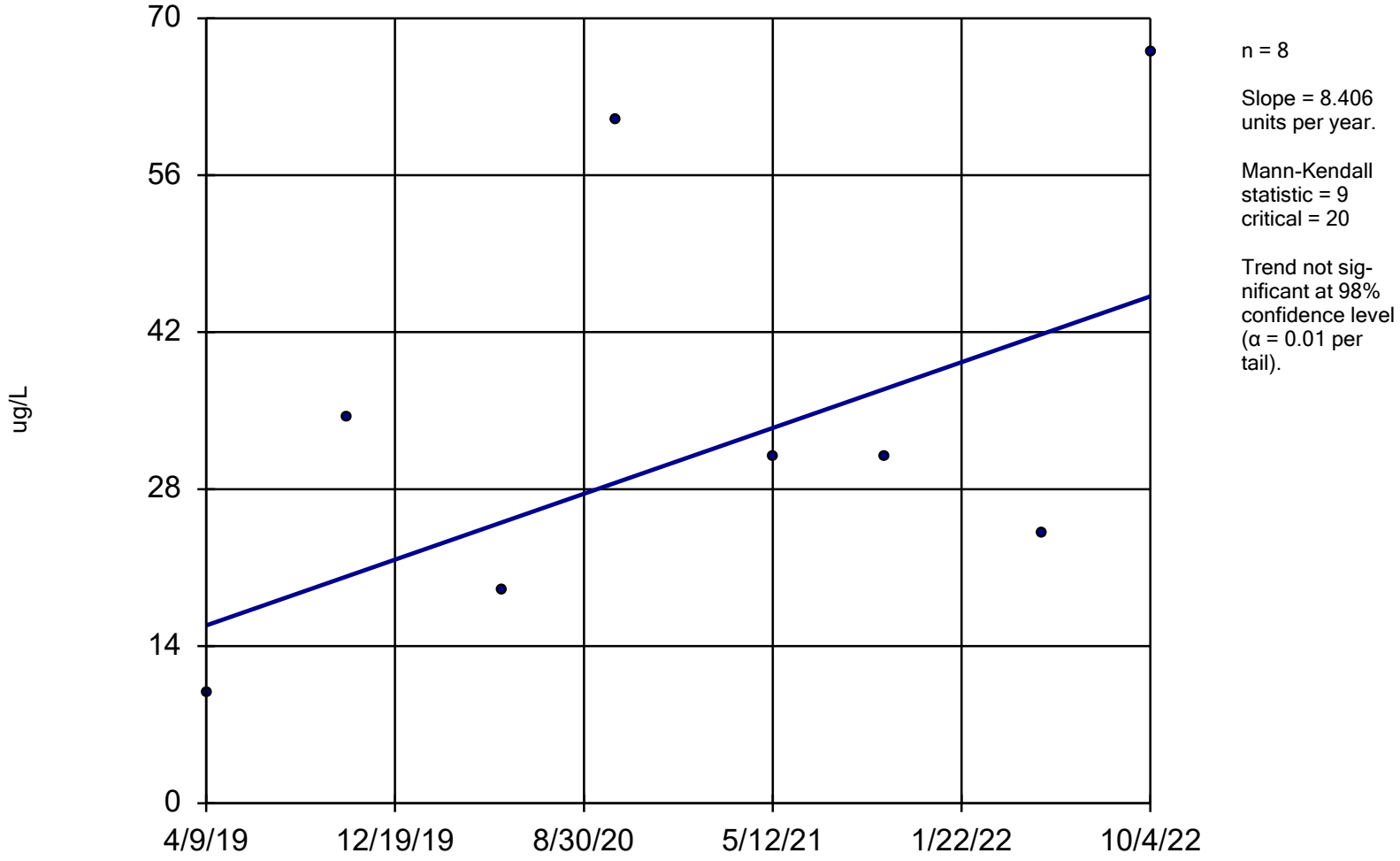
Observations = 32
ND/Trace = 25
Wells = 4
Minimum Value = 0.5
Maximum Value = 68
Mean Value = 2.913
Median Value = 0.5
Standard Deviation = 11.9
Coefficient of Variation = 4.086
Skewness = 5.353

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-15007	8	5	0.5	68	9.65	0.5	23.61	2.447	2.254
JCW-MW-15009	8	4	0.5	2	1	0.75	0.6547	0.6547	0.8165
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

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Arsenic, Total

JCW-MW-15007



n = 8

Slope = 8.406 units per year.

Mann-Kendall statistic = 9
critical = 20

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

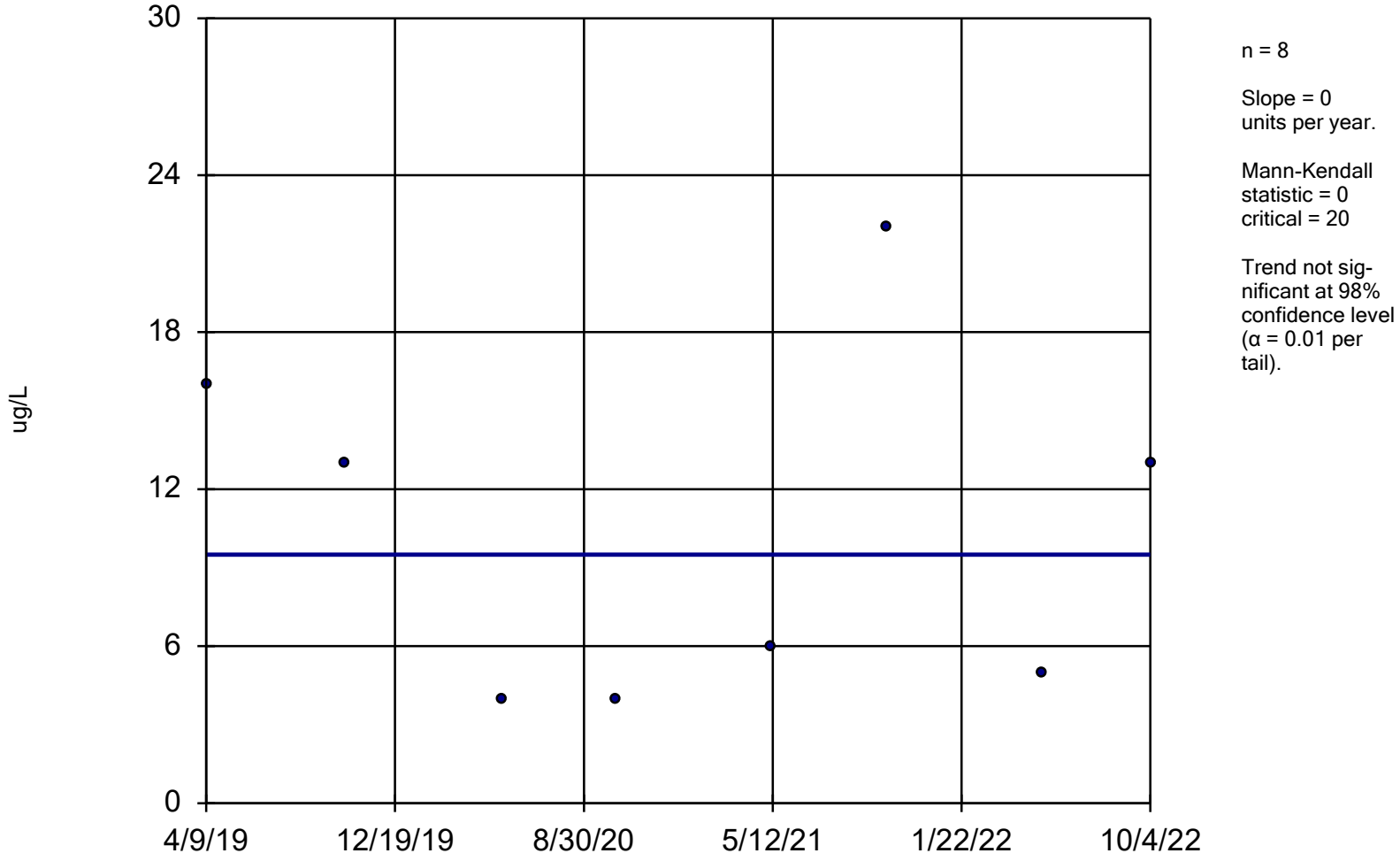
Sen's Slope Estimator Analysis Run 11/22/2022 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Arsenic, Total

JCW-MW-15010



n = 8

Slope = 0
units per year.

Mann-Kendall
statistic = 0
critical = 20

Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).

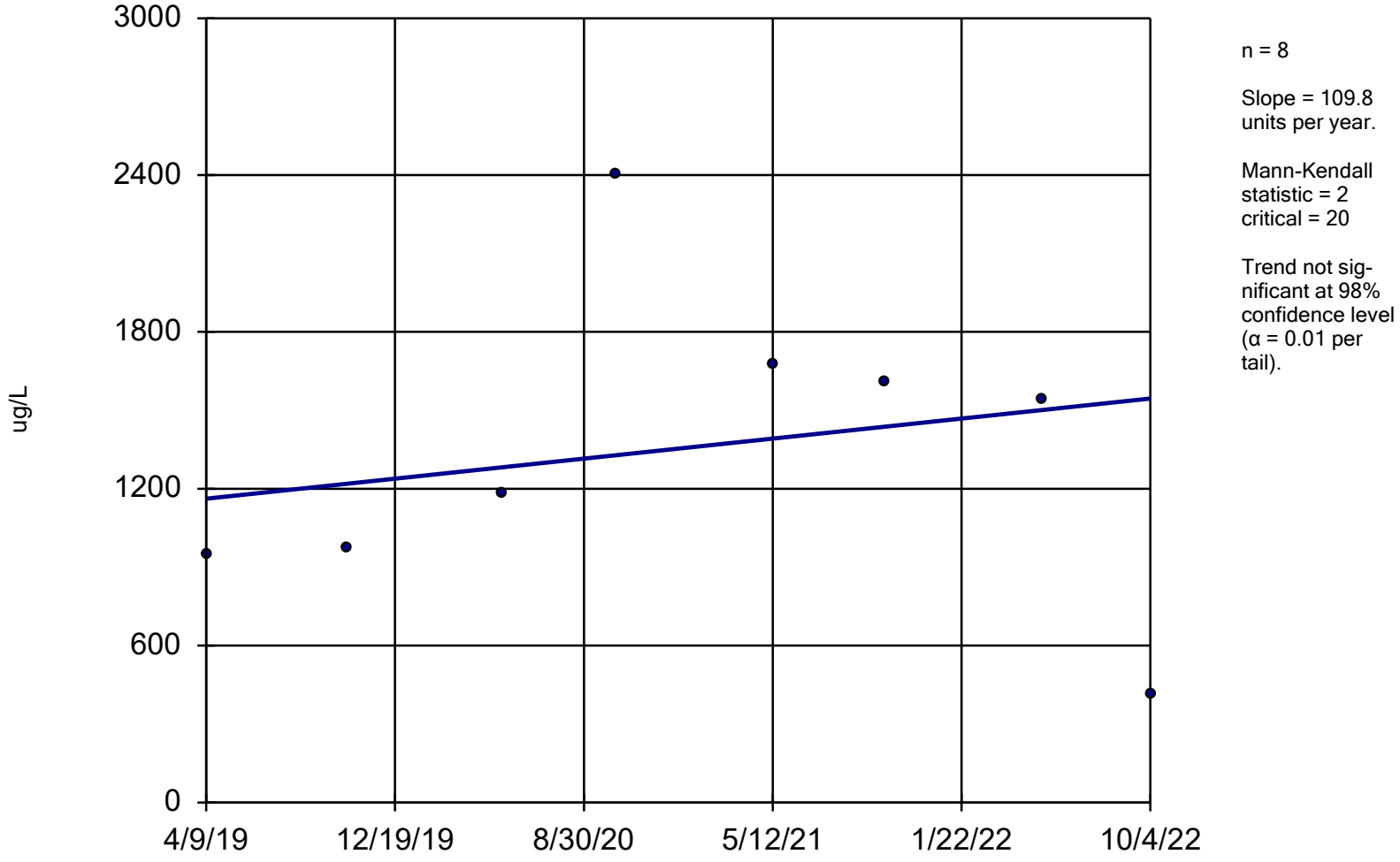
Sen's Slope Estimator Analysis Run 11/22/2022 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Barium, Total

JCW-MW-15007



n = 8

Slope = 109.8 units per year.

Mann-Kendall statistic = 2
critical = 20

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

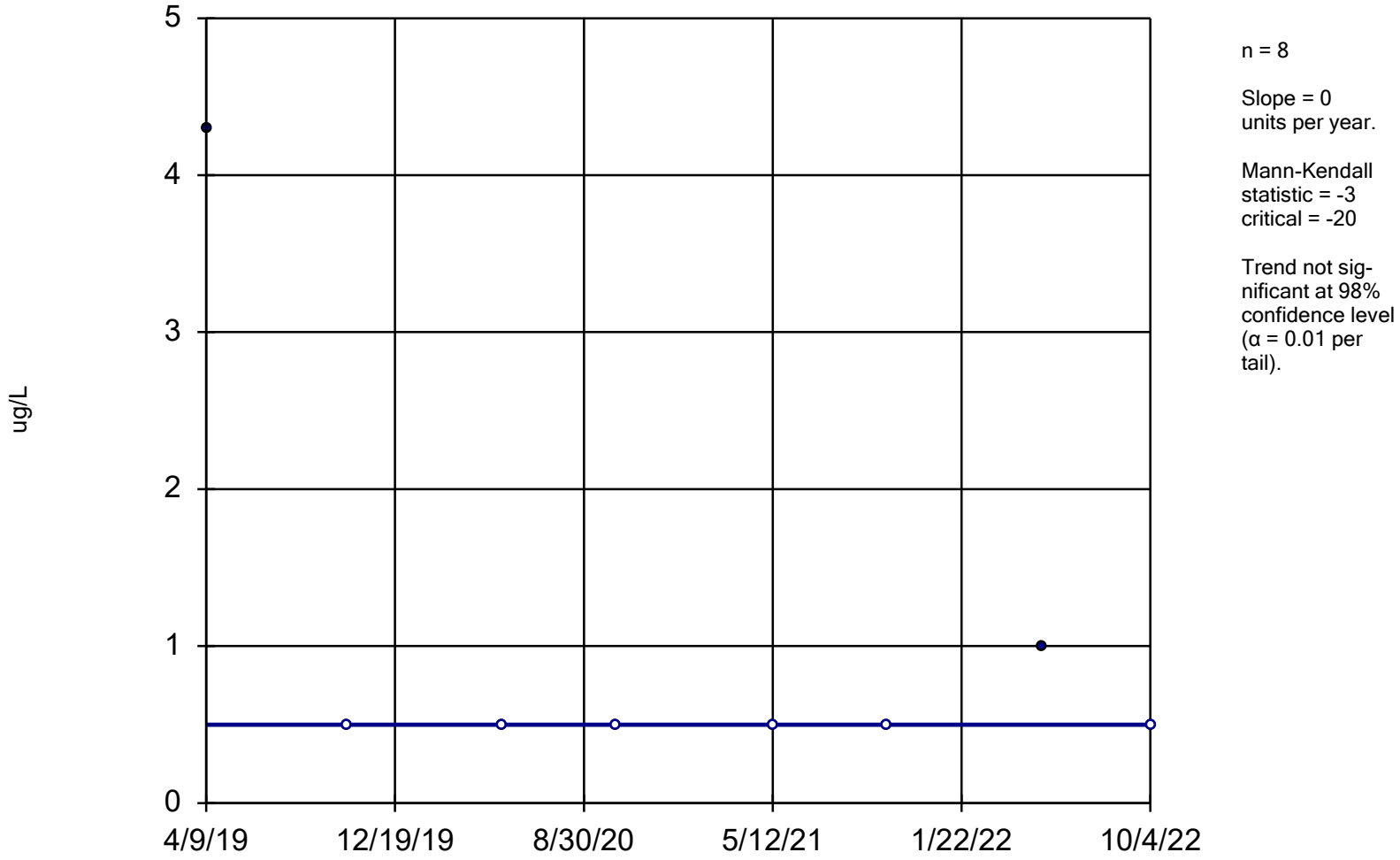
Sen's Slope Estimator Analysis Run 11/22/2022 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

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

Beryllium, Total

JCW-MW-15009



n = 8

Slope = 0
units per year.

Mann-Kendall
statistic = -3
critical = -20

Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).

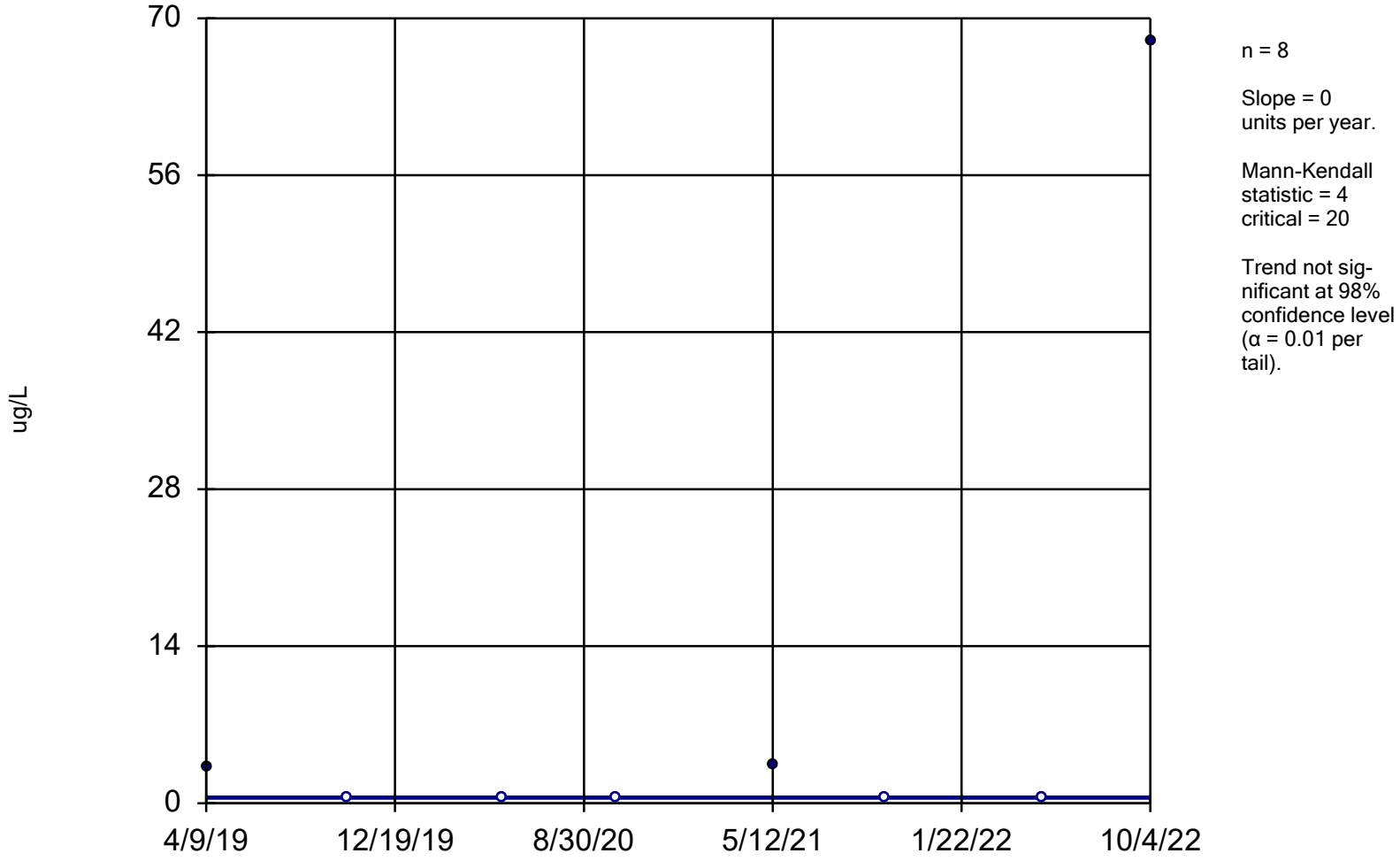
Sen's Slope Estimator Analysis Run 11/22/2022 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

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

Selenium, Total

JCW-MW-15007



n = 8

Slope = 0
units per year.

Mann-Kendall
statistic = 4
critical = 20

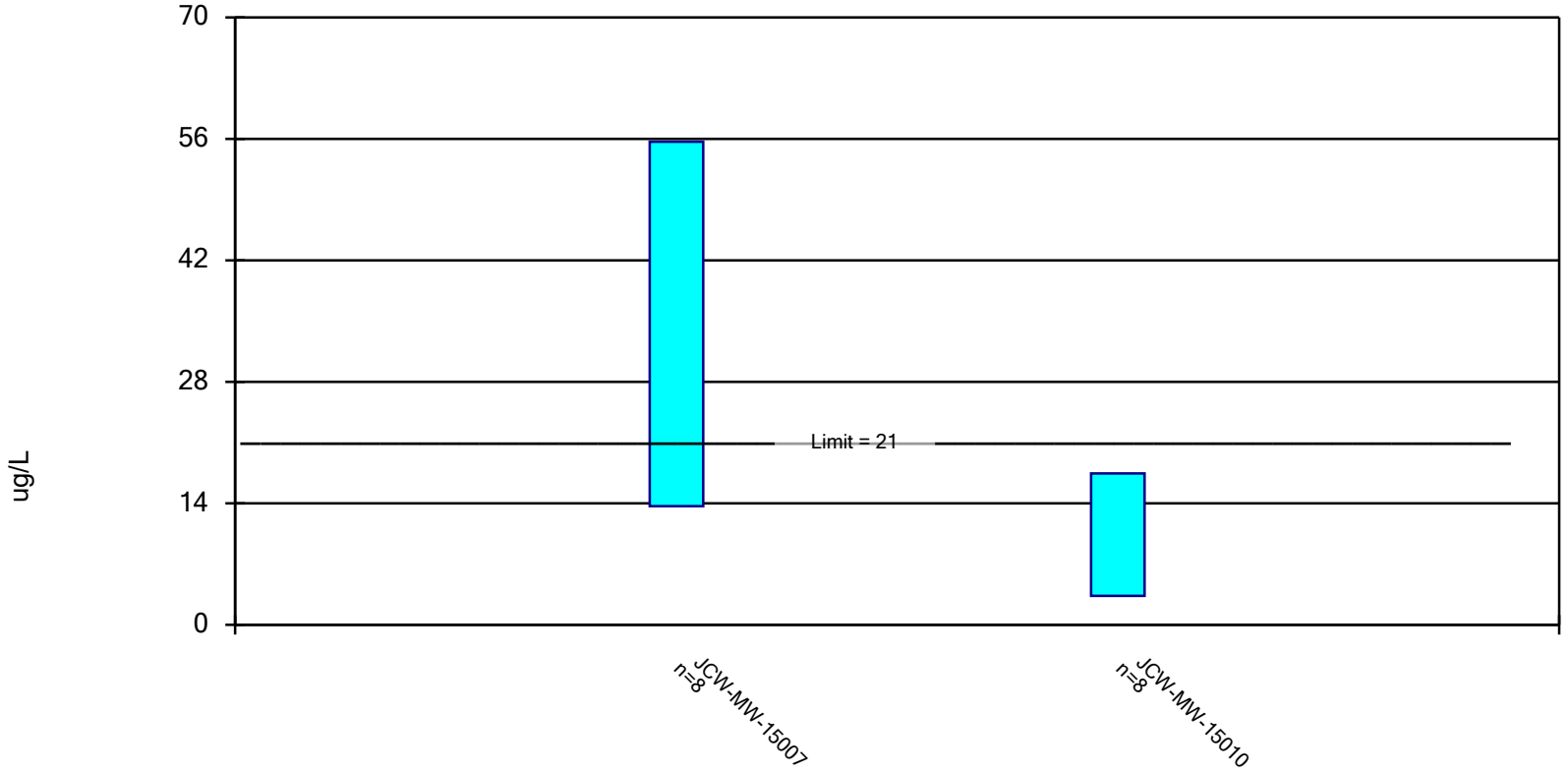
Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).

Sen's Slope Estimator Analysis Run 11/22/2022 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

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 11/22/2022 10:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Confidence Interval

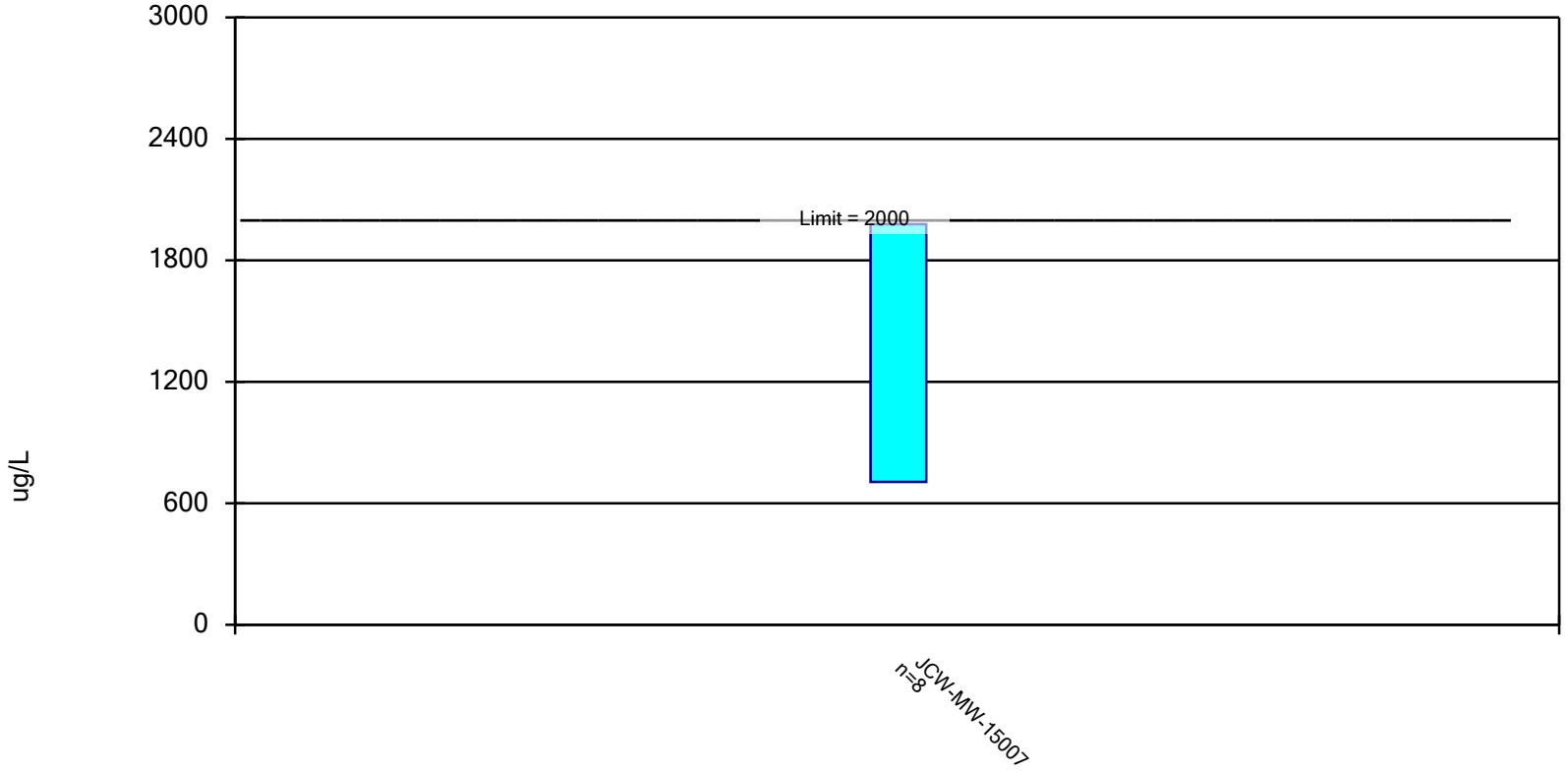
Constituent: Arsenic, Total (ug/L) Analysis Run 11/22/2022 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

	JCW-MW-15007	JCW-MW-15010
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
5/10/2022	24	5 (D)
10/4/2022	67	13
Mean	34.66	10.38
Std. Dev.	19.8	6.653
Upper Lim.	55.65	17.43
Lower Lim.	13.68	3.323

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 11/22/2022 10:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Confidence Interval

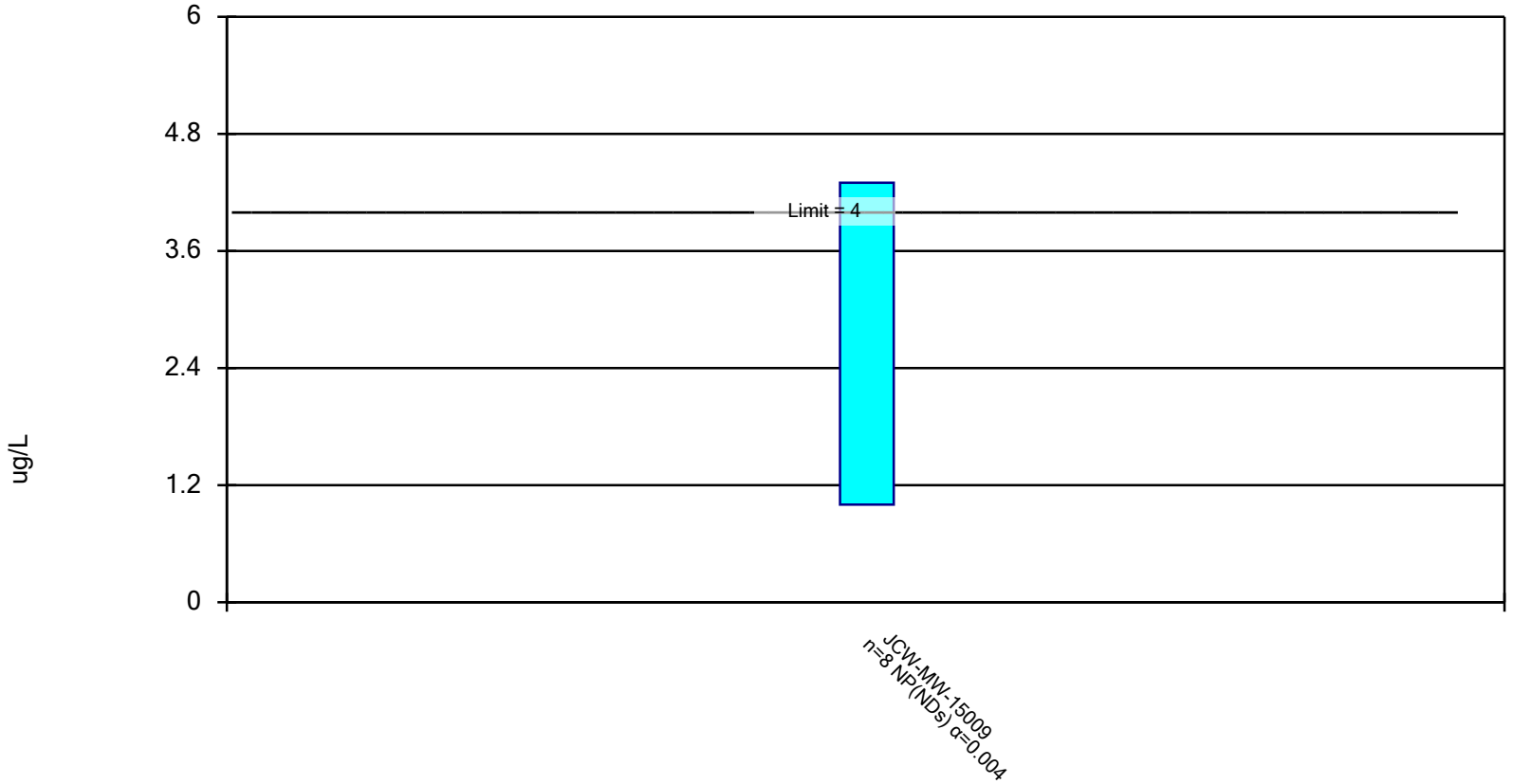
Constituent: Barium, Total (ug/L) Analysis Run 11/22/2022 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

	JCW-MW-15007
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)
5/10/2022	1540
10/4/2022	412
Mean	1342
Std. Dev.	600.2
Upper Lim.	1978
Lower Lim.	705.3

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Beryllium, Total Analysis Run 1/19/2023 12:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Confidence Interval

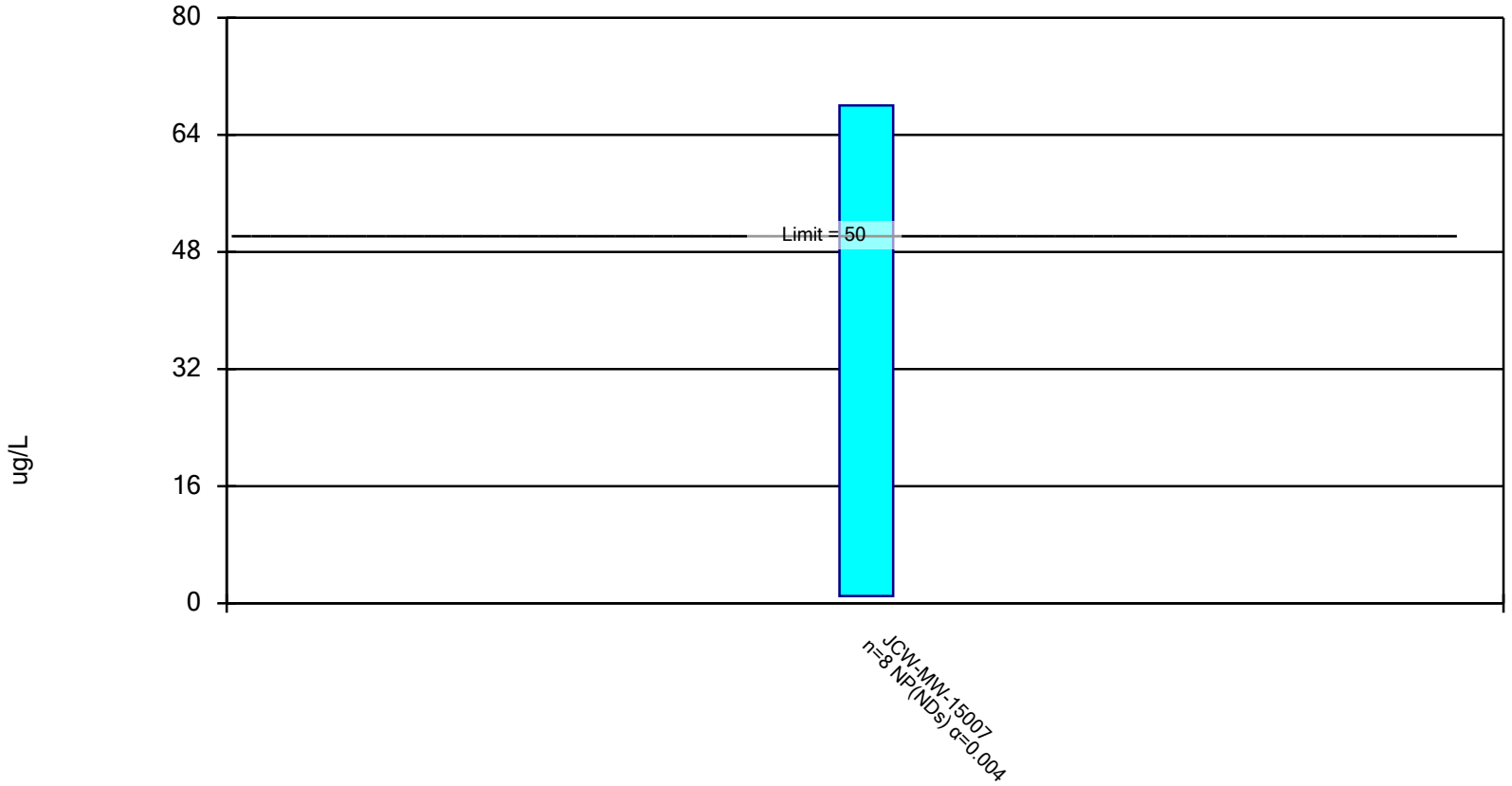
Constituent: Beryllium, Total (ug/L) Analysis Run 1/19/2023 12:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

	JCW-MW-15009
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
5/10/2022	1
10/4/2022	<1
Mean	1.413
Std. Dev.	1.167
Upper Lim.	4.3
Lower Lim.	1

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Selenium, Total Analysis Run 1/19/2023 12:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Confidence Interval

Constituent: Selenium, Total (ug/L) Analysis Run 1/19/2023 12:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

	JCW-MW-15007
4/9/2019	3.2
10/15/2019	<1 (D)
5/14/2020	<1
10/13/2020	<1
5/12/2021	3.5 (D)
10/12/2021	<1 (D)
5/10/2022	<1
10/4/2022	68
Mean	9.963
Std. Dev.	23.47
Upper Lim.	68
Lower Lim.	1

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: October 26, 2022

Subject: RCRA GROUNDWATER MONITORING – JCW BOTTOM ASH POND WELLS – 2022 Q4

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

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

Chemistry Project: 22-1020

TRC Environmental, Inc. conducted groundwater monitoring at the DEKarn Bottom Ash Pond Wells area on 10/04/2022 for the 4th Quarter requirement, as specified in the Sampling and Analysis Plan for the site. The samples were received for analysis by the Chemistry department of Laboratory Services on 10/06/2022.

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. As appropriate, 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

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q4-2022 JCW Bottom Ash Pond
Date Received: 10/6/2022
Chemistry Project: 22-1020

Sample #	Field Sample ID	Matrix	Sample Date	Site
22-1020-01	JCW-MW-15007	Groundwater	10/04/2022 04:07 PM	JCW Bottom Ash Pond
22-1020-02	JCW-MW-15009	Groundwater	10/04/2022 02:18 PM	JCW Bottom Ash Pond
22-1020-03	JCW-MW-15010	Groundwater	10/04/2022 01:20 PM	JCW Bottom Ash Pond
22-1020-04	JCW-MW-15028	Groundwater	10/04/2022 03:05 PM	JCW Bottom Ash Pond
22-1020-05	DUP-JCW-BAP	Groundwater	10/04/2022 12:00 AM	JCW Bottom Ash Pond
22-1020-06	JCW-MW-15009 MS	Groundwater	10/04/2022 02:18 PM	JCW Bottom Ash Pond
22-1020-07	JCW-MW-15009 MSD	Groundwater	10/04/2022 02:18 PM	JCW Bottom Ash Pond
22-1020-08	EB-JCW-BAP	Water	10/04/2022 04:23 PM	JCW Bottom Ash Pond
22-1020-09	FB-JCW-BAP	Water	10/04/2022 04:21 PM	JCW Bottom Ash Pond

Analytical Report

Report Date: 10/26/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **JCW-MW-15007**
Lab Sample ID: 22-1020-01
Matrix: Groundwater

Laboratory Project: **22-1020**
Collect Date: 10/04/2022
Collect Time: 04:07 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1020-01-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/10/2022	AB22-1010-07

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

Aliquot #: 22-1020-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Arsenic	67		ug/L	1.0	10/13/2022	AB22-1013-08
Barium	412		ug/L	5.0	10/13/2022	AB22-1013-08
Beryllium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Boron	570		ug/L	20.0	10/13/2022	AB22-1013-08
Cadmium	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Calcium	493000		ug/L	1000.0	10/16/2022	AB22-1013-08
Chromium	2		ug/L	1.0	10/13/2022	AB22-1013-08
Cobalt	ND		ug/L	6.0	10/13/2022	AB22-1013-08
Copper	2		ug/L	1.0	10/13/2022	AB22-1013-08
Iron	11800		ug/L	20.0	10/13/2022	AB22-1013-08
Lead	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Lithium	147		ug/L	10.0	10/13/2022	AB22-1013-08
Magnesium	58900		ug/L	1000.0	10/16/2022	AB22-1013-08
Molybdenum	ND		ug/L	5.0	10/13/2022	AB22-1013-08
Nickel	25		ug/L	2.0	10/13/2022	AB22-1013-08
Potassium	17500		ug/L	100.0	10/16/2022	AB22-1013-08
Selenium	68		ug/L	1.0	10/13/2022	AB22-1013-08
Silver	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Sodium	1890000		ug/L	1000.0	10/16/2022	AB22-1013-08
Thallium	ND		ug/L	2.0	10/13/2022	AB22-1013-08
Vanadium	22		ug/L	2.0	10/13/2022	AB22-1013-08
Zinc	ND		ug/L	10.0	10/13/2022	AB22-1013-08

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

Aliquot #: 22-1020-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	2880000		ug/L	1000.0	10/14/2022	AB22-1011-01
Fluoride	ND		ug/L	1000.0	10/12/2022	AB22-1011-01
Sulfate	773000		ug/L	1000.0	10/14/2022	AB22-1011-01

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1020-01-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	6910		mg/L	10.0	10/11/2022	AB22-1010-06

Analytical Report

Report Date: 10/26/22

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**22-1020**
Field Sample ID:	**JCW-MW-15007**	Collect Date:	10/04/2022
Lab Sample ID:	22-1020-01	Collect Time:	04:07 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1020-01-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	624000		ug/L	10000.0	10/17/2022	AB22-1017-04
Alkalinity Bicarbonate	624000		ug/L	10000.0	10/17/2022	AB22-1017-04
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-04

Analytical Report

Report Date: 10/26/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **JCW-MW-15009**
Lab Sample ID: 22-1020-02
Matrix: Groundwater

Laboratory Project: **22-1020**
Collect Date: 10/04/2022
Collect Time: 02:18 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1020-02-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/10/2022	AB22-1010-07

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

Aliquot #: 22-1020-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Arsenic	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Barium	23		ug/L	5.0	10/13/2022	AB22-1013-08
Beryllium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Boron	239		ug/L	20.0	10/13/2022	AB22-1013-08
Cadmium	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Calcium	566000		ug/L	1000.0	10/16/2022	AB22-1013-08
Chromium	1		ug/L	1.0	10/13/2022	AB22-1013-08
Cobalt	ND		ug/L	6.0	10/13/2022	AB22-1013-08
Copper	2		ug/L	1.0	10/13/2022	AB22-1013-08
Iron	17000		ug/L	20.0	10/16/2022	AB22-1013-08
Lead	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Lithium	92		ug/L	10.0	10/13/2022	AB22-1013-08
Magnesium	27200		ug/L	1000.0	10/16/2022	AB22-1013-08
Molybdenum	ND		ug/L	5.0	10/13/2022	AB22-1013-08
Nickel	8		ug/L	2.0	10/13/2022	AB22-1013-08
Potassium	11200		ug/L	100.0	10/16/2022	AB22-1013-08
Selenium	1		ug/L	1.0	10/13/2022	AB22-1013-08
Silver	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Sodium	18000		ug/L	1000.0	10/16/2022	AB22-1013-08
Thallium	ND		ug/L	2.0	10/13/2022	AB22-1013-08
Vanadium	ND		ug/L	2.0	10/13/2022	AB22-1013-08
Zinc	ND		ug/L	10.0	10/13/2022	AB22-1013-08

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

Aliquot #: 22-1020-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	32600		ug/L	1000.0	10/12/2022	AB22-1011-01
Fluoride	ND		ug/L	1000.0	10/12/2022	AB22-1011-01
Sulfate	1460000		ug/L	1000.0	10/15/2022	AB22-1011-01

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1020-02-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	2380		mg/L	10.0	10/10/2022	AB22-1010-06

Analytical Report

Report Date: 10/26/22

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**22-1020**
Field Sample ID:	**JCW-MW-15009**	Collect Date:	10/04/2022
Lab Sample ID:	22-1020-02	Collect Time:	02:18 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1020-02-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	236000		ug/L	10000.0	10/17/2022	AB22-1017-04
Alkalinity Bicarbonate	236000		ug/L	10000.0	10/17/2022	AB22-1017-04
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-04

Analytical Report

Report Date: 10/26/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **JCW-MW-15010**
Lab Sample ID: 22-1020-03
Matrix: Groundwater

Laboratory Project: **22-1020**
Collect Date: 10/04/2022
Collect Time: 01:20 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1020-03-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/10/2022	AB22-1010-07

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

Aliquot #: 22-1020-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Arsenic	13		ug/L	1.0	10/13/2022	AB22-1013-08
Barium	276		ug/L	5.0	10/13/2022	AB22-1013-08
Beryllium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Boron	1080		ug/L	20.0	10/13/2022	AB22-1013-08
Cadmium	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Calcium	170000		ug/L	1000.0	10/16/2022	AB22-1013-08
Chromium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Cobalt	ND		ug/L	6.0	10/13/2022	AB22-1013-08
Copper	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Iron	73		ug/L	20.0	10/13/2022	AB22-1013-08
Lead	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Lithium	71		ug/L	10.0	10/13/2022	AB22-1013-08
Magnesium	25100		ug/L	1000.0	10/16/2022	AB22-1013-08
Molybdenum	ND		ug/L	5.0	10/13/2022	AB22-1013-08
Nickel	5		ug/L	2.0	10/13/2022	AB22-1013-08
Potassium	9940		ug/L	100.0	10/16/2022	AB22-1013-08
Selenium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Silver	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Sodium	43100		ug/L	1000.0	10/16/2022	AB22-1013-08
Thallium	ND		ug/L	2.0	10/13/2022	AB22-1013-08
Vanadium	ND		ug/L	2.0	10/13/2022	AB22-1013-08
Zinc	ND		ug/L	10.0	10/13/2022	AB22-1013-08

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

Aliquot #: 22-1020-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	30500		ug/L	1000.0	10/12/2022	AB22-1011-01
Fluoride	ND		ug/L	1000.0	10/12/2022	AB22-1011-01
Sulfate	207000		ug/L	1000.0	10/12/2022	AB22-1011-01

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1020-03-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	836		mg/L	10.0	10/10/2022	AB22-1010-06

Analytical Report

Report Date: 10/26/22

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**22-1020**
Field Sample ID:	**JCW-MW-15010**	Collect Date:	10/04/2022
Lab Sample ID:	22-1020-03	Collect Time:	01:20 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1020-03-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	418000		ug/L	10000.0	10/17/2022	AB22-1017-04
Alkalinity Bicarbonate	418000		ug/L	10000.0	10/17/2022	AB22-1017-04
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-04

Analytical Report

Report Date: 10/26/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **JCW-MW-15028**
Lab Sample ID: 22-1020-04
Matrix: Groundwater

Laboratory Project: **22-1020**
Collect Date: 10/04/2022
Collect Time: 03:05 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1020-04-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/10/2022	AB22-1010-07

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

Aliquot #: 22-1020-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Arsenic	9		ug/L	1.0	10/13/2022	AB22-1013-08
Barium	385		ug/L	5.0	10/13/2022	AB22-1013-08
Beryllium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Boron	547		ug/L	20.0	10/13/2022	AB22-1013-08
Cadmium	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Calcium	192000		ug/L	1000.0	10/16/2022	AB22-1013-08
Chromium	1		ug/L	1.0	10/13/2022	AB22-1013-08
Cobalt	ND		ug/L	6.0	10/13/2022	AB22-1013-08
Copper	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Iron	659		ug/L	20.0	10/13/2022	AB22-1013-08
Lead	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Lithium	52		ug/L	10.0	10/13/2022	AB22-1013-08
Magnesium	33900		ug/L	1000.0	10/16/2022	AB22-1013-08
Molybdenum	ND		ug/L	5.0	10/13/2022	AB22-1013-08
Nickel	7		ug/L	2.0	10/13/2022	AB22-1013-08
Potassium	9710		ug/L	100.0	10/16/2022	AB22-1013-08
Selenium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Silver	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Sodium	649000		ug/L	1000.0	10/16/2022	AB22-1013-08
Thallium	ND		ug/L	2.0	10/13/2022	AB22-1013-08
Vanadium	13		ug/L	2.0	10/13/2022	AB22-1013-08
Zinc	ND		ug/L	10.0	10/13/2022	AB22-1013-08

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

Aliquot #: 22-1020-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	1350000		ug/L	1000.0	10/15/2022	AB22-1011-01
Fluoride	ND		ug/L	1000.0	10/12/2022	AB22-1011-01
Sulfate	106000		ug/L	1000.0	10/12/2022	AB22-1011-01

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1020-04-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	2460		mg/L	10.0	10/10/2022	AB22-1010-06

Analytical Report

Report Date: 10/26/22

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**22-1020**
Field Sample ID:	**JCW-MW-15028**	Collect Date:	10/04/2022
Lab Sample ID:	22-1020-04	Collect Time:	03:05 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1020-04-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	345000		ug/L	10000.0	10/17/2022	AB22-1017-04
Alkalinity Bicarbonate	345000		ug/L	10000.0	10/17/2022	AB22-1017-04
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-04

Analytical Report

Report Date: 10/26/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **DUP-JCW-BAP**
Lab Sample ID: 22-1020-05
Matrix: Groundwater

Laboratory Project: **22-1020**
Collect Date: 10/04/2022
Collect Time: 12:00 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1020-05-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/10/2022	AB22-1010-07

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

Aliquot #: 22-1020-05-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Arsenic	10		ug/L	1.0	10/13/2022	AB22-1013-08
Barium	378		ug/L	5.0	10/13/2022	AB22-1013-08
Beryllium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Boron	547		ug/L	20.0	10/13/2022	AB22-1013-08
Cadmium	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Calcium	201000		ug/L	1000.0	10/16/2022	AB22-1013-08
Chromium	1		ug/L	1.0	10/13/2022	AB22-1013-08
Cobalt	ND		ug/L	6.0	10/13/2022	AB22-1013-08
Copper	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Iron	707		ug/L	20.0	10/13/2022	AB22-1013-08
Lead	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Lithium	52		ug/L	10.0	10/13/2022	AB22-1013-08
Magnesium	35100		ug/L	1000.0	10/16/2022	AB22-1013-08
Molybdenum	ND		ug/L	5.0	10/13/2022	AB22-1013-08
Nickel	8		ug/L	2.0	10/13/2022	AB22-1013-08
Potassium	10300		ug/L	100.0	10/16/2022	AB22-1013-08
Selenium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Silver	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Sodium	666000		ug/L	1000.0	10/16/2022	AB22-1013-08
Thallium	ND		ug/L	2.0	10/13/2022	AB22-1013-08
Vanadium	14		ug/L	2.0	10/13/2022	AB22-1013-08
Zinc	ND		ug/L	10.0	10/13/2022	AB22-1013-08

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

Aliquot #: 22-1020-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	1250000		ug/L	1000.0	10/15/2022	AB22-1011-01
Fluoride	ND		ug/L	1000.0	10/12/2022	AB22-1011-01
Sulfate	105000		ug/L	1000.0	10/12/2022	AB22-1011-01

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1020-05-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	2560		mg/L	10.0	10/10/2022	AB22-1010-06

Analytical Report

Report Date: 10/26/22

Sample Site:	**JCW Bottom Ash Pond**	Laboratory Project:	**22-1020**
Field Sample ID:	**DUP-JCW-BAP**	Collect Date:	10/04/2022
Lab Sample ID:	22-1020-05	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1020-05-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	348000		ug/L	10000.0	10/17/2022	AB22-1017-04
Alkalinity Bicarbonate	348000		ug/L	10000.0	10/17/2022	AB22-1017-04
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-04

Analytical Report

Report Date: 10/26/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **JCW-MW-15009 MS**
Lab Sample ID: 22-1020-06
Matrix: Groundwater

Laboratory Project: **22-1020**
Collect Date: 10/04/2022
Collect Time: 02:18 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1020-06-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	110		%	0.2	10/10/2022	AB22-1010-07

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

Aliquot #: 22-1020-06-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	115		%	1.0	10/13/2022	AB22-1013-08
Arsenic	108		%	1.0	10/13/2022	AB22-1013-08
Barium	111		%	5.0	10/13/2022	AB22-1013-08
Beryllium	94		%	1.0	10/13/2022	AB22-1013-08
Boron	86		%	20.0	10/13/2022	AB22-1013-08
Cadmium	107		%	0.2	10/13/2022	AB22-1013-08
Calcium	127	Q	%	1000.0	10/16/2022	AB22-1013-08
Chromium	113		%	1.0	10/13/2022	AB22-1013-08
Cobalt	109		%	6.0	10/13/2022	AB22-1013-08
Copper	94		%	1.0	10/13/2022	AB22-1013-08
Iron	117		%	20.0	10/16/2022	AB22-1013-08
Lead	98		%	1.0	10/13/2022	AB22-1013-08
Lithium	96		%	10.0	10/13/2022	AB22-1013-08
Magnesium	118		%	1000.0	10/16/2022	AB22-1013-08
Molybdenum	119		%	5.0	10/13/2022	AB22-1013-08
Nickel	124		%	2.0	10/13/2022	AB22-1013-08
Potassium	108		%	100.0	10/16/2022	AB22-1013-08
Selenium	95		%	1.0	10/13/2022	AB22-1013-08
Silver	105		%	0.2	10/13/2022	AB22-1013-08
Sodium	118		%	1000.0	10/16/2022	AB22-1013-08
Thallium	99		%	2.0	10/13/2022	AB22-1013-08
Vanadium	117		%	2.0	10/13/2022	AB22-1013-08
Zinc	93		%	10.0	10/13/2022	AB22-1013-08

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

Aliquot #: 22-1020-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	107		%	1000.0	10/12/2022	AB22-1011-01
Fluoride	90		%	1000.0	10/12/2022	AB22-1011-01
Sulfate	120		%	1000.0	10/15/2022	AB22-1011-01

Alkalinity by SM 2320B

Aliquot #: 22-1020-06-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	97.0		%	10000.0	10/17/2022	AB22-1017-04

Analytical Report

Report Date: 10/26/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **JCW-MW-15009 MSD**
Lab Sample ID: 22-1020-07
Matrix: Groundwater

Laboratory Project: **22-1020**
Collect Date: 10/04/2022
Collect Time: 02:18 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1020-07-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	105		%	0.2	10/10/2022	AB22-1010-07

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

Aliquot #: 22-1020-07-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	113		%	1.0	10/13/2022	AB22-1013-08
Arsenic	108		%	1.0	10/13/2022	AB22-1013-08
Barium	110		%	5.0	10/13/2022	AB22-1013-08
Beryllium	89		%	1.0	10/13/2022	AB22-1013-08
Boron	86		%	20.0	10/13/2022	AB22-1013-08
Cadmium	106		%	0.2	10/13/2022	AB22-1013-08
Calcium	124		%	1000.0	10/16/2022	AB22-1013-08
Chromium	104		%	1.0	10/13/2022	AB22-1013-08
Cobalt	108		%	6.0	10/13/2022	AB22-1013-08
Copper	94		%	1.0	10/13/2022	AB22-1013-08
Iron	116		%	20.0	10/16/2022	AB22-1013-08
Lead	95		%	1.0	10/13/2022	AB22-1013-08
Lithium	88		%	10.0	10/13/2022	AB22-1013-08
Magnesium	116		%	1000.0	10/16/2022	AB22-1013-08
Molybdenum	117		%	5.0	10/13/2022	AB22-1013-08
Nickel	107		%	2.0	10/13/2022	AB22-1013-08
Potassium	107		%	100.0	10/16/2022	AB22-1013-08
Selenium	94		%	1.0	10/13/2022	AB22-1013-08
Silver	101		%	0.2	10/13/2022	AB22-1013-08
Sodium	115		%	1000.0	10/16/2022	AB22-1013-08
Thallium	95		%	2.0	10/13/2022	AB22-1013-08
Vanadium	111		%	2.0	10/13/2022	AB22-1013-08
Zinc	93		%	10.0	10/13/2022	AB22-1013-08

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

Aliquot #: 22-1020-07-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	107		%	1000.0	10/12/2022	AB22-1011-01
Fluoride	89		%	1000.0	10/12/2022	AB22-1011-01
Sulfate	102		%	1000.0	10/15/2022	AB22-1011-01

Alkalinity by SM 2320B

Aliquot #: 22-1020-07-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	93.6		%	10000.0	10/17/2022	AB22-1017-04

Analytical Report

Report Date: 10/26/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **EB-JCW-BAP**
Lab Sample ID: 22-1020-08
Matrix: Water

Laboratory Project: **22-1020**
Collect Date: 10/04/2022
Collect Time: 04:23 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1020-08-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/10/2022	AB22-1010-07

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

Aliquot #: 22-1020-08-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Arsenic	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Barium	ND		ug/L	5.0	10/13/2022	AB22-1013-08
Beryllium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Boron	ND		ug/L	20.0	10/13/2022	AB22-1013-08
Cadmium	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Calcium	ND		ug/L	1000.0	10/16/2022	AB22-1013-08
Chromium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Cobalt	ND		ug/L	6.0	10/13/2022	AB22-1013-08
Copper	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Iron	ND		ug/L	20.0	10/13/2022	AB22-1013-08
Lead	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Lithium	ND		ug/L	10.0	10/13/2022	AB22-1013-08
Magnesium	ND		ug/L	1000.0	10/16/2022	AB22-1013-08
Molybdenum	ND		ug/L	5.0	10/13/2022	AB22-1013-08
Nickel	ND		ug/L	2.0	10/13/2022	AB22-1013-08
Potassium	ND		ug/L	100.0	10/16/2022	AB22-1013-08
Selenium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Silver	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Sodium	ND		ug/L	1000.0	10/16/2022	AB22-1013-08
Thallium	ND		ug/L	2.0	10/13/2022	AB22-1013-08
Vanadium	ND		ug/L	2.0	10/13/2022	AB22-1013-08
Zinc	ND		ug/L	10.0	10/13/2022	AB22-1013-08

Analytical Report

Report Date: 10/26/22

Sample Site: **JCW Bottom Ash Pond**
Field Sample ID: **FB-JCW-BAP**
Lab Sample ID: 22-1020-09
Matrix: Water

Laboratory Project: **22-1020**
Collect Date: 10/04/2022
Collect Time: 04:21 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1020-09-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/10/2022	AB22-1010-07

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

Aliquot #: 22-1020-09-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Arsenic	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Barium	ND		ug/L	5.0	10/13/2022	AB22-1013-08
Beryllium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Boron	ND		ug/L	20.0	10/13/2022	AB22-1013-08
Cadmium	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Calcium	ND		ug/L	1000.0	10/16/2022	AB22-1013-08
Chromium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Cobalt	ND		ug/L	6.0	10/13/2022	AB22-1013-08
Copper	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Iron	ND		ug/L	20.0	10/13/2022	AB22-1013-08
Lead	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Lithium	ND		ug/L	10.0	10/13/2022	AB22-1013-08
Magnesium	ND		ug/L	1000.0	10/16/2022	AB22-1013-08
Molybdenum	ND		ug/L	5.0	10/13/2022	AB22-1013-08
Nickel	ND		ug/L	2.0	10/13/2022	AB22-1013-08
Potassium	ND		ug/L	100.0	10/16/2022	AB22-1013-08
Selenium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Silver	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Sodium	ND		ug/L	1000.0	10/16/2022	AB22-1013-08
Thallium	ND		ug/L	2.0	10/13/2022	AB22-1013-08
Vanadium	ND		ug/L	2.0	10/13/2022	AB22-1013-08
Zinc	ND		ug/L	10.0	10/13/2022	AB22-1013-08

Data Qualifiers	Exception Summary
Matrix Spike or Matrix Spike Duplicate recovery outside acceptance criteria;	No other exceptions occurred.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-1020

Inspection Date: 10.6.22 **Inspection By:** dmw

Sample Origin/Project Name: Q4 2022 JCW Bottom Ash Pond

Shipment Delivered By: Enter the type of shipment carrier.

Pony ____ FedEx ✓ UPS ____ USPS ____ Airborne ____

Other/Hand Carry (whom) ____

Tracking Number: 2787 8423 9309 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 2.9-5.2°C Samples Received on Ice: Yes ✓ No ____

M&TE # and Expiration 015402 / 5.25.23

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)					
~~500~~ 250 mL (plastic)	5				
Other					

dmw 10.6.22

pH paper
0.0 - 14.0
Cat NO: 13-640-508
Lot: 22240
Exp: 8.1.23

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

Page 1 of 1

SAMPLING SITE / CUSTOMER: Q4-2022 JCW Bottom Ash Pond

PROJECT NUMBER: 22-1020

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM: TRC

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

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

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

ANALYSIS REQUESTED (Attach List if More Space is Needed)

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

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	PRESERVATIVE HNO_3	PRESERVATIVE H_2SO_4	PRESERVATIVE NaOH	PRESERVATIVE HCl	PRESERVATIVE MeOH	PRESERVATIVE Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-1020-01	10/4/22	1607	GW	JCW-MW-15007	5	4	1						x	x	x	x	
-02	"	1418	GW	JCW-MW-15009	5	4	1						x	x	x	x	
-03	"	1320	GW	JCW-MW-15010	5	4	1						x	x	x	x	
-04	"	1305	GW	JCW-MW-15028	5	4	1						x	x	x	x	
-05	"	—	GW	DUP-JCW-BAP	5	4	1						x	x	x	x	
-06	"	1418	GW	JCW-MW-15009 MS	4	3	1						x	x		x	
-07	"	1418	GW	JCW-MW-15009 MSD	4	3	1						x	x		x	
-08	"	1623	W	EB-JCW-BAP	1		1						x				
-09	"	1631	W	FB-JCW-BAP	1		1						x				

RELINQUISHED BY: [signature] DATE/TIME: 10-5-22/1300 RECEIVED BY: Fedex

RELINQUISHED BY: Fed Ex DATE/TIME: 10-06-22 10:30 RECEIVED BY: [signature]

COMMENTS:

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

Temperature: 2.9-5.2 °C Cal. Due Date: 5-25-23

eurofins | Environment Testing

ANALYTICAL REPORT

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Tel: (330)497-9396

Laboratory Job ID: 240-174332-1
Client Project/Site: Karn/Weadock CCR Bottom Ash Pond

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

Attn: Darby Litz

Authorized for release by:
11/11/2022 8:16:22 PM

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

LINKS

Review your project results through my EOL

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.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the {0} Project Manager.

Table of Contents

Cover Page 1
Table of Contents 2
Definitions/Glossary 3
Case Narrative 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Tracer Carrier Summary 13
QC Sample Results 14
QC Association Summary 16
Lab Chronicle 17
Certification Summary 19
Chain of Custody 20
Receipt Checklists 25

Definitions/Glossary

Client: TRC Environmental Corporation. Job ID: 240-174332-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Qualifiers

Rad

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

Glossary

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

Case Narrative

Client: TRC Environmental Corporation. Job ID: 240-174332-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Job ID: 240-174332-1

Laboratory: Eurofins Canton

Narrative

Job Narrative
240-174332-1

Receipt
The samples were received on 10/8/2022 9:55 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperatures of the 6 coolers at receipt time were 0.8°C, 1.2°C, 1.4°C, 2.2°C, 3.1°C and 4.1°C

Gas Flow Proportional Counter
Method 903.0: Radium-226 batch 586581Any 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 (240-174332-1), JCW-MW-15009 (240-174332-2), JCW-MW-15010 (240-174332-3), JCW-MW-15028 (240-174332-4), DUP-JCW-BAP (240-174332-5), EB-JCW-BAP (240-174332-6), (LCS 160-586581/2-A), (MB 160-586581/1-A) and (240-174332-B-1-A DU)

Method 904.0: Radium-228 batch 586588Any 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 DateJCW-MW-15007 (240-174332-1), JCW-MW-15009 (240-174332-2), JCW-MW-15010 (240-174332-3), JCW-MW-15028 (240-174332-4), DUP-JCW-BAP (240-174332-5), EB-JCW-BAP (240-174332-6), (LCS 160-586588/2-A), (MB 160-586588/1-A) and (240-174332-B-1-B DU)

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

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

Method Summary

Client: TRC Environmental Corporation.
Job ID: 240-174332-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

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

Protocol References:

EPA = US Environmental Protection Agency

None = None

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

Laboratory References:

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

Sample Summary

Client: TRC Environmental Corporation.
Job ID: 240-174332-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-174332-1	JCW-MW-15007	Water	10/04/22 16:07	10/08/22 09:55
240-174332-2	JCW-MW-15009	Water	10/04/22 14:18	10/08/22 09:55
240-174332-3	JCW-MW-15010	Water	10/04/22 13:00	10/08/22 09:55
240-174332-4	JCW-MW-15028	Water	10/04/22 15:00	10/08/22 09:55
240-174332-5	DUP-JCW-BAP	Water	10/04/22 00:00	10/08/22 09:55
240-174332-6	EB-JCW-BAP	Water	10/04/22 16:23	10/08/22 09:55

Client: TRC Environmental Corporation.
Job ID: 240-174332-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Client Sample ID: JCW-MW-15007
Lab Sample ID: 240-174332-1
Date Collected: 10/04/22 16:07
Matrix: Water
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0770	U	0.109	0.109	1.00	0.184	pCi/L	10/19/22 14:28	11/11/22 09:51	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.4*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:51*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.481	U	0.381	0.383	1.00	0.585	pCi/L	10/19/22 15:04	11/04/22 13:44	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.4*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:44*	*1*
Y Carrier	*85.6*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:44*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.558	U	0.396	0.398	5.00	0.585	pCi/L		11/11/22 16:43	1

Client Sample ID: JCW-MW-15009 — Lab Sample ID: 240-174332-2

Date Collected: 10/04/22 14:18 — **Matrix: Water**
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.174		0.101	0.102	1.00	0.130	pCi/L	10/19/22 14:28	11/11/22 09:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.4*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:52*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.753		0.411	0.417	1.00	0.581	pCi/L	10/19/22 15:04	11/04/22 13:45	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.4*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:45*	*1*
Y Carrier	*88.2*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:45*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.927		0.423	0.429	5.00	0.581	pCi/L		11/11/22 16:43	1

Client Sample Results

Client: TRC Environmental Corporation.
Job ID: 240-174332-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Client Sample ID: JCW-MW-15010
Lab Sample ID: 240-174332-3

Date Collected: 10/04/22 13:00
Matrix: Water
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.318		0.131	0.134	1.00	0.150	pCi/L	10/19/22 14:28	11/11/22 09:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.2*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:52*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.652		0.416	0.421	1.00	0.619	pCi/L	10/19/22 15:04	11/04/22 13:50	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.2*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:50*	*1*
Y Carrier	*92.3*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:50*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.970		0.436	0.442	5.00	0.619	pCi/L		11/11/22 16:43	1

Client: TRC Environmental Corporation.
Job ID: 240-174332-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Client Sample ID: JCW-MW-15028
Lab Sample ID: 240-174332-4
Date Collected: 10/04/22 15:00
Matrix: Water
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.646		0.177	0.186	1.00	0.162	pCi/L	10/19/22 14:28	11/11/22 09:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*78.7*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:52*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.23		0.478	0.491	1.00	0.598	pCi/L	10/19/22 15:04	11/04/22 13:50	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*78.7*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:50*	*1*
Y Carrier	*87.5*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:50*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.87		0.510	0.525	5.00	0.598	pCi/L		11/11/22 16:43	1

Client Sample ID: DUP-JCW-BAP **Lab Sample ID: 240-174332-5**
Date Collected: 10/04/22 00:00 **Matrix: Water**
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.550		0.169	0.176	1.00	0.160	pCi/L	10/19/22 14:28	11/11/22 09:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*72.1*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:52*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	2.11		0.683	0.709	1.00	0.830	pCi/L	10/19/22 15:04	11/04/22 13:50	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*72.1*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:50*	*1*
Y Carrier	*77.4*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:50*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	2.66		0.704	0.731	5.00	0.830	pCi/L		11/11/22 16:43	1

Client: TRC Environmental Corporation.
Job ID: 240-174332-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Client Sample ID: EB-JCW-BAP
Lab Sample ID: 240-174332-6
Date Collected: 10/04/22 16:23
Matrix: Water
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0504	U	0.0844	0.0845	1.00	0.147	pCi/L	10/19/22 14:28	11/11/22 09:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.0*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:52*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.528	U	0.386	0.389	1.00	0.591	pCi/L	10/19/22 15:04	11/04/22 13:50	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.0*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:50*	*1*
Y Carrier	*90.8*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:50*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.578	U	0.395	0.398	5.00	0.591	pCi/L		11/11/22 16:43	1

Tracer/Carrier Summary

Client: TRC Environmental Corporation. Job ID: 240-174332-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Method: 903.0 - Radium-226 (GFPC)

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

		Percent Yield (Acceptance Limits)
		Ba
Lab Sample ID	Client Sample ID	(40-110)
240-174332-1	JCW-MW-15007	79.4
240-174332-1 DU	JCW-MW-15007	58.6
240-174332-2	JCW-MW-15009	82.4
240-174332-3	JCW-MW-15010	79.2
240-174332-4	JCW-MW-15028	78.7
240-174332-5	DUP-JCW-BAP	72.1
240-174332-6	EB-JCW-BAP	85.0
LCS 160-586581/2-A	Lab Control Sample	85.8
MB 160-586581/1-A	Method Blank	79.9

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

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

		Percent Yield (Acceptance Limits)	
		Ba	Y
Lab Sample ID	Client Sample ID	(40-110)	(40-110)
240-174332-1	JCW-MW-15007	79.4	85.6
240-174332-1 DU	JCW-MW-15007	58.6	89.0
240-174332-2	JCW-MW-15009	82.4	88.2
240-174332-3	JCW-MW-15010	79.2	92.3
240-174332-4	JCW-MW-15028	78.7	87.5
240-174332-5	DUP-JCW-BAP	72.1	77.4
240-174332-6	EB-JCW-BAP	85.0	90.8
LCS 160-586588/2-A	Lab Control Sample	85.8	88.6
MB 160-586588/1-A	Method Blank	79.9	77.0

Tracer/Carrier Legend

Ba = Ba Carrier
Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-586581/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 589758 — **Prep Batch: 586581**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.005428	U	0.0568	0.0568	1.00	0.118	pCi/L	10/19/22 14:28	11/11/22 09:51	1

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	79.9		40 - 110	10/19/22 14:28	11/11/22 09:51	1

Lab Sample ID: LCS 160-586581/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 589758 — **Prep Batch: 586581**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	9.891		1.07	1.00	0.134	pCi/L	87	75 - 125		

Carrier	LCS %Yield	LCS Qualifier	Limits
Ba Carrier	85.8		40 - 110

Lab Sample ID: 240-174332-1 DU — **Client Sample ID: JCW-MW-15007**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 589758 — **Prep Batch: 586581**

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-226	0.0770	U		0.1214	U	0.118	1.00	0.184	pCi/L			0.20	1

Carrier	DU %Yield	DU Qualifier	Limits
Ba Carrier	58.6		40 - 110

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-586588/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 588685 — **Prep Batch: 586588**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.2209	U	0.372	0.373	1.00	0.640	pCi/L	10/19/22 15:04	11/04/22 13:44	1

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	79.9		40 - 110	10/19/22 15:04	11/04/22 13:44	1
Y Carrier	77.0		40 - 110	10/19/22 15:04	11/04/22 13:44	1

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

Lab Sample ID: LCS 160-586588/2-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 588685 **Prep Batch: 586588**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			8.47	9.405		1.31	1.00	0.553	pCi/L	111	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*85.8*		*40 - 110*
Y Carrier	*88.6*		*40 - 110*

Lab Sample ID: 240-174332-1 DU **Client Sample ID: JCW-MW-15007**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 588685 **Prep Batch: 586588**

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-228	0.481	U		0.4702	U	0.452	1.00	0.714	pCi/L			0.01	1

Carrier	*DU %Yield*	*DU Qualifier*	*Limits*
Ba Carrier	*58.6*		*40 - 110*
Y Carrier	*89.0*		*40 - 110*

QC Association Summary

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

Job ID: 240-174332-1

Rad

Prep Batch: 586581

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-174332-1	JCW-MW-15007	Total/NA	Water	PrecSep STD	
240-174332-2	JCW-MW-15009	Total/NA	Water	PrecSep STD	
240-174332-3	JCW-MW-15010	Total/NA	Water	PrecSep STD	
240-174332-4	JCW-MW-15028	Total/NA	Water	PrecSep STD	
240-174332-5	DUP-JCW-BAP	Total/NA	Water	PrecSep STD	
240-174332-6	EB-JCW-BAP	Total/NA	Water	PrecSep STD	
MB 160-586581/1-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-586581/2-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
240-174332-1 DU	JCW-MW-15007	Total/NA	Water	PrecSep STD	

Prep Batch: 586588

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-174332-1	JCW-MW-15007	Total/NA	Water	PrecSep_0	
240-174332-2	JCW-MW-15009	Total/NA	Water	PrecSep_0	
240-174332-3	JCW-MW-15010	Total/NA	Water	PrecSep_0	
240-174332-4	JCW-MW-15028	Total/NA	Water	PrecSep_0	
240-174332-5	DUP-JCW-BAP	Total/NA	Water	PrecSep_0	
240-174332-6	EB-JCW-BAP	Total/NA	Water	PrecSep_0	
MB 160-586588/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-586588/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
240-174332-1 DU	JCW-MW-15007	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-174332-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Client Sample ID: JCW-MW-15007 — Lab Sample ID: 240-174332-1

Date Collected: 10/04/22 16:07 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589758	FLC	EET SL	11/11/22 09:51
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588685	FLC	EET SL	11/04/22 13:44
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Client Sample ID: JCW-MW-15009 — Lab Sample ID: 240-174332-2

Date Collected: 10/04/22 14:18 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589758	FLC	EET SL	11/11/22 09:52
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588685	FLC	EET SL	11/04/22 13:45
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Client Sample ID: JCW-MW-15010 — Lab Sample ID: 240-174332-3

Date Collected: 10/04/22 13:00 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589758	FLC	EET SL	11/11/22 09:52
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:50
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Client Sample ID: JCW-MW-15028 — Lab Sample ID: 240-174332-4

Date Collected: 10/04/22 15:00 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589758	FLC	EET SL	11/11/22 09:52
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:50
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-174332-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Client Sample ID: DUP-JCW-BAP — Lab Sample ID: 240-174332-5

Date Collected: 10/04/22 00:00 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589758	FLC	EET SL	11/11/22 09:52
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:50
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Client Sample ID: EB-JCW-BAP — Lab Sample ID: 240-174332-6

Date Collected: 10/04/22 16:23 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589758	FLC	EET SL	11/11/22 09:52
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:50
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Laboratory References:

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

Accreditation/Certification Summary

Client: TRC Environmental Corporation. Job ID: 240-174332-1
Project/Site: Karn/Weadock CCR Bottom Ash Pond

Laboratory: Eurofins St. Louis

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

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-06-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-22
California	Los Angeles County Sanitation Districts	10259	06-30-22 *
California	State	2886	07-01-22 *
Connecticut	State	PH-0241	03-31-23
Florida	NELAP	E87689	06-30-23
HI - RadChem Recognition	State	n/a	06-30-23
Illinois	NELAP	200023	11-30-23
Iowa	State	373	12-01-22
Kansas	NELAP	E-10236	10-31-22 *
Kentucky (DW)	State	KY90125	12-31-22
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-22
Louisiana (All)	NELAP	04080	06-30-23
Louisiana (DW)	State	LA011	12-31-22
Maryland	State	310	09-30-23
MI - RadChem Recognition	State	9005	06-30-23
Missouri	State	780	06-30-25
Nevada	State	MO000542020-1	07-31-23
New Jersey	NELAP	MO002	06-30-23
New York	NELAP	11616	04-01-23
North Dakota	State	R-207	06-30-23
NRC	NRC	24-24817-01	12-31-22
Oklahoma	NELAP	9997	08-31-23
Oregon	NELAP	4157	09-01-23
Pennsylvania	NELAP	68-00540	02-28-23
South Carolina	State	85002001	06-30-23
Texas	NELAP	T104704193	07-31-23
US Fish & Wildlife	US Federal Programs	058448	07-31-23
USDA	US Federal Programs	P330-17-00028	03-11-23
Utah	NELAP	MO000542021-14	07-31-23
Virginia	NELAP	10310	06-14-24
Washington	State	C592	08-30-23
West Virginia DEP	State	381	12-31-22

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

ofins Canton
30 S. Van Buren Avenue
Barberton, OH 44203
Phone (330) 497-9396 Phone (330) 497-0772

MICHIGAN 190

Chain of Custody Record

eurofins | Environment Testing America

Client Information	Sampler: JAVIER JASSO	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-99537-29049.1
Client Contact: Jacob Krenz	Phone: 734 904 3310	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin:	Page: Page of
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 #: 178829			
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, Y - Trizma, 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	10/4/22	1607	G	Water						
JCW-MW-15009	10/4/22	1412	G	Water	N	N	X	X	2	
JCW-MW-15010	10/4/22	1322	G	Water	N	N	X	X	2	
JCW-MW-15028	10/4/22	1500	G	Water	N	N	X	X	2	
DUP-JCW BAP	10/4/22	—	G	Water	N	N	X	X	2	
EB-JCW-BAP	10/4/22	1603	G	Water	N	N	X	X	2	
				Water						

240-174332 Chain of Custody

Possible Hazard Identification

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

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

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

Special Instructions/QC Requirements:

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

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		10-7-22/1016			10/7/22 10:15	EET
2		10/7/22 10:20	EET		10/8/22 955	
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Eurofins - Canton Sample Receipt Form/Narrative Login # :_____
Barberton Facility

Client TRC Site Name_____ Cooler unpacked by: Jamy Boyle

Cooler Received on 10-8-22 Opened on 10-8-22

FedEx: 1st Grd Exp UPS FAS Clipper Client Drop Off Eurofins Courier Other

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

Eurofins Cooler # 1A Foam Box Client Cooler Box Other _____

Packing material used: Bubble Wrap Foam Plastic Bag None Other _____

COOLANT: Wet Ice Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt X See Multiple Cooler Form
   IR GUN# IR-13 (CF +0.7 °C) Observed Cooler Temp._____°C Corrected Cooler Temp._____°C
   IR GUN #IR-15 (CF 0.0°C) Observed Cooler Temp._____°C Corrected Cooler Temp._____°C
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 2 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# HC286797
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 # : _____

Eurofins - 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-13 (IR-15)	3.1	3.1	(Wet Ice) Blue Ice Dry Ice Water None
(TA) Client Box Other	IR-13 (IR-15)	1.4	1.4	(Wet Ice) Blue Ice Dry Ice Water None
(TA) Client Box Other	IR-13 (IR-15)	2.2	2.2	(Wet Ice) Blue Ice Dry Ice Water None
(TA) Client Box Other	IR-13 (IR-15)	1.2	1.2	(Wet Ice) Blue Ice Dry Ice Water None
(TA) Client Box Other	IR-13 (IR-15)	4.1	4.1	(Wet Ice) Blue Ice Dry Ice Water None
(TA) Client Box Other	IR-13 (IR-15)	0.8	0.8	(Wet Ice) Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
				☐ See Temperature Excursion Form

Login Container Summary Report

Temperature readings: _____

Client Sample ID	Lab ID	Container Type	Container pH	Container Temp	Preservative Added (mls)	Lot #
JCW-MW-15007	240-174332-A-1	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15007	240-174332-B-1	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15009	240-174332-A-2	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15009	240-174332-B-2	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15010	240-174332-A-3	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15010	240-174332-B-3	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15028	240-174332-A-4	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-15028	240-174332-B-4	Plastic 1 liter - Nitric Acid	<2			
DUP-JCW-BAP	240-174332-A-5	Plastic 1 liter - Nitric Acid	<2			
DUP-JCW-BAP	240-174332-B-5	Plastic 1 liter - Nitric Acid	<2			
EB-JCW-BAP	240-174332-A-6	Plastic 1 liter - Nitric Acid	<2			
EB-JCW-BAP	240-174332-B-6	Plastic 1 liter - Nitric Acid	<2			

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
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: 240-158469.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: Michigan	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-174332-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 11/8/2022			
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, Y - Trizma, 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 (240-174332-1)	10/4/22	16:07 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-15009 (240-174332-2)	10/4/22	14:18 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-15010 (240-174332-3)	10/4/22	13:00 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-15028 (240-174332-4)	10/4/22	15:00 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-JCW-BAP (240-174332-5)	10/4/22	Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
EB-JCW-BAP (240-174332-6)	10/4/22	16:23 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte & accreditation compliance upon 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 Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing North Central, LLC.

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
Relinquished by: FED EX	Date/Time:	Company	Received by: FED EX	Date/Time:	Company
Relinquished by:	Date/Time:	Company	Received by: Autumn R. Johnson	Date/Time: OCT 11 2022 0830	Company ESSC
				Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Page 24 of 25

10/11/2022

Login Sample Receipt Checklist

Client: TRC Environmental Corporation.

Job Number: 240-174332-1

Login Number: 174332
List Number: 2
Creator: Worthington, Sierra M

List Source: Eurofins St. Louis
List Creation: 10/11/22 01:02 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	

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: October 27, 2022

Subject: RCRA GROUNDWATER MONITORING – DEK-JCW BACKGROUND WELLS – 2022 Q4

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

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

Chemistry Project: 22-1023

TRC Environmental, Inc. conducted groundwater monitoring at the Karn/Weadock Background Wells area on 10/04/2022 and 10/05/2021, 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 10/06/2022.

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, when applicable; all other quality control data is listed in the Quality Control Summary associated with the particular test method, as appropriate. Unless specifically noted in the case narrative, all method quality control requirements have been met. If any results are qualified, the corresponding data flags/qualifiers are listed on the last page of the results section. Any additional information on method performance, when applicable, is presented in this section of the case narrative. When data flags are not needed, the qualifiers text box on the last page is left blank, and a statement confirms that no exceptions occurred.

DEFINITIONS / QUALIFIERS

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

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

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

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q4_2022 DEK & JCW RCRA Background Wells
Date Received: 10/6/2022
Chemistry Project: 22-1023

Sample #	Field Sample ID	Matrix	Sample Date	Site
22-1023-01	MW-15002	Groundwater	10/05/2022 08:55 AM	DEK JCW Background
22-1023-02	MW-15008	Groundwater	10/04/2022 03:08 PM	DEK JCW Background
22-1023-03	MW-15016	Groundwater	10/05/2022 09:56 AM	DEK JCW Background
22-1023-04	MW-15019	Groundwater	10/04/2022 04:10 PM	DEK JCW Background
22-1023-05	DUP-Background	Groundwater	10/04/2022 12:00 AM	DEK JCW Background
22-1023-06	FB-Background	Water	10/05/2022 08:55 AM	DEK JCW Background

Analytical Report

Report Date: 10/27/22

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15002**
Lab Sample ID: 22-1023-01
Matrix: Groundwater

Laboratory Project: **22-1023**
Collect Date: 10/05/2022
Collect Time: 08:55 AM

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

Aliquot #: 22-1023-01-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Arsenic	9		ug/L	1.0	10/18/2022	AB22-1018-03
Barium	600		ug/L	5.0	10/18/2022	AB22-1018-03
Beryllium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Boron	147		ug/L	20.0	10/18/2022	AB22-1018-03
Cadmium	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Calcium	214000		ug/L	1000.0	10/18/2022	AB22-1018-03
Chromium	2		ug/L	1.0	10/18/2022	AB22-1018-03
Cobalt	ND		ug/L	6.0	10/18/2022	AB22-1018-03
Copper	2		ug/L	1.0	10/18/2022	AB22-1018-03
Iron	15300		ug/L	20.0	10/18/2022	AB22-1018-03
Lead	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Lithium	16		ug/L	10.0	10/18/2022	AB22-1018-03
Magnesium	31600		ug/L	1000.0	10/18/2022	AB22-1018-03
Molybdenum	ND		ug/L	5.0	10/18/2022	AB22-1018-03
Nickel	7		ug/L	2.0	10/18/2022	AB22-1018-03
Potassium	3930		ug/L	100.0	10/18/2022	AB22-1018-03
Selenium	36		ug/L	1.0	10/18/2022	AB22-1018-03
Silver	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Sodium	1090000		ug/L	1000.0	10/18/2022	AB22-1018-03
Thallium	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Vanadium	11		ug/L	2.0	10/18/2022	AB22-1018-03
Zinc	ND		ug/L	10.0	10/18/2022	AB22-1018-03

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1023-01-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/19/2022	AB22-1019-01

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

Aliquot #: 22-1023-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	1820000		ug/L	1000.0	10/18/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	2660		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1023-01-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	4210		mg/L	10.0	10/11/2022	AB22-1010-06

Analytical Report

Report Date: 10/27/22

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15008**
Lab Sample ID: 22-1023-02
Matrix: Groundwater

Laboratory Project: **22-1023**
Collect Date: 10/04/2022
Collect Time: 03:08 PM

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

Aliquot #: 22-1023-02-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Arsenic	2		ug/L	1.0	10/18/2022	AB22-1018-03
Barium	70		ug/L	5.0	10/18/2022	AB22-1018-03
Beryllium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Boron	175		ug/L	20.0	10/18/2022	AB22-1018-03
Cadmium	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Calcium	113000		ug/L	1000.0	10/18/2022	AB22-1018-03
Chromium	1		ug/L	1.0	10/18/2022	AB22-1018-03
Cobalt	ND		ug/L	6.0	10/18/2022	AB22-1018-03
Copper	1		ug/L	1.0	10/18/2022	AB22-1018-03
Iron	17500		ug/L	20.0	10/18/2022	AB22-1018-03
Lead	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Lithium	21		ug/L	10.0	10/18/2022	AB22-1018-03
Magnesium	16500		ug/L	1000.0	10/18/2022	AB22-1018-03
Molybdenum	ND		ug/L	5.0	10/18/2022	AB22-1018-03
Nickel	4		ug/L	2.0	10/18/2022	AB22-1018-03
Potassium	2970		ug/L	100.0	10/18/2022	AB22-1018-03
Selenium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Silver	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Sodium	147000		ug/L	1000.0	10/18/2022	AB22-1018-03
Thallium	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Vanadium	6		ug/L	2.0	10/18/2022	AB22-1018-03
Zinc	ND		ug/L	10.0	10/18/2022	AB22-1018-03

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1023-02-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/19/2022	AB22-1019-01

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

Aliquot #: 22-1023-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	261000		ug/L	1000.0	10/18/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	19300		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1023-02-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	901		mg/L	10.0	10/10/2022	AB22-1010-08

Analytical Report

Report Date: 10/27/22

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15016**
Lab Sample ID: 22-1023-03
Matrix: Groundwater

Laboratory Project: **22-1023**
Collect Date: 10/05/2022
Collect Time: 09:56 AM

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

Aliquot #: 22-1023-03-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Arsenic	3		ug/L	1.0	10/18/2022	AB22-1018-03
Barium	115		ug/L	5.0	10/18/2022	AB22-1018-03
Beryllium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Boron	690		ug/L	20.0	10/18/2022	AB22-1018-03
Cadmium	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Calcium	289000		ug/L	1000.0	10/18/2022	AB22-1018-03
Chromium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Cobalt	ND		ug/L	6.0	10/18/2022	AB22-1018-03
Copper	3		ug/L	1.0	10/18/2022	AB22-1018-03
Iron	427		ug/L	20.0	10/18/2022	AB22-1018-03
Lead	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Lithium	91		ug/L	10.0	10/18/2022	AB22-1018-03
Magnesium	38600		ug/L	1000.0	10/18/2022	AB22-1018-03
Molybdenum	6		ug/L	5.0	10/18/2022	AB22-1018-03
Nickel	12		ug/L	2.0	10/18/2022	AB22-1018-03
Potassium	15600		ug/L	100.0	10/18/2022	AB22-1018-03
Selenium	2		ug/L	1.0	10/18/2022	AB22-1018-03
Silver	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Sodium	141000		ug/L	1000.0	10/18/2022	AB22-1018-03
Thallium	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Vanadium	2		ug/L	2.0	10/18/2022	AB22-1018-03
Zinc	11		ug/L	10.0	10/18/2022	AB22-1018-03

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1023-03-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/19/2022	AB22-1019-01

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

Aliquot #: 22-1023-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	236000		ug/L	1000.0	10/18/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	639000		ug/L	1000.0	10/18/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1023-03-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1760		mg/L	10.0	10/10/2022	AB22-1010-08

Analytical Report

Report Date: 10/27/22

Sample Site:	**DEK JCW Background**	Laboratory Project:	**22-1023**
Field Sample ID:	**MW-15019**	Collect Date:	10/04/2022
Lab Sample ID:	22-1023-04	Collect Time:	04:10 PM
Matrix:	Groundwater		

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

Aliquot #: 22-1023-04-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Arsenic	2		ug/L	1.0	10/18/2022	AB22-1018-03
Barium	308		ug/L	5.0	10/18/2022	AB22-1018-03
Beryllium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Boron	297		ug/L	20.0	10/18/2022	AB22-1018-03
Cadmium	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Calcium	139000		ug/L	1000.0	10/18/2022	AB22-1018-03
Chromium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Cobalt	ND		ug/L	6.0	10/18/2022	AB22-1018-03
Copper	1		ug/L	1.0	10/18/2022	AB22-1018-03
Iron	20700		ug/L	20.0	10/18/2022	AB22-1018-03
Lead	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Lithium	12		ug/L	10.0	10/18/2022	AB22-1018-03
Magnesium	34100		ug/L	1000.0	10/18/2022	AB22-1018-03
Molybdenum	ND		ug/L	5.0	10/18/2022	AB22-1018-03
Nickel	5		ug/L	2.0	10/18/2022	AB22-1018-03
Potassium	1980		ug/L	100.0	10/18/2022	AB22-1018-03
Selenium	1		ug/L	1.0	10/18/2022	AB22-1018-03
Silver	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Sodium	216000		ug/L	1000.0	10/18/2022	AB22-1018-03
Thallium	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Vanadium	3		ug/L	2.0	10/18/2022	AB22-1018-03
Zinc	ND		ug/L	10.0	10/18/2022	AB22-1018-03

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1023-04-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/19/2022	AB22-1019-01

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

Aliquot #: 22-1023-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	355000		ug/L	1000.0	10/18/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	59700		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1023-04-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1190		mg/L	10.0	10/10/2022	AB22-1010-08

Analytical Report

Report Date: 10/27/22

Sample Site:	**DEK JCW Background**	Laboratory Project:	**22-1023**
Field Sample ID:	**DUP-Background**	Collect Date:	10/04/2022
Lab Sample ID:	22-1023-05	Collect Time:	12:00 AM
Matrix:	Groundwater		

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

Aliquot #: 22-1023-05-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Arsenic	2		ug/L	1.0	10/18/2022	AB22-1018-03
Barium	70		ug/L	5.0	10/18/2022	AB22-1018-03
Beryllium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Boron	181		ug/L	20.0	10/18/2022	AB22-1018-03
Cadmium	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Calcium	112000		ug/L	1000.0	10/18/2022	AB22-1018-03
Chromium	1		ug/L	1.0	10/18/2022	AB22-1018-03
Cobalt	ND		ug/L	6.0	10/18/2022	AB22-1018-03
Copper	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Iron	17700		ug/L	20.0	10/18/2022	AB22-1018-03
Lead	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Lithium	20		ug/L	10.0	10/18/2022	AB22-1018-03
Magnesium	17200		ug/L	1000.0	10/18/2022	AB22-1018-03
Molybdenum	ND		ug/L	5.0	10/18/2022	AB22-1018-03
Nickel	4		ug/L	2.0	10/18/2022	AB22-1018-03
Potassium	2470		ug/L	100.0	10/18/2022	AB22-1018-03
Selenium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Silver	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Sodium	146000		ug/L	1000.0	10/18/2022	AB22-1018-03
Thallium	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Vanadium	6		ug/L	2.0	10/18/2022	AB22-1018-03
Zinc	ND		ug/L	10.0	10/18/2022	AB22-1018-03

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1023-05-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/19/2022	AB22-1019-01

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

Aliquot #: 22-1023-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	246000		ug/L	1000.0	10/18/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	18800		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1023-05-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	885		mg/L	10.0	10/10/2022	AB22-1010-08

Analytical Report

Report Date: 10/27/22

Sample Site: **DEK JCW Background**
Field Sample ID: **FB-Background**
Lab Sample ID: 22-1023-06
Matrix: Water

Laboratory Project: **22-1023**
Collect Date: 10/05/2022
Collect Time: 08:55 AM

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

Aliquot #: 22-1023-06-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Arsenic	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Barium	ND		ug/L	5.0	10/18/2022	AB22-1018-03
Beryllium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Boron	ND		ug/L	20.0	10/18/2022	AB22-1018-03
Cadmium	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Calcium	ND		ug/L	1000.0	10/18/2022	AB22-1018-03
Chromium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Cobalt	ND		ug/L	6.0	10/18/2022	AB22-1018-03
Copper	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Iron	ND		ug/L	20.0	10/18/2022	AB22-1018-03
Lead	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Lithium	ND		ug/L	10.0	10/18/2022	AB22-1018-03
Magnesium	ND		ug/L	1000.0	10/18/2022	AB22-1018-03
Molybdenum	ND		ug/L	5.0	10/18/2022	AB22-1018-03
Nickel	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Potassium	ND		ug/L	100.0	10/18/2022	AB22-1018-03
Selenium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Silver	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Sodium	ND		ug/L	1000.0	10/18/2022	AB22-1018-03
Thallium	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Vanadium	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Zinc	ND		ug/L	10.0	10/18/2022	AB22-1018-03

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1023-06-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/19/2022	AB22-1019-01

Analytical Report

Report Date: 10/27/22

Data Qualifiers	Exception Summary
	No exceptions occurred.

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-1023

Inspection Date: 10.6.22 **Inspection By:** dmw

Sample Origin/Project Name: Q4 2022 JCN-DEK Background Wells

Shipment Delivered By: Enter the type of shipment carrier.

Pony ____ FedEx ✓ UPS ____ USPS ____ Airborne ____

Other/Hand Carry (whom) ____

Tracking Number: 278184239294 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 3.6-5.1°C Samples Received on Ice: Yes ✓ No ____

M&TE # and Expiration 015402 | 5.25.23

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

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or 60mL)					
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	11				
24 mL vial (glass)					
250 ~~500~~ mL (plastic)	5				
Other					

pH paper
0.0-14.0
Cat No. 13-640-508
Lot: 22240
Exp: 8.1.23

dmw 10.6.22

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

SAMPLING SITE / CUSTOMER: Q4-2022 JCW-DEK Background Wells

PROJECT NUMBER: 22-1023

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM: Andrew Whaley

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

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

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

ANALYSIS REQUESTED (Attach List if More Space is Needed)

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

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	PRESERVATIVE HNO_3	PRESERVATIVE H_2SO_4	PRESERVATIVE NaOH	PRESERVATIVE HCl	PRESERVATIVE MeOH	PRESERVATIVE Other	Total Metals	Anions	TDS	REMARKS
22-1023-01	10/5/22	855	GW	MW-15002	3	2	1						x	x	x	
-02	10/4/22	1508	GW	MW-15008	3	2	1						x	x	x	
-03	10/5/22	956	GW	MW-15016	3	2	1						x	x	x	
-04	10/4/22	1610	GW	MW-15019	3	2	1						x	x	x	
-05	10/4/22	—	GW	DUP-Background	3	2	1						x	x	x	
-06	10/5/22	855	W	FB- Background	1								x			

RELINQUISHED BY: [signature] — DATE/TIME: 10-5-22 1300 — RECEIVED BY: Fedex

RELINQUISHED BY: Fed Ex — DATE/TIME: 10-06-22 10:30 — RECEIVED BY: [signature]

COMMENTS:

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

Temperature: 3.6-5.1 °C — Cal. Due Date: 5-25-23

eurofins | Environment Testing

ANALYTICAL REPORT

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Tel: (330)497-9396

Laboratory Job ID: 240-174329-1
Client Project/Site: Karn/Weadock CCR Background Well

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

Attn: Darby Litz

Authorized for release by:
11/10/2022 4:24:07 PM

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

LINKS

Review your project results through my EOL

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.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the {0} Project Manager.

Table of Contents

Cover Page 1
Table of Contents 2
Definitions/Glossary 3
Case Narrative 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Tracer Carrier Summary 13
QC Sample Results 14
QC Association Summary 15
Lab Chronicle 16
Certification Summary 18
Chain of Custody 19
Receipt Checklists 24

Definitions/Glossary

Client: TRC Environmental Corporation. Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Qualifiers

Rad

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

Glossary

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

Case Narrative

Client: TRC Environmental Corporation. Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Job ID: 240-174329-1

Laboratory: Eurofins Canton

Narrative

Job Narrative
240-174329-1

Comments
All analysis were performed at Eurofins St. Louis Laboratory.

Receipt
The samples were received on 10/8/2022 9:55 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 6 coolers at receipt time were 0.8º C, 1.2º C, 1.4º C, 2.2º C, 3.1º C and 4.1º C.

RAD
Method 903.0: Radium-226 batch 586489
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 (240-174329-1), MW-15008 (240-174329-2), MW-15016 (240-174329-3), MW-15019 (240-174329-4), DUP-BACKGROUND (240-174329-5), FB-BACKGROUND (240-174329-6), (LCS 160-586489/2-A), (MB 160-586489/1-A), (180-145631-A-1-A) and (180-145631-A-1-B DU)

Method 904.0: Radium-228 batch 586571
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 (240-174329-1), MW-15008 (240-174329-2), MW-15016 (240-174329-3), MW-15019 (240-174329-4), DUP-BACKGROUND (240-174329-5), FB-BACKGROUND (240-174329-6), (LCS 160-586571/2-A), (MB 160-586571/1-A), (180-145631-A-1-C) and (180-145631-A-1-D DU)

Method 904.0: Radium-228 batch 586571
The sample duplicate (DUP) precision was outside control limits. Sample matrix interference is suspected.
(180-145631-A-1-D DU)

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

Method Summary

Client: TRC Environmental Corporation.
Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

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

Protocol References:

EPA = US Environmental Protection Agency

None = None

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

Laboratory References:

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

Sample Summary

Client: TRC Environmental Corporation.
Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-174329-1	MW-15002	Water	10/05/22 08:55	10/08/22 09:55
240-174329-2	MW-15008	Water	10/04/22 15:08	10/08/22 09:55
240-174329-3	MW-15016	Water	10/05/22 09:56	10/08/22 09:55
240-174329-4	MW-15019	Water	10/04/22 16:10	10/08/22 09:55
240-174329-5	DUP-BACKGROUND	Water	10/04/22 00:00	10/08/22 09:55
240-174329-6	FB-BACKGROUND	Water	10/05/22 08:55	10/08/22 09:55

Client Sample ID: MW-15002 — Lab Sample ID: 240-174329-1

Date Collected: 10/05/22 08:55 — **Matrix: Water**
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.850		0.196	0.210	1.00	0.131	pCi/L	10/19/22 12:19	11/09/22 15:56	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*97.5*		*40 - 110*	*10/19/22 12:19*	*11/09/22 15:56*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	2.69		0.687	0.730	1.00	0.743	pCi/L	10/19/22 13:40	11/02/22 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*97.5*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*
Y Carrier	*86.0*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	3.54		0.714	0.760	5.00	0.743	pCi/L		11/10/22 13:17	1

Client Sample ID: MW-15008 — Lab Sample ID: 240-174329-2

Date Collected: 10/04/22 15:08 — **Matrix: Water**
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.265		0.118	0.120	1.00	0.125	pCi/L	10/19/22 12:19	11/09/22 15:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*98.3*		*40 - 110*	*10/19/22 12:19*	*11/09/22 15:58*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.62		0.594	0.612	1.00	0.754	pCi/L	10/19/22 13:40	11/02/22 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*98.3*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*
Y Carrier	*87.9*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.88		0.606	0.624	5.00	0.754	pCi/L		11/10/22 13:17	1

Client Sample ID: MW-15016 — Lab Sample ID: 240-174329-3

Date Collected: 10/05/22 09:56 — **Matrix: Water**
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.151	U	0.112	0.113	1.00	0.158	pCi/L	10/19/22 12:19	11/09/22 15:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.0*		*40 - 110*	*10/19/22 12:19*	*11/09/22 15:58*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.56**		0.619	0.636	1.00	0.789	pCi/L	10/19/22 13:40	11/02/22 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.0*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*
Y Carrier	*86.7*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.71**		0.629	0.646	5.00	0.789	pCi/L		11/10/22 13:17	1

Client Sample ID: MW-15019 — Lab Sample ID: 240-174329-4

Date Collected: 10/04/22 16:10 — **Matrix: Water**
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.478		0.153	0.159	1.00	0.132	pCi/L	10/19/22 12:19	11/09/22 15:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*97.5*		*40 - 110*	*10/19/22 12:19*	*11/09/22 15:58*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	2.11		0.628	0.657	1.00	0.684	pCi/L	10/19/22 13:40	11/02/22 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*97.5*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*
Y Carrier	*83.7*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	2.59		0.646	0.676	5.00	0.684	pCi/L		11/10/22 13:17	1

Client: TRC Environmental Corporation.
Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Client Sample ID: DUP-BACKGROUND
Lab Sample ID: 240-174329-5
Date Collected: 10/04/22 00:00
Matrix: Water
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.439		0.157	0.162	1.00	0.163	pCi/L	10/19/22 12:19	11/09/22 16:00	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.8*		*40 - 110*	*10/19/22 12:19*	*11/09/22 16:00*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.77		0.702	0.720	1.00	0.956	pCi/L	10/19/22 13:40	11/02/22 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.8*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*
Y Carrier	*85.6*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	2.21		0.719	0.738	5.00	0.956	pCi/L		11/10/22 13:17	1

Client: TRC Environmental Corporation.
Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Client Sample ID: FB-BACKGROUND
Lab Sample ID: 240-174329-6
Date Collected: 10/05/22 08:55
Matrix: Water
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0435	U	0.0662	0.0663	1.00	0.114	pCi/L	10/19/22 12:19	11/09/22 16:00	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*96.8*		*40 - 110*	*10/19/22 12:19*	*11/09/22 16:00*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.51**		0.458	0.478	1.00	0.512	pCi/L	10/19/22 13:40	11/02/22 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*96.8*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*
Y Carrier	*87.5*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*

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

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.55**		0.463	0.483	5.00	0.512	pCi/L		11/10/22 13:17	1

Tracer/Carrier Summary

Client: TRC Environmental Corporation.
Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water
Prep Type: Total/NA

		Percent Yield (Acceptance Limits)
		Ba
Lab Sample ID	Client Sample ID	(40-110)
240-174329-1	MW-15002	97.5
240-174329-2	MW-15008	98.3
240-174329-3	MW-15016	85.0
240-174329-4	MW-15019	97.5
240-174329-5	DUP-BACKGROUND	95.8
240-174329-6	FB-BACKGROUND	96.8
LCS 160-586489/2-A	Lab Control Sample	99.8
MB 160-586489/1-A	Method Blank	99.8

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water
Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
		Ba	Y
Lab Sample ID	Client Sample ID	(40-110)	(40-110)
240-174329-1	MW-15002	97.5	86.0
240-174329-2	MW-15008	98.3	87.9
240-174329-3	MW-15016	85.0	86.7
240-174329-4	MW-15019	97.5	83.7
240-174329-5	DUP-BACKGROUND	95.8	85.6
240-174329-6	FB-BACKGROUND	96.8	87.5
LCS 160-586571/2-A	Lab Control Sample	99.8	87.1
MB 160-586571/1-A	Method Blank	99.8	83.7

Tracer/Carrier Legend

Ba = Ba Carrier
Y = Y Carrier

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

Job ID: 240-174329-1

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-586489/1-A
Matrix: Water
Analysis Batch: 589429

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 586489

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.01471	U	0.0601	0.0601	1.00	0.127	pCi/L	10/19/22 12:19	11/09/22 15:55	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.8*		*40 - 110*	*10/19/22 12:19*	*11/09/22 15:55*	*1*

Lab Sample ID: LCS 160-586489/2-A
Matrix: Water
Analysis Batch: 589429

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 586489

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	11.66		1.20	1.00	0.0930	pCi/L	103	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*99.8*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-586571/1-A
Matrix: Water
Analysis Batch: 588252

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 586571

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.001		0.423	0.433	1.00	0.557	pCi/L	10/19/22 13:40	11/02/22 13:54	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.8*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:54*	*1*
Y Carrier	*83.7*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:54*	*1*

Lab Sample ID: LCS 160-586571/2-A
Matrix: Water
Analysis Batch: 588252

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 586571

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			8.48	9.458		1.48	1.00	0.776	pCi/L	112	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*99.8*		*40 - 110*
Y Carrier	*87.1*		*40 - 110*

QC Association Summary

Client: TRC Environmental Corporation. Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Rad

Prep Batch: 586489

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-174329-1	MW-15002	Total/NA	Water	PrecSep STD	
240-174329-2	MW-15008	Total/NA	Water	PrecSep STD	
240-174329-3	MW-15016	Total/NA	Water	PrecSep STD	
240-174329-4	MW-15019	Total/NA	Water	PrecSep STD	
240-174329-5	DUP-BACKGROUND	Total/NA	Water	PrecSep STD	
240-174329-6	FB-BACKGROUND	Total/NA	Water	PrecSep STD	
MB 160-586489/1-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-586489/2-A	Lab Control Sample	Total/NA	Water	PrecSep STD	

Prep Batch: 586571

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-174329-1	MW-15002	Total/NA	Water	PrecSep_0	
240-174329-2	MW-15008	Total/NA	Water	PrecSep_0	
240-174329-3	MW-15016	Total/NA	Water	PrecSep_0	
240-174329-4	MW-15019	Total/NA	Water	PrecSep_0	
240-174329-5	DUP-BACKGROUND	Total/NA	Water	PrecSep_0	
240-174329-6	FB-BACKGROUND	Total/NA	Water	PrecSep_0	
MB 160-586571/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-586571/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Client Sample ID: MW-15002 — Lab Sample ID: 240-174329-1

Date Collected: 10/05/22 08:55 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586489	ZR	EET SL	10/19/22 12:19
Total/NA	Analysis	903.0		1	589429	FLC	EET SL	11/09/22 15:56
Total/NA	Prep	PrecSep_0			586571	CMM	EET SL	10/19/22 13:40
Total/NA	Analysis	904.0		1	588252	JCB	EET SL	11/02/22 13:55
Total/NA	Analysis	Ra226_Ra228		1	589622	MLK	EET SL	11/10/22 13:17

Client Sample ID: MW-15008 — Lab Sample ID: 240-174329-2

Date Collected: 10/04/22 15:08 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586489	ZR	EET SL	10/19/22 12:19
Total/NA	Analysis	903.0		1	589429	FLC	EET SL	11/09/22 15:58
Total/NA	Prep	PrecSep_0			586571	CMM	EET SL	10/19/22 13:40
Total/NA	Analysis	904.0		1	588252	JCB	EET SL	11/02/22 13:55
Total/NA	Analysis	Ra226_Ra228		1	589622	MLK	EET SL	11/10/22 13:17

Client Sample ID: MW-15016 — Lab Sample ID: 240-174329-3

Date Collected: 10/05/22 09:56 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586489	ZR	EET SL	10/19/22 12:19
Total/NA	Analysis	903.0		1	589429	FLC	EET SL	11/09/22 15:58
Total/NA	Prep	PrecSep_0			586571	CMM	EET SL	10/19/22 13:40
Total/NA	Analysis	904.0		1	588252	JCB	EET SL	11/02/22 13:55
Total/NA	Analysis	Ra226_Ra228		1	589622	MLK	EET SL	11/10/22 13:17

Client Sample ID: MW-15019 — Lab Sample ID: 240-174329-4

Date Collected: 10/04/22 16:10 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586489	ZR	EET SL	10/19/22 12:19
Total/NA	Analysis	903.0		1	589429	FLC	EET SL	11/09/22 15:58
Total/NA	Prep	PrecSep_0			586571	CMM	EET SL	10/19/22 13:40
Total/NA	Analysis	904.0		1	588252	JCB	EET SL	11/02/22 13:55
Total/NA	Analysis	Ra226_Ra228		1	589622	MLK	EET SL	11/10/22 13:17

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Client Sample ID: DUP-BACKGROUND — Lab Sample ID: 240-174329-5

Date Collected: 10/04/22 00:00 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586489	ZR	EET SL	10/19/22 12:19
Total/NA	Analysis	903.0		1	589434	FLC	EET SL	11/09/22 16:00
Total/NA	Prep	PrecSep_0			586571	CMM	EET SL	10/19/22 13:40
Total/NA	Analysis	904.0		1	588252	JCB	EET SL	11/02/22 13:55
Total/NA	Analysis	Ra226_Ra228		1	589622	MLK	EET SL	11/10/22 13:17

Client Sample ID: FB-BACKGROUND — Lab Sample ID: 240-174329-6

Date Collected: 10/05/22 08:55 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586489	ZR	EET SL	10/19/22 12:19
Total/NA	Analysis	903.0		1	589434	FLC	EET SL	11/09/22 16:00
Total/NA	Prep	PrecSep_0			586571	CMM	EET SL	10/19/22 13:40
Total/NA	Analysis	904.0		1	588252	JCB	EET SL	11/02/22 13:55
Total/NA	Analysis	Ra226_Ra228		1	589622	MLK	EET SL	11/10/22 13:17

Laboratory References:

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

Accreditation/Certification Summary

Client: TRC Environmental Corporation. Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Laboratory: Eurofins St. Louis

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

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-06-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-22
California	Los Angeles County Sanitation Districts	10259	06-30-22 *
California	State	2886	07-01-22 *
Connecticut	State	PH-0241	03-31-23
Florida	NELAP	E87689	06-30-23
HI - RadChem Recognition	State	n/a	06-30-23
Illinois	NELAP	200023	11-30-23
Iowa	State	373	12-01-22
Kansas	NELAP	E-10236	10-31-22 *
Kentucky (DW)	State	KY90125	12-31-22
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-22
Louisiana (All)	NELAP	04080	06-30-23
Louisiana (DW)	State	LA011	12-31-22
Maryland	State	310	09-30-23
MI - RadChem Recognition	State	9005	06-30-23
Missouri	State	780	06-30-25
Nevada	State	MO000542020-1	07-31-23
New Jersey	NELAP	MO002	06-30-23
New York	NELAP	11616	04-01-23
North Dakota	State	R-207	06-30-23
NRC	NRC	24-24817-01	12-31-22
Oklahoma	NELAP	9997	08-31-23
Oregon	NELAP	4157	09-01-23
Pennsylvania	NELAP	68-00540	02-28-23
South Carolina	State	85002001	06-30-23
Texas	NELAP	T104704193	07-31-23
US Fish & Wildlife	US Federal Programs	058448	07-31-23
USDA	US Federal Programs	P330-17-00028	03-11-23
Utah	NELAP	MO000542021-14	07-31-23
Virginia	NELAP	10310	06-14-24
Washington	State	C592	08-30-23
West Virginia DEP	State	381	12-31-22

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

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Phone (330) 497-9396 Phone (330) 497-0772

MICHIGAN 190

Chain of Custody Record

eurofins | Environment Testing America

Client Information	Sampler: Andrew Whaley	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-99536-29047.1
Client Contact: Jacob Krenz	Phone: 734-210-9239	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin:	Page: Page 1 of 1
Company: TRC Environmental Corporation.	PWSID:			Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: Δ Yes Δ No			
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: 178829			
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, Y - Trizma, 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	10/5/22	855	G	Water	N	N	X	X		
MW-15008	10/4/22	1508	G	Water	N	N	X	X		
MW-15016	10/5/22	956	G	Water	N	N	X	X		
MW-15019	10/4/22	1610	G	Water	N	N	X	X		
DUP-Background	10/4/22	—	G	Water	N	N	X	X		
FB-Background	10/5/22	855	G	Water	N	N	X	X		
				~~Water~~						

240-174329 Chain of Custody

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

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

Special Instructions/QC Requirements:

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

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		10-7-22/1016	TRC		10/7/22 1015	EETAC
2		10/7/22 1015			10-8-22-955	EETNC
3						

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

11/10/2022

Eurofins - Canton Sample Receipt Form/Narrative Login # :_____
Barberton Facility

Client TRC Site Name_____ Cooler unpacked by: Jenny Koch

Cooler Received on 10-8-22 Opened on 10-8-22

FedEx: 1st Grd Exp UPS FAS Clipper Client Drop Off Eurofins Courier Other

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

Eurofins Cooler # 1A Foam Box Client Cooler Box Other _____

Packing material used: Bubble Wrap Foam Plastic Bag None Other _____

COOLANT: Wet Ice Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt X See Multiple Cooler Form
   IR GUN# IR-13 (CF +0.7 °C) Observed Cooler Temp._____°C Corrected Cooler Temp._____°C
   IR GUN #IR-15 (CF 0.0°C) Observed Cooler Temp._____°C Corrected Cooler Temp._____°C
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 2 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# HC286797
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 # : ______________

Eurofins - 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-13 (IR-15)	3.1	3.1	(Wet Ice) Blue Ice Dry Ice Water None
(TA) Client Box Other	IR-13 (IR-15)	1.4	1.4	(Wet Ice) Blue Ice Dry Ice Water None
(TA) Client Box Other	IR-13 (IR-15)	2.2	2.2	(Wet Ice) Blue Ice Dry Ice Water None
(TA) Client Box Other	IR-13 (IR-15)	1.2	1.2	(Wet Ice) Blue Ice Dry Ice Water None
(TA) Client Box Other	IR-13 (IR-15)	4.1	4.1	(Wet Ice) Blue Ice Dry Ice Water None
(TA) Client Box Other	IR-13 (IR-15)	0.8	0.8	(Wet Ice) Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 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	240-174329-A-1	Plastic 1 liter - Nitric Acid	<2			
MW-15002	240-174329-B-1	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-174329-A-2	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-174329-B-2	Plastic 1 liter - Nitric Acid	<2			
MW-15016	240-174329-A-3	Plastic 1 liter - Nitric Acid	<2			
MW-15016	240-174329-B-3	Plastic 1 liter - Nitric Acid	<2			
MW-15019	240-174329-A-4	Plastic 1 liter - Nitric Acid	<2			
MW-15019	240-174329-B-4	Plastic 1 liter - Nitric Acid	<2			
DUP-BACKGROUND	240-174329-A-5	Plastic 1 liter - Nitric Acid	<2			
DUP-BACKGROUND	240-174329-B-5	Plastic 1 liter - Nitric Acid	<2			
FB-BACKGROUND	240-174329-A-6	Plastic 1 liter - Nitric Acid	<2			
FB-BACKGROUND	240-174329-B-6	Plastic 1 liter - Nitric Acid	<2			

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
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: 240-158469.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: Michigan	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-174329-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 11/8/2022			
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, Y - Trizma, 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-15002 (240-174329-1)	10/5/22	08:55 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15008 (240-174329-2)	10/4/22	15:08 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15016 (240-174329-3)	10/5/22	09:56 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15019 (240-174329-4)	10/4/22	16:10 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-BACKGROUND (240-174329-5)	10/4/22	Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
FB-BACKGROUND (240-174329-6)	10/5/22	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 Environment Testing North Central, LLC 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 Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing North Central, LLC.

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: RA	Date/Time: 10/10/22 1000	Company: EBTNC	Received by: FED EX	Date/Time:	Company
Relinquished by: FED EX	Date/Time:	Company	Received by: [signature]	Date/Time: OCT 1 1 2022 0830	Company: FIA STC
Relinquished by:	Date/Time:	Company	Received by: Autumn R. Johnson	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: 240-174329-1

Login Number: 174329
List Number: 2
Creator: Worthington, Sierra M

List Source: Eurofins St. Louis
List Creation: 10/11/22 01:02 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 2022 Hydrogeological Monitoring Report

JC Weadock Solid Waste Disposal Area

Essexville, Michigan

April 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

TABLE OF CONTENTS

1.0 Introduction 1

1.1 Statement of Adherence to Approved Hydrogeological Monitoring Plan 1
1.2 Program Summary 1
1.3 Site Overview 3
1.4 Geology/Hydrogeology 3

2.0 Leachate Monitoring 5

3.0 Groundwater Monitoring 6

3.1 Monitoring Well Network 6
3.2 February/March 2022 Monitoring Event 7
3.2.1 Data Quality Review 8
3.3 Groundwater Flow Rate and Direction 8
3.4 Groundwater Analytical Data and Relevant Screening Criteria 9
3.4.1 Groundwater Monitoring Analytical Results 10
3.4.2 Detection Monitoring 10
3.4.3 Assessment Monitoring Data Evaluation 11
3.4.3.1 Establishing Groundwater Protection Standards 11
3.4.3.2 Data Comparison to Groundwater Protection Standards 11
3.4.4 GSI Compliance Monitoring 12
3.5 Alternate Source Demonstration 13
3.5.1 Monitoring Well JCW-MW-18001: Sulfate 13
3.5.2 Monitoring Well MW-55: Arsenic and Molybdenum 14

4.0 Conclusions and Recommendations 15

5.0 References 16

TABLES

Table 1 Summary of Groundwater Elevation Data: February 2022
Table 2 Summary of Groundwater Sampling Results (Analytical): March 2022; JC Weadock Solid Waste Disposal Area
Table 3 Summary of Field Parameters: March 2022
Table 4 Summary of Confidence Interval Evaluation: March 2022
Table 5 Mass Flux Calculations
Table 6 Synthetic Precipitation Leaching Procedure Results
Table 7 Leachate Headwell Results
Table 8 EGLE Exceedance Summary Table

FIGURES

Figure 1 Site Location Map
Figure 2 Site Map
Figure 3 Potentiometric Surface Map – February 2022

APPENDICES

Appendix A Static Water Level Evaluation
Appendix B Data Quality Review
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
Appendix H Well Decommissioning and Installation Records

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 2022 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 first quarter 2022 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. Laboratory leachate data for the four dry-handled CCR samples are shown in Table 6. The 2022 laboratory leachate data are generally consistent with data collected in previous years.

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 and to assess which constituents have the potential to exceed applicable criteria at the compliance well locations.

Leachate headwell LH-103 was decommissioned in March 2022 due to damage noted in Q4 2021. LH-103R was installed in March 2022 as a replacement and is shown on Figures 2 and 3. Well decommissioning and installation records are included in Appendix H. The location of LH-103R was selected to provide representative field leachate concentrations with considerations for accessibility during current and future landfill construction activities. Since field leachate data were not able to be collected from LH-103 during the Q4 2021, leachate headwell LH-103R was sampled in Q1 2022 and results are shown in Table 7. The February 2022 field leachate data for LH-103R are generally consistent with data collected in previous years from LH-103 and LH-104.

Concentrations of low-level mercury in LH-103R were detected at 2.25 ng/L which is above the GSI criterion of 1.3 nanograms per liter (ng/L); however, concentrations of mercury in the leachate headwell remain well below 200 ng/L (0.2 ug/L), which is the quantification level allowed per EGLE Policy 09-014 dated June 20, 2012. Mercury analysis occurs quarterly at the porewater monitoring compliance well locations and mercury has not been detected above 200 ng/L; therefore, the result in LH-103R is considered a *de minimis* condition pursuant to Section 20120e of Part 201.

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 February/March 2022 Monitoring Event

In accordance with the Weadock Landfill HMP, TRC conducted the first quarter 2022 monitoring event for the Weadock Landfill on February 28 through March 11, 2022. 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 first quarter 2022 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, two field duplicates (JCW-MW-18005 and 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 February 2022 are generally within the range of 580 to 599 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 2022 monitoring event are included in the attached laboratory report (Appendix E). Groundwater analytical data from the first quarter 2022 monitoring event 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. 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 2.

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 (Section 3.4.2 Detection Monitoring and Section 3.4.3 Assessment Monitoring). 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.

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. Trend analyses could be completed for the first time for constituents that were added to the monitoring program by the Weadock Landfill HMP (i.e., calcium, chloride, fluoride, and total dissolved solids), as the monitoring wells had a sufficient amount of data to perform trend analysis (i.e., 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:

- Boron concentrations are trending upward at several monitoring wells. The previously observed increasing trend at MW-54R has continued and the increasing trend initially observed for MW-55 in fourth quarter 2021 was confirmed in the first quarter 2022. New, unconfirmed increasing trends for boron were observed at MW-50, MW-51, MW-53, MW-53R, and OW-57R Out in first quarter 2022.

- A new, unconfirmed increasing trend for chloride was observed at MW-54R in first quarter 2022.
- The new, unconfirmed increasing trends for iron at MW-53R and MW-55 that were observed in fourth quarter 2021 were not confirmed in first quarter 2022.
- A new, unconfirmed increasing trend for calcium was observed at JCW-MW-18001 in first quarter 2022.
- A continuous increasing trend was observed for sulfate at JCW-MW-18001. Sulfate concentrations remain below the generic final acute value (FAV).
- A new, unconfirmed increasing trend for total dissolved solids (TDS) was observed at JCW-MW-18001 in first quarter 2022.

The potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill. Several of these newly observed trends, such as those observed for calcium and chloride, may be a result of changes in lake levels rather than a change in flux from the landfill and will continue to be evaluated. Sulfate concentrations are related to redox conditions and the increasing trend of sulfate 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 several porewater compliance monitoring wells. Statistical significance above the GWPS established for boron has been noted for these monitoring wells per the Part 115 groundwater monitoring program requirements, as discussed in Section 3.4.3.2. Continued monitoring and assessment for potential future actions is warranted at this time; however, observed concentrations of boron in each of the monitoring wells is less than the relevant Part 115 compliance standard - the GSI pathway standard (Section 3.4.4).

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 the March 2022 Sampling Event*). A summary of the confidence interval evaluation is provided in Table 4.

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 (Part 115): The first quarter 2022 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 were present at statistically significant levels above the GWPS. The GWPS for boron was established based on background concentrations observed in wells unaffected by the Weadock Landfill or Weadock Bottom Ash Pond. Detection monitoring (i.e., Appendix III) constituents 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 below relevant GSI criteria, as discussed in Section 3.4.4.

Assessment Monitoring Constituents (Part 115 and Federal CCR): Based on the first quarter 2022 statistical evaluation, there are no assessment monitoring constituents present at statistically significant levels above the GWPSs 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 9.37 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 2022 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
- 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 the March 2022 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.

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).

Arsenic and Molybdenum at MW-55: Concentrations of arsenic and molybdenum at MW-55 have at times exceeded the GSI criteria on a direct comparison to the fixed limit basis. The statistical evaluation presented in Appendix D shows that the lower confidence limit of the arsenic and molybdenum data over the past 8 events did not exceed 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 arsenic and molybdenum based upon the contribution from each GSI 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). Compliance with the GSI pathway criteria on a mass flux basis is supported by the calculations in Table 5 that show the estimated mass flux of arsenic (9.4 x 10^{-6} lbs/day) and molybdenum (1.7 x 10^{-5} lbs/day) are less than the loading limits of 3.2 x 10^{-4} lbs/day and 3.8 x 10^{-4} lbs/day, respectively, based on the generic GSI criterion for molybdenum and the site-specific chronic mixing zone GSI criterion for arsenic.

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 Q1 2022), 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 at JCW-MW-18001 is currently higher than what was observed from 2018 to 2019 (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). Surface water and groundwater levels are now decreasing; however, it may take time for the local geochemistry to re-equilibrate to lowered water levels and dissolved oxygen remains elevated compared to prior years.

- Sulfate concentrations at JCW-MW-18001 (1,080 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.

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 (*2021 Annual Groundwater Monitoring and Corrective Action Report*; TRC, January 2022). 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 and have been relatively stable, as evidenced by the time series plots in Figure G2. Stable or decreasing concentrations of boron is further supports 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 increased over 4-ft since between 2010 and 2020. The oxidation-reduction potential (ORP) at MW-55 has generally decreased (i.e., is more reducing) since 2010. 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 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 2022 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 *2021 Annual Groundwater Monitoring and Corrective Action Report*, due to observed groundwater concentrations that are indicative of impact from past landfill operations. Evaluation of the first quarter 2022 data in accordance with the Weadock Landfill HMP demonstrate that boron is present at concentrations above the GWPS. Boron is a detection monitoring (i.e., Appendix III) constituent that does 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 are below relevant GSI criteria, as discussed in Section 3.4.4.

The statistical evaluation in first quarter 2022 found that no 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 second quarter monitoring event for is scheduled for May 2022.

5.0 References

AECOM. November 6, 2009. Potential Failure Mode Analysis (PFMA) Report. JC Weadock Electric Generation Facility Ash Dike Risk Assessment Essexville, Michigan. Prepared for Consumers Energy Company

Consumers Energy Company. 2015. *Hydrogeological Monitoring Plan Rev. 2: JC Weadock Solid Waste Disposal Area.* June 9.

Consumers Energy. 2019. *JC Weadock Landfill Response Action Plan Submittal, JC Weadock Generating Facility (WDS# 395457), Essexville, Michigan.* March 15.

Golder Associates, Inc. 2018. *J.C. Weadock Generating Facility, Slurry Wall Vent Closure Construction Documentation Report*. October 30.

Michigan Department of Natural Resources (MDNR). 1986. *Determination of Permit Exemption No. GWE-0005.* August 25.

Michigan Department of Environmental Quality (MDEQ). 2015. *Implementation of a Mixing Zone Request Consumers Energy DE Karn/JC Weadock Complex.* December 23.

MDEQ. 2018. *Slurry Wall Construction Certification; JC Weadock Landfill, Bay County, Michigan, Waste Data System Number 395457.* December 19.

Michigan Department of Environment, Great Lakes, and Energy (EGLE). 2020. *Closure Certification, Consumers Weadock Complex (Weadock) Bottom Ash Pond, Bay County, Waste Data System No. 395457*. November 30. [Letter]

Natural Resource Technology. 2005. Phase II Groundwater Discharge Evaluation, Final Report.

Natural Resource Technology. 2010. Revised Hydrogeological Monitoring Plan – JC Weadock Solid Waste Disposal Area.TRC. 2018. Annual Groundwater Monitoring Report – JC Weadock Power Plant, Landfill CCR Unit. Prepared for Consumers Energy Company. January.

TRC. 2018. *Annual Groundwater Monitoring Report – JC Weadock Power Plant, Landfill CCR Unit*. Prepared for Consumers Energy Company.

TRC. 2019a. *2018 Annual Groundwater Monitoring Report – JC Weadock Power Plant Landfill CCR Unit. Prepared for Consumers Energy Company.* January.

TRC. 2019b. *Assessment of Corrective Measures – JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residual Units.* Prepared for Consumers Energy Company. September.

TRC. 2020. *2019 Annual Groundwater Monitoring Report – JC Weadock Power Plant Landfill CCR Unit.* Prepared for Consumers Energy Company. January.

TRC. 2022. *2021 Annual Groundwater Monitoring and Corrective Action Report – JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residuals (CCR) Units.* Prepared for Consumers Energy Company. January.

TRC. 2021. *Landfill Hydrogeological Monitoring Plan – JC Weadock Power Plant, Essexville, Michigan.* Prepared for Consumers Energy Company. February.

TRC. 2021. *First Quarter 2021 Hydrogeological Monitoring Report – JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* Prepared for Consumers Energy Company. April.

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

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

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

Tables

Table 1
Summary of Groundwater Elevation Data: Februrary 2022
First Quarter 2022 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Well Location	TOC Elevation (ft)	Geologic Unit of Screen Interval	Screen Interval Elevation (ft)			February 28, 2022	
						Depth to Water (ft BTOC)	Groundwater Elevation (ft)
Background Monitoring Wells							
MW-15002	587.71	Sand	580.9	to	570.9	6.80	580.91
MW-15008	585.36	Sand with clay	578.7	to	568.7	4.53	580.83
MW-15016	586.49	Sand	581.2	to	578.2	NM	NM
MW-15019	586.17	Sand and Sand/Clay	579.5	to	569.5	5.75	580.42
Bottom Ash Pond: Downgradient Monitoring Wells							
JCW-MW-15007	587.40	Sand	582.7	to	579.2	3.55	583.85
JCW-MW-15009	589.64	Sand	581.9	to	576.9	9.28	580.36
JCW-MW-15010	597.76	Sand	579.7	to	578.2	17.60	580.16
JCW-MW-15028	589.64	Sand	567.7	to	564.7	8.00	581.64
Landfill: Downgradient Monitoring Wells (outside slurry wall)							
JCW-MW-18001	596.73	Sand and Sandy Clay	578.3	to	573.3	17.00	579.73
JCW-MW-18004	593.04	Sandy Clay	583.9	to	578.9	13.19	579.85
JCW-MW-18005	590.89	Sand and Sandy Clay	580.0	to	575.0	9.88	581.01
JCW-MW-18006	600.72	Fly Ash and Sandy Clay	582.8	to	577.8	14.80	585.92
MW-50	593.36	Sand	577.8	to	574.8	13.63	579.73
MW-51	594.29	Sand and Clay	577.8	to	574.8	14.68	579.61
MW-52	594.90	Sand	579.3	to	576.3	15.23	579.67
MW-53	593.68	Sand and Clay	579.1	to	576.1	13.89	579.79
MW-53R	594.25	Sand and Clay	580.4	to	575.4	14.95	579.30
MW-54R	593.89	Clay and Sand	581.3	to	576.3	14.10	579.79
MW-55	593.82	Sand	581.5	to	578.5	14.35	579.47
OW-57ROUT	591.00	Sandy Clay	577.0	to	572.0	9.90	581.10
Landfill: Static Water Level Only (inside slurry wall)							
JCW-OW-18001	595.84	Fly Ash and Sand	581.1	to	576.1	8.70	587.14
JCW-OW-18002	593.63	Sand	578.9	to	573.9	11.15	582.48
JCW-OW-18003	593.99	Sand and Clay	580.5	to	575.5	8.68	585.31
JCW-OW-18004	594.19	Sandy Clay	584.6	to	579.6	7.48	586.71
JCW-OW-18006	600.61	Fly Ash and Clay with Sand	582.9	to	577.9	12.68	587.93
MW-20	592.73	NR	~581.1	to	~578.1	7.00	585.73
OW-51	593.62	Clay and Sand	578.9	to	575.9	10.24	583.38
OW-53	593.64	Clay and Sand	579.0	to	576.0	8.36	585.28
OW-54	594.10	Clay and Sand	580.0	to	577.0	7.62	586.48
OW-55	594.67	Clay (or Sand and Clay)	580.9	to	577.9	5.83	588.84
OW-56R	592.01	Ash and Sand	577.5	to	572.5	5.89	586.12
OW-57R IN	590.86	Sandy Clay	575.7	to	570.7	6.74	584.12
OW-61	612.37	Ash and Sand	588.0	to	585.0	13.24	599.13
OW-63	612.53	Ash and Sand	594.2	to	591.2	NM	NM
Landfill: Leachate Headwells							
LH-103R	612.70	Fly Ash	25.0	to	30.0	24.85[(1)]	587.85
LH-104	596.56	Fly Ash	8.0	to	11.0	8.33	588.23

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

NI:Not Installed; NM: Not Measured; NR: Not Recorded

(1) LH-103R water level measurment was collected on 3/11/2022.

Table 2
Summary of Groundwater Sampling Results (Analytical): March 2022
First Quarter 2022 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:	3/7/2022	3/7/2022	3/7/2022	3/7/2022	3/8/2022	3/8/2022
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**	7,200	44,000	69,000	**1,670**	259	**1,030**	**3,220**	**1,610**	**1,420**
Calcium	mg/L	NC	NC	NC	500[EE]	NC	NC	412	236	159	143	186	255
Chloride	mg/L	250**	250[E]	250[E]	500	NC	NC	60	19.6	61.7	75	54.9	91.1
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	**500[EE]**	NC	NC	**1,080**	**537**	204	38.1	**346**	**446**
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	NC	NC	**2,310**	**1,280**	**942**	**792**	**999**	**1,480**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	NC	NC	6.8	6.9	7.1	7.1	7.4	7.4
Appendix IV[(1)]													
Antimony	ug/L	6	6.0	6.0	130	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	100	680	< 1	< 1	5	**33**	2	**12**
Barium	ug/L	2,000	2,000	2,000	670	NC	NC	129	32	108	665	115	198
Beryllium	ug/L	4	4.0	4.0	6.7	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	3.0	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	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
Lead	ug/L	NC	4.0	4.0	29	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	NC	NC	87	34	32	63	77	58
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	3,200	NC	NC	< 5	< 5	5	< 5	6	< 5
Selenium	ug/L	50	50	50	5.0	55	120	2	2	3	2	2	3
Thallium	ug/L	2	2.0	2.0	3.7	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	86	**952**	**3,300**	**9,040**	**1,400**	**1,310**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	NC	NC	NC	2	1	< 1	< 1	< 1	< 1
Nickel	ug/L	NC	100	100	NC	NC	NC	6	4	10	6	< 2	< 2
Silver	ug/L	100**	34	98	NC	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	4.5	62	NC	NC	NC	< 2	< 2	< 2	4	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000[E]	NC	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 2
Summary of Groundwater Sampling Results (Analytical): March 2022
First Quarter 2022 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Chronic-Based Mixing Zone GSI Criteria^	Acute-Based Mixing Zone GSI Criteria^	Sample Location: MW-52 Sample Date: 3/8/2022 Downgradient/ GSI	MW-53 3/8/2022 Downgradient/ GSI	MW-53R 3/8/2022 Downgradient/ GSI	MW-54R 3/9/2022 Downgradient/ GSI	MW-55 3/7/2022 Downgradient/ GSI	OW-57ROUT 3/9/2022 Downgradient
Appendix III[(1)]													
Boron	ug/L	NC	**500**	**500**	7,200	44,000	69,000	**1,310**	**4,100**	**2,330**	**4,720**	**826**	**2,030**
Calcium	mg/L	NC	NC	NC	500[EE]	NC	NC	251	146	188	186	163	126
Chloride	mg/L	250**	250[E]	250[E]	500	NC	NC	51.6	81.1	39.9	49.8	20.2	62.5
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	**500[EE]**	NC	NC	**654**	39.5	71.7	67.1	35.4	83.1
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	NC	NC	**1,520**	**768**	**709**	**776**	**808**	**1,030**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	NC	NC	7.1	7.4	7.1	6.9	7.1	7.2
Appendix IV[(1)]													
Antimony	ug/L	6	6.0	6.0	130	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	100	680	< 1	1	10	1	**88**	< 1
Barium	ug/L	2,000	2,000	2,000	670	NC	NC	170	401	203	154	299	85
Beryllium	ug/L	4	4.0	4.0	6.7	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	3.0	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	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
Lead	ug/L	NC	4.0	4.0	29	NC	NC	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	NC	NC	27	48	56	74	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	3,200	NC	NC	< 5	< 5	< 5	7	**89**	8
Selenium	ug/L	50	50	50	5.0	55	120	2	3	2	2	1	1
Thallium	ug/L	2	2.0	2.0	3.7	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	**2,870**	**1,130**	**1,080**	**496**	**29,800**	96
Copper	ug/L	1,000**	1,000[E]	1,000[E]	NC	NC	NC	1	< 1	2	1	< 1	2
Nickel	ug/L	NC	100	100	NC	NC	NC	< 2	< 2	< 2	< 2	4	17
Silver	ug/L	100**	34	98	NC	NC	NC	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	4.5	62	NC	NC	NC	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000[E]	NC	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 Field Parameters: March 2022
First Quarter 2022 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	3/7/2022	1.03	-200.0	6.8	2,982	10.4	2.0
JCW-MW-18004	3/7/2022	4.99	-25.8	6.9	1,691	3.6	3.0
JCW-MW-18005	3/7/2022	1.29	-108.5	7.1	1,410	6.1	14.0
JCW-MW-18006	3/7/2022	0.99	-151.5	7.1	1,385	7.7	1.8
MW-50	3/8/2022	1.19	-149.8	7.4	1,508	7.5	5.0
MW-51	3/8/2022	1.38	-119.5	7.4	2,100	6.4	3.0
MW-52	3/8/2022	0.90	-140.0	7.1	2,034	7.4	5.0
MW-53	3/8/2022	1.28	-129.0	7.4	1,360	6.8	2.0
MW-53R	3/8/2022	1.29	-129.5	7.1	1,430	7.3	4.8
MW-54R	3/9/2022	1.90	-60.5	6.9	1,317	5.1	1.9
MW-55	3/7/2022	1.16	-139.5	7.1	1,453	6.0	3.0
OW-57ROUT	3/9/2022	4.95	-30.5	7.2	1,297	4.8	4.2

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
Summary of Confidence Interval Evaluation: March 2022
First Quarter 2022 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**	1,200	**790**	1,300	**1,100**	4,100	**2,600**	2,100	**1,400**	6,200	**1,700**	880	550	2,200	**1,700**	1,700	**1,300**	--	**--**	1,200	**980**	3,100	**2,300**
Calcium	mg/L	280	380	190	340	270	--	--	180	90	--	--	--	--	--	--	--	--	480	280	310	230	320	150	--	--
Sulfate	mg/L	780	1,100	510	--	--	--	--	--	**--**	--	--	--	--	--	--	--	--	1,300	580	--	**--**	550	170	--	--
Arsenic	ug/L	21	--	--	--	--	--	--	--	--	34	15	--	--	--(1)	--(1)	--	--	38	0.50	--	--	--	--	33	18
Molybdenum	ug/L	73	--	--	--	--	--	--	--	--	--	--	--	--	--(1)	--(1)	--	--	--	--	--	--	--	--	--	--
Iron	ug/L	28,000	--	--	--	--	--	--	--	--	--	--	--	--	41,000	21,000	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/L	6	--	--	--	--	--	--	--	--	--	--	--	--	--	**--**	--	--	12	2.0	--	--	--	--	--	--

GSI Statistical Evaluation

Constituent	Units	GSI	MW-55	
			UCL	LCL
Arsenic	ug/L	100	190	90
Molybdenum	ug/L	120	210	120

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, January 2022); therefore, confidence intervals were not calculated

Table 5
Mass Flux Calculations
First Quarter 2022 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Karn-Weadock Mixing Zone Compliance

Saginaw Bay Static Water Elevation: 579.57 2/28/2022

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)	Total Loading (µg/day)	**Molybdenum 120 µg/L** total volume x concentration: Concentration[4] (µg/L)	Total Loading (µg/day)
Non-Adjacent Zone														
MW-54R	510	579.79	576.3	2.50	55	1,275		0.0040	3.62E+00	1.03E+02	1	1.03E+02	7	7.18E+02
JCW-MW-18004	820	579.85	579.9	-0.05	45	-41		0.0062	0.00E+00	0.00E+00	1	0.00E+00	5	0.00E+00
MW-55	1,220	579.47	578.0	1.47	45	1,793		-0.0022	0.00E+00	0.00E+00	88	0.00E+00	89	0.00E+00
JCW-MW-18005	1,120	581.01	578.5	1.25	120	1,400		0.0120	1.19E+01	3.38E+02	5	1.69E+03	5	1.69E+03
Discharge Channel														
JCW-MW-18001	1,010	579.73	574.8	3.75	40	3,788	7.1E-01	0.0040	1.08E+01	3.05E+02	1	3.05E+02	5	1.52E+03
MW-50	970	579.73	574.31	4.50	45	4,365		0.0036	1.10E+01	3.12E+02	2	6.24E+02	6	1.87E+03
Adjacent Zone														
MW-51	1,850	579.61	575.3	4.31	60	7,974		0.0007	3.77E+00	1.07E+02	12	1.28E+03	5	5.34E+02
MW-52	740	579.67	575.79	3.88	55	2,871		0.0018	3.71E+00	1.05E+02	1	1.05E+02	5	5.25E+02
MW-53	730	579.79	577.84	1.95	35	1,423		0.0063	6.35E+00	1.80E+02	1	1.80E+02	5	9.00E+02

ft^3 to liter is (ft^3 x 28.32)

Total Volume: 5.12E+01 ft^3/day; 1.45E+03 liter/day; 5.92E-04 ft^3/sec

	Arsenic	Molybdenum
Total (lbs/day):	9.43E-06	1.71E-05
Total (µg/day):	4,288	7,761

Chronic Loading Limits	Arsenic	Molybdenum
lb/day	3.19E-04	3.82E-04
kg/day	1.45E-04	1.74E-04
g/day	1.45E-01	1.74E-01
mg/day	1.45E+02	1.74E+02
µg/day	144,880	173,856

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
Synthetic Precipitation Leaching Procedure Results
First Quarter 2022 Quarterly Report
JC Weadock Landfill, Essexville, Michigan

Parameter	Reporting Limit	Units	DE Karn Ash Silo Samples - March 1, 2022			
			Fly Ash	Fly Ash	Fly Ash	Fly Ash
			Grab 1	Grab 2	Grab 3	Grab 4
Antimony	1	ug/L	<1	<1	<1	<1
Arsenic	1	ug/L	1	1	1	1
Barium	5	ug/L	420	1,900	1,600	2,600
Beryllium	1	ug/L	<1	<1	<1	<1
Boron	20	ug/L	170	94	180	150
Cadmium	0.2	ug/L	<0.2	<0.2	<0.2	<0.2
Chromium	1	ug/L	99	120	87	100
Cobalt	6	ug/L	<6	<6	<6	<6
Copper	2	ug/L	3	<2	<2	<2
Iron	20	ug/L	27	29	26	33
Lead	1	ug/L	<1	<1	<1	<1
Lithium	10	ug/L	12	21	21	21
Mercury	0.2	ug/L	<0.2	<0.2	<0.2	<0.2
Molybdenum	5	ug/L	100	110	160	200
Nickel	2	ug/L	12	9	9	8
Selenium	1	ug/L	49	41	49	54
Silver	0.2	ug/L	<0.2	<0.2	<0.2	<0.2
Sodium	1,000	ug/L	24,800	25,200	38,300	44,100
Thallium	2	ug/L	<2	<2	<2	<2
Vanadium	2	ug/L	39	69	39	41
Zinc	10	ug/L	<10	<10	<10	<10
Alkalinity, Bicarbonate	10,000	ug/L	<10,000	<10,000	<10,000	<10,000
Sulfate	2,000	ug/L	420,000	253,000	309,000	291,000

Notes:

ug/L = micrograms per liter

Table 7
Leachate Headwell Results
First Quarter 2022 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Parameter	Reporting Limit	Units	2022 Field Leachate	2021 Field Leachate	2020 Field Leachate		2019 Field Leachate	
			LH103R	LH104	LH103	LH104	LH103	LH104
Indicator Parameters								
Alkalinity, Bicarbonate	10,000	µg/L	1,200,000	351,000	202,000	886,000	189,000	194,000
Dissolved Oxygen	0.1	mg/L	1.16	0.49	1.35	1.32	0.26	0.36
O.R.P.	1	mV	-121.6	-119.6	-137.1	-88.8	-101.8	5.1
pH	0.05	S.U.	6.95	7.47	7.52	7.39	7.21	7.50
Specific Conductance	1	µS/cm	2,498	1,715	805	2,000	647	1,092
Metals								
Antimony	1	µg/L	<1	2	<1	<1	<1	5
Arsenic	1	µg/L	87	26	394	23	501	13
Barium	5	µg/L	589	266	334	474	246	116
Beryllium	1	µg/L	<1	<1	<1	<1	<1	<1
Boron	20	µg/L	8,240	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	<0.2
Chromium	1	µg/L	1	<1	<1	<1	3	<1
Cobalt	15	µg/L	<6	<6	<6	<6	<15	<15
Copper	1	µg/L	2	1	<1	1	<1	3
Iron	20	µg/L	17,800	285	5,220	414	3,480	51
Lead	1	µg/L	<1	<1	<1	<1	<1	<1
Lithium	10	µg/L	188	58	84	61	63	23
Mercury	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	--	--
Mercury (low-level)	0.5	ng/L	2.25	0.58	0.86	0.69	1.40	1.04
Molybdenum	5	µg/L	12	40	132	21	187	175
Nickel	2	µg/L	18	8	<2	6	2	<2
Selenium	1	µg/L	21	5	2	2	2	45
Silver	0.2	µg/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Sodium	1,000	µg/L	156,000	80,500	72,300	59,500	59,200	52,400
Sulfate	1,000	µg/L	94,800	178,000	<1,000	62,900	1,050	346,000
Thallium	2	µg/L	<2	<2	<2	<2	<2	<2
Vanadium	2	µg/L	5	28	<2	11	<2	59
Zinc	10	µg/L	<10	<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 8
EGLE Exceedance Summary Table
First Quarter 2022 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. 2022 (**bold** >201)	4 Qtr. 2021 (**bold** >201)	3 Qtr. 2021 (**bold** >201)	2 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:	APRIL 2022
PROJ. NO.:	464096
FILE:	464096-101-001.mxd

FIGURE 1

S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\3_WEADOCK\2022_MXDs\464096-101-001.mxd -- Saved By: AADAIR on 4/18/2022, 08:41:05 AM

LEGEND

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

0 600 1,200 Feet

1 " = 600 '
1:7,200

N

PROJECT:
CONSUMERS ENERGY COMPANY
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:
SITE MAP

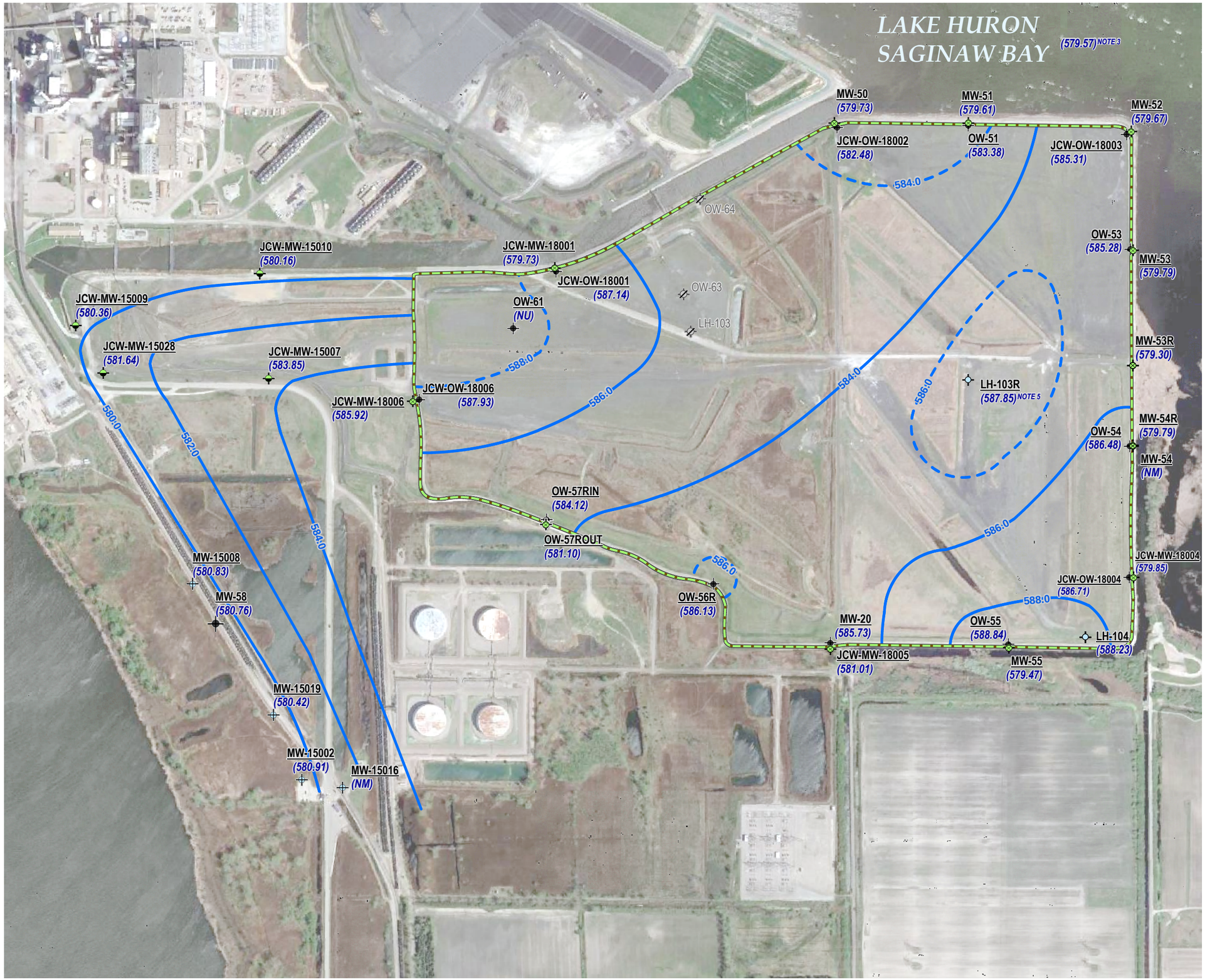
DRAWN BY:	A. ADAIR	PROJ NO.:	464096
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		**FIGURE 2**
DATE:	APRIL 2022		

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

FILE NO.: 464096-102-002.mxd

Plot Date: 4/27/2022, 15:31:26 PM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 26976713 WEADOCK\2022 MXDs\FEBRUARY 2022\464096-102-002.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
Plot Date: 4/27/2022, 13:45:27 PM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 26976713 WEADOCK\2022 MXDs\FEBRUARY 2022\464096-103-003.mxd



LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED 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.
5. STATIC WATER LEVEL MEASURED ON 3/11/2022.

0 600 1,200 Feet

1 " = 600 '
1:7,200

PROJECT:
CONSUMERS ENERGY COMPANY
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:
POTENTIOMETRIC SURFACE MAP FEBRUARY 2022

DRAWN BY:	A. ADAIR	PROJ NO.:	464096
CHECKED BY:	J. KRENZ		
APPROVED BY:	L. DARBY		**FIGURE 3**
DATE:	APRIL 2022		

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

FILE NO.: 464096-103-003.mxd

Appendix A
Static Water Level Evaluation

Table A1

Static Water Levels for Select Perimeter Dike Monitoring Wells and NOAA Staff Gauge

First Quarter 2022 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	2/28/2022	579.73	579.56	0.17
MW-51	2/28/2022	579.61		0.05
MW-52	2/28/2022	579.67		0.11
MW-53	2/28/2022	579.79		0.23
MW-53R	2/28/2022	579.30		-0.26
MW-54R	2/28/2022	579.79		0.23
MW-55	2/28/2022	579.47		-0.09
JCW-MW-18004	2/28/2022	579.85		0.29
Average:		**579.65**		

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 2022 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	587.14		22.37	3.31E-01	2.00	2.88	1,010	2.30E-08	0.33	2,904	6.27E-02	0.47	171
JCW-MW-18001		579.73			3.75								
JCW-OW-18002	582.48		28.87	9.53E-02	4.00	4.25	970		0.10	4,123	2.56E-02	0.19	70
MW-50		579.73			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	583.38		14.38	2.62E-01	4.00	4.16	1,850	2.30E-08	0.26	7,687	1.31E-01	0.98	359
MW-51		579.61			4.31								
JCW-OW-18003	585.31		33.85	1.67E-01	3.50	3.69	740		0.17	2,731	2.97E-02	0.22	81
MW-52		579.67			3.88								
OW-53	585.28		20.14	2.73E-01	1.25	1.60	730		0.27	1,168	2.08E-02	0.16	57
MW-53		579.79			1.95								

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	586.48		21.23	3.15E-01	2.00	2.25	510	2.30E-08	0.32	1,148	2.36E-02	0.18	64
MW-54R		579.79			2.50								
JCW-OW-18004	586.71		26.59	2.58E-01	8.00	3.98	820		0.26	3,260	5.48E-02	0.41	150
JCW-MW-18004		579.85			-0.05								
OW-55	588.84		23.95	3.91E-01	2.00	1.74	1,220		0.39	2,117	5.40E-02	0.40	147
MW-55		579.47			1.47								
MW-20	585.73		40.93	1.15E-01	1.50	1.38	1,120		0.12	1,540	1.16E-02	0.09	32
JCW-MW-18005		581.01			1.25								

Calculated Groundwater Discharge from JC Weadock (gal per day)	**=**	**3.10**
(cubic ft per day)	**=**	**0.41**
(cubic ft per min)		**2.9E-04**
Calculated Groundwater Discharge from JC Weadock (gal per yr)	**=**	**1,131**
(cubic ft per yr)	**=**	**151**
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)	**=**	**1.68E-02**

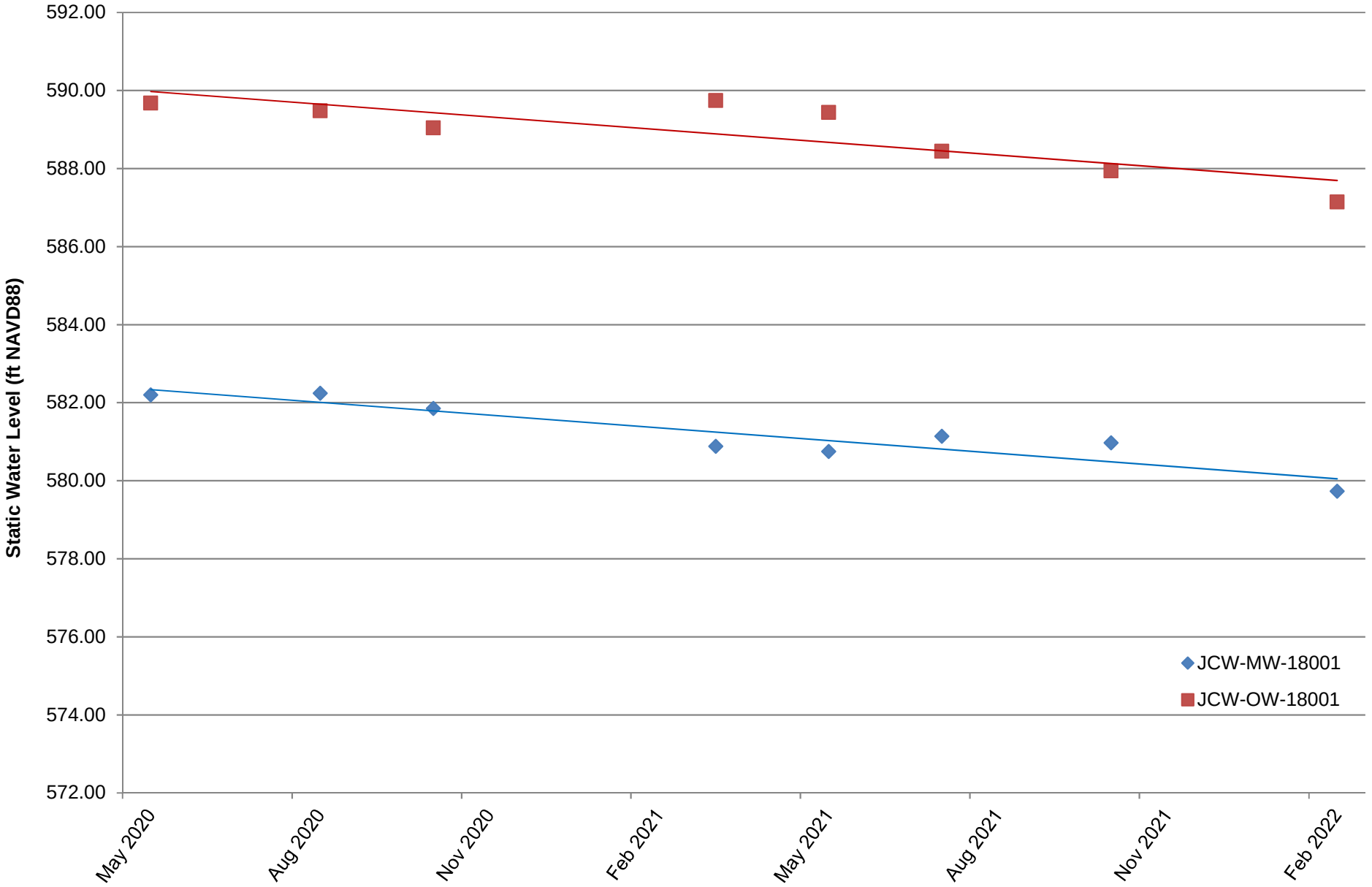
Notes:

Water level data collected on February 28, 2022 are shown by yellow cells:

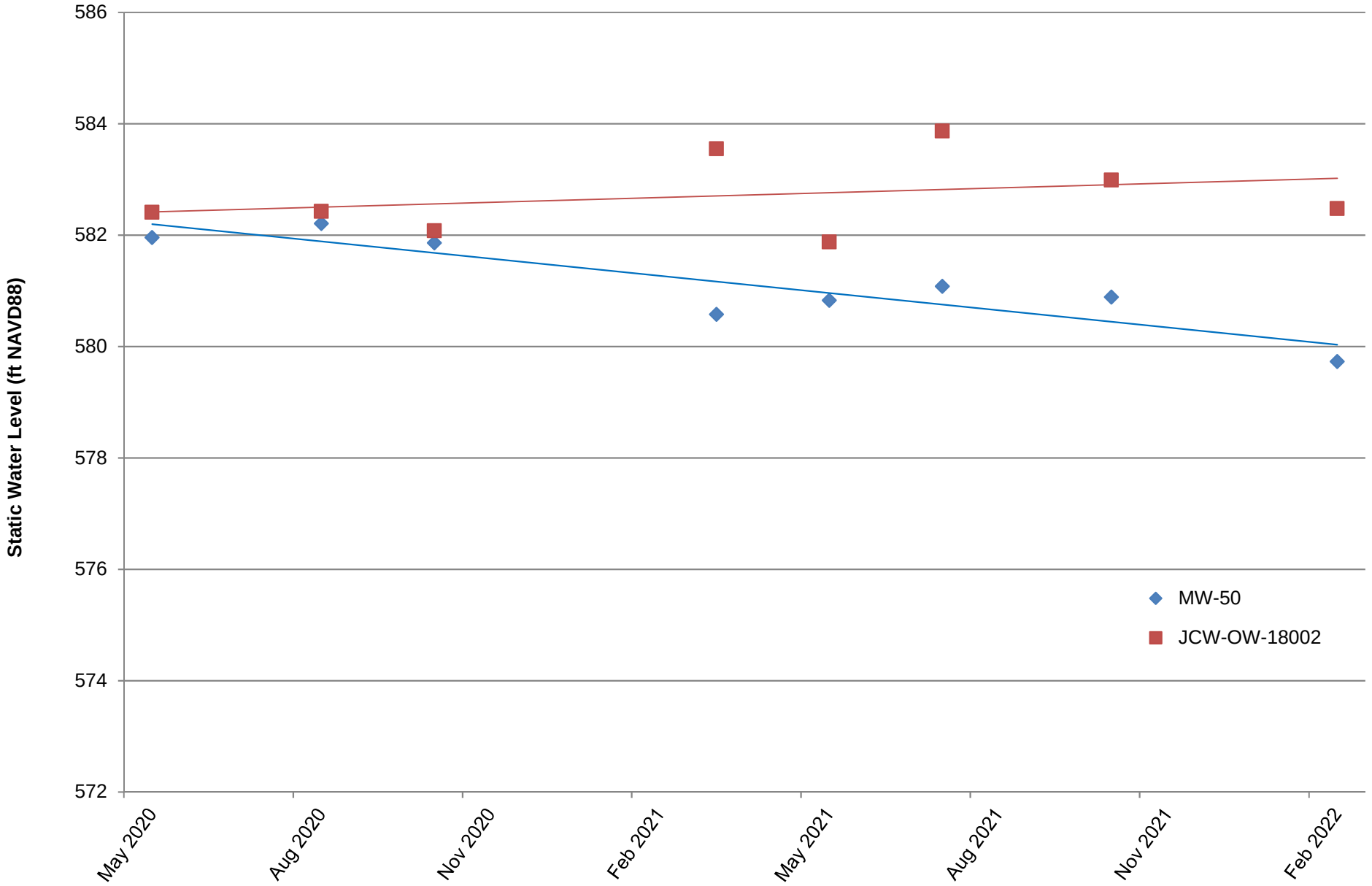
1. Monitoring Well Zones based on Phase II Evaluation, Appendix K Groundwater Discharge Calculations, September 30, 2005. Representative wells based on the Landfill Hydrogeological Monitoring Plan, February 2021.
2. Saturated thickness will be the thickness of the sand unit when the observed SWL is above 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

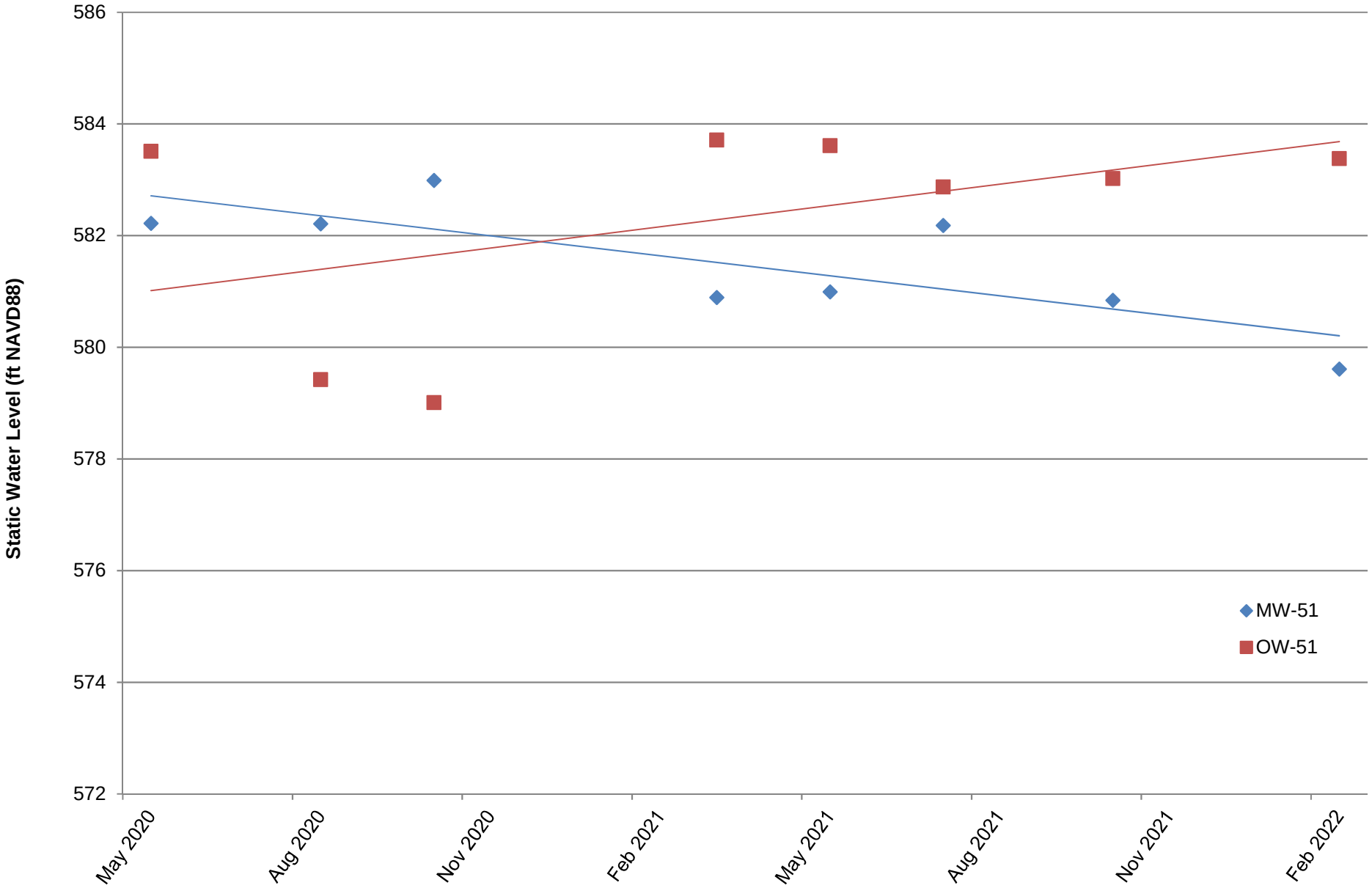
Appendix A
Static Water Level for JCW-MW-18001 and JCW-OW-18001



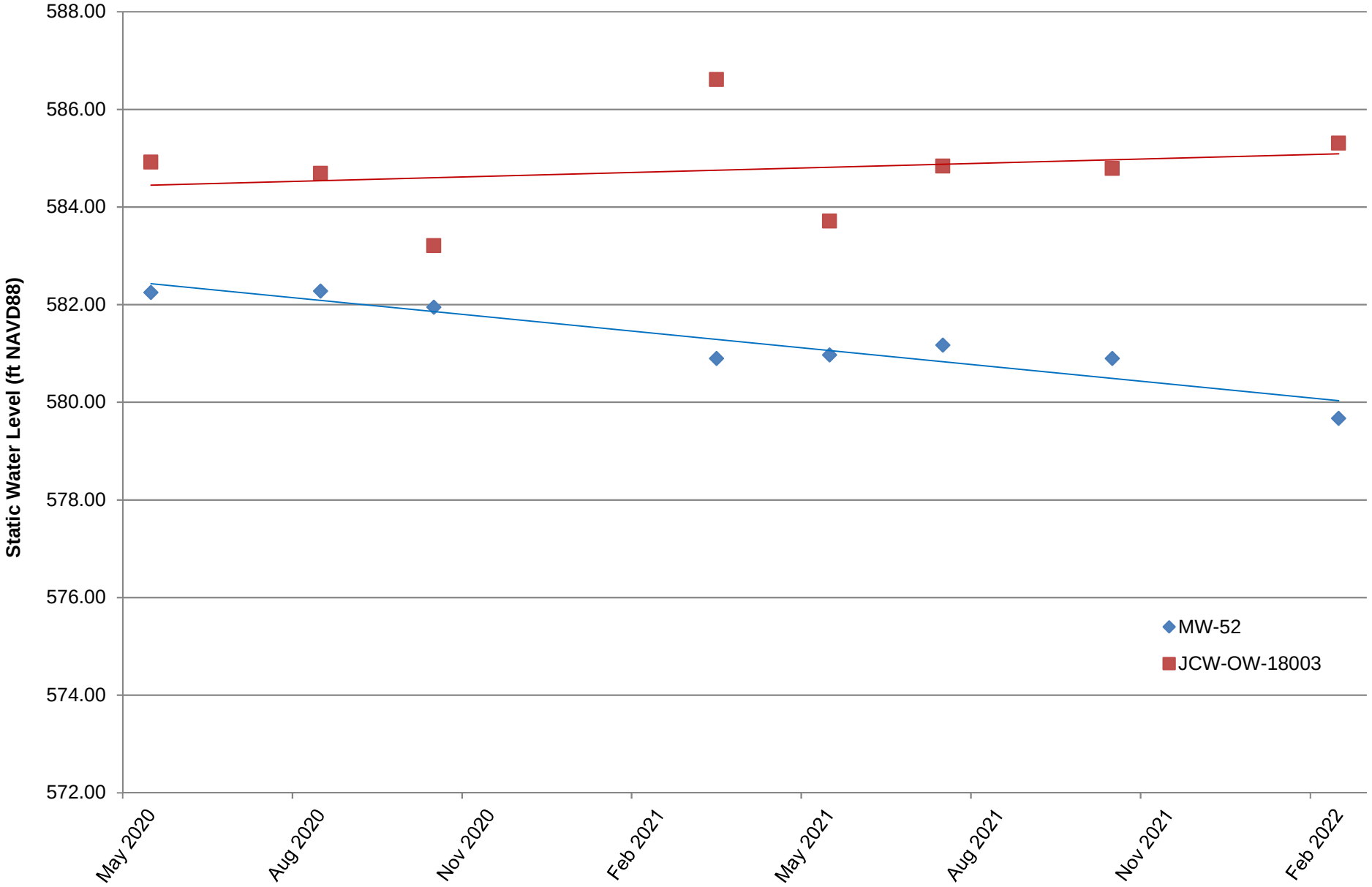
Appendix A
Static Water Level for MW-50 and JCW-OW-18002



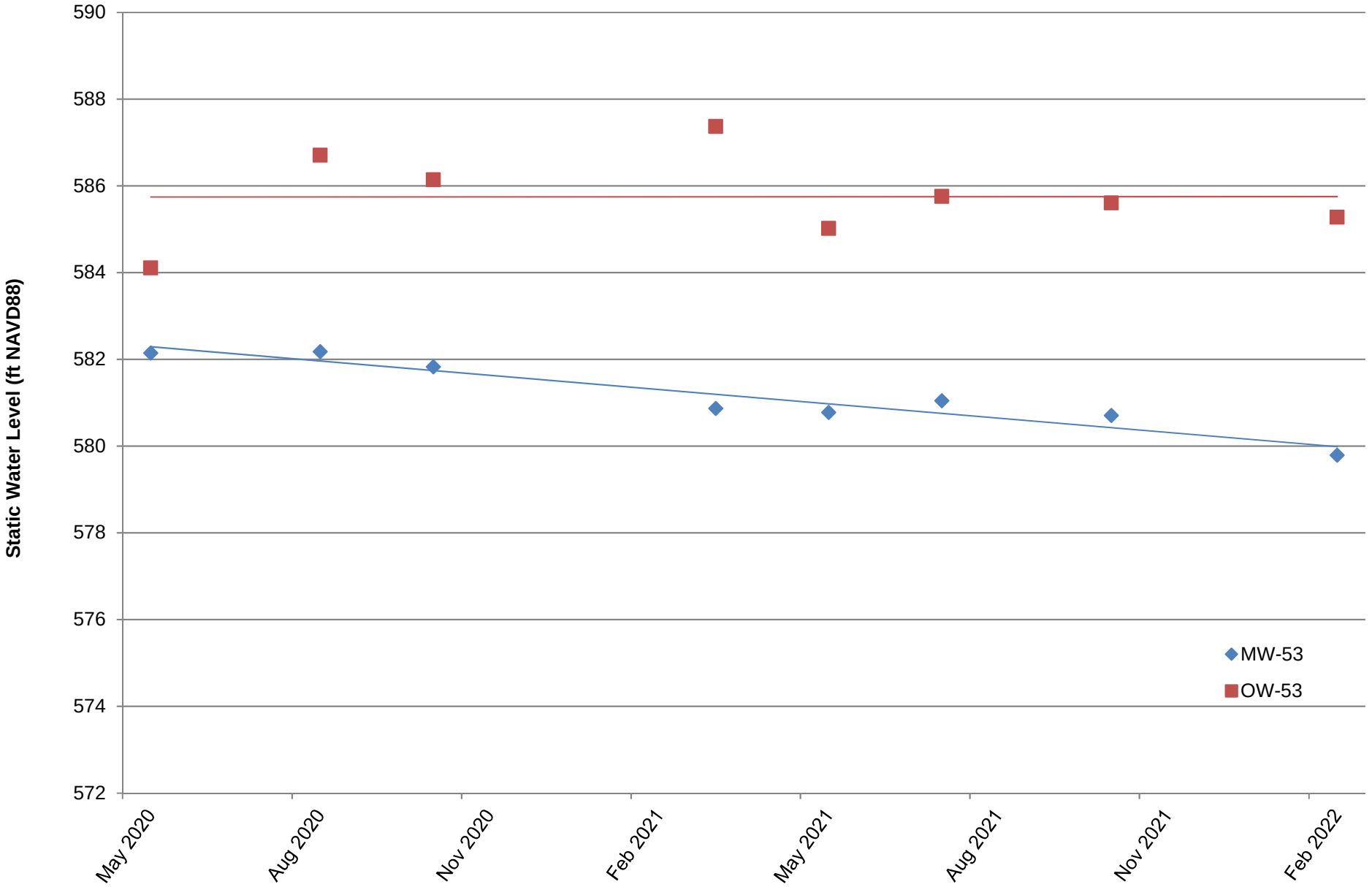
Appendix A
Static Water Level for MW-51 and OW-51



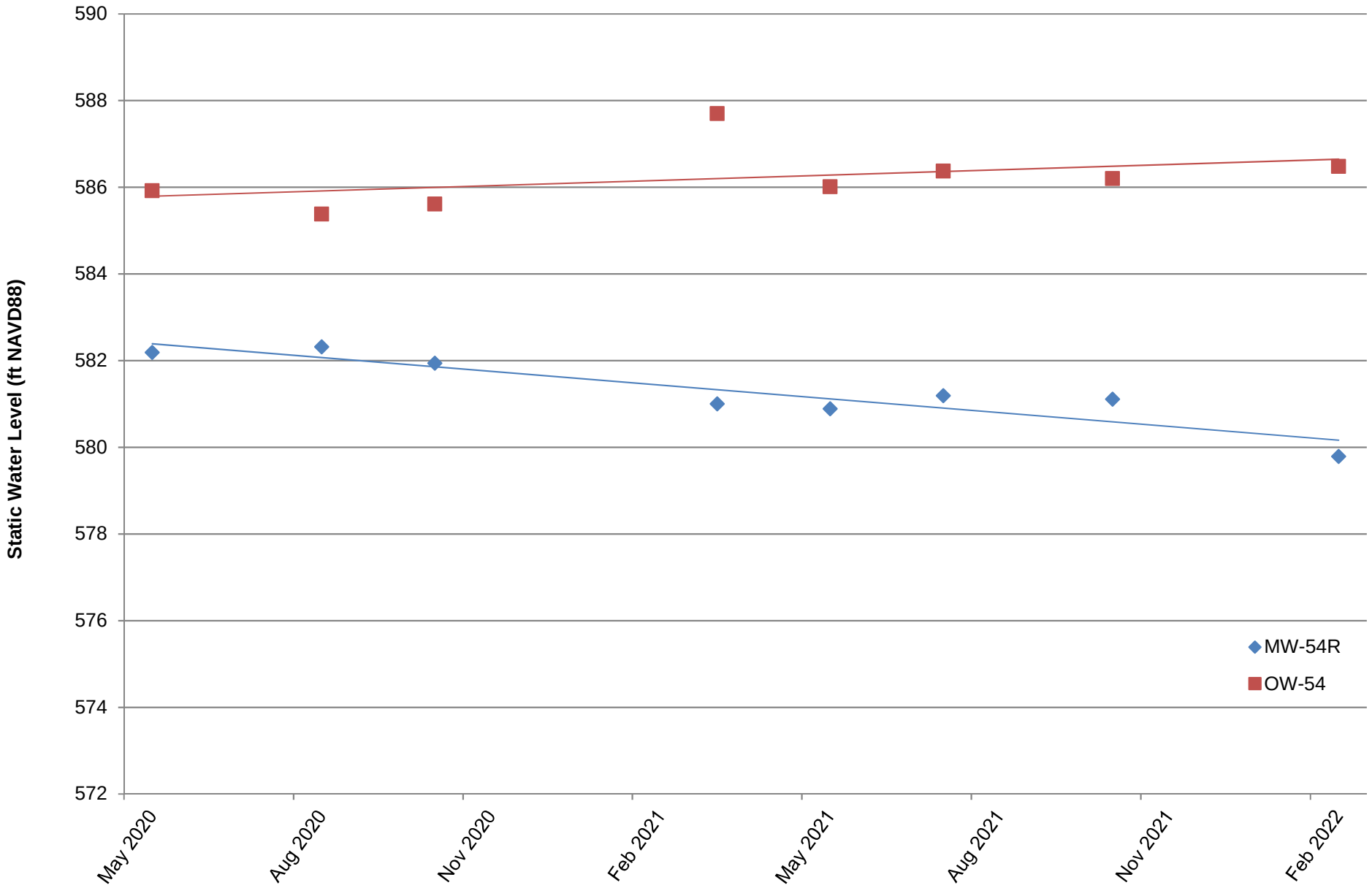
Appendix A
Static Water Level for MW-52 and JCW-OW-18003



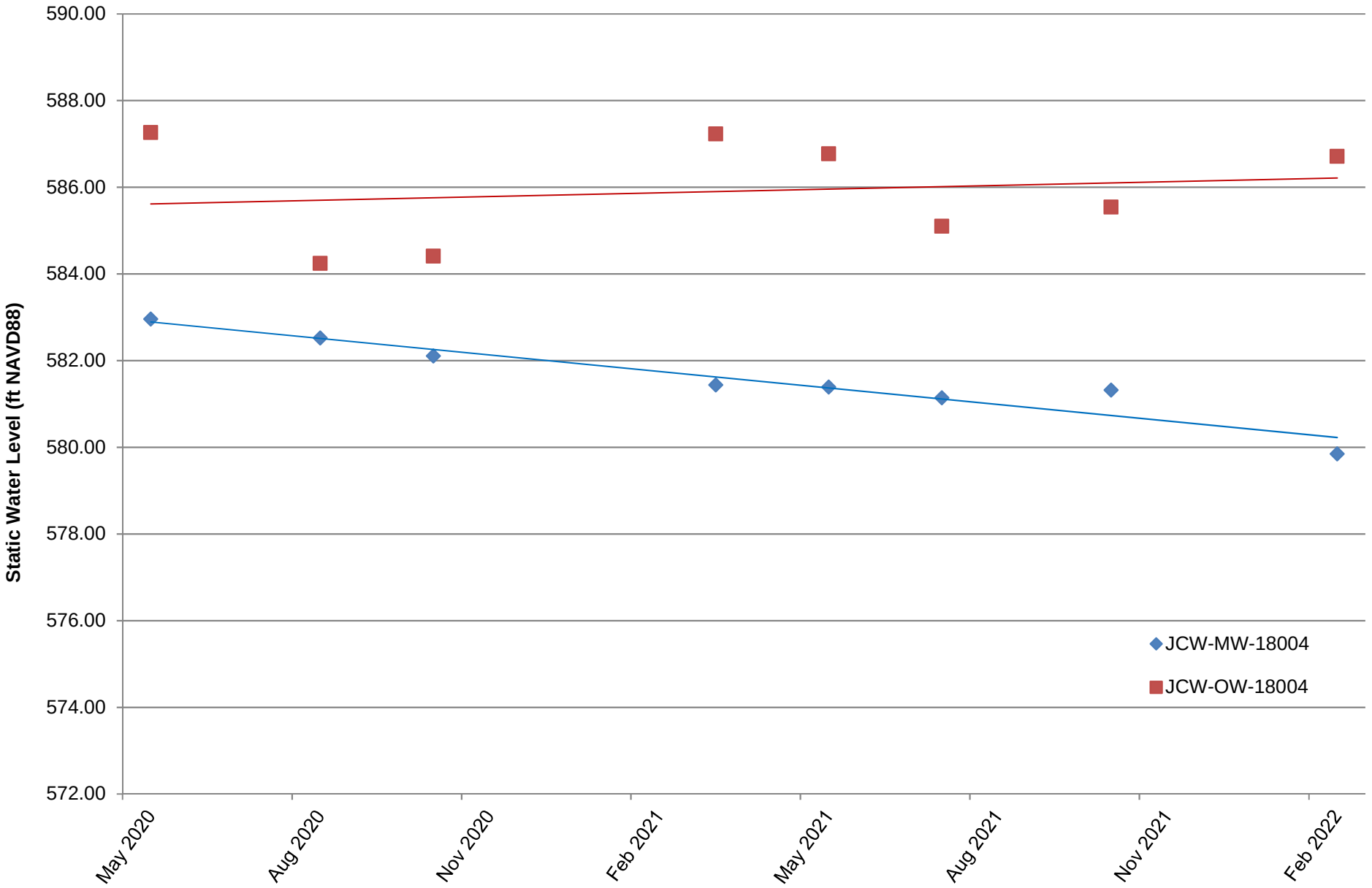
Appendix A
Static Water Level for MW-53 and OW-53



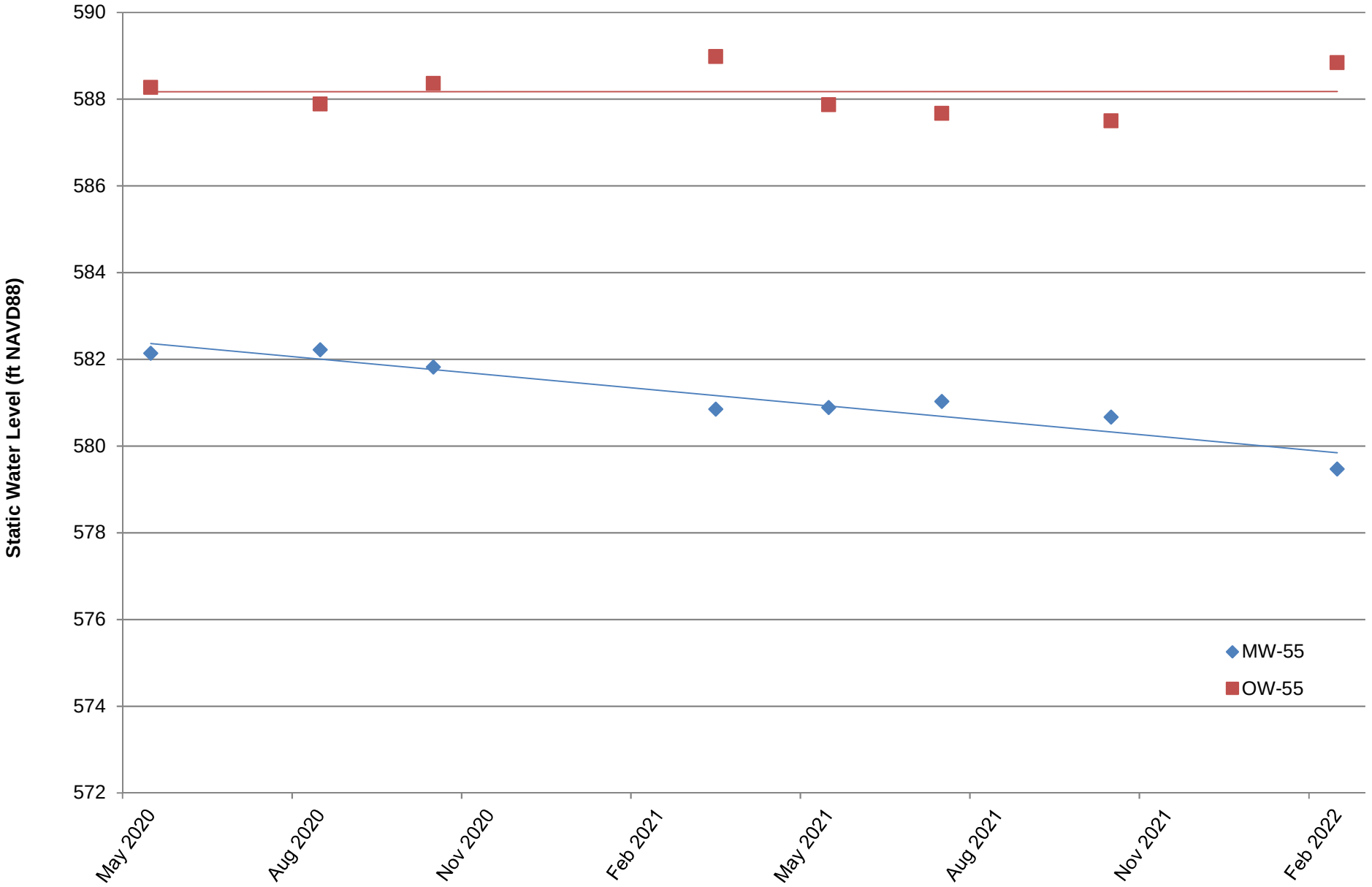
Appendix A
Static Water Level for MW-54R and OW-54



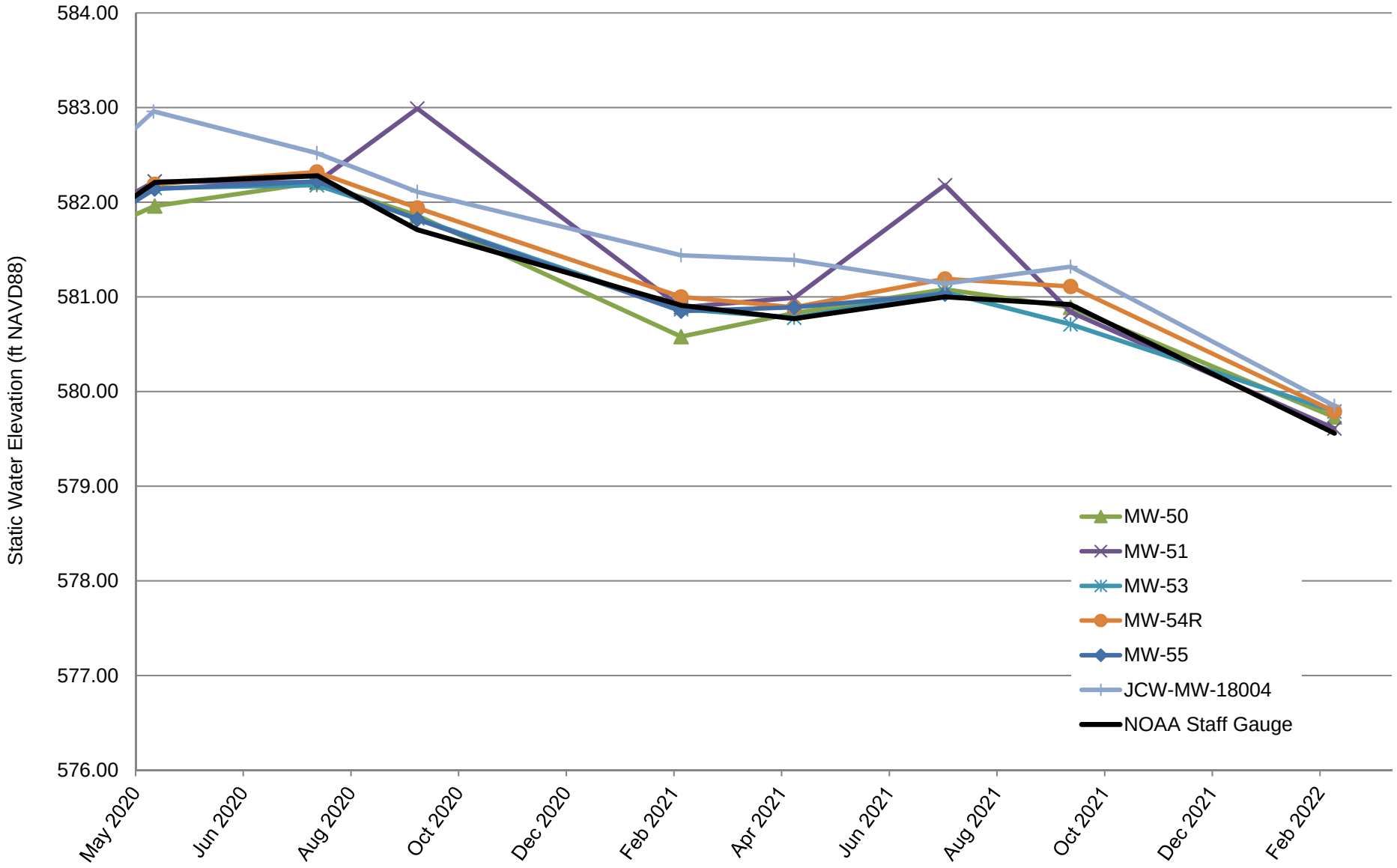
Appendix A
Static Water Level for JCW-MW-18004 and JCW-OW-18004



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 2022
JC Weadock Landfill

Porewater samples were collected by TRC for the March 2022 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) 22-0150.

During the March 2022 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-57R OUT

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, 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

- 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 were within the acceptance limits with one exception.
    - Molybdenum recovered above the acceptance limits (75-125%) in the MS/MSD (126%/128%) performed on this sample. Positive results for molybdenum in porewater samples are potentially biased high as summarized in the attached table, 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. However, since all recoveries, except molybdenum as noted above, were within the acceptance limits, there is no impact on data usability due to this issue.

- The field duplicate pair samples were DUP-JCW-LF-01/JCW-MW-18005 and DUP-JCW-LF-02/MW-50; all criteria between the parent and duplicate samples were within the QC limits with the following exception.
  - Nickel was not detected in sample MW-50 and was detected >5x the RL in the field duplicate sample, DUP-JCW-LF-02; the absolute difference was > the RL. Nickel was detected ≥5x the RL in sample JCW-MW-18005 and was detected >5x the RL in the field duplicate sample, DUP-JCW-LF-01; the RPD (85.7%) was >30. Therefore, the positive and nondetect results for nickel in all 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.

Attachment 1
Summary of Data Non-Conformances
JC Weadock, Landfill Wells – RCRA CCR Monitoring Program
Essexville, Michigan

Samples	Collection Date	Analytes	Non-Conformance/Issue
JCW-MW-18005	3/7/2022	Molybdenum	Potential high bias; high recoveries in matrix spike and matrix spike duplicate.
MW-50	3/8/2022		
MW-55	3/7/2022		
DUP-JCW-LF-01	3/7/2022		
DUP-JCW-LF-02	3/8/2022		
MW-54R	3/9/2022		
OW-57R OUT	3/9/2022		
JCW-MW-18001	3/7/2022	Nickel	Potential uncertainty; field duplicate variability.
JCW-MW-18004	3/7/2022		
JCW-MW-18005	3/7/2022		
JCW-MW-18006	3/7/2022		
MW-50	3/8/2022		
MW-51	3/8/2022		
MW-52	3/8/2022		
MW-53	3/8/2022		
MW-53R	3/8/2022		
MW-54R	3/9/2022		
MW-55	3/7/2022		
MW-58	3/7/2022		
DUP-JCW-LF-01	3/7/2022		
DUP-JCW-LF-02	3/8/2022		
OW-57R OUT	3/9/2022		

Laboratory Data Quality Review
Groundwater Monitoring Event March 2022
JC Weadock Landfill

A groundwater sample was collected by TRC for the March 2022 sampling event. The sample was analyzed for total metals, low-level mercury, 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) 22-0153R.

During the March 2022 sampling event, a groundwater sample was collected from the following well:

- LH-103R

The 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
Low-Level Mercury	EPA 1631E
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 (including low-level mercury), 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, as well as low-level mercury, 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-02), one trip blank (TB-01) and one equipment blank (EB-02) sample were collected. Low-level mercury was not detected in these blank samples.
- MS and MSD analyses were performed on sample LH-103R for low-level mercury. The recoveries were within the acceptance limits. The relative percent difference (RPD) was not provided by the laboratory and therefore was 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 LH-103R DUP and LH-103R; the RPD between the parent and duplicate samples was within the QC limit.
- 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 2022 Quarterly Report
Data from May 2020 to March 2022

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	↑*	↑*
Calcium	↑*	O	↓*	O	↓*	O
Chloride	O	O	O	O	↓*	O
Fluoride	O*	O*	O*	O*	O*	O*
Iron	O	O	O	O	O	O
pH/Corrosivity	↓	O	O	O	O	O
Sulfate	↑ ASD	O	O	O	↓*	↓*
Total Dissolved Solids	↑*	↓*	O	O	O	↓*

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
First Quarter 2022 Quarterly Report
Data from May 2020 to March 2022

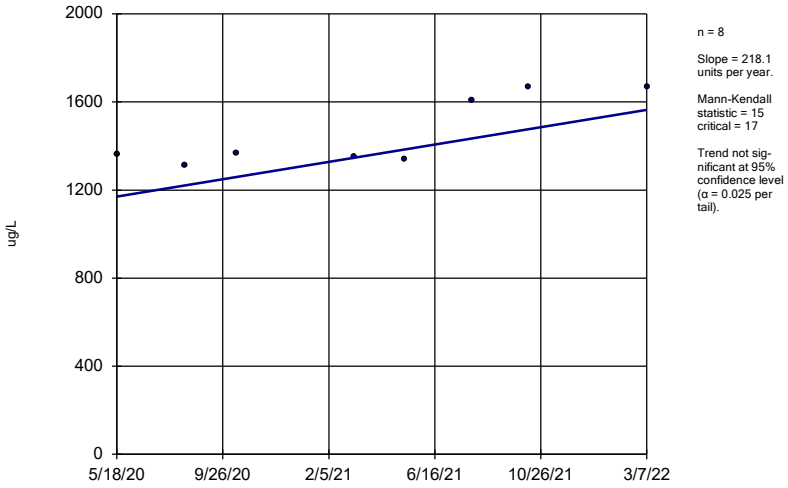
Porewater Monitoring Points						
PARAMETER	**MW-52**	**MW-53**	**MW-53R**	**MW-54R**	**MW-55**	**OW-57R OUT**
Boron	O	↑*	↑*	↑	↑	↑*
Calcium	O	↓*	O	O	O	O
Chloride	O	O	O	↑*	O	O
Fluoride	O*	O*	O*	O*	O*	O*
Iron	O	O	O	O	O	O
pH/Corrosivity	O	O	O	O	O	O
Sulfate	O	↓*	O	↓*	↓	O
Total Dissolved Solids	O	↓*	↓*	O	O	O

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.)

Boron, Total

JCW-MW-18001



n = 8

Slope = 218.1 units per year.

Mann-Kendall statistic = 15
critical = 17

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

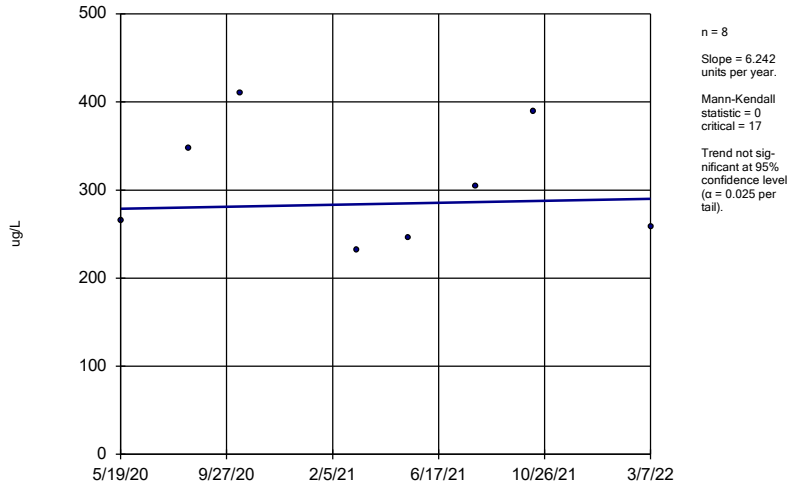
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

JCW-MW-18004



n = 8

Slope = 6.242 units per year.

Mann-Kendall statistic = 0
critical = 17

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

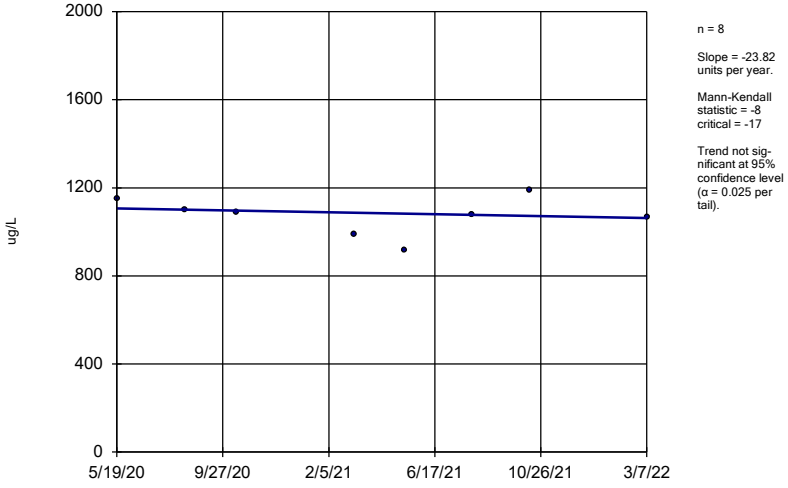
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

JCW-MW-18005



n = 8

Slope = -23.82 units per year.

Mann-Kendall statistic = -8
critical = -17

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

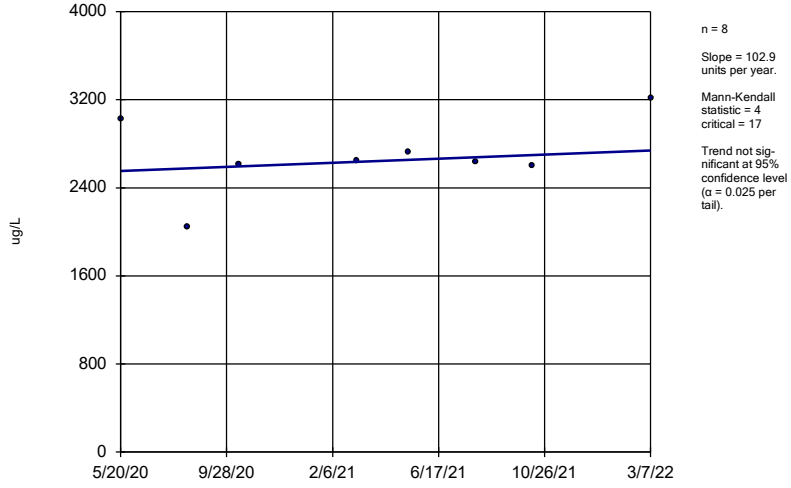
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

JCW-MW-18006



n = 8

Slope = 102.9 units per year.

Mann-Kendall statistic = 4
critical = 17

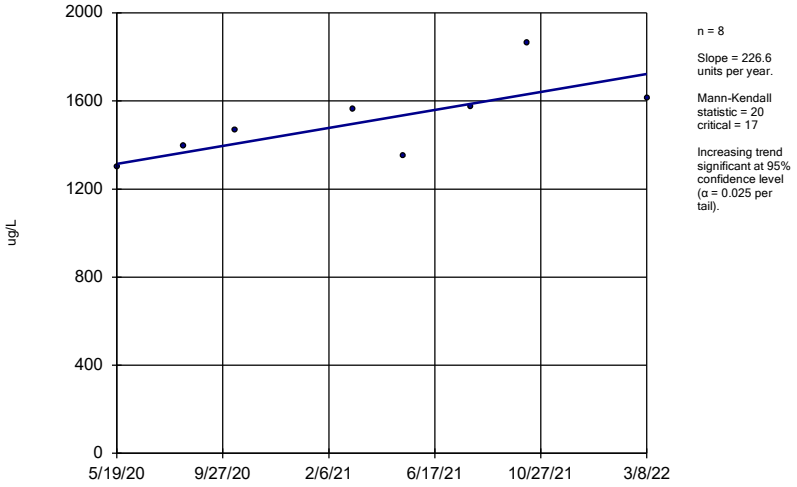
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Boron, Total

MW-50



n = 8

Slope = 226.6 units per year.

Mann-Kendall statistic = 20 critical = 17

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

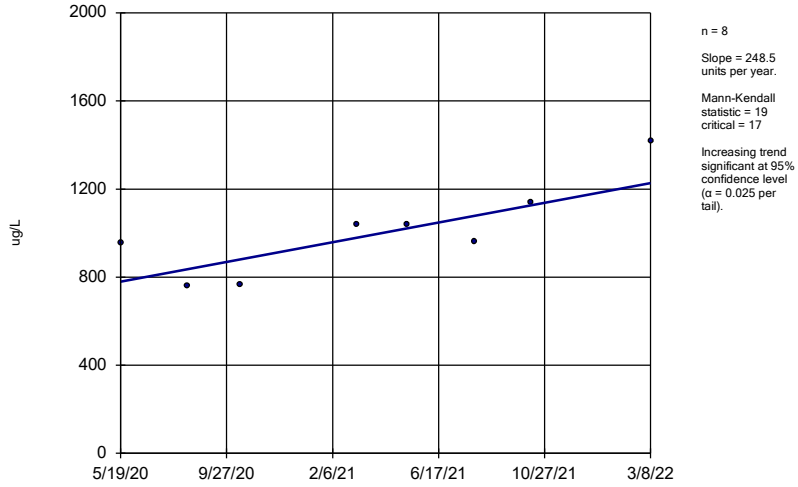
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

MW-51



n = 8

Slope = 248.5 units per year.

Mann-Kendall statistic = 19 critical = 17

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

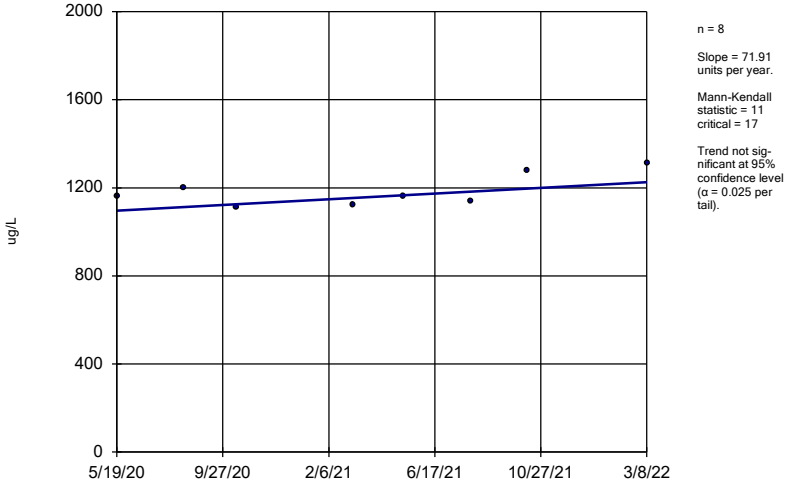
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

MW-52



n = 8

Slope = 71.91 units per year.

Mann-Kendall statistic = 11 critical = 17

Trend not sig-nificant at 95% confidence level (α = 0.025 per tail).

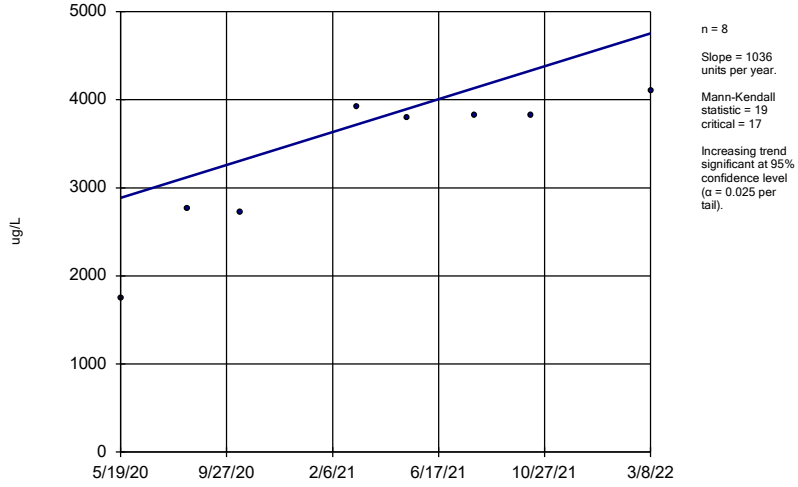
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

MW-53



n = 8

Slope = 1036 units per year.

Mann-Kendall statistic = 19 critical = 17

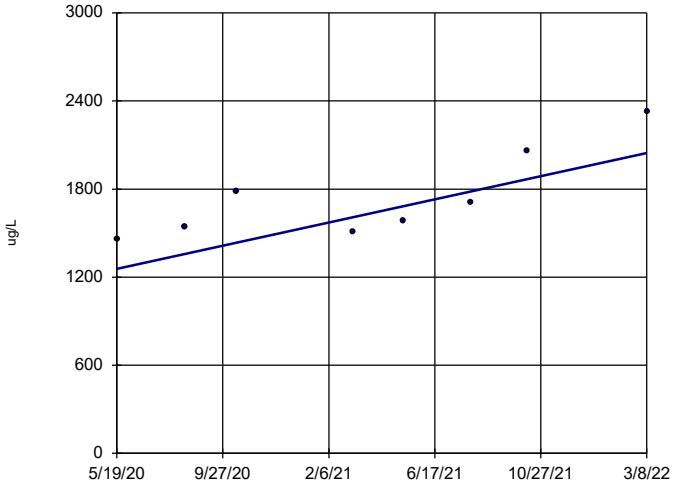
Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Boron, Total

MW-53R



n = 8

Slope = 437.5 units per year.

Mann-Kendall statistic = 20 critical = 17

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

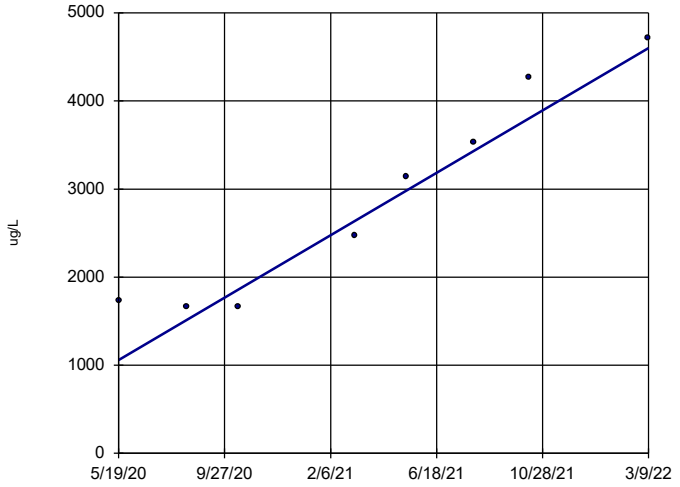
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

MW-54R



n = 8

Slope = 1961 units per year.

Mann-Kendall statistic = 23 critical = 17

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

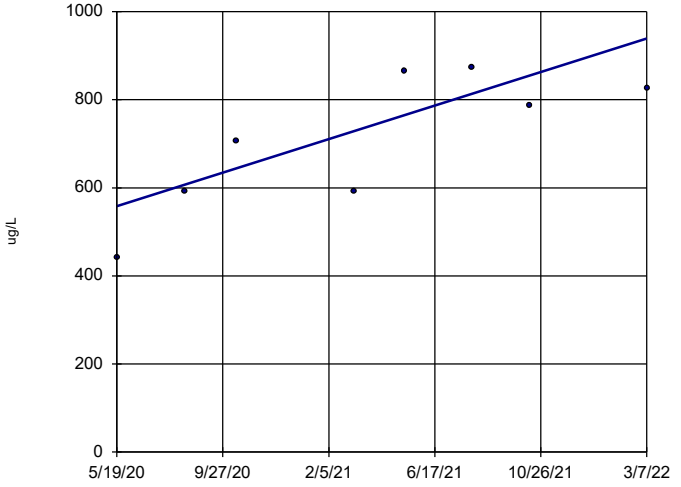
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

MW-55



n = 8

Slope = 211.6 units per year.

Mann-Kendall statistic = 18 critical = 17

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

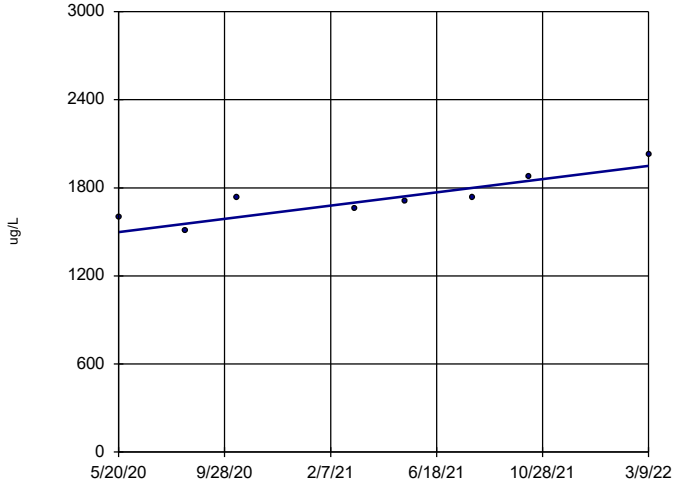
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

OW-57ROUT



n = 8

Slope = 249.6 units per year.

Mann-Kendall statistic = 21 critical = 17

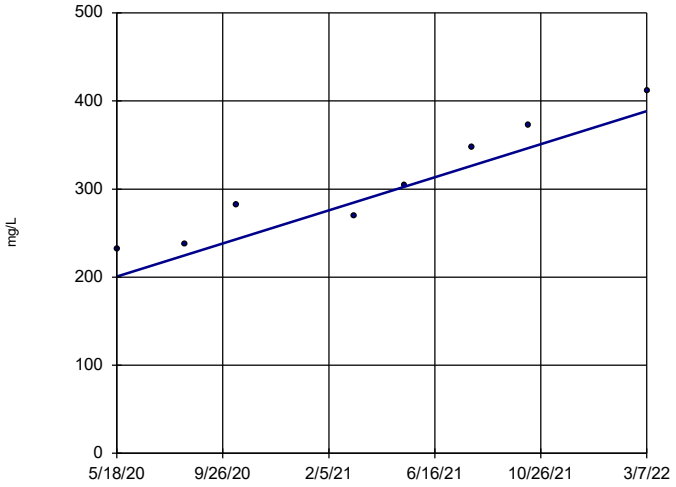
Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Calcium, Total

JCW-MW-18001



n = 8

Slope = 104.2 units per year.

Mann-Kendall statistic = 26
critical = 17

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

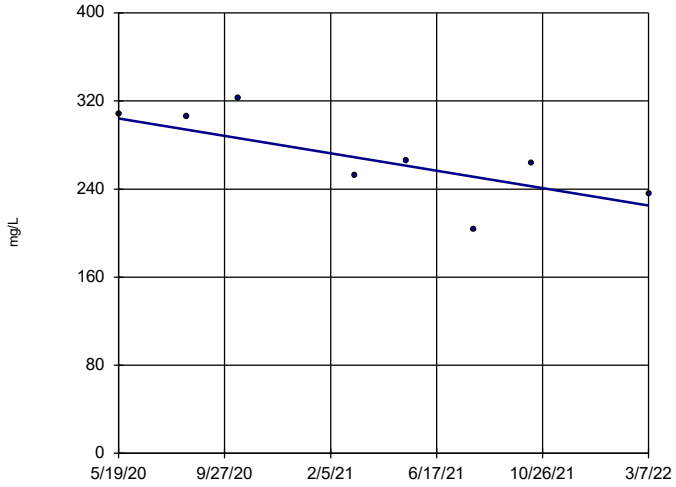
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

JCW-MW-18004



n = 8

Slope = -43.77 units per year.

Mann-Kendall statistic = -16
critical = -17

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

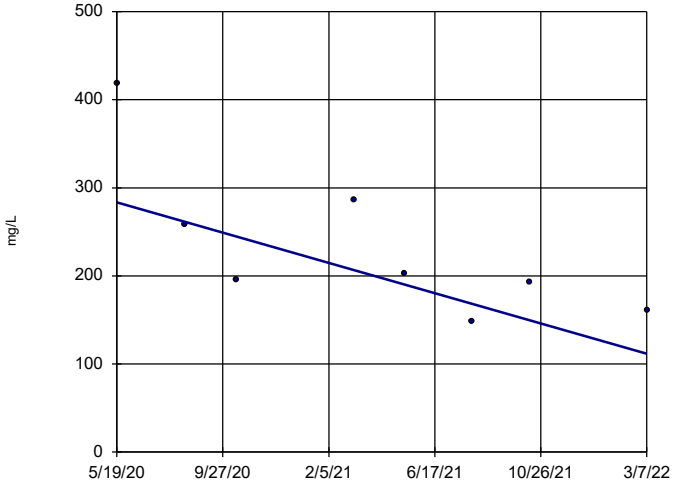
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

JCW-MW-18005



n = 8

Slope = -95.61 units per year.

Mann-Kendall statistic = -18
critical = -17

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

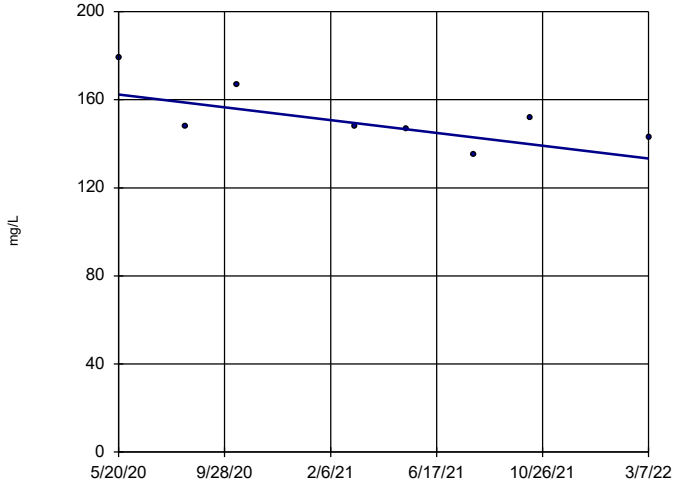
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

JCW-MW-18006



n = 8

Slope = -16.15 units per year.

Mann-Kendall statistic = -15
critical = -17

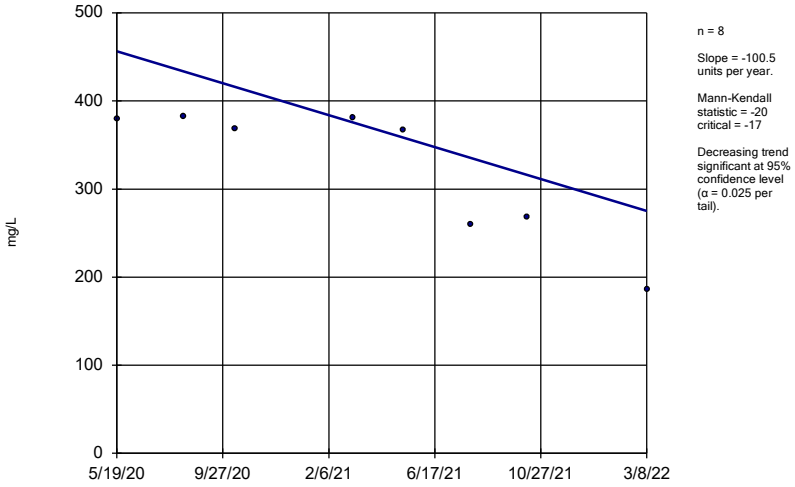
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Calcium, Total

MW-50



n = 8

Slope = -100.5 units per year.

Mann-Kendall statistic = -20 critical = -17

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

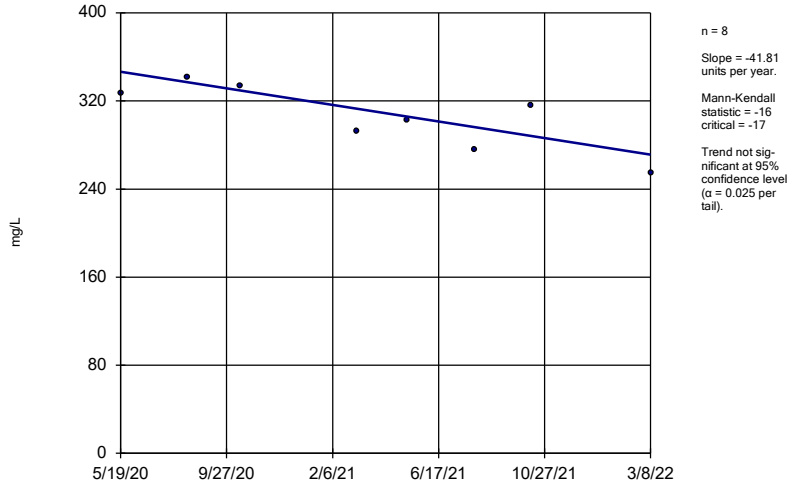
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

MW-51



n = 8

Slope = -41.81 units per year.

Mann-Kendall statistic = -16 critical = -17

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

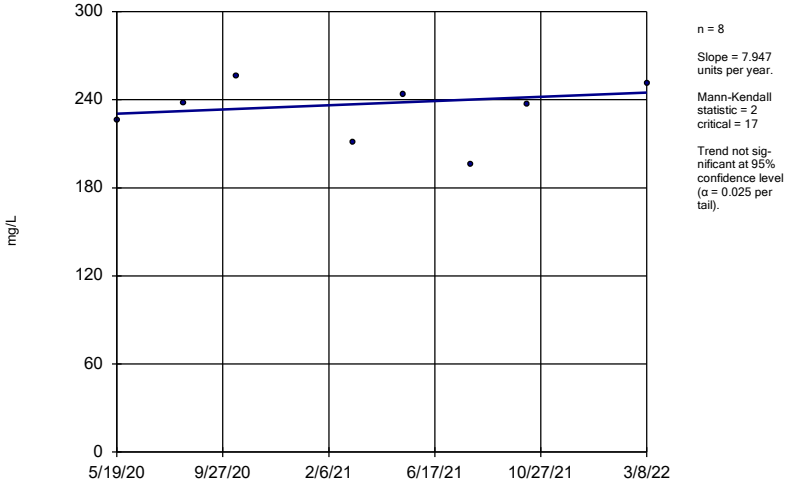
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

MW-52



n = 8

Slope = 7.947 units per year.

Mann-Kendall statistic = 2 critical = 17

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

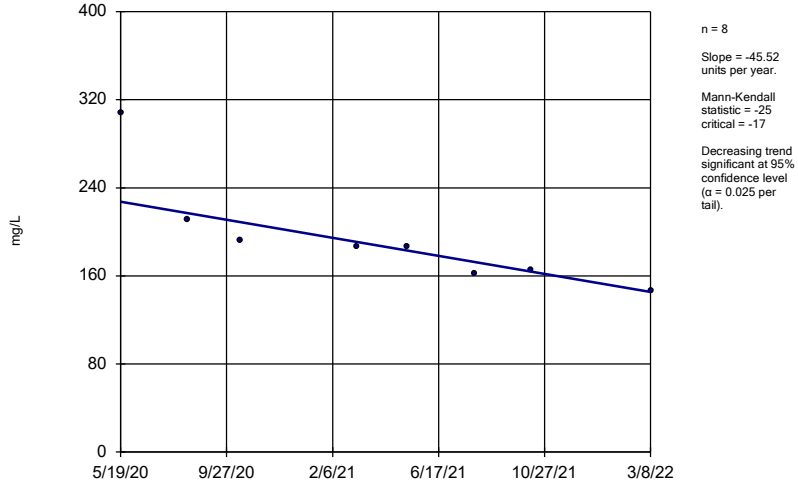
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

MW-53



n = 8

Slope = -45.52 units per year.

Mann-Kendall statistic = -25 critical = -17

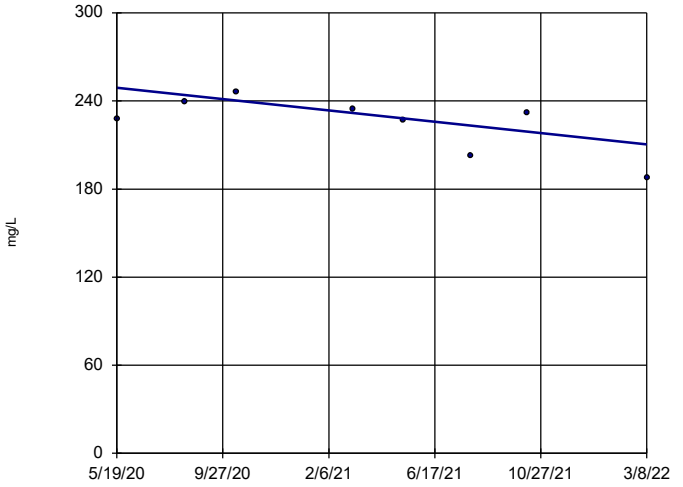
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Calcium, Total

MW-53R



n = 8

Slope = -21.46 units per year.

Mann-Kendall statistic = -14 critical = -17

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

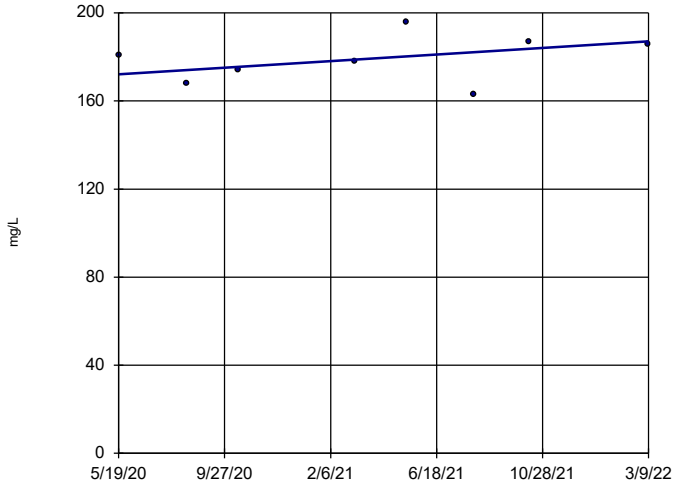
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

MW-54R



n = 8

Slope = 8.275 units per year.

Mann-Kendall statistic = 6 critical = 17

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

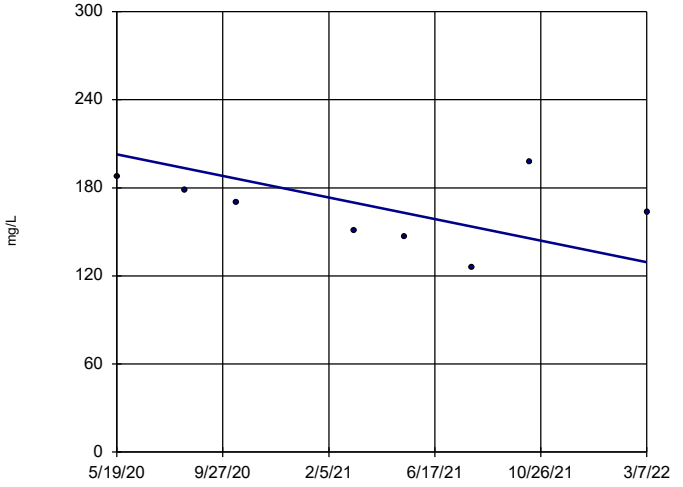
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

MW-55



n = 8

Slope = -40.81 units per year.

Mann-Kendall statistic = -10 critical = -17

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

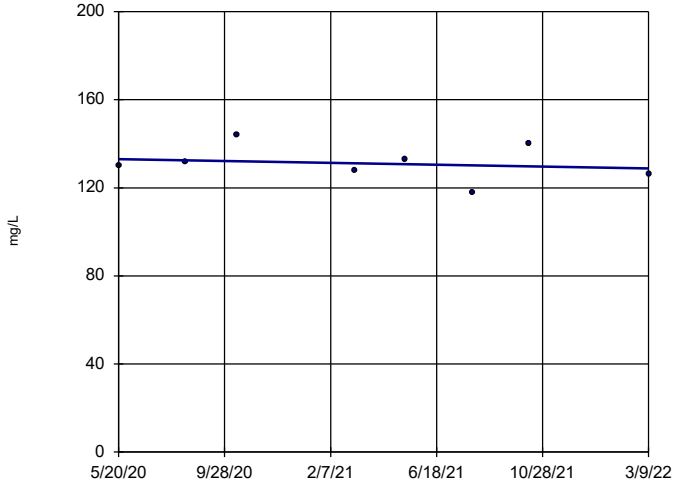
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

OW-57ROUT



n = 8

Slope = -2.355 units per year.

Mann-Kendall statistic = -4 critical = -17

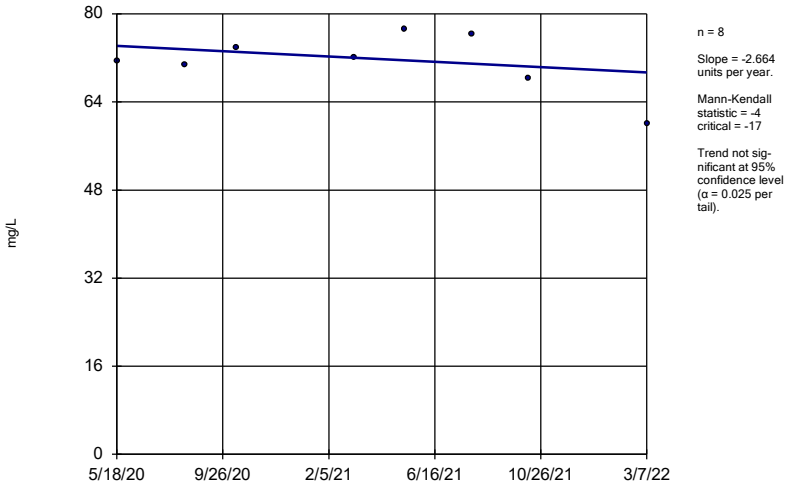
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Chloride

JCW-MW-18001



n = 8

Slope = -2.664 units per year.

Mann-Kendall statistic = -4
critical = -17

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

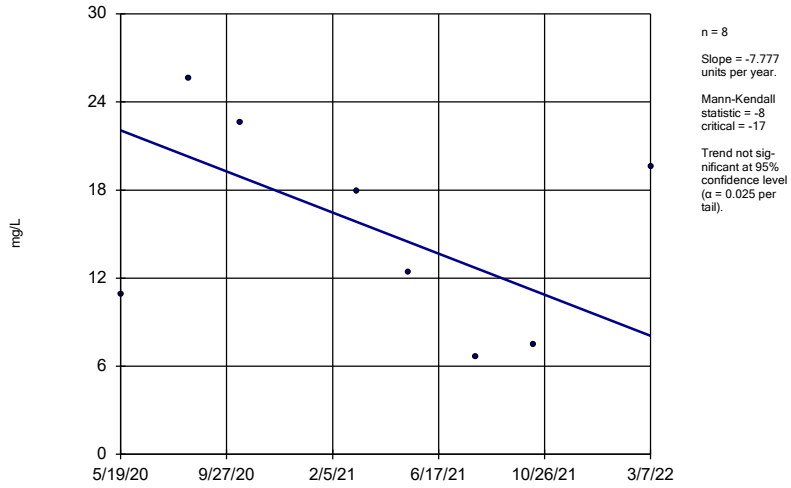
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

JCW-MW-18004



n = 8

Slope = -7.777 units per year.

Mann-Kendall statistic = -8
critical = -17

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

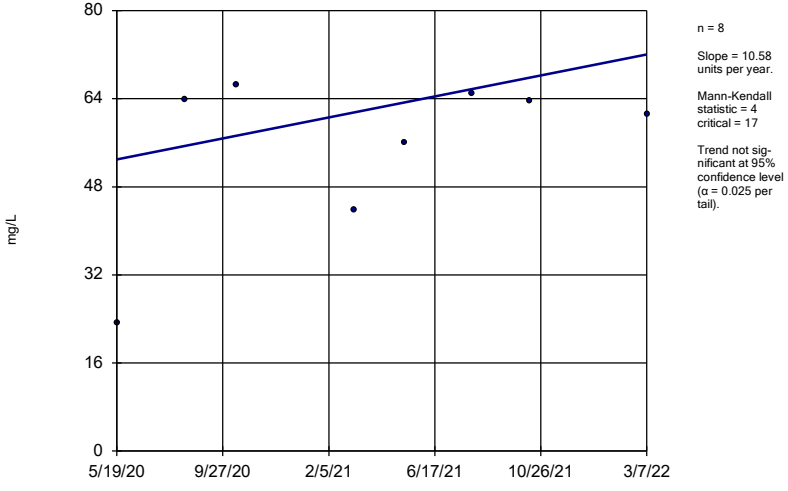
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

JCW-MW-18005



n = 8

Slope = 10.58 units per year.

Mann-Kendall statistic = 4
critical = 17

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

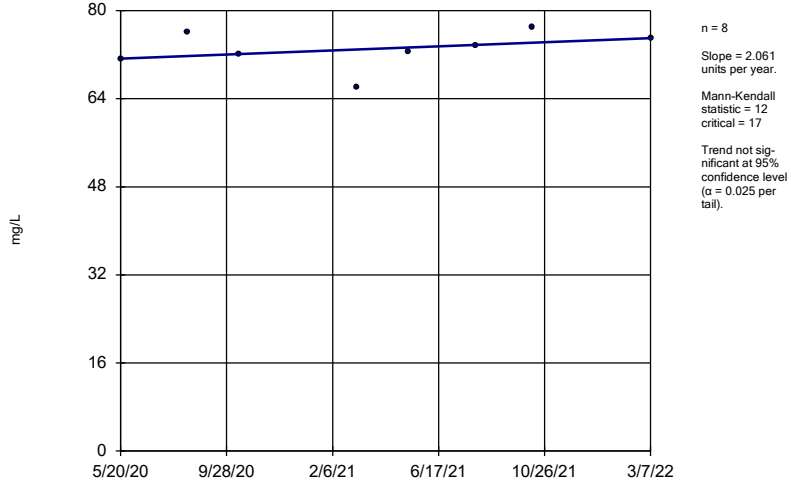
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

JCW-MW-18006



n = 8

Slope = 2.061 units per year.

Mann-Kendall statistic = 12
critical = 17

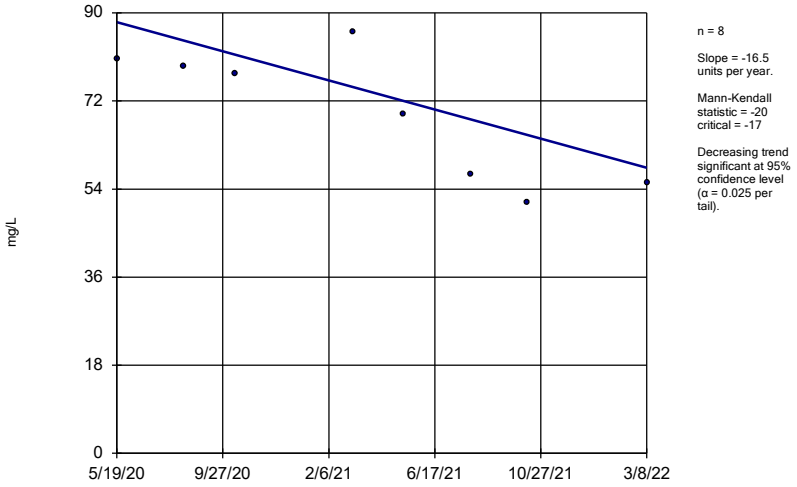
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Chloride

MW-50



n = 8

Slope = -16.5 units per year.

Mann-Kendall statistic = -20 critical = -17

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

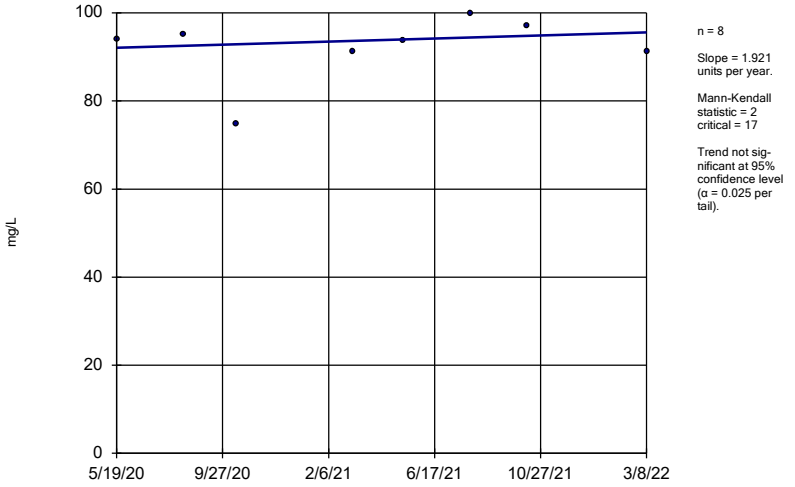
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

MW-51



n = 8

Slope = 1.921 units per year.

Mann-Kendall statistic = 2 critical = 17

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

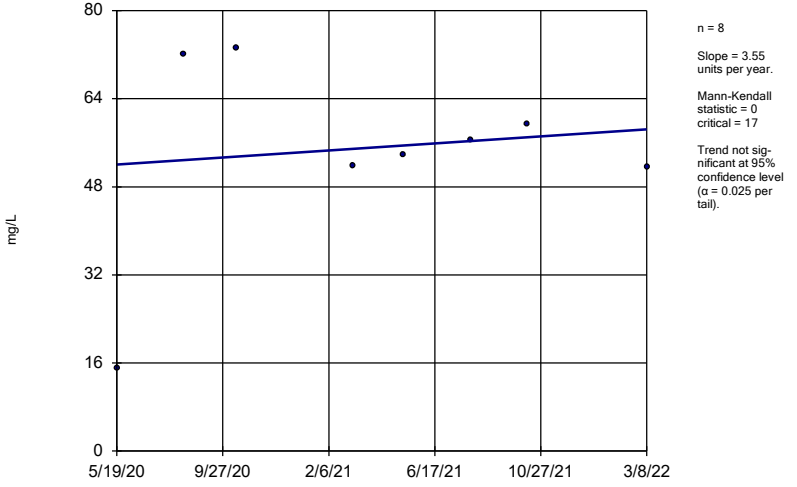
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

MW-52



n = 8

Slope = 3.55 units per year.

Mann-Kendall statistic = 0 critical = 17

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

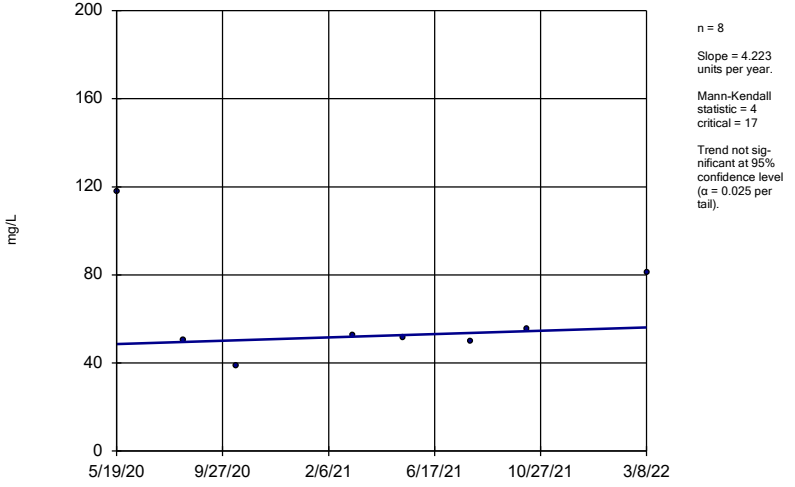
Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

MW-53



n = 8

Slope = 4.223 units per year.

Mann-Kendall statistic = 4 critical = 17

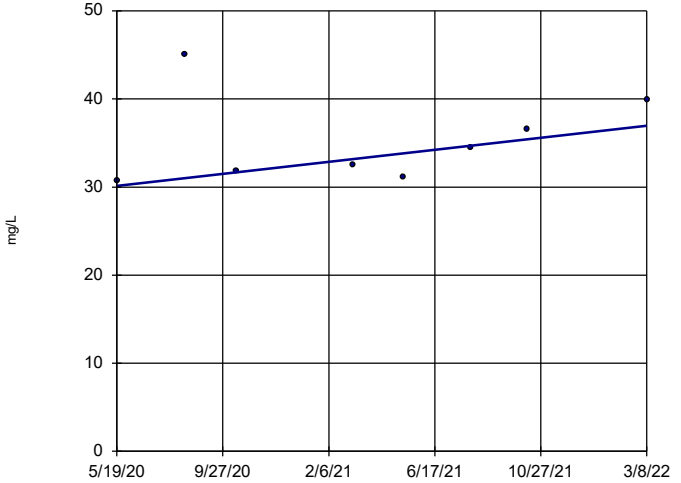
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/11/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Chloride

MW-53R



n = 8

Slope = 3.799 units per year.

Mann-Kendall statistic = 12 critical = 17

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

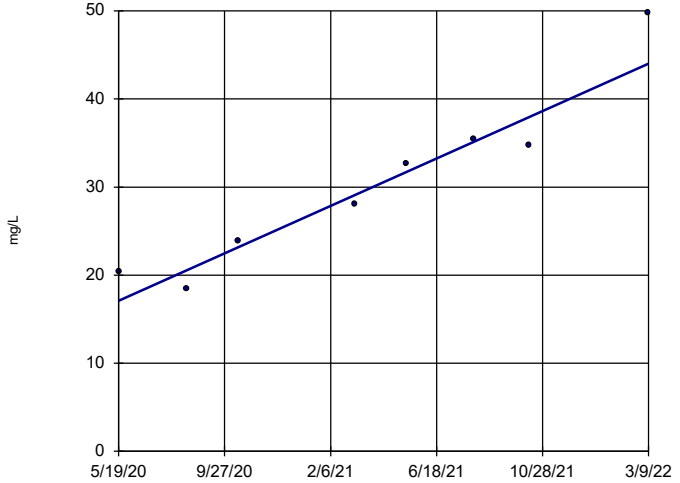
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

MW-54R



n = 8

Slope = 14.91 units per year.

Mann-Kendall statistic = 24 critical = 17

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

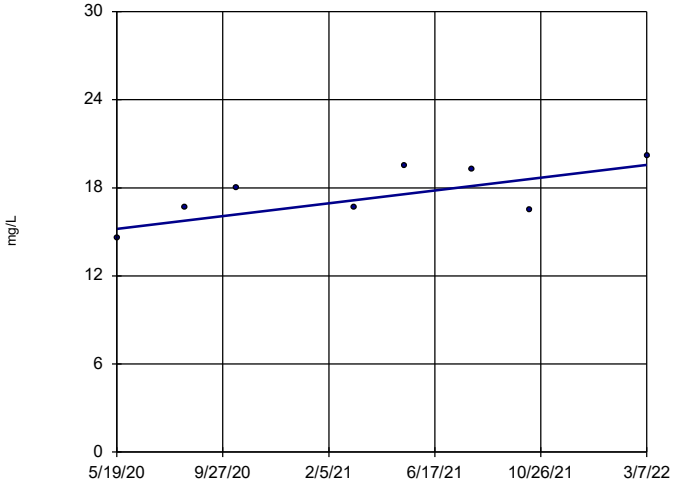
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

MW-55



n = 8

Slope = 2.418 units per year.

Mann-Kendall statistic = 13 critical = 17

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

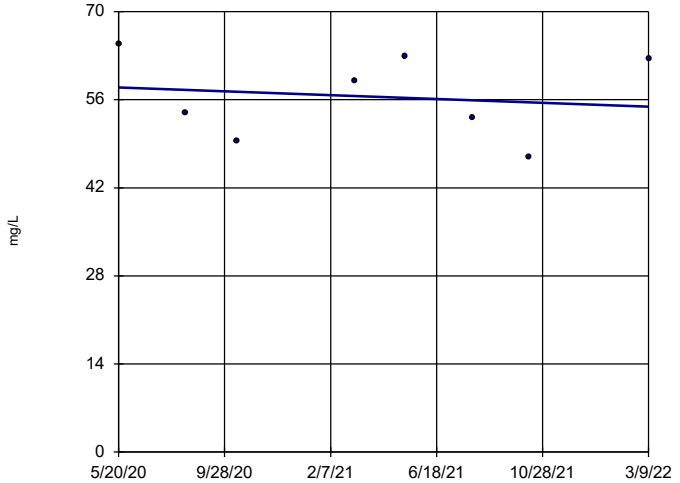
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

OW-57ROUT



n = 8

Slope = -1.691 units per year.

Mann-Kendall statistic = -6 critical = -17

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

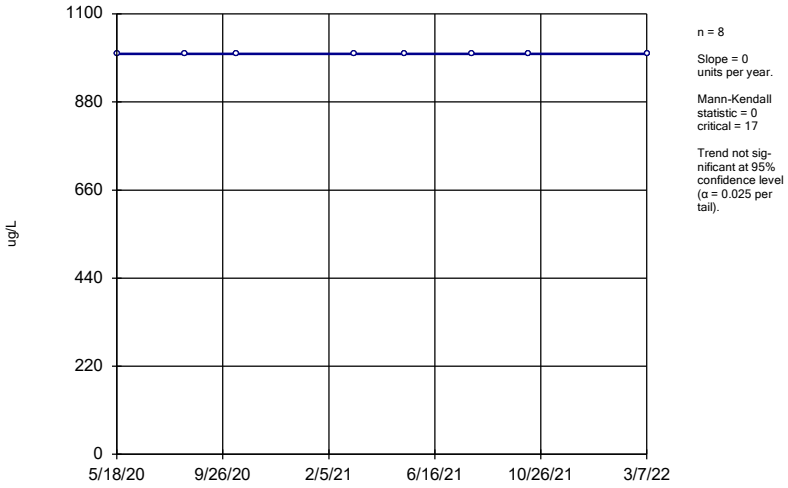
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Fluoride

JCW-MW-18001



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0
critical = 17

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

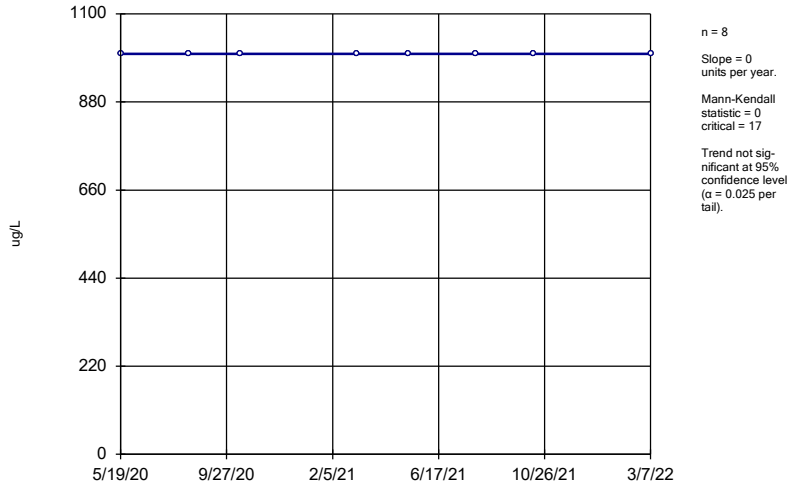
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Fluoride

JCW-MW-18004



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0
critical = 17

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

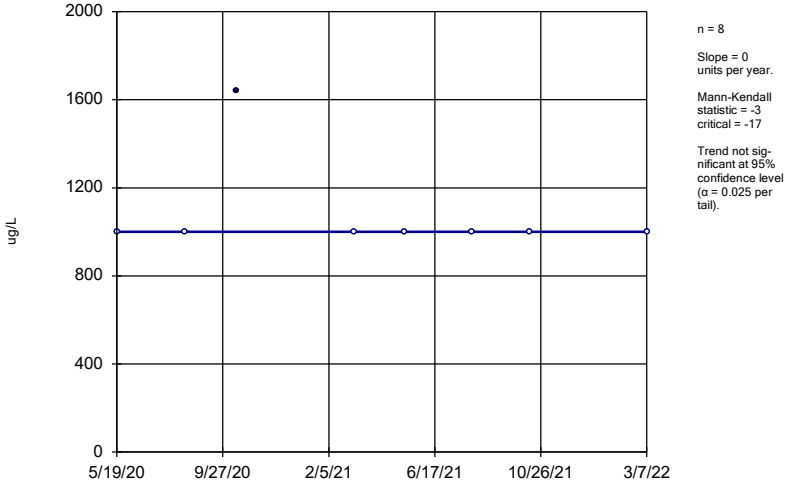
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Fluoride

JCW-MW-18005



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -3
critical = -17

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

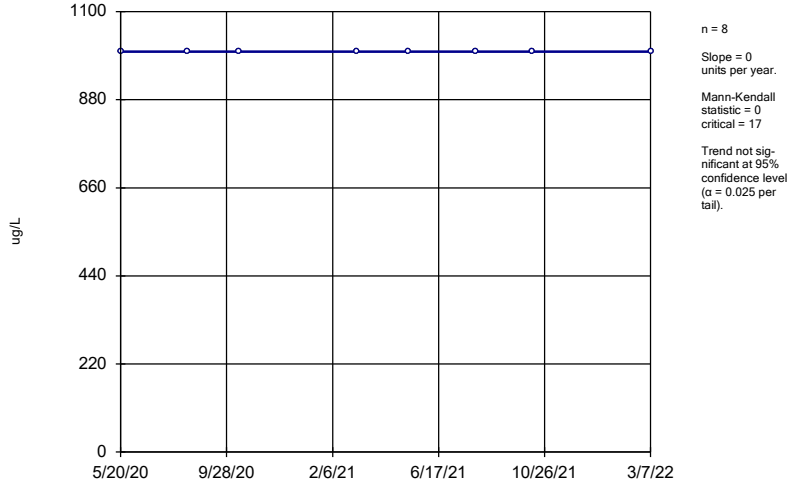
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Fluoride

JCW-MW-18006



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0
critical = 17

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

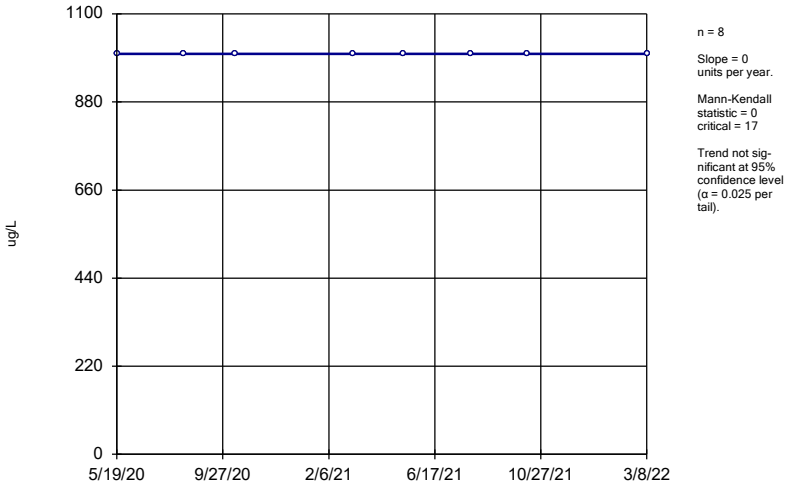
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Fluoride

MW-50



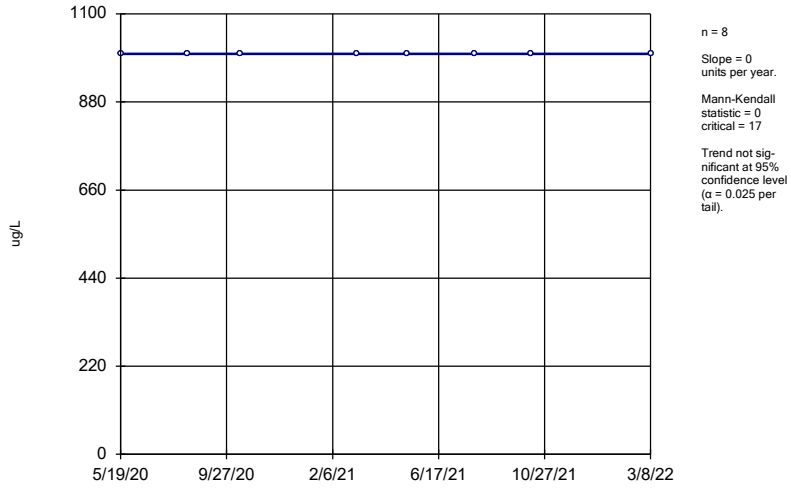
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Fluoride

MW-51



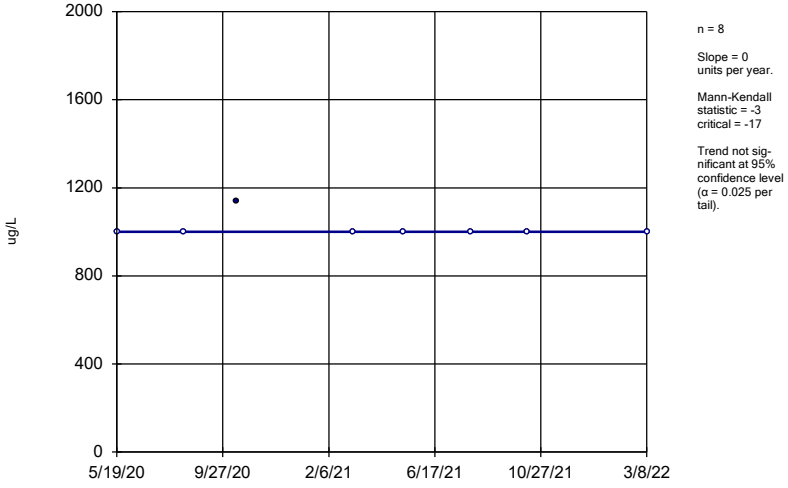
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Fluoride

MW-52



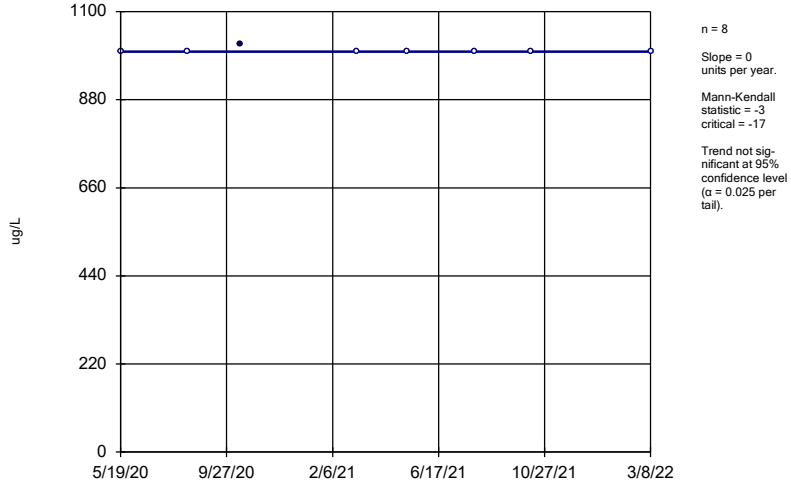
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Fluoride

MW-53



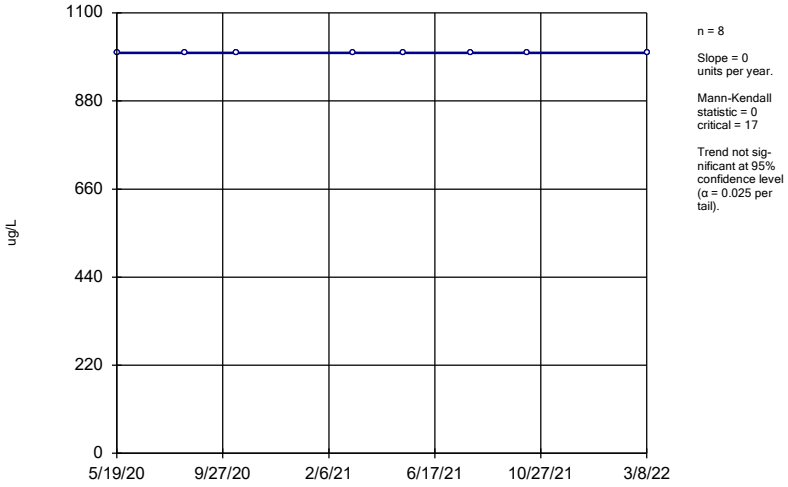
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Fluoride

MW-53R



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

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

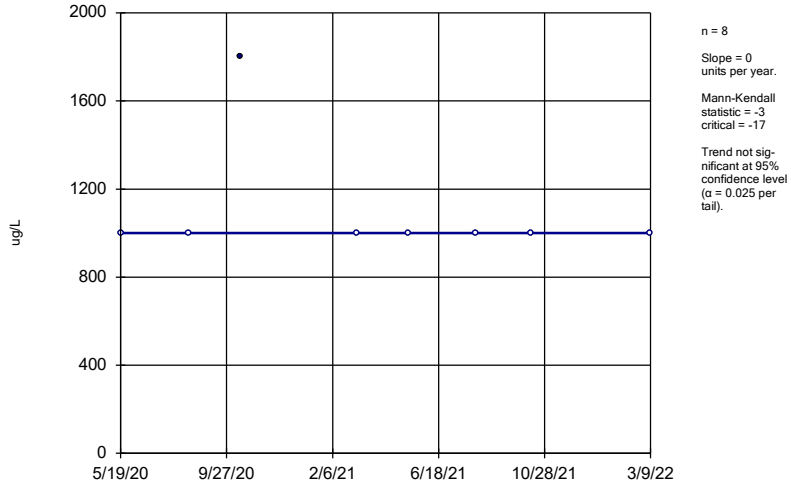
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Fluoride

MW-54R



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -3 critical = -17

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

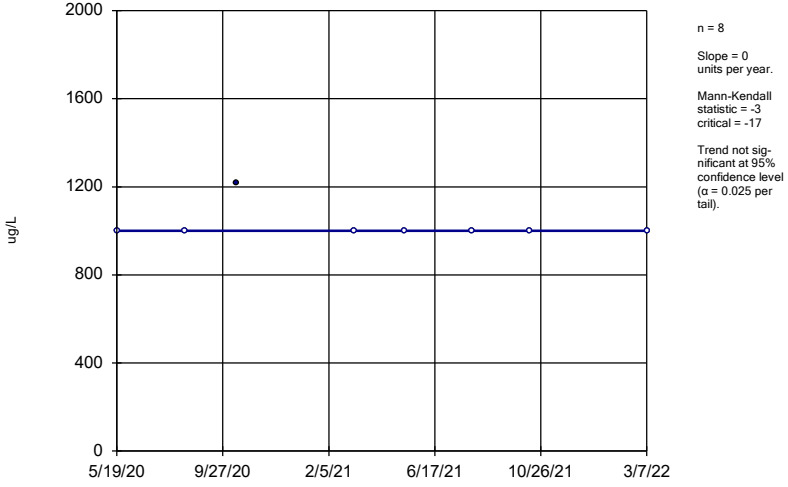
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Fluoride

MW-55



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -3 critical = -17

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

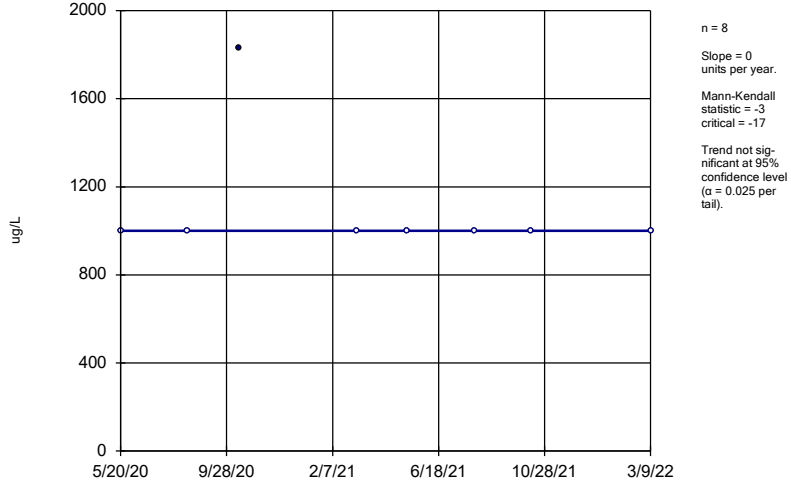
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Fluoride

OW-57ROUT



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -3 critical = -17

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

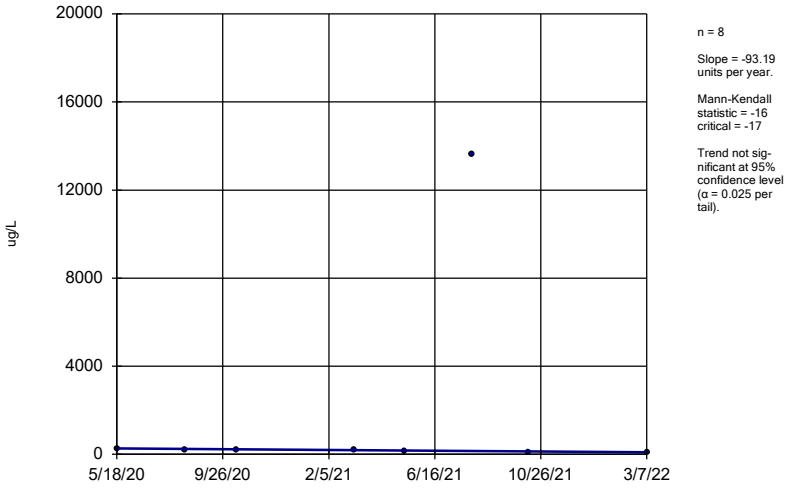
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

JCW-MW-18001



n = 8

Slope = -93.19 units per year.

Mann-Kendall statistic = -16
critical = -17

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

Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

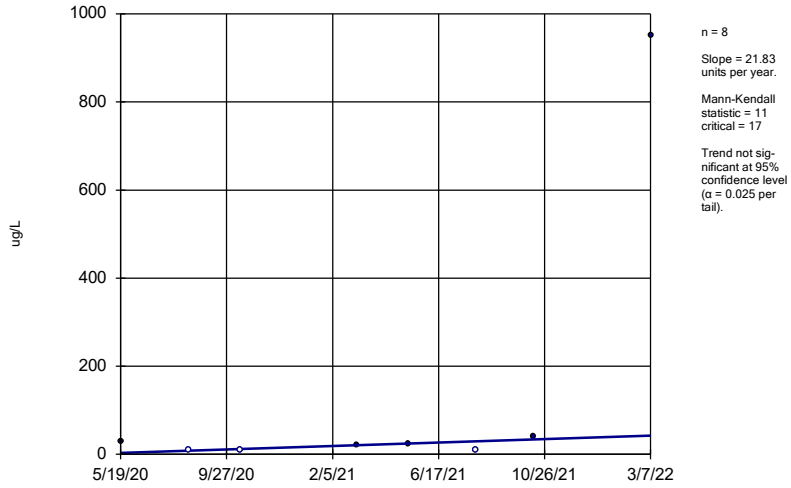
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Hollow symbols indicate censored values.

Iron, Total

JCW-MW-18004



n = 8

Slope = 21.83 units per year.

Mann-Kendall statistic = 11
critical = 17

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

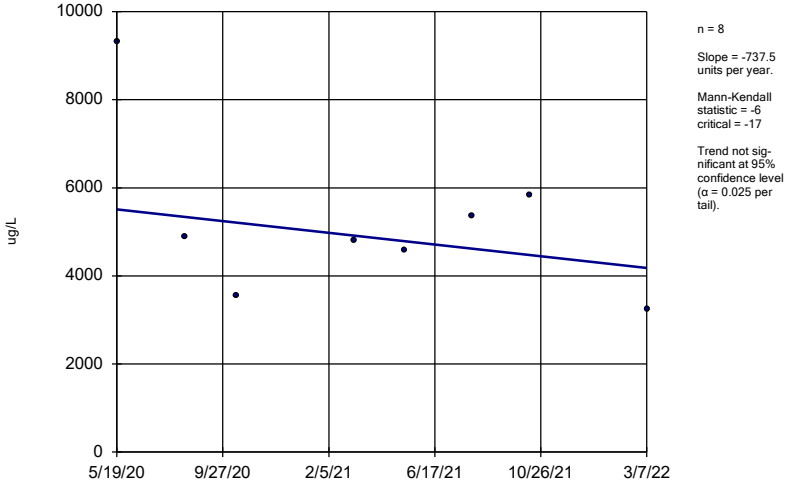
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

JCW-MW-18005



n = 8

Slope = -737.5 units per year.

Mann-Kendall statistic = -6
critical = -17

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

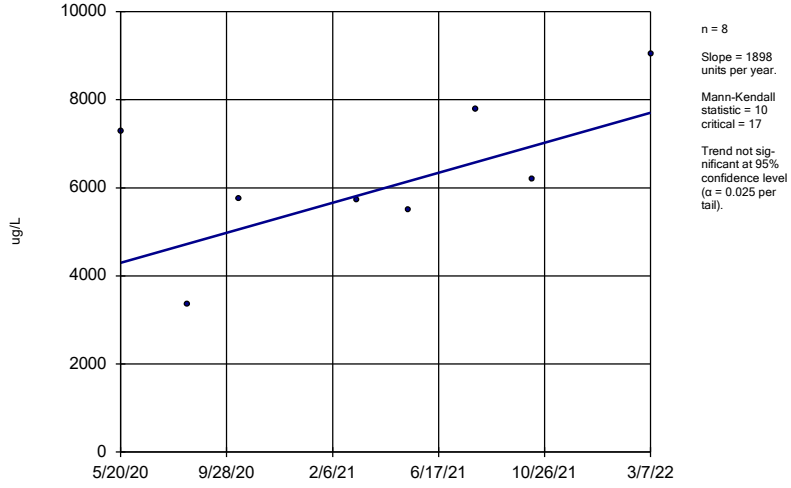
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

JCW-MW-18006



n = 8

Slope = 1898 units per year.

Mann-Kendall statistic = 10
critical = 17

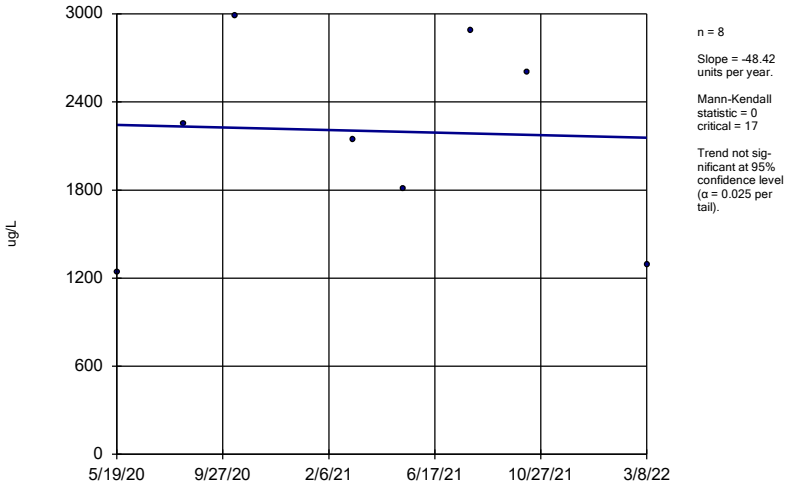
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Iron, Total

MW-50



n = 8

Slope = -48.42 units per year.

Mann-Kendall statistic = 0 critical = 17

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

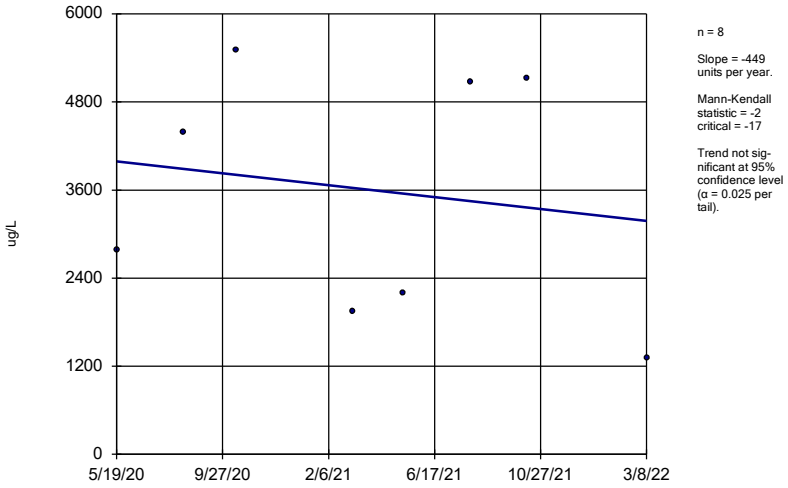
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

MW-51



n = 8

Slope = -449 units per year.

Mann-Kendall statistic = -2 critical = -17

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

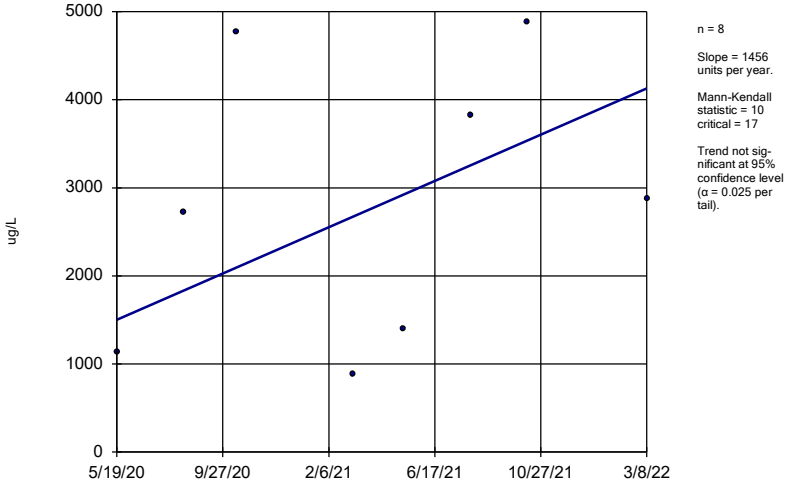
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

MW-52



n = 8

Slope = 1456 units per year.

Mann-Kendall statistic = 10 critical = 17

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

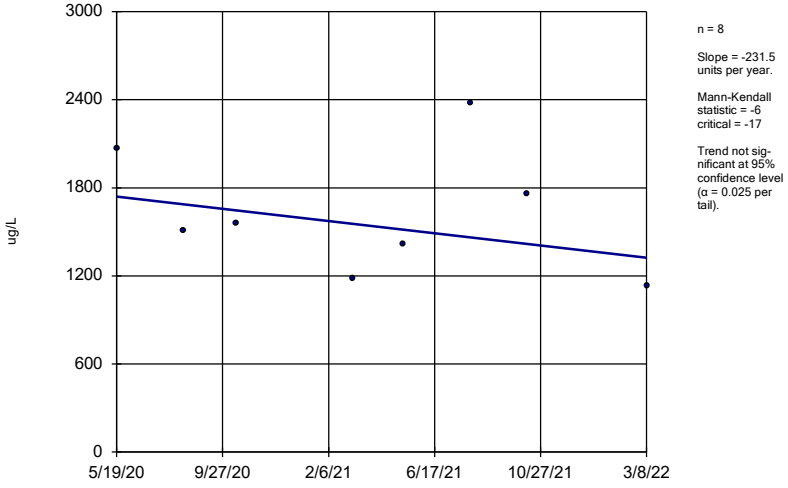
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

MW-53



n = 8

Slope = -231.5 units per year.

Mann-Kendall statistic = -6 critical = -17

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

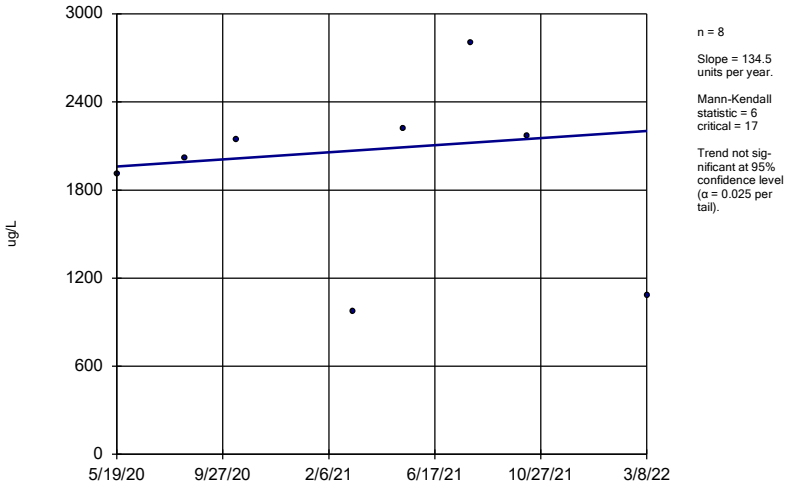
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

MW-53R



n = 8

Slope = 134.5 units per year.

Mann-Kendall statistic = 6 critical = 17

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

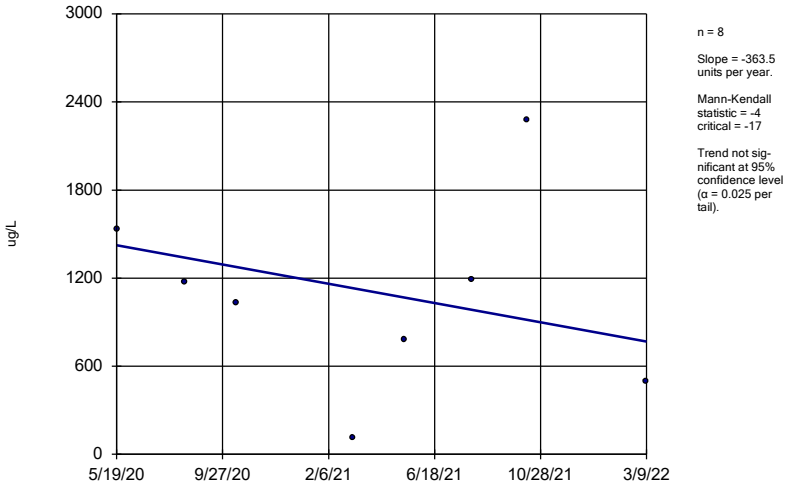
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

MW-54R



n = 8

Slope = -363.5 units per year.

Mann-Kendall statistic = -4 critical = -17

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

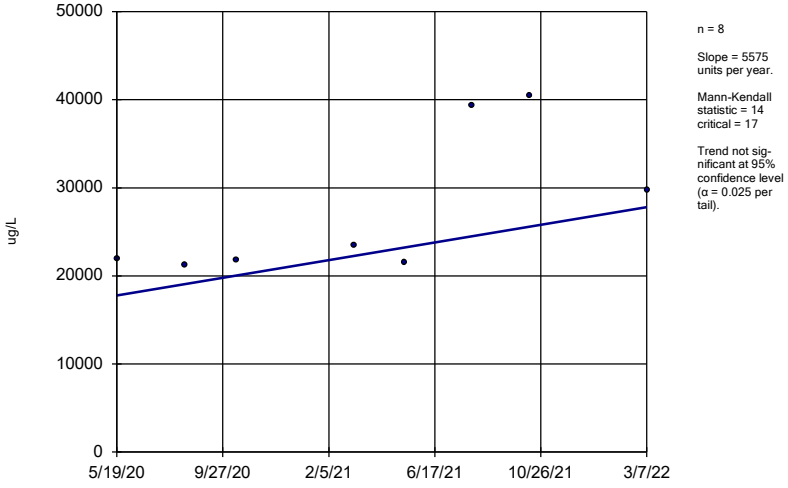
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

MW-55



n = 8

Slope = 5575 units per year.

Mann-Kendall statistic = 14 critical = 17

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

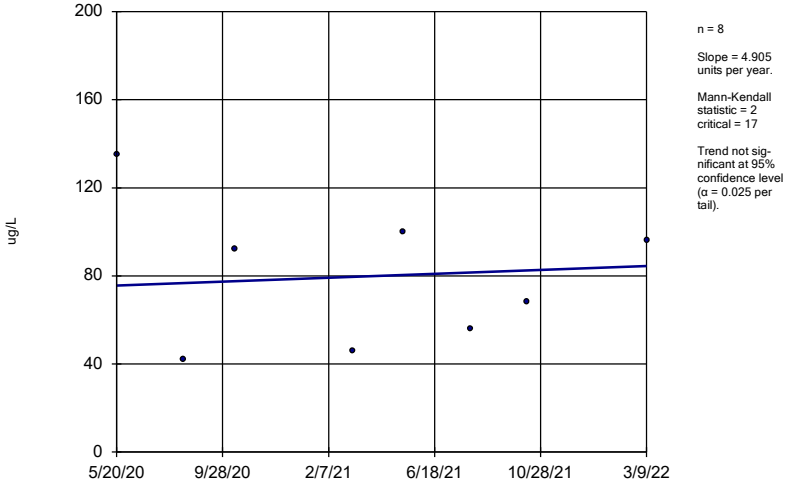
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

OW-57ROUT



n = 8

Slope = 4.905 units per year.

Mann-Kendall statistic = 2 critical = 17

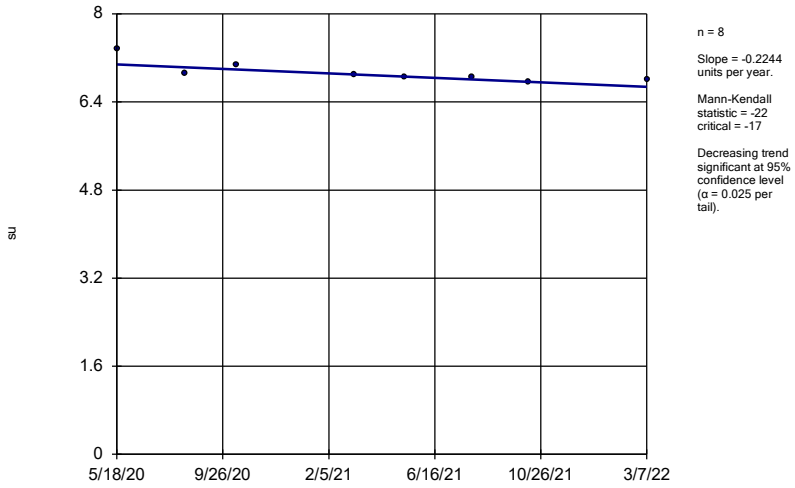
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

pH, Field

JCW-MW-18001



n = 8

Slope = -0.2244 units per year.

Mann-Kendall statistic = -22 critical = -17

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

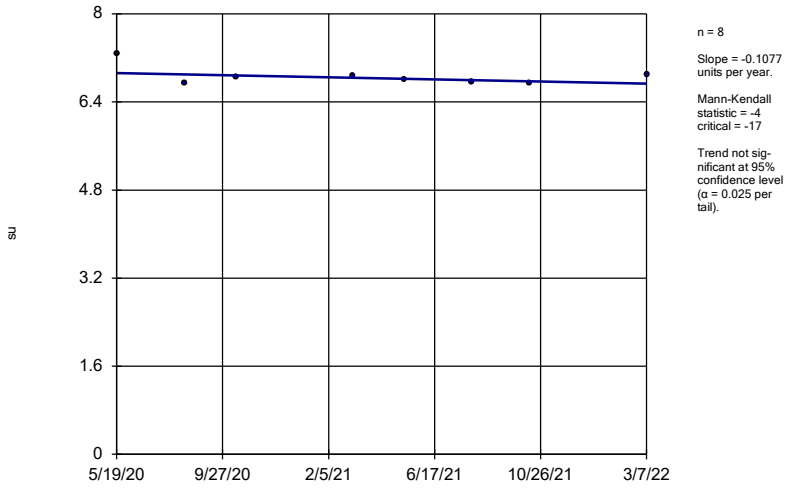
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

JCW-MW-18004



n = 8

Slope = -0.1077 units per year.

Mann-Kendall statistic = -4 critical = -17

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

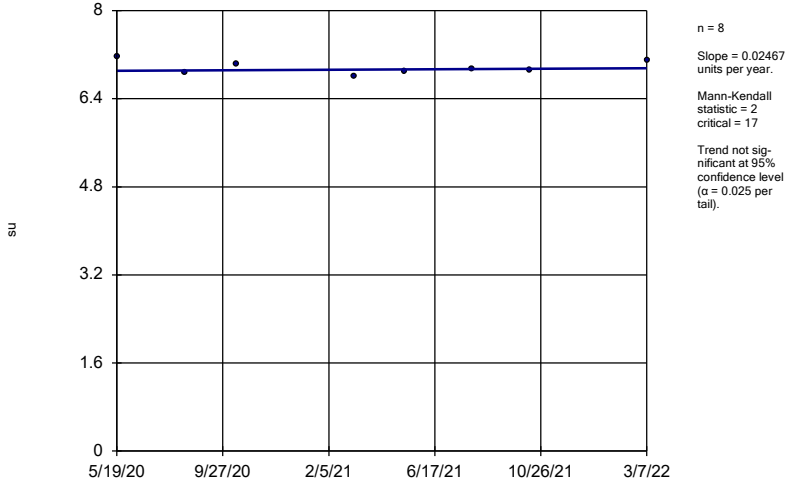
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

JCW-MW-18005



n = 8

Slope = 0.02467 units per year.

Mann-Kendall statistic = 2 critical = 17

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

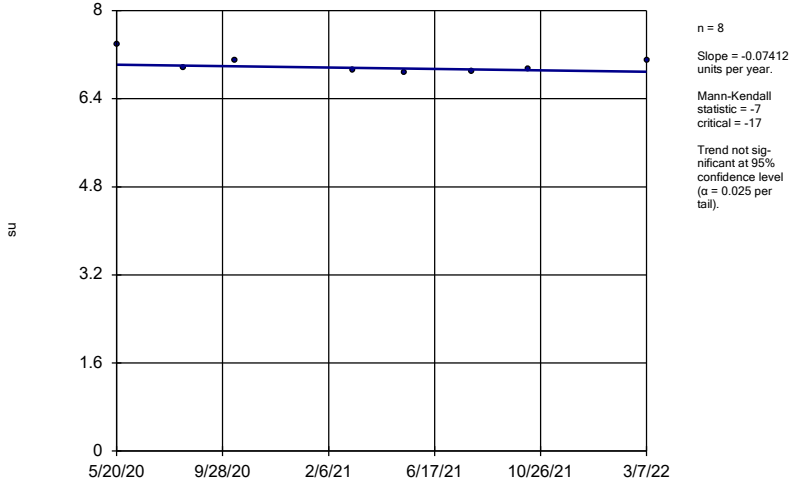
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

JCW-MW-18006



n = 8

Slope = -0.07412 units per year.

Mann-Kendall statistic = -7 critical = -17

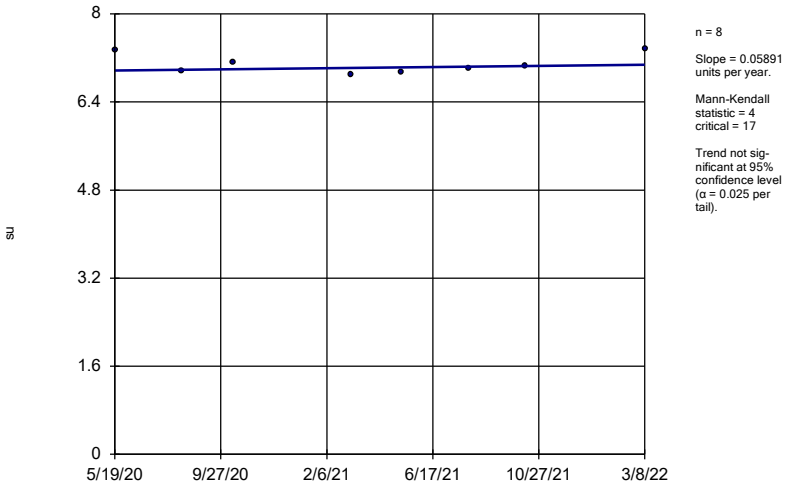
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

pH, Field

MW-50



n = 8

Slope = 0.05891 units per year.

Mann-Kendall statistic = 4 critical = 17

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

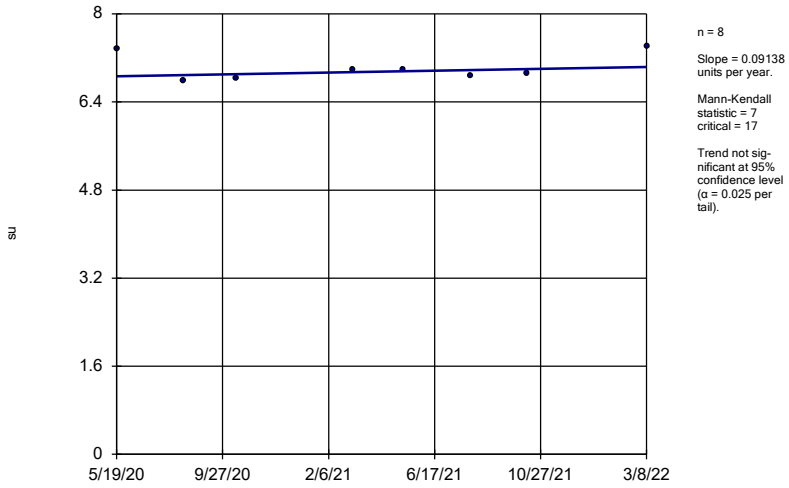
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

MW-51



n = 8

Slope = 0.09138 units per year.

Mann-Kendall statistic = 7 critical = 17

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

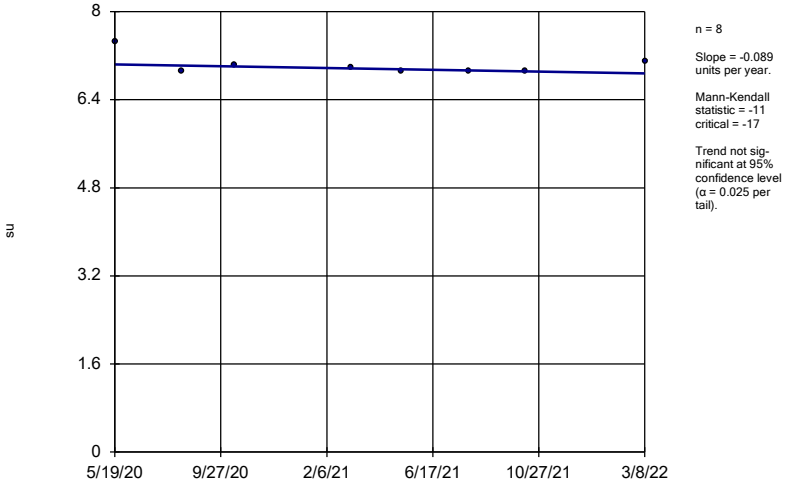
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

MW-52



n = 8

Slope = -0.089 units per year.

Mann-Kendall statistic = -11 critical = -17

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

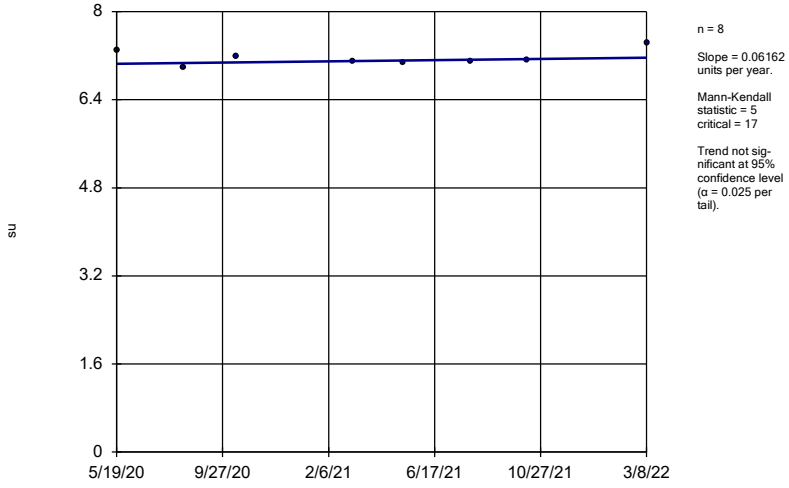
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

MW-53



n = 8

Slope = 0.06162 units per year.

Mann-Kendall statistic = 5 critical = 17

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

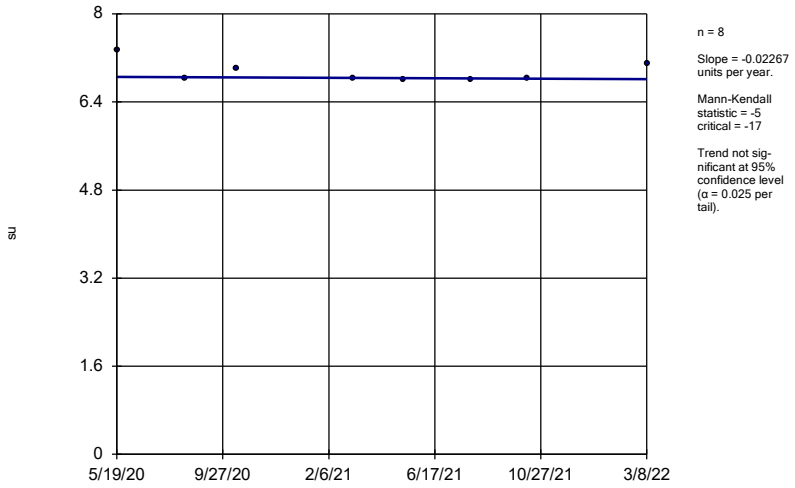
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

MW-53R



n = 8

Slope = -0.02267 units per year.

Mann-Kendall statistic = -5
critical = -17

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

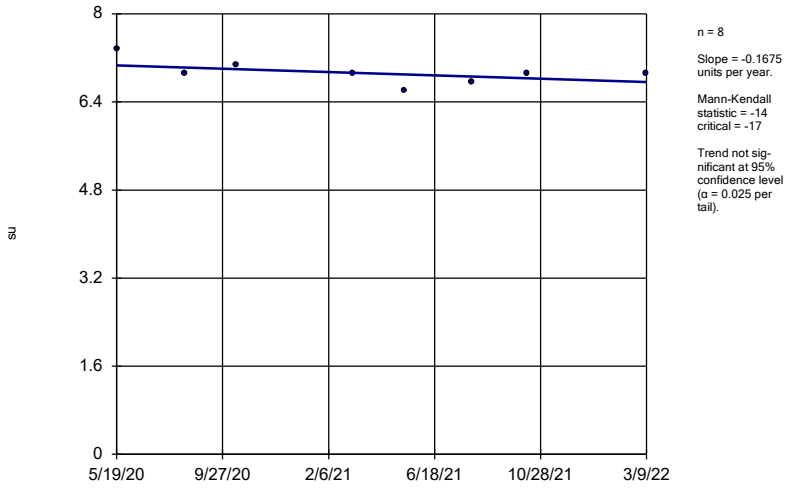
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

MW-54R



n = 8

Slope = -0.1675 units per year.

Mann-Kendall statistic = -14
critical = -17

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

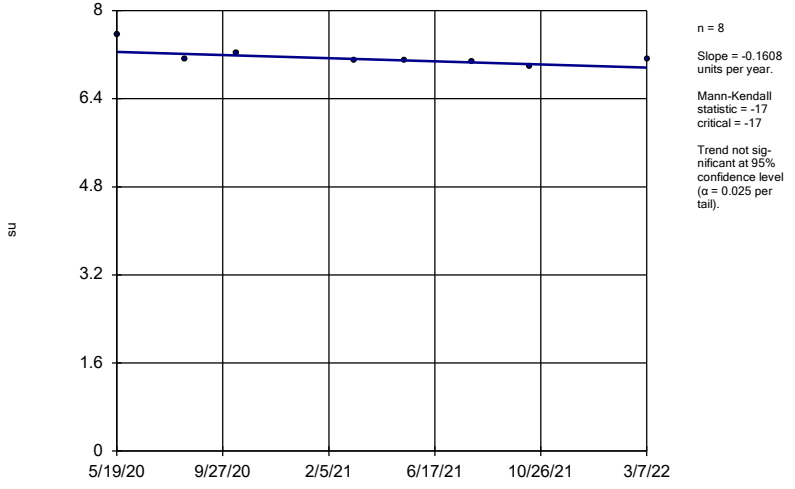
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

MW-55



n = 8

Slope = -0.1608 units per year.

Mann-Kendall statistic = -17
critical = -17

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

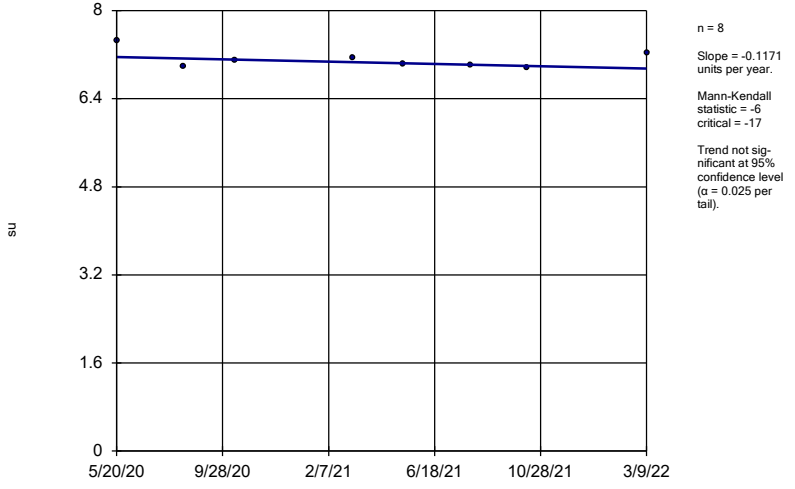
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

OW-57ROUT



n = 8

Slope = -0.1171 units per year.

Mann-Kendall statistic = -6
critical = -17

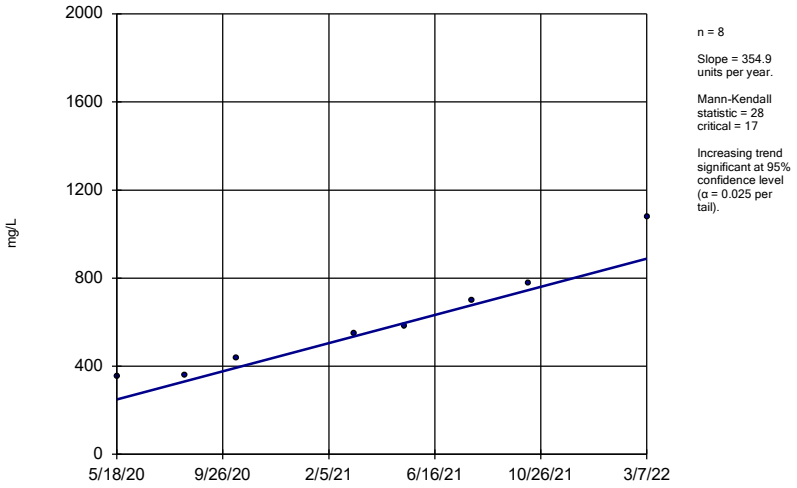
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sulfate

JCW-MW-18001



n = 8

Slope = 354.9 units per year.

Mann-Kendall statistic = 28 critical = 17

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

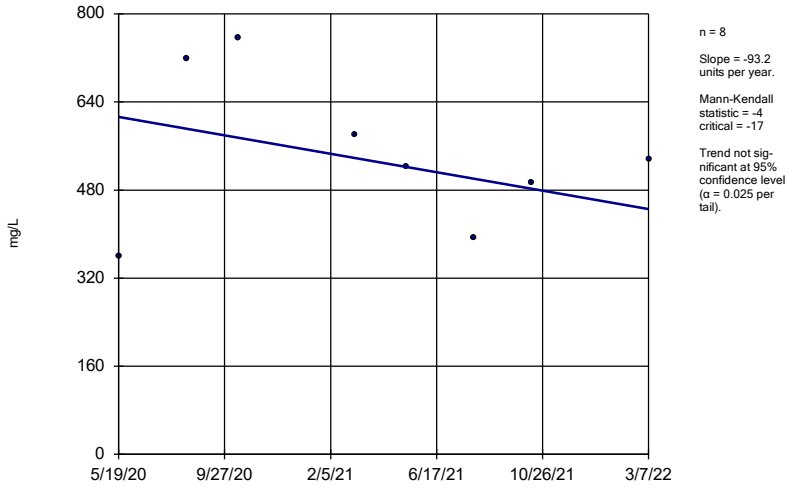
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

JCW-MW-18004



n = 8

Slope = -93.2 units per year.

Mann-Kendall statistic = -4 critical = -17

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

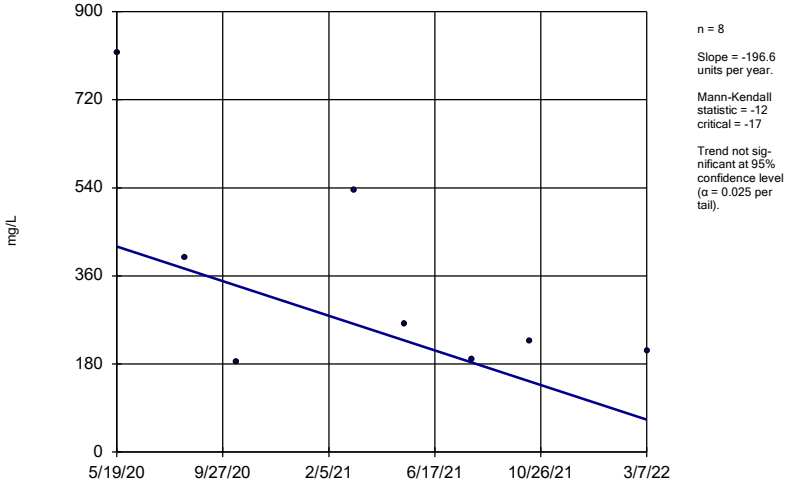
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

JCW-MW-18005



n = 8

Slope = -196.6 units per year.

Mann-Kendall statistic = -12 critical = -17

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

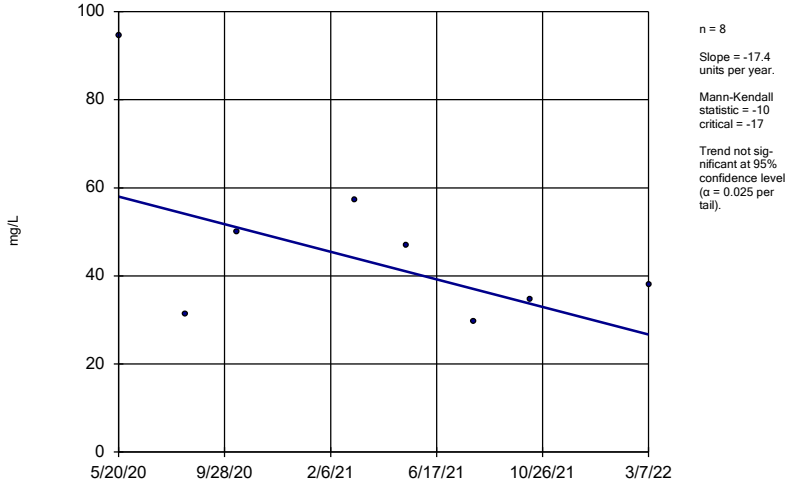
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

JCW-MW-18006



n = 8

Slope = -17.4 units per year.

Mann-Kendall statistic = -10 critical = -17

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

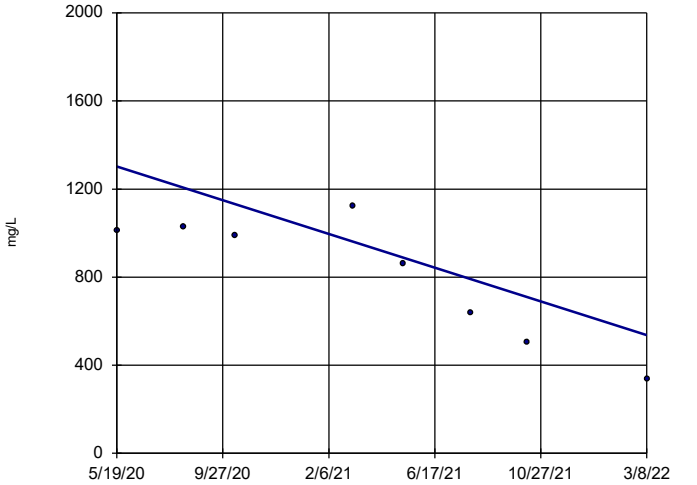
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

MW-50



n = 8

Slope = -424.3 units per year.

Mann-Kendall statistic = -20 critical = -17

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

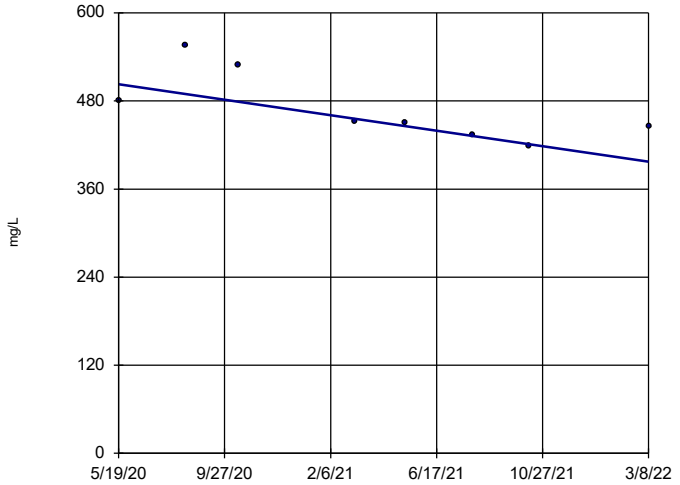
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

MW-51



n = 8

Slope = -58.47 units per year.

Mann-Kendall statistic = -20 critical = -17

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

Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

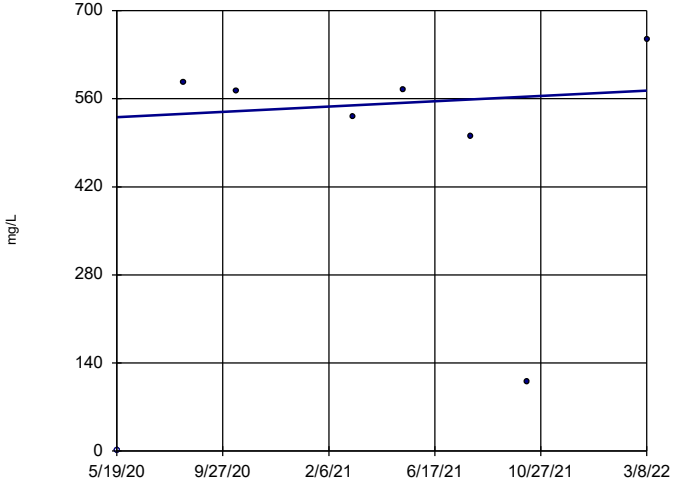
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Hollow symbols indicate censored values.

Sulfate

MW-52



n = 8

Slope = 23.34 units per year.

Mann-Kendall statistic = 2 critical = 17

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

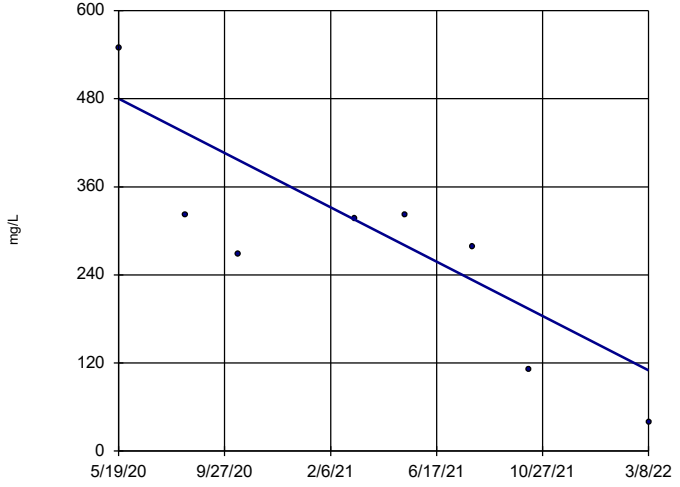
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

MW-53



n = 8

Slope = -205.4 units per year.

Mann-Kendall statistic = -18 critical = -17

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

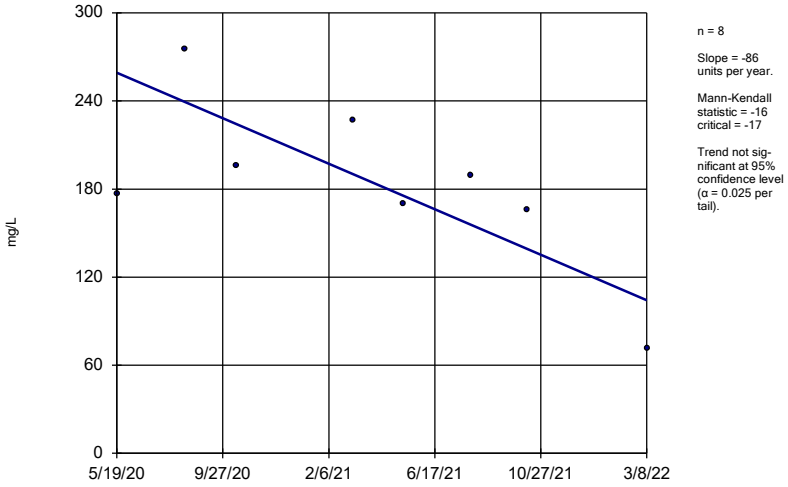
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

MW-53R



n = 8

Slope = -86 units per year.

Mann-Kendall statistic = -16 critical = -17

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

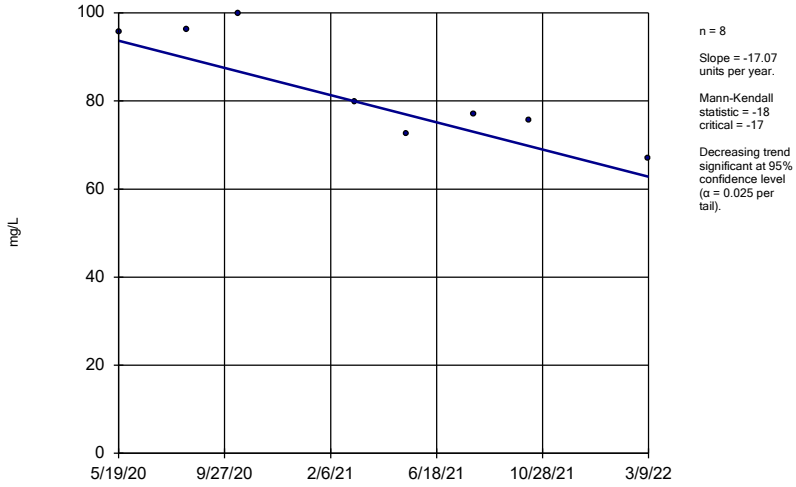
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

MW-54R



n = 8

Slope = -17.07 units per year.

Mann-Kendall statistic = -18 critical = -17

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

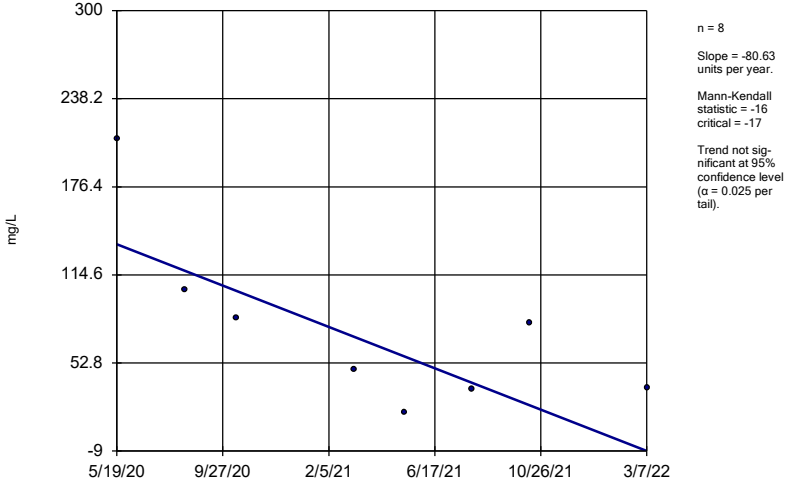
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

MW-55



n = 8

Slope = -80.63 units per year.

Mann-Kendall statistic = -16 critical = -17

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

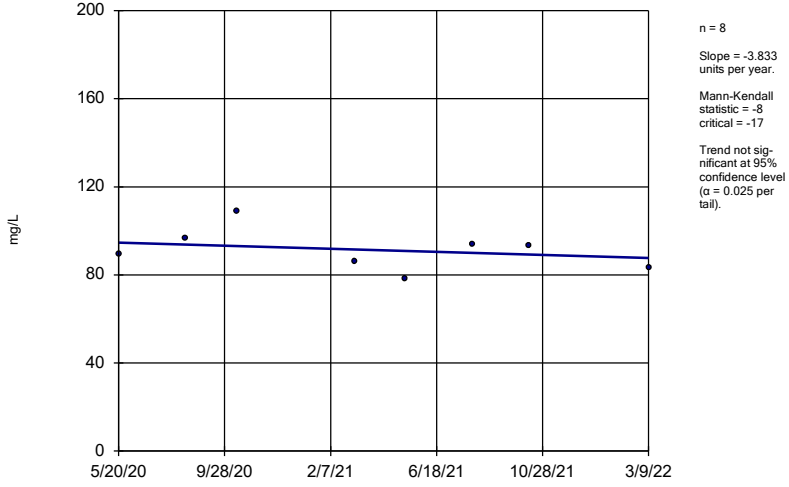
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

OW-57ROUT



n = 8

Slope = -3.833 units per year.

Mann-Kendall statistic = -8 critical = -17

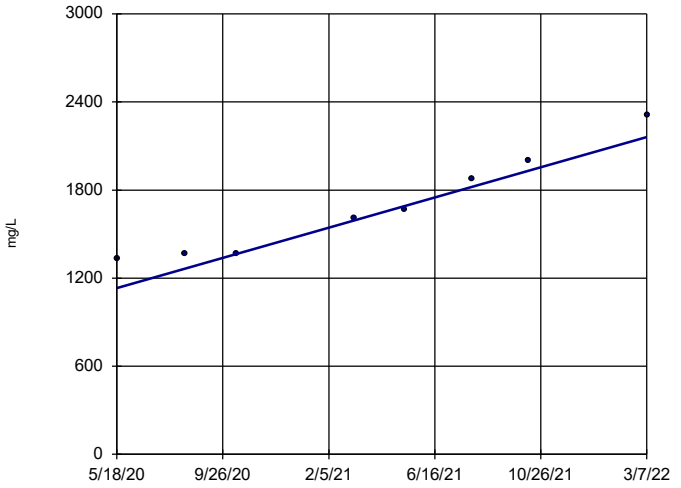
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Total Dissolved Solids

JCW-MW-18001



n = 8

Slope = 570.7 units per year.

Mann-Kendall statistic = 27 critical = 17

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

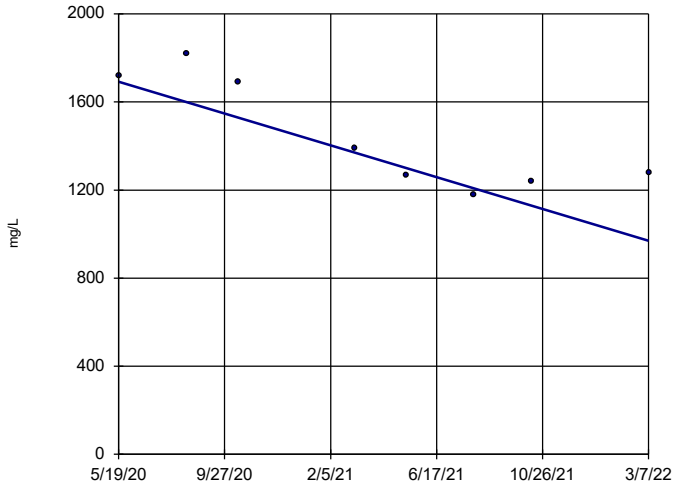
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

JCW-MW-18004



n = 8

Slope = -401.1 units per year.

Mann-Kendall statistic = -18 critical = -17

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

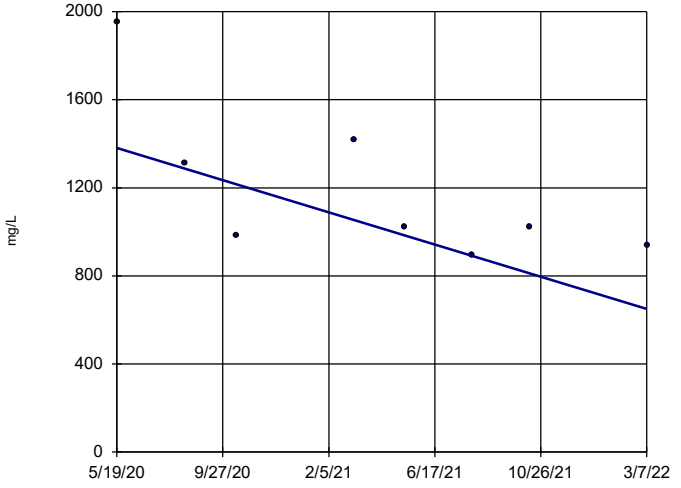
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

JCW-MW-18005



n = 8

Slope = -406 units per year.

Mann-Kendall statistic = -15 critical = -17

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

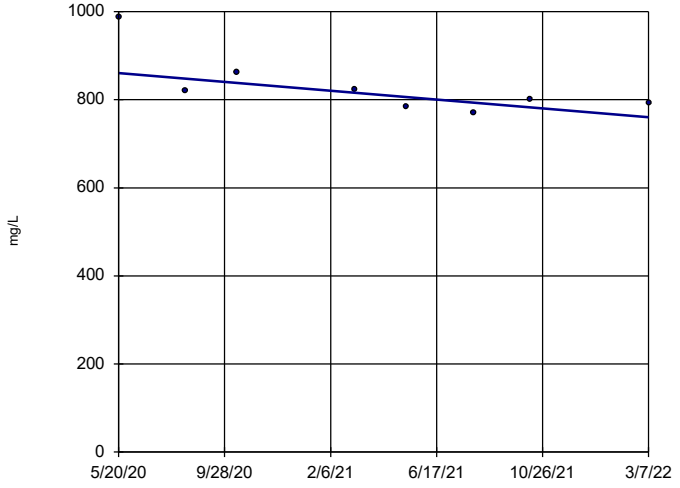
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

JCW-MW-18006



n = 8

Slope = -55.73 units per year.

Mann-Kendall statistic = -16 critical = -17

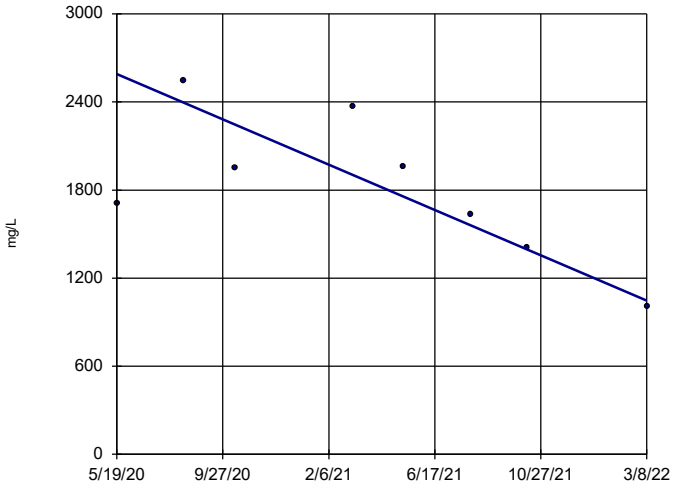
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Total Dissolved Solids

MW-50



n = 8

Slope = -856.3 units per year.

Mann-Kendall statistic = -16
critical = -17

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

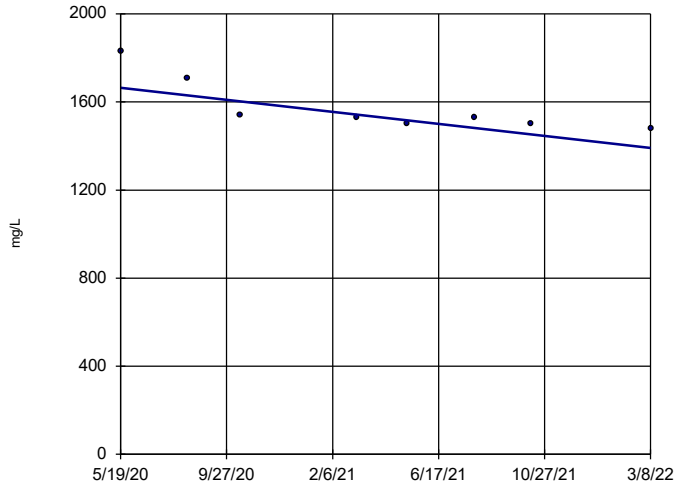
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

MW-51



n = 8

Slope = -151.2 units per year.

Mann-Kendall statistic = -24
critical = -17

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

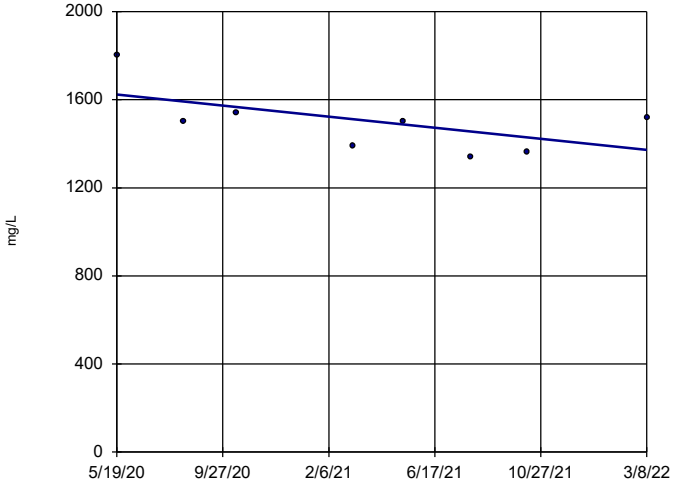
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

MW-52



n = 8

Slope = -139.7 units per year.

Mann-Kendall statistic = -11
critical = -17

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

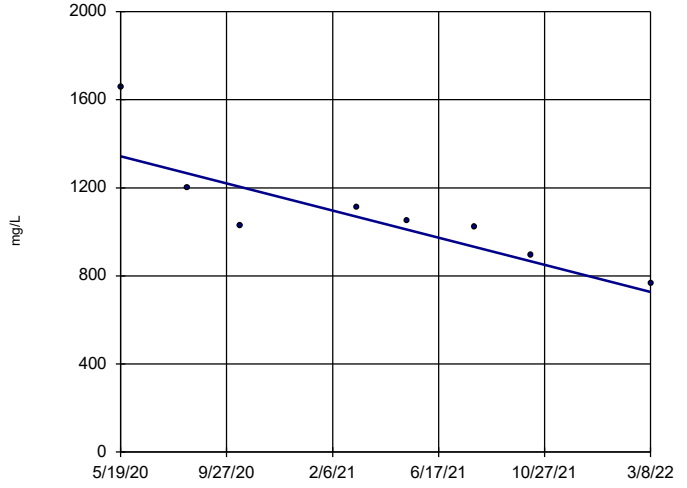
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

MW-53



n = 8

Slope = -341.4 units per year.

Mann-Kendall statistic = -24
critical = -17

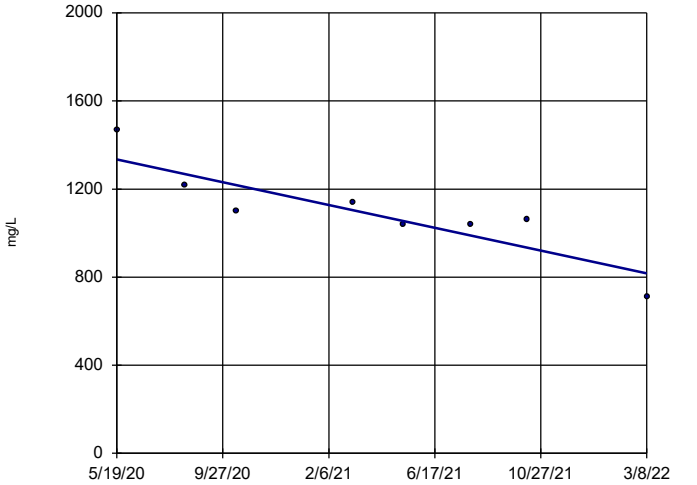
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Total Dissolved Solids

MW-53R



n = 8

Slope = -286.6 units per year.

Mann-Kendall statistic = -21
critical = -17

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

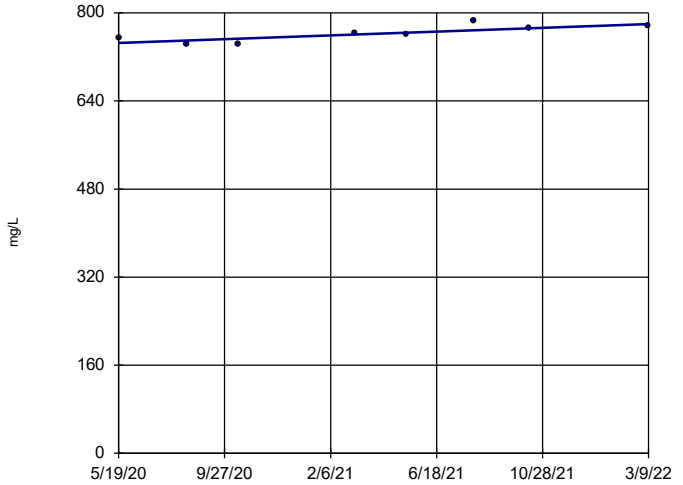
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

MW-54R



n = 8

Slope = 18.93 units per year.

Mann-Kendall statistic = 17
critical = 17

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

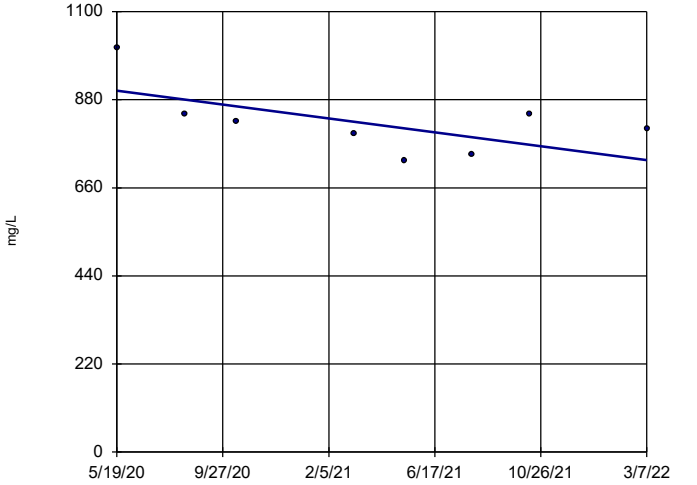
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

MW-55



n = 8

Slope = -96.33 units per year.

Mann-Kendall statistic = -11
critical = -17

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

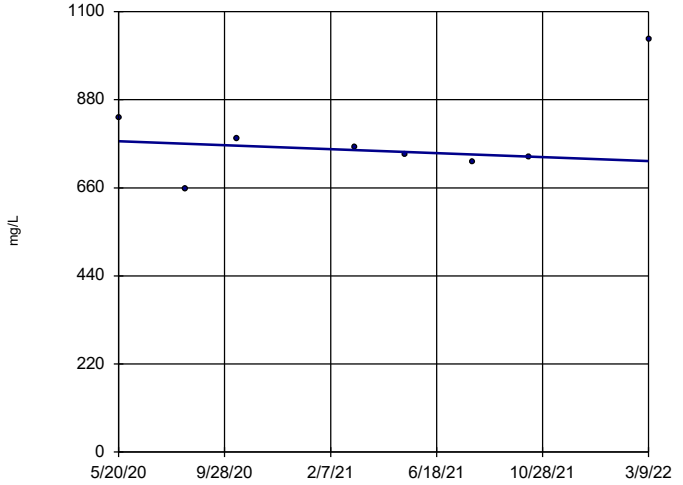
Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

OW-57ROUT



n = 8

Slope = -27.29 units per year.

Mann-Kendall statistic = -2
critical = -17

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

Sen's Slope Estimator Analysis Run 4/11/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Appendix D
Assessment Monitoring and GSI Statistical Evaluation

1540 Eisenhower Pl.
Ann Arbor, MI 48108

T 734.971.7080
TRCcompanies.com

Technical Memorandum

Date:	April 22, 2022
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC Alex Eklund, TRC
Project No.:	464096.0000 Phase 002, Task 002
Subject:	Assessment Monitoring and GSI Statistical Evaluation of the March 2022 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 2022 monitoring event was conducted on March 7 through 10, 2022. 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 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 first quarter 2022 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

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 no constituents 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 confidence that the measured concentrations are different from the criterion and thus no compelling

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

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 2020 through March 2022) 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, JCW-MW-18001, 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.

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, calcium, 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 trends for boron at MW-54R and OW-57ROUT, calcium at JCW-MW-18001 and MW-53, and sulfate at JCW-MW-18001 are statistically significant (Attachment 1). The trends are 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 and OW-57ROUT, calcium at JCW-MW-18001 and MW-53, and sulfate at JCW-MW-18001. 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, and MW-55 Calcium at JCW-MW-18004 and MW-51 Sulfate at JCW-MW-18001 and MW-50 Arsenic at JCW-MW-18006 and MW-53R
Normalized by natural log transformation	Sulfate at JCW-MW-18005
Normalized by square root transformation	Calcium at JCW-MW-18005
Normalized by power transformation	Boron at MW-53 (x^3)
Non-Parametric (not able to be normalized)	Boron at JCW-MW-18001 Calcium at MW-50 Arsenic at JCW-MW-18001 Iron at MW-55
Non-Parametric (over 50% non-detect)	Vanadium at JCW-MW-18001

The confidence interval test compares the lower confidence limit to the GWPS. Arsenic concentrations at JCW-MW-18006 were previously considered statistically significant; however the lower confidence limit has been below the GWPS since the second quarter 2021. Calcium concentrations at MW-51 were previously considered statistically significant; however calcium concentrations appear to be decreasing and the lower confidence limit is below the GWPS in first quarter 2022. Concentrations trends will continue to be monitored. Statistically significant exceedances of the GWPS 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. The boron 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; 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.

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	Arsenic at MW-55 Molybdenum at MW-55

The confidence interval tests compare the lower confidence limit to the GSI. The statistical evaluation found that no constituents were present at statistically significant levels exceeding the site-specific GSI criteria. Arsenic and molybdenum concentrations at MW-55 were previously considered statistically significant; however, the arsenic and molybdenum concentrations decreased in first quarter 2022. The previously observed increasing trend for arsenic at MW-55 was no longer statistically significant in first quarter 2022. The lower confidence limits for arsenic and molybdenum were below the GWPS in first quarter 2022.

Attachments

Table 1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards – May 2020 to March 2022

Table 2 Comparison of Groundwater Sampling Results to GSI – May 2020 to March 2022

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:			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	3/8/2022	3/8/2022
Constituent	Unit	GWPS														
Appendix III[(1)]					Field Dup			Field Dup		Field Dup		Field Dup		Field Dup		Field Dup
Boron	ug/L	**560**	**1,300**	**1,430**	**1,360**	**1,470**	**1,510**	**1,610**	**1,380**	**1,320**	**1,520**	**1,630**	**1,830**	**1,900**	**1,610**	**1,620**
Calcium	mg/L	**280**	**380**	**382**	**382**	**368**	**386**	**375**	**363**	**370**	267	252	274	261	186	185
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	54.9	55.6
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	< 1,000	< 1,000
Sulfate	mg/L	**780**	**1,010**	**1,020**	**1,040**	**990**	**1,130**	**1,120**	**856**	**867**	638	634	496	512	346	330
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	999	1,010
pH, Field	SU	6.5 - 8.5	7.4	7.0	--	7.1	6.9	--	6.9	--	7.0	--	7.1	--	7.4	--
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	2	2	3	1	1	1	1	2	2	3	3	2	2
Barium	ug/L	2,000	163	150	153	147	116	115	108	109	91	97	102	89	115	117
Beryllium	ug/L	4.0	< 1	< 1	< 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	< 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	< 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	< 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	97	111	115	100	126	128	100	100	79	81	93	68	77	77
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	< 0.2	< 0.2
Molybdenum	ug/L	**73**	8	7	8	7	< 5	< 5	< 5	< 5	< 5	< 5	< 5	6	6	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	< 1	< 1	1	1	1	< 1	1	3	2	4	4	2	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]																
Iron	ug/L	**28,000**	1,240	2,280	2,230	2,990	2,100	2,190	1,810	1,810	3,000	2,780	2,500	2,710	1,400	1,180
Copper	ug/L	1,000	3	3	7	3	4	4	< 1	2	1	< 1	1	< 1	< 1	< 1
Nickel	ug/L	100	3	< 2	2	< 2	< 2	< 2	< 2	< 2	11	12	16	11	< 2	19
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	< 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:			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	3/8/2022
Constituent	Unit	GWPS										
Appendix III[1]				Field Dup			Field Dup					
Boron	ug/L	**560**	**944**	**967**	**758**	**739**	**798**	**1,040**	**1,040**	**960**	**1,140**	**1,420**
Calcium	mg/L	**280**	**331**	**322**	**341**	**330**	**337**	**293**	**303**	276	**316**	255
Chloride	mg/L	2,300	93.8	94.2	95.2	74.2	75.4	91.2	93.6	99.8	97.1	91.1
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**	487	474	556	522	537	452	450	434	418	446
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	1,480
pH, Field	SU	6.5 - 8.5	7.4	--	6.8	6.8	--	7.0	7.0	6.9	6.9	7.4
Appendix IV[1]												
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	12	12	12	17	17	11	11	14	20	12
Barium	ug/L	2,000	150	153	153	147	150	143	148	148	197	198
Beryllium	ug/L	4.0	< 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
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	< 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	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	55	57	57	51	55	62	57	47	64	58
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
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	3	3
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]												
Iron	ug/L	**28,000**	2,830	2,750	4,390	5,400	5,600	1,940	2,200	5,080	5,130	1,310
Copper	ug/L	1,000	2	2	2	2	2	2	< 1	< 1	1	< 1
Nickel	ug/L	100	2	< 2	2	< 2	< 2	< 2	< 2	11	18	< 2
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	< 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:	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,160**	**1,200**	**1,110**	**1,120**	**1,160**	**1,140**	**1,280**	**1,310**
Calcium	mg/L	**280**	226	238	256	211	244	196	237	251
Chloride	mg/L	2,300	15.1	72.0	73.3	51.8	53.9	56.5	59.4	51.6
Fluoride	ug/L	4,000	< 1,000	< 1,000	1,140	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	< 1	586	572	531	574	501	110	654
Total Dissolved Solids	mg/L	4,700	1,800	1,500	1,540	1,390	1,500	1,340	1,360	1,520
pH, Field	SU	6.5 - 8.5	7.5	6.9	7.0	7.0	6.9	6.9	6.9	7.1
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	144	144	139	123	132	115	152	170
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6	< 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	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	32	38	33	31	29	21	31	27
Mercury	ug/L	2.0	< 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
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	3	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	1,140	2,720	4,770	879	1,400	3,830	4,880	2,870
Copper	ug/L	1,000	2	2	2	2	< 1	< 1	1	1
Nickel	ug/L	100	< 2	< 2	< 2	< 2	< 2	9	14	< 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	< 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:	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,750**	**2,760**	**2,720**	**3,920**	**3,790**	**3,820**	**3,820**	**4,100**
Calcium	mg/L	**280**	**308**	211	192	187	187	162	166	146
Chloride	mg/L	2,300	118	50.5	38.6	52.9	51.8	49.9	55.5	81.1
Fluoride	ug/L	4,000	< 1,000	< 1,000	1,020	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	549	321	269	317	322	279	111	39.5
Total Dissolved Solids	mg/L	4,700	1,660	1,200	1,030	1,110	1,050	1,020	896	768
pH, Field	SU	6.5 - 8.5	7.3	7.0	7.2	7.1	7.1	7.1	7.1	7.4
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	2	2	2	< 1	< 1	2	2	1
Barium	ug/L	2,000	144	130	131	202	214	200	212	401
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	6	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6	< 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	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	58	53	49	52	46	38	53	48
Mercury	ug/L	2.0	< 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
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	2	< 1	< 1	< 1	2	3	< 1	3
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	2,070	1,510	1,560	1,180	1,420	2,380	1,760	1,130
Copper	ug/L	1,000	4	1	2	2	< 1	< 1	< 1	< 1
Nickel	ug/L	100	3	< 2	< 2	< 2	< 2	6	10	< 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	< 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:	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,460**	**1,540**	**1,780**	**1,510**	**1,580**	**1,710**	**2,060**	**2,330**
Calcium	mg/L	**280**	228	239	246	234	227	203	232	188
Chloride	mg/L	2,300	30.7	45.0	31.8	32.5	31.1	34.5	36.6	39.9
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**	177	275	196	227	170	189	166	71.7
Total Dissolved Solids	mg/L	4,700	1,470	1,220	1,100	1,140	1,040	1,040	1,060	709
pH, Field	SU	6.5 - 8.5	7.4	6.8	7.0	6.8	6.8	6.8	6.8	7.1
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**27**	**31**	**40**	19	18	**23**	**25**	10
Barium	ug/L	2,000	252	208	242	202	208	204	189	203
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 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
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	60	71	66	64	59	56	57	56
Mercury	ug/L	2.0	< 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
Radium-226	pCi/L	NA	0.356	--	--	--	0.306	--	0.344	--
Radium-228	pCi/L	NA	0.846	--	--	--	0.822	--	1.05	--
Radium-226/228	pCi/L	5.0	1.20	--	--	--	1.13	--	1.40	--
Selenium	ug/L	50	< 1	< 1	1	< 1	< 1	2	3	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	1,910	2,020	2,140	971	2,220	2,800	2,170	1,080
Copper	ug/L	1,000	1	3	1	2	1	1	< 1	2
Nickel	ug/L	100	< 2	< 2	< 2	< 2	< 2	10	2	< 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	< 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:	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/11/2021	3/9/2022
Constituent	Unit	GWPS								
Appendix III(1)										
Boron	ug/L	**560**	**1,730**	**1,660**	**1,660**	**2,470**	**3,140**	**3,530**	**4,270**	**4,720**
Calcium	mg/L	**280**	181	168	174	178	196	163	187	186
Chloride	mg/L	2,300	20.4	18.5	23.9	28.0	32.7	35.5	34.7	49.8
Fluoride	ug/L	4,000	< 1,000	< 1,000	1,800	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	95.7	96.2	100	79.9	72.7	77.0	75.7	67.1
Total Dissolved Solids	mg/L	4,700	755	743	743	763	762	786	772	776
pH, Field	SU	6.5 - 8.5	7.4	6.9	7.1	6.9	6.6	6.8	6.9	6.9
Appendix IV(1)										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	2	3	3	1	1	2	4	1
Barium	ug/L	2,000	95	104	103	118	122	124	129	154
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6	< 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	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	58	61	57	66	64	60	59	74
Mercury	ug/L	2.0	< 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	7	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	2	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters(2)										
Iron	ug/L	**28,000**	1,530	1,170	1,030	115	782	1,190	2,280	496
Copper	ug/L	1,000	1	< 1	1	1	2	1	< 1	1
Nickel	ug/L	100	4	6	4	< 2	3	9	< 2	< 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	< 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:			5/19/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	441	**592**	**705**	**593**	**866**	**873**	**788**	**826**
Calcium	mg/L	**280**	188	178	170	151	147	126	198	163
Chloride	mg/L	2,300	14.6	16.7	18.0	16.7	19.5	19.3	16.5	20.2
Fluoride	ug/L	4,000	< 1,000	< 1,000	1,220	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	210	104	84.0	48.0	18.5	34.3	80.7	35.4
Total Dissolved Solids	mg/L	4,700	1,010	844	826	794	729	743	844	808
pH, Field	SU	6.5 - 8.5	7.6	7.1	7.2	7.1	7.1	7.1	7.0	7.1
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**85**	**107**	**123**	**152**	**169**	**204**	**198**	**88**
Barium	ug/L	2,000	223	250	223	366	323	347	330	299
Beryllium	ug/L	4.0	< 1	< 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	< 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	< 6
Fluoride	ug/L	4,000	< 1,000	< 1,000	1,220	< 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	27	33	33	28	24	25	34	28
Mercury	ug/L	2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	**214**	**207**	**179**	**166**	**131**	**157**	**206**	**89**
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	2	1	< 1	1	1	2	1
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	22,000	21,300	21,800	23,500	21,500	**39,400**	**40,500**	**29,800**
Copper	ug/L	1,000	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Nickel	ug/L	100	< 2	< 2	< 2	< 2	< 2	6	8	4
Silver	ug/L	34	< 0.3	< 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	< 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:	5/20/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/9/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,600**	**1,510**	**1,730**	**1,660**	**1,710**	**1,730**	**1,880**	**2,030**
Calcium	mg/L	**280**	130	132	144	128	133	118	140	126
Chloride	mg/L	2,300	64.9	53.9	49.4	59.0	62.9	53.1	46.9	62.5
Fluoride	ug/L	4,000	< 1,000	< 1,000	1,830	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	89.4	96.8	109	86.0	78.3	93.9	93.1	83.1
Total Dissolved Solids	mg/L	4,700	834	658	782	761	743	725	737	1,030
pH, Field	SU	6.5 - 8.5	7.5	7.0	7.1	7.2	7.0	7.0	7.0	7.2
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	72	77	73	70	73	72	75	85
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	2	1	1	1	1	1	< 1	1
Cobalt	ug/L	15	< 6	< 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	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	24	27	24	26	24	20	21	26
Mercury	ug/L	2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	7	7	8	7	6	7	9	8
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	2	1
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	135	42	92	46	100	56	68	96
Copper	ug/L	1,000	2	2	2	2	1	2	1	2
Nickel	ug/L	100	16	16	14	15	16	21	12	17
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	< 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:	5/18/2020	8/10/2020	10/13/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/7/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,360**	**1,310**	**1,370**	**1,350**	**1,340**	**1,610**	**1,670**	**1,670**
Calcium	mg/L	**280**	232	237	**282**	270	**305**	**348**	**373**	**412**
Chloride	mg/L	2,300	71.5	70.8	73.8	72.1	77.3	76.4	68.3	60.0
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**	352	357	435	549	580	700	777	**1,080**
Total Dissolved Solids	mg/L	4,700	1330	1,370	1,370	1,610	1,670	1,880	2,000	2,310
pH, Field	SU	6.5 - 8.5	7.4	6.9	7.1	6.9	6.9	6.9	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	3	3	2	2	**38**	1	< 1
Barium	ug/L	2,000	252	261	273	213	166	199	184	129
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	8	< 1	< 1
Cobalt	ug/L	15	< 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
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1
Lithium	ug/L	180	60	69	66	69	68	71	103	87
Mercury	ug/L	2.0	< 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	9	< 5	< 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	2	3	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	277	202	182	183	154	13,600	91	86
Copper	ug/L	1,000	1	1	1	2	3	6	2	2
Nickel	ug/L	100	< 2	< 2	2	8	2	16	20	6
Silver	ug/L	34	< 0.3	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2	< 2	2	**12**	< 2	< 2
Zinc	ug/L	2,400	< 10	< 30	< 10	< 10	< 10	12	< 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-18004							
		Sample Date:	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	265	347	410	232	246	304	389	259
Calcium	mg/L	**280**	**308**	**306**	**323**	252	266	203	264	236
Chloride	mg/L	2,300	10.9	25.6	22.6	17.9	12.4	6.65	7.45	19.6
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**	361	718	756	581	523	393	493	537
Total Dissolved Solids	mg/L	4,700	1,720	1,820	1,690	1,390	1,270	1,180	1,240	1,280
pH, Field	SU	6.5 - 8.5	7.3	6.7	6.9	6.9	6.8	6.8	6.8	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	28	36	34	20	27	36	41	32
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 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
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	31	39	37	35	36	47	63	34
Mercury	ug/L	2.0	< 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
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	7	1	4	3	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	29	< 20	< 20	21	24	< 20	39	952
Copper	ug/L	1,000	3	2	3	3	2	1	2	1
Nickel	ug/L	100	< 2	< 2	4	< 2	2	9	16	4
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	< 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:			5/19/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	3/7/2022
Constituent	Unit	GWPS									Field Dup
Appendix III[1]											
Boron	ug/L	**560**	**1,150**	**1,100**	**1,090**	**987**	**919**	**1,080**	**1,190**	**1,030**	**1,100**
Calcium	mg/L	**280**	**419**	259	195	**286**	202	149	193	159	164
Chloride	mg/L	2,300	23.2	63.9	66.5	43.7	56.0	64.9	63.6	61.7	60.7
Fluoride	ug/L	4,000	< 1,000	< 1,000	1,640	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	**817**	398	185	535	263	190	227	204	211
Total Dissolved Solids	mg/L	4,700	1,950	1,310	986	1,420	1,020	895	1,020	942	934
pH, Field	SU	6.5 - 8.5	7.2	6.9	7.0	6.8	6.9	7.0	6.9	7.1	--
Appendix IV[1]											
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	12	8	8	7	9	9	9	5	5
Barium	ug/L	2,000	141	87	98	135	93	98	124	108	110
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
Cobalt	ug/L	15	< 6	< 6	< 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	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1	< 1
Lithium	ug/L	180	53	45	33	39	30	28	39	32	30
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
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	2	4	3	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**	9,310	4,900	3,550	4,800	4,590	5,350	5,840	3,300	3,170
Copper	ug/L	1,000	3	2	1	2	1	12	1	< 1	< 1
Nickel	ug/L	100	4	9	11	8	10	29	22	10	25
Silver	ug/L	34	< 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
Zinc	ug/L	2,400	< 10	< 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.

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:			5/20/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**3,030**	**2,040**	**2,610**	**2,650**	**2,720**	**2,640**	**2,600**	**3,220**
Calcium	mg/L	**280**	179	148	167	148	147	135	152	143
Chloride	mg/L	2,300	71.2	76.1	72.2	66.1	72.6	73.6	77.0	75.0
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**	94.5	31.2	50.1	57.3	47.0	29.7	34.7	38.1
Total Dissolved Solids	mg/L	4,700	988	820	861	823	784	769	802	792
pH, Field	SU	6.5 - 8.5	7.4	7.0	7.1	6.9	6.9	6.9	7.0	7.1
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**33**	12	**22**	**30**	**30**	**25**	21	**33**
Barium	ug/L	2,000	500	361	489	477	472	492	351	665
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 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
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	70	41	59	58	53	46	47	63
Mercury	ug/L	2.0	< 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
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	2	4	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	7,280	3,360	5,760	5,730	5,490	7,790	6,200	9,040
Copper	ug/L	1,000	< 1	< 1	< 1	< 1	2	< 1	< 1	< 1
Nickel	ug/L	100	4	2	< 2	3	3	6	10	6
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**	3	< 2	3	3	3	4	2	4
Zinc	ug/L	2,400	< 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 2
Comparison of Groundwater Sampling Results to GSI – March 2020 to October 2021
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

						MW-50													
					Sample Location:														
					Sample Date:	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	3/8/2022	3/8/2022
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**			Field Dup			Field Dup		Field Dup		Field Dup		Field Dup		Field Dup
Appendix III(1)																			
Boron	ug/L	4,000	44,000	69,000	44,000	1,300	1,430	1,360	1,470	1,510	1,610	1,380	1,320	1,520	1,630	1,830	1,900	1,610	1,620
Sulfate	mg/L	1,200[F]	NC	NC	1,200	1,010	1,020	1,040	990	1,130	1,120	856	867	638	634	496	512	346	330
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.4	7.0	--	7.1	6.9	--	6.9	--	7.0	--	7.1	--	7.4	--
Appendix IV(1)																			
Arsenic	ug/L	10	100	680	**100**	1	2	2	3	1	1	1	1	2	2	3	3	2	2
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	97	111	115	100	126	128	100	100	79	81	93	68	77	77
Molybdenum	ug/L	120	NC	NC	**120**	8	7	8	7	< 5	< 5	< 5	< 5	< 5	< 5	< 5	6	6	6
Selenium	ug/L	50	55	120	55	2	< 1	< 1	1	1	1	< 1	1	3	2	4	4	2	2
MI Part 115 Parameters(2)																			
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,240	2,280	2,230	2,990	2,100	2,190	1,810	1,810	3,000	2,780	2,500	2,710	1,400	1,180
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.

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:	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	3/8/2022
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	944	967	758	739	798	1,040	1,040	960	1,140	1,420
Sulfate	mg/L	1,200[F]	NC	NC	1,200	487	474	556	522	537	452	450	434	418	446
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.4	--	6.8	6.8	--	7.0	7.0	6.9	6.9	7.4
Appendix IV(1)															
Arsenic	ug/L	10	100	680	**100**	12	12	12	17	17	11	11	14	20	12
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	55	57	57	51	55	62	57	47	64	58
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	3	3
MI Part 115 Parameters(2)															
Iron	ug/L	500,000[EE]	NC	NC	500,000	2,830	2,750	4,390	5,400	5,600	1,940	2,200	5,080	5,130	1,310
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.

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:	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022
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	1,160	1,200	1,110	1,120	1,160	1,140	1,280	1,310
Sulfate	mg/L	1,200[F]	NC	NC	1,200	< 1	586	572	531	574	501	110	654
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.5	6.9	7.0	7.0	6.9	6.9	6.9	7.1
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	32	38	33	31	29	21	31	27
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	3	2
MI Part 115 Parameters[(2)]													
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,140	2,720	4,770	879	1,400	3,830	4,880	2,870
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.

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:	5/19/2020	8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022
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	1,750	2,760	2,720	3,920	3,790	3,820	3,820	4,100
Sulfate	mg/L	1,200[F]	NC	NC	1,200	549	321	269	317	322	279	111	39.5
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.3	7.0	7.2	7.1	7.1	7.1	7.1	7.4
Appendix IV[(1)]													
Arsenic	ug/L	10	100	680	**100**	2	2	2	< 1	< 1	2	2	1
Chromium	ug/L	11[H]	NC	NC	11	6	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	58	53	49	52	46	38	53	48
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	2	< 1	< 1	< 1	2	3	< 1	3
MI Part 115 Parameters[(2)]													
Iron	ug/L	500,000[EE]	NC	NC	500,000	2,070	1,510	1,560	1,180	1,420	2,380	1,760	1,130
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.

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:	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022
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	1,460	1,540	1,780	1,510	1,580	1,710	2,060	2,330
Sulfate	mg/L	1,200[F]	NC	NC	1,200	177	275	196	227	170	189	166	71.7
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.4	6.8	7.0	6.8	6.8	6.8	6.8	7.1
Appendix IV(1)													
Arsenic	ug/L	10	100	680	**100**	27	31	40	19	18	23	25	10
Chromium	ug/L	11[H]	NC	NC	11	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	60	71	66	64	59	56	57	56
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	2	3	2
MI Part 115 Parameters(2)													
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,910	2,020	2,140	971	2,220	2,800	2,170	1,080
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.

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:	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/11/2021	3/8/2022
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	1,730	1,660	1,660	2,470	3,140	3,530	4,270	4,720
Sulfate	mg/L	1,200[F]	NC	NC	1,200	95.7	96.2	100	79.9	72.7	77.0	75.7	67.1
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.4	6.9	7.1	6.9	6.6	6.8	6.9	6.9
Appendix IV(1)													
Arsenic	ug/L	10	100	680	**100**	2	3	3	1	1	2	4	1
Chromium	ug/L	11[H]	NC	NC	11	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	58	61	57	66	64	60	59	74
Molybdenum	ug/L	120	NC	NC	**120**	< 5	5	5	< 5	< 5	< 5	7	7
Selenium	ug/L	50	55	120	55	< 1	< 1	< 1	< 1	< 1	1	2	2
MI Part 115 Parameters(2)													
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,530	1,170	1,030	115	782	1,190	2,280	496
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.

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:	5/19/2020	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022
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	441	592	705	593	866	873	788	826
Sulfate	mg/L	1,200[F]	NC	NC	1,200	210	104	84.0	48.0	18.5	34.3	80.7	35.4
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.6	7.1	7.2	7.1	7.1	7.1	7.0	7.1
Appendix IV[(1)]													
Arsenic	ug/L	10	100	680	**100**	85	**107**	**123**	**152**	**169**	**204**	**198**	88
Chromium	ug/L	11[H]	NC	NC	11	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	27	33	33	28	24	25	34	28
Molybdenum	ug/L	120	NC	NC	**120**	**214**	**207**	**179**	**166**	**131**	**157**	**206**	89
Selenium	ug/L	50	55	120	55	< 1	2	1	< 1	1	1	2	1
MI Part 115 Parameters[(2)]													
Iron	ug/L	500,000[EE]	NC	NC	500,000	22,000	21,300	21,800	23,500	21,500	39,400	40,500	29,800
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.

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:	5/19/2020	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022
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	265	347	410	232	246	304	389	259
Sulfate	mg/L	1,200[F]	NC	NC	1,200	361	718	756	581	523	393	493	537
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.3	6.7	6.9	6.9	6.8	6.8	6.8	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	31	39	37	35	36	47	63	34
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	7	1	4	3	2
MI Part 115 Parameters[(2)]													
Iron	ug/L	500,000[EE]	NC	NC	500,000	29	< 20	< 20	21	24	< 20	39	952
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.

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.

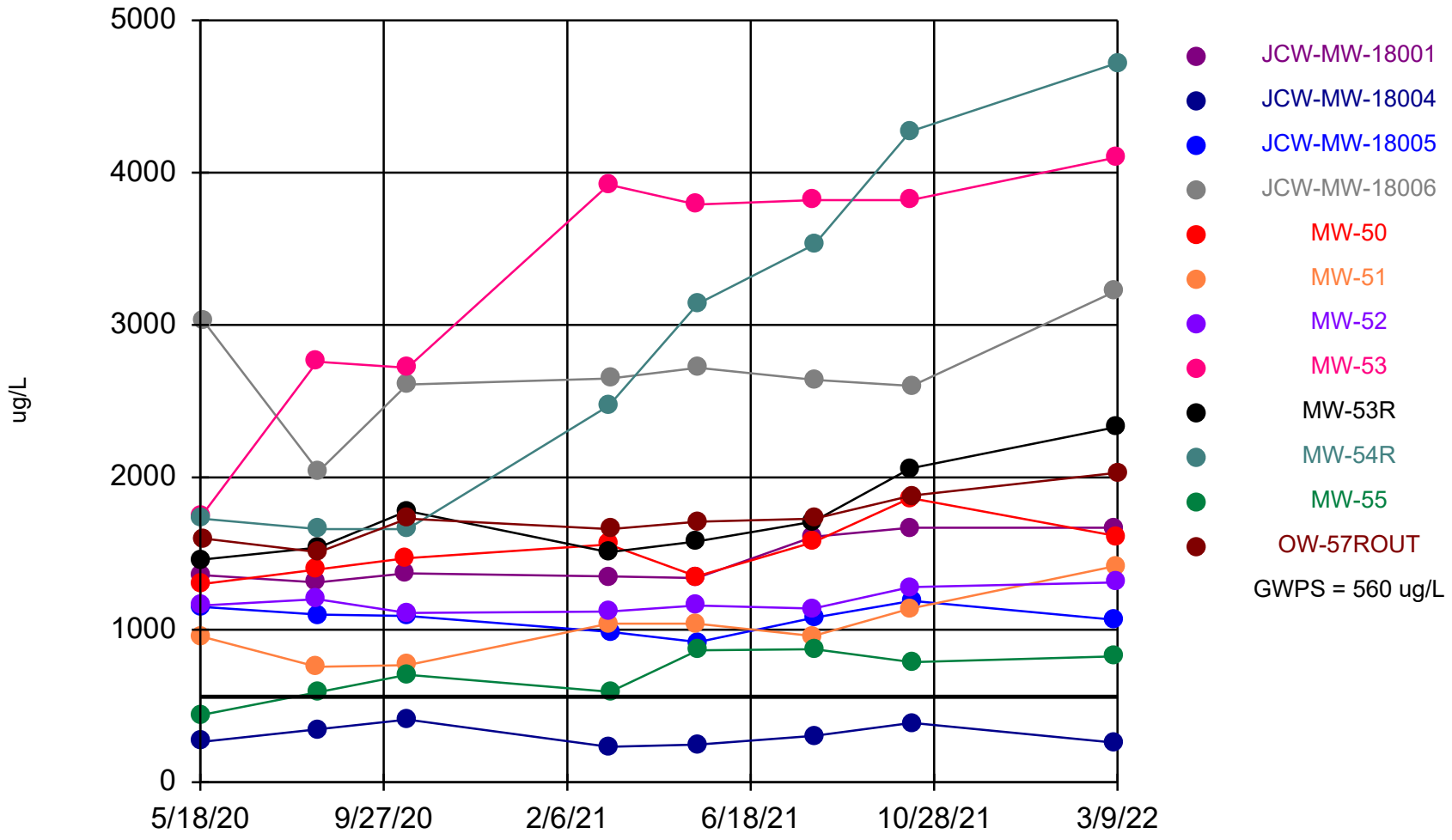
(1) 40 CFR Part 257 Appendix III Detection Monitoring Constituents and Appendix IV Assessment Monitoring Constituents.

(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.9.6.32 Sanitas software licensed to Consumers Energy. EPA

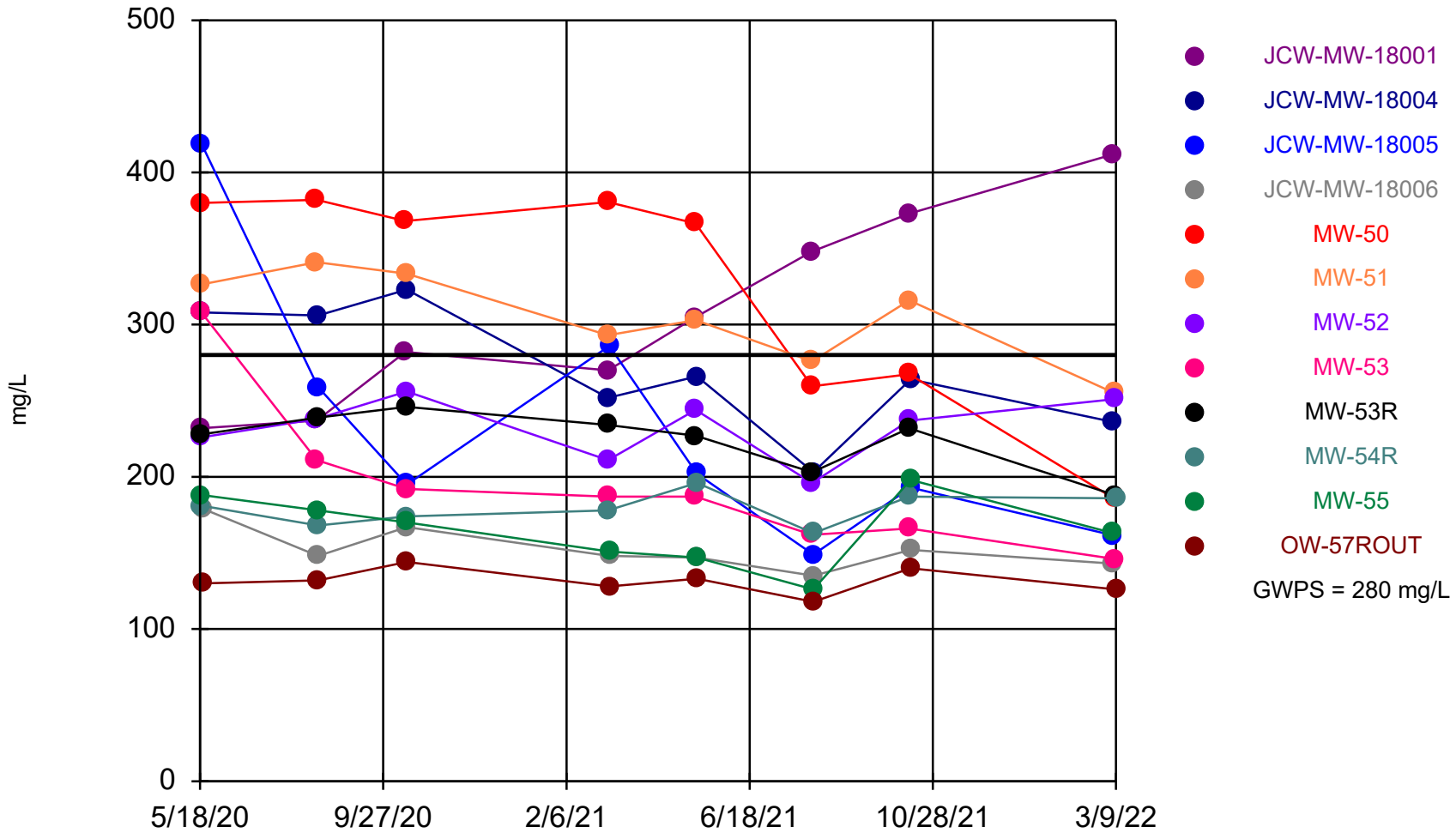
Boron Comparison to GWPS



Time Series Analysis Run 4/12/2022 10:39 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Calcium Comparison to GWPS

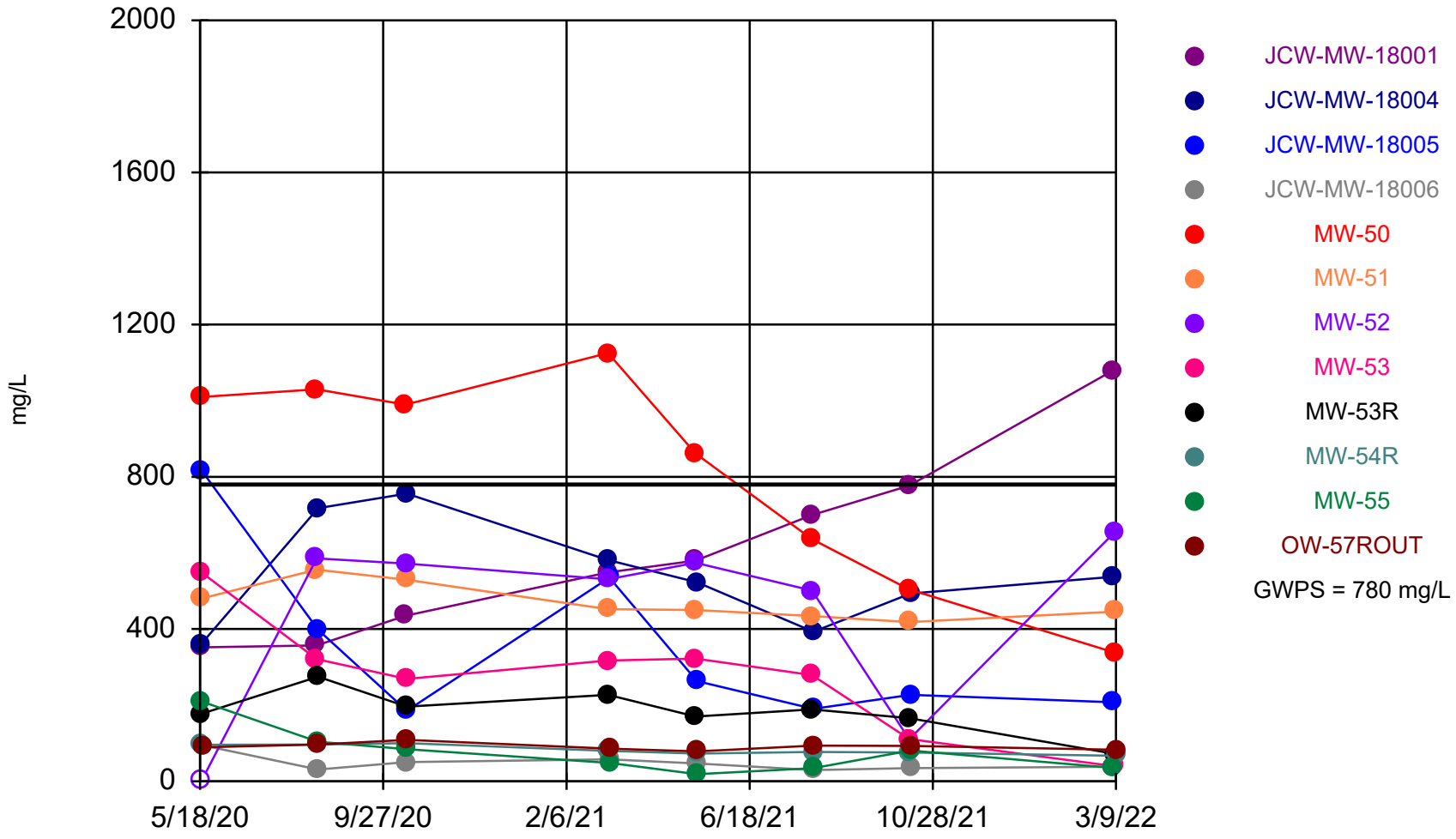


Time Series Analysis Run 4/12/2022 10:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Sulfate Comparison to GWPS

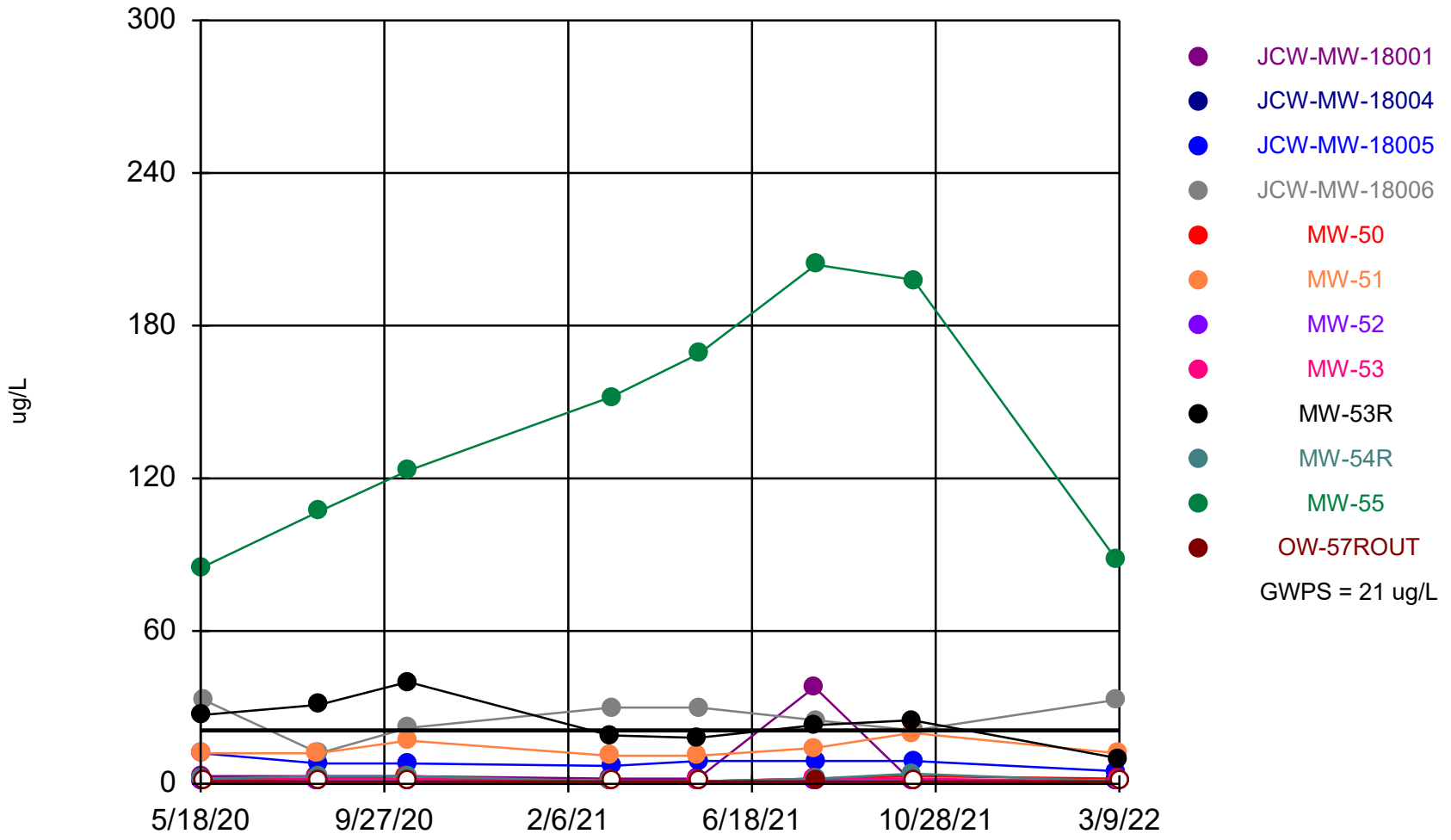


Time Series Analysis Run 4/12/2022 10:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Arsenic Comparison to GWPS

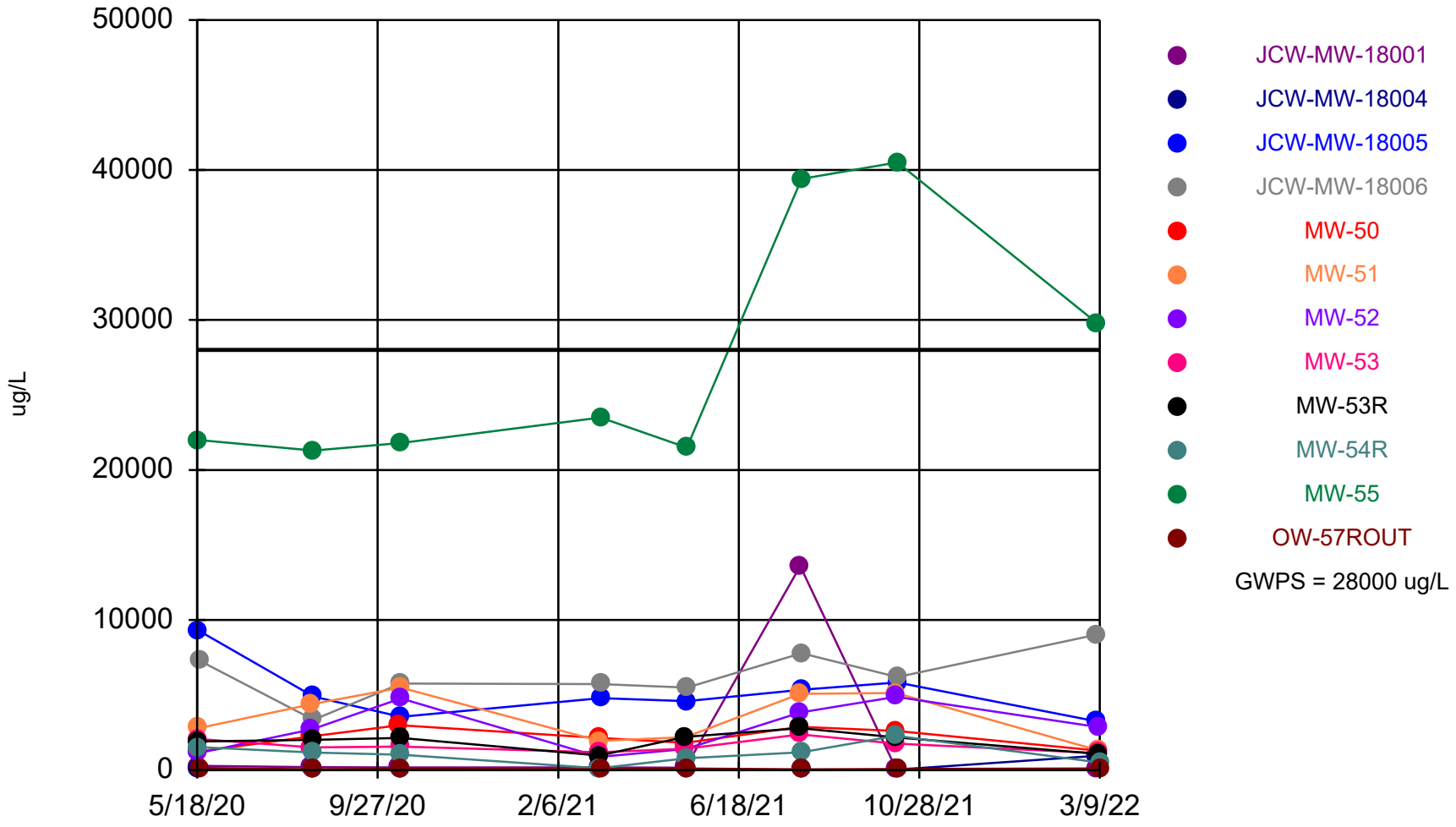


Time Series Analysis Run 4/12/2022 10:45 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Iron Comparison to GWPS

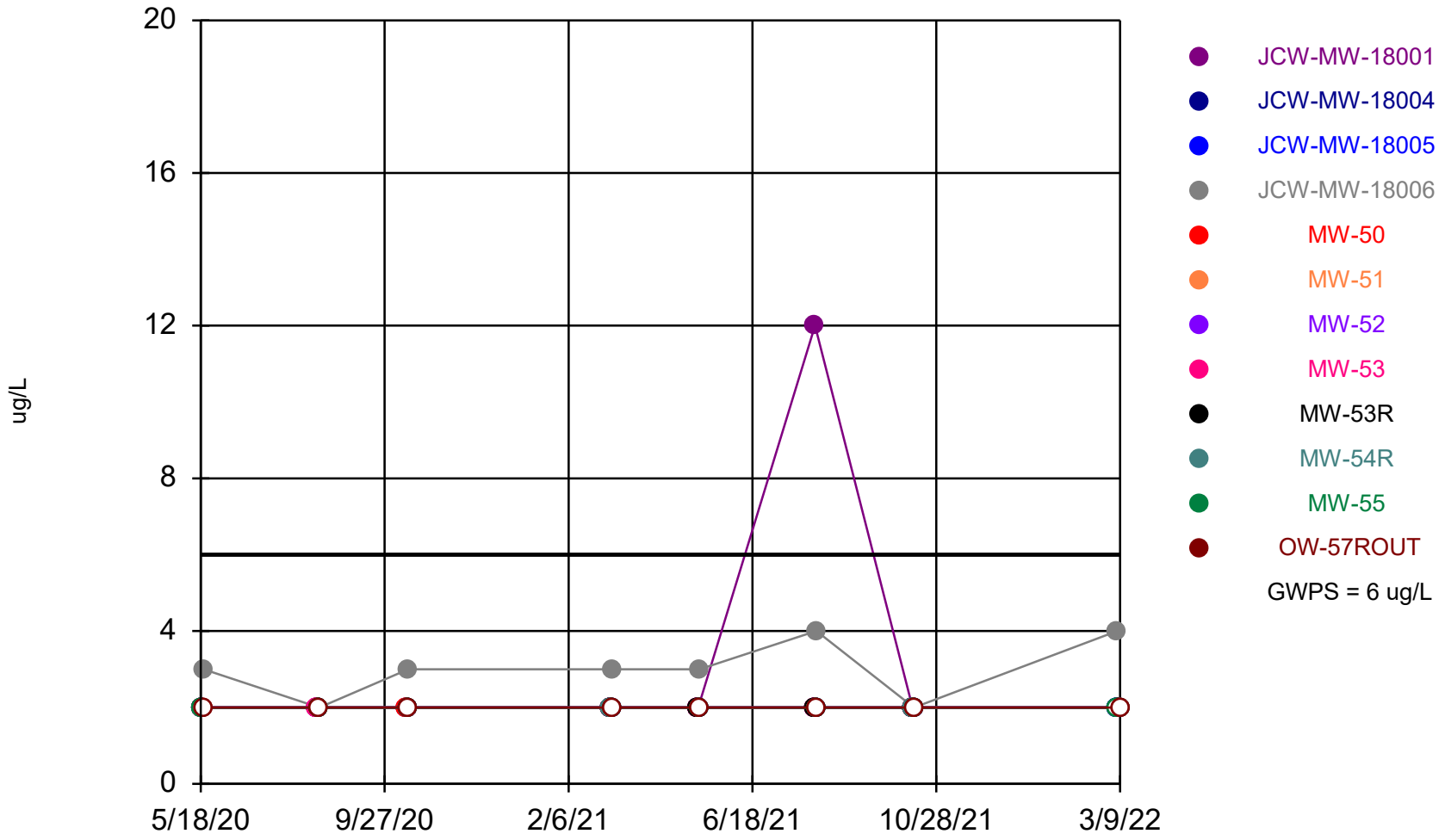


Time Series Analysis Run 4/12/2022 10:45 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Vanadium Comparison to GWPS



Time Series Analysis Run 4/12/2022 10:45 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Arsenic, Total Analysis Run 4/12/2022 9:25 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

For observations made between 5/18/2020 and 3/9/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 25
Wells = 12
Minimum Value = 1
Maximum Value = 204
Mean Value = 18.99
Median Value = 3
Standard Deviation = 40.27
Coefficient of Variation = 2.121
Skewness = 3.231

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	1	1	38	6.625	2.5	12.7	1.918	2.248
JCW-MW-18004	8	8	1	1	1	1	0	0	NaN
JCW-MW-18005	8	0	5	12	8.375	8.5	1.996	0.2383	0.1387
JCW-MW-18006	8	0	12	33	25.75	27.5	7.246	0.2814	-0.7404
MW-50	8	0	1	3	1.875	2	0.8345	0.4451	0.2217
MW-51	8	0	11	20	13.63	12	3.249	0.2384	1.107
MW-52	8	7	1	1	1	1	0	0	NaN
MW-53	8	2	1	2	1.625	2	0.5175	0.3185	-0.5164
MW-53R	8	0	10	40	24.13	24	9.047	0.375	0.2406
MW-54R	8	0	1	4	2.125	2	1.126	0.5299	0.3911
MW-55	8	0	85	204	140.8	137.5	47.13	0.3348	0.1467
OW-57ROUT	8	7	1	1	1	1	0	0	NaN

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Boron, Total Analysis Run 4/12/2022 9:25 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

For observations made between 5/18/2020 and 3/9/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 0
Wells = 12
Minimum Value = 232
Maximum Value = 4720
Mean Value = 1638
Median Value = 1440
Standard Deviation = 980.3
Coefficient of Variation = 0.5984
Skewness = 1.121

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	1310	1670	1460	1365	159.4	0.1092	0.5181
JCW-MW-18004	8	0	232	410	306.5	284.5	67.99	0.2218	0.4486
JCW-MW-18005	8	0	919	1190	1073	1085	86.07	0.08025	-0.5143
JCW-MW-18006	8	0	2040	3220	2689	2645	346.1	0.1287	-0.312
MW-50	8	0	1300	1865	1516	1515	180.5	0.119	0.7035
MW-51	8	0	758	1420	1010	1000	211.8	0.2097	0.6517
MW-52	8	0	1110	1310	1185	1160	73.68	0.06218	0.7618
MW-53	8	0	1750	4100	3335	3805	830.3	0.249	-0.9162
MW-53R	8	0	1460	2330	1746	1645	304.6	0.1744	0.9713
MW-54R	8	0	1660	4720	2898	2805	1211	0.4181	0.2961
MW-55	8	0	441	873	710.5	746.5	156	0.2196	-0.5146
OW-57ROUT	8	0	1510	2030	1731	1720	161.7	0.09342	0.5954

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Calcium, Total Analysis Run 4/12/2022 9:25 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

For observations made between 5/18/2020 and 3/9/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 0
Wells = 12
Minimum Value = 118
Maximum Value = 419
Mean Value = 226.6
Median Value = 207
Standard Deviation = 75.18
Coefficient of Variation = 0.3318
Skewness = 0.6894

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	232	412	307.4	293.5	65.01	0.2115	0.3611
JCW-MW-18004	8	0	203	323	269.8	265	40.65	0.1507	-0.198
JCW-MW-18005	8	0	149	419	233.1	198.5	88.04	0.3777	1.227
JCW-MW-18006	8	0	135	179	152.4	148	14.04	0.09214	0.8614
MW-50	8	0	185.5	382	323.7	367.3	75.56	0.2334	-0.8336
MW-51	8	0	255	341	305.5	309.5	29.71	0.09725	-0.462
MW-52	8	0	196	256	232.4	237.5	20.4	0.0878	-0.6592
MW-53	8	0	146	308	194.9	187	49.99	0.2565	1.558
MW-53R	8	0	188	246	224.6	230	19.39	0.08632	-0.9474
MW-54R	8	0	163	196	179.1	179.5	10.75	0.06001	-0.009878
MW-55	8	0	126	198	165.1	166.5	23.47	0.1422	-0.2235
OW-57ROUT	8	0	118	144	131.4	131	8.088	0.06156	0.02005

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Iron, Total Analysis Run 4/12/2022 9:25 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

For observations made between 5/18/2020 and 3/9/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 3
Wells = 12
Minimum Value = 10
Maximum Value = 40500
Mean Value = 4516
Median Value = 2045
Standard Deviation = 7696
Coefficient of Variation = 1.704
Skewness = 3.023

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	86	13600	1847	182.5	4749	2.572	2.267
JCW-MW-18004	8	3	10	952	136.9	22.5	329.5	2.407	2.263
JCW-MW-18005	8	0	3235	9310	5197	4850	1872	0.3602	1.339
JCW-MW-18006	8	0	3360	9040	6331	5980	1716	0.271	-0.1028
MW-50	8	0	1240	2990	2153	2200	671.3	0.3118	-0.1844
MW-51	8	0	1310	5500	3543	3590	1663	0.4694	-0.07783
MW-52	8	0	879	4880	2811	2795	1589	0.5654	0.1042
MW-53	8	0	1130	2380	1626	1535	429.1	0.2638	0.5728
MW-53R	8	0	971	2800	1914	2080	608.4	0.3179	-0.4502
MW-54R	8	0	115	2280	1074	1100	657.5	0.6121	0.4031
MW-55	8	0	21300	40500	27475	22750	8186	0.2979	0.8518
OW-57ROUT	8	0	42	135	79.38	80	31.94	0.4024	0.393

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Sulfate Analysis Run 4/12/2022 9:25 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

For observations made between 5/18/2020 and 3/9/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 1
Wells = 12
Minimum Value = 0.5
Maximum Value = 1125
Mean Value = 332
Median Value = 266
Standard Deviation = 281.1
Coefficient of Variation = 0.8465
Skewness = 0.9137

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	352	1080	603.8	564.5	245.6	0.4069	0.8052
JCW-MW-18004	8	0	361	756	545.3	530	139.4	0.2556	0.2608
JCW-MW-18005	8	0	185	817	352.8	245	223.7	0.6341	1.246
JCW-MW-18006	8	0	29.7	94.5	47.83	42.55	21.2	0.4433	1.424
MW-50	8	0	338	1125	811.8	925.8	285.2	0.3513	-0.5682
MW-51	8	0	418	556	470.8	451	48.32	0.1026	0.8071
MW-52	8	1	0.5	654	441.1	551.5	243.9	0.5531	-1.09
MW-53	8	0	39.5	549	275.9	298	152.9	0.554	0.1246
MW-53R	8	0	71.7	275	184	183	57.92	0.3148	-0.462
MW-54R	8	0	67.1	100	83.04	78.45	12.43	0.1497	0.2695
MW-55	8	0	18.5	210	76.86	64.35	61.29	0.7974	1.333
OW-57ROUT	8	0	78.3	109	91.2	91.25	9.422	0.1033	0.551

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Vanadium, Total Analysis Run 4/21/2022 5:01 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

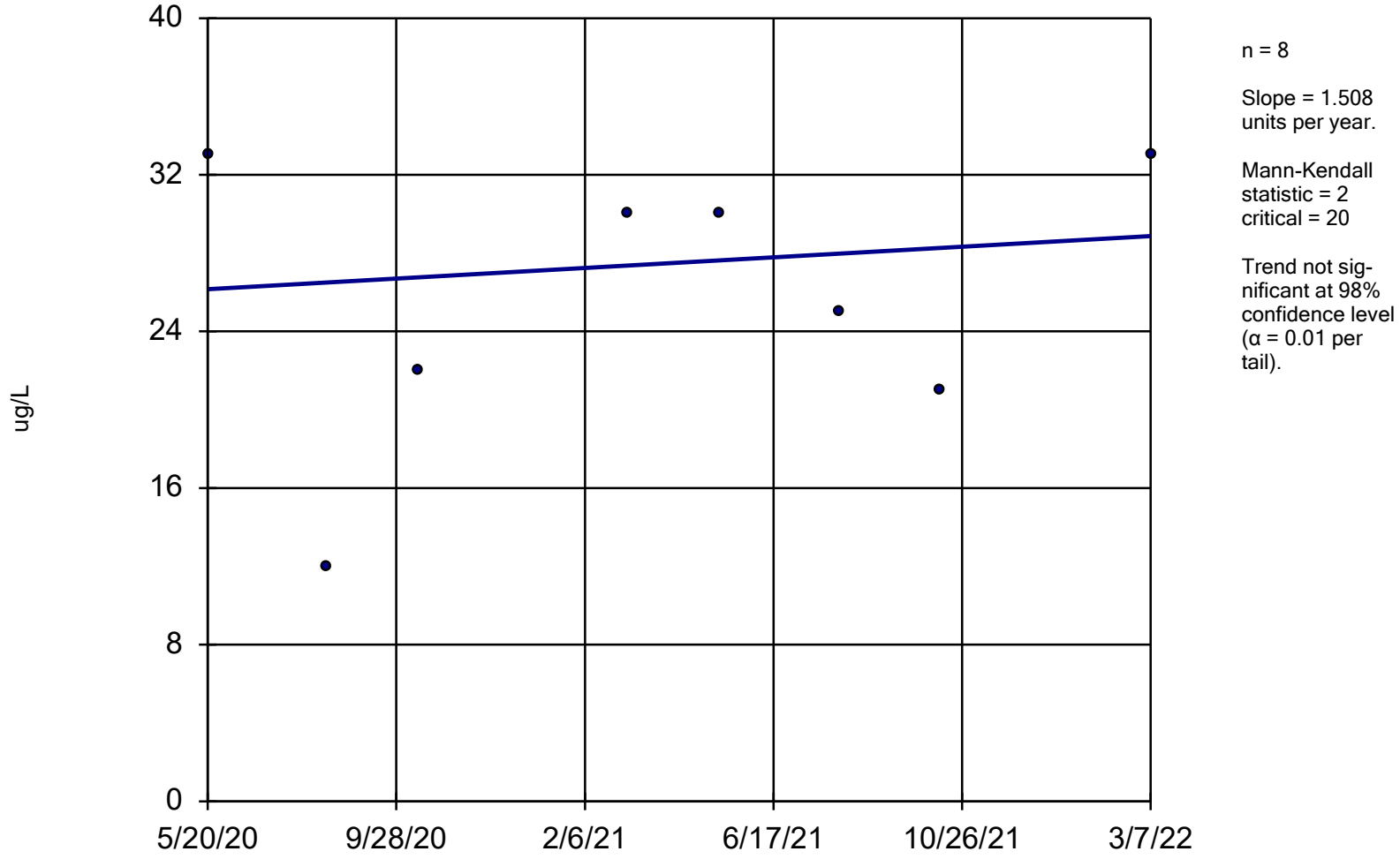
For observations made between 5/18/2020 and 3/9/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 87
Wells = 12
Minimum Value = 2
Maximum Value = 12
Mean Value = 2.188
Median Value = 2
Standard Deviation = 1.069
Coefficient of Variation = 0.4888
Skewness = 8.293

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	8	2	2	2	2	0	0	NaN
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

Arsenic, Total

JCW-MW-18006



n = 8

Slope = 1.508 units per year.

Mann-Kendall statistic = 2
critical = 20

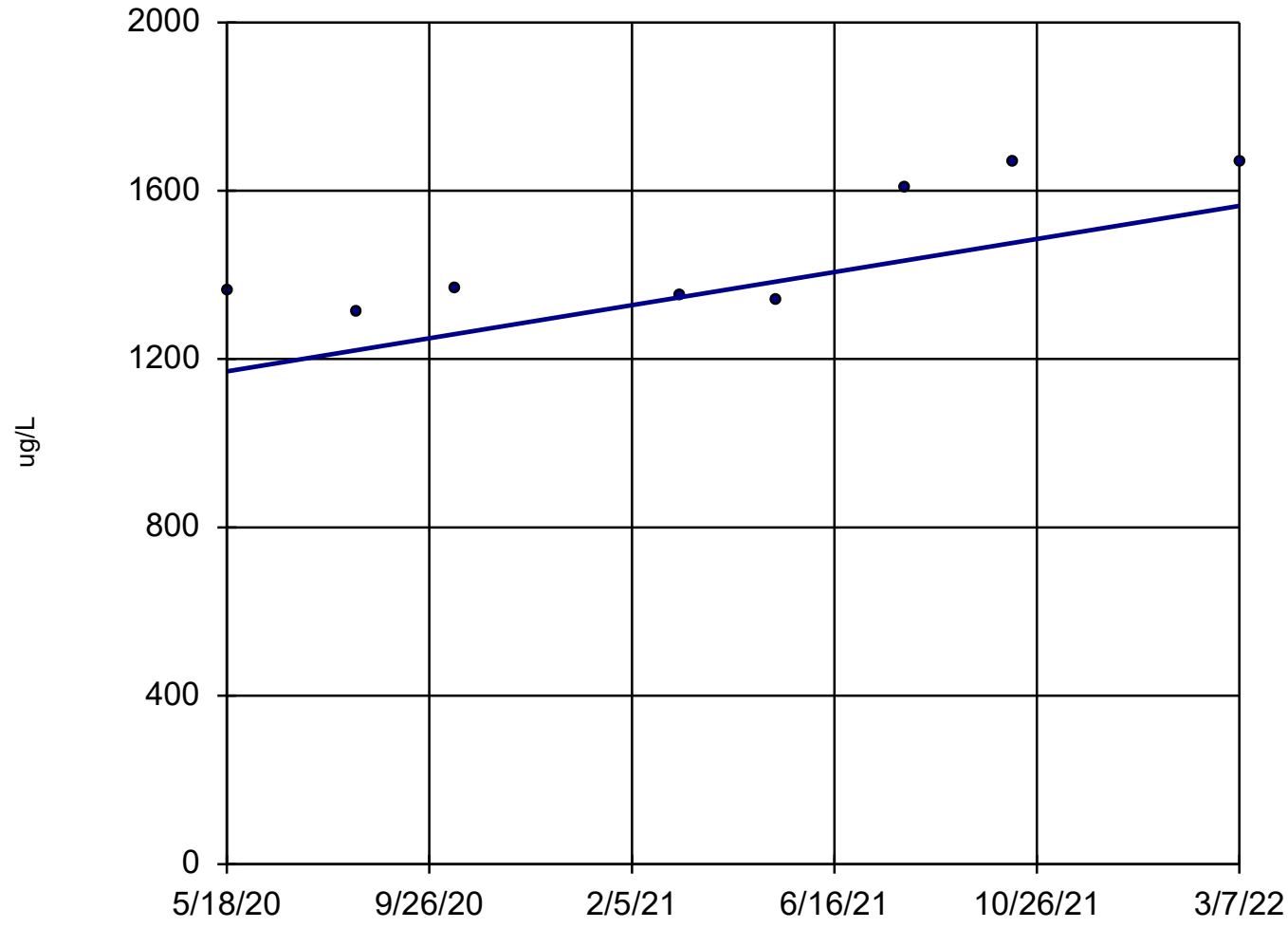
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2022 9:31 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Boron, Total

JCW-MW-18001



n = 8

Slope = 218.1 units per year.

Mann-Kendall statistic = 15
critical = 20

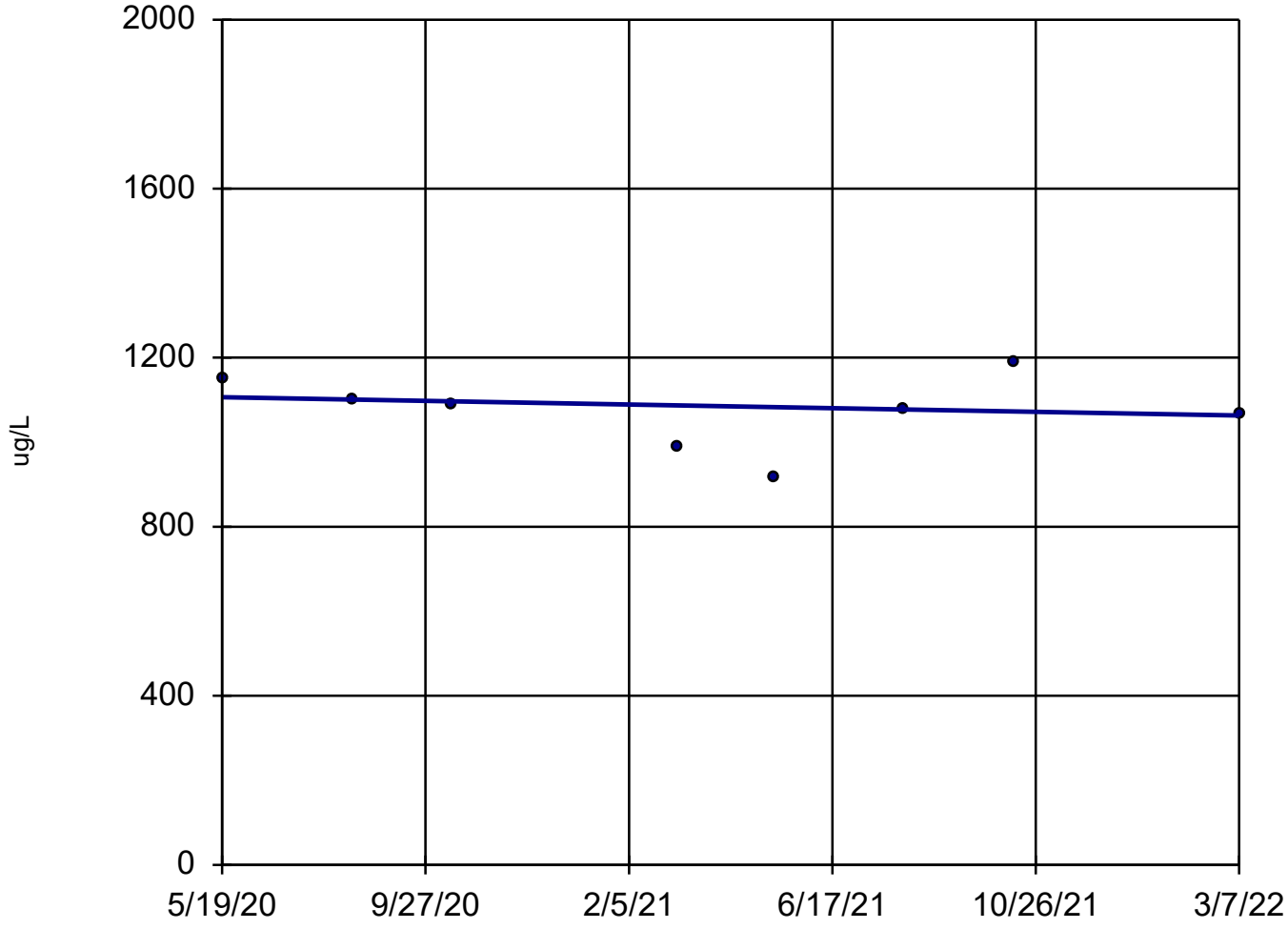
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2022 9:31 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Boron, Total

JCW-MW-18005



n = 8

Slope = -23.82 units per year.

Mann-Kendall statistic = -8
critical = -20

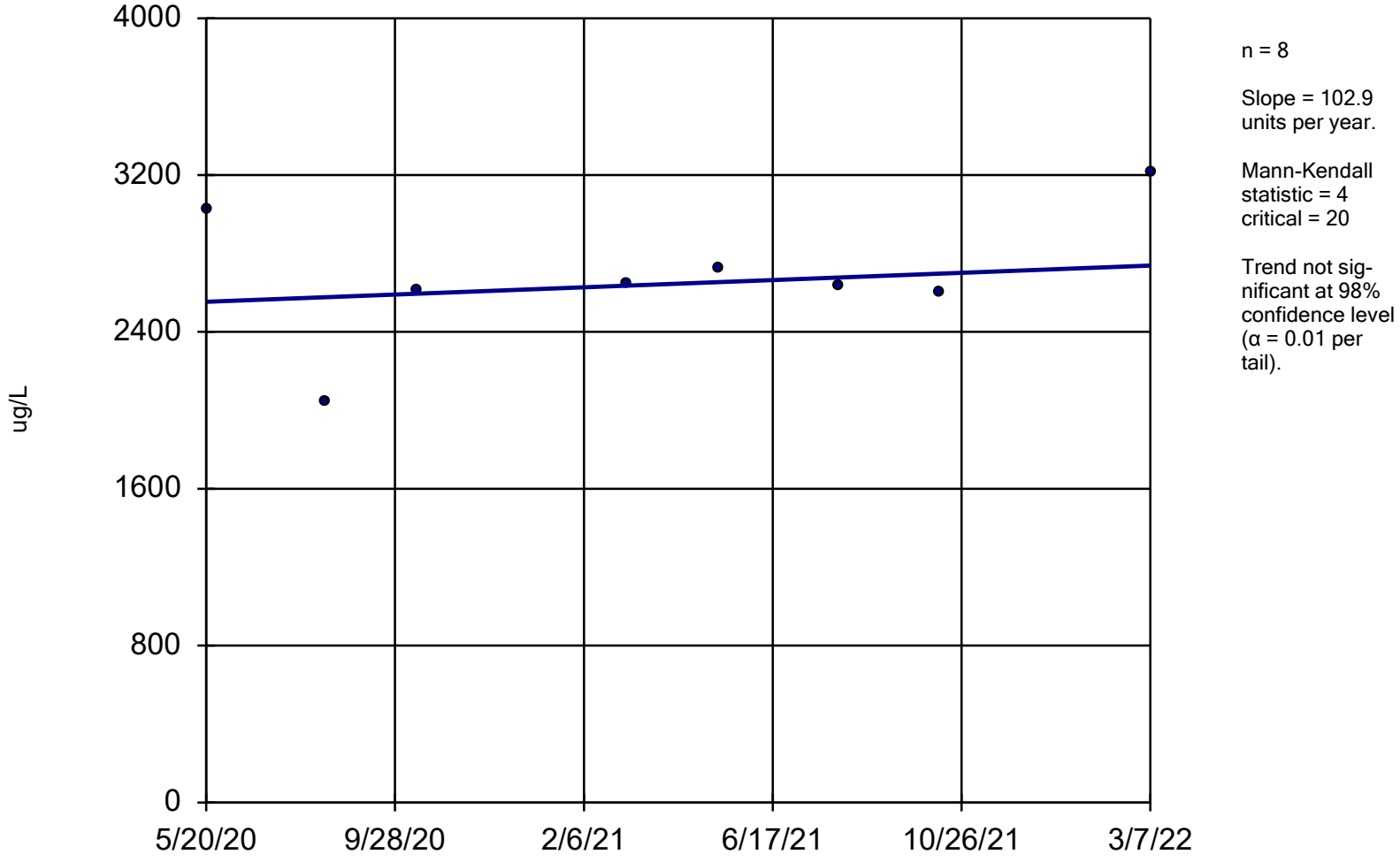
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2022 9:31 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Boron, Total

JCW-MW-18006



n = 8

Slope = 102.9 units per year.

Mann-Kendall statistic = 4
critical = 20

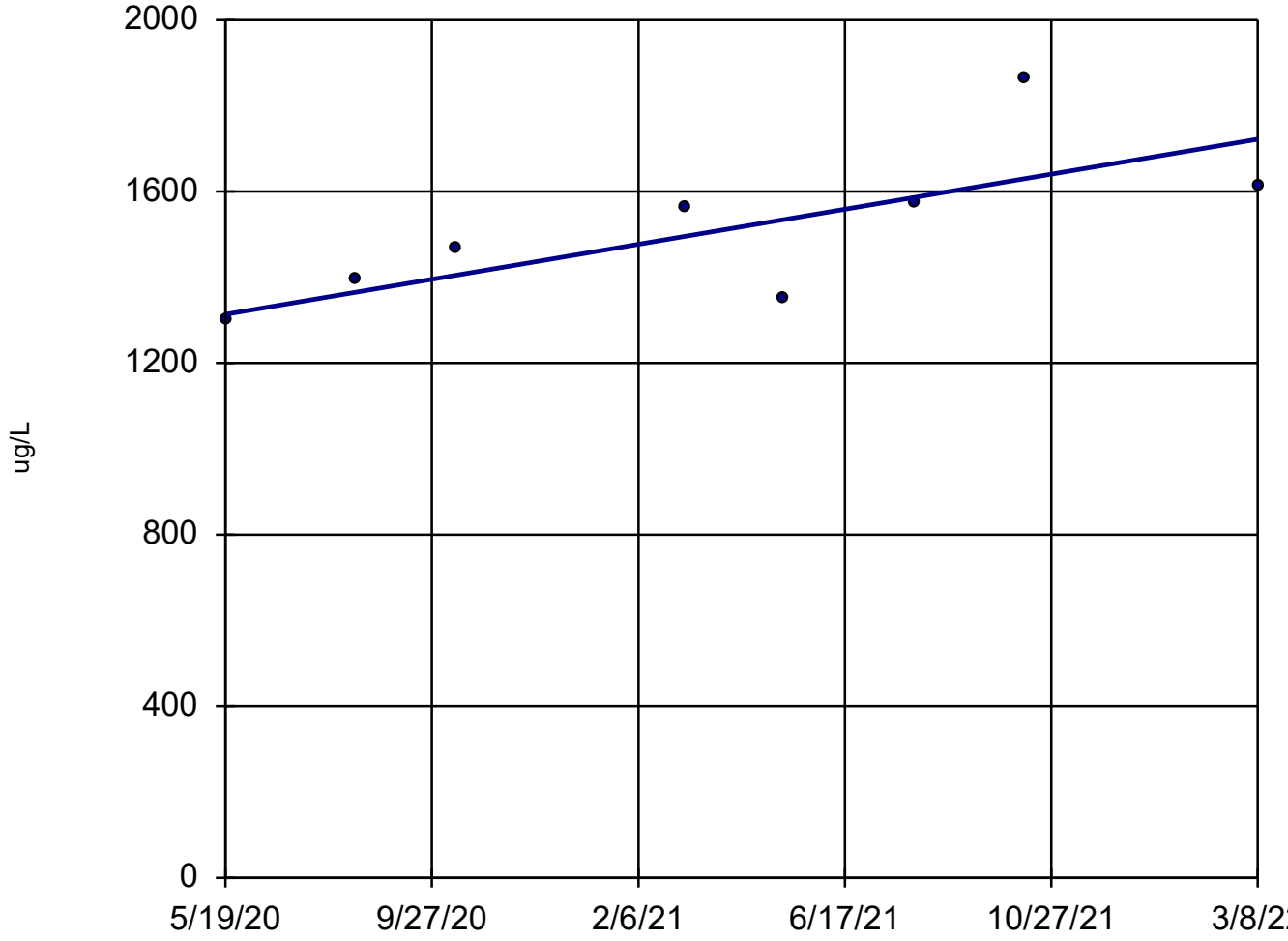
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2022 9:31 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Boron, Total

MW-50



n = 8

Slope = 226.6 units per year.

Mann-Kendall statistic = 20
critical = 20

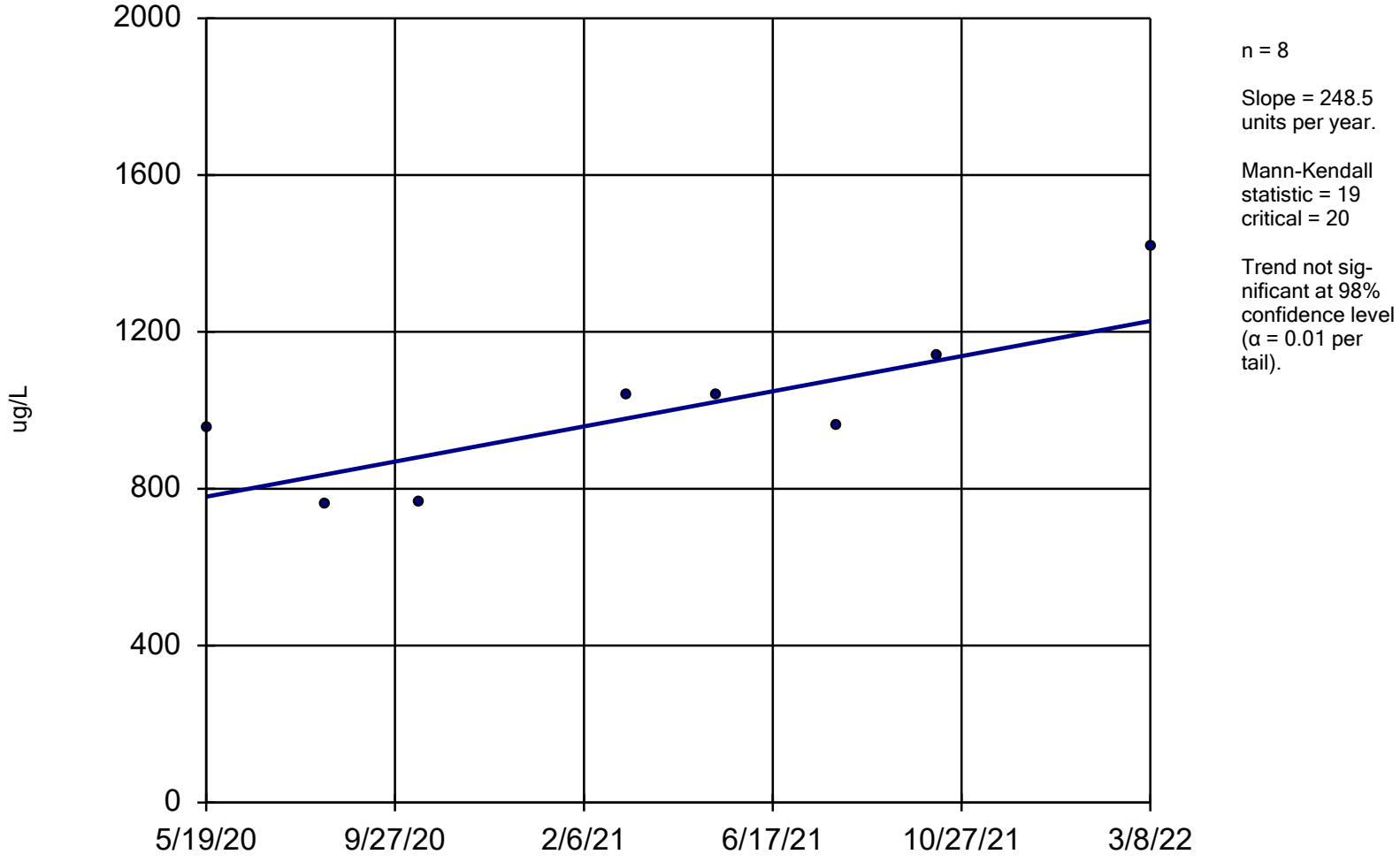
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2022 9:31 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Boron, Total

MW-51



n = 8

Slope = 248.5 units per year.

Mann-Kendall statistic = 19
critical = 20

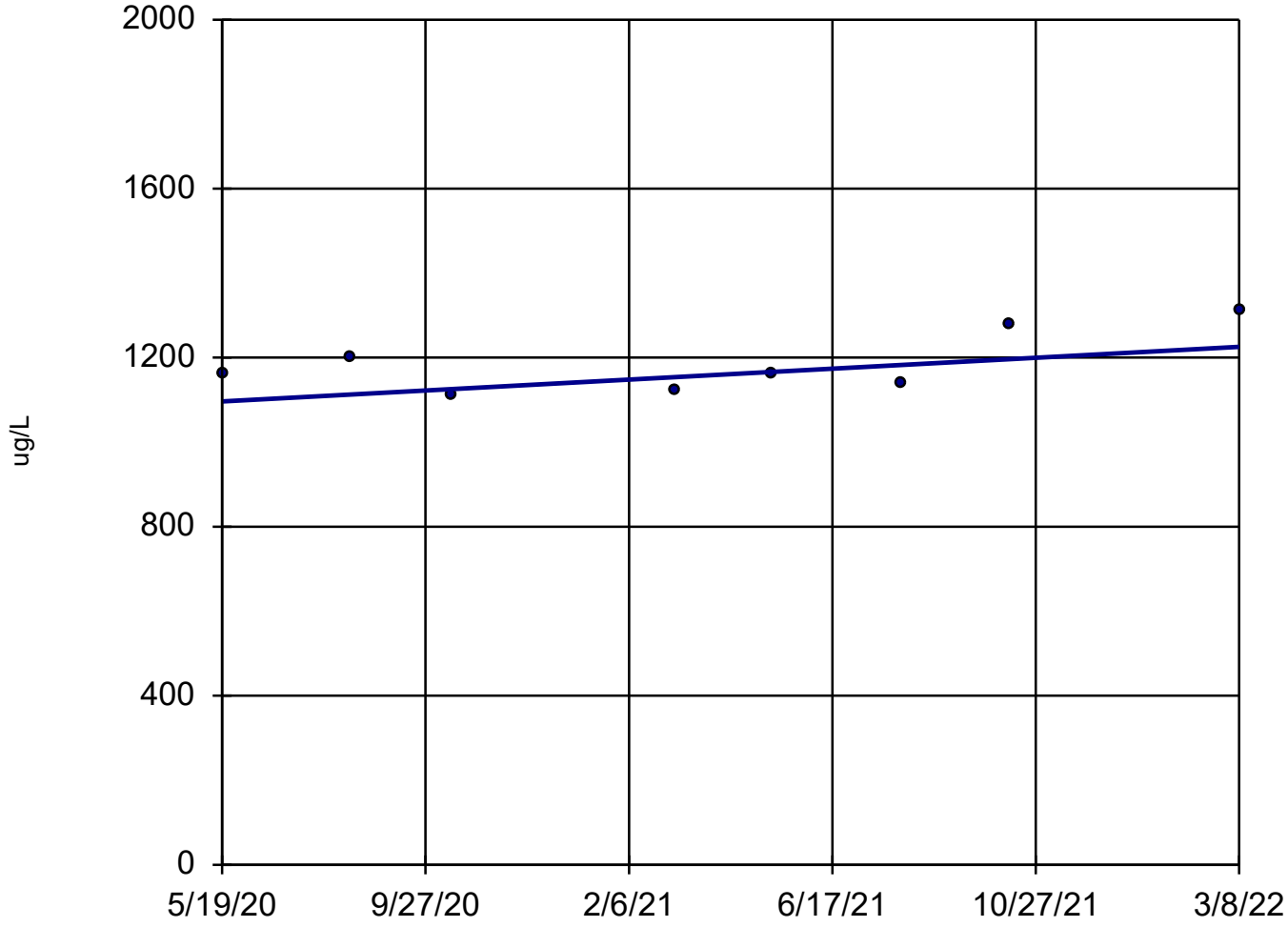
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2022 9:31 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Boron, Total

MW-52



n = 8

Slope = 71.91 units per year.

Mann-Kendall statistic = 11
critical = 20

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

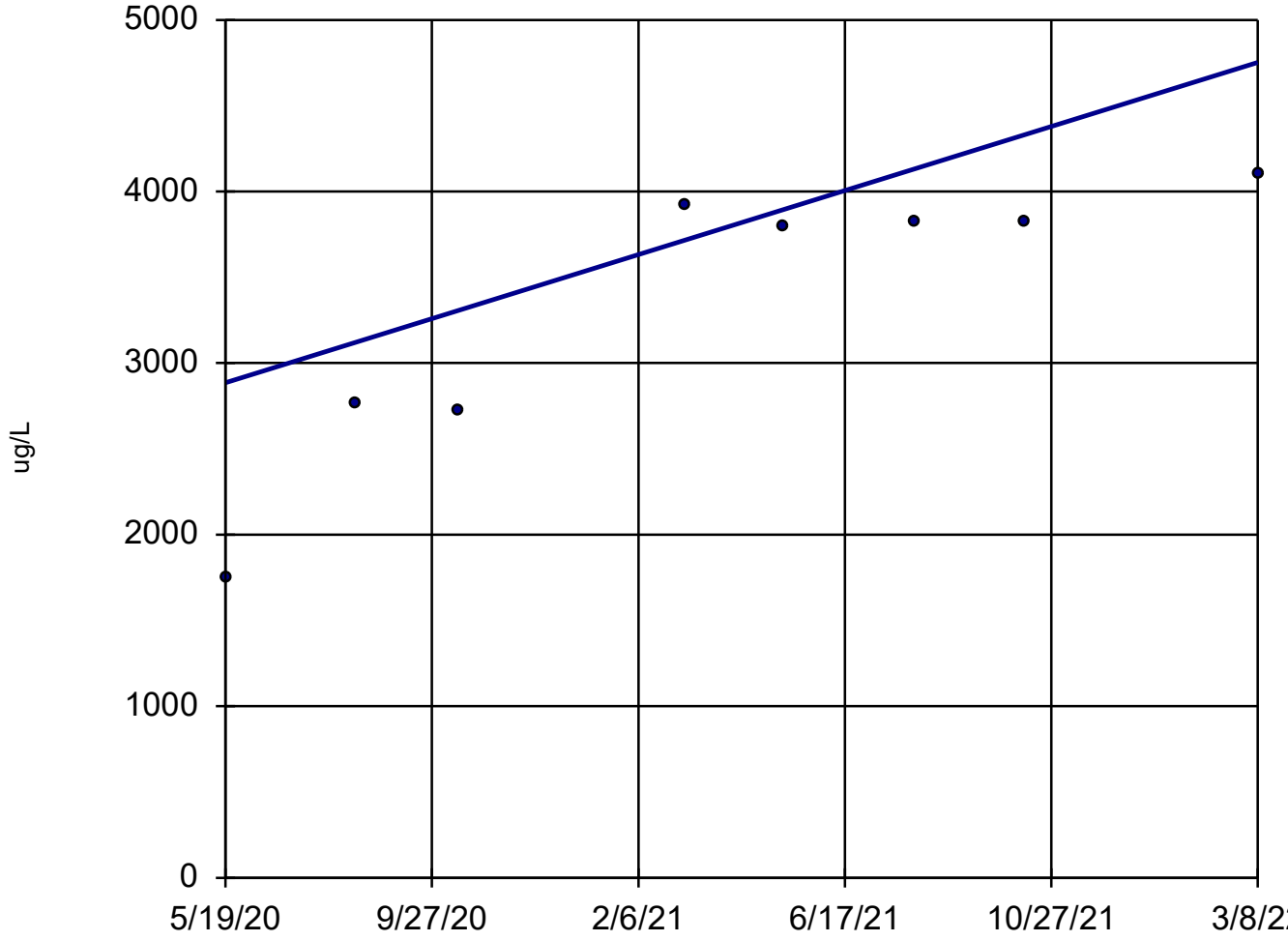
Sen's Slope Estimator Analysis Run 4/12/2022 9:31 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

MW-53



n = 8

Slope = 1036 units per year.

Mann-Kendall statistic = 19 critical = 20

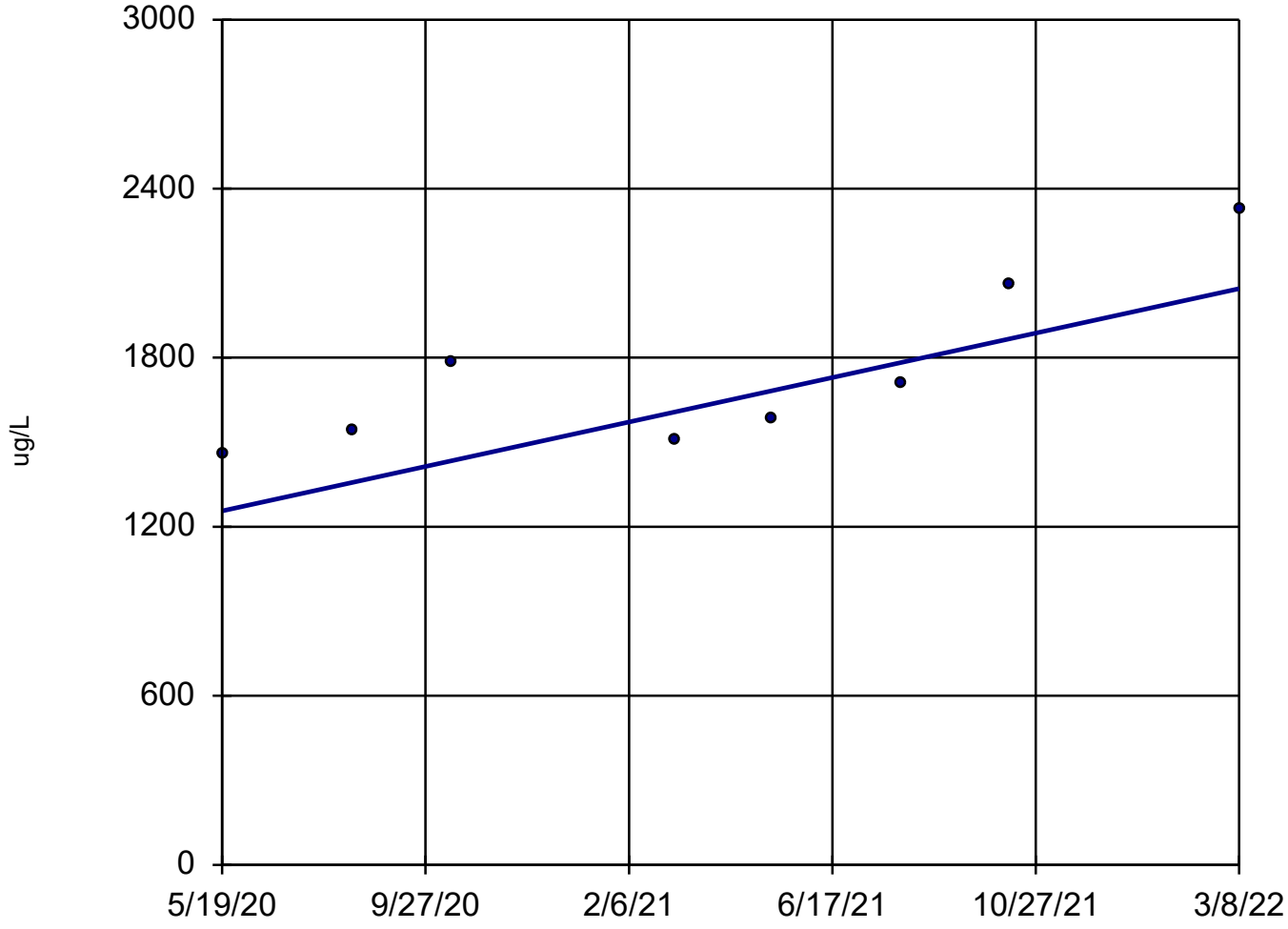
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2022 9:31 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Boron, Total

MW-53R



n = 8

Slope = 437.5 units per year.

Mann-Kendall statistic = 20
critical = 20

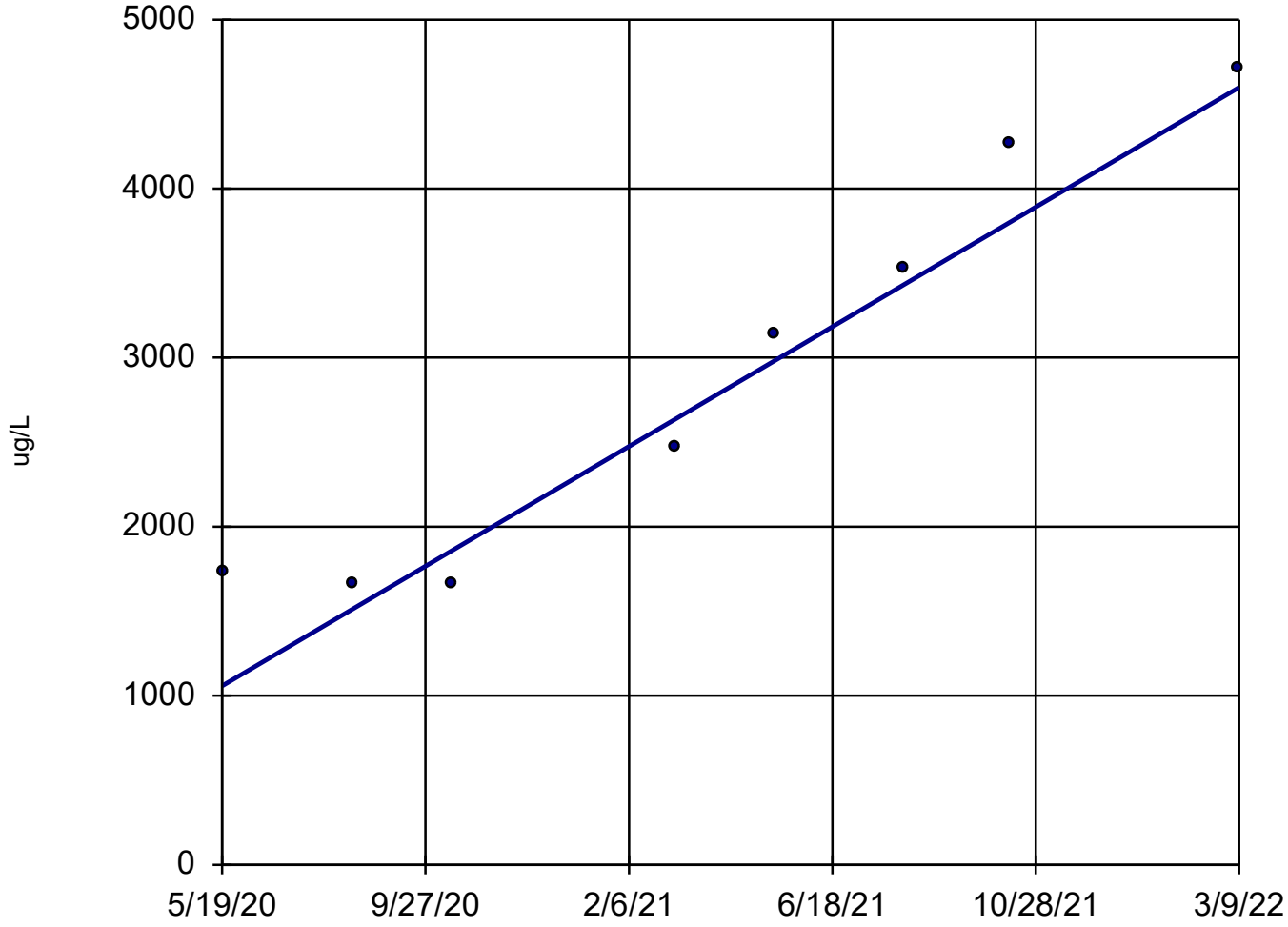
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2022 9:31 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Boron, Total

MW-54R



n = 8

Slope = 1961 units per year.

Mann-Kendall statistic = 23
critical = 20

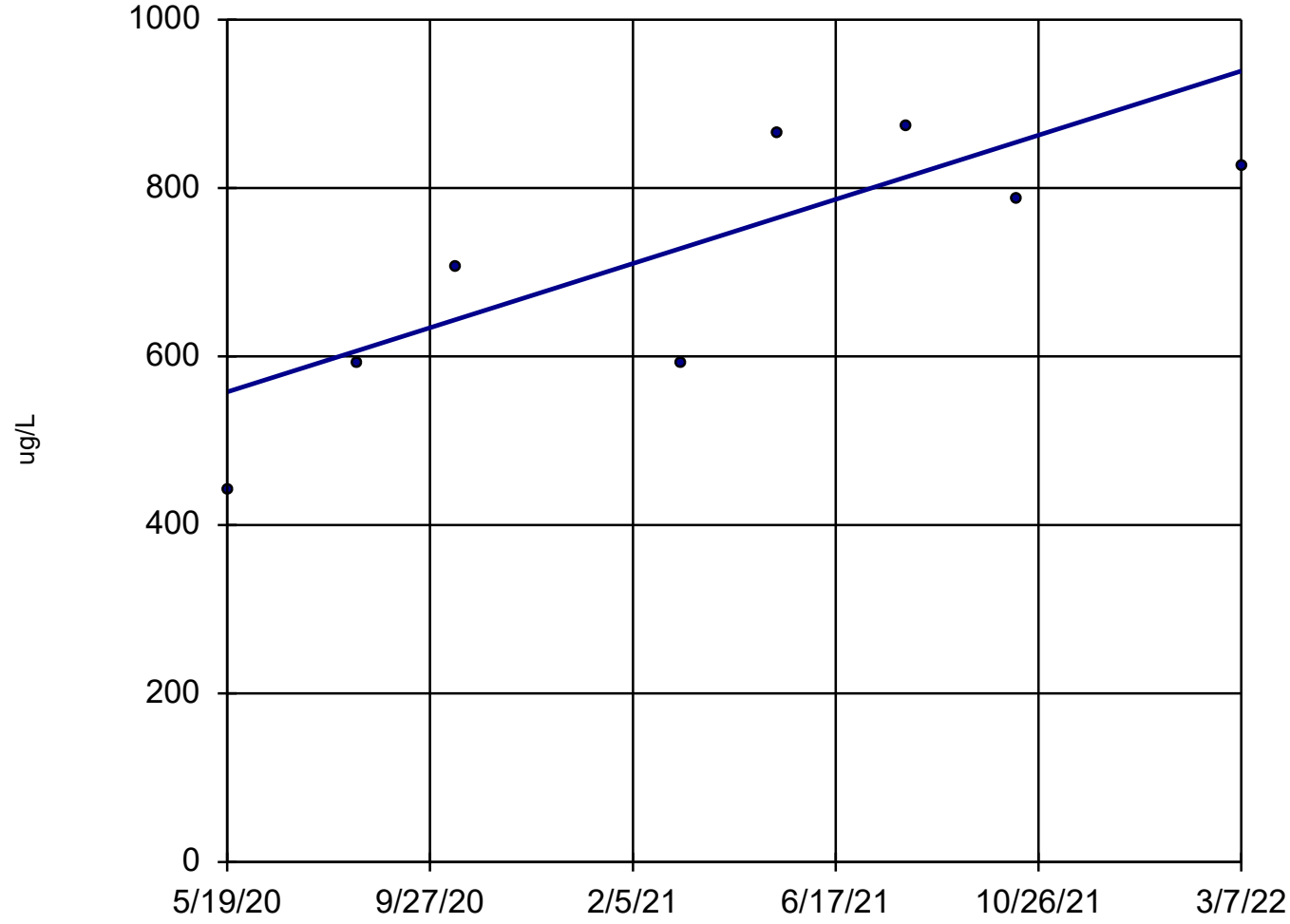
Increasing trend significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2022 9:31 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Boron, Total

MW-55



n = 8

Slope = 211.6 units per year.

Mann-Kendall statistic = 18
critical = 20

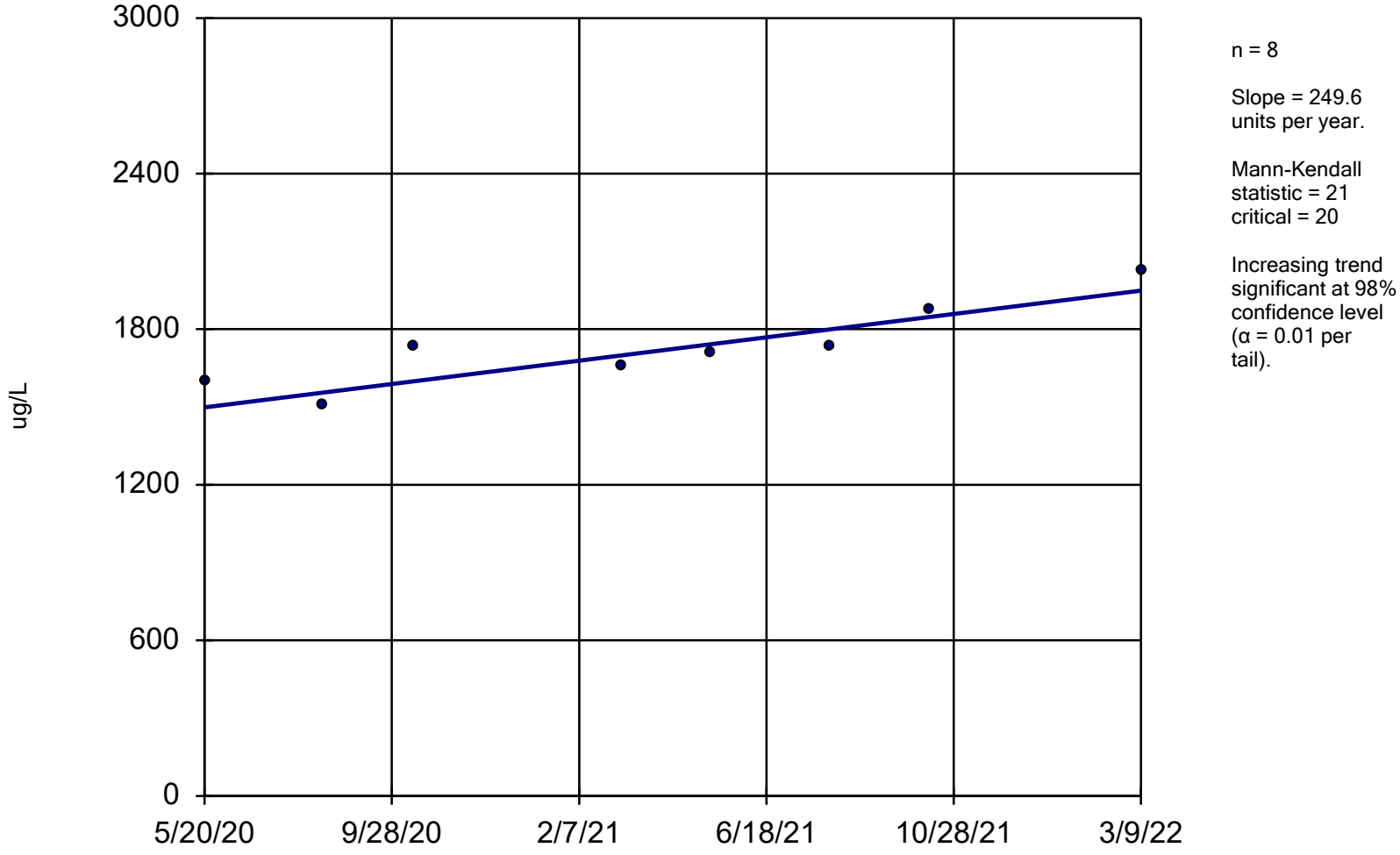
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2022 9:31 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Boron, Total

OW-57ROUT



n = 8

Slope = 249.6 units per year.

Mann-Kendall statistic = 21
critical = 20

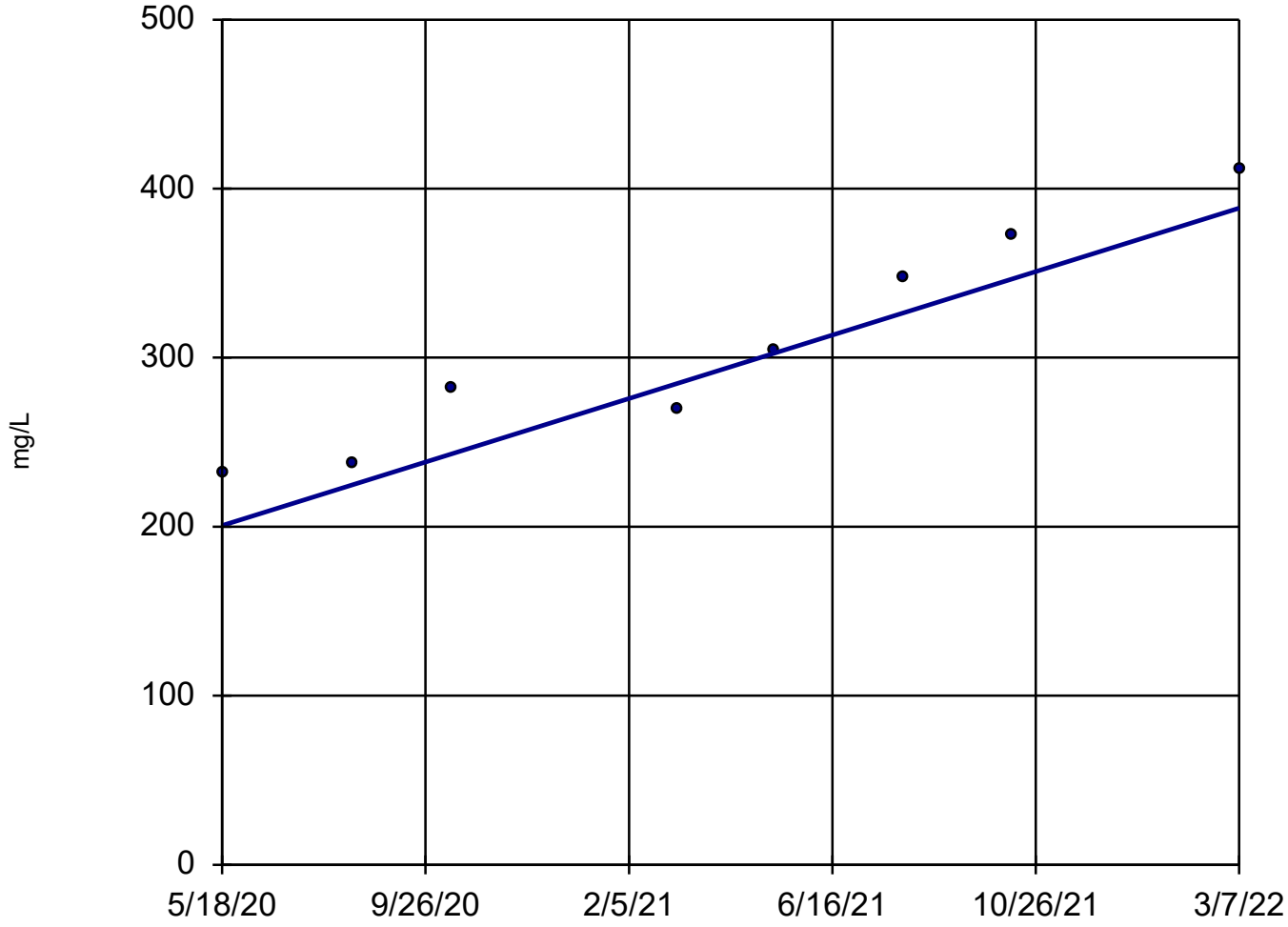
Increasing trend significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2022 9:31 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Calcium, Total

JCW-MW-18001



n = 8

Slope = 104.2 units per year.

Mann-Kendall statistic = 26
critical = 20

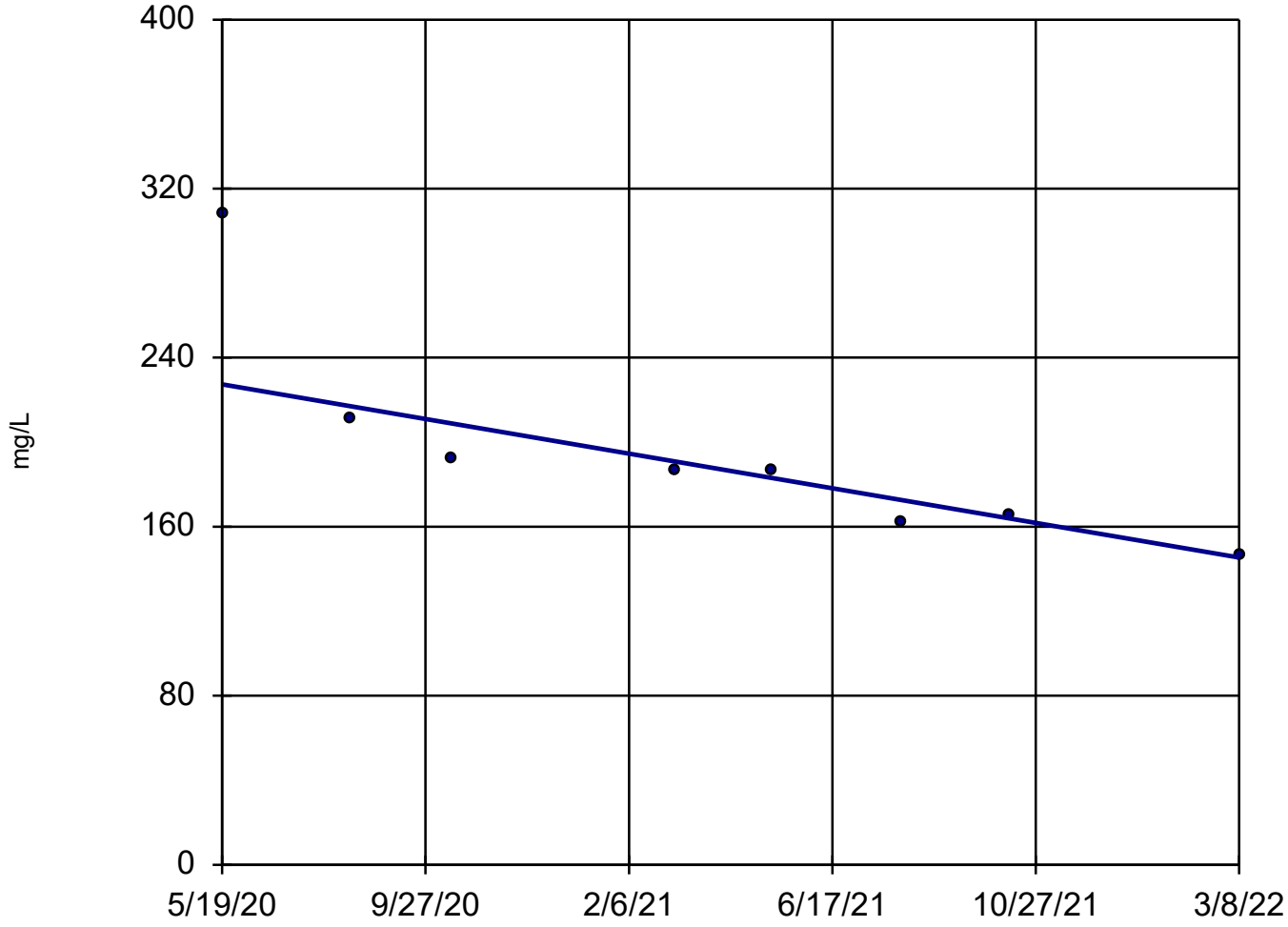
Increasing trend significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2022 9:31 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Calcium, Total

MW-53



n = 8

Slope = -45.52 units per year.

Mann-Kendall statistic = -25
critical = -20

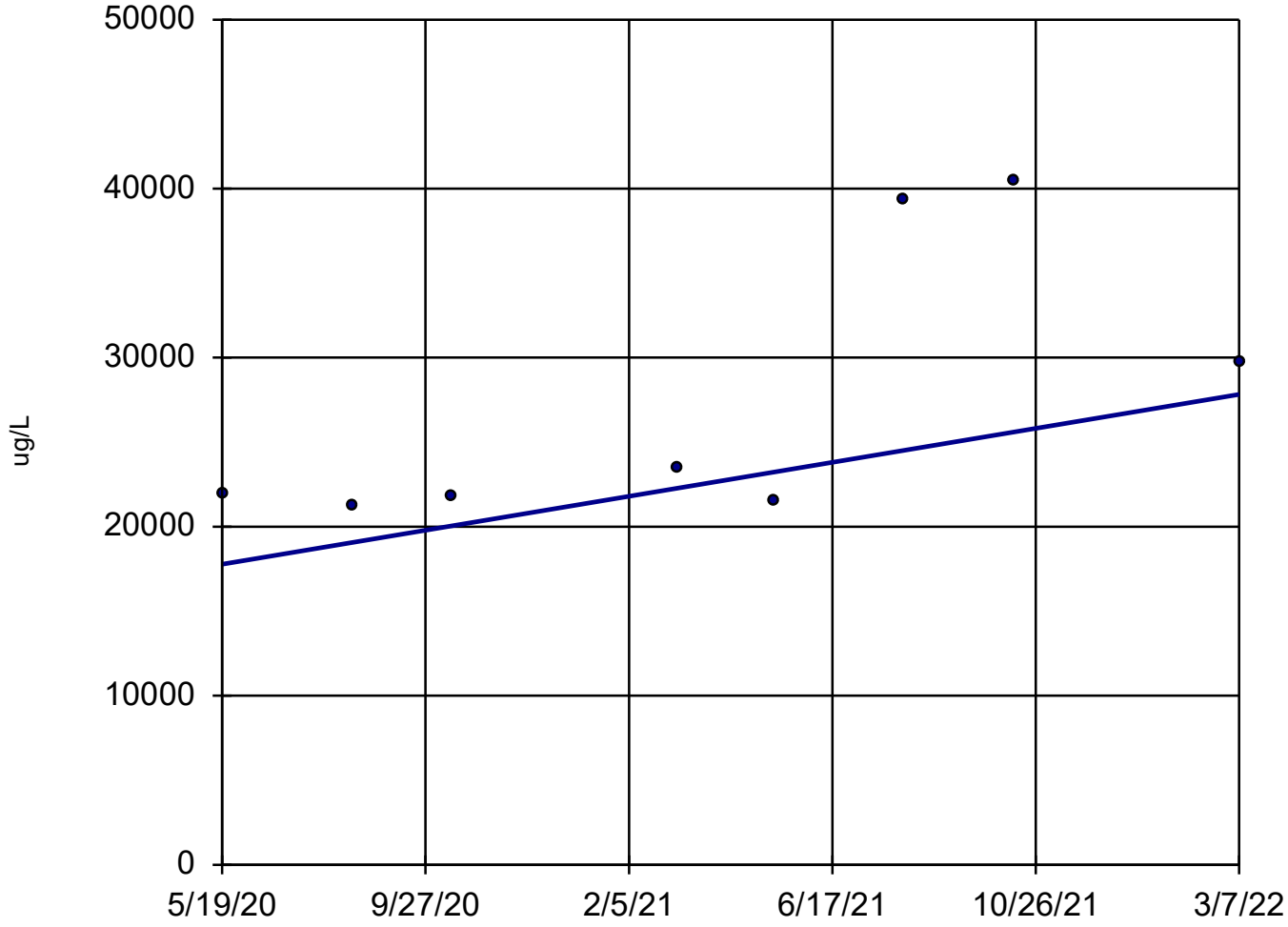
Decreasing trend significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/21/2022 5:03 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Iron, Total

MW-55



n = 8

Slope = 5575 units per year.

Mann-Kendall statistic = 14
critical = 20

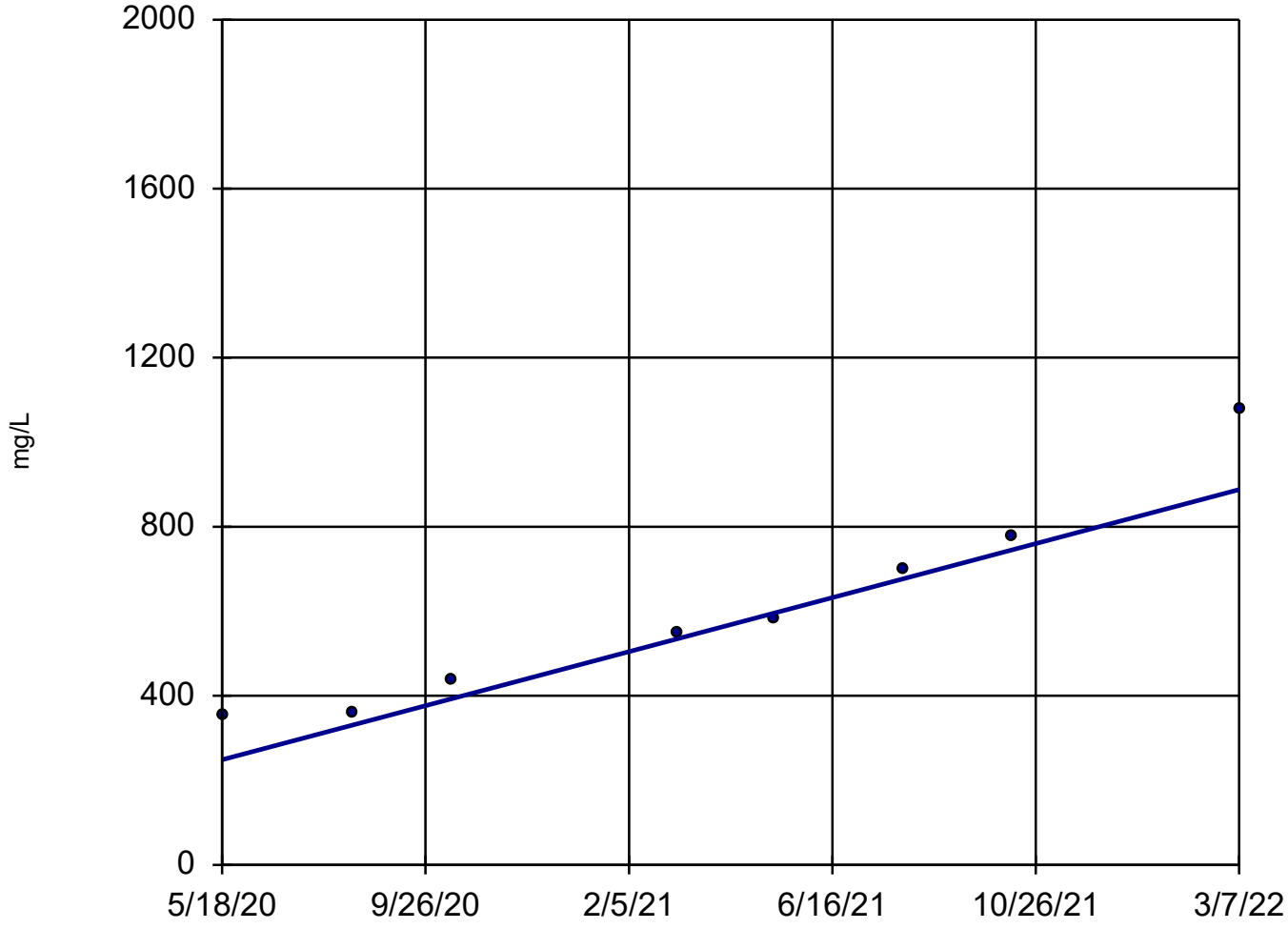
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2022 9:31 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sulfate

JCW-MW-18001



n = 8

Slope = 354.9 units per year.

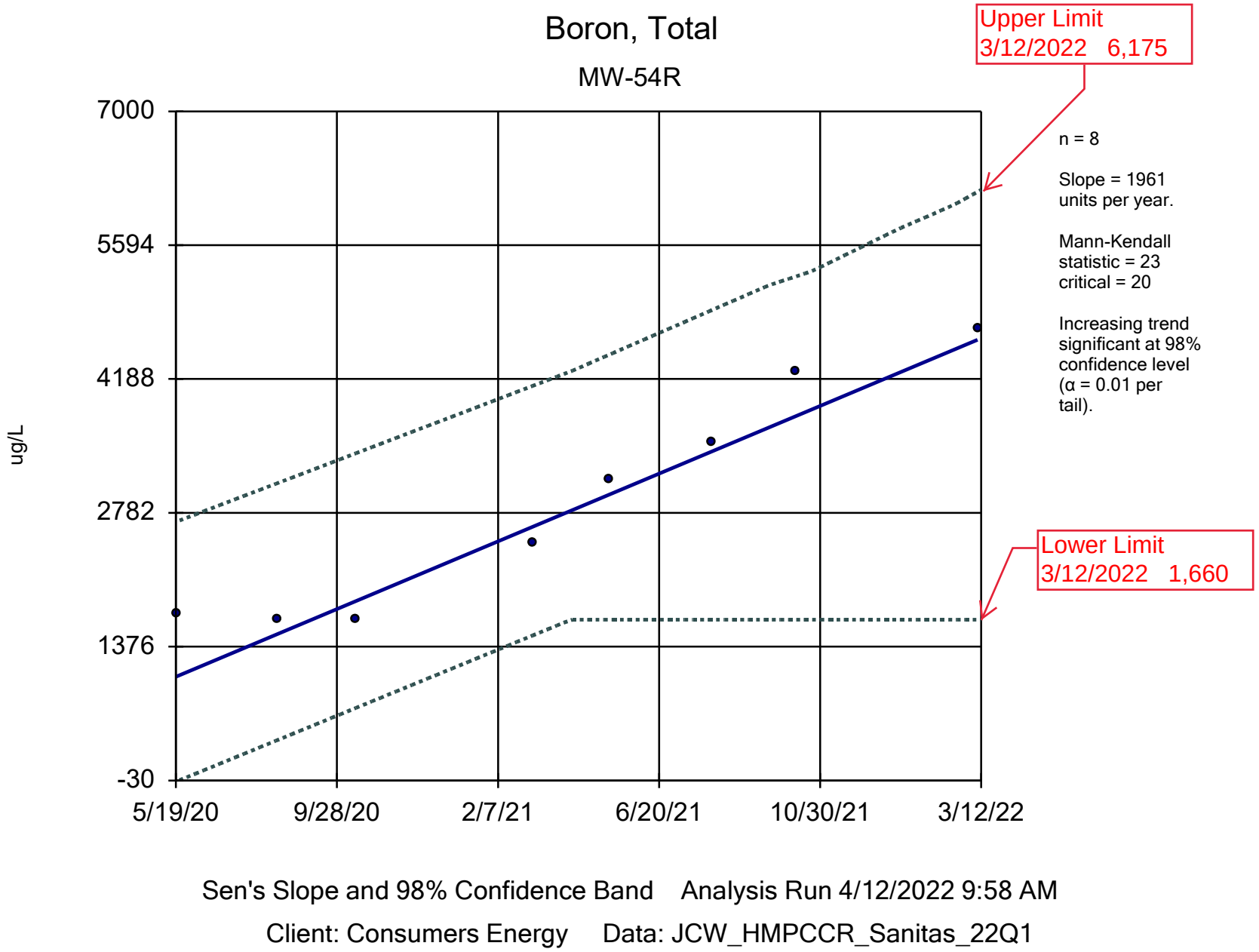
Mann-Kendall statistic = 28
critical = 20

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

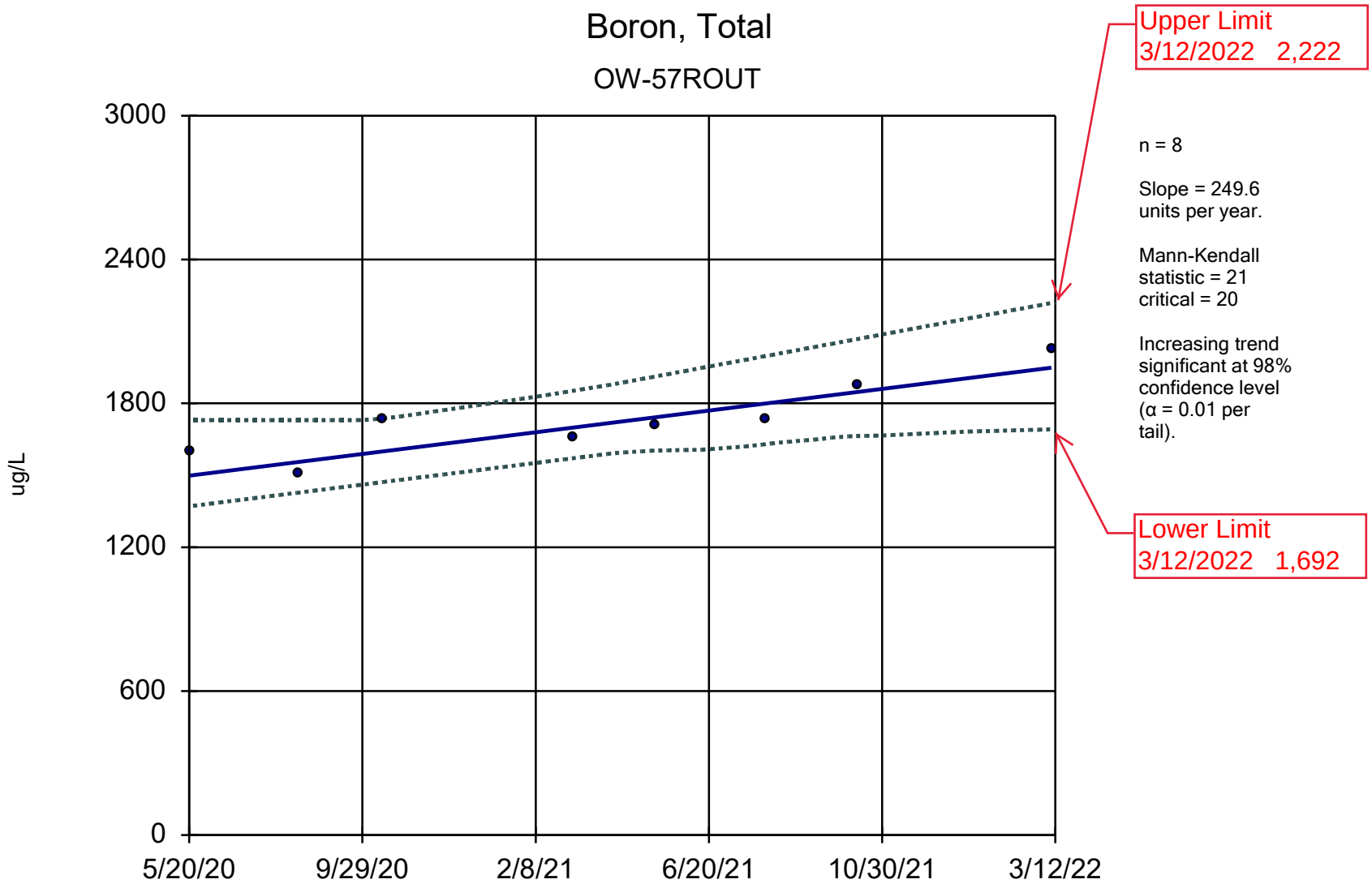
Sen's Slope Estimator Analysis Run 4/12/2022 9:31 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA



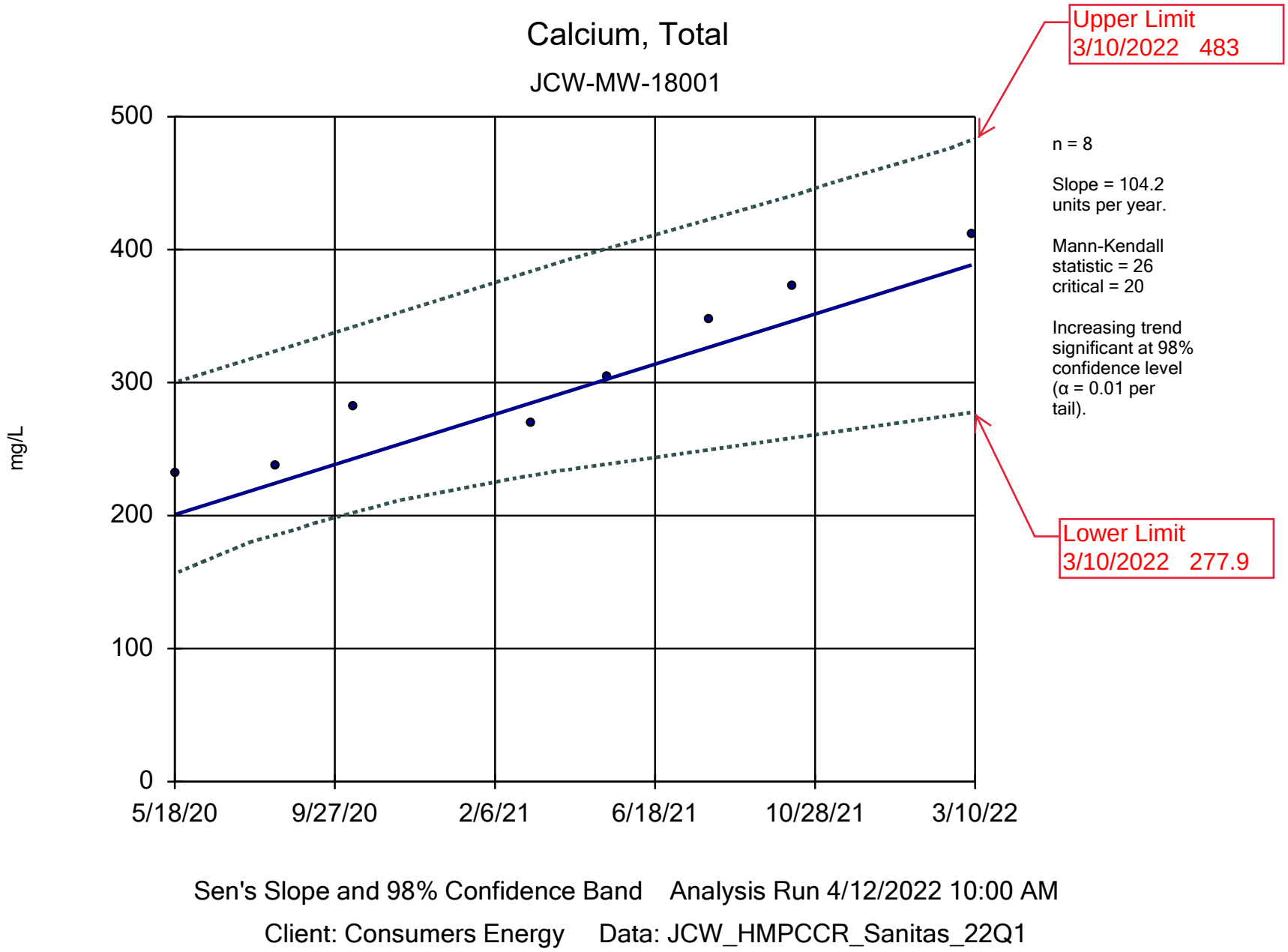
Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA



Sen's Slope and 98% Confidence Band Analysis Run 4/12/2022 9:59 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

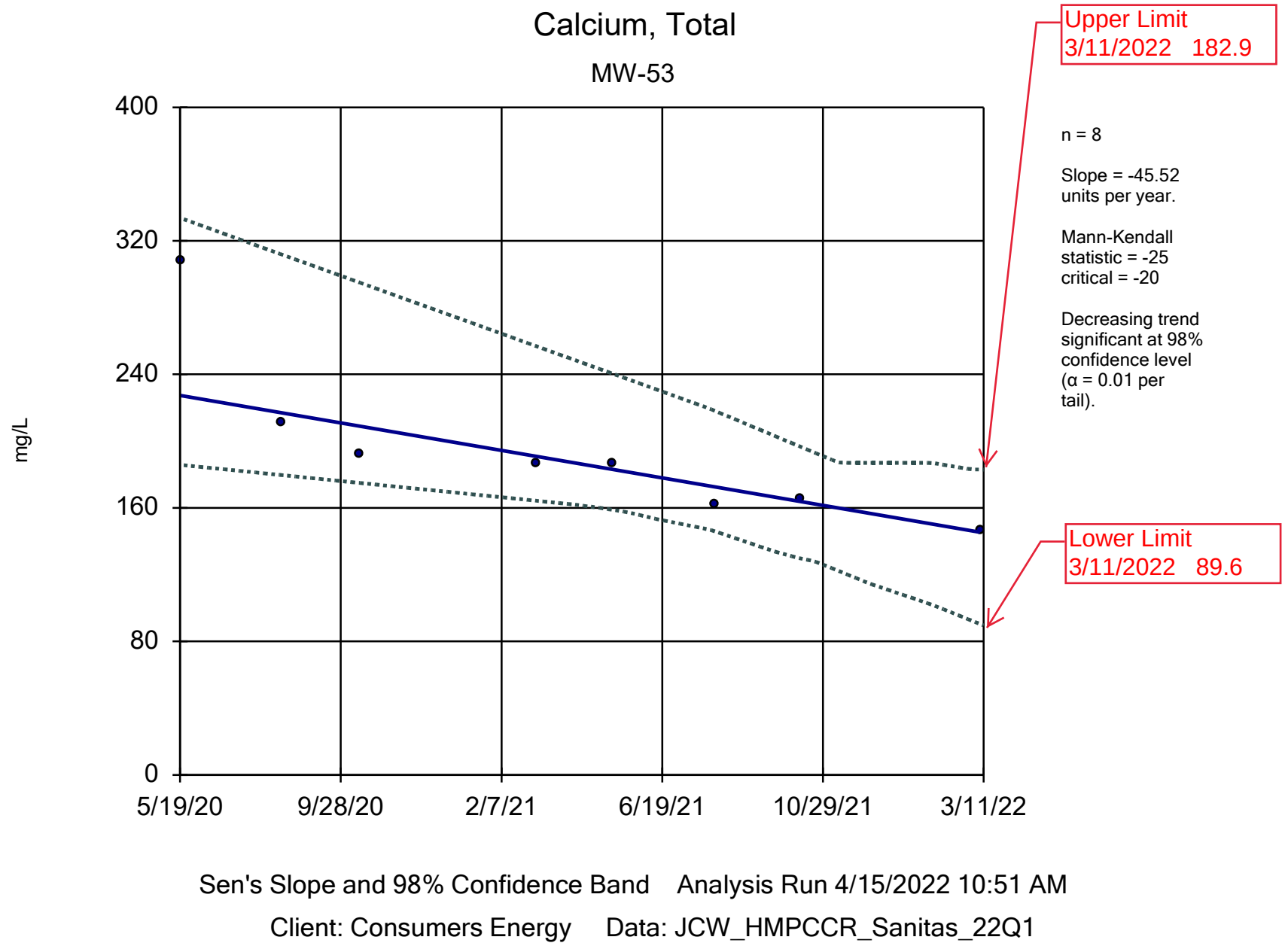
Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA



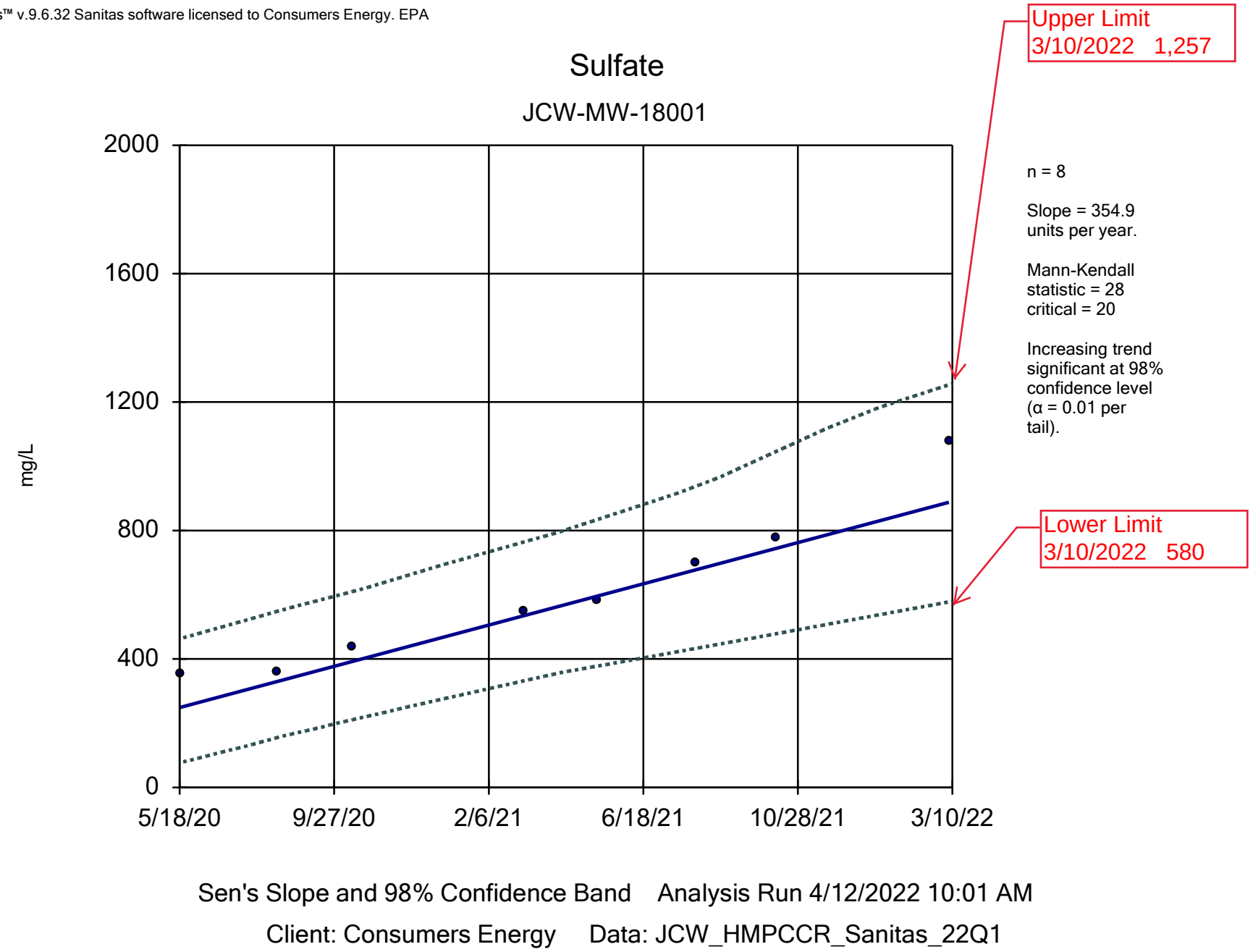
Sen's Slope and 98% Confidence Band Analysis Run 4/12/2022 10:00 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA



Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

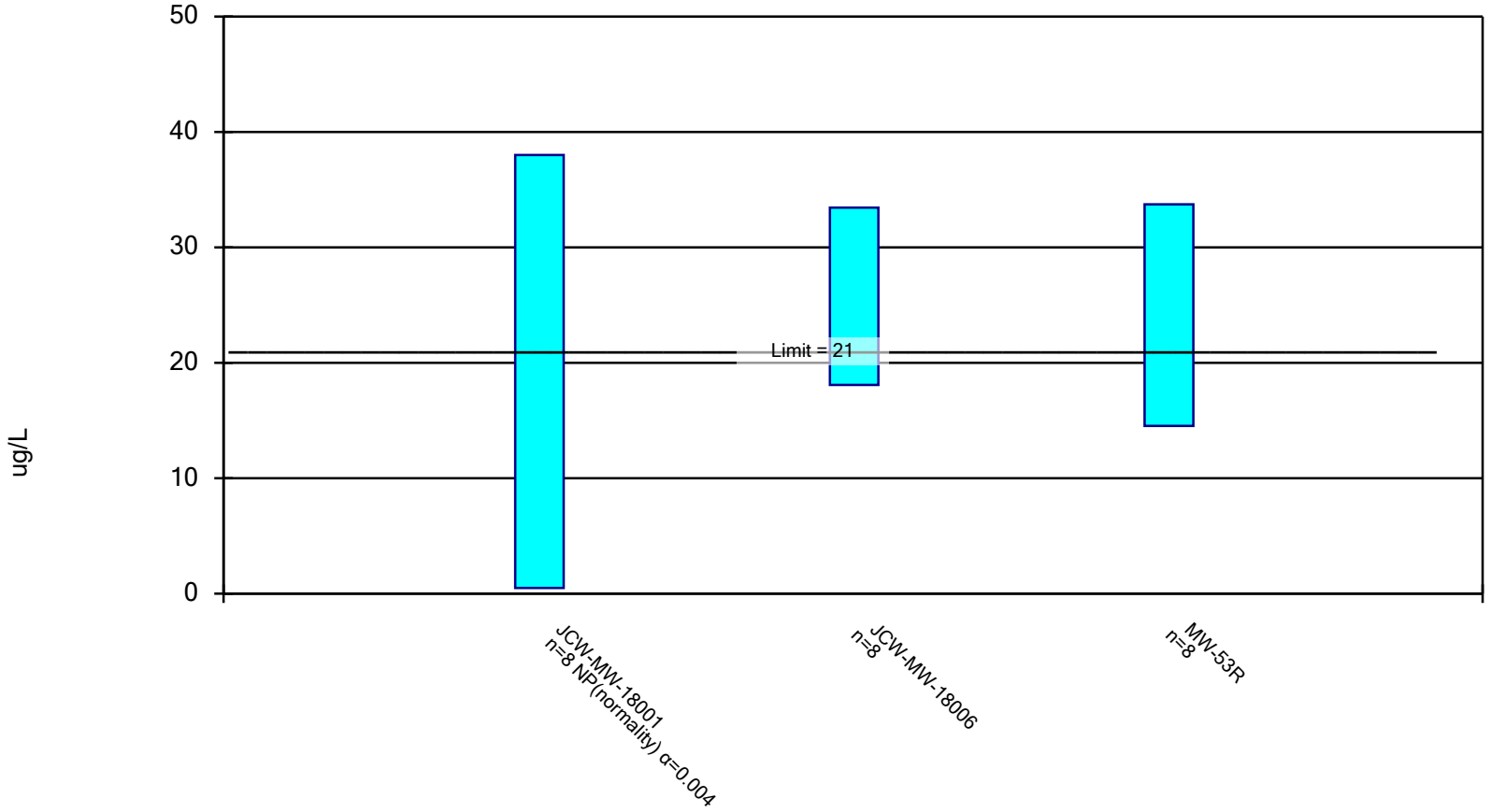


Sen's Slope and 98% Confidence Band Analysis Run 4/12/2022 10:01 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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 4/12/2022 11:10 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Confidence Interval

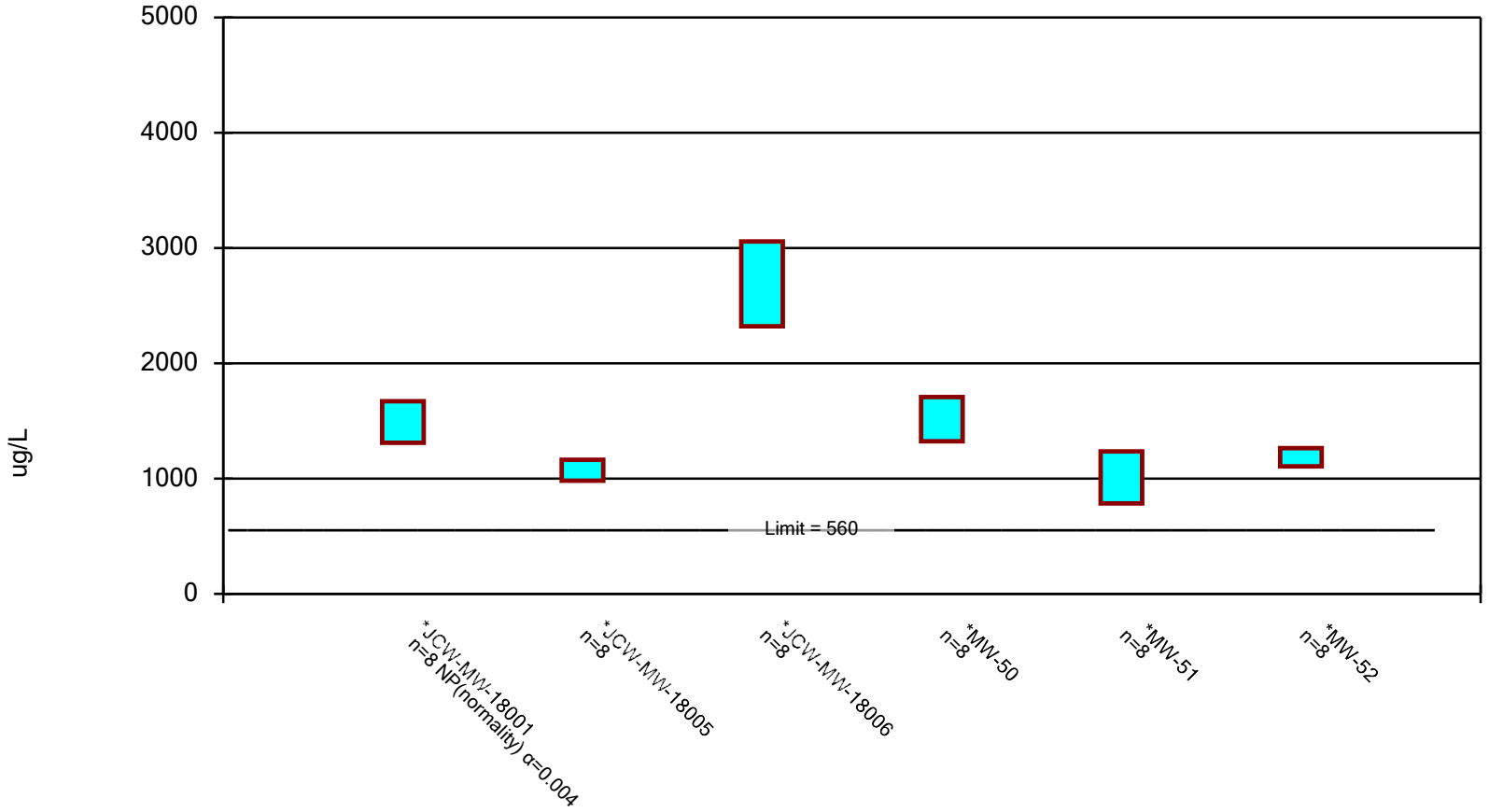
Constituent: Arsenic, Total (ug/L) Analysis Run 4/12/2022 11:11 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

	JCW-MW-18001	JCW-MW-18006	MW-53R
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	
3/7/2022	<1	33	
3/8/2022			10
Mean	6.563	25.75	24.13
Std. Dev.	12.74	7.246	9.047
Upper Lim.	38	33.43	33.71
Lower Lim.	0.5	18.07	14.54

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 4/12/2022 10:15 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Confidence Interval

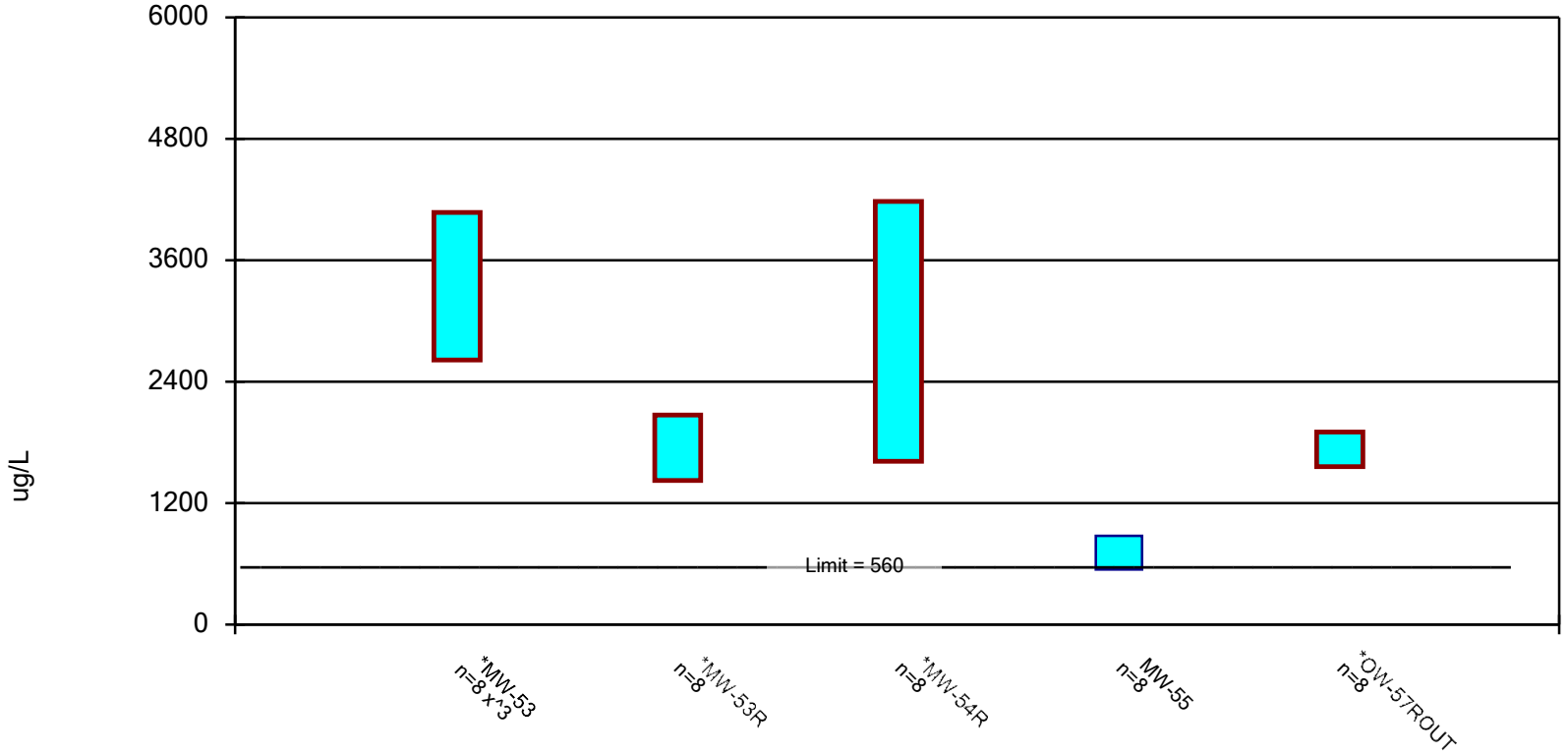
Constituent: Boron, Total (ug/L) Analysis Run 4/12/2022 10:16 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

	JCW-MW-18001	JCW-MW-18005	JCW-MW-18006	MW-50	MW-51	MW-52
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			
3/7/2022	1670	1065 (D)	3220			
3/8/2022				1615 (D)	1420	1310
Mean	1460	1073	2689	1516	1010	1185
Std. Dev.	159.4	86.07	346.1	180.5	211.8	73.68
Upper Lim.	1670	1164	3056	1708	1235	1263
Lower Lim.	1310	981.4	2322	1325	785.7	1107

Parametric Confidence Interval

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



Statistically significant trends observed for boron at MW-54R and OW-57R OUT. Confidence bands are used in place of confidence intervals

Constituent: Boron, Total Analysis Run 4/12/2022 10:15 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Confidence Interval

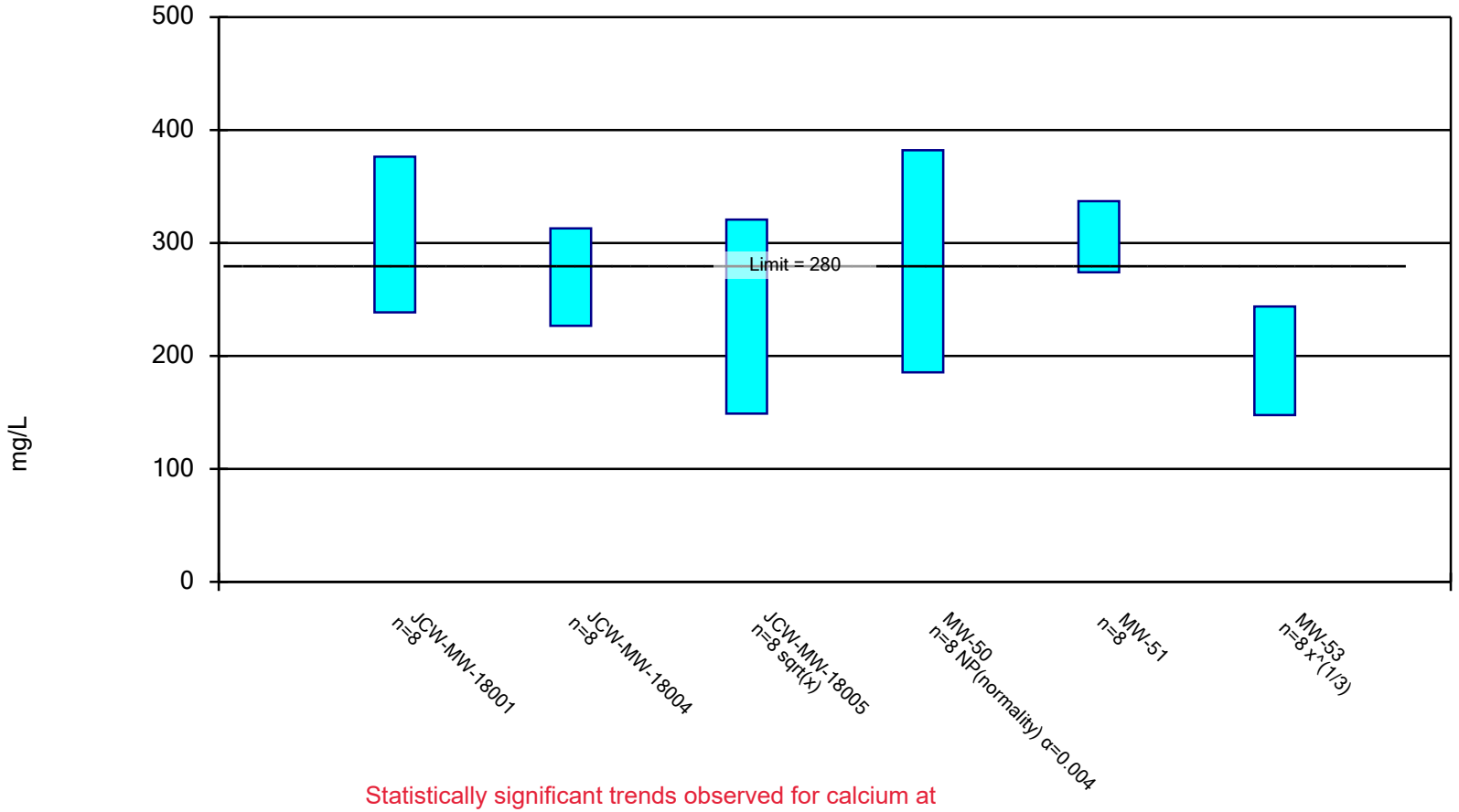
Constituent: Boron, Total (ug/L) Analysis Run 4/12/2022 10:16 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

	MW-53	MW-53R	MW-54R	MW-55	OW-57ROUT
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
8/2/2021	3820	1710			
8/3/2021			3530	873	1730
10/11/2021	3820	2060	4270		
10/12/2021				788	1880
3/7/2022				826	
3/8/2022	4100	2330			
3/9/2022			4720		2030
Mean	3335	1746	2898	710.5	1731
Std. Dev.	830.3	304.6	1211	156	161.7
Upper Lim.	4073	2069	4182	875.9	1903
Lower Lim.	2613	1423	1613	545.1	1560

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.



Statistically significant trends observed for calcium at JCW-MW-18001 and MW-53. Confidence bands are used in place of confidence intervals

Constituent: Calcium, Total Analysis Run 4/12/2022 10:15 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Confidence Interval

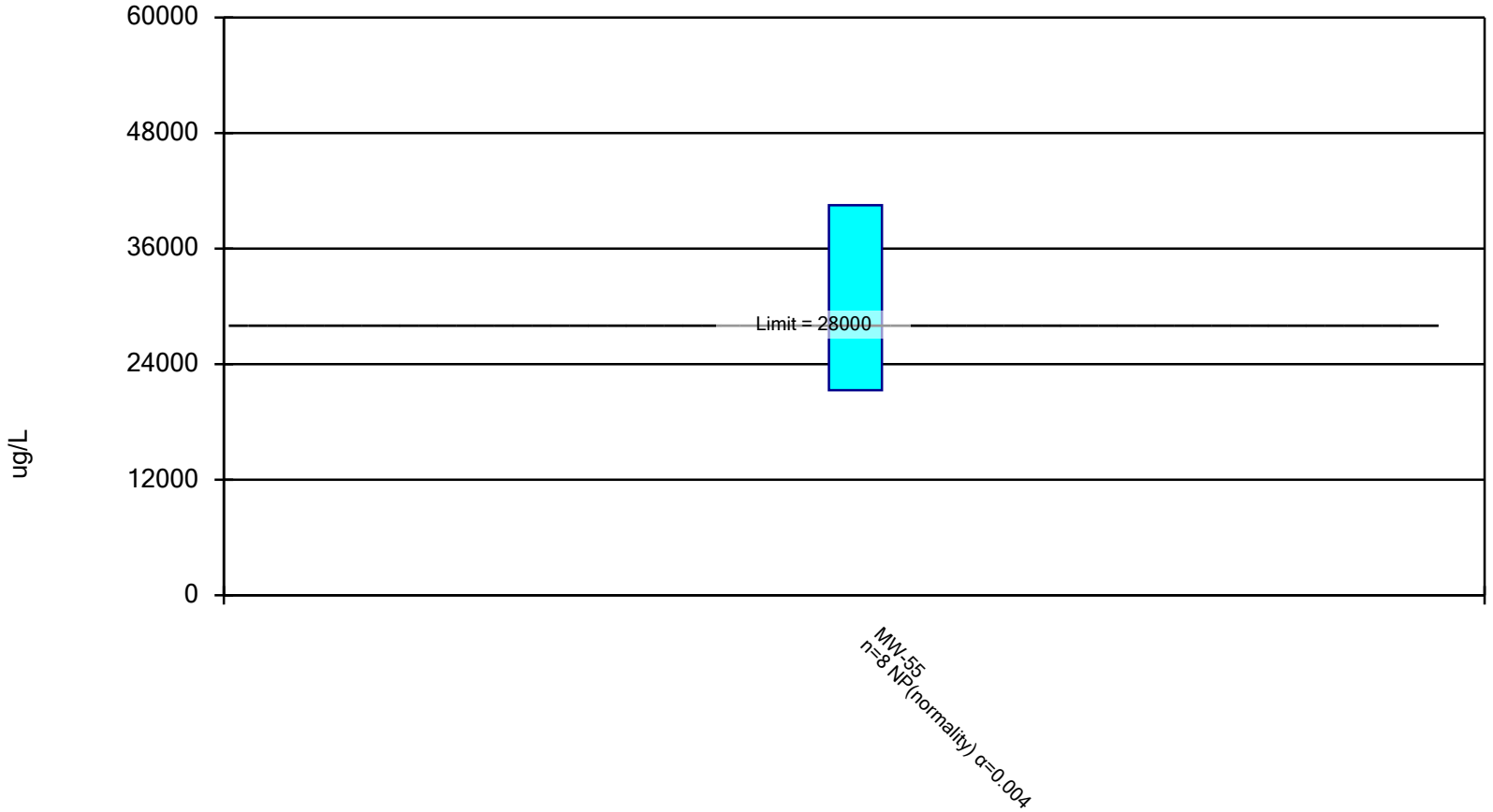
Constituent: Calcium, Total (mg/L) Analysis Run 4/12/2022 10:16 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

	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			
3/7/2022	412	236	161.5 (D)			
3/8/2022				185.5 (D)	255	146
Mean	307.4	269.8	233.1	323.7	305.5	194.9
Std. Dev.	65.01	40.65	88.04	75.56	29.71	49.99
Upper Lim.	376.3	312.8	320.8	382	337	243.7
Lower Lim.	238.5	226.7	148.9	185.5	274	147.7

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Iron, Total Analysis Run 4/12/2022 10:15 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Confidence Interval

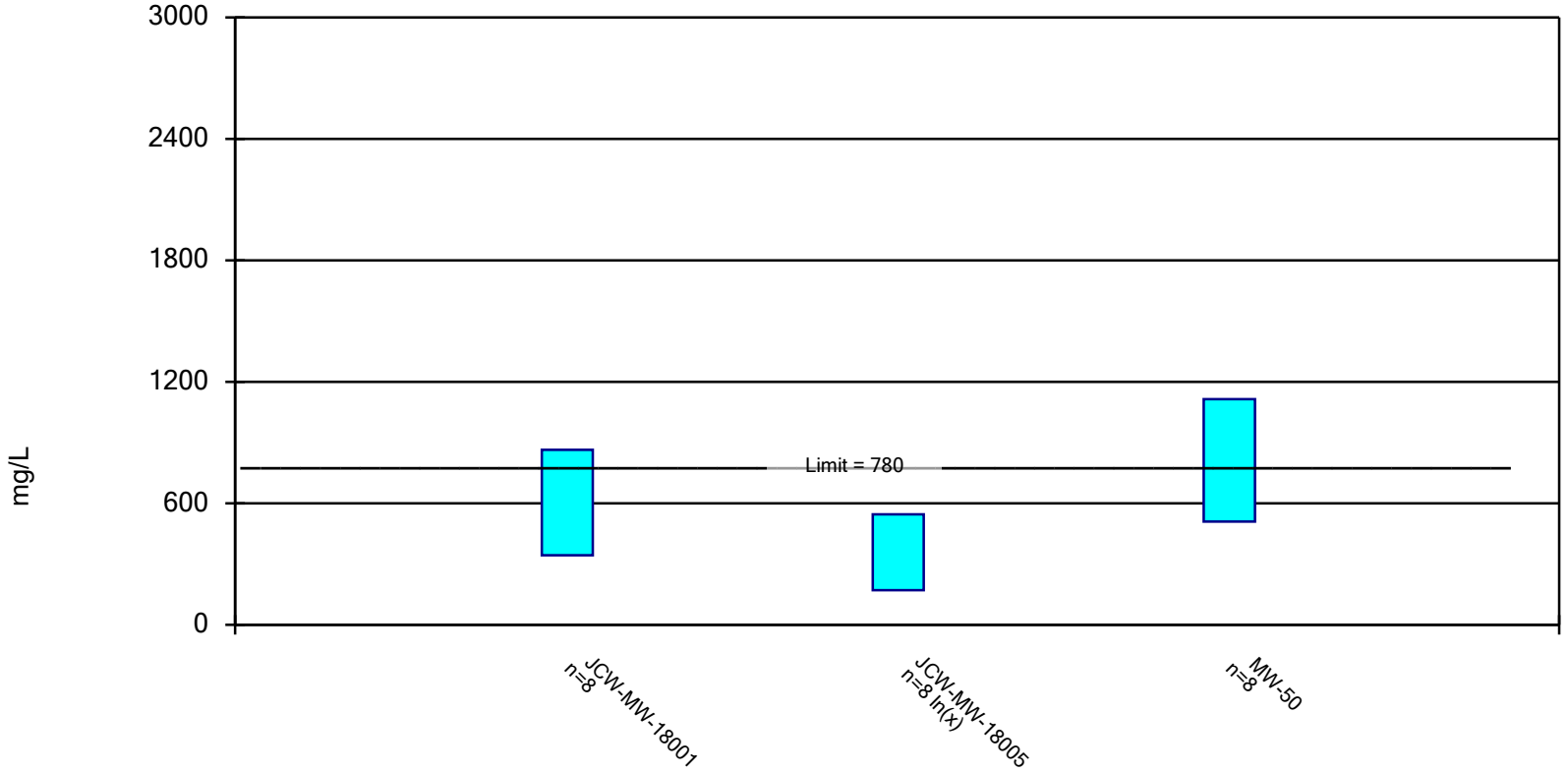
Constituent: Iron, Total (ug/L) Analysis Run 4/12/2022 10:16 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

	MW-55
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
3/7/2022	29800
Mean	27475
Std. Dev.	8186
Upper Lim.	40500
Lower Lim.	21300

Parametric Confidence Interval

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



Statistically significant trend observed for sulfate at JCW-MW-18001. Confidence bands are used in place of confidence interval

Constituent: Sulfate Analysis Run 4/12/2022 10:15 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Confidence Interval

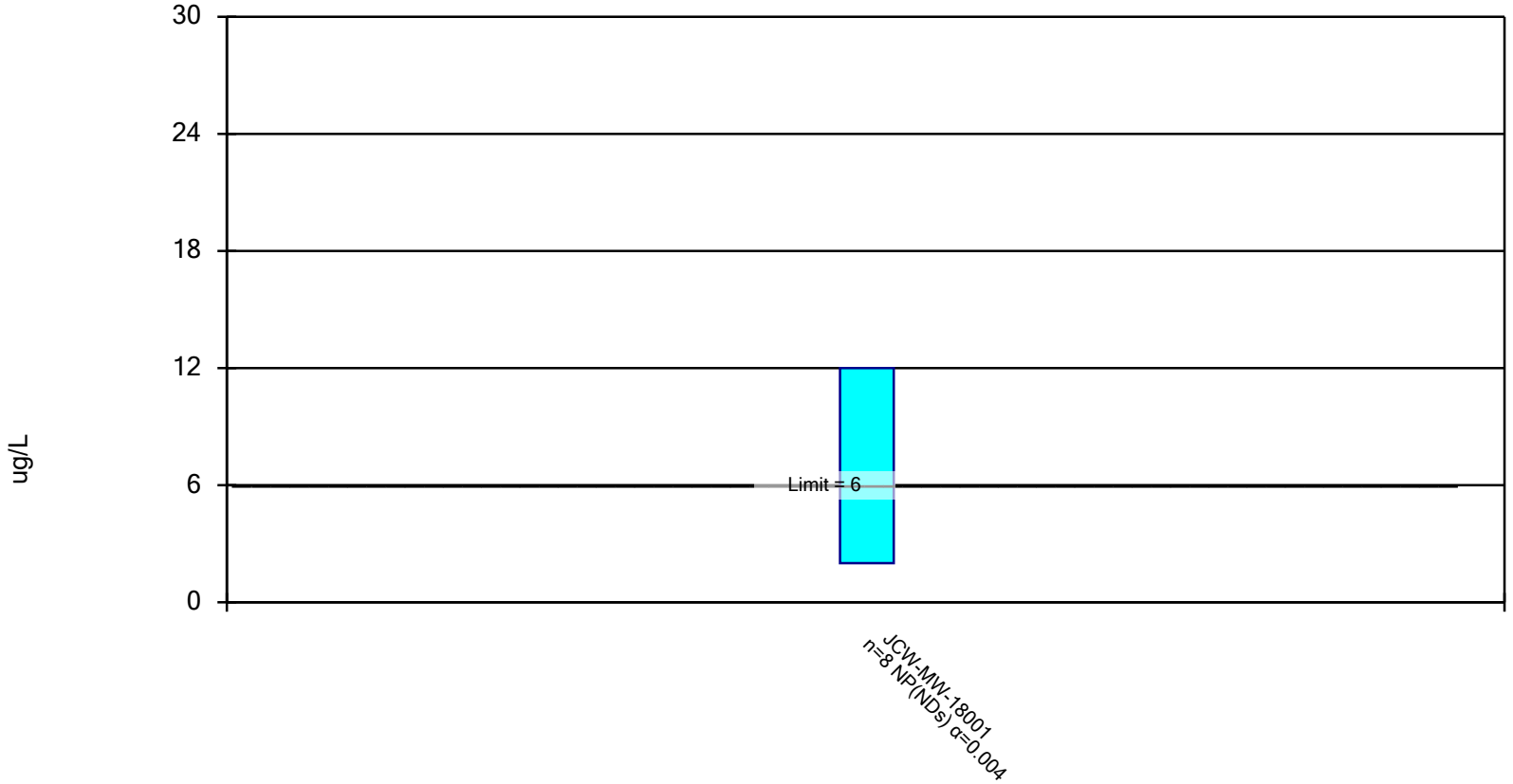
Constituent: Sulfate (mg/L) Analysis Run 4/12/2022 10:16 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

	JCW-MW-18001	JCW-MW-18005	MW-50
5/18/2020	352		
5/19/2020		817	1010
8/10/2020	357		1030 (D)
8/11/2020		398	
10/13/2020	435		990
10/14/2020		185	
3/8/2021	549		1125 (D)
3/9/2021		535	
5/10/2021	580		861.5 (D)
5/11/2021		263	
8/2/2021	700		636 (D)
8/3/2021		190	
10/11/2021	777		504 (D)
10/12/2021		227	
3/7/2022	1080	207.5 (D)	
3/8/2022			338 (D)
Mean	603.8	352.8	811.8
Std. Dev.	245.6	223.7	285.2
Upper Lim.	864.1	545	1114
Lower Lim.	343.4	171.2	509.5

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Vanadium, Total Analysis Run 4/12/2022 10:15 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Confidence Interval

Constituent: Vanadium, Total (ug/L) Analysis Run 4/12/2022 10:16 AM

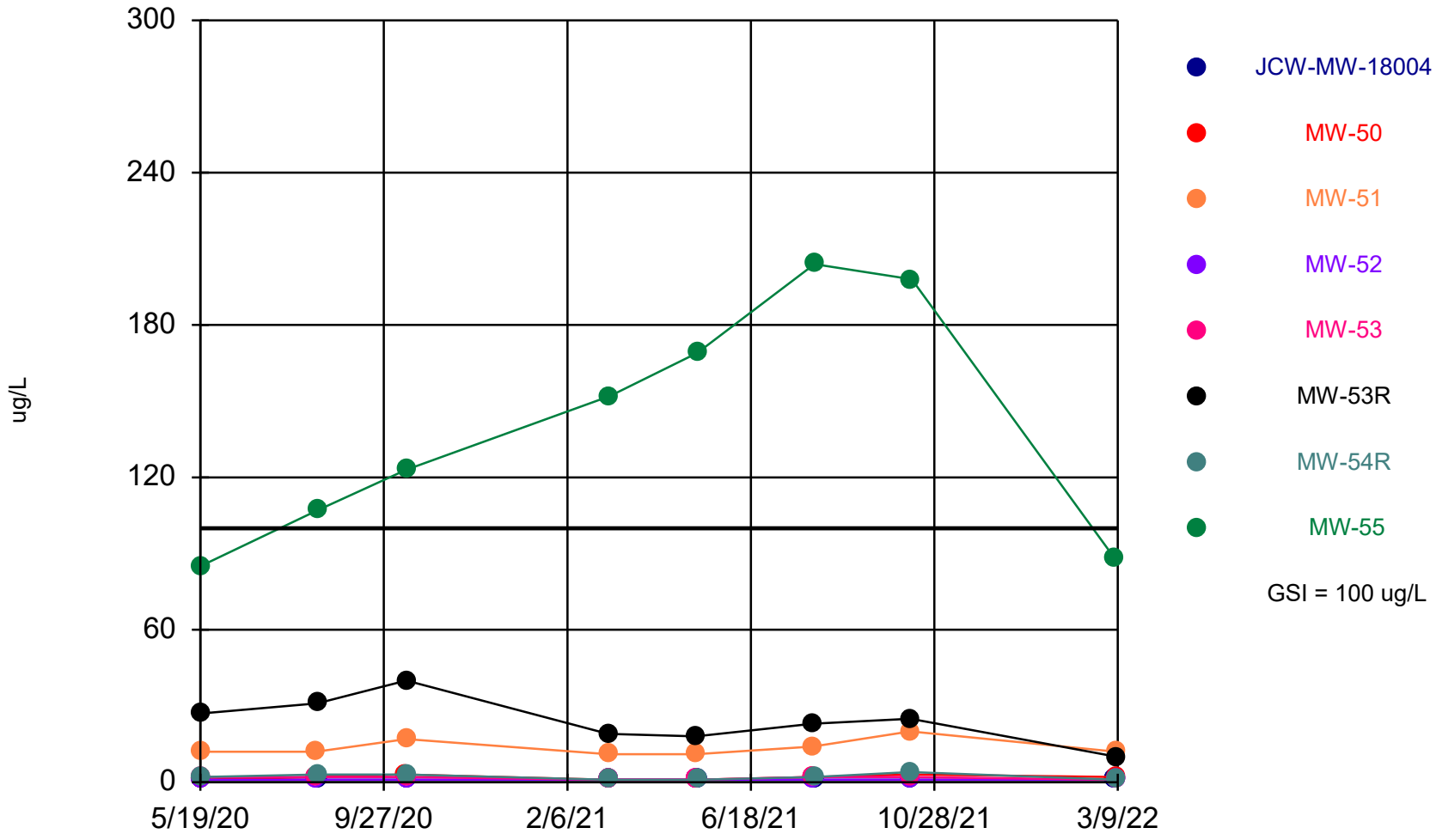
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

	JCW-MW-18001
5/18/2020	<2
8/10/2020	<2
10/13/2020	<2
3/8/2021	<2
5/10/2021	2
8/2/2021	12
10/11/2021	<2
3/7/2022	<2
Mean	3.25
Std. Dev.	3.536
Upper Lim.	12
Lower Lim.	2

Attachment 2
GSI Evaluation Sanitas™ Output Files

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

Arsenic Comparison to GSI

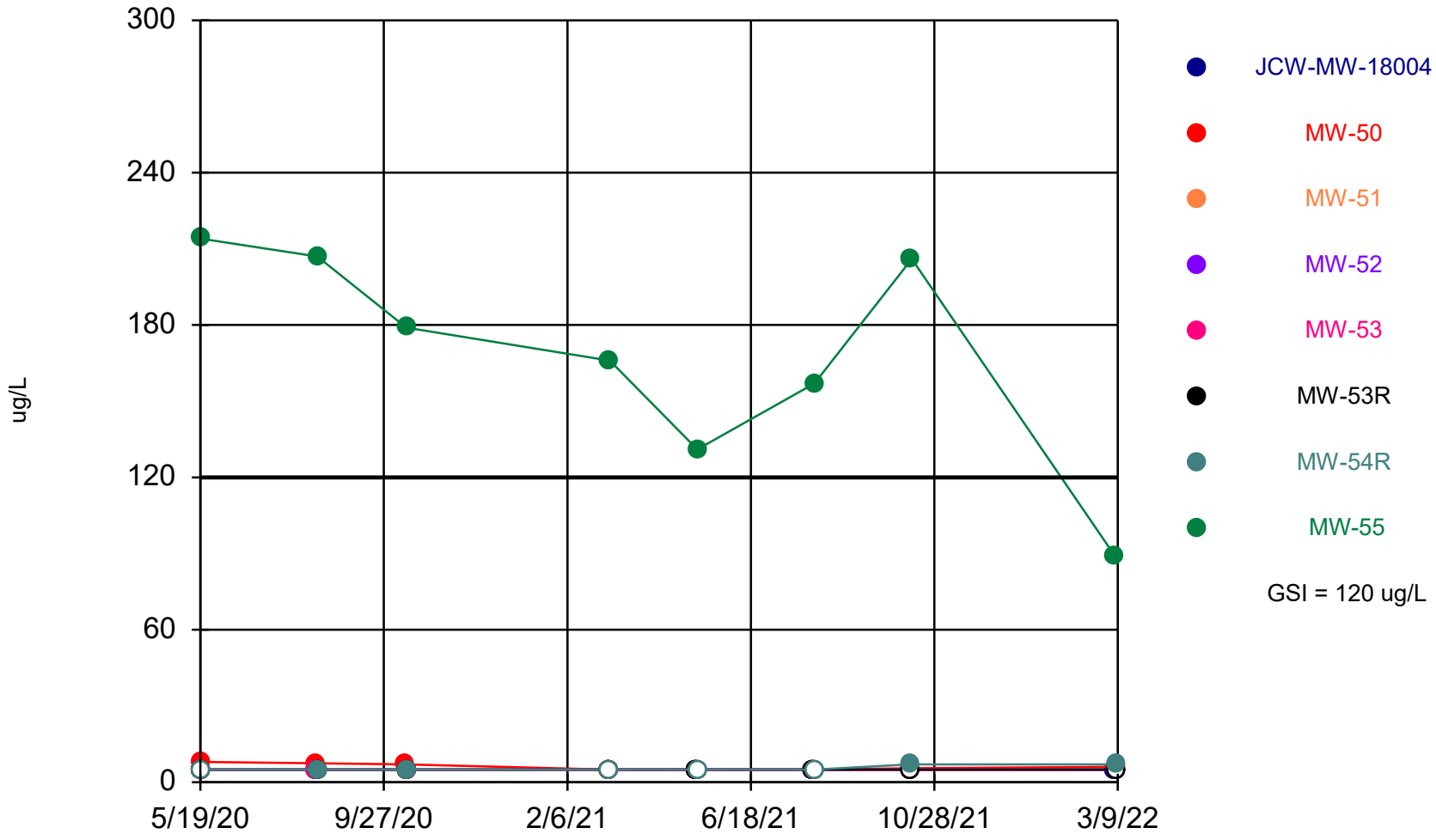


Time Series Analysis Run 4/12/2022 11:53 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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

Molybdenum Comparison to GSI



Time Series Analysis Run 4/12/2022 11:54 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Arsenic, Total Analysis Run 4/12/2022 11:56 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

For observations made between 5/19/2020 and 3/9/2022, a summary of the selected data set:

Observations = 64
ND/Trace = 17
Wells = 8
Minimum Value = 1
Maximum Value = 204
Mean Value = 23.27
Median Value = 2
Standard Deviation = 48.19
Coefficient of Variation = 2.071
Skewness = 2.593

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	8	1	1	1	1	0	0	NaN
MW-50	8	0	1	3	1.875	2	0.8345	0.4451	0.2217
MW-51	8	0	11	20	13.63	12	3.249	0.2384	1.107
MW-52	8	7	1	1	1	1	0	0	NaN
MW-53	8	2	1	2	1.625	2	0.5175	0.3185	-0.5164
MW-53R	8	0	10	40	24.13	24	9.047	0.375	0.2406
MW-54R	8	0	1	4	2.125	2	1.126	0.5299	0.3911
MW-55	8	0	85	204	140.8	137.5	47.13	0.3348	0.1467

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Molybdenum, Total Analysis Run 4/12/2022 11:56 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

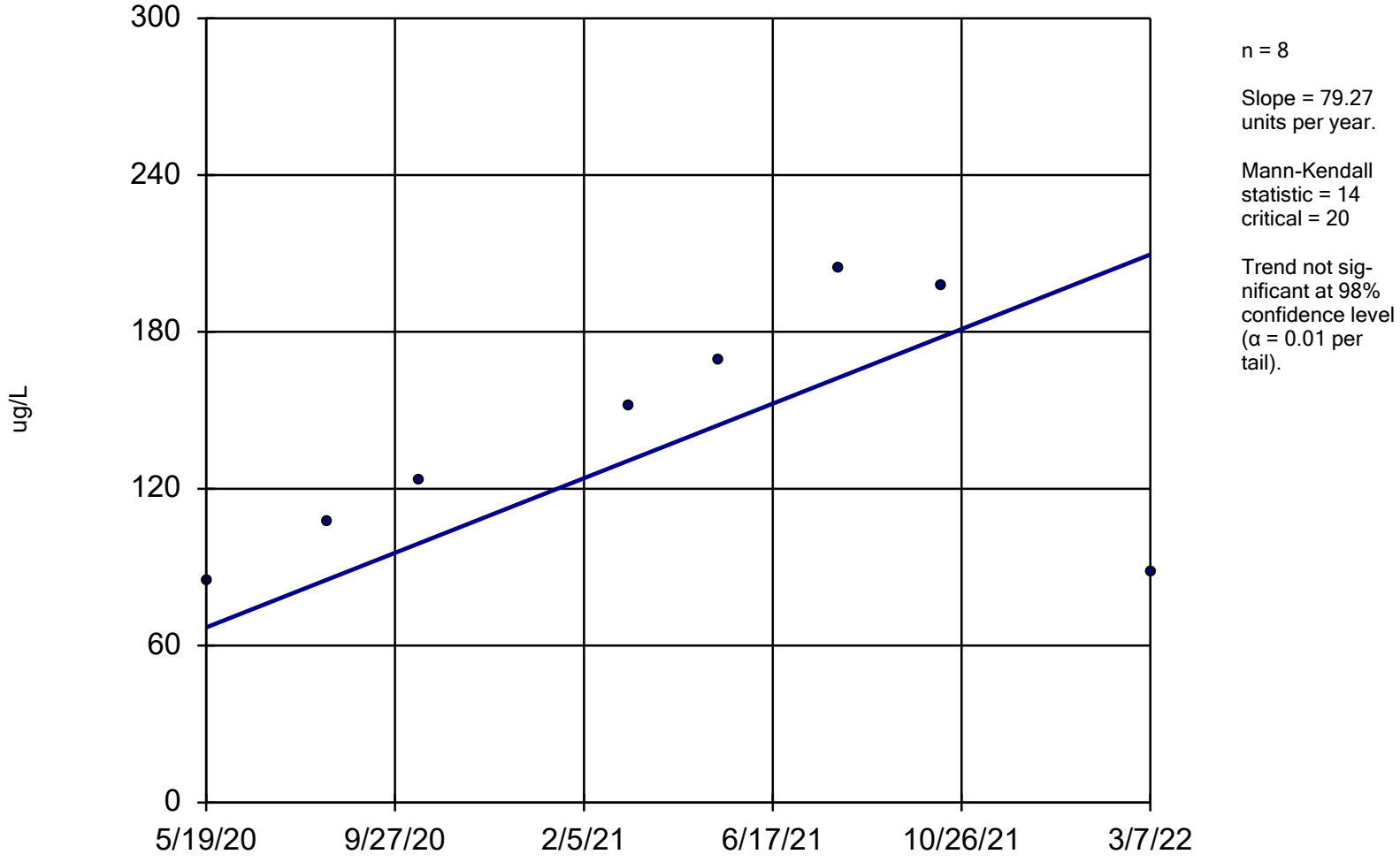
For observations made between 5/19/2020 and 3/9/2022, a summary of the selected data set:

Observations = 64
ND/Trace = 47
Wells = 8
Minimum Value = 5
Maximum Value = 214
Mean Value = 25.66
Median Value = 5
Standard Deviation = 56.32
Coefficient of Variation = 2.195
Skewness = 2.516

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	8	6.125	5.75	1.217	0.1988	0.4523
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	7	5.5	5	0.9258	0.1683	1.155
MW-55	8	0	89	214	168.6	172.5	42.98	0.2549	-0.6854

Arsenic, Total

MW-55



n = 8

Slope = 79.27 units per year.

Mann-Kendall statistic = 14
critical = 20

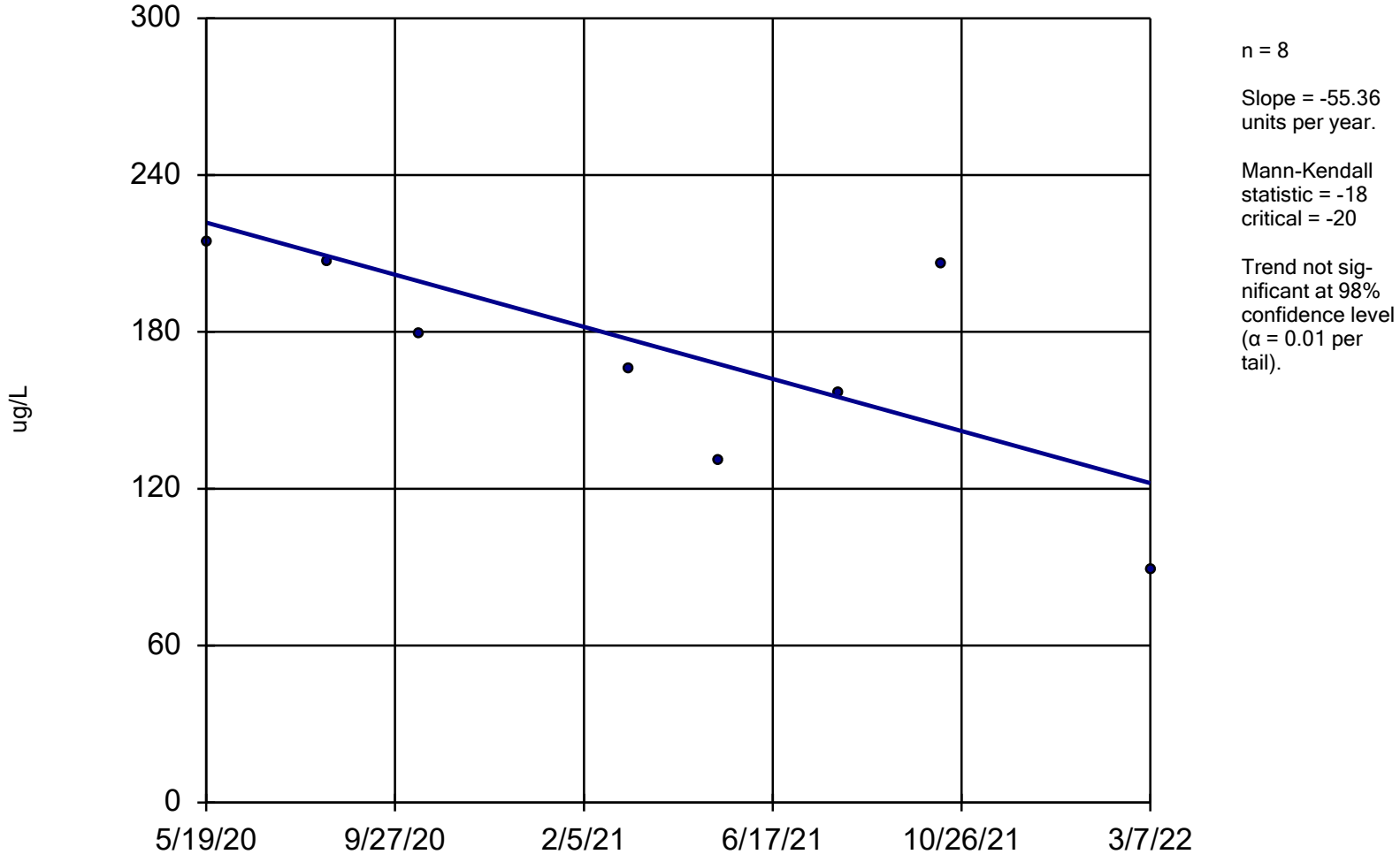
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2022 12:00 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Molybdenum, Total

MW-55



n = 8

Slope = -55.36 units per year.

Mann-Kendall statistic = -18
critical = -20

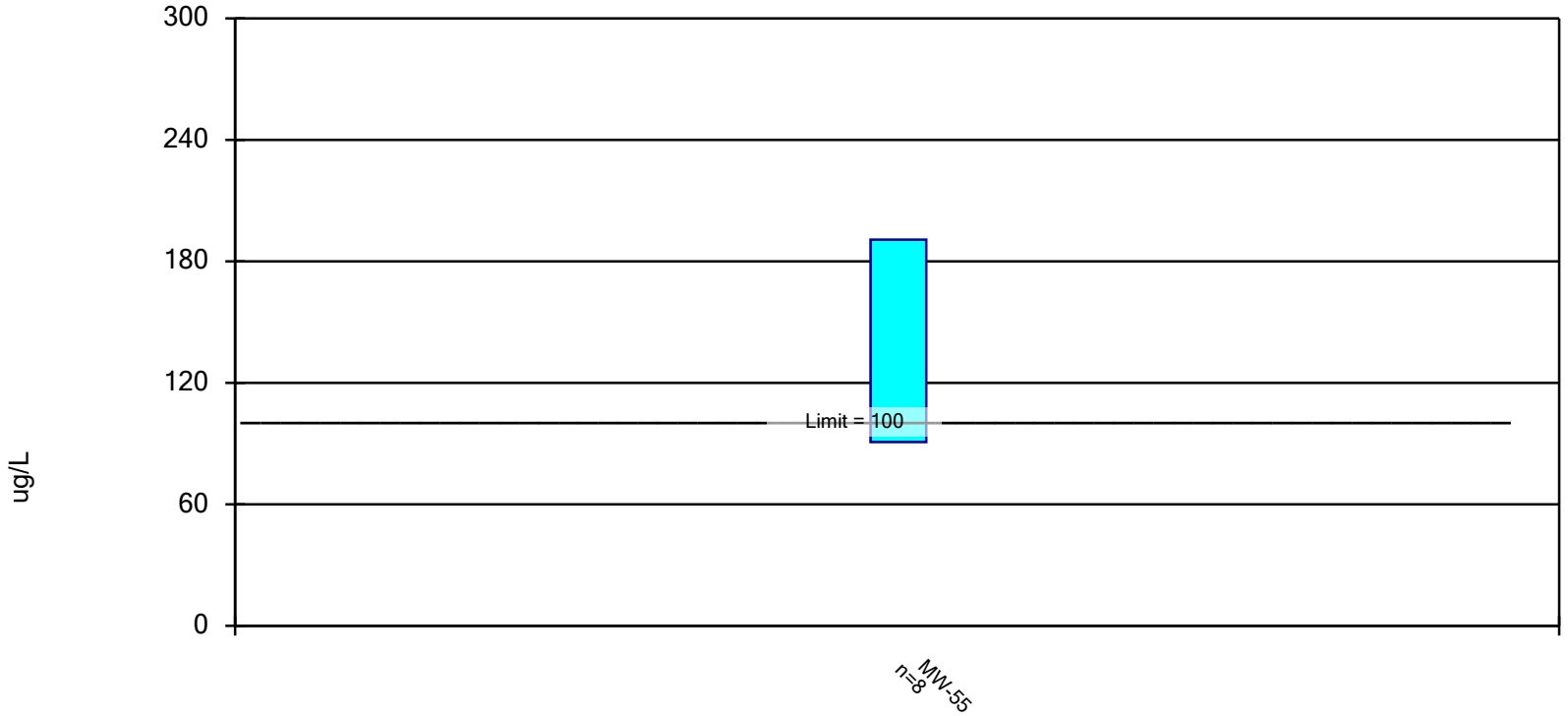
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 4/12/2022 12:00 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

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 4/12/2022 12:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Confidence Interval

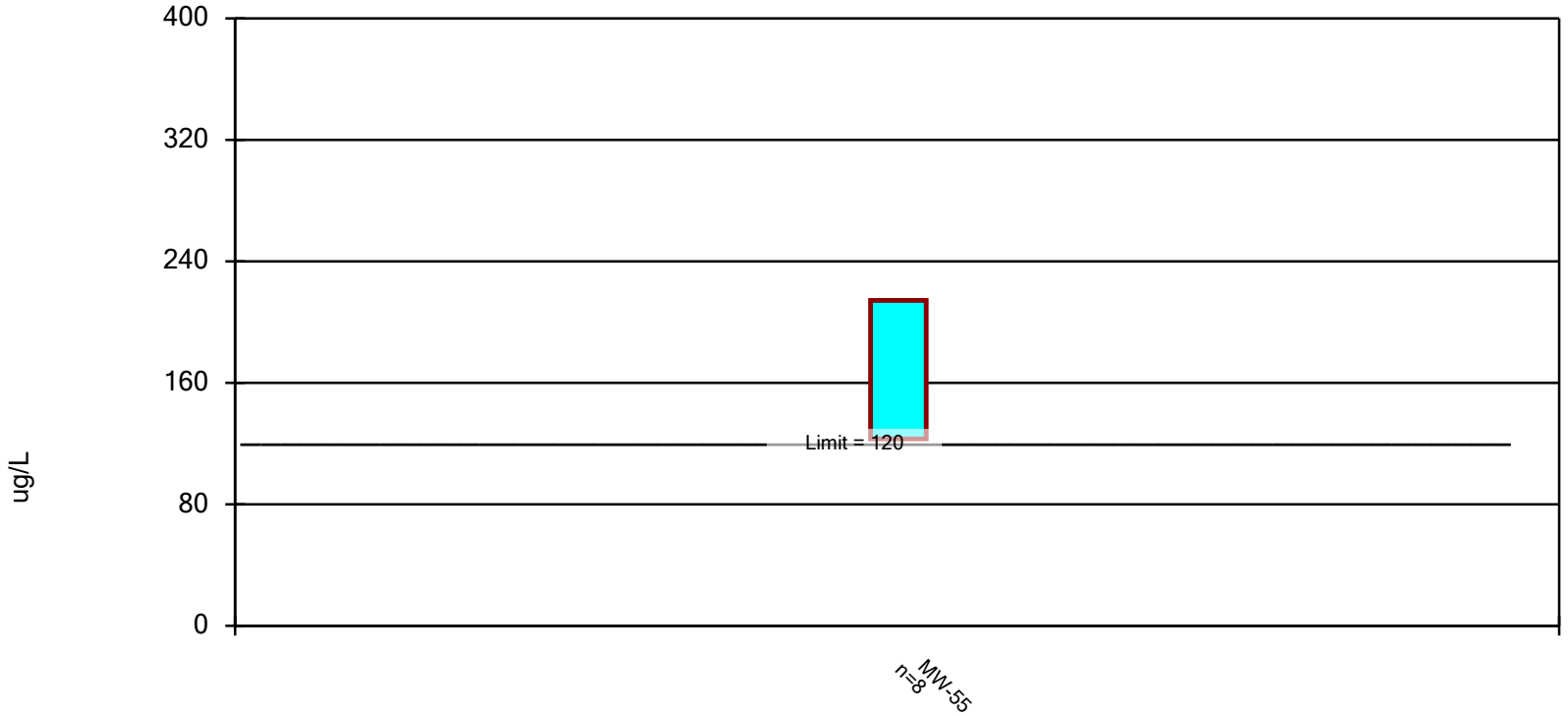
Constituent: Arsenic, Total (ug/L) Analysis Run 4/12/2022 12:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

	MW-55
5/19/2020	85
8/11/2020	107
10/14/2020	123
3/9/2021	152
5/11/2021	169
8/3/2021	204
10/12/2021	198
3/7/2022	88
Mean	140.8
Std. Dev.	47.13
Upper Lim.	190.7
Lower Lim.	90.8

Parametric Confidence Interval

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



Using the number of significant figures consistent with the GSI criterion, the lower confidence limit at MW-55 is equal to the GSI criterion; therefore the limit is not exceeded

Constituent: Molybdenum, Total Analysis Run 4/12/2022 12:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

Confidence Interval

Constituent: Molybdenum, Total (ug/L) Analysis Run 4/12/2022 12:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q1

	MW-55
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
3/7/2022	89
Mean	168.6
Std. Dev.	42.98
Upper Lim.	214.2
Lower Lim.	123.1

Appendix E
Laboratory Analytical Report

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: March 24, 2022

Subject: PART 115 GROUNDWATER MONITORING – JCW POREWATER – 2022 Q1

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

Darby Litz, Project Manager
TRC Environmental Corporation
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 22-0150

TRC Environmental, Inc. conducted groundwater monitoring at the JCWeadock site on 03/07/2022 through 03/09/2022, for the 1st Quarter requirements, as specified in the Hydrogeological Monitoring Plan for the site. The samples were received for analysis by the Chemistry department of Laboratory Services on 03/09/2022 and 03/10/2022.

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, 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

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q1-2022 Weadock Porewater Wells
Date Received: 3/09/2022 and 03/10/2022
Chemistry Project: 22-0150

Sample #	Field Sample ID	Matrix	Sample Date	Site
22-0150-01	JCW-MW-18001	Groundwater	03/07/2022 06:54 AM	JCW Solid Waste Disposal Area, Porewater
22-0150-02	JCW-MW-18004	Groundwater	03/07/2022 07:57 AM	JCW Solid Waste Disposal Area, Porewater
22-0150-03	JCW-MW-18005	Groundwater	03/07/2022 12:20 PM	JCW Solid Waste Disposal Area, Porewater
22-0150-04	JCW-MW-18006	Groundwater	03/07/2022 01:12 PM	JCW Solid Waste Disposal Area, Porewater
22-0150-05	MW-50	Groundwater	03/08/2022 07:35 AM	JCW Solid Waste Disposal Area, Porewater
22-0150-06	MW-51	Groundwater	03/08/2022 08:08 AM	JCW Solid Waste Disposal Area, Porewater
22-0150-07	MW-52	Groundwater	03/08/2022 09:00 AM	JCW Solid Waste Disposal Area, Porewater
22-0150-08	MW-53	Groundwater	03/08/2022 09:35 AM	JCW Solid Waste Disposal Area, Porewater
22-0150-09	MW-53R	Groundwater	03/08/2022 01:09 PM	JCW Solid Waste Disposal Area, Porewater
22-0150-10	MW-54R	Groundwater	03/09/2022 07:05 AM	JCW Solid Waste Disposal Area, Porewater
22-0150-11	MW-55	Groundwater	03/07/2022 09:43 AM	JCW Solid Waste Disposal Area, Porewater
22-0150-12	OW-57R OUT	Groundwater	03/09/2022 08:31 AM	JCW Solid Waste Disposal Area, Porewater
22-0150-13	MW-58	Groundwater	03/07/2022 02:06 PM	JCW Solid Waste Disposal Area, Porewater
22-0150-14	DUP-JCW-LF-01	Groundwater	03/07/2022 12:00 AM	JCW Solid Waste Disposal Area, Porewater
22-0150-15	DUP-JCW-LF-02	Groundwater	03/08/2022 12:00 AM	JCW Solid Waste Disposal Area, Porewater
22-0150-16	JCW-MW-18001 MS	Groundwater	03/07/2022 06:54 AM	JCW Solid Waste Disposal Area, Porewater
22-0150-17	JCW-MW-18001 MSD	Groundwater	03/07/2022 06:54 AM	JCW Solid Waste Disposal Area, Porewater
22-0150-18	FB-01	Water	03/09/2022 08:45 AM	JCW Solid Waste Disposal Area, Porewater
22-0150-19	EB-01	Water	03/09/2022 08:40 AM	JCW Solid Waste Disposal Area, Porewater

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**JCW-MW-18001**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-01	Collect Time:	06:54 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-01-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-01

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

Aliquot #: 22-0150-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	129		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	1670		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	412000		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	2		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	86		ug/L	20.0	03/15/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	87		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	106000		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	1050		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	ND		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	6		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	16000		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	2		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	166000		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	60000		ug/L	1000.0	03/10/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	1080000		ug/L	1000.0	03/11/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**JCW-MW-18001**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-01	Collect Time:	06:54 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0150-01-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	2310		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0150-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	677000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	677000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-02	Collect Time:	07:57 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-02-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-01

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

Aliquot #: 22-0150-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	32		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	259		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	236000		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	1		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	952		ug/L	20.0	03/15/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	34		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	90400		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	242		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	ND		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	4		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	1880		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	2		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	36000		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	19600		ug/L	1000.0	03/10/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	537000		ug/L	1000.0	03/11/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-02	Collect Time:	07:57 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0150-02-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1280		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0150-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	421000		ug/L	10000.0	03/14/2022	AB22-0314-12
Alkalinity Bicarbonate	421000		ug/L	10000.0	03/14/2022	AB22-0314-12
Alkalinity Carbonate	ND		ug/L	10000.0	03/14/2022	AB22-0314-12

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-03	Collect Time:	12:20 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-03-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-01

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

Aliquot #: 22-0150-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	5		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	108		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	1030		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	159000		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	3300		ug/L	20.0	03/16/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	32		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	64400		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	217		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	5		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	10		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	2090		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	3		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	64200		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	61700		ug/L	1000.0	03/10/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	204000		ug/L	1000.0	03/11/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-03	Collect Time:	12:20 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0150-03-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	942		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0150-03-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	525000		ug/L	10000.0	03/14/2022	AB22-0314-12
Alkalinity Bicarbonate	525000		ug/L	10000.0	03/14/2022	AB22-0314-12
Alkalinity Carbonate	ND		ug/L	10000.0	03/14/2022	AB22-0314-12

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**JCW-MW-18006**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-04	Collect Time:	01:12 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-04-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-01

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

Aliquot #: 22-0150-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	33		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	665		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	3220		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	143000		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	9040		ug/L	20.0	03/16/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	63		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	50000		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	340		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	ND		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	6		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	9290		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	2		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	93700		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	4		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	75000		ug/L	1000.0	03/10/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	38100		ug/L	1000.0	03/10/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**JCW-MW-18006**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-04	Collect Time:	01:12 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0150-04-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	792		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0150-04-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	621000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	621000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**MW-50**	Collect Date:	03/08/2022
Lab Sample ID:	22-0150-05	Collect Time:	07:35 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-05-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-01

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

Aliquot #: 22-0150-05-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	2		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	115		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	1610		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	186000		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	1		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	1400		ug/L	20.0	03/16/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	77		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	50200		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	561		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	6		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	10200		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	2		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	67000		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	54900		ug/L	1000.0	03/10/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	346000		ug/L	1000.0	03/10/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**MW-50**	Collect Date:	03/08/2022
Lab Sample ID:	22-0150-05	Collect Time:	07:35 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0150-05-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	999		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0150-05-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	441000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	441000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **MW-51**
Lab Sample ID: 22-0150-06
Matrix: Groundwater

Laboratory Project: **22-0150**
Collect Date: 03/08/2022
Collect Time: 08:08 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-06-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-01

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

Aliquot #: 22-0150-06-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	12		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	198		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	1420		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	255000		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	1310		ug/L	20.0	03/16/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	58		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	66900		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	937		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	ND		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	7120		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	3		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	125000		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	91100		ug/L	1000.0	03/11/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	446000		ug/L	1000.0	03/11/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**MW-51**	Collect Date:	03/08/2022
Lab Sample ID:	22-0150-06	Collect Time:	08:08 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0150-06-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1480		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0150-06-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	616000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	616000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **MW-52**
Lab Sample ID: 22-0150-07
Matrix: Groundwater

Laboratory Project: **22-0150**
Collect Date: 03/08/2022
Collect Time: 09:00 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-07-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-01

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

Aliquot #: 22-0150-07-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	170		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	1310		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	251000		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	1		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	2870		ug/L	20.0	03/16/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	27		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	114000		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	526		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	ND		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	5160		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	2		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	76300		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-07-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	51600		ug/L	1000.0	03/10/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	654000		ug/L	1000.0	03/11/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**MW-52**	Collect Date:	03/08/2022
Lab Sample ID:	22-0150-07	Collect Time:	09:00 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0150-07-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1520		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0150-07-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	474000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	474000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **MW-53**
Lab Sample ID: 22-0150-08
Matrix: Groundwater

Laboratory Project: **22-0150**
Collect Date: 03/08/2022
Collect Time: 09:35 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-08-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-01

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

Aliquot #: 22-0150-08-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	1		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	401		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	4100		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	146000		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	1130		ug/L	20.0	03/16/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	48		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	40200		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	432		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	ND		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	8860		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	3		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	94200		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-08-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	81100		ug/L	1000.0	03/10/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	39500		ug/L	1000.0	03/10/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**MW-53**	Collect Date:	03/08/2022
Lab Sample ID:	22-0150-08	Collect Time:	09:35 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0150-08-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	768		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0150-08-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	577000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	577000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **MW-53R**
Lab Sample ID: 22-0150-09
Matrix: Groundwater

Laboratory Project: **22-0150**
Collect Date: 03/08/2022
Collect Time: 01:09 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-09-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-01

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

Aliquot #: 22-0150-09-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	10		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	203		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	2330		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	188000		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	2		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	1080		ug/L	20.0	03/16/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	56		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	57100		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	315		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	ND		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	6670		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	2		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	48700		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-09-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	39900		ug/L	1000.0	03/10/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	71700		ug/L	1000.0	03/10/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**MW-53R**	Collect Date:	03/08/2022
Lab Sample ID:	22-0150-09	Collect Time:	01:09 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0150-09-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	709		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0150-09-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	678000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	678000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **MW-54R**
Lab Sample ID: 22-0150-10
Matrix: Groundwater

Laboratory Project: **22-0150**
Collect Date: 03/09/2022
Collect Time: 07:05 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-10-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-01

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

Aliquot #: 22-0150-10-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	1		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	154		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	4720		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	186000		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	1		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	496		ug/L	20.0	03/16/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	74		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	47300		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	108		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	7		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	2380		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	2		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	29600		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-10-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	49800		ug/L	1000.0	03/10/2022	AB22-0311-03
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0311-03
Sulfate	67100		ug/L	1000.0	03/10/2022	AB22-0311-03

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**MW-54R**	Collect Date:	03/09/2022
Lab Sample ID:	22-0150-10	Collect Time:	07:05 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0150-10-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	776		mg/L	10.0	03/14/2022	AB22-0314-06

Alkalinity by SM 2320B

Aliquot #: 22-0150-10-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	589000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	589000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **MW-55**
Lab Sample ID: 22-0150-11
Matrix: Groundwater

Laboratory Project: **22-0150**
Collect Date: 03/07/2022
Collect Time: 09:43 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-11-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-01

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

Aliquot #: 22-0150-11-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	88		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	299		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	826		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	163000		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	29800		ug/L	20.0	03/16/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	28		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	32600		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	285		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	89		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	4		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	4100		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	1		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	107000		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-11-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	20200		ug/L	1000.0	03/10/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	35400		ug/L	1000.0	03/10/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**MW-55**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-11	Collect Time:	09:43 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0150-11-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	808		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0150-11-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	735000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	735000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **OW-57R OUT**
Lab Sample ID: 22-0150-12
Matrix: Groundwater

Laboratory Project: **22-0150**
Collect Date: 03/09/2022
Collect Time: 08:31 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-12-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2021	AB22-0315-02

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

Aliquot #: 22-0150-12-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	85		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	2030		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	126000		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	1		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	2		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	96		ug/L	20.0	03/15/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	26		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	72800		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	96		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	8		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	17		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	2410		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	1		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	59500		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-12-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	62500		ug/L	1000.0	03/10/2022	AB22-0311-03
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0311-03
Sulfate	83100		ug/L	1000.0	03/10/2022	AB22-0311-03

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**OW-57R OUT**	Collect Date:	03/09/2022
Lab Sample ID:	22-0150-12	Collect Time:	08:31 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0150-12-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1030		mg/L	10.0	03/14/2022	AB22-0314-06

Alkalinity by SM 2320B

Aliquot #: 22-0150-12-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	545000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	545000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **MW-58**
Lab Sample ID: 22-0150-13
Matrix: Groundwater

Laboratory Project: **22-0150**
Collect Date: 03/07/2022
Collect Time: 02:06 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-13-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-02

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

Aliquot #: 22-0150-13-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	2		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	98		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	154		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	102000		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	8740		ug/L	20.0	03/16/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	22		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	17000		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	279		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	ND		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	15		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	4690		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	1		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	170000		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	3		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-13-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	267000		ug/L	1000.0	03/11/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	8860		ug/L	1000.0	03/10/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**MW-58**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-13	Collect Time:	02:06 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0150-13-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	803		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0150-13-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	303000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	303000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**DUP-JCW-LF-01**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-14	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-14-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-02

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

Aliquot #: 22-0150-14-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	5		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	110		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	1100		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	164000		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	3170		ug/L	20.0	03/16/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	30		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	67300		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	232		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	5		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	25		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	2410		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	3		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	66600		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-14-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	60700		ug/L	1000.0	03/10/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	211000		ug/L	1000.0	03/11/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**DUP-JCW-LF-01**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-14	Collect Time:	12:00 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0150-14-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	934		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0150-14-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	539000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	539000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**DUP-JCW-LF-02**	Collect Date:	03/08/2022
Lab Sample ID:	22-0150-15	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-15-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-02

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

Aliquot #: 22-0150-15-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	2		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	117		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	1620		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	185000		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	1		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	1180		ug/L	20.0	03/16/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	77		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	50900		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	546		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	6		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	19		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	10200		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	2		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	67600		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-15-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	55600		ug/L	1000.0	03/10/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	330000		ug/L	1000.0	03/11/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**DUP-JCW-LF-02**	Collect Date:	03/08/2022
Lab Sample ID:	22-0150-15	Collect Time:	12:00 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0150-15-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1010		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0150-15-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	435000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	435000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**JCW-MW-18001 MS**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-16	Collect Time:	06:54 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-16-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	88.5		%	0.2	03/15/2022	AB22-0315-02

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

Aliquot #: 22-0150-16-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	110		%	1.0	03/15/2022	AB22-0316-08
Arsenic	101		%	1.0	03/15/2022	AB22-0316-08
Barium	79		%	5.0	03/15/2022	AB22-0316-08
Beryllium	98		%	1.0	03/15/2022	AB22-0316-08
Boron	119		%	20.0	03/16/2022	AB22-0316-08
Cadmium	106		%	0.2	03/15/2022	AB22-0316-08
Calcium	102		%	1000.0	03/16/2022	AB22-0316-08
Chromium	96		%	1.0	03/15/2022	AB22-0316-08
Cobalt	92		%	6.0	03/15/2022	AB22-0316-08
Copper	84		%	1.0	03/15/2022	AB22-0316-08
Iron	82		%	20.0	03/16/2022	AB22-0316-08
Lead	112		%	1.0	03/15/2022	AB22-0316-08
Lithium	94		%	10.0	03/15/2022	AB22-0316-08
Magnesium	120		%	1000.0	03/16/2022	AB22-0316-08
Manganese	109		%	5.0	03/16/2022	AB22-0316-08
Molybdenum	126		%	5.0	03/15/2022	AB22-0316-08
Nickel	108		%	2.0	03/15/2022	AB22-0316-08
Potassium	116		%	100.0	03/16/2022	AB22-0316-08
Selenium	91		%	1.0	03/15/2022	AB22-0316-08
Silver	95.8		%	0.2	03/15/2022	AB22-0316-08
Sodium	118		%	1000.0	03/16/2022	AB22-0316-08
Thallium	113		%	2.0	03/15/2022	AB22-0316-08
Vanadium	101		%	2.0	03/15/2022	AB22-0316-08
Zinc	84		%	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-16-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	102		%	1000.0	03/11/2022	AB22-0310-07
Fluoride	91		%	1000.0	03/10/2022	AB22-0310-07
Sulfate	99		%	1000.0	03/11/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**JCW-MW-18001 MS**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-16	Collect Time:	06:54 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-0150-16-C03-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	93.1		%	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**JCW-MW-18001 MSD**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-17	Collect Time:	06:54 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-17-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	83.0		%	0.2	03/15/2022	AB22-0315-02

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

Aliquot #: 22-0150-17-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	109		%	1.0	03/15/2022	AB22-0316-08
Arsenic	100		%	1.0	03/15/2022	AB22-0316-08
Barium	81		%	5.0	03/15/2022	AB22-0316-08
Beryllium	99		%	1.0	03/15/2022	AB22-0316-08
Boron	117		%	20.0	03/16/2022	AB22-0316-08
Cadmium	106		%	0.2	03/15/2022	AB22-0316-08
Calcium	102		%	1000.0	03/16/2022	AB22-0316-08
Chromium	92		%	1.0	03/15/2022	AB22-0316-08
Cobalt	90		%	6.0	03/15/2022	AB22-0316-08
Copper	83		%	1.0	03/15/2022	AB22-0316-08
Iron	79		%	20.0	03/16/2022	AB22-0316-08
Lead	112		%	1.0	03/15/2022	AB22-0316-08
Lithium	91		%	10.0	03/15/2022	AB22-0316-08
Magnesium	114		%	1000.0	03/16/2022	AB22-0316-08
Manganese	107		%	5.0	03/16/2022	AB22-0316-08
Molybdenum	128		%	5.0	03/15/2022	AB22-0316-08
Nickel	109		%	2.0	03/15/2022	AB22-0316-08
Potassium	116		%	100.0	03/16/2022	AB22-0316-08
Selenium	82		%	1.0	03/15/2022	AB22-0316-08
Silver	92.3		%	0.2	03/15/2022	AB22-0316-08
Sodium	114		%	1000.0	03/16/2022	AB22-0316-08
Thallium	115		%	2.0	03/15/2022	AB22-0316-08
Vanadium	101		%	2.0	03/15/2022	AB22-0316-08
Zinc	85		%	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-17-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	104		%	1000.0	03/11/2022	AB22-0310-07
Fluoride	94		%	1000.0	03/10/2022	AB22-0310-07
Sulfate	103		%	1000.0	03/11/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0150**
Field Sample ID:	**JCW-MW-18001 MSD**	Collect Date:	03/07/2022
Lab Sample ID:	22-0150-17	Collect Time:	06:54 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-0150-17-C03-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	91.6		%	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **FB-01**
Lab Sample ID: 22-0150-18
Matrix: Water

Laboratory Project: **22-0150**
Collect Date: 03/09/2022
Collect Time: 08:45 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-18-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-02

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

Aliquot #: 22-0150-18-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	ND		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	ND		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	ND		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	ND		ug/L	20.0	03/15/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	ND		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	ND		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	ND		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	ND		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	ND		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	ND		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-18-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	ND		ug/L	1000.0	03/10/2022	AB22-0311-03
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0311-03
Sulfate	ND		ug/L	1000.0	03/10/2022	AB22-0311-03

Analytical Report

Report Date: 03/24/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **EB-01**
Lab Sample ID: 22-0150-19
Matrix: Water

Laboratory Project: **22-0150**
Collect Date: 03/09/2022
Collect Time: 08:40 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0150-19-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-02

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

Aliquot #: 22-0150-19-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Arsenic	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Barium	ND		ug/L	5.0	03/15/2022	AB22-0316-08
Beryllium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Boron	ND		ug/L	20.0	03/16/2022	AB22-0316-08
Cadmium	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Calcium	ND		ug/L	1000.0	03/16/2022	AB22-0316-08
Chromium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Cobalt	ND		ug/L	6.0	03/15/2022	AB22-0316-08
Copper	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Iron	ND		ug/L	20.0	03/15/2022	AB22-0316-08
Lead	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Lithium	ND		ug/L	10.0	03/15/2022	AB22-0316-08
Magnesium	ND		ug/L	1000.0	03/16/2022	AB22-0316-08
Manganese	ND		ug/L	5.0	03/16/2022	AB22-0316-08
Molybdenum	ND		ug/L	5.0	03/15/2022	AB22-0316-08
Nickel	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Potassium	ND		ug/L	100.0	03/16/2022	AB22-0316-08
Selenium	ND		ug/L	1.0	03/15/2022	AB22-0316-08
Silver	ND		ug/L	0.2	03/15/2022	AB22-0316-08
Sodium	ND		ug/L	1000.0	03/16/2022	AB22-0316-08
Thallium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Vanadium	ND		ug/L	2.0	03/15/2022	AB22-0316-08
Zinc	ND		ug/L	10.0	03/15/2022	AB22-0316-08

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

Aliquot #: 22-0150-19-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	ND		ug/L	1000.0	03/10/2022	AB22-0311-03
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0311-03
Sulfate	ND		ug/L	1000.0	03/10/2022	AB22-0311-03

Analytical Report

Report Date: 03/24/22

Data Qualifiers	Exception Summary
	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-0150

Inspection Date: 3.9.22 **Inspection By:** dmw

Sample Origin/Project Name: Q1-2022 Weadock Porewater Wells

Shipment Delivered By: Enter the type of shipment carrier.

Pony ____ FedEx ✓ UPS ____ USPS ____ Airborne ____

Other/Hand Carry (whom) ____

Tracking Number: 2706 3161 5831 Shipping Form Attached: Yes ✓ No ____

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

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

Loose/Unpackaged Containers ____ Other ____

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

Damaged Shipment Observed: None ✓ Dented ____ Leaking ____

Other ____

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

Shipping Containers Received: Opened ____ Sealed ✓

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

CoC ✓ Work Request ____ Air Data Sheet ____ Other ____

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

As-Received Temperature Range 1.6-3.8 °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)	34				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	38				
24 mL vial (glass)					
500 mL (plastic)					
Other 250 mL plastic	15				

pH paper
0.0-14.0
Cat. No. 13-640-508
lot: 222420
Exp: 8.1.23

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22.0150

Inspection Date: 3.10.22 **Inspection By:** TMR

Sample Origin/Project Name: Weadock Porewater Wells

Shipment Delivered By: Enter the type of shipment carrier.

Pony ____ FedEx ✓ UPS ____ USPS ____ Airborne ____

Other/Hand Carry (whom) ____

Tracking Number: 2706 7950 4505 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 2.4-5.1°C Samples Received on Ice: Yes ✓ No ____

M&TE # and Expiration 015484 10-14-22

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

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

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

Page _____ of _____

SAMPLING SITE / CUSTOMER: Q1-2022 Weadock Porewater Wells	PROJECT NUMBER: 22-0150	SAP CC or WO#:	ANALYSIS REQUESTED (Attach List if More Space is Needed)
SAMPLING TEAM:	TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____	REQUESTER: Harold Register	QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____
SEND REPORT TO: Caleb Batts	email:	phone:	
COPY TO: Harold Register; TRC	MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste		

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0150-01	3/7/21	0654	GW	JCW-MW-18001	5	4	1						x	x	x	x	
-02	3/7/21	0757	GW	JCW-MW-18004	5	4	1						x	x	x	x	
-03	3/7/21	1220	GW	JCW-MW-18005	5	4	1						x	x	x	x	
-04	3/7/21	1312	GW	JCW-MW-18006	5	4	1						x	x	x	x	
-05	3/9/21	0735	GW	MW-50	5	4	1						x	x	x	x	
-06	3/8/21	0800	GW	MW-51	5	4	1						x	x	x	x	
-07	3/8/21	0900	GW	MW-52	5	4	1						x	x	x	x	
-08	3/8/21	0935	GW	MW-53	5	4	1						x	x	x	x	
-09	3/8/21	1309	GW	MW-53R	5	4	1						x	x	x	x	
-10			GW	MW-54R	5	4	1						x	x	x	x	
-11	3/7/21	0943	GW	MW-55	5	4	1						x	x	x	x	
-12			GW	OW-57R OUT	5	4	1						x	x	x	x	

RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:	COMMENTS:
	3/8/21 1400	Fed Ex	
RELINQUISHED BY: Fed Ex	DATE/TIME: 03-09-2022 11:30	RECEIVED BY:	Received on Ice? ☑ Yes ☐ No M&TE #: 015402 Temperature: 1-6-3.8 °C Cal. Due Date: 6-3-22

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

Page _____ of _____

SAMPLING SITE / CUSTOMER: Q1-2022 Weadock Porewater Wells

PROJECT NUMBER: **22-0150**

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

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

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

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

ANALYSIS REQUESTED (Attach List if More Space is Needed)

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

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0150-13	3/7/22	1406	GW	MW-58	5	4	1						x	x	x	x	
-14	3/7/22	—	GW	DUP-JCW-LF-01	5	4	1						x	x	x	x	
-15	3/8/22	—	GW	DUP-JCW-LF-02	5	4	1						x	x	x	x	
-16	3/7/22	0654	GW	JCW-MW-18001 MS	4	3	1						x	x		x	
-17	3/7/22	0654	GW	JCW-MW-18001 MSD	4	3	1						x	x		x	
-18			W	FB-01	2	1	1						x	x			
-19			W	EB-01	2	1	1						x	x			

RELINQUISHED BY: [signature] DATE/TIME: 3/8/22 1400 RECEIVED BY: FedEx

RELINQUISHED BY: FedEx DATE/TIME: 03-09-22 11:30 RECEIVED BY: [signature]

COMMENTS:

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

Temperature: 1.6-3.8 °C Cal. Due Date: 6-3-22

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

Page _____ of _____

SAMPLING SITE / CUSTOMER: Q1-2022 Weadock Porewater Wells

PROJECT NUMBER: **22-0150**

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

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

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

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

ANALYSIS REQUESTED (Attach List if More Space is Needed)

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

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0150-13			GW	MW-58	5	4	1						x	x	x	x	
-14			GW	DUP-JCW-LF-01	5	4	1						x	x	x	x	
-15			GW	DUP-JCW-LF-01	5	4	1						x	x	x	x	
-16			GW	JCW-MW-18001 MS	4	3	1						x	x		x	
-17			GW	JCW-MW-18001 MSD	4	3	1						x	x		x	
-18	3/9/22	0945	W	FB-01	2	1	1						x	x			
-19	3/9/22	0946	W	EB-01	2	1	1						x	x			

RELINQUISHED BY: [signature] DATE/TIME: 3/9/22 1470 RECEIVED BY: Fed Ex

RELINQUISHED BY: Fed Ex DATE/TIME: 03-10-22 11:30 RECEIVED BY: [signature]

COMMENTS:

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

Temperature: 2.4-5.1 °C Cal. Due Date: 6-3-22

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

Page _____ of _____

SAMPLING SITE / CUSTOMER: Q1-2022 Weadock Porewater Wells	PROJECT NUMBER: 22-0150	SAP CC or WO#:	ANALYSIS REQUESTED (Attach List if More Space is Needed)
SAMPLING TEAM:	TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____	REQUESTER: Harold Register	QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____
SEND REPORT TO: Caleb Batts	email:	phone:	
COPY TO: Harold Register; TRC	MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste		

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0150-01			GW	JCW-MW-18001	5	4	1						x	x	x	x	
-02			GW	JCW-MW-18004	5	4	1						x	x	x	x	
-03			GW	JCW-MW-18005	5	4	1						x	x	x	x	
-04			GW	JCW-MW-18006	5	4	1						x	x	x	x	
-05			GW	MW-50	5	4	1						x	x	x	x	
-06			GW	MW-51	5	4	1						x	x	x	x	
-07			GW	MW-52	5	4	1						x	x	x	x	
-08			GW	MW-53	5	4	1						x	x	x	x	
-09			GW	MW-53R	5	4	1						x	x	x	x	
-10	3/9/22	0905	GW	MW-54R	5	4	1						x	x	x	x	
-11			GW	MW-55	5	4	1						x	x	x	x	
-12	3/9/22	0831	GW	OW-57R OUT	5	4	1						x	x	x	x	

RELINQUISHED BY:	DATE/TIME: 3/9/22 1432	RECEIVED BY: Fed Ex
RELINQUISHED BY: Fed Ex	DATE/TIME: 03-10-2022 11:30	RECEIVED BY:

COMMENTS:

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

Temperature: 1.6 - 3.8 °C Cal. Due Date: 6-3-22

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: April 01, 2022

Subject: HMP GROUNDWATER MONITORING – LABORATORY LEACHATE – 2022

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

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

Chemistry Project: 22-0154

Four fly ash samples were collected on 03/01/2022 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 03/01/2022.

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.
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.

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 1210 ug/L and Boron measured 133 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

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q1-2022 DEK HMP Fly Ash Laboratory Leachate
Date Received: 3/01/2022
Chemistry Project: 22-0154

Sample #	Field Sample ID	Matrix	Sample Date	Site
22-0154-01	Fly Ash #1 - Unit 1 Sample 1	Fly Ash	03/01/2022 09:30 AM	DEK Solid Waste Disposal Area
22-0154-02	Fly Ash #2 - Unit 1 Sample 2	Fly Ash	03/01/2022 09:30 AM	DEK Solid Waste Disposal Area
22-0154-03	Fly Ash #3 - Unit 2 Sample 1	Fly Ash	03/01/2022 09:35 AM	DEK Solid Waste Disposal Area
22-0154-04	Fly Ash #4 - Unit 2 Sample 2	Fly Ash	03/01/2022 09:35 AM	DEK Solid Waste Disposal Area

Analytical Report

Report Date: 04/01/22

Sample Site: **DEK Solid Waste Disposal Area (392503)**
Field Sample ID: **Fly Ash #1 - Unit 1 Sample 1**
Lab Sample ID: 22-0154-01
Matrix: Leachate

Laboratory Project: **22-0154**
Collect Date: 03/01/2022
Collect Time: 09:30 AM

SPLP Extraction by EPA 1312

Aliquot #: 22-0154-01-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
SPLP Extraction	complete				03/09/2022	AB22-0308-07

SPLP Phosphorus by EPA 1312 / SM 4500-P; B5-E

Aliquot #: 22-0154-01-C01-A02 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
SPLP Phosphorus	ND		ug/L	10.0	03/14/2022	AB22-0314-11

SPLP Mercury by EPA 1312 / 7470A

Aliquot #: 22-0154-01-C01-A03 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-02

SPLP Sulfate by EPA 300.0

Aliquot #: 22-0154-01-C01-A04 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfate	420000		ug/L	1000.0	03/15/2022	AB22-0315-06

SPLP Alkalinity Bicarbonate by EPA 1312 / SM 2320B

Aliquot #: 22-0154-01-C01-A05 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
SPLP Alkalinity, Bicarbonate	ND		ug/L	10000.0	03/18/2022	AB22-0317-01

SPLP Laboratory Leachate Metals by EPA 1312/6020A

Aliquot #: 22-0154-01-C01-A06 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/18/2022	AB22-0318-05
Arsenic	1		ug/L	1.0	03/18/2022	AB22-0318-05
Barium	420		ug/L	5.0	03/18/2022	AB22-0318-05
Beryllium	ND		ug/L	1.0	03/18/2022	AB22-0318-05
Boron	170	X	ug/L	20.0	03/18/2022	AB22-0318-05
Cadmium	ND		ug/L	0.2	03/18/2022	AB22-0318-05
Chromium	99		ug/L	1.0	03/18/2022	AB22-0318-05
Cobalt	ND		ug/L	6.0	03/18/2022	AB22-0318-05
Copper	3		ug/L	2.0	03/18/2022	AB22-0318-05
Iron	27		ug/L	20.0	03/18/2022	AB22-0318-05
Lead	ND		ug/L	1.0	03/18/2022	AB22-0318-05
Lithium	12		ug/L	10.0	03/18/2022	AB22-0318-05
Molybdenum	100		ug/L	5.0	03/18/2022	AB22-0318-05
Nickel	12		ug/L	2.0	03/18/2022	AB22-0318-05
Selenium	49		ug/L	1.0	03/18/2022	AB22-0318-05
Silver	ND		ug/L	0.2	03/18/2022	AB22-0318-05
Sodium	24800	X	ug/L	1000.0	03/18/2022	AB22-0318-05

Analytical Report

Report Date: 04/01/22

Sample Site:	**DEK Solid Waste Disposal Area (392503)**	Laboratory Project:	**22-0154**
Field Sample ID:	**Fly Ash #1 - Unit 1 Sample 1**	Collect Date:	03/01/2022
Lab Sample ID:	22-0154-01	Collect Time:	09:30 AM
Matrix:	Leachate		

SPLP Laboratory Leachate Metals by EPA 1312/6020A **Aliquot #: 22-0154-01-C01-A06** **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Thallium	ND		ug/L	2.0	03/18/2022	AB22-0318-05
Vanadium	39		ug/L	2.0	03/18/2022	AB22-0318-05
Zinc	ND		ug/L	10.0	03/18/2022	AB22-0318-05

Analytical Report

Report Date: 04/01/22

Sample Site: **DEK Solid Waste Disposal Area (392503)**
Field Sample ID: **Fly Ash #2 - Unit 1 Sample 2**
Lab Sample ID: 22-0154-02
Matrix: Leachate

Laboratory Project: **22-0154**
Collect Date: 03/01/2022
Collect Time: 09:30 AM

SPLP Extraction by EPA 1312

Aliquot #: 22-0154-02-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
SPLP Extraction	complete				03/09/2022	AB22-0308-07

SPLP Phosphorus by EPA 1312 / SM 4500-P; B5-E

Aliquot #: 22-0154-02-C01-A02 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
SPLP Phosphorus	ND		ug/L	10.0	03/14/2022	AB22-0314-11

SPLP Mercury by EPA 1312 / 7470A

Aliquot #: 22-0154-02-C01-A03 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-02

SPLP Sulfate by EPA 300.0

Aliquot #: 22-0154-02-C01-A04 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfate	253000		ug/L	1000.0	03/15/2022	AB22-0315-06

SPLP Alkalinity Bicarbonate by EPA 1312 / SM 2320B

Aliquot #: 22-0154-02-C01-A05 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
SPLP Alkalinity, Bicarbonate	ND		ug/L	10000.0	03/18/2022	AB22-0317-01

SPLP Laboratory Leachate Metals by EPA 1312/6020A

Aliquot #: 22-0154-02-C01-A06 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/18/2022	AB22-0318-05
Arsenic	1		ug/L	1.0	03/18/2022	AB22-0318-05
Barium	1900		ug/L	5.0	03/18/2022	AB22-0318-05
Beryllium	ND		ug/L	1.0	03/18/2022	AB22-0318-05
Boron	94	X	ug/L	20.0	03/18/2022	AB22-0318-05
Cadmium	ND		ug/L	0.2	03/18/2022	AB22-0318-05
Chromium	120		ug/L	1.0	03/18/2022	AB22-0318-05
Cobalt	ND		ug/L	6.0	03/18/2022	AB22-0318-05
Copper	ND		ug/L	2.0	03/18/2022	AB22-0318-05
Iron	29		ug/L	20.0	03/18/2022	AB22-0318-05
Lead	ND		ug/L	1.0	03/18/2022	AB22-0318-05
Lithium	21		ug/L	10.0	03/18/2022	AB22-0318-05
Molybdenum	110		ug/L	5.0	03/18/2022	AB22-0318-05
Nickel	9		ug/L	2.0	03/18/2022	AB22-0318-05
Selenium	41		ug/L	1.0	03/18/2022	AB22-0318-05
Silver	ND		ug/L	0.2	03/18/2022	AB22-0318-05
Sodium	25200	X	ug/L	1000.0	03/18/2022	AB22-0318-05

Analytical Report

Report Date: 04/01/22

Sample Site:	**DEK Solid Waste Disposal Area (392503)**	Laboratory Project:	**22-0154**
Field Sample ID:	**Fly Ash #2 - Unit 1 Sample 2**	Collect Date:	03/01/2022
Lab Sample ID:	22-0154-02	Collect Time:	09:30 AM
Matrix:	Leachate		

SPLP Laboratory Leachate Metals by EPA 1312/6020A **Aliquot #: 22-0154-02-C01-A06** **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Thallium	ND		ug/L	2.0	03/18/2022	AB22-0318-05
Vanadium	69		ug/L	2.0	03/18/2022	AB22-0318-05
Zinc	ND		ug/L	10.0	03/18/2022	AB22-0318-05

Analytical Report

Report Date: 04/01/22

Sample Site: **DEK Solid Waste Disposal Area (392503)**
Field Sample ID: **Fly Ash #3 - Unit 2 Sample 1**
Lab Sample ID: 22-0154-03
Matrix: Leachate

Laboratory Project: **22-0154**
Collect Date: 03/01/2022
Collect Time: 09:35 AM

SPLP Extraction by EPA 1312

Aliquot #: 22-0154-03-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
SPLP Extraction	complete				03/09/2022	AB22-0308-07

SPLP Phosphorus by EPA 1312 / SM 4500-P; B5-E

Aliquot #: 22-0154-03-C01-A02 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
SPLP Phosphorus	ND		ug/L	10.0	03/14/2022	AB22-0314-11

SPLP Mercury by EPA 1312 / 7470A

Aliquot #: 22-0154-03-C01-A03 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-02

SPLP Sulfate by EPA 300.0

Aliquot #: 22-0154-03-C01-A04 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfate	309000		ug/L	1000.0	03/15/2022	AB22-0315-06

SPLP Alkalinity Bicarbonate by EPA 1312 / SM 2320B

Aliquot #: 22-0154-03-C01-A05 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
SPLP Alkalinity, Bicarbonate	ND		ug/L	10000.0	03/18/2022	AB22-0317-01

SPLP Laboratory Leachate Metals by EPA 1312/6020A

Aliquot #: 22-0154-03-C01-A06 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/18/2022	AB22-0318-05
Arsenic	1		ug/L	1.0	03/18/2022	AB22-0318-05
Barium	1600		ug/L	5.0	03/18/2022	AB22-0318-05
Beryllium	ND		ug/L	1.0	03/18/2022	AB22-0318-05
Boron	180	X	ug/L	20.0	03/18/2022	AB22-0318-05
Cadmium	ND		ug/L	0.2	03/18/2022	AB22-0318-05
Chromium	87		ug/L	1.0	03/18/2022	AB22-0318-05
Cobalt	ND		ug/L	6.0	03/18/2022	AB22-0318-05
Copper	ND		ug/L	2.0	03/18/2022	AB22-0318-05
Iron	26		ug/L	20.0	03/18/2022	AB22-0318-05
Lead	ND		ug/L	1.0	03/18/2022	AB22-0318-05
Lithium	21		ug/L	10.0	03/18/2022	AB22-0318-05
Molybdenum	160		ug/L	5.0	03/18/2022	AB22-0318-05
Nickel	9		ug/L	2.0	03/18/2022	AB22-0318-05
Selenium	49		ug/L	1.0	03/18/2022	AB22-0318-05
Silver	ND		ug/L	0.2	03/18/2022	AB22-0318-05
Sodium	38300	X	ug/L	1000.0	03/18/2022	AB22-0318-05

Analytical Report

Report Date: 04/01/22

Sample Site:	**DEK Solid Waste Disposal Area (392503)**	Laboratory Project:	**22-0154**
Field Sample ID:	**Fly Ash #3 - Unit 2 Sample 1**	Collect Date:	03/01/2022
Lab Sample ID:	22-0154-03	Collect Time:	09:35 AM
Matrix:	Leachate		

SPLP Laboratory Leachate Metals by EPA 1312/6020A **Aliquot #: 22-0154-03-C01-A06** **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Thallium	ND		ug/L	2.0	03/18/2022	AB22-0318-05
Vanadium	39		ug/L	2.0	03/18/2022	AB22-0318-05
Zinc	ND		ug/L	10.0	03/18/2022	AB22-0318-05

Analytical Report

Report Date: 04/01/22

Sample Site: **DEK Solid Waste Disposal Area (392503)**
Field Sample ID: **Fly Ash #4 - Unit 2 Sample 2**
Lab Sample ID: 22-0154-04
Matrix: Leachate

Laboratory Project: **22-0154**
Collect Date: 03/01/2022
Collect Time: 09:35 AM

SPLP Extraction by EPA 1312

Aliquot #: 22-0154-04-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
SPLP Extraction	complete				03/09/2022	AB22-0308-07

SPLP Phosphorus by EPA 1312 / SM 4500-P; B5-E

Aliquot #: 22-0154-04-C01-A02 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
SPLP Phosphorus	ND		ug/L	10.0	03/14/2022	AB22-0314-11

SPLP Mercury by EPA 1312 / 7470A

Aliquot #: 22-0154-04-C01-A03 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-02

SPLP Sulfate by EPA 300.0

Aliquot #: 22-0154-04-C01-A04 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfate	291000		ug/L	1000.0	03/15/2022	AB22-0315-06

SPLP Alkalinity Bicarbonate by EPA 1312 / SM 2320B

Aliquot #: 22-0154-04-C01-A05 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
SPLP Alkalinity, Bicarbonate	ND		ug/L	10000.0	03/18/2022	AB22-0317-01

SPLP Laboratory Leachate Metals by EPA 1312/6020A

Aliquot #: 22-0154-04-C01-A06 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/18/2022	AB22-0318-05
Arsenic	1		ug/L	1.0	03/18/2022	AB22-0318-05
Barium	2600		ug/L	5.0	03/18/2022	AB22-0318-05
Beryllium	ND		ug/L	1.0	03/18/2022	AB22-0318-05
Boron	150	X	ug/L	20.0	03/18/2022	AB22-0318-05
Cadmium	ND		ug/L	0.2	03/18/2022	AB22-0318-05
Chromium	100		ug/L	1.0	03/18/2022	AB22-0318-05
Cobalt	ND		ug/L	6.0	03/18/2022	AB22-0318-05
Copper	ND		ug/L	2.0	03/18/2022	AB22-0318-05
Iron	33		ug/L	20.0	03/18/2022	AB22-0318-05
Lead	ND		ug/L	1.0	03/18/2022	AB22-0318-05
Lithium	21		ug/L	10.0	03/18/2022	AB22-0318-05
Molybdenum	200		ug/L	5.0	03/18/2022	AB22-0318-05
Nickel	8		ug/L	2.0	03/18/2022	AB22-0318-05
Selenium	54		ug/L	1.0	03/18/2022	AB22-0318-05
Silver	ND		ug/L	0.2	03/18/2022	AB22-0318-05
Sodium	44100	X	ug/L	1000.0	03/18/2022	AB22-0318-05

Analytical Report

Report Date: 04/01/22

Sample Site:	**DEK Solid Waste Disposal Area (392503)**	Laboratory Project:	**22-0154**
Field Sample ID:	**Fly Ash #4 - Unit 2 Sample 2**	Collect Date:	03/01/2022
Lab Sample ID:	22-0154-04	Collect Time:	09:35 AM
Matrix:	Leachate		

SPLP Laboratory Leachate Metals by EPA 1312/6020A **Aliquot #: 22-0154-04-C01-A06** **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Thallium	ND		ug/L	2.0	03/18/2022	AB22-0318-05
Vanadium	41		ug/L	2.0	03/18/2022	AB22-0318-05
Zinc	ND		ug/L	10.0	03/18/2022	AB22-0318-05

Analytical Report

Report Date: 04/01/22

Data Qualifiers	Exception Summary
X = Sodium and Boron found in the SPLP Extraction Blank.	No other exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-0154

Inspection Date: 03-01-2022 **Inspection By:** EB

Sample Origin/Project Name: Icam Fly Ash for SPLP

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx _____ UPS _____ USPS _____ Airborne _____

Other/Hand Carry (whom) CET

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 N/A Sealed N/A

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 17.3°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~~ Fly Ash	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					

Page 2 of 2 not needed

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

Page 1 of 1

SAMPLING SITE / CUSTOMER:	DEKarn - Fly Ash Laboratory Leachate
LAB PROJECT NUMBER:	22-0154
SAP CC or WO#:	
REQUESTER:	Harold Register
SAMPLING TEAM:	
TURNAROUND TIME REQUIRED:	☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☑ OTHER 10 days
SEND REPORT TO:	Caleb Batts
email:	
phone:	
COPY TO:	Harold Register; TRC

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

ANALYSIS REQUESTED (Attach List if More Space is Needed): Laboratory Leachate List

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

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	TOTAL #	CONTAINERS / PRESERVATIVE: None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Laboratory Leachate List	REMARKS
22-0154-01	03-01-22	0830	OX	Fly Ash #1 - Unit 1 Sample 1	1	1							✓	
22-0154-02	↓	1030	OX	Fly Ash #2 - Unit 1 Sample 2	1	1							✓	
22-0154-03		0835	OX	Fly Ash #3 - Unit 2 Sample 1	1	1							✓	
22-0154-04		1035	OX	Fly Ash #4 - Unit 2 Sample 2	1	1							✓	

RELINQUISHED BY:	DATE/TIME: 3-1-22 1225	RECEIVED BY:
RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:

COMMENTS:

Received on Ice? Yes ✓ No

Temperature: 17.3 °C

M&TE #: 005402

Cal. Due Date: 6-3-22

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: March 24, 2022

Subject: PART 115 GROUNDWATER MONITORING – JCW LEACHATE WELLS – 2022 Q1

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

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

Chemistry Project: 22-0153R

TRC Environmental, Inc. conducted groundwater monitoring at the JC Weadock solid waste disposal area on 03/10/2022 for the 1st Quarter requirements, as specified in the Hydrogeological Monitoring Plan for the site. The samples were received for analysis by the Chemistry Department of Laboratory Services on 03/10/2022.

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

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q1-2022 JCW Leachate Wells
Date Received: 3/10/2022
Chemistry Project: 22-0153

Sample #	Field Sample ID	Matrix	Sample Date	Site
22-0153-01	LH-103R	Groundwater	03/10/2022 07:03 AM	JCW Solid Waste Disposal Area
22-0153-02	LH-103R DUP	Groundwater	03/10/2022 07:03 AM	JCW Solid Waste Disposal Area
22-0153-03	LH-103R MS	Groundwater	03/10/2022 07:03 AM	JCW Solid Waste Disposal Area
22-0153-04	LH-103R MSD	Groundwater	03/10/2022 07:03 AM	JCW Solid Waste Disposal Area
22-0153-05	FB-02	Water	03/10/2022 07:05 AM	JCW Solid Waste Disposal Area
22-0153-06	EB-02	Water	03/10/2022 07:05 AM	JCW Solid Waste Disposal Area
22-0153-07	TB-01	Water	03/10/2022 12:00 AM	JCW Solid Waste Disposal Area

Analytical Report

Report Date: 03/24/22

Sample Site: **JCW Solid Waste Disposal Area (395457)**
Field Sample ID: **LH-103R**
Lab Sample ID: 22-0153-01
Matrix: Groundwater

Laboratory Project: **22-0153**
Collect Date: 03/10/2022
Collect Time: 07:03 AM

Mercury, Low Level by EPA 1631E

Aliquot #: 22-0153-01-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	2.25		ng/L	0.5	03/18/2022	AB22-0318-09

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0153-01-C02-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-02

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

Aliquot #: 22-0153-01-C02-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Arsenic	87		ug/L	1.0	03/18/2022	AB22-0318-04
Barium	589		ug/L	5.0	03/18/2022	AB22-0318-04
Beryllium	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Boron	8240		ug/L	20.0	03/18/2022	AB22-0318-04
Cadmium	ND		ug/L	0.2	03/18/2022	AB22-0318-04
Calcium	253000		ug/L	1000.0	03/18/2022	AB22-0318-04
Chromium	1		ug/L	1.0	03/18/2022	AB22-0318-04
Cobalt	ND		ug/L	6.0	03/18/2022	AB22-0318-04
Copper	2		ug/L	1.0	03/18/2022	AB22-0318-04
Iron	17800		ug/L	20.0	03/18/2022	AB22-0318-04
Lead	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Lithium	188		ug/L	10.0	03/18/2022	AB22-0318-04
Magnesium	87100		ug/L	1000.0	03/18/2022	AB22-0318-04
Manganese	1290		ug/L	5.0	03/18/2022	AB22-0318-04
Molybdenum	12		ug/L	5.0	03/18/2022	AB22-0318-04
Nickel	18		ug/L	2.0	03/18/2022	AB22-0318-04
Potassium	17900		ug/L	100.0	03/18/2022	AB22-0318-04
Selenium	21		ug/L	1.0	03/18/2022	AB22-0318-04
Silver	ND		ug/L	0.2	03/18/2022	AB22-0318-04
Sodium	156000		ug/L	1000.0	03/18/2022	AB22-0318-04
Thallium	ND		ug/L	2.0	03/18/2022	AB22-0318-04
Vanadium	5		ug/L	2.0	03/18/2022	AB22-0318-04
Zinc	ND		ug/L	10.0	03/18/2022	AB22-0318-04

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

Aliquot #: 22-0153-01-C03-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	98100		ug/L	1000.0	03/15/2022	AB22-0315-05
Fluoride	ND		ug/L	1000.0	03/15/2022	AB22-0315-05

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**22-0153**
Field Sample ID:	**LH-103R**	Collect Date:	03/10/2022
Lab Sample ID:	22-0153-01	Collect Time:	07:03 AM
Matrix:	Groundwater		

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

Aliquot #: 22-0153-01-C03-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfate	94800		ug/L	1000.0	03/15/2022	AB22-0315-05

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0153-01-C04-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1490		mg/L	10.0	03/14/2022	AB22-0314-06

Alkalinity by SM 2320B

Aliquot #: 22-0153-01-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	1200000		ug/L	10000.0	03/15/2022	AB22-0315-12
Alkalinity Bicarbonate	1200000		ug/L	10000.0	03/15/2022	AB22-0315-12
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-12

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**22-0153**
Field Sample ID:	**LH-103R DUP**	Collect Date:	03/10/2022
Lab Sample ID:	22-0153-02	Collect Time:	07:03 AM
Matrix:	Groundwater		

Mercury, Low Level by EPA 1631E — **Aliquot #: 22-0153-02-C01-A01** — **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	1.74		ng/L	0.5	03/18/2022	AB22-0318-09

Analytical Report

Report Date: 03/24/22
04/01/22R

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**22-0153**
Field Sample ID:	**LH-103R MS**	Collect Date:	03/10/2022
Lab Sample ID:	22-0153-03	Collect Time:	07:03 AM
Matrix:	Groundwater		

Mercury, Low Level by EPA 1631E — **Aliquot #: 22-0153-03-C01-A01** — **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	79		%	0.5	03/18/2022	AB22-0318-09

Analytical Report

Report Date: 03/24/22
04/01/22R

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**22-0153**
Field Sample ID:	**LH-103R MSD**	Collect Date:	03/10/2022
Lab Sample ID:	22-0153-04	Collect Time:	07:03 AM
Matrix:	Groundwater		

Mercury, Low Level by EPA 1631E — **Aliquot #: 22-0153-04-C01-A01** — **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	81		%	0.5	03/18/2022	AB22-0318-09

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**22-0153**
Field Sample ID:	**FB-02**	Collect Date:	03/10/2022
Lab Sample ID:	22-0153-05	Collect Time:	07:05 AM
Matrix:	Water		

Mercury, Low Level by EPA 1631E — **Aliquot #: 22-0153-05-C01-A01** — **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	ND		ng/L	0.5	03/18/2022	AB22-0318-09

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**22-0153**
Field Sample ID:	**EB-02**	Collect Date:	03/10/2022
Lab Sample ID:	22-0153-06	Collect Time:	07:05 AM
Matrix:	Water		

Mercury, Low Level by EPA 1631E — **Aliquot #: 22-0153-06-C01-A01** — **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	ND		ng/L	0.5	03/18/2022	AB22-0318-09

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**22-0153**
Field Sample ID:	**TB-01**	Collect Date:	03/10/2022
Lab Sample ID:	22-0153-07	Collect Time:	12:00 AM
Matrix:	Water		

Mercury, Low Level by EPA 1631E — **Aliquot #: 22-0153-07-C01-A01** — **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	ND		ng/L	0.5	03/18/2022	AB22-0318-09

Analytical Report

Report Date: 03/24/22

Data Qualifiers	Exception Summary
	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-0153

Inspection Date: 3-10-22 **Inspection By:** TJR

Sample Origin/Project Name: Weadock Leachate

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx _____ UPS _____ USPS _____ Airborne _____

Other/Hand Carry (whom) _____

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 5.4°C (LLHg: 8.2°C) Samples Received on Ice: Yes ✓ No _____ (Except LLHg)

M&TE # and Expiration 015484 10-14-22

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)					
500 mL (plastic)					
Other 250 mL plastic	1				
8 oz boston round	7				

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

SAMPLING SITE / CUSTOMER: Q1-2022 Weadock Leachate Wells	PROJECT NUMBER: 22-0153	SAP CC or WO#:	ANALYSIS REQUESTED (Attach List if More Space is Needed)
SAMPLING TEAM:	TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER	REQUESTER: Harold Register	QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER
SEND REPORT TO: Caleb Batts	email:	phone:	
COPY TO: Harold Register; TRC	MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other; SL = Sludge; A = Air; WP = Wipe; WT = General Waste		

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Mercury, Low Level	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0153-01	3/10/22	0903	GW	LH-103R	6	4	1			1			x	x	x	x	x	
-02		0703	GW	LH-103R DUP	1					1			x					
-03		0703	GW	LH-103R MS	1					1			x					
-04		0703	GW	LH-103R MSD	1					1			x					
-05		0705	W	FB-02	1					1			x					
-06		0705	W	EB-02	1					1			x					
-07		2nd	W	TB-01	1					1			x					

RELINQUISHED BY: [signature] DATE/TIME: 3/10/22 1021 RECEIVED BY: [signature]

RELINQUISHED BY: DATE/TIME: RECEIVED BY:

COMMENTS:

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

Temperature: 5.4°C °C except LL Hg 8.2°C Cal. Due Date: 06/03/2022

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: March 24, 2022

Subject: HMP GROUNDWATER MONITORING – JCWEADOCK ASD – 2022 Q1

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

Darby Litz, Project Manager
TRC Environmental Corporation
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 22-0152

TRC Environmental, Inc. conducted groundwater monitoring at the JCWeadock site on 03/07/2022 through 03/09/2022, for the 1st Quarter requirements, as specified in the Hydrogeological Monitoring Plan for the site. The samples were received for analysis by the Chemistry department of Laboratory Services on 03/09/2022 and 03/10/2022.

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, 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

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q1-2022 Weadock ASD
Date Received: 3/10/2022
Chemistry Project: 22-0152

Sample #	Field Sample ID	Matrix	Sample Date	Site
22-0152-01	JWC-OW-18004	Groundwater	03/07/2022 06:45 AM	JC Weadock ASD
22-0152-02	OW-53	Groundwater	03/08/2022 10:30 AM	JC Weadock ASD
22-0152-03	OW-54	Groundwater	03/09/2022 07:49 AM	JC Weadock ASD
22-0152-04	OW-55	Groundwater	03/07/2022 10:51 AM	JC Weadock ASD

Analytical Report

Report Date: 03/24/22

Sample Site: **JC Weadock ASD**
Field Sample ID: **JWC-OW-18004**
Lab Sample ID: 22-0152-01
Matrix: Groundwater

Laboratory Project: **22-0152**
Collect Date: 03/07/2022
Collect Time: 06:45 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0152-01-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-02

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

Aliquot #: 22-0152-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Arsenic	1		ug/L	1.0	03/18/2022	AB22-0318-04
Barium	67		ug/L	5.0	03/18/2022	AB22-0318-04
Beryllium	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Boron	705		ug/L	20.0	03/18/2022	AB22-0318-04
Cadmium	ND		ug/L	0.2	03/18/2022	AB22-0318-04
Calcium	156000		ug/L	1000.0	03/18/2022	AB22-0318-04
Chromium	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Cobalt	ND		ug/L	6.0	03/18/2022	AB22-0318-04
Copper	3		ug/L	1.0	03/18/2022	AB22-0318-04
Iron	35		ug/L	20.0	03/18/2022	AB22-0318-04
Lead	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Lithium	ND		ug/L	10.0	03/18/2022	AB22-0318-04
Magnesium	67600		ug/L	1000.0	03/18/2022	AB22-0318-04
Manganese	15		ug/L	5.0	03/18/2022	AB22-0318-04
Molybdenum	ND		ug/L	5.0	03/18/2022	AB22-0318-04
Nickel	12		ug/L	2.0	03/18/2022	AB22-0318-04
Potassium	1800		ug/L	100.0	03/18/2022	AB22-0318-04
Selenium	3		ug/L	1.0	03/18/2022	AB22-0318-04
Silver	ND		ug/L	0.2	03/18/2022	AB22-0318-04
Sodium	74400		ug/L	1000.0	03/18/2022	AB22-0318-04
Thallium	ND		ug/L	2.0	03/18/2022	AB22-0318-04
Vanadium	ND		ug/L	2.0	03/18/2022	AB22-0318-04
Zinc	ND		ug/L	10.0	03/18/2022	AB22-0318-04

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

Aliquot #: 22-0152-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	95900		ug/L	1000.0	03/10/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	178000		ug/L	1000.0	03/15/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site: **JC Weadock ASD**
Field Sample ID: **JWC-OW-18004**
Lab Sample ID: 22-0152-01
Matrix: Groundwater

Laboratory Project: **22-0152**
Collect Date: 03/07/2022
Collect Time: 06:45 AM

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0152-01-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1000		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0152-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	501000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	501000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site: **JC Weadock ASD**
Field Sample ID: **OW-53**
Lab Sample ID: 22-0152-02
Matrix: Groundwater

Laboratory Project: **22-0152**
Collect Date: 03/08/2022
Collect Time: 10:30 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0152-02-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-02

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

Aliquot #: 22-0152-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Arsenic	11		ug/L	1.0	03/18/2022	AB22-0318-04
Barium	392		ug/L	5.0	03/18/2022	AB22-0318-04
Beryllium	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Boron	4000		ug/L	20.0	03/18/2022	AB22-0318-04
Cadmium	ND		ug/L	0.2	03/18/2022	AB22-0318-04
Calcium	138000		ug/L	1000.0	03/18/2022	AB22-0318-04
Chromium	1		ug/L	1.0	03/18/2022	AB22-0318-04
Cobalt	ND		ug/L	6.0	03/18/2022	AB22-0318-04
Copper	3		ug/L	1.0	03/18/2022	AB22-0318-04
Iron	1950		ug/L	20.0	03/18/2022	AB22-0318-04
Lead	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Lithium	56		ug/L	10.0	03/18/2022	AB22-0318-04
Magnesium	39100		ug/L	1000.0	03/18/2022	AB22-0318-04
Manganese	354		ug/L	5.0	03/18/2022	AB22-0318-04
Molybdenum	ND		ug/L	5.0	03/18/2022	AB22-0318-04
Nickel	10		ug/L	2.0	03/18/2022	AB22-0318-04
Potassium	8400		ug/L	100.0	03/18/2022	AB22-0318-04
Selenium	14		ug/L	1.0	03/18/2022	AB22-0318-04
Silver	ND		ug/L	0.2	03/18/2022	AB22-0318-04
Sodium	82800		ug/L	1000.0	03/18/2022	AB22-0318-04
Thallium	ND		ug/L	2.0	03/18/2022	AB22-0318-04
Vanadium	2		ug/L	2.0	03/18/2022	AB22-0318-04
Zinc	ND		ug/L	10.0	03/18/2022	AB22-0318-04

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

Aliquot #: 22-0152-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	82000		ug/L	1000.0	03/10/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	56200		ug/L	1000.0	03/10/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site: **JC Weadock ASD**
Field Sample ID: **OW-53**
Lab Sample ID: 22-0152-02
Matrix: Groundwater

Laboratory Project: **22-0152**
Collect Date: 03/08/2022
Collect Time: 10:30 AM

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0152-02-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	790		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0152-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	562000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	562000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site: **JC Weadock ASD**
Field Sample ID: **OW-54**
Lab Sample ID: 22-0152-03
Matrix: Groundwater

Laboratory Project: **22-0152**
Collect Date: 03/09/2022
Collect Time: 07:49 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0152-03-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-02

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

Aliquot #: 22-0152-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Arsenic	54		ug/L	1.0	03/18/2022	AB22-0318-04
Barium	312		ug/L	5.0	03/18/2022	AB22-0318-04
Beryllium	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Boron	5760		ug/L	20.0	03/18/2022	AB22-0318-04
Cadmium	ND		ug/L	0.2	03/18/2022	AB22-0318-04
Calcium	160000		ug/L	1000.0	03/18/2022	AB22-0318-04
Chromium	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Cobalt	ND		ug/L	6.0	03/18/2022	AB22-0318-04
Copper	1		ug/L	1.0	03/18/2022	AB22-0318-04
Iron	9230		ug/L	20.0	03/18/2022	AB22-0318-04
Lead	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Lithium	103		ug/L	10.0	03/18/2022	AB22-0318-04
Magnesium	52200		ug/L	1000.0	03/18/2022	AB22-0318-04
Manganese	393		ug/L	5.0	03/18/2022	AB22-0318-04
Molybdenum	ND		ug/L	5.0	03/18/2022	AB22-0318-04
Nickel	10		ug/L	2.0	03/18/2022	AB22-0318-04
Potassium	4510		ug/L	100.0	03/18/2022	AB22-0318-04
Selenium	14		ug/L	1.0	03/18/2022	AB22-0318-04
Silver	ND		ug/L	0.2	03/18/2022	AB22-0318-04
Sodium	49200		ug/L	1000.0	03/18/2022	AB22-0318-04
Thallium	ND		ug/L	2.0	03/18/2022	AB22-0318-04
Vanadium	ND		ug/L	2.0	03/18/2022	AB22-0318-04
Zinc	ND		ug/L	10.0	03/18/2022	AB22-0318-04

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

Aliquot #: 22-0152-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	82700		ug/L	1000.0	03/10/2022	AB22-0311-03
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0311-03
Sulfate	8710		ug/L	1000.0	03/10/2022	AB22-0311-03

Analytical Report

Report Date: 03/24/22

Sample Site: **JC Weadock ASD**
Field Sample ID: **OW-54**
Lab Sample ID: 22-0152-03
Matrix: Groundwater

Laboratory Project: **22-0152**
Collect Date: 03/09/2022
Collect Time: 07:49 AM

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0152-03-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	766		mg/L	10.0	03/14/2022	AB22-0314-06

Alkalinity by SM 2320B

Aliquot #: 22-0152-03-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	629000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	629000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Sample Site: **JC Weadock ASD**
Field Sample ID: **OW-55**
Lab Sample ID: 22-0152-04
Matrix: Groundwater

Laboratory Project: **22-0152**
Collect Date: 03/07/2022
Collect Time: 10:51 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0152-04-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-02

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

Aliquot #: 22-0152-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Arsenic	6		ug/L	1.0	03/18/2022	AB22-0318-04
Barium	374		ug/L	5.0	03/18/2022	AB22-0318-04
Beryllium	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Boron	2090		ug/L	20.0	03/18/2022	AB22-0318-04
Cadmium	ND		ug/L	0.2	03/18/2022	AB22-0318-04
Calcium	170000		ug/L	1000.0	03/18/2022	AB22-0318-04
Chromium	2		ug/L	1.0	03/18/2022	AB22-0318-04
Cobalt	ND		ug/L	6.0	03/18/2022	AB22-0318-04
Copper	2		ug/L	1.0	03/18/2022	AB22-0318-04
Iron	3420		ug/L	20.0	03/18/2022	AB22-0318-04
Lead	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Lithium	25		ug/L	10.0	03/18/2022	AB22-0318-04
Magnesium	32900		ug/L	1000.0	03/18/2022	AB22-0318-04
Manganese	239		ug/L	5.0	03/18/2022	AB22-0318-04
Molybdenum	ND		ug/L	5.0	03/18/2022	AB22-0318-04
Nickel	12		ug/L	2.0	03/18/2022	AB22-0318-04
Potassium	7590		ug/L	100.0	03/18/2022	AB22-0318-04
Selenium	4		ug/L	1.0	03/18/2022	AB22-0318-04
Silver	ND		ug/L	0.2	03/18/2022	AB22-0318-04
Sodium	53300		ug/L	1000.0	03/18/2022	AB22-0318-04
Thallium	ND		ug/L	2.0	03/18/2022	AB22-0318-04
Vanadium	2		ug/L	2.0	03/18/2022	AB22-0318-04
Zinc	ND		ug/L	10.0	03/18/2022	AB22-0318-04

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

Aliquot #: 22-0152-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	20900		ug/L	1000.0	03/10/2022	AB22-0310-07
Fluoride	ND		ug/L	1000.0	03/10/2022	AB22-0310-07
Sulfate	4870		ug/L	1000.0	03/10/2022	AB22-0310-07

Analytical Report

Report Date: 03/24/22

Sample Site: **JC Weadock ASD**
Field Sample ID: **OW-55**
Lab Sample ID: 22-0152-04
Matrix: Groundwater

Laboratory Project: **22-0152**
Collect Date: 03/07/2022
Collect Time: 10:51 AM

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0152-04-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	831		mg/L	10.0	03/10/2022	AB22-0310-04

Alkalinity by SM 2320B

Aliquot #: 22-0152-04-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	669000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Bicarbonate	669000		ug/L	10000.0	03/15/2022	AB22-0315-11
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-11

Analytical Report

Report Date: 03/24/22

Data Qualifiers	Exception Summary
	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-0152

Inspection Date: 3.9.22 **Inspection By:** dmw

Sample Origin/Project Name: Q1-2022 Weadock ASD

Shipment Delivered By: Enter the type of shipment carrier.

Pony ____ FedEx ✓ UPS ____ USPS ____ Airborne ____

Other/Hand Carry (whom) ____

Tracking Number: 2706 3161 5842 Shipping Form Attached: Yes ✓ No ____

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

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

Loose/Unpackaged Containers ____ Other ____

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

Damaged Shipment Observed: None ✓ Dented ____ Leaking ____

Other ____

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

Shipping Containers Received: Opened ____ Sealed ✓

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

CoC ✓ Work Request ____ Air Data Sheet ____ Other ____

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

As-Received Temperature Range 1.2-3.8°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)	8				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	8				
24 mL vial (glass)					
500 mL (plastic)					
Other 250ml plastic	4				

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-0152-03

Inspection Date: 3-10-22 **Inspection By:** TMR

Sample Origin/Project Name: Weadock

Shipment Delivered By: Enter the type of shipment carrier.

Pony ____ FedEx ✓ UPS ____ USPS ____ Airborne ____

Other/Hand Carry (whom) ____

Tracking Number: 2706 7950 4504 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 2.4-4.6°C Samples Received on Ice: Yes ✓ No ____

M&TE # and Expiration 015484 10-14-22

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)					
500 mL (plastic)					
Other 250mL plastic	1				

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

Page _____ of _____

SAMPLING SITE / CUSTOMER: Q1-2022 Weadock ASD		PROJECT NUMBER: 22-0152	SAP CC or WO#:
SAMPLING TEAM:		TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____	REQUESTER: Harold Register
SEND REPORT TO:	Caleb Batts	email:	phone:
COPY TO:	Harold Register		
	TRC		

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

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	ANALYSIS REQUESTED (Attach List if More Space is Needed) Total Metals	Anions	TDS	Alkalinity					REMARKS
22-0152-01	3/7/22	0917	GW	JCW-MW-18004	5	4	1						x	x	x	x						
-02	3/8/22	1037	GW	OW-53	5	4	1						x	x	x	x						
-03			GW	OW-54	5	4	1						x	x	x	x						
-04	3/7/22	1051	GW	OW-55	5	4	1						x	x	x	x						

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

RELINQUISHED BY:	DATE/TIME: 3/8/22 1400	RECEIVED BY: FedEx
RELINQUISHED BY: FedEx	DATE/TIME: 03-09-2022 11:30	RECEIVED BY:

COMMENTS:

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

Temperature: 1.2 - 3.8 °C Cal. Due Date: 6-3-22

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

Page _____ of _____

SAMPLING SITE / CUSTOMER:	PROJECT NUMBER:	SAP CC or WO#:
Q1-2022 Weadock ASD	22-0152	REQUESTER: Harold Register

SAMPLING TEAM:

TURNAROUND TIME REQUIRED:

☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO:	Caleb Batts	email:	phone:
COPY TO:	Harold Register		
	TRC		

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

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	ANALYSIS REQUESTED: Total Metals	Anions	TDS	Alkalinity
22-0152-01			GW	JCW-MW-18004	5	4	1						x	x	x	x
-02			GW	OW-53	5	4	1						x	x	x	x
-03	3/9/22	0745	GW	OW-54	5	4	1						x	x	x	x
-04			GW	OW-55	5	4	1						x	x	x	x

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

REMARKS

RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:
	3/9/22 1430	Fed Ex FEB 03102022
RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:
Fed Ex	03-10-22 1245	

COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015484

Temperature: 2.4 - 4.6 °C Cal. Due Date: 10-14-22

Appendix F
Field Records

TRC

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance
PROJECT NUMBER:	464096.0000.0000
PROJECT MANAGER:	Darby Litz
SITE LOCATION:	2742 Weadock Hwy Essexville, MI 48732
DATES OF FIELDWORK:	~~3/7/21~~ 2/28/22 TO 3/11/22
PURPOSE OF FIELDWORK:	First Quarter 2022 HMP Sampling and Supplemental CCR sampling
WORK PERFORMED BY:	Javier Jasso

SIGNED 3/11/22 DATE

CHECKED BY 3-15-22 DATE

TRC

GENERAL NOTES

PROJECT NAME:	CEC Weadock LF: 2022 GW Com	DATE: 2/28/22	TIME ARRIVED: 0727
PROJECT NUMBER:	464096.0000.0000	AUTHOR: Javier Jasso	TIME LEFT: 1041

WEATHER

TEMPERATURE: 30 °F WIND: 15 MPH VISIBILITY: Overcast

WORK / SAMPLING PERFORMED

Water levels

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
NA	NA

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS

SIGNED 3/11/22 DATE

CHECKED BY 3-15-22 DATE

TRC

GENERAL NOTES

PROJECT NAME: CEC Weadock LF: 2022 GW Com	DATE: 3/7/22	TIME ARRIVED: 0530
PROJECT NUMBER: 464096.0000.0000	AUTHOR: Javier Jasso	TIME LEFT: 1415

WEATHER

TEMPERATURE: 30 °F WIND: 10 MPH VISIBILITY: Over cast skies

WORK / SAMPLING PERFORMED

Wells Sampled
JCW-MW-18001, MS+MSD, JCW-MW-18004, JCW-OW-18004
MW 55, OW-5C, JCW MW 1800 S Dup #1, JCW MW 18006, MW 58

Getting Supplys

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
NA	NA

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
NA	NA	NA

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
purge water	NM	purged to ground

SIGNED 3/11/22 DATE

CHECKED BY 3-15-22 DATE

TRC

GENERAL NOTES

PROJECT NAME:	CEC Weadock LF: 2022 GW Com	DATE: 3/8/22	TIME ARRIVED: 0600
PROJECT NUMBER:	464096.0000.0000	AUTHOR: Javier Jasso	TIME LEFT: 1320

WEATHER		
TEMPERATURE: 14 °F	WIND: 16 MPH	VISIBILITY: Clear

WORK / SAMPLING PERFORMED

MW-50, Dup #2, 51, 52, 53, OW-53, MW-53R

Shipping Samples

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
NA	NA

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
NA	NA	NA

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
purge water	NM	purged to ground

SIGNED 3/11/22 DATE

CHECKED BY 3-15-22 DATE

TRC

GENERAL NOTES

PROJECT NAME:	CEC Weadock LF: 2022 GW Com	DATE: 3/9/22	TIME ARRIVED: 0800
PROJECT NUMBER:	464096.0000.0000	AUTHOR: Javier Jasso	TIME LEFT: 0830

WEATHER		
TEMPERATURE: 30 °F	WIND: 10 MPH	VISIBILITY: Overcast

WORK / SAMPLING PERFORMED

MW 54R, OW 54, OW57R out, EB#1, FB#1

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
NA	NA

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
NA	NA	NA

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
purge water	NM	purged to ground

SIGNED 3/11/22 DATE

CHECKED BY 3-15-22 DATE

TRC

EQUIPMENT SUMMARY

PROJECT NAME:	CEC Weadock LF: 2022 GW Co	SAMPLER NAME:	Javier Jasso
PROJECT NO.:	464096.0000.0000		

WATER LEVEL MEASUREMENTS COLLECTED WITH:

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

PRODUCT LEVEL MEASUREMENTS COLLECTED WITH:

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

DEPTH TO BOTTOM OF WELL MEASUREMENTS COLLECTED WITH:

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

PURGING METHOD

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

SAMPLING METHOD

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

PURGE WATER DISPOSAL METHOD

☑ GROUND ☐ DRUM ☐ POTW ☐ POLYTANK ☐ OTHER _____

DECONTAMINATION AND FIELD BLANK WATER SOURCE

POTABLE WATER SOURCE	DI WATER SOURCE
STORE BOUGHT	LABORATORY PROVIDED
SIGNED 3/16/22 DATE	CHECKED BY 3-15-22 DATE

REVISED 04/2019

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	MODEL: YSI Pro DSS	SAMPLER: JJ
PROJECT NO.:	464096.0000.0000	SERIAL #: TRC A2	DATE: 3/7/22

PH CALIBRATION CHECK

pH 7 (LOT #): 161081 (EXP. DATE): 9/23 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 163780 (EXP. DATE): 10/23 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
700 / 700	400 / 400	☑ WITHIN RANGE	0330
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 166021 (EXP. DATE): 11/22 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1413 / 1413	NA	☑ WITHIN RANGE	0330
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 210160313 (EXP. DATE): 4/26 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
220 / 220	21.0	☑ WITHIN RANGE	0336
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
867 / 867	21.0	☑ WITHIN RANGE	0335
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A196 (EXP. DATE): 7/23 POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
0 / 0	/	☑ WITHIN RANGE	0334
100 / 100	/	☑ WITHIN RANGE	0334
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

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

NOTES

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS

SIGNED 3/11/22 DATE

CHECKED BY 3-15-22 DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	MODEL: YSI Pro DSS	SAMPLER: JJ
PROJECT NO.:	464096.0000.0000	SERIAL #: TRC A2	DATE: 3/10/22

PH CALIBRATION CHECK

pH 7 (LOT #): 161981 (EXP. DATE): 9/23 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 163180 (EXP. DATE): 10/23 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
700 / 700	400 / 400	☑ WITHIN RANGE	0537
/	/	☑ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 161021 (EXP. DATE): 11/22 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1413 / 1413	NA	☑ WITHIN RANGE	0530
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 21000373 (EXP. DATE): 4/24 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
220 / 220	23.0	☑ WITHIN RANGE	0537
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
7.89 / 7.86	26.0	☑ WITHIN RANGE	0537
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A1196 (EXP. DATE): 7/23 POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
0 / 0	/	☑ WITHIN RANGE	0536
100 / 100	/	☑ WITHIN RANGE	0537
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

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

NOTES

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS

SIGNED 3/11/22 DATE

CHECKED BY 3-15-22 DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	MODEL: YSI Pro DSS	SAMPLER: JJ
PROJECT NO.:	464096.0000.0000	SERIAL #: TRC A2	DATE: 3/9/22

PH CALIBRATION CHECK

pH 7 (LOT #): 161061 (EXP. DATE): 4/23 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 165786 (EXP. DATE): 10/23 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 #): 161021 (EXP. DATE): 11/22 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1413 / 1413	20A	☑ WITHIN RANGE	0532
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 21D100313 (EXP. DATE): 4/26 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
220 / 220	23.0	☑ 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
8.04 / 8.04	25.	☑ WITHIN RANGE	0537
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A1196 (EXP. DATE): 7/23 POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
0 / 0	/	☑ WITHIN RANGE	0532
100 / 100	/	☑ WITHIN RANGE	0539
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

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

NOTES

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS

SIGNED _____ 3/11/22 DATE

CHECKED BY _____ 3-15-22 DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	MODEL: YSI Pro DSS	SAMPLER: JJ
PROJECT NO.:	464096.0000.0000	SERIAL #: TRC A2	DATE: 3/10/22

PH CALIBRATION CHECK

pH 7 (LOT #): 161091 (EXP. DATE): 9/23 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 16J780 (EXP. DATE): 10/23 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
7.00 / 7.00	4.00 / 4.00	☑ WITHIN RANGE	0530
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 16K021 (EXP. DATE): 11/22 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1413 / 1413	NA	☑ WITHIN RANGE	0530
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 210100313 (EXP. DATE): 4/26 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
220 / 220	23	☑ 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
8.35 / 8.35	23	☑ WITHIN RANGE	0530
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A1196 (EXP. DATE): 7/23 POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
0 / 0	/	☑ WITHIN RANGE	0530
100 / 100	/	☑ 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 _____ 3/11/22 DATE

CHECKED BY _____ 3-15-22 DATE

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	DATE: 2/28/22
PROJECT NUMBER:	464096.0000.0000	AUTHOR: Javier Jasso

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
JCW-MW-18001	0808	TOC	17.00	23.71	NA	NM
JCW-MW-18004	0857	TOC	13.14	14.22	NA	NM
JCW-MW-18005	0915	TOC	9.68	16.28	NA	NM
JCW-MW-18006	0932	TOC	14.40	23.68	NA	NM
JCW-OW-18001	0809	TOC	8.70	20.31	NA	NM
JCW-OW-18002	0814	TOC	11.15	19.41	NA	NM
JCW-OW-18003	0831	TOC	8.68	18.68	NA	NM
JCW-OW-18004	0856	TOC	7.48	14.81	NA	NM
JCW-OW-18006	0935	TOC	12.68	23.68	NA	NM
LH-103	0911	TOC	Damage		NA	NM
LH-104	0908	TOC	8.33	14.00	NA	NM
MW-20	0917	TOC	7.00	14.00	NA	NM
MW-50	0814	TOC	13.03	19.40	NA	NM
MW-51	0821	TOC	14.66	20.00	NA	NM
MW-52	0824	TOC	15.23	19.74	NA	NM
MW-53	0836	TOC	13.89	18.16	NA	NM
MW-53R	0844	TOC	14.95	18.80	NA	NM
MW-54R	0853	TOC	14.10	17.00	NA	NM
MW-55	0910	TOC	14.35	16.34	NA	NM
MW-58	1035	TOC	5.50	18.20	NA	NM
OW-51	0803	TOC	10.24	17.26	NA	NM
OW-53	0837	TOC	8.36	18.00	NA	NM
OW-54	0833	TOC	7.62	16.46	NA	NM
OW-55	0911	TOC	5.83	18.42	NA	NM
OW-56R	0924	TOC	5.89	20.31	NA	NM

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

SIGNED 3/11/22 DATE

CHECKED 3-15-22 DATE

REVISED 04/2019

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	DATE:	2/28/22
PROJECT NUMBER:	464096.0000.0000	AUTHOR:	Javier Jasso

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
OW-57 IN	0935	TOC	6.95	19.68	NA	NM
OW-57R IN	0936	TOC	6.74	20.14	NA	NM
OW-57 OUT	0934	TOC	10.7	19.48	NA	NM
OW-57R OUT	0933	TOC	9.90	20.30	NA	NM
OW-61	0945	TOC	13.24	26.24	NA	NM
OW-63	0953	TOC	well is to high for me to take a reading		NA	NM
JCW-MW-15030	0838		15.38	DNM		
JCW MW 15026	0846		14.70	DNM		
MW-16R	0854		14.68	DNM		
~~JCW-MW-15004~~	~~0901~~		~~7.45~~	~~14.85~~		
JCW MW-15031	0904		12.35	DNM		
OW-56	0915		6.50	19.27		
MW-14	10.10		9.35	20.38		
MW-15008	1020		4.53	17.40		
MW-15020	1022		5.09	17.17		
MW-116B	1026		4.95	32.76		
MW-15024	1030		6.03	17.17		
MW-15019	1032		5.75	16.85		
MW-15018	1035		5.85	9.94		
MW-15002	1039		6.80	16.86		
MW-15001	1040		8.90	DNM		
MW-15006	1043		3.90	~~Frozen~~		

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

SIGNED 3/11/22 DATE

CHECKED 3-15-22 DATE

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: SK	DATE: 3-15-22

SAMPLE ID: JCW-MW-19001 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0614	DATE: 3/7/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER	
DEPTH TO WATER:	17.01 T/ PVC	
DEPTH TO BOTTOM:	29 T/ PVC	
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS	
VOLUME REMOVED:	5 ☐ LITERS ☐ GALLONS	
COLOR:	CLOUDY ODOR: NONE	
TURBIDITY	☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY	
DISPOSAL METHOD:	☑ GROUND ☐ DRUM ☐ OTHER	

SAMPLE	TIME: 0654	DATE: 3/7/22
PH: 6.81 SU	CONDUCTIVITY: 2982 umhos/cm	
ORP: -200.0 mV	DO: 1.03 mg/L	
TURBIDITY: 1.95 NTU		
☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
TEMPERATURE: 10.4 °C	OTHER:	
COLOR: Clear	ODOR: none	
FILTRATE (0.45 um) ☐ YES	☑ NO	
FILTRATE COLOR:	FILTRATE ODOR:	
QC SAMPLE: ☑ MS/MSD	☐ DUP-	
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)
0614	200	4.46	2946	-38.0	8.0	1000+	8.3	17.01	INITIAL
0624		6.73	2977	-173.5	1.71	200	10.6	17.16	1
0629		6.79	3044	-170.0	1.19	110	10.7	17.10	2
0634		6.80	3015	-186.7	1.08	130	10.6	17.15	3
0639		6.81	3044	-190.0	1.07	2.70	10.4	17.11	4
0644		6.81	3036	-199.6	1.05	2.20	10.3	17.15	5
0649		6.81	2995	-194.5	1.03	1.91	10.4	17.11	6
0654		6.81	2982	-200.0	1.03	1.95	10.4	17.15	7

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
6	125	glass	A	☐ Y ☑ N					☐ Y ☐ N
1	250	pl	A	☐ Y ☑ N					☐ Y ☐ N
3	125	pl	A	☐ Y ☑ N					☐ Y ☐ N
3	125	pl	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	lab drop off	DATE SHIPPED:	3-10-22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	3/11

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 3/10/22	BY: SK	DATE: 3-15-22

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: 0731	DATE: 3/7/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER	
DEPTH TO WATER:	13.15 T/ PVC	
DEPTH TO BOTTOM:	14.72 T/ PVC	
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS	
VOLUME REMOVED:	2L ☒ LITERS ☐ GALLONS	
COLOR:	cloudy	ODOR: NON
TURBIDITY	☐ NONE ☐ SLIGHT ☑ MODERATE ☐ VERY	
DISPOSAL METHOD:	☑ GROUND ☐ DRUM ☐ OTHER	

SAMPLE	TIME: 0756	DATE: 3/7/22
PH: 6.90 SU	CONDUCTIVITY: 1691 umhos/cm	
ORP: -25.8 mV	DO: 4.99 mg/L	
TURBIDITY: 2.9C NTU		
☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
TEMPERATURE: 3.C °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)
0731	100	6.19	1815	-100.5	10.0	50.0	4.9	13.15	INITIAL
0736		6.75	1757	30.0	6.0	22.C	4.4	1341	.5
0741		6.95	1664	-5.0	5.50	6.20	4.2	1370	1
0746		6.9C	1678	-25.0	5.0C	3.0	3.7	1390	1.5
0751		6.9C	1691	-25.3	4.99	2.9	3.6	1405	2
0756		6.90	1691	-25.8	4.99	2.9C	3.6	1415	2.5
~~0801~~									~~3~~

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	glass	A	☐ Y ☑ N					☐ Y ☐ N
1	1L	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	1L	PL	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Lab Drop off	DATE SHIPPED:	3-10-22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	3/11/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: SK	DATE: 3-15-22

SAMPLE ID: ~~JCW-OW~~ SK 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: 0815	DATE: 3/7/22	SAMPLE	TIME: 0845	DATE: 3/7/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 7.14 T/ PVC

DEPTH TO BOTTOM: 14.95 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 3 ☒ LITERS ☐ GALLONS

COLOR: clear ODOR: none

TURBIDITY ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

PH: 7.15 SU CONDUCTIVITY: 1576 umhos/cm

ORP: -65.8 mV DO: 3.50 mg/L

TURBIDITY: 1.43 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 5.1 °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)
0815	100	7.39	1576	9.0	11.0	60.0	4.3	7.18	INITIAL
0830		7.09	1577	-20.0	4.16	1.95	5.3	8.10	.5
0837		7.11	1576	-50.0	3.60	1.60	5.3	8.95	1
0830		7.14	1577	-60.0	3.50	1.58	5.3	9.90	1.5
0837		7.14	1576	-65.0	3.49	1.56	5.2	9.90	2
0842		7.15	1576	-65.3	3.49	1.44	5.2	10.0	2.5
0845		7.15	1576	-65.8	3.50	1.43	5.1	10.18	3

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

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

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

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

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	3-10-22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	3/11/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: JK	DATE: 3-15-22

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: 0903	DATE: 3/7/22	SAMPLE	TIME: 0943	DATE: 3/7/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.12 SU	CONDUCTIVITY: 1453	umhos/cm
			ORP: -139.5 mV	DO: 1.16	mg/L
DEPTH TO WATER:	14.30 T/ PVC		TURBIDITY: 29.1 NTU		
DEPTH TO BOTTOM:	NM T/ PVC		☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS		TEMPERATURE: 6.0 °C	OTHER:	
VOLUME REMOVED:	8 ☒ LITERS ☐ GALLONS		COLOR: clear	ODOR: none	
COLOR:	Brownish 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)
0903	200	7.15	1678	-7.3	2.0	200	4.8	14.3	INITIAL
0908		7.21	1394	-70.5	3.67	250.0	5.2	14.3	1.0
0913		7.12	1422	-110.0	1.53	43.5	6.0	14.33	2.0
0918		7.11	1435	-130.0	1.33	30.	5.9	14.33	3.0
0923		7.11	1443	-140.0	1.20	12.6	6.0	14.35	4.0
0928		7.13	1450	-140.5	1.20	6.0	6.0	14.35	5.0
0933		7.13	1450	-139.5	1.16	3.0	6.0	14.35	6.0
0938		7.13	1453	-139.5	1.16	3.0	6.0	14.35	7
0943		7.13	1453	-139.5	1.16	2.9	6.0	14.35	8

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	g/HDPE	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	3-10-22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	3/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: JK	DATE: 3-15-22

SAMPLE ID: QW 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: 1000	DATE: 3/7/22	SAMPLE	TIME: 1051	DATE: 3/7/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.40 SU	CONDUCTIVITY: 1256 umhos/cm	
			ORP: -120.5 mV	DO: 1.29 mg/L	
DEPTH TO WATER: 5.48 T/ PVC			TURBIDITY: 20.0 NTU		
DEPTH TO BOTTOM: 18.43 T/ PVC			☒ NONE ☑ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 5.2 °C	OTHER:	
VOLUME REMOVED: 4.5 ☒ 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:	
			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)
1006	100	7.57	1091	-66.7	10.0	800	3.8	5.48	INITIAL
1011		7.53	1200	-79.1	2.51	730	4.7	6.70	.5
1016		7.50	1204	-90.0	1.97	320	4.7	7.13	1
1021		7.47	1217	-99.5	1.50	84.0	4.8	7.70	1.5
1026		7.46	1223	-110.0	1.46	38.0	4.8	8.0	2
1031		7.44	1236	-110.5	1.40	29.0	5.0	8.35	2.5
1036		7.40	1237	-116.5	1.30	20.0	5.0	8.70	3
1041		7.40	1247	-119.8	1.30	20.0	5.1	9.01	3.5
1046		7.40	1251	-120.0	1.30	20.0	5.1	9.30	4
1051		7.40	1256	-120.5	1.29	20.0	5.2	9.50	4.5

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

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

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

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

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	3-10-22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	3/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 3/16/22	BY: SK	DATE: 3-15-22

SAMPLE ID: JCW MW-1800S — WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 1105	DATE: 3/7/22	SAMPLE	TIME: 1220	DATE: 3/7/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.09 SU	CONDUCTIVITY: 1410 umhos/cm	
			ORP: -108.5 mV	DO: 1.29 mg/L	
DEPTH TO WATER: 9.40 T/ PVC			TURBIDITY: 140 NTU		
DEPTH TO BOTTOM: NM T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 6.1 °C	OTHER:	
VOLUME REMOVED: 5.5 ☒ LITERS ☐ GALLONS			COLOR: Clear	ODOR: none	
COLOR: Orange	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: DUP - JCW-LF-01		

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)
1105	100	7.09	1375	-75.7	10.0	700	6.0	9.40	INITIAL
1130		7.13	1353	-91.9	2.72	400	6.0	9.90	.5
1135		7.11	1349	-94.5	1.83	110.0	6.0	10.0	1
1140		7.11	1341	-98.0	1.60	51.0	5.9	10.10	1.5
1145		7.11	1336	-100.0	1.50	50.0	5.9	10.15	2
1150		7.12	1339	-106.5	1.49	38.25	5.8	10.15	2.5
1155		7.10	1342	-106.8	1.48	22.0	6.0	10.17	3
1200		7.10	1346	-107.0	1.48	20.0	6.1	10.18	3.5
1205		7.09	1364	-107.5	1.36	15.0	6.2	10.23	4
1210		7.09	1388	-108.0	1.30	14.90	6.1	10.23	4.5

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	HDPE	glass	A	☐ Y ☒ N					☐ Y ☐ N
2	250	PL	A	☐ Y ☒ N					☐ Y ☐ N
2	125	PL	A	☐ Y ☒ N					☐ Y ☐ N
2	125	PL	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	3-10-22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	3/11/22

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME:	CEC Weadock LF: 2022 GW Co	PREPARED			CHECKED		
PROJECT NUMBER:	464096.0000.0000	BY:	JJ	DATE: 3/11/22	BY: JK	DATE: 3-15-22	

SAMPLE ID: JCW-MW-16005

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	100	7.09	1401	-108.1	1.30	14.0	6.1	1035	5
1220		7.09	1410	-108.5	1.09	14.0	6.1	1031	5.5

SIGNATURE: 3/11/22

DATE SIGNED: _____

TRC WATER SAMPLE LOG

PROJECT NAME: CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER: 464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: JK	DATE: 3-15-22

SAMPLE ID: JCW-MW 1800C | 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: 3/7/22	SAMPLE	TIME: 1312	DATE: 3/7/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.09 SU	CONDUCTIVITY: 1385 umhos/cm	
			ORP: -151.5 mV	DO: 0.89 mg/L	
DEPTH TO WATER: 14.64 T/ PVC			TURBIDITY: 1.75 NTU		
DEPTH TO BOTTOM: NM T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 7.7 °C	OTHER:	
VOLUME REMOVED: 6 ☐ 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)
1240	200	7.20	1486	-91.5	10.0	27.0	6.0	14.64	INITIAL
1247		7.14	1381	-119.5	2.15	3.80	7.1	14.70	1
1252		7.08	1350	-131.5	1.39	2.20	7.4	14.78	2
1257		7.08	1351	-140.0	1.00	1.77	7.5	14.80	3
1302		7.09	1366	-150.5	1.00	1.72	7.6	14.80	4
1307		7.09	1380	-151.0	1.00	1.75	7.7	14.80	5
1312		7.09	1385	-151.5	0.89	1.71	7.7	14.80	6

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	G/HS	A	☐ Y ☑ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PL	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: lab Drop off	DATE SHIPPED: 3-10-22	AIRBILL NUMBER: —
COC NUMBER: —	SIGNATURE:	DATE SIGNED: 3/11/22

TRC WATER SAMPLE LOG

PROJECT NAME: CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER: 464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: JK	DATE: 3-15-22

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: 1341	DATE: 3/7/22	SAMPLE	TIME: 1406	DATE: 3/7/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.18 SU	CONDUCTIVITY: 1500 umhos/cm	
			ORP: -130.0 mV	DO: 1.28 mg/L	
DEPTH TO WATER: 5.46 T/ PVC			TURBIDITY: 6.80 NTU		
DEPTH TO BOTTOM: NM T/ PVC			☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 5.7 °C	OTHER:	
VOLUME REMOVED: 5 ☒ LITERS ☐ GALLONS			COLOR: clear	ODOR: none	
COLOR: Dark 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)
1341	200	7.50	1603	-110.1	10.0	2000	4.8	5.40	INITIAL
1346		7.21	1601	-96.1	2.64	24.10	6.1	5.42	1
1351		7.17	1556	-116.0	1.48	6.80	5.9	5.42	3
1356		7.18	1502	-130.0	1.30	6.85	5.7	5.41	3
1401		7.18	1500	-130.1	1.30	6.80	5.7	5.41	4
1406		7.18	1500	-130.0	1.28	6.80	5.7	5.41	5
~~1411~~								~~5.41~~	~~6~~
~~1416~~								~~5.41~~	~~7~~
									8

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	9/ASI	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: Lab Drop off	DATE SHIPPED: 3-10-22	AIRBILL NUMBER:
COC NUMBER:	SIGNATURE:	DATE SIGNED: 3/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER: 464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: SK	DATE: 3-15-22

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: 0640	DATE: 3/8/21	SAMPLE	TIME: 0725	DATE: 3/8/21

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

PH: 7.37 SU | CONDUCTIVITY: 1508 umhos/cm

ORP: -149.8 mV | DO: 1.19 mg/L

DEPTH TO WATER: 13.53 T/ PVC

DEPTH TO BOTTOM: NM T/ PVC

TURBIDITY: 50 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

TEMPERATURE: 7.5 °C | OTHER:

VOLUME REMOVED: 9 ☒ LITERS ☐ GALLONS

COLOR: clear | ODOR: NOK

COLOR: cloudy | ODOR: NOK

FILTRATE (0.45 um) ☐ YES ☑ NO

TURBIDITY ☐ NONE ☐ SLIGHT ☑ MODERATE ☐ VERY

FILTRATE COLOR: | FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☑ DUP-#2

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

COMMENTS: DUP-SCW-LF-02

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)
0640	RC	4.00	1552	18.5	9.8	43.0	5.2	13.53	INITIAL
0645		7.54	1551	-9.0	7.0	39.0	6.0	13.85	10
0650		7.45	1568	-51.6	2.15	28.0	7.0	13.85	2
0655		7.40	1536	-100.0	1.60	16.0	7.4	13.85	3.0
0700		7.35	1520	-125.0	1.40	11.0	7.5	13.85	4
0705		7.35	1515	-135.0	1.30	10	7.6	13.85	5.5
0710		7.37	1508	-135.0	1.29	7.0	7.7	13.85	6
0715		7.37	1506	-150.0	1.20	5	7.6	13.85	7
0720		7.37	1508	-149.5	1.19	5	7.5	13.85	8.
0725		7.37	1508	-149.8	1.19	5.0	7.5	13.85	9

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	125	9/AS	A	☐ Y ☑ N					☐ Y ☐ N
2	250	P1	A	☐ Y ☑ N					☐ Y ☐ N
2	125	P1	A	☐ Y ☑ N					☐ Y ☐ N
2	125	P1	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: lab Drop off	DATE SHIPPED: 3-10-22	AIRBILL NUMBER: —
COC NUMBER: —	SIGNATURE: [signature]	DATE SIGNED: 3/11/21

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: JK	DATE: 3-15-22

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: 0743	DATE: 3/8/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 14.78 T/ PVC

DEPTH TO BOTTOM: NM T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 5 ☒ LITERS ☐ GALLONS

COLOR: cloudy ODOR: non

TURBIDITY ☐ NONE ☐ SLIGHT ☒ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 0808	DATE: 3/8/22

PH: 7.40 SU | CONDUCTIVITY: 2100 umhos/cm

ORP: -119.5 mV | DO: 6.38 mg/L

TURBIDITY: 3.00 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 6.4 °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)
0743	200	7.84	1970	4.8	10.0	80.0	6.0	14.78	INITIAL
0748		7.53	1996	-30.0	2.90	18.8	6.5	14.85	1
0753		7.45	2070	-95.0	1.60	4.0	6.1	14.82	2
0758		7.40	2083	-118.8	1.40	3.25	6.4	14.81	3
0803		7.40	2093	-119.0	1.39	3.18	6.3	14.81	4
0808		7.40	2100	-119.5	1.38	3.00	6.4	14.85	5
~~0813~~									6
~~0818~~									7

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	9/Nea	A	☐ Y ☒ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	3-10-22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	3/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: JJ	DATE: 3-15-22

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: 0830	DATE: 3/8/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 15.30 T/ PVC

DEPTH TO BOTTOM: _____ T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 10 ☒ LITERS ☐ GALLONS

COLOR: Clear ODOR: None

TURBIDITY ☐ NONE ☐ SLIGHT ☒ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 0900	DATE: 3/8/22

PH: 7.09 SU | CONDUCTIVITY: 2034 umhos/cm

ORP: -140.0 mV | DO: 0.90 mg/L

TURBIDITY: 5.0 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 7.4 °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)
0830	200	7.91	946	-19.5	11.0	34.0	6.9	15.30	INITIAL
0835		7.17	1981	-80.0	1.43	12.0	7.2	15.45	1
0840		7.14	2002	-108.0	1.13	10.0	7.4	15.45	2
0845		7.10	2015	-130.0	1.00	6.80	7.3	15.45	3
0850		7.10	2023	-138.1	0.97	5.0	7.3	15.45	4
0855		7.09	2028	-140.0	0.91	5.0	7.4	15.45	5
0900		7.09	2034	-140.0	0.90	5.0	7.4	15.45	6
									7

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	PP	A	☐ Y ☒ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	1L	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	1L	PL	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	3-10-22	AIRBILL NUMBER:	—
COC NUMBER:	—	SIGNATURE:		DATE SIGNED:	3/11/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED			CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 3/11/22		BY: JK	DATE: 3-15-22

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: 0915	DATE: 3/8/22	SAMPLE	TIME: 0935	DATE: 3/8/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.44 SU	CONDUCTIVITY: 1360 umhos/cm	
			ORP: -129.0 mV	DO: 1.28 mg/L	
DEPTH TO WATER: 14.11 T/ PVC			TURBIDITY: 191 NTU		
DEPTH TO BOTTOM: NM T/ PVC			☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 6.8 °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)
0915	200	7.85	1689	-126.1	9.6	120	6.7	14.10	INITIAL
0925		7.50	1344	-95.0	1.57	3.0	6.7	14.16	1
0925		7.45	1352	-128.5	1.30	200	6.7	1416	2
0930		7.44	1391	-126.8	1.29	200	6.8	1416	3
0935		7.44	1360	-129.0	1.26	191	6.8	1416	4
									~~5~~
									~~6~~

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	9/AG	B	☐ Y ~~☒~~ N					☐ Y ☐ N
1	250	P1	A	☐ Y ~~☒~~ N					☐ Y ☐ N
1	125	P1	A	☐ Y ~~☒~~ N					☐ Y ☐ N
1	125	P1	B	☐ Y ~~☒~~ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Lab Drop off	DATE SHIPPED:	3-10-22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	3/11/22

WATER SAMPLE LOG

PROJECT NAME: CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER: 464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: DK	DATE: 3-15-22

SAMPLE ID: OW-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: 0950	DATE: 3/10/22	SAMPLE	TIME: 1030	DATE: 3/10/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.50 SU	CONDUCTIVITY: 1368	umhos/cm
			ORP: -127.5 mV	DO: 1.27	mg/L
DEPTH TO WATER: 8.31 T/ PVC			TURBIDITY: 10.0 NTU		
DEPTH TO BOTTOM: NM T/ PVC			☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 4.4 °C	OTHER:	
VOLUME REMOVED: 4 ☒ LITERS ☐ GALLONS			COLOR: CLOUDY	ODOR: none	
COLOR: TANISH	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)
0950	100	7.95	6666	-32.7	12.0	600	4.2	8.31	INITIAL
0955		7.54	1346	-85.7	1.64	1350	4.6	8.60	.5
1000		7.55	1345	-102.5	1.47	57.0	4.8	8.61	1
1005		7.50	1345	-115.0	1.30	23.0	4.6	8.61	1.5
1010		7.50	1349	-125.0	1.29	17.0	4.5	8.61	2
1015		7.50	1353	-125.0	1.20	15.0	4.4	8.61	2.5
1020		7.50	1357	-127.5	1.28	10.0	4.4	8.61	3
1025		7.50	1364	-127.0	1.27	10.0	4.4	8.61	3.5
1030		7.50	1368	-127.5	1.27	10.0	4.4	8.61	4

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: lab Drop off	DATE SHIPPED: 3-10-22	AIRBILL NUMBER:
COC NUMBER:	SIGNATURE:	DATE SIGNED: 3/11/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: SK	DATE: 3-15-22

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: 1229	DATE: 3/8/22	SAMPLE	TIME: 1309	DATE: 3/8/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.09 SU	CONDUCTIVITY: 1430	umhos/cm
			ORP: -129.1 mV	DO: 1.09	mg/L
DEPTH TO WATER:	14.70 T/ PVC		TURBIDITY: 4.71 NTU		
DEPTH TO BOTTOM:	NM T/ PVC		☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS		TEMPERATURE: 23 °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)
1229	200	7.76	6694	-48.6	10.0	2400	6e3	14.8	INITIAL
1234		7.19	1458	-60.1	1.87	500	7.1	1483	1
1239		7.16	1454	-75.0	1.98	70.0	7.1	1483	2
1244		7.11	1439	-105.0	1.67	18.10	7.2	1483	3
1249		7.10	1437	-115.0	1.58	33.0	7.2	1483	4
1254		7.09	1432	-128.0	1.30	15.0	7.2	1483	5
1259		709	1431	-128.8	1.30	5.0	7.2	1483	6
1304		709	1431	-129.0	1.29	5.0	7.2	1483	7
1309		709	1430	-129.5	1.29	4.75	7.3	1485	8
~~1314~~									~~9~~

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	9/HDS	A	☐ Y ☒ N					☐ Y ☐ N
1	250	pl	A	☐ Y ☒ N					☐ Y ☐ N
1	125	pl	A	☐ Y ☒ N					☐ Y ☐ N
1	125	Pl	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	3-10-22	AIRBILL NUMBER:	—
COC NUMBER:	—	SIGNATURE:		DATE SIGNED:	3/11/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 3/21/22	BY: JK	DATE: 3-15-22

SAMPLE ID: MW-542 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0621	DATE: 3/9/22	SAMPLE	TIME: 0701	DATE: 3/9/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.91 SU	CONDUCTIVITY: 1317 umhos/cm	
			ORP: -60.1 mV	DO: 1.90 mg/L	
DEPTH TO WATER:	14.21 T/ PVC		TURBIDITY: 1.80 NTU		
DEPTH TO BOTTOM:	NM T/ PVC		☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS		TEMPERATURE: 5.1 °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)
0621	200	6.90	1367	54.1	9.0	400	6.8	14.21	INITIAL
0627		7.01	1311	4.4	7.38	76.0	5.7	1445	1
0633		7.05	1308	10.4	6.71	220	5.3	1441	2
0640		6.95	1311	3.3	4.0	6.80	5.3	1445	3
0645		6.90	1315	-18.0	2.90	3.60	5.1	1446	4
0652		6.90	1314	-45.8	2.00	2.90	5.0	1441	5
0658		6.90	1315	-59.8	1.91	2.01	5.1	1445	6
0704		6.91	1316	-60.0	1.90	1.81	5.1	1445	7
0701		6.91	1317	-60.1	1.90	1.80	5.1	1445	8

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	glass	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P	A	☐ Y ☒ N					☐ Y ☐ N
1	1L	P	A	☐ Y ☒ N					☐ Y ☐ N
1	1L	P	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	3-10-22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	3/11/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: JK	DATE: 3-15-22

SAMPLE ID: OW-54 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0714	DATE: 3/9/22	SAMPLE	TIME: 0749	DATE: 3/9/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.15 SU	CONDUCTIVITY: 1393	umhos/cm
			ORP: -124.7 mV	DO: 1.17	mg/L
DEPTH TO WATER:	24.8 T/ PVC		TURBIDITY: 10.0 NTU		
DEPTH TO BOTTOM:	NM T/ PVC		☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS		TEMPERATURE: 5.9 °C	OTHER:	
VOLUME REMOVED:	3.1 ☒ 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)
0714	100	7.53	1336	22.2	12.0	50.0	4.1	24.8	INITIAL
0719		7.24	1357	-49.5	2.49	32.0	5.2	7.51	.5
0724		7.20	1364	-90.0	1.55	18.00	5.4	7.11	1
0729		7.18	1372	-120.0	1.30	21.0	5.6	7.15	1.5
0734		7.15	1380	-120.5	1.20	11.0	5.8	7.15	2
0739		7.14	1385	-124.0	1.18	10.0	6.0	7.15	2.5
0744		7.15	1389	-124.5	1.18	10.0	6.0	7.51	3
0749		7.15	1393	-124.9	1.17	10.0	5.9	7.15	3.5

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	9/HNO3	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	3-10-22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	3/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER: 464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: JK	DATE: 3-15-22

SAMPLE ID: GW-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: 0806	DATE: 3/9/22	SAMPLE	TIME: 0831	DATE: 3/9/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 9.43 T/ PVC

DEPTH TO BOTTOM: NM T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 2.5 ☒ LITERS ☐ GALLONS

COLOR: cloudy ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☑ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 7.23 SU — CONDUCTIVITY: 1297 umhos/cm

ORP: -30.5 mV — DO: 4.95 mg/L

TURBIDITY: 4.15 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 48 °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)
0806	100	7.60	1295	-9.1	11.0	95.0	3.8	9.43	INITIAL
0811		7.26	1295	-23.0	5.82	35.0	4.9	1021	.5
0816		7.24	1299	-30.0	5.0	6.90	4.8	10.95	1
0821		7.24	1295	-30.5	5.0	4.50	4.8	1153	1.5
0826		7.23	1296	-30.8	4.97	4.35	4.8	1205	2
0831		7.23	1297	-30.5	4.95	4.15	4.8	1316	2.5
									~~3~~
									~~3.5~~

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	gl/AS	A	☐ Y ☑ N					☐ Y ☐ N
1	250	PI	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PI	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PI	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: lab Drop off	DATE SHIPPED: 3-10-22	AIRBILL NUMBER: —
COC NUMBER: —	SIGNATURE: [signature]	DATE SIGNED: 3/11/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: JK	DATE: 3-10-22

SAMPLE ID: GB-01 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☒ DL ☐ LEACHATE ☐ OTHER

PURGING	TIME:	DATE:

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: NA T/ PVC

DEPTH TO BOTTOM: NA T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: ____ ☐ LITERS ☐ GALLONS

COLOR: ____ ODOR: ____

TURBIDITY

☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 0840	DATE: 3/9/22

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:

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

NA

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: lab Drop off	DATE SHIPPED: 3-10-22	AIRBILL NUMBER: ____
COC NUMBER: ____	SIGNATURE:	DATE SIGNED: 3/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: JK	DATE: 3-15-22

SAMPLE ID: FB #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:

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: NA T/ PVC

DEPTH TO BOTTOM: T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: ☐ LITERS ☐ GALLONS

COLOR: ODOR:

TURBIDITY
☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 0845	DATE: 3/9/22

PH: NM SU | CONDUCTIVITY: NM umhos/cm

ORP: NM mV | DO: NM mg/L

TURBIDITY: NM NTU

~~☐ NONE~~ ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: NM °C | OTHER:

COLOR: Clear | ODOR: none

FILTRATE (0.45 um) ☐ YES ☑ NO

FILTRATE COLOR: | FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

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

NA

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	1Lt	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	1Lt	PL	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	3-10-22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	3/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 3/11/22	BY: JK	DATE: 3-15-22

SAMPLE ID: LH 103 R — WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

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

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

PURGING	TIME: 0613	DATE: 3/10/22	SAMPLE	TIME: 0703	DATE: 3/10/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 6.91 SU	CONDUCTIVITY: 2496 umhos/cm	
			ORP: 101.6 mV	DO: 1.16 mg/L	
DEPTH TO WATER: 24.65 T/ PVC			TURBIDITY: 7.70 NTU		
DEPTH TO BOTTOM: 37.80 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 6.9 °C	OTHER:	
VOLUME REMOVED: 9 ☒ 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- LH-103R	
DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER			COMMENTS: LL Hg collected DUP/MS/MSD		

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)
0613	200	6.92	5060	14.3	6.0	33.0	7.0	24.65	INITIAL
0618		6.94	2853	-97.3	1.80	22.0	6.9	25.05	1
0623		6.97	2721	-113.6	1.38	19.0	6.9	25.05	2
0628		6.97	2659	-119.6	1.30	22.0	6.8	25.10	3
0633		6.97	2633	-122.7	1.32	23.80	6.8	25.10	4
0638		6.96	2559	-119.8	1.53	31.0	6.9	25.10	5
0643		6.96	2559	-119.8	1.26	13	6.4	25.10	6
0648		6.92	2917	-120.0	1.18	11.0	6.4	25.10	7
0653		6.92	2908	-120.8	1.18	9.75	6.3	25.10	8
0658		6.91	2914	-121.0	1.17	7.99	6.1	25.10	9

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

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

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

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	60mL	VOA	A	☐ Y ☒ N	6	250mL	glass	A	☐ Y ☒ N
1	250mL	Plastic	A	☐ Y ☒ N		↑			☐ Y ☐ N
1	125mL	↓	A	☐ Y ☒ N	LL Hg; DUP, MS/MSD, FB, EB				☐ Y ☐ N
1	↓	↓	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	3-10-22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	3/11/22

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

PROJECT NAME:	CEC Weadock LF: 2022 GW Cc	PREPARED			CHECKED		
PROJECT NUMBER:	464096.0000.0000	BY:	JJ	DATE: 3/11/22	BY: JK	DATE: 3-15-22	

SAMPLE ID: LH-103K

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)
0703	200	6.45	2498	-121.6	1.16	7.72	6.3	DRY	1C

SIGNATURE: 3/11/22

DATE SIGNED: _____

Pg 35 of 38

CHAIN OF CUSTODY

Consumers Energy
Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

Page _____ of _____

SAMPLING SITE / CUSTOMER: Q1-2022 Weadock Porewater Wells

PROJECT NUMBER: 22-0150

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

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

SEND REPORT TO: Caleb Batts

email:

phone:

COPY TO: Harold Register

TRC

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

ANALYSIS REQUESTED (Attach List if More Space is Needed)

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

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity						REMARKS
22-0150-01	3/7/21	0654	GW	JCW-MW-18001	5	4	1						x	x	x	x						
-02	3/7/22	0757	GW	JCW-MW-18004	5	4	1						x	x	x	x						
-03	3/7/22	1220	GW	JCW-MW-18005	5	4	1						x	x	x	x						
-04	3/7/22	1312	GW	JCW-MW-18006	5	4	1						x	x	x	x						
-05	3/8/22	0735	GW	MW-50	5	4	1						x	x	x	x						
-06	3/8/22	0808	GW	MW-51	5	4	1						x	x	x	x						
-07	3/8/22	0900	GW	MW-52	5	4	1						x	x	x	x						
-08	3/8/22	0935	GW	MW-53	5	4	1						x	x	x	x						
-09	3/8/22	1309	GW	MW-53R	5	4	1						x	x	x	x						
-10			GW	MW-54R	5	4	1						x	x	x	x						
-11	3/7/21	0943	GW	MW-55	5	4	1						x	x	x	x						
-12			GW	OW-57R OUT	5	4	1						x	x	x	x						

RELINQUISHED BY: [signature] DATE/TIME: 3/8/22 1400 RECEIVED BY: Fed Ex

RELINQUISHED BY: Fed Ex DATE/TIME: 03-09-2022 11:30 RECEIVED BY: [signature]

COMMENTS:

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

Temperature: 1.6-3.8 °C Cal. Due Date: 6-3-22

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

Page _____ of _____

SAMPLING SITE / CUSTOMER: Q1-2022 Weadock Porewater Wells

PROJECT NUMBER: **22-0150**

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

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

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

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

ANALYSIS REQUESTED (Attach List if More Space is Needed)

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

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	PRESERVATIVE HNO_3	PRESERVATIVE H_2SO_4	PRESERVATIVE NaOH	PRESERVATIVE HCl	PRESERVATIVE MeOH	PRESERVATIVE Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0150-13	3/7/22	1406	GW	MW-58	5	4	1						x	x	x	x	
-14	3/7/22	—	GW	DUP-JCW-LF-01	5	4	1						x	x	x	x	
-15	3/8/22	—	GW	DUP-JCW-LF-02	5	4	1						x	x	x	x	
-16	3/7/22	0654	GW	JCW-MW-18001 MS	4	3	1						x	x		x	
-17	3/7/22	0654	GW	JCW-MW-18001 MSD	4	3	1						x	x		x	
-18			W	FB-01	2	1	1						x	x			
-19			W	EB-01	2	1	1						x	x			

RELINQUISHED BY: 3/8/22 1400 — DATE/TIME: — RECEIVED BY: Fed Ex

RELINQUISHED BY: Fed Ex — DATE/TIME: 03-09-22 11:30 — RECEIVED BY:

COMMENTS:

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

Temperature: 1.6-3.8 °C — Cal. Due Date: 6-3-22

Pg 37 of 38

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

Page _____ of _____

SAMPLING SITE / CUSTOMER: Q1-2022 Weadock Porewater Wells	PROJECT NUMBER: 22-0150	SAP CC or WO#:	ANALYSIS REQUESTED (Attach List if More Space is Needed)
SAMPLING TEAM:		REQUESTER: Harold Register	
	TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____		
SEND REPORT TO: Caleb Batts	email:	phone:	
COPY TO: Harold Register / TRC	MATRIX CODES: GW = Groundwater, WW = Wastewater, W = Water / Aqueous Liquid, S = Soil / General Solid, O = Oil, OX = Other _____, SL = Sludge, A = Air, WP = Wipe, WT = General Waste		

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

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity					REMARKS
22-0150-13			GW	MW-58	5	4	1						x	x	x	x					
-14			GW	DUP-JCW-LF-01	5	4	1						x	x	x	x					
-15			GW	DUP-JCW-LF-01	5	4	1						x	x	x	x					
-16			GW	JCW-MW-18001 MS	4	3	1						x	x		x					
-17			GW	JCW-MW-18001 MSD	4	3	1						x	x		x					
-18	3/9/22	0945	W	FB-01	2	1	1						x	x							
-19	3/9/22	0950	W	EB-01	2	1	1						x	x							

RELINQUISHED BY:	DATE/TIME: 3/9/22 1430	RECEIVED BY: Fed Ex
RELINQUISHED BY: Fed Ex	DATE/TIME: 03-10-22 11:30	RECEIVED BY:

COMMENTS:

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

Temperature: 2.4-5.1 °C Cal. Due Date: 6-3-22

pg 38 of 78

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

Page _____ of _____

SAMPLING SITE / CUSTOMER: Q1-2022 Weadock Porewater Wells

PROJECT NUMBER: 22-0150

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

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

SEND REPORT TO: Caleb Batts

email:

phone:

COPY TO: Harold Register; TRC

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

ANALYSIS REQUESTED (Attach List if More Space is Needed)

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

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0150-01			GW	JCW-MW-18001	5	4	1						x	x	x	x	
-02			GW	JCW-MW-18004	5	4	1						x	x	x	x	
-03			GW	JCW-MW-18005	5	4	1						x	x	x	x	
-04			GW	JCW-MW-18006	5	4	1						x	x	x	x	
-05			GW	MW-50	5	4	1						x	x	x	x	
-06			GW	MW-51	5	4	1						x	x	x	x	
-07			GW	MW-52	5	4	1						x	x	x	x	
-08			GW	MW-53	5	4	1						x	x	x	x	
-09			GW	MW-53R	5	4	1						x	x	x	x	
-10	3/9/22	0805	GW	MW-54R	5	4	1						x	x	x	x	
-11			GW	MW-55	5	4	1						x	x	x	x	
-12	3/9/22	0831	GW	OW-57R OUT	5	4	1						x	x	x	x	

RELINQUISHED BY: DATE/TIME: 3/9/22 1432 RECEIVED BY: Fed Ex

RELINQUISHED BY: Fed Ex DATE/TIME: 03-10-2022 11:30 RECEIVED BY:

COMMENTS:

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

Temperature: 1.6 - 3.8 °C Cal. Due Date: 6-3-22

TRC

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance
PROJECT NUMBER:	464096.0000. Phase 3
PROJECT MANAGER:	Darby Litz
SITE LOCATION:	2742 Weadock Hwy Essexville, MI
DATES OF FIELDWORK:	3/7/2022 TO 3/11/2022
PURPOSE OF FIELDWORK:	Install Replacement Leachate Headwell and Well Decommission
WORK PERFORMED BY:	Jake Krenz

3-15-2022
SIGNED DATE

3-23-22
CHECKED BY DATE

TRC

GENERAL NOTES

PROJECT NAME: CEC Weadock LF: 2022 GW C	DATE: 3-7-2022	TIME ARRIVED: 0930
PROJECT NUMBER: 464096.0000. Phase 3	AUTHOR: Jake Krenz	TIME LEFT: 1730

WEATHER

TEMPERATURE: 31°F °F WIND: 5-10 MPH VISIBILITY: Snowy/low

WORK / SAMPLING PERFORMED

installed LIT-103R, see JOB Book pages for Details

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
NA	NA

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
Jason O'Dell	CEC	Sign in/out / safety orientation
Jon Gaeth	CEC	"
D. Litz	TRC	Site updates

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
Soil cuttings	NM	left by well and spread out

3-15-22
SIGNED DATE

AW 8-23-22
CHECKED BY DATE

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME: CEC Weadock LF: 2022 GW C	DATE: 3-8-2022	TIME ARRIVED: 0730
PROJECT NUMBER: 464096.0000. Phase 3	AUTHOR: Jake Krenz	TIME LEFT: 1815

WEATHER

TEMPERATURE: 23 °F WIND: 10-15 MPH VISIBILITY: clear

WORK / SAMPLING PERFORMED

Decommissioned monitoring wells OW-63 and LH-103

Developed LH-103R

See Job book for Details

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
NA	NA

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
J. O'Dell	CEC	Sign in/out
D. Litz	TRC	site updates
J.R. Register	CEC	site updates / Drilling and sampling plan
Lori Babcock	EGLE	Drilling / sampling plan

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
well Material	NM	Disposed of in dumpster on site
~~Soil cuttings~~		
purge water	NM	purged to ground

3-15-22
SIGNED DATE

AW 3-22-22
CHECKED BY DATE

REVISED 04/2019

TRC

GENERAL NOTES

PROJECT NAME: CEC Weadock LF: 2022 GW C	DATE: 3-10-22	TIME ARRIVED: 0600
PROJECT NUMBER: 464096.0000. Phase 3	AUTHOR: Jake Krenz	TIME LEFT: 1715

WEATHER

TEMPERATURE: 26 °F WIND: 10-15 MPH VISIBILITY: clear

WORK / SAMPLING PERFORMED

collected Sample from LH-103R

finished concrete work and labeled LH-103R

See Job Book for details

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN
NA	NA

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS
T. O'Dell	CEC	Sign in/out
D. Litz	TRC	Site updates

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS
purge water	NM	purged to ground

3-15-22
SIGNED DATE

3-23-22
CHECKED BY DATE

TRC

EQUIPMENT SUMMARY

PROJECT NAME:	CEC Weadock LF: 2022 GW	SAMPLER NAME:	Jake Krenz
PROJECT NO.:	464096.0000. Phase 3		

WATER LEVEL MEASUREMENTS COLLECTED WITH:

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

PRODUCT LEVEL MEASUREMENTS COLLECTED WITH:

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

DEPTH TO BOTTOM OF WELL MEASUREMENTS COLLECTED WITH:

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

PURGING METHOD

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

SAMPLING METHOD

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

PURGE WATER DISPOSAL METHOD

☑ GROUND ☐ DRUM ☐ POTW ☐ POLYTANK ☐ OTHER _____

DECONTAMINATION AND FIELD BLANK WATER SOURCE

POTABLE WATER SOURCE	DI WATER SOURCE
STORE BOUGHT	LABORATORY PROVIDED

SIGNED	DATE	CHECKED BY	DATE
[signature]	3-15-22	AW	3-23-22

REVISED 04/2019

TRC

LOG OF SOIL BORING

PROJECT NAME: ~~GEC Karn BAP/LI: 2022 GW Compliance~~		SOIL BORING ID: LH-103R	
PROJECT NUMBER: ~~464095.0001 Phase 3~~		LOCATION: See figure	SHEET 1 OF 3
LOGGED BY: Jake Krenz			SURFACE ELEV.: NA
PROJECT LOCATION: 2742 Weadock Hwy		N: ——— E: ———	DATE STARTED: 3-7-22
DRILLED BY: Stearns	DRILLER NAME: Jim Gryska		DATE COMPLETED: 3-7-22

NO.	TYPE	%	BLOWS	PID	DEPTH	VISUAL CLASSIFICATION AND OBSERVATIONS	COMMENT
			3			Sandy clay no clay, some fn sand, brown (10YR 5/3) Dry, non plast, stiff (frozen). Tr gravel	
1	SS	100	6	NA	1		
			8				
			10		2		
2	SS	100		NA	3		
					4		
3	SS	100		NA	5		
						Ash, fn-med sand sized, black, Dry, loose	
					6		
4	SS	60		NA	7		
					8		
5	SS	100		NA	9		
					10		

DRILLING METHOD	HSA
DRILL RIG	CME 850 XR
BORING DIAMETER	6"

WATER LEVEL OBSERVATIONS

FIRST OCCURRENCE: 25.5'

DATE	TIME	DEPTH TO WATER	DEPTH TOBOTTOM

SIGNED [signature] DATE 3-15-22

CHECKED AW DATE 3-23-22

REVISED 04/2019

TRC

LOG OF SOIL BORING

SHEET 2 OF 3

PROJECT NAME: ~~CEC Karn-BAP/LI: 2022 GW Compliance~~ SOIL BORING ID: LH-103R

NO.	TYPE	%	BLOWS	PID	DEPTH	VISUAL CLASSIFICATION AND OBSERVATIONS	COMMENT
6	SS	80	NA	NA	11	A to very Dark gray @ 11.0' BGS.	
					12		
7	SS	20	NA	NA	13		
					14		
8	SS	40	NA	NA	15		
					16		
9	SS	80	NA	NA	17		
					18		
10	SS	80 40	NA	NA	19		
					20		
11	SS	60	NA	NA	21		
					22		

SIGNED 3-15-22 DATE

CHECKED AW 3/23/22 DATE

REVISED 04/2019

TRC

LOG OF SOIL BORING

SHEET 3 OF 3

PROJECT NAME: ~~CEC Karn BAP/LI: 2022 GW Compliance~~ SOIL BORING ID: LH-103R

NO.	TYPE	%	BLOWS	PID	DEPTH	VISUAL CLASSIFICATION AND OBSERVATIONS	COMMENT
						A to moist @ 22' BGS	
12	SS	80	NA	NA	23		
					24	Clay, no clay, few-little fn-med sand, low ~~med~~ plast, brown (10YR5/3), med stiff, dry	
13	SS	100	NA	NA	25		
						Ash, no ash, very dark gray, fn organic matter, ~~[illegible]~~ wet.	
					26		
14	SS	100	NA	NA	27	~~A to moist - wet @ 27'~~	
					28	~~A to wet @ 28'~~	
15	SS	100	NA	NA	29		
					30	EOB @ 30' BGS	

SIGNED [signature] DATE 3-15-22

CHECKED AW DATE 3-23-22

REVISED 04/2019

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: ~~GEC Karn BAP/LI: 2022 GW Compliance~~		WELL ID:	LI-103R
PROJ. NO: ~~464095.0001.F~~	DATE INSTALLED: 3-7-22 INSTALLED BY: Jake Krenz	CHECKED BY:	ACW 3.23.22

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)
NA	+3 TOP OF CASING
NA	0.0 GROUND SURFACE
	1 CEMENT SURFACE PLUG
	GROUT/BACKFILL MATERIAL: Bentonite Slurry
25' ~~28~~	GROUT/BACKFILL METHOD: Tremmie
	21 GROUT
	BENTONITE SEAL MATERIAL: Hole plug
	23 BENTONITE SEAL
NA	25 TOP OF SCREEN
5'	FILTER PACK MATERIAL: washed med sand
NA	30 BOTTOM OF SCREEN
	30 BOTTOM OF FILTER PACK
	NA BENTONITE PLUG
	BACKFILL MATERIAL: NA
NA	30 HOLE BOTTOM

RISER PIPE LENGTH

SCREEN LENGTH

CASING AND SCREEN DETAILS

TYPE OF RISER:	schedule 40 PVC
PIPE SCHEDULE:	40
PIPE JOINTS:	threaded O-ring
SOLVENT USED?	None
SCREEN TYPE:	PVC
SCR. SLOT SIZE:	10 slot
BOREHOLE DIAMETER:	6 IN. FROM 0 TO 30 FT.
	NA IN. FROM NA TO NA FT.
SURF. CASING DIAMETER:	↓ IN. FROM ↓ TO ↓ FT.
	↓ IN. FROM ↓ TO ↓ FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD:	Surge / Purge
TIME DEVELOPING:	1 HOURS
WATER REMOVED:	40 GALLONS
WATER ADDED:	0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE:	very Turbid
COLOR BEFORE:	Black
CLARITY AFTER:	clear
COLOR AFTER:	clear
ODOR (IF PRESENT):	none

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	33.75	T/PVC	3-7-22	1628
DTB AFTER DEVELOPING:	~~233.80~~	T/PVC	3-10-22	0607
SWE BEFORE DEVELOPING:	24.78	T/PVC	3-7-22	1628
SWE AFTER DEVELOPING:	24.85	T/PVC	3-10-22	0610
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☒ YES ☐ NO

PROTECTIVE COVER ~~AND LOCK~~ INSTALLED? ☒ YES ☐ NO

LOCK KEY NUMBER: _____

NOTES:

CEC to provide lock for well

TRC

MONITORING WELL DECOMMISSIONING LOG

PROJECT NAME: ~~CEC Karn BAP/LI: 2022 GW Compliance~~		**MONITORING WELL ID:** LH - 103	
PROJECT NUMBER: ~~464095.0001 Pha~~	DATE: 3-8-22	LOCATION: See figure	LOCATION COORDINATES: N: E:
OBSERVED BY: Jake Krenz			
DRILLING CONTRACTOR: Stearns			
CREW CHIEF: Jim Grzyska		TOP OF CASING ELEV.: NA	SURFACE ELEV.: NA

PROTECTIVE COVER TYPE:	☒ STICK-UP	☐ FLUSH MOUNT ☐ TRAF. BOX ☐ OTHER	
PROTECTIVE COVER DIAMETER:	☐ 4" ☐ 8" ☐ 9" ☐ 10" ☐ 12" ☒ OTHER NA		
WELL MATERIAL:	☒ PVC	☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER	
WELL CASING DIAMETER:	☐ 1" ☒ 2" ☐ 4" ☐ 6" ☐ 8" ☐ OTHER		
WELL SCREEN MATERIAL:	☒ PVC	☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER	
WELL SCREEN LENGTH:	☒ 5-FT	☐ 10-FT ☐ UNKNOWN ☐ OTHER	DTW: 10.15 T/ PVC
WELL SCREEN SLOT SIZE:	☒ 0.01"	☐ 0.02" ☐ UNKNOWN ☐ OTHER	DTB: 12.60 T/ PVC

DECOMMISSIONING PROCEDURE:

NOTES:
Pulled well casing and filled remaining hole with Bentonite chips.

GROUTING PROCEDURE: Fill from above	NOTES: 3.6' stick u/i
GROUT TYPE: Bentonite chips	
GROUT MIX:	
GROUT INTERVAL: 9.6 FT-BGS TO 0 FT-BGS	
BENTONITE SEAL:	
SEAL INTERVAL: NA FT-BGS TO NA FT-BGS	

ADDITIONAL COMMENTS:

SIGNED	DATE	CHECKED	DATE
3-15-22		AW	3-28-22

TRC

MONITORING WELL DECOMMISSIONING LOG

PROJECT NAME: ~~CEC Karn BAP/LI: 2022 GW Compliance~~		MONITORING WELL ID: OW-63	
PROJECT NUMBER: ~~464095.0001.Ph2~~	DATE: 3-8-22	LOCATION: see figure	LOCATION COORDINATES: N: E:
OBSERVED BY: Jake Krenz			
DRILLING CONTRACTOR: Stearns Drilling			
CREW CHIEF: Jim Gayska		TOP OF CASING ELEV.: NA	SURFACE ELEV.: ~~NA~~

PROTECTIVE COVER TYPE:	☒ STICK-UP ☐ FLUSH MOUNT ☐ TRAF. BOX ☐ OTHER		
PROTECTIVE COVER DIAMETER:	☐ 4" ☐ 8" ☐ 9" ☐ 10" ☐ 12" ☒ OTHER N/A		
WELL MATERIAL:	☒ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER		
WELL CASING DIAMETER:	☐ 1" ☒ 2" ☐ 4" ☐ 6" ☐ 8" ☐ OTHER		
WELL SCREEN MATERIAL:	☒ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER		
WELL SCREEN LENGTH:	☒ 5-FT ☐ 10-FT ☐ UNKNOWN ☐ OTHER	DTW: 12.15	T/ PVC
WELL SCREEN SLOT SIZE:	☒ 0.01" ☐ 0.02" ☐ UNKNOWN ☐ OTHER	DTB: 20.93	T/ PVC

DECOMMISSIONING PROCEDURE:

NOTES:

Pulled casing and filled remaining hole with Bentonite chips

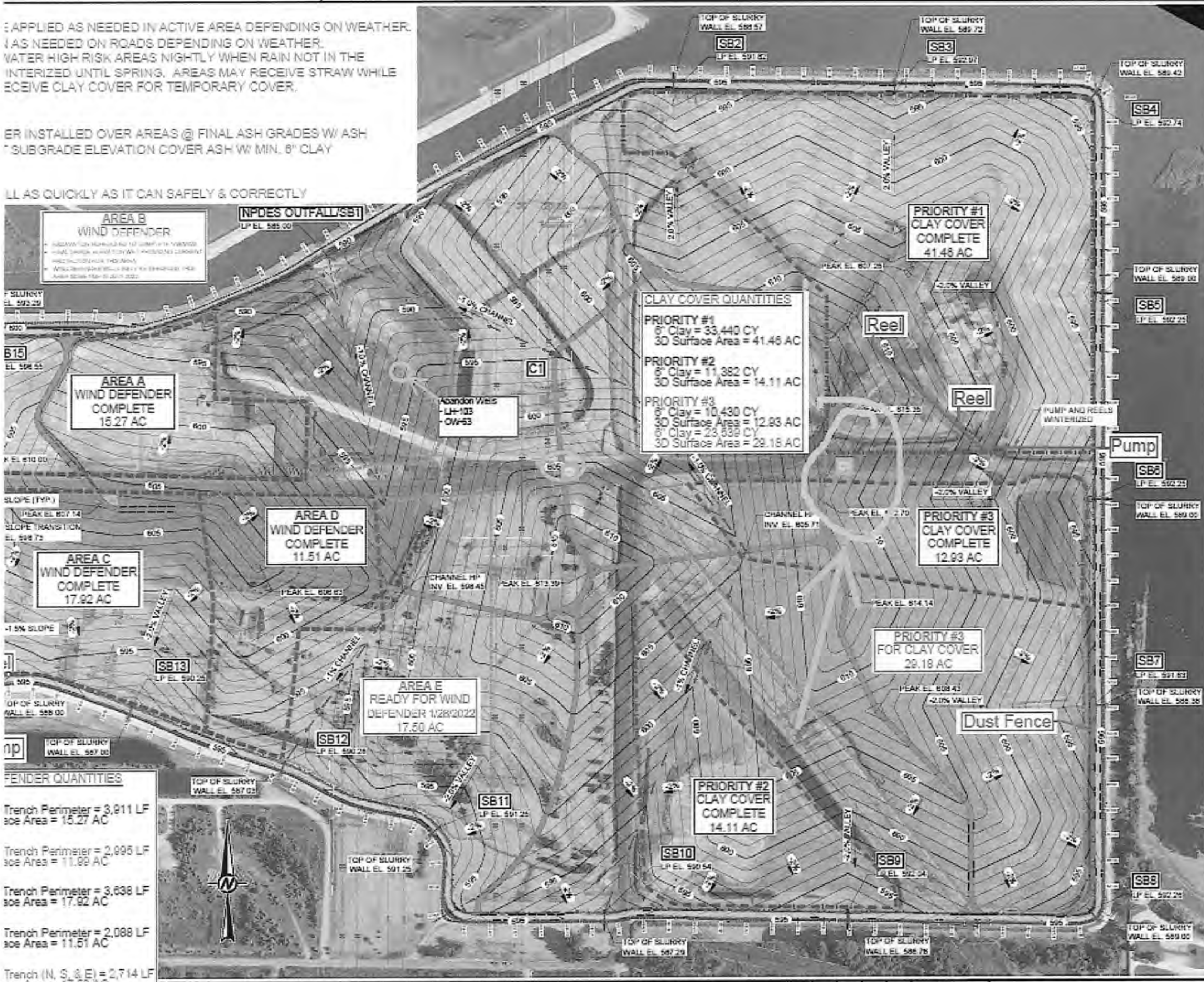
GROUTING PROCEDURE: Fill from above		NOTES: 7.2' of stick-up
GROUT TYPE: Bentonite chips		
GROUT MIX:		
GROUT INTERVAL: 13.73 FT-BGS	TO 0 FT-BGS	
BENTONITE SEAL:		
SEAL INTERVAL: NA FT-BGS	TO NA FT-BGS	

ADDITIONAL COMMENTS:

SIGNED 3-15-22 DATE

CHECKED 3/28/22 DATE

REVISED 04/2019



LEGEND

- EXISTING SLURRY WALL (INCLUDING FUTURE
- EXISTING ELECTRIC (OVERHEAD)
- EXISTING TRANSMISSION TOWER
- EXISTING TRANSMISSION POLE
- EXISTING GROUND ELEVATION CONTOUR (5'
- EXISTING GROUND ELEVATION CONTOUR (1'
- EXISTING ACCESS ROAD
- PROPOSED CLOSURE AREA BOUNDARY
- PROPOSED TOP OF FINAL COVER CONTOUR (5
- PROPOSED TOP OF FINAL COVER CONTOUR (1
- PROPOSED GRADE SLOPE AND SURFACE WA
- PROPOSED INTERIOR ACCESS ROAD
- PROPOSED PERIMETER ACCESS ROAD
- PROPOSED STILLING BASIN AND CULVERT
- PROPOSED INTERIOR CULVERT
- PROPOSED CHANNEL / DITCH CENTERLINE AN (-1% FLOW LINE SLOPE TYPICAL, UNLESS OTH

WIND DEFENDER MATERIAL · WIND DEFENI (SEE PLAN) · 2ft x 2ft ANCH WITH CLEAN STRUCTURAL · PREPARED FINISHED GRADE · EXISTING CCR OR STRUCTURAL FILL

WIND DEFENDER
ANCHOR TRENCH D
SCALE: 1" = 4'

NOTE

1. CONTRACTOR SHALL MAINTAIN OVERHEAD CLEARANCE RE WORKING UNDER POWER LINES. POWERLINE CLEARANCE AND 15 FEET FOR 138kV LINES.

REFERENCES

1. HORIZONTAL DATUM BASED ON MICHIGAN STATE PLANE CO NORTH AMERICAN DATUM 1983 (NAD83), SOUTH ZONE, INTE
2. VERTICAL DATUM AND ELEVATIONS SHOWN BASED ON NOR VERTICAL DATUM (NAVD) 1988, FEET.
3. AERIAL IMAGERY PROVIDED BY ROWE AIR-LAND SURVEYS STREET, SUITE 200, FLINT, MI 48502. PHOTO DATE AUGUST

0 200 400
1" = 200' FEET

2022-01-24
DRAFT

12 of 12 13

D	2021-12-21	CONCEPTUAL PLAN FOR REVIEW	JDP	SDA	JDP	JDP	
E	2022-01-24	CONCEPTUAL PLAN FOR REVIEW	JDP	SDA			
REV	DATE	DESCRIPTION	DR	BY			

Consumers Energy
...CK GENERATING FACILITY
ESSEXVILLE, MI

CONCEPTUAL
DUST MITIGATION PLAN
J.C. WEADOCK SOLID WASTE DISPOSAL

SCALE: AS SHOWN
JOB: 19118065

FIGURE 1

AW

13 of 13

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

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

Page 1 of 1

SAMPLING SITE / CUSTOMER: Q1-2022 Weadock Leachate Wells	PROJECT NUMBER: 22-0153	SAP CC or WO#:	ANALYSIS REQUESTED (Attach List if More Space is Needed)
SAMPLING TEAM:	TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER	REQUESTER: Harold Register	QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER
SEND REPORT TO: Caleb Batts	email:	phone:	
COPY TO: Harold Register; TRC	MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other; SL = Sludge; A = Air; WP = Wipe; WT = General Waste		

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Mercury, Low Level	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0153-01	3/10/22	0703	GW	LH-103R	6	4	1			1			x	x	x	x	x	
-02		0703	GW	LH-103R DUP	1					1			x					
-03		0703	GW	LH-103R MS	1					1			x					
-04		0703	GW	LH-103R MSD	1					1			x					
-05		0705	W	FB-02	1					1			x					
-06		0705	W	EB-02	1					1			x					
-07		N/A	W	TB-01	1					1			x					

RELINQUISHED BY: [signature] DATE/TIME: 3/10/22 1021 RECEIVED BY: [signature]

RELINQUISHED BY: [signature] DATE/TIME: RECEIVED BY: [signature]

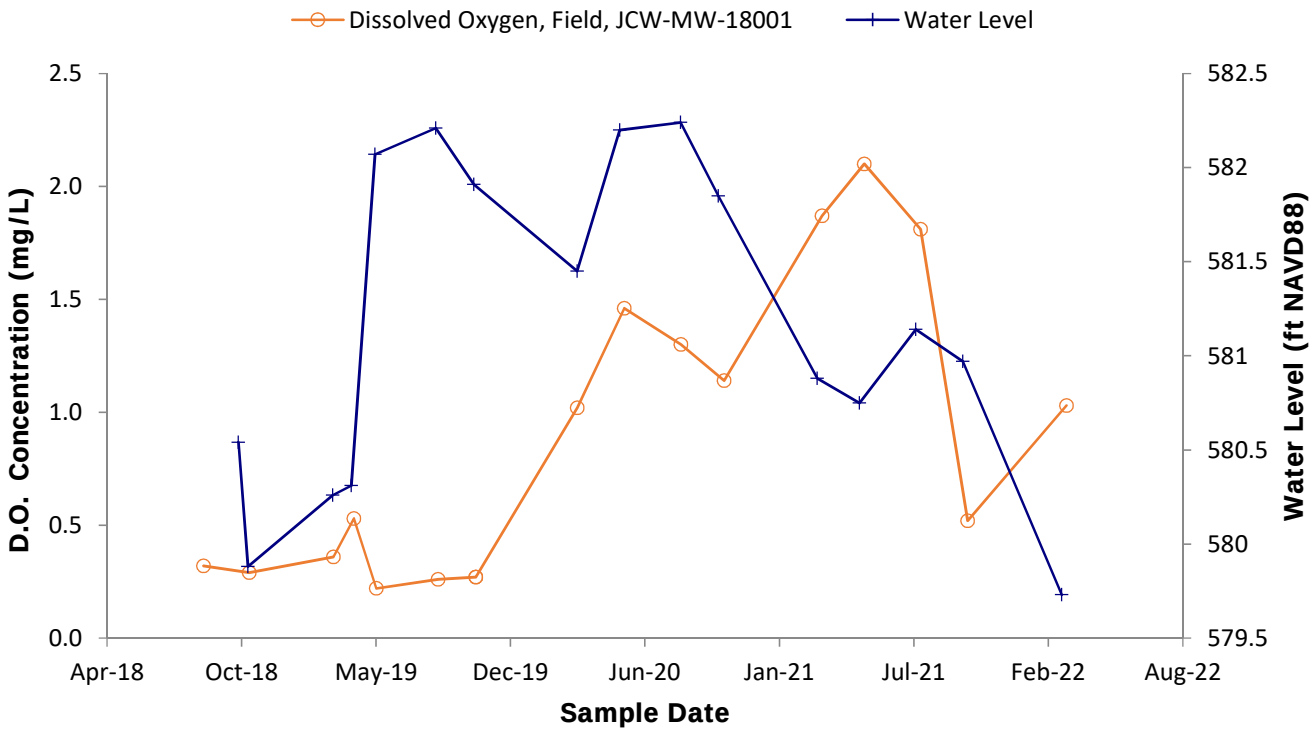
COMMENTS:

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

Temperature: 5.4°C °C except LL Hg 8.7°C Cal. Due Date: 06/03/2022

Appendix G
Alternate Source Demonstration Supporting Information

Figure G1: Time Series Plots for Sulfate at JCW-MW-18001 ASD



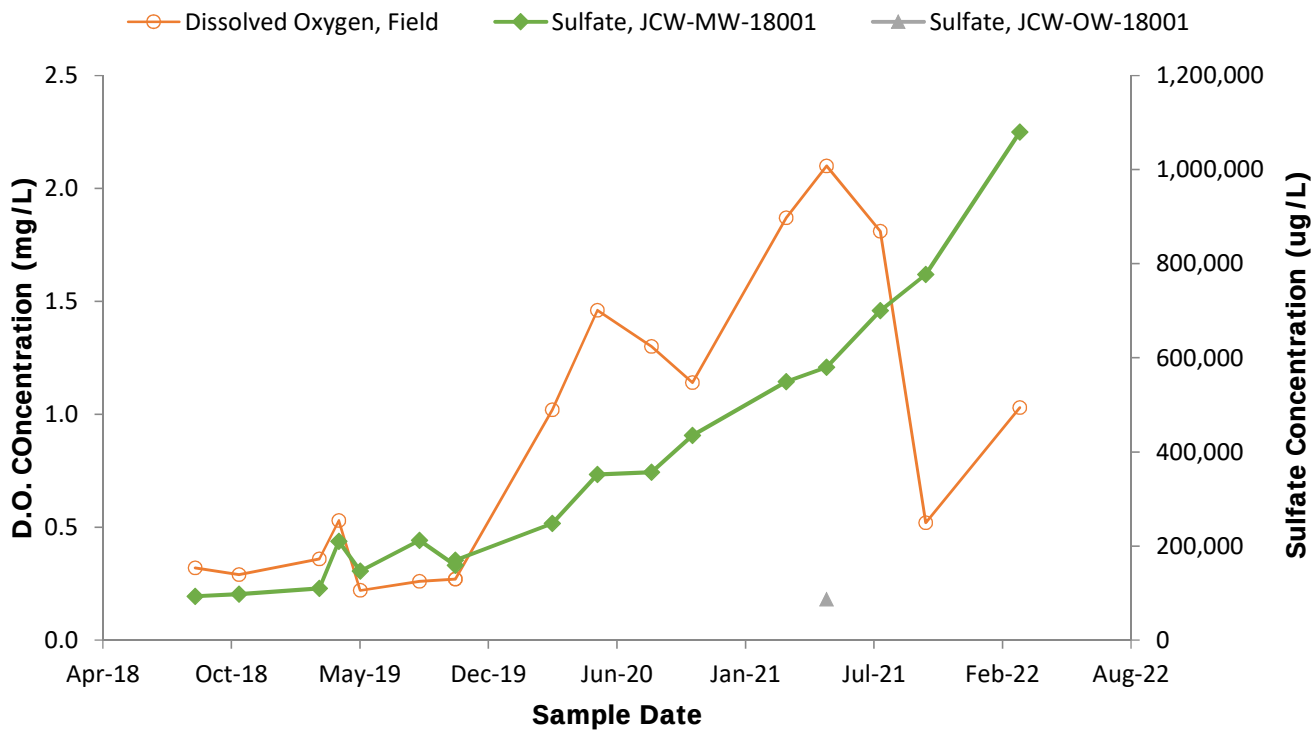
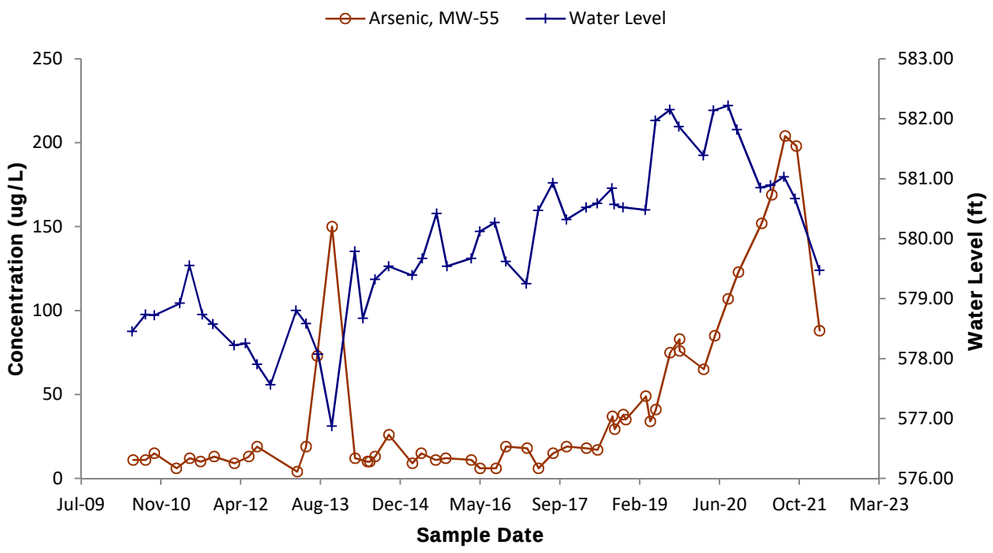


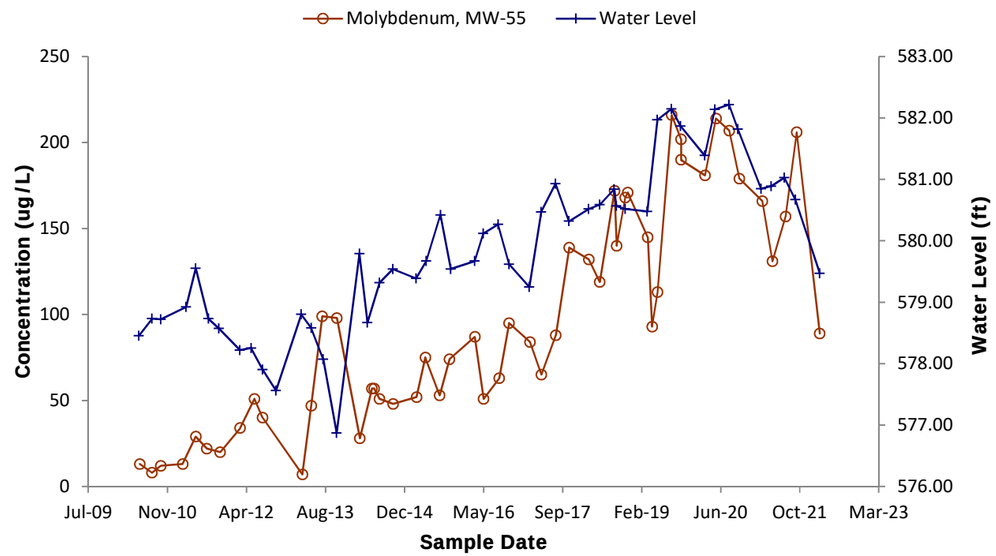
Table G2
Summary of Groundwater Sampling Results Near MW-55
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

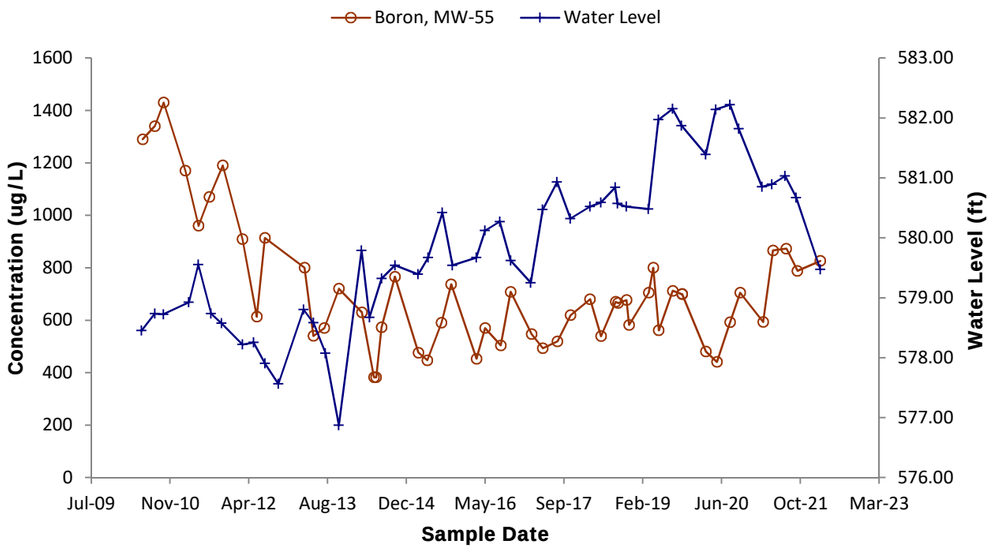
Constituent		Arsenic	Boron	Molybdenum	Oxidation Reduction Potential, Field
Unit		ug/L	ug/L	ug/L	mV
Outside Slurry Wall					
MW-55	5/11/2021	169	866	131	-123.0
	8/3/2021	204	873	157	-131.0
	10/12/2021	198	788	206	-156.0
	3/7/2022	88	826	89	-139.5
Inside Slurry Wall					
OW-55	5/11/2021	10	1,850	< 5	-66.3
	8/3/2021	15	1,890	< 5	-82.1
	10/12/2021	10	2,300	< 5	-147.0
	3/7/2022	6	2,090	< 5	-120.5
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
	3/7/2022	1	705	< 5	-65.8
LH-104	5/11/2021	29	12,200	59	39.9
	8/3/2021	21	9,410	10	-27.8
	10/7/2021	26	11200	40	-119.6

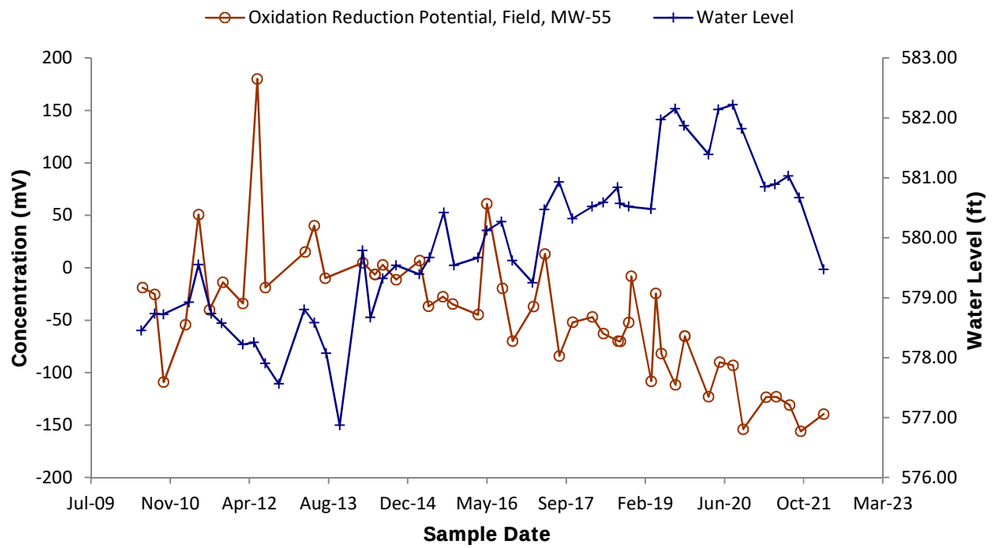
Notes:
ug/L - micrograms per liter; mV - millivolts

Figure G2: Time Series Plots for MW-55 ASD









Appendix H
Well Decommissioning and Installation Records

WELL CONSTRUCTION LOG

WELL NO. LH-103R

Facility/Project Name:	Date Drilling Started:	Date Drilling Completed:	Project Number:
CEC Weadock LF: 2022 GW Compliance	3/7/2022	3/7/2022	464096.0000

Drilling Firm:	Drilling Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth (ft bgs)	Borehole Dia. (in)
Stearns Drilling	Hollow Stem Auger	609.2	612.70	30.0	6

Boring Location: Weadock Landfill N: 780127.3 E: 13267890.3	Personnel Logged By - Jake Krenz Driller - Jim Gryska	Drilling Equipment:
		CME 850 XR

Civil Town/City/or Village:	County:	State:	Water Level Observations:
Essexville	Bay	MI	While Drilling: Date/Time 3/7/22 00:00 ▽ Depth (ft, bgs) 25.5 After Drilling: Date/Time 3/10/22 00:00 ▼ Depth (ft, bgs) 24.85

SAMPLE NUMBER AND TYPE	SAMPLE RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
1 SS	100		0	**SANDY CLAY** mostly clay, some fine sand, low plasticity, brown (10YR 5/3), dry, stiff.	CL			
2 SS	100							
3 SS	100		5	**ASH** fine sand sized grains, black (10YR 2/1), dry, loose.				
4 SS	60							
5 SS	100							
6 SS	80		10	Change to very dark gray (10YR 4/1) at 11 feet below ground surface.				
7 SS	80							
8 SS	90		15					
9 SS	80							
10 SS	40							
11 SS	80		20					
12 SS	80			Change to moist at 22 feet below ground surface.				
13 SS	100		25	▼ ▽ **CLAY** mostly clay, few to little find to medium sand, low plasticity, brown (10YR 5/3), dry, medium stiff.	CL			
14 SS	100			**ASH** fine sand sized grains, very dark gray (10YR 3/1), wet, loose.				
15 SS	100							
			30	End of boring at 30 feet below ground surface.				

SOIL BORING WELL CONSTRUCTION LOG WEADOCK LF LH-103R.GPJ 464096.0000 4/27/22

Signature:

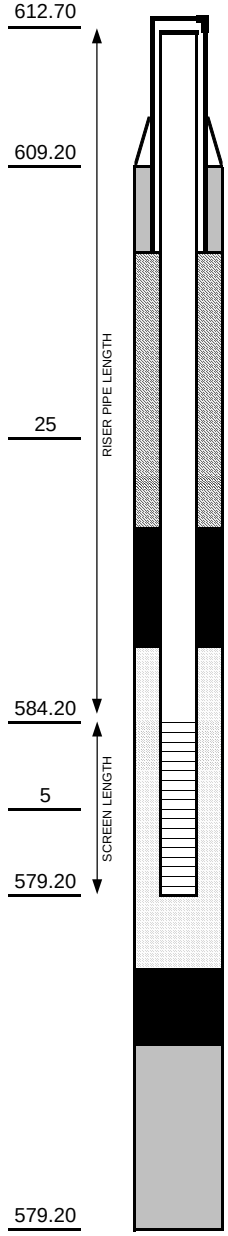
Firm: TRC
1540 Eisenhower Place Ann Arbor, MI 48108

Phone 734-971-7080

WELL CONSTRUCTION DIAGRAM

PROJ. NAME: CEC Karn BAP/LI: 2022 GW Compliance		WELL ID:	**LH-103R**
PROJ. NO: 464096.0000	DATE INSTALLED: 3/7/2022 INSTALLED BY: Jake Krenz	CHECKED BY:	Jen Reed

ELEVATION (BENCHMARK: USGS)	DEPTH BELOW OR ABOVE GROUND SURFACE (FEET)
612.70	3.5 TOP OF CASING
609.20	0.0 GROUND SURFACE
	1.0 CEMENT SURFACE PLUG
	GROUT/BACKFILL MATERIAL: BENTONITE SLURRY
	GROUT/BACKFILL METHOD: TREMIE
25 (RISER PIPE LENGTH)	
	21.0 GROUT
	BENTONITE SEAL MATERIAL: MEDIUM CHIPS
	23.0 BENTONITE SEAL
584.20	25.0 TOP OF SCREEN
5 (SCREEN LENGTH)	FILTER PACK MATERIAL: MEDIUM, WASHED SAND
579.20	30.0 BOTTOM OF SCREEN
	30.0 BOTTOM OF FILTER PACK
	NA BENTONITE PLUG
	BACKFILL MATERIAL: NATURAL COLLAPSE
579.20	30.0 HOLE BOTTOM



NOTES:
Lock to be provided by Consumers Energy.

CASING AND SCREEN DETAILS

TYPE OF RISER: 2-INCH PVC

PIPE SCHEDULE: 40

PIPE JOINTS: THREADED O-RINGS

SOLVENT USED? NO

SCREEN TYPE: 2-INCH PVC

SCR. SLOT SIZE: 0.01-INCH

BOREHOLE DIAMETER: 6 IN. FROM 0 TO 30 FT.
NA IN. FROM NA TO NA FT.

SURF. CASING DIAMETER: NA IN. FROM NA TO NA FT.
NA IN. FROM NA TO NA FT.

WELL DEVELOPMENT

DEVELOPMENT METHOD: SURGE AND PUMP

TIME DEVELOPING: 1 HOURS

WATER REMOVED: 40 GALLONS

WATER ADDED: 0 GALLONS

WATER CLARITY BEFORE / AFTER DEVELOPMENT

CLARITY BEFORE: Very Turbid

COLOR BEFORE: Black

CLARITY AFTER: Clear

COLOR AFTER: Clear

ODOR (IF PRESENT): none

WATER LEVEL SUMMARY

MEASUREMENT (FEET)			DATE	TIME
DTB BEFORE DEVELOPING:	33.75	T/PVC	3/7/2022	1628
DTB AFTER DEVELOPING:	33.80	T/PVC	3/10/2022	0715
SWE BEFORE DEVELOPING:	24.78	T/PVC	3/7/2022	1628
SWE AFTER DEVELOPING:	24.85	T/PVC	3/10/2022	0715
OTHER SWE:		T/PVC		
OTHER SWE:		T/PVC		

PROTECTIVE CASING DETAILS

PERMANENT, LEGIBLE WELL LABEL ADDED? ☑ YES ☐ NO

PROTECTIVE COVER AND LOCK INSTALLED? ☑ YES ☐ NO

LOCK KEY NUMBER: NA

MONITORING WELL DECOMMISSIONING LOG

PROJECT NAME: CEC Weadock LF: 2022 GW Compliance		**MONITORING WELL ID:** LH-103	
PROJECT NUMBER: 464096.0000	DATE: 03/08/2022	LOCATION: Weadock Landfill	LOCATION COORDINATES: N: NA E: NA
OBSERVED BY: Jake Krenz			
DRILLING CONTRACTOR: Stearns Drilling			
CREW CHIEF: Jim Gryska		TOP OF CASING ELEV.: NA	SURFACE ELEV.: NA

PROTECTIVE COVER TYPE:	☑ STICK-UP	☐ FLUSH MOUNT	☐ TRAF. BOX	☐ OTHER						
PROTECTIVE COVER DIAMETER:	☐ 4"	☐ 8"	☐ 9"	☐ 10"	☐ 12"	☑ OTHER None				
WELL MATERIAL:	☑ PVC	☐ SS	☐ IRON	☐ GALVANIZED STEEL	☐ OTHER					
WELL CASING DIAMETER:	☐ 1"	☑ 2"	☐ 4"	☐ 6"	☐ 8"	☐ OTHER				
WELL SCREEN MATERIAL:	☑ PVC	☐ SS	☐ IRON	☐ GALVANIZED STEEL	☐ OTHER					
WELL SCREEN LENGTH:	☑ 5-FT	☐ 10-FT	☐ UNKNOWN	☐ OTHER						
WELL SCREEN SLOT SIZE:	☑ 0.01"	☐ 0.02"	☐ UNKNOWN	☐ OTHER						

DTW: 10.15 T/ PVC

DTB: 12.6 T/ PVC

DECOMMISSIONING PROCEDURE PULL WELL AND GROUT

NOTES:
Pulled well casing and filled remaining hole with bentonite chips.

GROUTING PROCEDURE: FILL FROM ABOVE	NOTES: 3.6 feet of stick up.
GROUT TYPE: NA	
GROUT MIX: NA	
GROUT INTERVAL: NA FT-BGS TO NA FT-BGS	
BENTONITE SEAL: MEDIUM CHIPS	
SEAL INTERVAL: 9.6 FT-BGS TO 0 FT-BGS	

ADDITIONAL COMMENTS:

SIGNED	4/27/2022 DATE	CHECKED	4/27/2022 DATE

MONITORING WELL DECOMMISSIONING LOG

PROJECT NAME: CEC Weadock LF: 2022 GW Compliance		**MONITORING WELL ID:** OW-63	
PROJECT NUMBER: 464096.0000	DATE: 03/08/2022	LOCATION: Weadock Landfill	LOCATION COORDINATES: N: NA E: NA
OBSERVED BY: Jake Krenz			
DRILLING CONTRACTOR: Stearns Drilling			
CREW CHIEF: Jim Gryska		TOP OF CASING ELEV.: NA	SURFACE ELEV.: NA

PROTECTIVE COVER TYPE:	☑ STICK-UP ☐ FLUSH MOUNT ☐ TRAF. BOX ☐ OTHER		
PROTECTIVE COVER DIAMETER:	☐ 4" ☐ 8" ☐ 9" ☐ 10" ☐ 12" ☑ OTHER None		
WELL MATERIAL:	☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER		
WELL CASING DIAMETER:	☐ 1" ☑ 2" ☐ 4" ☐ 6" ☐ 8" ☐ OTHER		
WELL SCREEN MATERIAL:	☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER		
WELL SCREEN LENGTH:	☑ 5-FT ☐ 10-FT ☐ UNKNOWN ☐ OTHER	**DTW:** 12.15	T/ PVC
WELL SCREEN SLOT SIZE:	☑ 0.01" ☐ 0.02" ☐ UNKNOWN ☐ OTHER	**DTB:** 20.93	T/ PVC

DECOMMISSIONING PROCEDURE PULL WELL AND GROUT

NOTES:
Pulled well casing and filled remaining hole with bentonite chips.

GROUTING PROCEDURE: FILL FROM ABOVE	NOTES:
GROUT TYPE: NA	7.2 feet of stick up.
GROUT MIX: NA	
GROUT INTERVAL: NA FT-BGS TO NA FT-BGS	
BENTONITE SEAL: MEDIUM CHIPS	
SEAL INTERVAL: 13.73 FT-BGS TO 0 FT-BGS	

ADDITIONAL COMMENTS:

SIGNED	4/27/2022 DATE	CHECKED	4/27/2022 DATE

2022 Semiannual Groundwater Monitoring Report and Second Quarter 2022 Hydrogeological Monitoring Report

JC Weadock Solid Waste Disposal Area

Essexville, Michigan

July 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

TABLE OF CONTENTS

1.0 Introduction 1

1.1 Statement of Adherence to Approved Hydrogeological Monitoring Plan 1
1.2 Program Summary 1
1.3 Site Overview 3
1.4 Geology/Hydrogeology 3

2.0 Leachate Monitoring 5

3.0 Groundwater Monitoring 6

3.1 Monitoring Well Network 6
3.2 May 2022 Monitoring Event 7
3.2.1 Data Quality Review 8
3.3 Groundwater Flow Rate and Direction 8
3.4 Groundwater Analytical Data and Relevant Screening Criteria 9
3.4.1 Groundwater Monitoring Analytical Results 10
3.4.2 Detection Monitoring 10
3.4.3 Assessment Monitoring Data Evaluation 11
3.4.3.1 Establishing Groundwater Protection Standards 12
3.4.3.2 Data Comparison to Groundwater Protection Standards 12
3.4.4 GSI Compliance Monitoring 13
3.5 Alternate Source Demonstration 14
3.5.1 Monitoring Well JCW-MW-18001: Sulfate and TDS 14
3.5.2 Monitoring Well MW-55: Arsenic and Molybdenum 14
3.5.3 Chloride at MW-54R 15

4.0 Conclusions and Recommendations 16

5.0 References 17

TABLES

Table 1 Summary of Groundwater Elevation Data: May 2022
Table 2 Summary of Groundwater Sampling Results (Analytical): May 2022; JC Weadock Solid Waste Disposal Area
Table 3 Summary of Groundwater Sampling Results (Analytical): May 2022; Background Wells
Table 4 Summary of Field Parameters: May 2022
Table 5 Summary of Confidence Interval Evaluation: May 2022
Table 6 EGLE Exceedance Summary Table

FIGURES

Figure 1 Site Location Map
Figure 2 Site Map
Figure 3 Potentiometric Surface Map – May 2022

APPENDICES

Appendix A Static Water Level Evaluation
Appendix B Data Quality Review
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 Second Quarter 2022 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 second quarter 2022 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-103R[1] and LH-104. This program was implemented to determine constituents in the leachate as measured under actual conditions in the field and to assess which constituents have the potential to exceed applicable criteria at the compliance well locations.

Laboratory leachate data was not collected during the second quarter.

[1] Leachate headwell LH-103 was decommissioned in March 2022 due to damage noted in Q4 2021. LH-103R was installed in March 2022. Well decommissioning and installation records were provided as Appendix H of the *First Quarter 2022 Hydrogeological Monitoring Report* (TRC, 2022).

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, and 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 2022 Monitoring Event

In accordance with the Weadock Landfill HMP, TRC conducted the second quarter 2022 monitoring event for the Weadock Landfill on May 2 through 10, 2022. 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 Environment Testing 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 226/228

Samples were also analyzed for additional constituents including magnesium, sodium, potassium, and bicarbonate, carbonate, and total alkalinity. Analytical results from the second quarter 2022 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, two field duplicates (JCW-MW-18006 and 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 laboratory 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 3.

Groundwater elevations measured at the site in May 2022 are generally within the range of 578 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 2022 monitoring event are included in the attached laboratory report (Appendix E). Groundwater analytical data from the second quarter 2022 monitoring event 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. During the sampling event, field staff noted that the dissolved oxygen sensor on the water quality meter used to sample the Weadock Landfill downgradient wells was not functioning. Therefore, dissolved oxygen was not measured for the Weadock Landfill wells during the second quarter 2022 sampling event.

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. Downgradient groundwater quality is evaluated using sample results from 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. 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 GWPSs for the landfill. Data for these wells are tabulated in Table 3.

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 (Section 3.4.2 Detection Monitoring and Section 3.4.3 Assessment Monitoring). 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.

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 3.3, 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.

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:

- The previously observed increasing trend for boron at MW-54R has continued to be observed in second quarter 2022.
- The increasing trends initially observed for boron at MW-51 and OW-57R Out in first quarter 2022 were confirmed in the second quarter 2022.
- The previously confirmed increasing trend for boron at MW-55 in the first quarter 2022 did not continue to increase in second quarter 2022.
- The new increasing trends for boron that were observed at MW-50, MW-53, and MW-53R in first quarter 2022 were not confirmed in second quarter 2022.
- The increasing trend initially observed for chloride at MW-54R in first quarter 2022 was confirmed in the second quarter 2022.
- A continuous increasing trend was observed for sulfate at JCW-MW-18001. Sulfate concentrations remain below the generic final acute value (FAV).
- The increasing trend initially observed for total dissolved solids (TDS) at JCW-MW-18001 in first quarter 2022 was confirmed in the second quarter 2022.

Although increasing trends for detection monitoring constituents were observed, individual constituent trends provide a *potential indication* that there may be a release coming from the monitored unit. When these indicator trends are evaluated with other co-monitored conditions and parameters at the Weadock Landfill, the increasing trends for detection monitoring constituents do not appear to be a result of a new release from operation of the landfill. The potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill. Several of these newly observed trends, such as those observed for calcium, chloride, sulfate, and TDS, are likely a result of localized geochemical changes influenced by changes in lake levels rather than a change in flux from the landfill and will continue to be evaluated. Sulfate concentrations are related to redox conditions and the increasing trend of sulfate is attributed to localized changes in geochemistry near JCW-MW-18001, rather than a change in flux from the landfill, as discussed further in Section 3.5.

Consumers is further evaluating possible causes of the increasing boron concentrations at several porewater compliance monitoring wells. Previous studies (NRT, 2005) documented boron at significantly elevated concentrations at the Karn-Weadock Power Generating Complex. Boron was also identified at SSI background levels in the 2017 *Annual Groundwater Monitoring Report – JC Weadock Power Plant, Landfill CCR Unit* (TRC, 2018) and was one of the detection monitoring constituents that triggered the initiation of the assessment monitoring program. Statistical significance above the GWPS established for boron has been noted for these monitoring wells per the Part 115 groundwater monitoring program requirements, as discussed in Section 3.4.3.2. Continued monitoring and assessment for potential future actions is warranted at this time; however, observed concentrations of boron in each of the monitoring wells is less than the relevant Part 115 compliance standard - the GSI pathway standard (Section 3.4.4).

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 the May 2022 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 (Part 115): The second quarter 2022 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, MW-55, and OW-57R OUT were present at statistically significant levels above the GWPS. The GWPS for boron was established based on background concentrations observed in wells unaffected by the Weadock Landfill or Weadock Bottom Ash Pond. Detection monitoring (i.e., Appendix III) constituents 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 below relevant GSI criteria, as discussed in Section 3.4.4.

Assessment Monitoring Constituents (Part 115 and Federal CCR): Based on the second quarter 2022 statistical evaluation, there are no assessment monitoring constituents present at statistically significant levels above the GWPSs 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 8.67 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 2022 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
- 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 the May 2022 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.

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, MW-55, 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).

Arsenic and Molybdenum at MW-55: Concentrations of arsenic and molybdenum at MW-55 have at times exceeded the GSI criteria on a direct comparison to the fixed limit basis (Appendix D: Table 2). The May 2022 sampling event results show that arsenic and molybdenum concentrations are below applicable GSI criteria. The statistical evaluation presented in Appendix D shows that the lower confidence limit of the arsenic and molybdenum data over the past 8 events did not exceed 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 (Appendix A: Table A1).

3.5 Alternate Source Demonstration

At this time, Consumers Energy is continuing to assert an Alternate Source Demonstration (ASD), for the following, as detailed in the 2021 Semiannual Groundwater Monitoring Report and Fourth Quarter 2021 Hydrogeological Monitoring Report (TRC, January 2022):

- Sulfate in monitoring well JCW-MW-18001; and
- Arsenic and molybdenum in monitoring well MW-55.

The ASD has been updated this quarter to include:

- TDS in monitoring well JCW-MW-18001; and
- Chloride in monitoring well MW-54R.

3.5.1 Monitoring Well JCW-MW-18001: Sulfate and TDS

Although confirmed increasing trends were observed at JCW-MW-18001 for sulfate and TDS (through Q2 2022), 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 and TDS 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.

- Sulfate is one of several constituents that contribute to the overall TDS concentration. Increasing sulfate concentrations would result in an increase in TDS as well.
- Dissolved oxygen at JCW-MW-18001 is currently higher than what was observed from 2018 to 2019 (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). Surface water and groundwater levels are now decreasing; however, it may take time for the local geochemistry to re-equilibrate to lowered water levels and dissolved oxygen remains elevated compared to prior years.
- Sulfate concentrations at JCW-MW-18001 (752 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.

3.5.2 Monitoring Well MW-55: Arsenic and Molybdenum

Additionally, Consumers Energy is continuing to assert an Alternate Source Demonstration (ASD) for arsenic and molybdenum at MW-55 indicating elevated levels of constituents at that location are not related to materials management of the Weadock Landfill (*2021 Annual Groundwater Monitoring and Corrective Action Report*; TRC, January 2022). 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 and have been relatively stable, as evidenced by the time series plots in Figure G2. Stable or decreasing concentrations of boron is further supports 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 increased over 4-ft since between 2010 and 2020. The oxidation-reduction potential (ORP) at MW-55 has generally decreased (i.e., is more reducing) since 2010. 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 increased solubility of arsenic and molybdenum.

3.5.3 Chloride at MW-54R

An observation of an increasing trend of chloride at MW-54R without other corroborating lines of evidence is not indicative of a release from the Landfill. The potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill. Furthermore, arsenic is present in CCR material managed at this site and was detected at 87 ug/L in leachate headwell LH-103R in March 2022. Arsenic can be used as a tracer to indicate whether the slurry wall is functioning as designed. If groundwater inside the landfill was adversely affecting groundwater on the outside of the slurry wall, arsenic would be expected to be present at concentrations above background levels (21 ug/L). Arsenic was not detected in the groundwater sample collected at MW-54R in May 2022 and arsenic has historically not been observed at this location at concentrations greater than 4 ug/L. Changes in chloride at MW-54R are likely a result of localized geochemical changes influenced by changes in lake levels. Additionally, chloride was identified as naturally elevated in the Phase II Discharge Evaluation (NRT, September 2005) and was eliminated as a constituent of concern when the mixing zone was first authorized based on the data supporting that conclusion. The box and whiskers plot in Appendix G further illustrates that the chloride concentrations observed at MW-54R are within the range of concentrations observed regionally within other wells in the compliance well network and well below the chloride concentration observed at leachate headwell LH-103R in March 2022.

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 2022 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 *2021 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 2022 data in accordance with the Weadock Landfill HMP demonstrate that boron is present at concentrations above the GWPS. Boron is a detection monitoring (i.e., Appendix III) constituent that does 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 are below relevant GSI criteria, as discussed in Section 3.4.4.

The statistical evaluation in second quarter 2022 found that no 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 third quarter monitoring event for is scheduled for July 2022.

5.0 References

AECOM. November 6, 2009. Potential Failure Mode Analysis (PFMA) Report. JC Weadock Electric Generation Facility Ash Dike Risk Assessment Essexville, Michigan. Prepared for Consumers Energy Company

Consumers Energy Company. 2015. *Hydrogeological Monitoring Plan Rev. 2: JC Weadock Solid Waste Disposal Area.* June 9.

Consumers Energy. 2019. *JC Weadock Landfill Response Action Plan Submittal, JC Weadock Generating Facility (WDS# 395457), Essexville, Michigan.* March 15.

Golder Associates, Inc. 2018. *J.C. Weadock Generating Facility, Slurry Wall Vent Closure Construction Documentation Report*. October 30.

Michigan Department of Natural Resources (MDNR). 1986. *Determination of Permit Exemption No. GWE-0005.* August 25.

Michigan Department of Environmental Quality (MDEQ). 2015. *Implementation of a Mixing Zone Request Consumers Energy DE Karn/JC Weadock Complex.* December 23.

MDEQ. 2018. *Slurry Wall Construction Certification; JC Weadock Landfill, Bay County, Michigan, Waste Data System Number 395457.* December 19.

Michigan Department of Environment, Great Lakes, and Energy (EGLE). 2020. *Closure Certification, Consumers Weadock Complex (Weadock) Bottom Ash Pond, Bay County, Waste Data System No. 395457*. November 30. [Letter]

Natural Resource Technology. 2005. Phase II Groundwater Discharge Evaluation, Final Report.

Natural Resource Technology. 2010. Revised Hydrogeological Monitoring Plan – JC Weadock Solid Waste Disposal Area. TRC. 2018. Annual Groundwater Monitoring Report – JC Weadock Power Plant, Landfill CCR Unit. Prepared for Consumers Energy Company. January.

TRC. 2018. *Annual Groundwater Monitoring Report – JC Weadock Power Plant, Landfill CCR Unit*. Prepared for Consumers Energy Company.

TRC. 2019a. *2018 Annual Groundwater Monitoring Report – JC Weadock Power Plant Landfill CCR Unit. Prepared for Consumers Energy Company.* January.

TRC. 2019b. *Assessment of Corrective Measures – JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residual Units.* Prepared for Consumers Energy Company. September.

TRC. 2020. *2019 Annual Groundwater Monitoring Report – JC Weadock Power Plant Landfill CCR Unit.* Prepared for Consumers Energy Company. January.

TRC. 2022. *2021 Annual Groundwater Monitoring and Corrective Action Report – JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residuals (CCR) Units.* Prepared for Consumers Energy Company. January.

TRC. 2021. *Landfill Hydrogeological Monitoring Plan – JC Weadock Power Plant, Essexville, Michigan.* Prepared for Consumers Energy Company. February.

TRC. 2021. *First Quarter 2021 Hydrogeological Monitoring Report – JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* Prepared for Consumers Energy Company. April.

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

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

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

Tables

Table 1

Summary of Groundwater Elevation Data: May 2022

Second Quarter 2022 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 2, 2022	
						Depth to Water (ft BTOC)	Groundwater Elevation (ft)
Background Monitoring Wells							
MW-15002	587.71	Sand	580.9	to	570.9	6.61	581.10
MW-15008	585.36	Sand with clay	578.7	to	568.7	4.38	580.98
MW-15016	586.49	Sand	581.2	to	578.2	3.66	582.83
MW-15019	586.17	Sand and Sand/Clay	579.5	to	569.5	5.31	580.86
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	8.70	580.94
JCW-MW-15010	597.76	Sand	579.7	to	578.2	17.25	580.51
JCW-MW-15028	589.64	Sand	567.7	to	564.7	7.28	582.36
Landfill: Downgradient Monitoring Wells (outside slurry wall)							
JCW-MW-18001	596.73	Sand and Sandy Clay	578.3	to	573.3	16.78	579.95
JCW-MW-18004	593.04	Sandy Clay	583.9	to	578.9	12.28	580.76
JCW-MW-18005	590.89	Sand and Sandy Clay	580.0	to	575.0	8.33	582.56
JCW-MW-18006	600.72	Fly Ash and Sandy Clay	582.8	to	577.8	12.91	587.81
MW-50	593.36	Sand	577.8	to	574.8	13.49	579.87
MW-51	594.29	Sand and Clay	577.8	to	574.8	14.33	579.96
MW-52	594.90	Sand	579.3	to	576.3	14.13	580.77
MW-53	593.68	Sand and Clay	579.1	to	576.1	13.72	579.96
MW-53R	594.25	Sand and Clay	580.4	to	575.4	14.23	580.02
MW-54R	593.89	Clay and Sand	581.3	to	576.3	13.80	580.09
MW-55	593.82	Sand	581.5	to	578.5	14.00	579.82
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	17.08	578.76
JCW-OW-18002	593.63	Sand	578.9	to	573.9	10.94	582.69
JCW-OW-18003	593.99	Sand and Clay	580.5	to	575.5	8.55	585.44
JCW-OW-18004	594.19	Sandy Clay	584.6	to	579.6	6.27	587.92
JCW-OW-18006	600.61	Fly Ash and Clay with Sand	582.9	to	577.9	9.20	591.41
MW-20	592.73	NR	~581.1	to	~578.1	6.53	586.20
OW-51	593.62	Clay and Sand	578.9	to	575.9	10.08	583.54
OW-53	593.64	Clay and Sand	579.0	to	576.0	7.58	586.06
OW-54	594.10	Clay and Sand	580.0	to	577.0	6.81	587.29
OW-55	594.67	Clay (or Sand and Clay)	580.9	to	577.9	6.18	588.49
OW-56R	592.01	Ash and Sand	577.5	to	572.5	5.95	586.06
OW-57R IN	590.86	Sandy Clay	575.7	to	570.7	6.08	584.78
OW-61	602.15	Ash and Sand	588.0	to	585.0	9.66	592.49
OW-63	612.53	Ash and Sand	594.2	to	591.2	NM	NM
Landfill: Leachate Headwells							
LH-103R	612.70	Fly Ash	30.2	to	33.2	23.58	589.12
LH-104	596.56	Fly Ash	8.0	to	11.0	7.48	589.08

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 Groundwater Sampling Results (Analytical): May 2022
Second Quarter 2022 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:	5/9/2022	5/10/2022	5/10/2022	5/9/2022	5/9/2022	5/9/2022
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		**1,560**	226	**1,010**	**2,990**	**1,360**	**1,350**
Calcium	mg/L	NC	NC	NC	500[EE]	NC	NC		335	235	280	136	169	247
Chloride	mg/L	250**	250[E]	250[E]	**50**	NC	NC		**58.8**	10.8	32.6	**67.3**	**53.3**	**92.8**
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****	**250[E]**	**250[E]**	**500[EE]**	NC	NC		**752**	**512**	**437**	32.8	**285**	**420**
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	NC	NC		**1,970**	**1,290**	**1,330**	**788**	**1,020**	**1,510**
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	6.8	6.8	7.0	7.2	7.2
Appendix IV[(1)]														
Antimony	ug/L	6	6.0	6.0	2	NC	NC		< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	**10**	**10**	**10**	100	680		< 1	< 1	5	22	1	10
Barium	ug/L	2,000	2,000	2,000	1,200	NC	NC		80	26	110	514	86	150
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		2	< 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		76	42	33	56	69	56
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	6	6	< 5	< 5
Radium-226	pCi/L	NC	NC	NC	NC	NC	NC		< 0.327	< 0.417	< 0.414	< 0.416	< 0.310	< 0.423
Radium-228	pCi/L	NC	NC	NC	NC	NC	NC		0.494	0.790	< 0.521	< 0.518	< 0.493	< 0.494
Radium-226/228	pCi/L	NC	NC	NC	NC	NC	NC		0.586	0.910	0.622	0.690	0.518	0.576
Selenium	ug/L	50	50	50	5.0	55	120		2	2	2	< 1	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****	**300[E]**	**300[E]**	500,000[EE]	NC	NC		210	< 20	**1,680**	**6,600**	**723**	**1,210**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	NC	NC		3	2	2	1	1	2
Nickel	ug/L	NC	100	100	120	NC	NC		8	< 2	< 2	< 2	< 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:

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 2
Summary of Groundwater Sampling Results (Analytical): May 2022
Second Quarter 2022 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:	5/9/2022	5/9/2022	5/9/2022	5/9/2022	5/10/2022	5/10/2022
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		**1,090**	**3,880**	**1,830**	**4,110**	**642**	**1,990**
Calcium	mg/L	NC	NC	NC	500EE	NC	NC		231	147	226	169	177	131
Chloride	mg/L	250**	250E	250E	**50**	NC	NC		**50.5**	**50.9**	41.6	35.8	11.8	**57.3**
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	**500**EE	NC	NC		**591**	215	**314**	86.3	249	69.4
Total Dissolved Solids	mg/L	**500****	**500**E	**500**E	**500**	NC	NC		**1,490**	**886**	**1,290**	**712**	**942**	**702**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5E	6.5 - 8.5E	6.5 - 9.0	NC	NC		7.0	7.3	6.9	7.0	7.0	7.1
Appendix IV(1)														
Antimony	ug/L	6	6.0	6.0	2	NC	NC		< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	100	680		< 1	< 1	8	< 1	**48**	< 1
Barium	ug/L	2,000	2,000	2,000	1,200	NC	NC		107	356	147	111	222	79
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	2	< 1	2
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		25	41	61	64	24	27
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	9	**78**	7
Radium-226	pCi/L	NC	NC	NC	NC	NC	NC		< 0.489	0.406	< 0.325	< 0.347	< 0.478	< 0.440
Radium-228	pCi/L	NC	NC	NC	NC	NC	NC		< 0.532	< 0.518	< 0.480	< 0.552	< 0.646	< 0.539
Radium-226/228	pCi/L	NC	NC	NC	NC	NC	NC		0.875	0.824	< 0.480	< 0.552	0.696	< 0.539
Selenium	ug/L	50	50	50	5.0	55	120		2	1	2	2	3	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****	**300**E	**300**E	500,000EE	NC	NC		**2,030**	**1,060**	**460**	121	**15,000**	74
Copper	ug/L	1,000**	1,000E	1,000E	20	NC	NC		2	1	2	1	1	2
Nickel	ug/L	NC	100	100	120	NC	NC		< 2	< 2	< 2	< 2	3	14
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.

* - 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): May 2022
DE Karn & JC Weadock Background – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	**MW-15002**	**MW-15008**	**MW-15016**	**MW-15019**
					Sample Date:	5/2/2022	5/2/2022	5/3/2022	5/2/2022
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Background			
Appendix III(1)									
Boron	ug/L	NC	500	500	4,000	103	112	329	236
Calcium	mg/L	NC	NC	NC	500EE	238	89.5	216	139
Chloride	mg/L	**250****	**250**E**	**250**E**	**50**	**2,210**	**197**	**243**	**324**
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250**E**	**250**E**	500EE	6	4.99	**267**	62.5
Total Dissolved Solids	mg/L	**500****	**500**E**	**500**E**	**500**	**4,240**	**783**	**1,390**	**1,200**
pH, Field	SU	**6.5 - 8.5****	**6.5 - 8.5**E**	**6.5 - 8.5**E**	**6.5 - 9.0**	6.5	**6.4**	6.7	6.5
Appendix IV(1)									
Antimony	ug/L	6	6.0	6.0	2.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	**14**	2	8	2
Barium	ug/L	2,000	2,000	2,000	1,200	682	52	72	308
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	3	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	16	16	80	12
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	120	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NC	NC	NC	1.37	< 0.447	< 0.368	< 0.579
Radium-228	pCi/L	NC	NC	NC	NC	3.30	< 0.588	< 0.611	1.83
Radium-226/228	pCi/L	5	NC	NC	NC	4.68	0.826	0.624	2.11
Selenium	ug/L	**50**	**50**	**50**	**5**	**54**	< 1	2	2
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**	500,000EE	**16,100**	**15,500**	**8,020**	**21,000**
Copper	ug/L	1,000**	1,000E	1,000E	20	3	< 1	5	< 1
Nickel	ug/L	NC	100	100	120	14	5	13	8
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	62	27	**15**	**6**	3	3
Zinc	ug/L	5,000**	2,400	5,000E	260	23	< 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 Field Parameters: May 2022
Second Quarter 2022 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	5/2/2022	0.00	-49.7	6.5	5,911	9.2	10.0
MW-15008	5/2/2022	0.05	-73.2	6.4	1,347	8.5	9.5
MW-15016	5/3/2022	0.01	-84.0	6.7	1,390	8.1	10.0
MW-15019	5/2/2022	0.01	-71.1	6.5	1,414	7.3	4.0
Weadock Landfill							
JCW-MW-18001	5/9/2022	--	-16.0	7.0	2,600	11.6	5.0
JCW-MW-18004	5/10/2022	--	219.5	6.8	1,650	10.0	1.9
JCW-MW-18005	5/10/2022	--	97.8	6.8	1,815	12.8	10.0
JCW-MW-18006	5/9/2022	--	-49.0	7.0	1,363	16.0	2.7
MW-50	5/9/2022	--	-20.0	7.2	1,483	9.7	2.7
MW-51	5/9/2022	--	-29.5	7.2	2,076	9.0	2.8
MW-52	5/9/2022	--	-80.0	7.0	2,000	10.5	2.8
MW-53	5/9/2022	--	-49.0	7.3	1,382	10.1	3.8
MW-53R	5/9/2022	--	59.7	6.9	2,000	10.5	4.0
MW-54R	5/9/2022	--	46.0	7.0	1,248	10.5	3.8
MW-55	5/10/2022	--	-65.5	7.0	1,495	9.7	5.0
OW-57ROUT	5/10/2022	--	100.0	7.1	1,290	15.9	3.9

Notes:
mg/L - Milligrams per Liter.
mV - Millivolts.
SU - Standard Units.
umhos/cm - Micromhos per centimeter.
°C - Degrees Celcius.
NTU - Nephelometric Turbidity Unit.
-- = Parameter Not Measured. The dissolved oxygen sensor on the water quality meter was not functioning.

Table 5
Summary of Confidence Interval Evaluation: May 2022
Second Quarter 2022 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	**1,400**	1,600	**960**	1,300	**1,100**	4,100	**2,700**	2,100	**1,500**	6,200	**3,000**	860	**610**	2,200	**1,700**	1,700	**1,300**	--	**--**	1,100	**970**	3,100	**2,300**
Calcium	mg/L	280	370	72	330	260	--	--	--	**--**	--	--	--	--	--	--	--	--	380	260	300	220	270	160	--	--
Sulfate	mg/L	780	980	-74	--	--	--	--	--	**--**	--	--	--	--	--	--	--	--	1,200	680	--	**--**	--	**--**	--	--
Arsenic	ug/L	21	--	--	--	--	--	--	--	--	33	11	--	--	--(1)	--(1)	--	--	38	1.0	--	--	--	--	32	17
Molybdenum	ug/L	73	--	--	--	--	--	--	--	--	--	--	--	--	--(1)	--(1)	--	--	--	--	--	--	--	--	--	--
Iron	ug/L	28,000	--	--	--	--	--	--	--	--	--	--	--	--	36,000	17,000	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/L	6	--	--	--	--	--	--	--	--	--	--	--	--	--	**--**	--	--	12	2.0	--	--	--	--	--	--

GSI Statistical Evaluation

Constituent	Units	GSI	MW-55	
			UCL	LCL
Arsenic	ug/L	100	190	78
Molybdenum	ug/L	120	200	100

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, January 2022); therefore, confidence intervals were not calculated

Table 6

EGLE Exceedance Summary Table
Second Quarter 2022 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

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

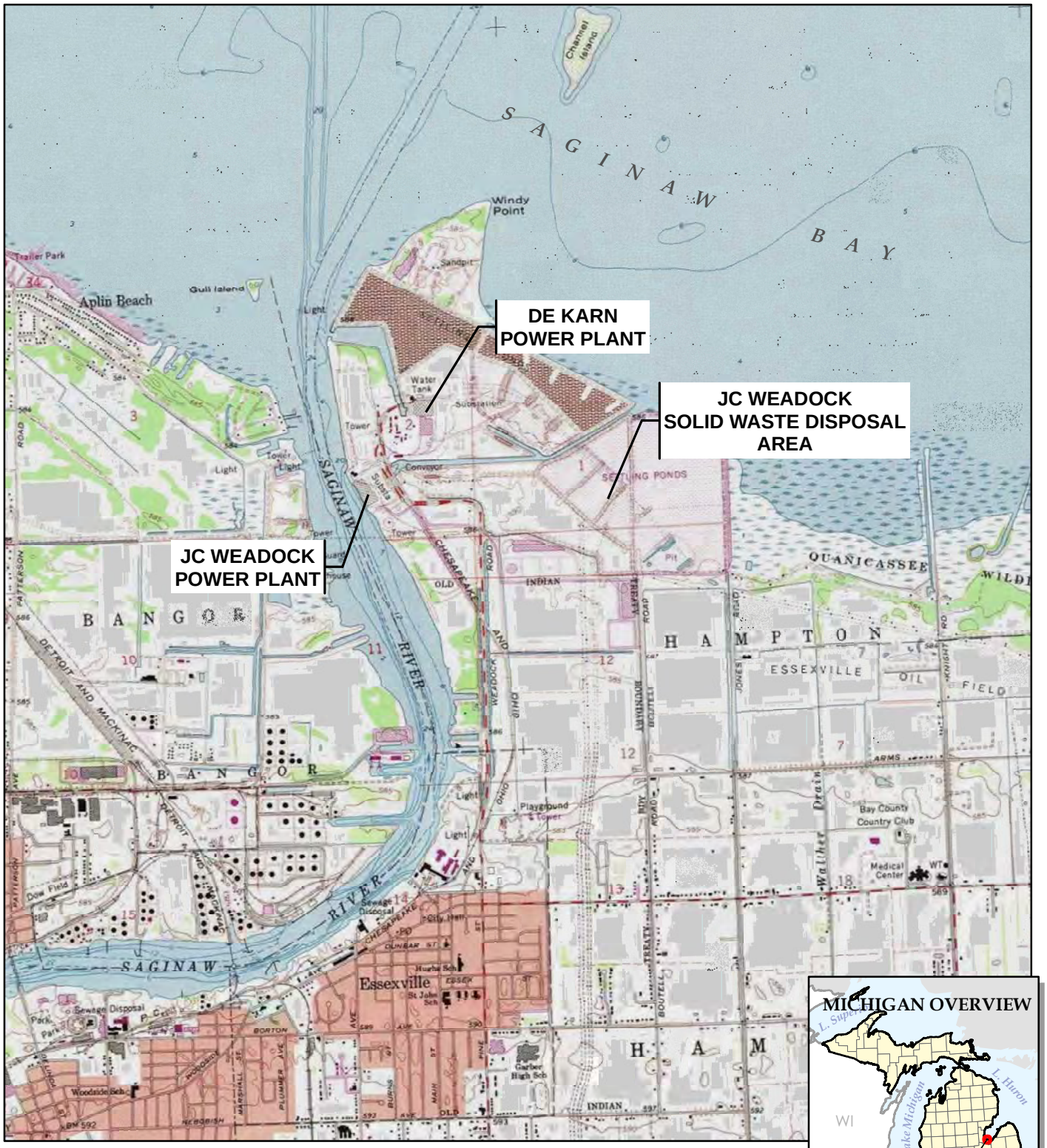
Data is in	**(X) ug/L**	**or**
	( ) mg/L	
unless otherwise stated		

Facility: JC Weadock – WDS# 395457

Well #	Location	Parameter	Part 201 GRCC	Statistical Limit (or 'CC' for Control Charts)	2 Qtr. 2022 (**bold** >201)	1 Qtr. 2022 (**bold** >201)	4 Qtr. 2021 (**bold** >201)	3 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:	JULY 2022
PROJ. NO.:	464096
FILE:	464096-101-001.mxd

FIGURE 1

S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\3_WEADOCK\2022_MXDs\MAY_2022\464096-101-001.mxd -- Saved By: AADAIR on 5/25/2022, 12:20:11 PM

LEGEND

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

0 600 1,200 Feet

1 " = 600 '
1:7,200

N

PROJECT:
CONSUMERS ENERGY COMPANY
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:
SITE MAP

DRAWN BY:	A. ADAIR	PROJ NO.:	464096
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		**FIGURE 2**
DATE:	JULY 2022		

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

FILE NO.: 464096-102-002.mxd

Plot Date: 5/25/2022, 12:28:12 PM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 2697673 WEADOCK\2022 MXDs\MAY 2022\464096-102-002.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)
- JCW LANDFILL SOIL BORING
- DECOMMISSIONED 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.

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 2022

DRAWN BY:	A. ADAIR	PROJ NO.:	464096
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		**FIGURE 3**
DATE:	JULY 2022		

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

FILE NO.: 464096-103-003.mxd

Plot Date: 6/29/2022, 10:19:31 AM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 2697673 WEADOCK\2022 MXDs\MAY 2022\464096-103-003.mxd
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 2022 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	5/2/2022	579.87	579.95	-0.08
MW-51	5/2/2022	579.96		0.01
MW-52	5/2/2022	580.77		0.82
MW-53	5/2/2022	579.96		0.01
MW-53R	5/2/2022	580.02		0.07
MW-54R	5/2/2022	580.09		0.14
MW-55	5/2/2022	579.82		-0.13
JCW-MW-18004	5/2/2022	580.76		0.81
Average:		**580.16**		

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 2022 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[6]	588.76		22.37	3.94E-01	2.00	2.88	1,010	2.30E-08	0.39	2,904	7.46E-02	0.56	204
JCW-MW-18001		579.95			3.75								
JCW-OW-18002	582.69		28.87	9.77E-02	4.00	4.25	970		0.10	4,123	2.63E-02	0.20	72
MW-50		579.87			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	583.54		14.38	2.49E-01	4.00	4.33	1,850	2.30E-08	0.25	8,011	1.30E-01	0.97	355
MW-51		579.96			4.66								
JCW-OW-18003	585.44		33.85	1.38E-01	3.50	4.00	740		0.14	2,960	2.66E-02	0.20	73
MW-52		580.77			4.50								
OW-53	586.06		20.14	3.03E-01	1.25	1.69	730		0.30	1,230	2.43E-02	0.18	66
MW-53		579.96			2.12								

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	587.29		21.23	3.39E-01	2.00	2.25	510	2.30E-08	0.34	1,148	2.54E-02	0.19	69
MW-54R		580.09			2.50								
JCW-OW-18004	587.92		26.59	2.69E-01	8.00	4.43	820		0.27	3,633	6.38E-02	0.48	174
JCW-MW-18004		580.76			0.86								
OW-55	588.49		23.95	3.62E-01	2.00	1.91	1,220		0.36	2,330	5.50E-02	0.41	150
MW-55		579.82			1.82								
MW-20	586.20		40.93	8.89E-02	1.50	1.38	1,120		0.09	1,540	8.93E-03	0.07	24
JCW-MW-18005		582.56			1.25								

Calculated Groundwater Discharge from JC Weadock (gal per day)	**=**	**3.25**
(cubic ft per day)	**=**	**0.43**
(cubic ft per min)		**3.0E-04**
Calculated Groundwater Discharge from JC Weadock (gal per yr)	**=**	**1,187**
(cubic ft per yr)	**=**	**159**
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)	**=**	**1.77E-02**

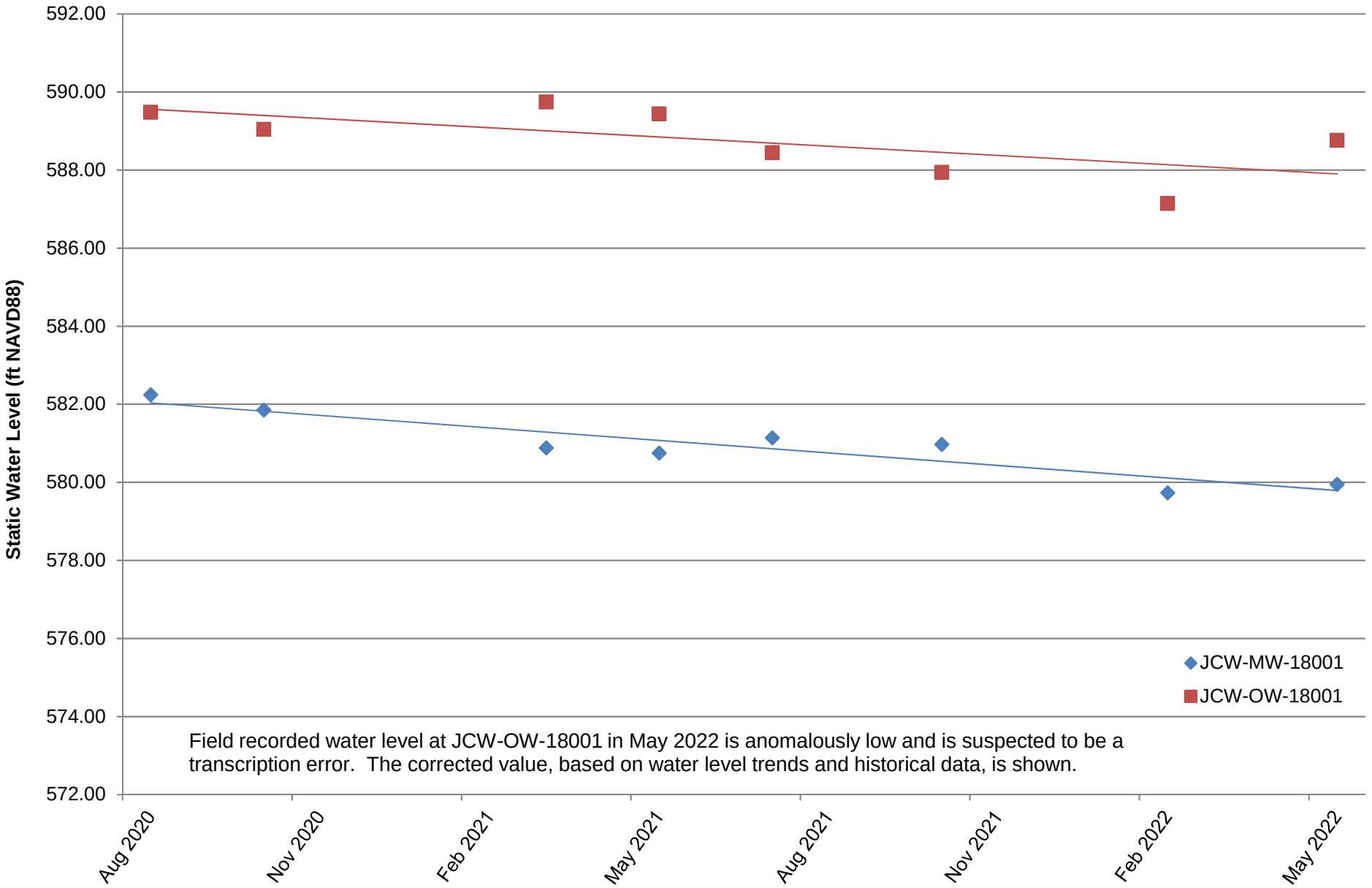
Notes:

Water level data collected on May 2, 2022 are shown by yellow cells:

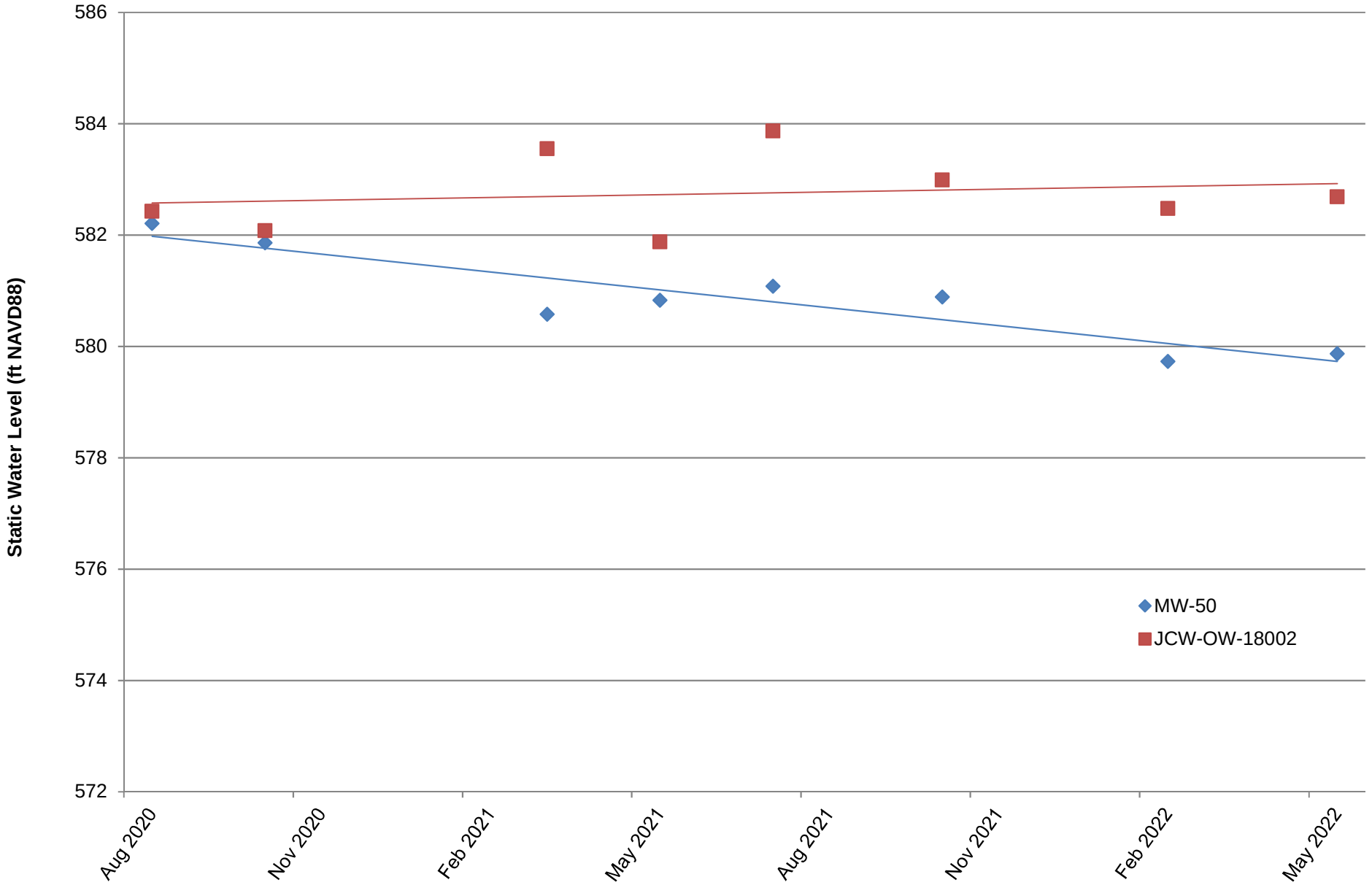
1. Monitoring Well Zones based on Phase II Evaluation, Appendix K Groundwater Discharge Calculations, September 30, 2005. Representative wells based on the Landfill Hydrogeological Monitoring Plan, February 2021.
2. Saturated thickness will be the thickness of the sand unit when the observed SWL is above 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.
6. Field recorded water level is anomalously low and is suspected to be a transcription error. The corrected value, based on water level trends and historical data, is used to calculate flux.

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

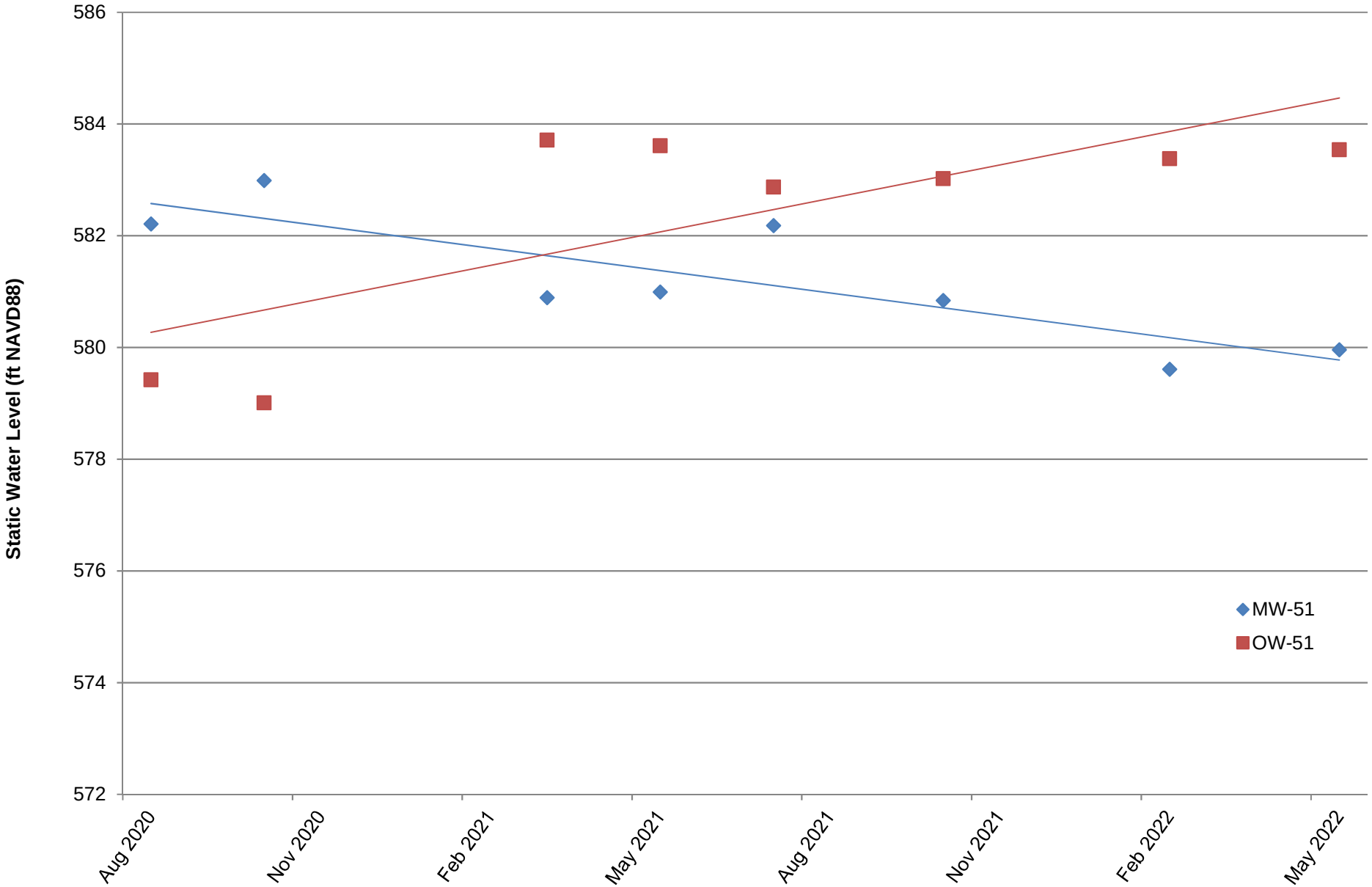
Appendix A
Static Water Level for JCW-MW-18001 and JCW-OW-18001



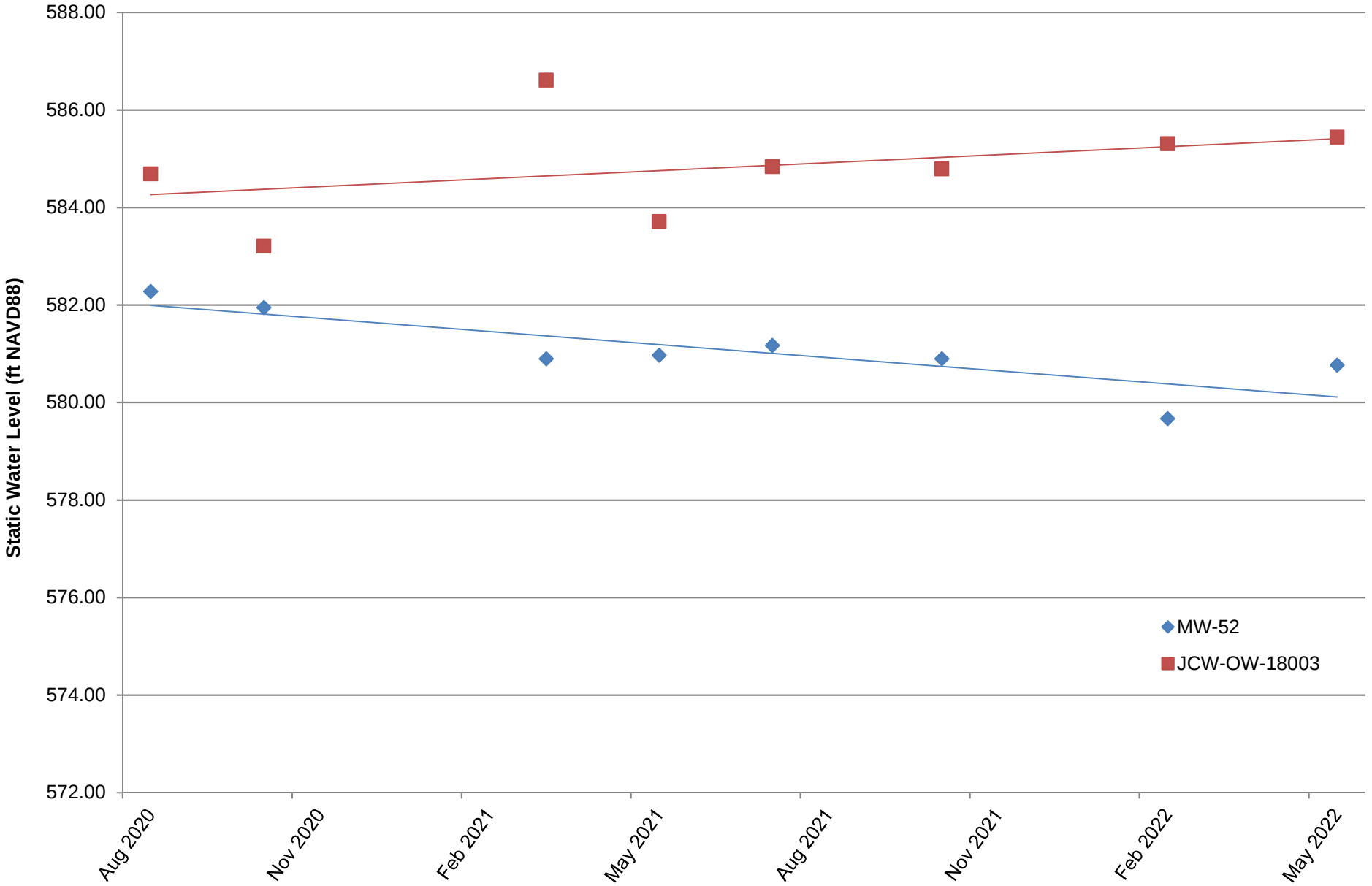
Appendix A
Static Water Level for MW-50 and JCW-OW-18002



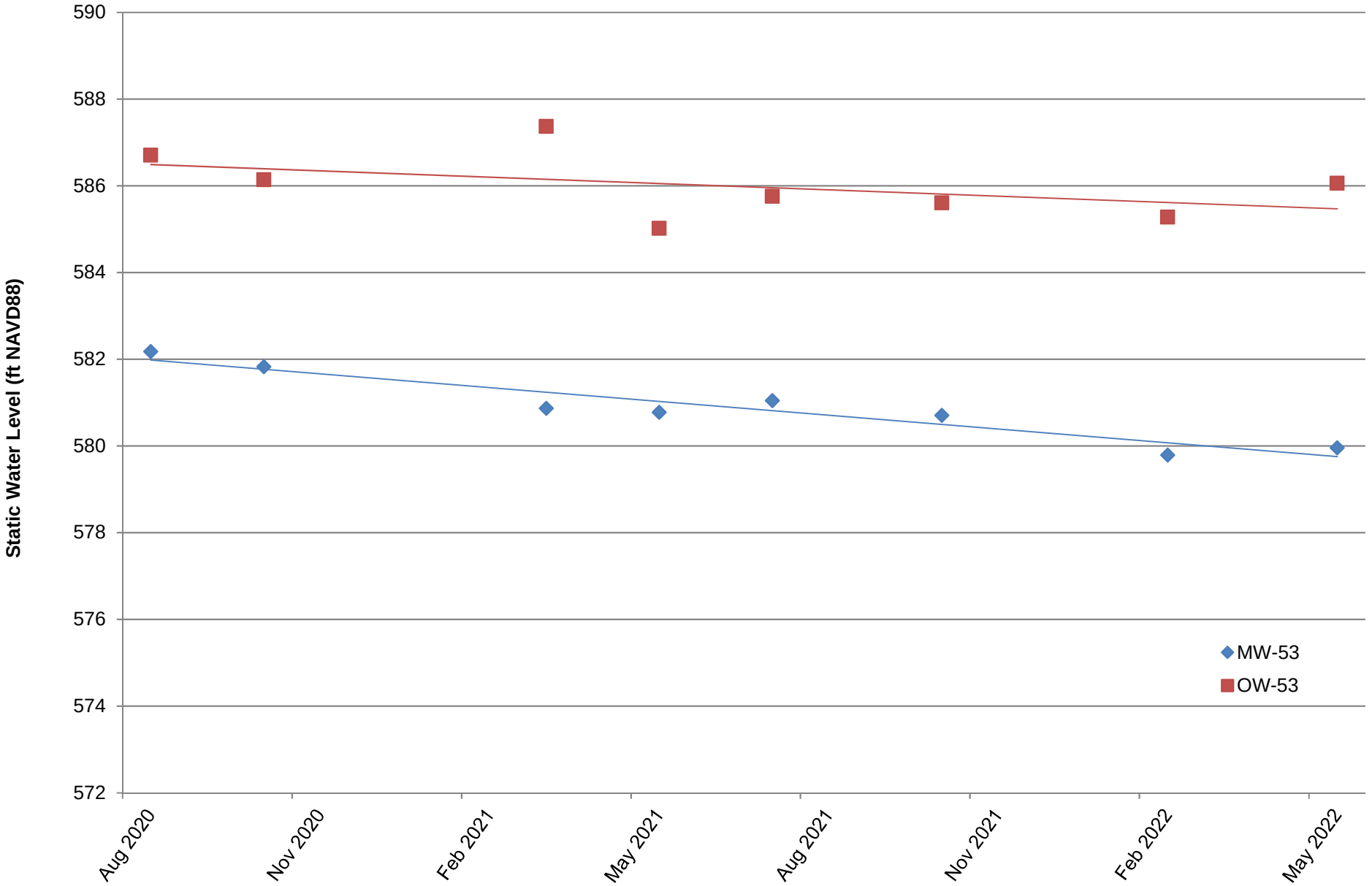
Appendix A
Static Water Level for MW-51 and OW-51



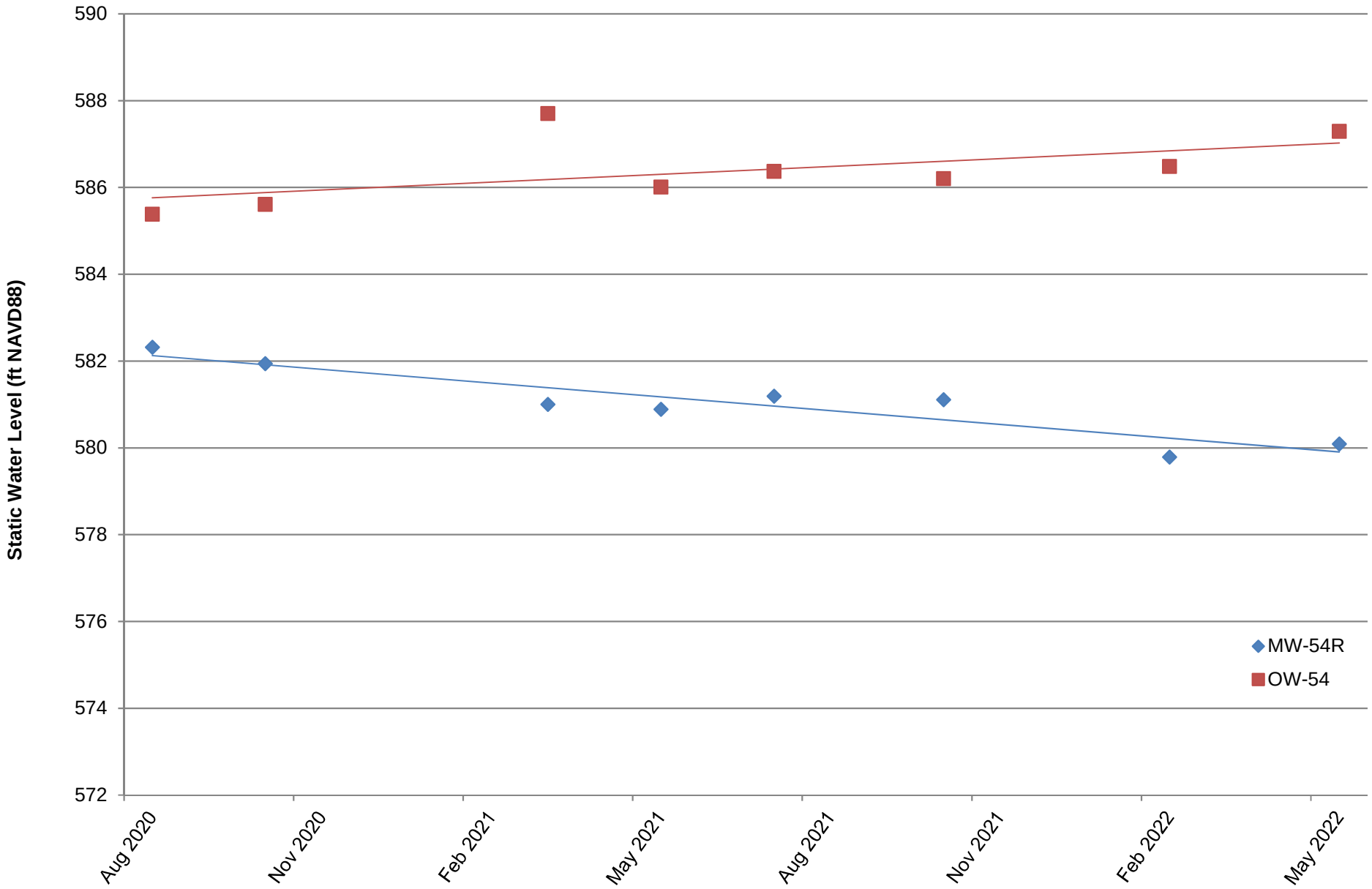
Appendix A
Static Water Level for MW-52 and JCW-OW-18003



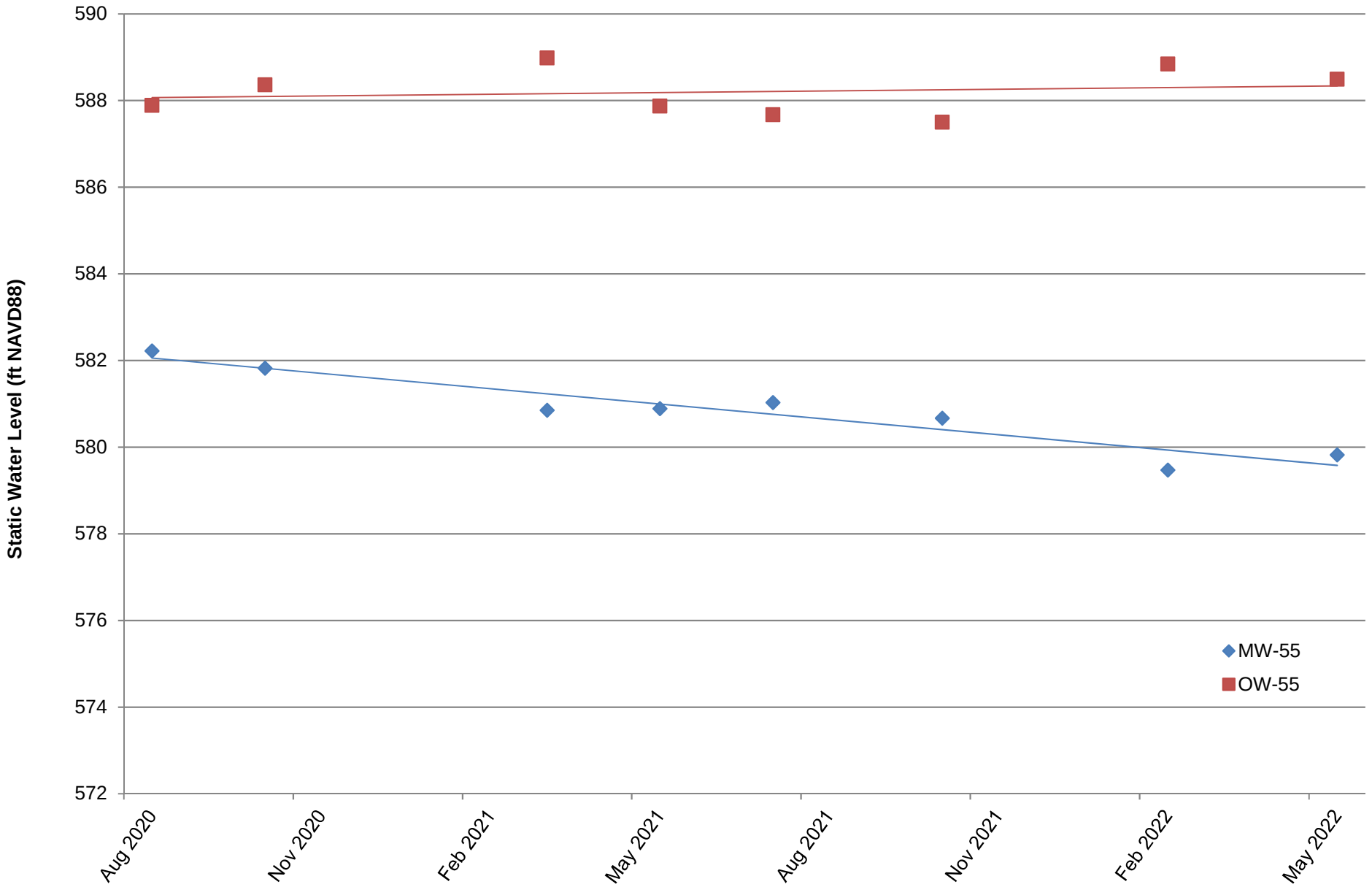
Appendix A
Static Water Level for MW-53 and OW-53



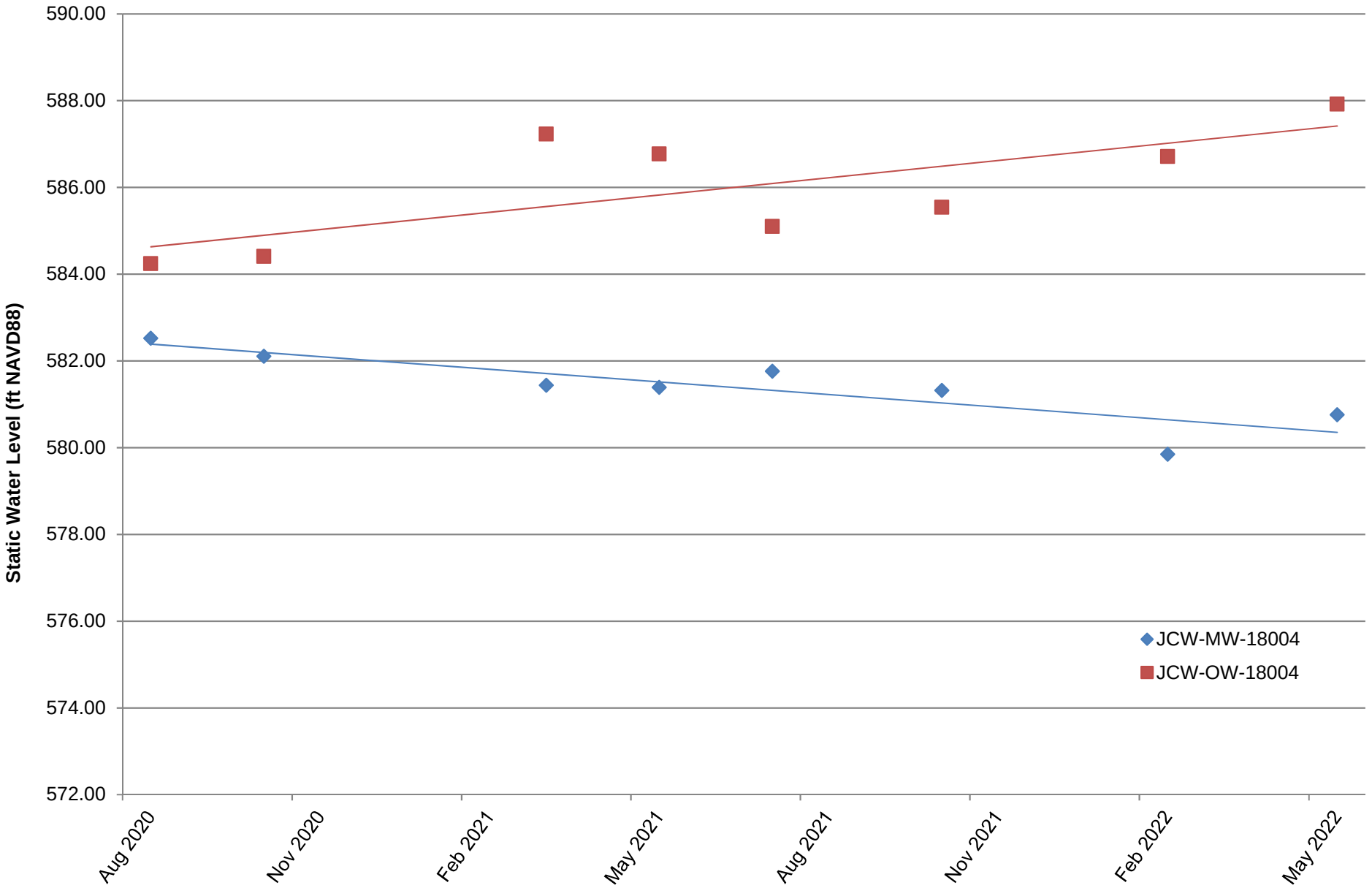
Appendix A
Static Water Level for MW-54R and OW-54



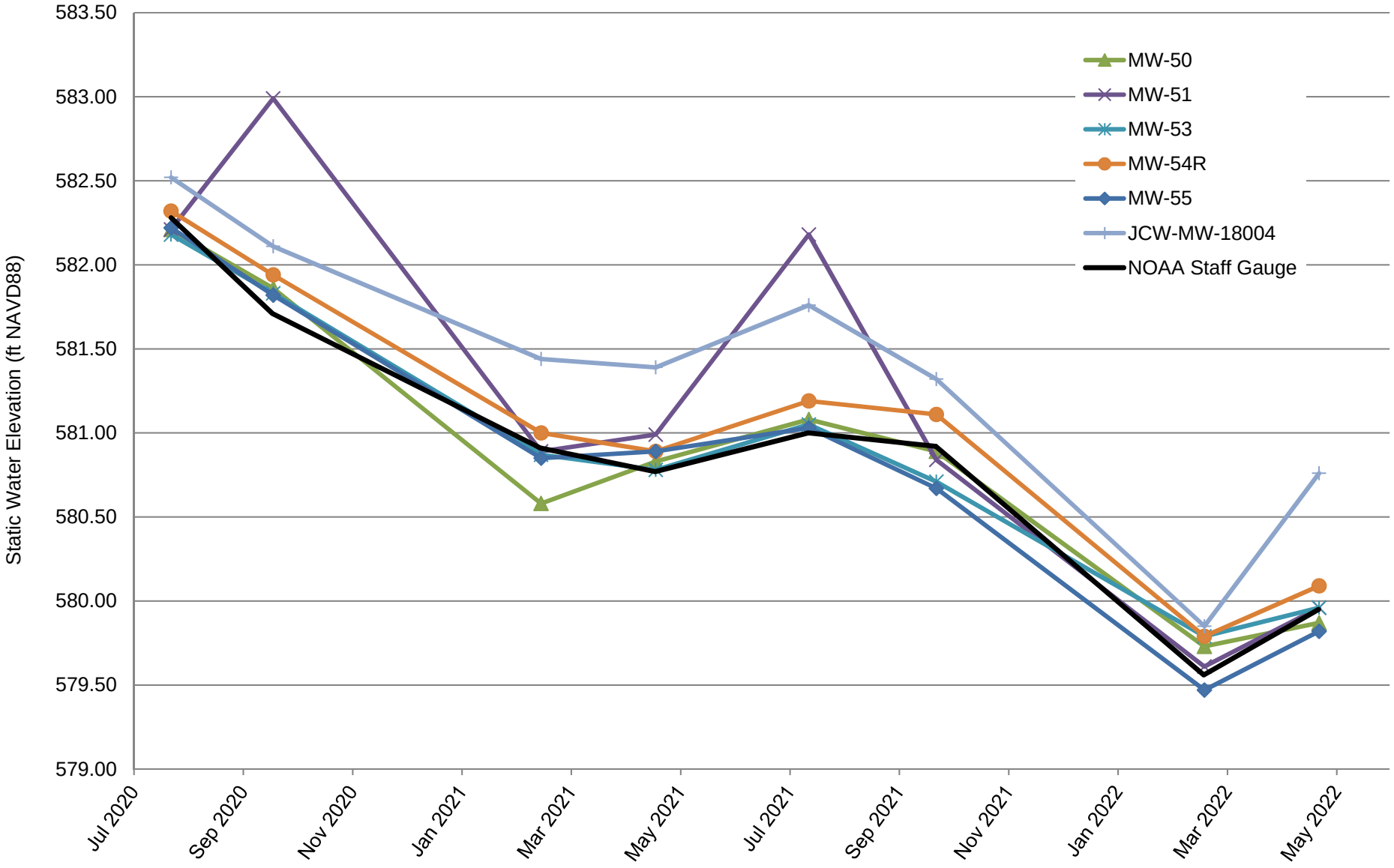
Appendix A
Static Water Level for MW-55 and OW-55



Appendix A
Static Water Level for JCW-MW-18004 and JCW-OW-18004



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 2022
JC Weadock Landfill

Porewater samples were collected by TRC for the May 2022 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) 22-0441.

During the May 2022 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-57R OUT

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, 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:

- 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 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-JCW-LF-02/JCW-MW-18006 and DUP-JCW-LF-01/MW-50; all criteria between the parent and duplicate samples were within the QC limits with the following exception.
    - Nickel was not detected in sample MW-50 and was detected <5x the RL in the field duplicate sample, DUP-JCW-LF-01; the absolute difference was > the RL. Therefore, the positive and nondetect results for nickel in all porewater samples except DUP-JCW-LF-02 and JCW-MW-18006 are estimated as summarized in the attached table, Attachment A.
- Laboratory duplicate analyses were not performed on a sample from this data set.

Attachment A
Summary of Data Non-Conformances
JC Weadock, Landfill Wells – CCR Monitoring Program
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
JCW-MW-18001	5/9/2022	Nickel	Potential uncertainty; field duplicate variability.
JCW-MW-18004	5/10/2022		
JCW-MW-18005	5/10/2022		
MW-50	5/9/2022		
MW-51	5/9/2022		
MW-52	5/9/2022		
MW-53	5/9/2022		
MW-53R	5/9/2022		
MW-54R	5/9/2022		
MW-55	5/10/2022		
MW-58	5/9/2022		
DUP-JCW-LF-01	5/9/2022		
OW-57R OUT	5/10/2022		

Laboratory Data Quality Review
Porewater Monitoring Event May 2022
JC Weadock Landfill

Porewater samples were collected by TRC for the May 2022 sampling event. Samples were analyzed for radium by Eurofins-TestAmerica in St. Louis, Missouri (Eurofins TA – St. Louis). The laboratory analytical results were reported in laboratory sample delivery group (SDG) 240-166413-1.

During the May 2022 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 (Ra-226, Ra-228, Combined Ra-226 & Ra-228)	EPA 903.0, EPA 904.0

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

Data Usability Review Procedure

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

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

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

This data usability report addresses the following items:

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

Review Summary

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

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

QA/QC Sample Summary:

- Target analytes were not detected in the method blanks.
- One equipment blank (EB-01) was collected. Target analytes were not detected in the equipment blank sample.
- LCS/LCSD recoveries and relative error ratios (RER) for all target analytes were within laboratory control limits.
- MS/MSD analyses were not performed on a sample from this SDG.
- The field duplicate pair samples were DUP-01/MW-50. All criteria were met.
- Carrier recoveries were within 40-110%.

Laboratory Data Quality Review
Groundwater Monitoring Event May 2022
JC Weadock/DE Karn Background

Groundwater samples were collected by TRC for the May 2022 sampling event. Samples were analyzed for total metals, anions, and total dissolved solids by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 22-0443.

During the May 2022 sampling event, a groundwater sample was collected from each of the following wells:

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

Each sample was analyzed for the following constituents:

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

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

Data Usability Review Procedure

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

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

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

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

This data usability report addresses the following items:

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

Review Summary

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

- The reviewed Appendix III, IV, and additional Part 115 constituents 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 were not detected in this blank sample.
- MS and MSD analyses were not performed on a sample from this data set.
- The field duplicate pair samples were DUP-Background and MW-15008; 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 2022
JC Weadock/Karn DEK Background

Groundwater samples were collected by TRC for the May 2022 sampling event. Samples were analyzed for radium by Eurofins-TestAmerica in St. Louis, Missouri (Eurofins TA – St. Louis). The laboratory analytical results were reported in laboratory sample delivery group (SDG) 240-166150-1.

During the May 2022 sampling event, a groundwater sample was collected from each of the following wells:

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

Each sample was analyzed for the following constituents:

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

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

Data Usability Review Procedure

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

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

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

This data usability report addresses the following items:

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

Review Summary

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

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

QA/QC Sample Summary:

- Target analytes were not detected in the method blanks.
- One equipment blank (EB-04) was collected. Target analytes were not detected in the equipment blank sample.
- LCS/LCSD recoveries and relative percent differences or relative error ratios (RER) for all target analytes were within laboratory control limits with the following exception.
    - The RER (1.12) for radium 228 was outside of the laboratory control limit (1.0) in the LCS/LCSD associated with all samples. Positive detections of radium 228 in select samples should be considered estimated as summarized in the attached table, Attachment A.
- MS/MSD and laboratory duplicate analyses were not performed on a sample from this SDG.
- The field duplicate pair samples were DUP-04/MW-15008. All criteria were met.
- Carrier recoveries were within 40-110%.

Attachment A
Summary of Data Non-Conformances for Groundwater Analytical Data
JC Weadock and DE Karn Background Wells – CCR Monitoring Program
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
MW-15002	5/2/2022	Radium 228	Detected results should be considered estimated due to LCS/LCSD Relative Error Ratio (RER) outside of criteria.
MW-15019	5/2/2022		
DUP-04	5/2/2022		

Appendix C
Detection Monitoring Statistical Trend Tests

Appendix C
Detection Monitoring Statistical Summary for JC Weadock Facility
Second Quarter 2022 Quarterly Report
Data from August 2020 to May 2022

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	O	O	O	O	↓	O
Chloride	O	O	O	O	O	O
Fluoride	O*	O*	O*	O*	O*	O*
Iron	O	O	O	O	O	O
pH/Corrosivity	O	O	O	O	O	O
Sulfate	↑ ASD	O	O	O	↓	↓
Total Dissolved Solids	↑ ASD	O	O	O	↓*	O

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 2022 Hydrogeological Monitoring Report for the Weadock Landfill, TRC, July 2022.)

Appendix C
Detection Monitoring Statistical Summary for JC Weadock Facility
Second Quarter 2022 Quarterly Report
Data from August 2020 to May 2022

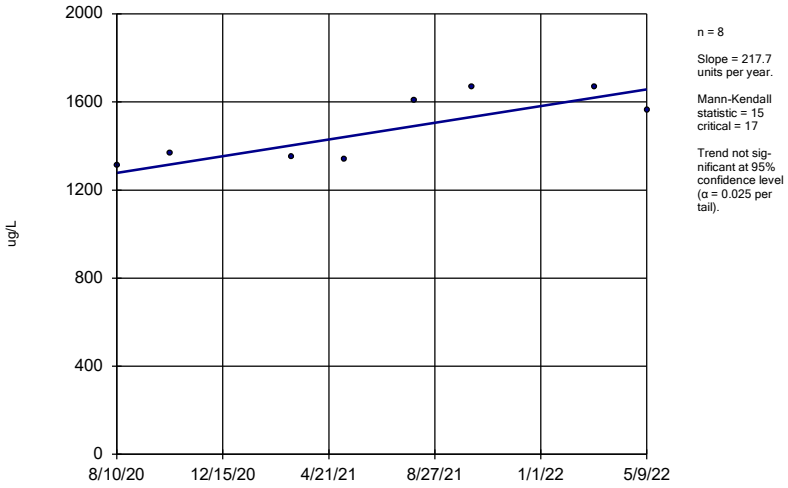
Porewater Monitoring Points						
PARAMETER	**MW-52**	**MW-53**	**MW-53R**	**MW-54R**	**MW-55**	**OW-57R OUT**
Boron	O	O	O	↑	O	↑
Calcium	O	↓	O	O	O	O
Chloride	O	O	O	↑ ASD	O	O
Fluoride	O*	O*	O*	O*	O*	O*
Iron	O	O	O	O	O	O
pH/Corrosivity	O	O	O	O	O	O
Sulfate	O	O	O	O	O	O
Total Dissolved Solids	O	↓	O	O	O	O

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 2022 Hydrogeological Monitoring Report for the Weadock Landfill, TRC, July 2022.)

Boron, Total

JCW-MW-18001



n = 8

Slope = 217.7 units per year.

Mann-Kendall statistic = 15 critical = 17

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

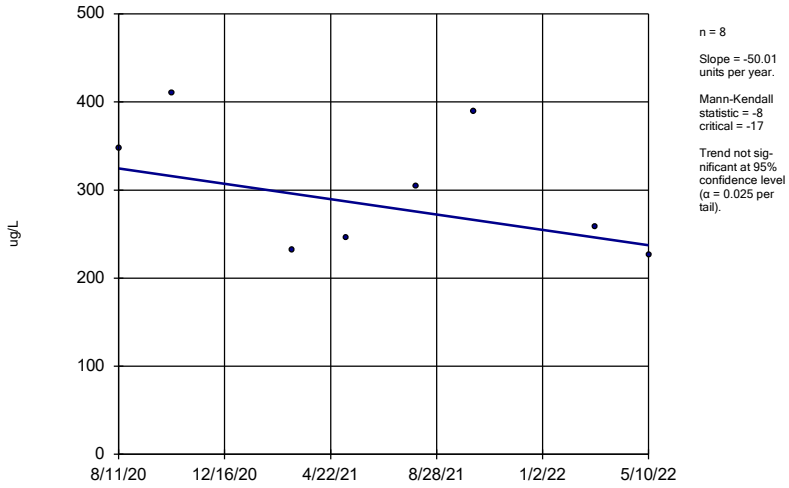
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

JCW-MW-18004



n = 8

Slope = -50.01 units per year.

Mann-Kendall statistic = -8 critical = -17

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

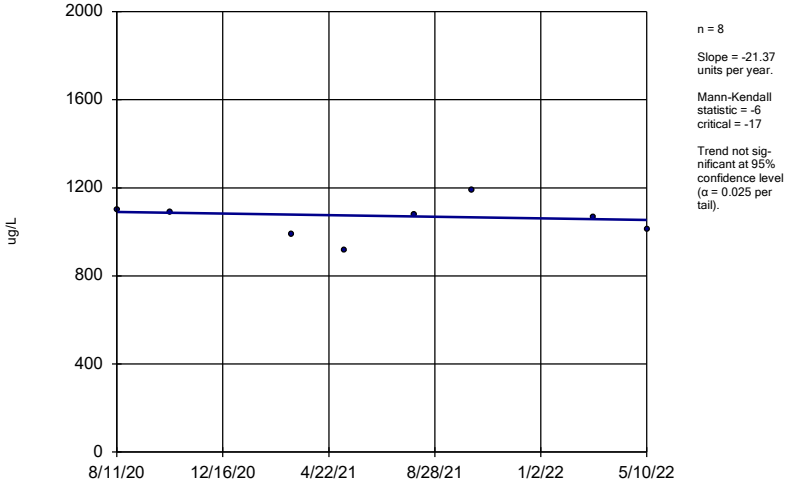
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

JCW-MW-18005



n = 8

Slope = -21.37 units per year.

Mann-Kendall statistic = -6 critical = -17

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

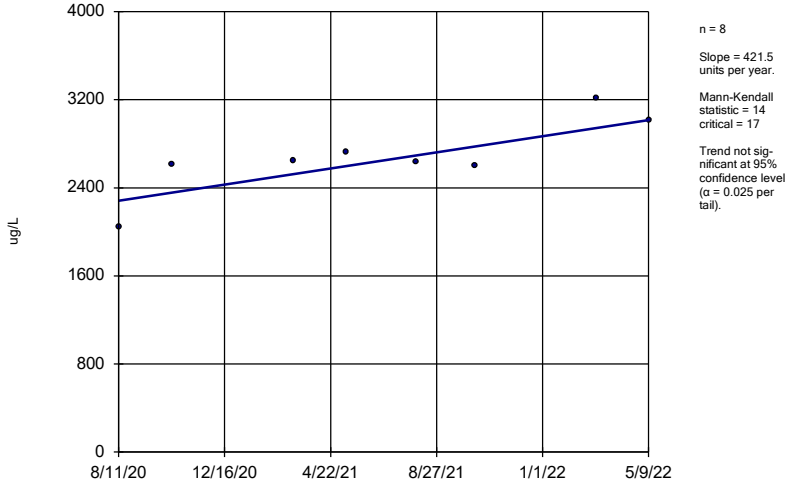
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

JCW-MW-18006



n = 8

Slope = 421.5 units per year.

Mann-Kendall statistic = 14 critical = 17

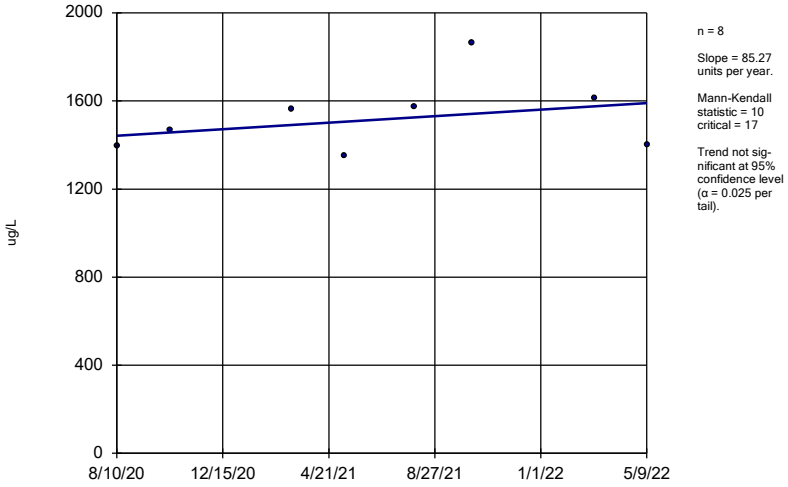
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Boron, Total

MW-50



n = 8

Slope = 85.27 units per year.

Mann-Kendall statistic = 10 critical = 17

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

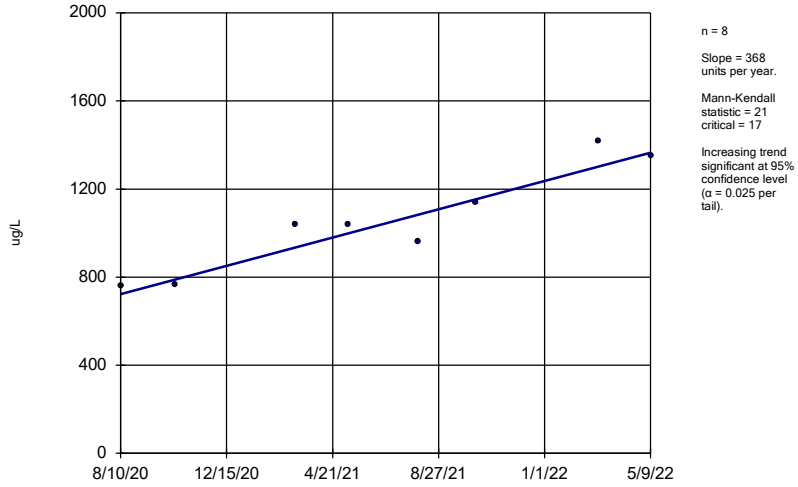
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-51



n = 8

Slope = 368 units per year.

Mann-Kendall statistic = 21 critical = 17

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

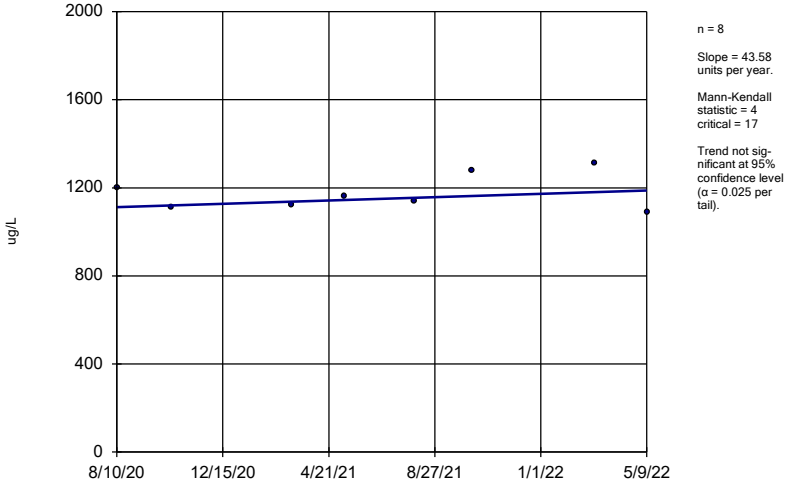
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-52



n = 8

Slope = 43.58 units per year.

Mann-Kendall statistic = 4 critical = 17

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

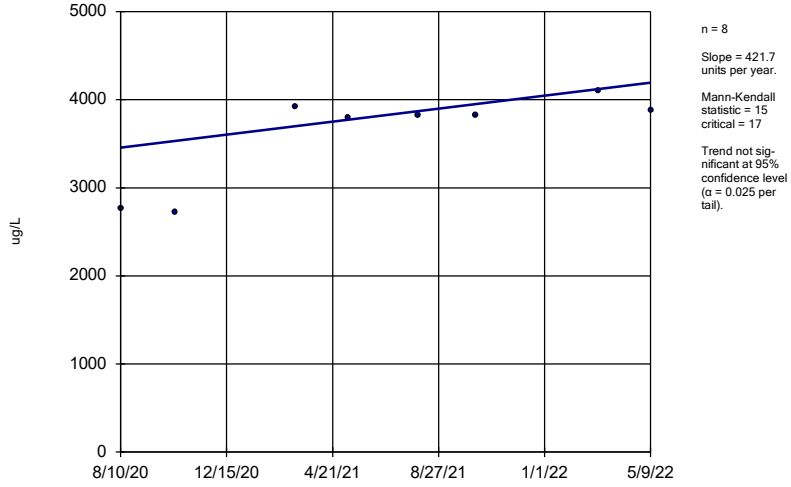
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-53



n = 8

Slope = 421.7 units per year.

Mann-Kendall statistic = 15 critical = 17

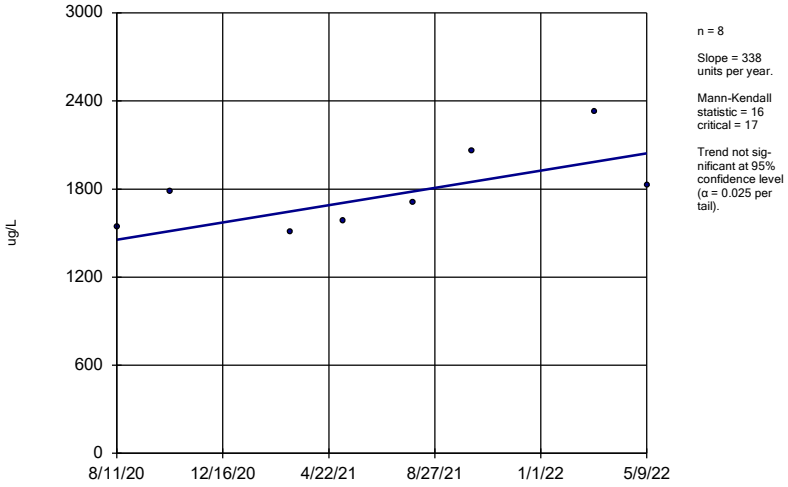
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Boron, Total

MW-53R



n = 8

Slope = 338 units per year.

Mann-Kendall statistic = 16 critical = 17

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

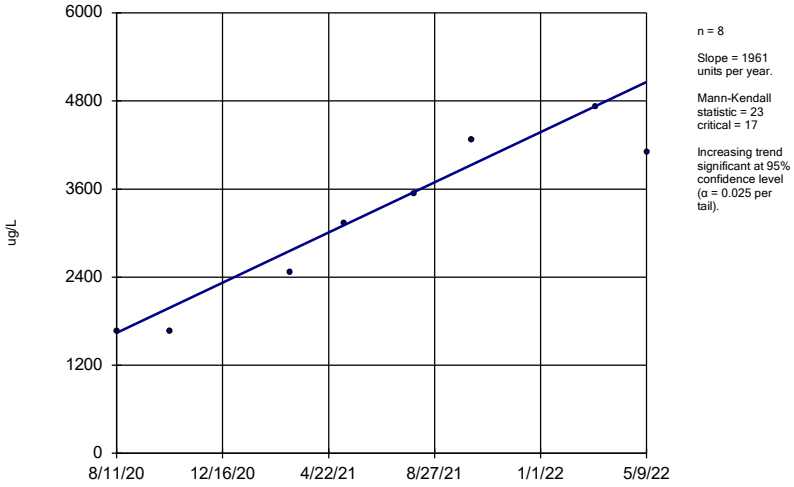
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-54R



n = 8

Slope = 1961 units per year.

Mann-Kendall statistic = 23 critical = 17

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

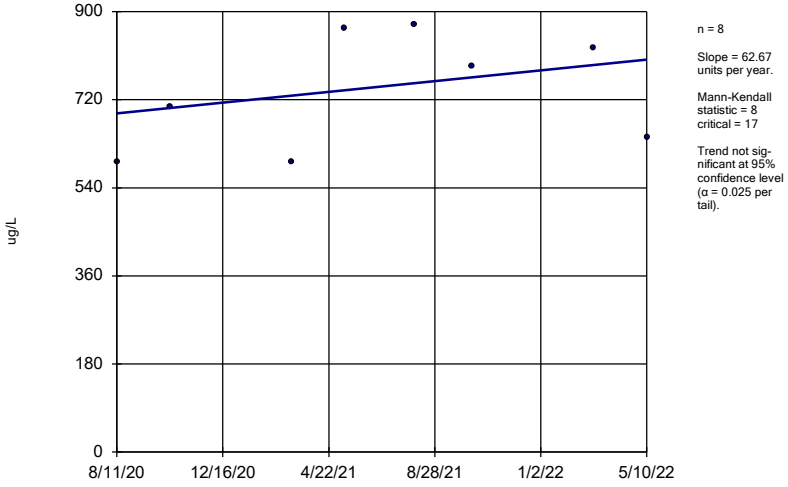
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-55



n = 8

Slope = 62.67 units per year.

Mann-Kendall statistic = 8 critical = 17

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

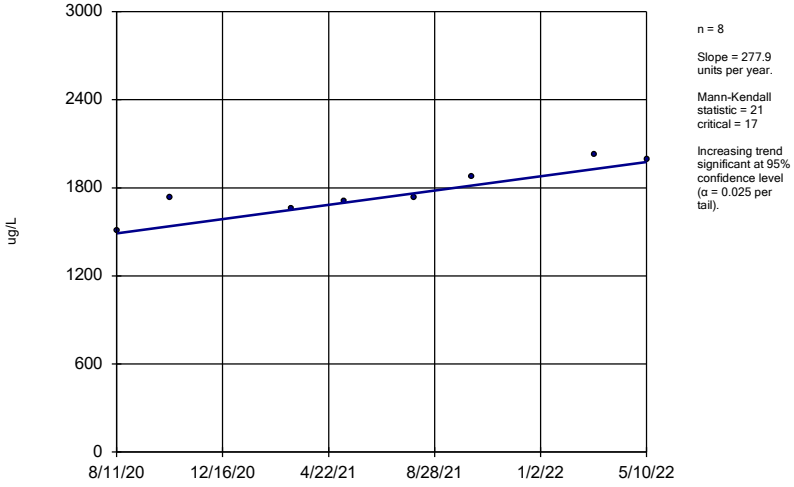
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

OW-57ROUT



n = 8

Slope = 277.9 units per year.

Mann-Kendall statistic = 21 critical = 17

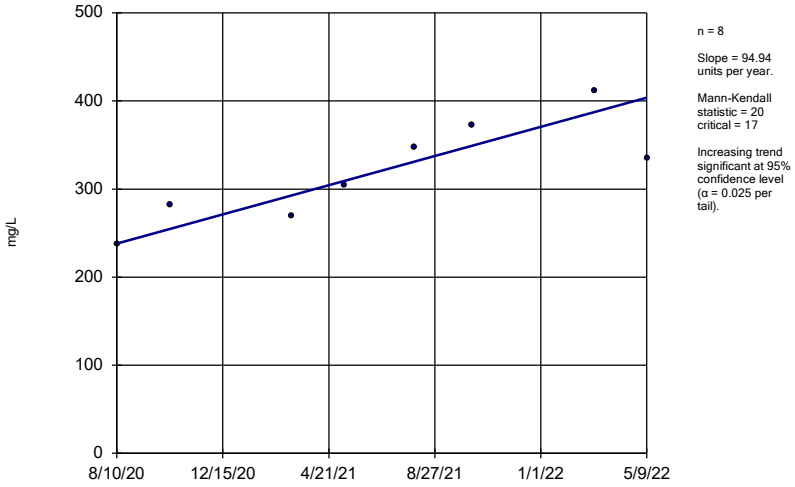
Increasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Calcium, Total

JCW-MW-18001



n = 8

Slope = 94.94 units per year.

Mann-Kendall statistic = 20 critical = 17

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

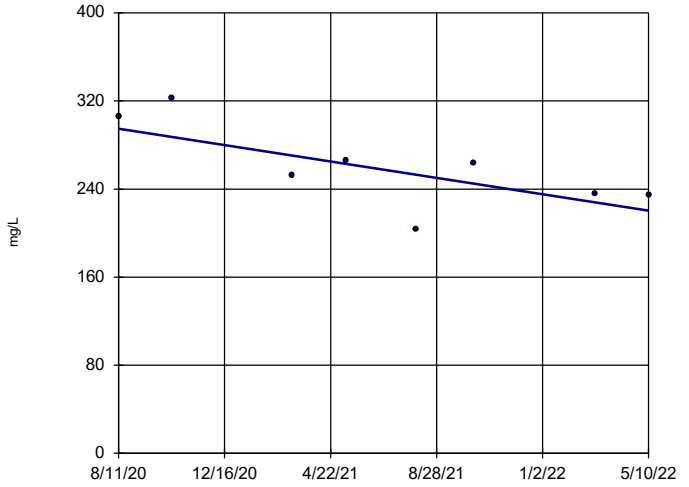
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

JCW-MW-18004



n = 8

Slope = -42.64 units per year.

Mann-Kendall statistic = -16 critical = -17

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

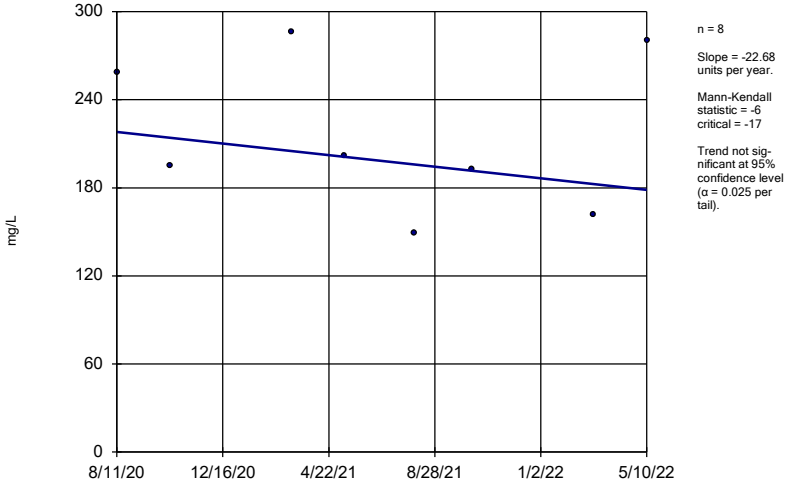
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

JCW-MW-18005



n = 8

Slope = -22.68 units per year.

Mann-Kendall statistic = -6 critical = -17

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

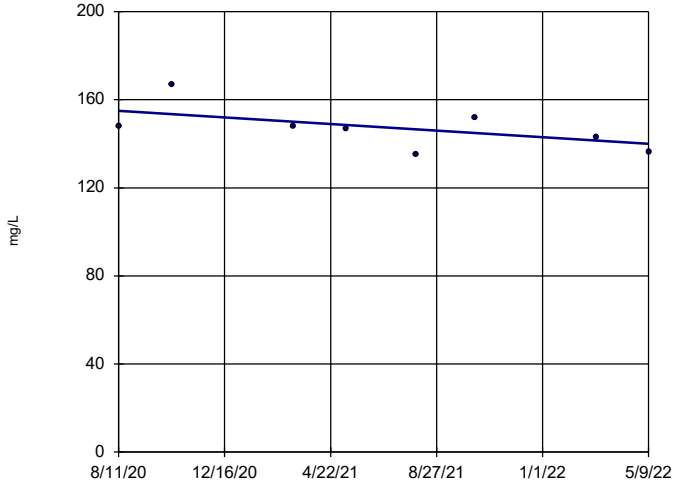
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

JCW-MW-18006



n = 8

Slope = -8.584 units per year.

Mann-Kendall statistic = -13 critical = -17

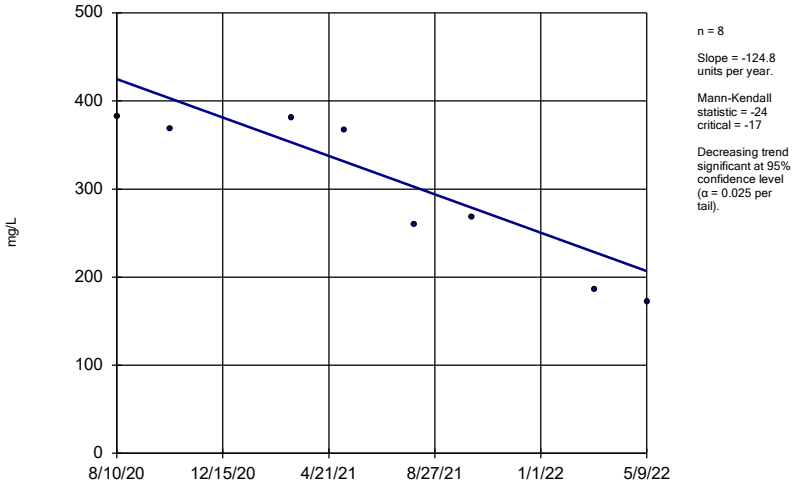
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Calcium, Total

MW-50



n = 8

Slope = -124.8 units per year.

Mann-Kendall statistic = -24 critical = -17

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

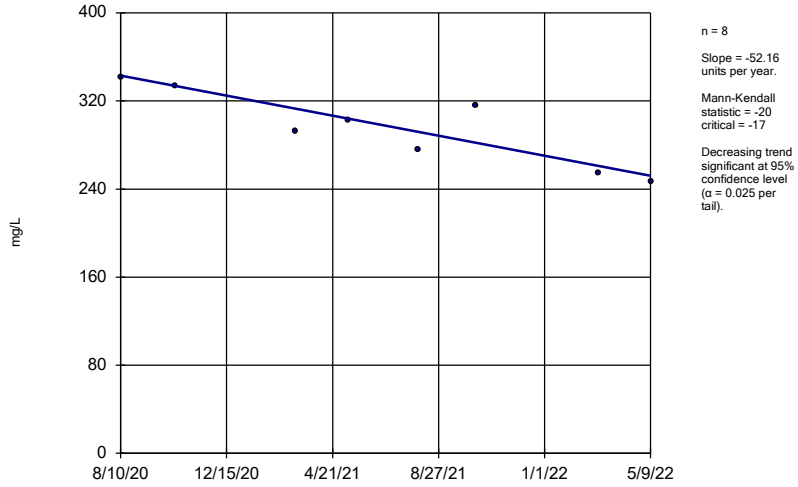
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

MW-51



n = 8

Slope = -52.16 units per year.

Mann-Kendall statistic = -20 critical = -17

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

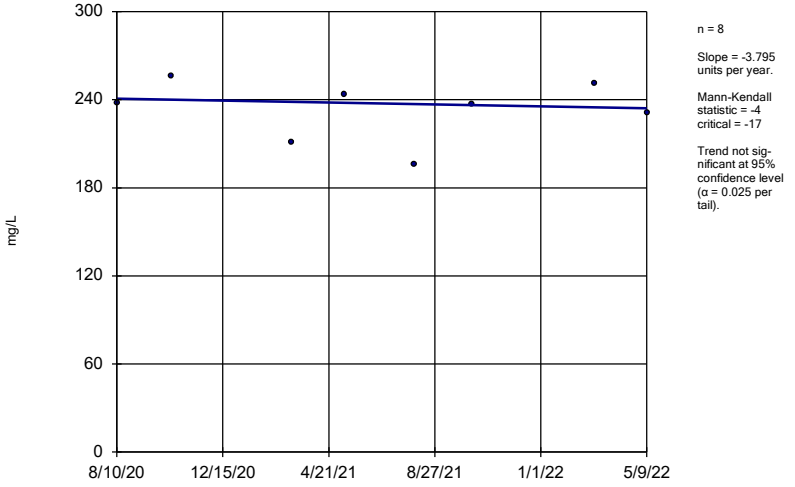
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

MW-52



n = 8

Slope = -3.795 units per year.

Mann-Kendall statistic = -4 critical = -17

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

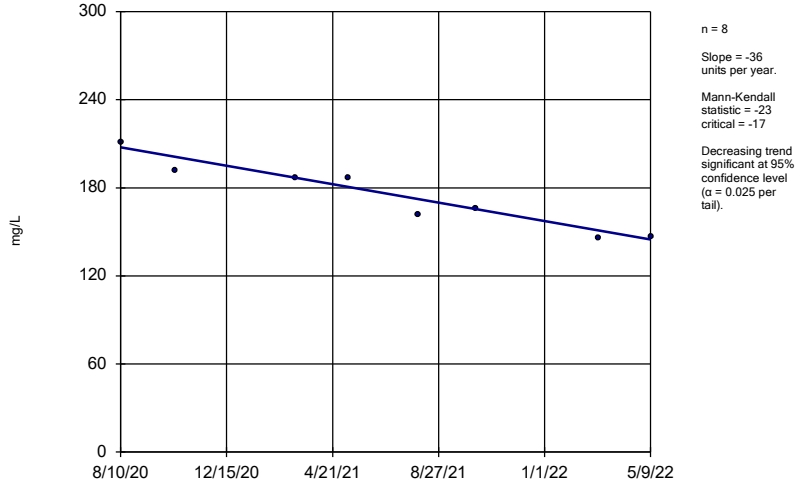
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

MW-53



n = 8

Slope = -36 units per year.

Mann-Kendall statistic = -23 critical = -17

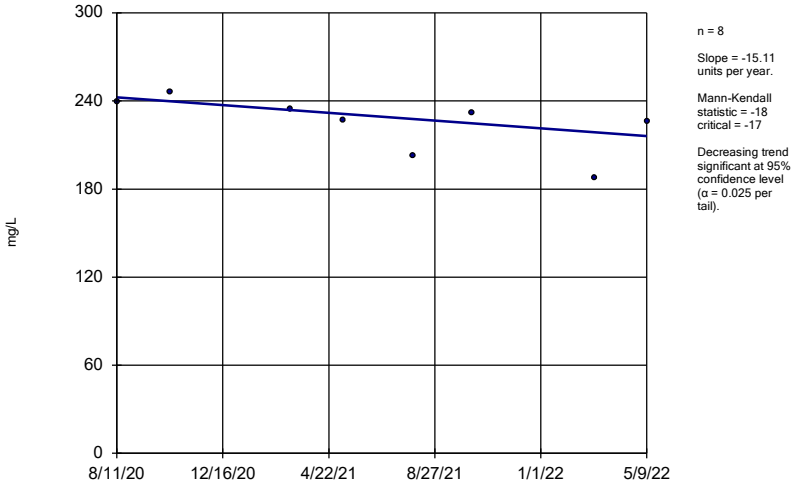
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Calcium, Total

MW-53R



n = 8

Slope = -15.11 units per year.

Mann-Kendall statistic = -18
critical = -17

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

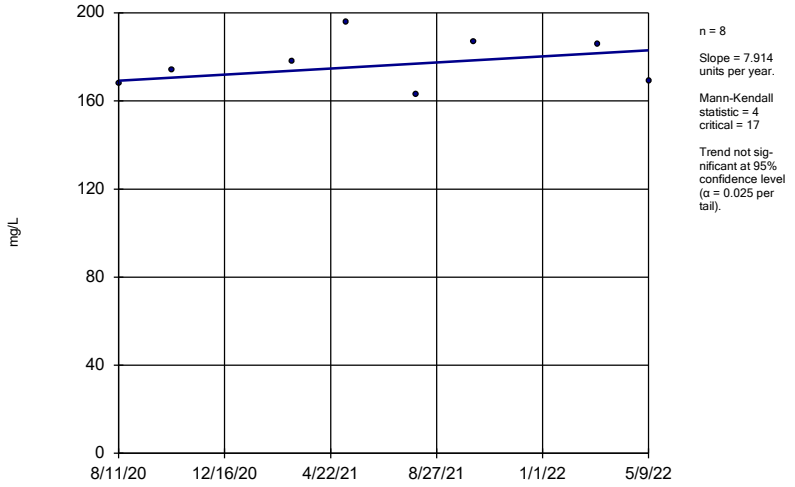
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

MW-54R



n = 8

Slope = 7.914 units per year.

Mann-Kendall statistic = 4
critical = 17

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

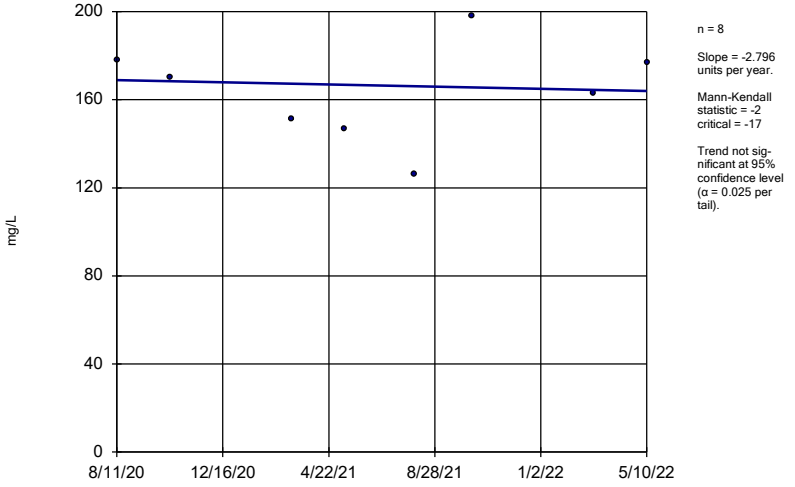
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

MW-55



n = 8

Slope = -2.796 units per year.

Mann-Kendall statistic = -2
critical = -17

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

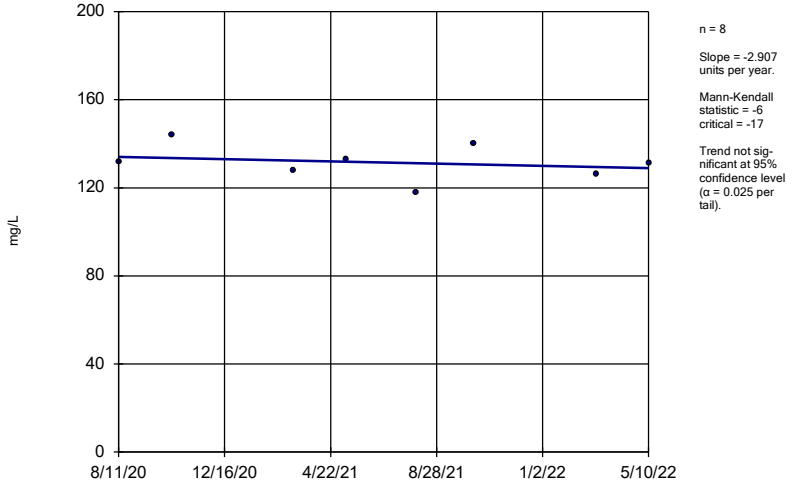
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

OW-57ROUT



n = 8

Slope = -2.907 units per year.

Mann-Kendall statistic = -6
critical = -17

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

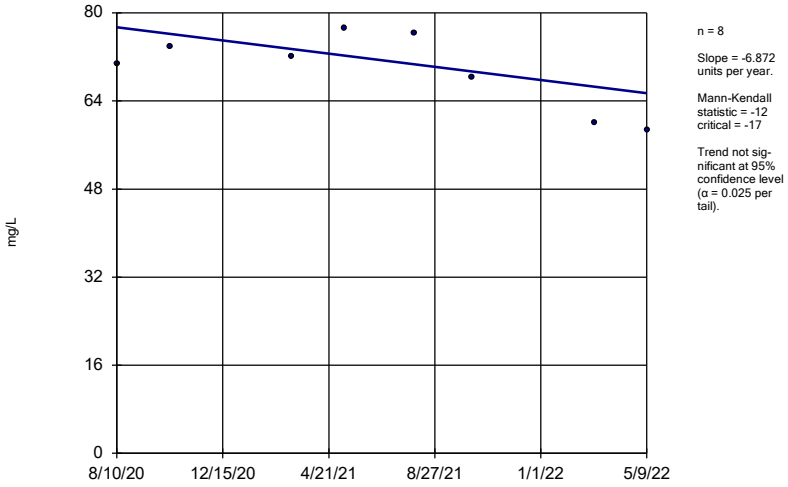
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

JCW-MW-18001



n = 8

Slope = -6.872 units per year.

Mann-Kendall statistic = -12
critical = -17

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

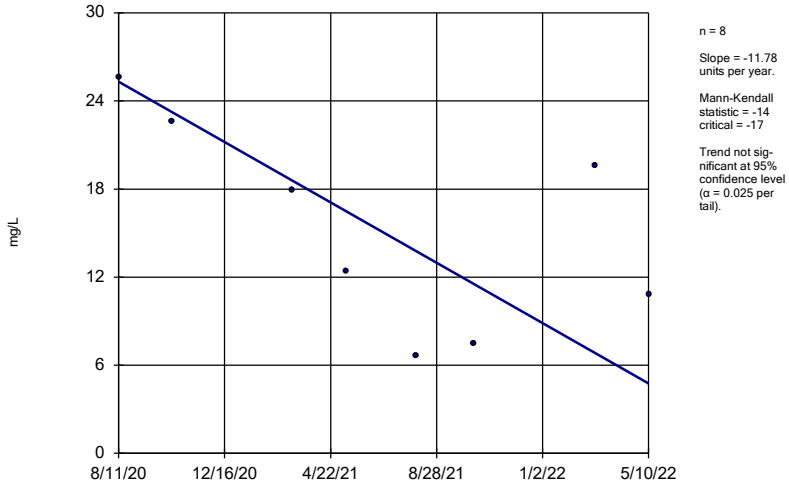
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

JCW-MW-18004



n = 8

Slope = -11.78 units per year.

Mann-Kendall statistic = -14
critical = -17

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

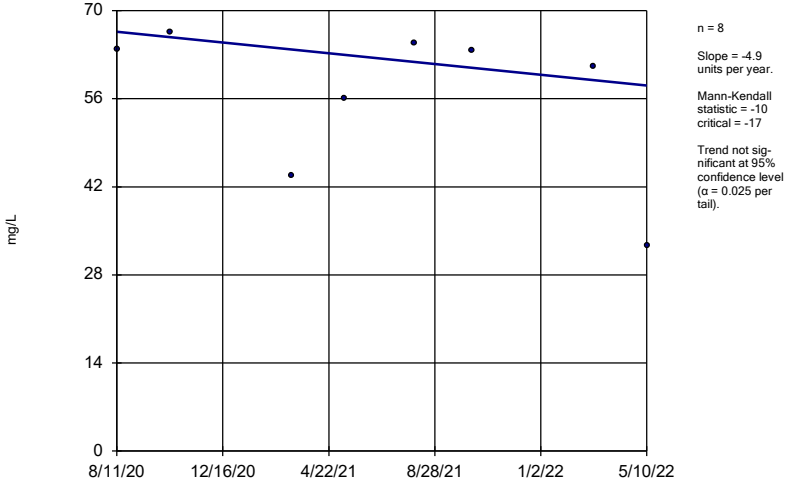
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

JCW-MW-18005



n = 8

Slope = -4.9 units per year.

Mann-Kendall statistic = -10
critical = -17

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

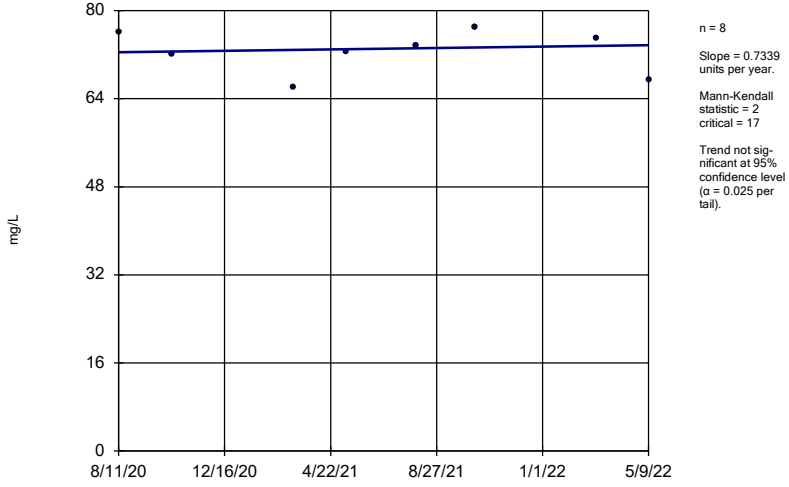
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

JCW-MW-18006



n = 8

Slope = 0.7339 units per year.

Mann-Kendall statistic = 2
critical = 17

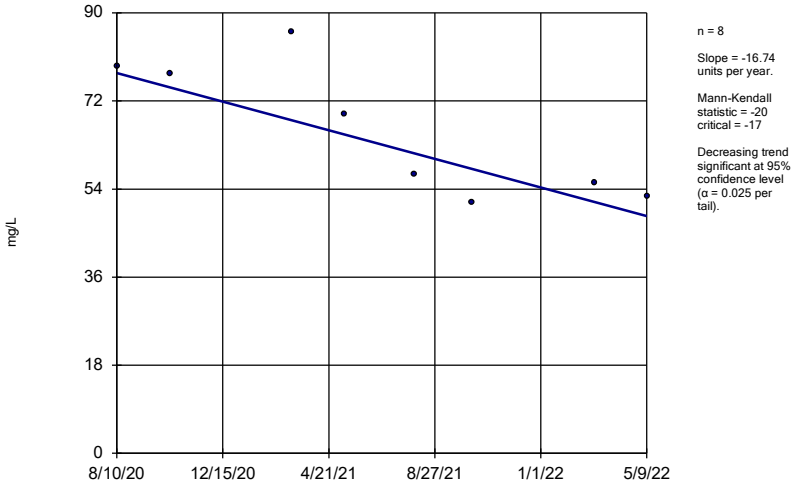
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Chloride

MW-50



n = 8

Slope = -16.74 units per year.

Mann-Kendall statistic = -20 critical = -17

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

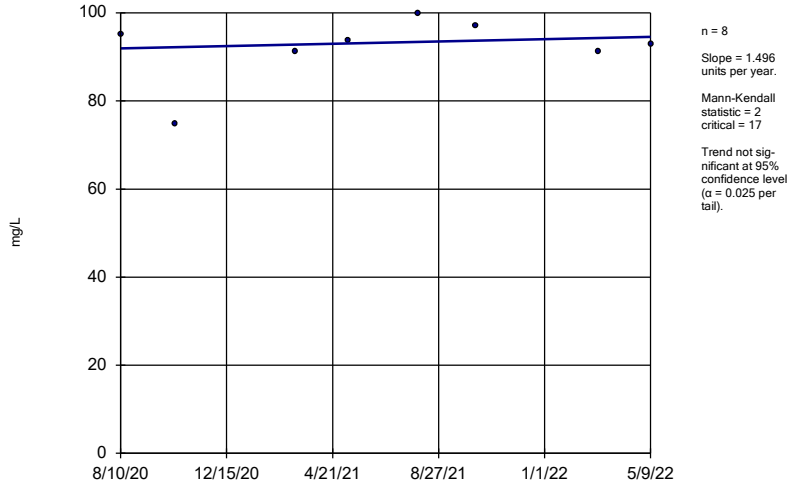
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

MW-51



n = 8

Slope = 1.496 units per year.

Mann-Kendall statistic = 2 critical = 17

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

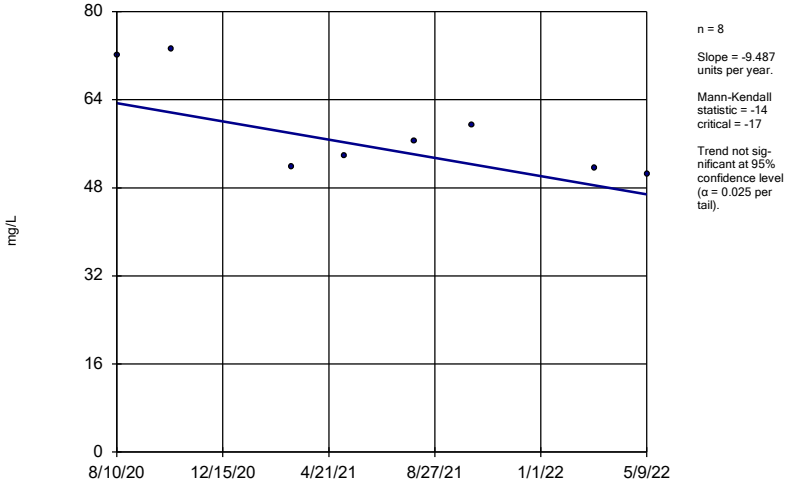
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

MW-52



n = 8

Slope = -9.487 units per year.

Mann-Kendall statistic = -14 critical = -17

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

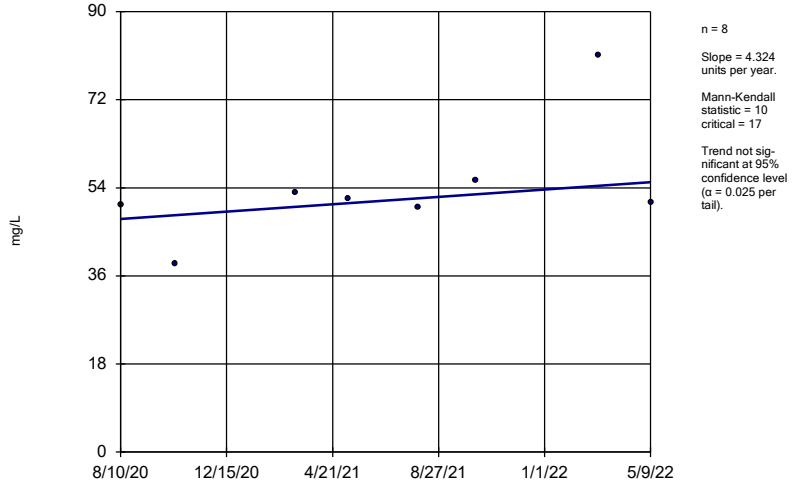
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

MW-53



n = 8

Slope = 4.324 units per year.

Mann-Kendall statistic = 10 critical = 17

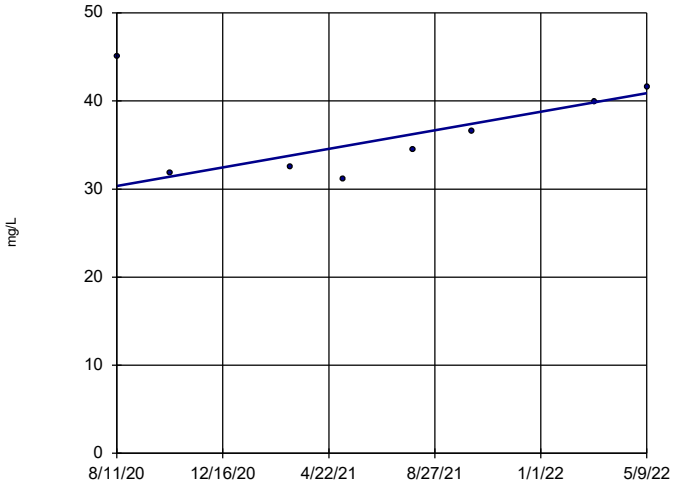
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Chloride

MW-53R



n = 8

Slope = 6.025 units per year.

Mann-Kendall statistic = 10 critical = 17

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

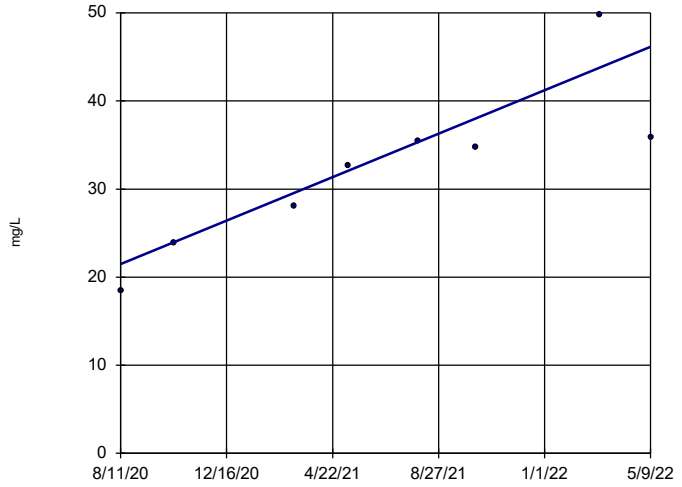
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

MW-54R



n = 8

Slope = 14.17 units per year.

Mann-Kendall statistic = 24 critical = 17

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

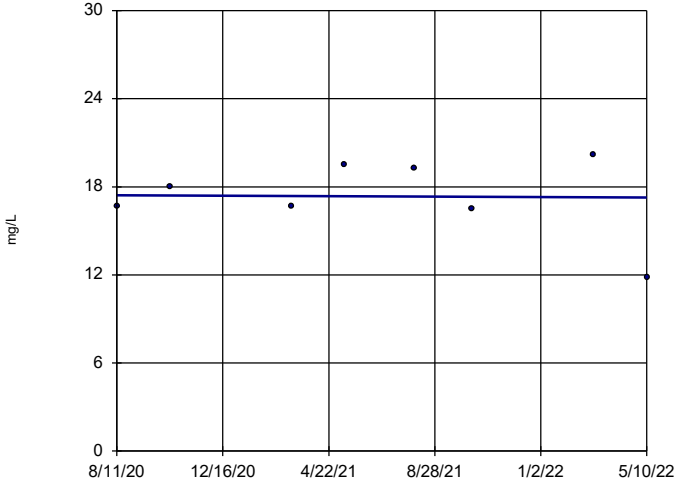
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

MW-55



n = 8

Slope = -0.08548 units per year.

Mann-Kendall statistic = -1 critical = -17

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

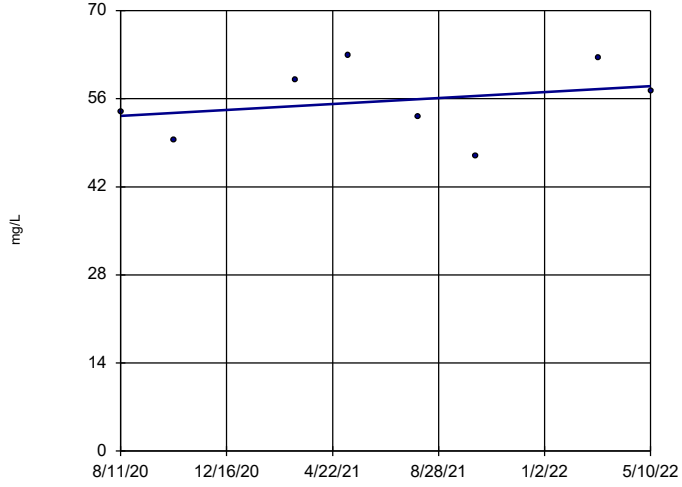
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

OW-57ROUT



n = 8

Slope = 2.724 units per year.

Mann-Kendall statistic = 2 critical = 17

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

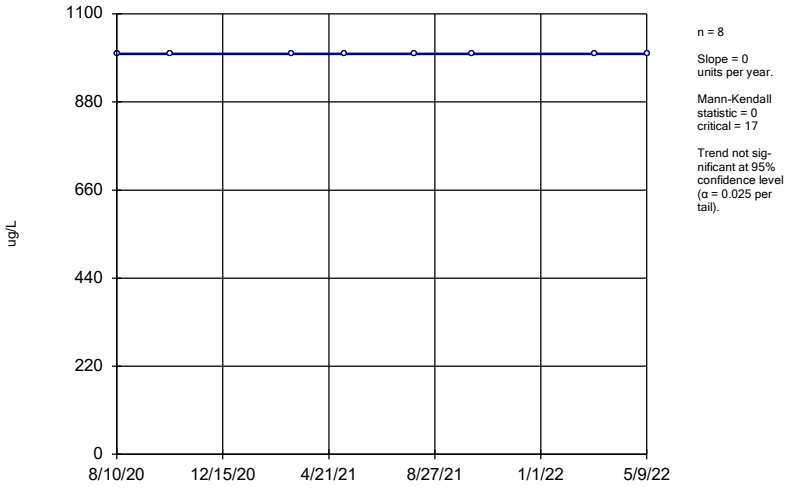
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Fluoride

JCW-MW-18001



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

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

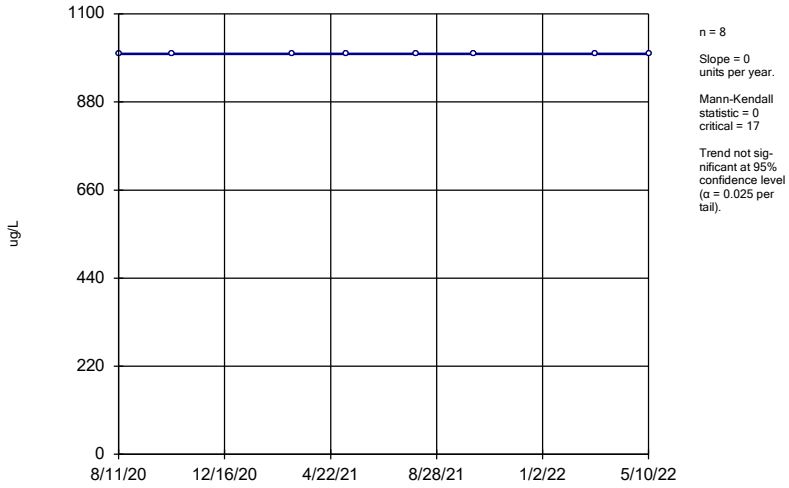
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Fluoride

JCW-MW-18004



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

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

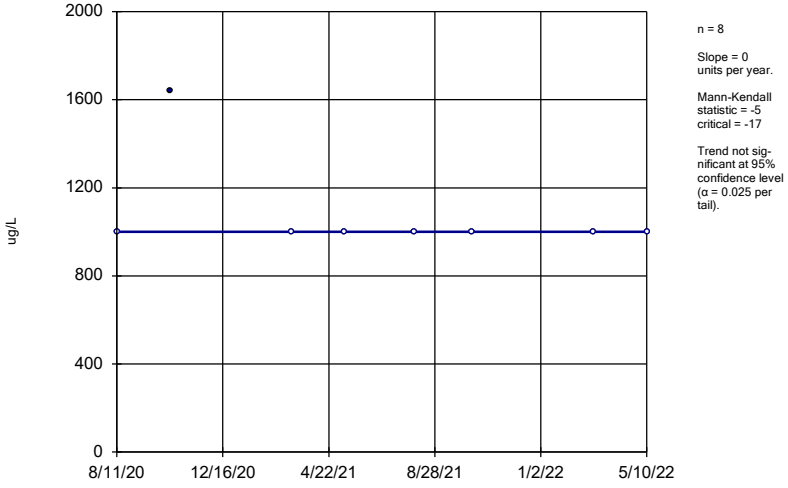
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Fluoride

JCW-MW-18005



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -5 critical = -17

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

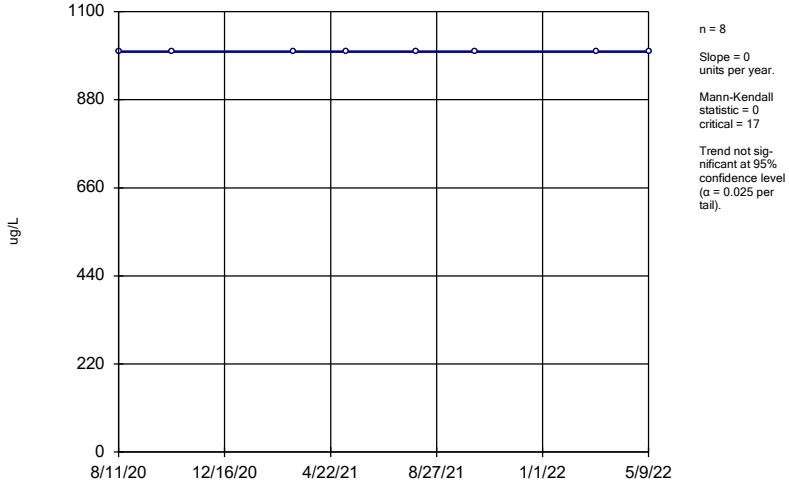
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Fluoride

JCW-MW-18006



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

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

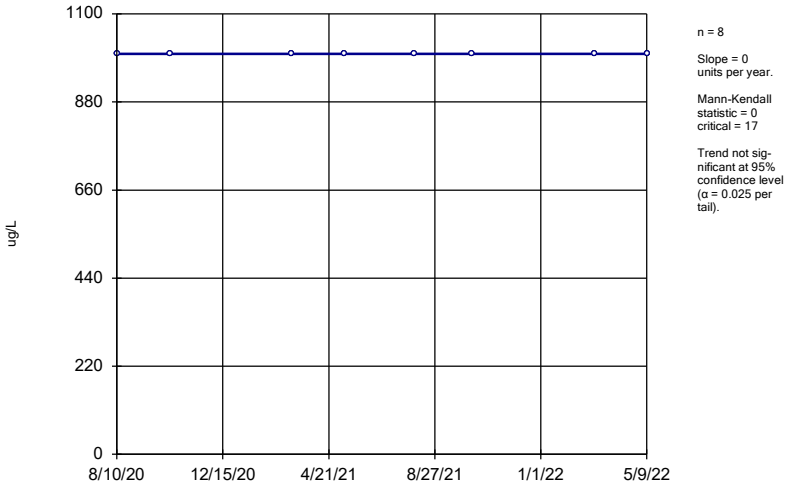
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Fluoride

MW-50



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

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

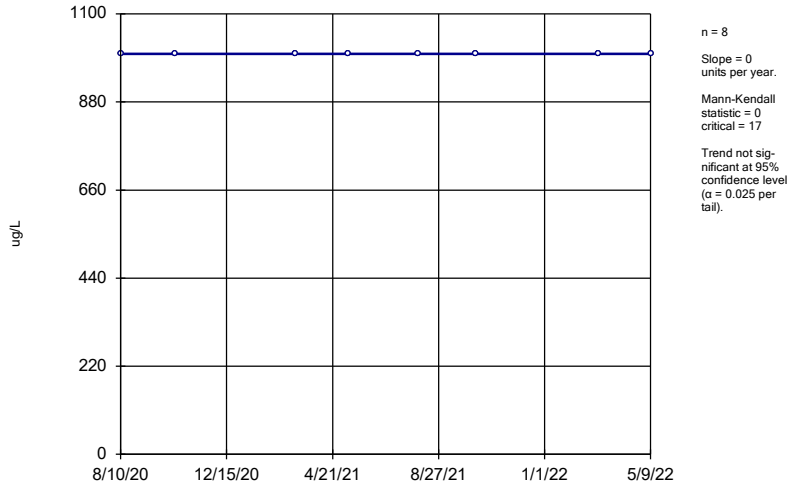
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Fluoride

MW-51



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

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

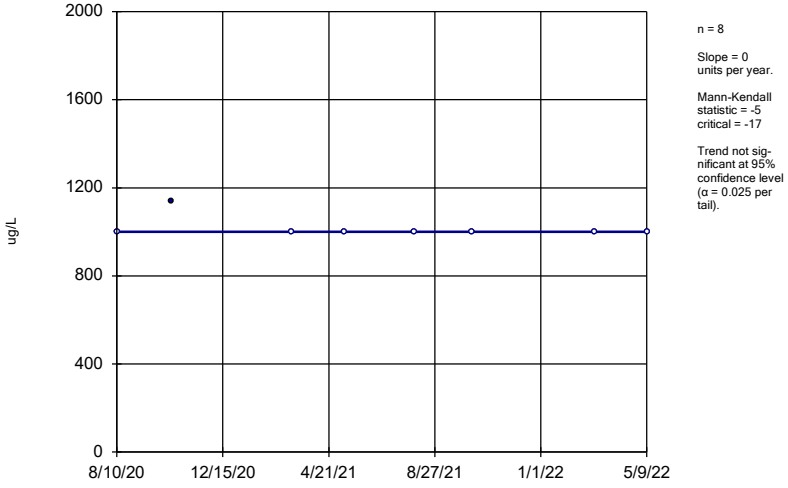
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Fluoride

MW-52



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -5 critical = -17

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

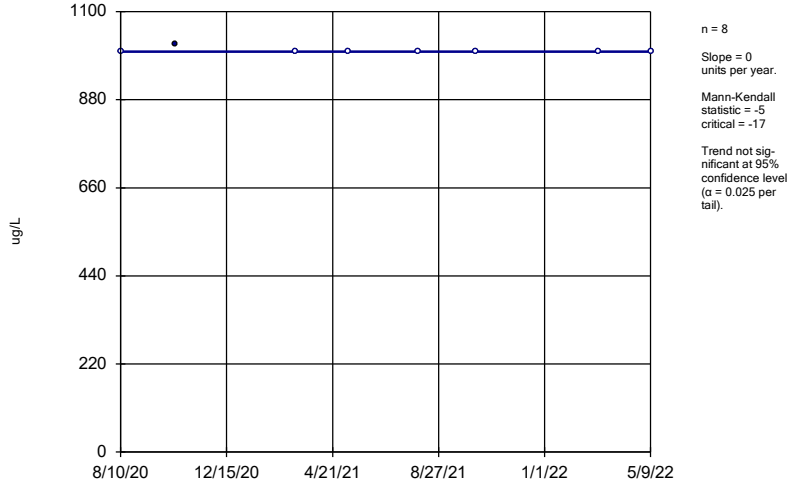
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Fluoride

MW-53



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -5 critical = -17

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

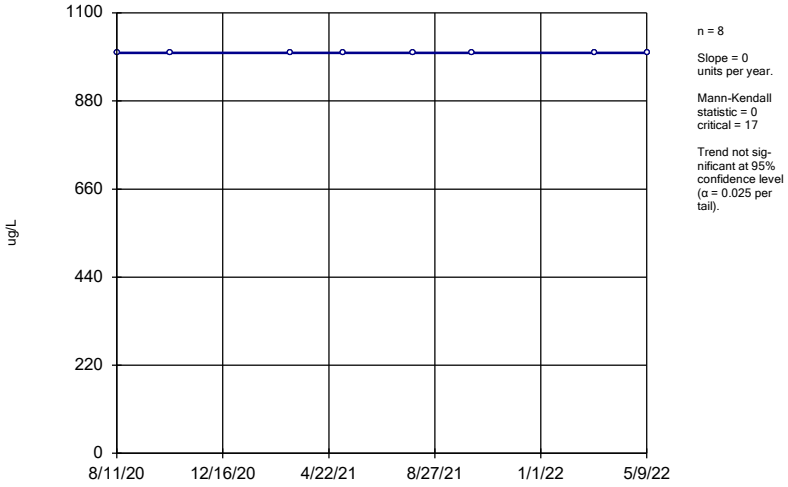
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Fluoride

MW-53R



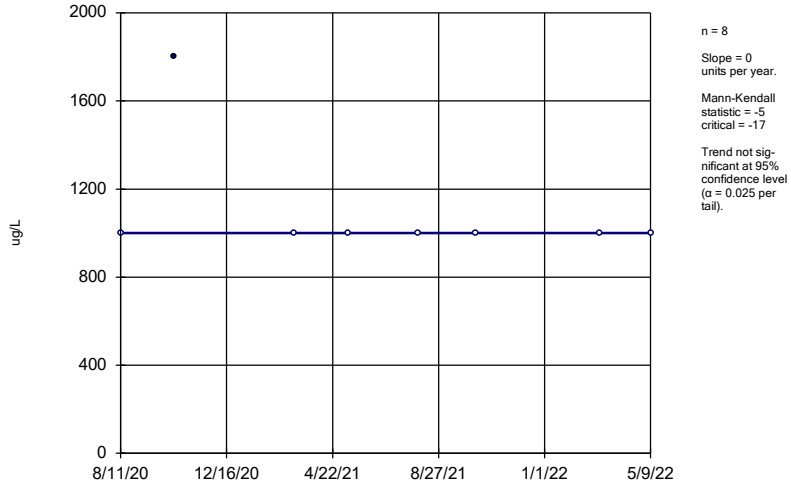
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Fluoride

MW-54R



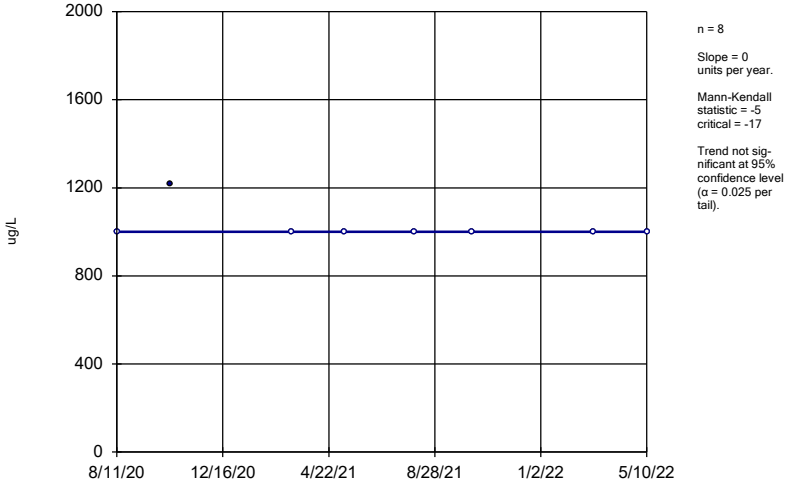
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Fluoride

MW-55



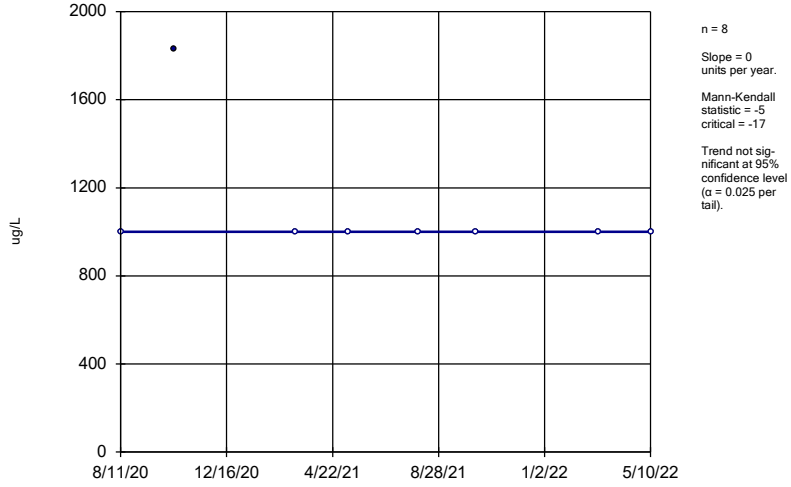
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Fluoride

OW-57ROUT



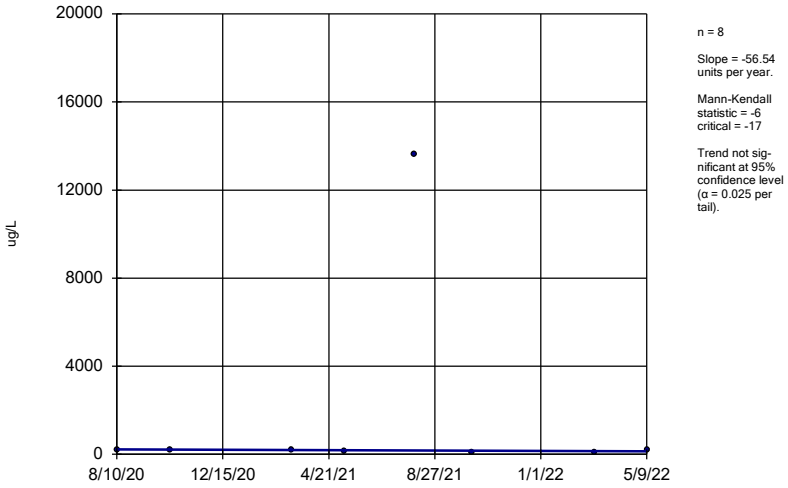
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

JCW-MW-18001



n = 8

Slope = -56.54 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 6/10/2022 12:21 PM

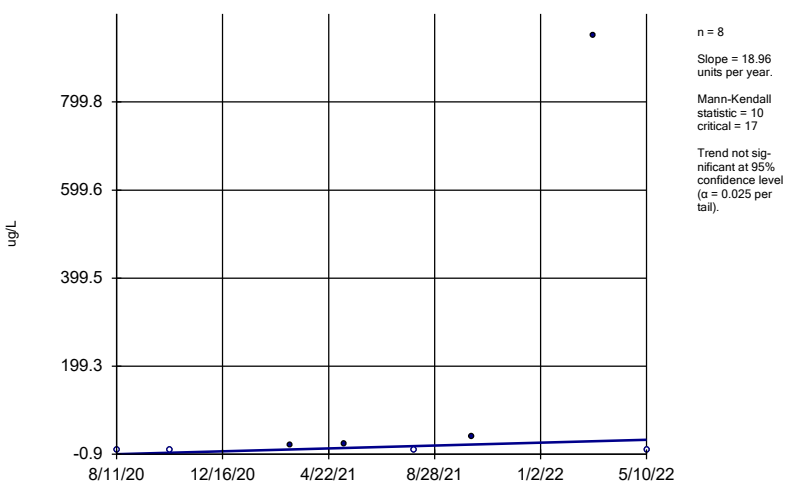
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Hollow symbols indicate censored values.

Iron, Total

JCW-MW-18004



n = 8

Slope = 18.96 units per year.

Mann-Kendall statistic = 10 critical = 17

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

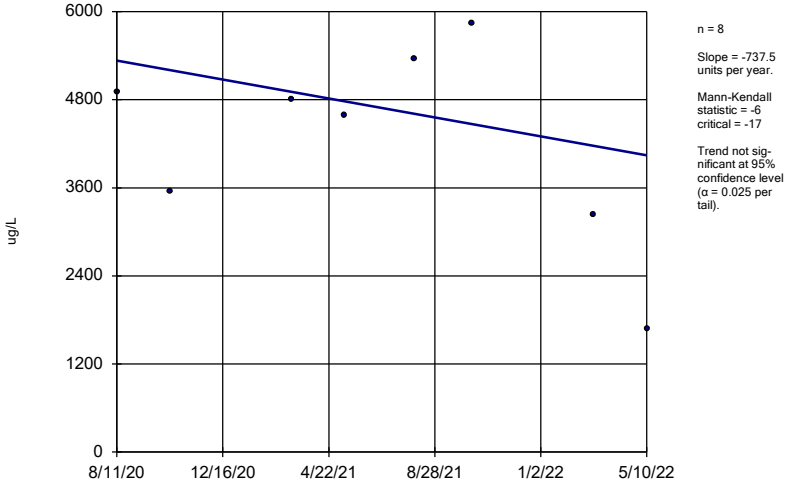
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

JCW-MW-18005



n = 8

Slope = -737.5 units per year.

Mann-Kendall statistic = -6 critical = -17

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

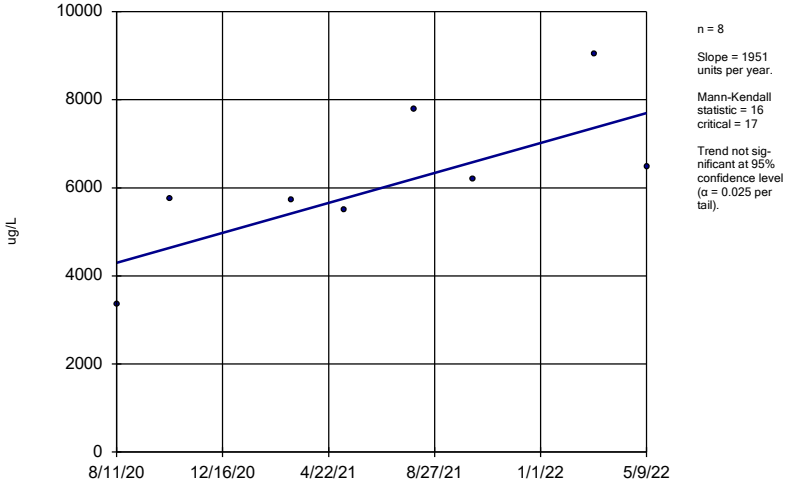
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

JCW-MW-18006



n = 8

Slope = 1951 units per year.

Mann-Kendall statistic = 16 critical = 17

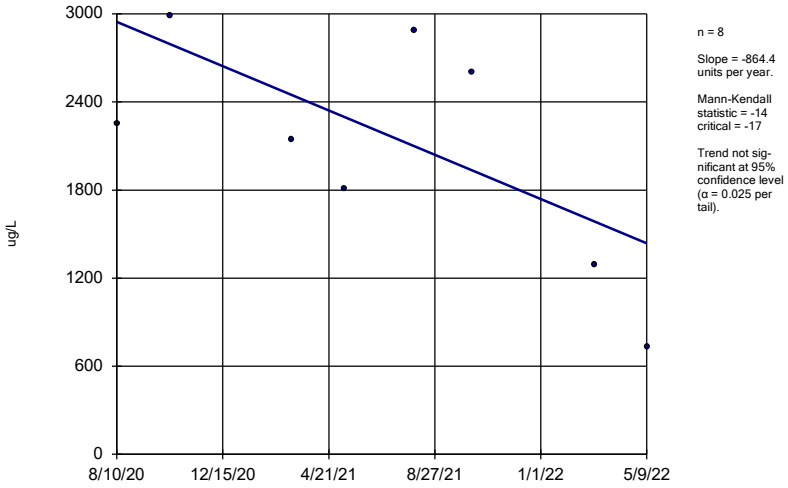
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Iron, Total

MW-50



n = 8

Slope = -864.4 units per year.

Mann-Kendall statistic = -14
critical = -17

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

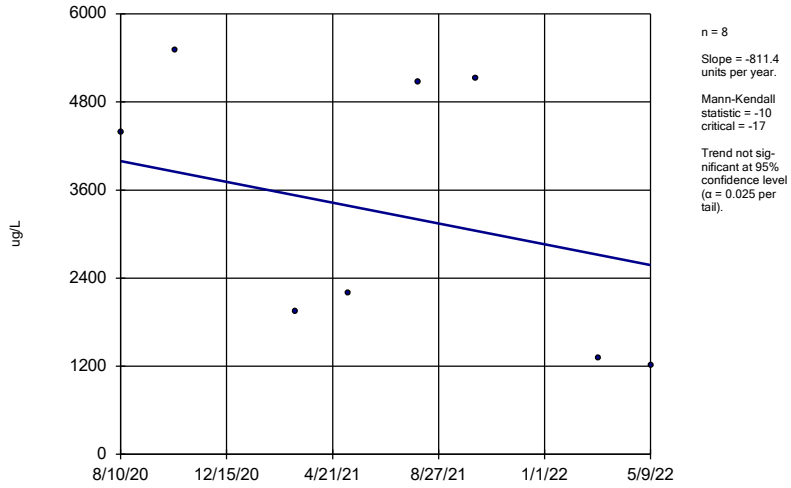
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

MW-51



n = 8

Slope = -811.4 units per year.

Mann-Kendall statistic = -10
critical = -17

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

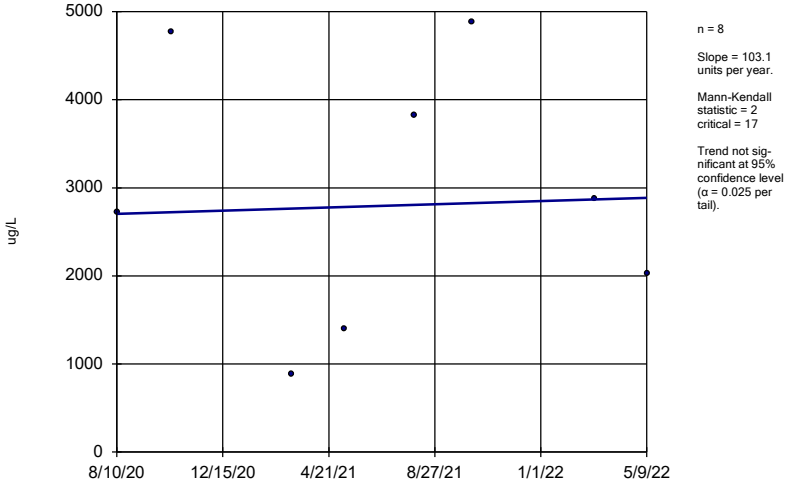
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

MW-52



n = 8

Slope = 103.1 units per year.

Mann-Kendall statistic = 2
critical = 17

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

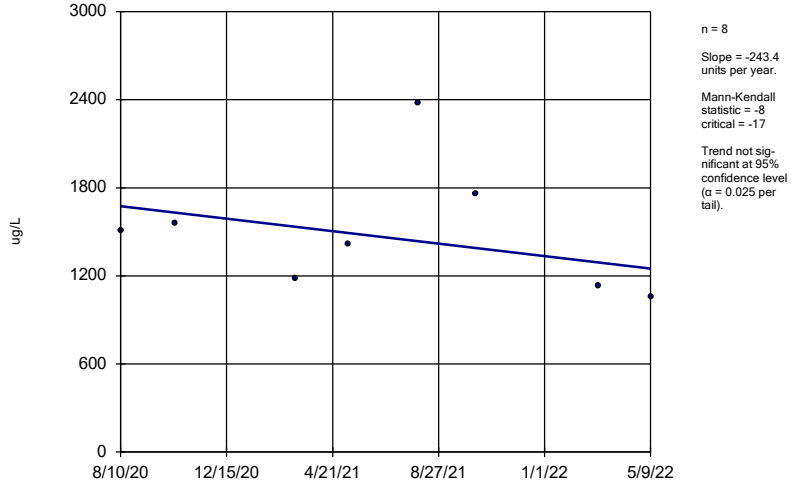
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

MW-53



n = 8

Slope = -243.4 units per year.

Mann-Kendall statistic = -8
critical = -17

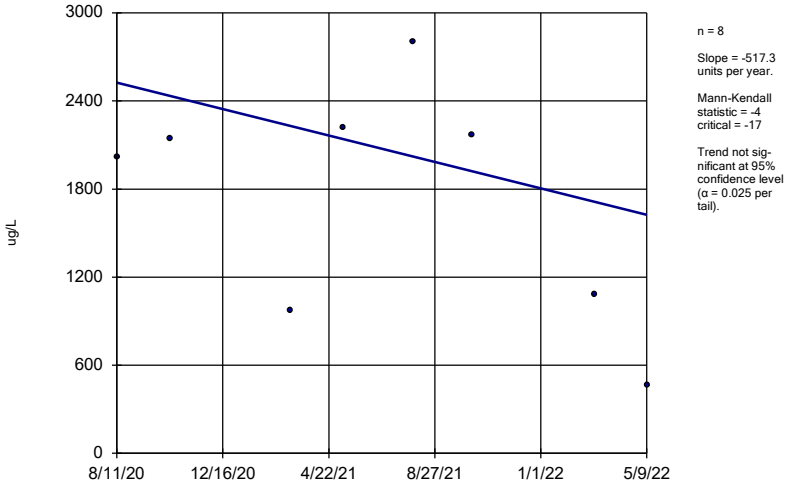
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Iron, Total

MW-53R



n = 8

Slope = -517.3 units per year.

Mann-Kendall statistic = -4 critical = -17

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

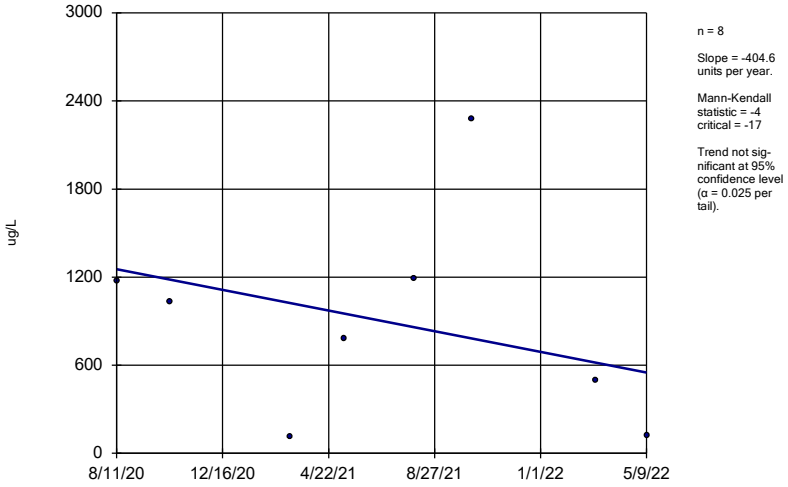
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

MW-54R



n = 8

Slope = -404.6 units per year.

Mann-Kendall statistic = -4 critical = -17

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

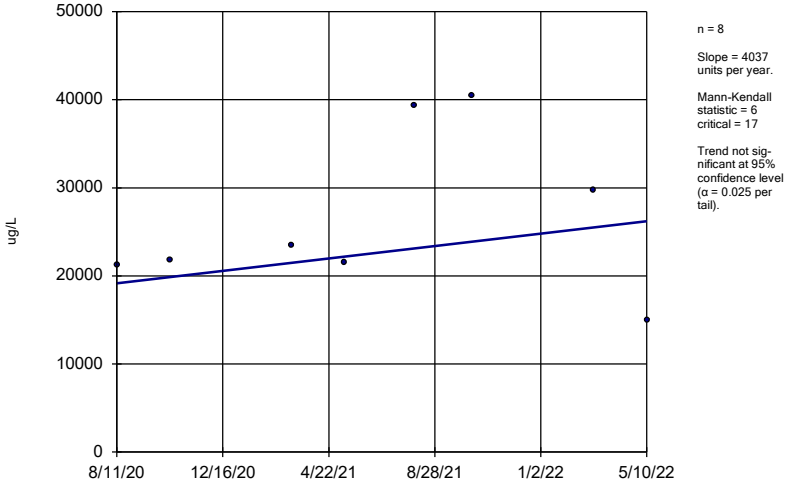
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

MW-55



n = 8

Slope = 4037 units per year.

Mann-Kendall statistic = 6 critical = 17

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

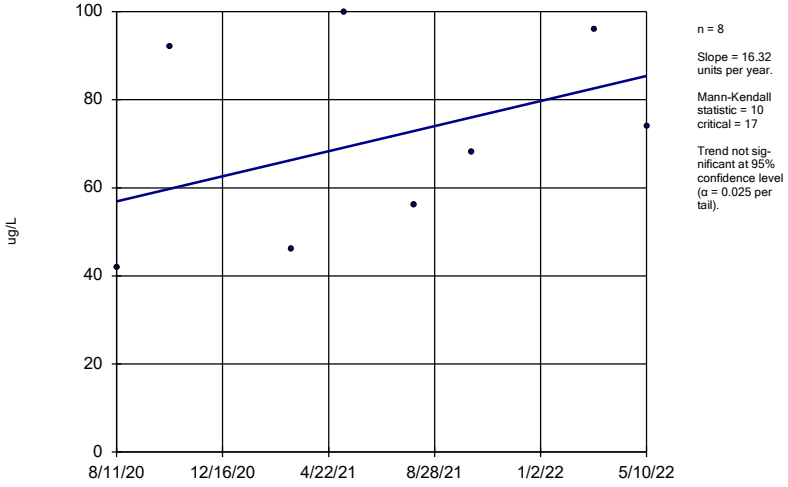
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

OW-57ROUT



n = 8

Slope = 16.32 units per year.

Mann-Kendall statistic = 10 critical = 17

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

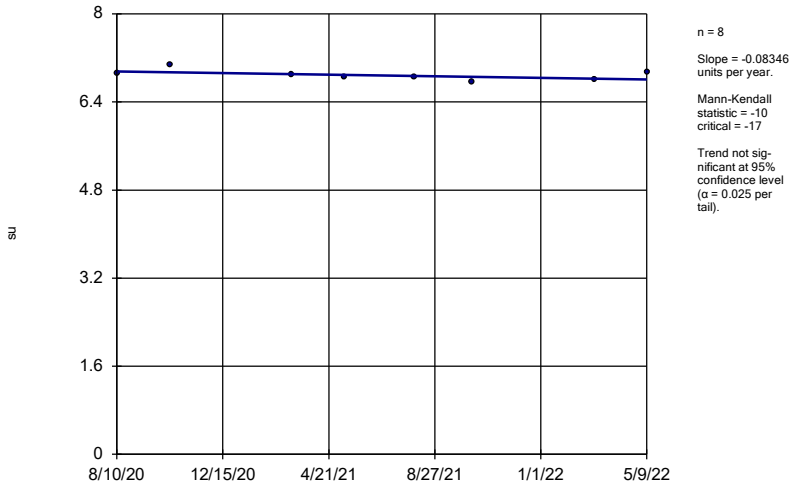
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

JCW-MW-18001



n = 8

Slope = -0.08346 units per year.

Mann-Kendall statistic = -10
critical = -17

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

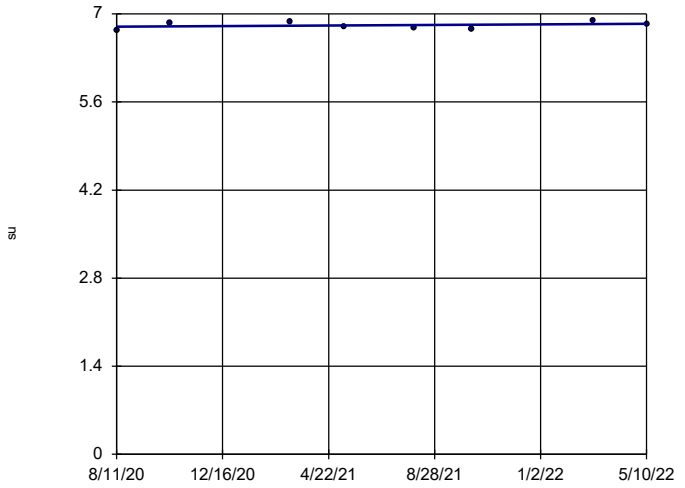
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

JCW-MW-18004



n = 8

Slope = 0.02437 units per year.

Mann-Kendall statistic = 4
critical = 17

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

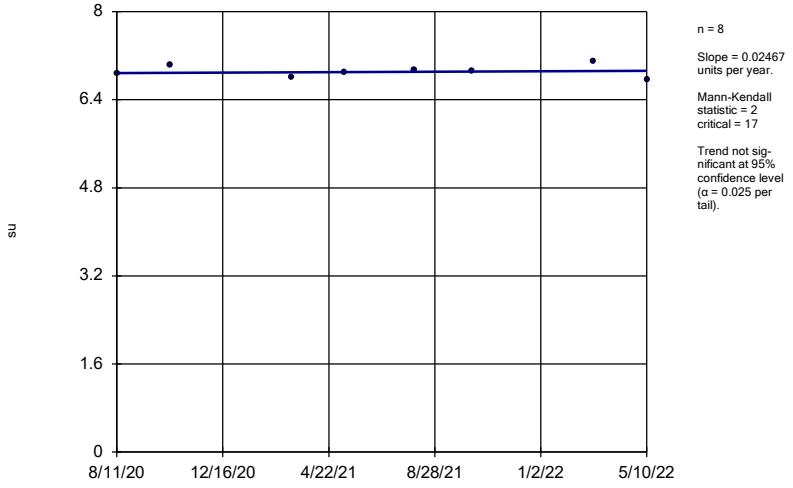
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

JCW-MW-18005



n = 8

Slope = 0.02467 units per year.

Mann-Kendall statistic = 2
critical = 17

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

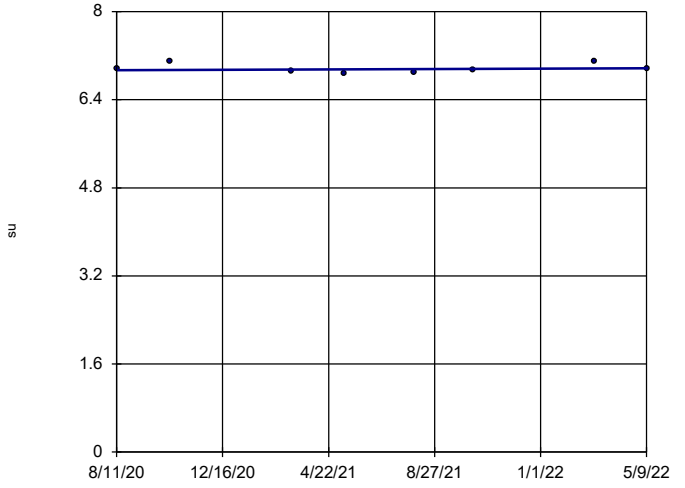
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

JCW-MW-18006



n = 8

Slope = 0.02033 units per year.

Mann-Kendall statistic = 3
critical = 17

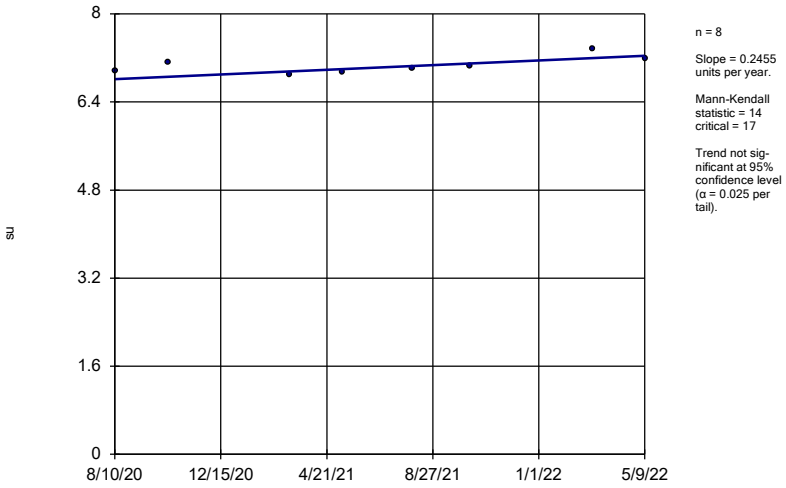
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

pH, Field

MW-50



n = 8

Slope = 0.2455 units per year.

Mann-Kendall statistic = 14 critical = 17

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

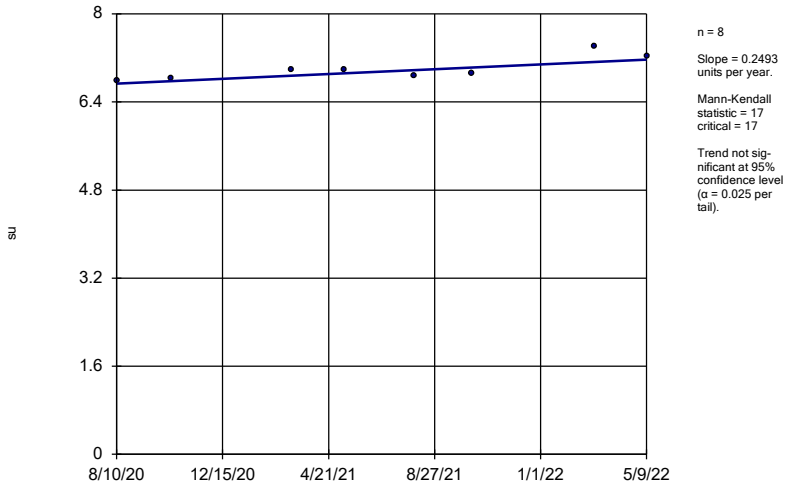
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

MW-51



n = 8

Slope = 0.2493 units per year.

Mann-Kendall statistic = 17 critical = 17

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

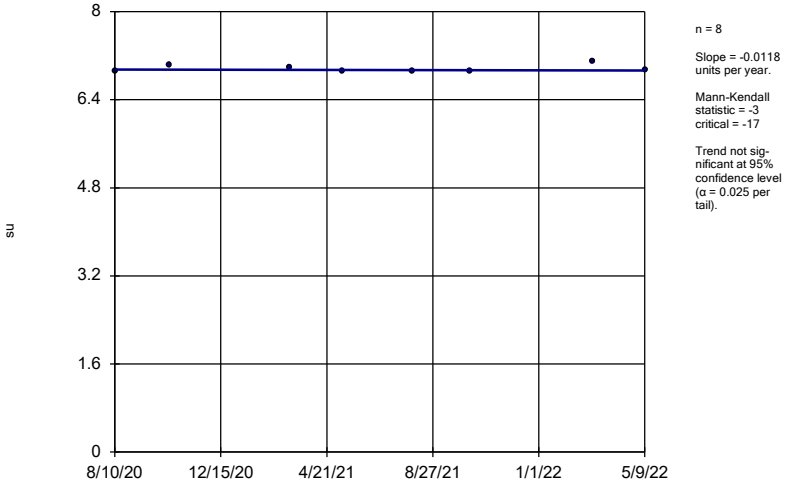
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

MW-52



n = 8

Slope = -0.0118 units per year.

Mann-Kendall statistic = -3 critical = -17

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

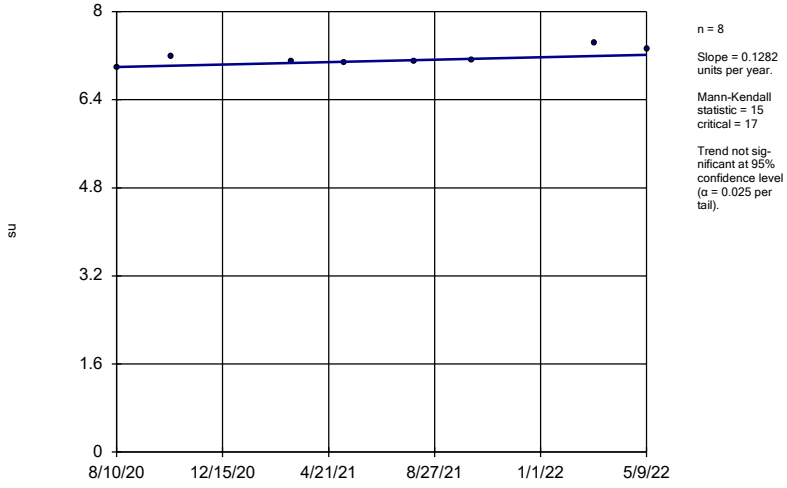
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

MW-53



n = 8

Slope = 0.1282 units per year.

Mann-Kendall statistic = 15 critical = 17

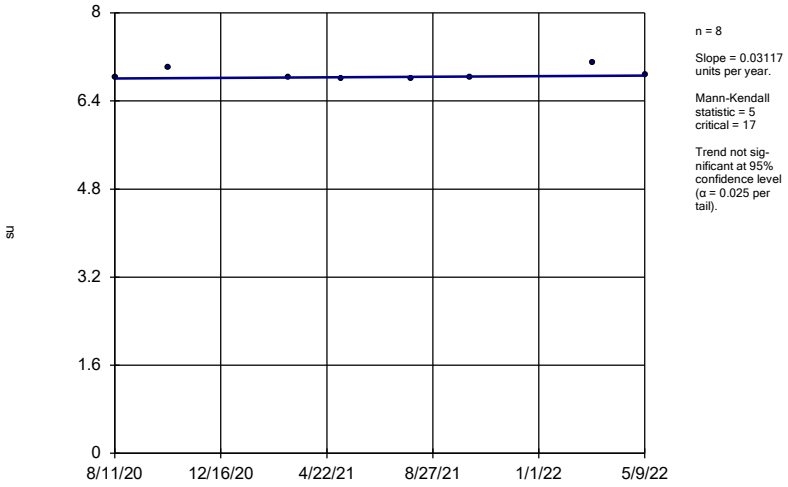
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

pH, Field

MW-53R



n = 8

Slope = 0.03117 units per year.

Mann-Kendall statistic = 5
critical = 17

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

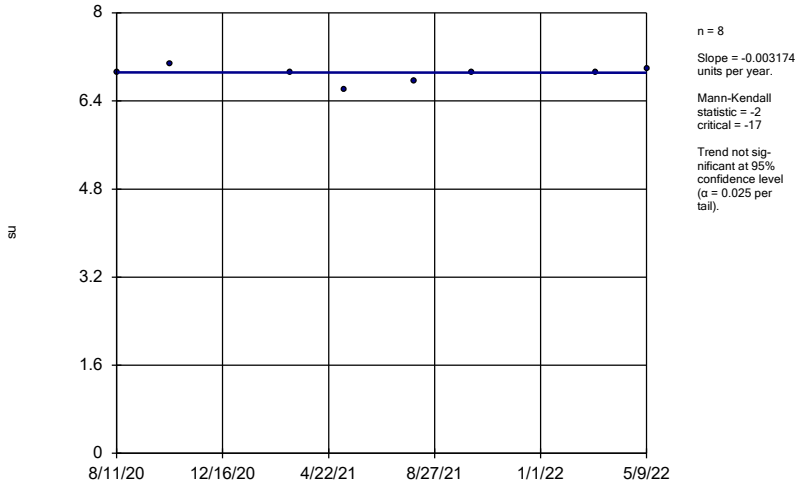
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

MW-54R



n = 8

Slope = -0.003174 units per year.

Mann-Kendall statistic = -2
critical = -17

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

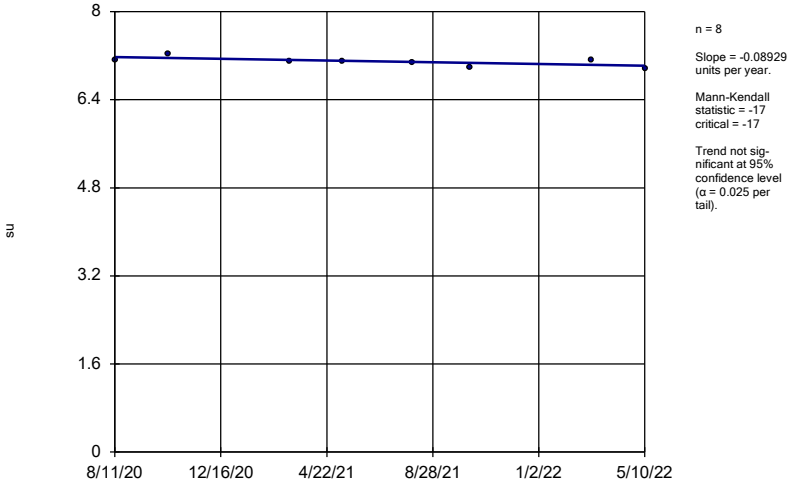
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

MW-55



n = 8

Slope = -0.08929 units per year.

Mann-Kendall statistic = -17
critical = -17

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

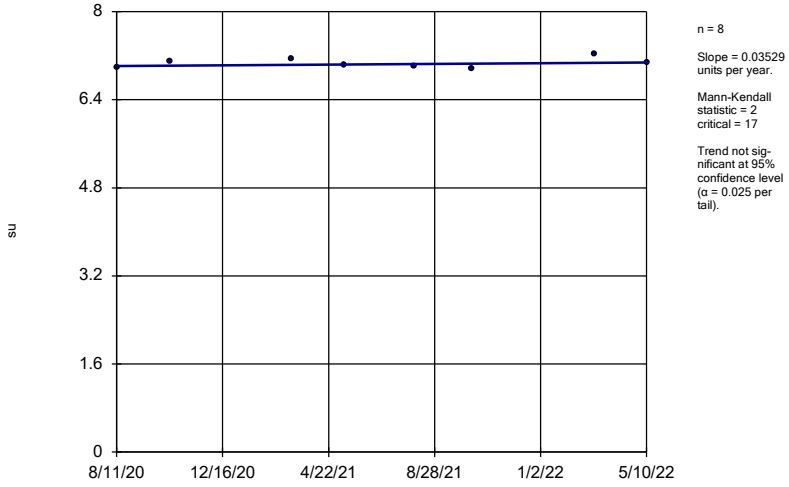
Sen's Slope Estimator Analysis Run 6/10/2022 12:21 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

OW-57ROUT



n = 8

Slope = 0.03529 units per year.

Mann-Kendall statistic = 2
critical = 17

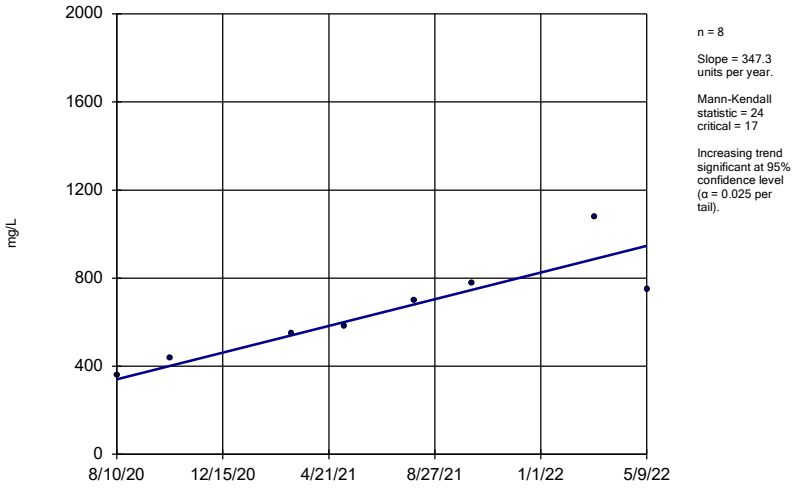
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sulfate

JCW-MW-18001



n = 8

Slope = 347.3 units per year.

Mann-Kendall statistic = 24 critical = 17

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

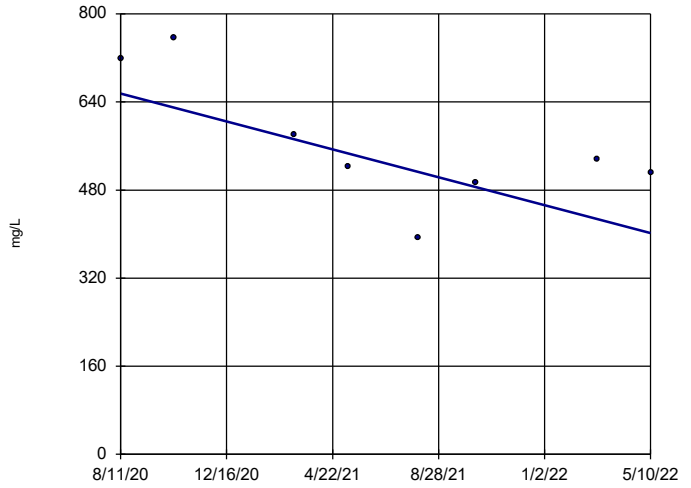
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

JCW-MW-18004



n = 8

Slope = -145 units per year.

Mann-Kendall statistic = -14 critical = -17

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

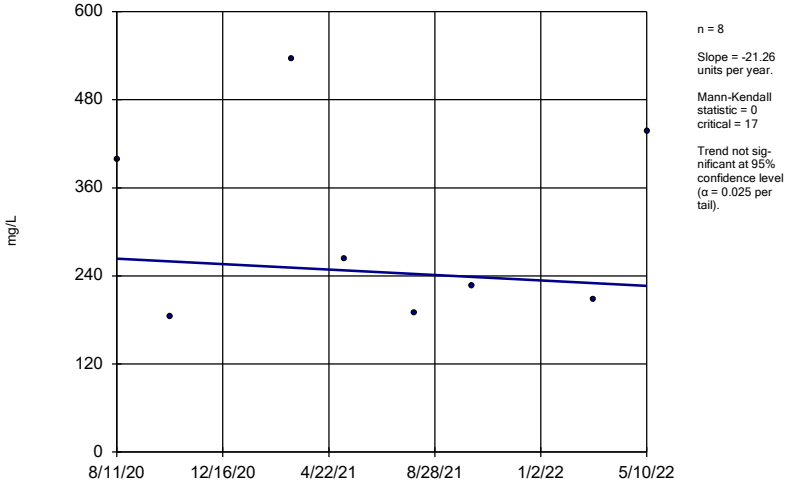
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

JCW-MW-18005



n = 8

Slope = -21.26 units per year.

Mann-Kendall statistic = 0 critical = 17

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

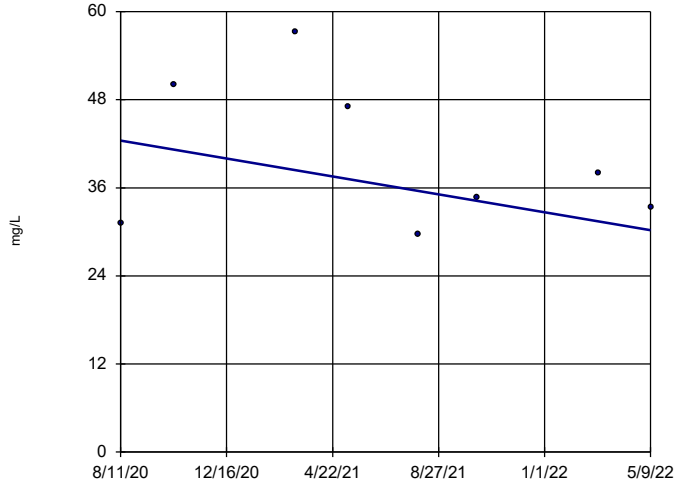
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

JCW-MW-18006



n = 8

Slope = -7.009 units per year.

Mann-Kendall statistic = -6 critical = -17

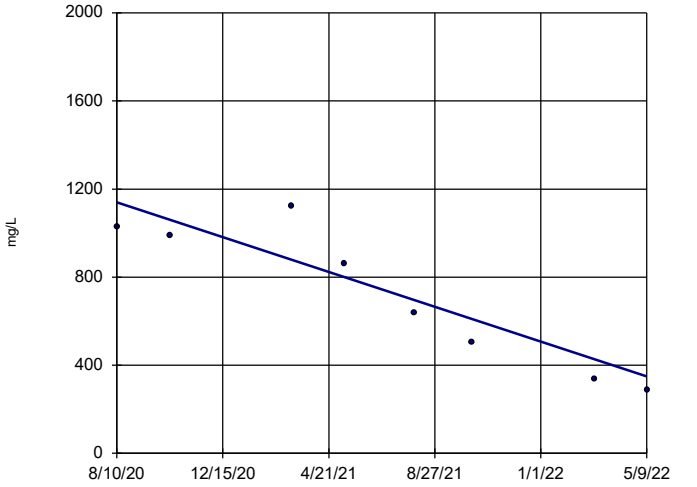
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sulfate

MW-50



n = 8

Slope = -453.3 units per year.

Mann-Kendall statistic = -24 critical = -17

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

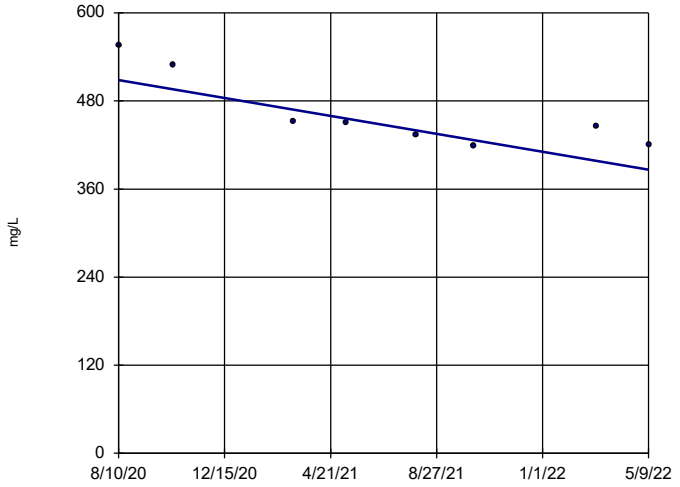
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

MW-51



n = 8

Slope = -69.85 units per year.

Mann-Kendall statistic = -22 critical = -17

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

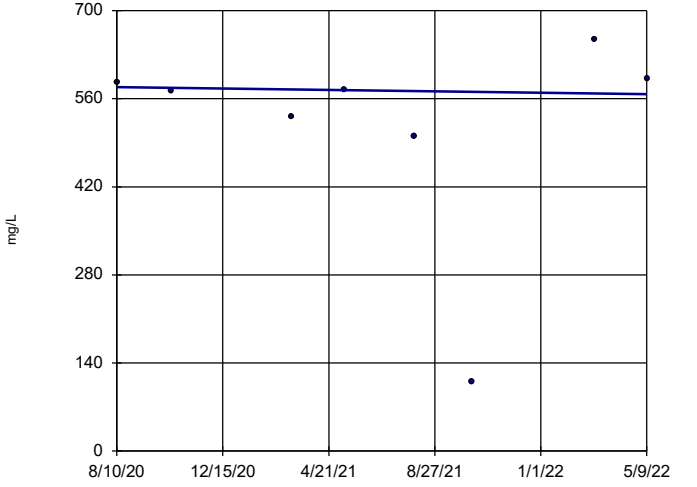
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

MW-52



n = 8

Slope = -6.589 units per year.

Mann-Kendall statistic = 0 critical = 17

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

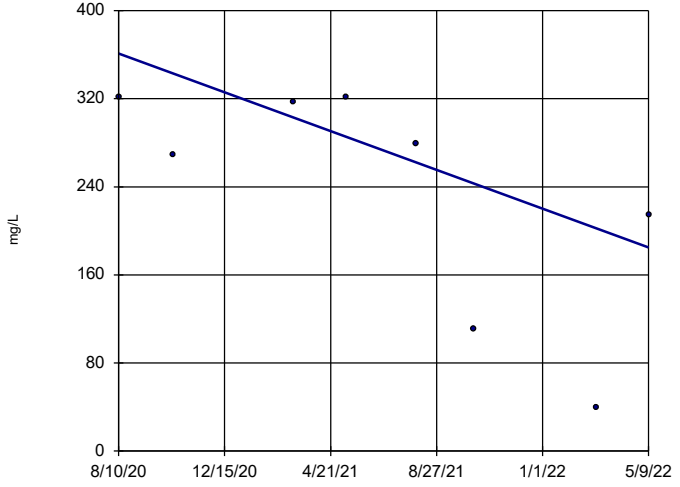
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

MW-53



n = 8

Slope = -100.8 units per year.

Mann-Kendall statistic = -14 critical = -17

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

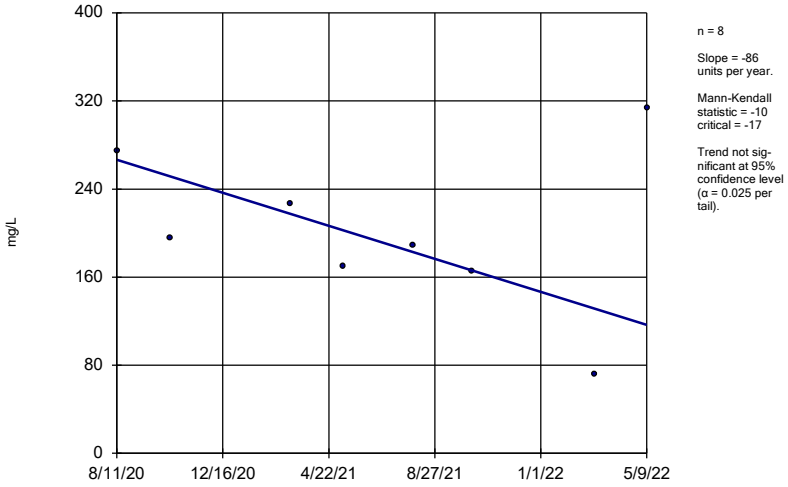
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

MW-53R



n = 8

Slope = -86 units per year.

Mann-Kendall statistic = -10 critical = -17

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

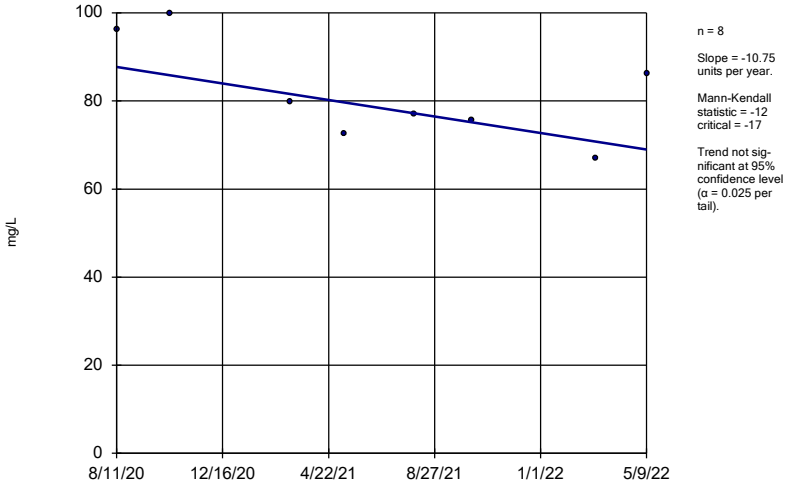
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

MW-54R



n = 8

Slope = -10.75 units per year.

Mann-Kendall statistic = -12 critical = -17

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

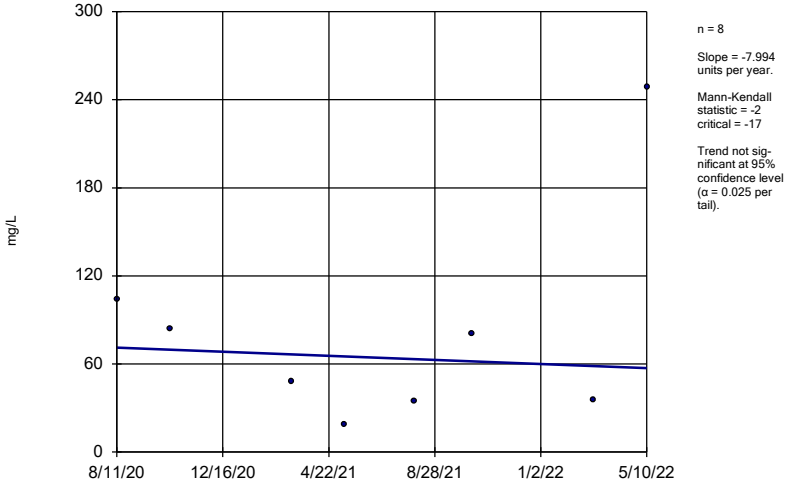
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

MW-55



n = 8

Slope = -7.994 units per year.

Mann-Kendall statistic = -2 critical = -17

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

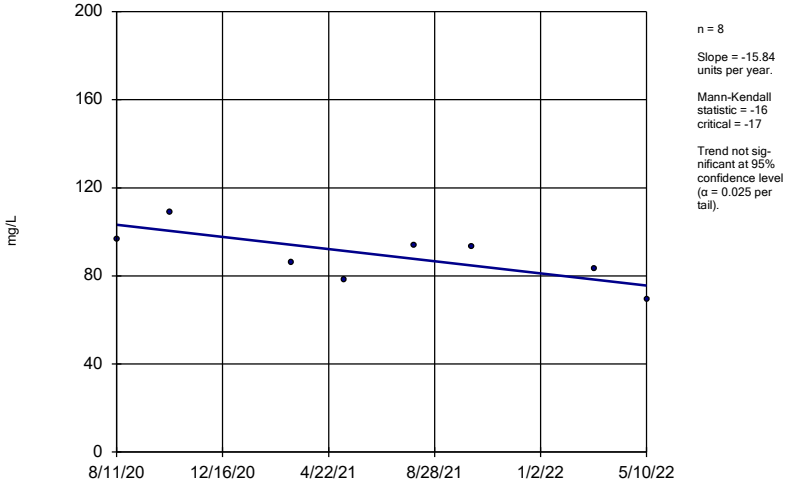
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

OW-57ROUT



n = 8

Slope = -15.84 units per year.

Mann-Kendall statistic = -16 critical = -17

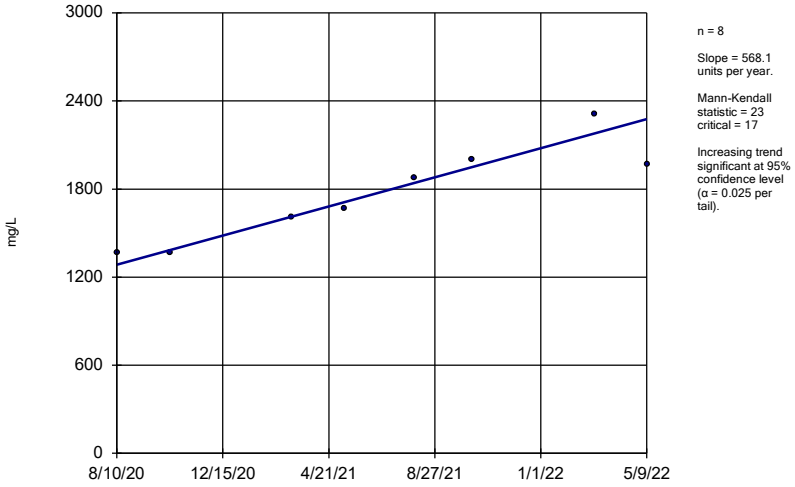
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Total Dissolved Solids

JCW-MW-18001



n = 8

Slope = 568.1 units per year.

Mann-Kendall statistic = 23 critical = 17

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

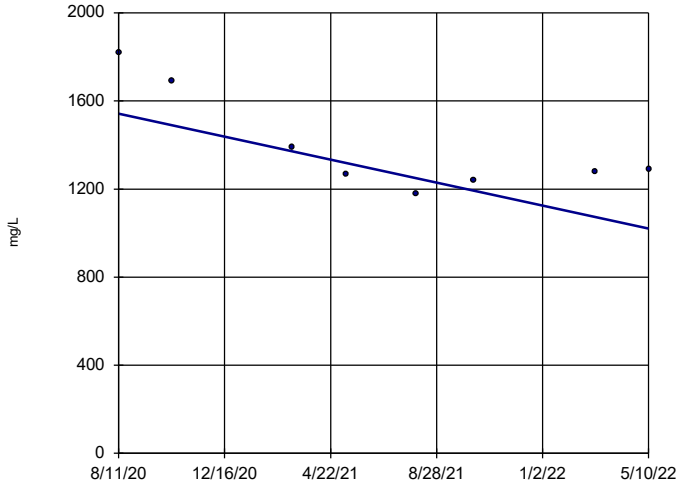
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

JCW-MW-18004



n = 8

Slope = -298.8 units per year.

Mann-Kendall statistic = -12 critical = -17

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

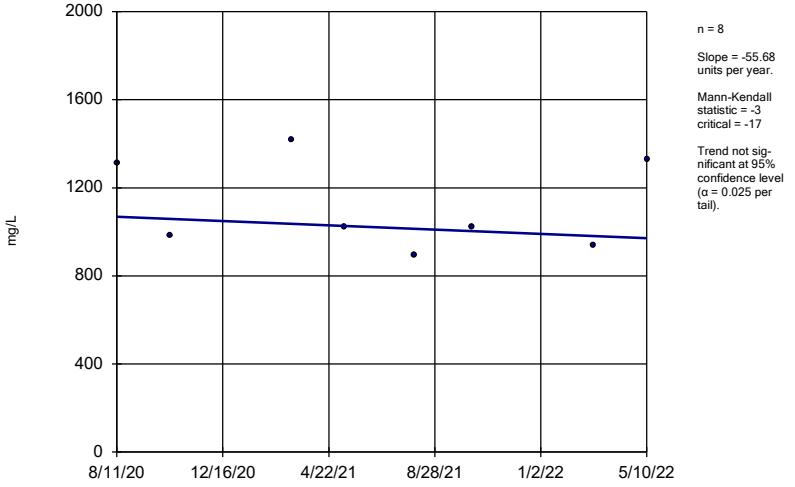
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

JCW-MW-18005



n = 8

Slope = -55.68 units per year.

Mann-Kendall statistic = -3 critical = -17

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

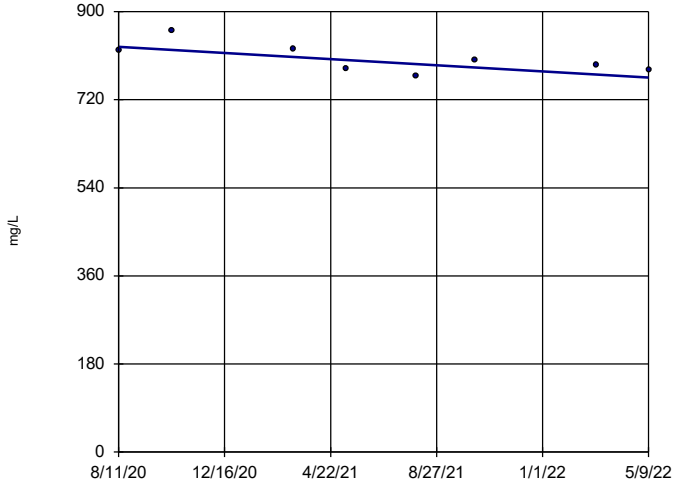
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

JCW-MW-18006



n = 8

Slope = -36.08 units per year.

Mann-Kendall statistic = -14 critical = -17

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

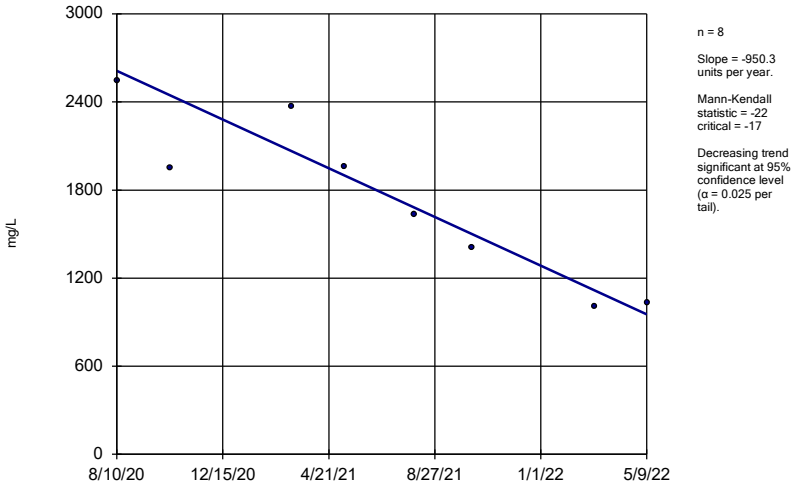
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

MW-50



n = 8

Slope = -950.3 units per year.

Mann-Kendall statistic = -22
critical = -17

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

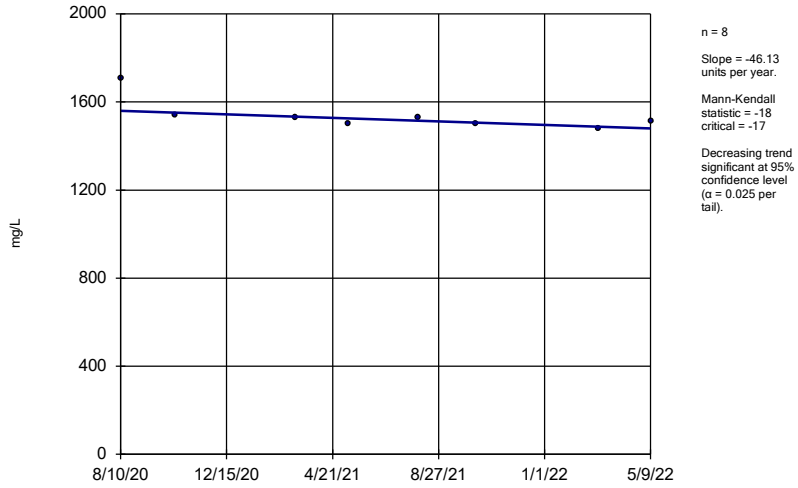
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

MW-51



n = 8

Slope = -46.13 units per year.

Mann-Kendall statistic = -18
critical = -17

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

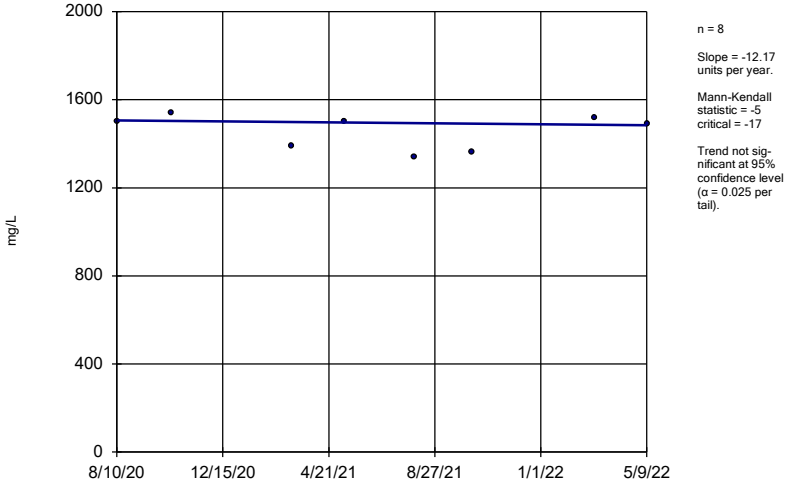
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

MW-52



n = 8

Slope = -12.17 units per year.

Mann-Kendall statistic = -5
critical = -17

Trend not sig-nificant at 95% confidence level (α = 0.025 per tail).

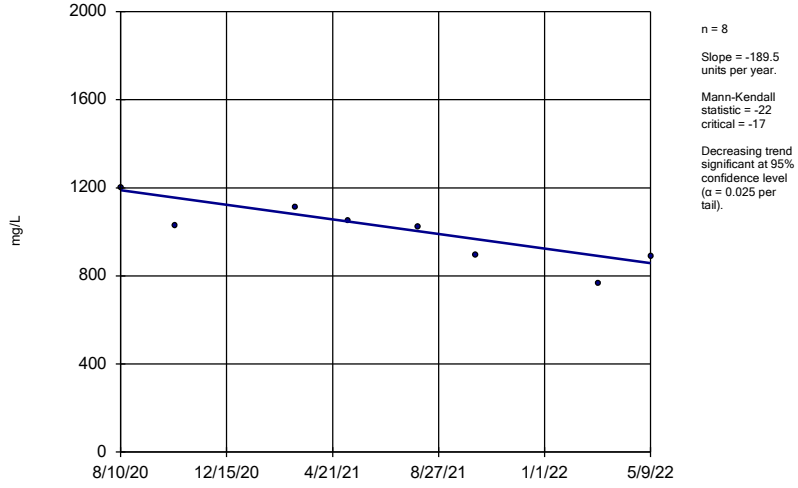
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

MW-53



n = 8

Slope = -189.5 units per year.

Mann-Kendall statistic = -22
critical = -17

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

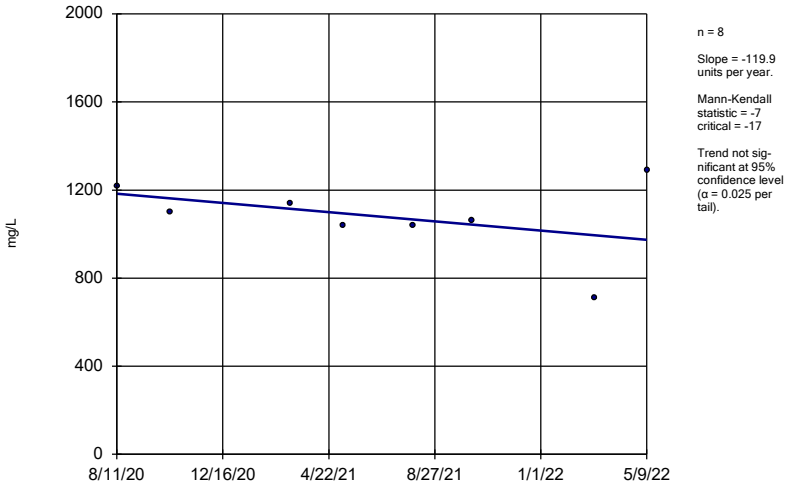
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

MW-53R



n = 8

Slope = -119.9 units per year.

Mann-Kendall statistic = -7
critical = -17

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

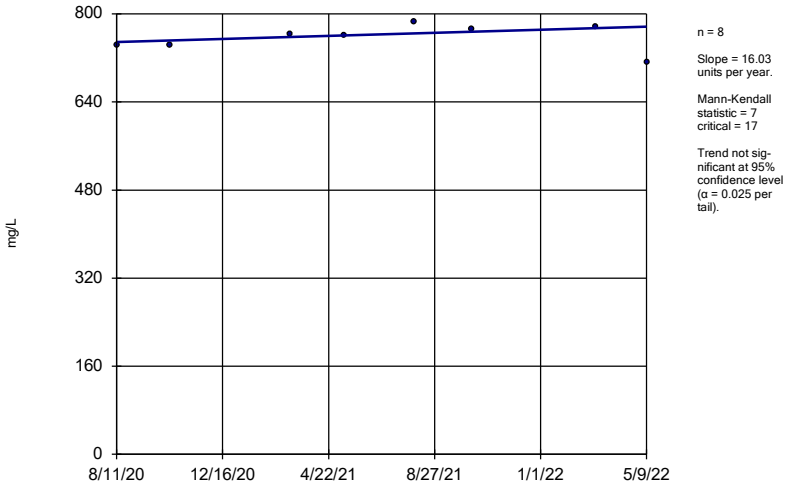
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

MW-54R



n = 8

Slope = 16.03 units per year.

Mann-Kendall statistic = 7
critical = 17

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

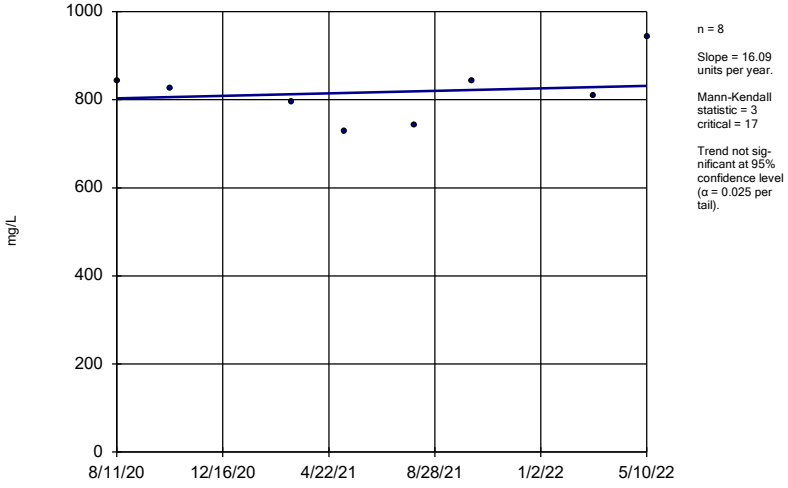
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

MW-55



n = 8

Slope = 16.09 units per year.

Mann-Kendall statistic = 3
critical = 17

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

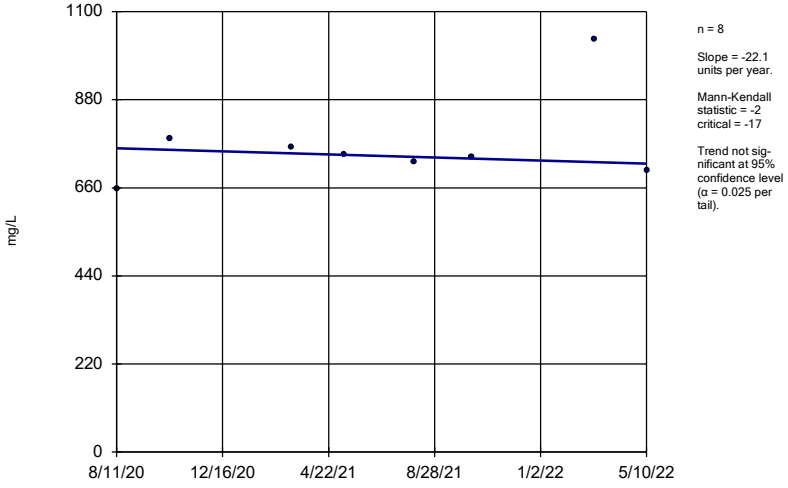
Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

OW-57ROUT



n = 8

Slope = -22.1 units per year.

Mann-Kendall statistic = -2
critical = -17

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

Sen's Slope Estimator Analysis Run 6/10/2022 12:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Appendix D
Assessment Monitoring and GSI Statistical Evaluation

1540 Eisenhower Pl.
Ann Arbor, MI 48108

T 734.971.7080
TRCcompanies.com

Technical Memorandum

Date:	June 30, 2022
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC Alex Eklund, TRC
Project No.:	464096.0000 Phase 002, Task 002
Subject:	Assessment Monitoring and GSI Statistical Evaluation of the May 2022 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 2022 monitoring event was conducted on May 2 through 10, 2022. 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 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 second quarter 2022 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	11 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 no constituents 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 confidence that the measured concentrations are different from the criterion and thus no compelling

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

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 2020 through May 2022) 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, JCW-MW-18001, JCW-MW-18004, and JCW-MW-18005;
- Sulfate in MW-50 and JCW-MW-18001;
- 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.

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 arsenic, boron, calcium, 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 trends for boron at MW-51, MW-54R, and OW-57ROUT, calcium at MW-50, and sulfate at JCW-MW-18001 and MW-50 are statistically significant (Attachment 1). The trends are 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-51, MW-54R, and OW-57ROUT, calcium at MW-50, and sulfate at JCW-MW-18001 and MW-50. 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-52, MW-53R, and MW-55 Calcium at JCW-MW-18001, JCW-MW-18004, JCW-MW-18005, and MW-51 Arsenic at JCW-MW-18006 and MW-53R Iron at MW-55
Non-Parametric (not able to be normalized)	Boron at JCW-MW-18001 and MW-53 Arsenic at JCW-MW-18001
Non-Parametric (over 50% non-detect)	Vanadium at JCW-MW-18001

The confidence interval test compares the lower confidence limit to the GWPS. Arsenic concentrations at JCW-MW-18006 were previously considered statistically significant; however, the lower confidence limit has been below the GWPS since the second quarter 2021. Calcium concentrations at MW-51 were previously considered statistically significant; however, calcium concentrations appear to be decreasing and the lower confidence limit has been below the GWPS since the first quarter 2022. Concentrations trends will continue to be monitored. Statistically significant exceedances of the GWPS 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, MW-55, and OW-57R OUT. The boron 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; 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.

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	Arsenic at MW-55 Molybdenum at MW-55

The confidence interval tests compare the lower confidence limit to the GSI. The statistical evaluation found that no constituents were present at statistically significant levels exceeding the site-specific GSI criteria. Arsenic and molybdenum concentrations at MW-55 were previously considered statistically significant; however, the arsenic and molybdenum concentrations decreased in the first and second quarters of 2022. The lower confidence limits for arsenic and molybdenum continued to be below the GWPS in second quarter 2022.

Attachments

Table 1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2020 to May 2022

Table 2 Comparison of Groundwater Sampling Results to GSI – August 2020 to May 2022

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 2020 to May 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

Sample Location:			MW-50															
Sample Date:			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	3/8/2022	3/8/2022	5/9/2022	5/9/2022
Constituent	Unit	GWPS																
Appendix III[1]				Field Dup			Field Dup		Field Dup		Field Dup		Field Dup		Field Dup		Field Dup
Boron	ug/L	**560**	**1,430**	**1,360**	**1,470**	**1,510**	**1,610**	**1,380**	**1,320**	**1,520**	**1,630**	**1,830**	**1,900**	**1,610**	**1,620**	**1,360**	**1,440**
Calcium	mg/L	**280**	**382**	**382**	**368**	**386**	**375**	**363**	**370**	267	252	274	261	186	185	169	175
Chloride	mg/L	2,300	78.5	79.9	77.5	86.5	85.6	68.9	69.9	57.0	57.2	51.0	51.7	54.9	55.6	53.3	51.6
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	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	**1,020**	**1,040**	**990**	**1,130**	**1,120**	**856**	**867**	638	634	496	512	346	330	285	286
Total Dissolved Solids	mg/L	4,700	2,270	2,820	1,950	2,360	2,380	1,950	1,970	1,630	1,640	1,440	1,380	999	1,010	1,020	1,050
pH, Field	SU	6.5 - 8.5	7.0	--	7.1	6.9	--	6.9	--	7.0	--	7.1	--	7.4	--	7.2	--
Appendix IV[1]																	
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	2	2	3	1	1	1	1	2	2	3	3	2	2	1	1
Barium	ug/L	2,000	150	153	147	116	115	108	109	91	97	102	89	115	117	86	86
Beryllium	ug/L	4.0	< 1	< 1	< 1	< 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	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	< 1	< 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	< 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	< 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	< 1
Lithium	ug/L	180	111	115	100	126	128	100	100	79	81	93	68	77	77	69	66
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	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	7	8	7	< 5	< 5	< 5	< 5	< 5	< 5	< 5	6	6	6	< 5	< 5
Radium-226	pCi/L	NA	--	--	< 0.537	--	--	< 0.237	< 0.245	--	--	< 0.215	0.243	--	--	< 0.310	< 0.287
Radium-228	pCi/L	NA	--	--	0.613	--	--	0.557	0.607	--	--	1.15	1.22	--	--	< 0.493	0.648
Radium-226/228	pCi/L	5.0	--	--	1.01	--	--	0.650	0.671	--	--	1.21	1.46	--	--	0.518	0.904
Selenium	ug/L	50	< 1	< 1	1	1	1	< 1	1	3	2	4	4	2	2	2	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]																	
Iron	ug/L	**28,000**	2,280	2,230	2,990	2,100	2,190	1,810	1,810	3,000	2,780	2,500	2,710	1,400	1,180	723	737
Copper	ug/L	1,000	3	7	3	4	4	< 1	2	1	< 1	1	< 1	< 1	< 1	1	1
Nickel	ug/L	100	< 2	2	< 2	< 2	< 2	< 2	< 2	11	12	16	11	< 2	19	< 2	6
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	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	< 30	< 30	< 10	< 10	< 10	< 10	< 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 – August 2020 to May 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

Sample Location:			MW-51								
Sample Date:			8/10/2020	10/14/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022
Constituent	Unit	GWPS									
Appendix III[1]					Field Dup						
Boron	ug/L	**560**	**758**	**739**	**798**	**1,040**	**1,040**	**960**	**1,140**	**1,420**	**1,350**
Calcium	mg/L	**280**	**341**	**330**	**337**	**293**	**303**	276	**316**	255	247
Chloride	mg/L	2,300	95.2	74.2	75.4	91.2	93.6	99.8	97.1	91.1	92.8
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**	556	522	537	452	450	434	418	446	420
Total Dissolved Solids	mg/L	4,700	1,710	1,550	1,530	1,530	1,500	1,530	1,500	1,480	1,510
pH, Field	SU	6.5 - 8.5	6.8	6.8	--	7.0	7.0	6.9	6.9	7.4	7.2
Appendix IV[1]											
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	12	17	17	11	11	14	20	12	10
Barium	ug/L	2,000	153	147	150	143	148	148	197	198	150
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
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
Lithium	ug/L	180	57	51	55	62	57	47	64	58	56
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
Radium-226	pCi/L	NA	--	1.35	< 0.352	--	< 0.268	--	0.451	--	< 0.423
Radium-228	pCi/L	NA	--	< 0.588	0.776	--	0.626	--	2.01	--	< 0.494
Radium-226/228	pCi/L	5.0	--	1.43	1.11	--	0.851	--	2.46	--	0.576
Selenium	ug/L	50	< 1	< 1	< 1	1	< 1	1	3	3	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	4,390	5,400	5,600	1,940	2,200	5,080	5,130	1,310	1,210
Copper	ug/L	1,000	2	2	2	2	< 1	< 1	1	< 1	2
Nickel	ug/L	100	2	< 2	< 2	< 2	< 2	11	18	< 2	< 2
Silver	ug/L	34	< 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
Zinc	ug/L	2,400	< 30	< 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 – August 2020 to May 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

Sample Location:			MW-52							
Sample Date:			8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,200**	**1,110**	**1,120**	**1,160**	**1,140**	**1,280**	**1,310**	**1,090**
Calcium	mg/L	**280**	238	256	211	244	196	237	251	231
Chloride	mg/L	2,300	72.0	73.3	51.8	53.9	56.5	59.4	51.6	50.5
Fluoride	ug/L	4,000	< 1,000	1,140	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	586	572	531	574	501	110	654	591
Total Dissolved Solids	mg/L	4,700	1,500	1,540	1,390	1,500	1,340	1,360	1,520	1,490
pH, Field	SU	6.5 - 8.5	6.9	7.0	7.0	6.9	6.9	6.9	7.1	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	144	139	123	132	115	152	170	107
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1
Cobalt	ug/L	15	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	1,140	< 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	38	33	31	29	21	31	27	25
Mercury	ug/L	2.0	< 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
Radium-226	pCi/L	NA	--	0.744	--	< 0.237	--	< 0.274	--	< 0.489
Radium-228	pCi/L	NA	--	0.636	--	< 0.407	--	0.778	--	< 0.532
Radium-226/228	pCi/L	5.0	--	1.38	--	< 0.407	--	1.03	--	0.875
Selenium	ug/L	50	< 1	1	1	1	1	3	2	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	2,720	4,770	879	1,400	3,830	4,880	2,870	2,030
Copper	ug/L	1,000	2	2	2	< 1	< 1	1	1	2
Nickel	ug/L	100	< 2	< 2	< 2	< 2	9	14	< 2	< 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	< 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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2020 to May 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

Sample Location:			MW-53							
Sample Date:			8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**2,760**	**2,720**	**3,920**	**3,790**	**3,820**	**3,820**	**4,100**	**3,880**
Calcium	mg/L	**280**	211	192	187	187	162	166	146	147
Chloride	mg/L	2,300	50.5	38.6	52.9	51.8	49.9	55.5	81.1	50.9
Fluoride	ug/L	4,000	< 1,000	1,020	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	321	269	317	322	279	111	39.5	215
Total Dissolved Solids	mg/L	4,700	1,200	1,030	1,110	1,050	1,020	896	768	886
pH, Field	SU	6.5 - 8.5	7.0	7.2	7.1	7.1	7.1	7.1	7.4	7.3
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	2	2	< 1	< 1	2	2	1	< 1
Barium	ug/L	2,000	130	131	202	214	200	212	401	356
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	1,020	< 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	53	49	52	46	38	53	48	41
Mercury	ug/L	2.0	< 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
Radium-226	pCi/L	NA	--	< 0.531	--	< 0.239	--	0.399	--	0.406
Radium-228	pCi/L	NA	--	0.503	--	0.455	--	0.979	--	< 0.518
Radium-226/228	pCi/L	5.0	--	0.823	--	0.684	--	1.38	--	0.824
Selenium	ug/L	50	< 1	< 1	< 1	2	3	< 1	3	1
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	1,510	1,560	1,180	1,420	2,380	1,760	1,130	1,060
Copper	ug/L	1,000	1	2	2	< 1	< 1	< 1	< 1	1
Nickel	ug/L	100	< 2	< 2	< 2	< 2	6	10	< 2	< 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	< 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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2020 to May 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-53R							
		Sample Date:	8/11/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,540**	**1,780**	**1,510**	**1,580**	**1,710**	**2,060**	**2,330**	**1,830**
Calcium	mg/L	**280**	239	246	234	227	203	232	188	226
Chloride	mg/L	2,300	45.0	31.8	32.5	31.1	34.5	36.6	39.9	41.6
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**	275	196	227	170	189	166	71.7	314
Total Dissolved Solids	mg/L	4,700	1,220	1,100	1,140	1,040	1,040	1,060	709	1,290
pH, Field	SU	6.5 - 8.5	6.8	7.0	6.8	6.8	6.8	6.8	7.1	6.9
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**31**	**40**	19	18	**23**	**25**	10	8
Barium	ug/L	2,000	208	242	202	208	204	189	203	147
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1
Cobalt	ug/L	15	< 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
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	71	66	64	59	56	57	56	61
Mercury	ug/L	2.0	< 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
Radium-226	pCi/L	NA	--	--	--	0.306	--	0.344	--	< 0.325
Radium-228	pCi/L	NA	--	--	--	0.822	--	1.05	--	< 0.480
Radium-226/228	pCi/L	5.0	--	--	--	1.13	--	1.40	--	< 0.480
Selenium	ug/L	50	< 1	1	< 1	< 1	2	3	2	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	2,020	2,140	971	2,220	2,800	2,170	1,080	460
Copper	ug/L	1,000	3	1	2	1	1	< 1	2	2
Nickel	ug/L	100	< 2	< 2	< 2	< 2	10	2	< 2	< 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	< 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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2020 to May 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-54R							
		Sample Date:	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/11/2021	3/9/2022	5/9/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,660**	**1,660**	**2,470**	**3,140**	**3,530**	**4,270**	**4,720**	**4,110**
Calcium	mg/L	**280**	168	174	178	196	163	187	186	169
Chloride	mg/L	2,300	18.5	23.9	28.0	32.7	35.5	34.7	49.8	35.8
Fluoride	ug/L	4,000	< 1,000	1,800	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	96.2	100	79.9	72.7	77.0	75.7	67.1	86.3
Total Dissolved Solids	mg/L	4,700	743	743	763	762	786	772	776	712
pH, Field	SU	6.5 - 8.5	6.9	7.1	6.9	6.6	6.8	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**	3	3	1	1	2	4	1	< 1
Barium	ug/L	2,000	104	103	118	122	124	129	154	111
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2
Cobalt	ug/L	15	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	1,800	< 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	61	57	66	64	60	59	74	64
Mercury	ug/L	2.0	< 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	7	7	9
Radium-226	pCi/L	NA	--	< 0.334	--	< 0.255	--	< 0.231	--	< 0.347
Radium-228	pCi/L	NA	--	< 0.504	--	0.782	--	0.759	--	< 0.552
Radium-226/228	pCi/L	5.0	--	0.546	--	0.900	--	0.965	--	< 0.552
Selenium	ug/L	50	< 1	< 1	< 1	< 1	1	2	2	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	1,170	1,030	115	782	1,190	2,280	496	121
Copper	ug/L	1,000	< 1	1	1	2	1	< 1	1	1
Nickel	ug/L	100	6	4	< 2	3	9	< 2	< 2	< 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	< 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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2020 to May 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

Sample Location:			MW-55							
Sample Date:			8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	5/10/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**592**	**705**	**593**	**866**	**873**	**788**	**826**	**642**
Calcium	mg/L	**280**	178	170	151	147	126	198	163	177
Chloride	mg/L	2,300	16.7	18.0	16.7	19.5	19.3	16.5	20.2	11.8
Fluoride	ug/L	4,000	< 1,000	1,220	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	104	84.0	48.0	18.5	34.3	80.7	35.4	249
Total Dissolved Solids	mg/L	4,700	844	826	794	729	743	844	808	942
pH, Field	SU	6.5 - 8.5	7.1	7.2	7.1	7.1	7.1	7.0	7.1	7.0
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**107**	**123**	**152**	**169**	**204**	**198**	**88**	**48**
Barium	ug/L	2,000	250	223	366	323	347	330	299	222
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	1,220	< 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	33	33	28	24	25	34	28	24
Mercury	ug/L	2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	**207**	**179**	**166**	**131**	**157**	**206**	**89**	**78**
Radium-226	pCi/L	NA	--	< 0.447	--	0.525	--	0.467	--	< 0.478
Radium-228	pCi/L	NA	--	0.566	--	0.896	--	1.10	--	< 0.646
Radium-226/228	pCi/L	5.0	--	0.798	--	1.42	--	1.56	--	0.696
Selenium	ug/L	50	2	1	< 1	1	1	2	1	3
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	21,300	21,800	23,500	21,500	**39,400**	**40,500**	**29,800**	15,000
Copper	ug/L	1,000	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1
Nickel	ug/L	100	< 2	< 2	< 2	< 2	6	8	4	3
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	< 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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2020 to May 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	OW-57R OUT							
		Sample Date:	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/9/2022	5/10/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,510**	**1,730**	**1,660**	**1,710**	**1,730**	**1,880**	**2,030**	**1,990**
Calcium	mg/L	**280**	132	144	128	133	118	140	126	131
Chloride	mg/L	2,300	53.9	49.4	59.0	62.9	53.1	46.9	62.5	57.3
Fluoride	ug/L	4,000	< 1,000	1,830	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	96.8	109	86.0	78.3	93.9	93.1	83.1	69.4
Total Dissolved Solids	mg/L	4,700	658	782	761	743	725	737	1,030	702
pH, Field	SU	6.5 - 8.5	7.0	7.1	7.2	7.0	7.0	7.0	7.2	7.1
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	77	73	70	73	72	75	85	79
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	1	1	1	1	1	< 1	1	2
Cobalt	ug/L	15	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	1,830	< 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	27	24	26	24	20	21	26	27
Mercury	ug/L	2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	7	8	7	6	7	9	8	7
Radium-226	pCi/L	NA	--	< 0.324	--	< 0.286	--	< 0.227	--	< 0.440
Radium-228	pCi/L	NA	--	< 0.463	--	0.606	--	1.12	--	< 0.539
Radium-226/228	pCi/L	5.0	--	0.499	--	0.615	--	1.26	--	< 0.539
Selenium	ug/L	50	< 1	< 1	< 1	< 1	< 1	2	1	3
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	42	92	46	100	56	68	96	74
Copper	ug/L	1,000	2	2	2	1	2	1	2	2
Nickel	ug/L	100	16	14	15	16	21	12	17	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	< 30	16	< 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 – August 2020 to May 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

Sample Location:			JCW-MW-18001							
Sample Date:			8/10/2020	10/13/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/7/2022	5/9/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,310**	**1,370**	**1,350**	**1,340**	**1,610**	**1,670**	**1,670**	**1,560**
Calcium	mg/L	**280**	237	**282**	270	**305**	**348**	**373**	**412**	**335**
Chloride	mg/L	2,300	70.8	73.8	72.1	77.3	76.4	68.3	60.0	58.8
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**	357	435	549	580	700	777	**1,080**	752
Total Dissolved Solids	mg/L	4,700	1,370	1,370	1,610	1,670	1,880	2,000	2,310	1,970
pH, Field	SU	6.5 - 8.5	6.9	7.1	6.9	6.9	6.9	6.8	6.8	7.0
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	3	3	2	2	**38**	1	< 1	< 1
Barium	ug/L	2,000	261	273	213	166	199	184	129	80
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	8	< 1	< 1	2
Cobalt	ug/L	15	< 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
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	2	< 1	< 1	< 1
Lithium	ug/L	180	69	66	69	68	71	103	87	76
Mercury	ug/L	2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5	< 5	9	< 5	< 5	< 5
Radium-226	pCi/L	NA	--	< 0.423	--	< 0.378	--	0.337	--	< 0.327
Radium-228	pCi/L	NA	--	0.616	--	< 0.558	--	1.05	--	0.494
Radium-226/228	pCi/L	5.0	--	1.03	--	< 0.558	--	1.39	--	0.586
Selenium	ug/L	50	< 1	< 1	< 1	< 1	2	3	2	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	202	182	183	154	13,600	91	86	210
Copper	ug/L	1,000	1	1	2	3	6	2	2	3
Nickel	ug/L	100	< 2	2	8	2	16	20	6	8
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	**12**	< 2	< 2	< 2
Zinc	ug/L	2,400	< 30	< 10	< 10	< 10	12	< 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 – August 2020 to May 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18004							
		Sample Date:	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	5/10/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	347	410	232	246	304	389	259	226
Calcium	mg/L	**280**	**306**	**323**	252	266	203	264	236	235
Chloride	mg/L	2,300	25.6	22.6	17.9	12.4	6.65	7.45	19.6	10.8
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**	718	756	581	523	393	493	537	512
Total Dissolved Solids	mg/L	4,700	1,820	1,690	1,390	1,270	1,180	1,240	1,280	1,290
pH, Field	SU	6.5 - 8.5	6.7	6.9	6.9	6.8	6.8	6.8	6.9	6.8
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	36	34	20	27	36	41	32	26
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 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
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	39	37	35	36	47	63	34	42
Mercury	ug/L	2.0	< 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
Radium-226	pCi/L	NA	--	< 0.424	--	< 0.271	--	0.182	--	< 0.417
Radium-228	pCi/L	NA	--	1.04	--	< 0.425	--	0.796	--	0.790
Radium-226/228	pCi/L	5.0	--	0.922	--	< 0.425	--	0.978	--	0.910
Selenium	ug/L	50	< 1	< 1	7	1	4	3	2	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	< 20	< 20	21	24	< 20	39	952	< 20
Copper	ug/L	1,000	2	3	3	2	1	2	1	2
Nickel	ug/L	100	< 2	4	< 2	2	9	16	4	< 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	< 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.

Table 1
Comparison of Groundwater Sampling Results to Groundwater Protection Standards – August 2020 to May 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

Sample Location:			JCW-MW-18005								
Sample Date:			8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	3/7/2022	5/10/2022
Constituent	Unit	GWPS								Field Dup	
Appendix III[1]											
Boron	ug/L	**560**	**1,100**	**1,090**	**987**	**919**	**1,080**	**1,190**	**1,030**	**1,100**	**1,010**
Calcium	mg/L	**280**	259	195	**286**	202	149	193	159	164	280
Chloride	mg/L	2,300	63.9	66.5	43.7	56.0	64.9	63.6	61.7	60.7	32.6
Fluoride	ug/L	4,000	< 1,000	1,640	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	398	185	535	263	190	227	204	211	437
Total Dissolved Solids	mg/L	4,700	1,310	986	1,420	1,020	895	1,020	942	934	1,330
pH, Field	SU	6.5 - 8.5	6.9	7.0	6.8	6.9	7.0	6.9	7.1	--	6.8
Appendix IV[1]											
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	8	8	7	9	9	9	5	5	5
Barium	ug/L	2,000	87	98	135	93	98	124	108	110	110
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
Cobalt	ug/L	15	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	< 1,000	1,640	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	2	< 1	< 1	< 1	< 1
Lithium	ug/L	180	45	33	39	30	28	39	32	30	33
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	6
Radium-226	pCi/L	NA	--	1.07	--	< 0.224	--	< 0.262	--	--	< 0.414
Radium-228	pCi/L	NA	--	0.540	--	0.524	--	0.984	--	--	< 0.521
Radium-226/228	pCi/L	5.0	--	1.61	--	0.728	--	1.16	--	--	0.622
Selenium	ug/L	50	< 1	< 1	< 1	1	2	4	3	3	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	4,900	3,550	4,800	4,590	5,350	5,840	3,300	3,170	1,680
Copper	ug/L	1,000	2	1	2	1	12	1	< 1	< 1	2
Nickel	ug/L	100	9	11	8	10	29	22	10	25	< 2
Silver	ug/L	34	< 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
Zinc	ug/L	2,400	< 30	< 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 – August 2020 to May 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

Sample Location:			JCW-MW-18006								
Sample Date:			8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	5/9/2022	5/9/2022
Constituent	Unit	GWPS									Field Dup
Appendix III[1]											
Boron	ug/L	**560**	**2,040**	**2,610**	**2,650**	**2,720**	**2,640**	**2,600**	**3,220**	**2,990**	**3,030**
Calcium	mg/L	**280**	148	167	148	147	135	152	143	136	136
Chloride	mg/L	2,300	76.1	72.2	66.1	72.6	73.6	77.0	75.0	67.3	67.7
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**	31.2	50.1	57.3	47.0	29.7	34.7	38.1	32.8	34.0
Total Dissolved Solids	mg/L	4,700	820	861	823	784	769	802	792	788	772
pH, Field	SU	6.5 - 8.5	7.0	7.1	6.9	6.9	6.9	7.0	7.1	7.0	--
Appendix IV[1]											
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	12	**22**	**30**	**30**	**25**	21	**33**	**22**	**23**
Barium	ug/L	2,000	361	489	477	472	492	351	665	514	509
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
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
Lithium	ug/L	180	41	59	58	53	46	47	63	56	57
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	6	< 5
Radium-226	pCi/L	NA	--	0.716	--	0.418	--	0.268	--	< 0.416	--
Radium-228	pCi/L	NA	--	0.853	--	< 0.483	--	0.872	--	< 0.518	--
Radium-226/228	pCi/L	5.0	--	1.57	--	0.888	--	1.14	--	0.690	--
Selenium	ug/L	50	< 1	< 1	< 1	1	2	4	2	< 1	1
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	3,360	5,760	5,730	5,490	7,790	6,200	9,040	6,600	6,360
Copper	ug/L	1,000	< 1	< 1	< 1	2	< 1	< 1	< 1	1	< 1
Nickel	ug/L	100	2	< 2	3	3	6	10	6	< 2	< 2
Silver	ug/L	34	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	3	3	3	4	2	4	3	3
Zinc	ug/L	2,400	< 30	< 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 2
Comparison of Groundwater Sampling Results to GSI – August 2020 to May 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

						Sample Location:	MW-50													
						Sample Date:	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	3/8/2022	3/8/2022	5/9/2022	5/9/2022
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	Field Dup
Boron	ug/L	4,000	44,000	69,000	44,000		1,430	1,360	1,470	1,510	1,610	1,380	1,320	1,520	1,630	1,830	1,900	1,610	1,620	1,360	1,440
Sulfate	mg/L	1,200[F]	NC	NC	1,200		1,020	1,040	990	1,130	1,120	856	867	638	634	496	512	346	330	285	286
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0		7.0	--	7.1	6.9	--	6.9	--	7.0	--	7.1	--	7.4	--	7.2	--
Appendix IV(1)																				
Arsenic	ug/L	10	100	680	**100**		2	2	3	1	1	1	1	2	2	3	3	2	2	1	1
Chromium	ug/L	11[H]	NC	NC	11		< 1	< 1	< 1	1	1	< 1	< 1	< 1	< 1	< 1	< 1	1	1	1	1
Lithium	ug/L	440	NC	NC	440		111	115	100	126	128	100	100	79	81	93	68	77	77	69	66
Molybdenum	ug/L	120	NC	NC	**120**		7	8	7	< 5	< 5	< 5	< 5	< 5	< 5	< 5	6	6	6	< 5	< 5
Selenium	ug/L	50	55	120	55		< 1	< 1	1	1	1	< 1	1	3	2	4	4	2	2	2	2
MI Part 115 Parameters(2)																				
Iron	ug/L	500,000[EE]	NC	NC	500,000		2,280	2,230	2,990	2,100	2,190	1,810	1,810	3,000	2,780	2,500	2,710	1,400	1,180	723	737
Vanadium	ug/L	27	NC	NC	27		< 2	< 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.

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 – August 2020 to May 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-51								
					Sample Date:	8/10/2020	10/14/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III(1)								Field Dup						
Boron	ug/L	4,000	44,000	69,000	44,000	758	739	798	1,040	1,040	960	1,140	1,420	1,350
Sulfate	mg/L	1,200[F]	NC	NC	1,200	556	522	537	452	450	434	418	446	420
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.8	6.8	--	7.0	7.0	6.9	6.9	7.4	7.2
Appendix IV(1)														
Arsenic	ug/L	10	100	680	**100**	12	17	17	11	11	14	20	12	10
Chromium	ug/L	11[H]	NC	NC	11	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1
Lithium	ug/L	440	NC	NC	440	57	51	55	62	57	47	64	58	56
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	< 1	< 1	< 1	1	< 1	1	3	3	2
MI Part 115 Parameters(2)														
Iron	ug/L	500,000[EE]	NC	NC	500,000	4,390	5,400	5,600	1,940	2,200	5,080	5,130	1,310	1,210
Vanadium	ug/L	27	NC	NC	27	< 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.

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 – August 2020 to May 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-52							
					Sample Date:	8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022
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	1,110	1,120	1,160	1,140	1,280	1,310	1,090
Sulfate	mg/L	1,200[F]	NC	NC	1,200	586	572	531	574	501	110	654	591
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.9	7.0	7.0	6.9	6.9	6.9	7.1	7.0
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	38	33	31	29	21	31	27	25
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	3	2	2
MI Part 115 Parameters[(2)]													
Iron	ug/L	500,000[EE]	NC	NC	500,000	2,720	4,770	879	1,400	3,830	4,880	2,870	2,030
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.

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 – August 2020 to May 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-53							
					Sample Date:	8/10/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022
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	2,760	2,720	3,920	3,790	3,820	3,820	4,100	3,880
Sulfate	mg/L	1,200[F]	NC	NC	1,200	321	269	317	322	279	111	39.5	215
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.0	7.2	7.1	7.1	7.1	7.1	7.4	7.3
Appendix IV[(1)]													
Arsenic	ug/L	10	100	680	**100**	2	2	< 1	< 1	2	2	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	53	49	52	46	38	53	48	41
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	2	3	< 1	3	1
MI Part 115 Parameters[(2)]													
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,510	1,560	1,180	1,420	2,380	1,760	1,130	1,060
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.

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 – August 2020 to May 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-53R							
					Sample Date:	8/11/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022
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	1,540	1,780	1,510	1,580	1,710	2,060	2,330	1,830
Sulfate	mg/L	1,200[F]	NC	NC	1,200	275	196	227	170	189	166	71.7	314
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.8	7.0	6.8	6.8	6.8	6.8	7.1	6.9
Appendix IV(1)													
Arsenic	ug/L	10	100	680	**100**	31	40	19	18	23	25	10	8
Chromium	ug/L	11[H]	NC	NC	11	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1
Lithium	ug/L	440	NC	NC	440	71	66	64	59	56	57	56	61
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	2	3	2	2
MI Part 115 Parameters(2)													
Iron	ug/L	500,000[EE]	NC	NC	500,000	2,020	2,140	971	2,220	2,800	2,170	1,080	460
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.

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 – August 2020 to May 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-54R							
					Sample Date:	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/11/2021	3/8/2022	5/9/2022
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	1,660	1,660	2,470	3,140	3,530	4,270	4,720	4,110
Sulfate	mg/L	1,200[F]	NC	NC	1,200	96.2	100	79.9	72.7	77.0	75.7	67.1	86.3
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.9	7.1	6.9	6.6	6.8	6.9	6.9	7.0
Appendix IV[(1)]													
Arsenic	ug/L	10	100	680	**100**	3	3	1	1	2	4	1	< 1
Chromium	ug/L	11[H]	NC	NC	11	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2
Lithium	ug/L	440	NC	NC	440	61	57	66	64	60	59	74	64
Molybdenum	ug/L	120	NC	NC	**120**	5	5	< 5	< 5	< 5	7	7	9
Selenium	ug/L	50	55	120	55	< 1	< 1	< 1	< 1	1	2	2	2
MI Part 115 Parameters[(2)]													
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,170	1,030	115	782	1,190	2,280	496	121
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.

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 – August 2020 to May 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-55							
					Sample Date:	8/11/2020	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	5/10/2022
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	592	705	593	866	873	788	826	642
Sulfate	mg/L	1,200[F]	NC	NC	1,200	104	84.0	48.0	18.5	34.3	80.7	35.4	249
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.1	7.2	7.1	7.1	7.1	7.0	7.1	7.0
Appendix IV[(1)]													
Arsenic	ug/L	10	100	680	**100**	**107**	**123**	**152**	**169**	**204**	**198**	88	48
Chromium	ug/L	11[H]	NC	NC	11	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	33	33	28	24	25	34	28	24
Molybdenum	ug/L	120	NC	NC	**120**	**207**	**179**	**166**	**131**	**157**	**206**	89	78
Selenium	ug/L	50	55	120	55	2	1	< 1	1	1	2	1	3
MI Part 115 Parameters[(2)]													
Iron	ug/L	500,000[EE]	NC	NC	500,000	21,300	21,800	23,500	21,500	39,400	40,500	29,800	15,000
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.

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 – August 2020 to May 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	JCW-MW-18004							
					Sample Date:	8/11/2020	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	5/10/2022
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	347	410	232	246	304	389	259	226
Sulfate	mg/L	1,200[F]	NC	NC	1,200	718	756	581	523	393	493	537	512
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.7	6.9	6.9	6.8	6.8	6.8	6.9	6.8
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	39	37	35	36	47	63	34	42
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	50	55	120	55	< 1	< 1	7	1	4	3	2	2
MI Part 115 Parameters[(2)]													
Iron	ug/L	500,000[EE]	NC	NC	500,000	< 20	< 20	21	24	< 20	39	952	< 20
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.

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.

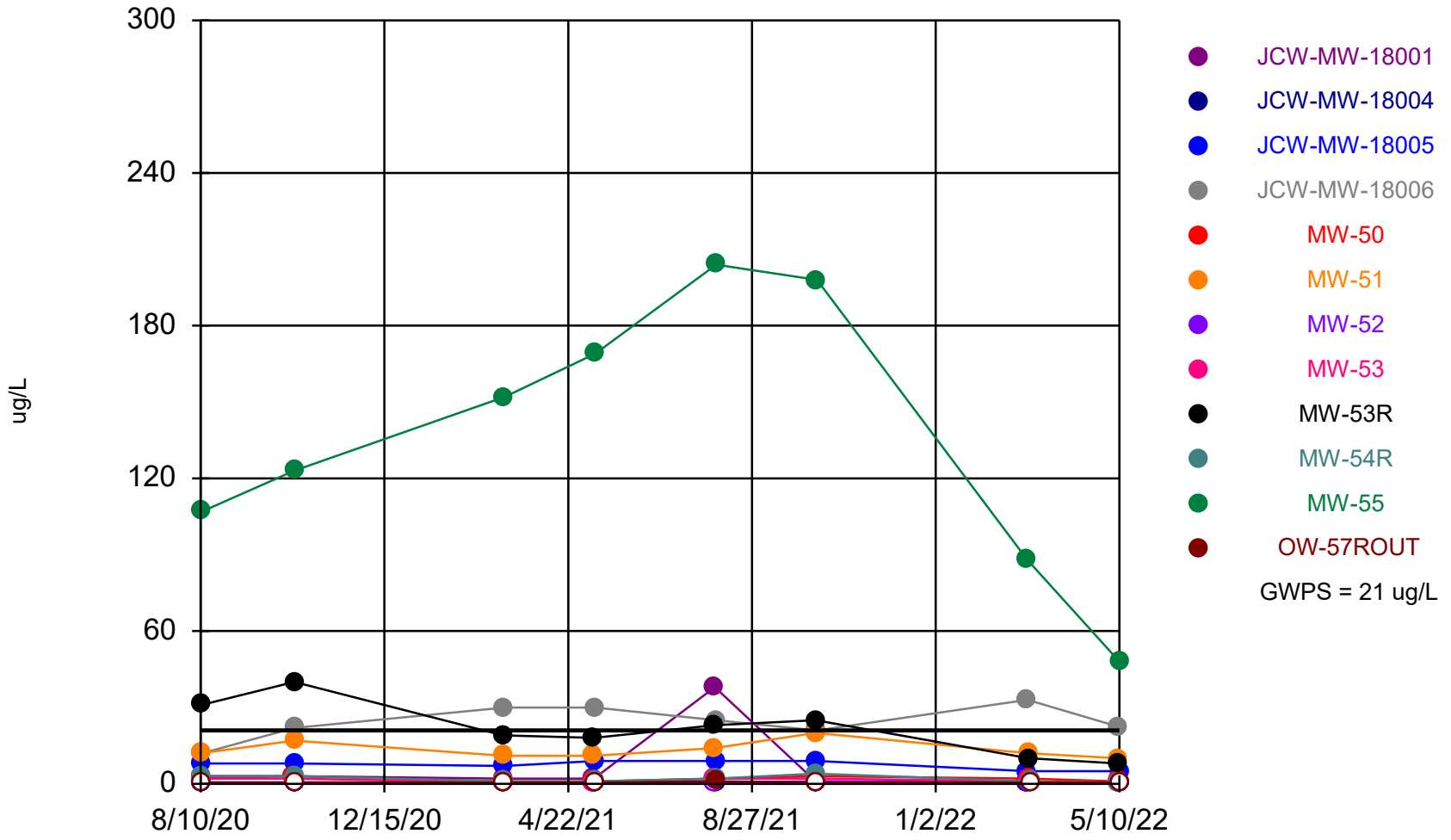
(1) 40 CFR Part 257 Appendix III Detection Monitoring Constituents and Appendix IV Assessment Monitoring Constituents.

(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.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Arsenic Comparison to GWPS

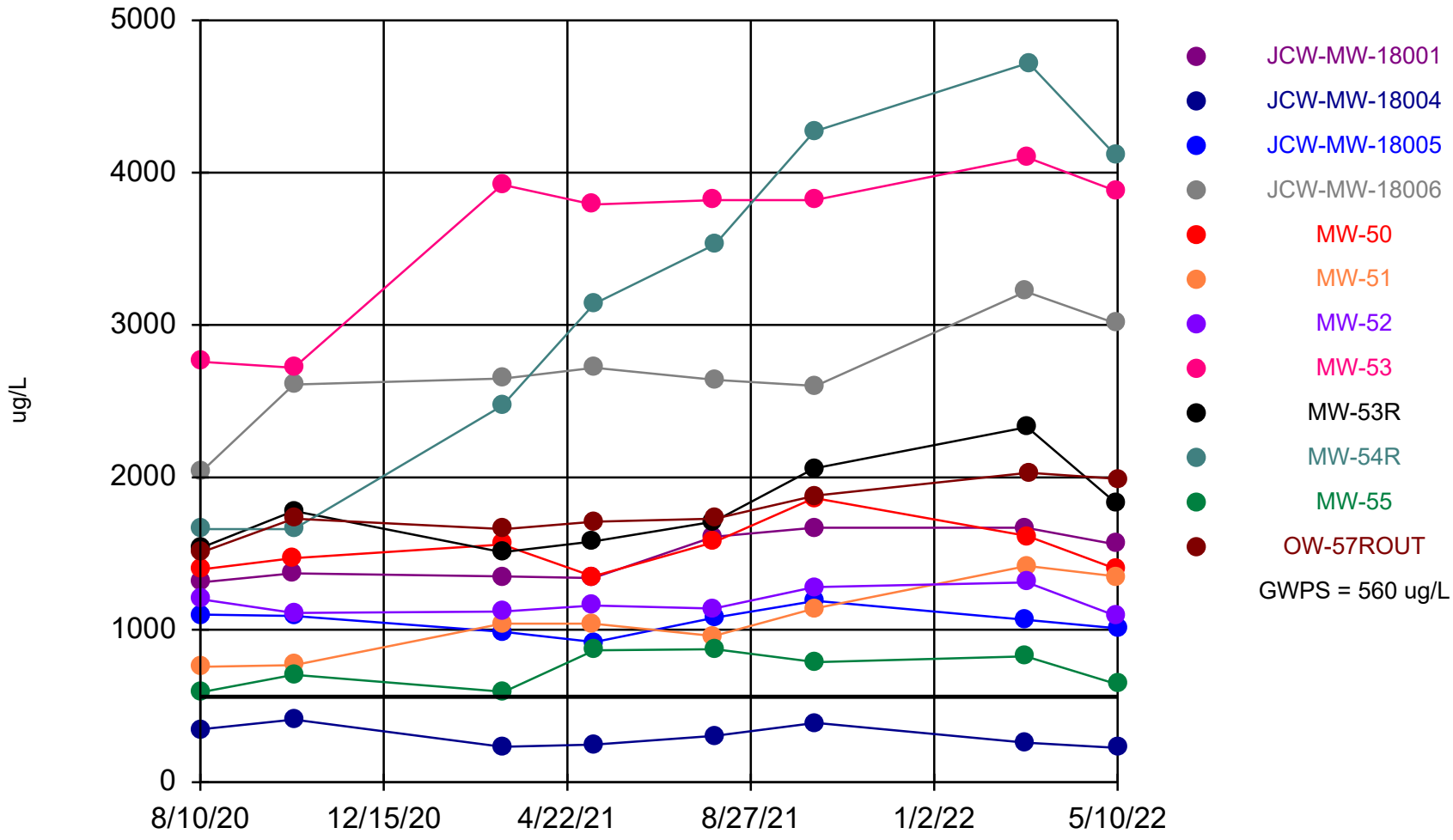


Time Series Analysis Run 6/8/2022 2:02 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron Comparison to GWPS

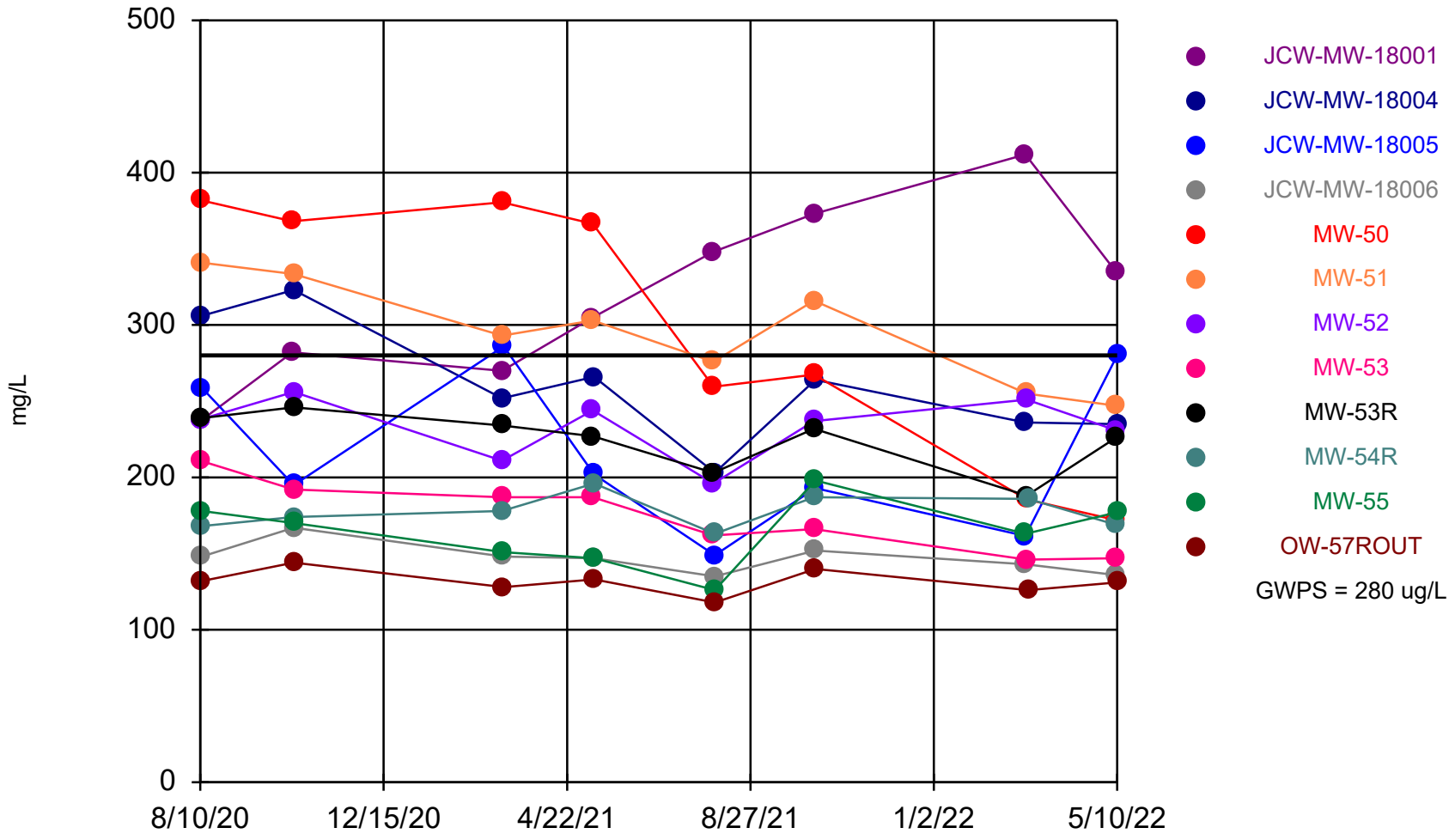


Time Series Analysis Run 6/8/2022 2:05 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium Comparison to GWPS

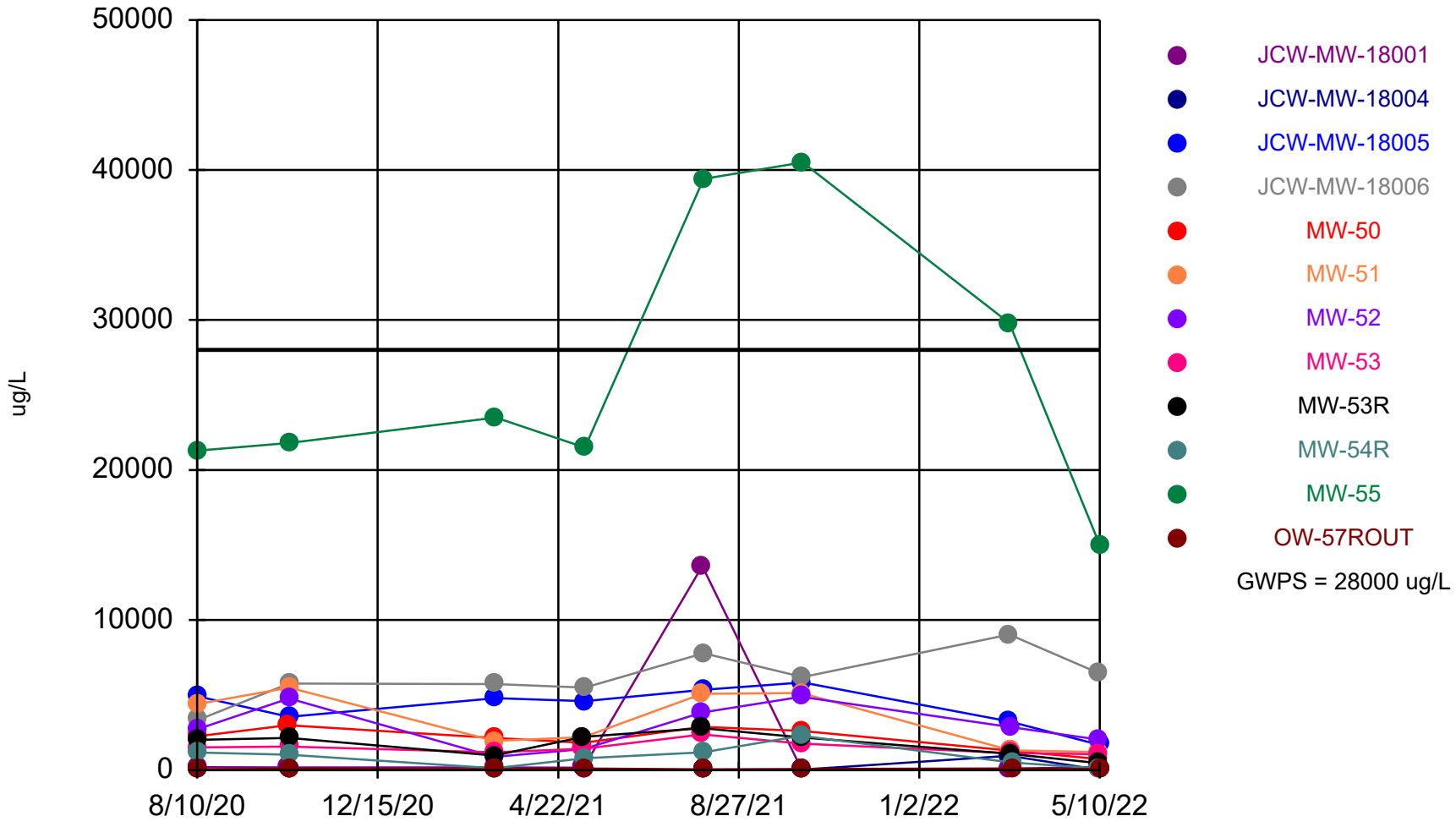


Time Series Analysis Run 6/8/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Iron Comparison to GWPS

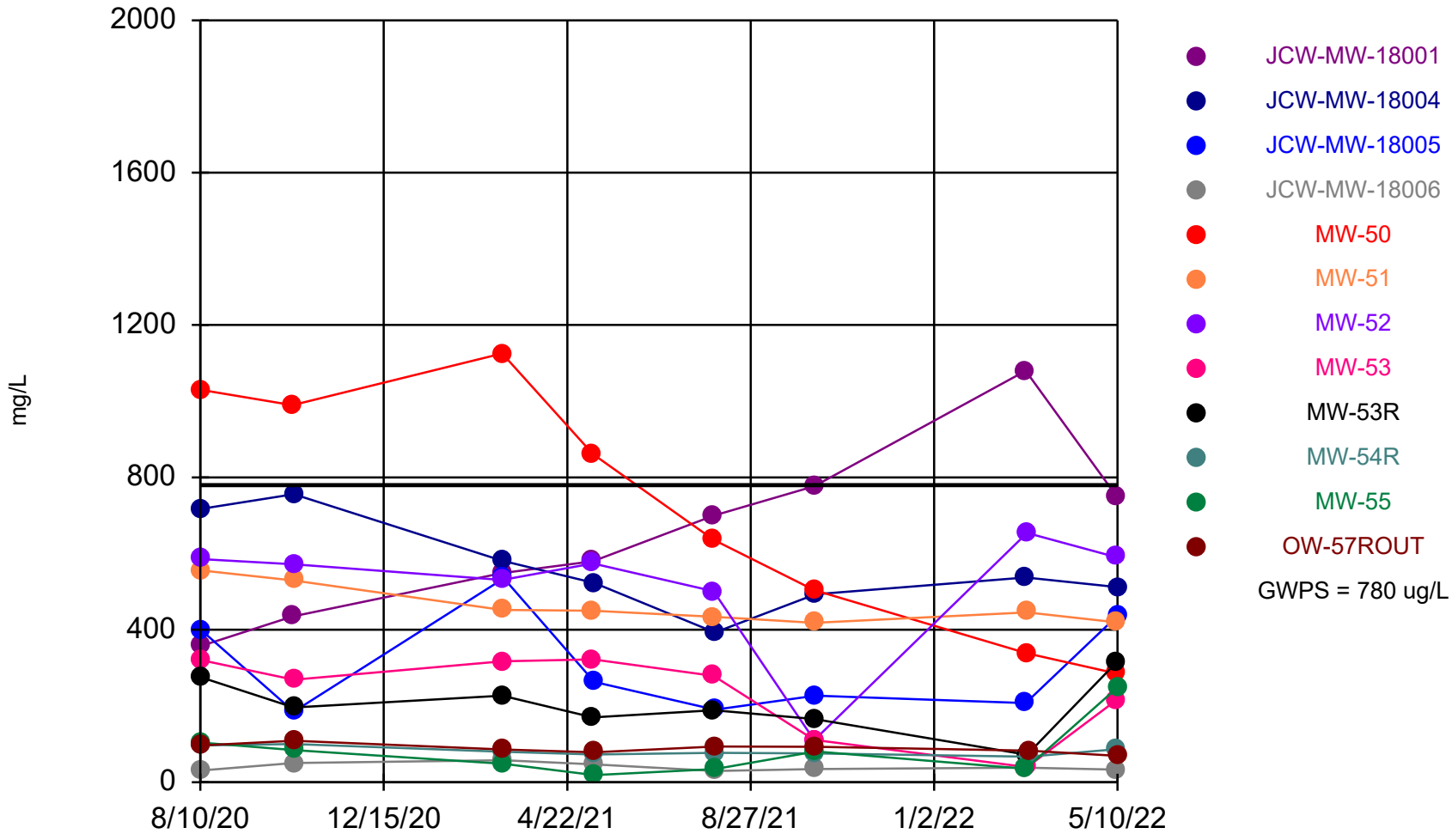


Time Series Analysis Run 6/8/2022 2:06 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate Comparison to GWPS

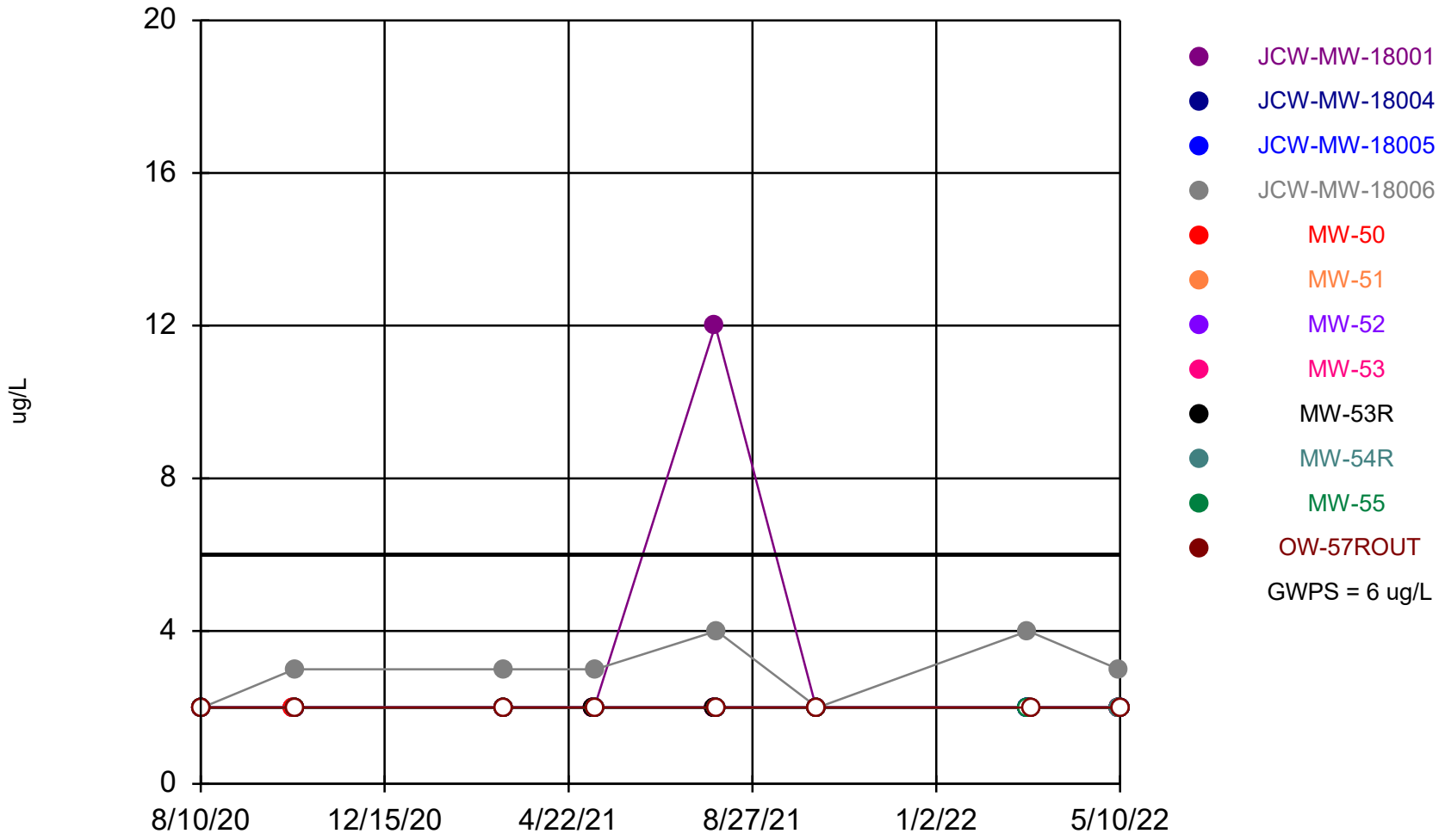


Time Series Analysis Run 6/8/2022 2:07 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Vanadium Comparison to GWPS



Time Series Analysis Run 6/8/2022 2:08 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Arsenic, Total Analysis Run 6/8/2022 2:10 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

For observations made between 8/10/2020 and 5/10/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 28
Wells = 12
Minimum Value = 1
Maximum Value = 204
Mean Value = 18.16
Median Value = 2.5
Standard Deviation = 39.83
Coefficient of Variation = 2.193
Skewness = 3.357

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	2	1	38	6.375	2	12.81	2.009	2.249
JCW-MW-18004	8	8	1	1	1	1	0	0	NaN
JCW-MW-18005	8	0	5	9	7.5	8	1.69	0.2254	-0.6641
JCW-MW-18006	8	0	12	33	24.44	23.75	6.673	0.2731	-0.5212
MW-50	8	0	1	3	1.875	2	0.8345	0.4451	0.2217
MW-51	8	0	10	20	13.38	12	3.462	0.2588	0.9876
MW-52	8	7	1	1	1	1	0	0	NaN
MW-53	8	3	1	2	1.5	1.5	0.5345	0.3563	0
MW-53R	8	0	8	40	21.75	21	10.55	0.4852	0.3393
MW-54R	8	1	1	4	2	1.5	1.195	0.5976	0.5367
MW-55	8	0	48	204	136.1	137.5	54.6	0.4011	-0.2192
OW-57ROUT	8	7	1	1	1	1	0	0	NaN

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Boron, Total Analysis Run 6/8/2022 2:10 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

For observations made between 8/10/2020 and 5/10/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 0
Wells = 12
Minimum Value = 226
Maximum Value = 4720
Mean Value = 1700
Median Value = 1490
Standard Deviation = 1034
Coefficient of Variation = 0.6081
Skewness = 1.035

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	1310	1670	1485	1465	157.1	0.1058	0.1043
JCW-MW-18004	8	0	226	410	301.6	281.5	72.63	0.2408	0.4042
JCW-MW-18005	8	0	919	1190	1055	1073	82.24	0.07794	-0.08999
JCW-MW-18006	8	0	2040	3220	2686	2645	343.3	0.1278	-0.3211
MW-50	8	0	1350	1865	1529	1515	166.3	0.1088	0.9421
MW-51	8	0	758	1420	1060	1040	241.2	0.2276	0.2043
MW-52	8	0	1090	1310	1176	1150	80.88	0.06876	0.6815
MW-53	8	0	2720	4100	3601	3820	540.3	0.15	-1.04
MW-53R	8	0	1510	2330	1793	1745	282.2	0.1574	0.8538
MW-54R	8	0	1660	4720	3195	3335	1175	0.3679	-0.1902
MW-55	8	0	592	873	735.6	746.5	118	0.1604	-0.09511
OW-57ROUT	8	0	1510	2030	1780	1730	174.8	0.09818	0.1111

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Calcium, Total Analysis Run 6/8/2022 2:10 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

For observations made between 8/10/2020 and 5/10/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 0
Wells = 12
Minimum Value = 118
Maximum Value = 412
Mean Value = 220.2
Median Value = 202.5
Standard Deviation = 71.2
Coefficient of Variation = 0.3234
Skewness = 0.7104

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	237	412	320.3	320	57.74	0.1803	0.1431
JCW-MW-18004	8	0	203	323	260.6	258	39	0.1496	0.2897
JCW-MW-18005	8	0	149	286	215.7	198.5	52.74	0.2445	0.225
JCW-MW-18006	8	0	135	167	147	147.5	10.06	0.06841	0.7513
MW-50	8	0	172	382	297.7	317	88.15	0.2961	-0.3656
MW-51	8	0	247	341	295.6	298	34.58	0.117	-0.116
MW-52	8	0	196	256	233	237.5	20.26	0.08693	-0.768
MW-53	8	0	146	211	174.8	176.5	23.14	0.1324	0.1056
MW-53R	8	0	188	246	224.4	229.5	19.35	0.08625	-0.9122
MW-54R	8	0	163	196	177.6	176	11.27	0.06348	0.3097
MW-55	8	0	126	198	163.8	166.5	22.23	0.1358	-0.2075
OW-57ROUT	8	0	118	144	131.5	131.5	8.071	0.06138	-0.02876

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Iron, Total Analysis Run 6/8/2022 2:10 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

For observations made between 8/10/2020 and 5/10/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 4
Wells = 12
Minimum Value = 10
Maximum Value = 40500
Mean Value = 4301
Median Value = 1875
Standard Deviation = 7568
Coefficient of Variation = 1.76
Skewness = 3.155

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	86	13600	1839	182.5	4753	2.585	2.267
JCW-MW-18004	8	4	10	952	134.5	15.5	330.5	2.457	2.263
JCW-MW-18005	8	0	1680	5840	4243	4695	1347	0.3175	-0.7665
JCW-MW-18006	8	0	3360	9040	6231	5980	1675	0.2689	0.05366
MW-50	8	0	730	2990	2089	2200	785	0.3757	-0.5238
MW-51	8	0	1210	5500	3345	3295	1848	0.5526	-0.009059
MW-52	8	0	879	4880	2922	2795	1483	0.5076	0.08319
MW-53	8	0	1060	2380	1500	1465	428.5	0.2856	1.029
MW-53R	8	0	460	2800	1733	2080	796.6	0.4598	-0.3849
MW-54R	8	0	115	2280	898	906	704.9	0.785	0.7286
MW-55	8	0	15000	40500	26600	22650	9170	0.3447	0.5611
OW-57ROUT	8	0	42	100	71.75	71	22.71	0.3166	-0.02923

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Sulfate Analysis Run 6/8/2022 2:10 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

For observations made between 8/10/2020 and 5/10/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 0
Wells = 12
Minimum Value = 18.5
Maximum Value = 1125
Mean Value = 329.2
Median Value = 272
Standard Deviation = 270.6
Coefficient of Variation = 0.822
Skewness = 0.8852

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	357	1080	653.8	640	227.1	0.3474	0.5505
JCW-MW-18004	8	0	393	756	564.1	530	119.7	0.2122	0.4553
JCW-MW-18005	8	0	185	535	305.3	245	133.1	0.4358	0.6761
JCW-MW-18006	8	0	29.7	57.3	40.19	36.4	10.06	0.2504	0.5898
MW-50	8	0	285.5	1125	721.3	748.8	325.5	0.4512	-0.1439
MW-51	8	0	418	556	463.2	448	51.22	0.1106	1.005
MW-52	8	0	110	654	514.9	573	169.6	0.3294	-1.956
MW-53	8	0	39.5	322	234.2	274	106.1	0.453	-0.9242
MW-53R	8	0	71.7	314	201.1	192.5	73.67	0.3664	-0.1453
MW-54R	8	0	67.1	100	81.86	78.45	11.47	0.1402	0.471
MW-55	8	0	18.5	249	81.74	64.35	73.69	0.9016	1.6
OW-57ROUT	8	0	69.4	109	88.7	89.55	12.21	0.1376	0.05148

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Vanadium, Total Analysis Run 6/8/2022 2:10 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

For observations made between 8/10/2020 and 5/10/2022, a summary of the selected data set:

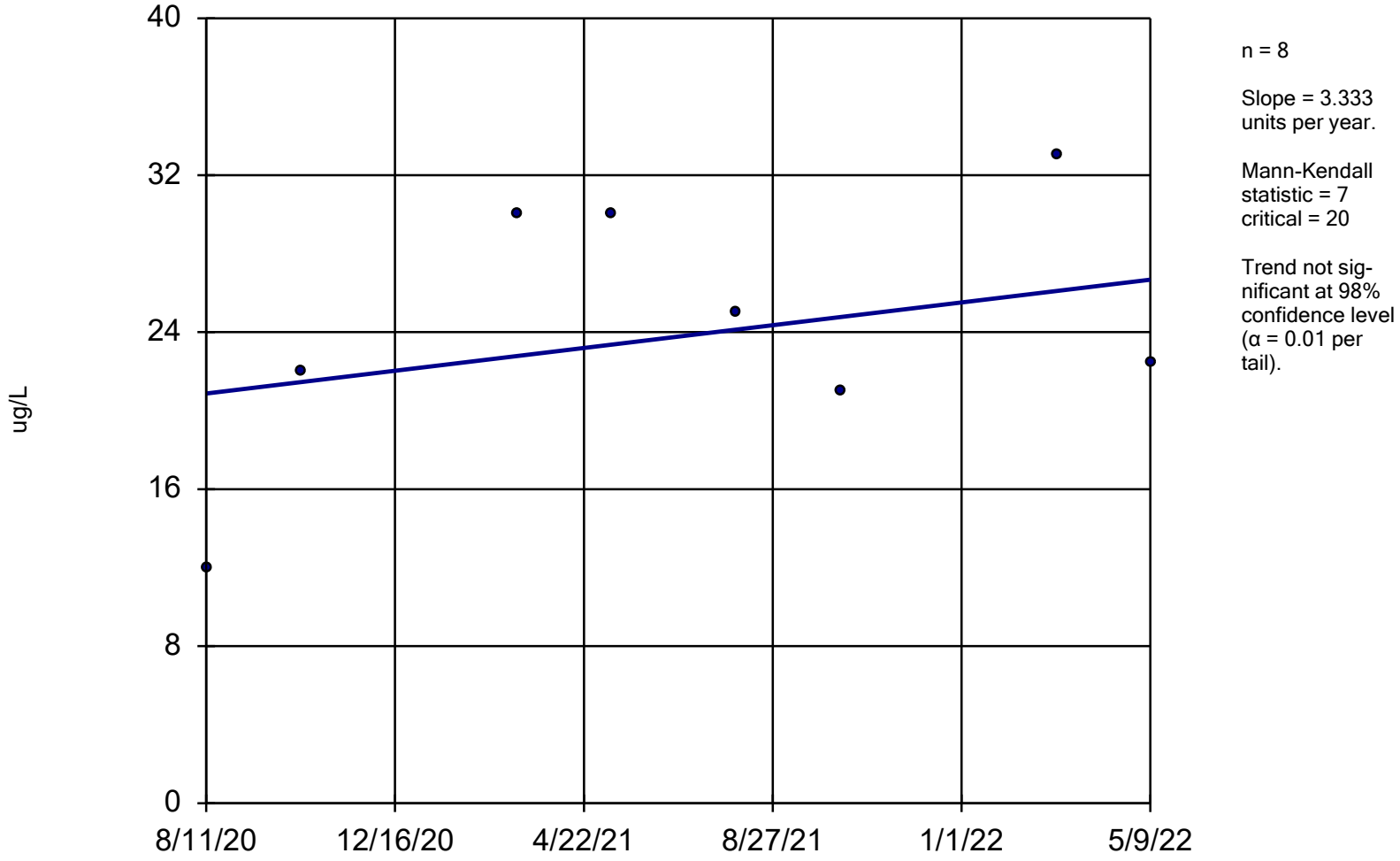
Observations = 96
ND/Trace = 87
Wells = 12
Minimum Value = 2
Maximum Value = 12
Mean Value = 2.188
Median Value = 2
Standard Deviation = 1.069
Coefficient of Variation = 0.4888
Skewness = 8.293

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	8	2	2	2	2	0	0	NaN
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

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Arsenic, Total

JCW-MW-18006



n = 8

Slope = 3.333 units per year.

Mann-Kendall statistic = 7
critical = 20

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

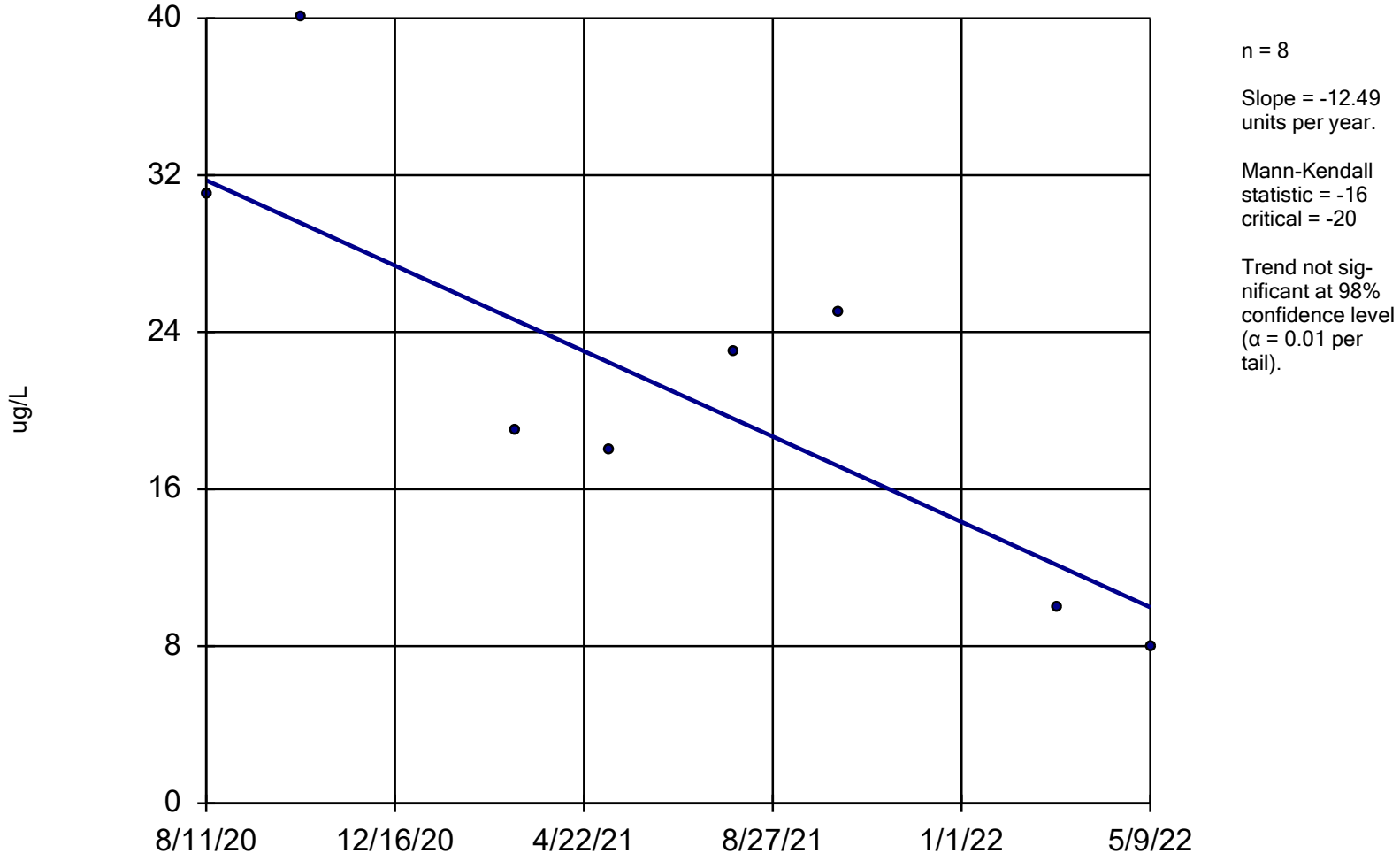
Sen's Slope Estimator Analysis Run 6/8/2022 2:47 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Arsenic, Total

MW-53R



n = 8

Slope = -12.49 units per year.

Mann-Kendall statistic = -16
critical = -20

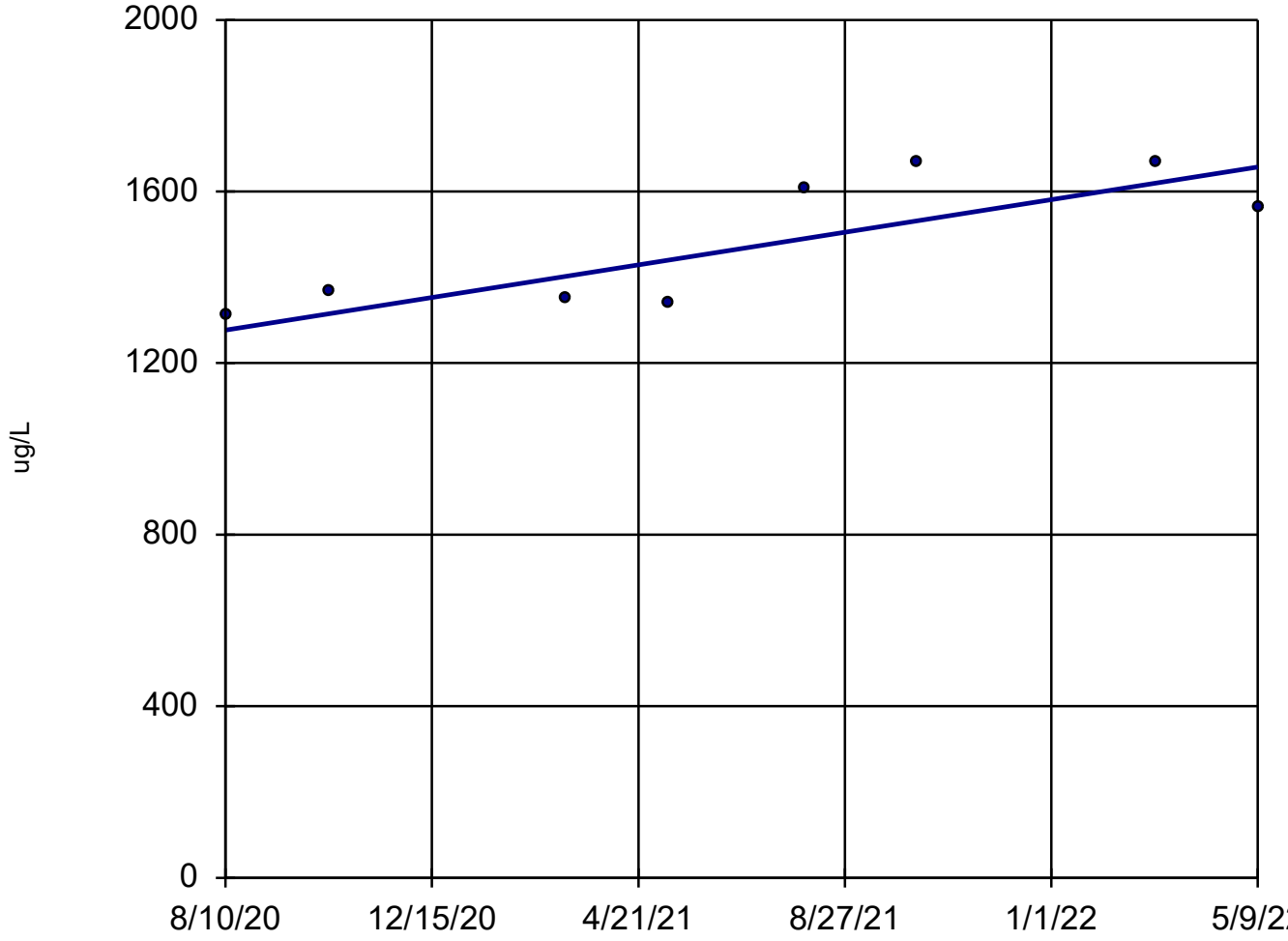
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/8/2022 2:47 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Boron, Total

JCW-MW-18001



n = 8

Slope = 217.7 units per year.

Mann-Kendall statistic = 15
critical = 20

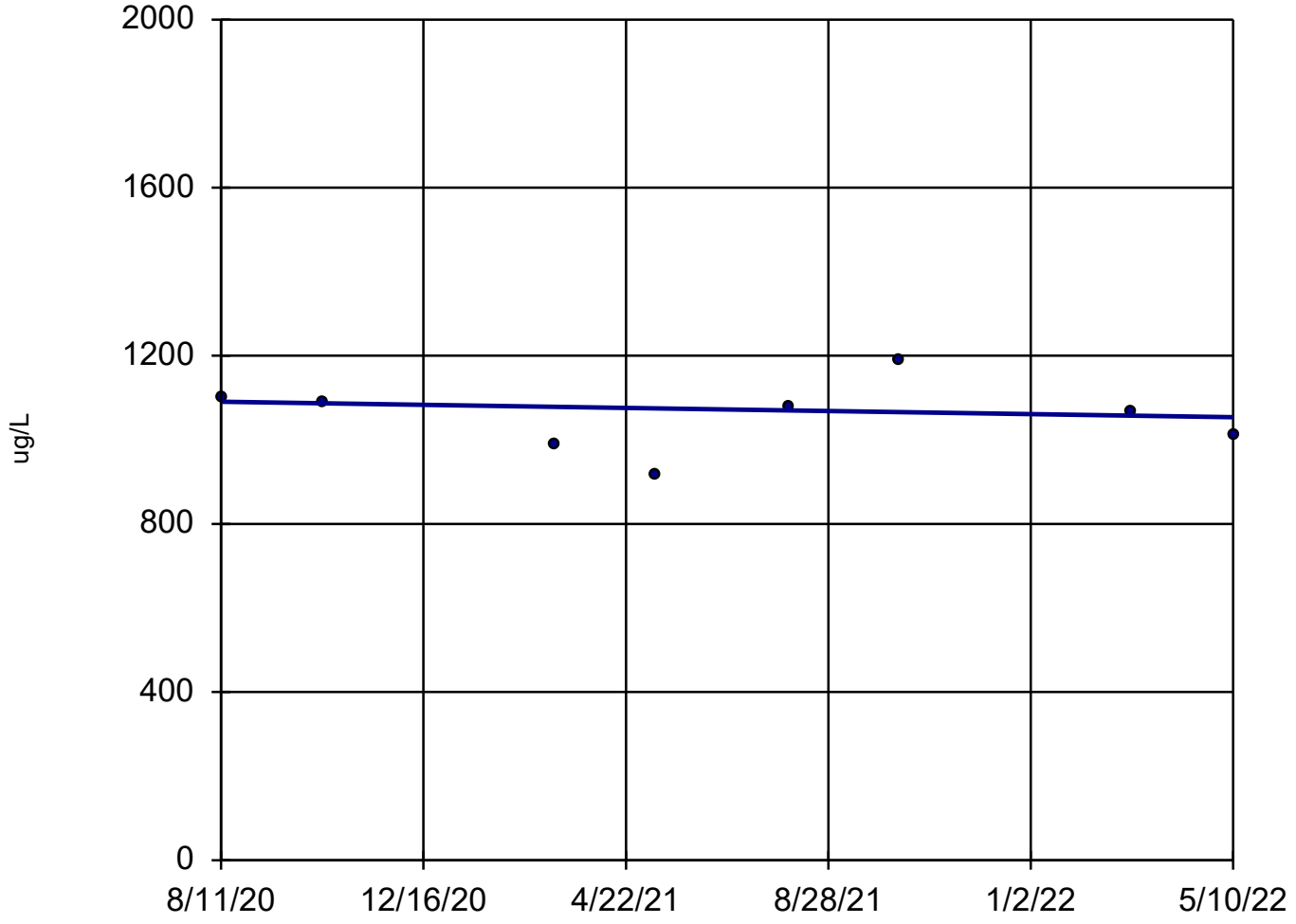
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/8/2022 2:47 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Boron, Total

JCW-MW-18005



n = 8

Slope = -21.37 units per year.

Mann-Kendall statistic = -6
critical = -20

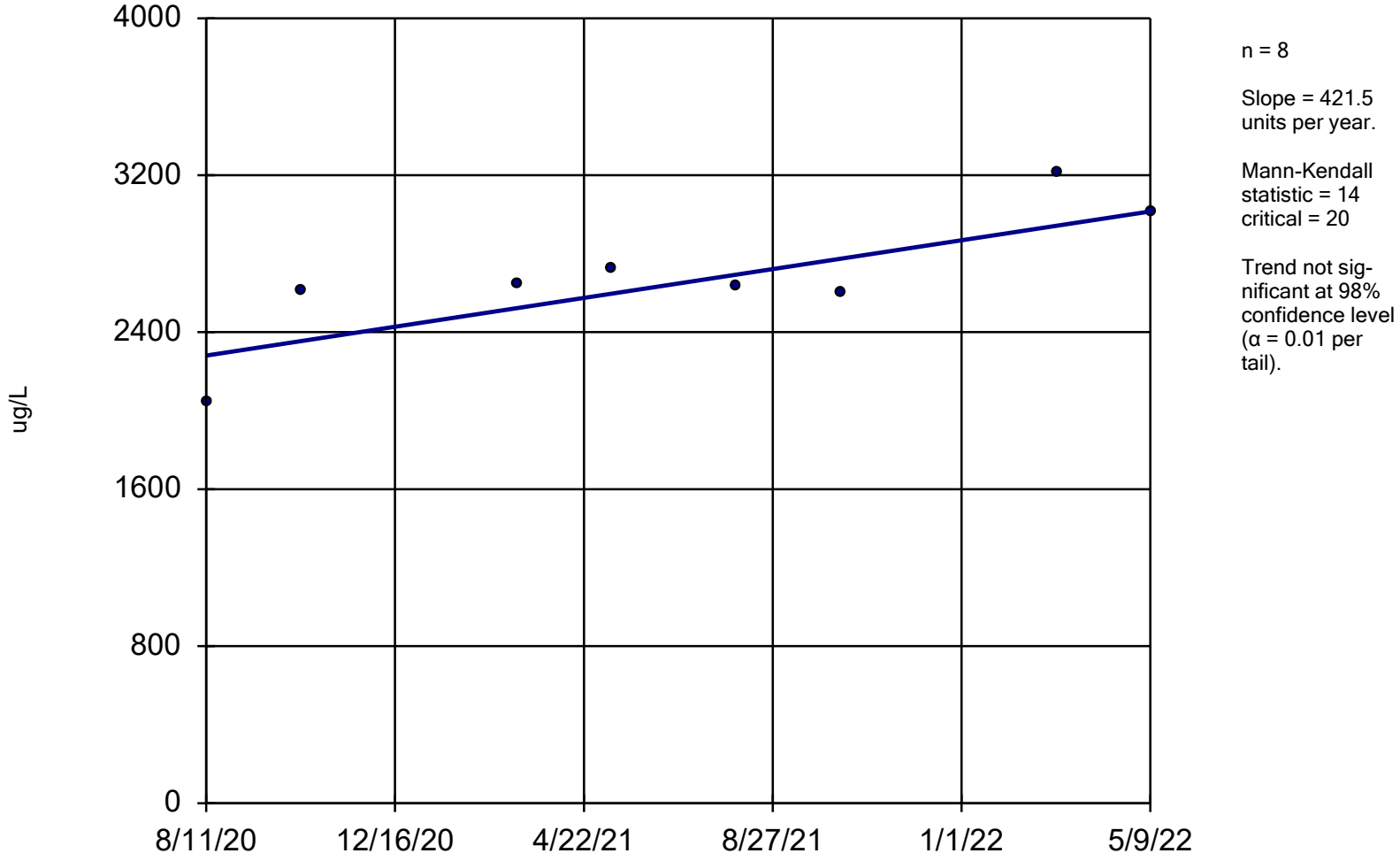
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/8/2022 2:47 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Boron, Total

JCW-MW-18006



n = 8

Slope = 421.5 units per year.

Mann-Kendall statistic = 14
critical = 20

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

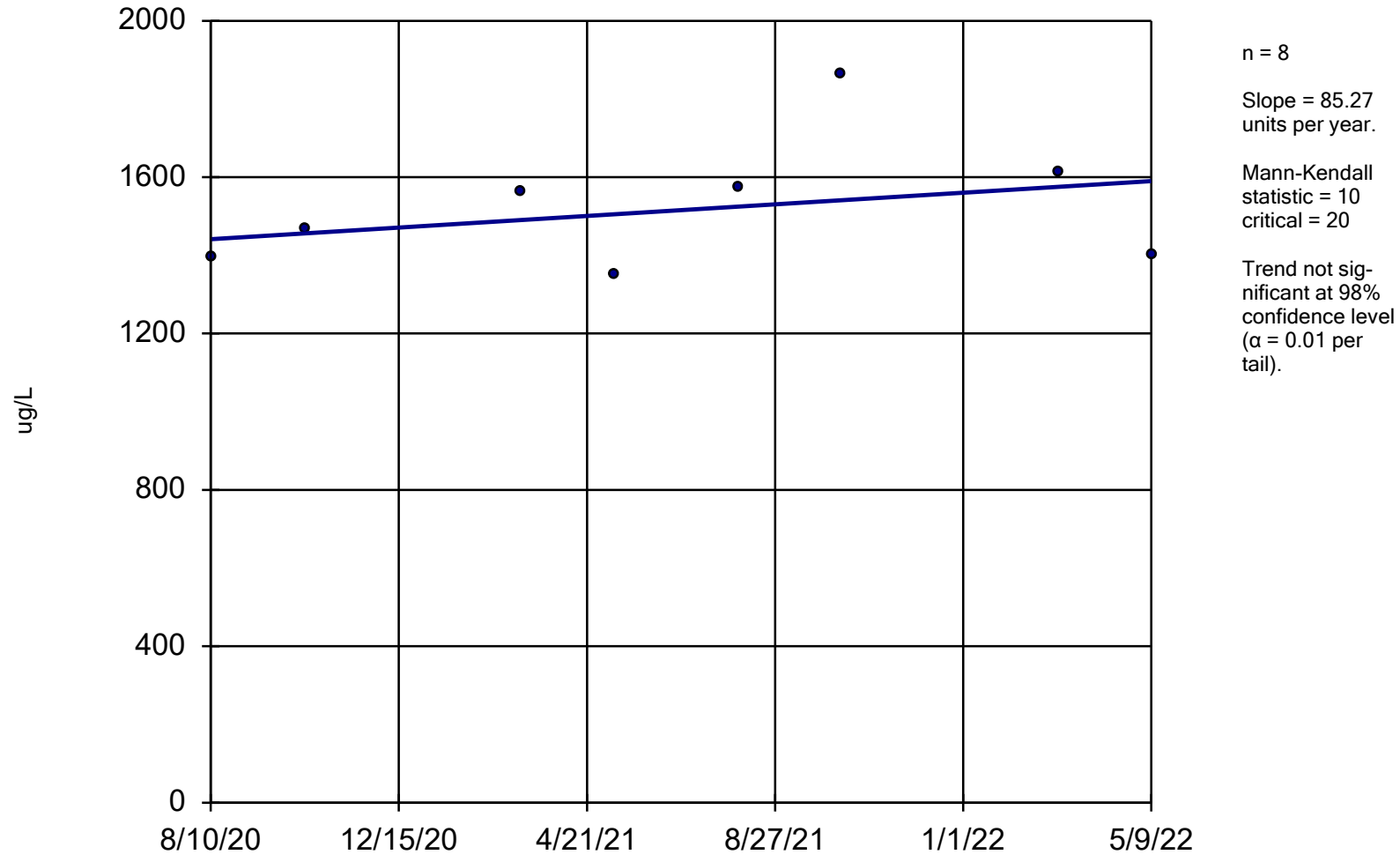
Sen's Slope Estimator Analysis Run 6/8/2022 2:47 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-50



n = 8

Slope = 85.27 units per year.

Mann-Kendall statistic = 10
critical = 20

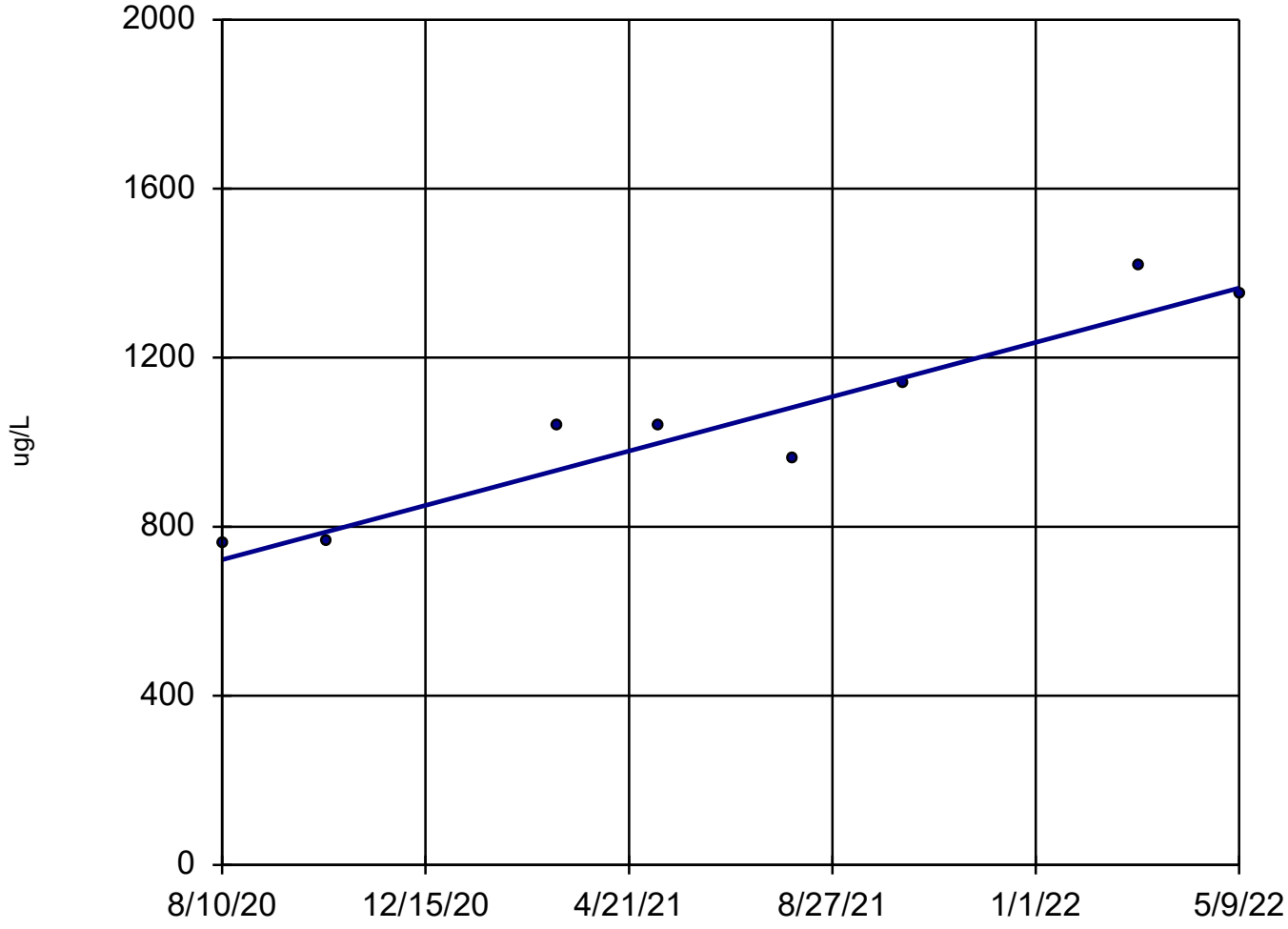
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/8/2022 2:47 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Boron, Total

MW-51



n = 8

Slope = 368 units per year.

Mann-Kendall statistic = 21 critical = 20

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

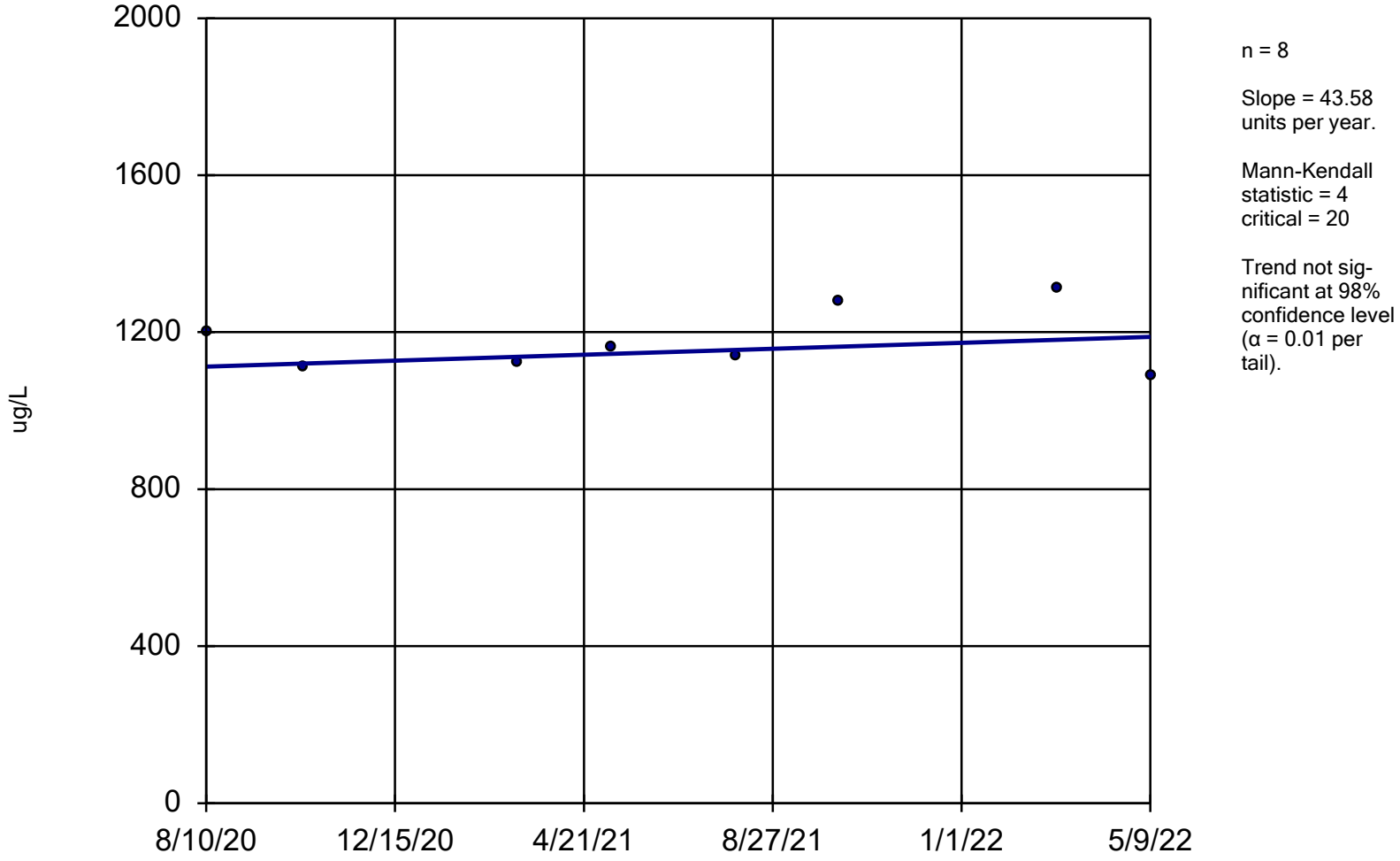
Sen's Slope Estimator Analysis Run 6/8/2022 2:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-52



n = 8

Slope = 43.58 units per year.

Mann-Kendall statistic = 4
critical = 20

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

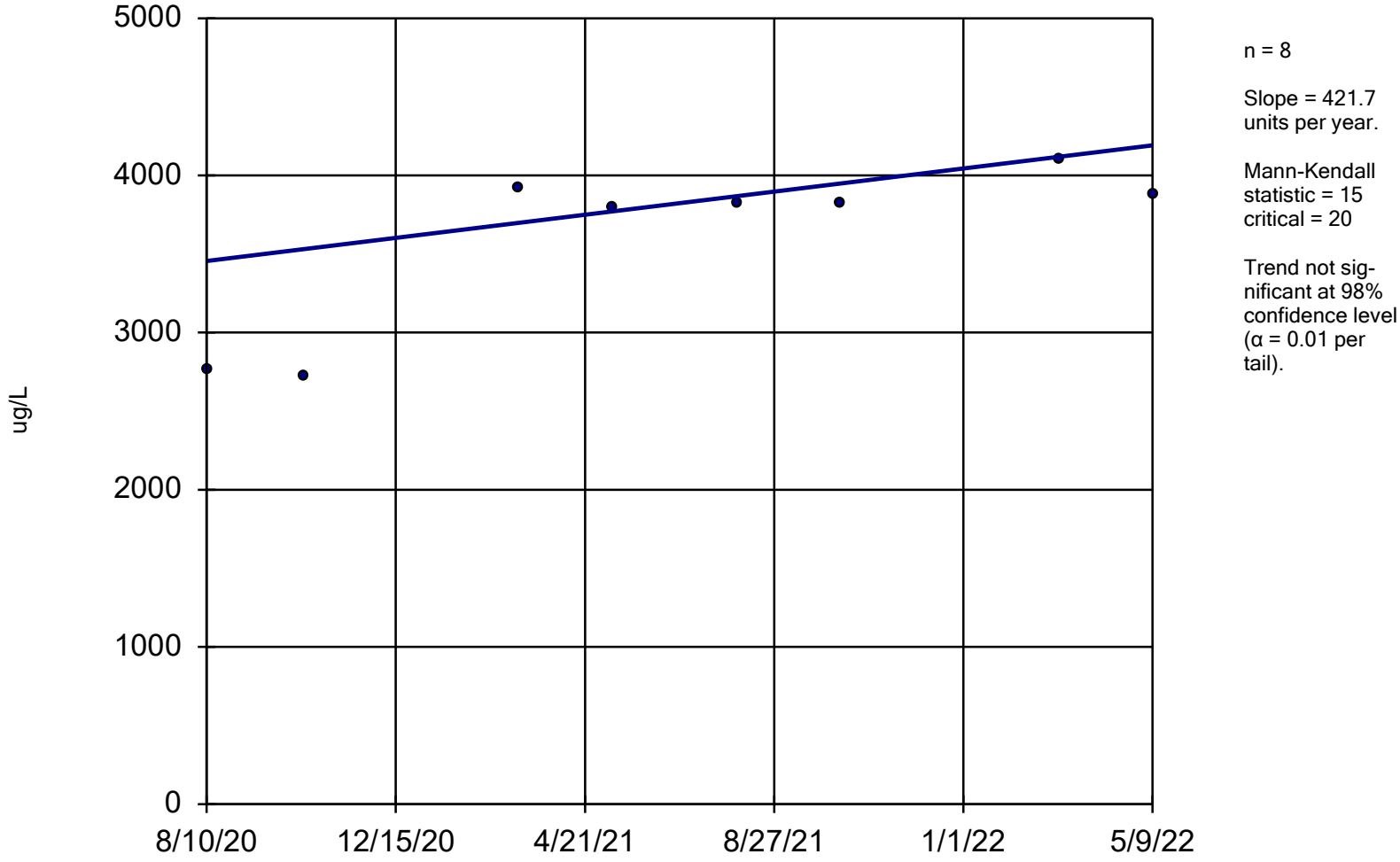
Sen's Slope Estimator Analysis Run 6/8/2022 2:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-53



n = 8

Slope = 421.7 units per year.

Mann-Kendall statistic = 15
critical = 20

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

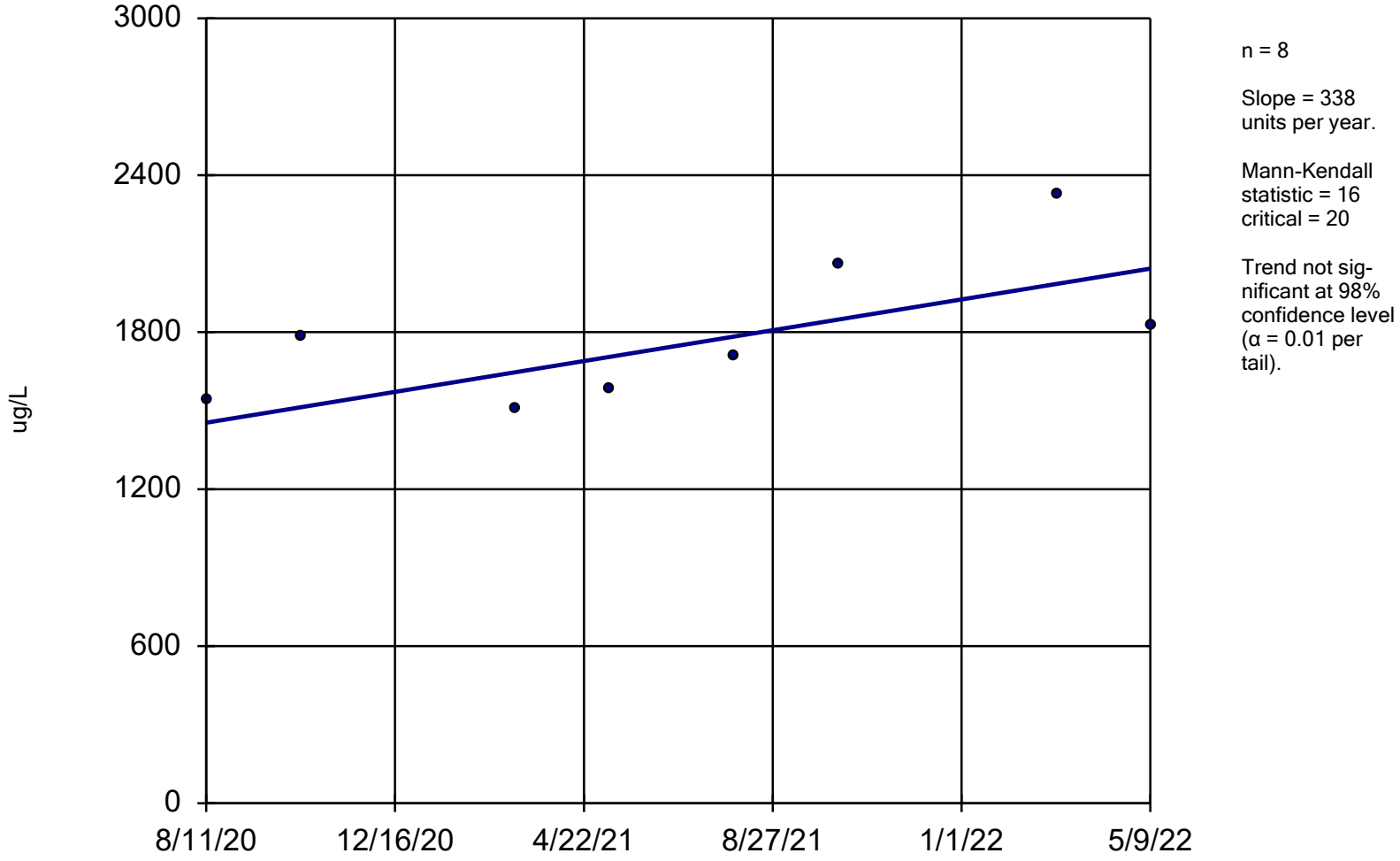
Sen's Slope Estimator Analysis Run 6/8/2022 2:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-53R



n = 8

Slope = 338 units per year.

Mann-Kendall statistic = 16 critical = 20

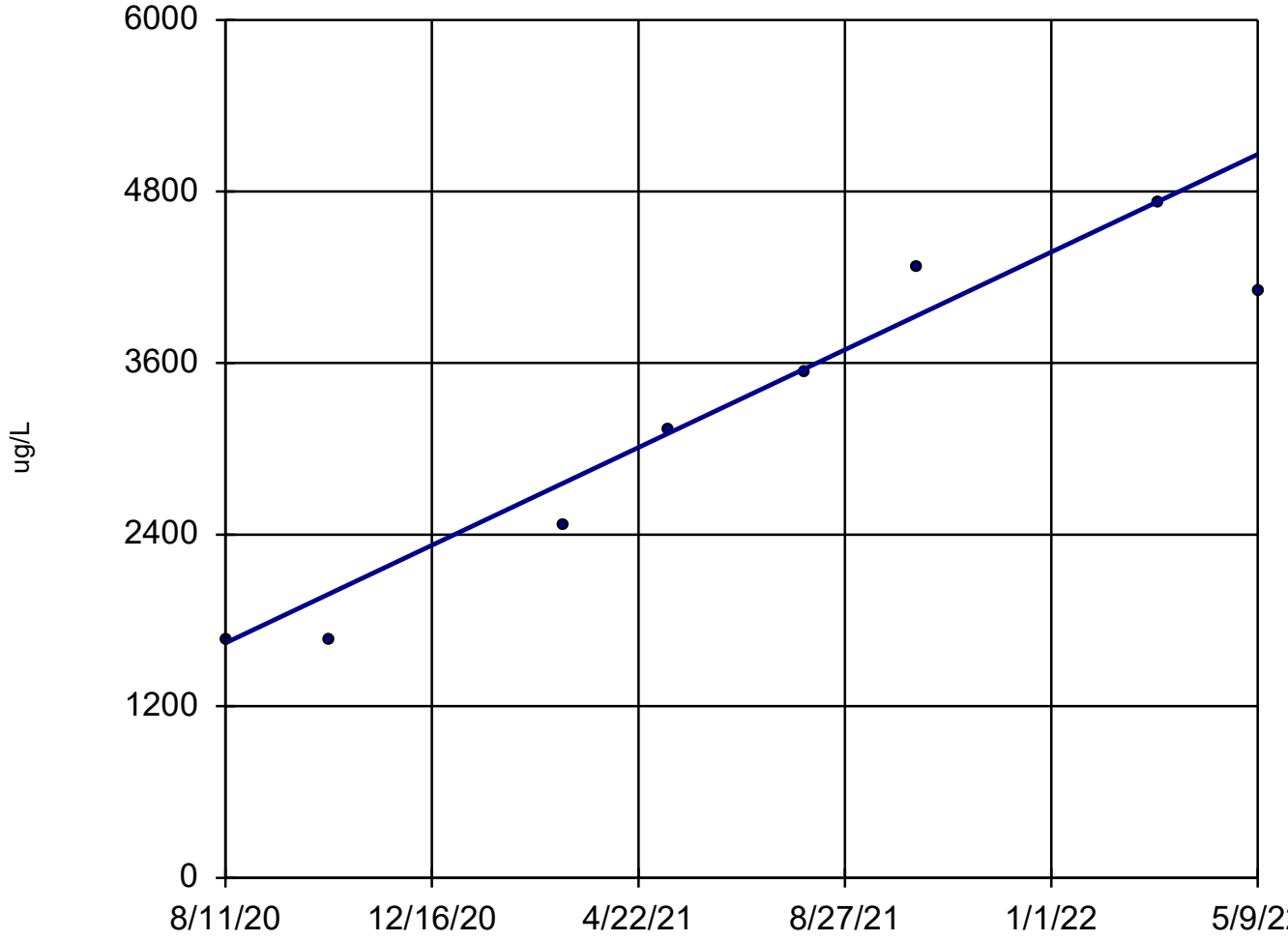
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/8/2022 2:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Boron, Total

MW-54R



n = 8

Slope = 1961 units per year.

Mann-Kendall statistic = 23
critical = 20

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

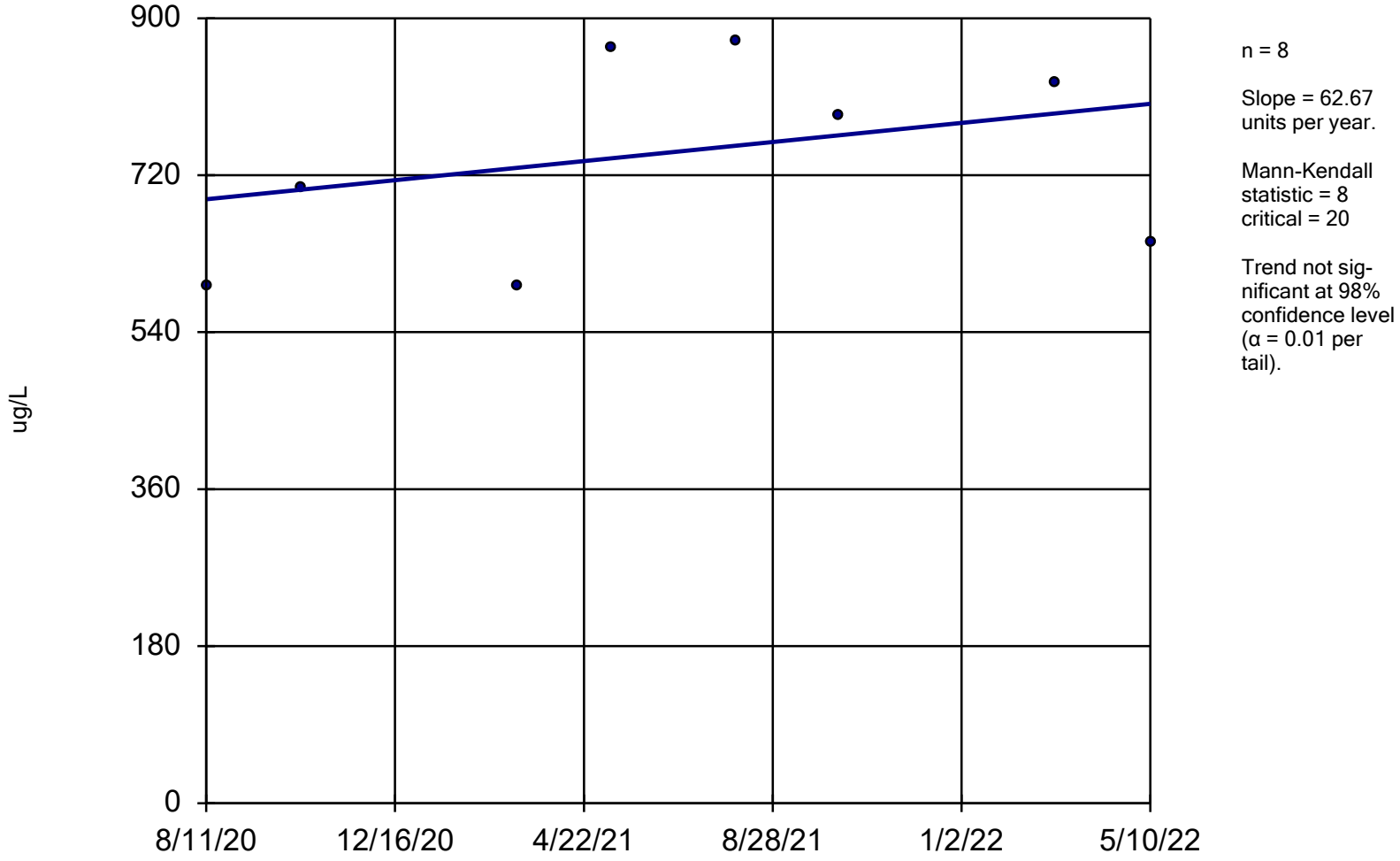
Sen's Slope Estimator Analysis Run 6/8/2022 2:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-55



n = 8

Slope = 62.67 units per year.

Mann-Kendall statistic = 8
critical = 20

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

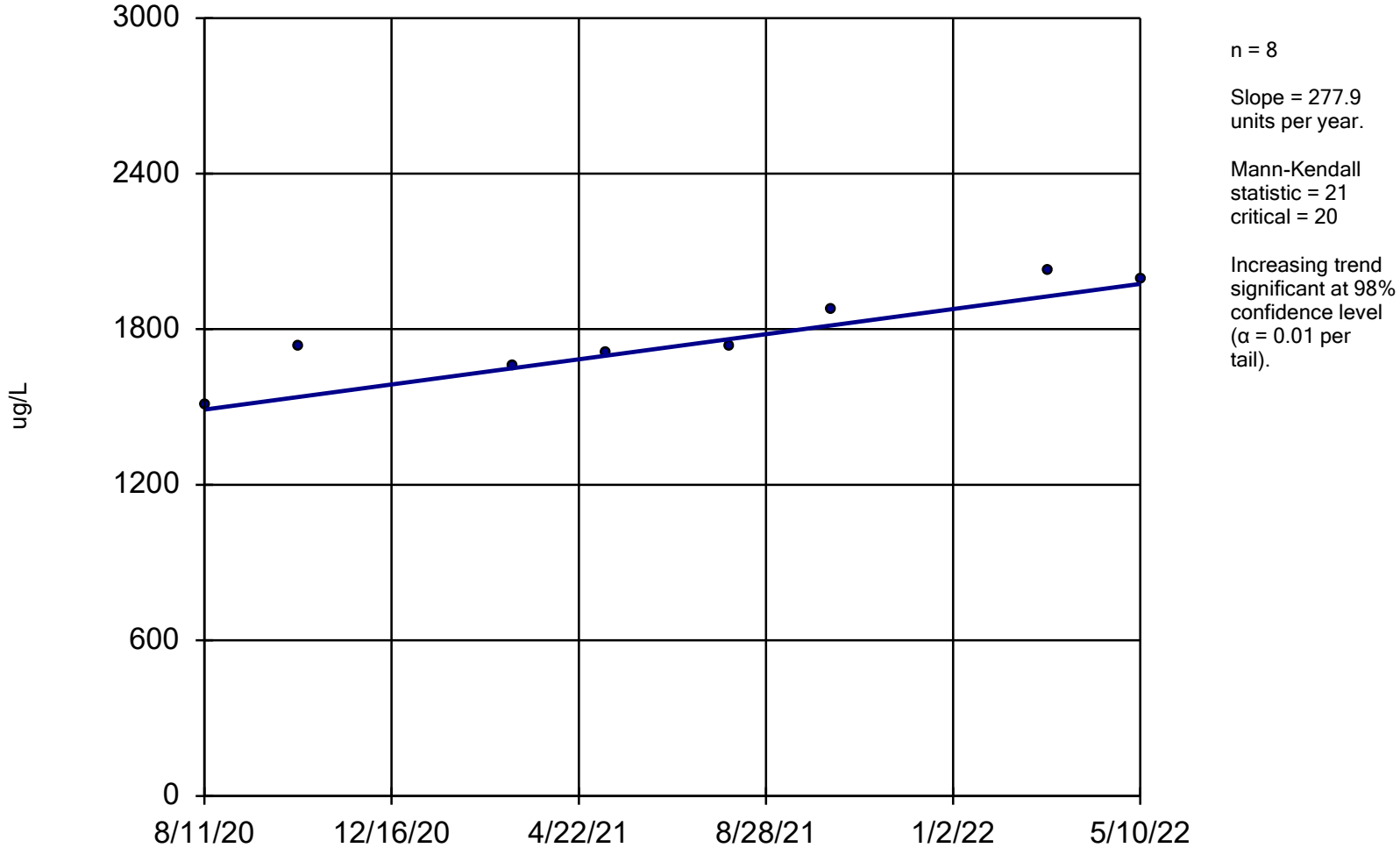
Sen's Slope Estimator Analysis Run 6/8/2022 2:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

OW-57ROUT



n = 8

Slope = 277.9 units per year.

Mann-Kendall statistic = 21
critical = 20

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

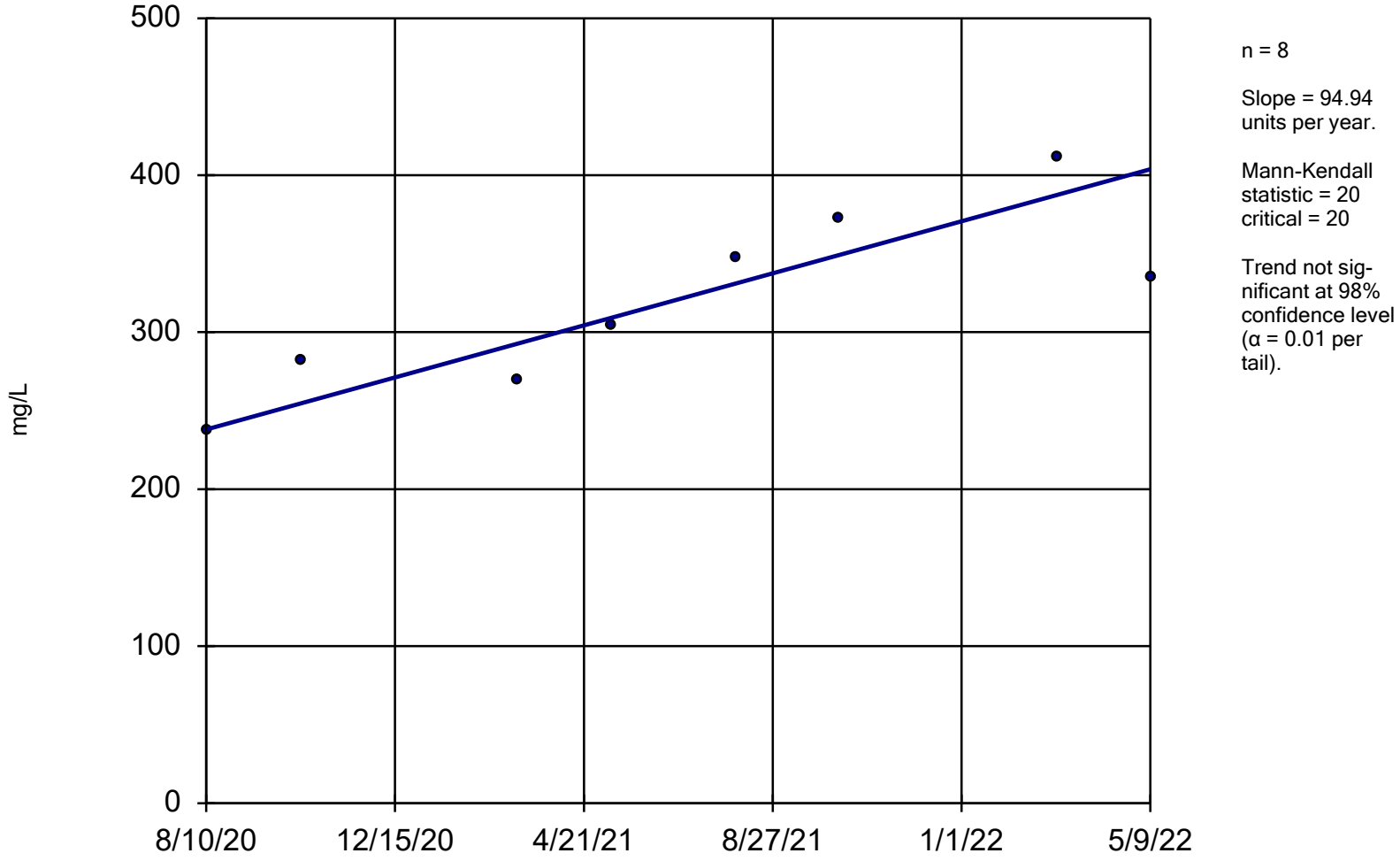
Sen's Slope Estimator Analysis Run 6/8/2022 2:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

JCW-MW-18001



n = 8

Slope = 94.94 units per year.

Mann-Kendall statistic = 20
critical = 20

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

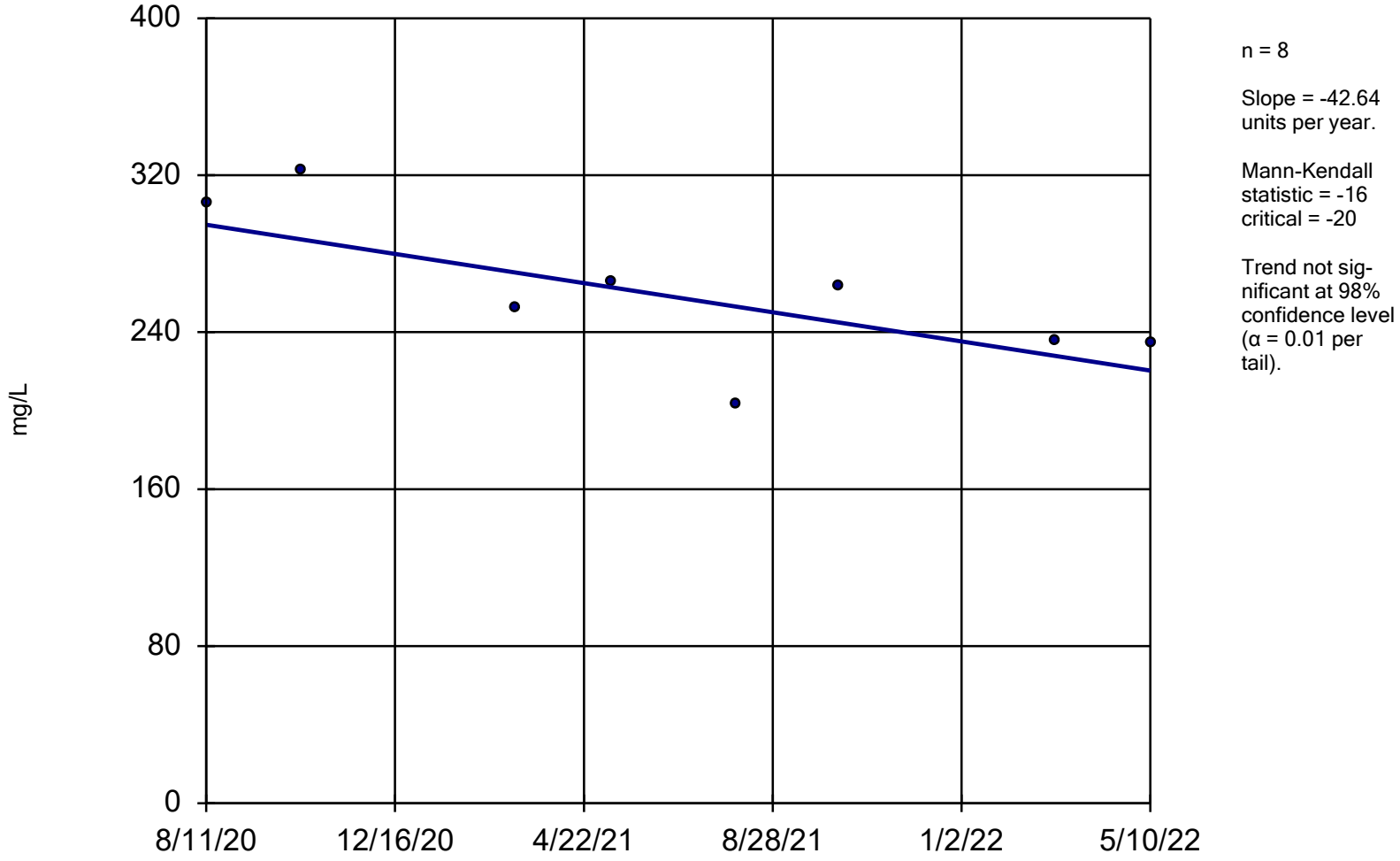
Sen's Slope Estimator Analysis Run 6/8/2022 2:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

JCW-MW-18004



n = 8

Slope = -42.64 units per year.

Mann-Kendall statistic = -16
critical = -20

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

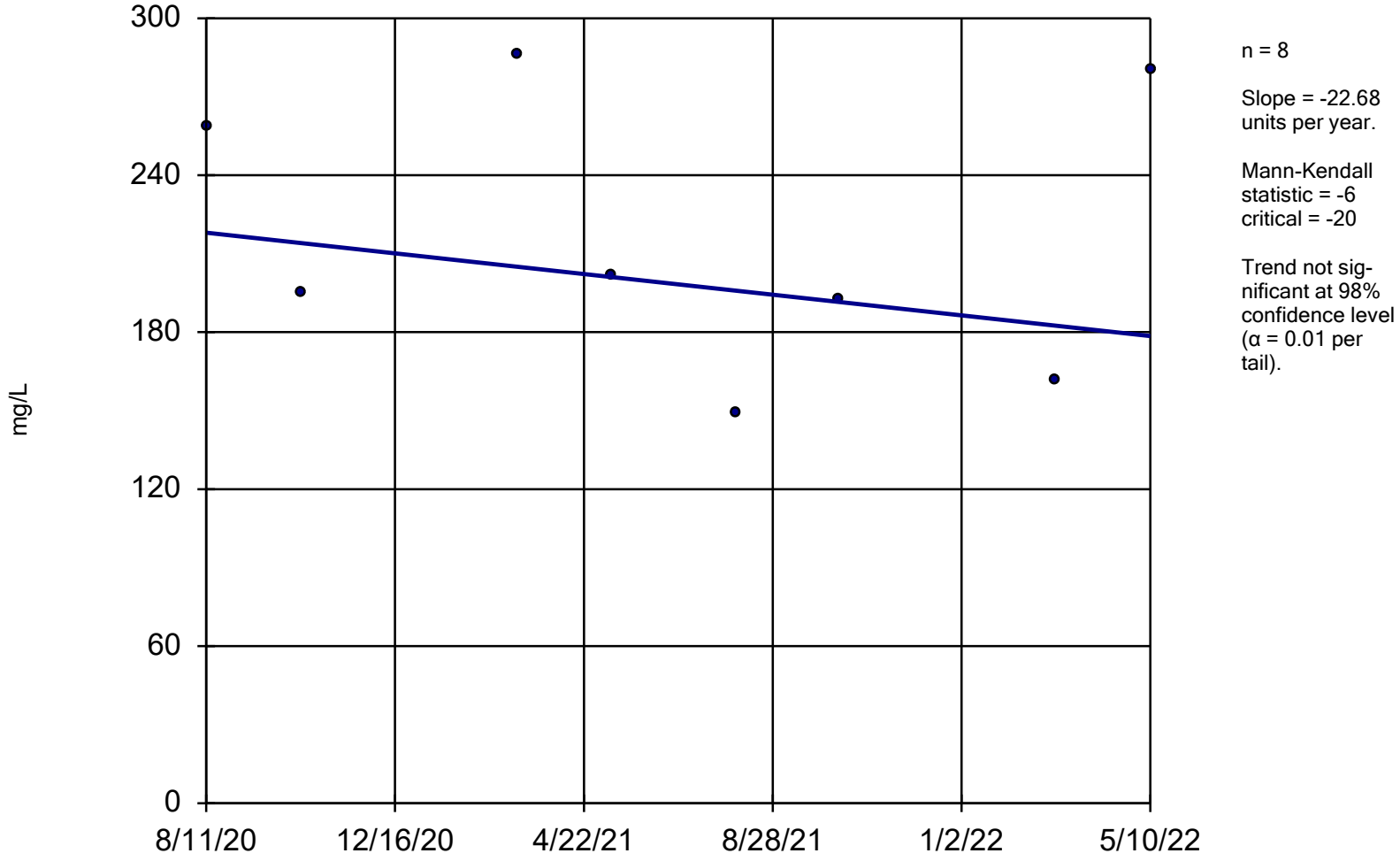
Sen's Slope Estimator Analysis Run 6/8/2022 2:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

JCW-MW-18005



n = 8

Slope = -22.68 units per year.

Mann-Kendall statistic = -6
critical = -20

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

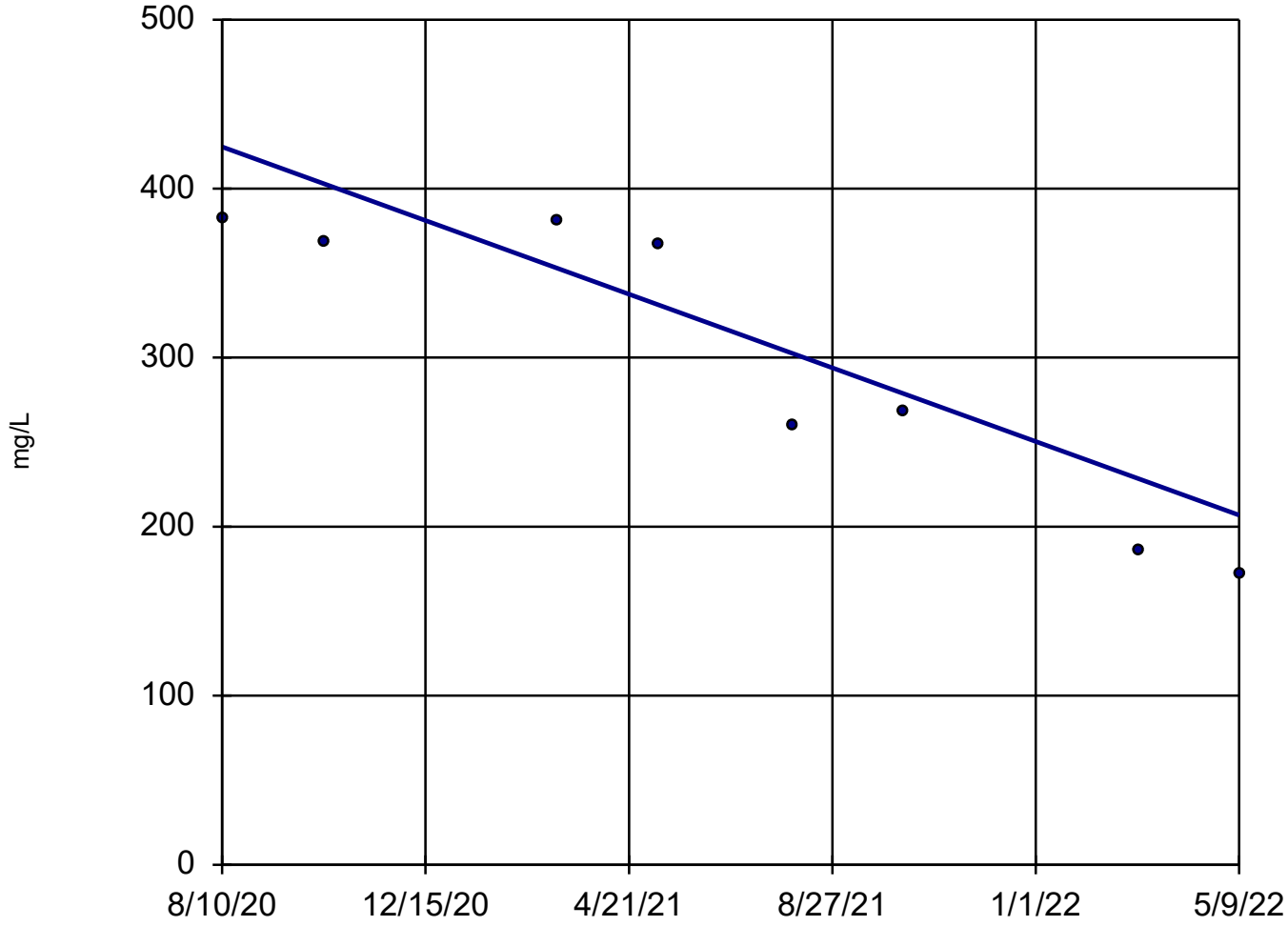
Sen's Slope Estimator Analysis Run 6/8/2022 2:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

MW-50



n = 8

Slope = -124.8 units per year.

Mann-Kendall statistic = -24
critical = -20

Decreasing trend significant at 98% confidence level (α = 0.01 per tail).

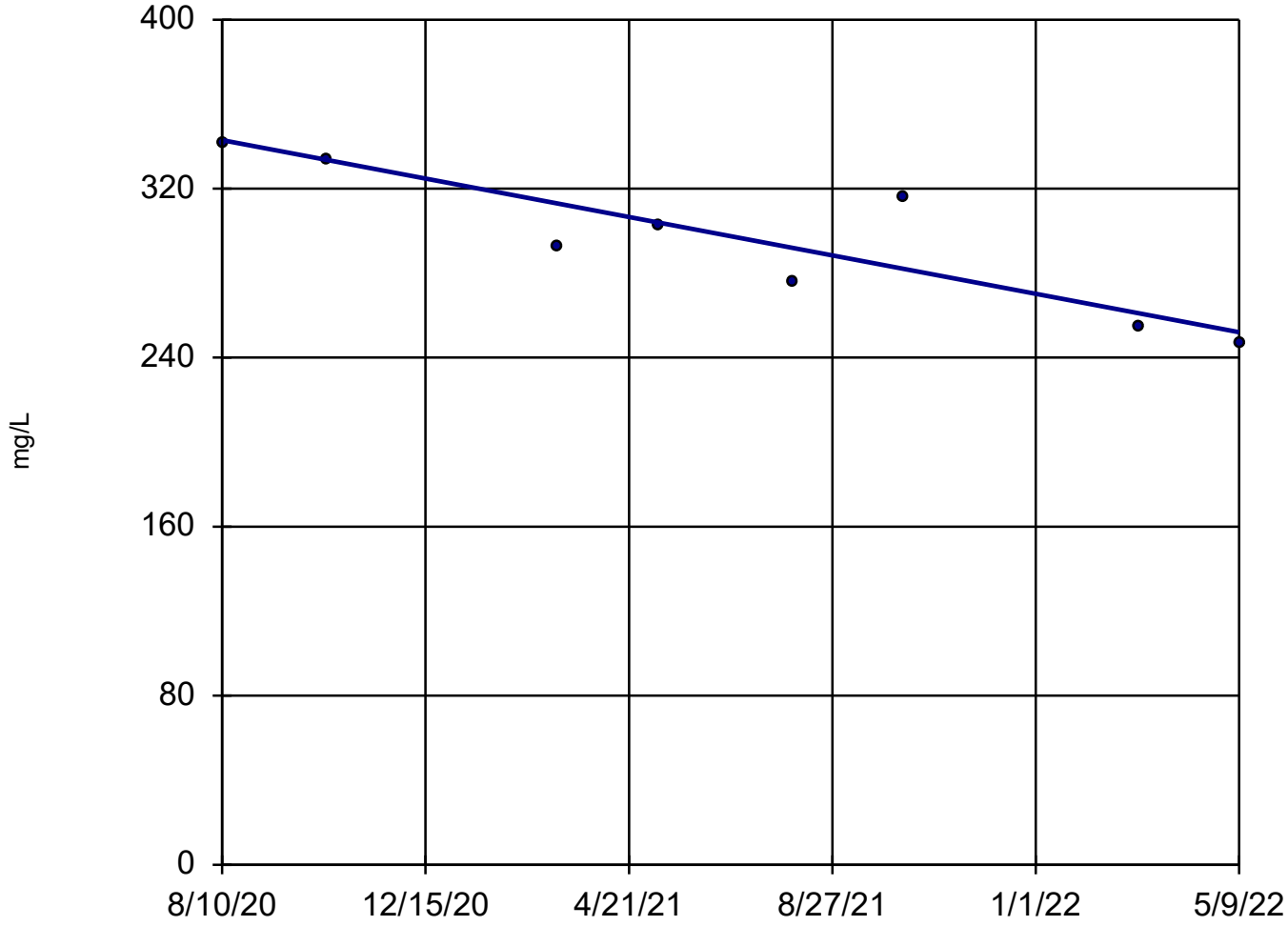
Sen's Slope Estimator Analysis Run 6/8/2022 2:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

MW-51



n = 8

Slope = -52.16 units per year.

Mann-Kendall statistic = -20
critical = -20

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

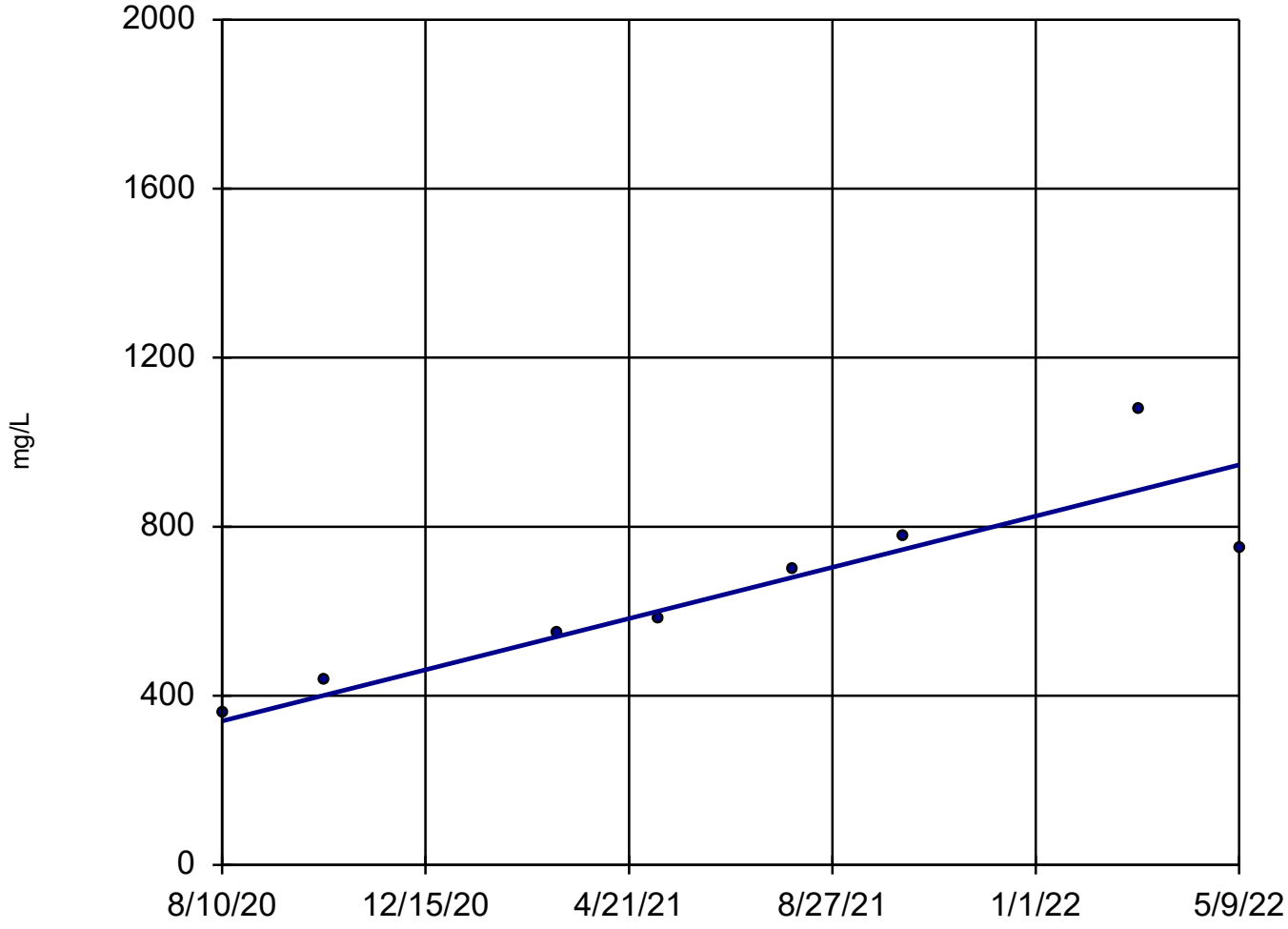
Sen's Slope Estimator Analysis Run 6/8/2022 2:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

JCW-MW-18001



n = 8

Slope = 347.3 units per year.

Mann-Kendall statistic = 24
critical = 20

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

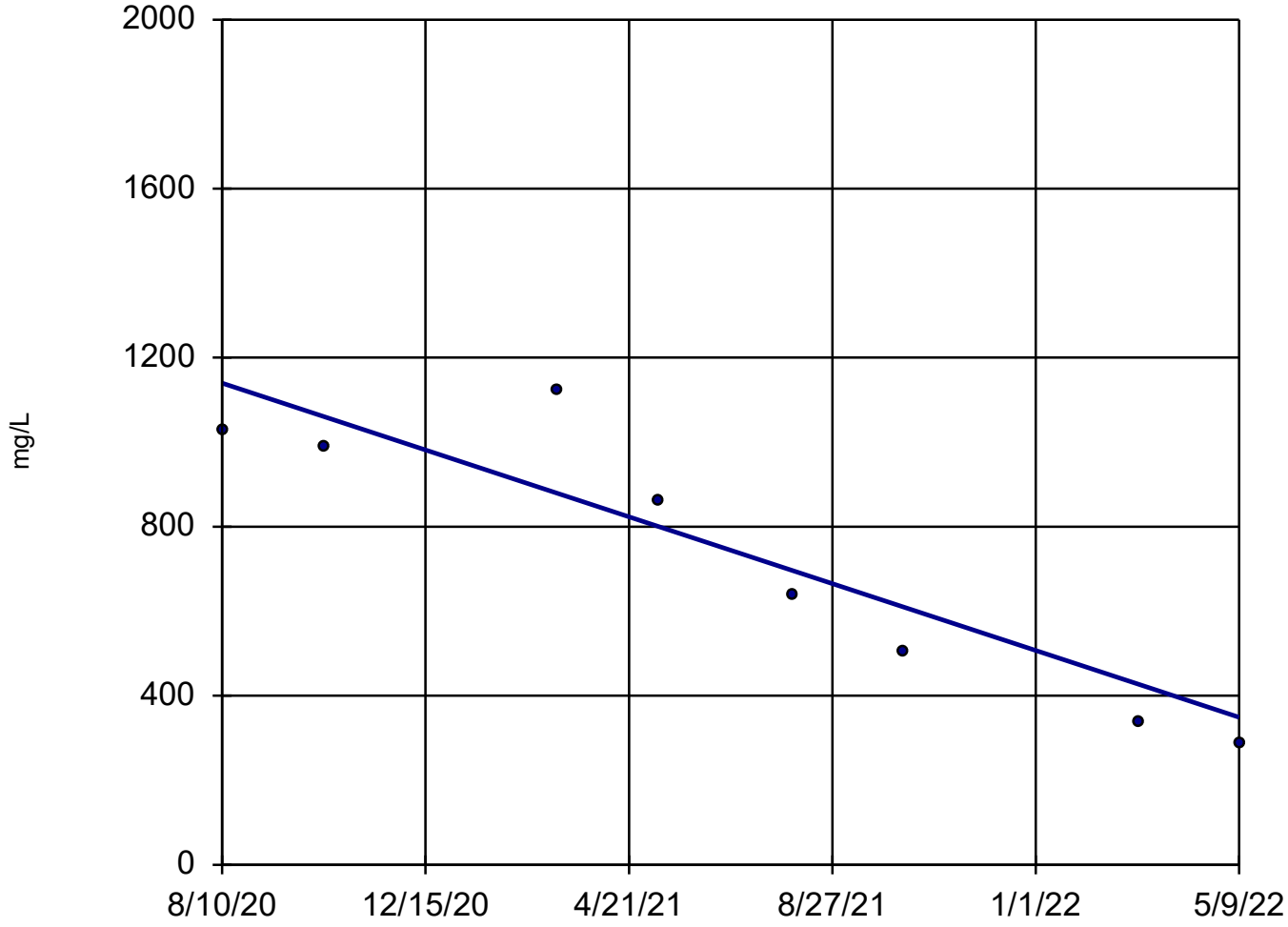
Sen's Slope Estimator Analysis Run 6/8/2022 2:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

MW-50



n = 8

Slope = -453.3 units per year.

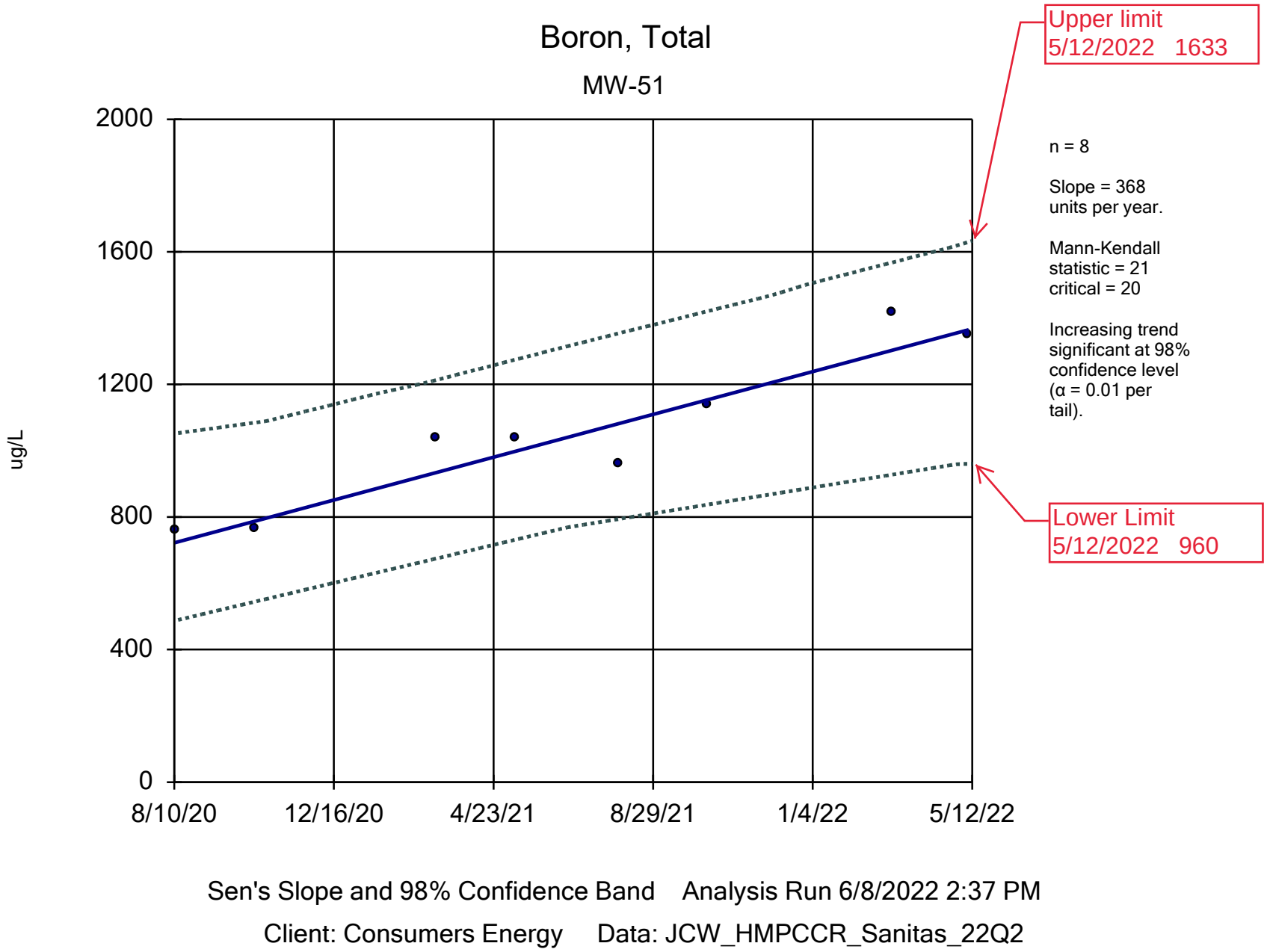
Mann-Kendall statistic = -24
critical = -17

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

Sen's Slope Estimator Analysis Run 6/10/2022 2:22 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

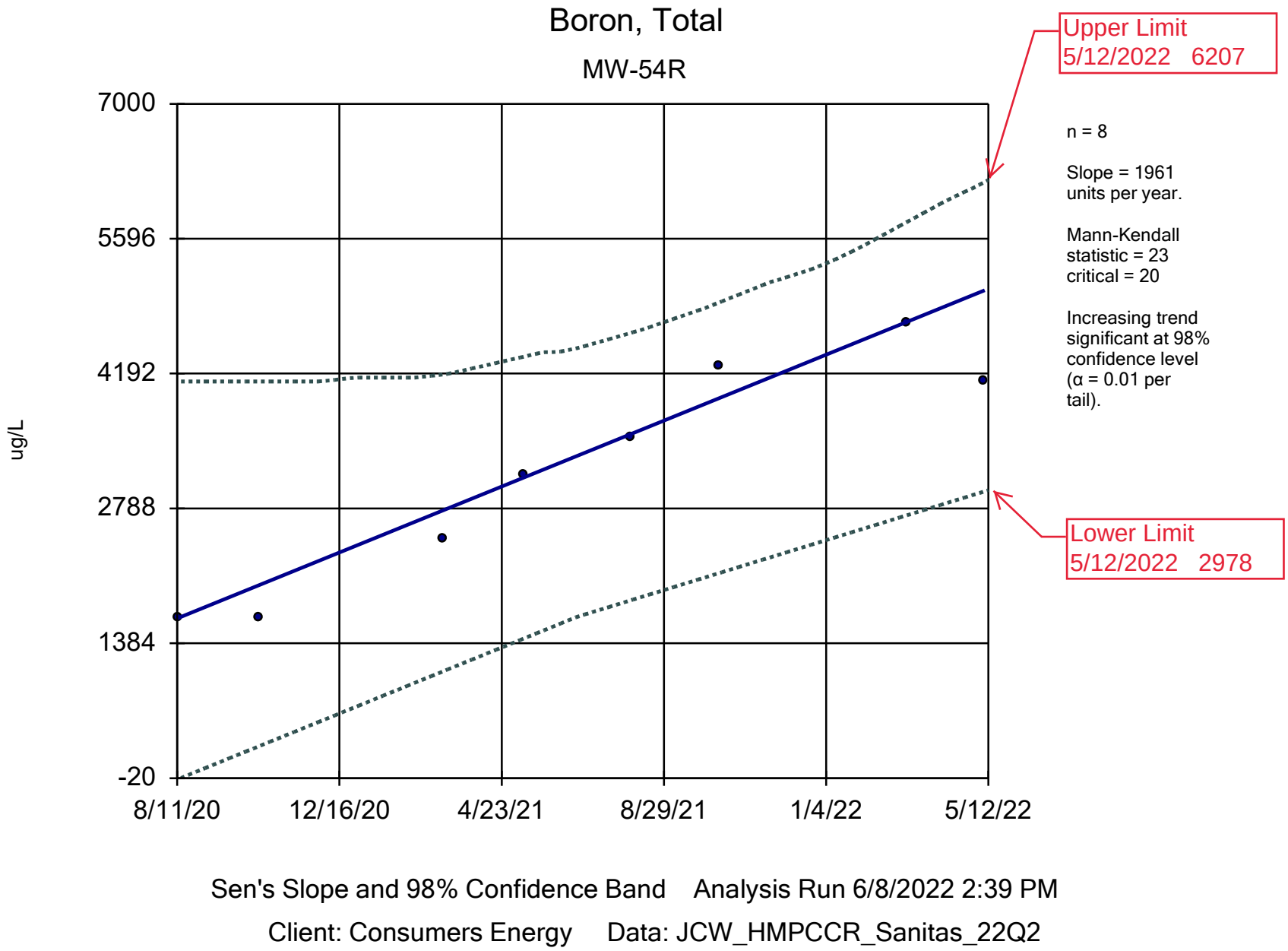
Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG



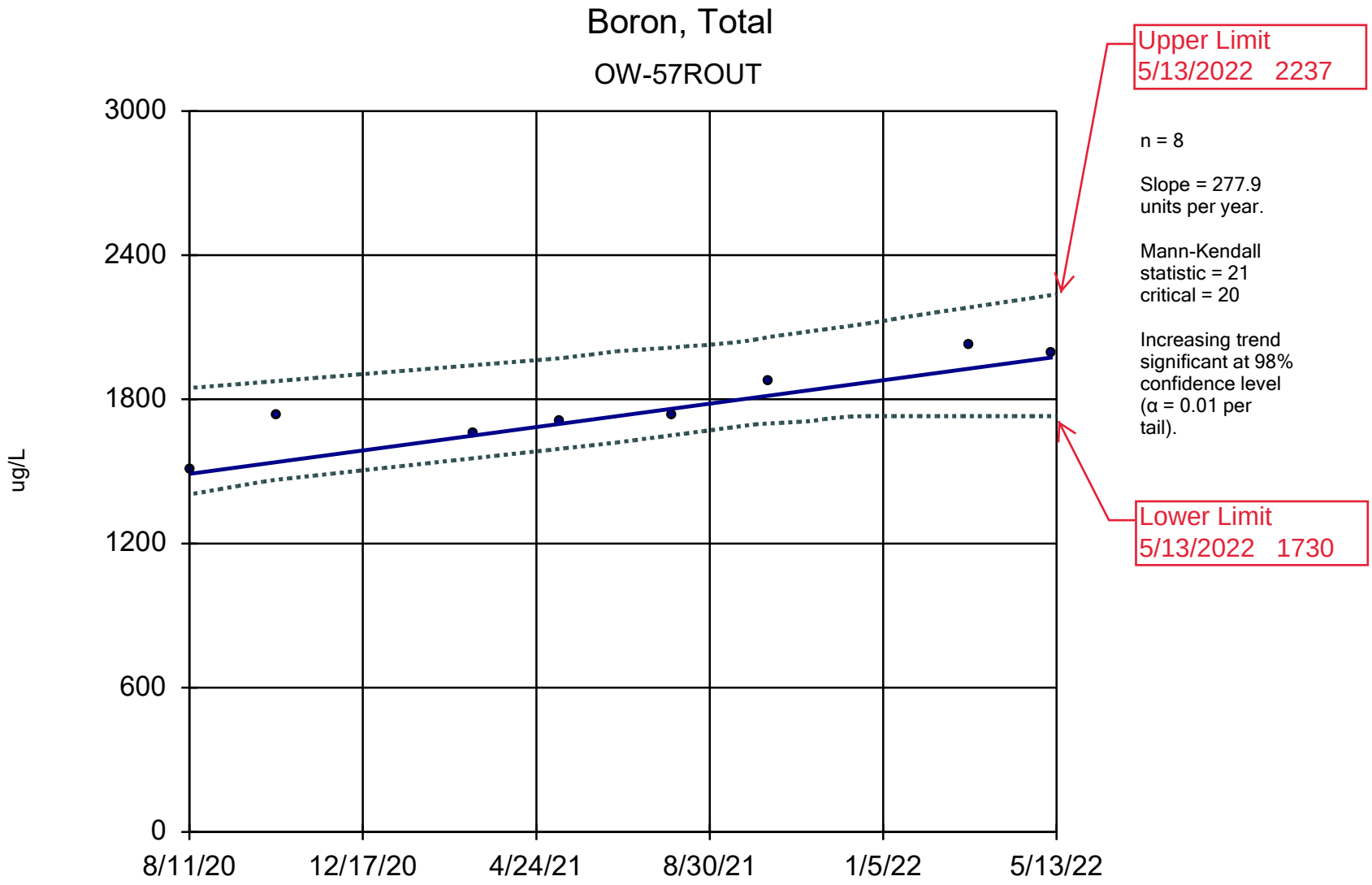
Sen's Slope and 98% Confidence Band Analysis Run 6/8/2022 2:37 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG



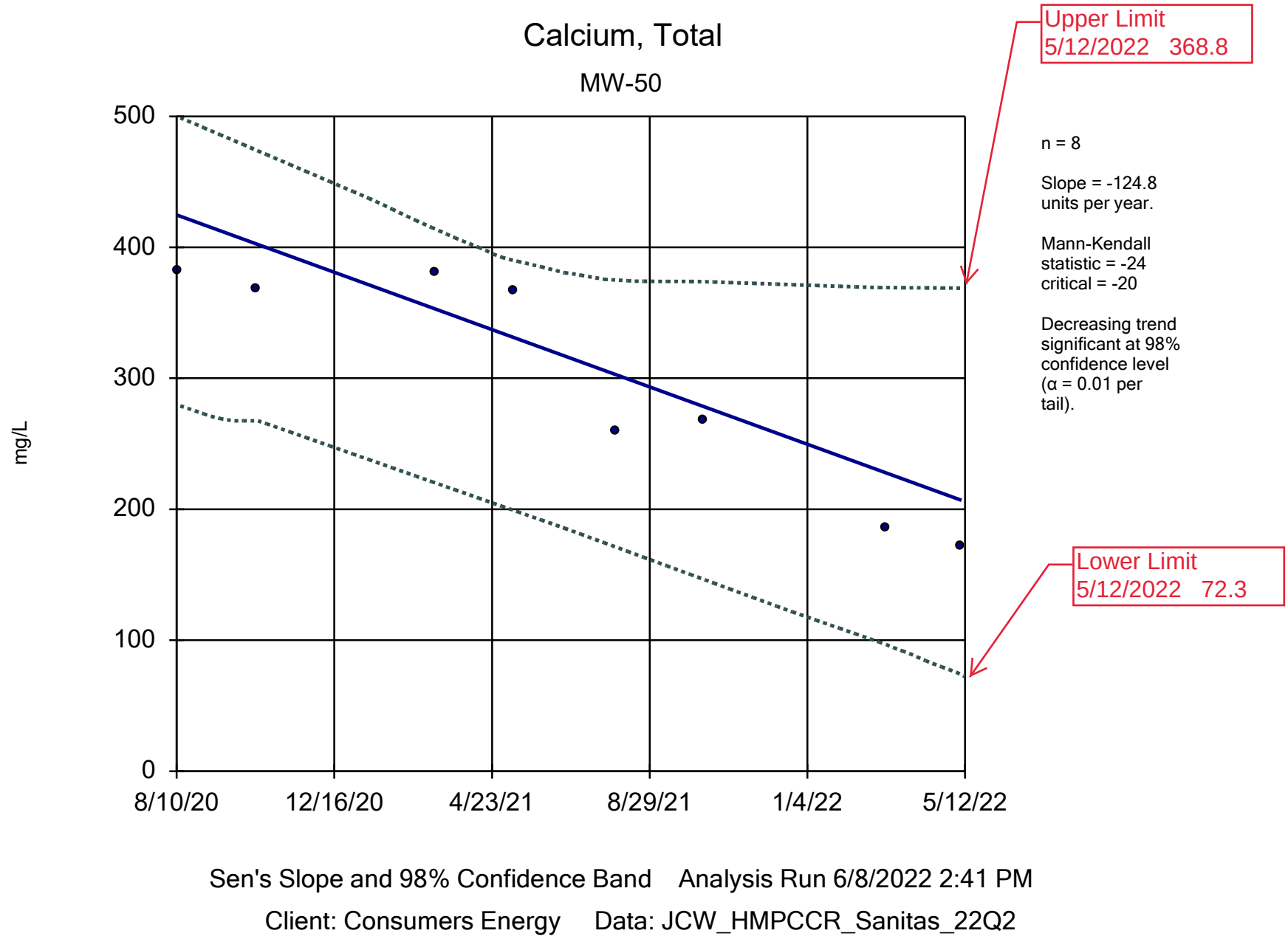
Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG



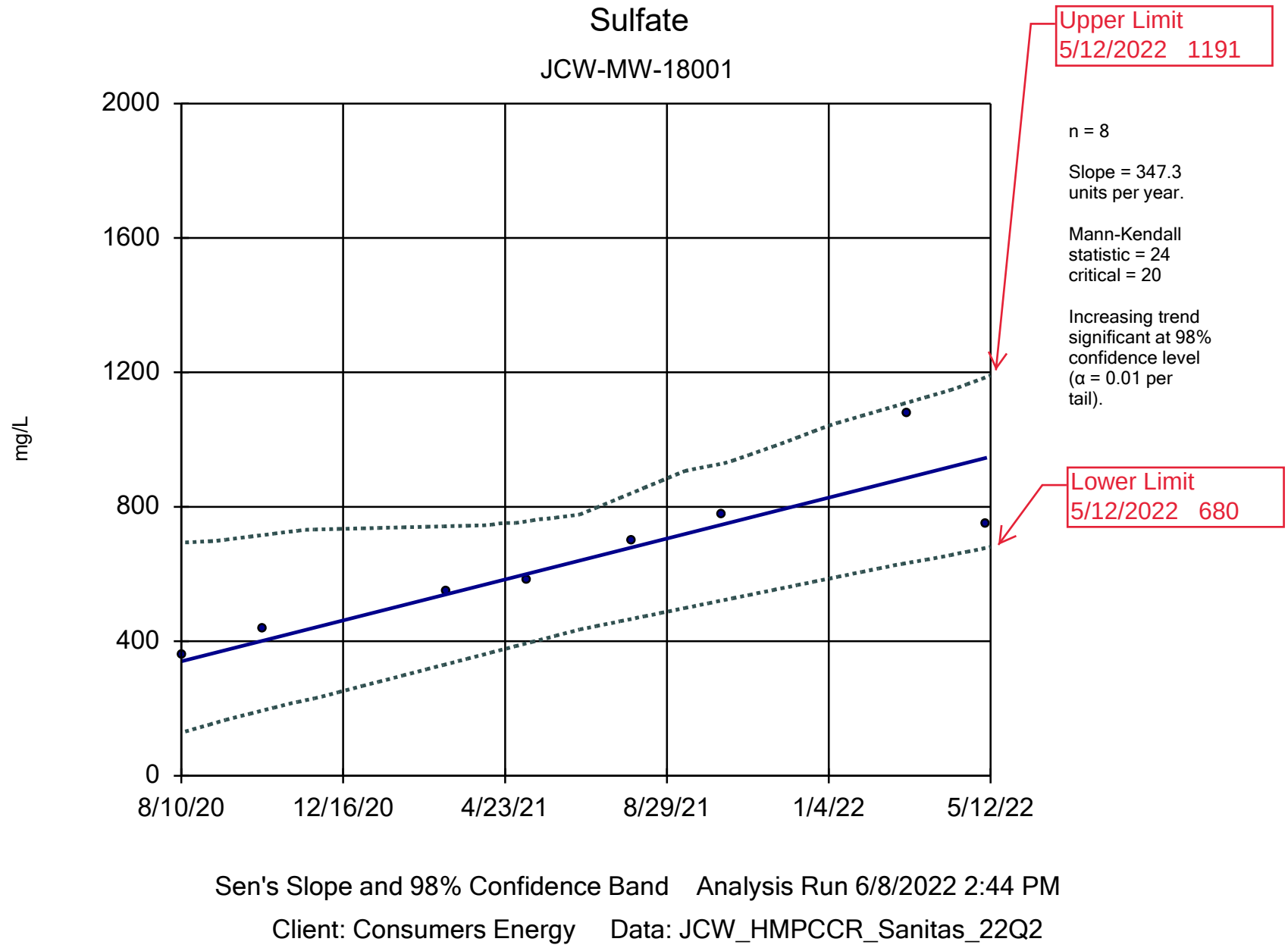
Sen's Slope and 98% Confidence Band Analysis Run 6/8/2022 2:40 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG



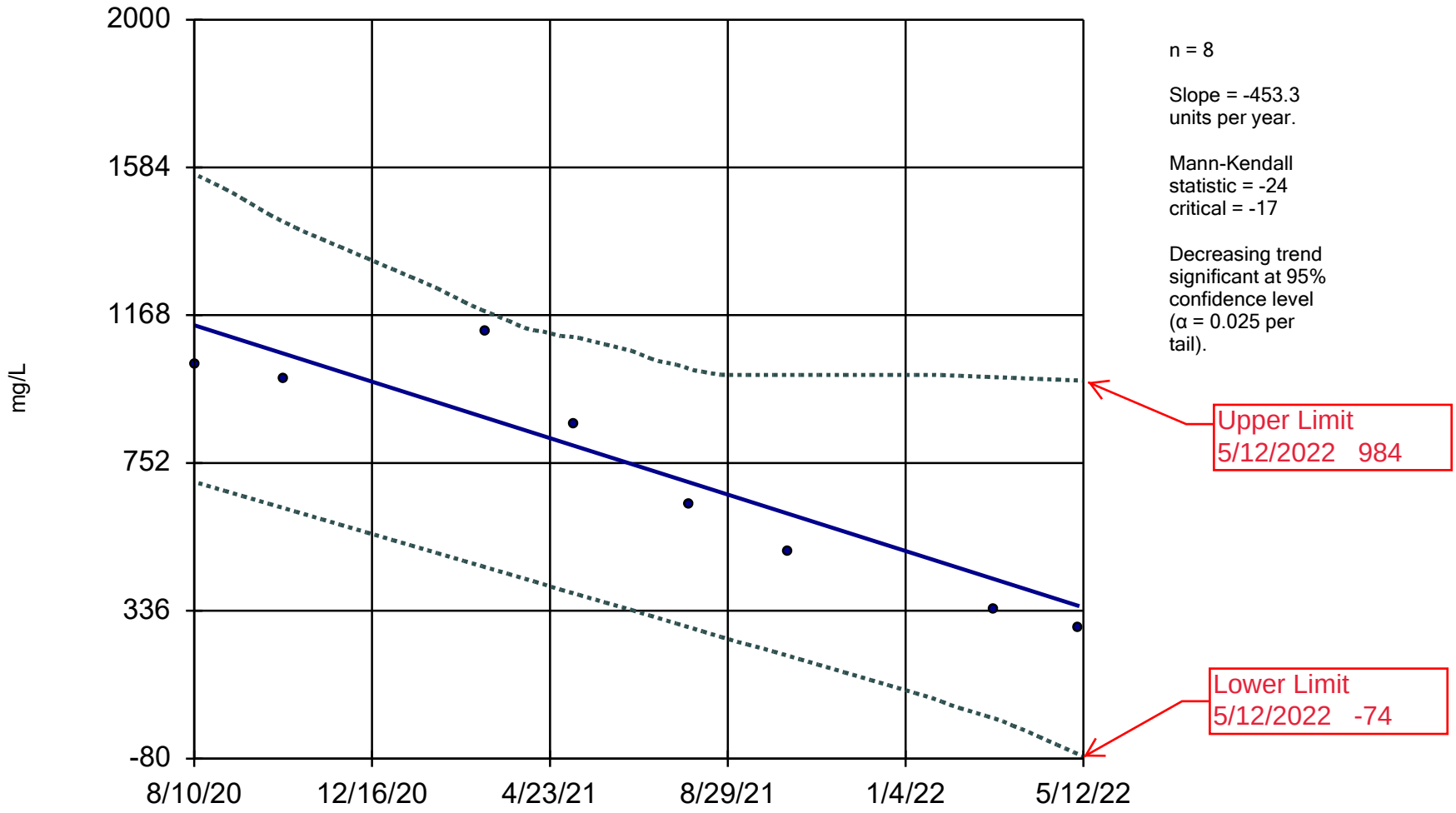
Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG



Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

MW-50

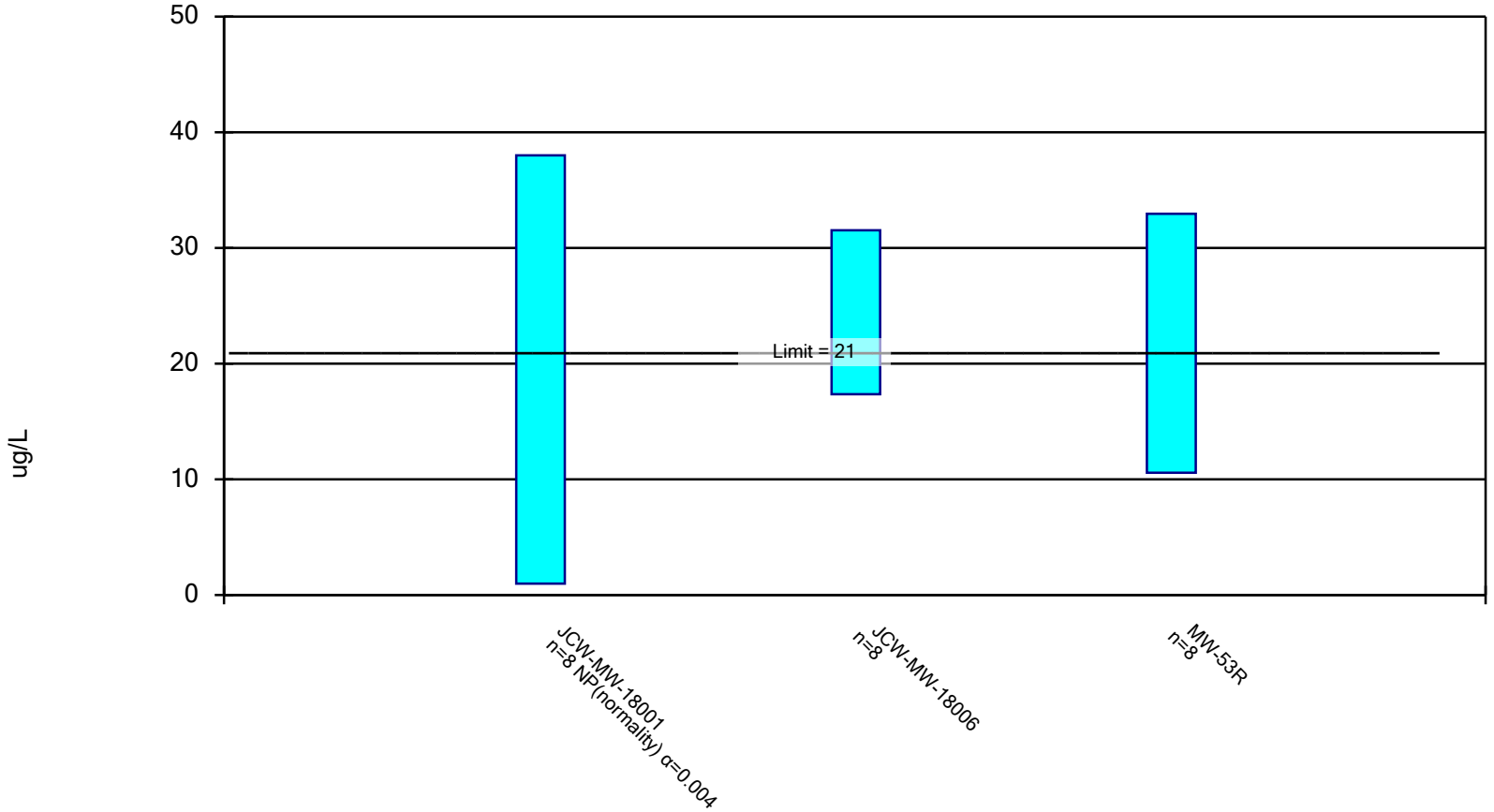


Sen's Slope and 98% Confidence Band Analysis Run 6/10/2022 2:24 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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 6/9/2022 10:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Confidence Interval

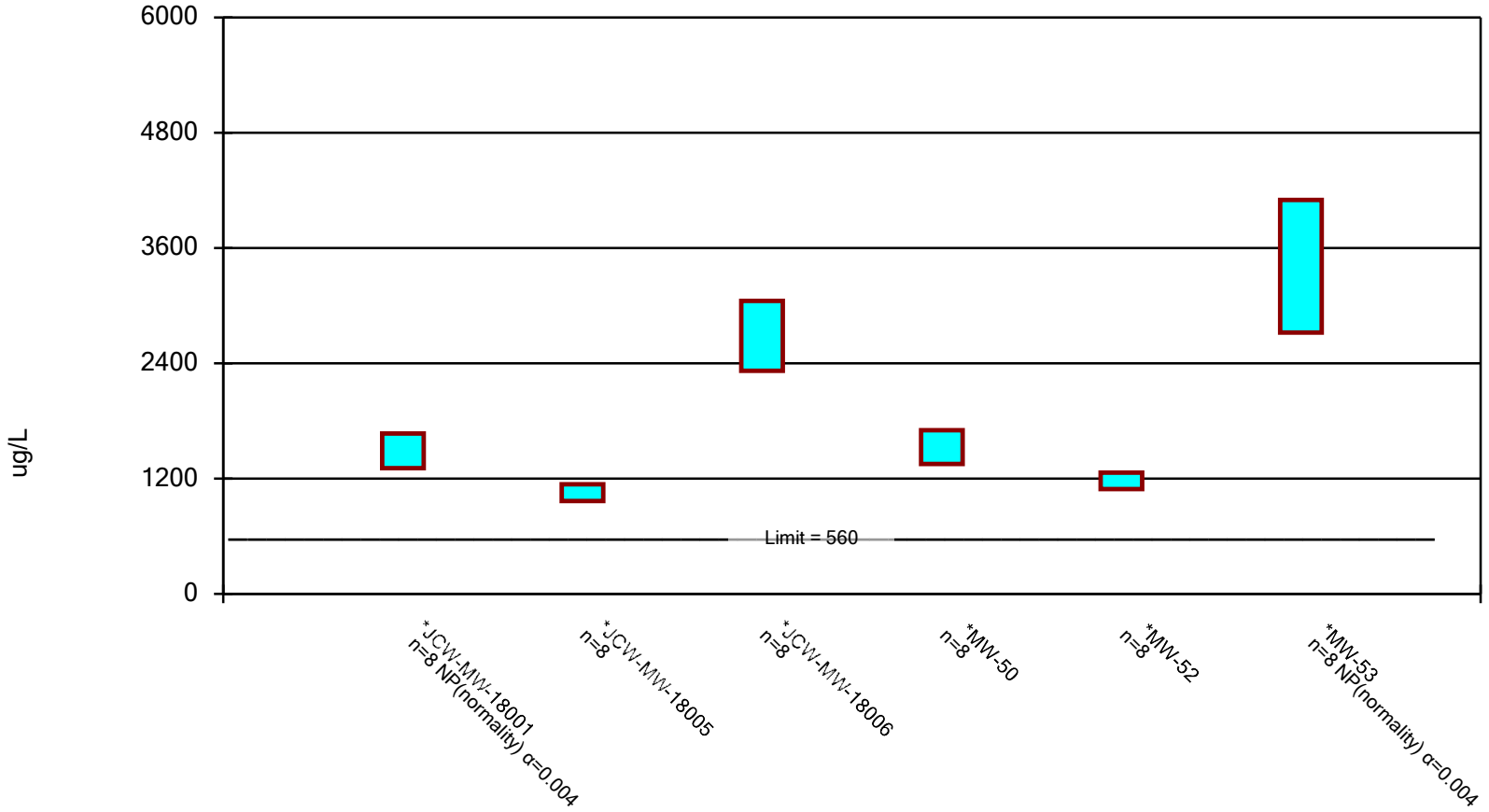
Constituent: Arsenic, Total (ug/L) Analysis Run 6/9/2022 11:00 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

	JCW-MW-18001	JCW-MW-18006	MW-53R
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	
3/7/2022	<1	33	
3/8/2022			10
5/9/2022	<1	22.5 (D)	8
Mean	6.375	24.44	21.75
Std. Dev.	12.81	6.673	10.55
Upper Lim.	38	31.51	32.94
Lower Lim.	1	17.36	10.56

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 6/9/2022 10:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Confidence Interval

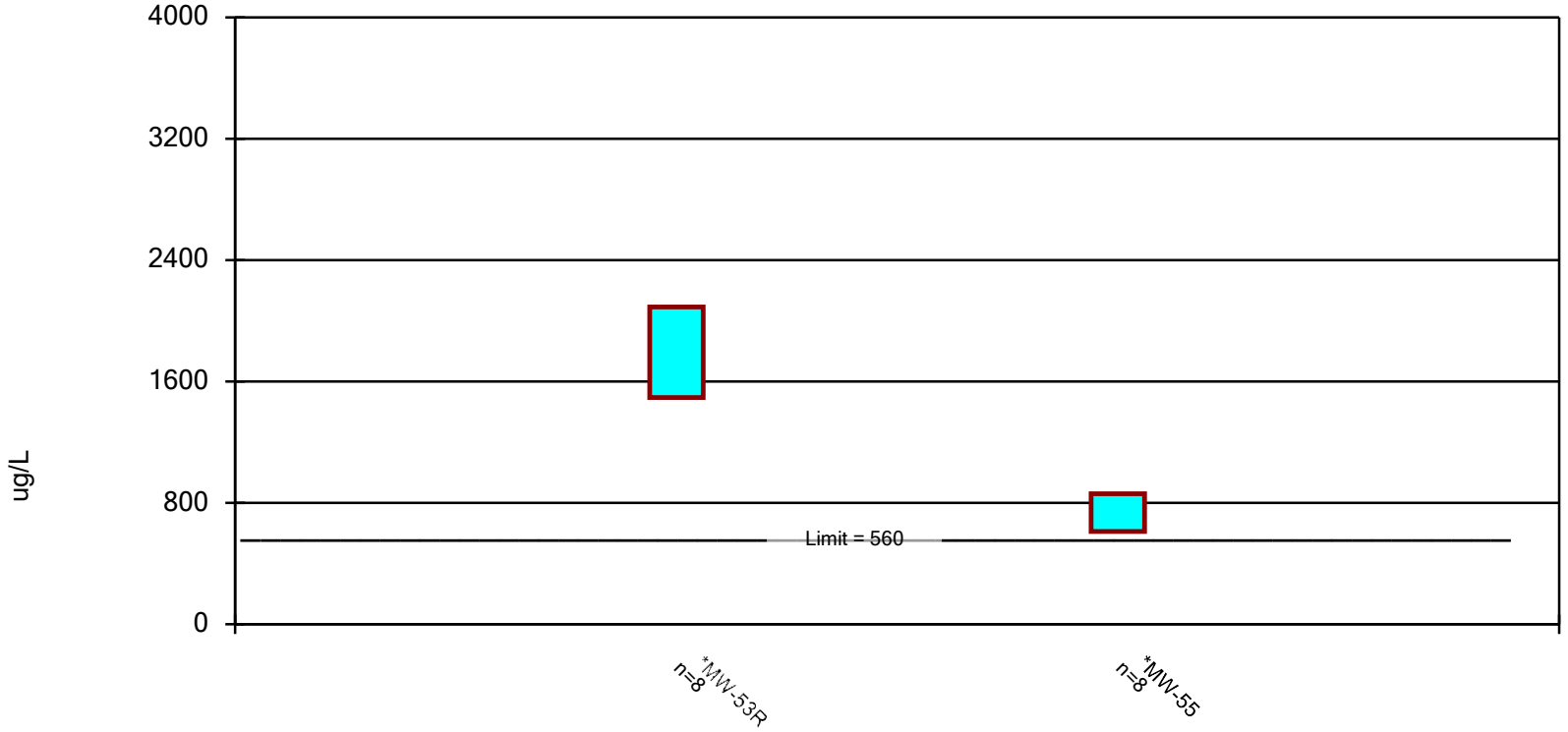
Constituent: Boron, Total (ug/L) Analysis Run 6/9/2022 11:00 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

	JCW-MW-18001	JCW-MW-18005	JCW-MW-18006	MW-50	MW-52	MW-53
8/10/2020	1310			1395 (D)	1200	2760
8/11/2020		1100	2040			
10/13/2020	1370			1470		
10/14/2020		1090	2610		1110	2720
3/8/2021	1350			1560 (D)	1120	3920
3/9/2021		987	2650			
5/10/2021	1340			1350 (D)	1160	3790
5/11/2021		919	2720			
8/2/2021	1610			1575 (D)	1140	3820
8/3/2021		1080	2640			
10/11/2021	1670			1865 (D)	1280	3820
10/12/2021		1190	2600			
3/7/2022	1670	1065 (D)	3220			
3/8/2022				1615 (D)	1310	4100
5/9/2022	1560		3010 (D)	1400 (D)	1090	3880
5/10/2022		1010				
Mean	1485	1055	2686	1529	1176	3601
Std. Dev.	157.1	82.24	343.3	166.3	80.88	540.3
Upper Lim.	1670	1142	3050	1705	1262	4100
Lower Lim.	1310	968	2322	1353	1091	2720

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 6/9/2022 10:55 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Confidence Interval

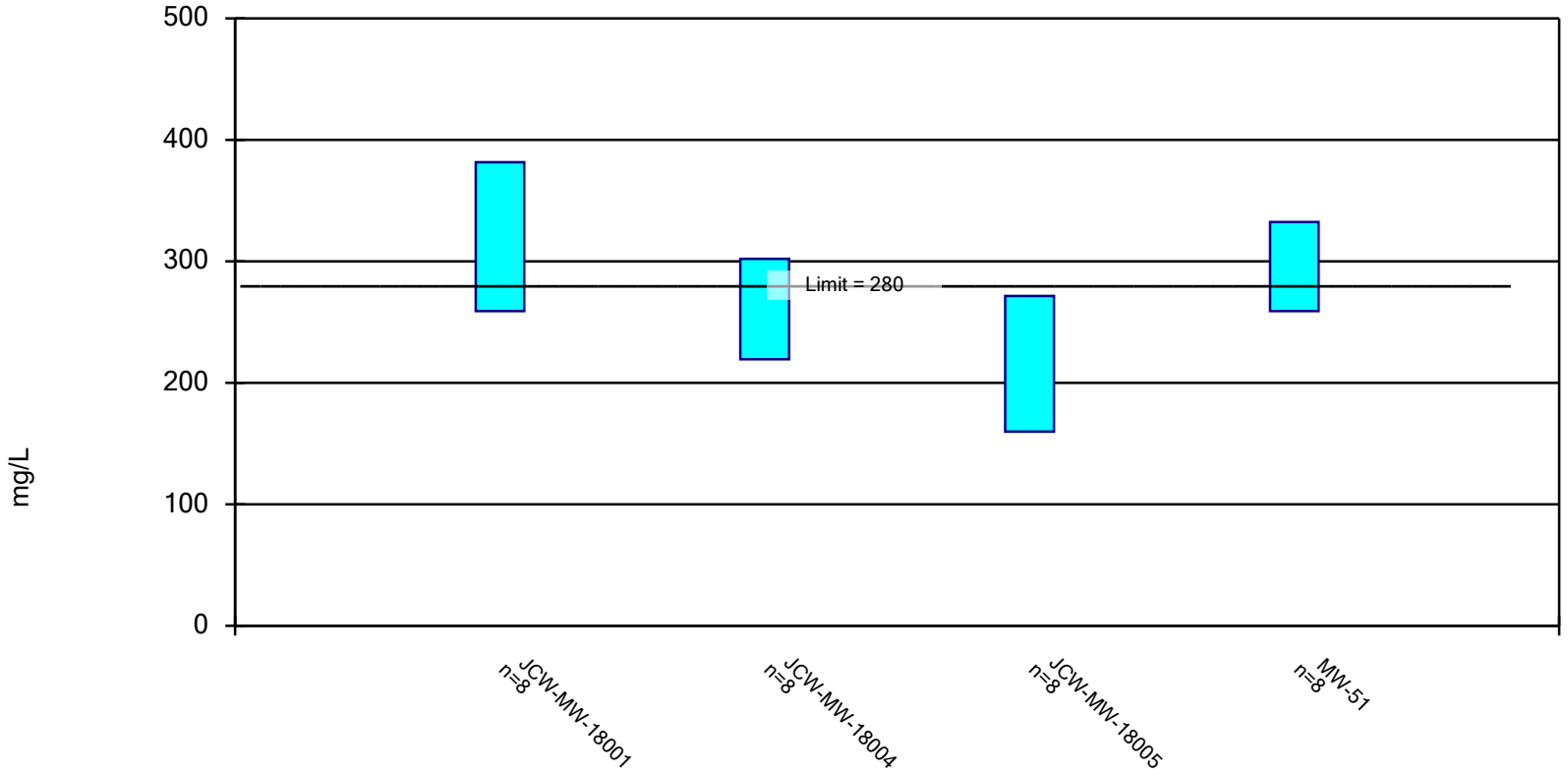
Constituent: Boron, Total (ug/L) Analysis Run 6/9/2022 11:00 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

	MW-53R	MW-55
8/11/2020	1540	592
10/14/2020	1780	705
3/8/2021	1510	
3/9/2021		593
5/10/2021	1580	
5/11/2021		866
8/2/2021	1710	
8/3/2021		873
10/11/2021	2060	
10/12/2021		788
3/7/2022		826
3/8/2022	2330	
5/9/2022	1830	
5/10/2022		642
Mean	1793	735.6
Std. Dev.	282.2	118
Upper Lim.	2092	860.7
Lower Lim.	1493	610.6

Parametric Confidence Interval

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



Constituent: Calcium, Total Analysis Run 6/9/2022 10:56 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Confidence Interval

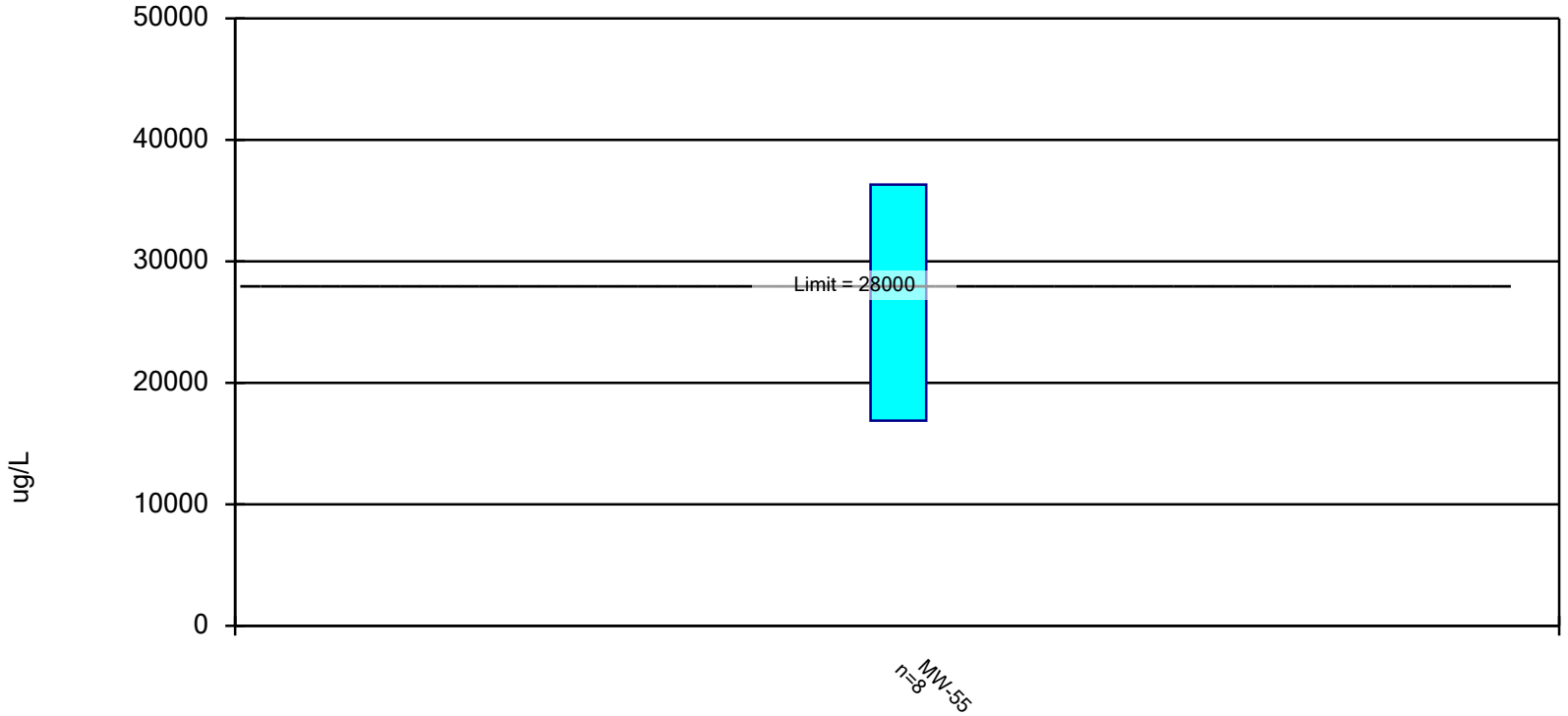
Constituent: Calcium, Total (mg/L) Analysis Run 6/9/2022 11:00 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

	JCW-MW-18001	JCW-MW-18004	JCW-MW-18005	MW-51
8/10/2020	237			341
8/11/2020		306	259	
10/13/2020	282			
10/14/2020		323	195	333.5 (D)
3/8/2021	270	252		293
3/9/2021			286	
5/10/2021	305			303
5/11/2021		266	202	
8/2/2021	348			276
8/3/2021		203	149	
10/11/2021	373			316
10/12/2021		264	193	
3/7/2022	412	236	161.5 (D)	
3/8/2022				255
5/9/2022	335			247
5/10/2022		235	280	
Mean	320.3	260.6	215.7	295.6
Std. Dev.	57.74	39	52.74	34.58
Upper Lim.	381.5	302	271.6	332.2
Lower Lim.	259	219.3	159.8	258.9

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 6/9/2022 10:56 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Confidence Interval

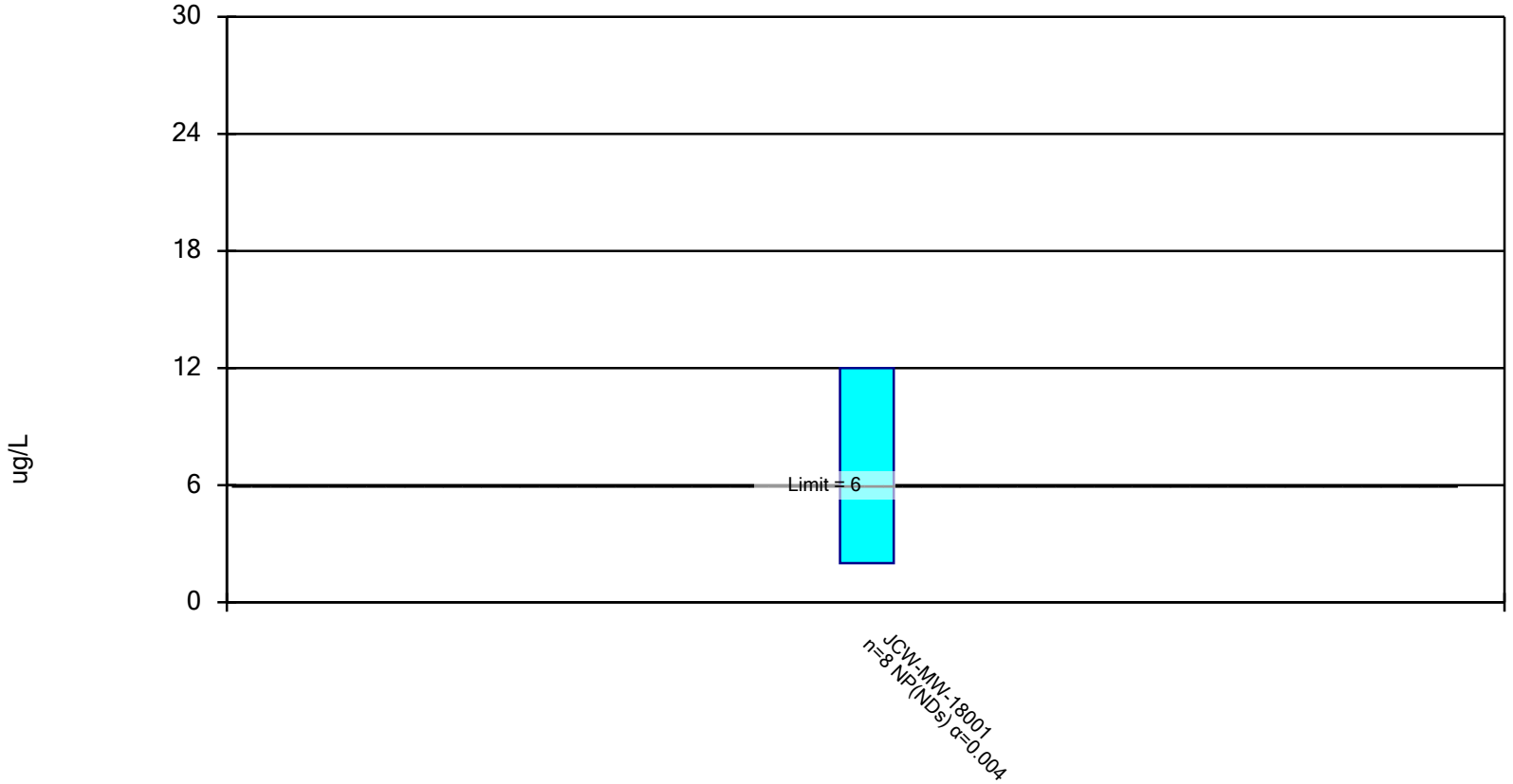
Constituent: Iron, Total (ug/L) Analysis Run 6/9/2022 11:00 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

	MW-55
8/11/2020	21300
10/14/2020	21800
3/9/2021	23500
5/11/2021	21500
8/3/2021	39400
10/12/2021	40500
3/7/2022	29800
5/10/2022	15000
Mean	26600
Std. Dev.	9170
Upper Lim.	36319
Lower Lim.	16881

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Vanadium, Total Analysis Run 6/16/2022 1:11 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Confidence Interval

Constituent: Vanadium, Total (ug/L) Analysis Run 6/16/2022 1:11 PM

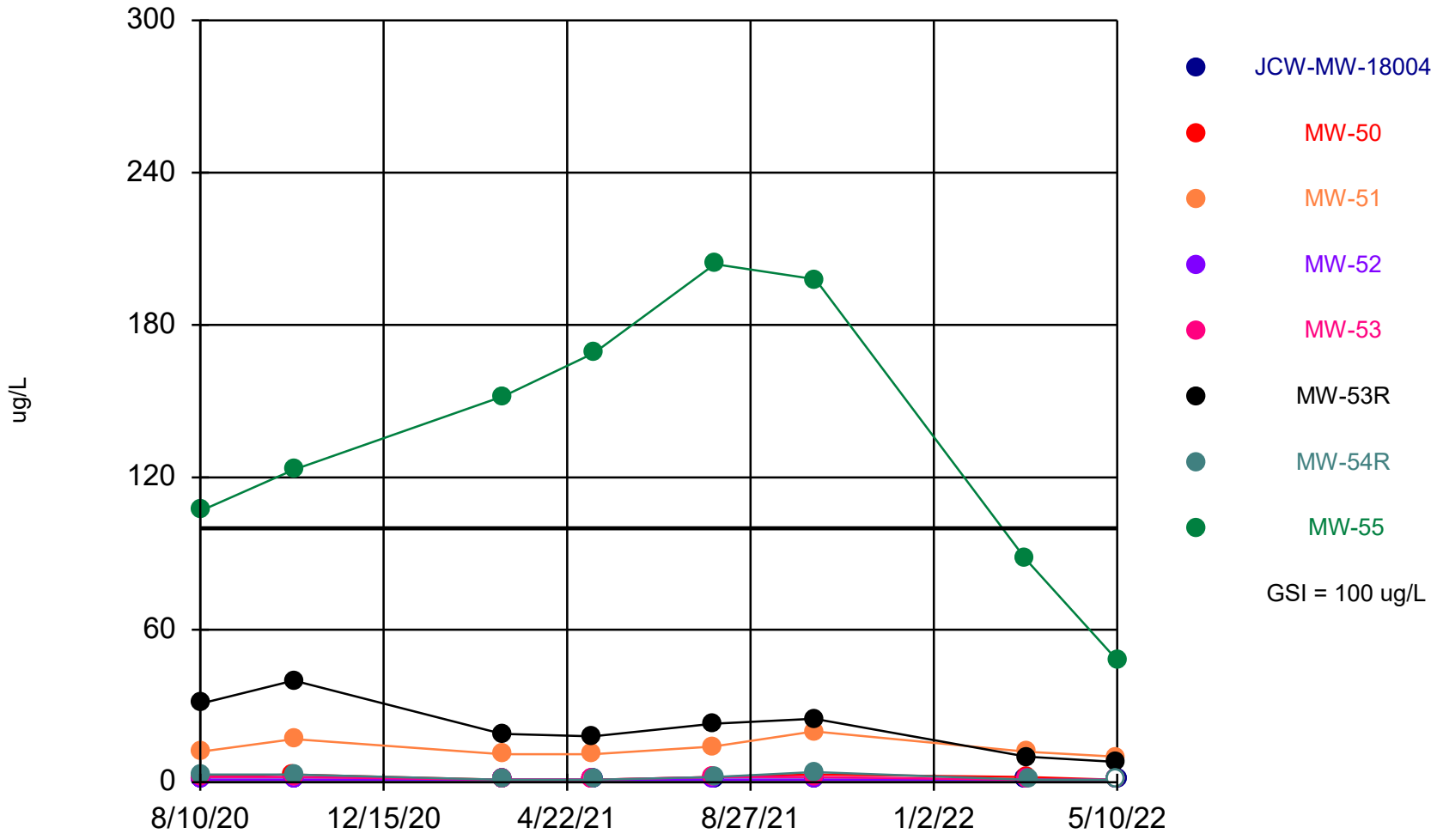
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

	JCW-MW-18001
8/10/2020	<2
10/13/2020	<2
3/8/2021	<2
5/10/2021	2
8/2/2021	12
10/11/2021	<2
3/7/2022	<2
5/9/2022	<2
Mean	3.25
Std. Dev.	3.536
Upper Lim.	12
Lower Lim.	2

Attachment 2
GSI Evaluation Sanitas™ Output Files

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

Arsenic Comparison to GSI

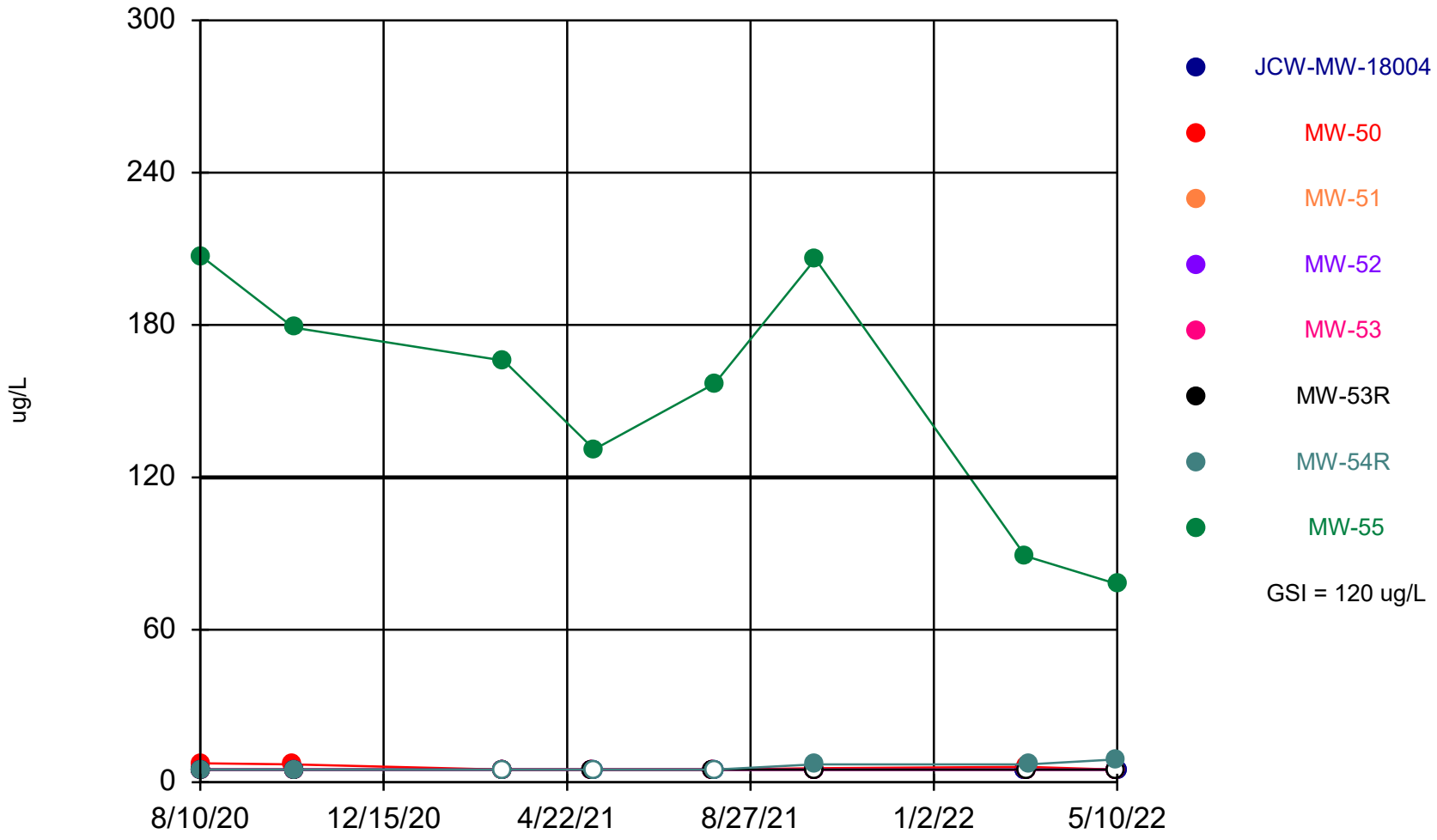


Time Series Analysis Run 6/9/2022 12:37 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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

Molybdenum Comparison to GSI



Time Series Analysis Run 6/9/2022 12:38 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Arsenic, Total Analysis Run 6/9/2022 12:39 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

For observations made between 8/10/2020 and 5/10/2022, a summary of the selected data set:

Observations = 64
ND/Trace = 19
Wells = 8
Minimum Value = 1
Maximum Value = 204
Mean Value = 22.33
Median Value = 2
Standard Deviation = 47.71
Coefficient of Variation = 2.137
Skewness = 2.698

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	8	1	1	1	1	0	0	NaN
MW-50	8	0	1	3	1.875	2	0.8345	0.4451	0.2217
MW-51	8	0	10	20	13.38	12	3.462	0.2588	0.9876
MW-52	8	7	1	1	1	1	0	0	NaN
MW-53	8	3	1	2	1.5	1.5	0.5345	0.3563	0
MW-53R	8	0	8	40	21.75	21	10.55	0.4852	0.3393
MW-54R	8	1	1	4	2	1.5	1.195	0.5976	0.5367
MW-55	8	0	48	204	136.1	137.5	54.6	0.4011	-0.2192

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Molybdenum, Total Analysis Run 6/9/2022 12:39 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

For observations made between 8/10/2020 and 5/10/2022, a summary of the selected data set:

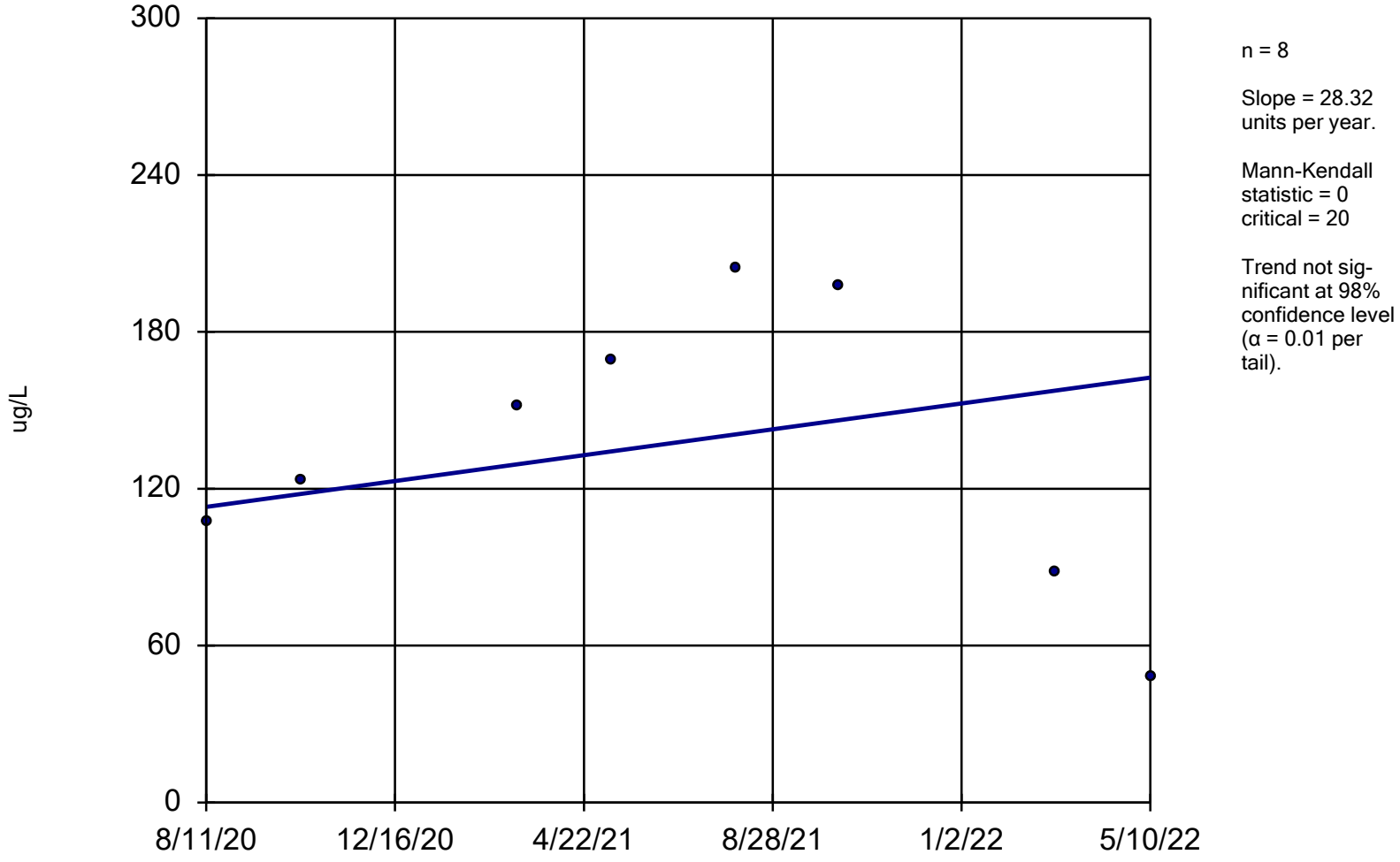
Observations = 64
ND/Trace = 47
Wells = 8
Minimum Value = 5
Maximum Value = 207
Mean Value = 23.55
Median Value = 5
Standard Deviation = 51.45
Coefficient of Variation = 2.185
Skewness = 2.655

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	7.5	5.75	5.25	1	0.1739	0.8591
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	3	5	9	6	5	1.512	0.252	1.061
MW-55	8	0	78	207	151.6	161.5	48.95	0.3229	-0.3896

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Arsenic, Total

MW-55



n = 8

Slope = 28.32 units per year.

Mann-Kendall statistic = 0
critical = 20

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

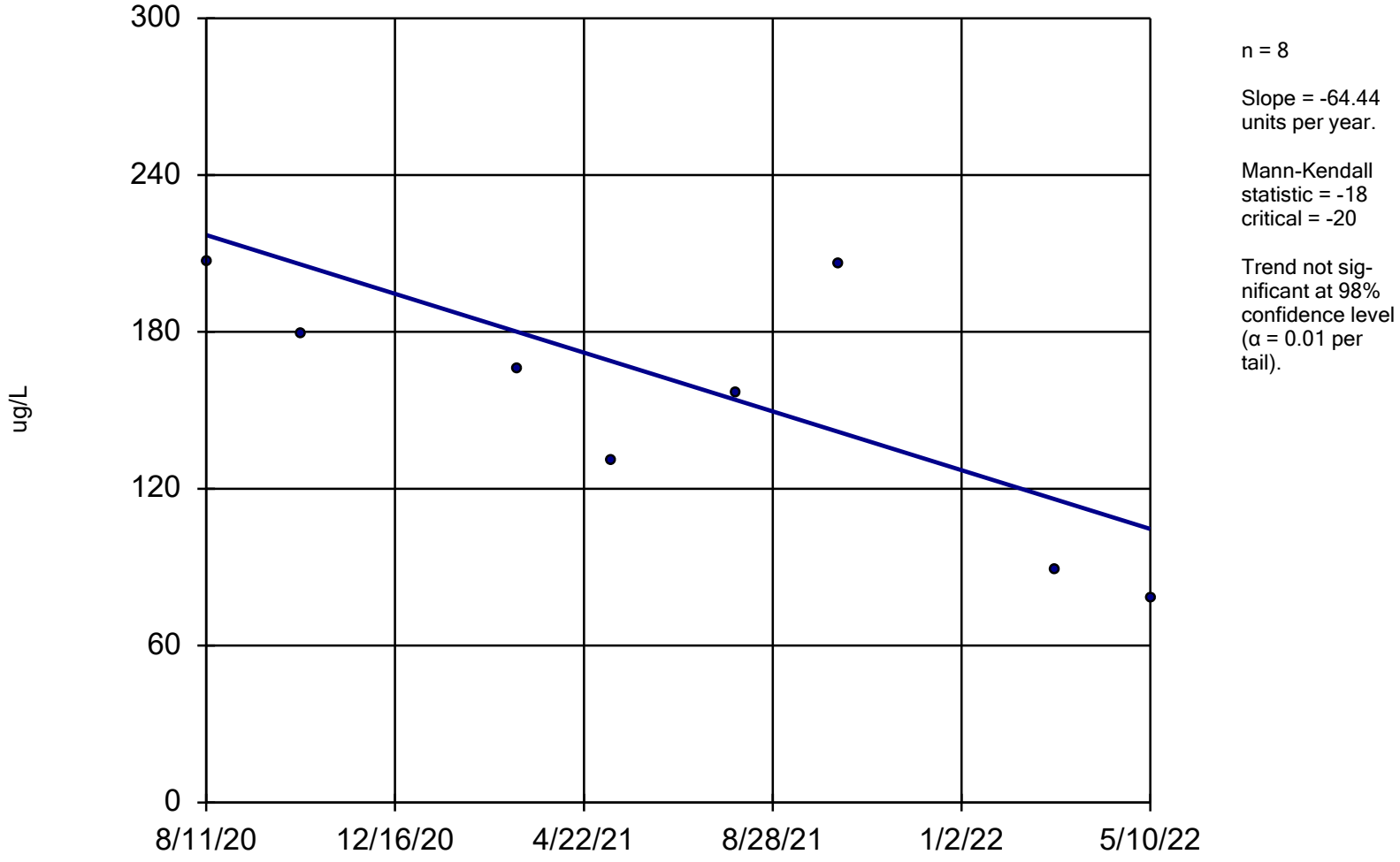
Sen's Slope Estimator Analysis Run 6/9/2022 12:40 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Molybdenum, Total

MW-55



n = 8

Slope = -64.44 units per year.

Mann-Kendall statistic = -18
critical = -20

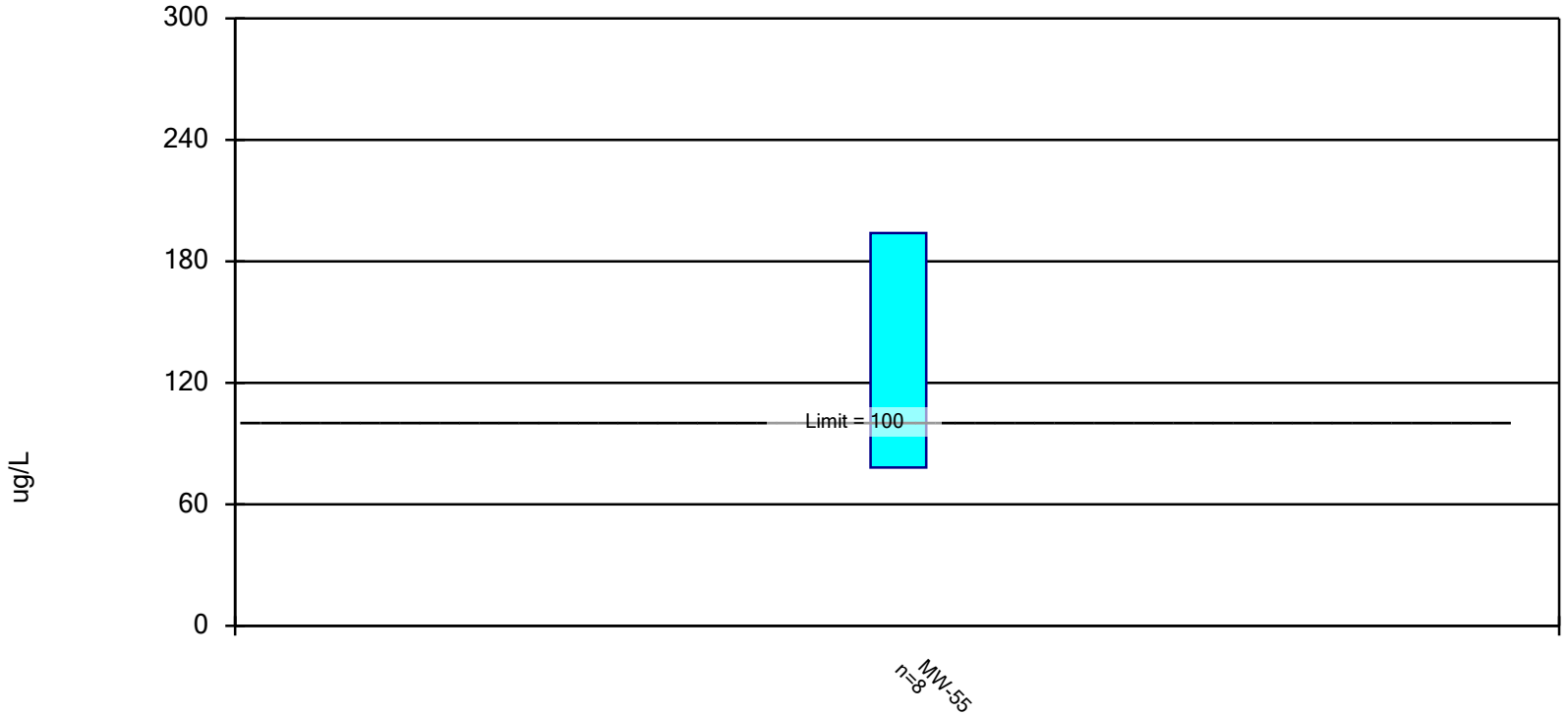
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 6/9/2022 12:40 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

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 6/9/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Confidence Interval

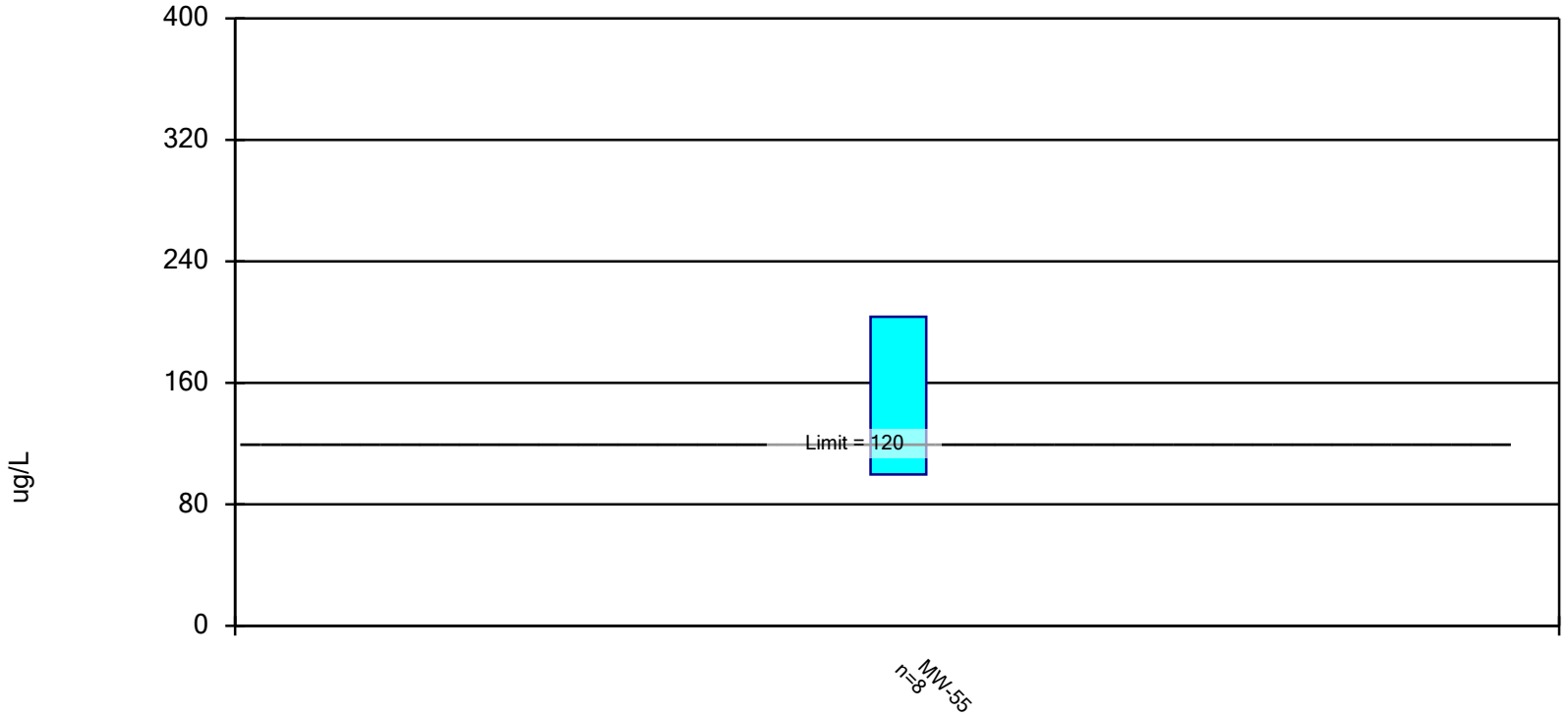
Constituent: Arsenic, Total (ug/L) Analysis Run 6/9/2022 12:51 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

	MW-55
8/11/2020	107
10/14/2020	123
3/9/2021	152
5/11/2021	169
8/3/2021	204
10/12/2021	198
3/7/2022	88
5/10/2022	48
Mean	136.1
Std. Dev.	54.6
Upper Lim.	194
Lower Lim.	78.25

Parametric Confidence Interval

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



Constituent: Molybdenum, Total Analysis Run 6/9/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

Confidence Interval

Constituent: Molybdenum, Total (ug/L) Analysis Run 6/9/2022 12:51 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q2

	MW-55
8/11/2020	207
10/14/2020	179
3/9/2021	166
5/11/2021	131
8/3/2021	157
10/12/2021	206
3/7/2022	89
5/10/2022	78
Mean	151.6
Std. Dev.	48.95
Upper Lim.	203.5
Lower Lim.	99.74

Appendix E
Laboratory Analytical Report

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: May 25, 2022

Subject: PART 115 GROUNDWATER MONITORING – JCW POREWATER – 2022 Q2

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

Darby Litz, Project Manager
TRC Environmental Corporation
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 22-0441

TRC Environmental, Inc. conducted groundwater monitoring at the JCWeadock site on 05/09/2022 and 05/10/2022, for the 2nd Quarter requirements, as specified in the Hydrogeological Monitoring Plan for the site. The samples were received for analysis by the Chemistry department of Laboratory Services on 05/11/2022.

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, 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

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q2-2022 Weadock Porewater Wells
Date Received: 5/11/2022
Chemistry Project: 22-0441

Sample #	Field Sample ID	Matrix	Sample Date	Site
22-0441-01	JCW-MW-18001	Groundwater	05/09/2022 07:05 AM	JCW Solid Waste Disposal Area, Porewater
22-0441-02	JCW-MW-18004	Groundwater	05/10/2022 06:34 AM	JCW Solid Waste Disposal Area, Porewater
22-0441-03	JCW-MW-18005	Groundwater	05/10/2022 10:04 AM	JCW Solid Waste Disposal Area, Porewater
22-0441-04	JCW-MW-18006	Groundwater	05/09/2022 01:33 PM	JCW Solid Waste Disposal Area, Porewater
22-0441-05	MW-50	Groundwater	05/09/2022 08:05 AM	JCW Solid Waste Disposal Area, Porewater
22-0441-06	MW-51	Groundwater	05/09/2022 09:17 AM	JCW Solid Waste Disposal Area, Porewater
22-0441-07	MW-52	Groundwater	05/09/2022 10:20 AM	JCW Solid Waste Disposal Area, Porewater
22-0441-08	MW-53	Groundwater	05/09/2022 11:09 AM	JCW Solid Waste Disposal Area, Porewater
22-0441-09	MW-53R	Groundwater	05/09/2022 02:34 PM	JCW Solid Waste Disposal Area, Porewater
22-0441-10	MW-54R	Groundwater	05/09/2022 01:15 PM	JCW Solid Waste Disposal Area, Porewater
22-0441-11	MW-55	Groundwater	05/10/2022 08:12 AM	JCW Solid Waste Disposal Area, Porewater
22-0441-12	OW-57R OUT	Groundwater	05/10/2022 11:05 AM	JCW Solid Waste Disposal Area, Porewater
22-0441-13	MW-58	Groundwater	05/09/2022 12:57 PM	JCW Solid Waste Disposal Area, Porewater
22-0441-14	DUP-JCW-LF-01	Groundwater	05/09/2022 12:00 AM	JCW Solid Waste Disposal Area, Porewater
22-0441-15	DUP-JCW-LF-02	Groundwater	05/09/2022 12:00 AM	JCW Solid Waste Disposal Area, Porewater
22-0441-16	JCW-MW-18001 MS	Groundwater	05/09/2022 07:05 AM	JCW Solid Waste Disposal Area, Porewater
22-0441-17	JCW-MW-18001 MSD	Groundwater	05/09/2022 07:05 AM	JCW Solid Waste Disposal Area, Porewater
22-0441-18	FB-01	Water	05/09/2022 11:40 AM	JCW Solid Waste Disposal Area, Porewater
22-0441-19	EB-01	Water	05/09/2022 11:35 AM	JCW Solid Waste Disposal Area, Porewater

Analytical Report

Report Date: 05/25/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **JCW-MW-18001**
Lab Sample ID: 22-0441-01
Matrix: Groundwater

Laboratory Project: **22-0441**
Collect Date: 05/09/2022
Collect Time: 07:05 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-01-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	80		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	1560		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	335000		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	2		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	3		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	210		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	76		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	88100		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	ND		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	8		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	14200		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	2		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	154000		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	58800		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	752000		ug/L	1000.0	05/19/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0441-01-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1970		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**JCW-MW-18001**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-01	Collect Time:	07:05 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 22-0441-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	650000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Bicarbonate	650000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-04

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	05/10/2022
Lab Sample ID:	22-0441-02	Collect Time:	06:34 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-02-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	26		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	226		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	235000		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	2		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	ND		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	42		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	83900		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	ND		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	1720		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	2		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	23600		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	10800		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	512000		ug/L	1000.0	05/19/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0441-02-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1290		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	05/10/2022
Lab Sample ID:	22-0441-02	Collect Time:	06:34 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 22-0441-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	430000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Bicarbonate	430000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-04

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	05/10/2022
Lab Sample ID:	22-0441-03	Collect Time:	10:04 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-03-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	5		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	110		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	1010		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	280000		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	2		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	1680		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	33		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	66600		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	6		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	2760		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	2		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	39600		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	32600		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	437000		ug/L	1000.0	05/19/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0441-03-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1330		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	05/10/2022
Lab Sample ID:	22-0441-03	Collect Time:	10:04 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 22-0441-03-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	535000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Bicarbonate	535000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-04

Analytical Report

Report Date: 05/25/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **JCW-MW-18006**
Lab Sample ID: 22-0441-04
Matrix: Groundwater

Laboratory Project: **22-0441**
Collect Date: 05/09/2022
Collect Time: 01:33 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-04-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	22		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	514		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	2990		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	136000		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	1		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	6600		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	56		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	49200		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	6		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	7900		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	92200		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	3		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	67300		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	32800		ug/L	1000.0	05/18/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0441-04-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	788		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**JCW-MW-18006**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-04	Collect Time:	01:33 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-0441-04-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	603000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Bicarbonate	603000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-04

Analytical Report

Report Date: 05/25/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **MW-50**
Lab Sample ID: 22-0441-05
Matrix: Groundwater

Laboratory Project: **22-0441**
Collect Date: 05/09/2022
Collect Time: 08:05 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-05-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-05-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	1		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	86		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	1360		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	169000		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	1		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	1		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	723		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	69		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	48000		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	ND		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	8270		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	2		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	71600		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	53300		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	285000		ug/L	1000.0	05/19/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0441-05-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1020		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**MW-50**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-05	Collect Time:	08:05 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 22-0441-05-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	421000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Bicarbonate	421000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-04

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**MW-51**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-06	Collect Time:	09:17 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-06-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-06-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	10		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	150		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	1350		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	247000		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	1		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	2		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	1210		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	56		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	66400		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	ND		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	6600		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	2		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	133000		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	92800		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	420000		ug/L	1000.0	05/19/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0441-06-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1510		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**MW-51**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-06	Collect Time:	09:17 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 22-0441-06-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	589000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Bicarbonate	589000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-04

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**MW-52**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-07	Collect Time:	10:20 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-07-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-07-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	107		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	1090		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	231000		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	1		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	2		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	2030		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	25		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	105000		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	ND		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	3810		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	2		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	69800		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-07-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	50500		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	591000		ug/L	1000.0	05/19/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0441-07-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1490		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**MW-52**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-07	Collect Time:	10:20 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 22-0441-07-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	450000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Bicarbonate	450000		ug/L	10000.0	05/17/2022	AB22-0517-04
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-04

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**MW-53**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-08	Collect Time:	11:09 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-08-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-08-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	356		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	3880		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	147000		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	1		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	1060		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	41		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	41400		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	ND		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	7230		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	1		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	93700		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-08-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	50900		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	215000		ug/L	1000.0	05/19/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0441-08-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	886		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**MW-53**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-08	Collect Time:	11:09 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 22-0441-08-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	432000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Bicarbonate	432000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-05

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**MW-53R**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-09	Collect Time:	02:34 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-09-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-09-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	8		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	147		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	1830		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	226000		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	1		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	2		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	460		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	61		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	68000		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	ND		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	5640		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	2		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	105000		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-09-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	41600		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	314000		ug/L	1000.0	05/19/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0441-09-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1290		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**MW-53R**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-09	Collect Time:	02:34 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 22-0441-09-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	677000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Bicarbonate	677000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-05

Analytical Report

Report Date: 05/25/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **MW-54R**
Lab Sample ID: 22-0441-10
Matrix: Groundwater

Laboratory Project: **22-0441**
Collect Date: 05/09/2022
Collect Time: 01:15 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-10-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-10-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	111		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	4110		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	169000		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	2		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	1		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	121		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	64		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	48500		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	9		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	1810		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	2		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	29300		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-10-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	35800		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	86300		ug/L	1000.0	05/18/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0441-10-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	712		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**MW-54R**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-10	Collect Time:	01:15 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 22-0441-10-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	544000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Bicarbonate	544000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-05

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**MW-55**	Collect Date:	05/10/2022
Lab Sample ID:	22-0441-11	Collect Time:	08:12 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-11-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-11-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	48		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	222		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	642		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	177000		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	1		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	15000		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	24		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	35000		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	78		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	3		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	3630		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	3		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	109000		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-11-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	11800		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	249000		ug/L	1000.0	05/19/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0441-11-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	942		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**MW-55**	Collect Date:	05/10/2022
Lab Sample ID:	22-0441-11	Collect Time:	08:12 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 22-0441-11-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	541000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Bicarbonate	541000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-05

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**OW-57R OUT**	Collect Date:	05/10/2022
Lab Sample ID:	22-0441-12	Collect Time:	11:05 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-12-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-12-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	79		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	1990		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	131000		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	2		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	2		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	74		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	27		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	78800		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	7		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	14		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	2600		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	3		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	64400		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-12-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	57300		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	69400		ug/L	1000.0	05/18/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0441-12-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	702		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**OW-57R OUT**	Collect Date:	05/10/2022
Lab Sample ID:	22-0441-12	Collect Time:	11:05 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-0441-12-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	538000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Bicarbonate	538000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-05

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**MW-58**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-13	Collect Time:	12:57 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-13-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-13-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	106		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	130		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	120000		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	1		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	10100		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	21		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	20300		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	ND		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	6		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	4720		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	182000		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	4		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-13-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	265000		ug/L	1000.0	05/19/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	13500		ug/L	1000.0	05/18/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0441-13-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	934		mg/L	10.0	05/11/2022	AB22-0511-09

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**MW-58**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-13	Collect Time:	12:57 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-0441-13-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	327000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Bicarbonate	327000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-05

Analytical Report

Report Date: 05/25/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **DUP-JCW-LF-01**
Lab Sample ID: 22-0441-14
Matrix: Groundwater

Laboratory Project: **22-0441**
Collect Date: 05/09/2022
Collect Time: 12:00 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-14-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-14-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	1		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	86		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	1440		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	175000		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	1		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	1		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	737		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	66		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	50100		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	ND		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	6		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	9180		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	2		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	75700		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-14-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	51600		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	286000		ug/L	1000.0	05/19/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0441-14-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1050		mg/L	10.0	05/11/2022	AB22-0511-10

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**DUP-JCW-LF-01**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-14	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 22-0441-14-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	423000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Bicarbonate	423000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-05

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**DUP-JCW-LF-02**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-15	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-15-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-15-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	23		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	509		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	3030		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	136000		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	6360		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	57		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	48900		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	ND		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	7220		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	1		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	92400		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	3		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-15-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	67700		ug/L	1000.0	05/18/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/18/2022	AB22-0518-14
Sulfate	34000		ug/L	1000.0	05/18/2022	AB22-0518-14

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0441-15-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	772		mg/L	10.0	05/11/2022	AB22-0511-10

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**DUP-JCW-LF-02**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-15	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-0441-15-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	605000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Bicarbonate	605000		ug/L	10000.0	05/17/2022	AB22-0517-05
Alkalinity Carbonate	ND		ug/L	10000.0	05/17/2022	AB22-0517-05

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**JCW-MW-18001 MS**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-16	Collect Time:	07:05 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-16-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	97.0		%	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-16-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	108		%	1.0	05/17/2022	AB22-0516-06
Arsenic	105		%	1.0	05/17/2022	AB22-0516-06
Barium	105		%	5.0	05/17/2022	AB22-0516-06
Beryllium	96		%	1.0	05/17/2022	AB22-0516-06
Boron	114		%	20.0	05/16/2022	AB22-0516-06
Cadmium	103		%	0.2	05/17/2022	AB22-0516-06
Calcium	109		%	1000.0	05/16/2022	AB22-0516-06
Chromium	102		%	1.0	05/17/2022	AB22-0516-06
Cobalt	101		%	6.0	05/17/2022	AB22-0516-06
Copper	89		%	1.0	05/17/2022	AB22-0516-06
Iron	108		%	20.0	05/16/2022	AB22-0516-06
Lead	84		%	1.0	05/17/2022	AB22-0516-06
Lithium	99		%	10.0	05/17/2022	AB22-0516-06
Magnesium	116		%	1000.0	05/16/2022	AB22-0516-06
Molybdenum	116		%	5.0	05/17/2022	AB22-0516-06
Nickel	98		%	2.0	05/17/2022	AB22-0516-06
Potassium	111		%	100.0	05/16/2022	AB22-0516-06
Selenium	101		%	1.0	05/17/2022	AB22-0516-06
Silver	96.3		%	0.2	05/17/2022	AB22-0516-06
Sodium	119		%	1000.0	05/16/2022	AB22-0516-06
Thallium	88		%	2.0	05/17/2022	AB22-0516-06
Vanadium	107		%	2.0	05/17/2022	AB22-0516-06
Zinc	95		%	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-16-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	104		%	1000.0	05/19/2022	AB22-0518-14
Fluoride	84		%	1000.0	05/19/2022	AB22-0518-14
Sulfate	99		%	1000.0	05/19/2022	AB22-0518-14

Alkalinity by SM 2320B

Aliquot #: 22-0441-16-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	91.5		%	10000.0	05/17/2022	AB22-0517-05

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**JCW-MW-18001 MSD**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-17	Collect Time:	07:05 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-17-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	107		%	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-17-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	106		%	1.0	05/17/2022	AB22-0516-06
Arsenic	104		%	1.0	05/17/2022	AB22-0516-06
Barium	107		%	5.0	05/17/2022	AB22-0516-06
Beryllium	94		%	1.0	05/17/2022	AB22-0516-06
Boron	117		%	20.0	05/16/2022	AB22-0516-06
Cadmium	101		%	0.2	05/17/2022	AB22-0516-06
Calcium	110		%	1000.0	05/16/2022	AB22-0516-06
Chromium	99		%	1.0	05/17/2022	AB22-0516-06
Cobalt	100		%	6.0	05/17/2022	AB22-0516-06
Copper	88		%	1.0	05/17/2022	AB22-0516-06
Iron	105		%	20.0	05/16/2022	AB22-0516-06
Lead	84		%	1.0	05/17/2022	AB22-0516-06
Lithium	96		%	10.0	05/17/2022	AB22-0516-06
Magnesium	118		%	1000.0	05/16/2022	AB22-0516-06
Molybdenum	115		%	5.0	05/17/2022	AB22-0516-06
Nickel	94		%	2.0	05/17/2022	AB22-0516-06
Potassium	115		%	100.0	05/16/2022	AB22-0516-06
Selenium	96		%	1.0	05/17/2022	AB22-0516-06
Silver	95.0		%	0.2	05/17/2022	AB22-0516-06
Sodium	124		%	1000.0	05/16/2022	AB22-0516-06
Thallium	88		%	2.0	05/17/2022	AB22-0516-06
Vanadium	106		%	2.0	05/17/2022	AB22-0516-06
Zinc	92		%	10.0	05/17/2022	AB22-0516-06

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

Aliquot #: 22-0441-17-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	104		%	1000.0	05/19/2022	AB22-0518-14
Fluoride	84		%	1000.0	05/19/2022	AB22-0518-14
Sulfate	95		%	1000.0	05/19/2022	AB22-0518-14

Alkalinity by SM 2320B

Aliquot #: 22-0441-17-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	90.5		%	10000.0	05/17/2022	AB22-0517-05

Analytical Report

Report Date: 05/25/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **FB-01**
Lab Sample ID: 22-0441-18
Matrix: Water

Laboratory Project: **22-0441**
Collect Date: 05/09/2022
Collect Time: 11:40 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-18-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

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

Aliquot #: 22-0441-18-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	ND		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	ND		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	ND		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	ND		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	ND		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	ND		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	ND		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	ND		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	ND		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0441-18-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	ND		ug/L	1000.0	05/19/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/19/2022	AB22-0518-14
Sulfate	ND		ug/L	1000.0	05/19/2022	AB22-0518-14

Analytical Report

Report Date: 05/25/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0441**
Field Sample ID:	**EB-01**	Collect Date:	05/09/2022
Lab Sample ID:	22-0441-19	Collect Time:	11:35 AM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0441-19-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/12/2022	AB22-0512-02

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0441-19-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Arsenic	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Barium	ND		ug/L	5.0	05/17/2022	AB22-0516-06
Beryllium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Boron	ND		ug/L	20.0	05/16/2022	AB22-0516-06
Cadmium	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Calcium	ND		ug/L	1000.0	05/16/2022	AB22-0516-06
Chromium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Cobalt	ND		ug/L	6.0	05/17/2022	AB22-0516-06
Copper	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Iron	ND		ug/L	20.0	05/16/2022	AB22-0516-06
Lead	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Lithium	ND		ug/L	10.0	05/17/2022	AB22-0516-06
Magnesium	ND		ug/L	1000.0	05/16/2022	AB22-0516-06
Molybdenum	ND		ug/L	5.0	05/17/2022	AB22-0516-06
Nickel	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Potassium	ND		ug/L	100.0	05/16/2022	AB22-0516-06
Selenium	ND		ug/L	1.0	05/17/2022	AB22-0516-06
Silver	ND		ug/L	0.2	05/17/2022	AB22-0516-06
Sodium	ND		ug/L	1000.0	05/16/2022	AB22-0516-06
Thallium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Vanadium	ND		ug/L	2.0	05/17/2022	AB22-0516-06
Zinc	ND		ug/L	10.0	05/17/2022	AB22-0516-06

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0441-19-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	ND		ug/L	1000.0	05/19/2022	AB22-0518-14
Fluoride	ND		ug/L	1000.0	05/19/2022	AB22-0518-14
Sulfate	ND		ug/L	1000.0	05/19/2022	AB22-0518-14

Data Qualifiers	Exception Summary
	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-0441

Inspection Date: 05/11/22 **Inspection By:** CNH

Sample Origin/Project Name: Q2 2022 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 (3) 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 4.0-5.6°C Samples Received on Ice: Yes (Y) No _____

M&TE # and Expiration 015402 | 10-3-22

Number and Type of Containers: Enter the total number of sample containers received.

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or ~~60mL~~)	34				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	30				
24 mL vial (glass)					
250 ~~500~~ mL (plastic)	15				
Other					

pH 0-14
FSP 13-640-508
lot# 222420
exp. 8-1-23

PG. PG. 2g2 not needed

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

SAMPLING SITE / CUSTOMER: Q2-2022 Weadock Porewater Wells

PROJECT NUMBER: 22-0441

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	PRESERVATIVE HNO_3	PRESERVATIVE H_2SO_4	PRESERVATIVE NaOH	PRESERVATIVE HCl	PRESERVATIVE MeOH	PRESERVATIVE Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0441-01	5/9/22	0905	GW	JCW-MW-18001	5	4	1						x	x	x	x	
-02	5/10/22	0634	GW	JCW-MW-18004	5	4	1						x	x	x	x	
-03	5/10/22	1004	GW	JCW-MW-18005	5	4	1						x	x	x	x	
-04	5/9/22	1333	GW	JCW-MW-18006	5	4	1						x	x	x	x	
-05	5/9/22	0801	GW	MW-50	5	4	1						x	x	x	x	
-06	5/9/22	0917	GW	MW-51	5	4	1						x	x	x	x	
-07	5/9/22	1020	GW	MW-52	5	4	1						x	x	x	x	
-08	5/9/22	1109	GW	MW-53	5	4	1						x	x	x	x	
-09	5/9/22	1434	GW	MW-53R	5	4	1						x	x	x	x	
-10	5/9/22	1315	GW	MW-54R	5	4	1						x	x	x	x	
-11	5/10/22	0817	GW	MW-55	5	4	1						x	x	x	x	
-12	5/10/22	1105	GW	OW-57R OUT	5	4	1						x	x	x	x	

RELINQUISHED BY: [signature] DATE/TIME: 5/11/22 0730 RECEIVED BY: [signature]

RELINQUISHED BY: DATE/TIME: RECEIVED BY:

COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015402

Temperature: ~~5.2 6.0~~ 4.0 - 5.6 °C Cal. Due Date: 6-3-22

EB 051122

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

SAMPLING SITE / CUSTOMER: Q2-2022 Weadock Porewater Wells

PROJECT NUMBER: 22-0441

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	PRESERVATIVE HNO_3	PRESERVATIVE H_2SO_4	PRESERVATIVE NaOH	PRESERVATIVE HCl	PRESERVATIVE MeOH	PRESERVATIVE Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0441-13	5/9/22	1257	GW	MW-58	5	4	1						x	x	x	x	
-14	5/9/22	—	GW	DUP-JCW-LF-01	5	4	1						x	x	x	x	
-15	5/9/22	—	GW	DUP-JCW-LF-02	5	4	1						x	x	x	x	
-16	5/9/22	0705	GW	JCW-MW-18001 MS	4	3	1						x	x		x	
-17	5/9/22	0705	GW	JCW-MW-18001 MSD	4	3	1						x	x		x	
-18	5/10/22	1140	W	FB-01	2	1	1						x	x			
-19	5/10/22	1135	W	EB-01	2	1	1						x	x			

RELINQUISHED BY: [signature] DATE/TIME: 5/11/22 0930 RECEIVED BY: [signature]

RELINQUISHED BY: DATE/TIME: RECEIVED BY:

COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015402

Temperature: 4.0-5.6 °C Cal. Due Date: 6-3-22

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: May 25, 2022

Subject: RCRA GROUNDWATER MONITORING – DEK-JCW BACKGROUND WELLS – 2022 Q2

CC: HDRegister, P22-521
BLSwanberg, P22-119

Darby Litz, Project Manager
TRC Companies, Inc.
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 22-0443

TRC Environmental, Inc. conducted groundwater monitoring at the Karn/Weadock Background Wells area on 05/02/2022 and 05/03/2022, 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 05/04/2022.

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, when applicable; all other quality control data is listed in the Quality Control Summary associated with the particular test method, as appropriate. Unless specifically noted in the case narrative, all method quality control requirements have been met. If any results are qualified, the corresponding data flags/qualifiers are listed on the last page of the results section. Any additional information on method performance, when applicable, is presented in this section of the case narrative. When data flags are not needed, the qualifiers text box on the last page is left blank, and a statement confirms that no exceptions occurred.

DEFINITIONS / QUALIFIERS

The following qualifiers and/or acronyms are used in the report, where applicable:

Acronym	Description
RL	Reporting Limit
ND	Result not detected or below Reporting Limit
NT	Non TNI analyte
LCS	Laboratory Control Sample
LRB	Laboratory Reagent Blank (also referred to as Method Blank)
DUP	Duplicate
MS	Matrix Spike
MSD	Matrix Spike Duplicate
RPD	Relative Percent Difference
MDL	Method Detection Limit
PQL	Practical Quantitation Limit
TDL	Target Detection Limit
SM	Standard Methods Compendium

Qualifier	Description
*	Generic data flag, applicable description added in the corresponding notes section
B	The analyte was detected in the LRB at a level which is significant relative to sample result
D	Reporting limit elevated due to dilution
E	Estimated due to result exceeding the linear range of the analyzer
H	The maximum recommended hold time was exceeded
I	Dilution required due to matrix interference; reporting limit elevated
J	Estimated due to result found above MDL but below PQL (or RL)
K	Reporting limit raised due to matrix interference
M	The precision for duplicate analysis was not met; RPD outside acceptance criteria
N	Non-homogeneous sample made analysis questionable
PI	Possible interference may have affected the accuracy of the laboratory result
Q	Matrix Spike or Matrix Spike Duplicate recovery outside acceptance criteria
R	Result confirmed by new sample preparation and reanalysis
X	Other notation required; comment listed in sample notes and/or case narrative

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q2-2022 JCW-DEK Background Wells
Date Received: 5/04/2022
Chemistry Project: 22-0443

Sample #	Field Sample ID	Matrix	Sample Date	Site
22-0443-01	MW-15002	Groundwater	05/02/2022 05:24 PM	DEK JCW Background
22-0443-02	MW-15008	Groundwater	05/02/2022 01:45 PM	DEK JCW Background
22-0443-03	MW-15016	Groundwater	05/03/2022 08:37 AM	DEK JCW Background
22-0443-04	MW-15019	Groundwater	05/02/2022 03:20 PM	DEK JCW Background
22-0443-05	DUP-Background	Groundwater	05/02/2022 12:00 AM	DEK JCW Background
22-0443-06	FB- Background	Water	05/02/2022 01:45 PM	DEK JCW Background

Analytical Report

Report Date: 05/25/22

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15002**
Lab Sample ID: 22-0443-01
Matrix: Groundwater

Laboratory Project: **22-0443**
Collect Date: 05/02/2022
Collect Time: 05:24 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0443-01-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/10/2022	AB22-0510-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0443-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Arsenic	14		ug/L	1.0	05/11/2022	AB22-0511-14
Barium	682		ug/L	5.0	05/11/2022	AB22-0511-14
Beryllium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Boron	103		ug/L	20.0	05/11/2022	AB22-0511-14
Cadmium	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Calcium	238000		ug/L	1000.0	05/12/2022	AB22-0511-14
Chromium	3		ug/L	1.0	05/11/2022	AB22-0511-14
Cobalt	ND		ug/L	6.0	05/11/2022	AB22-0511-14
Copper	3		ug/L	1.0	05/11/2022	AB22-0511-14
Iron	16100		ug/L	20.0	05/11/2022	AB22-0511-14
Lead	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Lithium	16		ug/L	10.0	05/11/2022	AB22-0511-14
Molybdenum	ND		ug/L	5.0	05/11/2022	AB22-0511-14
Nickel	14		ug/L	2.0	05/11/2022	AB22-0511-14
Selenium	54		ug/L	1.0	05/11/2022	AB22-0511-14
Silver	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Thallium	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Vanadium	15		ug/L	2.0	05/11/2022	AB22-0511-14
Zinc	23		ug/L	10.0	05/11/2022	AB22-0511-14

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0443-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	2210000		ug/L	1000.0	05/17/2022	AB22-0509-05
Fluoride	ND		ug/L	1000.0	05/16/2022	AB22-0509-05
Sulfate	6000		ug/L	1000.0	05/16/2022	AB22-0509-05

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0443-01-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	4240		mg/L	10.0	05/05/2022	AB22-0505-01

Analytical Report

Report Date: 05/25/22

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15008**
Lab Sample ID: 22-0443-02
Matrix: Groundwater

Laboratory Project: **22-0443**
Collect Date: 05/02/2022
Collect Time: 01:45 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0443-02-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/10/2022	AB22-0510-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0443-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Arsenic	2		ug/L	1.0	05/11/2022	AB22-0511-14
Barium	52		ug/L	5.0	05/11/2022	AB22-0511-14
Beryllium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Boron	112		ug/L	20.0	05/11/2022	AB22-0511-14
Cadmium	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Calcium	89500		ug/L	1000.0	05/12/2022	AB22-0511-14
Chromium	1		ug/L	1.0	05/11/2022	AB22-0511-14
Cobalt	ND		ug/L	6.0	05/11/2022	AB22-0511-14
Copper	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Iron	15500		ug/L	20.0	05/11/2022	AB22-0511-14
Lead	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Lithium	16		ug/L	10.0	05/11/2022	AB22-0511-14
Molybdenum	ND		ug/L	5.0	05/11/2022	AB22-0511-14
Nickel	5		ug/L	2.0	05/11/2022	AB22-0511-14
Selenium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Silver	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Thallium	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Vanadium	6		ug/L	2.0	05/11/2022	AB22-0511-14
Zinc	ND		ug/L	10.0	05/11/2022	AB22-0511-14

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0443-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	197000		ug/L	1000.0	05/17/2022	AB22-0509-05
Fluoride	ND		ug/L	1000.0	05/16/2022	AB22-0509-05
Sulfate	4990		ug/L	1000.0	05/16/2022	AB22-0509-05

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0443-02-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	783		mg/L	10.0	05/05/2022	AB22-0505-02

Analytical Report

Report Date: 05/25/22

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15016**
Lab Sample ID: 22-0443-03
Matrix: Groundwater

Laboratory Project: **22-0443**
Collect Date: 05/03/2022
Collect Time: 08:37 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0443-03-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/10/2022	AB22-0510-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0443-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Arsenic	8		ug/L	1.0	05/11/2022	AB22-0511-14
Barium	72		ug/L	5.0	05/11/2022	AB22-0511-14
Beryllium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Boron	329		ug/L	20.0	05/11/2022	AB22-0511-14
Cadmium	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Calcium	216000		ug/L	1000.0	05/12/2022	AB22-0511-14
Chromium	1		ug/L	1.0	05/11/2022	AB22-0511-14
Cobalt	ND		ug/L	6.0	05/11/2022	AB22-0511-14
Copper	5		ug/L	1.0	05/11/2022	AB22-0511-14
Iron	8020		ug/L	20.0	05/11/2022	AB22-0511-14
Lead	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Lithium	80		ug/L	10.0	05/11/2022	AB22-0511-14
Molybdenum	ND		ug/L	5.0	05/11/2022	AB22-0511-14
Nickel	13		ug/L	2.0	05/11/2022	AB22-0511-14
Selenium	2		ug/L	1.0	05/11/2022	AB22-0511-14
Silver	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Thallium	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Vanadium	3		ug/L	2.0	05/11/2022	AB22-0511-14
Zinc	ND		ug/L	10.0	05/11/2022	AB22-0511-14

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0443-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	243000		ug/L	1000.0	05/17/2022	AB22-0509-05
Fluoride	ND		ug/L	1000.0	05/16/2022	AB22-0509-05
Sulfate	267000		ug/L	1000.0	05/17/2022	AB22-0509-05

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0443-03-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1390		mg/L	10.0	05/05/2022	AB22-0505-02

Analytical Report

Report Date: 05/25/22

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15019**
Lab Sample ID: 22-0443-04
Matrix: Groundwater

Laboratory Project: **22-0443**
Collect Date: 05/02/2022
Collect Time: 03:20 PM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0443-04-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/10/2022	AB22-0510-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0443-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Arsenic	2		ug/L	1.0	05/11/2022	AB22-0511-14
Barium	308		ug/L	5.0	05/11/2022	AB22-0511-14
Beryllium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Boron	236		ug/L	20.0	05/11/2022	AB22-0511-14
Cadmium	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Calcium	139000		ug/L	1000.0	05/12/2022	AB22-0511-14
Chromium	1		ug/L	1.0	05/11/2022	AB22-0511-14
Cobalt	ND		ug/L	6.0	05/11/2022	AB22-0511-14
Copper	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Iron	21000		ug/L	20.0	05/11/2022	AB22-0511-14
Lead	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Lithium	12		ug/L	10.0	05/11/2022	AB22-0511-14
Molybdenum	ND		ug/L	5.0	05/11/2022	AB22-0511-14
Nickel	8		ug/L	2.0	05/11/2022	AB22-0511-14
Selenium	2		ug/L	1.0	05/11/2022	AB22-0511-14
Silver	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Thallium	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Vanadium	3		ug/L	2.0	05/11/2022	AB22-0511-14
Zinc	ND		ug/L	10.0	05/11/2022	AB22-0511-14

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0443-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	324000		ug/L	1000.0	05/17/2022	AB22-0509-05
Fluoride	ND		ug/L	1000.0	05/16/2022	AB22-0509-05
Sulfate	62500		ug/L	1000.0	05/16/2022	AB22-0509-05

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0443-04-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1200		mg/L	10.0	05/05/2022	AB22-0505-02

Analytical Report

Report Date: 05/25/22

Sample Site: **DEK JCW Background**
Field Sample ID: **DUP-Background**
Lab Sample ID: 22-0443-05
Matrix: Groundwater

Laboratory Project: **22-0443**
Collect Date: 05/02/2022
Collect Time: 12:00 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0443-05-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/10/2022	AB22-0510-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0443-05-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Arsenic	2		ug/L	1.0	05/11/2022	AB22-0511-14
Barium	58		ug/L	5.0	05/11/2022	AB22-0511-14
Beryllium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Boron	125		ug/L	20.0	05/11/2022	AB22-0511-14
Cadmium	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Calcium	103000		ug/L	1000.0	05/12/2022	AB22-0511-14
Chromium	2		ug/L	1.0	05/11/2022	AB22-0511-14
Cobalt	ND		ug/L	6.0	05/11/2022	AB22-0511-14
Copper	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Iron	16600		ug/L	20.0	05/11/2022	AB22-0511-14
Lead	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Lithium	17		ug/L	10.0	05/11/2022	AB22-0511-14
Molybdenum	ND		ug/L	5.0	05/11/2022	AB22-0511-14
Nickel	5		ug/L	2.0	05/11/2022	AB22-0511-14
Selenium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Silver	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Thallium	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Vanadium	6		ug/L	2.0	05/11/2022	AB22-0511-14
Zinc	ND		ug/L	10.0	05/11/2022	AB22-0511-14

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0443-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	198000		ug/L	1000.0	05/17/2022	AB22-0509-05
Fluoride	ND		ug/L	1000.0	05/16/2022	AB22-0509-05
Sulfate	4950		ug/L	1000.0	05/16/2022	AB22-0509-05

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0443-05-C03-A01 **Analyst: CET**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	786		mg/L	10.0	05/05/2022	AB22-0505-02

Analytical Report

Report Date: 05/25/22

Sample Site:	**DEK JCW Background**	Laboratory Project:	**22-0443**
Field Sample ID:	**FB- Background**	Collect Date:	05/02/2022
Lab Sample ID:	22-0443-06	Collect Time:	01:45 PM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0443-06-C01-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	05/10/2022	AB22-0510-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0443-06-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Arsenic	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Barium	ND		ug/L	5.0	05/11/2022	AB22-0511-14
Beryllium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Boron	ND		ug/L	20.0	05/11/2022	AB22-0511-14
Cadmium	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Calcium	ND		ug/L	1000.0	05/12/2022	AB22-0511-14
Chromium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Cobalt	ND		ug/L	6.0	05/11/2022	AB22-0511-14
Copper	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Iron	ND		ug/L	20.0	05/11/2022	AB22-0511-14
Lead	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Lithium	ND		ug/L	10.0	05/11/2022	AB22-0511-14
Molybdenum	ND		ug/L	5.0	05/11/2022	AB22-0511-14
Nickel	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Selenium	ND		ug/L	1.0	05/11/2022	AB22-0511-14
Silver	ND		ug/L	0.2	05/11/2022	AB22-0511-14
Thallium	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Vanadium	ND		ug/L	2.0	05/11/2022	AB22-0511-14
Zinc	ND		ug/L	10.0	05/11/2022	AB22-0511-14

Analytical Report

Report Date: 05/25/22

Data Qualifiers	Exception Summary
	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-0443

Inspection Date: 5.4.22 **Inspection By:** dmw

Sample Origin/Project Name: Q2-2022 JCN-DEK Background Wells

Shipment Delivered By: Enter the type of shipment carrier.

Pony ____ FedEx ✓ UPS ____ USPS ____ Airborne ____

Other/Hand Carry (whom) ____

Tracking Number: 272724708310 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 2.9 - 4.7°C Samples Received on Ice: Yes ✓ No ____

METER Exp. Date: 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)					
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	11				
24 mL vial (glass)					
500 mL (plastic)					
Other 250 ml plastic	5				

pH paper

COA No: 13-640-508
0.0 - 14.0
Lot: 222420
Exp: 8.1.23

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

Page 1 of 1

SAMPLING SITE / CUSTOMER: Q2-2022 JCW-DEK Background Wells

PROJECT NUMBER: 22-0443

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	REMARKS
22-0443-01	5/2/22	1724	GW	MW-15002	4	3	1						x	x	x	
-02	5/2/22	1345	GW	MW-15008	4	3	1						x	x	x	
-03	5/3/22	837	GW	MW-15016	4	3	1						x	x	x	
-04	5/2/22	1520	GW	MW-15019	4	3	1						x	x	x	
-05	5/2/22	—	GW	DUP-Background	4	3	1						x	x	x	
-06	5/2/22	1345	W	FB- Background	1								x			

RELINQUISHED BY: Mindy Schwandt — DATE/TIME: 5/3/22 — RECEIVED BY: FedEx

RELINQUISHED BY: Fed Ex — DATE/TIME: 05-04-2022 10:25 — RECEIVED BY:

COMMENTS:

Received on Ice? ☑ Yes ☐ No — M&TE #: 015402

Temperature: 2.4-4.6 °C — Cal. Due Date: 6-3-22

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Tel: (330)497-9396

Laboratory Job ID: 240-166413-1
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:
6/20/2022 8:22:00 PM

Kris Brooks, Project Manager II
(330)966-9790
Kris.Brooks@et.eurofinsus.com

LINKS
Review your project results through my EOL
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.

Table of Contents

Cover Page 1
Table of Contents 2
Definitions/Glossary 3
Case Narrative 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Tracer Carrier Summary 21
QC Sample Results 22
QC Association Summary 24
Lab Chronicle 25
Certification Summary 29
Chain of Custody 30
Receipt Checklists 37

Definitions/Glossary

Client: TRC Environmental Corporation. Job ID: 240-166413-1
Project/Site: Karn/Weadock CCR JCW 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: 240-166413-1

Laboratory: Eurofins Canton

Narrative

Job Narrative
240-166413-1

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 St. Louis laboratory.

Receipt
The samples were received on 5/12/2022 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 0.8º C, 0.9º C and 1.8º C.

RAD
Method 903.0: Radium-226 batch 565788 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 (240-166413-1), JCW-MW-18004 (240-166413-2), JCW-MW-18005 (240-166413-3), JCW-MW-18006 (240-166413-4), MW-50 (240-166413-5), MW-51 (240-166413-6), MW-52 (240-166413-7), MW-53 (240-166413-8), MW-53R (240-166413-9), MW-54R (240-166413-10), MW-55 (240-166413-11), OW-57R- OUT (240-166413-12), DUP-01 (240-166413-13), EB-01 (240-166413-14), (LCS 160-565788/1-A), (LCSD 160-565788/2-A) and (MB 160-565788/23-A)

Method 904.0: Radium 228 Batch 160-569783: 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 (240-166413-1), JCW-MW-18004 (240-166413-2), JCW-MW-18005 (240-166413-3), JCW-MW-18006 (240-166413-4), MW-50 (240-166413-5), MW-51 (240-166413-6), MW-52 (240-166413-7), MW-53 (240-166413-8), MW-53R (240-166413-9), MW-54R (240-166413-10), MW-55 (240-166413-11), OW-57R-OUT (240-166413-12), DUP-01 (240-166413-13), EB-01 (240-166413-14), (LCS 160-569783/2-A), (LCSD 160-569783/3-A) and (MB 160-569783/1-A)

Method PrecSep_0: Radium-228 Prep Batch 160-565793
The following sample was prepared at a reduced aliquot due to Matrix: MW-55 (240-166413-11). 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: The following samples are being re-extracted due to LCS/LCSD failure (low). Original batch 565793. JCW-MW-18001 (240-166413-1), JCW-MW-18004 (240-166413-2), JCW-MW-18005 (240-166413-3), JCW-MW-18006 (240-166413-4), MW-50 (240-166413-5), MW-51 (240-166413-6), MW-52 (240-166413-7), MW-53 (240-166413-8), MW-53R (240-166413-9), MW-54R (240-166413-10), MW-55 (240-166413-11), OW-57R- OUT (240-166413-12), DUP-01 (240-166413-13) and EB-01 (240-166413-14)

Method PrecSep_0: Radium-228 prep batch 160-569783 Insufficient sample volume was available to perform a sample duplicate for the following samples: JCW-MW-18001 (240-166413-1), JCW-MW-18004 (240-166413-2), JCW-MW-18005 (240-166413-3), JCW-MW-18006 (240-166413-4), MW-50 (240-166413-5), MW-51 (240-166413-6), MW-52 (240-166413-7), MW-53 (240-166413-8), MW-53R (240-166413-9), MW-54R (240-166413-10), MW-55 (240-166413-11), OW-57R- OUT (240-166413-12), DUP-01 (240-166413-13) and EB-01 (240-166413-14). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

Method PrecSep_0: Radium-228 prep batch 160-569783. The following sample was prepared at a reduced aliquot due to Matrix: MW-55 (240-166413-11). 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: Radium-226 Prep Batch 160-565788. The following sample was prepared at a reduced aliquot due to Matrix: MW-55 (240-166413-11). 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.
Job ID: 240-166413-1
Project/Site: Karn/Weadock CCR JCW Ash Pond

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	TAL SL
904.0	Radium-228 (GFPC)	EPA	TAL SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	TAL SL
PrecSep STD	Preparation, Precipitate Separation (Standard In-Growth)	None	TAL SL
PrecSep_0	Preparation, Precipitate Separation	None	TAL SL

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

TAL SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: TRC Environmental Corporation.
Job ID: 240-166413-1
Project/Site: Karn/Weadock CCR JCW Ash Pond

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-166413-1	JCW-MW-18001	Water	05/09/22 07:05	05/12/22 08:00
240-166413-2	JCW-MW-18004	Water	05/10/22 06:34	05/12/22 08:00
240-166413-3	JCW-MW-18005	Water	05/10/22 10:04	05/12/22 08:00
240-166413-4	JCW-MW-18006	Water	05/09/22 13:33	05/12/22 08:00
240-166413-5	MW-50	Water	05/09/22 08:00	05/12/22 08:00
240-166413-6	MW-51	Water	05/09/22 09:17	05/12/22 08:00
240-166413-7	MW-52	Water	05/09/22 10:20	05/12/22 08:00
240-166413-8	MW-53	Water	05/09/22 11:09	05/12/22 08:00
240-166413-9	MW-53R	Water	05/09/22 14:34	05/12/22 08:00
240-166413-10	MW-54R	Water	05/09/22 15:15	05/12/22 08:00
240-166413-11	MW-55	Water	05/10/22 08:12	05/12/22 08:00
240-166413-12	OW-57R- OUT	Water	05/10/22 11:05	05/12/22 08:00
240-166413-13	DUP-01	Water	05/08/22 00:00	05/12/22 08:00
240-166413-14	EB-01	Water	05/10/22 11:35	05/12/22 08:00

Client Sample Results

Client: TRC Environmental Corporation. Job ID: 240-166413-1
Project/Site: Karn/Weadock CCR JCW Ash Pond

Client Sample ID: JCW-MW-18001 Lab Sample ID: 240-166413-1

Date Collected: 05/09/22 07:05 **Matrix: Water**
Date Received: 05/12/22 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	0.0913	U	0.181	0.182	1.00	0.327	pCi/L	05/16/22 12:29	06/09/22 19:05	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.5*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:05*	*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	**0.494**		0.302	0.306	1.00	0.433	pCi/L	06/13/22 14:10	06/17/22 13:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.5*		*40 - 110*	*06/13/22 14:10*	*06/17/22 13:57*	*1*
Y Carrier	*86.4*		*40 - 110*	*06/13/22 14:10*	*06/17/22 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	**0.586**		0.352	0.356	5.00	0.433	pCi/L		06/20/22 11:18	1

Client Sample ID: JCW-MW-18004 — Lab Sample ID: 240-166413-2

Date Collected: 05/10/22 06:34 — **Matrix: Water**
Date Received: 05/12/22 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	0.120	U	0.234	0.234	1.00	0.417	pCi/L	05/16/22 12:29	06/09/22 19:06	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*74.6*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:06*	*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	**0.790**		0.375	0.382	1.00	0.505	pCi/L	06/13/22 14:10	06/17/22 13:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.0*		*40 - 110*	*06/13/22 14:10*	*06/17/22 13:57*	*1*
Y Carrier	*84.1*		*40 - 110*	*06/13/22 14:10*	*06/17/22 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	**0.910**		0.442	0.448	5.00	0.505	pCi/L		06/20/22 11:18	1

Client Sample ID: JCW-MW-18005 — Lab Sample ID: 240-166413-3

Date Collected: 05/10/22 10:04 — **Matrix: Water**
Date Received: 05/12/22 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	0.223	U	0.254	0.255	1.00	0.414	pCi/L	05/16/22 12:29	06/09/22 19:06	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.5*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:06*	*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	0.400	U	0.335	0.337	1.00	0.521	pCi/L	06/13/22 14:10	06/17/22 13:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.8*		*40 - 110*	*06/13/22 14:10*	*06/17/22 13:57*	*1*
Y Carrier	*83.0*		*40 - 110*	*06/13/22 14:10*	*06/17/22 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	**0.622**		0.420	0.423	5.00	0.521	pCi/L		06/20/22 11:18	1

Client Sample ID: JCW-MW-18006 — Lab Sample ID: 240-166413-4

Date Collected: 05/09/22 13:33 — **Matrix: Water**
Date Received: 05/12/22 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	0.223	U	0.255	0.256	1.00	0.416	pCi/L	05/16/22 12:29	06/09/22 19:06	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.3*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:06*	*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	0.467	U	0.341	0.344	1.00	0.518	pCi/L	06/13/22 14:10	06/17/22 13:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.0*		*40 - 110*	*06/13/22 14:10*	*06/17/22 13:57*	*1*
Y Carrier	*83.0*		*40 - 110*	*06/13/22 14:10*	*06/17/22 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	**0.690**		0.426	0.429	5.00	0.518	pCi/L		06/20/22 11:18	1

Client Sample ID: MW-50 — Lab Sample ID: 240-166413-5

Date Collected: 05/09/22 08:00 — **Matrix: Water**
Date Received: 05/12/22 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	0.282	U	0.218	0.219	1.00	0.310	pCi/L	05/16/22 12:29	06/09/22 19:07	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.0*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:07*	*1*

Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.236	U	0.297	0.298	1.00	0.493	pCi/L	06/13/22 14:10	06/17/22 13:57	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.0*		*40 - 110*	*06/13/22 14:10*	*06/17/22 13:57*	*1*
Y Carrier	*84.1*		*40 - 110*	*06/13/22 14:10*	*06/17/22 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	**0.518**		0.368	0.370	5.00	0.493	pCi/L		06/20/22 11:18	1

Client Sample ID: MW-51 — Lab Sample ID: 240-166413-6

Date Collected: 05/09/22 09:17 — **Matrix: Water**
Date Received: 05/12/22 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	0.109	U	0.237	0.237	1.00	0.423	pCi/L	05/16/22 12:29	06/09/22 19:38	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*86.5*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:38*	*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	0.467	U	0.328	0.331	1.00	0.494	pCi/L	06/13/22 14:10	06/17/22 13:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.5*		*40 - 110*	*06/13/22 14:10*	*06/17/22 13:58*	*1*
Y Carrier	*84.5*		*40 - 110*	*06/13/22 14:10*	*06/17/22 13:58*	*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	**0.576**		0.405	0.407	5.00	0.494	pCi/L		06/20/22 11:18	1

Client Sample ID: MW-52
Date Collected: 05/09/22 10:20
Date Received: 05/12/22 08:00

Lab Sample ID: 240-166413-7
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	0.451	U	0.331	0.334	1.00	0.489	pCi/L	05/16/22 12:29	06/09/22 19:38	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*74.3*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:38*	*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	0.424	U	0.343	0.345	1.00	0.532	pCi/L	06/13/22 14:10	06/17/22 13:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.8*		*40 - 110*	*06/13/22 14:10*	*06/17/22 13:58*	*1*
Y Carrier	*83.7*		*40 - 110*	*06/13/22 14:10*	*06/17/22 13:58*	*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	**0.875**		0.477	0.480	5.00	0.532	pCi/L		06/20/22 11:18	1

Client Sample ID: MW-53
Date Collected: 05/09/22 11:09
Date Received: 05/12/22 08:00

Lab Sample ID: 240-166413-8
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	**0.406**		0.245	0.247	1.00	0.312	pCi/L	05/16/22 12:29	06/09/22 19:38	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*84.8*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:38*	*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	0.419	U	0.335	0.337	1.00	0.518	pCi/L	06/13/22 14:10	06/17/22 13:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.5*		*40 - 110*	*06/13/22 14:10*	*06/17/22 13:58*	*1*
Y Carrier	*84.9*		*40 - 110*	*06/13/22 14:10*	*06/17/22 13:58*	*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	**0.824**		0.415	0.418	5.00	0.518	pCi/L		06/20/22 11:18	1

Client: TRC Environmental Corporation.
Job ID: 240-166413-1
Project/Site: Karn/Weadock CCR JCW Ash Pond

Client Sample ID: MW-53R
Lab Sample ID: 240-166413-9
Date Collected: 05/09/22 14:34
Matrix: Water
Date Received: 05/12/22 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	0.251	U	0.217	0.218	1.00	0.325	pCi/L	05/16/22 12:29	06/09/22 19:38	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*90.8*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:38*	*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	0.156	U	0.278	0.278	1.00	0.480	pCi/L	06/13/22 14:10	06/17/22 13:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.3*		*40 - 110*	*06/13/22 14:10*	*06/17/22 13:58*	*1*
Y Carrier	*84.5*		*40 - 110*	*06/13/22 14:10*	*06/17/22 13:58*	*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	0.407	U	0.353	0.353	5.00	0.480	pCi/L		06/20/22 11:18	1

Client Sample ID: MW-54R
Date Collected: 05/09/22 15:15
Date Received: 05/12/22 08:00

Lab Sample ID: 240-166413-10
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	-0.00689	U	0.167	0.167	1.00	0.347	pCi/L	05/16/22 12:29	06/09/22 19:38	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.0*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:38*	*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	0.317	0.317	1.00	0.552	pCi/L	06/13/22 14:10	06/17/22 14:00	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.3*		*40 - 110*	*06/13/22 14:10*	*06/17/22 14:00*	*1*
Y Carrier	*83.0*		*40 - 110*	*06/13/22 14:10*	*06/17/22 14:00*	*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	0.146	U	0.358	0.358	5.00	0.552	pCi/L		06/20/22 11:18	1

Client Sample ID: MW-55
Date Collected: 05/10/22 08:12
Date Received: 05/12/22 08:00

Lab Sample ID: 240-166413-11
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	0.137	U	0.266	0.267	1.00	0.478	pCi/L	05/16/22 12:29	06/09/22 19:38	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*77.3*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:38*	*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	0.559	U	0.424	0.427	1.00	0.646	pCi/L	06/13/22 14:10	06/17/22 14:00	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.0*		*40 - 110*	*06/13/22 14:10*	*06/17/22 14:00*	*1*
Y Carrier	*84.5*		*40 - 110*	*06/13/22 14:10*	*06/17/22 14:00*	*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	**0.696**		0.501	0.504	5.00	0.646	pCi/L		06/20/22 11:18	1

Client Sample ID: OW-57R- OUT
Lab Sample ID: 240-166413-12

Date Collected: 05/10/22 11:05
Matrix: Water
Date Received: 05/12/22 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	0.299	U	0.281	0.282	1.00	0.440	pCi/L	05/16/22 12:29	06/09/22 19:38	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.3*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:38*	*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	0.160	U	0.312	0.312	1.00	0.539	pCi/L	06/13/22 14:10	06/17/22 14:00	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.0*		*40 - 110*	*06/13/22 14:10*	*06/17/22 14:00*	*1*
Y Carrier	*86.0*		*40 - 110*	*06/13/22 14:10*	*06/17/22 14:00*	*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	0.459	U	0.420	0.421	5.00	0.539	pCi/L		06/20/22 11:18	1

Client Sample ID: DUP-01
Date Collected: 05/08/22 00:00
Date Received: 05/12/22 08:00

Lab Sample ID: 240-166413-13
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	0.256	U	0.200	0.201	1.00	0.287	pCi/L	05/16/22 12:29	06/09/22 19:38	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.8*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:38*	*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	**0.648**		0.347	0.352	1.00	0.482	pCi/L	06/13/22 14:10	06/17/22 14:01	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*92.3*		*40 - 110*	*06/13/22 14:10*	*06/17/22 14:01*	*1*
Y Carrier	*85.2*		*40 - 110*	*06/13/22 14:10*	*06/17/22 14:01*	*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	**0.904**		0.401	0.405	5.00	0.482	pCi/L		06/20/22 11:18	1

Client Sample ID: EB-01 — Lab Sample ID: 240-166413-14

Date Collected: 05/10/22 11:35 — **Matrix: Water**
Date Received: 05/12/22 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	-0.178	U	0.157	0.157	1.00	0.416	pCi/L	05/16/22 12:29	06/09/22 19:38	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*84.8*		*40 - 110*	*05/16/22 12:29*	*06/09/22 19:38*	*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	0.152	U	0.290	0.291	1.00	0.504	pCi/L	06/13/22 14:10	06/17/22 14:01	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*91.0*		*40 - 110*	*06/13/22 14:10*	*06/17/22 14:01*	*1*
Y Carrier	*83.4*		*40 - 110*	*06/13/22 14:10*	*06/17/22 14:01*	*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	-0.0256	U	0.330	0.331	5.00	0.504	pCi/L		06/20/22 11:18	1

Tracer/Carrier Summary

Client: TRC Environmental Corporation.
Job ID: 240-166413-1
Project/Site: Karn/Weadock CCR JCW Ash Pond

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
		Ba
Lab Sample ID	Client Sample ID	(40-110)
240-166413-1	JCW-MW-18001	86.5
240-166413-2	JCW-MW-18004	74.6
240-166413-3	JCW-MW-18005	88.5
240-166413-4	JCW-MW-18006	85.3
240-166413-5	MW-50	87.0
240-166413-6	MW-51	86.5
240-166413-7	MW-52	74.3
240-166413-8	MW-53	84.8
240-166413-9	MW-53R	90.8
240-166413-10	MW-54R	87.0
240-166413-11	MW-55	77.3
240-166413-12	OW-57R- OUT	91.3
240-166413-13	DUP-01	94.8
240-166413-14	EB-01	84.8
LCS 160-565788/1-A	Lab Control Sample	99.0
LCSD 160-565788/2-A	Lab Control Sample Dup	96.8
MB 160-565788/23-A	Method Blank	69.1

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)	
		Ba	Y
Lab Sample ID	Client Sample ID	(40-110)	(40-110)
240-166413-1	JCW-MW-18001	93.5	86.4
240-166413-2	JCW-MW-18004	90.0	84.1
240-166413-3	JCW-MW-18005	88.8	83.0
240-166413-4	JCW-MW-18006	91.0	83.0
240-166413-5	MW-50	93.0	84.1
240-166413-6	MW-51	93.5	84.5
240-166413-7	MW-52	88.8	83.7
240-166413-8	MW-53	90.5	84.9
240-166413-9	MW-53R	92.3	84.5
240-166413-10	MW-54R	87.3	83.0
240-166413-11	MW-55	93.0	84.5
240-166413-12	OW-57R- OUT	93.0	86.0
240-166413-13	DUP-01	92.3	85.2
240-166413-14	EB-01	91.0	83.4
LCS 160-569783/2-A	Lab Control Sample	97.3	83.7
LCSD 160-569783/3-A	Lab Control Sample Dup	96.3	84.1
MB 160-569783/1-A	Method Blank	99.5	84.9

Tracer/Carrier Legend

Ba = Ba Carrier
Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-565788/23-A
Matrix: Water
Analysis Batch: 569248

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 565788

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.03434	U	0.165	0.165	1.00	0.332	pCi/L	05/16/22 12:29	06/09/22 21:14	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*69.1*		*40 - 110*	*05/16/22 12:29*	*06/09/22 21:14*	*1*

Lab Sample ID: LCS 160-565788/1-A
Matrix: Water
Analysis Batch: 569248

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 565788

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	9.157		1.21	1.00	0.269	pCi/L	81	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*99.0*		*40 - 110*

Lab Sample ID: LCSD 160-565788/2-A
Matrix: Water
Analysis Batch: 569248

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 565788

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RER	RER Limit
Radium-226			11.3	8.743		1.18	1.00	0.355	pCi/L	77	75 - 125	0.17	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*96.8*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-569783/1-A
Matrix: Water
Analysis Batch: 570480

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 569783

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.08470	U	0.220	0.220	1.00	0.445	pCi/L	06/13/22 14:10	06/17/22 13:57	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.5*		*40 - 110*	*06/13/22 14:10*	*06/17/22 13:57*	*1*
Y Carrier	*84.9*		*40 - 110*	*06/13/22 14:10*	*06/17/22 13:57*	*1*

Method: 904.0 - Radium-228 (GFPC) (Continued)

Lab Sample ID: LCS 160-569783/2-A **Client Sample ID: Lab Control Sample**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 570480 **Prep Batch: 569783**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			8.53	8.634		1.19	1.00	0.503	pCi/L	101	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*97.3*		*40 - 110*
Y Carrier	*83.7*		*40 - 110*

Lab Sample ID: LCSD 160-569783/3-A **Client Sample ID: Lab Control Sample Dup**
Matrix: Water **Prep Type: Total/NA**
Analysis Batch: 570480 **Prep Batch: 569783**

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RER	RER Limit
Radium-228			8.53	7.654		1.08	1.00	0.436	pCi/L	90	75 - 125	0.43	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*96.3*		*40 - 110*
Y Carrier	*84.1*		*40 - 110*

Rad

Prep Batch: 565788

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-166413-1	JCW-MW-18001	Total/NA	Water	PrecSep STD	
240-166413-2	JCW-MW-18004	Total/NA	Water	PrecSep STD	
240-166413-3	JCW-MW-18005	Total/NA	Water	PrecSep STD	
240-166413-4	JCW-MW-18006	Total/NA	Water	PrecSep STD	
240-166413-5	MW-50	Total/NA	Water	PrecSep STD	
240-166413-6	MW-51	Total/NA	Water	PrecSep STD	
240-166413-7	MW-52	Total/NA	Water	PrecSep STD	
240-166413-8	MW-53	Total/NA	Water	PrecSep STD	
240-166413-9	MW-53R	Total/NA	Water	PrecSep STD	
240-166413-10	MW-54R	Total/NA	Water	PrecSep STD	
240-166413-11	MW-55	Total/NA	Water	PrecSep STD	
240-166413-12	OW-57R- OUT	Total/NA	Water	PrecSep STD	
240-166413-13	DUP-01	Total/NA	Water	PrecSep STD	
240-166413-14	EB-01	Total/NA	Water	PrecSep STD	
MB 160-565788/23-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-565788/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
LCSD 160-565788/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	

Prep Batch: 569783

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-166413-1	JCW-MW-18001	Total/NA	Water	PrecSep_0	
240-166413-2	JCW-MW-18004	Total/NA	Water	PrecSep_0	
240-166413-3	JCW-MW-18005	Total/NA	Water	PrecSep_0	
240-166413-4	JCW-MW-18006	Total/NA	Water	PrecSep_0	
240-166413-5	MW-50	Total/NA	Water	PrecSep_0	
240-166413-6	MW-51	Total/NA	Water	PrecSep_0	
240-166413-7	MW-52	Total/NA	Water	PrecSep_0	
240-166413-8	MW-53	Total/NA	Water	PrecSep_0	
240-166413-9	MW-53R	Total/NA	Water	PrecSep_0	
240-166413-10	MW-54R	Total/NA	Water	PrecSep_0	
240-166413-11	MW-55	Total/NA	Water	PrecSep_0	
240-166413-12	OW-57R- OUT	Total/NA	Water	PrecSep_0	
240-166413-13	DUP-01	Total/NA	Water	PrecSep_0	
240-166413-14	EB-01	Total/NA	Water	PrecSep_0	
MB 160-569783/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-569783/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-569783/3-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: 240-166413-1

Client Sample ID: JCW-MW-18001

Lab Sample ID: 240-166413-1

Date Collected: 05/09/22 07:05

Matrix: Water

Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569248	06/09/22 19:05	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569783	06/13/22 14:10	MS	TAL SL
Total/NA	Analysis	904.0		1	570480	06/17/22 13:57	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570750	06/20/22 11:18	FLC	TAL SL

Client Sample ID: JCW-MW-18004

Lab Sample ID: 240-166413-2

Date Collected: 05/10/22 06:34

Matrix: Water

Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569247	06/09/22 19:06	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569783	06/13/22 14:10	MS	TAL SL
Total/NA	Analysis	904.0		1	570480	06/17/22 13:57	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570750	06/20/22 11:18	FLC	TAL SL

Client Sample ID: JCW-MW-18005

Lab Sample ID: 240-166413-3

Date Collected: 05/10/22 10:04

Matrix: Water

Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569247	06/09/22 19:06	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569783	06/13/22 14:10	MS	TAL SL
Total/NA	Analysis	904.0		1	570480	06/17/22 13:57	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570750	06/20/22 11:18	FLC	TAL SL

Client Sample ID: JCW-MW-18006

Lab Sample ID: 240-166413-4

Date Collected: 05/09/22 13:33

Matrix: Water

Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569247	06/09/22 19:06	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569783	06/13/22 14:10	MS	TAL SL
Total/NA	Analysis	904.0		1	570480	06/17/22 13:57	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570750	06/20/22 11:18	FLC	TAL SL

Lab Chronicle

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Ash Pond

Job ID: 240-166413-1

Client Sample ID: MW-50
Date Collected: 05/09/22 08:00
Date Received: 05/12/22 08:00

Lab Sample ID: 240-166413-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569247	06/09/22 19:07	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569783	06/13/22 14:10	MS	TAL SL
Total/NA	Analysis	904.0		1	570480	06/17/22 13:57	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570750	06/20/22 11:18	FLC	TAL SL

Client Sample ID: MW-51
Date Collected: 05/09/22 09:17
Date Received: 05/12/22 08:00

Lab Sample ID: 240-166413-6
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569247	06/09/22 19:38	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569783	06/13/22 14:10	MS	TAL SL
Total/NA	Analysis	904.0		1	570480	06/17/22 13:58	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570750	06/20/22 11:18	FLC	TAL SL

Client Sample ID: MW-52
Date Collected: 05/09/22 10:20
Date Received: 05/12/22 08:00

Lab Sample ID: 240-166413-7
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569247	06/09/22 19:38	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569783	06/13/22 14:10	MS	TAL SL
Total/NA	Analysis	904.0		1	570480	06/17/22 13:58	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570750	06/20/22 11:18	FLC	TAL SL

Client Sample ID: MW-53
Date Collected: 05/09/22 11:09
Date Received: 05/12/22 08:00

Lab Sample ID: 240-166413-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569247	06/09/22 19:38	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569783	06/13/22 14:10	MS	TAL SL
Total/NA	Analysis	904.0		1	570480	06/17/22 13:58	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570750	06/20/22 11:18	FLC	TAL SL

Lab Chronicle

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Ash Pond

Job ID: 240-166413-1

Client Sample ID: MW-53R

Lab Sample ID: 240-166413-9

Date Collected: 05/09/22 14:34

Matrix: Water

Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569247	06/09/22 19:38	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569783	06/13/22 14:10	MS	TAL SL
Total/NA	Analysis	904.0		1	570480	06/17/22 13:58	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570750	06/20/22 11:18	FLC	TAL SL

Client Sample ID: MW-54R

Lab Sample ID: 240-166413-10

Date Collected: 05/09/22 15:15

Matrix: Water

Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569247	06/09/22 19:38	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569783	06/13/22 14:10	MS	TAL SL
Total/NA	Analysis	904.0		1	570479	06/17/22 14:00	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570750	06/20/22 11:18	FLC	TAL SL

Client Sample ID: MW-55

Lab Sample ID: 240-166413-11

Date Collected: 05/10/22 08:12

Matrix: Water

Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569247	06/09/22 19:38	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569783	06/13/22 14:10	MS	TAL SL
Total/NA	Analysis	904.0		1	570479	06/17/22 14:00	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570750	06/20/22 11:18	FLC	TAL SL

Client Sample ID: OW-57R- OUT

Lab Sample ID: 240-166413-12

Date Collected: 05/10/22 11:05

Matrix: Water

Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569247	06/09/22 19:38	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569783	06/13/22 14:10	MS	TAL SL
Total/NA	Analysis	904.0		1	570479	06/17/22 14:00	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570750	06/20/22 11:18	FLC	TAL SL

Lab Chronicle

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Ash Pond

Job ID: 240-166413-1

Client Sample ID: DUP-01

Lab Sample ID: 240-166413-13

Date Collected: 05/08/22 00:00

Matrix: Water

Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569247	06/09/22 19:38	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569783	06/13/22 14:10	MS	TAL SL
Total/NA	Analysis	904.0		1	570479	06/17/22 14:01	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570750	06/20/22 11:18	FLC	TAL SL

Client Sample ID: EB-01

Lab Sample ID: 240-166413-14

Date Collected: 05/10/22 11:35

Matrix: Water

Date Received: 05/12/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			565788	05/16/22 12:29	MS	TAL SL
Total/NA	Analysis	903.0		1	569247	06/09/22 19:38	FLC	TAL SL
Total/NA	Prep	PrecSep_0			569783	06/13/22 14:10	MS	TAL SL
Total/NA	Analysis	904.0		1	570479	06/17/22 14:01	CLP	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	570750	06/20/22 11:18	FLC	TAL SL

Laboratory References:

TAL SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: TRC Environmental Corporation. Job ID: 240-166413-1
Project/Site: Karn/Weadock CCR JCW Ash Pond

Laboratory: Eurofins St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-06-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-22
California	Los Angeles County Sanitation Districts	10259	06-30-22
California	State	2886	07-01-22
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	12-31-22
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-22
Louisiana	NELAP	04080	06-30-22
Louisiana (DW)	State	LA011	12-31-22
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	04-01-23
North Dakota	State	R-207	06-30-22
NRC	NRC	24-24817-01	12-31-22
Oklahoma	NELAP	9997	08-31-22
Oregon	NELAP	4157	09-01-22
Pennsylvania	NELAP	68-00540	02-28-23
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	06-14-23
Washington	State	C592	08-30-22
West Virginia DEP	State	381	10-31-22

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

MICHIGAN 190

eurofins | Environment Testing America

Client Information	Sampler: JAMES JASE	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-94784-33306.1
Client Contact: Jacob Krenz	Phone: 734 904 3316	E-Mail: Kris.Brooks@et.eurofinsus.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	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, Ra226Ra228_GFPC	904.0 - Standard Target List	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	D		
JCW-MW-18001	5/9/22	0905	G	Water	N	N	1	1	2	
JCW-MW-18004	5/10/22	0834	G	Water	N	N	1	1	2	
JCW-MW-18005	5/10/22	1004	G	Water	N	N	1	1	2	
JCW-MW-18006	5/9/22	1333	G	Water	N	N	1	1	2	
MW-50	5/9/22	0801	G	Water	N	N	1	1	2	
MW-51	5/9/22	0917	G	Water	N	N	1	1	2	
MW-52	5/9/22	1016	G	Water	N	N	1	1	2	
MW-53	5/9/22	1109	G	Water	N	N	1	1	2	
MW-53R	5/9/22	1434	G	Water	N	N	1	1	2	
MW-54R	5/9/22	1515	G	Water	N	N	1	1	2	
MW-55	5/10/22	0813	G	Water	N	N	1	1	2	

240-166413 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1		5/11/22 0830	TRC		5/11/22 0830	EENA
2		5/11/22	EENA		5-12-22 0800	EENC
3		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 Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

eurofins Environment Testing America

Client Information	Sampler	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-94784-33306.2
Client Contact: Jacob Krenz	Phone	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin:	Page: Page 2 of 2
Company: TRC Environmental Corporation	PWSID	Analysis Requested		Job #:
Address: 1540 Eisenhower Place	Due Date 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)
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#:			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	5/10/22	1105	G	Water	N	N	X	X	2	
DUP-01	5/10/22	—	G	Water	N	N	X	X	2	
EB-01	5/10/22	1135	G	Water	N	N	X	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
1					5/11/22 0830	EEA
2		5/11/22 0830	EEA		5-18-22 800	EFTNC
3		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 # : 166413**
Canton Facility

Client TRC Site Name _____ Cooler unpacked by: Matt

Cooler Received on 5-12-22 Opened on 5-12-22

FedEx: 1st Grd Exp UPS FAS Clipper Client Drop Off TestAmerica Courier Other _____

Receipt After-hours: Drop-off Date/Time _____ Storage Location _____

TestAmerica Cooler # 11 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-13 (CF **0.0** °C) Observed Cooler Temp._____°C Corrected Cooler Temp._____°C
   IR GUN #IR-15 (CF **-0.7**°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:

Recieved 2 sets of samples labled 18006, one with time 1004 one 1333. Matched times with COC, Same with Samples MW-50.

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 # : ______________

Eurofins - 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-13 IR-15	1.8	1.8	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15	0.9	0.9	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15	0.8	0.8	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
				☐ See Temperature Excursion Form

WI-NC-099 Cooler Receipt Form Page 2 – Multiple Coolers

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Login Container Summary Report

Temperature readings: _____

Client Sample ID	Lab ID	Container Type	Container pH	Container Temp	Preservative Added (mls)	Lot #
JCW-MW-18001	240-166413-A-1	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18001	240-166413-B-1	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18004	240-166413-A-2	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18004	240-166413-B-2	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18005	240-166413-A-3	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18005	240-166413-B-3	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18006	240-166413-A-4	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18006	240-166413-B-4	Plastic 1 liter - Nitric Acid	<2			
MW-50	240-166413-A-5	Plastic 1 liter - Nitric Acid	<2			
MW-50	240-166413-B-5	Plastic 1 liter - Nitric Acid	<2			
MW-51	240-166413-A-6	Plastic 1 liter - Nitric Acid	<2			
MW-51	240-166413-B-6	Plastic 1 liter - Nitric Acid	<2			
MW-52	240-166413-A-7	Plastic 1 liter - Nitric Acid	<2			
MW-52	240-166413-B-7	Plastic 1 liter - Nitric Acid	<2			
MW-53	240-166413-A-8	Plastic 1 liter - Nitric Acid	<2			
MW-53	240-166413-B-8	Plastic 1 liter - Nitric Acid	<2			
MW-53R	240-166413-A-9	Plastic 1 liter - Nitric Acid	<2			
MW-53R	240-166413-B-9	Plastic 1 liter - Nitric Acid	<2			
MW-54R	240-166413-A-10	Plastic 1 liter - Nitric Acid	<2			
MW-54R	240-166413-B-10	Plastic 1 liter - Nitric Acid	<2			
MW-55	240-166413-A-11	Plastic 1 liter - Nitric Acid	<2			
MW-55	240-166413-B-11	Plastic 1 liter - Nitric Acid	<2			
OW-57R- OUT	240-166413-A-12	Plastic 1 liter - Nitric Acid	<2			
OW-57R- OUT	240-166413-B-12	Plastic 1 liter - Nitric Acid	<2			
DUP-01	240-166413-A-13	Plastic 1 liter - Nitric Acid	<2			
DUP-01	240-166413-B-13	Plastic 1 liter - Nitric Acid	<2			
EB-01	240-166413-A-14	Plastic 1 liter - Nitric Acid	<2			
EB-01	240-166413-B-14	Plastic 1 liter - Nitric Acid	<2			

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
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: 240-151953.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: Michigan	Page: Page 1 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-166413-1
Address: 13715 Rider Trail North,	Due Date Requested: 6/13/2022			Preservation Codes:
City: Earth City	TAT Requested (days):			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)
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			Other:
Email:	WO #:			
Project Name: Kam/Weadock CCR Groundwater Monitoring	Project #: 24024154			
Site:	SSOW#:			

Analysis Requested

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_STD Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
JCW-MW-18001 (240-166413-1)	5/9/22	07:05 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-18004 (240-166413-2)	5/10/22	06:34 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-18005 (240-166413-3)	5/10/22	10:04 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-18006 (240-166413-4)	5/9/22	13:33 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-50 (240-166413-5)	5/9/22	08:00 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-51 (240-166413-6)	5/9/22	09:17 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-52 (240-166413-7)	5/9/22	10:20 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-53 (240-166413-8)	5/9/22	11:09 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-53R (240-166413-9)	5/9/22	14:34 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte & accreditation compliance upon 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 Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing North Central, LLC.

Possible Hazard Identification	***Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)***
Unconfirmed	☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ____ *Months*
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1	[signature]	5-12-22 1446	ETA	FED EX		
2	FED EX			[signature]	MAY 13 2022 0850	GTASD
3						

Custody Seals Intact: ∆ Yes ∆ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
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: 240-151953.2
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: Michigan	Page: Page 2 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-166413-1
Address: 13715 Rider Trail North,	Due Date Requested: 6/13/2022			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Karn/Weadock CCR Groundwater Monitoring	Project #: 24024154			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_STD Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
MW-54R (240-166413-10)	5/9/22	15:15 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-55 (240-166413-11)	5/10/22	08:12 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
OW-57R- OUT (240-166413-12)	5/10/22	11:05 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-01 (240-166413-13)	5/8/22	Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
EB-01 (240-166413-14)	5/10/22	11:35 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte & accreditation compliance upon 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 Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing North Central, LLC.

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: 5-12-22 1446	Company ETA	Received by: FED EX	Date/Time:	Company
Relinquished by: FED EX	Date/Time:	Company	Received by: Dena Worthington	Date/Time: MAY 13 2022 0850	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: 240-166413-1

Login Number: 166413
List Number: 2
Creator: Worthington, Sierra M

List Source: Eurofins St. Louis
List Creation: 05/13/22 11:49 AM

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

eurofins | Environment Testing America

ANALYTICAL REPORT

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Tel: (330)497-9396

Laboratory Job ID: 240-166150-1
Client Project/Site: CCR Background Well

For:
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

Attn: Darby Litz

Authorized for release by:
6/12/2022 7:33:54 PM

Kris Brooks, Project Manager II
(330)966-9790
Kris.Brooks@et.eurofinsus.com

LINKS
Review your project results through my EOL
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.

Table of Contents

Cover Page 1
Table of Contents 2
Definitions/Glossary 3
Case Narrative 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Tracer Carrier Summary 13
QC Sample Results 14
QC Association Summary 16
Lab Chronicle 17
Certification Summary 19
Chain of Custody 20
Receipt Checklists 25

Definitions/Glossary

Client: TRC Environmental Corporation.
Project/Site: CCR Background Well

Job ID: 240-166150-1

Qualifiers

Rad

Qualifier	Qualifier Description
*	RPD of the LCS and LCSD exceeds the control 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: 240-166150-1

Laboratory: Eurofins Canton

Narrative

Job Narrative
240-166150-1

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 St. Louis laboratory.

Receipt
The samples were received on 5/6/2022 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 0.9º C, 1.3º C and 1.4º C.

RAD
Method 903.0: Radium-226 batch 564568
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 (240-166150-1), MW-15008 (240-166150-2), MW-15016 (240-166150-3), MW-15019 (240-166150-4), DUP-04 (240-166150-5), EB-04 (240-166150-6), (LCS 160-564568/1-A), (LCSD 160-564568/2-A) and (MB 160-564568/23-A)

Method 904.0: Radium-228 batch 564569
The RER/DER of the laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) was outside control limits. However the recovery for the LCS/LCSD passed and the RPD was <40% demonstrating acceptable method performance. Original results will be reported. (LCSD 160-564569/2-A)

Method 904.0: Radium-228 batch 564569
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 (240-166150-1), MW-15008 (240-166150-2), MW-15016 (240-166150-3), MW-15019 (240-166150-4), DUP-04 (240-166150-5), EB-04 (240-166150-6), (LCS 160-564569/1-A), (LCSD 160-564569/2-A) and (MB 160-564569/23-A)

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: CCR Background Well

Job ID: 240-166150-1

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 St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: TRC Environmental Corporation.
Project/Site: CCR Background Well

Job ID: 240-166150-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-166150-1	MW-15002	Water	05/02/22 17:24	05/06/22 08:00
240-166150-2	MW-15008	Water	05/02/22 13:45	05/06/22 08:00
240-166150-3	MW-15016	Water	05/03/22 08:37	05/06/22 08:00
240-166150-4	MW-15019	Water	05/02/22 15:20	05/06/22 08:00
240-166150-5	DUP-04	Water	05/02/22 00:00	05/06/22 08:00
240-166150-6	EB-04	Water	05/02/22 13:45	05/06/22 08:00

Client: TRC Environmental Corporation.
Project/Site: CCR Background Well

Job ID: 240-166150-1

Client Sample ID: MW-15002

Date Collected: 05/02/22 17:24
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-1

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	1.37		0.522	0.536	1.00	0.574	pCi/L	05/10/22 09:51	06/07/22 18:11	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.3*		*40 - 110*	*05/10/22 09:51*	*06/07/22 18:11*	*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	3.30	*	0.757	0.816	1.00	0.785	pCi/L	05/10/22 10:04	06/07/22 15:33	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*82.3*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*1*
Y Carrier	*86.7*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*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	4.68		0.920	0.976	5.00	0.785	pCi/L		06/08/22 13:03	1

Client Sample ID: MW-15008

Date Collected: 05/02/22 13:45
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-2

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	0.317	U	0.294	0.295	1.00	0.447	pCi/L	05/10/22 09:51	06/07/22 18:35	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.8*		*40 - 110*	*05/10/22 09:51*	*06/07/22 18:35*	*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	0.509	U *	0.388	0.391	1.00	0.588	pCi/L	05/10/22 10:04	06/07/22 15:33	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.8*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*1*
Y Carrier	*86.4*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*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	**0.826**		0.487	0.490	5.00	0.588	pCi/L		06/08/22 13:03	1

Client Sample ID: MW-15016

Date Collected: 05/03/22 08:37
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-3

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	0.0815	U	0.195	0.195	1.00	0.368	pCi/L	05/10/22 09:51	06/07/22 18:11	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.0*		*40 - 110*	*05/10/22 09:51*	*06/07/22 18:11*	*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	0.542	U *	0.403	0.406	1.00	0.611	pCi/L	05/10/22 10:04	06/07/22 15:33	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*93.0*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*1*
Y Carrier	*84.5*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*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	**0.624**		0.448	0.450	5.00	0.611	pCi/L		06/08/22 13:03	1

Client: TRC Environmental Corporation.
Project/Site: CCR Background Well

Job ID: 240-166150-1

Client Sample ID: MW-15019

Date Collected: 05/02/22 15:20
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-4

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	0.278	U	0.349	0.350	1.00	0.579	pCi/L	05/10/22 09:51	06/07/22 18:05	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.8*		*40 - 110*	*05/10/22 09:51*	*06/07/22 18:05*	*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	**1.83**	*	0.601	0.625	1.00	0.742	pCi/L	05/10/22 10:04	06/07/22 15:33	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.8*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*1*
Y Carrier	*86.7*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:33*	*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	**2.11**		0.695	0.716	5.00	0.742	pCi/L		06/08/22 13:03	1

Client Sample ID: DUP-04

Date Collected: 05/02/22 00:00
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-5

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	0.650		0.422	0.426	1.00	0.599	pCi/L	05/10/22 09:51	06/07/22 18:05	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*40 - 110*	*05/10/22 09:51*	*06/07/22 18:05*	*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	0.938	*	0.482	0.490	1.00	0.675	pCi/L	05/10/22 10:04	06/07/22 15:34	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*88.3*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:34*	*1*
Y Carrier	*89.0*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:34*	*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	1.59		0.641	0.649	5.00	0.675	pCi/L		06/08/22 13:03	1

Client Sample ID: EB-04

Date Collected: 05/02/22 13:45
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-6

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	-0.0315	U	0.209	0.209	1.00	0.466	pCi/L	05/10/22 09:51	06/07/22 18:05	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*57.6*		*40 - 110*	*05/10/22 09:51*	*06/07/22 18:05*	*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	0.292	U *	0.488	0.488	1.00	0.832	pCi/L	05/10/22 10:04	06/07/22 15:35	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*57.6*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:35*	*1*
Y Carrier	*87.9*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:35*	*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	0.260	U	0.531	0.531	5.00	0.832	pCi/L		06/08/22 13:03	1

Tracer/Carrier Summary

Client: TRC Environmental Corporation.
Project/Site: CCR Background Well

Job ID: 240-166150-1

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)
		Ba
Lab Sample ID	Client Sample ID	(40-110)
240-166150-1	MW-15002	82.3
240-166150-2	MW-15008	89.8
240-166150-3	MW-15016	93.0
240-166150-4	MW-15019	89.8
240-166150-5	DUP-04	88.3
240-166150-6	EB-04	57.6
LCS 160-564568/1-A	Lab Control Sample	94.3
LCSD 160-564568/2-A	Lab Control Sample Dup	82.3
MB 160-564568/23-A	Method Blank	99.3

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
		Ba	Y
Lab Sample ID	Client Sample ID	(40-110)	(40-110)
240-166150-1	MW-15002	82.3	86.7
240-166150-2	MW-15008	89.8	86.4
240-166150-3	MW-15016	93.0	84.5
240-166150-4	MW-15019	89.8	86.7
240-166150-5	DUP-04	88.3	89.0
240-166150-6	EB-04	57.6	87.9
LCS 160-564569/1-A	Lab Control Sample	94.3	84.9
LCSD 160-564569/2-A	Lab Control Sample Dup	82.3	84.5
MB 160-564569/23-A	Method Blank	99.3	91.2

Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-564568/23-A
Matrix: Water
Analysis Batch: 569008

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 564568

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.002143	U	0.135	0.135	1.00	0.285	pCi/L	05/10/22 09:51	06/07/22 20:02	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.3*		*40 - 110*	*05/10/22 09:51*	*06/07/22 20:02*	*1*

Lab Sample ID: LCS 160-564568/1-A
Matrix: Water
Analysis Batch: 568823

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 564568

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	9.625		1.28	1.00	0.274	pCi/L	85	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*94.3*		*40 - 110*

Lab Sample ID: LCSD 160-564568/2-A
Matrix: Water
Analysis Batch: 568823

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 564568

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RER	RER Limit
Radium-226			11.3	9.709		1.34	1.00	0.405	pCi/L	86	75 - 125	0.03	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*82.3*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-564569/23-A
Matrix: Water
Analysis Batch: 568850

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 564569

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.03881	U	0.215	0.215	1.00	0.396	pCi/L	05/10/22 10:04	06/07/22 15:38	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.3*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:38*	*1*
Y Carrier	*91.2*		*40 - 110*	*05/10/22 10:04*	*06/07/22 15:38*	*1*

Method: 904.0 - Radium-228 (GFPC) (Continued)

Lab Sample ID: LCS 160-564569/1-A
Matrix: Water
Analysis Batch: 569007

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 564569

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			8.55	6.624		1.00	1.00	0.571	pCi/L	77	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*94.3*		*40 - 110*
Y Carrier	*84.9*		*40 - 110*

Lab Sample ID: LCSD 160-564569/2-A
Matrix: Water
Analysis Batch: 569007

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 564569

Analyte			Spike Added	LCSD Result	LCSD Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits	RER	RER Limit
Radium-228			8.55	9.176	*	1.28	1.00	0.579	pCi/L	107	75 - 125	1.12	1

Carrier	*LCSD %Yield*	*LCSD Qualifier*	*Limits*
Ba Carrier	*82.3*		*40 - 110*
Y Carrier	*84.5*		*40 - 110*

QC Association Summary

Client: TRC Environmental Corporation.
Project/Site: CCR Background Well

Job ID: 240-166150-1

Rad

Prep Batch: 564568

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-166150-1	MW-15002	Total/NA	Water	PrecSep STD	
240-166150-2	MW-15008	Total/NA	Water	PrecSep STD	
240-166150-3	MW-15016	Total/NA	Water	PrecSep STD	
240-166150-4	MW-15019	Total/NA	Water	PrecSep STD	
240-166150-5	DUP-04	Total/NA	Water	PrecSep STD	
240-166150-6	EB-04	Total/NA	Water	PrecSep STD	
MB 160-564568/23-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-564568/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
LCSD 160-564568/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	

Prep Batch: 564569

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-166150-1	MW-15002	Total/NA	Water	PrecSep_0	
240-166150-2	MW-15008	Total/NA	Water	PrecSep_0	
240-166150-3	MW-15016	Total/NA	Water	PrecSep_0	
240-166150-4	MW-15019	Total/NA	Water	PrecSep_0	
240-166150-5	DUP-04	Total/NA	Water	PrecSep_0	
240-166150-6	EB-04	Total/NA	Water	PrecSep_0	
MB 160-564569/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-564569/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-564569/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: TRC Environmental Corporation.
Project/Site: CCR Background Well

Job ID: 240-166150-1

Client Sample ID: MW-15002
Date Collected: 05/02/22 17:24
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			564568	05/10/22 09:51	LPS	TAL SL
Total/NA	Analysis	903.0		1	568823	06/07/22 18:11	FLC	TAL SL
Total/NA	Prep	PrecSep_0			564569	05/10/22 10:04	LPS	TAL SL
Total/NA	Analysis	904.0		1	568823	06/07/22 15:33	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	569042	06/08/22 13:03	SCB	TAL SL

Client Sample ID: MW-15008
Date Collected: 05/02/22 13:45
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			564568	05/10/22 09:51	LPS	TAL SL
Total/NA	Analysis	903.0		1	568823	06/07/22 18:35	FLC	TAL SL
Total/NA	Prep	PrecSep_0			564569	05/10/22 10:04	LPS	TAL SL
Total/NA	Analysis	904.0		1	568823	06/07/22 15:33	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	569042	06/08/22 13:03	SCB	TAL SL

Client Sample ID: MW-15016
Date Collected: 05/03/22 08:37
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			564568	05/10/22 09:51	LPS	TAL SL
Total/NA	Analysis	903.0		1	568823	06/07/22 18:11	FLC	TAL SL
Total/NA	Prep	PrecSep_0			564569	05/10/22 10:04	LPS	TAL SL
Total/NA	Analysis	904.0		1	568823	06/07/22 15:33	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	569042	06/08/22 13:03	SCB	TAL SL

Client Sample ID: MW-15019
Date Collected: 05/02/22 15:20
Date Received: 05/06/22 08:00

Lab Sample ID: 240-166150-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			564568	05/10/22 09:51	LPS	TAL SL
Total/NA	Analysis	903.0		1	569008	06/07/22 18:05	FLC	TAL SL
Total/NA	Prep	PrecSep_0			564569	05/10/22 10:04	LPS	TAL SL
Total/NA	Analysis	904.0		1	568823	06/07/22 15:33	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	569042	06/08/22 13:03	SCB	TAL SL

Lab Chronicle

Client: TRC Environmental Corporation.
Project/Site: CCR Background Well

Job ID: 240-166150-1

Client Sample ID: DUP-04

Lab Sample ID: 240-166150-5

Date Collected: 05/02/22 00:00

Matrix: Water

Date Received: 05/06/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			564568	05/10/22 09:51	LPS	TAL SL
Total/NA	Analysis	903.0		1	569008	06/07/22 18:05	FLC	TAL SL
Total/NA	Prep	PrecSep_0			564569	05/10/22 10:04	LPS	TAL SL
Total/NA	Analysis	904.0		1	568823	06/07/22 15:34	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	569042	06/08/22 13:03	SCB	TAL SL

Client Sample ID: EB-04

Lab Sample ID: 240-166150-6

Date Collected: 05/02/22 13:45

Matrix: Water

Date Received: 05/06/22 08:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	PrecSep STD			564568	05/10/22 09:51	LPS	TAL SL
Total/NA	Analysis	903.0		1	569008	06/07/22 18:05	FLC	TAL SL
Total/NA	Prep	PrecSep_0			564569	05/10/22 10:04	LPS	TAL SL
Total/NA	Analysis	904.0		1	568835	06/07/22 15:35	FLC	TAL SL
Total/NA	Analysis	Ra226_Ra228		1	569042	06/08/22 13:03	SCB	TAL SL

Laboratory References:

TAL SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: TRC Environmental Corporation. Job ID: 240-166150-1
Project/Site: CCR Background Well

Laboratory: Eurofins St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-06-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-22
California	Los Angeles County Sanitation Districts	10259	06-30-22
California	State	2886	07-01-22
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	12-31-22
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-22
Louisiana	NELAP	04080	06-30-22
Louisiana (DW)	State	LA011	12-31-22
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	04-01-23
North Dakota	State	R-207	06-30-22
NRC	NRC	24-24817-01	12-31-22
Oklahoma	NELAP	9997	08-31-22
Oregon	NELAP	4157	09-01-22
Pennsylvania	NELAP	68-00540	02-28-23
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

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

MICHIGAN 190

eurofins | Environment Testing America

Client Information	Sampler: Henry Schmidt	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-94785-33282.1
Client Contact: Jacob Krenz	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin:	Page: Page 1 of 1
Company: TRC Environmental Corporation.	PWSID:			Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: Δ Yes Δ No			
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: TBD			
Email: JKrenz@trccompanies.com	WO #:			
Project Name: Karn/Weadock CCR Background Well	Project #: 24024154			
Site:	SSOW#:			

Analysis Requested

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2O3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - pH 4-5
L - EDA	Z - other (specify)

Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, Ra226Ra228_GFPC	904.0 - Standard Target List	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	D		
MW-15002	5/2/22	1724	G	Water	N	N	X	X		
MW-15008	5/2/22	1345	G	Water	N	N	X	X		
MW-15016	5/3/22	837	G	Water	N	N	X	X		
MW-15019	5/2/22	1520	G	Water	N	N	X	X		
DUP-04	5/2/22	—	G	Water	N	N	X	X		
EB-04	5/2/22	1045	G	Water	N	N	X	X		
				Water						

240-166150 Chain of Custody

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time	Company	Received by	Date/Time	Company
1	Henry Schmidt	5/3/22/1600	TRC		5-3-22/1600	TRC
2		5-5-22/1330	TRC		5/5/22 1330	FEDEX
3		5/5/22 1335	FEDEX		5-6-22 0800	EEDNC

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

6/12/2022

Eurofins TestAmerica Canton Sample Receipt Form/Narrative Login # : 166150
Canton Facility

Client TRC Site Name

Cooler Received on 5-6-22 Opened on 5-6-22

Cooler unpacked by: TME

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-13 (CF 0.0 °C) Observed Cooler Temp._____°C Corrected Cooler Temp._____°C
   IR GUN #IR-15 (CF -0.7°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 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)? (Y)
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:

Containers for DUP-04 and EB-04 are labeled as DUP-Background and EB-Background. Dates and times match COC. Samples are logged per the COC. TME 5-6-22

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 # : 166150

Eurofins - 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-13 IR-15	1.3	1.3	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15	1.4	1.4	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15	0.9	0.9	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 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	240-166150-A-1	Plastic 1 liter - Nitric Acid	<2			
MW-15002	240-166150-B-1	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-166150-A-2	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-166150-B-2	Plastic 1 liter - Nitric Acid	<2			
MW-15016	240-166150-A-3	Plastic 1 liter - Nitric Acid	<2			
MW-15016	240-166150-B-3	Plastic 1 liter - Nitric Acid	<2			
MW-15019	240-166150-A-4	Plastic 1 liter - Nitric Acid	<2			
MW-15019	240-166150-B-4	Plastic 1 liter - Nitric Acid	<2			
DUP-04	240-166150-A-5	Plastic 1 liter - Nitric Acid	<2			
DUP-04	240-166150-B-5	Plastic 1 liter - Nitric Acid	<2			
EB-04	240-166150-A-6	Plastic 1 liter - Nitric Acid	<2			
EB-04	240-166150-B-6	Plastic 1 liter - Nitric Acid	<2			

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
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: 240-151693.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: Michigan	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-166150-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 6/7/2022			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: 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 - Client ID (Lab ID)	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0/PrecSep_STD Standard Target List	904.0/PrecSep_0 Standard Target List	Ra226Ra228_GFPC	Total Number of containers	Special Instructions/Note:
			Preservation Code:								
MW-15002 (240-166150-1)	5/2/22	17:24 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15008 (240-166150-2)	5/2/22	13:45 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15016 (240-166150-3)	5/3/22	08:37 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15019 (240-166150-4)	5/2/22	15:20 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-04 (240-166150-5)	5/2/22	Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
EB-04 (240-166150-6)	5/2/22	13:45 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte & accreditation compliance upon 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 Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing North Central, LLC.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
	5-6-22 1428	ETA	FED EX		
Relinquished by: FED EX	Date/Time:	Company	Received by: Dina Worthington	Date/Time: MAY 0 9 2022 0835	Company ETASL
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: 240-166150-1
SDG Number:

Login Number: 166150
List Number: 2
Creator: Worthington, Sierra M

List Source: Eurofins St. Louis
List Creation: 05/09/22 02:40 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.	False	

Appendix F
Field Records

TRC

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance
PROJECT NUMBER:	464096.0000.0000
PROJECT MANAGER:	Darby Litz
SITE LOCATION:	2742 Weadock Hwy Essexville, MI 48732
DATES OF FIELDWORK:	5/9/22 TO 5/10/22
PURPOSE OF FIELDWORK:	First Quarter 2022 HMP Sampling and Supplemental CCR sampling
WORK PERFORMED BY:	Javier Jasso

SIGNED 5/11/22 DATE

CHECKED BY 5-18-22 DATE

TRC

GENERAL NOTES

PROJECT NAME: CEC Weadock LF: 2022 GW Com	DATE: 5/12/22	TIME ARRIVED: 0600
PROJECT NUMBER: 464096.0000.0000	AUTHOR: Javier Jasso	TIME LEFT: 0630

WEATHER		
TEMPERATURE: 47 °F	WIND: 10 MPH	VISIBILITY: Clear

WORK / SAMPLING PERFORMED
Walkover

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN

COMMUNICATION		
NAME	REPRESENTING	SUBJECT / COMMENTS

INVESTIGATION DERIVED WASTE SUMMARY		
WASTE MATRIX	QUANTITY	COMMENTS

5/12/22
SIGNED DATE

5-18-22
CHECKED BY DATE

TRC

GENERAL NOTES

PROJECT NAME:	CEC Weadock LF: 2022 GW Com	DATE: 5/9/22	TIME ARRIVED: 0800
PROJECT NUMBER:	464096.0000.0000	AUTHOR: Javier Jasso	TIME LEFT: 1430

WEATHER		
TEMPERATURE: 45 °F	WIND: 10 MPH	VISIBILITY Overcast

WORK / SAMPLING PERFORMED

Wells Sampled: MW-18001, MS, MSD, 50, Dup #01, 51, 52, 53, OW-53, 58, 18004, Dup #2, 53R, 54R, OW54

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS

SIGNED 5/11/22 DATE

CHECKED BY 5-18-22 DATE

TRC

GENERAL NOTES

PROJECT NAME:	CEC Weadock LF: 2022 GW Com	DATE: 5/10/22	TIME ARRIVED: 0552
PROJECT NUMBER:	464096.0000.0000	AUTHOR: Javier Jasso	TIME LEFT: 1155

WEATHER		
TEMPERATURE: 60 °F	WIND: 20 MPH	VISIBILITY: overcast

WORK / SAMPLING PERFORMED

JCW-MW-18004, OW-18004, 55, OW 55, 18005, OW-57 Rout
F.B @ E.B. 01

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS

SIGNED 5/11/22 DATE

CHECKED BY 5-18-22 DATE

TRC

EQUIPMENT SUMMARY

PROJECT NAME:	CEC Weadock LF: 2022 GW Co	SAMPLER NAME:	Javier Jasso
PROJECT NO.:	464096.0000.0000		

WATER LEVEL MEASUREMENTS COLLECTED WITH:

NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)
HERON DIPPER-T	TRC A2

PRODUCT LEVEL MEASUREMENTS COLLECTED WITH:

NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)
NA	NA

DEPTH TO BOTTOM OF WELL MEASUREMENTS COLLECTED WITH:

NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)
HERON DIPPER-T	TRC A2

PURGING METHOD

NAME AND MODEL OF PUMP OR TYPE OF BAILER	SERIAL NUMBER (IF APPLICABLE)
PERISTALTIC PUMP	TRC A2

SAMPLING METHOD

NAME AND MODEL OF PUMP OR TYPE OF BAILER	SERIAL NUMBER (IF APPLICABLE)
PERISTALTIC PUMP	TRC A2
GEOTECH DISPOSABLE FILTER	0.45 MICRON
NAME AND MODEL OF FILTERATION DEVICE	FILTER TYPE AND SIZE
DEDICATED POLY TUBING	☑ LOW-FLOW SAMPLING EVENT
TUBING TYPE	

PURGE WATER DISPOSAL METHOD

☑ GROUND ☐ DRUM ☐ POTW ☐ POLYTANK ☐ OTHER _____

DECONTAMINATION AND FIELD BLANK WATER SOURCE

POTABLE WATER SOURCE	DI WATER SOURCE
STORE BOUGHT	LABORATORY PROVIDED
SIGNED 5/18/22 DATE	CHECKED BY 5-18-22 DATE

REVISED 04/2019

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	MODEL: YSI Pro DSS	SAMPLER: JJ
PROJECT NO.:	464096.0000.0000	SERIAL #: TRC A2	DATE: 5/9/22

PH CALIBRATION CHECK

pH 7 (LOT #): 26A 918 (EXP. DATE): 1/24 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 26B003 (EXP. DATE): 2/24 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
7.00 / 7.00	4.02 / 4.00	☒ WITHIN RANGE	0615
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 26A 393 (EXP. DATE): 1/23 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1413 / 1413	N A	☐ WITHIN RANGE	0615
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 26100577 (EXP. DATE): 7/24 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
223 / 223	18.0	☒ WITHIN RANGE	0615
/		☐ 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.	☒ WITHIN RANGE	0615
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): LA Motte (EXP. DATE): POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
0 / 0	/	☒ WITHIN RANGE	0611
10 / 10	/	☒ WITHIN RANGE	0611
/	/	☐ 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
DO not working	

SIGNED [signature] 5/11/22 DATE

CHECKED BY [signature] 5-18-22 DATE

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	DATE: 5/10/22 | 5/9/22
PROJECT NUMBER:	464096.0000.0000	AUTHOR: Javier Jasso

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
JCW-MW-18001	0626	TOC	16.78	23.71	NA	NM
JCW-MW-18004	0706	TOC	12.28	14.72	NA	NM
JCW-MW-18005	0721	TOC	8.33	16.78	NA	NM
JCW-MW-18006	0708	TOC	12.91	23.68	NA	NM
JCW-OW-18001	0627	TOC	17.08	20.15	NA	NM
JCW-OW-18002	0634	TOC	10.94	19.41	NA	NM
JCW-OW-18003	0646	TOC	8.51	18.63	NA	NM
JCW-OW-18004	0707	TOC	6.27	14.85	NA	NM
JCW-OW-18006	0743	TOC	9.20	23.47	NA	NM
LH-103 R	0655	TOC	23.58	33.41	NA	NM
LH-104	0713	TOC	7.48	1400	NA	NM
MW-20	0724	TOC	6.53	14.00	NA	NM
MW-50	0633	TOC	13.49	18.18	NA	NM
MW-51	0639	TOC	14.33	20.00	NA	NM
MW-52	0641	TOC	14.13	19.74	NA	NM
MW-53	0651	TOC	13.72	18.18	NA	NM
MW-53R	0656	TOC	14.23	18.80	NA	NM
MW-54R	0701	TOC	1380	17.33	NA	NM
MW-55	0717	TOC	14.00	1636	NA	NM
MW-58	0629	TOC	5.36	16.28	NA	NM
OW-51	0640	TOC	10.08	17.30	NA	NM
OW-53	0652	TOC	7.56	1800	NA	NM
OW-54	0702	TOC	6.81	16.46	NA	NM
OW-55	0710	TOC	6.10	1847	NA	NM
OW-56R	0737	TOC	5.95	Dum	NA	NM

ALL WATER LEVELS MUST INCLUDE REFERENCE POINT AND TAPE CORRECTION FACTOR (E.G., 1.1 + 0.00 T/PVC).

SIGNED 5/11/22 DATE

CHECKED 5-18-22 DATE

REVISED 04/2019

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	DATE: 5/2/22	
PROJECT NUMBER:	464096.0000.0000	AUTHOR:	Javier Jasso

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
OW-57 IN	0730	TOC	6.25	19.60	NA	NM
OW-57R IN	0721	TOC	6.08	20.18	NA	NM
OW-57 OUT	0732	TOC	10.18	19.48	NA	NM
OW-57R OUT	0733	TOC	10.18	20.30	NA	NM
OW-61	0748	TOC	9.66	DNM	NA	NM
OW-63	0800	TOC	could not locate		NA	NM
JCW-15029	0648		[illegible]	~~1300~~		
JCW-15026	0658		14.58	~~DNM~~		
MW-16R	0703		14.10	DNM		
JCW MW15021	0716		15.30	DNM		
OW-56	0728		5.98	DNM		
MW-19	0808		8.61	DNM		
MW-15020	0826		5.06	DNM		
MW-116B	0830		4.61	DNM		
MW-15024	0833		5.80	DNM		

ALL WATER LEVELS MUST INCLUDE REFERENCE POINT AND TAPE CORRECTION FACTOR
(E.G., 1.1 + 0.00 T/PVC).

SIGNED 5/11/22 DATE

CHECKED [signature] 5-18-22 DATE

REVISED 04/2019

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 5/11/22	BY: JK	DATE: 5-18-22

SAMPLE ID: JCW-MW-18C20 1 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 0630	DATE: 5/9/22	SAMPLE	TIME: 0705	DATE: 5/9/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.91 SU	CONDUCTIVITY: 2600 umhos/cm	
			ORP: -16.0 mV	DO: NM mg/L	
DEPTH TO WATER: 16.76 T/ PVC			TURBIDITY: 5.0 NTU		
DEPTH TO BOTTOM: 23.75 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 11.0 °C	OTHER:	
VOLUME REMOVED: 7 ☑ 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: Do not working		

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)
0630	200	6.00	3043	103.6	NM	43.0	11.0	16.66	INITIAL
0631		6.79	3031	4.1		19.3	11.3	16.67	1
0644		6.86	3031	0.3		23.0	11.3	16.67	2
0649		6.87	2978	-0.7		5.60	11.1	16.67	3
0654		6.91	2798	-1.9		5.45	11.0	16.67	4
0659		6.91	2600	-15.5		5.15	10.9	16.67	5
0704		6.95	2600	-13.7		5.00	11.0	16.67	6
0705		6.94	2600	-16.0		5.00	11.0	16.67	7

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
6	125	g/ASS	A	☐ Y ☑ N					☐ Y ☐ N
3	125	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☐ N					☐ Y ☐ N
3	125	PL	B	☐ Y ☑ N					☐ Y ☐ N
2	1L	PL	B	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	5/11/22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	5/11/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 5/10/22	BY: JK	DATE: 5-18-22

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: 0740	DATE: 5/9/22	SAMPLE	TIME: 0805	DATE: 5/9/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.19 SU	CONDUCTIVITY: 1483 umhos/cm	
			ORP: -20.0 mV	DO: NM mg/L	
DEPTH TO WATER: 13.49 T/ PVC			TURBIDITY: 2.70 NTU		
DEPTH TO BOTTOM: 16.12 T/ PVC			☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 9.7 °C	OTHER:	
VOLUME REMOVED: 5 ☒ LITERS ☐ GALLONS			COLOR: clear	ODOR: none	
COLOR: clear	ODOR none		FILTRATE (0.45 um) ☐ YES ☒ NO		
TURBIDITY			FILTRATE COLOR:	FILTRATE ODOR:	
☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD	☒ DUP- #01	
DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER			COMMENTS: DO not working		

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	7.62	836	56.2	NM	11.0	9.7	13.37	INITIAL
0745		7.20	1555	58.6		6.60	9.6	1331	1
0750		7.20	1531	30.8		3.0	9.6	1331	2
0755		7.20	1498	-19.2		3.0	9.6	1331	3
0800		7.20	1491	-19.8		2.90	9.7	1331	4
0805		7.19	1483	-20.0		2.70	9.7	1331	5
~~0810~~								~~1331~~	~~6~~
~~0815~~								~~1331~~	~~7~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
3	1L	AG1	A	☐ Y ☒ N					☐ Y ☐ N
2	250	P1	A	☐ Y ☒ N					☐ Y ☐ N
2	1L	P1	A	☐ Y ☒ N					☐ Y ☐ N
2	1L	P1	B	☐ Y ☒ N					☐ Y ☐ N
4	1L	P1	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Lab Dropoff	DATE SHIPPED:	5/11/22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	5/11/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 5/4/22	BY: JK	DATE: 5-18-22

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: 5/9/22	SAMPLE	TIME: 0917	DATE: 5/9/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.23 SU	CONDUCTIVITY: 2076 umhos/cm	
			ORP: -29.5 mV	DO: NM mg/L	
DEPTH TO WATER: 14.33 T/ PVC			TURBIDITY: 2.71 NTU		
DEPTH TO BOTTOM: 20.46 T/ PVC			☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 9.C °C	OTHER:	
VOLUME REMOVED: 5 to ☐ LITERS ☐ GALLONS			COLOR: clear	ODOR: none	
COLOR: cloudy	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: DO. not working		

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	7.51	903 1	107.1	NM	33	11.1	14.46	INITIAL
0897		7.24	1974	87.3		12.C	9C	1403	1
0903		7.24	2026	13.C		3.50	8.9	1403	2
0907		7.24	2053	-28.1		3.15	8.9	1403	3
0912		7.24	2065	-29.0		3.0	9.0	1403	4
0917		7.23	2076	-29.5		2.71	9.0	1403	5
								~~1403~~	~~6~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PLA	B	☐ Y ☒ N					☐ Y ☐ N
2	1L	P1	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	5/11/22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	5/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 5/11/22	BY: JK	DATE: 5-18-22

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: 0950	DATE: 5/9/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 14.13 T/ PVC

DEPTH TO BOTTOM: 19.79 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 6 ☑ LITERS ☐ GALLONS

COLOR: Clear ODOR: none

TURBIDITY ☐ NONE ☑ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1020	DATE: 5/9/22

PH: 6.91 SU CONDUCTIVITY: 2000 umhos/cm

ORP: -80 mV DO: NM mg/L

TURBIDITY: 2.75 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 10.5 °C OTHER:

COLOR: clear ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS: DO not working

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	200	7.51	934	93.4	NM	16.0	14.4	14.68	INITIAL
0955		6.99	1967	30.8		3.80	10.5	14.80	1
1000		6.96	1991	10.5		3.50	10.1	14.80	2
1005		6.96	1988	-7.5		3.15	10.5	14.80	3
1010		6.95	1990	-7.8		3.00	10.6	14.80	4
1015		6.95	2000	-7.9		2.85	10.5	14.80	5
1020		6.91	2000	-8.0		2.75	10.5	14.80	6

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	g/nss	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	B	☐ Y ☒ N					☐ Y ☐ N
2	1L	P1	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Lab Drop off	DATE SHIPPED:	5/11/22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	5/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED			CHECKED		
PROJECT NUMBER:	464096.0000.0000	BY:	JJ	DATE: 5/4/22	BY: JK	DATE: 5-18-22	

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: 1049	DATE: 5/9/22	SAMPLE	TIME: 1109	DATE: 5/9/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 13.72 T/ PVC

DEPTH TO BOTTOM: 18.18 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 4 ☒ LITERS ☐ GALLONS

COLOR: Clear ODOR: none

TURBIDITY ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

PH: 7.31 SU CONDUCTIVITY: 1382 umhos/cm

ORP: -49.0 mV DO: NM mg/L

TURBIDITY: 3.75 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 10.1 °C OTHER:

COLOR: Clear ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS: DO not working

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)
1049	200	7.61	1438	93.6	NM	5.0	14.6	13.91	INITIAL
1054		7.43	1396	86.6		4.75	10.4	13.76	1
1059		7.30	1382	-48.0		4.15	10.1	13.70	2
1104		7.36	1374	-48.5		3.85	10.2	13.76	3
1109		7.31	1382	-49.0		3.75	10.1	13.72	4

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☒ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	B	☐ Y ☒ N					☐ Y ☐ N
2	1L	PL	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	5/10/22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	5/10/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 5/11/22	BY: JK	DATE: 5-18-22

SAMPLE ID: OW-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: 1133	DATE: 5/9/22	SAMPLE	TIME: 1213	DATE: 5/9/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 7.20 SU	CONDUCTIVITY: 1371 umhos/cm	
DEPTH TO WATER: 7.58 T/ PVC			ORP: -76.1 mV	DO: NM mg/L	
DEPTH TO BOTTOM: 19.00 T/ PVC			TURBIDITY: 9.85 NTU		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
VOLUME REMOVED: 8 ☒ LITERS ☐ GALLONS			TEMPERATURE: 11.1 °C	OTHER:	
COLOR: BROWNISH	ODOR: NON		COLOR: CLEAR	ODOR: NONE	
TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☒ VERY			FILTRATE (0.45 um) ☐ YES ☒ NO		
			FILTRATE COLOR:	FILTRATE ODOR:	
			QC SAMPLE: ☐ MS/MSD ☐ DUP-		
DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER			COMMENTS: DO not working		

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)
1133	200	7.71	1631	20.1	NM	3775	18.9	7.49	INITIAL
1138		7.31	1365	-63.0		2357	11.6	7.80	1.0
1143		7.31	1363	-66.5		1271	11.1	7.86	2.0
1148		7.30	1363	-70.0		50	10.9	7.86	3.0
1153		7.28	1362	-75.0		24.0	11.0	7.86	4.0
1158		7.28	1359	-75.5		19.0	11.1	7.86	5.0
1203		7.28	1364	-75.8		10.0	11.1	7.80	6
1208		7.28	1364	-76.0		10.0	11.1	7.81	7
1213		7.28	1371	-76.1	↓	9.85	11.1	7.82	8

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glAbi	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: Lab Drop off	DATE SHIPPED: 5/11/22	AIRBILL NUMBER:
COC NUMBER:	SIGNATURE:	DATE SIGNED: 5/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 5/4/22	BY: JK	DATE: 5-18-22

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: 1233	DATE: 5/9/22	SAMPLE	TIME: 1257	DATE: 5/9/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 6.97 SU	CONDUCTIVITY: 1655 umhos/cm	
			ORP: -60.5 mV	DO: NM mg/L	
DEPTH TO WATER: 5.36 T/ PVC			TURBIDITY: 1.15 NTU		
DEPTH TO BOTTOM: 18.38 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 11.8 °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: DO not working		

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)
1232	200	7.34	1696	-52.6	NM	36.6	12.1	5.36	INITIAL
1237		6.99	1765	-55.7		6.0	11.5	5.36	1
1242		6.91	1735	-58.8		2.0	11.2	5.36	2
1247		6.96	1695	-59.8		1.80	11.0	5.36	3
1252		6.97	1665	-60.0		1.55	11.1	5.36	4
1257		6.97	1655	-60.5		1.15	11.2	5.36	5
									~~6~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	GLASS	A	☐ Y ☒ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	N	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	5/4/22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	5/11/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 5/11/22	BY: JK	DATE: 5-18-22

SAMPLE ID: SCW-MW 16006 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1308	DATE: 5/9/22	SAMPLE	TIME: 1333	DATE: 5/9/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 6.97 SU	CONDUCTIVITY: 1363 umhos/cm	
			ORP: -49.0 mV	DO: NM mg/L	
DEPTH TO WATER: ~~13.30~~ 12.96			TURBIDITY: 2.65 NTU		
DEPTH TO BOTTOM: 23.47 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 16.0 °C	OTHER:	
VOLUME REMOVED: 5 ☒ LITERS ☐ GALLONS			COLOR: clear	ODOR: none	
COLOR: clear	ODOR: none		FILTRATE (0.45 um) ☐ YES ☒ NO		
TURBIDITY			FILTRATE COLOR:	FILTRATE ODOR:	
☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY			QC SAMPLE: ☐ MS/MSD ☒ DUP- # 5		
DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER			COMMENTS: no networking		

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)
1308	200	7.20	697	-33.5	NM	13.0	18.4	13.16	INITIAL
1313		6.98	1309	-35.6		4.75	16.6	1325	1
1318		6.97	1318	-38.8		4.00	16.6	1325	2
1323		6.97	1324	-48.8		3.05	15.9	1325	3
1328		6.97	1348	-48.5		2.85	16.6	1325	4
1333		6.97	1363	-49.0		2.65	16.0	1325	5
									~~6~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	125	G/AG	A	☐ Y ☒ N					☐ Y ☐ N
2	~~250~~	P1	A	☐ Y ☒ N					☐ Y ☐ N
2	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
2	125	P1	B	☐ Y ☒ N					☐ Y ☐ N
2	1L	P1	A	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off Courier	DATE SHIPPED:	5/11/22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	5/11/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 5/11/22	BY: JJL	DATE: 5-18-22

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: 1404	DATE: 5/9/22	SAMPLE	TIME: 1434	DATE: 5/9/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 6.88 SU	CONDUCTIVITY: 2000 umhos/cm	
			ORP: 59.7 mV	DO: NM mg/L	
DEPTH TO WATER: 14.23 T/ PVC			TURBIDITY: 4.0 NTU		
DEPTH TO BOTTOM: 18.22 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 10.1 °C	OTHER:	
VOLUME REMOVED: 6 ☒ 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: DO not working		

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)
1404	200	7.09	2147	83.7	NM	1050	12.6	14.15	INITIAL
1409		6.88	2248	94.5		86	10.8	14.36	1
1414		6.88	2213	110.0		21.	10.6	1436	2
1419		6.84	2127	90.0		12	10.6	1436	3
1424		6.88	2050	60.0		6.0	10.1	1436	4
1429		6.88	1995	59.8		4.0	10.1	1430	5
1434		6.88	2000	59.7	↓	4.0	10.1	1436	6

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	G/AG1	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	B	☐ Y ☒ N					☐ Y ☐ N
2	1L	P1	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD: lab Drop off	DATE SHIPPED: 5/11/22	AIRBILL NUMBER:
COC NUMBER:	SIGNATURE:	DATE SIGNED: 5/11/22

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 5/18/22	BY: JK	DATE: 5-18-22

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: 1455	DATE: 5/9/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 13.86 T/ PVC

DEPTH TO BOTTOM: 17.21 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 4 ☐ LITERS ☐ GALLONS

COLOR: Brown ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☒ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1515	DATE: 5/9/22

PH: 6.99 SU CONDUCTIVITY: 1248 umhos/cm

ORP: 46.0 mV DO: NM mg/L

TURBIDITY: 3.75 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 10.5 °C OTHER:

COLOR: Clear ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS: DO not working

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)
1455	200	7.37	635	90.4	NM	90	12.6	1365	INITIAL
1500		7.02	1255	101.5		21	10.7	1383	1
1505		7.00	1264	45.8		4	10.6	1383	2
1510		6.99	1253	45.8		4	10.5	1383	3
1515		6.99	1248	46.0		3.75	10.5	1383	4
~~1520~~								~~1383~~	~~5~~ 6

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☒ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	B	☐ Y ☒ N					☐ Y ☐ N
2	1L	PL	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	5/11/22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	5/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER: 464096.0000.0000	BY: JJ	DATE: 5/11/21	BY: JK	DATE: 5-18-22

SAMPLE ID: OW 54 — WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1535	DATE: 5/9/22	SAMPLE	TIME: 1600	DATE: 5/9/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 6.61 T/ PVC

DEPTH TO BOTTOM: 16.48 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 2.5 ☑ LITERS ☐ GALLONS

COLOR: Brownish ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 7.11 SU — CONDUCTIVITY: 1398 umhos/cm

ORP: -89.0 mV — DO: ~~[illegible]~~ mg/L

TURBIDITY: 9.75 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 11.0 °C — OTHER:

COLOR: Clear — ODOR: none

FILTRATE (0.45 um) ☐ YES ☑ NO

FILTRATE COLOR: — FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS: DO not working

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)
1535	100	7.39	645	-22.7	NM	86	19.9	6.90	INITIAL
1540		7.16	1384	-79.5		61	11.6	7.02	.5
1545		7.13	1389	-85.0		18	11.1	702	1
1550		7.10	1392	-88.7		10	11.0	702	1.5
1555		7.11	1396	-88.9		10	11.0	702	2
1600		7.11	1398	-89.0		9.75	11.0	702	2.5
~~1605~~							~~[illegible]~~		

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - ____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	Glass	A	☐ Y ☑ N					☐ Y ☐ N
1	250	PI	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PI	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PI	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: lab Drop off	DATE SHIPPED: 5/11/22	AIRBILL NUMBER: —
COC NUMBER: —	SIGNATURE: [signature]	DATE SIGNED: 5/11/22

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 5/11/22	BY: JK	DATE: 5-18-22

SAMPLE ID: GW-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: 0614	DATE: 5/10/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER	
DEPTH TO WATER:	12.28 T/ PVC	
DEPTH TO BOTTOM:	14.72 T/ PVC	
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS	
VOLUME REMOVED:	2 ☒ LITERS ☐ GALLONS	
COLOR:	Clear	ODOR: non
TURBIDITY	☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY	
DISPOSAL METHOD:	☒ GROUND ☐ DRUM ☐ OTHER	

SAMPLE	TIME: 0634	DATE: 5/10/22
PH:	6.84 SU	CONDUCTIVITY: 1652 umhos/cm
ORP:	219.5 mV	DO: NM mg/L
TURBIDITY:	1.90 NTU	
☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
TEMPERATURE:	10.0 °C	OTHER:
COLOR:	Clear	ODOR: non
FILTRATE (0.45 um)	☐ YES ☒ NO	
FILTRATE COLOR:		FILTRATE ODOR:
QC SAMPLE:	☐ MS/MSD ☐ DUP-	
COMMENTS:	DO not working	

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)
0614	100	6.00	805	246.0	NM	9.0	14.6	12.24	INITIAL
0619		6.79	1640	218.0		3.0	10.4	12.50	.1
0624		6.83	1632	218.8		2.0	10.1	12.76	1
0629		6.84	1644	219.0		2.0	10.0	12.85	1.1
0634		6.84	1652	219.5	↓	1.90	10.0	12.95	2
~~0639~~									~~2.1~~
									~~3~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	9/ASS	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	B	☐ Y ☒ N					☐ Y ☐ N
2	1L	P1	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	5/11/22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	5/11/22

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 5/11/22	BY: JK	DATE: 5-18-22

SAMPLE ID: JCWMW-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: 5/10/22	SAMPLE	TIME: 0730	DATE: 5/10/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.92 SU	CONDUCTIVITY: 1546 umhos/cm	
			ORP: 213 mV	DO: NM mg/L	
DEPTH TO WATER: 6.27 T/ PVC			TURBIDITY: 2.0 NTU		
DEPTH TO BOTTOM: 14.81 T/ PVC			☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 9.3 °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: DO not working		

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	109	7.13	670	218	NM	4.0	13.2	6.73	INITIAL
0705		6.94	1511	219		3.0	9.6	7.21	.5
0710		6.92	1547	216		2.0	9.4	8.01	1
0715		6.92	1542	213		2.0	9.4	8.66	1.5
0720		6.92	1546	213		2.0	9.3	9.46	2
									~~2.5~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED		PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____							
NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	PNO	A	☐ Y ☒ N					☐ Y ☐ N
1	250	PO	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PO	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PO	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	lab drop off	DATE SHIPPED:	5/11/22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	5/11/22

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED			CHECKED		
PROJECT NUMBER:	464096.0000.0000	BY:	JJ	DATE: 5/10/22	BY: JK	DATE: 5-18-22	

SAMPLE ID: MW 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: 0738	DATE: 5/10/22	SAMPLE	TIME: 0813	DATE: 5/10/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.96 SU	CONDUCTIVITY: 1491 umhos/cm	
			ORP: -65.5 mV	DO: NM mg/L	
DEPTH TO WATER: 14.02 T/ PVC			TURBIDITY: 5.0 NTU		
DEPTH TO BOTTOM: 16.38 T/ PVC			☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 9.7 °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: DO not working		

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)
0736	200	7.20	733	-52.1	NM	91.0	12.3	13.79	INITIAL
0743		7.03	1464	-62.7		60	9.9	13.85	1
0748		6.98	1460	-59.0		28	9.7	13.85	2
0753		6.97	1465	-59.5		19	9.9	13.85	3
0758		6.96	1479	-62.8		9.0	9.8	13.85	4
0803		6.96	1487	-64.8		6.0	9.6	13.85	5
0808		6.96	1494	-65.9		5.0	9.7	13.85	6
0813		6.96	1495	-65.5		5.0	9.7	13.85	7

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED		PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F -							
NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☒ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	B	☐ Y ☒ N					☐ Y ☐ N
2	1L	PL	B	☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: lab Drop off	DATE SHIPPED: 5/11/22	AIRBILL NUMBER:
COC NUMBER:	SIGNATURE:	DATE SIGNED: 5/11/22

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 5/10/22	BY: JK	DATE: 5-18-22

SAMPLE ID: GW-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: 0841	DATE: 5/10/22	SAMPLE	TIME: 0906	DATE: 5/10/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 6.16 T/ PVC

DEPTH TO BOTTOM: 19.47 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 2.5 ☒ LITERS ☐ GALLONS

COLOR: Brownish ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☒ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

PH: 7.27 SU CONDUCTIVITY: 1236 umhos/cm

ORP: -85.0 mV DO: NM mg/L

TURBIDITY: 9.0 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 11.6 °C OTHER:

COLOR: Clear ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS: DO not working

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)
0841	100	7.56	588	-12.9	NM	54	16.6	6.30	INITIAL
0846		7.24	122 T	-77.7		40	11.0	9.18	.5
0851		7.27	123 T	-85.3		16	10.7	7.96	1
0856		7.26	127 T	-85.3		9.0	10.9	8.46	1.5
0901		7.25	1238	-85.1		9.0	11.0	8.85	2
0906		7.27	1236	-85.0		9.0	11.0	9.25	2.5
~~0911~~									~~3~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	g/AG	A	☐ Y ☒ N					☐ Y ☐ N
1	250	p1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	p1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	p1	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Lab Drop off	DATE SHIPPED:	5/11/22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	5/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 5/11/22	BY: JLC	DATE: 5-18-22

SAMPLE ID: JLC-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: 0924	DATE: 5/10/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 8.33 T/ PVC

DEPTH TO BOTTOM: 16.78 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 4 ☒ LITERS ☐ GALLONS

COLOR: orange ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☒ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1004	DATE: 5/10/22

PH: 6.76 SU CONDUCTIVITY: 1811 umhos/cm

ORP: 97.8 mV DO: NM mg/L

TURBIDITY: 10 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: DO not working

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)
0924	100	6.94	1802	14.0	NM	988	14.4	8.32	INITIAL
0929		6.77	1880	59.1		183	12.2	9.15	.5
0934		6.75	1876	76		68	12.7	9.33	1
0939		6.75	1870	89.7		28	12.7	9.46	1.5
0944		6.75	1864	93.0		23	12.6	9.45	2
0949		6.75	1862	97.0		18	12.4	9.58	2.5
0954		6.75	1857	97.0		10	12.9	9.70	3
0959		6.76	1817	97.5		10	12.9	9.55	3.5
1004		6.76	1811	97.8	↓	10	12.8	9.55	4
~~1009~~									~~4.5~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	G/HCl	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	B	☐ Y ☒ N					☐ Y ☐ N
2	1L	P1	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	5/11/22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	5/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 5/11/22	BY: JK	DATE: 5-18-22

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: 1045	DATE: 5/10/22	SAMPLE	TIME: 1105	DATE: 5/10/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 707 SU	CONDUCTIVITY: 1290 umhos/cm	
DEPTH TO WATER: 10.10 T/ PVC			ORP: 100 mV	DO: NM mg/L	
DEPTH TO BOTTOM: 20.16 T/ PVC			TURBIDITY: 3.85 NTU		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
VOLUME REMOVED: 2 ☒ LITERS ☐ GALLONS			TEMPERATURE: 15.9 °C	OTHER:	
COLOR: clear	ODOR: none		COLOR: clear	ODOR: none	
TURBIDITY			FILTRATE (0.45 um) ☐ YES ☒ NO		
☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY			FILTRATE COLOR:	FILTRATE ODOR:	
DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER			QC SAMPLE: ☐ MS/MSD ☐ DUP-		
			COMMENTS: DO not working		

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)
1045	100	7.35	1245	106.5	NM	11.0	21.0	9.54	INITIAL
1050		7.08	1293	102.3		6.	16.0	10.45	.5
1055		707	1293	100		4	15.9	10.75	1
1100		707	1296	99.5		4.	15.8	11.18	1.5
1105		707	1290	100	↓	3.85	15.9	11.58	2
~~1110~~									~~2.5~~
									~~3~~
									~~3.5~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	q/AG	A	☐ Y ☒ N					☐ Y ☐ N
1	250	p1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	p1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	p1	B	☐ Y ☒ N					☐ Y ☐ N
2	1L	p1	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	lab Drop off	DATE SHIPPED:	5/11/22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	5/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 5/11/22	BY: JK	DATE: 5-18-22

SAMPLE ID: GB-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:

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: ____ T/ PVC

DEPTH TO BOTTOM: ____ T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: ____ ☐ LITERS ☐ GALLONS

COLOR: ____ ODOR: ____

TURBIDITY
☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1135	DATE: 5/10/22

PH: NA SU | CONDUCTIVITY: NA umhos/cm

ORP: NA mV | DO: NA mg/L

TURBIDITY: NA NTU

☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: NA °C | OTHER: ____

COLOR: clear | ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: ____ | FILTRATE ODOR: ____

QC SAMPLE: ☐ MS/MSD ☐ DUP- ____

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
									INITIAL

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - ____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	125	P	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P	B	☐ Y ☒ N					☐ Y ☐ N
2	1L	P	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	lab drop off	DATE SHIPPED:	5/11/22	AIRBILL NUMBER:	____
COC NUMBER:	____	SIGNATURE:		DATE SIGNED:	5/11/22

WATER SAMPLE LOG

PROJECT NAME: CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER: 464096.0000.0000	BY: JJ	DATE: 5/11/22	BY: JK	DATE: 5-18-22

SAMPLE ID: FB #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: 1140	DATE: 5/10/22
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: NA ☐ 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.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - ____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	125	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PL	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: lab drop off	DATE SHIPPED: 5/11/22	AIRBILL NUMBER: ____
COC NUMBER: ____	SIGNATURE:	DATE SIGNED: 5/11/22

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Phone: 330-497-9396 Fax: 330-497-0772

Chain of Custody Record

MICHIGAN 190

eurofins | Environment Testing America

Client Information	Sampler: JAVIER JASSE	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-94784-33306.1
Client Contact: Jacob Krenz	Phone: 734 904 3310	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin:	Page: Page 1 of 2
Company: TRC Environmental Corporation.	PWSID:	Analysis Requested		Job #:
Address: 1540 Eisenhower Place	Due Date 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)
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			Other:
Email: JKrenz@trccompanies.com	WO #:			
Project Name: Karn/Weadock CCR JCW Ash Pond	Project #: 24024154			
Site:	SSOW#:			

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, Ra226Ra228_GFPC	904.0 - Standard Target List	Total Number of containers	Special Instructions/Note:
			Preservation Code:							
JCW-MW-18001	5/9/22	0905	G	Water	N	N	X	X	2	
JCW-MW-18004	5/10/22	0834	G	Water	N	N	X	X	2	
JCW-MW-18005	5/10/22	1004	G	Water	N	N	X	X	2	
JCW-MW-18006	5/9/22	1333	G	Water	N	N	X	X	2	
MW-50	5/9/22	0802	G	Water	N	N	X	X	2	
MW-51	5/9/22	0917	G	Water	N	N	X	X	2	
MW-52	5/9/22	1032	G	Water	N	N	X	X	2	
MW-53	5/9/22	1109	G	Water	N	N	X	X	2	
MW-53R	5/9/22	1434	G	Water	N	N	X	X	2	
MW-54R	5/9/22	1515	G	Water	N	N	X	X	2	
MW-55	5/10/22	0813	G	Water	N	N	X	X	2	

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: 5/11/22 830	Company TRC	Received by:	Date/Time: 5/11/22 0830	Company EEA	
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company	
Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company	

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 06/08/2021

Page 28 of 71

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

SAMPLING SITE / CUSTOMER: Q2-2022 Weadock Porewater Wells

PROJECT NUMBER: **22-0441**

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	PRESERVATIVE HNO_3	PRESERVATIVE H_2SO_4	PRESERVATIVE NaOH	PRESERVATIVE HCl	PRESERVATIVE MeOH	PRESERVATIVE Other	Total Metals	Anions	TDS	Alkalinity					REMARKS
22-0441-01	5/9/22	0905	GW	JCW-MW-18001	5	4	1						x	x	x	x					
-02	5/10/22	0634	GW	JCW-MW-18004	5	4	1						x	x	x	x					
-03	5/10/22	1004	GW	JCW-MW-18005	5	4	1						x	x	x	x					
-04	5/9/22	1333	GW	JCW-MW-18006	5	4	1						x	x	x	x					
-05	5/9/22	0800	GW	MW-50	5	4	1						x	x	x	x					
-06	5/9/22	0917	GW	MW-51	5	4	1						x	x	x	x					
-07	5/9/22	1020	GW	MW-52	5	4	1						x	x	x	x					
-08	5/9/22	1109	GW	MW-53	5	4	1						x	x	x	x					
-09	5/9/22	1434	GW	MW-53R	5	4	1						x	x	x	x					
-10	5/9/22	1515	GW	MW-54R	5	4	1						x	x	x	x					
-11	5/10/22	0817	GW	MW-55	5	4	1						x	x	x	x					
-12	5/10/22	1105	GW	OW-57R OUT	5	4	1						x	x	x	x					

RELINQUISHED BY: [signature] DATE/TIME: 5/11/22 0730 RECEIVED BY: [signature]

RELINQUISHED BY: DATE/TIME: RECEIVED BY:

COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015402

Temperature: ~~5.2 - 6.0~~ 4.0 - 5.6 °C Cal. Due Date: 6-3-22

EB 051122

Pg 29 of 31

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

SAMPLING SITE / CUSTOMER: Q2-2022 Weadock Porewater Wells

PROJECT NUMBER: 22-0441

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	PRESERVATIVE HNO_3	PRESERVATIVE H_2SO_4	PRESERVATIVE NaOH	PRESERVATIVE HCl	PRESERVATIVE MeOH	PRESERVATIVE Other	Total Metals	Anions	TDS	Alkalinity					REMARKS
22-0441-13	5/9/22	1257	GW	MW-58	5	4	1						x	x	x	x					
-14	5/9/22	—	GW	DUP-JCW-LF-01	5	4	1						x	x	x	x					
-15	5/9/22	—	GW	DUP-JCW-LF-02	5	4	1						x	x	x	x					
-16	5/9/22	0705	GW	JCW-MW-18001 MS	4	3	1						x	x		x					
-17	5/9/22	0705	GW	JCW-MW-18001 MSD	4	3	1						x	x		x					
-18	5/10/22	1140	W	FB-01	2	1	1						x	x							
-19	5/10/22	1135	W	EB-01	2	1	1						x	x							

RELINQUISHED BY: [signature] DATE/TIME: 5/11/22 0930 RECEIVED BY: [signature]

RELINQUISHED BY: DATE/TIME: RECEIVED BY:

COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015402

Temperature: 4.0-5.6 °C Cal. Due Date: 6-3-22

Pg 30 of 31

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

SAMPLING SITE / CUSTOMER: Q2-2022 Weadock ASD

PROJECT NUMBER: 22-0442

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity					REMARKS
22-0442-01	5/10/22	0730	GW	JCW-MW-18004	5	4	1						x	x	x	x					
-02	5/9/22	1213	GW	OW-53	5	4	1						x	x	x	x					
-03	5/9/22	1602	GW	OW-54	5	4	1						x	x	x	x					
-04	5/10/22	0911	GW	OW-55	5	4	1						x	x	x	x					

RELINQUISHED BY: _____ DATE/TIME: 5/11/22 0932 RECEIVED BY: _____

RELINQUISHED BY: _____ DATE/TIME: _____ RECEIVED BY: _____

COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015402

Temperature: 5.2 - 6.0 °C Cal. Due Date: 6-3-22

Appendix G
Alternate Source Demonstration Supporting Information

Consumers Energy
Count on Us®

A CMS Energy Company

Date: July 25, 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

Signature

July 25, 2022

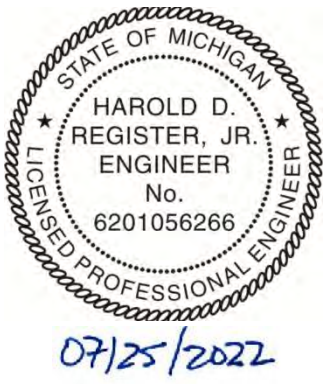
Date of Certification

Harold D. Register, Jr., P.E.

Name

6201056266

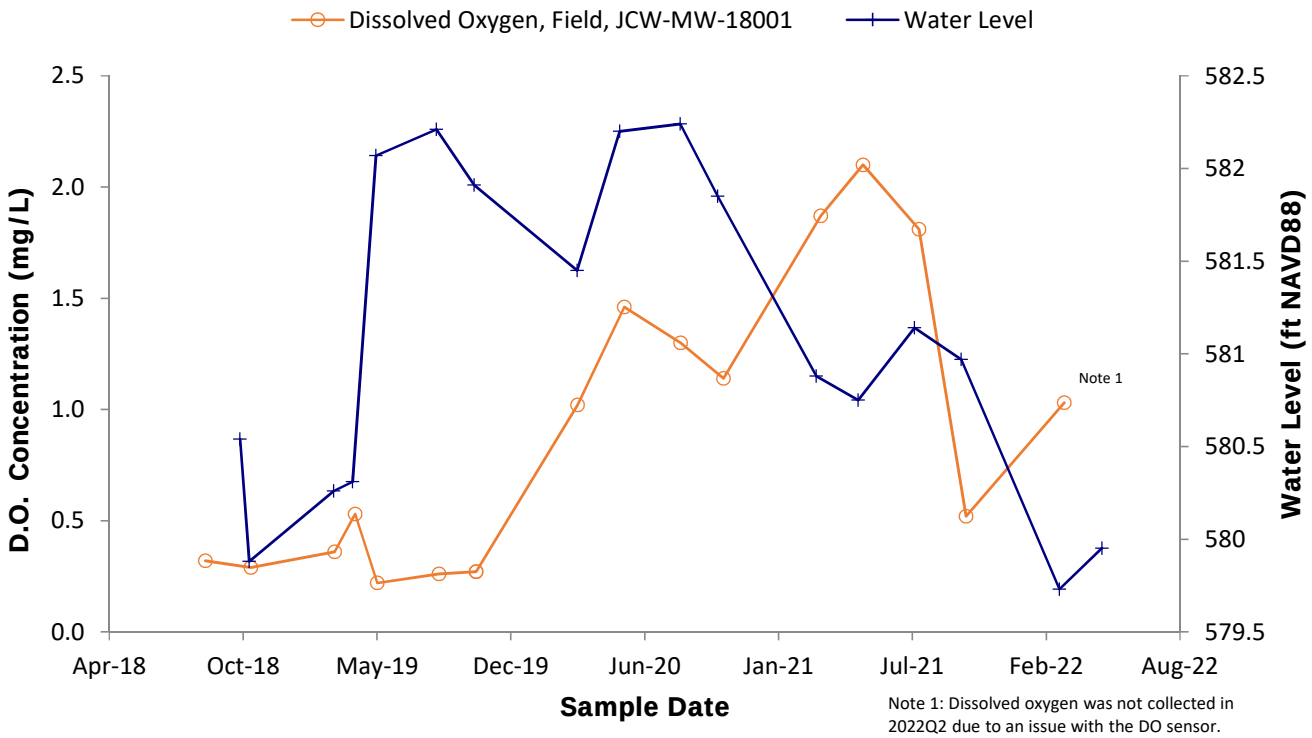
Professional Engineer Certification Number



References

TRC (July 2022). *First Semi-Annual/Second Quarter 2022 Hydrogeological Monitoring Report, JC Weadock Landfill CCR Unit, Essexville, Michigan*

Figure G1: Time Series Plots for Sulfate at JCW-MW-18001 ASD



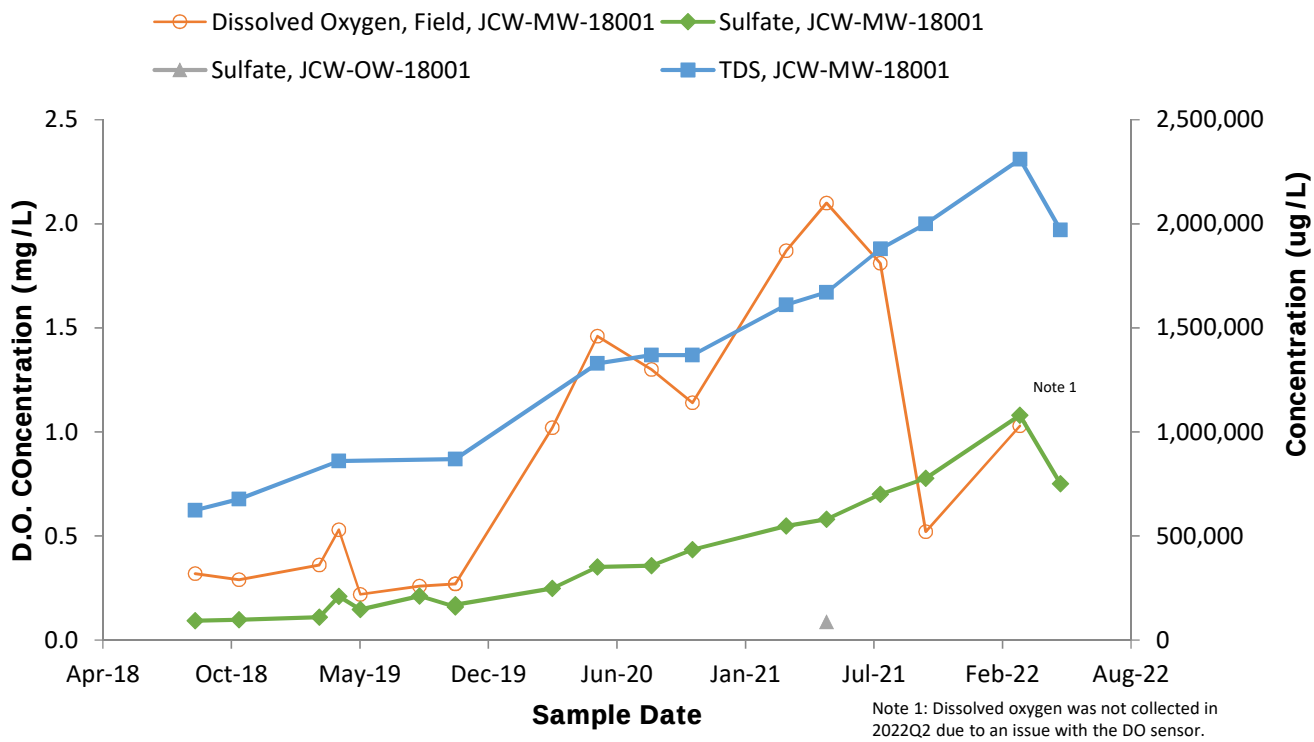
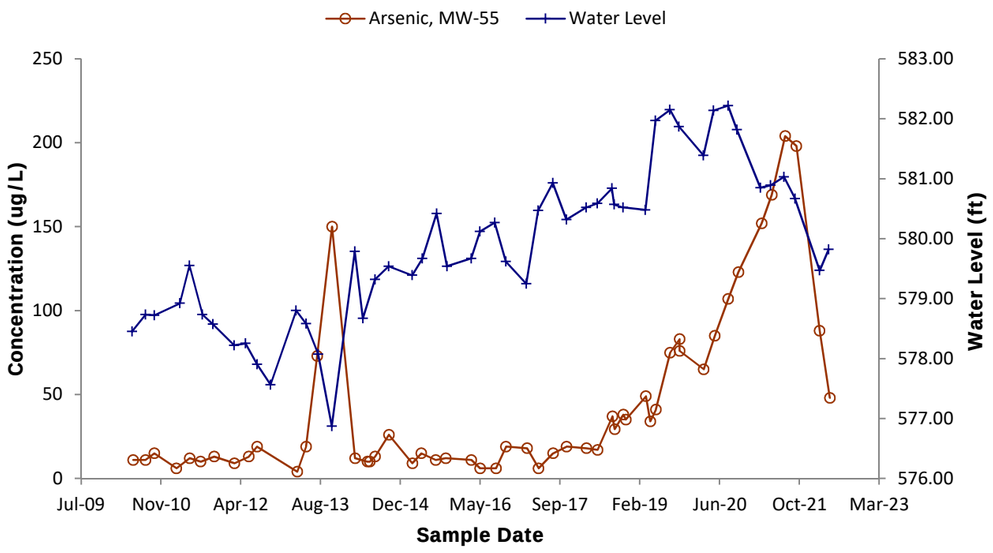


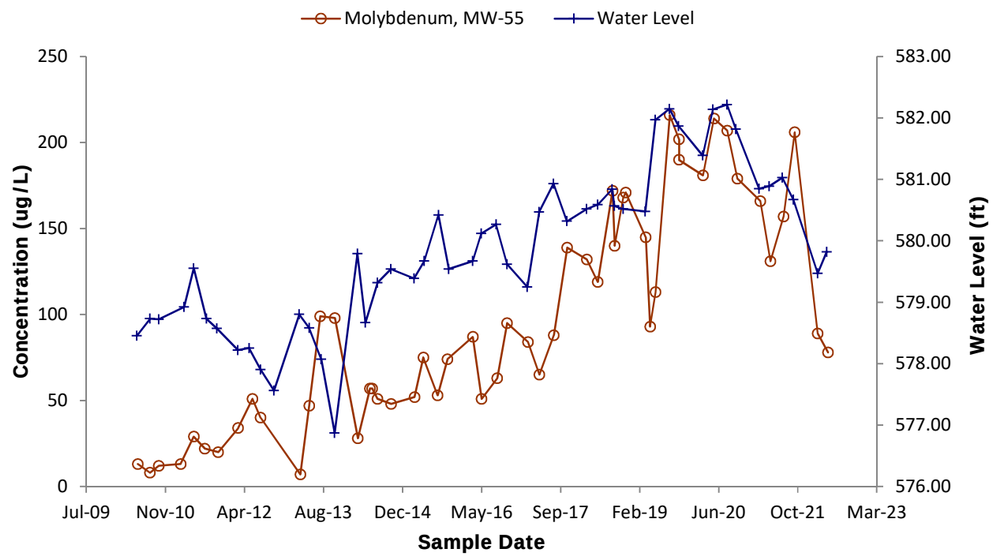
Table G2
Summary of Groundwater Sampling Results Near MW-55
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

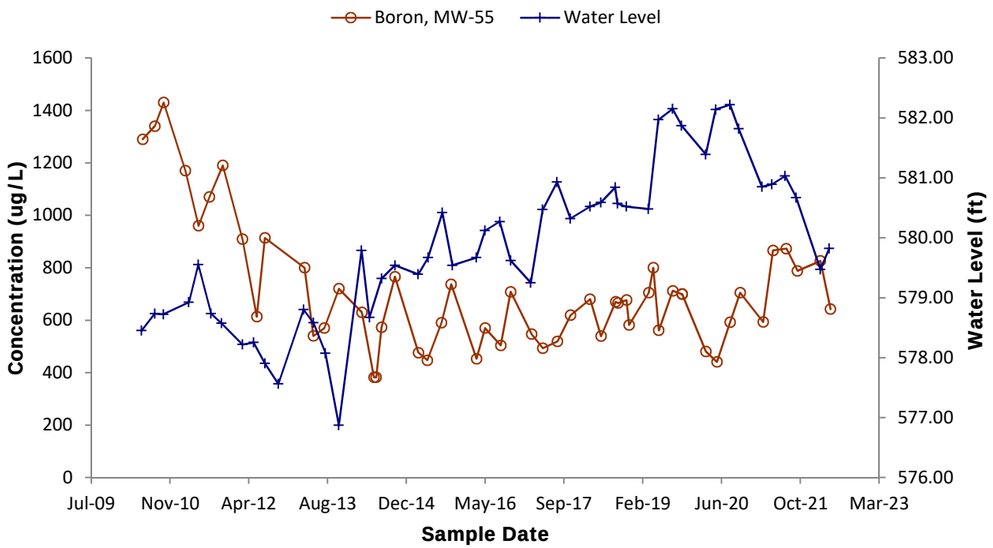
Constituent		Arsenic	Boron	Molybdenum	Oxidation Reduction Potential, Field
Unit		ug/L	ug/L	ug/L	mV
Outside Slurry Wall					
MW-55	8/3/2021	204	873	157	-131.0
	10/12/2021	198	788	206	-156.0
	3/7/2022	88	826	89	-139.5
	5/10/2022	48	642	78	-65.5
Inside Slurry Wall					
OW-55	8/3/2021	15	1,890	< 5	-82.1
	10/12/2021	10	2,300	< 5	-147.0
	3/7/2022	6	2,090	< 5	-120.5
	5/10/2022	14	2,050	< 5	-85.0
JCW-OW-18004	8/3/2021	1	801	< 5	148.3
	10/12/2021	1	857	< 5	-20.0
	3/7/2022	1	705	< 5	-65.8
	5/10/2022	< 1	815	< 5	213.0
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

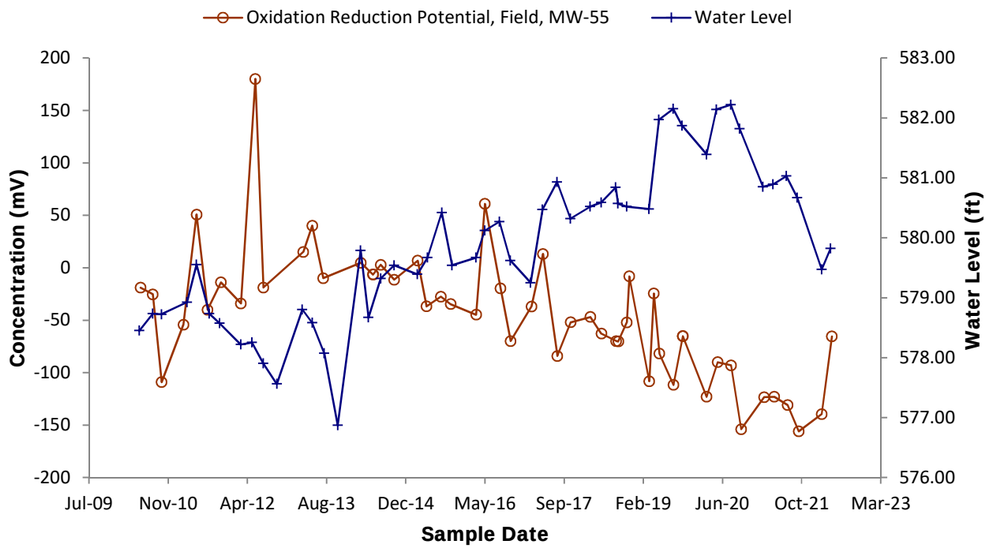
Notes:
ug/L - micrograms per liter; mV - millivolts

Figure G2: Time Series Plots for MW-55 ASD









Third Quarter 2022 Hydrogeological Monitoring Report

JC Weadock Solid Waste Disposal Area

Essexville, Michigan

October 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

TABLE OF CONTENTS

1.0 Introduction 1

1.1 Statement of Adherence to Approved Hydrogeological Monitoring Plan 1
1.2 Program Summary 1
1.3 Site Overview 3
1.4 Geology/Hydrogeology 3

2.0 Leachate Monitoring 5

3.0 Groundwater Monitoring 6

3.1 Monitoring Well Network 6
3.2 August 2022 Monitoring Event 7
3.2.1 Data Quality Review 8
3.3 Groundwater Flow Rate and Direction 8
3.4 Groundwater Analytical Data and Relevant Screening Criteria 9
3.4.1 Groundwater Monitoring Analytical Results 9
3.4.2 Detection Monitoring 10
3.4.3 Assessment Monitoring Data Evaluation 11
3.4.3.1 Establishing Groundwater Protection Standards 11
3.4.3.2 Data Comparison to Groundwater Protection Standard**s** 12
3.4.4 GSI Compliance Monitoring 12
3.5 Alternate Source Demonstration 13
3.5.1 Monitoring Well JCW-MW-18001: Sulfate and TDS 14
3.5.2 Monitoring Well MW-55: Arsenic and Molybdenum 14
3.5.3 Chloride at MW-54R 15

4.0 Conclusions and Recommendations 16

5.0 References 17

TABLES

Table 1 Summary of Groundwater Elevation Data:
Table 2 Summary of Groundwater Sampling Results (Analytical): August 2022; JC Weadock Solid Waste Disposal Area
Table 3 Summary of Field Parameters: August 2022
Table 4 Summary of Confidence Interval Evaluation: August 2022
Table 5 EGLE Exceedance Summary Table

FIGURES

Figure 1 Site Location Map
Figure 2 Site Map
Figure 3 Potentiometric Surface Map – July 2022

APPENDICES

Appendix A Static Water Level Evaluation
Appendix B Data Quality Review
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 Third Quarter 2022 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 2022 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, is 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-103R[1] and LH-104. This program was implemented to determine constituents in the leachate as measured under actual conditions in the field and to assess which constituents have the potential to exceed applicable criteria at the compliance well locations.

Leachate data was not collected during the third quarter.

[1] Leachate headwell LH-103 was decommissioned in March 2022 due to damage noted in Q4 2021. LH-103R was installed in March 2022. Well decommissioning and installation records were provided as Appendix H of the *First Quarter 2022 Hydrogeological Monitoring Report* (TRC, 2022).

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 and 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 2022 Monitoring Event

In accordance with the Weadock Landfill HMP, TRC conducted the third quarter 2022 monitoring event for the Weadock Landfill by collecting water levels on July 25 and collecting groundwater samples on August 1 through 2, 2022. 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 2022 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, two field duplicates (MW-50 and MW-55), 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 laboratory 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 3.

Groundwater elevations measured at the Site in July 2022 are generally within the range of 580 to 585 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 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. 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. 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 2022 monitoring event are included in the attached laboratory report (Appendix E). Groundwater analytical data from the third quarter 2022 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 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. Downgradient groundwater quality is evaluated using sample results from 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. 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 GWPSs for the landfill. Background wells were not sampled in third quarter 2022.

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 (Section 3.4.2 Detection Monitoring and Section 3.4.3 Assessment Monitoring). 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.

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 3.3, 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.

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:

- The previously observed increasing trend for boron at MW-54R has continued in Q3 2022.
- The previously confirmed increasing trends for boron at MW-51 and OW-57R OUT did not continue in Q3 2022.
- A new, unconfirmed increasing trend for calcium was observed at JCW-MW-18001 in Q3 2022.
- A new, unconfirmed increasing trend for chloride was observed at MW-53R in Q3 2022.
- The previously confirmed increasing trend for chloride at MW-54R has continued to be observed in Q3 2022.

- The previously confirmed increasing trend for sulfate at JCW-MW-18001 has continued to be observed in Q3 2022. Sulfate concentrations remain below the generic final acute value (FAV).
- The previously confirmed increasing trend for TDS at JCW-MW-18001 has continued to be observed in Q3 2022.

Although increasing trends for detection monitoring constituents were observed, individual constituent trends provide a *potential indication* that there may be a release coming from the monitored unit. When these indicator trends are evaluated with other co-monitored conditions and parameters at the Weadock Landfill, the increasing trends for detection monitoring constituents do not appear to be a result of a new release from operation of the landfill. The potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill. Several of these newly observed trends, such as those observed for calcium, chloride, sulfate, and TDS, are likely a result of localized geochemical changes influenced by changes in lake levels rather than a change in flux from the landfill and will continue to be evaluated. The increasing trends of sulfate in JCW-MW-18001 and chloride in MW-54R are attributed to localized changes in geochemistry proximal to each well, rather than a change in flux from the landfill, as discussed further in Section 3.5.

Consumers is further evaluating possible causes of the increasing boron concentrations at several porewater compliance monitoring wells. Previous studies (NRT, 2005) documented boron at significantly elevated concentrations at the Karn-Weadock Power Generating Complex. Boron was also identified at SSI background levels in the 2017 *Annual Groundwater Monitoring Report – JC Weadock Power Plant, Landfill CCR Unit* (TRC, 2018) and was one of the detection monitoring constituents that triggered the initiation of the assessment monitoring program. Statistical significance above the GWPS established for boron has been noted for these monitoring wells per the Part 115 groundwater monitoring program requirements, as discussed in Section 3.4.3.2. Continued monitoring and assessment for potential future actions is warranted at this time; however, observed concentrations of boron in each of the monitoring wells is less than the relevant Part 115 compliance standard - the GSI pathway standard (Section 3.4.4).

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 D (*Assessment Monitoring and GSI Statistical Evaluation of the August 2022 Sampling Event*). A summary of the confidence interval evaluation is provided in Table 4.

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 (Part 115): The third quarter 2022 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, MW-55, and OW-57R OUT and calcium at JCW-MW-18001 were present at statistically significant levels above the GWPS. Boron was one of the Appendix III SSIs that originally triggered assessment monitoring. Boron concentrations have been consistently above the GWPS but less than the chronic-based mixing zone-based GSI criterion of 44,000 ug/L within the Weadock Landfill monitoring well network since monitoring under the February 2021 HMP began. Calcium at JCW-MW-18001 was a new, unconfirmed GWPS exceedance in third quarter 2022 resulting from increases in calcium concentration since first quarter 2021.

The GWPS for boron and calcium were established based on background concentrations observed in wells unaffected by the Weadock Landfill or Weadock Bottom Ash Pond. Detection monitoring (i.e., Appendix III) constituents 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 below relevant GSI criteria, as discussed in Section 3.4.4. There are no health-based or GSI criteria specific to calcium.

Assessment Monitoring Constituents (Part 115 and Federal CCR): Based on the third quarter 2022 statistical evaluation, there are no assessment monitoring constituents present at statistically significant levels above the GWPSs 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 5.91 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 2022 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 the August 2022 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.

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, MW-55, 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).

Arsenic and Molybdenum at MW-55: Concentrations of arsenic and molybdenum at MW-55 have at times exceeded the GSI criteria on a direct comparison to the fixed limit basis (Appendix D: Table 2). The August 2022 sampling event results show that arsenic and molybdenum concentrations are below applicable GSI criteria. The statistical evaluation presented in Appendix D shows that the lower confidence limits of the arsenic and molybdenum data over the past 8 events do not exceed 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 (Appendix A: Table A1).

3.5 Alternate Source Demonstration

At this time, Consumers Energy is continuing to assert an Alternate Source Demonstration (ASD), for the following, as detailed in the 2022 Semiannual Groundwater Monitoring Report and Second Quarter 2022 Hydrogeological Monitoring Report (TRC, July 2022):

- Sulfate and TDS in monitoring well JCW-MW-18001;
- Arsenic and molybdenum in monitoring well MW-55; and
- Chloride in monitoring well MW-54R.

3.5.1 Monitoring Well JCW-MW-18001: Sulfate and TDS

Although confirmed increasing trends were observed at JCW-MW-18001 for sulfate and TDS (through Q3 2022), 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 and TDS 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.

- Sulfate is one of several constituents that contribute to the overall TDS concentration. Increasing sulfate concentrations would result in an increase in TDS as well.
- Dissolved oxygen at JCW-MW-18001 is currently higher than what was observed from 2018 to 2019 (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). Surface water and groundwater levels are now decreasing; however, it may take time for the local geochemistry to re-equilibrate to lowered water levels and dissolved oxygen remains elevated compared to prior years.
- Sulfate concentrations at JCW-MW-18001 (1,180 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.

3.5.2 Monitoring Well MW-55: Arsenic and Molybdenum

Additionally, Consumers Energy is continuing to assert an Alternate Source Demonstration (ASD) for arsenic and molybdenum at MW-55 indicating elevated levels of constituents at that location are not related to materials management of the Weadock Landfill (*2021 Annual Groundwater Monitoring and Corrective Action Report*; TRC, January 2022). 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 locations sampled as a part of this ASD. Additionally, boron concentrations at MW-55 have decreased since 2010 and have been relatively stable, as evidenced by the time series plots in Figure G2. Stable or decreasing concentrations of boron is further supports 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 increased over 4-ft since between 2010 and 2020. The oxidation-reduction potential (ORP) at MW-55 has generally decreased (i.e., is more reducing) since 2010. 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 increased solubility of arsenic and molybdenum.

3.5.3 Chloride at MW-54R

An observation of an increasing trend of chloride at MW-54R without other corroborating lines of evidence is not indicative of a release from the Landfill. The potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill. Furthermore, arsenic is present in CCR material managed at the Site and was detected at 87 ug/L in leachate headwell LH-103R in March 2022. Arsenic can be used as a tracer to indicate whether the slurry wall is functioning as designed. If groundwater inside the landfill was adversely affecting groundwater on the outside of the slurry wall, arsenic would be expected to be present at concentrations above background levels (21 ug/L). Arsenic was detected in the groundwater sample collected at MW-54R in August 2022 at 2 ug/L and arsenic has historically not been observed at this location at concentrations greater than 4 ug/L. Changes in chloride at MW-54R are likely a result of localized geochemical changes influenced by changes in lake levels. Additionally, chloride was identified as naturally elevated in the Phase II Discharge Evaluation (NRT, September 2005) and was eliminated as a constituent of concern when the mixing zone was first authorized based on the data supporting that conclusion. The box and whiskers plot in Appendix G further illustrates that the chloride concentrations observed at MW-54R are within the range of concentrations observed regionally within other wells in the compliance well network and well below the chloride concentration observed at leachate headwell LH-103R in March 2022.

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 2022 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 *2021 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 2022 data in accordance with the Weadock Landfill HMP demonstrate that boron is present at concentrations above the GWPS and calcium may be present at concentrations above the GWPS (*i.e.* unconfirmed GWPS exceedance). 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 are below relevant GSI criteria, as discussed in Section 3.4.4. There is no GSI criteria specific to calcium.

The statistical evaluation in third quarter 2022 found that no 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 fourth quarter monitoring event for is scheduled for October 2022.

5.0 References

AECOM. November 6, 2009. Potential Failure Mode Analysis (PFMA) Report. JC Weadock Electric Generation Facility Ash Dike Risk Assessment Essexville, Michigan. Prepared for Consumers Energy Company

Consumers Energy Company. 2015. *Hydrogeological Monitoring Plan Rev. 2: JC Weadock Solid Waste Disposal Area.* June 9.

Consumers Energy. 2019. *JC Weadock Landfill Response Action Plan Submittal, JC Weadock Generating Facility (WDS# 395457), Essexville, Michigan.* March 15.

Golder Associates, Inc. 2018. *J.C. Weadock Generating Facility, Slurry Wall Vent Closure Construction Documentation Report*. October 30.

Michigan Department of Natural Resources (MDNR). 1986. *Determination of Permit Exemption No. GWE-0005.* August 25.

Michigan Department of Environmental Quality (MDEQ). 2015. *Implementation of a Mixing Zone Request Consumers Energy DE Karn/JC Weadock Complex.* December 23.

MDEQ. 2018. *Slurry Wall Construction Certification; JC Weadock Landfill, Bay County, Michigan, Waste Data System Number 395457.* December 19.

Michigan Department of Environment, Great Lakes, and Energy (EGLE). 2020. *Closure Certification, Consumers Weadock Complex (Weadock) Bottom Ash Pond, Bay County, Waste Data System No. 395457*. November 30. [Letter]

Natural Resource Technology. 2005. Phase II Groundwater Discharge Evaluation, Final Report.

Natural Resource Technology. 2010. Revised Hydrogeological Monitoring Plan – JC Weadock Solid Waste Disposal Area. TRC. 2018. Annual Groundwater Monitoring Report – JC Weadock Power Plant, Landfill CCR Unit. Prepared for Consumers Energy Company. January.

TRC. 2018. *Annual Groundwater Monitoring Report – JC Weadock Power Plant, Landfill CCR Unit*. Prepared for Consumers Energy Company.

TRC. 2019a. *2018 Annual Groundwater Monitoring Report – JC Weadock Power Plant Landfill CCR Unit. Prepared for Consumers Energy Company.* January.

TRC. 2019b. *Assessment of Corrective Measures – JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residual Units.* Prepared for Consumers Energy Company. September.

TRC. 2020. *2019 Annual Groundwater Monitoring Report – JC Weadock Power Plant Landfill CCR Unit.* Prepared for Consumers Energy Company. January.

TRC. 2021. *Landfill Hydrogeological Monitoring Plan – JC Weadock Power Plant, Essexville, Michigan.* Prepared for Consumers Energy Company. February.

TRC. 2021. *First Quarter 2021 Hydrogeological Monitoring Report – JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* Prepared for Consumers Energy Company. April.

TRC. 2022. *2021 Annual Groundwater Monitoring and Corrective Action Report – JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residuals (CCR) Units.* Prepared for Consumers Energy Company. January.

TRC. 2022. *2022 Semiannual Groundwater Monitoring Report and Second Quarter 2022 Hydrogeological Monitoring Report – JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* Prepared for Consumers Energy Company. July.

USEPA. 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance. Office of Conservation and Recovery. EPA 530/R-09-007.*

USEPA. 2015. *40 CFR Parts 257 and 261. Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule. 80 Federal Register 74 (April 17, 2015), pp. 21301-21501 (80 FR 21301*). April

USEPA. 2018. 40 CFR Part 257. Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; Amendments to the National Minimum Criteria (Phase One, Part One); Final Rule. 83 Federal Register 146 (July 30, 2018), pp. 36435-36456 (83 FR 36435). July.

Tables

Table 1

Summary of Groundwater Elevation Data

JC Weadock Solid Waste Disposal Area – Hydrogeological Monitoring Program

Essexville, Michigan

Well Location	TOC Elevation (ft)	Geologic Unit of Screen Interval	Screen Interval Elevation (ft)			July 25, 2022	
						Depth to Water (ft BTOC)	Groundwater Elevation (ft)
Background Monitoring Wells							
MW-15002	587.71	Sand	580.9	to	570.9	6.88	580.83
MW-15008	585.36	Sand with clay	578.7	to	568.7	4.51	580.85
MW-15016	586.49	Sand	581.2	to	578.2	3.80	582.69
MW-15019	586.17	Sand and Sand/Clay	579.5	to	569.5	5.46	580.71
Bottom Ash Pond: Downgradient Monitoring Wells							
JCW-MW-15007	587.40	Sand	582.7	to	579.2	4.25	583.15
JCW-MW-15009	589.64	Sand	581.9	to	576.9	9.12	580.52
JCW-MW-15010	597.76	Sand	579.7	to	578.2	17.00	580.76
JCW-MW-15028	589.64	Sand	567.7	to	564.7	8.57	581.07
Landfill: Downgradient Monitoring Wells (outside slurry wall)							
JCW-MW-18001	596.73	Sand and Sandy Clay	578.3	to	573.3	16.21	580.52
JCW-MW-18004	593.04	Sandy Clay	583.9	to	578.9	12.12	580.92
JCW-MW-18005	590.89	Sand and Sandy Clay	580.0	to	575.0	8.94	581.95
JCW-MW-18006	600.72	Fly Ash and Sandy Clay	582.8	to	577.8	15.34	585.38
MW-50	593.36	Sand	577.8	to	574.8	12.79	580.57
MW-51	594.29	Sand and Clay	577.8	to	574.8	13.70	580.59
MW-52	594.90	Sand	579.3	to	576.3	14.30	580.60
MW-53	593.68	Sand and Clay	579.1	to	576.1	13.10	580.58
MW-53R	594.25	Sand and Clay	580.4	to	575.4	13.76	580.49
MW-54R	593.89	Clay and Sand	581.3	to	576.3	13.27	580.62
MW-55	593.82	Sand	581.5	to	578.5	13.41	580.41
OW-57ROUT	591.00	Sandy Clay	577.0	to	572.0	10.25	580.75
Landfill: Static Water Level Only (inside slurry wall)							
JCW-OW-18001	595.84	Fly Ash and Sand	581.1	to	576.1	9.00	586.84
JCW-OW-18002	593.63	Sand	578.9	to	573.9	10.47	583.16
JCW-OW-18003	593.99	Sand and Clay	580.5	to	575.5	9.02	584.97
JCW-OW-18004	594.19	Sandy Clay	584.6	to	579.6	9.90	584.29
JCW-OW-18006	600.61	Fly Ash and Clay with Sand	582.9	to	577.9	11.16	589.45
MW-20	592.73	NR	~581.1	to	~578.1	7.85	584.88
OW-51	593.62	Clay and Sand	578.9	to	575.9	9.90	583.72
OW-53	593.64	Clay and Sand	579.0	to	576.0	7.26	586.38
OW-54	594.10	Clay and Sand	580.0	to	577.0	7.37	586.73
OW-55	594.67	Clay (or Sand and Clay)	580.9	to	577.9	8.35	586.32
OW-56R	592.01	Ash and Sand	577.5	to	572.5	5.46	586.55
OW-57R IN	590.86	Sandy Clay	575.7	to	570.7	5.95	584.91
OW-61	602.15	Ash and Sand	588.0	to	585.0	12.30	589.85
Landfill: Leachate Headwells							
LH-103R	612.70	Fly Ash	30.2	to	33.2	24.00	588.70
LH-104	596.56	Fly Ash	8.0	to	11.0	12.09	584.47

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 2022
JC Weadock Solid Waste Disposal Area – Hydrogeological Monitoring Program
Essexville, Michigan

							Sample Location:	JCW-MW-18001	JCW-MW-18004	JCW-MW-18005	JCW-MW-18006	MW-50	MW-51
							Sample Date:	8/1/2022	8/1/2022	8/2/2022	8/2/2022	8/1/2022	8/1/2022
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	**1,470**	313	**981**	**2,260**	**1,290**	**1,270**
Calcium	mg/L	NC	NC	NC	500[EE]	NC	NC	389	215	165	109	161	211
Chloride	mg/L	250**	250[E]	250[E]	**50**	NC	NC	**64.6**	12.5	**50.9**	**79**	**54.2**	**102**
Fluoride	ug/L	4,000	NC	NC	NC	NC	NC	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	**500[EE]**	NC	NC	**1,180**	**512**	213	14.9	**324**	**404**
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	NC	NC	**2,580**	**1,290**	**967**	**709**	**1,080**	**1,450**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	NC	NC	6.6	6.7	6.7	6.7	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	< 1	4	**21**	2	**15**
Barium	ug/L	2,000	2,000	2,000	1,200	NC	NC	61	31	71	452	90	169
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	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
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	95	51	32	52	64	53
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	6	< 5
Selenium	ug/L	50	50	50	5.0	55	120	3	1	< 1	< 1	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****	**300[E]**	**300[E]**	500,000[EE]	NC	NC	196	45	**2,810**	**7,670**	**1,830**	**1,860**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	NC	NC	2	2	< 1	< 1	< 1	< 1
Nickel	ug/L	NC	100	100	120	NC	NC	14	2	9	5	6	6
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:

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 Amendment - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) addtional detection monitoring constituent (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

BOLD value indicates an exceedance of one or more of the listed criteria.

RED value indicates an exceedance of the MCL.

All metals were analyzed as total unless otherwise specified.

Table 2
Summary of Groundwater Sampling Results (Analytical): August 2022
JC Weadock Solid Waste Disposal Area – Hydrogeological Monitoring Program
Essexville, Michigan

						MW-52	MW-53	MW-53R	MW-54R	MW-55	OW-57ROUT
						8/1/2022	8/1/2022	8/1/2022	8/1/2022	8/1/2022	8/2/2022
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Downgradient/ GSI	Downgradient/ GSI	Downgradient/ GSI	Downgradient/ GSI	Downgradient/ GSI	Downgradient
Appendix III[(1)]											
Boron	ug/L	NC	**500**	**500**	**4,000**	**1,070**	**4,300**	**1,560**	**4,970**	**709**	**1,570**
Calcium	mg/L	NC	NC	NC	500[EE]	222	116	219	158	159	113
Chloride	mg/L	250**	250[E]	250[E]	**50**	45.1	**66.5**	**50.4**	43.9	11.8	**52**
Fluoride	ug/L	4,000	NC	NC	NC	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	**500[EE]**	**663**	119	**533**	72.1	248	85
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	**1,580**	**820**	**1,530**	**800**	**930**	**714**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	6.7	7.1	6.7	6.9	6.9	6.8
Appendix IV[(1)]											
Antimony	ug/L	6	6.0	6.0	2.0	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	< 1	1	**17**	2	**80**	< 1
Barium	ug/L	2,000	2,000	2,000	1,200	118	313	97	109	232	67
Beryllium	ug/L	4	4.0	4.0	33	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	< 1	< 1	< 1	< 1	< 1	1
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
Lead	ug/L	NC	4.0	4.0	14	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	29	42	70	74	29	23
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	**73**	210	120	< 5	< 5	< 5	10	**80**	7
Selenium	ug/L	50	50	50	5.0	2	3	2	1	3	1
Thallium	ug/L	2	2.0	2.0	2.0	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115[(2)]											
Iron	ug/L	**300****	**300[E]**	**300[E]**	500,000[EE]	**5,020**	**1,240**	**1,030**	**367**	**18,000**	37
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	2	< 1	2	1	< 1	1
Nickel	ug/L	NC	100	100	120	5	4	5	2	6	17
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	4.5	62	27	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000[E]	260	< 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 Amendment - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) addtional detection monitoring constituent (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.
BOLD value indicates an exceedance of one or more of the listed criteria.
RED value indicates an exceedance of the MCL.
All metals were analyzed as total unless otherwise specified.

Table 3
Summary of Field Parameters: August 2022
JC Weadock Solid Waste Disposal Area – Hydrogeological 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)
Weadock Landfill							
JCW-MW-18001	8/1/2022	0.74	-86.5	6.6	3,000	13.9	2.5
JCW-MW-18004	8/1/2022	4.20	-110.0	6.7	1,622	18.7	3.8
JCW-MW-18005	8/2/2022	1.15	-100.8	6.7	1,520	13.3	5.0
JCW-MW-18006	8/2/2022	1.03	-131.0	6.7	1,337	12.6	3.0
MW-50	8/1/2022	0.82	-108.5	7.0	1,492	14.9	2.4
MW-51	8/1/2022	0.77	-97.0	7.0	2,033	13.7	2.9
MW-52	8/1/2022	0.79	-78.5	6.7	1,993	13.7	2.5
MW-53	8/1/2022	0.85	-108.0	7.1	1,292	15.0	2.4
MW-53R	8/1/2022	0.88	-62.0	6.7	2,125	15.5	8.0
MW-54R	8/1/2022	0.86	-116.0	6.9	1,230	16.1	7.7
MW-55	8/1/2022	0.82	-155.0	6.9	1,404	16.0	6.5
OW-57ROUT	8/2/2022	1.17	-100.0	6.8	1,300	13.0	3.0

Notes:
mg/L - Milligrams per Liter.
mV - Millivolts.
SU - Standard Units.
umhos/cm - Micromhos per centimeter.
°C - Degrees Celcius.
NTU - Nephelometric Turbidity Unit.

Table 4

Summary of Confidence Interval Evaluation: August 2022

JC Weadock Solid Waste Disposal Area – Hydrogeological Monitoring Program

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**	1,400	**890**	1,300	**1,100**	4,200	**3,400**	2,100	**1,500**	6,300	**3,900**	860	**640**	2,000	**1,600**	1,700	**1,400**	--	**--**	1,100	**950**	3,000	**2,400**
Calcium	mg/L	280	370	47	320	240	--	--	--	**--**	--	--	--	--	--	--	--	--	390	**290**	290	210	260	150	--	--
Sulfate	mg/L	780	640	-110	--	--	--	--	--	**--**	--	--	--	--	--	--	--	--	1,500	740	--	**--**	--	**--**	--	--
Arsenic	ug/L	21	--	--	--	--	--	--	--	--	31	9.5	--	--	--[(1)]	--[(1)]	--	--	38	0.5	--	--	--	--	31	21
Molybdenum	ug/L	73	--	--	--	--	--	--	--	--	--	--	--	--	--[(1)]	--[(1)]	--	--	--	--	--	--	--	--	--	--
Iron	ug/L	28,000	--	--	--	--	--	--	--	--	--	--	--	--	36,000	16,000	--	--	--	--	--	--	--	--	--	--
Vanadium	ug/L	6	--	--	--	--	--	--	--	--	--	--	--	--	--	**--**	--	--	12	2.0	--	--	--	--	--	--

GSI Statistical Evaluation

Constituent	Units	GSI	MW-55	
			UCL	LCL
Arsenic	ug/L	100	190	72
Molybdenum	ug/L	120	190	80

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, January 2022); therefore, confidence intervals were not calculated

Table 5

EGLE Exceedance Summary Table

JC Weadock Solid Waste Disposal Area – Hydrogeological Monitoring Program

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. 2022 (**bold** >201)	2 Qtr. 2022 (**bold** >201)	1 Qtr. 2022 (**bold** >201)	4 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 2022
PROJ. NO.:	464096
FILE:	464096-001-001.mxd

FIGURE 1

S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\3_WEADOCK\2022_MXDs\Q3_2022_OCTOBER\464096-001-001.mxd -- Saved By: AADAIR on 8/29/2022, 09:40:00 AM

LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVEL
- DECOMMISSIONED WELL
- SLURRY WALL (APPROXIMATE)

NOTES

1. BASE MAP IMAGERY FROM NEARMAP, (5/4/2022).
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).

0 600 1,200 Feet

1 " = 600 '
1:7,200

N

PROJECT:
CONSUMERS ENERGY COMPANY
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE:
SITE MAP

DRAWN BY:	A. ADAIR	PROJ NO.:	464096
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		**FIGURE 2**
DATE:	OCTOBER 2022		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
www.trcsolutions.com

FILE NO.: 464096-001-002.mxd

Plot Date: 9/9/2022, 11:24:13 AM by AADAIR -- LAYOUT: ANSI B(11"x17")
Path: S:\11-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 26976713 WEADOCK\2022 MXDs\Q3 2022 OCTOBER\464096-001-002.mxd
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Map Rotation: 0
TRC - GIS

LAKE HURON
SAGINAW BAY
(580.53) NOTE 3

MW-50 (580.57)
MW-51 (580.59)
MW-52 (580.60)
JCW-OW-18002 (583.16)
OW-51 (583.72)
JCW-OW-18003 (584.97)
OW-64
584:0
OW-53 (586.38)
586:0
MW-53 (580.58)
JCW-MW-15010 (580.76)
JCW-MW-18001 (580.52)
JCW-OW-18001 (586.84)
OW-63
OW-61 (589.85)
LH-103
JCW-MW-15009 (580.52)
JCW-MW-15028 (581.07)
JCW-MW-15007 (583.15)
584:0
MW-53R (580.49)
588:0
LH-103R (588.70)
JCW-OW-18006 (589.45)
JCW-MW-18006 (585.38)
588:0
586:0
MW-54R (580.62)
OW-54 (586.73)
582:0
MW-54 (NM)
OW-57RIN (584.91)
OW-57ROUT (580.75)
JCW-MW-18004 (580.92)
586:0
JCW-OW-18004 (584.29)
MW-15008 (580.85)
MW-58 (580.73)
584:0
OW-56R (586.55)
MW-20 (584.88)
586:0
OW-55 (586.32)
LH-104 (584.47)
JCW-MW-18005 (581.95)
MW-55 (580.41)
MW-15019 (580.71)
Saginaw River
MW-15002 (580.83)
MW-15016 (582.69)

LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING
- JCW LANDFILL HMP WELL
- LEACHATE HEADWELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED 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 NEARMAP, (5/4/2022).
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 2022

DRAWN BY:	A. ADAIR	PROJ NO.:	464096
CHECKED BY:	J. KRENZ		
APPROVED BY:	D. LITZ		**FIGURE 3**
DATE:	OCTOBER 2022		

TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
www.trccompanies.com

FILE NO.: 464096-001-003.mxd

Plot Date: 9/9/2022, 12:17:58 PM by AADAIR -- LAYOUT: ANSI B (11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 2697613 WEADOCK\2022 MXDs\Q3 2022 OCTOBER\464096-001-003.mxd
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 2022 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	07/25/2022	580.57	580.53	0.04
MW-51	07/25/2022	580.59		0.06
MW-52	07/25/2022	580.60		0.07
MW-53	07/25/2022	580.58		0.05
MW-53R	07/25/2022	580.49		-0.04
MW-54R	07/25/2022	580.62		0.09
MW-55	07/25/2022	580.41		-0.12
JCW-MW-18004	07/25/2022	580.92		0.39
Average:		**580.60**		

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 2022 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[6]	586.84		22.37	2.83E-01	2.00	2.88	1,010	2.30E-08	0.28	2,904	5.35E-02	0.40	146
JCW-MW-18001		580.52			3.75								
JCW-OW-18002	582.69		28.87	7.34E-02	4.00	4.25	970		0.07	4,123	1.97E-02	0.15	54
MW-50		580.57			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	583.72		14.38	2.18E-01	4.00	4.50	1,850	2.30E-08	0.22	8,325	1.18E-01	0.88	323
MW-51		580.59			5.00								
JCW-OW-18003	584.97		33.85	1.29E-01	3.50	4.00	740		0.13	2,960	2.49E-02	0.19	68
MW-52		580.60			4.50								
OW-53	586.38		20.14	2.88E-01	1.25	1.75	730		0.29	1,278	2.40E-02	0.18	65
MW-53		580.58			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	586.73		21.23	2.88E-01	2.00	2.25	510	2.30E-08	0.29	1,148	2.15E-02	0.16	59
MW-54R		580.62			2.50								
JCW-OW-18004	584.29		26.59	1.27E-01	7.19	4.10	820		0.13	3,366	2.78E-02	0.21	76
JCW-MW-18004		580.92			1.02								
OW-55	586.32		23.95	2.47E-01	2.00	2.20	1,220		0.25	2,690	4.33E-02	0.32	118
MW-55		580.41			2.41								
MW-20	584.88		40.93	7.16E-02	1.50	1.38	1,120		0.07	1,540	7.19E-03	0.05	20
JCW-MW-18005		581.95			1.25								

Calculated Groundwater Discharge from JC Weadock (gal per day) = 2.54

(cubic ft per day) = 0.34

(cubic ft per min) 2.4E-04

Calculated Groundwater Discharge from JC Weadock (gal per yr) = 928

(cubic ft per yr) = 124

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) = 1.38E-02

Notes:

Water level data collected on July 25, 2022 are shown by yellow cells:

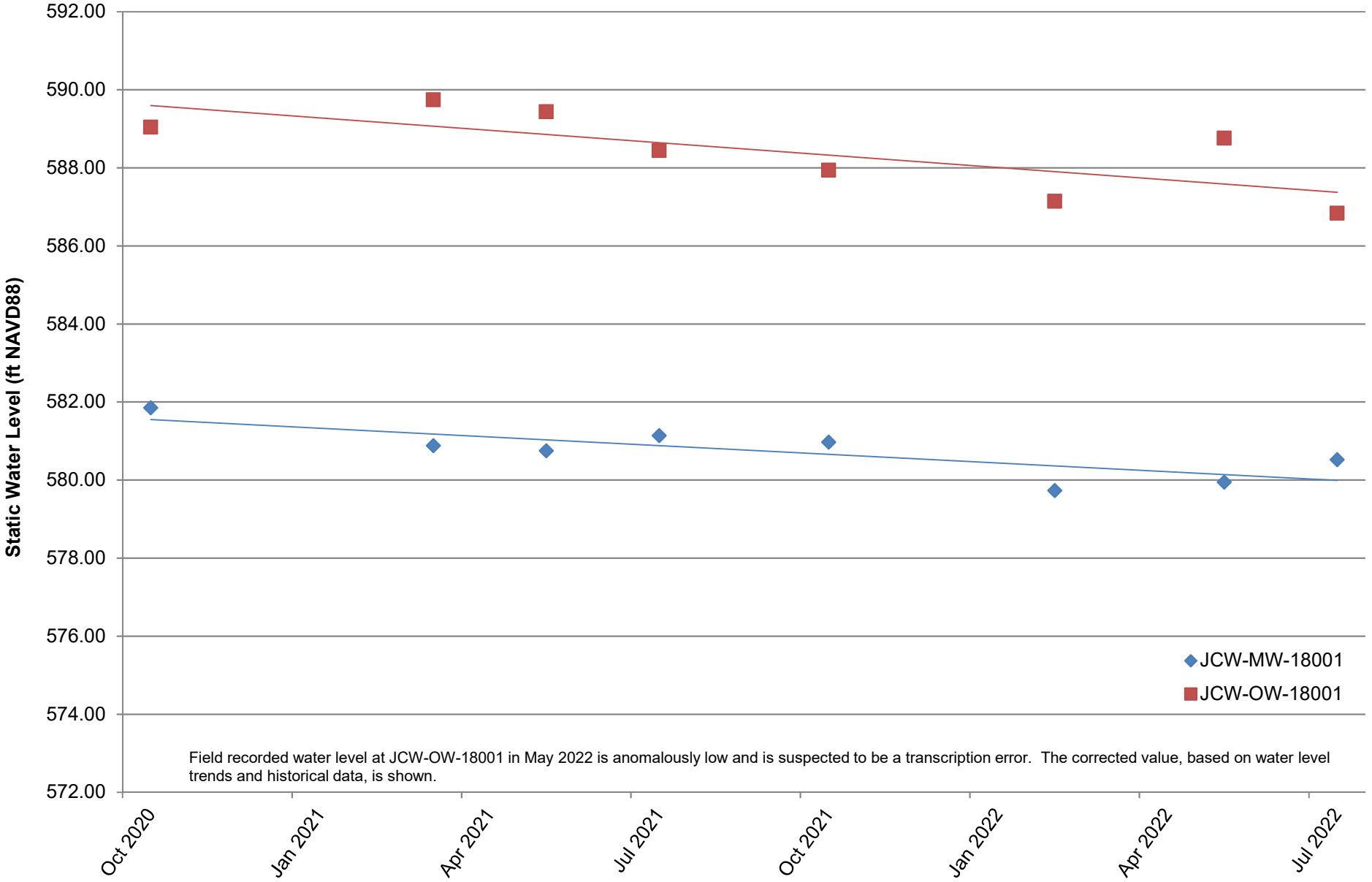
1. Monitoring Well Zones based on Phase II Evaluation, Appendix K Groundwater Discharge Calculations, September 30, 2005. Representative wells based on the Landfill Hydrogeological Monitoring Plan, February 2021.
2. Saturated thickness will be the thickness of the sand unit when the observed SWL is above 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.
6. Field recorded water level is anomalously low and is suspected to be a transcription error. The corrected value, based on water level trends and historical data, is used to calculate flux.

SWL = Static Water Level; Obs Well = Observation Well; MW= Monitoring Well; ft NAVD 88 = feet above North American Vertical Datum 1988

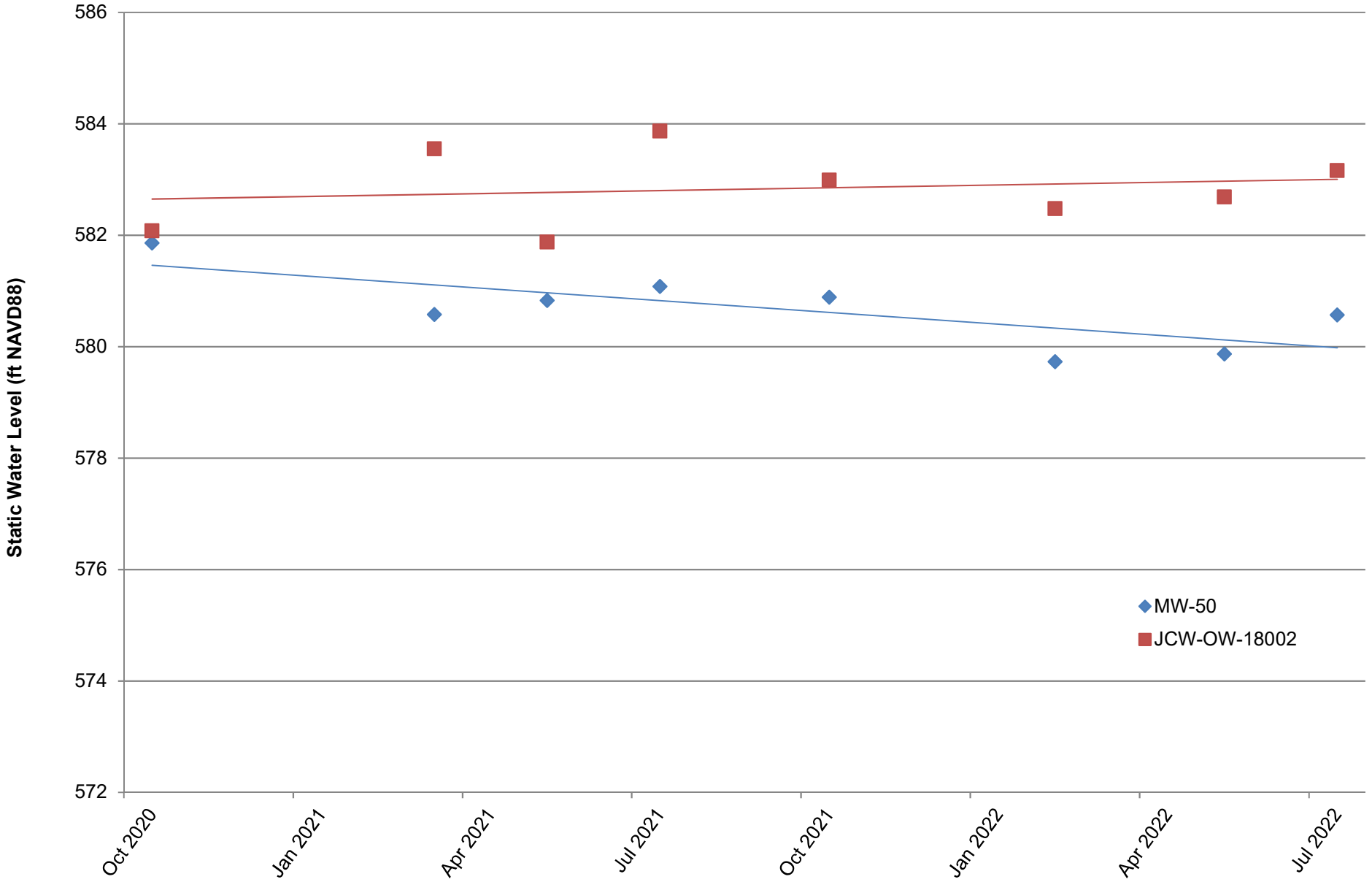
ft/ft = feet per foot; cm/sec = centimeters per second; ft^2 = square feet; ft^3/day = cubic feet per day; Gal/day = gallons per day; Gal/yr = gallons per year

i = hydraulic gradient; K = hydraulic conductivity; x_{wells} = distance between well pairs

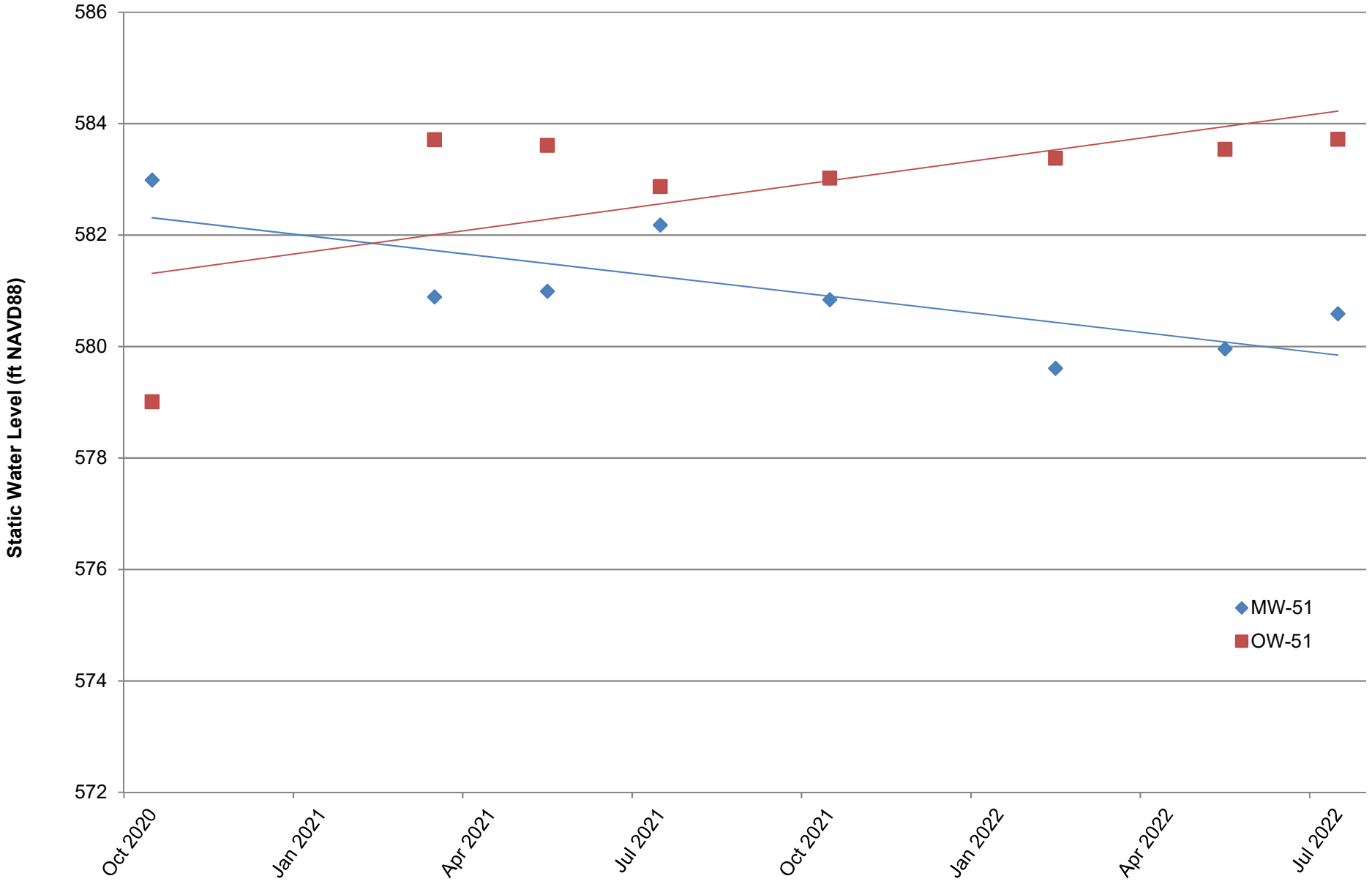
Appendix A
Static Water Level for JCW-MW-18001 and JCW-OW-18001



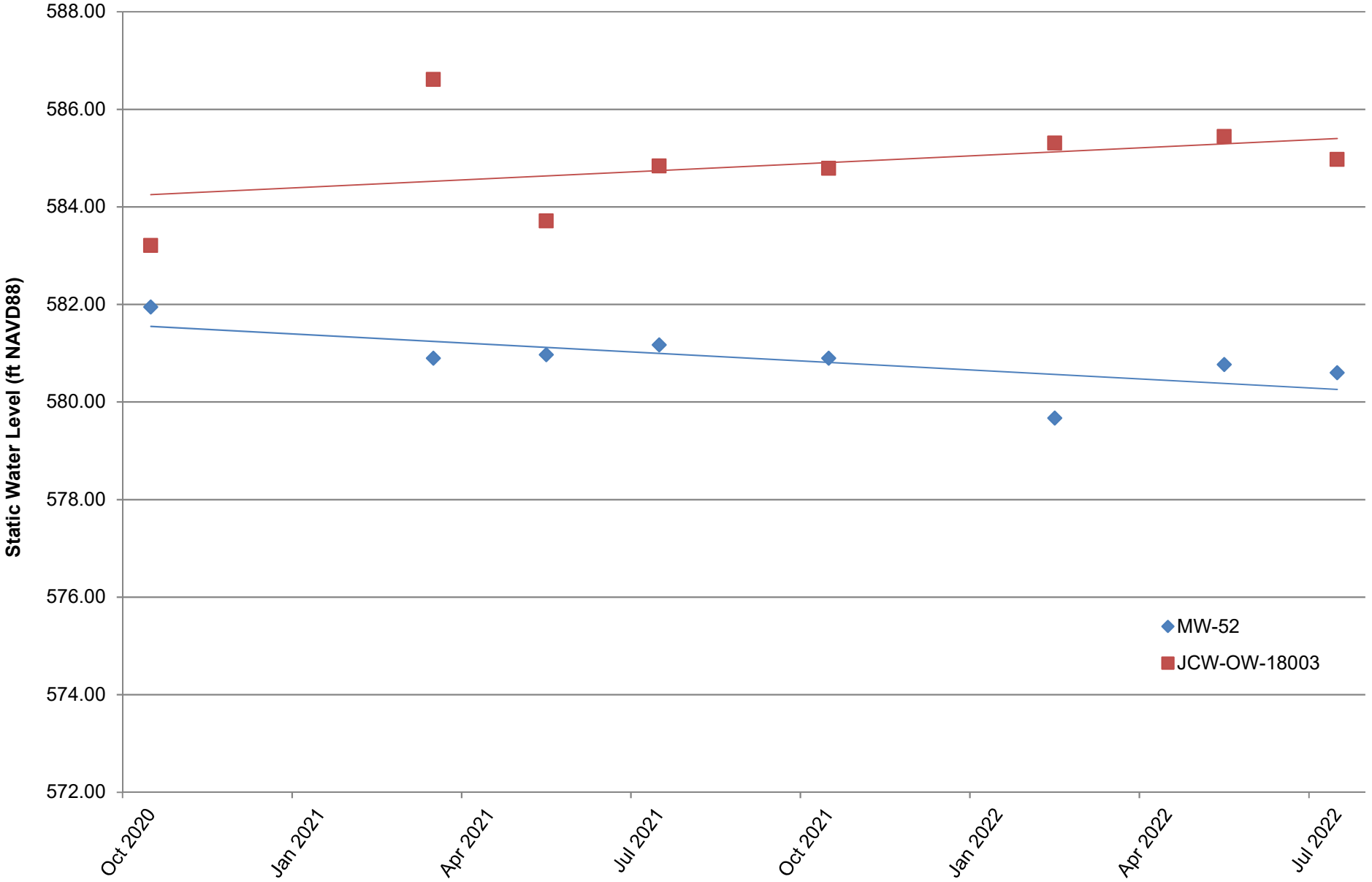
Appendix A
Static Water Level for MW-50 and JCW-OW-18002



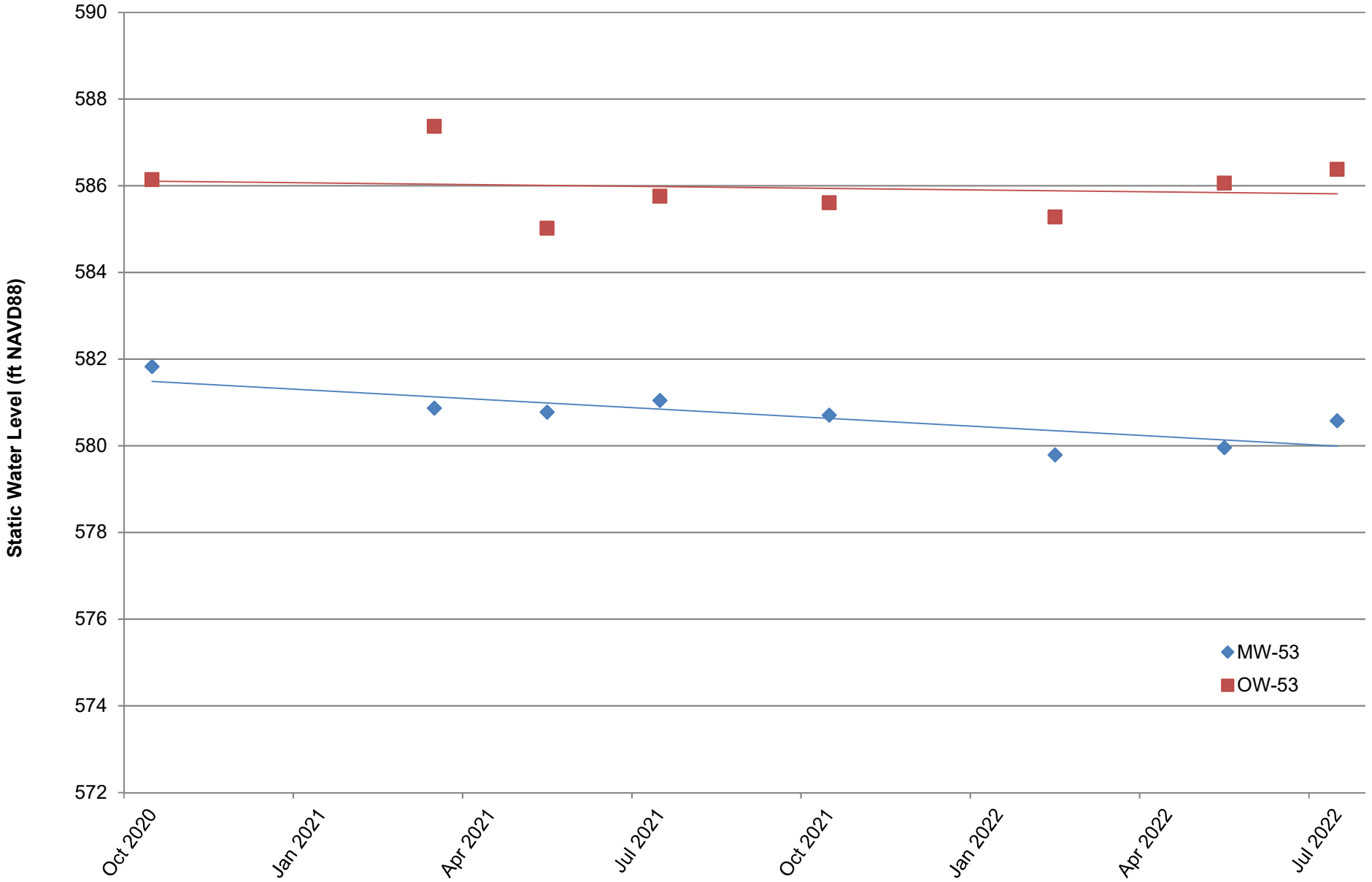
Appendix A
Static Water Level for MW-51 and OW-51



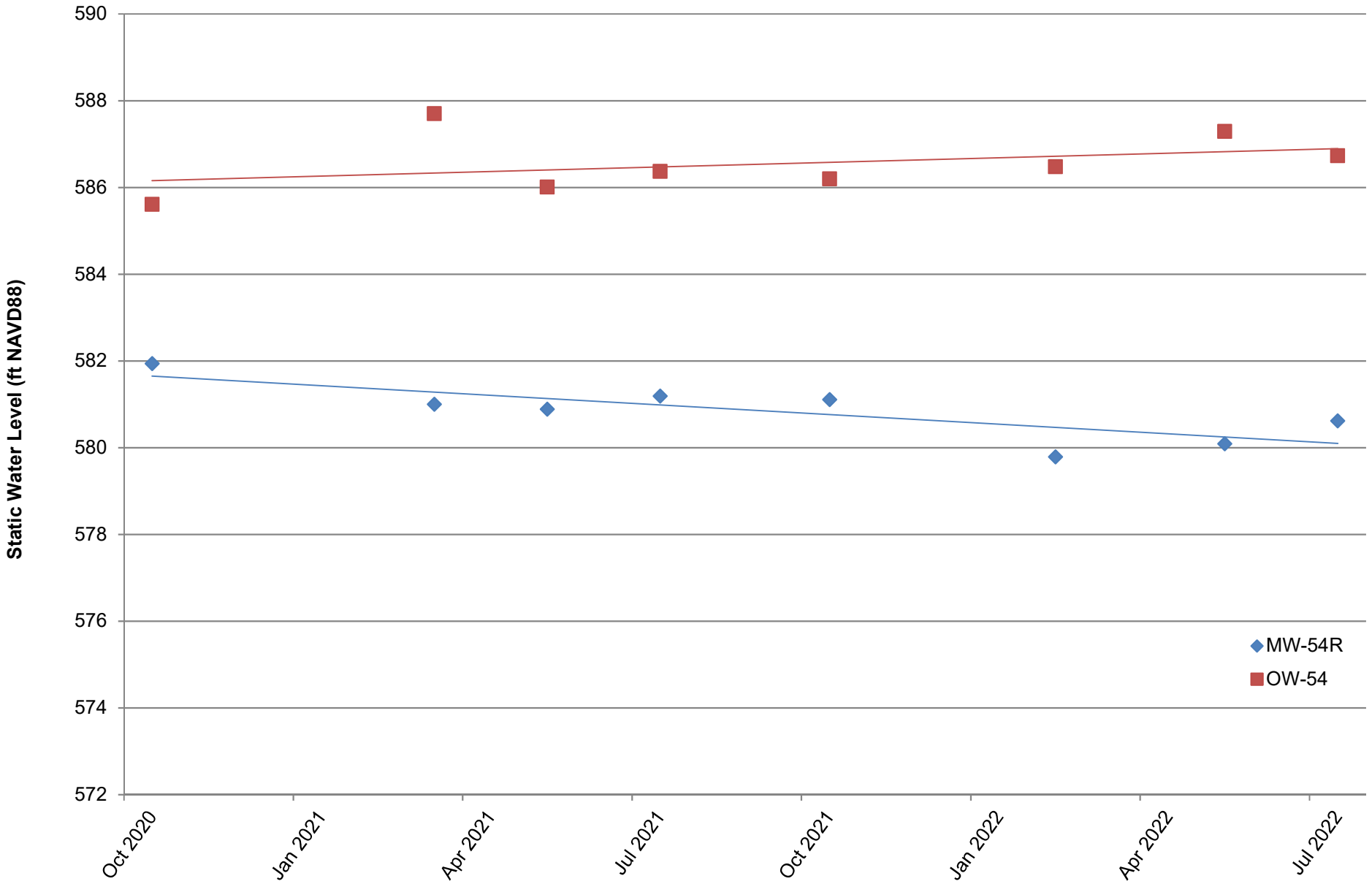
Appendix A
Static Water Level for MW-52 and JCW-OW-18003



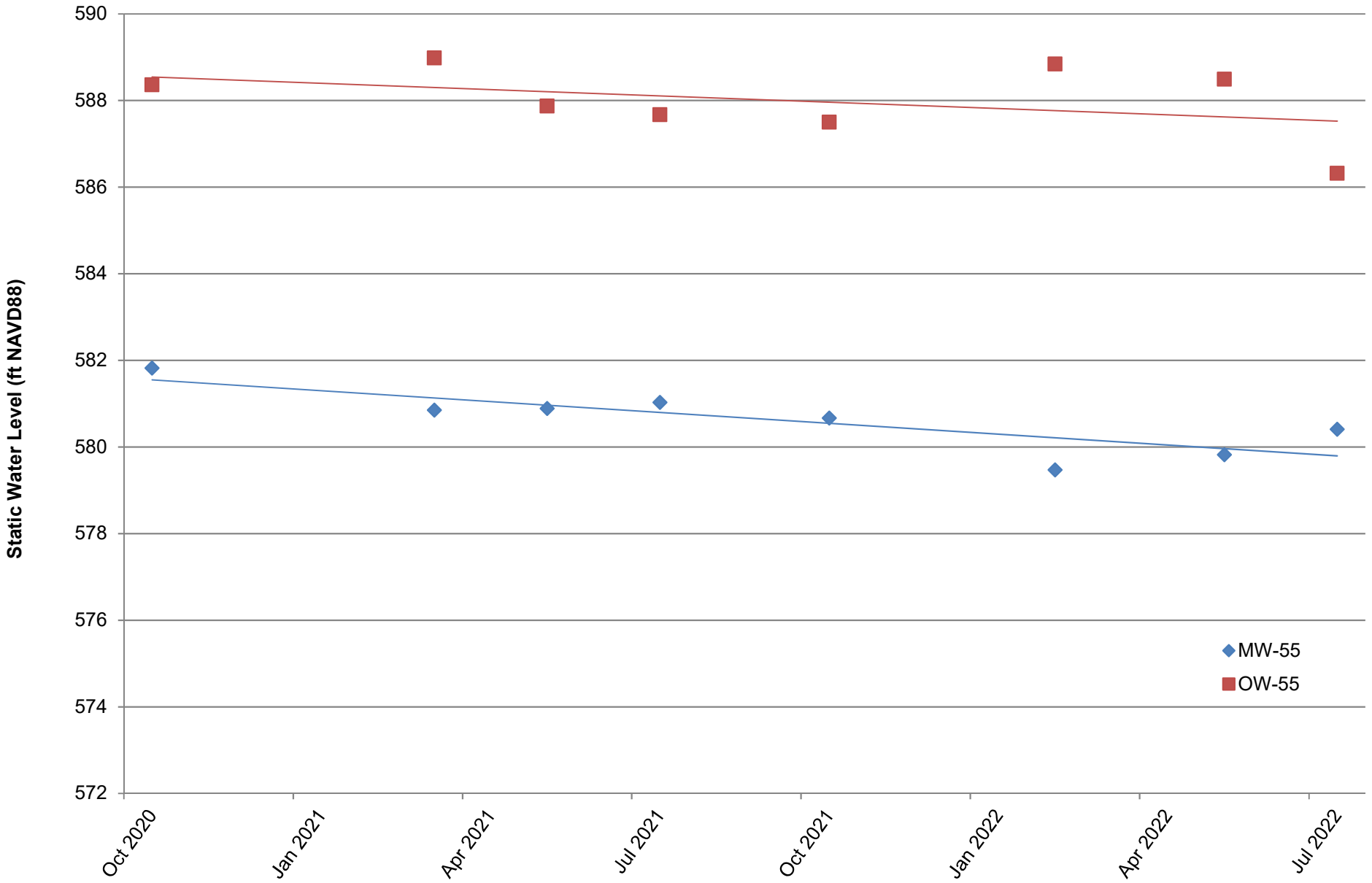
Appendix A
Static Water Level for MW-53 and OW-53



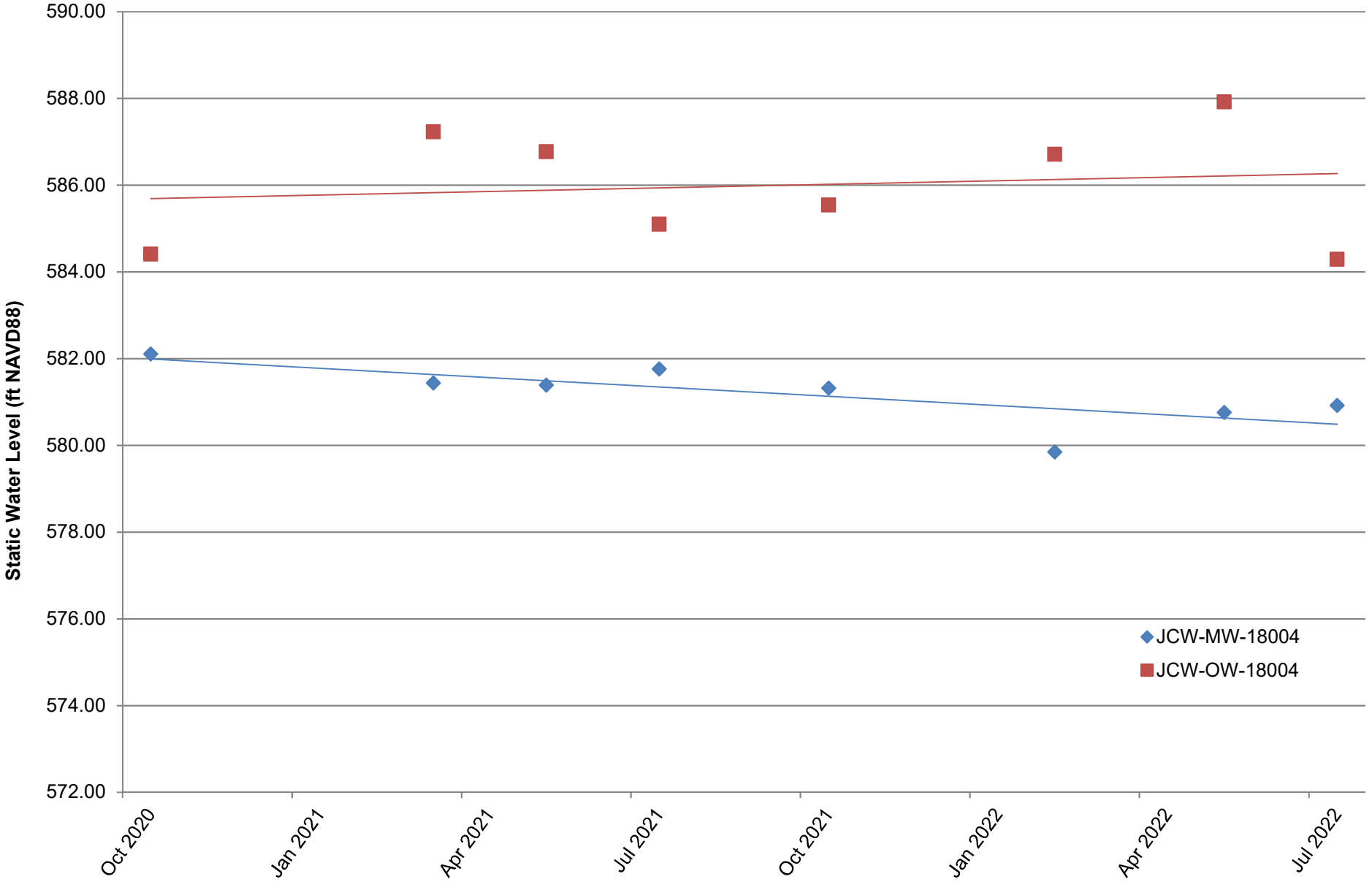
Appendix A
Static Water Level for MW-54R and OW-54



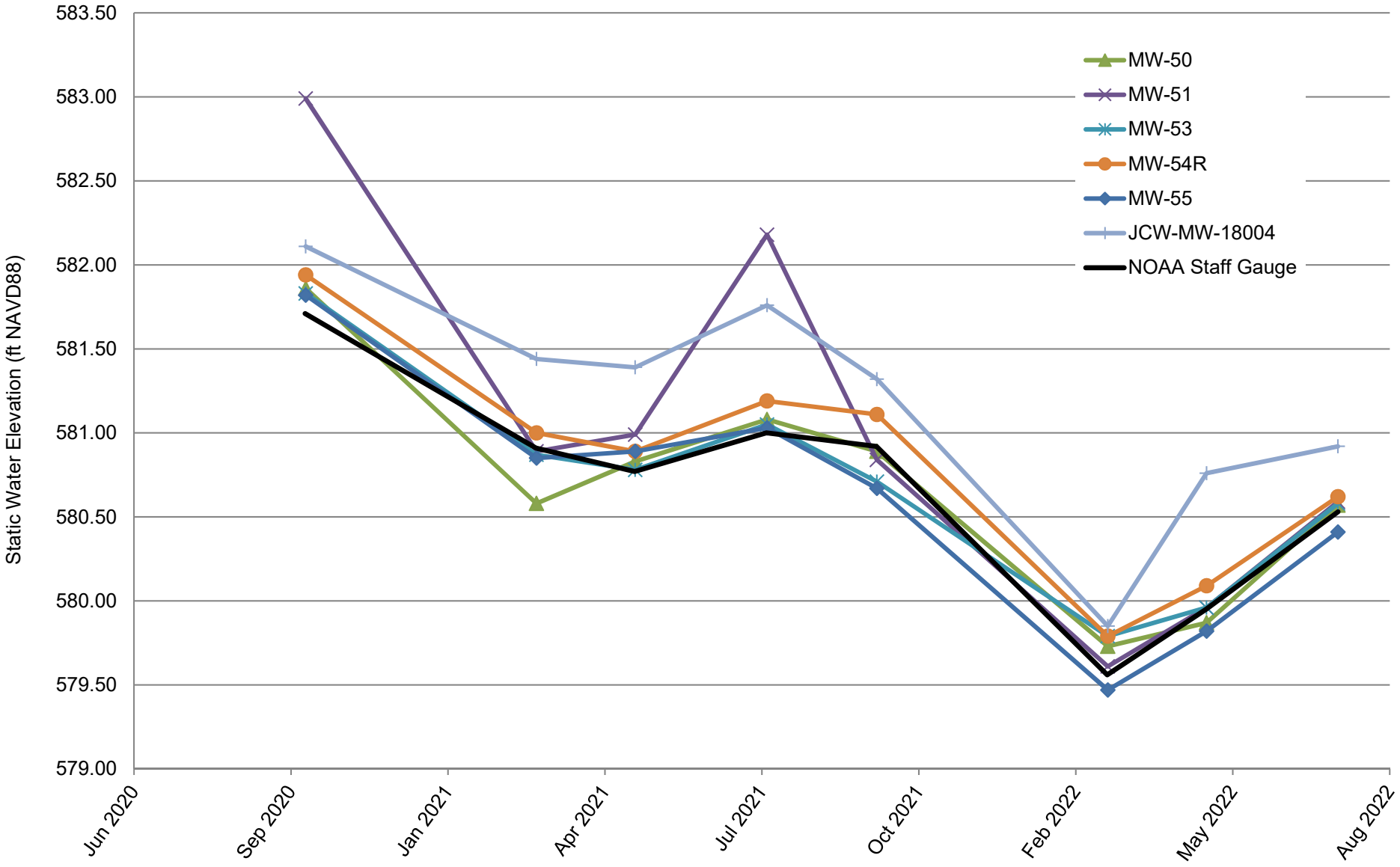
Appendix A
Static Water Level for MW-55 and OW-55



Appendix A
Static Water Level for JCW-MW-18004 and JCW-OW-18004



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 2022
JC Weadock Landfill

Porewater samples were collected by TRC for the August 2022 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) 22-0773.

During the August 2022 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-57R OUT

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, and alkalinity analyses.

This data usability report addresses the following items:

- Usability of the data if quality control (QC) results suggest potential problems with all or some of the data;
- Actions regarding specific QC criteria exceedances.

Review Summary

The data quality objectives and laboratory completeness goals for the project were met, and the data are usable for their intended purpose. A summary of the data quality review, including non-conformances and issues identified in this evaluation, are noted below.

- The reviewed Appendix III, IV, optional Piper Diagram analyses, and additional Part 115 constituents will be utilized for the purposes of the detection and assessment monitoring programs.
- Data are usable for the purposes of the detection and assessment monitoring program.
- When the data are evaluated through the applicable 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 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-JCW-LF-02/ MW-55 and DUP-JCW-LF-01/MW-50; all criteria between the parent and duplicate samples 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

Third Quarter 2022 Quarterly Report

Data from October 2020 to August 2022

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	↑*	O	O	↓*	↓	↓*
Chloride	O	O	O	O	↓*	O
Fluoride	O*	O*	O*	O*	O*	O*
Iron	O	O	O	O	O	O
pH/Corrosivity	O	O	O	O	O	O
Sulfate	↑ ASD	O	O	↓*	↓	↓
Total Dissolved Solids	↑ ASD	O	O	↓*	↓	↓*

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 2022 Hydrogeological Monitoring Report for the Weadock Landfill, TRC, July 2022.)

Appendix C

Detection Monitoring Statistical Summary for JC Weadock Facility

Third Quarter 2022 Quarterly Report

Data from October 2020 to August 2022

Porewater Monitoring Points						
PARAMETER	**MW-52**	**MW-53**	**MW-53R**	**MW-54R**	**MW-55**	**OW-57R OUT**
Boron	O	O	O	↑	O	O
Calcium	O	↓	O	O	O	O
Chloride	O	O	↑*	↑ ASD	O	O
Fluoride	O*	O*	O*	O*	O*	O*
Iron	O	O	O	O	O	O
pH/Corrosivity	O	O	O	O	↓*	O
Sulfate	O	O	O	O	O	O
Total Dissolved Solids	O	↓	O	O	O	O

Notes:

O* = Non-detect (70%)

O = No trend

↑ = Upward trend, continuous

↑* = Upward trend, new

↑ = Upward trend, confirmed

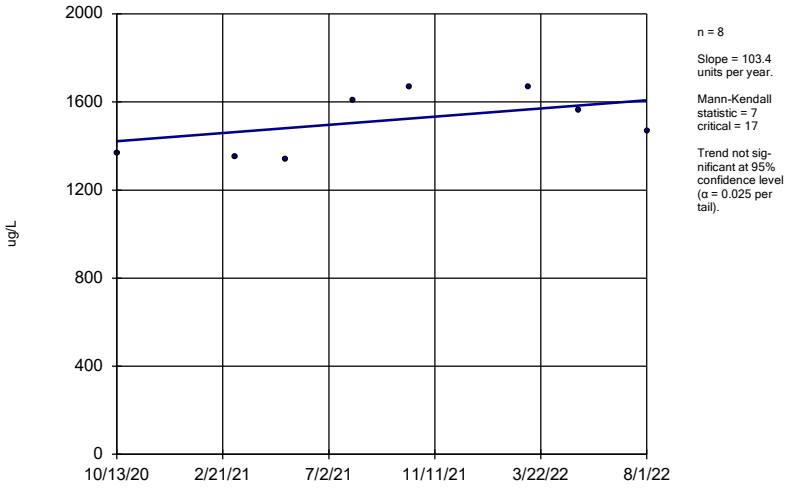
↓ = Downward trend, continuous

↓* = Downward trend, new

↑ ASD = Alternate Source Demonstration (Second Quarter 2022 Hydrogeological Monitoring Report for the Weadock Landfill, TRC, July 2022.)

Boron, Total

JCW-MW-18001



n = 8

Slope = 103.4 units per year.

Mann-Kendall statistic = 7
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

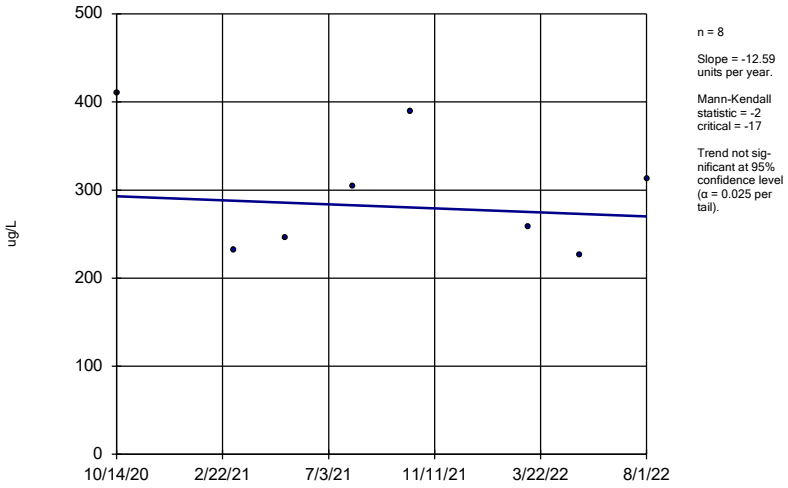
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

JCW-MW-18004



n = 8

Slope = -12.59 units per year.

Mann-Kendall statistic = -2
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

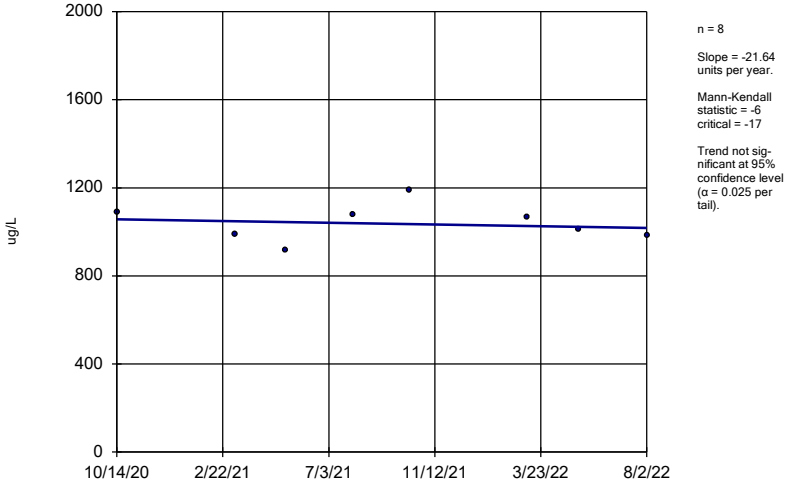
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

JCW-MW-18005



n = 8

Slope = -21.64 units per year.

Mann-Kendall statistic = -6
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

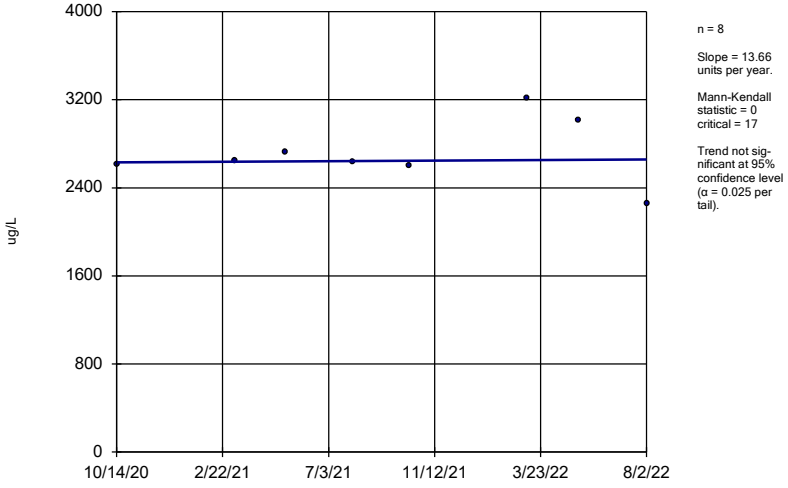
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

JCW-MW-18006



n = 8

Slope = 13.66 units per year.

Mann-Kendall statistic = 0
critical = 17

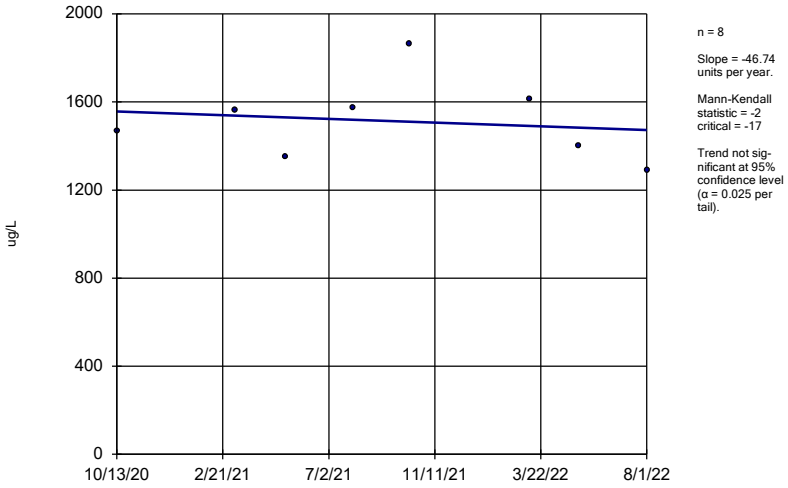
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Boron, Total

MW-50



n = 8

Slope = -46.74 units per year.

Mann-Kendall statistic = -2 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

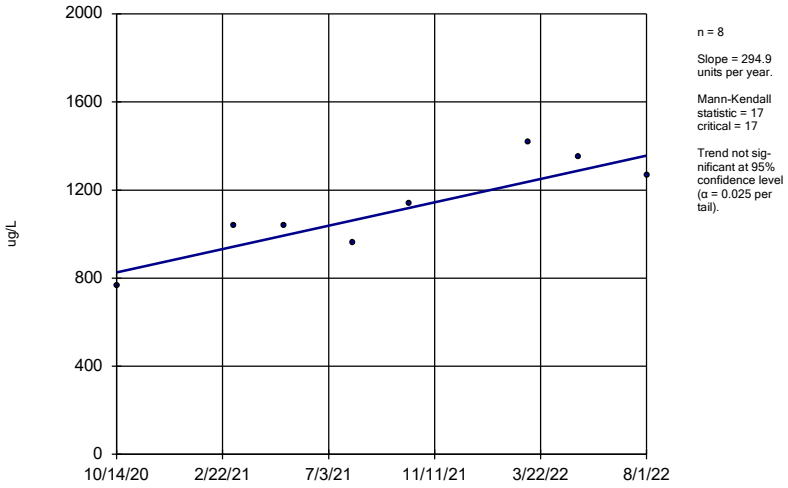
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-51



n = 8

Slope = 294.9 units per year.

Mann-Kendall statistic = 17 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

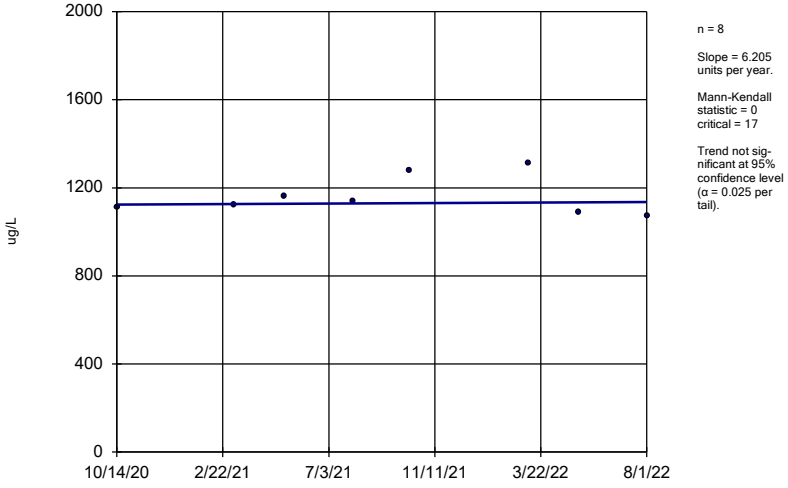
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-52



n = 8

Slope = 6.205 units per year.

Mann-Kendall statistic = 0 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

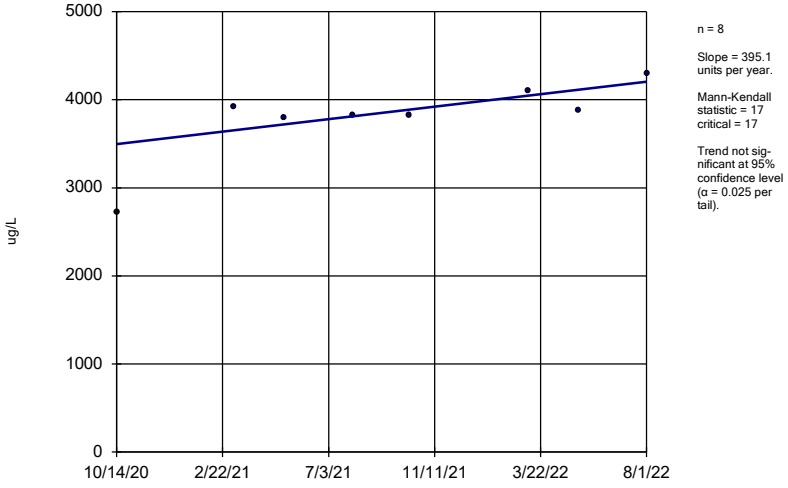
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-53



n = 8

Slope = 395.1 units per year.

Mann-Kendall statistic = 17 critical = 17

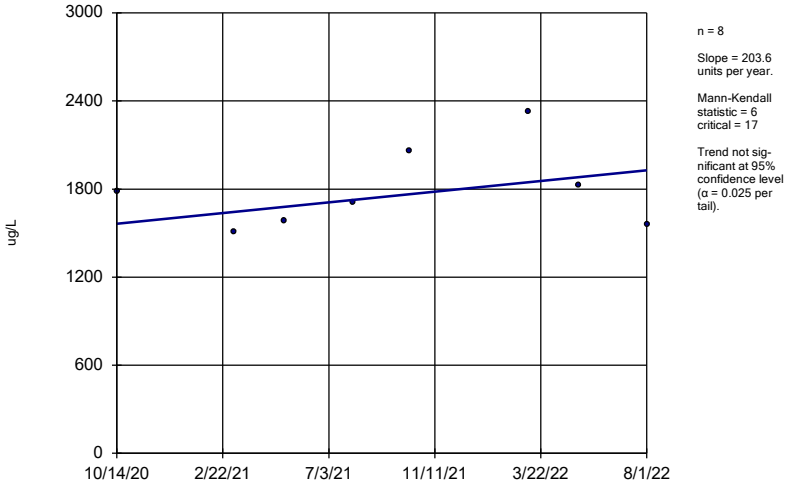
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Boron, Total

MW-53R



n = 8

Slope = 203.6 units per year.

Mann-Kendall statistic = 6 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

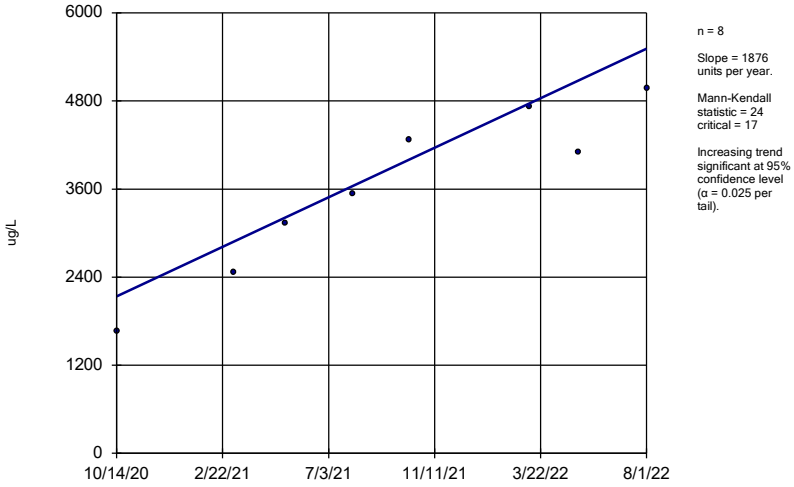
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-54R



n = 8

Slope = 1876 units per year.

Mann-Kendall statistic = 24 critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

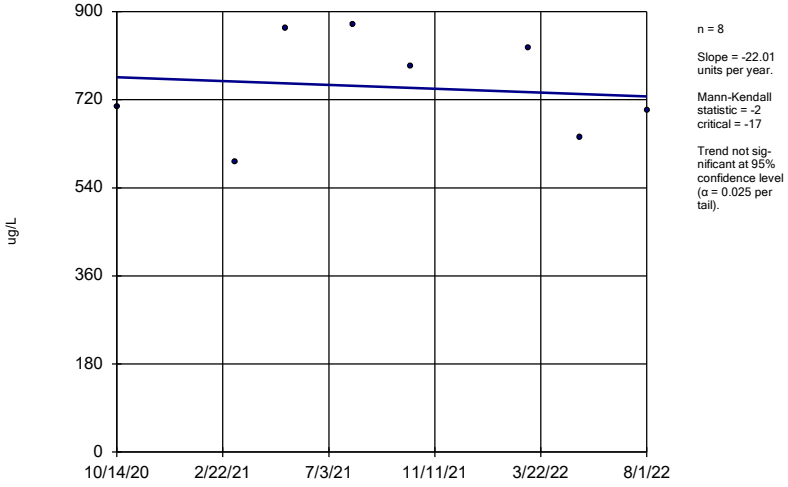
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-55



n = 8

Slope = -22.01 units per year.

Mann-Kendall statistic = -2 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

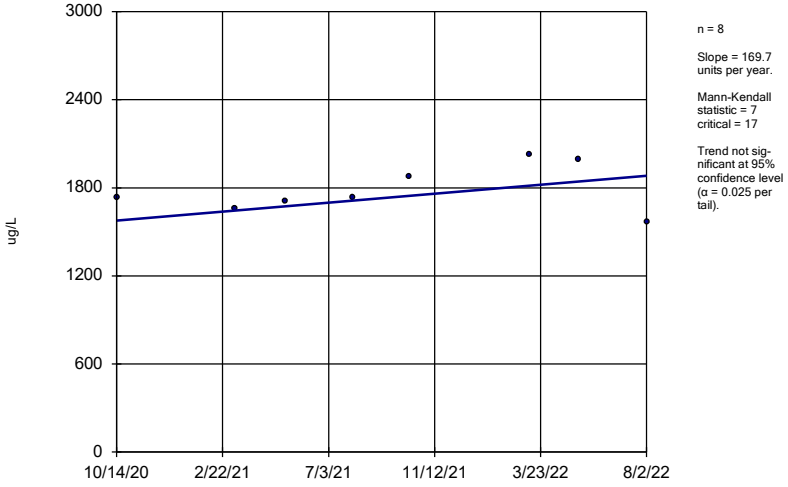
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

OW-57ROUT



n = 8

Slope = 169.7 units per year.

Mann-Kendall statistic = 7 critical = 17

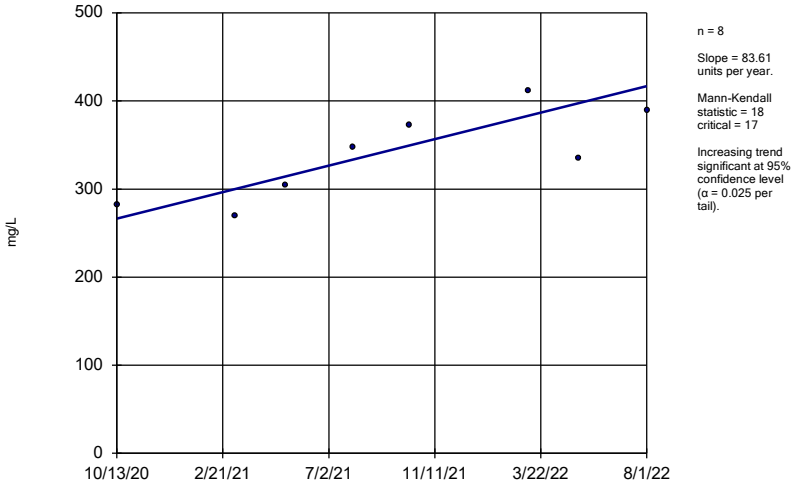
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Calcium, Total

JCW-MW-18001



n = 8

Slope = 83.61 units per year.

Mann-Kendall statistic = 18
critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

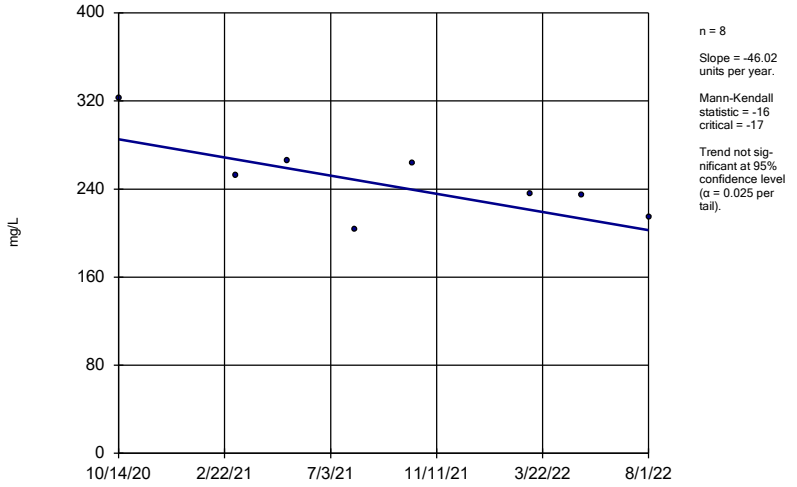
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

JCW-MW-18004



n = 8

Slope = -46.02 units per year.

Mann-Kendall statistic = -16
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

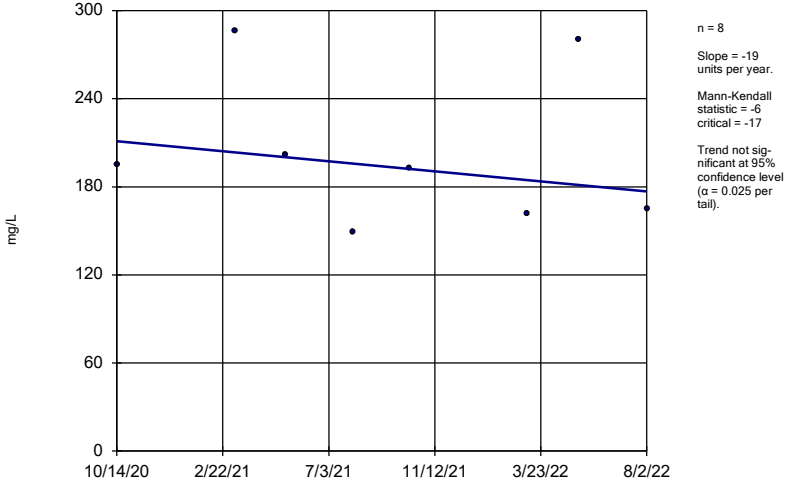
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

JCW-MW-18005



n = 8

Slope = -19 units per year.

Mann-Kendall statistic = -6
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

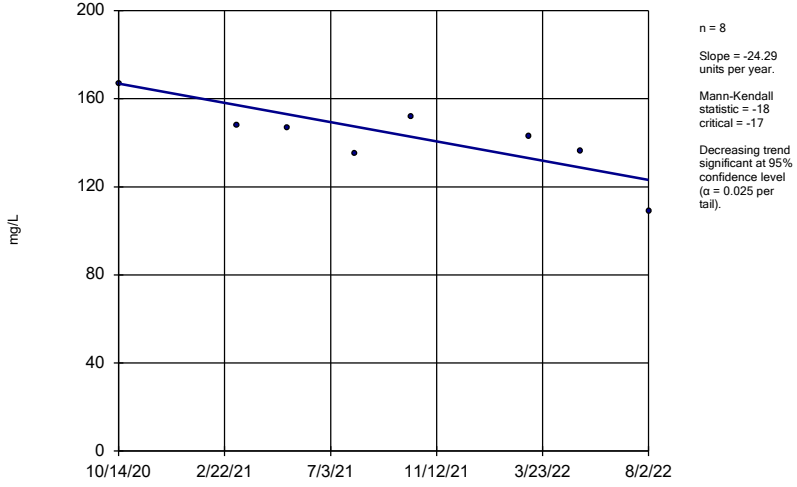
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

JCW-MW-18006



n = 8

Slope = -24.29 units per year.

Mann-Kendall statistic = -18
critical = -17

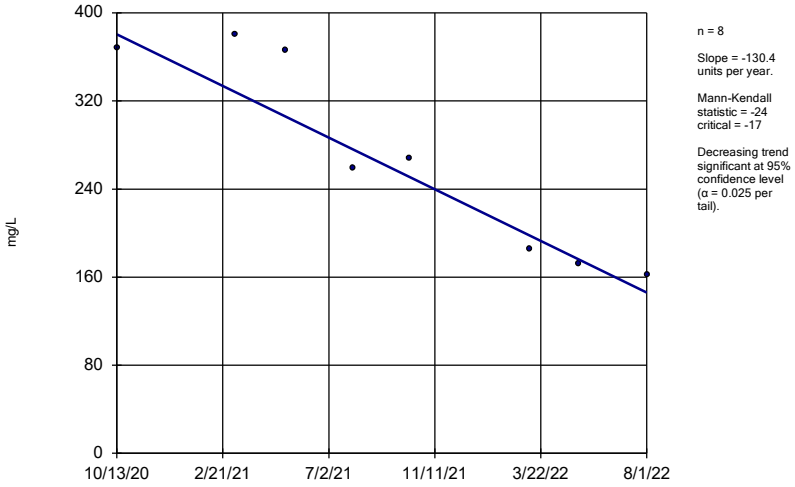
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Calcium, Total

MW-50



n = 8

Slope = -130.4 units per year.

Mann-Kendall statistic = -24 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

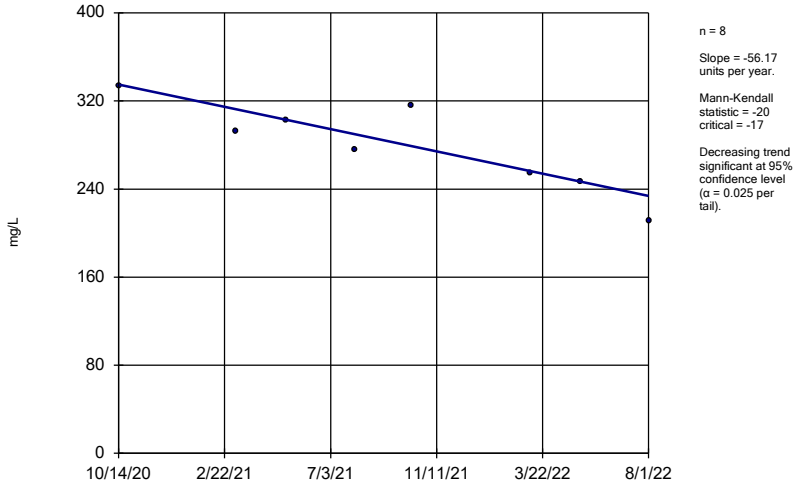
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

MW-51



n = 8

Slope = -56.17 units per year.

Mann-Kendall statistic = -20 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

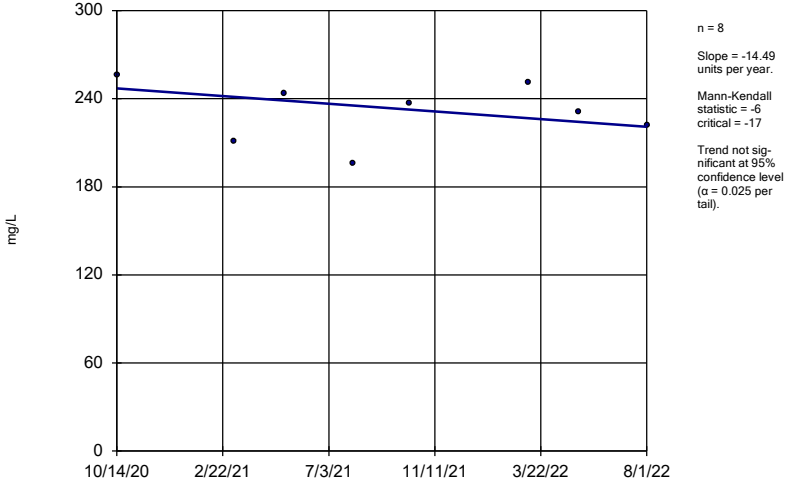
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

MW-52



n = 8

Slope = -14.49 units per year.

Mann-Kendall statistic = -6 critical = -17

Trend not sig-nificant at 95% confidence level (α = 0.025 per tail).

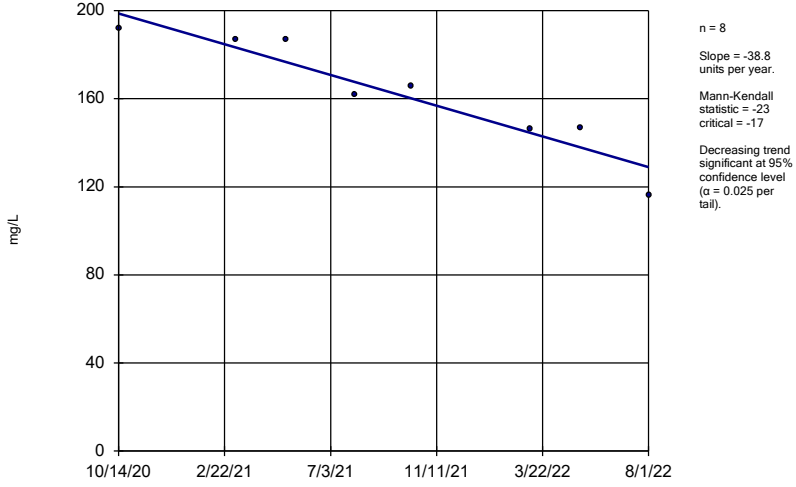
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

MW-53



n = 8

Slope = -38.8 units per year.

Mann-Kendall statistic = -23 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

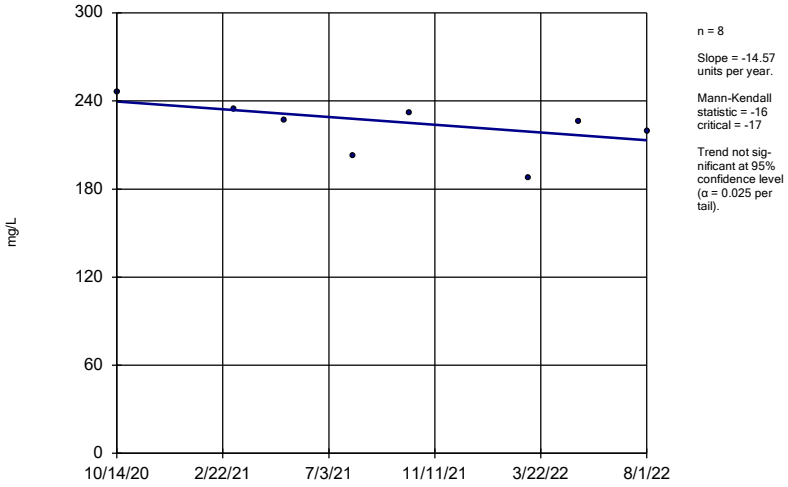
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

MW-53R



n = 8

Slope = -14.57 units per year.

Mann-Kendall statistic = -16 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

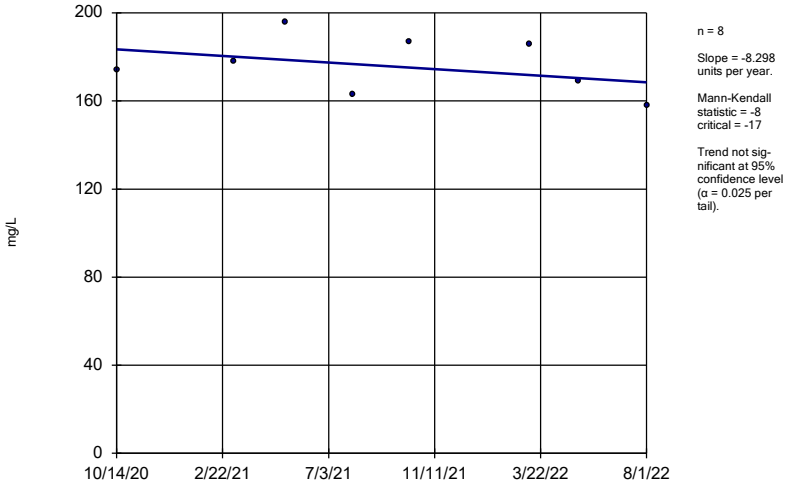
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

MW-54R



n = 8

Slope = -8.298 units per year.

Mann-Kendall statistic = -8 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

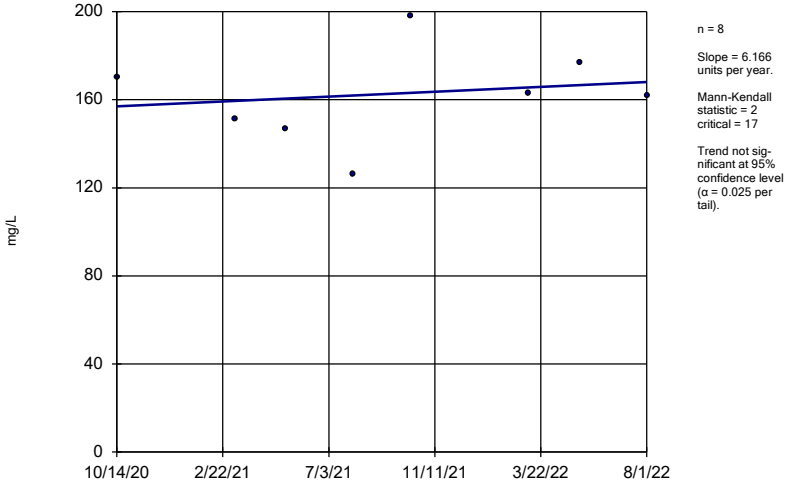
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

MW-55



n = 8

Slope = 6.166 units per year.

Mann-Kendall statistic = 2 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

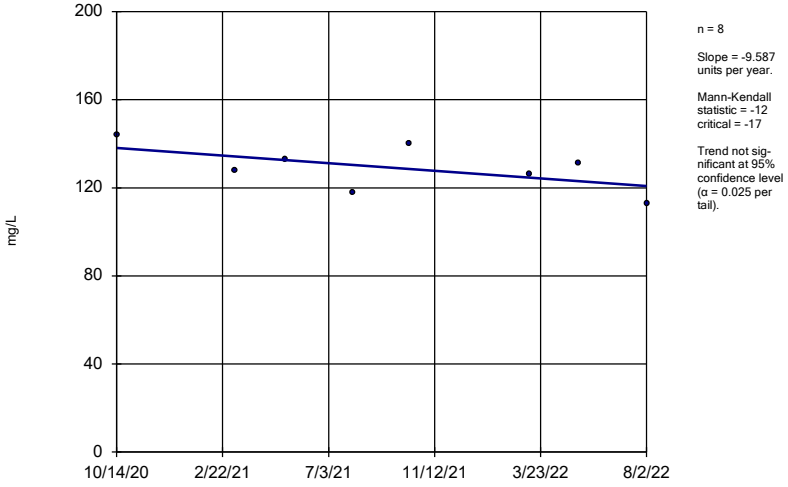
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

OW-57ROUT



n = 8

Slope = -9.587 units per year.

Mann-Kendall statistic = -12 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

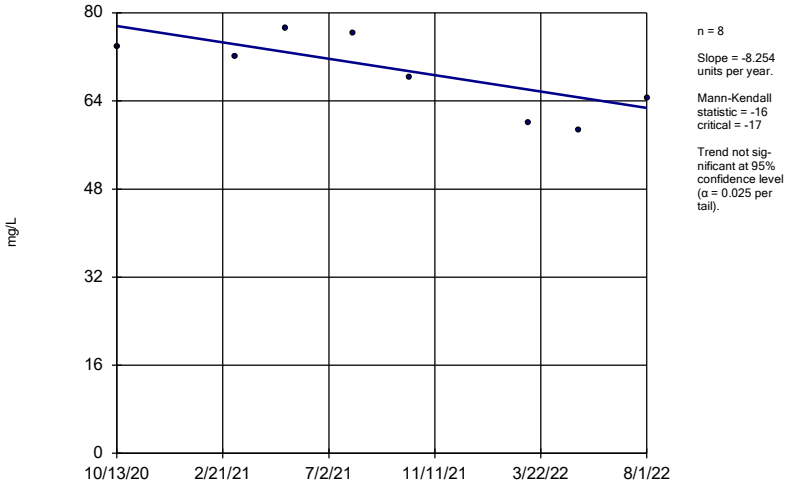
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

JCW-MW-18001



n = 8

Slope = -8.254 units per year.

Mann-Kendall statistic = -16
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

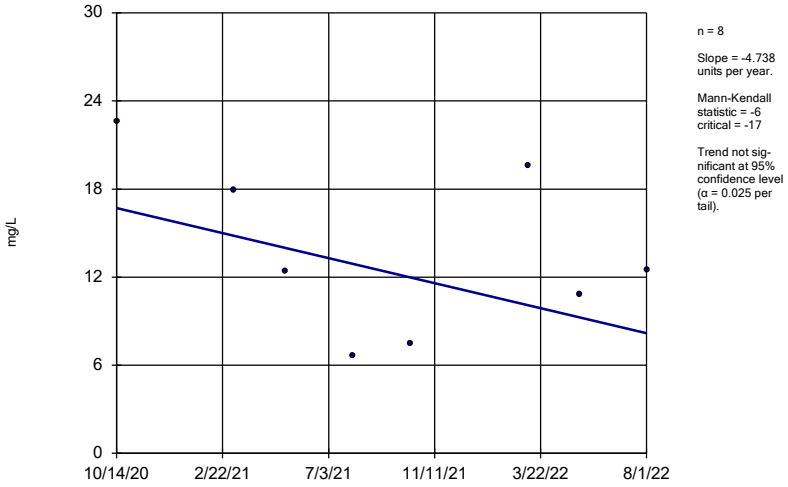
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

JCW-MW-18004



n = 8

Slope = -4.738 units per year.

Mann-Kendall statistic = -6
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

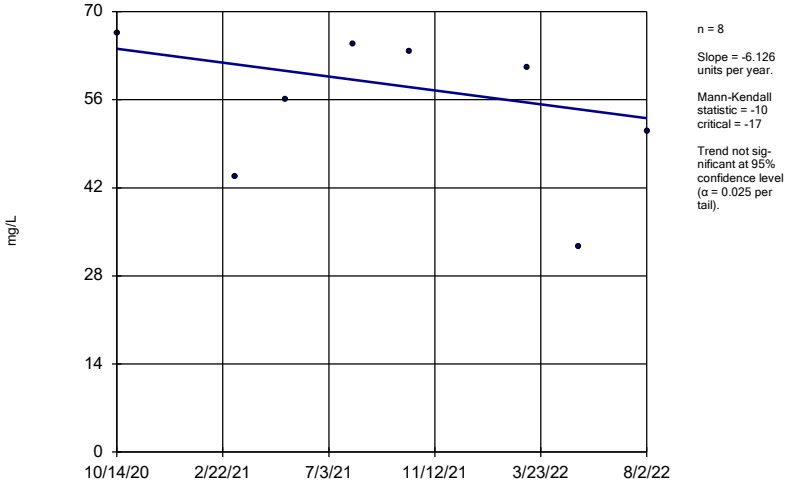
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

JCW-MW-18005



n = 8

Slope = -6.126 units per year.

Mann-Kendall statistic = -10
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

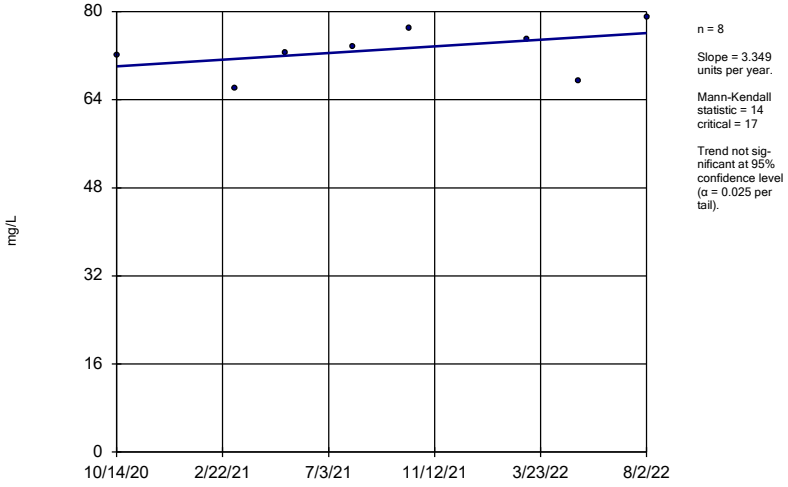
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

JCW-MW-18006



n = 8

Slope = 3.349 units per year.

Mann-Kendall statistic = 14
critical = 17

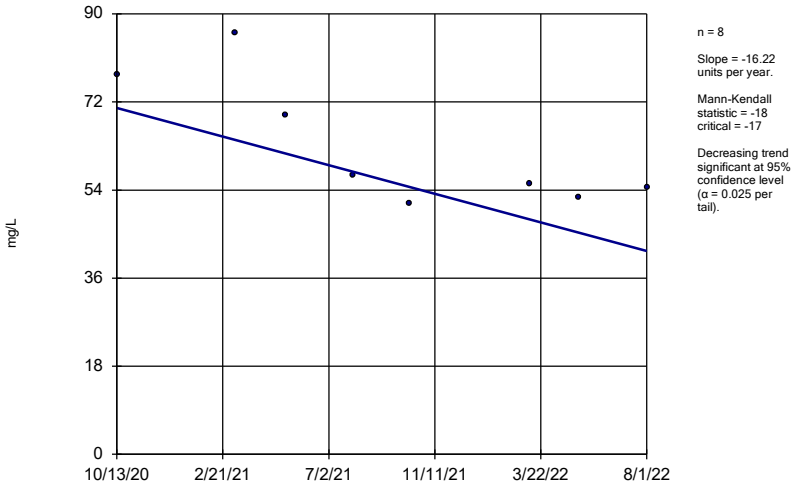
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Chloride

MW-50



n = 8

Slope = -16.22 units per year.

Mann-Kendall statistic = -18
critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

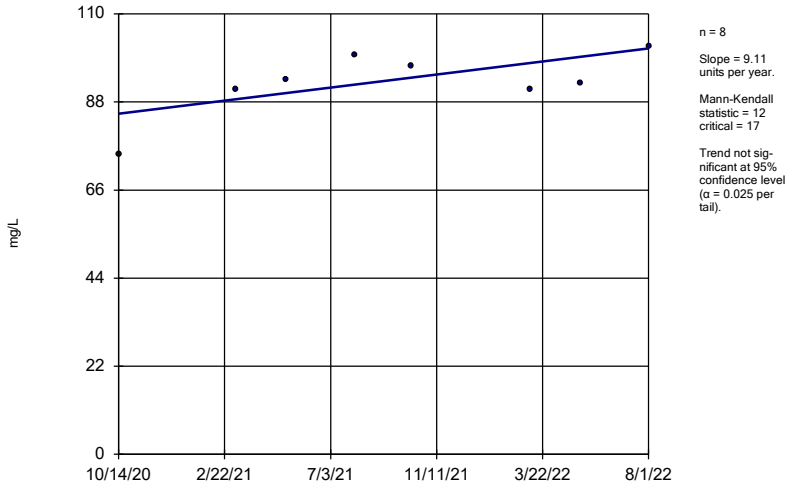
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

MW-51



n = 8

Slope = 9.11 units per year.

Mann-Kendall statistic = 12
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

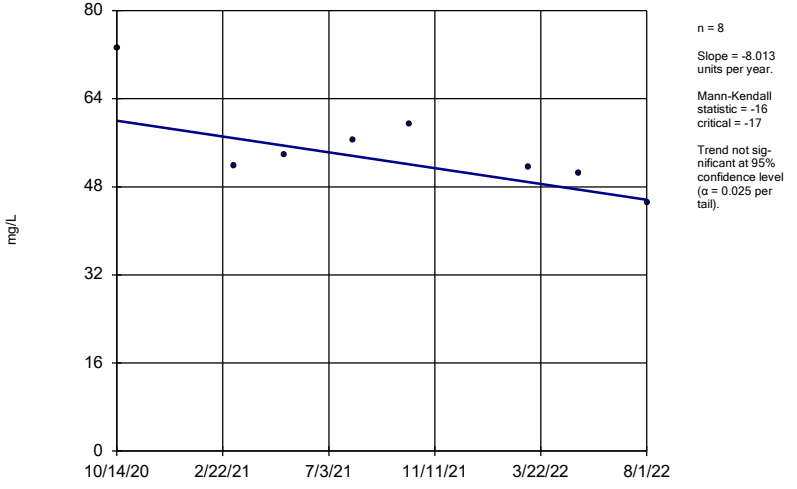
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

MW-52



n = 8

Slope = -8.013 units per year.

Mann-Kendall statistic = -16
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

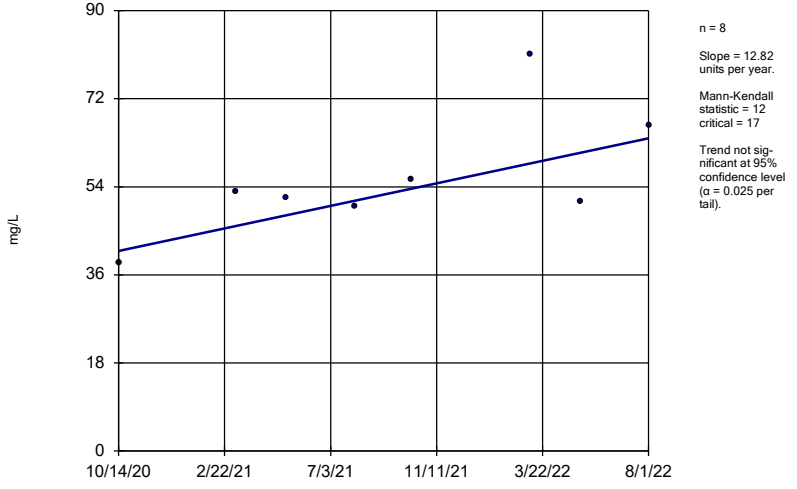
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

MW-53



n = 8

Slope = 12.82 units per year.

Mann-Kendall statistic = 12
critical = 17

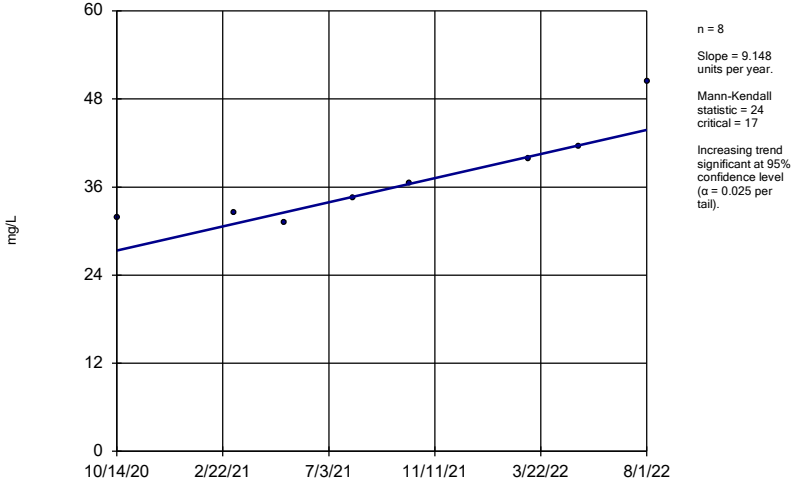
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Chloride

MW-53R



n = 8

Slope = 9.148 units per year.

Mann-Kendall statistic = 24
critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

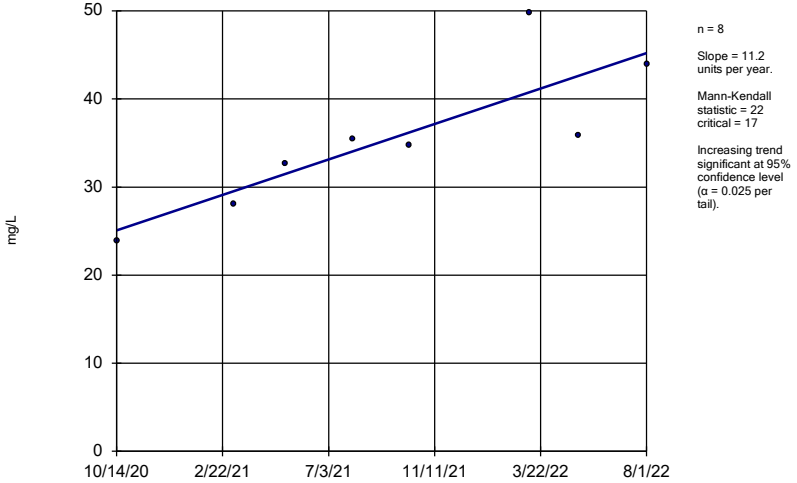
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

MW-54R



n = 8

Slope = 11.2 units per year.

Mann-Kendall statistic = 22
critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

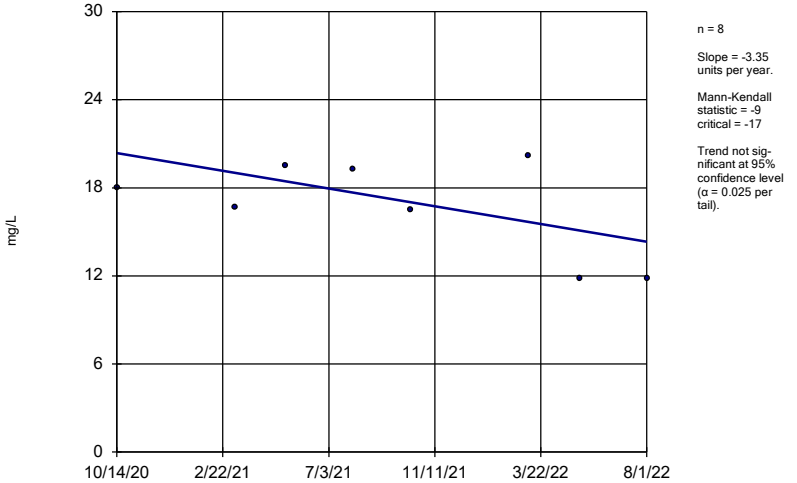
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

MW-55



n = 8

Slope = -3.35 units per year.

Mann-Kendall statistic = -9
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

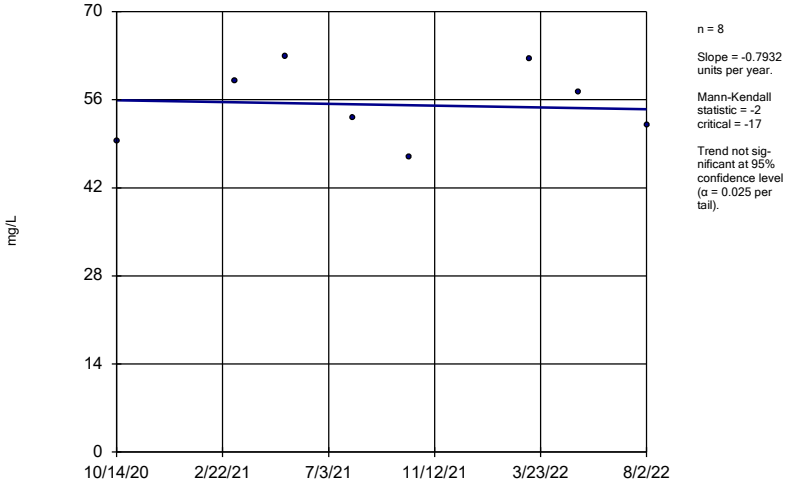
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride

OW-57ROUT



n = 8

Slope = -0.7932 units per year.

Mann-Kendall statistic = -2
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

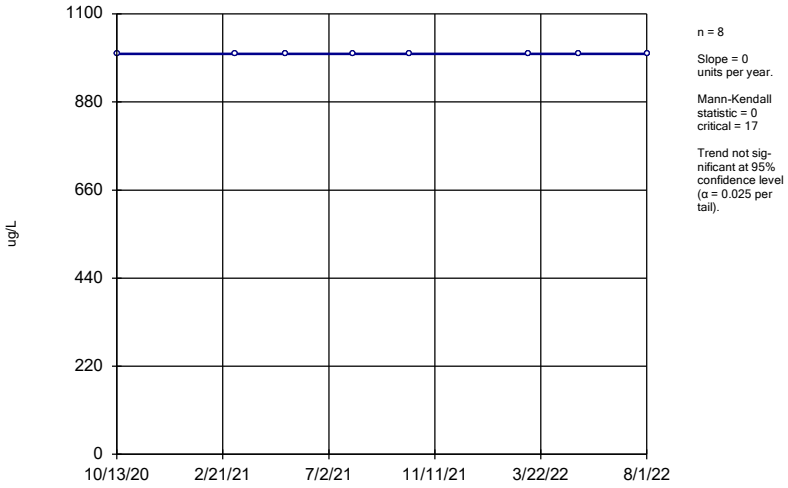
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Fluoride

JCW-MW-18001



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

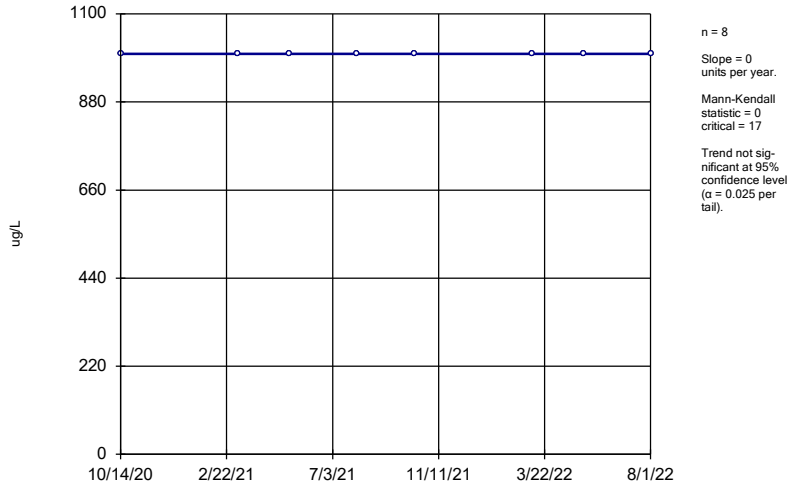
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Fluoride

JCW-MW-18004



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

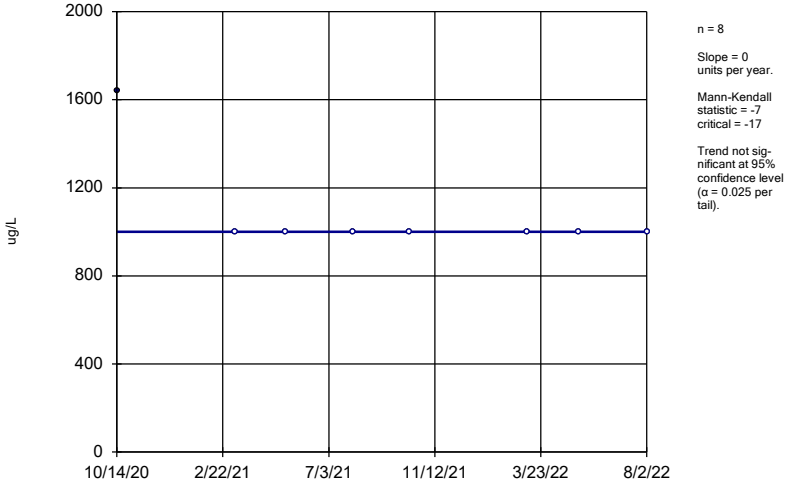
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Fluoride

JCW-MW-18005



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -7 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

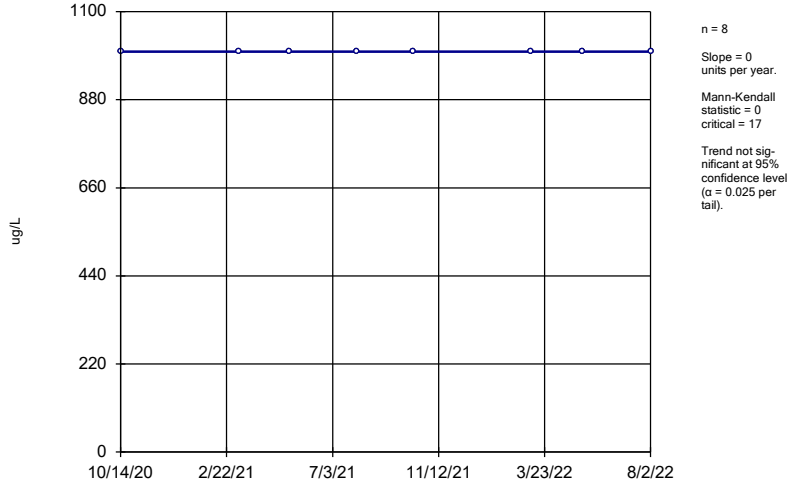
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Fluoride

JCW-MW-18006



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

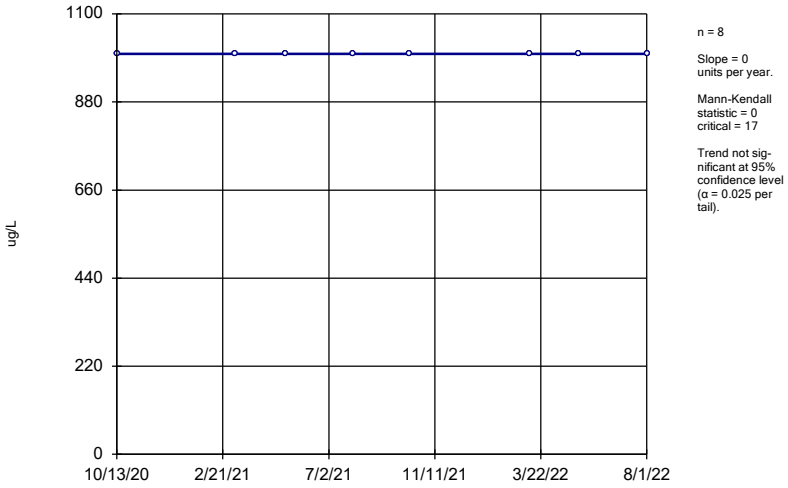
Sen's Slope Estimator Analysis Run 8/31/2022 1:30 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Fluoride

MW-50



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

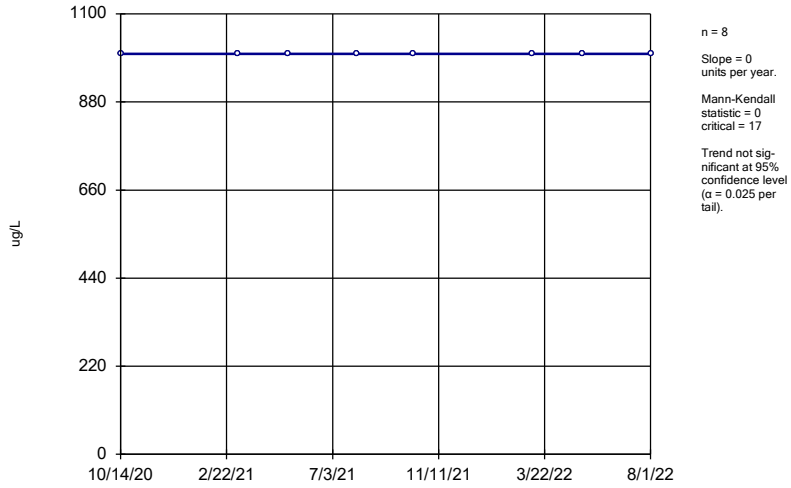
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Fluoride

MW-51



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

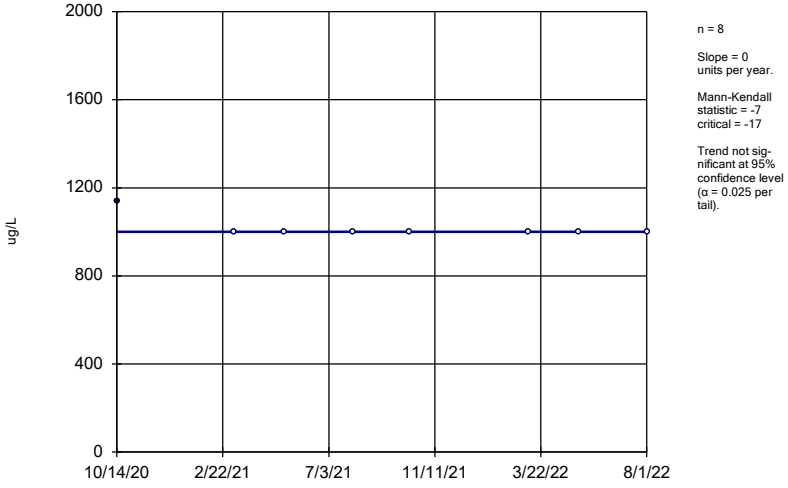
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Fluoride

MW-52



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -7 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

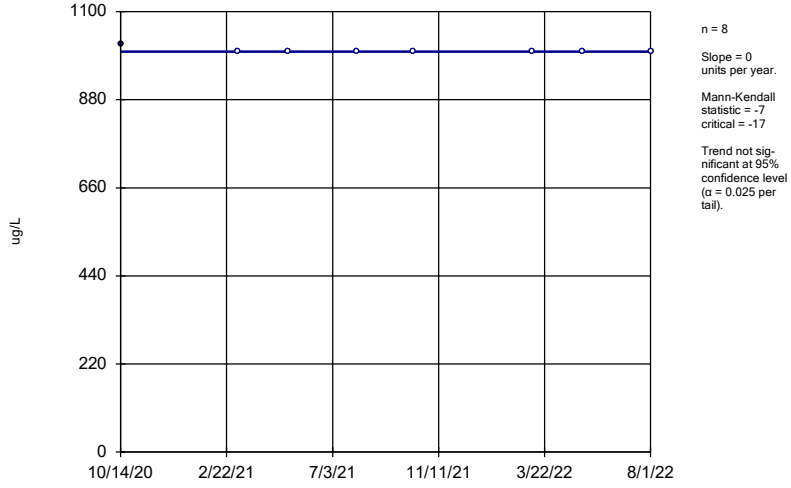
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Fluoride

MW-53



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = -7 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

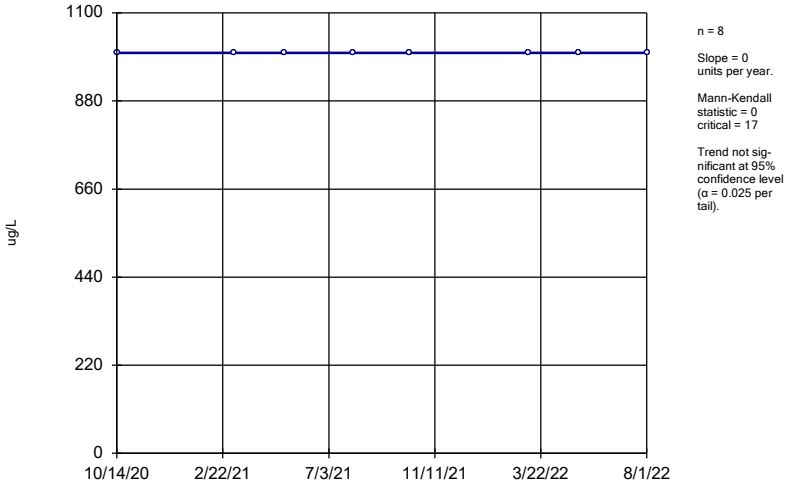
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Fluoride

MW-53R

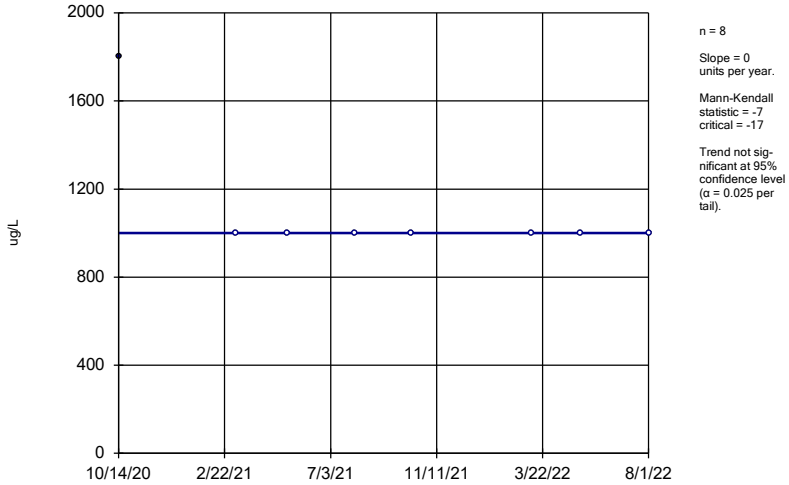


Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Fluoride

MW-54R

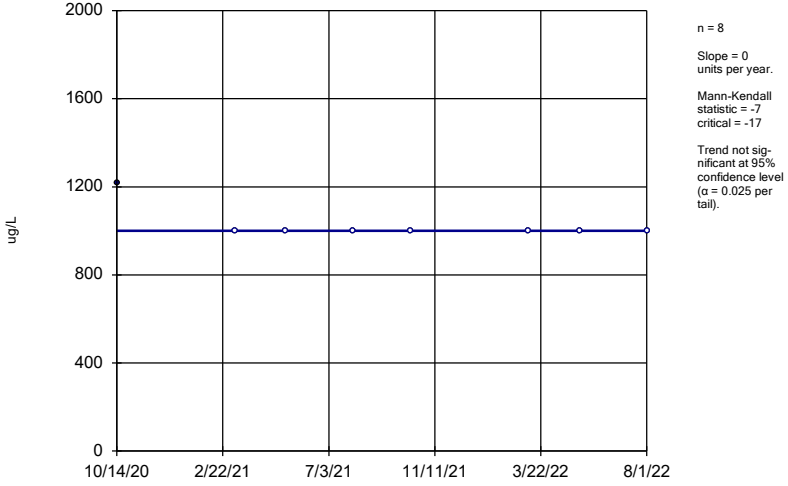


Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Fluoride

MW-55

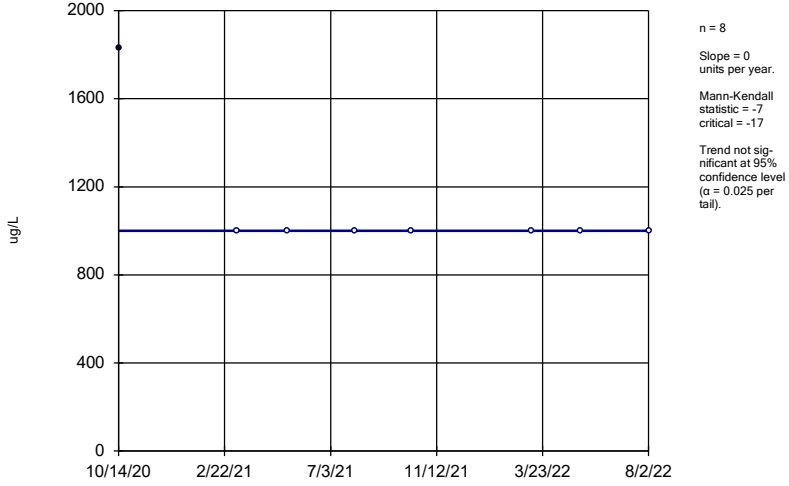


Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Fluoride

OW-57ROUT

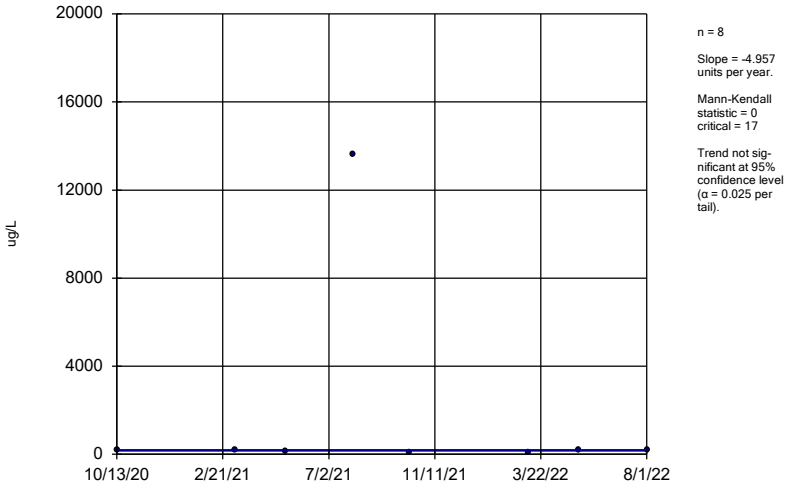


Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

JCW-MW-18001



n = 8

Slope = -4.957 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 8/31/2022 1:31 PM

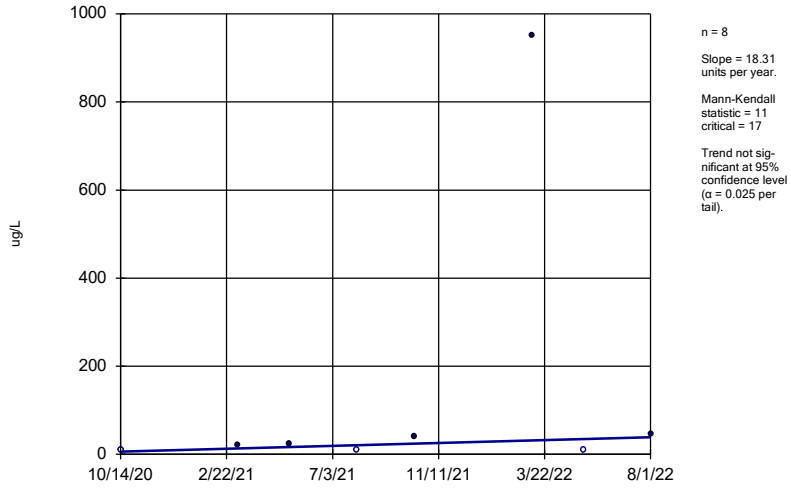
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Hollow symbols indicate censored values.

Iron, Total

JCW-MW-18004



n = 8

Slope = 18.31 units per year.

Mann-Kendall statistic = 11 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

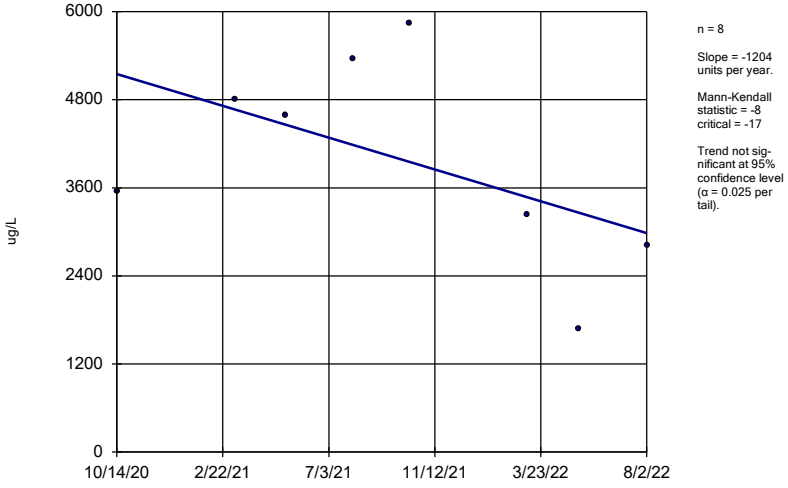
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

JCW-MW-18005



n = 8

Slope = -1204 units per year.

Mann-Kendall statistic = -8 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

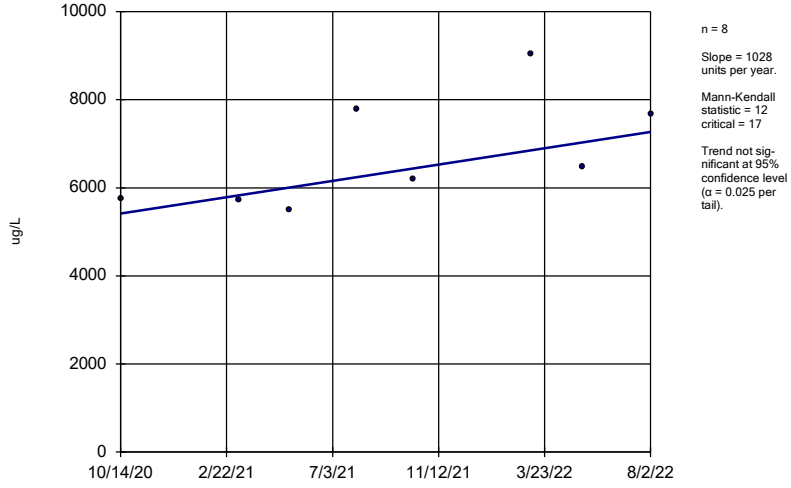
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

JCW-MW-18006



n = 8

Slope = 1028 units per year.

Mann-Kendall statistic = 12 critical = 17

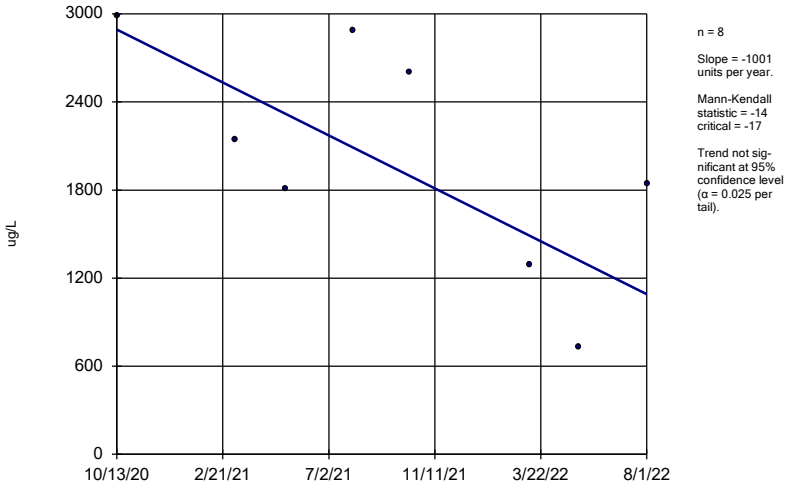
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Iron, Total

MW-50



n = 8

Slope = -1001 units per year.

Mann-Kendall statistic = -14 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

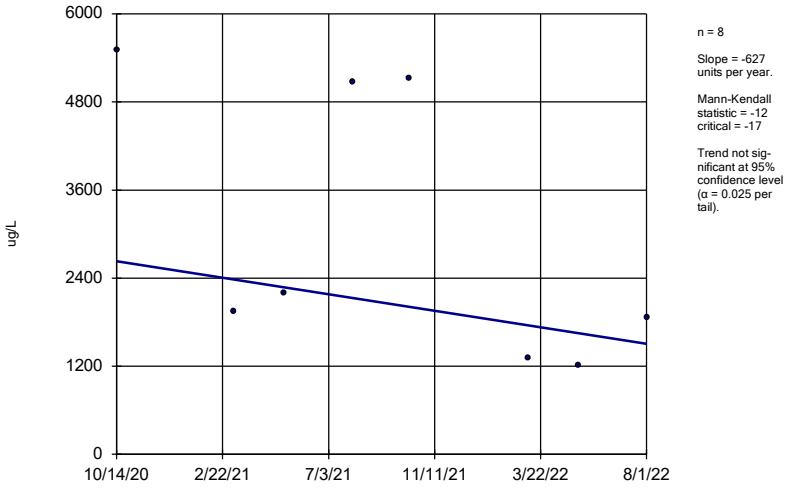
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

MW-51



n = 8

Slope = -627 units per year.

Mann-Kendall statistic = -12 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

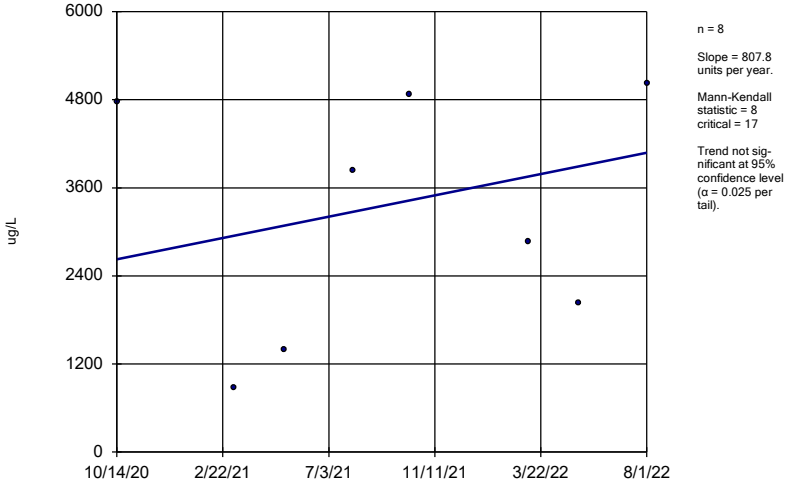
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

MW-52



n = 8

Slope = 807.8 units per year.

Mann-Kendall statistic = 8 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

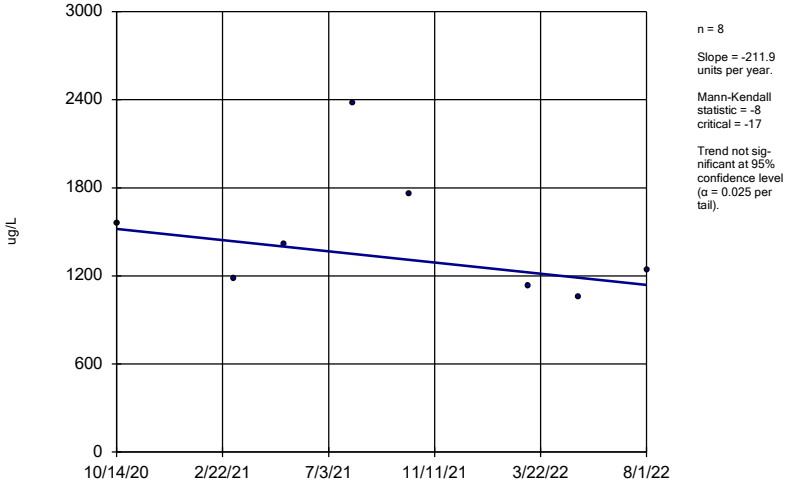
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

MW-53



n = 8

Slope = -211.9 units per year.

Mann-Kendall statistic = -8 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

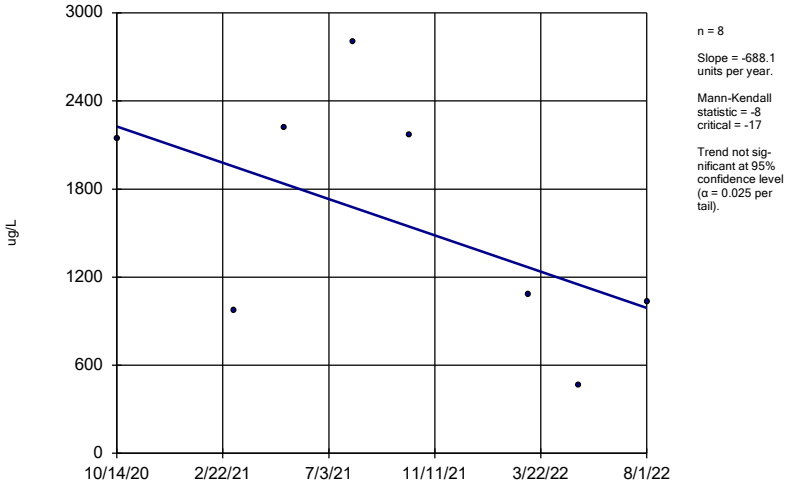
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

MW-53R



n = 8

Slope = -688.1 units per year.

Mann-Kendall statistic = -8 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

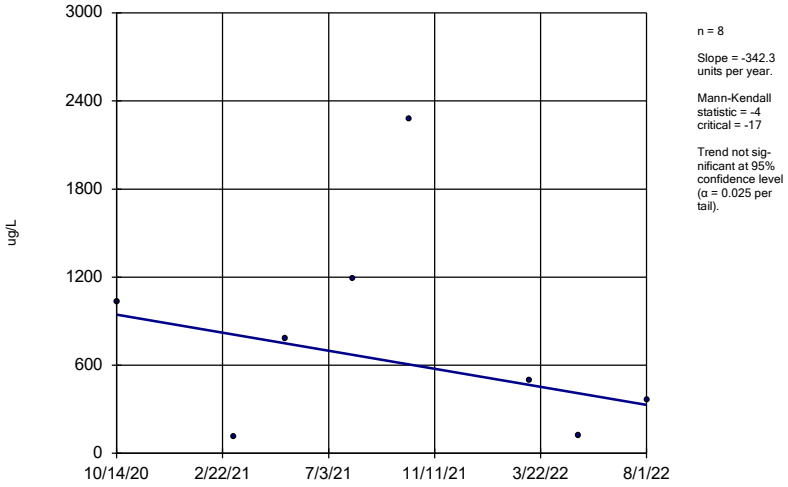
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

MW-54R



n = 8

Slope = -342.3 units per year.

Mann-Kendall statistic = -4 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

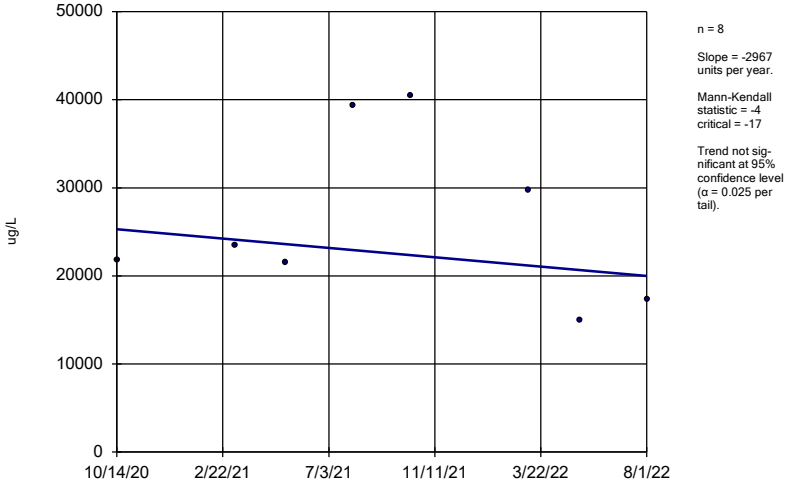
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

MW-55



n = 8

Slope = -2967 units per year.

Mann-Kendall statistic = -4 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

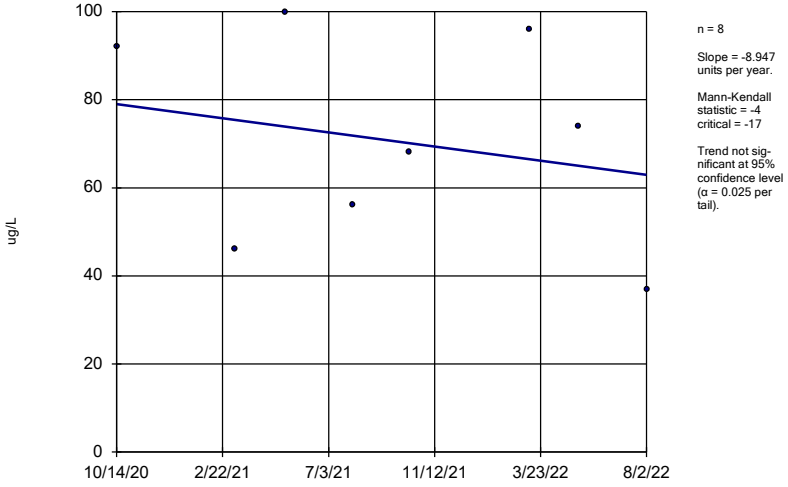
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

OW-57ROUT



n = 8

Slope = -8.947 units per year.

Mann-Kendall statistic = -4 critical = -17

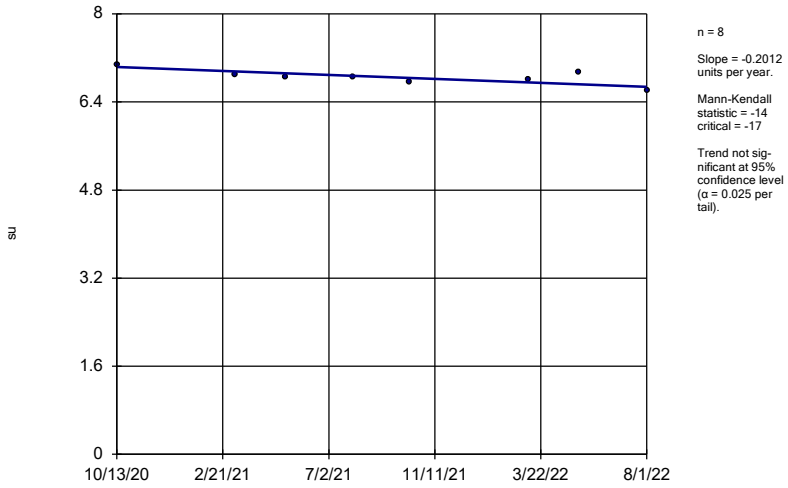
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

pH, Field

JCW-MW-18001



n = 8

Slope = -0.2012 units per year.

Mann-Kendall statistic = -14 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

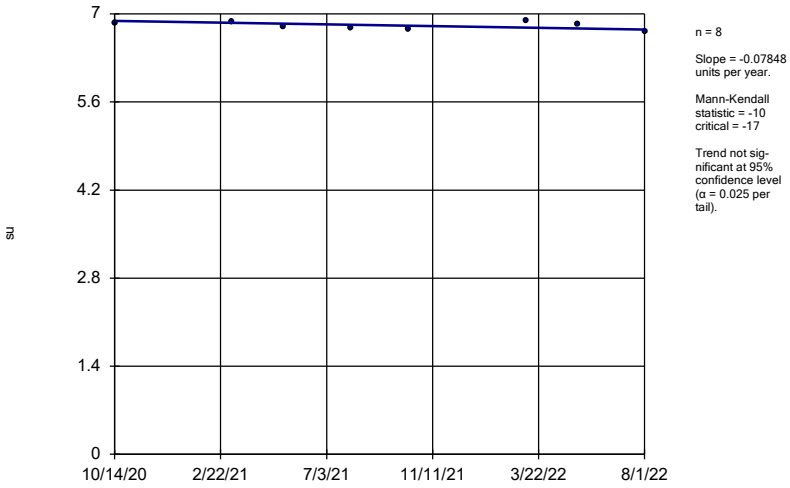
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

JCW-MW-18004



n = 8

Slope = -0.07848 units per year.

Mann-Kendall statistic = -10 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

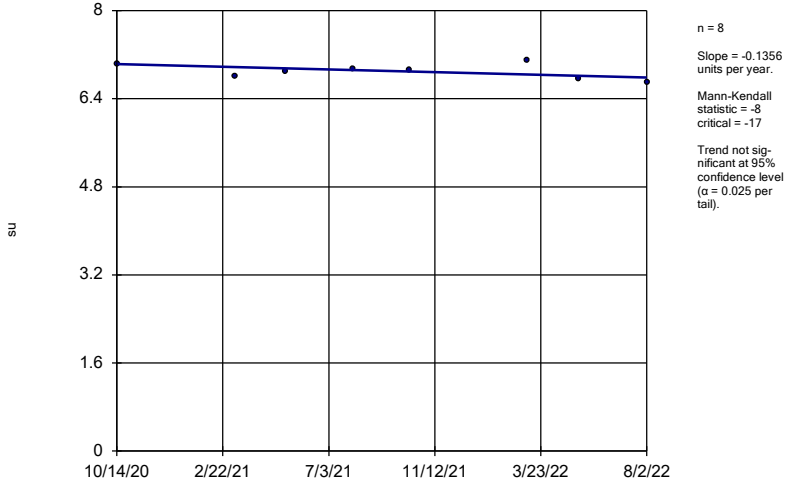
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

JCW-MW-18005



n = 8

Slope = -0.1356 units per year.

Mann-Kendall statistic = -8 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

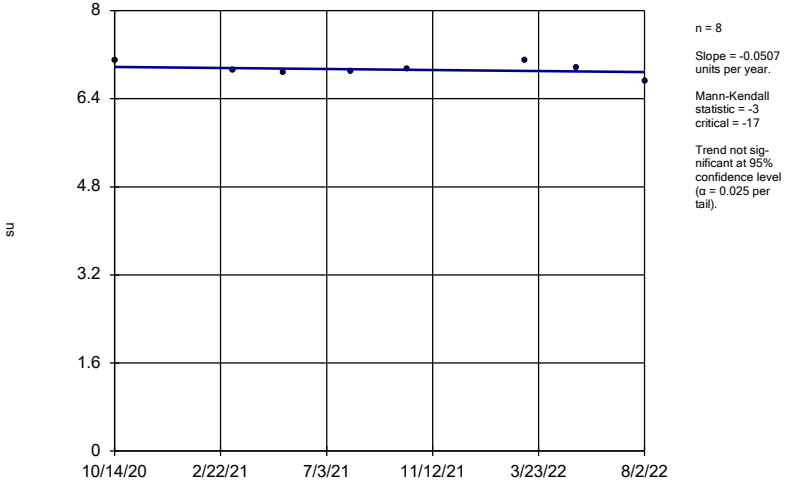
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

JCW-MW-18006



n = 8

Slope = -0.0507 units per year.

Mann-Kendall statistic = -3 critical = -17

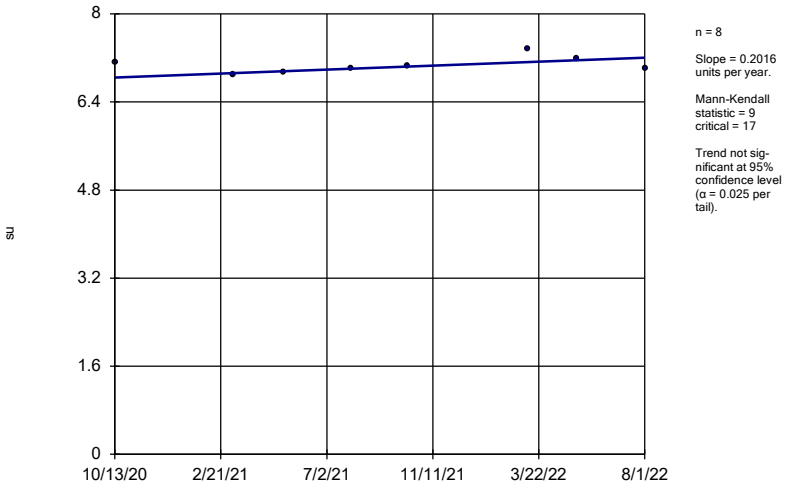
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

pH, Field

MW-50



n = 8

Slope = 0.2016 units per year.

Mann-Kendall statistic = 9 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

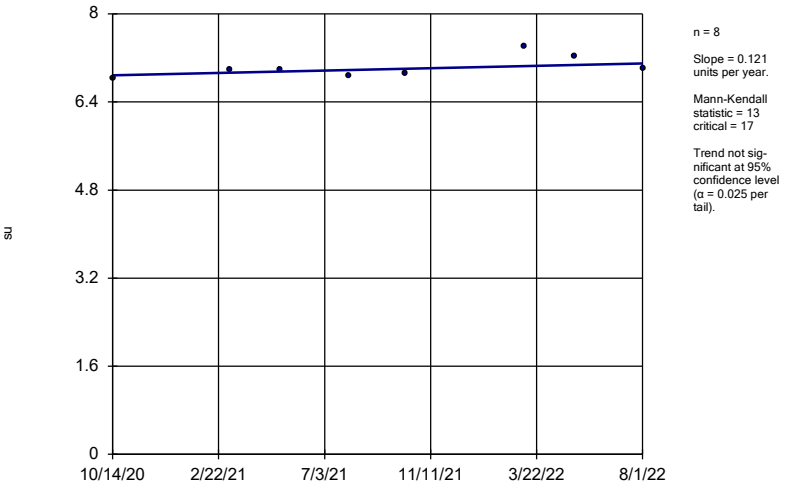
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

MW-51



n = 8

Slope = 0.121 units per year.

Mann-Kendall statistic = 13 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

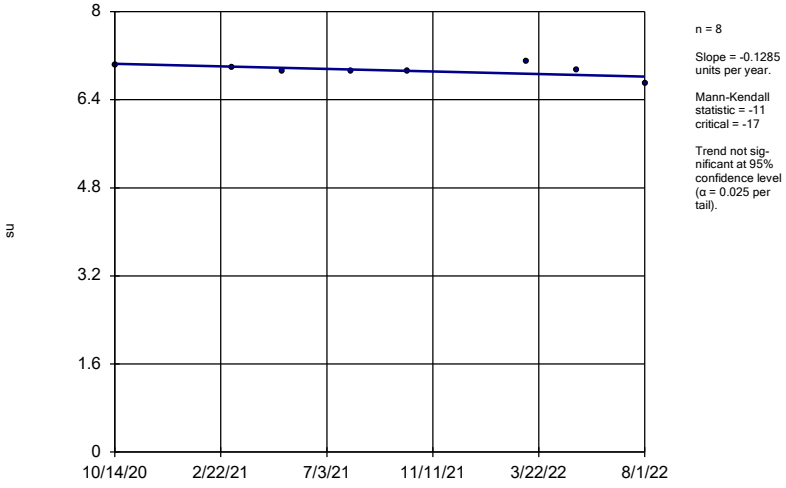
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

MW-52



n = 8

Slope = -0.1285 units per year.

Mann-Kendall statistic = -11 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

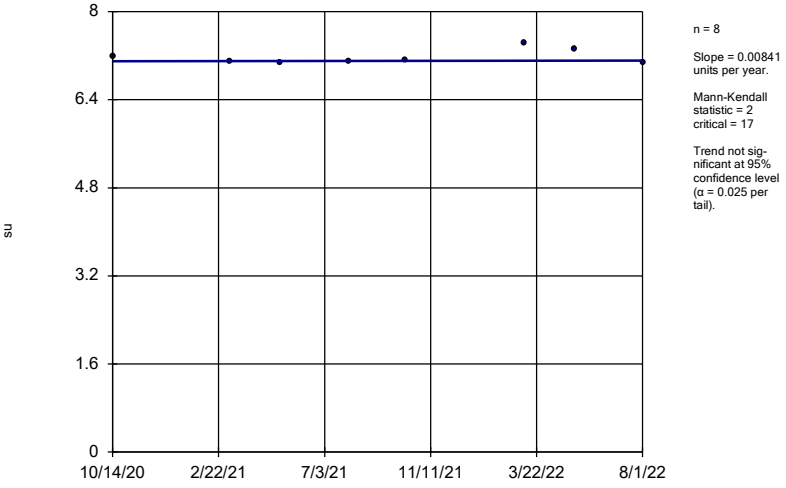
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

MW-53



n = 8

Slope = 0.00841 units per year.

Mann-Kendall statistic = 2 critical = 17

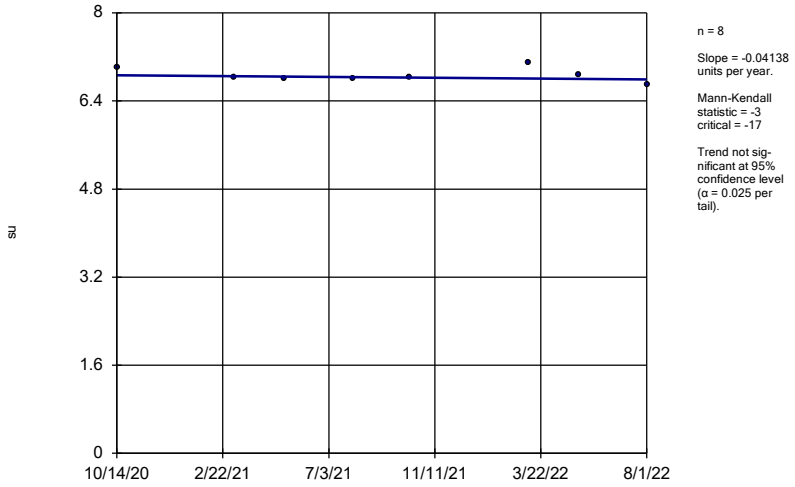
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

pH, Field

MW-53R



n = 8

Slope = -0.04138 units per year.

Mann-Kendall statistic = -3
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

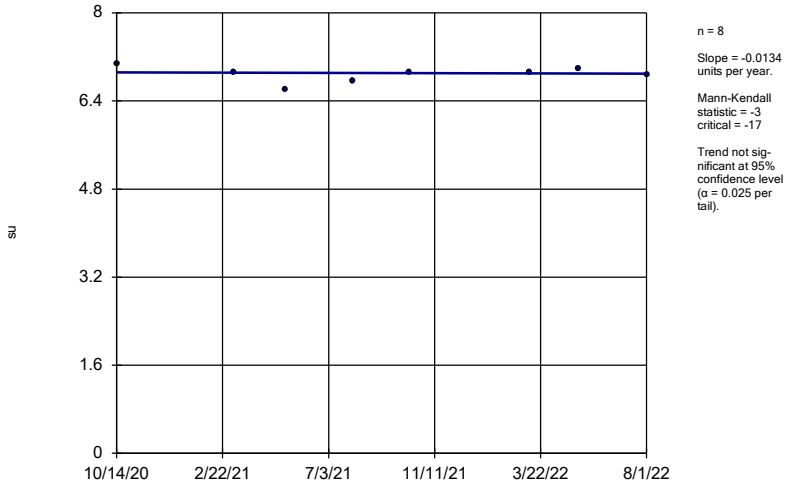
Sen's Slope Estimator Analysis Run 9/6/2022 10:06 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

MW-54R



n = 8

Slope = -0.0134 units per year.

Mann-Kendall statistic = -3
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

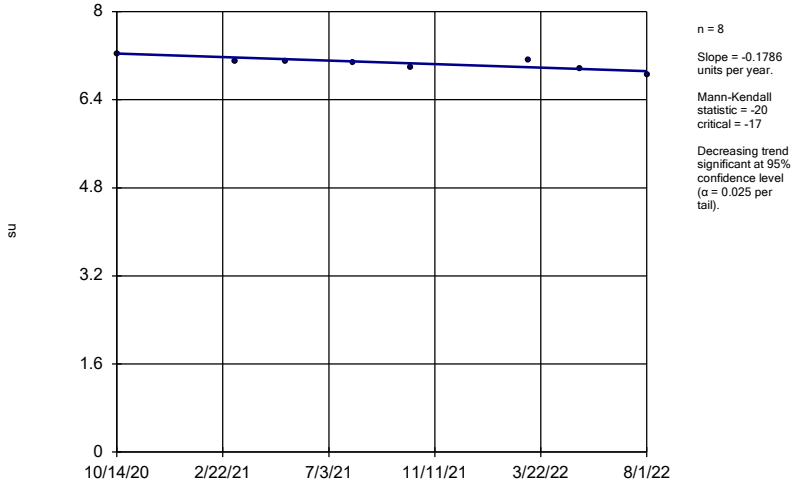
Sen's Slope Estimator Analysis Run 9/6/2022 10:06 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

MW-55



n = 8

Slope = -0.1786 units per year.

Mann-Kendall statistic = -20
critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

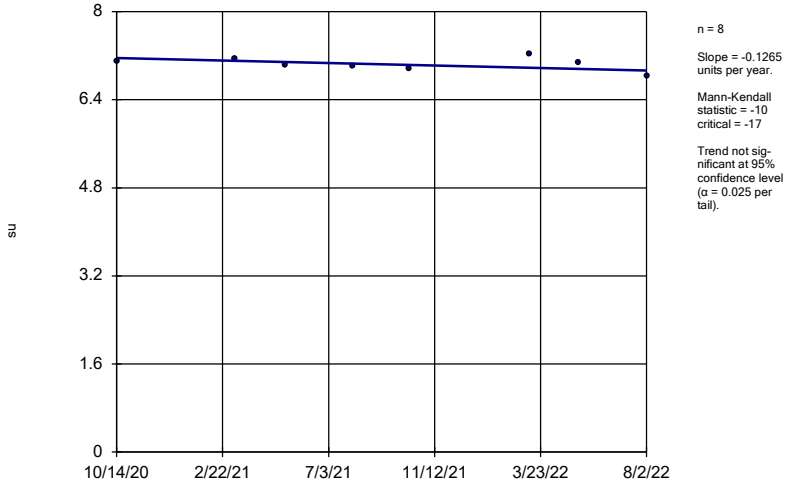
Sen's Slope Estimator Analysis Run 9/6/2022 10:06 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

pH, Field

OW-57ROUT



n = 8

Slope = -0.1265 units per year.

Mann-Kendall statistic = -10
critical = -17

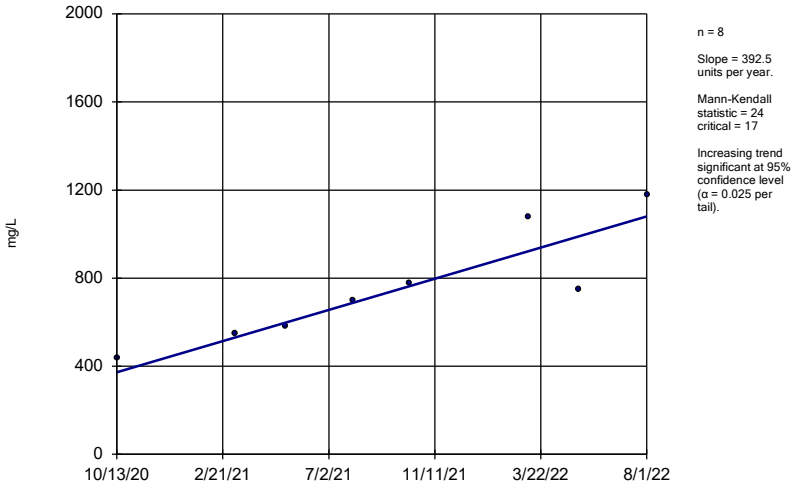
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 9/6/2022 10:06 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sulfate

JCW-MW-18001



n = 8

Slope = 392.5 units per year.

Mann-Kendall statistic = 24 critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

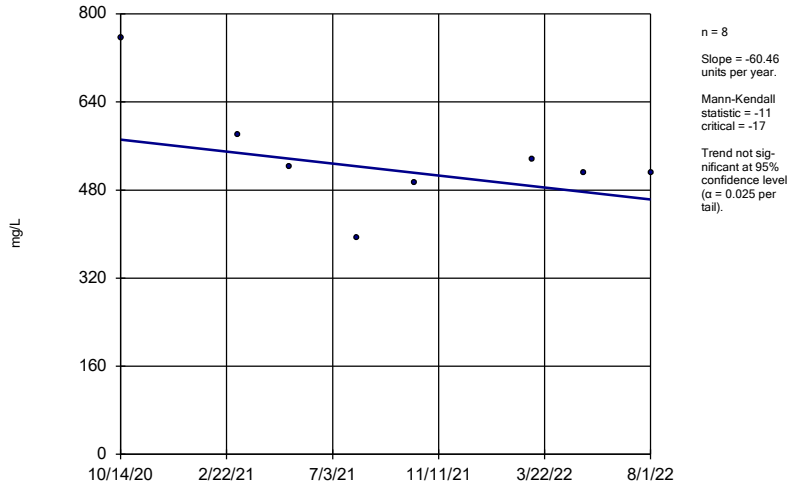
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

JCW-MW-18004



n = 8

Slope = -60.46 units per year.

Mann-Kendall statistic = -11 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

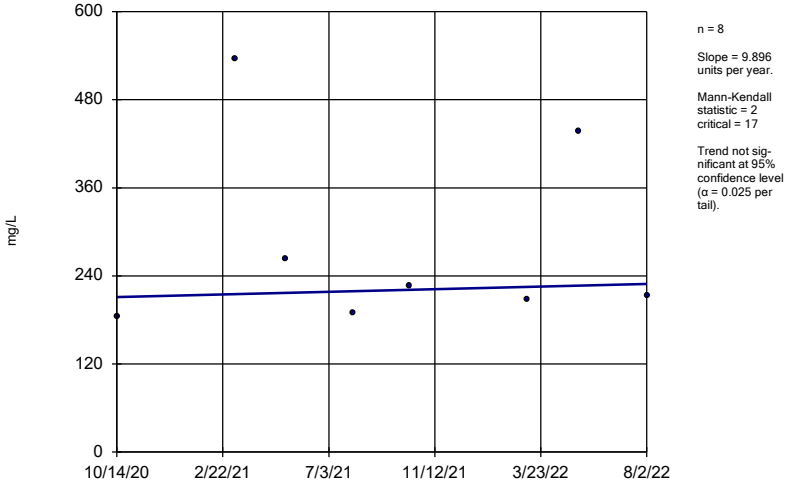
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

JCW-MW-18005



n = 8

Slope = 9.896 units per year.

Mann-Kendall statistic = 2 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

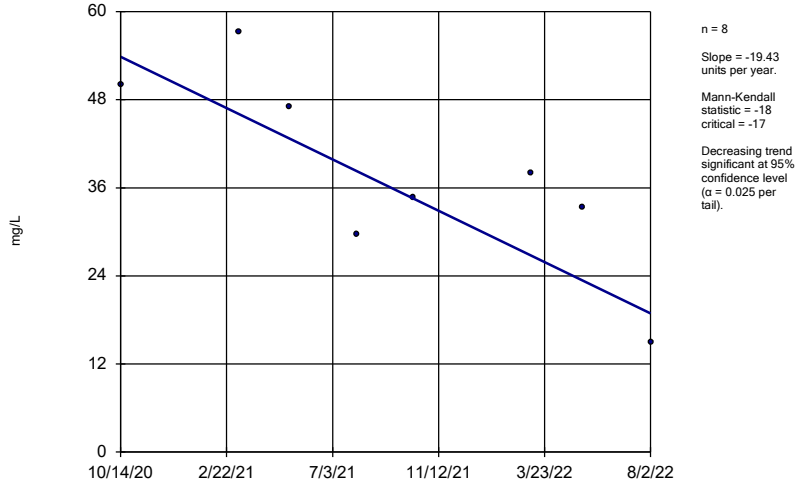
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

JCW-MW-18006



n = 8

Slope = -19.43 units per year.

Mann-Kendall statistic = -18 critical = -17

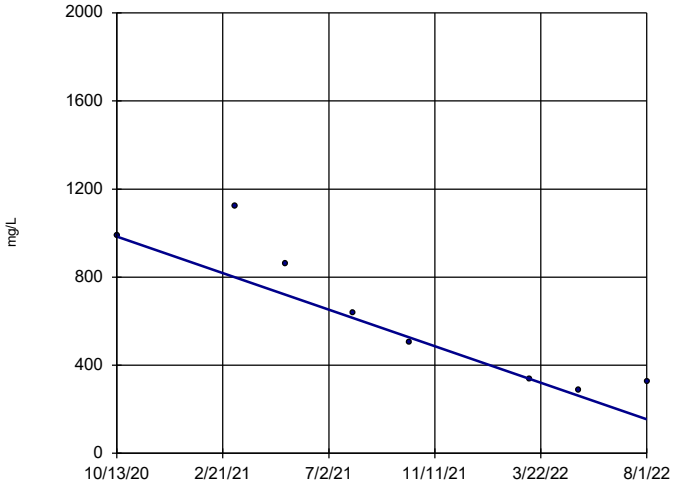
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sulfate

MW-50



n = 8

Slope = -461.3 units per year.

Mann-Kendall statistic = -24 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

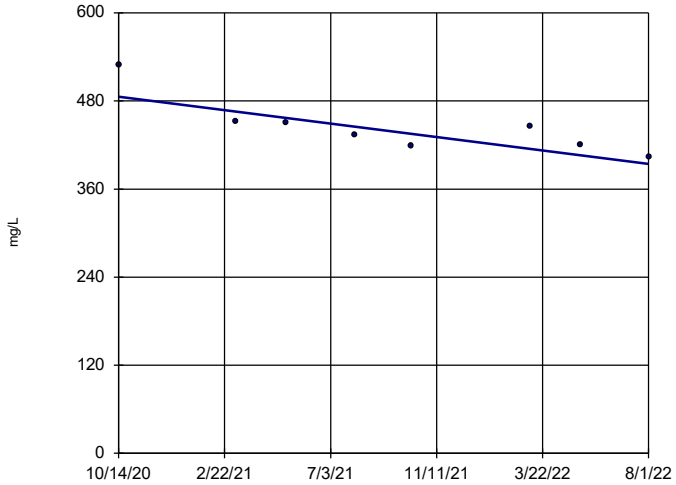
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

MW-51



n = 8

Slope = -50.94 units per year.

Mann-Kendall statistic = -22 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

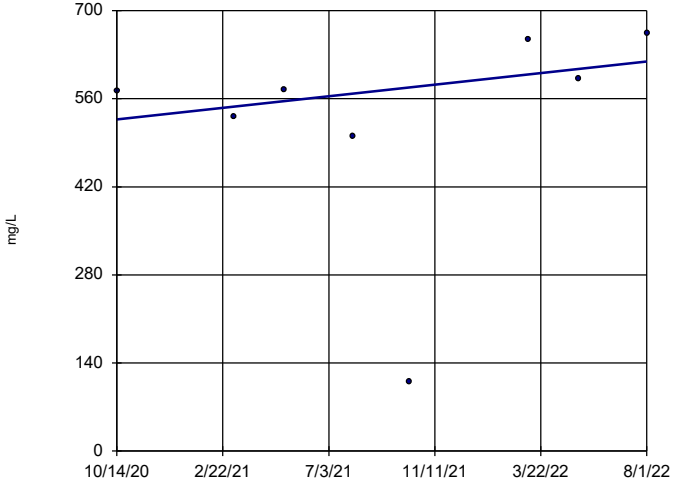
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

MW-52



n = 8

Slope = 50.96 units per year.

Mann-Kendall statistic = 10 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

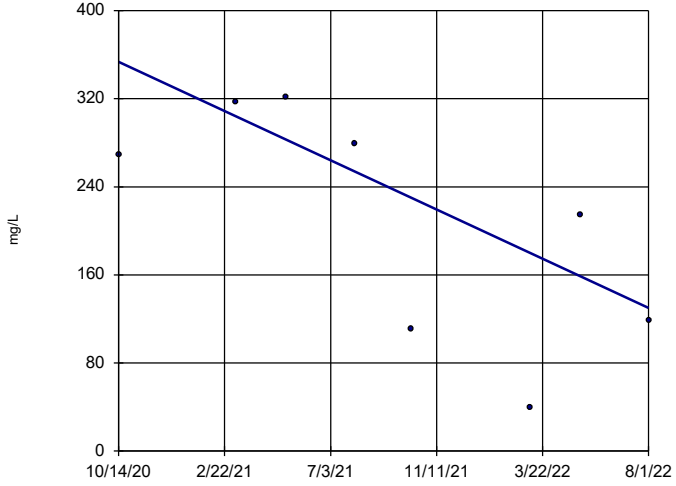
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

MW-53



n = 8

Slope = -124.4 units per year.

Mann-Kendall statistic = -12 critical = -17

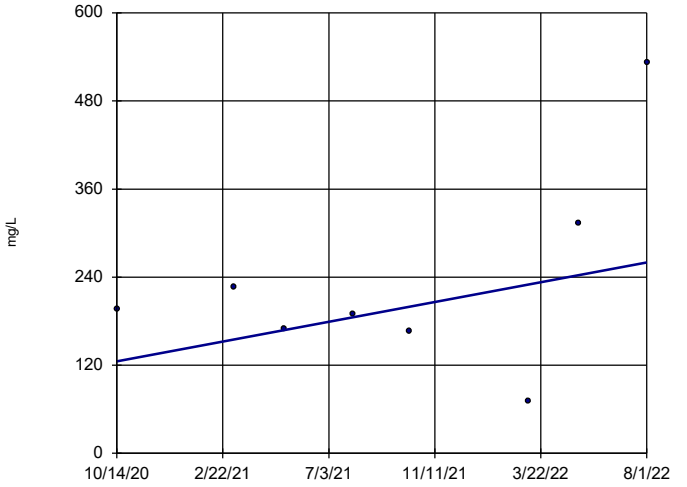
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sulfate

MW-53R



n = 8

Slope = 74.83 units per year.

Mann-Kendall statistic = 2 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

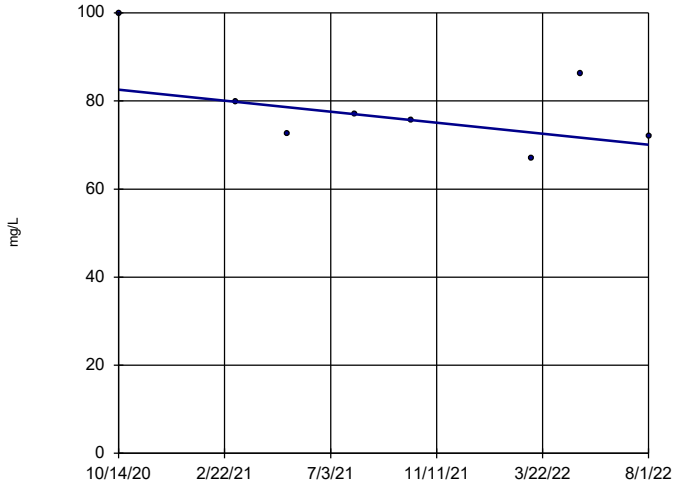
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

MW-54R



n = 8

Slope = -6.971 units per year.

Mann-Kendall statistic = -12 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

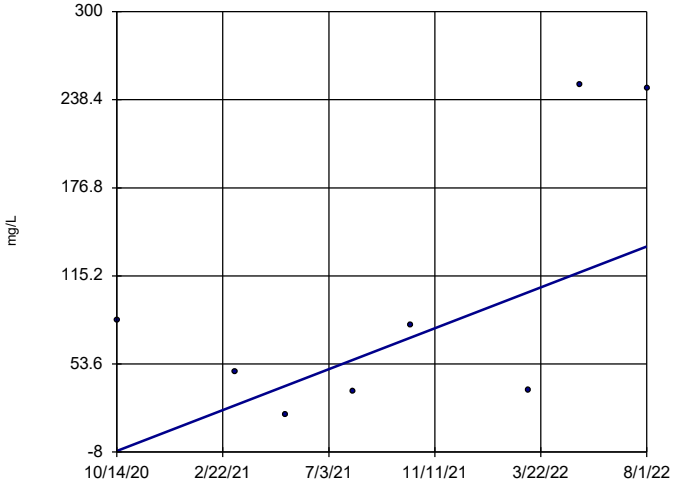
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

MW-55



n = 8

Slope = 79.54 units per year.

Mann-Kendall statistic = 8 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

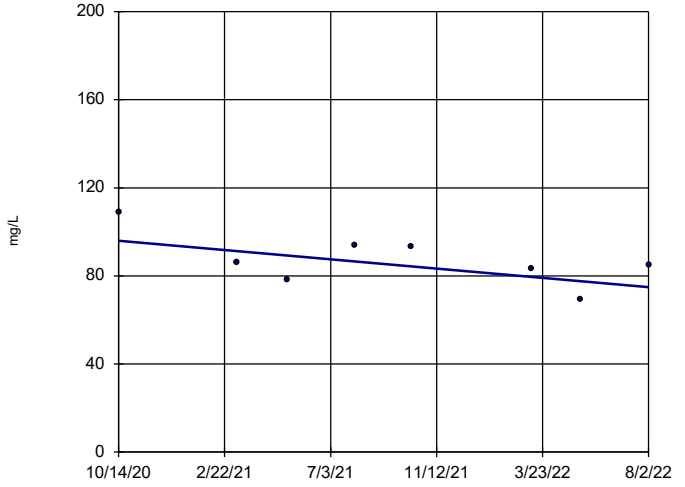
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

OW-57ROUT



n = 8

Slope = -11.69 units per year.

Mann-Kendall statistic = -12 critical = -17

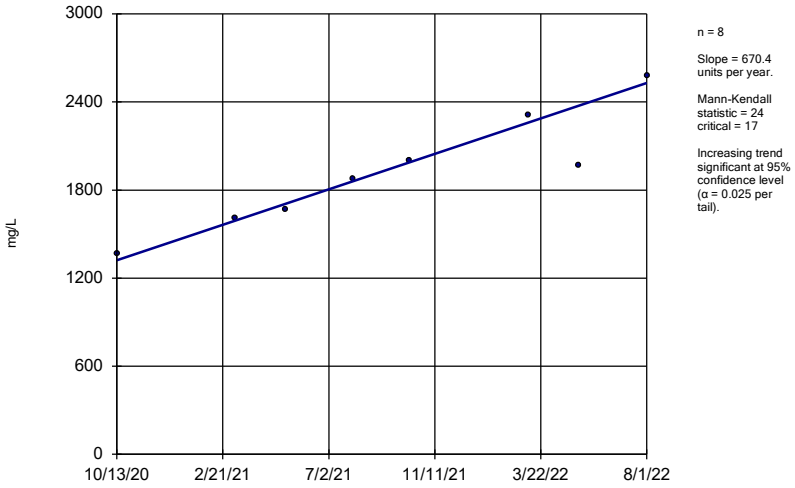
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Total Dissolved Solids

JCW-MW-18001



n = 8

Slope = 670.4 units per year.

Mann-Kendall statistic = 24 critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

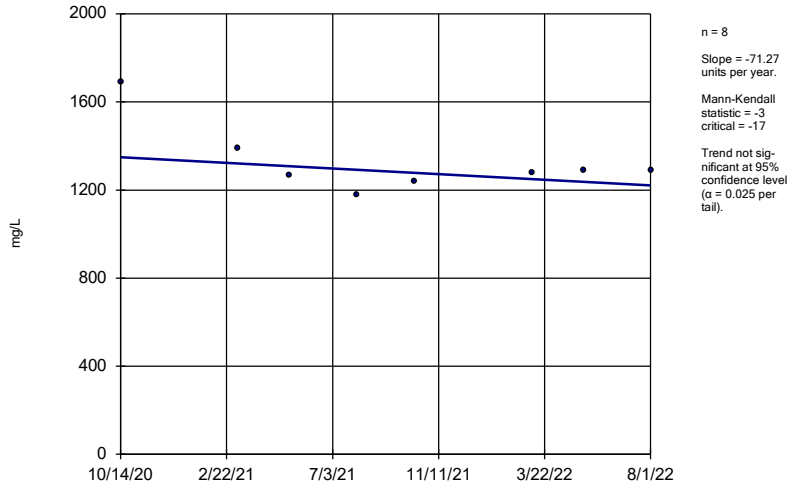
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

JCW-MW-18004



n = 8

Slope = -71.27 units per year.

Mann-Kendall statistic = -3 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

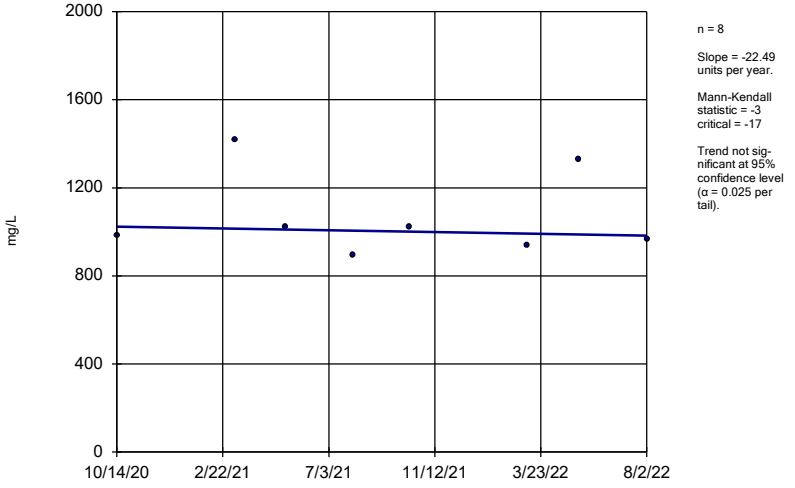
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

JCW-MW-18005



n = 8

Slope = -22.49 units per year.

Mann-Kendall statistic = -3 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

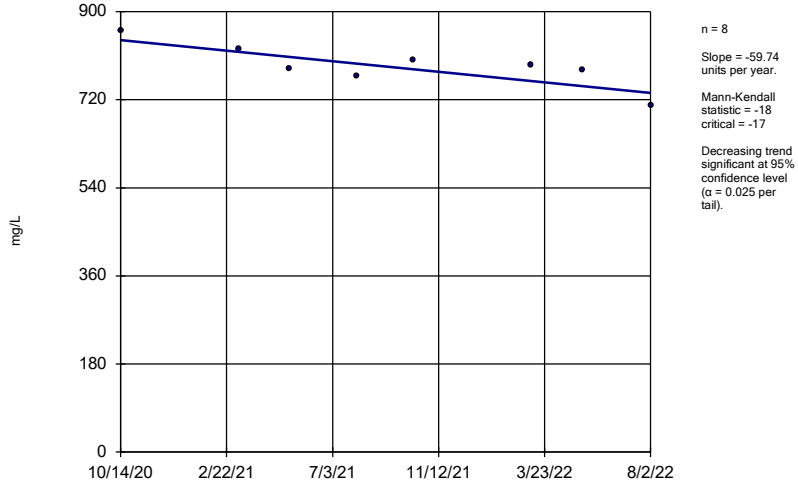
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

JCW-MW-18006



n = 8

Slope = -59.74 units per year.

Mann-Kendall statistic = -18 critical = -17

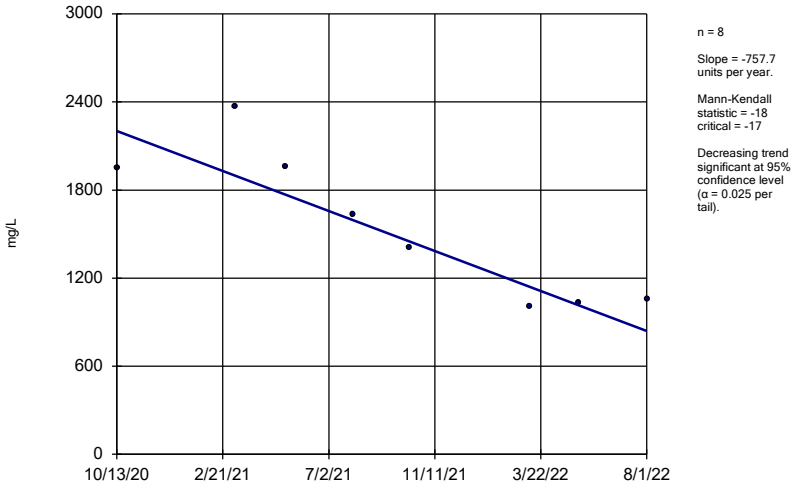
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Total Dissolved Solids

MW-50



n = 8

Slope = -757.7 units per year.

Mann-Kendall statistic = -18
critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

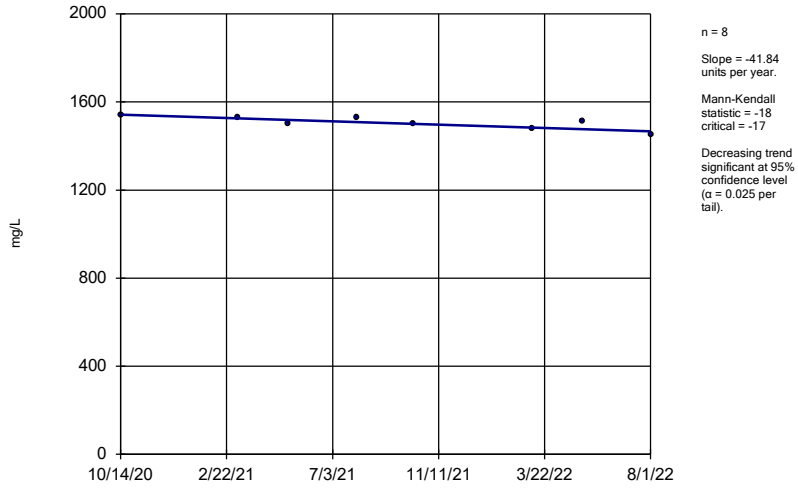
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

MW-51



n = 8

Slope = -41.84 units per year.

Mann-Kendall statistic = -18
critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

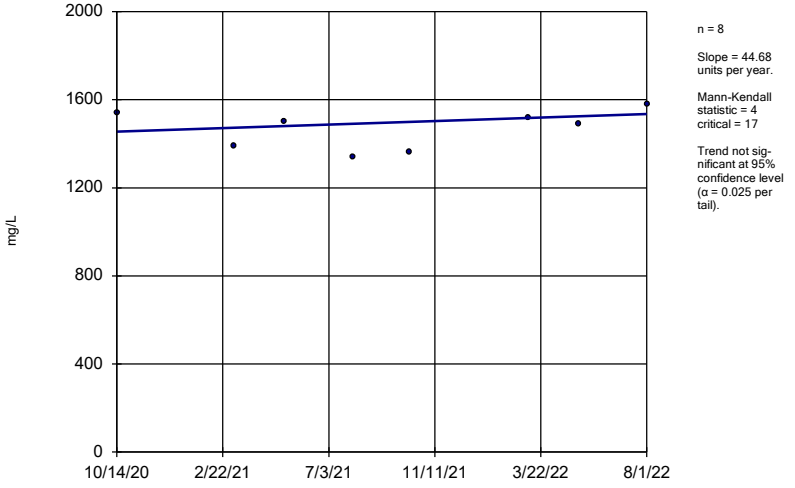
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

MW-52



n = 8

Slope = 44.68 units per year.

Mann-Kendall statistic = 4
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

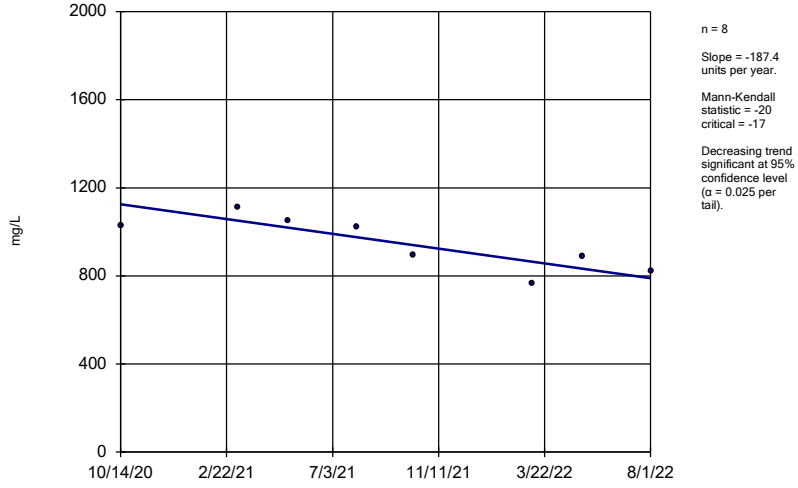
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

MW-53



n = 8

Slope = -187.4 units per year.

Mann-Kendall statistic = -20
critical = -17

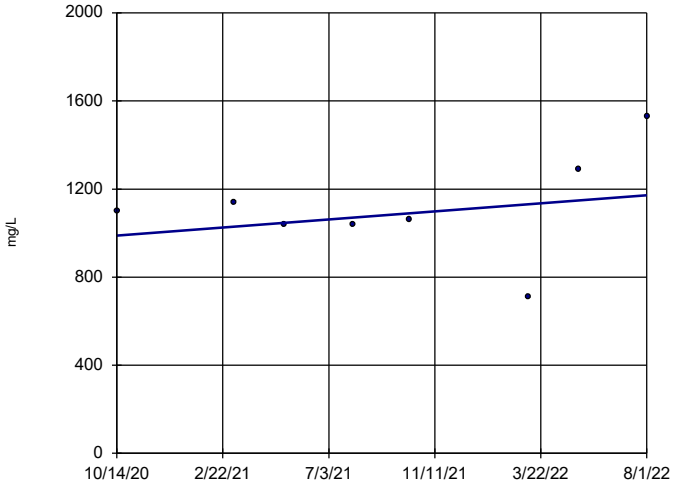
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Total Dissolved Solids

MW-53R



n = 8

Slope = 102.5 units per year.

Mann-Kendall statistic = 5 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

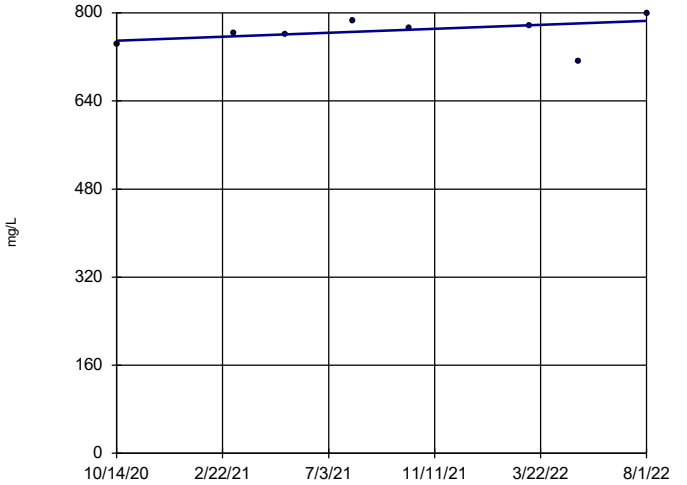
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

MW-54R



n = 8

Slope = 20.25 units per year.

Mann-Kendall statistic = 10 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

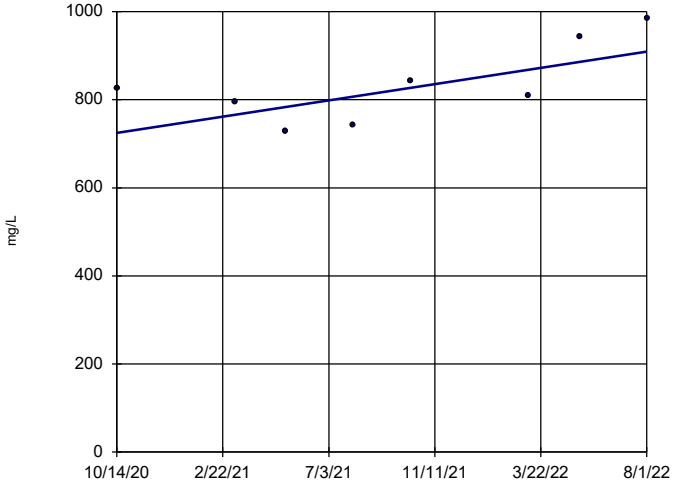
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

MW-55



n = 8

Slope = 103 units per year.

Mann-Kendall statistic = 14 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

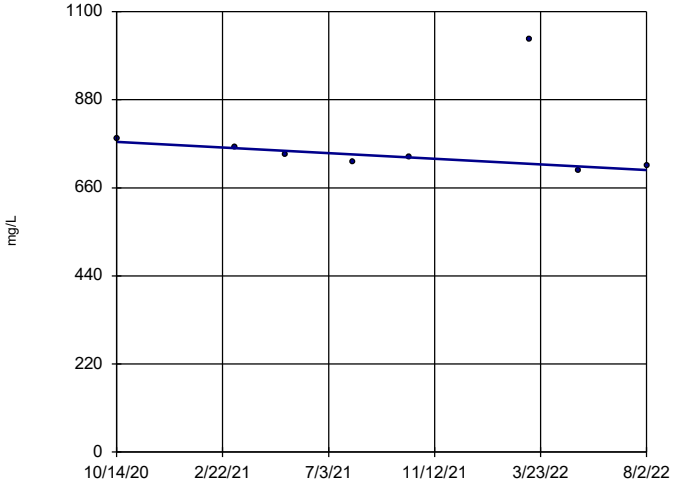
Sen's Slope Estimator Analysis Run 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Total Dissolved Solids

OW-57ROUT



n = 8

Slope = -39.07 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 8/31/2022 1:31 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

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 14, 2022
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC Alex Eklund, TRC
Project No.:	464096.0000 Phase 002, Task 002
Subject:	Assessment Monitoring and GSI Statistical Evaluation of the August 2022 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 2022 monitoring event was conducted on July 25 through August 2, 2022. 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[2]. 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

[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).

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, the vent 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 2022 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	11 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 no constituents 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 [3], 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

[3] USEPA. 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance*. Office of Conservation and Recovery. EPA 530/R-09-007.

the upper confidence level is above), the statistical test result indicates that there is insufficient 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 2020 through August 2022) 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[4] 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.

[4] Confidence level is assessed for each individual comparison (i.e. per well and per constituent).

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 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[5] 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, JCW-MW-18001, JCW-MW-18004, and JCW-MW-18005;
- Sulfate in MW-50 and JCW-MW-18001;
- 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.

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 arsenic, boron, calcium, 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

[5] 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.

trend test to test for significance of the trend at the 98% confidence level. The trend tests show that the trends for boron at MW-54R, calcium at MW-50, and sulfate at JCW-MW-18001 and MW-50 are statistically significant (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 MW-54R, calcium at MW-50, and sulfate at JCW-MW-18001 and MW-50. 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-18001, 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, and MW-51 Arsenic at JCW-MW-18006 and MW-53R Iron at MW-55
Normalized by square root transformation	Calcium at JCW-MW-18005
Normalized by power transformation	Boron at MW-53 (x^4)
Non-Parametric (not able to be normalized)	Arsenic at JCW-MW-18001
Non-Parametric (over 50% non-detect)	Vanadium at JCW-MW-18001

The confidence interval test compares the lower confidence limit to the GWPS. Arsenic concentrations at JCW-MW-18006 were previously considered statistically significant; however, the lower confidence limit has been at or below the GWPS since the second quarter 2021. Calcium concentrations at MW-51 were previously considered statistically significant; however, calcium concentrations are decreasing and the lower confidence limit has been below the GWPS since the first quarter 2022. Concentrations trends will continue to be monitored. Statistically significant exceedances of the GWPS 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, MW-55, and OW-57R OUT, and calcium at JCW-MW-18001. . Boron concentrations have been consistently above the GWPS since monitoring under the February 2021 HMP began. Calcium at JCW-MW-18001 was a new, unconfirmed GWPS exceedance in third quarter 2022 resulting from increases in calcium concentration since first quarter 2021. 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; 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.

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	Arsenic at MW-55 Molybdenum at MW-55

The confidence interval tests compare the lower confidence limit to the GSI. The statistical evaluation found that no constituents were present at statistically significant levels exceeding the site-specific GSI criteria. Arsenic and molybdenum concentrations at MW-55 were previously considered statistically significant; however, the arsenic and molybdenum concentrations decreased in 2022. The lower confidence limits for arsenic and molybdenum continued to be below the GWPS in third quarter 2022.

Attachments

Table 1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards – October 2020 to August 2022

Table 2 Comparison of Groundwater Sampling Results to GSI – October 2020 to August 2022

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 2020 to August 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

			Sample Location:	MW-50														
			Sample Date:	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	3/8/2022	3/8/2022	5/9/2022	5/9/2022	8/1/2022	8/1/2022
Constituent	Unit	GWPS																
Appendix III[1]						Field Dup		Field Dup		Field Dup		Field Dup		Field Dup		Field Dup		Field Dup
Boron	ug/L	**560**		**1,470**	**1,510**	**1,610**	**1,380**	**1,320**	**1,520**	**1,630**	**1,830**	**1,900**	**1,610**	**1,620**	**1,360**	**1,440**	**1,290**	**1,290**
Calcium	mg/L	**280**		**368**	**386**	**375**	**363**	**370**	267	252	274	261	186	185	169	175	161	164
Chloride	mg/L	2,300		77.5	86.5	85.6	68.9	69.9	57.0	57.2	51.0	51.7	54.9	55.6	53.3	51.6	54.2	54.9
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	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**		**990**	**1,130**	**1,120**	**856**	**867**	638	634	496	512	346	330	285	286	324	325
Total Dissolved Solids	mg/L	4,700		1,950	2,360	2,380	1,950	1,970	1,630	1,640	1,440	1,380	999	1,010	1,020	1,050	1,080	1,040
pH, Field	SU	6.5 - 8.5		7.1	6.9	--	6.9	--	7.0	--	7.1	--	7.4	--	7.2	--	7.0	--
Appendix IV[1]																		
Antimony	ug/L	6.0		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**		3	1	1	1	1	2	2	3	3	2	2	1	1	2	2
Barium	ug/L	2,000		147	116	115	108	109	91	97	102	89	115	117	86	86	90	94
Beryllium	ug/L	4.0		< 1	< 1	< 1	< 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	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100		< 1	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	< 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	< 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	< 1
Lithium	ug/L	180		100	126	128	100	100	79	81	93	68	77	77	69	66	64	61
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	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**		7	< 5	< 5	< 5	< 5	< 5	< 5	< 5	6	6	6	< 5	< 5	6	6
Radium-226	pCi/L	NA		< 0.537	--	--	< 0.237	< 0.245	--	--	< 0.215	0.243	--	--	< 0.310	< 0.287	--	--
Radium-228	pCi/L	NA		0.613	--	--	0.557	0.607	--	--	1.15	1.22	--	--	< 0.493	0.648	--	--
Radium-226/228	pCi/L	5.0		1.01	--	--	0.650	0.671	--	--	1.21	1.46	--	--	0.518	0.904	--	--
Selenium	ug/L	50		1	1	1	< 1	1	3	2	4	4	2	2	2	2	2	2
Thallium	ug/L	2.0		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]																		
Iron	ug/L	**28,000**		2,990	2,100	2,190	1,810	1,810	3,000	2,780	2,500	2,710	1,400	1,180	723	737	1,830	1,850
Copper	ug/L	1,000		3	4	4	< 1	2	1	< 1	1	< 1	< 1	< 1	1	1	< 1	< 1
Nickel	ug/L	100		< 2	< 2	< 2	< 2	< 2	11	12	16	11	< 2	19	< 2	6	6	7
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	< 0.2
Vanadium	ug/L	**6.0**		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400		< 10	< 10	< 10	< 10	< 10	< 10	< 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 – October 2020 to August 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

			Sample Location:	MW-51							
			Sample Date:	10/14/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022
Constituent	Unit	GWPS										
Appendix III[1]					Field Dup							
Boron	ug/L	**560**		**739**	**798**	**1,040**	**1,040**	**960**	**1,140**	**1,420**	**1,350**	**1,270**
Calcium	mg/L	**280**		**330**	**337**	**293**	**303**	276	**316**	255	247	211
Chloride	mg/L	2,300		74.2	75.4	91.2	93.6	99.8	97.1	91.1	92.8	102
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**		522	537	452	450	434	418	446	420	404
Total Dissolved Solids	mg/L	4,700		1,550	1,530	1,530	1,500	1,530	1,500	1,480	1,510	1,450
pH, Field	SU	6.5 - 8.5		6.8	--	7.0	7.0	6.9	6.9	7.4	7.2	7.0
Appendix IV[1]												
Antimony	ug/L	6.0		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**		17	17	11	11	14	20	12	10	15
Barium	ug/L	2,000		147	150	143	148	148	197	198	150	169
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
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
Lithium	ug/L	180		51	55	62	57	47	64	58	56	53
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
Radium-226	pCi/L	NA		1.35	< 0.352	--	< 0.268	--	0.451	--	< 0.423	--
Radium-228	pCi/L	NA		< 0.588	0.776	--	0.626	--	2.01	--	< 0.494	--
Radium-226/228	pCi/L	5.0		1.43	1.11	--	0.851	--	2.46	--	0.576	--
Selenium	ug/L	50		< 1	< 1	1	< 1	1	3	3	2	2
Thallium	ug/L	2.0		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]												
Iron	ug/L	**28,000**		5,400	5,600	1,940	2,200	5,080	5,130	1,310	1,210	1,860
Copper	ug/L	1,000		2	2	2	< 1	< 1	1	< 1	2	< 1
Nickel	ug/L	100		< 2	< 2	< 2	< 2	11	18	< 2	< 2	6
Silver	ug/L	34		< 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
Zinc	ug/L	2,400		< 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 – October 2020 to August 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-52							
		Sample Date:	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,110**	**1,120**	**1,160**	**1,140**	**1,280**	**1,310**	**1,090**	**1,070**
Calcium	mg/L	**280**	256	211	244	196	237	251	231	222
Chloride	mg/L	2,300	73.3	51.8	53.9	56.5	59.4	51.6	50.5	45.1
Fluoride	ug/L	4,000	1,140	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	572	531	574	501	110	654	591	663
Total Dissolved Solids	mg/L	4,700	1,540	1,390	1,500	1,340	1,360	1,520	1,490	1,580
pH, Field	SU	6.5 - 8.5	7.0	7.0	6.9	6.9	6.9	7.1	7.0	6.7
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	139	123	132	115	152	170	107	118
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	1	< 1
Cobalt	ug/L	15	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	1,140	< 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	33	31	29	21	31	27	25	29
Mercury	ug/L	2.0	< 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
Radium-226	pCi/L	NA	0.744	--	< 0.237	--	< 0.274	--	< 0.489	--
Radium-228	pCi/L	NA	0.636	--	< 0.407	--	0.778	--	< 0.532	--
Radium-226/228	pCi/L	5.0	1.38	--	< 0.407	--	1.03	--	0.875	--
Selenium	ug/L	50	1	1	1	1	3	2	2	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	4,770	879	1,400	3,830	4,880	2,870	2,030	5,020
Copper	ug/L	1,000	2	2	< 1	< 1	1	1	2	2
Nickel	ug/L	100	< 2	< 2	< 2	9	14	< 2	< 2	5
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	< 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 – October 2020 to August 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-53							
		Sample Date:	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**2,720**	**3,920**	**3,790**	**3,820**	**3,820**	**4,100**	**3,880**	**4,300**
Calcium	mg/L	**280**	192	187	187	162	166	146	147	116
Chloride	mg/L	2,300	38.6	52.9	51.8	49.9	55.5	81.1	50.9	66.5
Fluoride	ug/L	4,000	1,020	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	269	317	322	279	111	39.5	215	119
Total Dissolved Solids	mg/L	4,700	1,030	1,110	1,050	1,020	896	768	886	820
pH, Field	SU	6.5 - 8.5	7.2	7.1	7.1	7.1	7.1	7.4	7.3	7.1
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	2	< 1	< 1	2	2	1	< 1	1
Barium	ug/L	2,000	131	202	214	200	212	401	356	313
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	1,020	< 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	49	52	46	38	53	48	41	42
Mercury	ug/L	2.0	< 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
Radium-226	pCi/L	NA	< 0.531	--	< 0.239	--	0.399	--	0.406	--
Radium-228	pCi/L	NA	0.503	--	0.455	--	0.979	--	< 0.518	--
Radium-226/228	pCi/L	5.0	0.823	--	0.684	--	1.38	--	0.824	--
Selenium	ug/L	50	< 1	< 1	2	3	< 1	3	1	3
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	1,560	1,180	1,420	2,380	1,760	1,130	1,060	1,240
Copper	ug/L	1,000	2	2	< 1	< 1	< 1	< 1	1	< 1
Nickel	ug/L	100	< 2	< 2	< 2	6	10	< 2	< 2	4
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	< 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 – October 2020 to August 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-53R							
		Sample Date:	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,780**	**1,510**	**1,580**	**1,710**	**2,060**	**2,330**	**1,830**	**1,560**
Calcium	mg/L	**280**	246	234	227	203	232	188	226	219
Chloride	mg/L	2,300	31.8	32.5	31.1	34.5	36.6	39.9	41.6	50.4
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**	196	227	170	189	166	71.7	314	533
Total Dissolved Solids	mg/L	4,700	1,100	1,140	1,040	1,040	1,060	709	1,290	1,530
pH, Field	SU	6.5 - 8.5	7.0	6.8	6.8	6.8	6.8	7.1	6.9	6.7
Appendix IV[(1)]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**40**	19	18	**23**	**25**	10	8	17
Barium	ug/L	2,000	242	202	208	204	189	203	147	97
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	1	< 1
Cobalt	ug/L	15	< 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
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	66	64	59	56	57	56	61	70
Mercury	ug/L	2.0	< 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
Radium-226	pCi/L	NA	--	--	0.306	--	0.344	--	< 0.325	--
Radium-228	pCi/L	NA	--	--	0.822	--	1.05	--	< 0.480	--
Radium-226/228	pCi/L	5.0	--	--	1.13	--	1.40	--	< 0.480	--
Selenium	ug/L	50	1	< 1	< 1	2	3	2	2	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	2,140	971	2,220	2,800	2,170	1,080	460	1,030
Copper	ug/L	1,000	1	2	1	1	< 1	2	2	2
Nickel	ug/L	100	< 2	< 2	< 2	10	2	< 2	< 2	5
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	< 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 – October 2020 to August 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	MW-54R							
		Sample Date:	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/11/2021	3/9/2022	5/9/2022	8/1/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,660**	**2,470**	**3,140**	**3,530**	**4,270**	**4,720**	**4,110**	**4,970**
Calcium	mg/L	**280**	174	178	196	163	187	186	169	158
Chloride	mg/L	2,300	23.9	28.0	32.7	35.5	34.7	49.8	35.8	43.9
Fluoride	ug/L	4,000	1,800	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	100	79.9	72.7	77.0	75.7	67.1	86.3	72.1
Total Dissolved Solids	mg/L	4,700	743	763	762	786	772	776	712	800
pH, Field	SU	6.5 - 8.5	7.1	6.9	6.6	6.8	6.9	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**	3	1	1	2	4	1	< 1	2
Barium	ug/L	2,000	103	118	122	124	129	154	111	109
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	2	< 1
Cobalt	ug/L	15	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	1,800	< 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	57	66	64	60	59	74	64	74
Mercury	ug/L	2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	5	< 5	< 5	< 5	7	7	9	10
Radium-226	pCi/L	NA	< 0.334	--	< 0.255	--	< 0.231	--	< 0.347	--
Radium-228	pCi/L	NA	< 0.504	--	0.782	--	0.759	--	< 0.552	--
Radium-226/228	pCi/L	5.0	0.546	--	0.900	--	0.965	--	< 0.552	--
Selenium	ug/L	50	< 1	< 1	< 1	1	2	2	2	1
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	1,030	115	782	1,190	2,280	496	121	367
Copper	ug/L	1,000	1	1	2	1	< 1	1	1	1
Nickel	ug/L	100	4	< 2	3	9	< 2	< 2	< 2	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	< 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 – October 2020 to August 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

			Sample Location:	MW-55							
			Sample Date:	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	5/10/2022	8/1/2022	8/1/2022
Constituent	Unit	GWPS										Field Dup
Appendix III[1]												
Boron	ug/L	**560**		**705**	**593**	**866**	**873**	**788**	**826**	**642**	**709**	**687**
Calcium	mg/L	**280**		170	151	147	126	198	163	177	159	165
Chloride	mg/L	2,300		18.0	16.7	19.5	19.3	16.5	20.2	11.8	11.8	11.8
Fluoride	ug/L	4,000		1,220	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**		84.0	48.0	18.5	34.3	80.7	35.4	249	248	245
Total Dissolved Solids	mg/L	4,700		826	794	729	743	844	808	942	930	1,040
pH, Field	SU	6.5 - 8.5		7.2	7.1	7.1	7.1	7.0	7.1	7.0	6.9	--
Appendix IV[1]												
Antimony	ug/L	6.0		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**		**123**	**152**	**169**	**204**	**198**	**88**	**48**	**80**	**78**
Barium	ug/L	2,000		223	366	323	347	330	299	222	232	231
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
Cobalt	ug/L	15		< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000		1,220	< 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
Lithium	ug/L	180		33	28	24	25	34	28	24	29	28
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**		**179**	**166**	**131**	**157**	**206**	**89**	**78**	**80**	**78**
Radium-226	pCi/L	NA		< 0.447	--	0.525	--	0.467	--	< 0.478	--	--
Radium-228	pCi/L	NA		0.566	--	0.896	--	1.10	--	< 0.646	--	--
Radium-226/228	pCi/L	5.0		0.798	--	1.42	--	1.56	--	0.696	--	--
Selenium	ug/L	50		1	< 1	1	1	2	1	3	3	4
Thallium	ug/L	2.0		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]												
Iron	ug/L	**28,000**		21,800	23,500	21,500	**39,400**	**40,500**	**29,800**	15,000	18,000	16,600
Copper	ug/L	1,000		< 1	< 1	< 1	< 1	< 1	< 1	1	< 1	1
Nickel	ug/L	100		< 2	< 2	< 2	6	8	4	3	6	6
Silver	ug/L	34		< 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
Zinc	ug/L	2,400		< 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 – October 2020 to August 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	OW-57R OUT							
		Sample Date:	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/9/2022	5/10/2022	8/2/2022
Constituent	Unit	GWPS								
Appendix III[1]										
Boron	ug/L	**560**	**1,730**	**1,660**	**1,710**	**1,730**	**1,880**	**2,030**	**1,990**	**1,570**
Calcium	mg/L	**280**	144	128	133	118	140	126	131	113
Chloride	mg/L	2,300	49.4	59.0	62.9	53.1	46.9	62.5	57.3	52.0
Fluoride	ug/L	4,000	1,830	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	109	86.0	78.3	93.9	93.1	83.1	69.4	85.0
Total Dissolved Solids	mg/L	4,700	782	761	743	725	737	1,030	702	714
pH, Field	SU	6.5 - 8.5	7.1	7.2	7.0	7.0	7.0	7.2	7.1	6.8
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	73	70	73	72	75	85	79	67
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	1	1	1	1	< 1	1	2	1
Cobalt	ug/L	15	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	1,830	< 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	24	26	24	20	21	26	27	23
Mercury	ug/L	2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	8	7	6	7	9	8	7	7
Radium-226	pCi/L	NA	< 0.324	--	< 0.286	--	< 0.227	--	< 0.440	--
Radium-228	pCi/L	NA	< 0.463	--	0.606	--	1.12	--	< 0.539	--
Radium-226/228	pCi/L	5.0	0.499	--	0.615	--	1.26	--	< 0.539	--
Selenium	ug/L	50	< 1	< 1	< 1	< 1	2	1	3	1
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]										
Iron	ug/L	**28,000**	92	46	100	56	68	96	74	37
Copper	ug/L	1,000	2	2	1	2	1	2	2	1
Nickel	ug/L	100	14	15	16	21	12	17	14	17
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	16	< 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 – October 2020 to August 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18001							
		Sample Date:	10/13/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/7/2022	5/9/2022	8/1/2022
Constituent	Unit	GWPS								
Appendix III[1]										
Boron	ug/L	**560**	**1,370**	**1,350**	**1,340**	**1,610**	**1,670**	**1,670**	**1,560**	**1,470**
Calcium	mg/L	**280**	**282**	270	**305**	**348**	**373**	**412**	**335**	**389**
Chloride	mg/L	2,300	73.8	72.1	77.3	76.4	68.3	60.0	58.8	64.6
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**	435	549	580	700	777	**1,080**	752	**1,180**
Total Dissolved Solids	mg/L	4,700	1,370	1,610	1,670	1,880	2,000	2,310	1,970	2,580
pH, Field	SU	6.5 - 8.5	7.1	6.9	6.9	6.9	6.8	6.8	7.0	6.6
Appendix IV[1]										
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	3	2	2	**38**	1	< 1	< 1	< 1
Barium	ug/L	2,000	273	213	166	199	184	129	80	61
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	8	< 1	< 1	2	< 1
Cobalt	ug/L	15	< 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
Lead	ug/L	4.0	< 1	< 1	< 1	2	< 1	< 1	< 1	< 1
Lithium	ug/L	180	66	69	68	71	103	87	76	95
Mercury	ug/L	2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5	9	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA	< 0.423	--	< 0.378	--	0.337	--	< 0.327	--
Radium-228	pCi/L	NA	0.616	--	< 0.558	--	1.05	--	0.494	--
Radium-226/228	pCi/L	5.0	1.03	--	< 0.558	--	1.39	--	0.586	--
Selenium	ug/L	50	< 1	< 1	< 1	2	3	2	2	3
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]										
Iron	ug/L	**28,000**	182	183	154	13,600	91	86	210	196
Copper	ug/L	1,000	1	2	3	6	2	2	3	2
Nickel	ug/L	100	2	8	2	16	20	6	8	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	**12**	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	< 10	< 10	< 10	12	< 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 – October 2020 to August 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18004							
		Sample Date:	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	5/10/2022	8/1/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	410	232	246	304	389	259	226	313
Calcium	mg/L	**280**	**323**	252	266	203	264	236	235	215
Chloride	mg/L	2,300	22.6	17.9	12.4	6.65	7.45	19.6	10.8	12.5
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**	756	581	523	393	493	537	512	512
Total Dissolved Solids	mg/L	4,700	1,690	1,390	1,270	1,180	1,240	1,280	1,290	1,290
pH, Field	SU	6.5 - 8.5	6.9	6.9	6.8	6.8	6.8	6.9	6.8	6.7
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	34	20	27	36	41	32	26	31
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 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
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	37	35	36	47	63	34	42	51
Mercury	ug/L	2.0	< 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
Radium-226	pCi/L	NA	< 0.424	--	< 0.271	--	0.182	--	< 0.417	--
Radium-228	pCi/L	NA	1.04	--	< 0.425	--	0.796	--	0.790	--
Radium-226/228	pCi/L	5.0	0.922	--	< 0.425	--	0.978	--	0.910	--
Selenium	ug/L	50	< 1	7	1	4	3	2	2	1
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	< 20	21	24	< 20	39	952	< 20	45
Copper	ug/L	1,000	3	3	2	1	2	1	2	2
Nickel	ug/L	100	4	< 2	2	9	16	4	< 2	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	< 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 – October 2020 to August 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18005								
		Sample Date:	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	3/7/2022	5/10/2022	8/2/2022
Constituent	Unit	GWPS									
Appendix III[1]									Field Dup		
Boron	ug/L	**560**	**1,090**	**987**	**919**	**1,080**	**1,190**	**1,030**	**1,100**	**1,010**	**981**
Calcium	mg/L	**280**	195	**286**	202	149	193	159	164	280	165
Chloride	mg/L	2,300	66.5	43.7	56.0	64.9	63.6	61.7	60.7	32.6	50.9
Fluoride	ug/L	4,000	1,640	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	185	535	263	190	227	204	211	437	213
Total Dissolved Solids	mg/L	4,700	986	1,420	1,020	895	1,020	942	934	1,330	967
pH, Field	SU	6.5 - 8.5	7.0	6.8	6.9	7.0	6.9	7.1	--	6.8	6.7
Appendix IV[1]											
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	8	7	9	9	9	5	5	5	4
Barium	ug/L	2,000	98	135	93	98	124	108	110	110	71
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
Cobalt	ug/L	15	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	1,640	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	4.0	< 1	< 1	< 1	2	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	33	39	30	28	39	32	30	33	32
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	6	< 5
Radium-226	pCi/L	NA	1.07	--	< 0.224	--	< 0.262	--	--	< 0.414	--
Radium-228	pCi/L	NA	0.540	--	0.524	--	0.984	--	--	< 0.521	--
Radium-226/228	pCi/L	5.0	1.61	--	0.728	--	1.16	--	--	0.622	--
Selenium	ug/L	50	< 1	< 1	1	2	4	3	3	2	< 1
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	3,550	4,800	4,590	5,350	5,840	3,300	3,170	1,680	2,810
Copper	ug/L	1,000	1	2	1	12	1	< 1	< 1	2	< 1
Nickel	ug/L	100	11	8	10	29	22	10	25	< 2	9
Silver	ug/L	34	< 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
Zinc	ug/L	2,400	< 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 – October 2020 to August 2022
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18006								
		Sample Date:	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	5/9/2022	5/9/2022	8/2/2022
Constituent	Unit	GWPS								Field Dup	
Appendix III[1]											
Boron	ug/L	**560**	**2,610**	**2,650**	**2,720**	**2,640**	**2,600**	**3,220**	**2,990**	**3,030**	**2,260**
Calcium	mg/L	**280**	167	148	147	135	152	143	136	136	109
Chloride	mg/L	2,300	72.2	66.1	72.6	73.6	77.0	75.0	67.3	67.7	79.0
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**	50.1	57.3	47.0	29.7	34.7	38.1	32.8	34.0	14.9
Total Dissolved Solids	mg/L	4,700	861	823	784	769	802	792	788	772	709
pH, Field	SU	6.5 - 8.5	7.1	6.9	6.9	6.9	7.0	7.1	7.0	--	6.7
Appendix IV[1]											
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	**22**	**30**	**30**	**25**	21	**33**	**22**	**23**	21
Barium	ug/L	2,000	489	477	472	492	351	665	514	509	452
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
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
Lithium	ug/L	180	59	58	53	46	47	63	56	57	52
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	6	< 5	< 5
Radium-226	pCi/L	NA	0.716	--	0.418	--	0.268	--	< 0.416	--	--
Radium-228	pCi/L	NA	0.853	--	< 0.483	--	0.872	--	< 0.518	--	--
Radium-226/228	pCi/L	5.0	1.57	--	0.888	--	1.14	--	0.69	--	--
Selenium	ug/L	50	< 1	< 1	1	2	4	2	< 1	1	< 1
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]											
Iron	ug/L	**28,000**	5,760	5,730	5,490	7,790	6,200	9,040	6,600	6,360	7,670
Copper	ug/L	1,000	< 1	< 1	2	< 1	< 1	< 1	1	< 1	< 1
Nickel	ug/L	100	< 2	3	3	6	10	6	< 2	< 2	5
Silver	ug/L	34	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	3	3	3	4	2	4	3	3	3
Zinc	ug/L	2,400	< 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 2
Comparison of Groundwater Sampling Results to GSI – October 2020 to August 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-50													
					Sample Date:	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	3/8/2022	3/8/2022	5/9/2022	5/9/2022	8/1/2022	8/1/2022
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	1,470	1,510	1,610	1,380	1,320	1,520	1,630	1,830	1,900	1,610	1,620	1,360	1,440	1,290	1,290
Sulfate	mg/L	1,200[F]	NC	NC	1,200	990	1,130	1,120	856	867	638	634	496	512	346	330	285	286	324	325
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.1	6.9	--	6.9	--	7.0	--	7.1	--	7.4	--	7.2	--	7.0	--
Appendix IV[(1)]																				
Arsenic	ug/L	10	100	680	**100**	3	1	1	1	1	2	2	3	3	2	2	1	1	2	2
Chromium	ug/L	11[H]	NC	NC	11	< 1	1	1	< 1	< 1	< 1	< 1	< 1	< 1	1	1	1	1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	100	126	128	100	100	79	81	93	68	77	77	69	66	64	61
Molybdenum	ug/L	120	NC	NC	**120**	7	< 5	< 5	< 5	< 5	< 5	< 5	< 5	6	6	6	< 5	< 5	6	6
Selenium	ug/L	5.0	55	120	55	1	1	1	< 1	1	3	2	4	4	2	2	2	2	2	2
MI Part 115 Parameters[(2)]																				
Iron	ug/L	500,000[EE]	NC	NC	500,000	2,990	2,100	2,190	1,810	1,810	3,000	2,780	2,500	2,710	1,400	1,180	723	737	1,830	1,850
Vanadium	ug/L	27	NC	NC	27	< 2	< 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.

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 – October 2020 to August 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-51								
					Sample Date:	10/14/2020	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III(1)							Field Dup							
Boron	ug/L	4,000	44,000	69,000	44,000	739	798	1,040	1,040	960	1,140	1,420	1,350	1,270
Sulfate	mg/L	1,200[F]	NC	NC	1,200	522	537	452	450	434	418	446	420	404
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.8	--	7.0	7.0	6.9	6.9	7.4	7.2	7.0
Appendix IV(1)														
Arsenic	ug/L	10	100	680	**100**	17	17	11	11	14	20	12	10	15
Chromium	ug/L	11[H]	NC	NC	11	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1	< 1
Lithium	ug/L	440	NC	NC	440	51	55	62	57	47	64	58	56	53
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	5.0	55	120	55	< 1	< 1	1	< 1	1	3	3	2	2
MI Part 115 Parameters(2)														
Iron	ug/L	500,000[EE]	NC	NC	500,000	5,400	5,600	1,940	2,200	5,080	5,130	1,310	1,210	1,860
Vanadium	ug/L	27	NC	NC	27	< 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.

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 – October 2020 to August 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-52							
					Sample Date:	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022
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	1,110	1,120	1,160	1,140	1,280	1,310	1,090	1,070
Sulfate	mg/L	1,200[F]	NC	NC	1,200	572	531	574	501	110	654	591	663
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.0	7.0	6.9	6.9	6.9	7.1	7.0	6.7
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	33	31	29	21	31	27	25	29
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	5.0	55	120	55	1	1	1	1	3	2	2	2
MI Part 115 Parameters[(2)]													
Iron	ug/L	500,000[EE]	NC	NC	500,000	4,770	879	1,400	3,830	4,880	2,870	2,030	5,020
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.

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 – October 2020 to August 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-53							
					Sample Date:	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022
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	2,720	3,920	3,790	3,820	3,820	4,100	3,880	4,300
Sulfate	mg/L	1,200[F]	NC	NC	1,200	269	317	322	279	111	39.5	215	119
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.2	7.1	7.1	7.1	7.1	7.4	7.3	7.1
Appendix IV[(1)]													
Arsenic	ug/L	10	100	680	**100**	2	< 1	< 1	2	2	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	49	52	46	38	53	48	41	42
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	5.0	55	120	55	< 1	< 1	2	3	< 1	3	1	3
MI Part 115 Parameters[(2)]													
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,560	1,180	1,420	2,380	1,760	1,130	1,060	1,240
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.

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 – October 2020 to August 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-53R							
					Sample Date:	10/14/2020	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022
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	1,780	1,510	1,580	1,710	2,060	2,330	1,830	1,560
Sulfate	mg/L	1,200[F]	NC	NC	1,200	196	227	170	189	166	71.7	314	533
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.0	6.8	6.8	6.8	6.8	7.1	6.9	6.7
Appendix IV[(1)]													
Arsenic	ug/L	10	100	680	**100**	40	19	18	23	25	10	8	17
Chromium	ug/L	11[H]	NC	NC	11	< 1	< 1	< 1	< 1	< 1	< 1	1	< 1
Lithium	ug/L	440	NC	NC	440	66	64	59	56	57	56	61	70
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	5.0	55	120	55	1	< 1	< 1	2	3	2	2	2
MI Part 115 Parameters[(2)]													
Iron	ug/L	500,000[EE]	NC	NC	500,000	2,140	971	2,220	2,800	2,170	1,080	460	1,030
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.

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 – October 2020 to August 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-54R							
					Sample Date:	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022
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	1,660	2,470	3,140	3,530	4,270	4,720	4,110	4,970
Sulfate	mg/L	1,200[F]	NC	NC	1,200	100	79.9	72.7	77.0	75.7	67.1	86.3	72.1
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.1	6.9	6.6	6.8	6.9	6.9	7.0	6.9
Appendix IV(1)													
Arsenic	ug/L	10	100	680	**100**	3	1	1	2	4	1	< 1	2
Chromium	ug/L	11[H]	NC	NC	11	< 1	< 1	< 1	< 1	< 1	< 1	2	< 1
Lithium	ug/L	440	NC	NC	440	57	66	64	60	59	74	64	74
Molybdenum	ug/L	120	NC	NC	**120**	5	< 5	< 5	< 5	7	7	9	10
Selenium	ug/L	5.0	55	120	55	< 1	< 1	< 1	1	2	2	2	1
MI Part 115 Parameters(2)													
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,030	115	782	1,190	2,280	496	121	367
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.

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 – October 2020 to August 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	MW-55								
					Sample Date:	10/14/2020	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	5/10/2022	8/1/2022	8/1/2022
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									
Appendix III(1)														Field Dup
Boron	ug/L	4,000	44,000	69,000	44,000	705	593	866	873	788	826	642	709	687
Sulfate	mg/L	1,200[F]	NC	NC	1,200	84.0	48.0	18.5	34.3	80.7	35.4	249	248	245
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.2	7.1	7.1	7.1	7.0	7.1	7.0	6.9	--
Appendix IV(1)														
Arsenic	ug/L	10	100	680	**100**	**123**	**152**	**169**	**204**	**198**	88	48	80	78
Chromium	ug/L	11[H]	NC	NC	11	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	33	28	24	25	34	28	24	29	28
Molybdenum	ug/L	120	NC	NC	**120**	**179**	**166**	**131**	**157**	**206**	89	78	80	78
Selenium	ug/L	5.0	55	120	55	1	< 1	1	1	2	1	3	3	4
MI Part 115 Parameters(2)														
Iron	ug/L	500,000[EE]	NC	NC	500,000	21,800	23,500	21,500	39,400	40,500	29,800	15,000	18,000	16,600
Vanadium	ug/L	27	NC	NC	27	< 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.

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 – October 2020 to August 2022
JC Weadock Landfill – RCRA CCR Monitoring Program
Essexville, Michigan

						Sample Location:	JCW-MW-18004						
						Sample Date:	10/14/2020	3/8/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	5/10/2022	8/1/2022
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		410	232	246	304	389	259	226	313
Sulfate	mg/L	1,200[F]	NC	NC	1,200		756	581	523	393	493	537	512	512
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0		6.9	6.9	6.8	6.8	6.8	6.9	6.8	6.7
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		37	35	36	47	63	34	42	51
Molybdenum	ug/L	120	NC	NC	**120**		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	5.0	55	120	55		< 1	7	1	4	3	2	2	1
MI Part 115 Parameters(2)														
Iron	ug/L	500,000[EE]	NC	NC	500,000		< 20	21	24	< 20	39	952	< 20	45
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.

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.

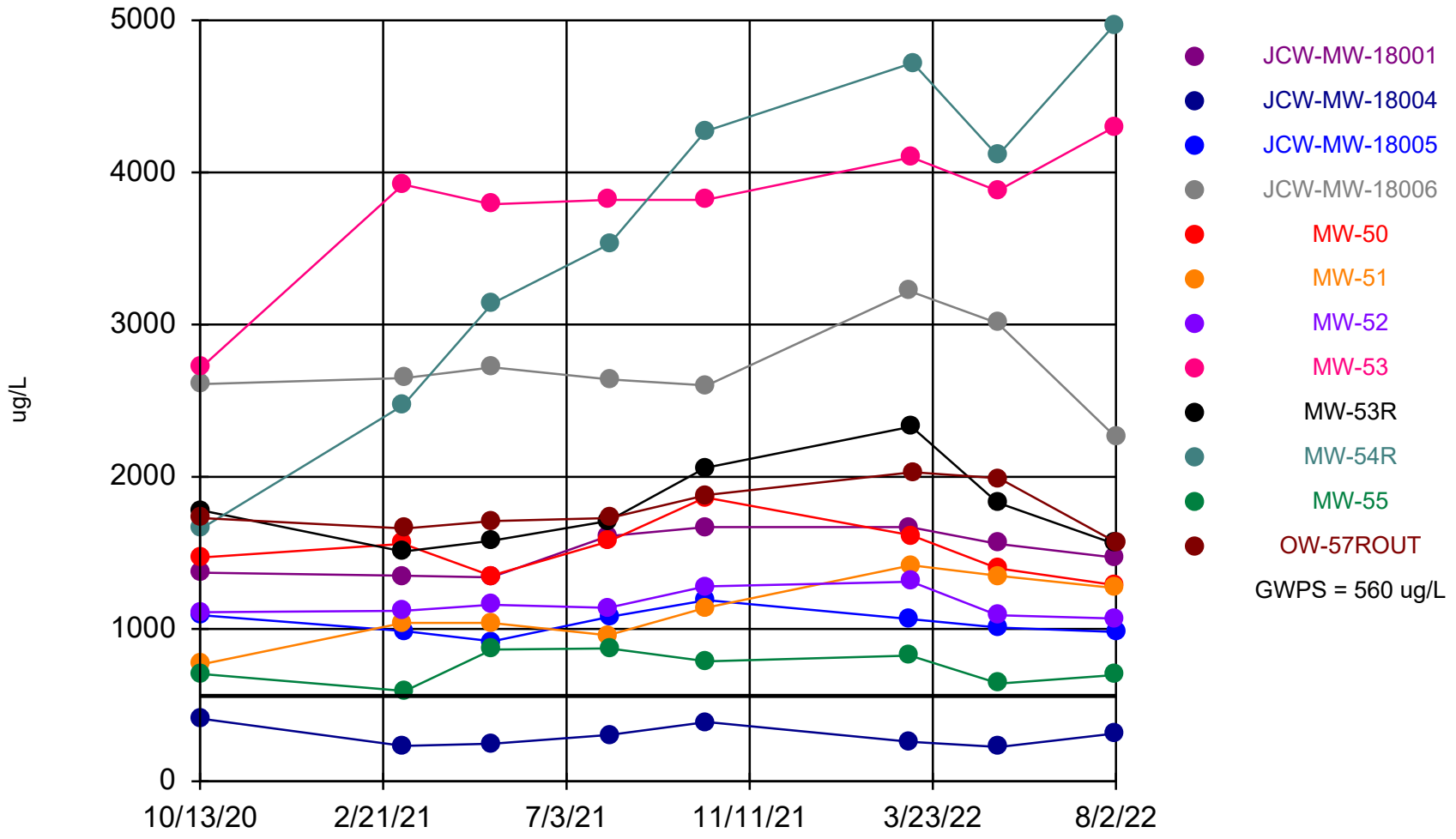
(1) 40 CFR Part 257 Appendix III Detection Monitoring Constituents and Appendix IV Assessment Monitoring Constituents.

(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.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron Comparison to GWPS

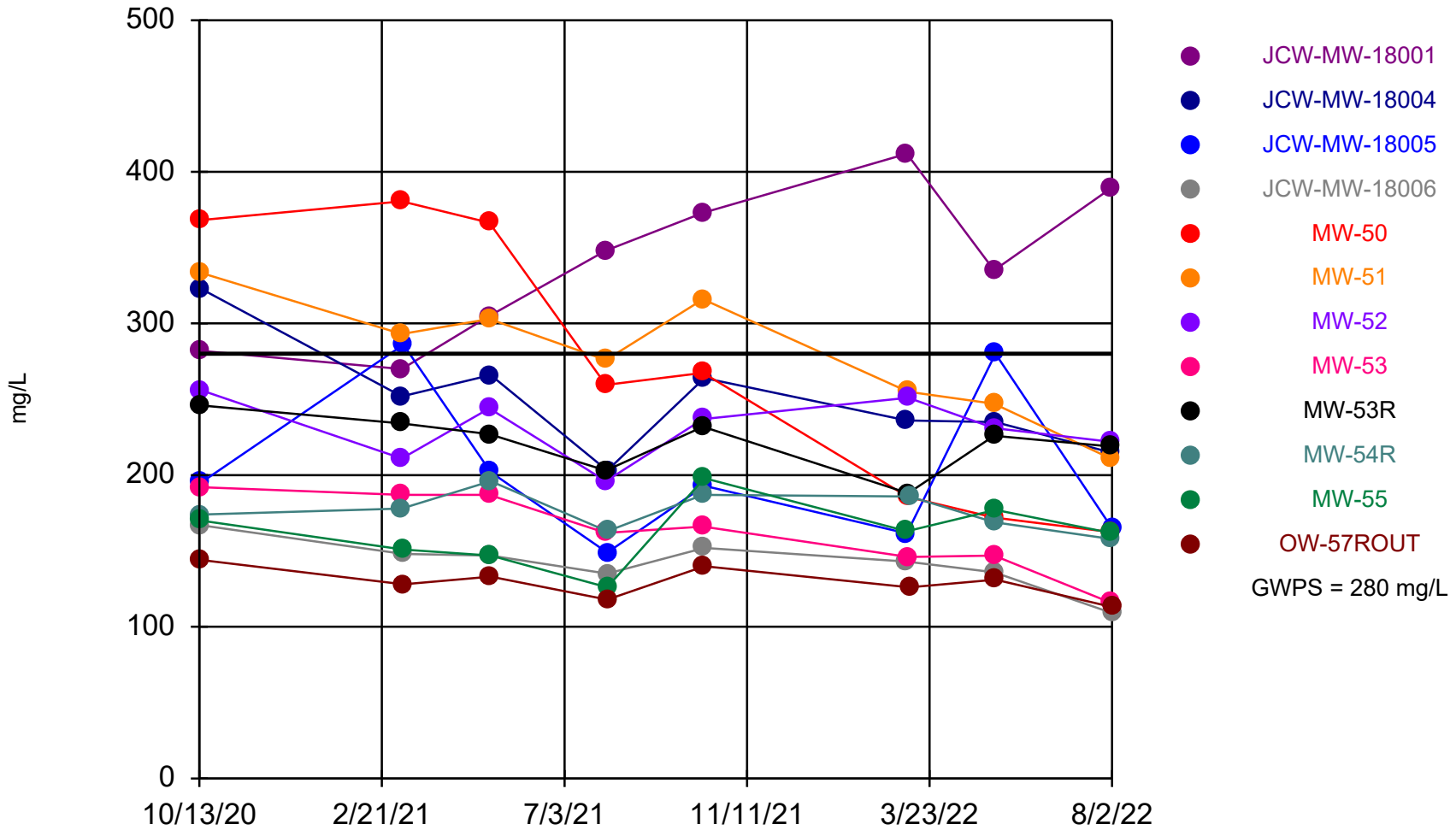


Time Series Analysis Run 8/31/2022 2:49 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium Comparison to GWPS

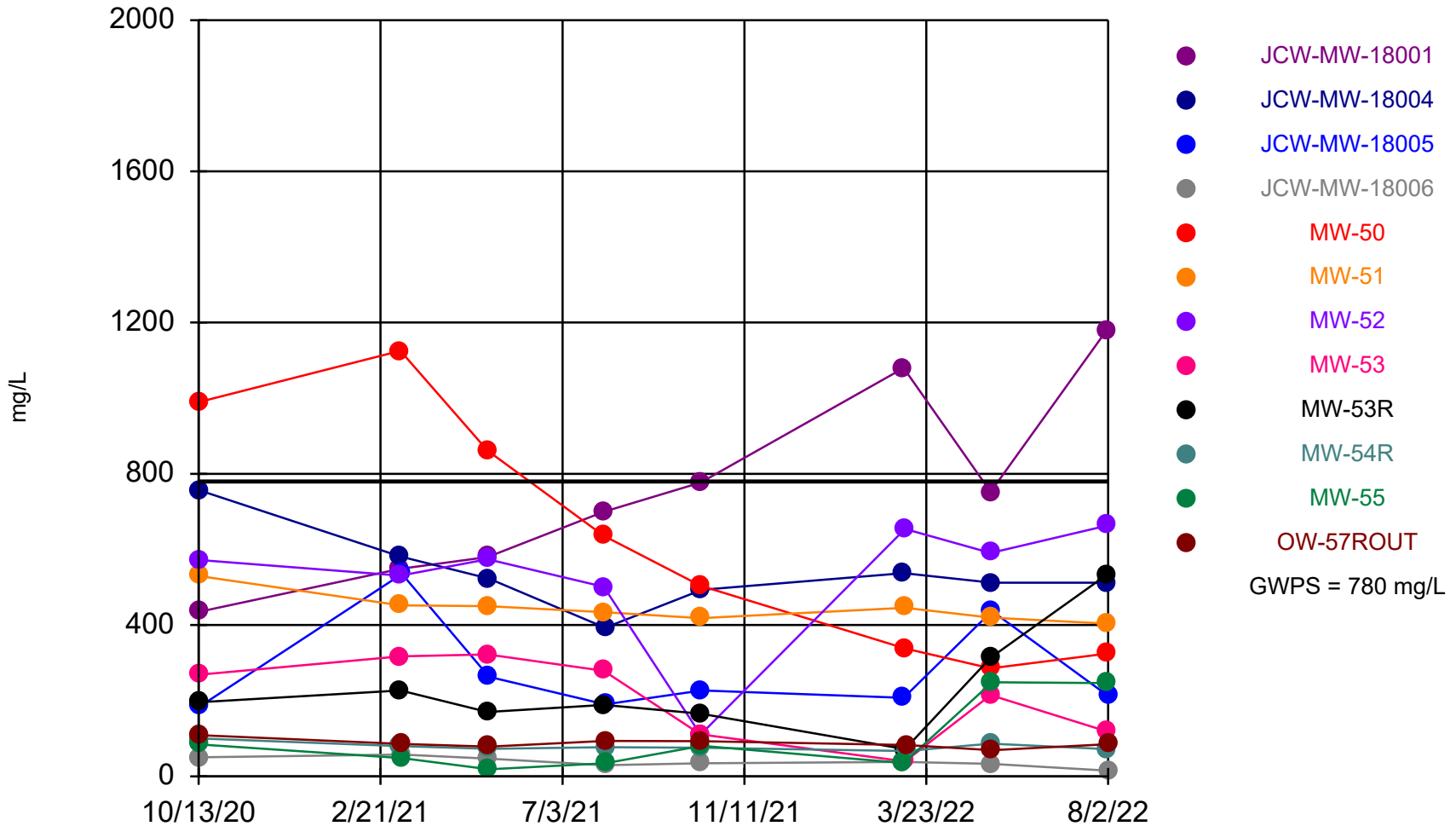


Time Series Analysis Run 8/31/2022 2:51 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate Comparison to GWPS

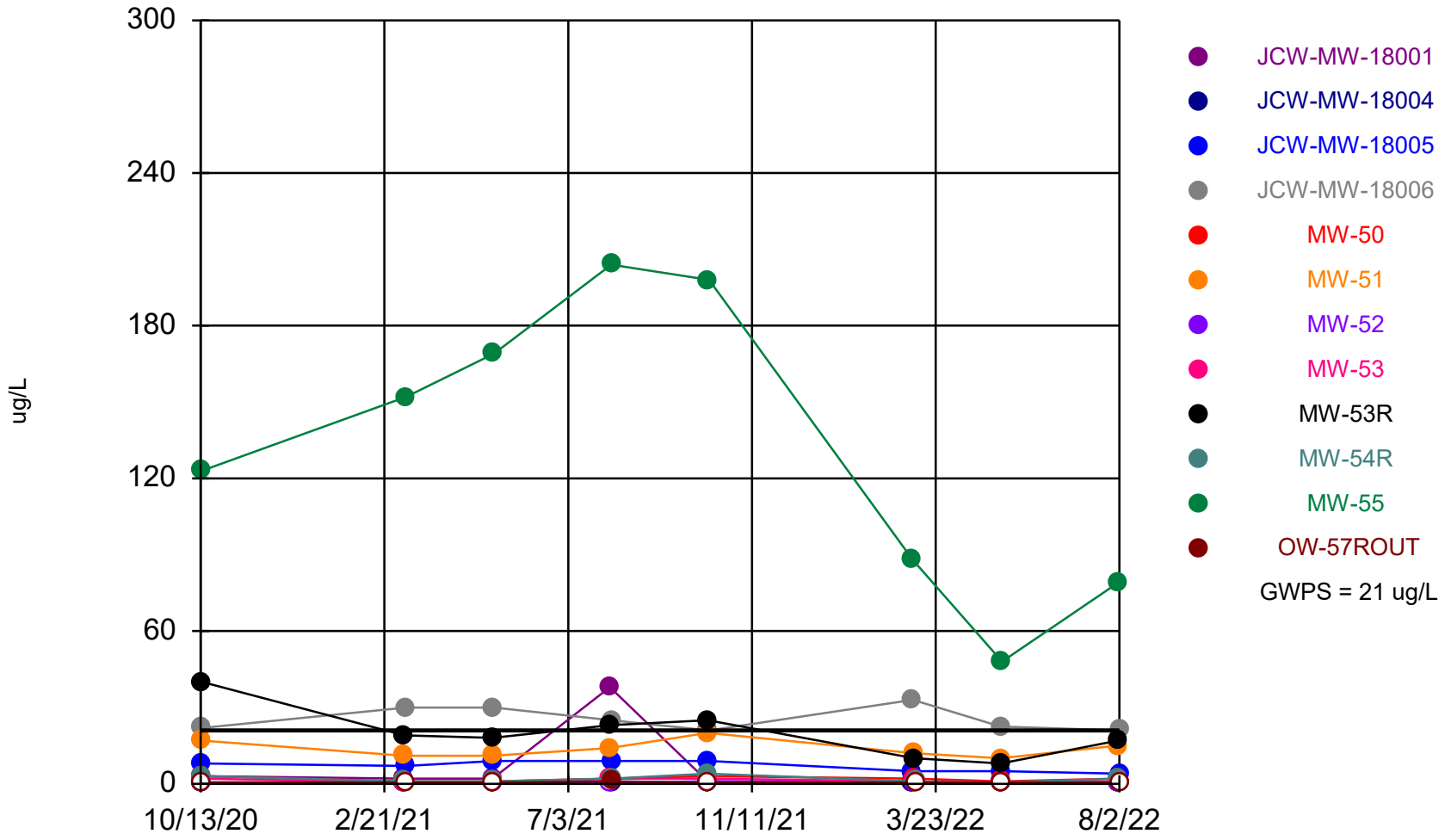


Time Series Analysis Run 8/31/2022 2:53 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Arsenic Comparison to GWPS

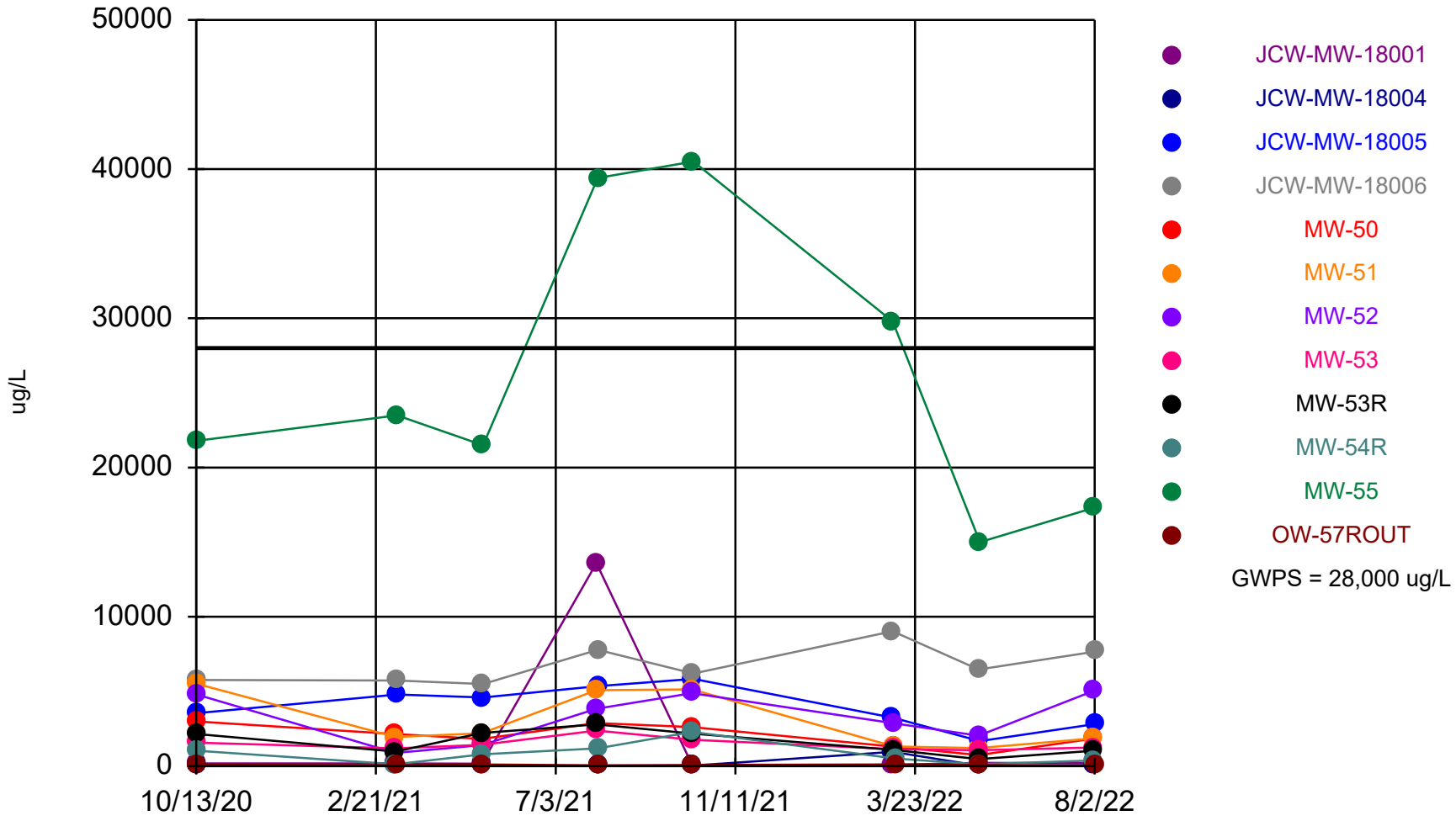


Time Series Analysis Run 8/31/2022 2:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Iron Comparison to GWPS

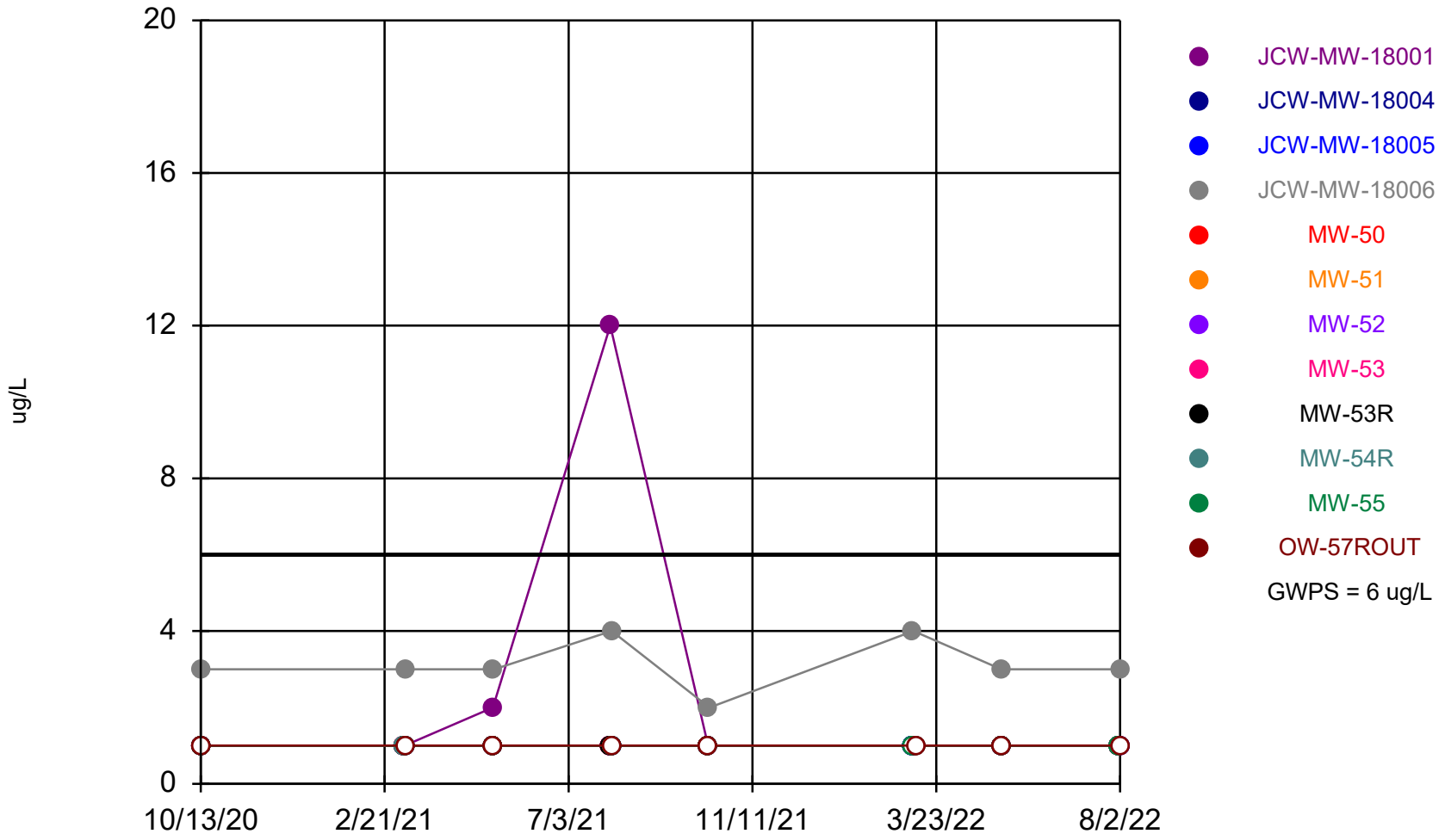


Time Series Analysis Run 8/31/2022 2:52 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Vanadium Comparison to GWPS



Time Series Analysis Run 8/31/2022 2:53 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Arsenic, Total Analysis Run 8/31/2022 2:57 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

For observations made between 10/13/2020 and 8/2/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 29
Wells = 12
Minimum Value = 0.5
Maximum Value = 204
Mean Value = 17.61
Median Value = 2
Standard Deviation = 39.33
Coefficient of Variation = 2.233
Skewness = 3.441

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	3	0.5	38	5.938	1.5	12.99	2.187	2.246
JCW-MW-18004	8	8	0.5	0.5	0.5	0.5	0	0	NaN
JCW-MW-18005	8	0	4	9	7	7.5	2.07	0.2957	-0.3098
JCW-MW-18006	8	0	21	33	25.56	23.75	4.762	0.1863	0.4556
MW-50	8	0	1	3	1.875	2	0.8345	0.4451	0.2217
MW-51	8	0	10	20	13.75	13	3.454	0.2512	0.67
MW-52	8	7	0.5	1	0.5625	0.5	0.1768	0.3143	2.268
MW-53	8	3	0.5	2	1.188	1	0.7039	0.5928	0.2719
MW-53R	8	0	8	40	20	18.5	9.943	0.4971	0.8372
MW-54R	8	1	0.5	4	1.813	1.5	1.193	0.6584	0.7445
MW-55	8	0	48	204	132.6	137.5	57.55	0.434	-0.1214
OW-57ROUT	8	7	0.5	1	0.5625	0.5	0.1768	0.3143	2.268

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Boron, Total Analysis Run 8/31/2022 2:57 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

For observations made between 10/13/2020 and 8/2/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 0
Wells = 12
Minimum Value = 226
Maximum Value = 4970
Mean Value = 1757
Median Value = 1490
Standard Deviation = 1110
Coefficient of Variation = 0.6318
Skewness = 1.081

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	1340	1670	1505	1515	141	0.0937	-0.02238
JCW-MW-18004	8	0	226	410	297.4	281.5	70.56	0.2373	0.5943
JCW-MW-18005	8	0	919	1190	1040	1038	83.71	0.08047	0.3619
JCW-MW-18006	8	0	2260	3220	2714	2645	288.6	0.1064	0.3752
MW-50	8	0	1290	1865	1516	1515	181.7	0.1199	0.6679
MW-51	8	0	768.5	1420	1124	1090	216.3	0.1926	-0.1433
MW-52	8	0	1070	1310	1160	1130	88.16	0.076	0.8547
MW-53	8	0	2720	4300	3794	3850	467.2	0.1231	-1.613
MW-53R	8	0	1510	2330	1795	1745	279.7	0.1558	0.8727
MW-54R	8	0	1660	4970	3609	3820	1140	0.3159	-0.4815
MW-55	8	0	593	873	748.9	746.5	104.8	0.1399	-0.1575
OW-57ROUT	8	0	1570	2030	1788	1730	162.4	0.09084	0.362

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Calcium, Total Analysis Run 8/31/2022 2:57 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

For observations made between 10/13/2020 and 8/2/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 0
Wells = 12
Minimum Value = 109
Maximum Value = 412
Mean Value = 213.9
Median Value = 196
Standard Deviation = 71.57
Coefficient of Variation = 0.3345
Skewness = 0.8136

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	270	412	339.3	341.5	51.06	0.1505	-0.01458
JCW-MW-18004	8	0	203	323	249.3	244	37.1	0.1489	0.7917
JCW-MW-18005	8	0	149	286	203.9	194	52.18	0.2559	0.7411
JCW-MW-18006	8	0	109	167	142.1	145	16.74	0.1178	-0.6601
MW-50	8	0	162.5	380.5	270.3	263.5	92.23	0.3413	0.06938
MW-51	8	0	211	333.5	279.3	284.5	40.26	0.1441	-0.3338
MW-52	8	0	196	256	231	234	20.48	0.08866	-0.4545
MW-53	8	0	116	192	162.9	164	26.07	0.1601	-0.5085
MW-53R	8	0	188	246	221.9	226.5	18.47	0.08323	-0.6926
MW-54R	8	0	158	196	176.4	176	12.93	0.0733	0.04541
MW-55	8	0	126	198	161.8	162.5	21.47	0.1328	0.02472
OW-57ROUT	8	0	113	144	129.1	129.5	10.37	0.08032	-0.1314

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Iron, Total Analysis Run 8/31/2022 2:57 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

For observations made between 10/13/2020 and 8/2/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 3
Wells = 12
Minimum Value = 10
Maximum Value = 40500
Mean Value = 4254
Median Value = 1785
Standard Deviation = 7505
Coefficient of Variation = 1.764
Skewness = 3.184

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	86	13600	1838	182.5	4753	2.586	2.267
JCW-MW-18004	8	3	10	952	138.9	22.5	328.8	2.368	2.26
JCW-MW-18005	8	0	1680	5840	3982	4070	1403	0.3524	-0.2518
JCW-MW-18006	8	0	5490	9040	6770	6340	1262	0.1864	0.6854
MW-50	8	0	730	2990	2038	1993	786.2	0.3859	-0.3157
MW-51	8	0	1210	5500	3029	2070	1860	0.6143	0.4375
MW-52	8	0	879	5020	3210	3350	1652	0.5146	-0.1914
MW-53	8	0	1060	2380	1466	1330	438.1	0.2988	1.179
MW-53R	8	0	460	2800	1609	1610	822.1	0.511	0.03486
MW-54R	8	0	115	2280	797.6	639	717.7	0.8998	1.072
MW-55	8	0	15000	40500	26100	22650	9599	0.3678	0.5432
OW-57ROUT	8	0	37	100	71.13	71	23.7	0.3332	-0.1205

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Sulfate Analysis Run 8/31/2022 2:57 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

For observations made between 10/13/2020 and 8/2/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 0
Wells = 12
Minimum Value = 14.9
Maximum Value = 1180
Mean Value = 327.1
Median Value = 256
Standard Deviation = 274.2
Coefficient of Variation = 0.8384
Skewness = 0.9892

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	435	1180	756.6	726	257.8	0.3407	0.5509
JCW-MW-18004	8	0	393	756	538.4	517.5	102.8	0.191	1.009
JCW-MW-18005	8	0	185	535	282.2	220	130.7	0.4632	1.179
JCW-MW-18006	8	0	14.9	57.3	38.15	36.4	13.28	0.3481	-0.2542
MW-50	8	0	285.5	1125	633.1	570	325.4	0.5141	0.3423
MW-51	8	0	404	529.5	444.2	440	38.48	0.08663	1.403
MW-52	8	0	110	663	524.5	573	176.3	0.3361	-1.837
MW-53	8	0	39.5	322	208.9	242	106.5	0.5097	-0.4125
MW-53R	8	0	71.7	533	233.3	192.5	138.6	0.5938	1.293
MW-54R	8	0	67.1	100	78.85	76.35	10.27	0.1303	1.081
MW-55	8	0	18.5	249	99.55	64.35	94.21	0.9463	0.9662
OW-57ROUT	8	0	69.4	109	87.23	85.5	11.8	0.1352	0.4063

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Vanadium, Total Analysis Run 8/31/2022 2:57 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

For observations made between 10/13/2020 and 8/2/2022, a summary of the selected data set:

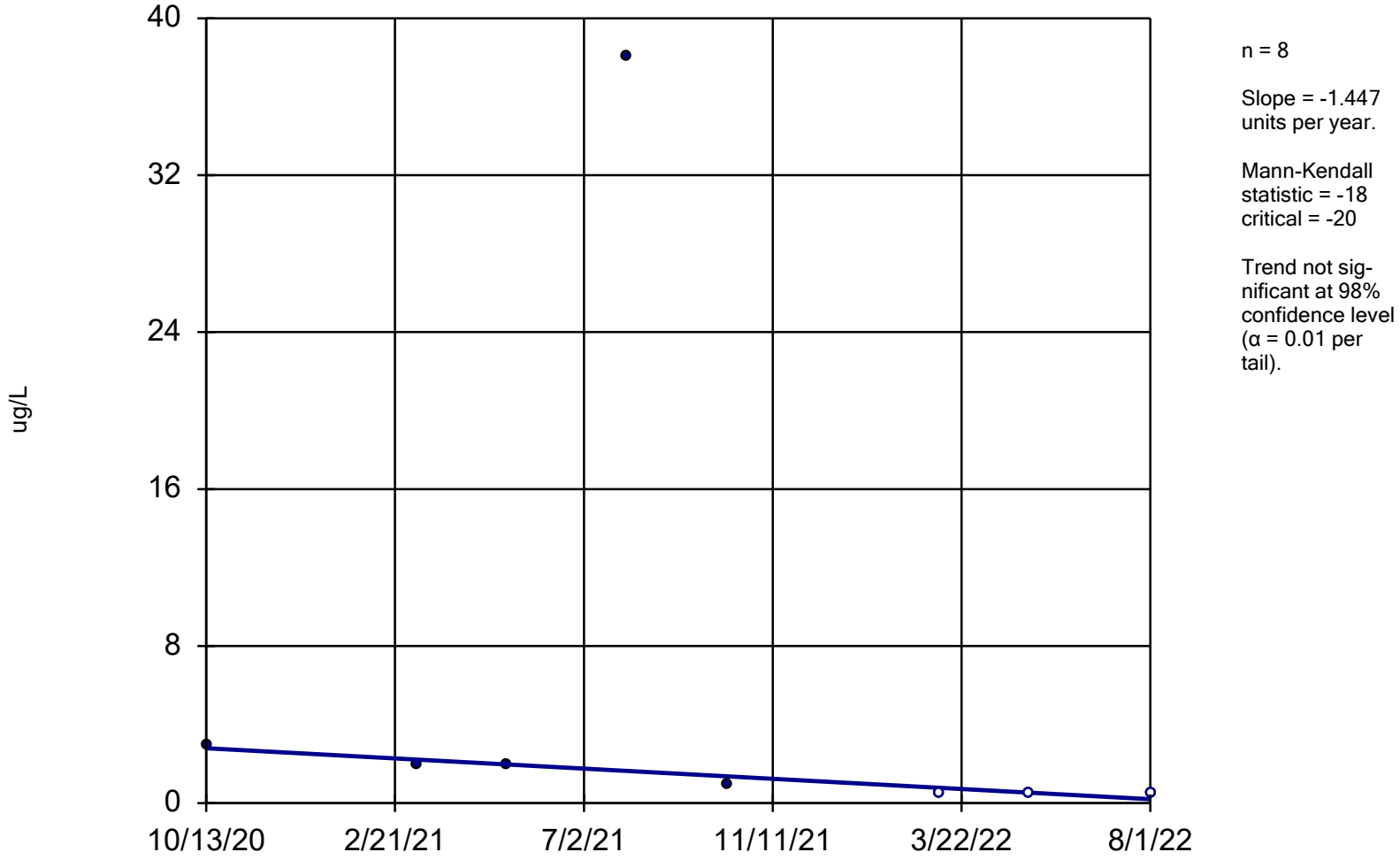
Observations = 96
ND/Trace = 86
Wells = 12
Minimum Value = 1
Maximum Value = 12
Mean Value = 1.302
Median Value = 1
Standard Deviation = 1.266
Coefficient of Variation = 0.9722
Skewness = 6.71

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	6	1	12	2.5	1	3.854	1.542	2.232
JCW-MW-18004	8	8	1	1	1	1	0	0	NaN
JCW-MW-18005	8	8	1	1	1	1	0	0	NaN
JCW-MW-18006	8	0	2	4	3.125	3	0.6409	0.2051	-0.0544
MW-50	8	8	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	8	1	1	1	1	0	0	NaN
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
OW-57ROUT	8	8	1	1	1	1	0	0	NaN

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Arsenic, Total

JCW-MW-18001



n = 8

Slope = -1.447 units per year.

Mann-Kendall statistic = -18
critical = -20

Trend not significant at 98% confidence level (α = 0.01 per tail).

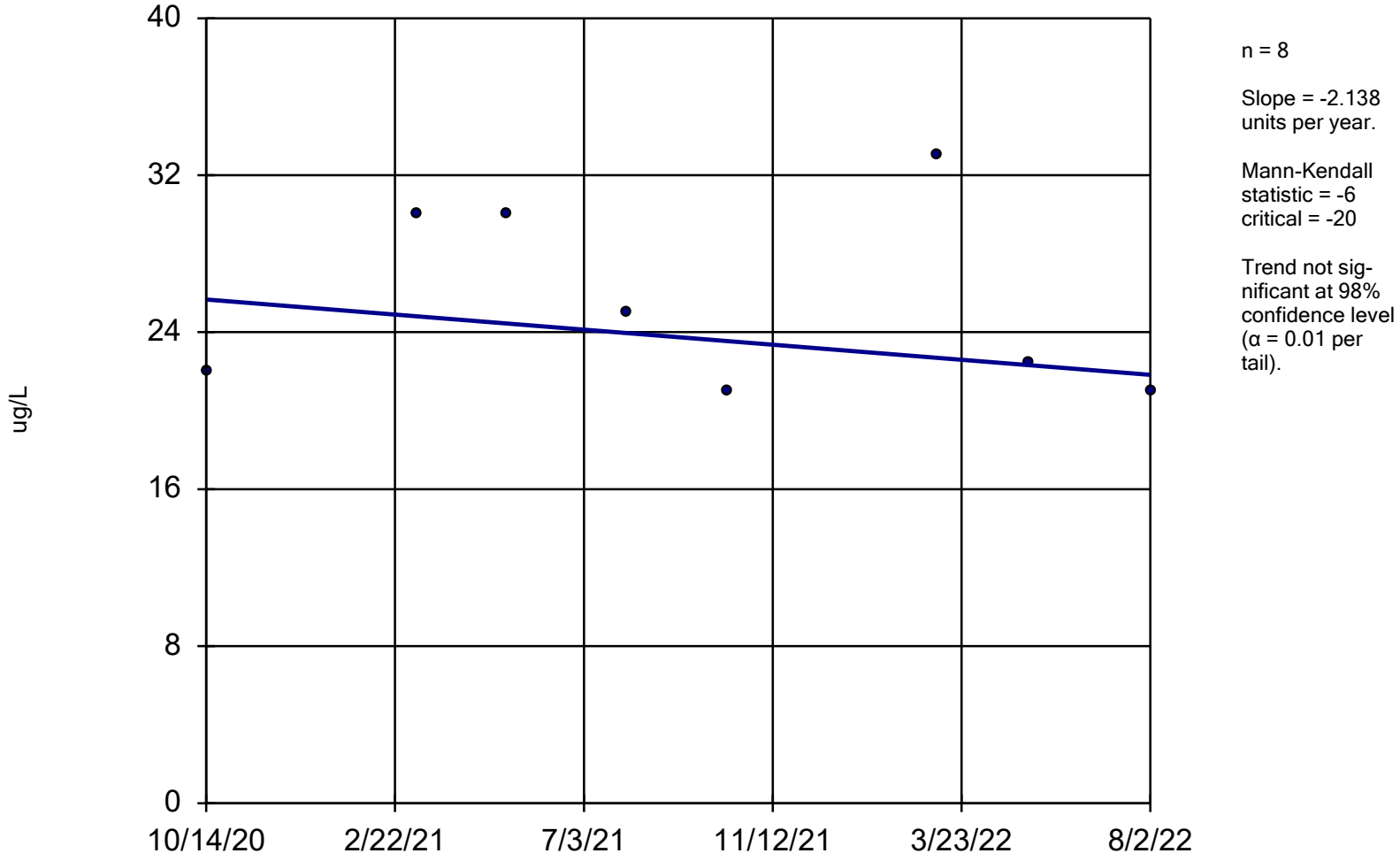
Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Arsenic, Total

JCW-MW-18006



n = 8

Slope = -2.138 units per year.

Mann-Kendall statistic = -6
critical = -20

Trend not significant at 98% confidence level (α = 0.01 per tail).

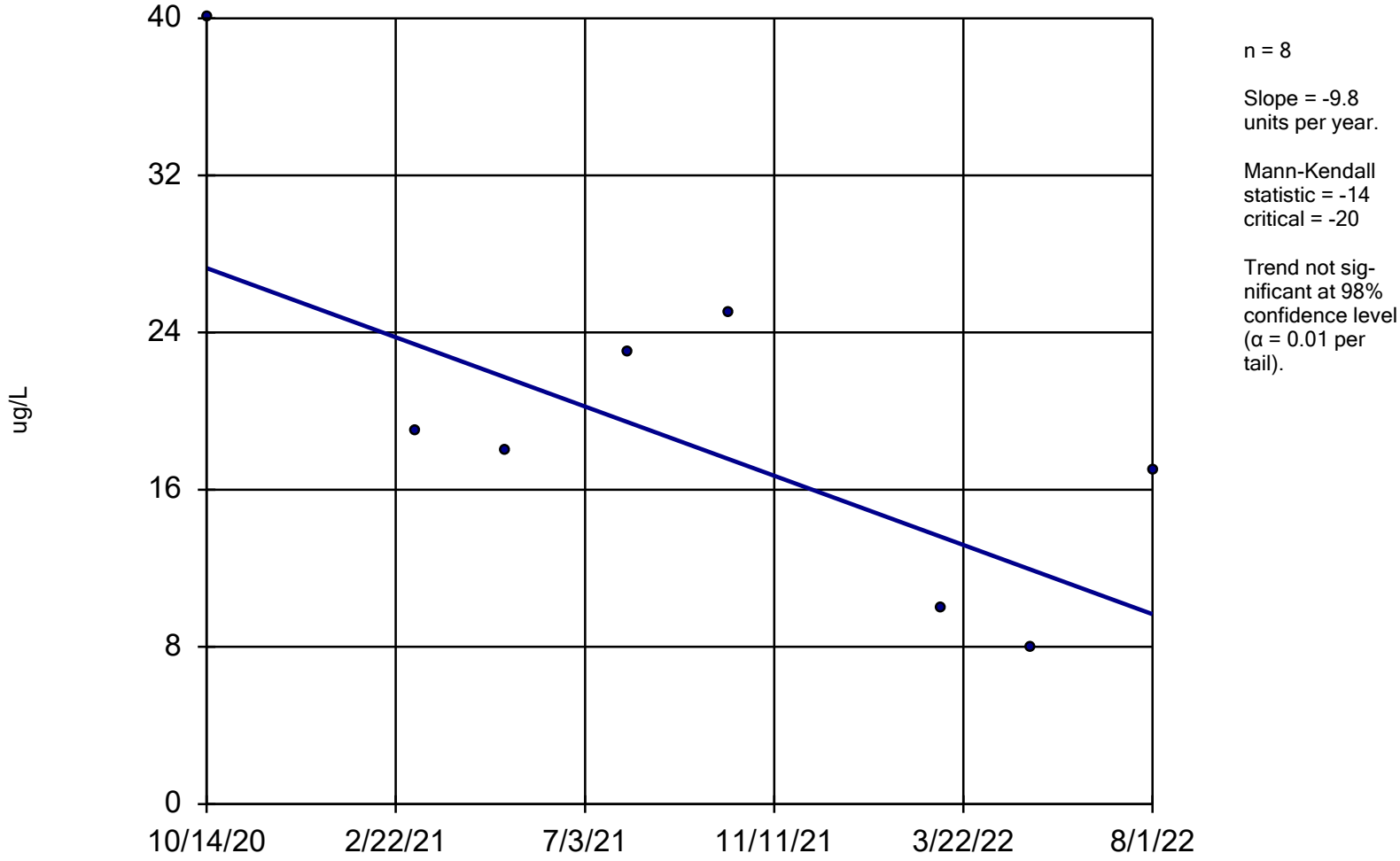
Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Arsenic, Total

MW-53R



n = 8

Slope = -9.8 units per year.

Mann-Kendall statistic = -14
critical = -20

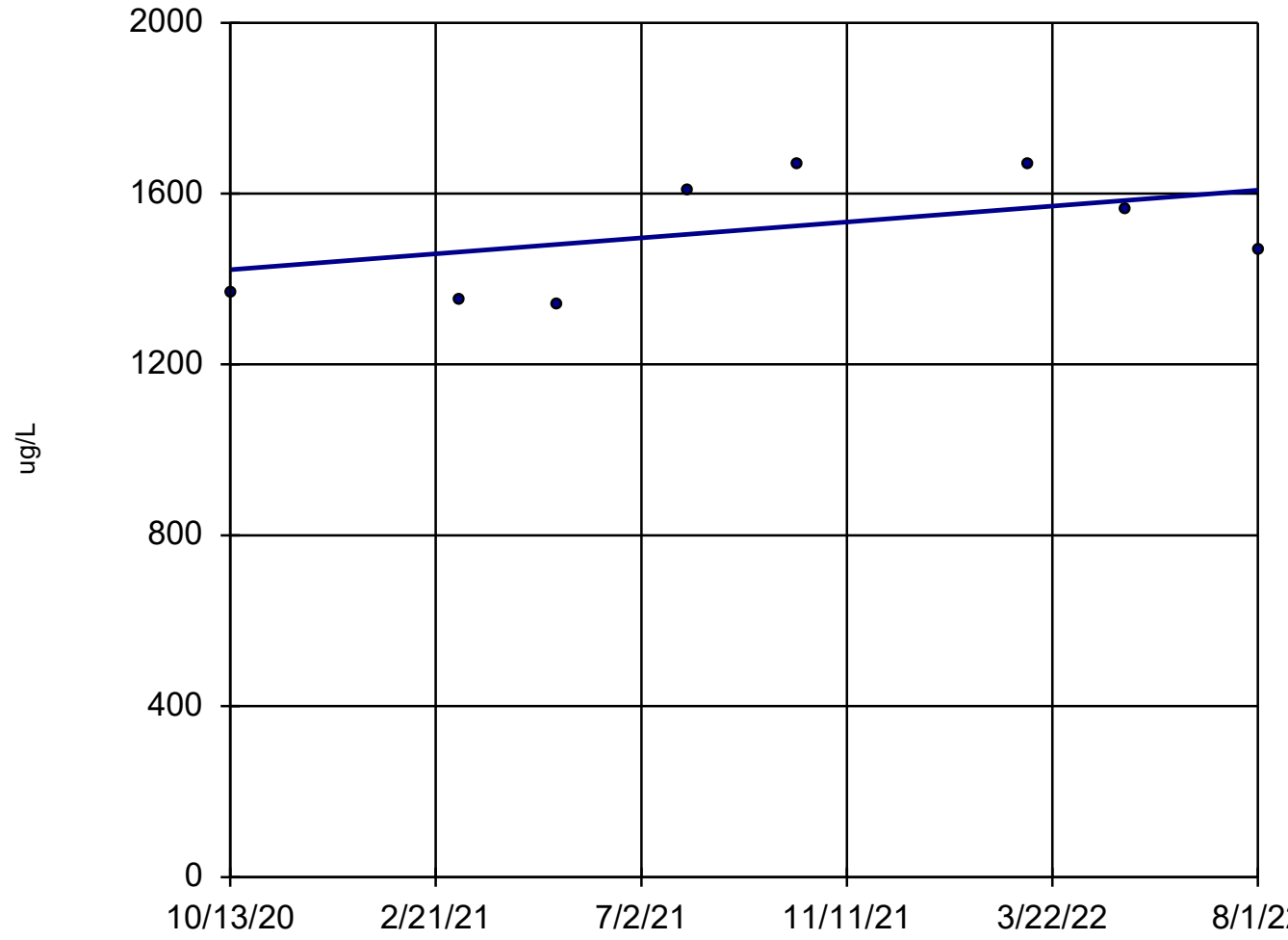
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Boron, Total

JCW-MW-18001



n = 8

Slope = 103.4 units per year.

Mann-Kendall statistic = 7
critical = 20

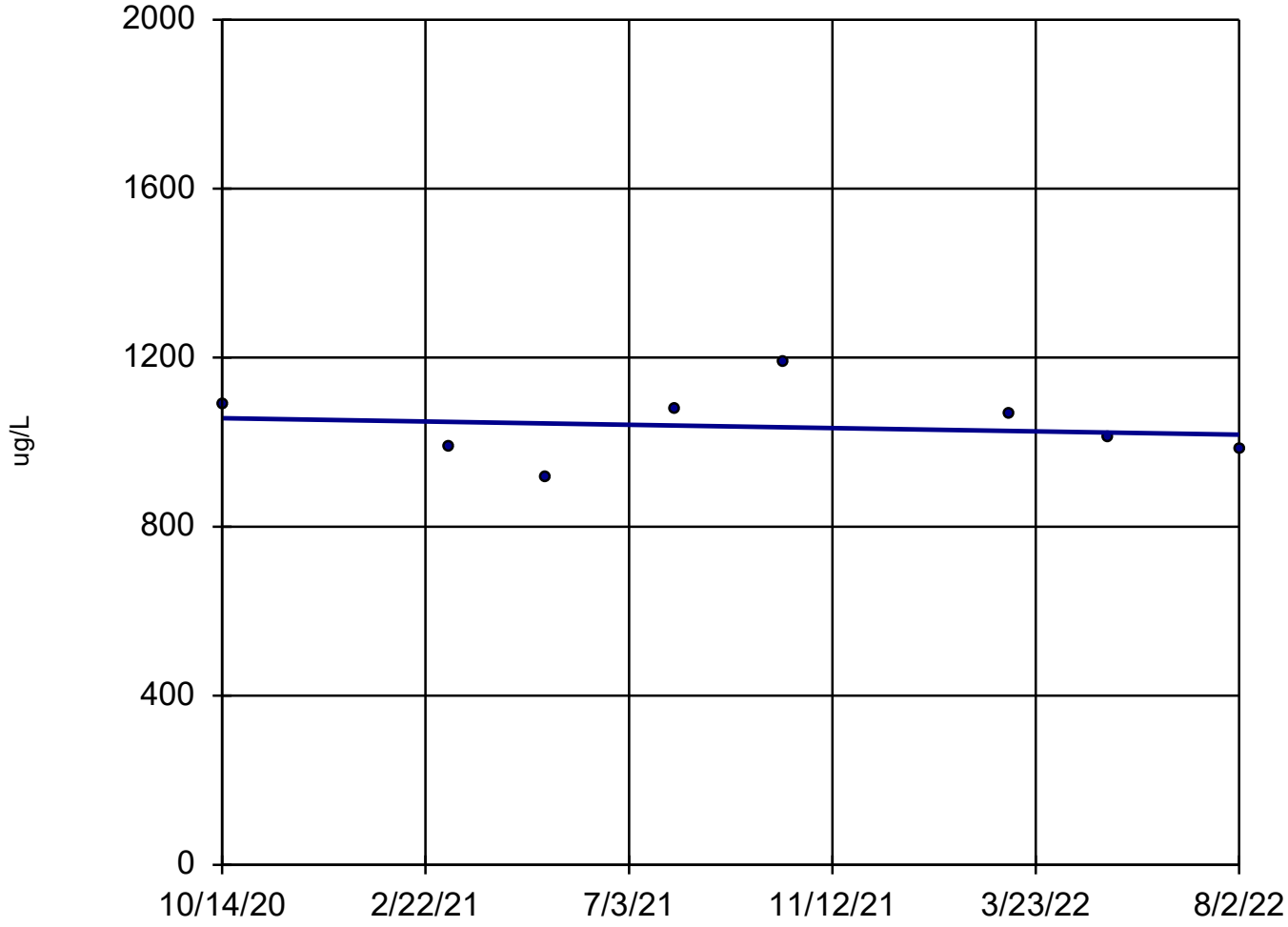
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Boron, Total

JCW-MW-18005



n = 8

Slope = -21.64 units per year.

Mann-Kendall statistic = -6
critical = -20

Trend not significant at 98% confidence level (α = 0.01 per tail).

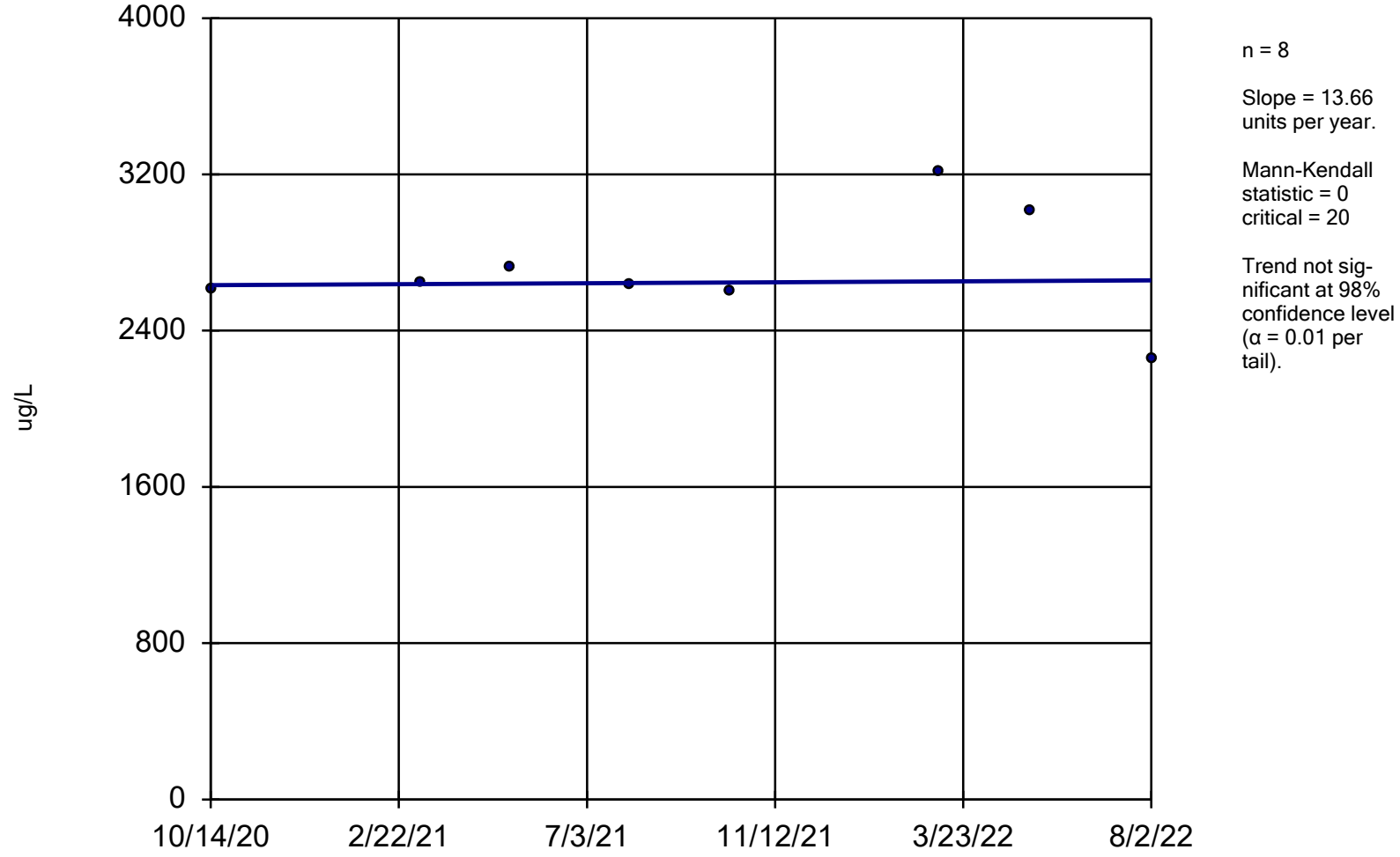
Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

JCW-MW-18006



n = 8

Slope = 13.66 units per year.

Mann-Kendall statistic = 0
critical = 20

Trend not significant at 98% confidence level (α = 0.01 per tail).

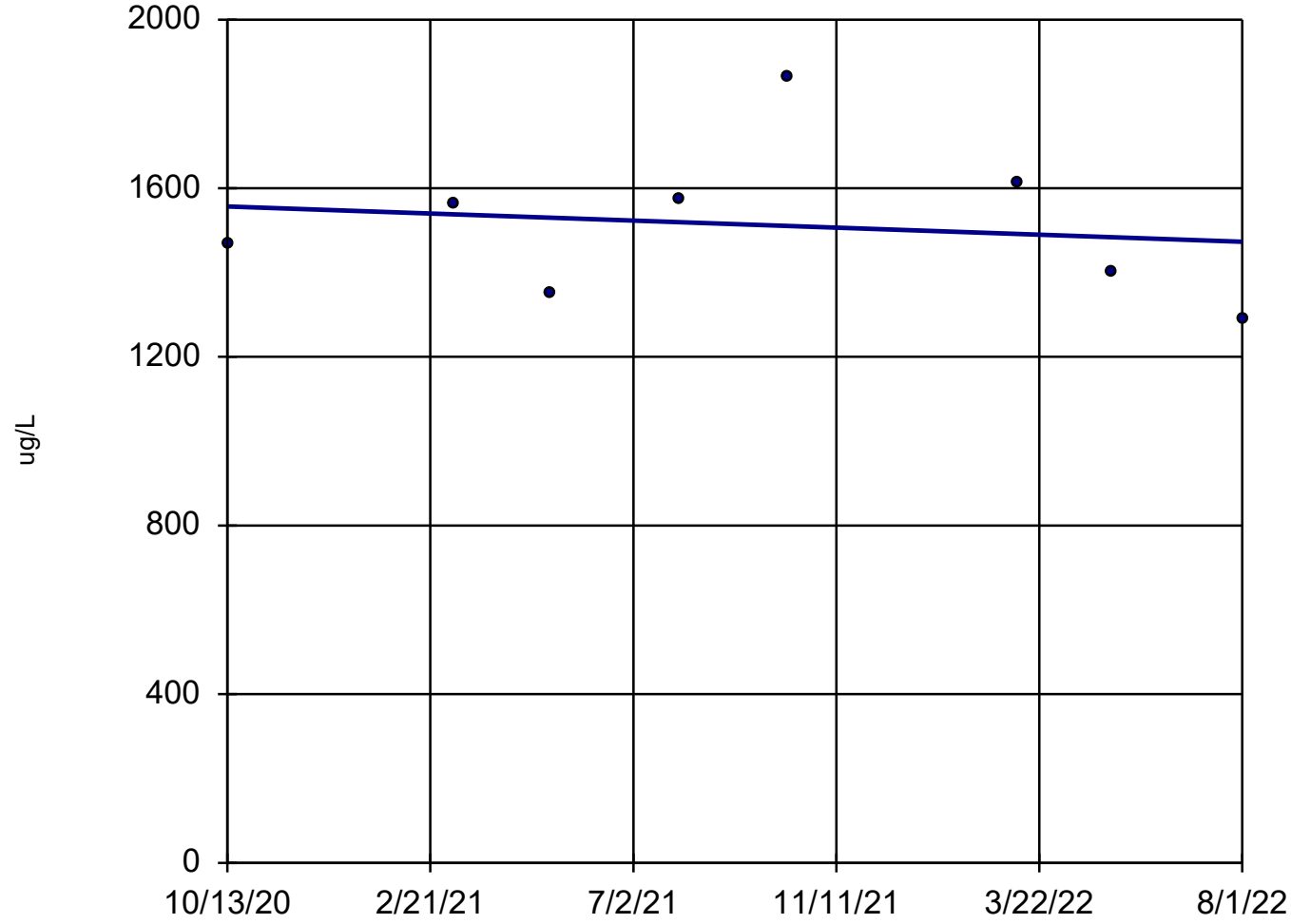
Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-50



n = 8

Slope = -46.74 units per year.

Mann-Kendall statistic = -2
critical = -20

Trend not significant at 98% confidence level (α = 0.01 per tail).

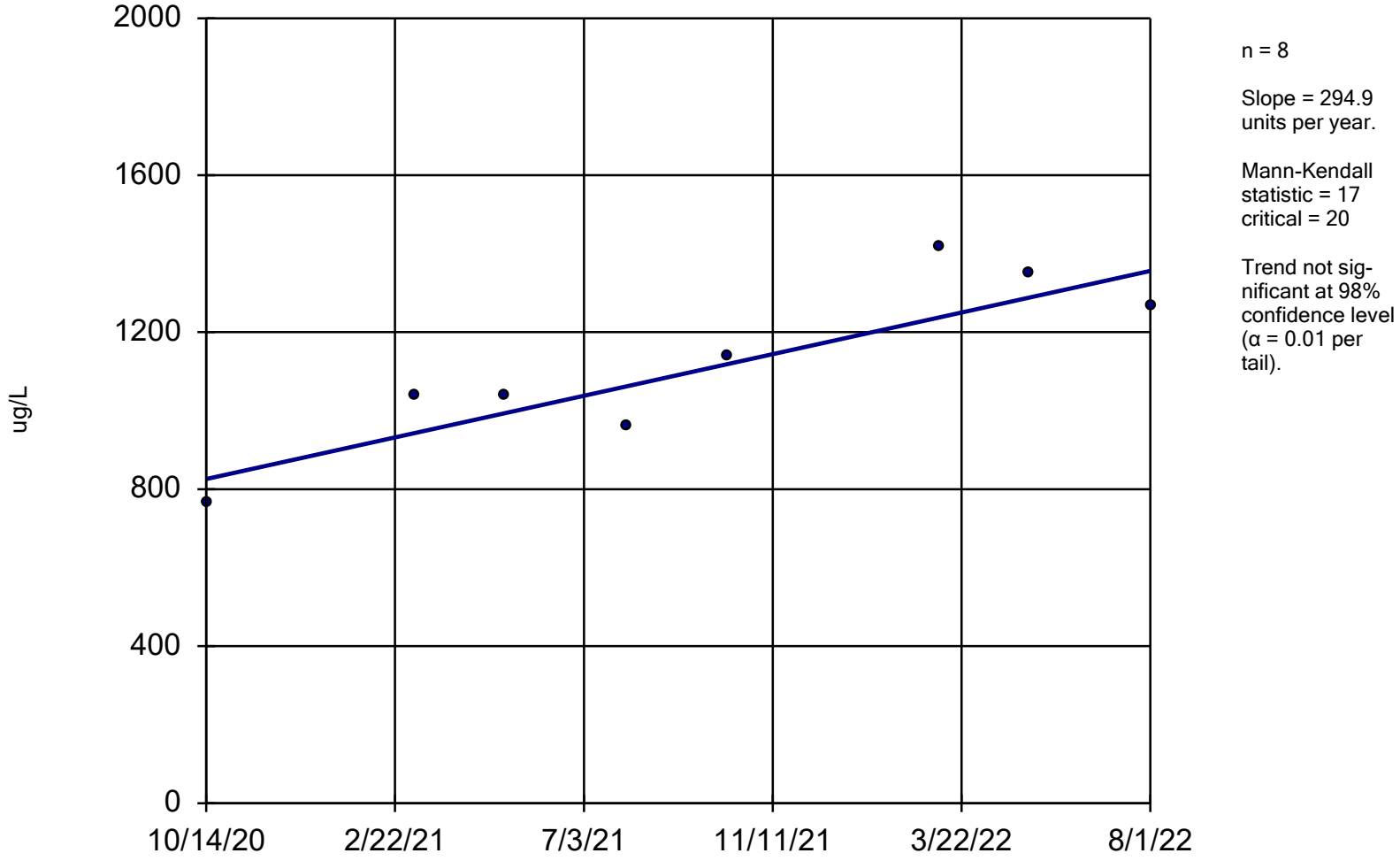
Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-51



n = 8

Slope = 294.9 units per year.

Mann-Kendall statistic = 17
critical = 20

Trend not significant at 98% confidence level (α = 0.01 per tail).

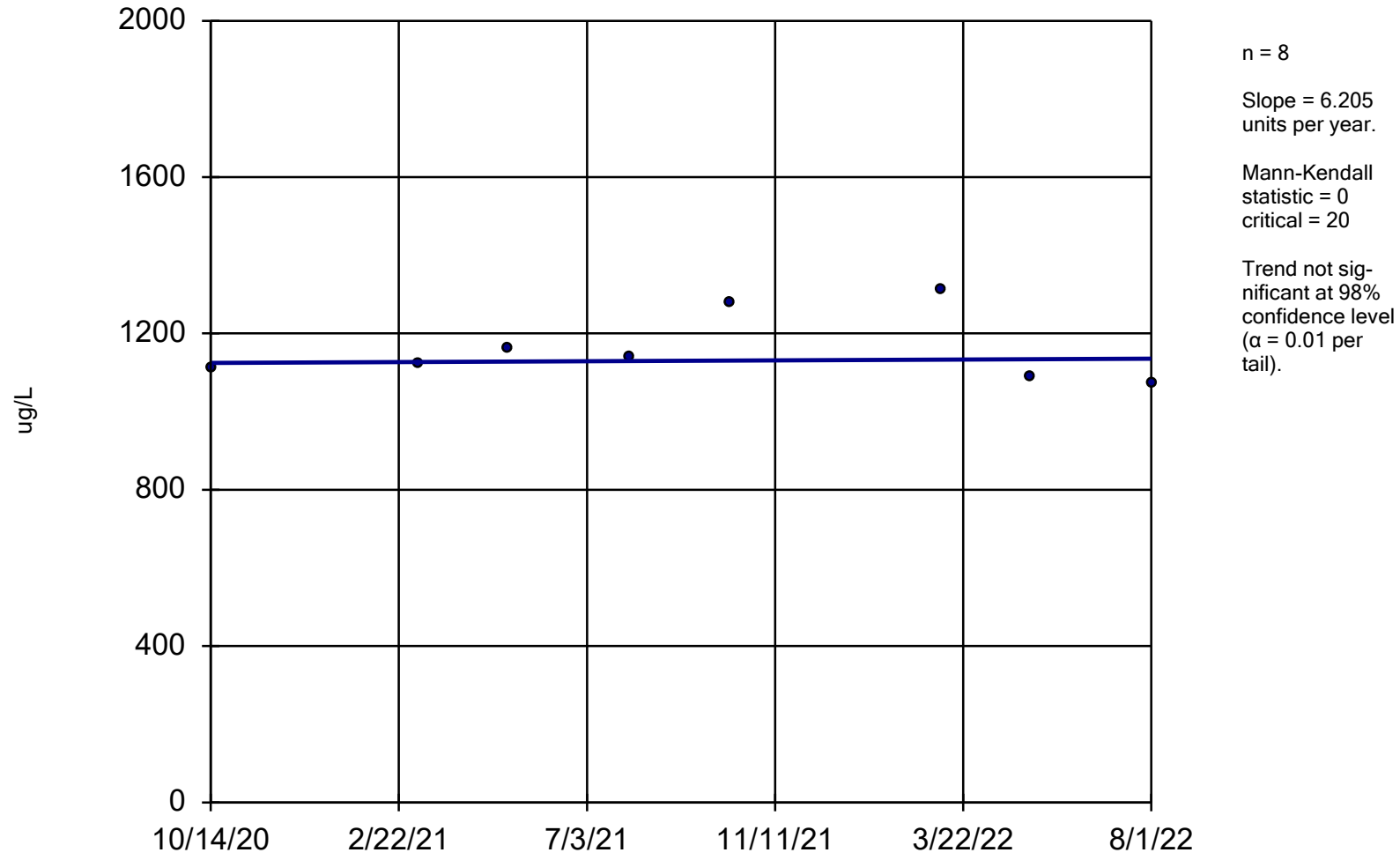
Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-52



n = 8

Slope = 6.205 units per year.

Mann-Kendall statistic = 0
critical = 20

Trend not significant at 98% confidence level (α = 0.01 per tail).

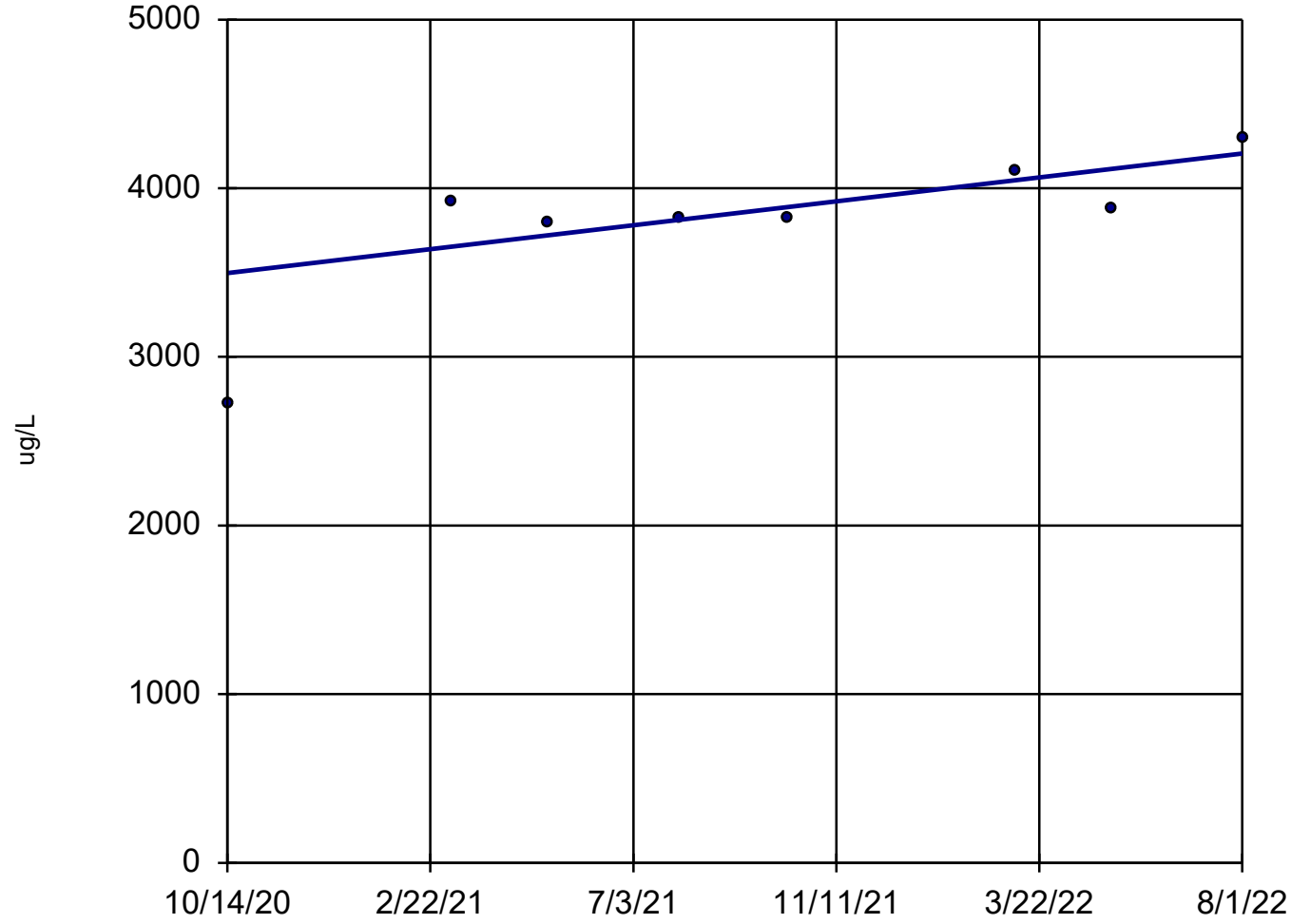
Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-53



n = 8

Slope = 395.1 units per year.

Mann-Kendall statistic = 17
critical = 20

Trend not significant at 98% confidence level (α = 0.01 per tail).

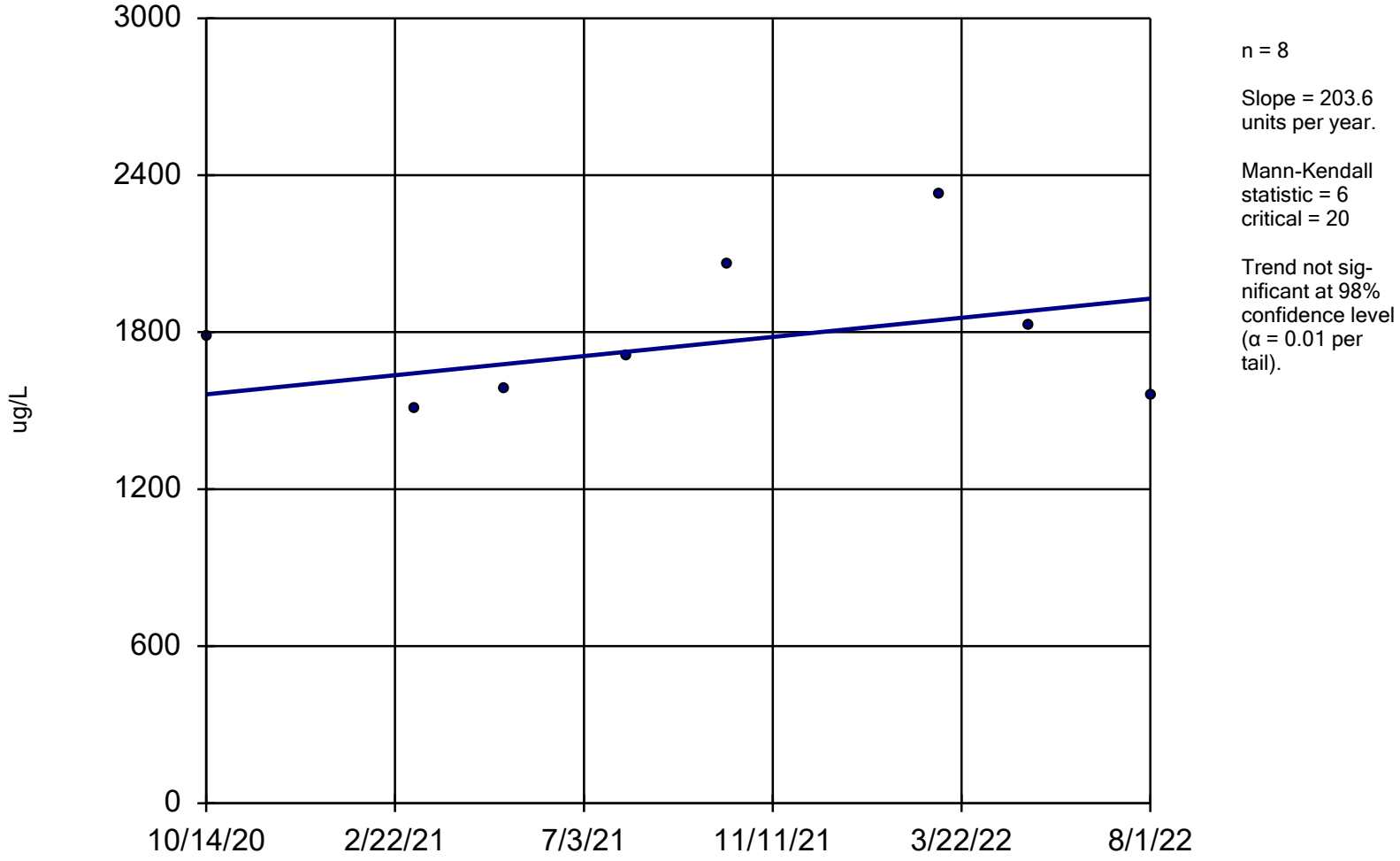
Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-53R



n = 8

Slope = 203.6 units per year.

Mann-Kendall statistic = 6
critical = 20

Trend not significant at 98% confidence level (α = 0.01 per tail).

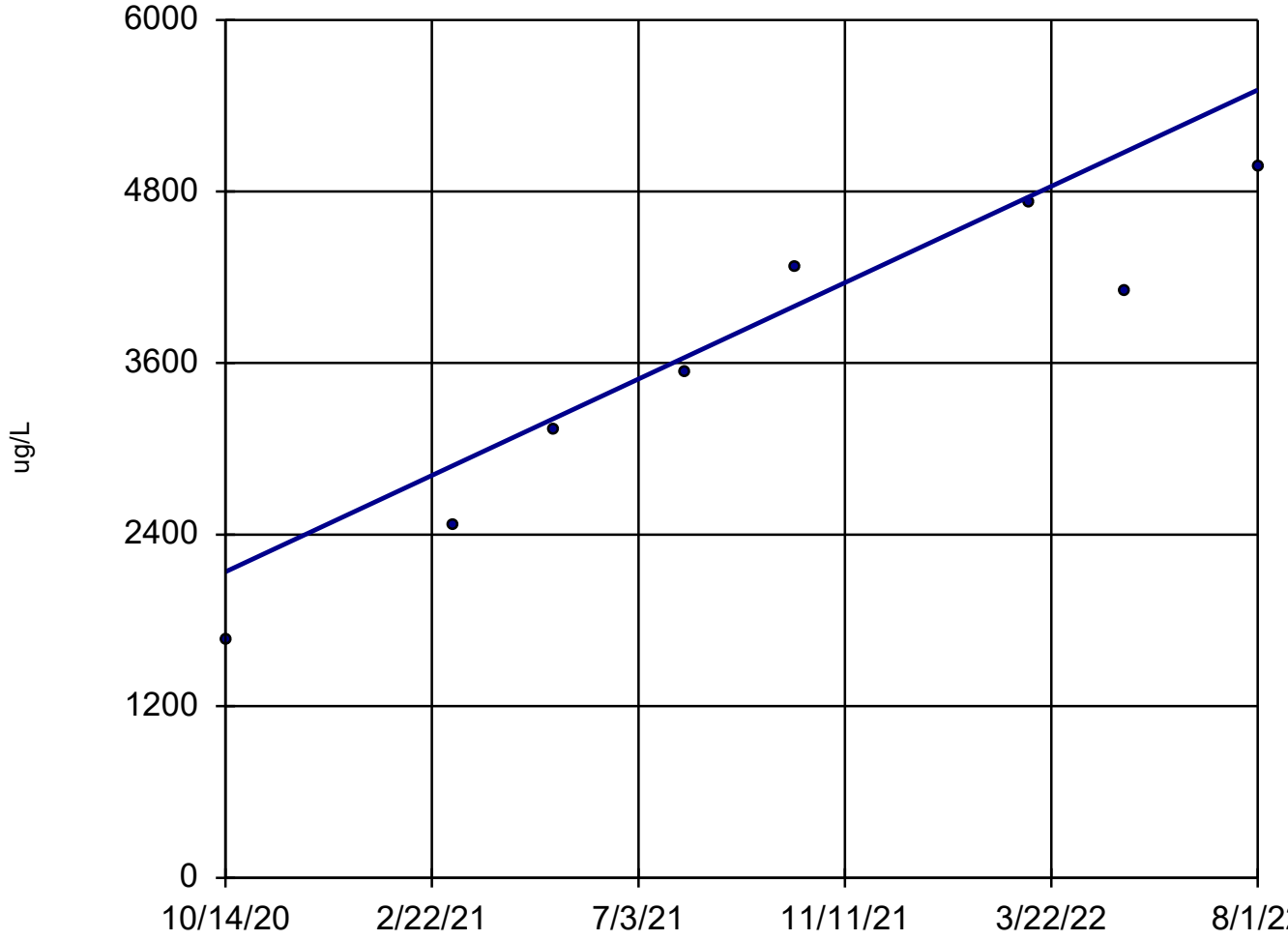
Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-54R



n = 8

Slope = 1876 units per year.

Mann-Kendall statistic = 24
critical = 20

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

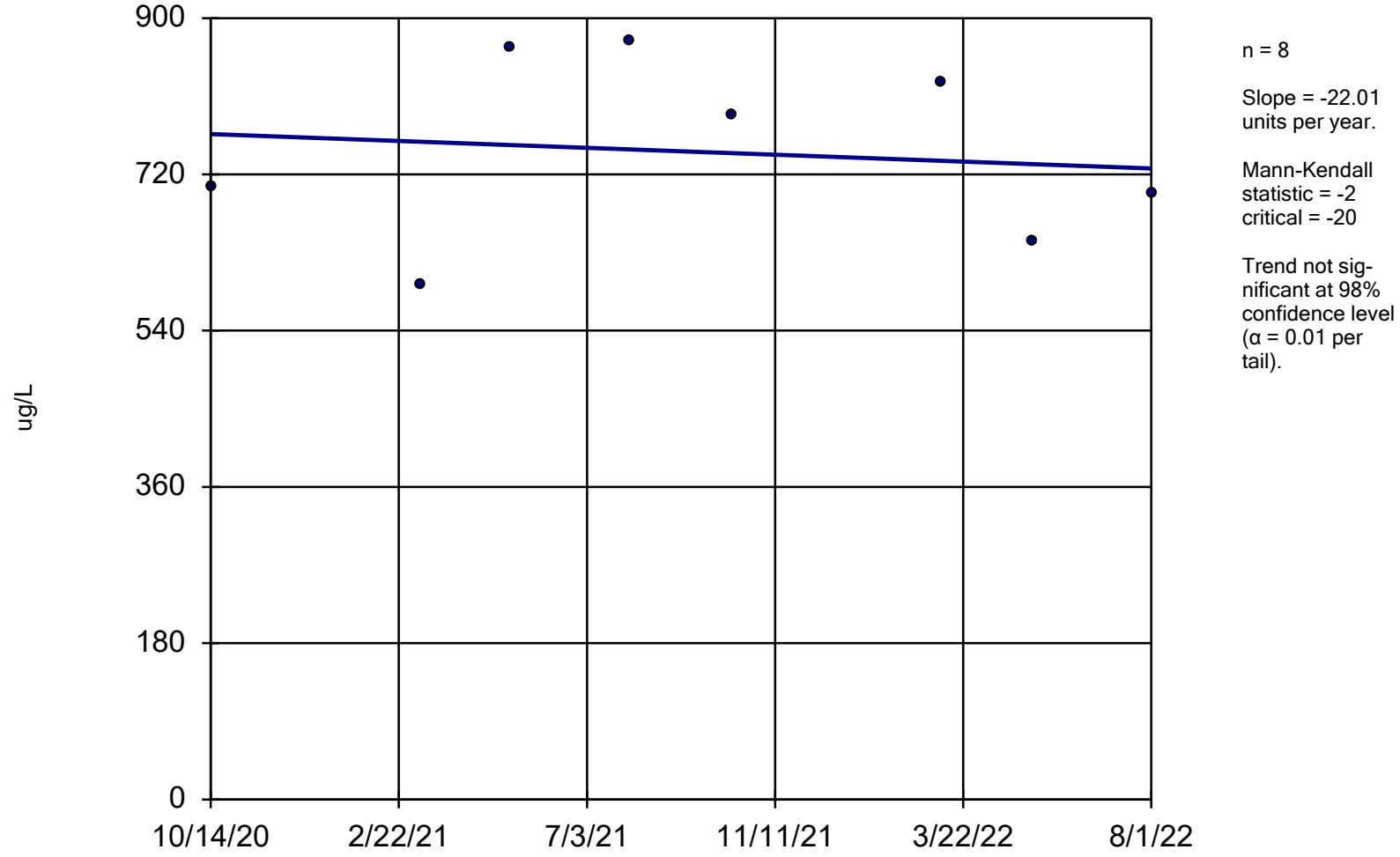
Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-55



n = 8

Slope = -22.01 units per year.

Mann-Kendall statistic = -2
critical = -20

Trend not significant at 98% confidence level (α = 0.01 per tail).

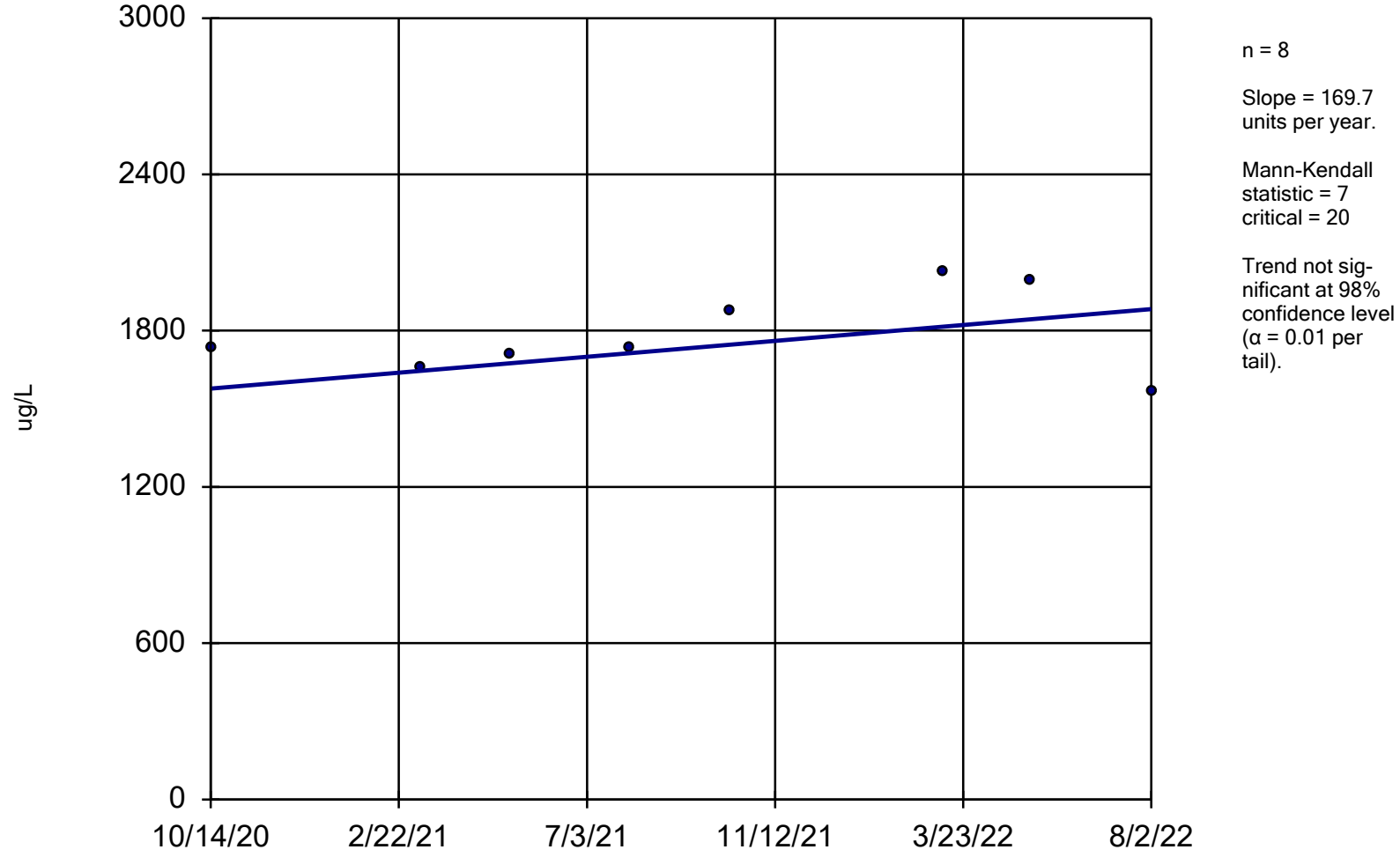
Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

OW-57ROUT



n = 8

Slope = 169.7 units per year.

Mann-Kendall statistic = 7
critical = 20

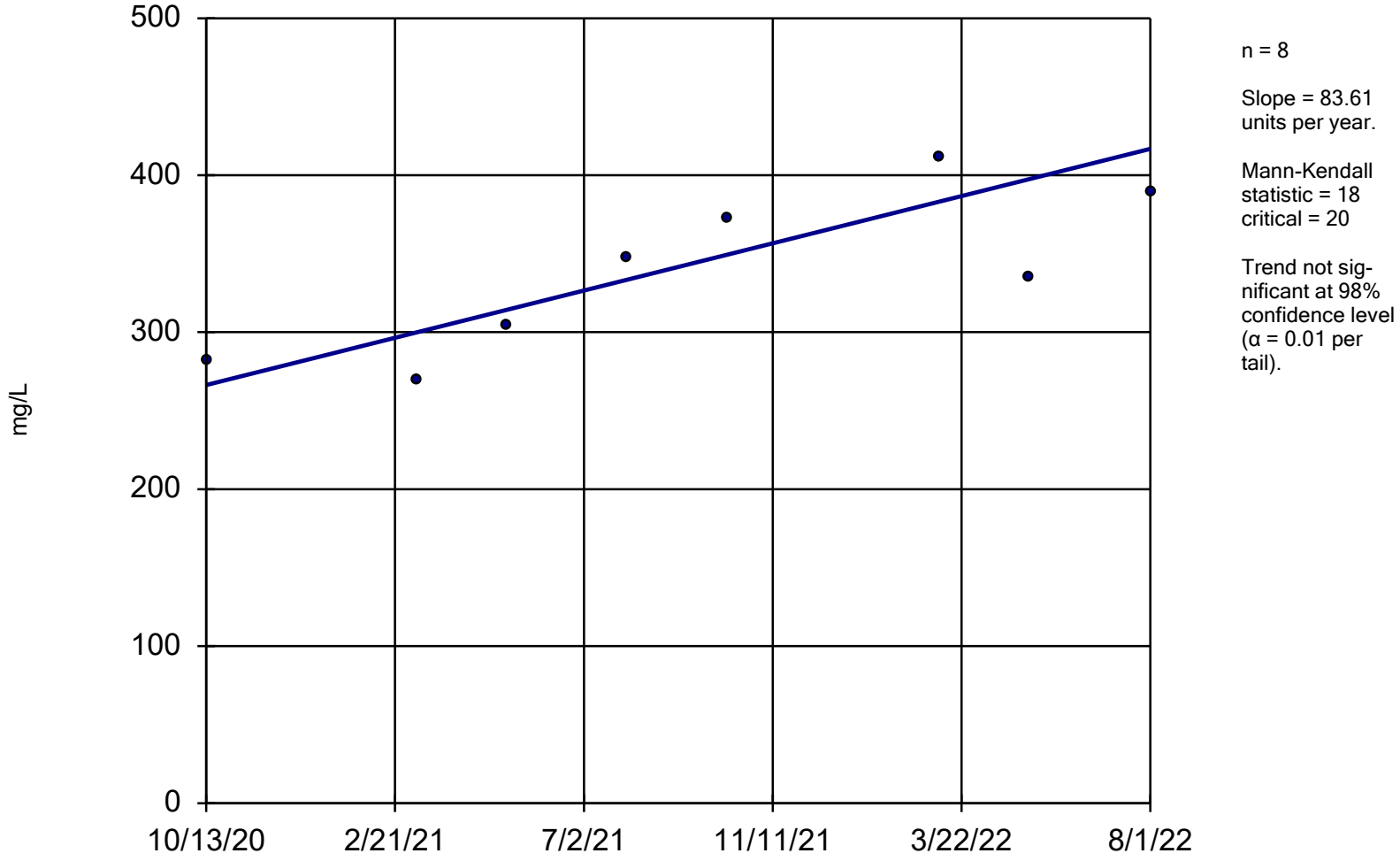
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Calcium, Total

JCW-MW-18001



n = 8

Slope = 83.61 units per year.

Mann-Kendall statistic = 18
critical = 20

Trend not significant at 98% confidence level (α = 0.01 per tail).

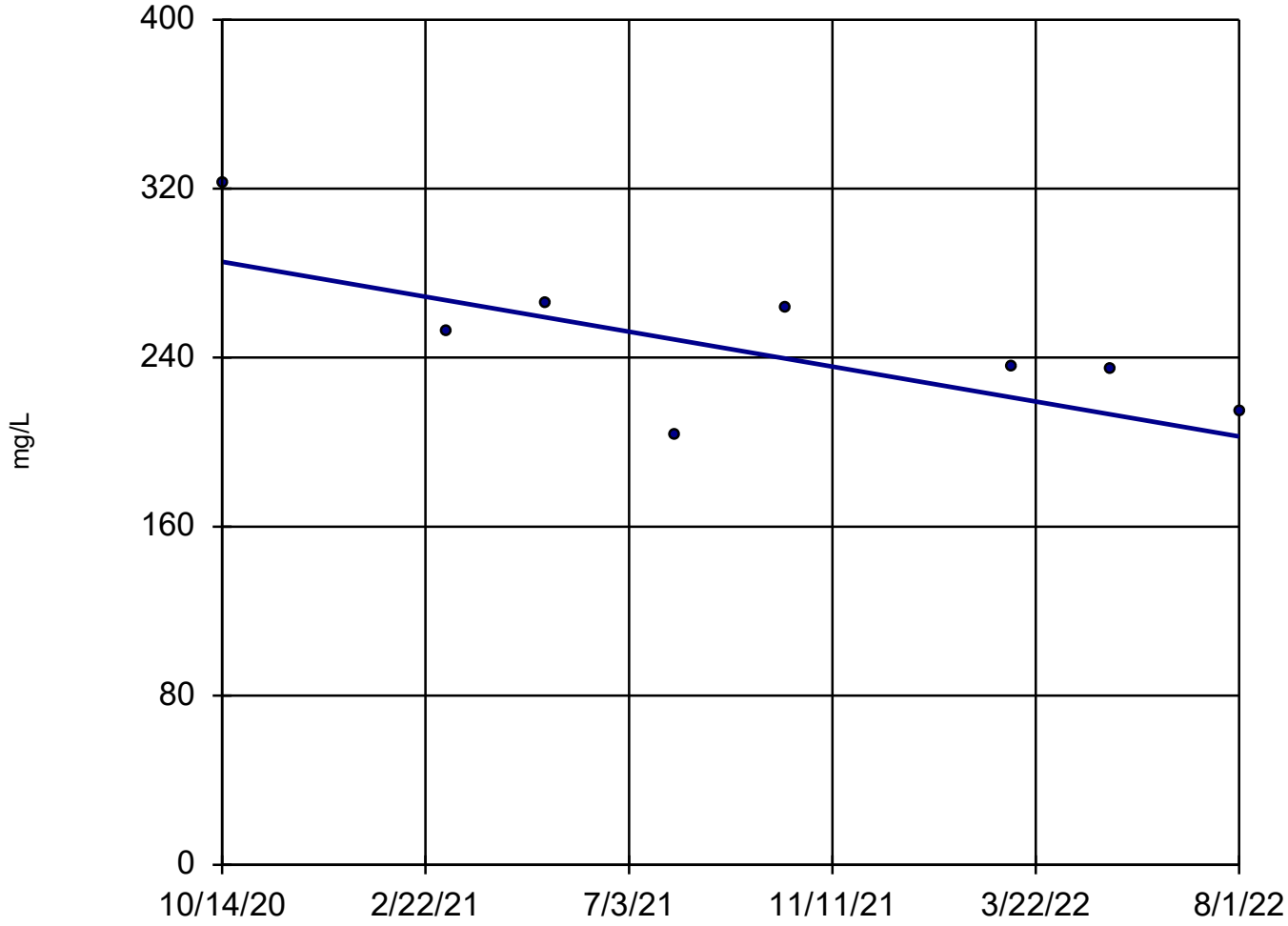
Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

JCW-MW-18004



n = 8

Slope = -46.02 units per year.

Mann-Kendall statistic = -16
critical = -20

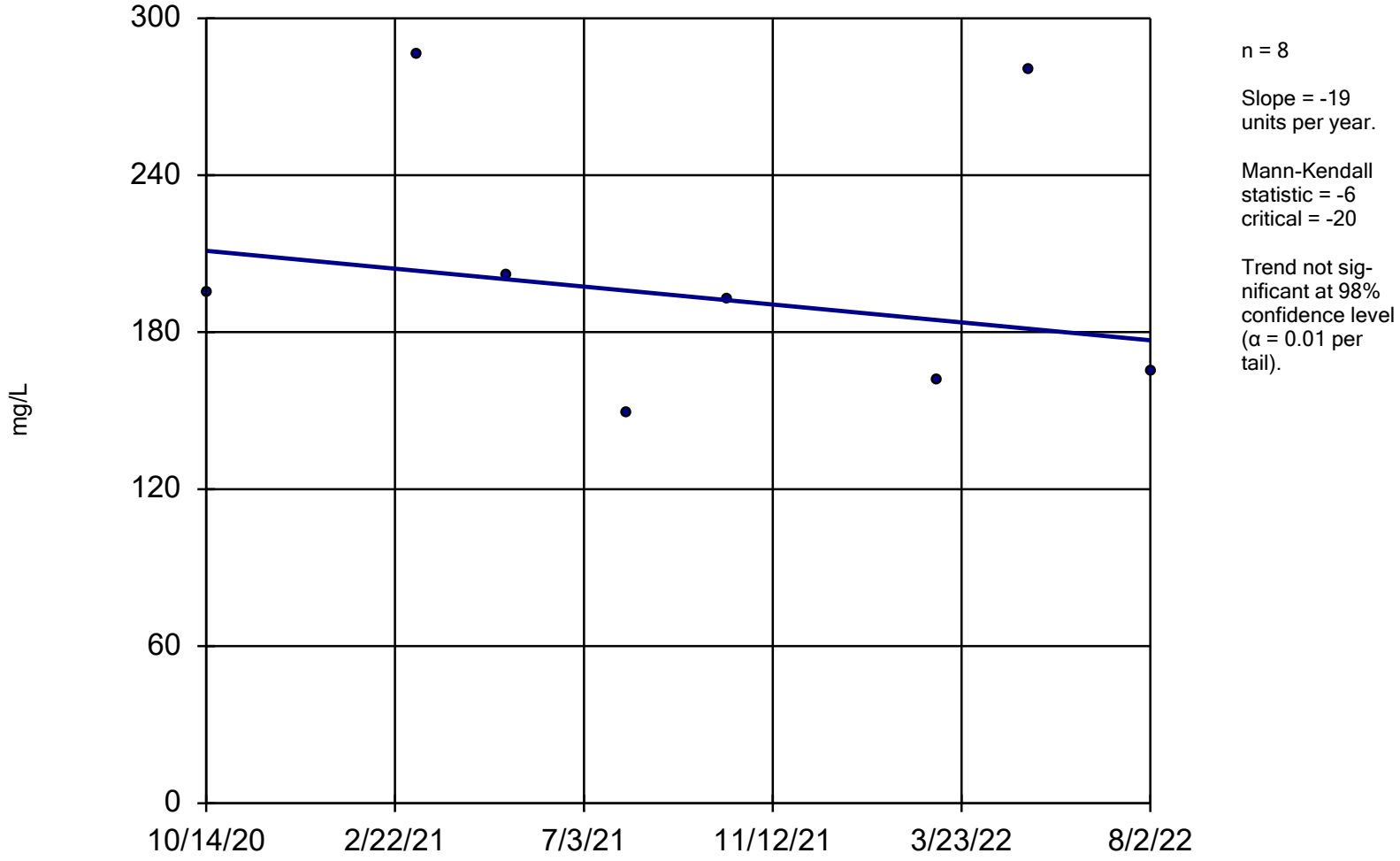
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Calcium, Total

JCW-MW-18005



n = 8

Slope = -19 units per year.

Mann-Kendall statistic = -6 critical = -20

Trend not significant at 98% confidence level (α = 0.01 per tail).

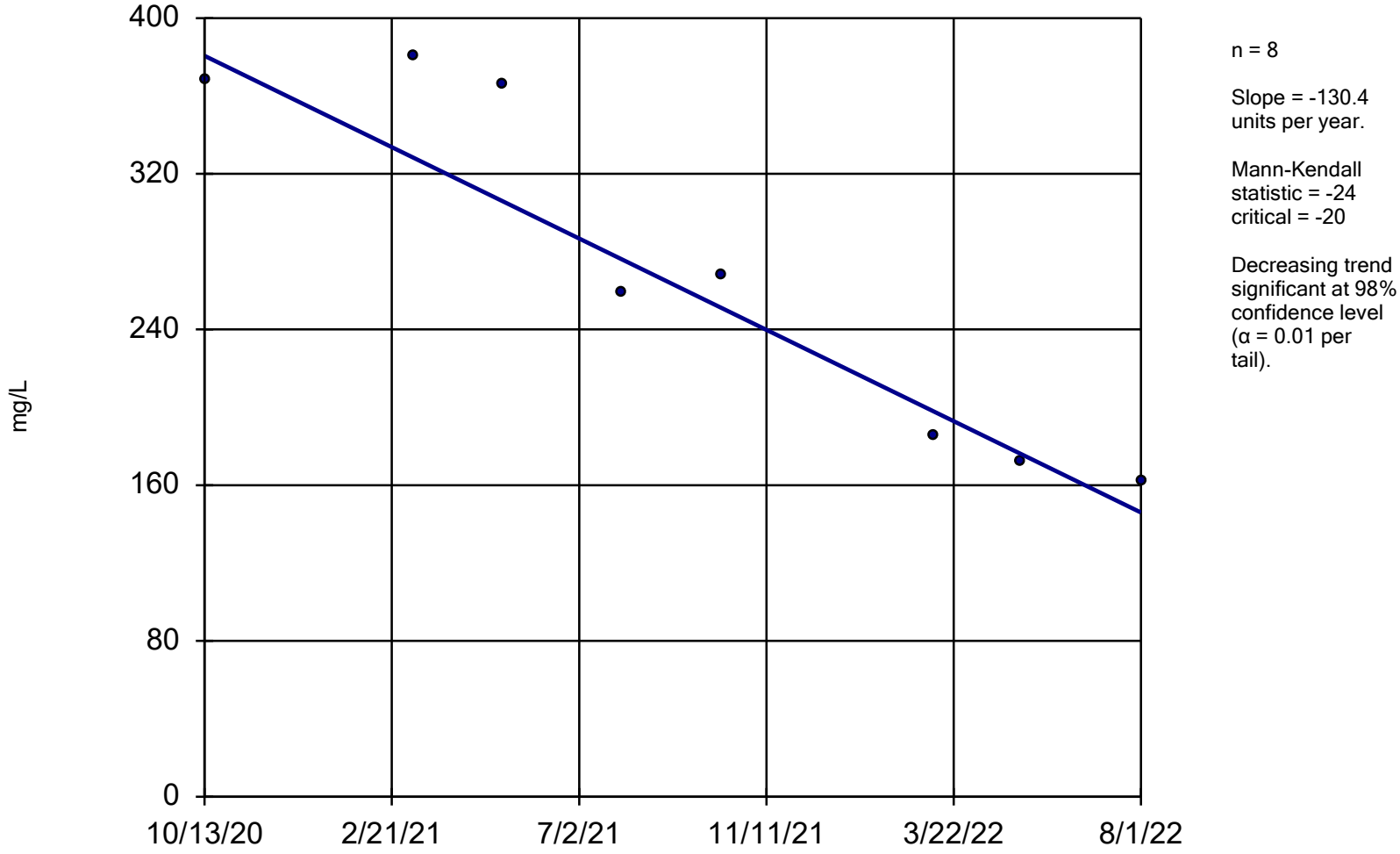
Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

MW-50



n = 8

Slope = -130.4 units per year.

Mann-Kendall statistic = -24
critical = -20

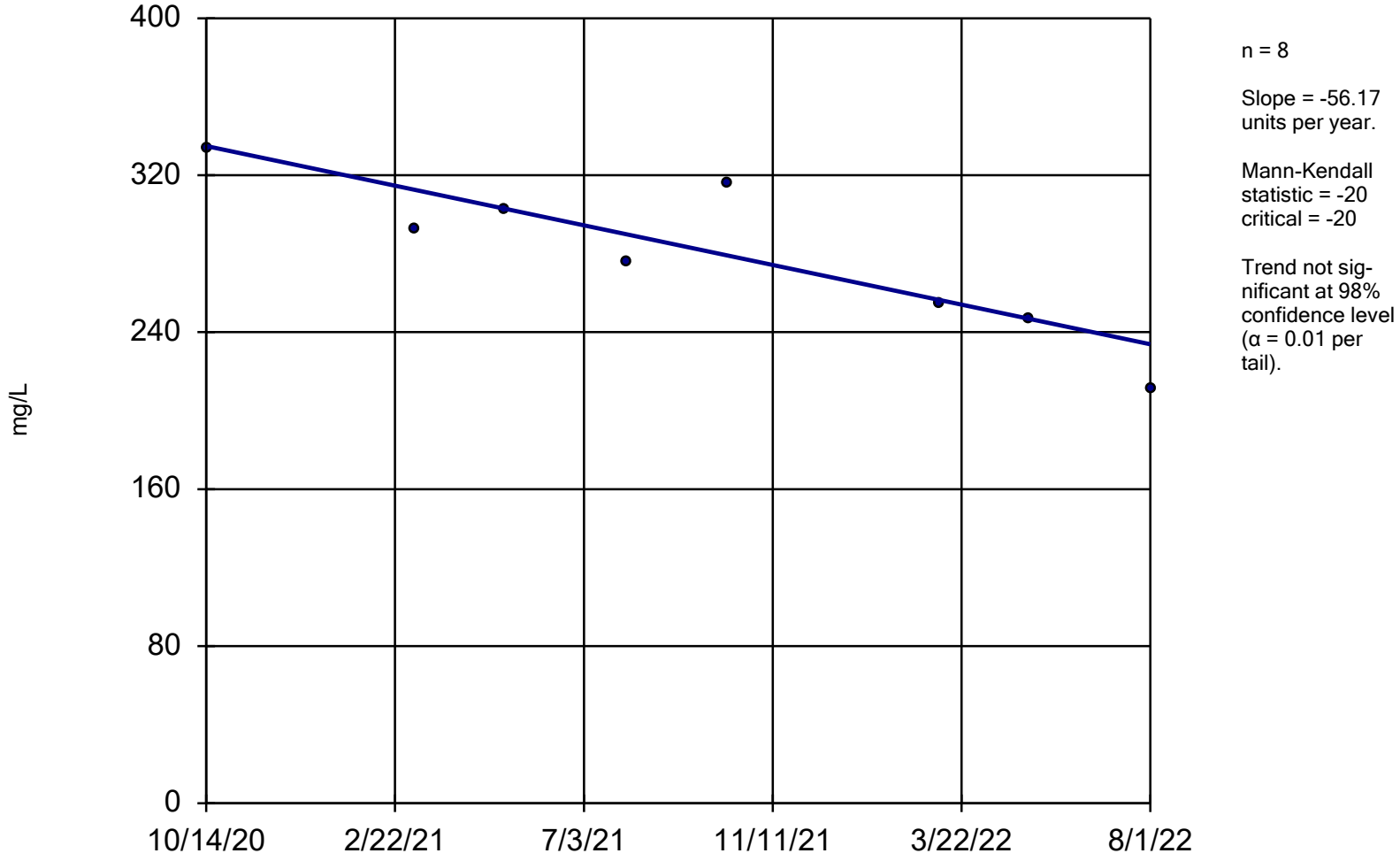
Decreasing trend significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Calcium, Total

MW-51



n = 8

Slope = -56.17 units per year.

Mann-Kendall statistic = -20
critical = -20

Trend not significant at 98% confidence level (α = 0.01 per tail).

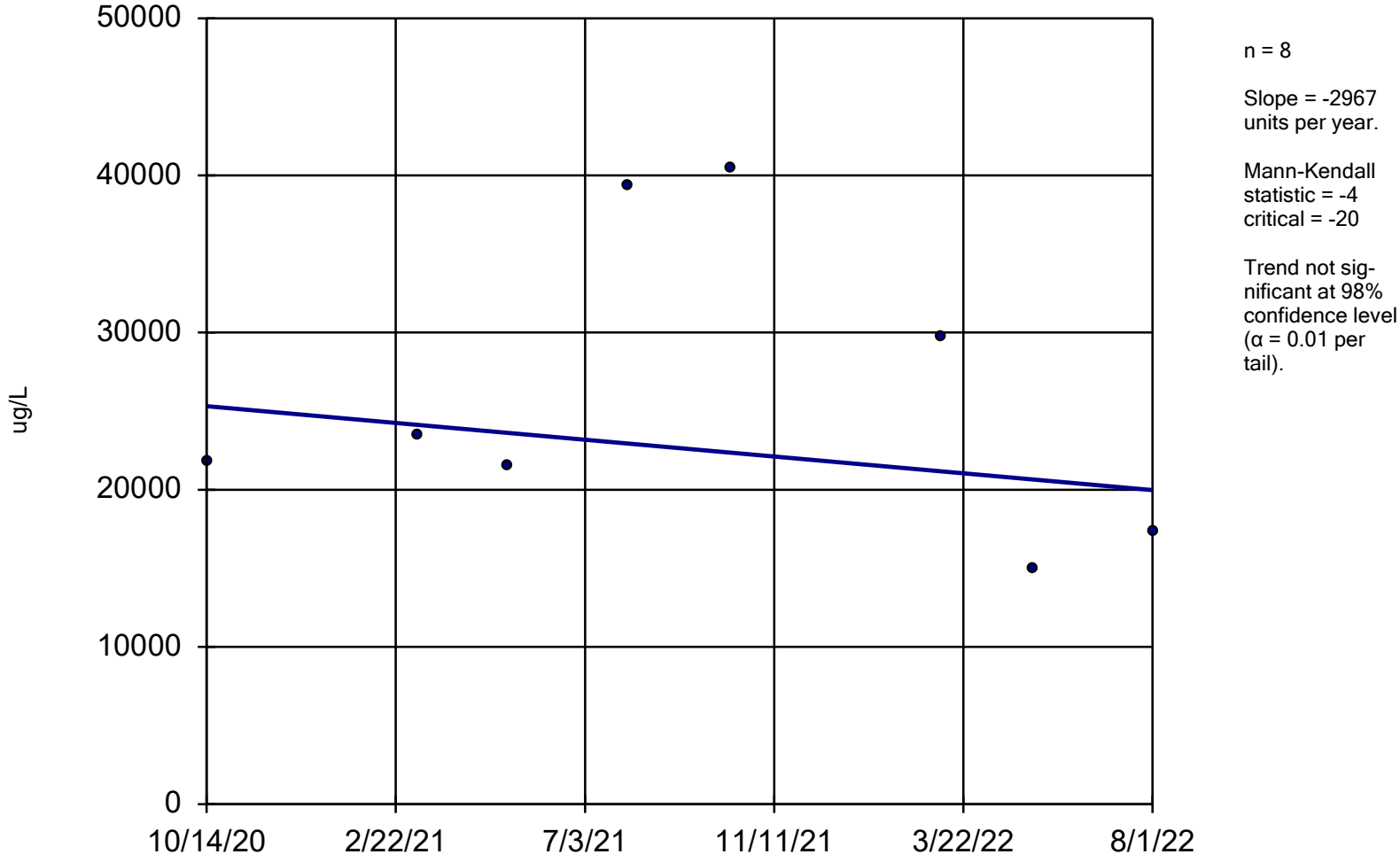
Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Iron, Total

MW-55



n = 8

Slope = -2967 units per year.

Mann-Kendall statistic = -4
critical = -20

Trend not significant at 98% confidence level (α = 0.01 per tail).

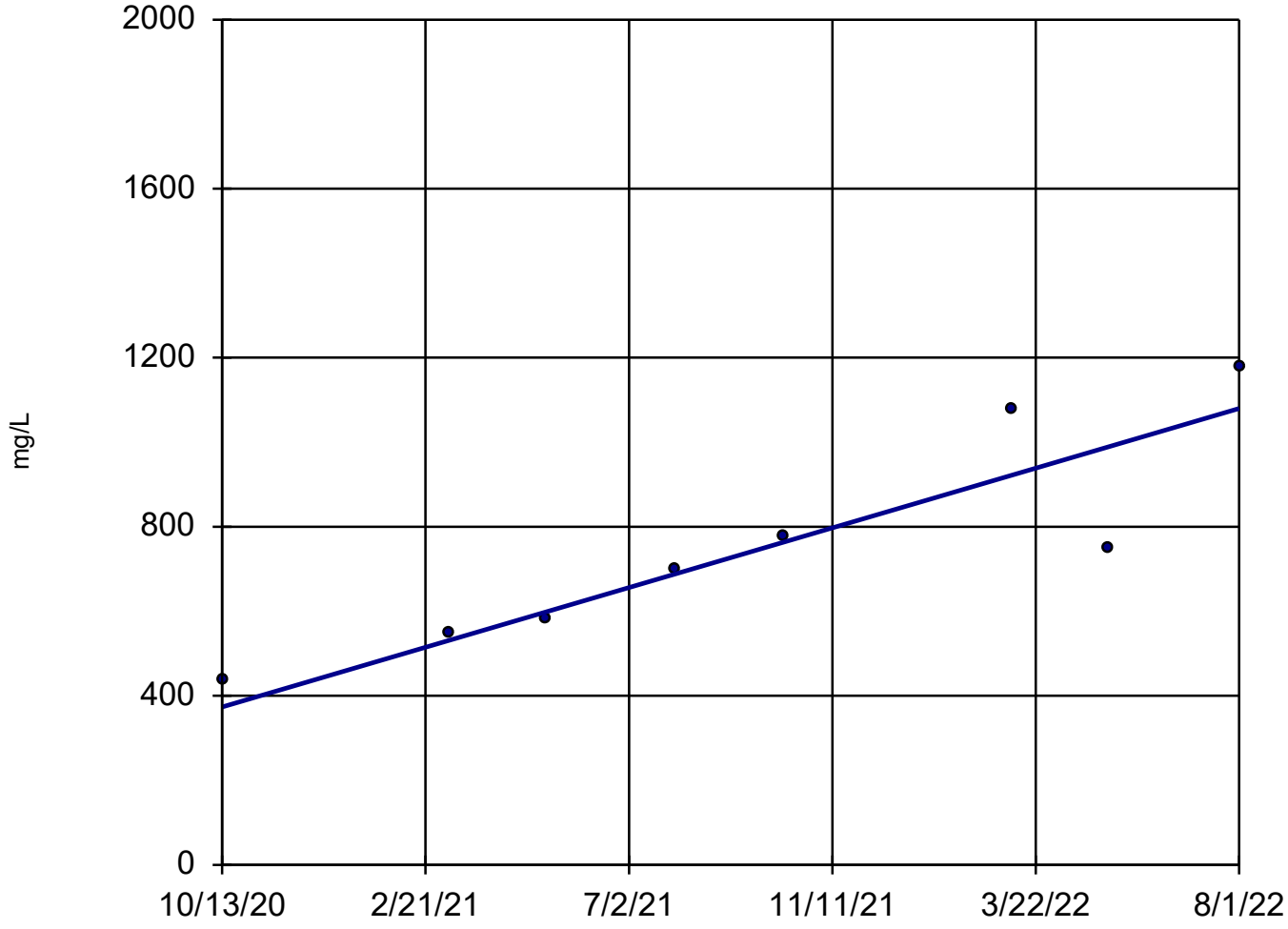
Sen's Slope Estimator Analysis Run 8/31/2022 3:12 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

JCW-MW-18001



n = 8

Slope = 392.5 units per year.

Mann-Kendall statistic = 24
critical = 20

Increasing trend significant at 98% confidence level (α = 0.01 per tail).

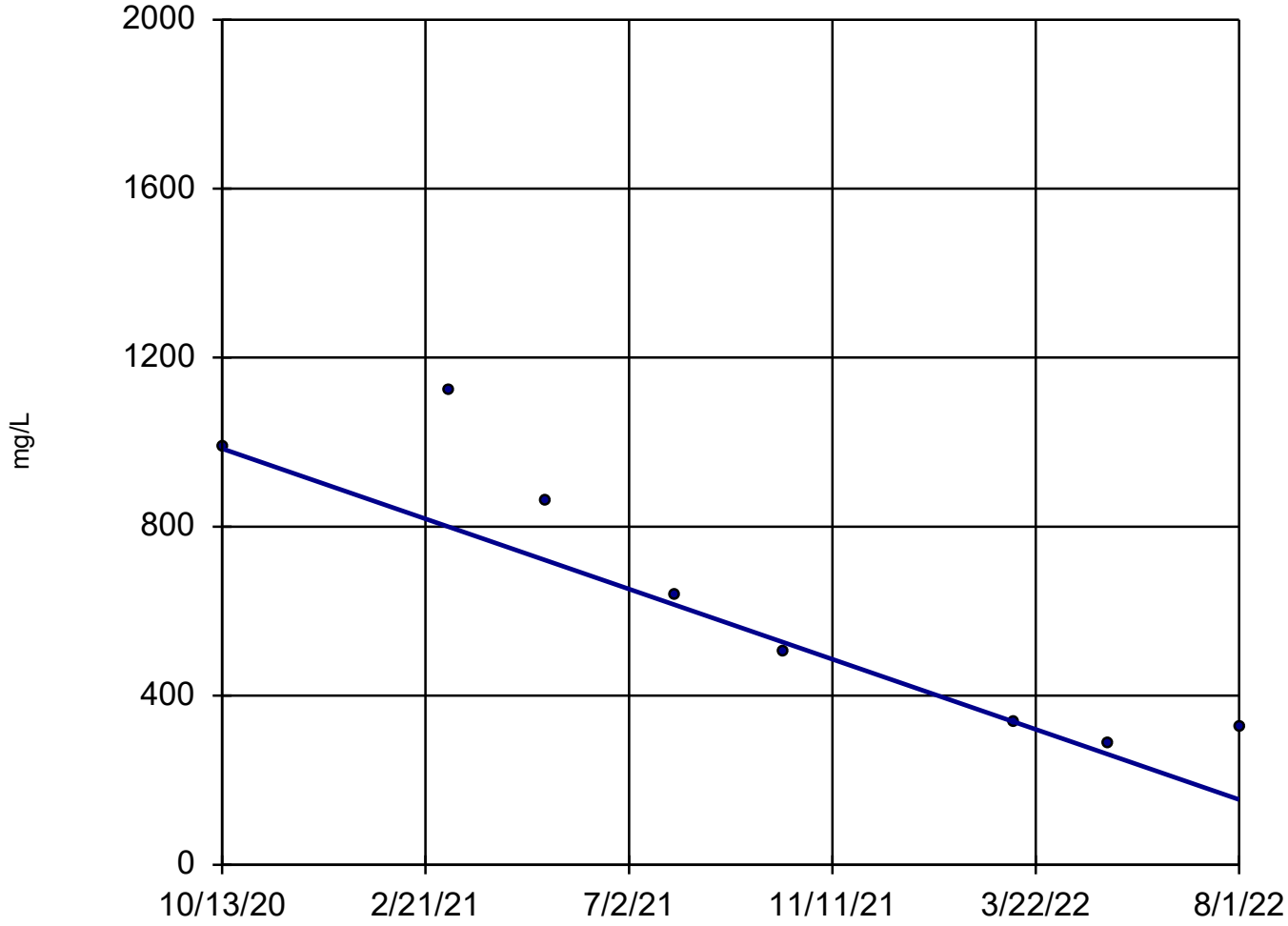
Sen's Slope Estimator Analysis Run 8/31/2022 3:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

MW-50



n = 8

Slope = -461.3 units per year.

Mann-Kendall statistic = -24
critical = -20

Decreasing trend significant at 98% confidence level (α = 0.01 per tail).

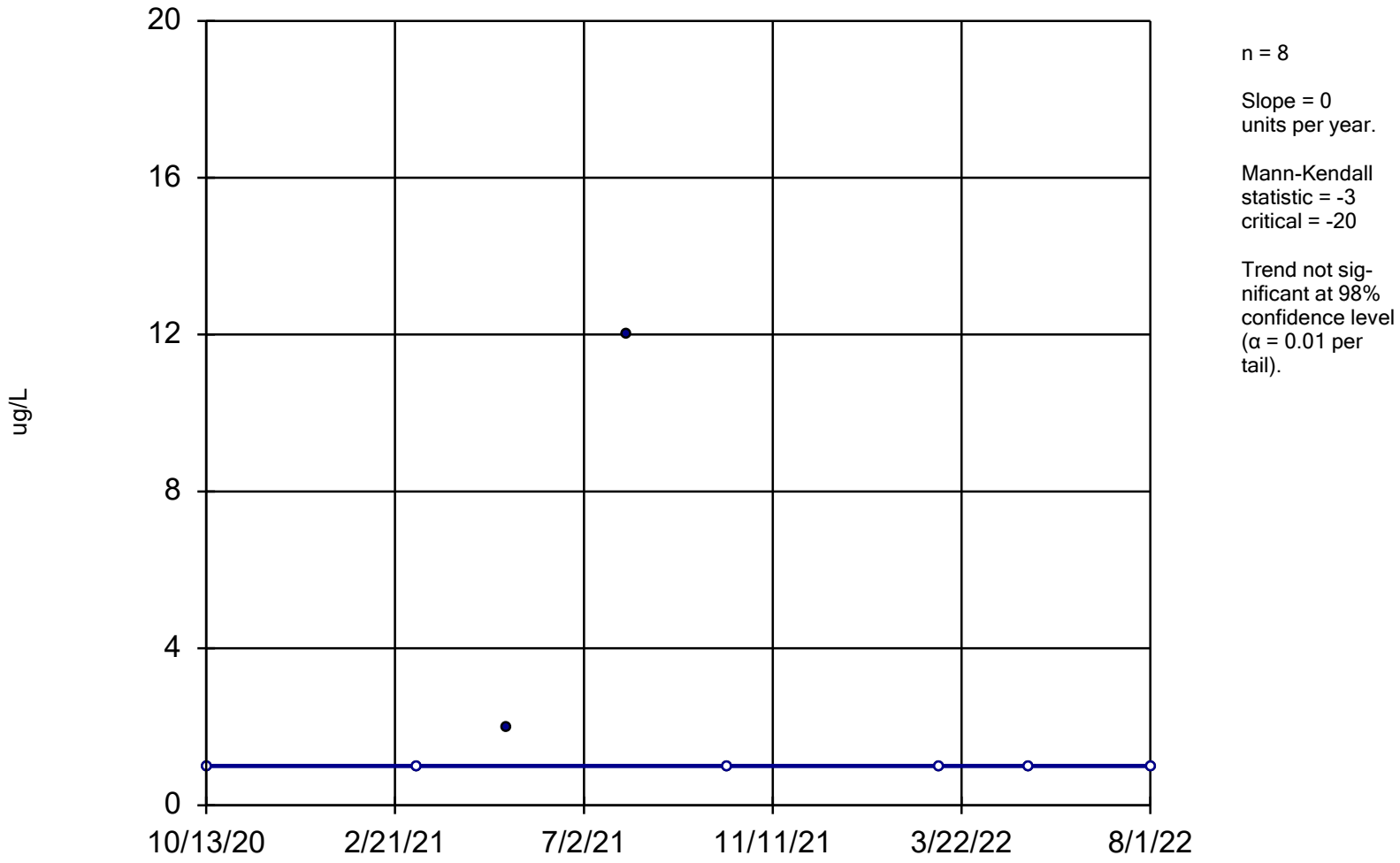
Sen's Slope Estimator Analysis Run 8/31/2022 3:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Vanadium, Total

JCW-MW-18001



n = 8

Slope = 0
units per year.

Mann-Kendall
statistic = -3
critical = -20

Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).

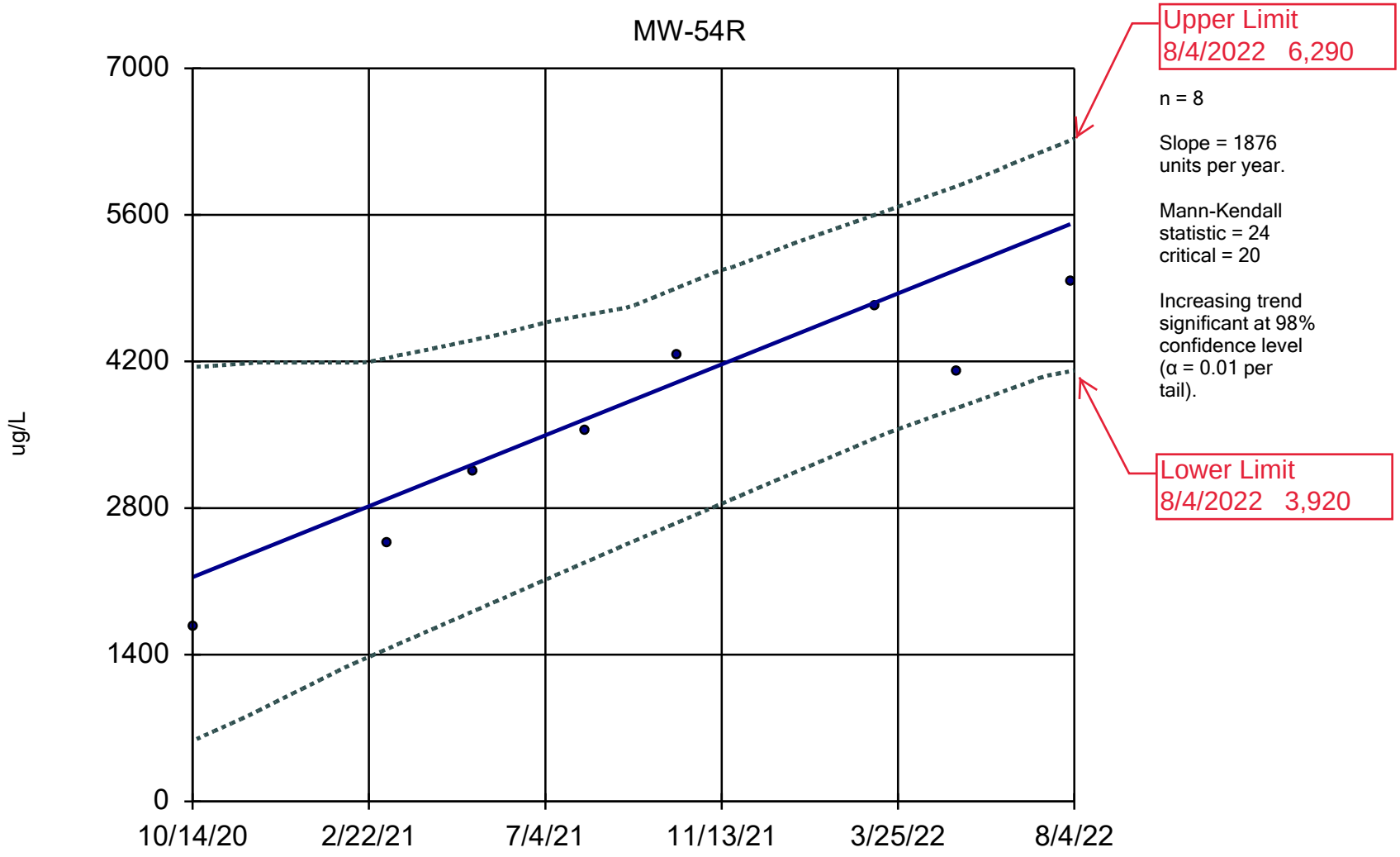
Sen's Slope Estimator Analysis Run 8/31/2022 3:13 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Boron, Total

MW-54R



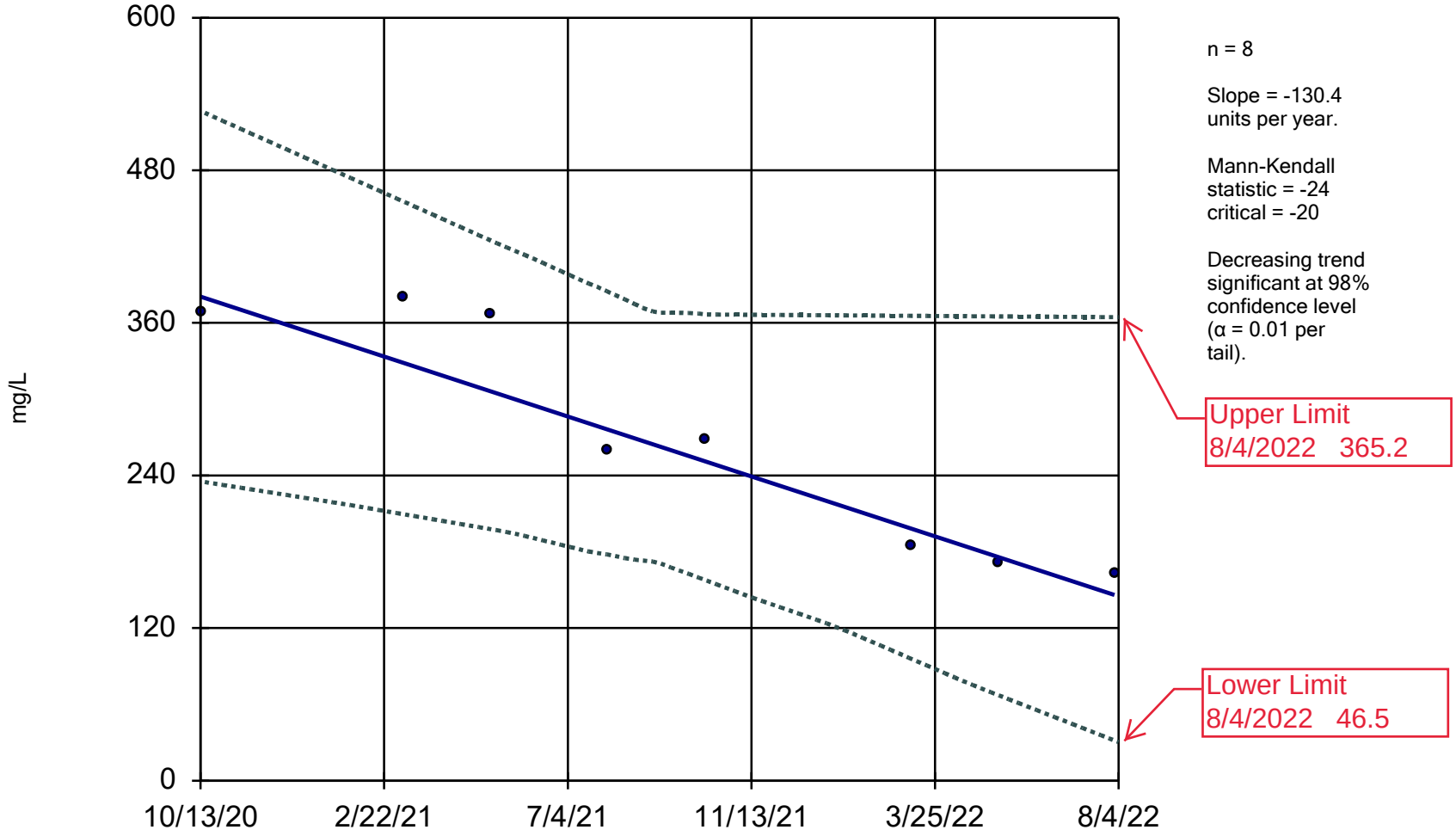
Sen's Slope and 98% Confidence Band Analysis Run 8/31/2022 3:19 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Calcium, Total

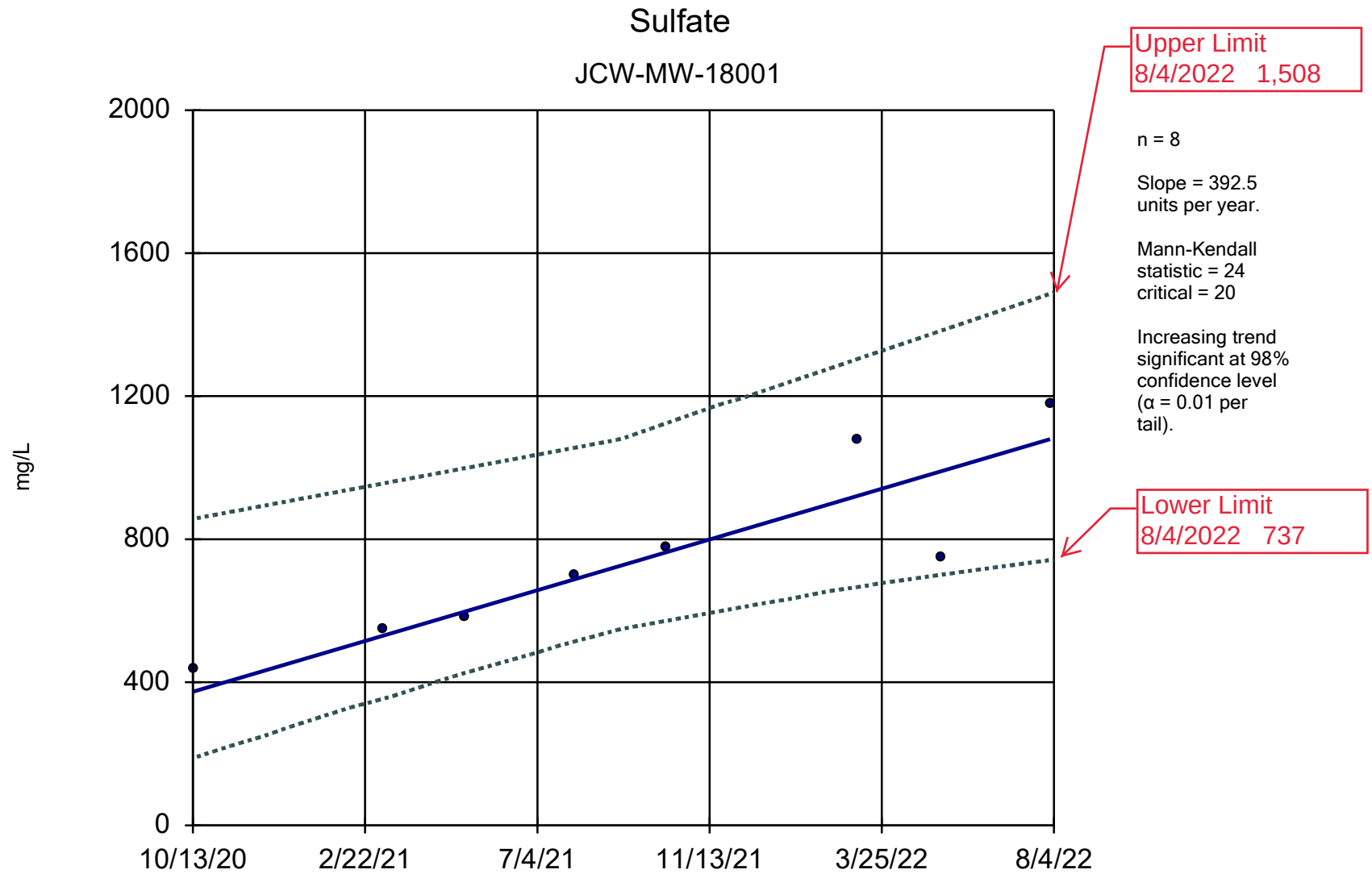
MW-50



Sen's Slope and 98% Confidence Band Analysis Run 8/31/2022 3:20 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG



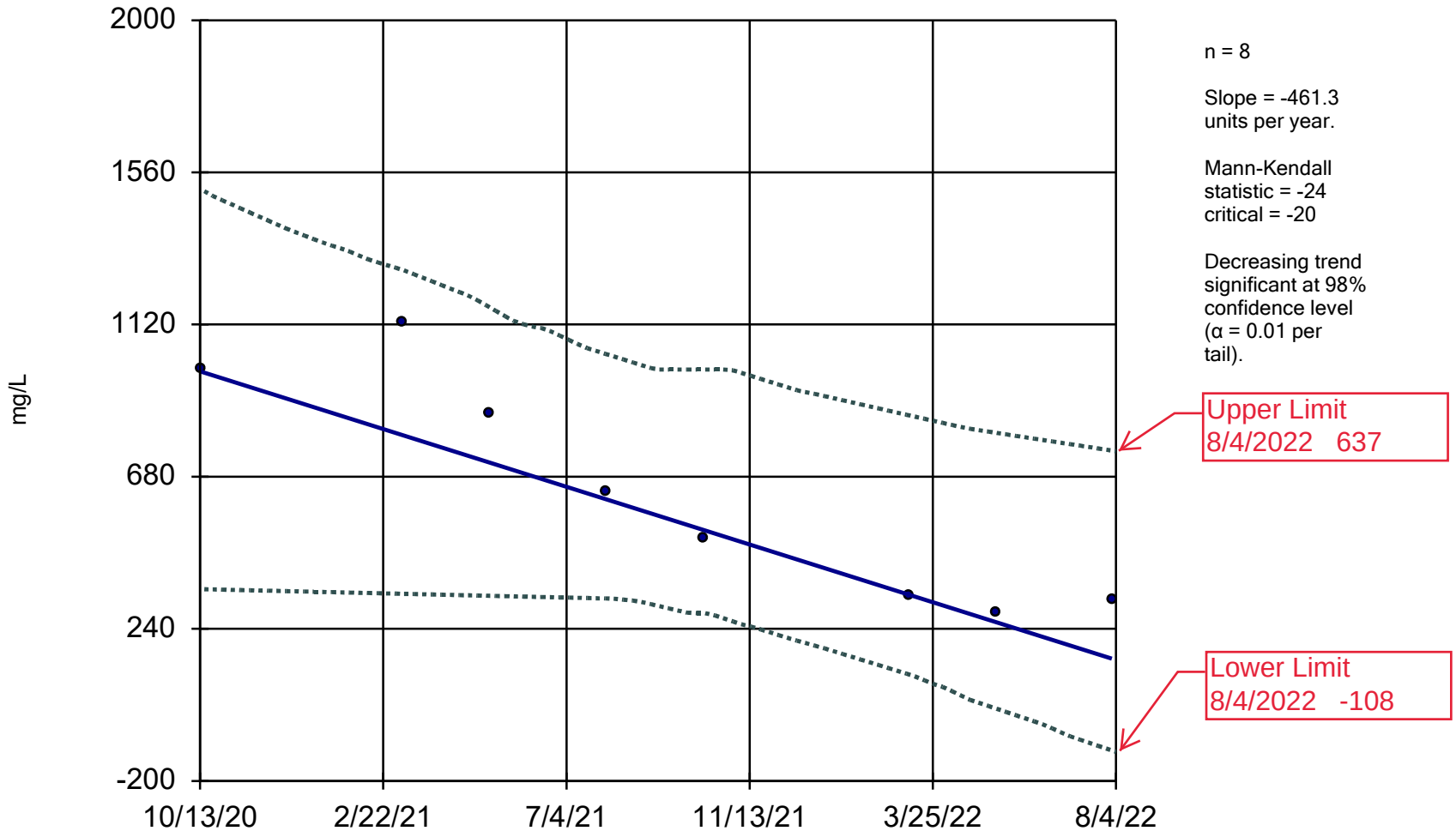
Sen's Slope and 98% Confidence Band Analysis Run 8/31/2022 3:20 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Sulfate

MW-50

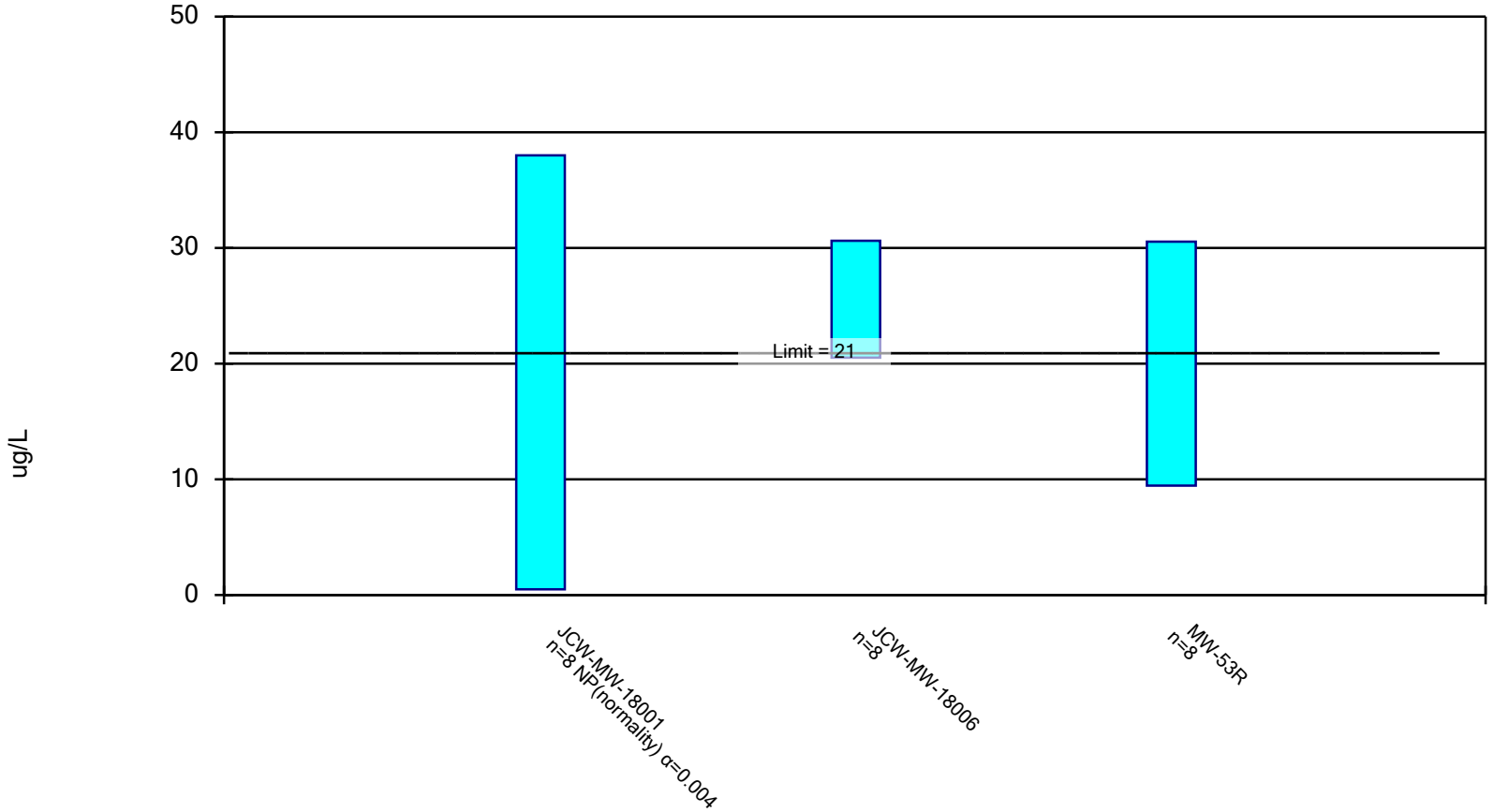


Sen's Slope and 98% Confidence Band Analysis Run 8/31/2022 3:20 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

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 9/1/2022 11:32 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Confidence Interval

Constituent: Arsenic, Total (ug/L) Analysis Run 9/1/2022 11:33 AM

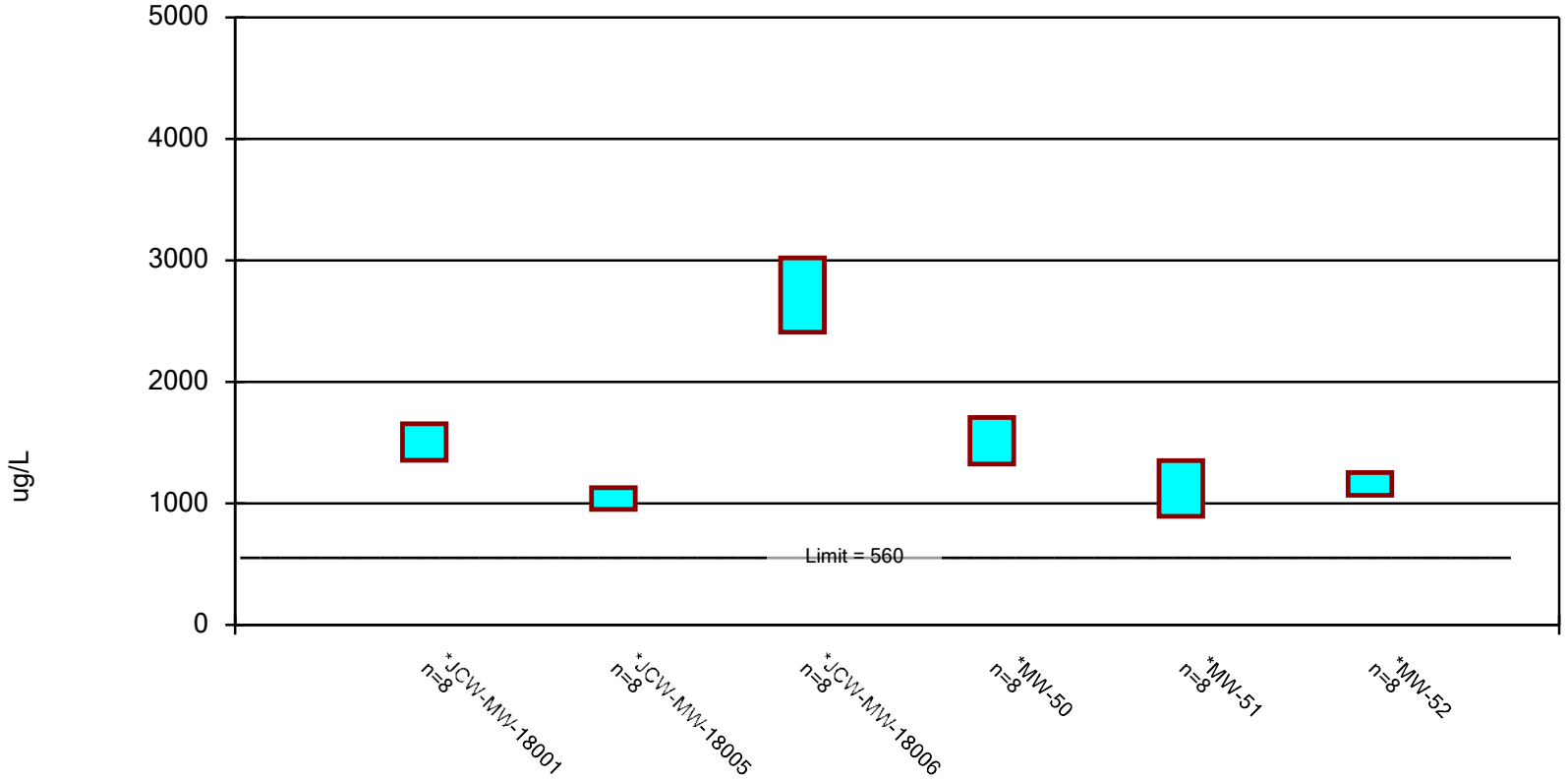
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

	JCW-MW-18001	JCW-MW-18006	MW-53R
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	
3/7/2022	<1	33	
3/8/2022			10
5/9/2022	<1	22.5 (D)	8
8/1/2022	<1		17
8/2/2022		21	
Mean	5.938	25.56	20
Std. Dev.	12.99	4.762	9.943
Upper Lim.	38	30.61	30.54
Lower Lim.	0.5	20.52	9.461

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

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 9/1/2022 11:32 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Confidence Interval

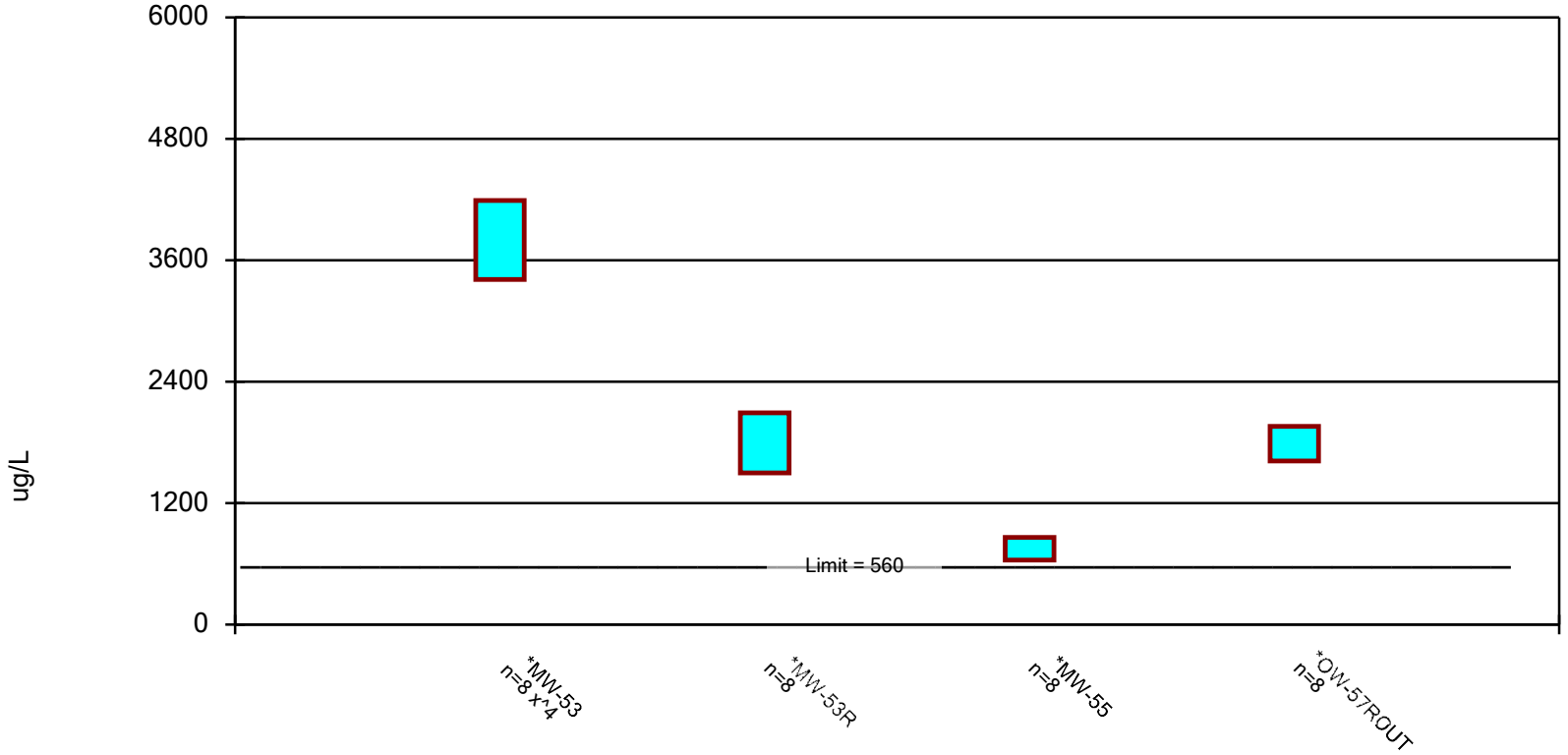
Constituent: Boron, Total (ug/L) Analysis Run 9/1/2022 11:33 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

	JCW-MW-18001	JCW-MW-18005	JCW-MW-18006	MW-50	MW-51	MW-52
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			
3/7/2022	1670	1065 (D)	3220			
3/8/2022				1615 (D)	1420	1310
5/9/2022	1560		3010 (D)	1400 (D)	1350	1090
5/10/2022		1010				
8/1/2022	1470			1290 (D)	1270	1070
8/2/2022		981	2260			
Mean	1505	1040	2714	1516	1124	1160
Std. Dev.	141	83.71	288.6	181.7	216.3	88.16
Upper Lim.	1654	1129	3020	1708	1353	1253
Lower Lim.	1356	951.5	2408	1323	894.2	1067

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 9/1/2022 11:32 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Confidence Interval

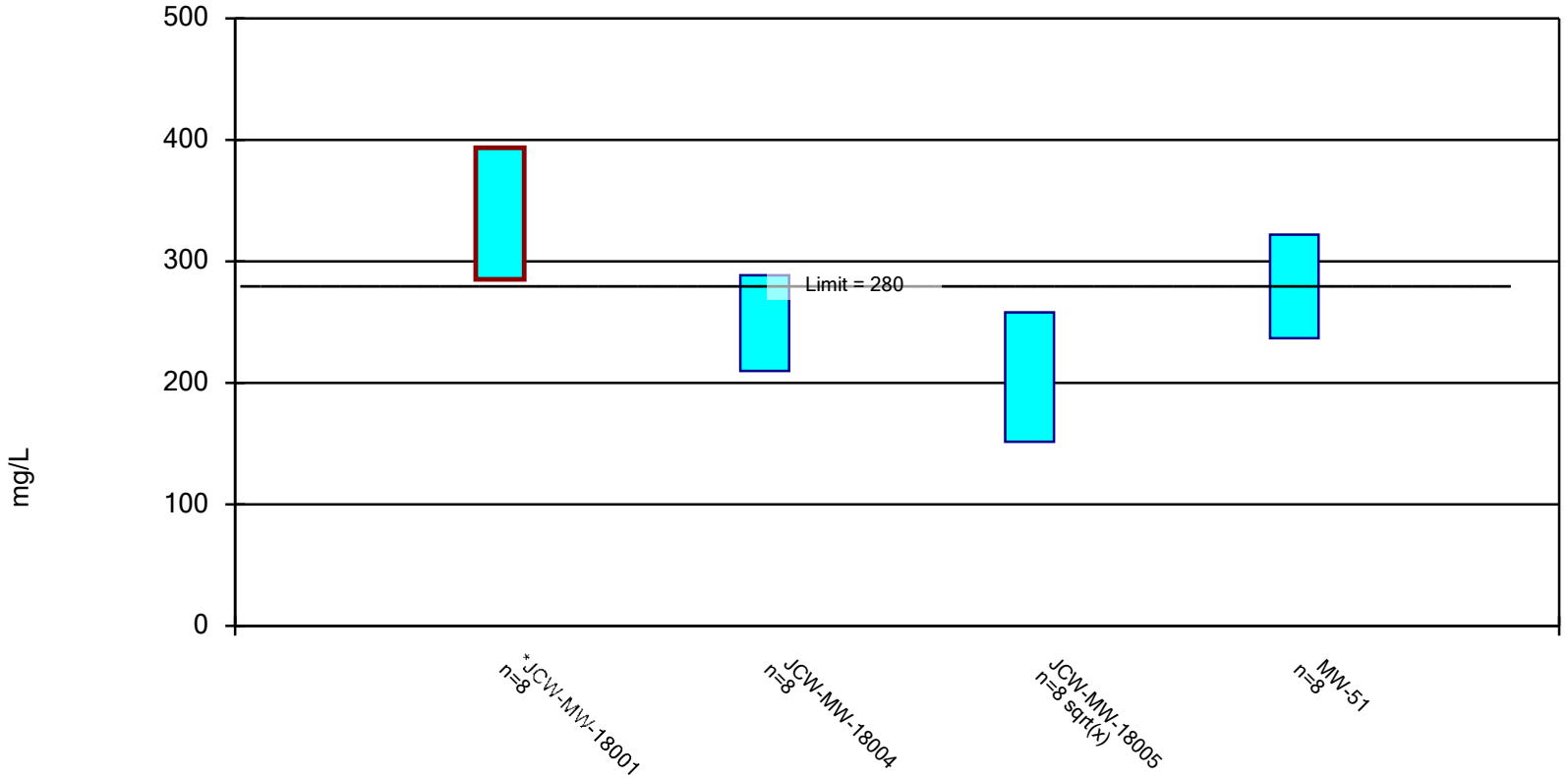
Constituent: Boron, Total (ug/L) Analysis Run 9/1/2022 11:33 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

	MW-53	MW-53R	MW-55	OW-57ROUT
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
3/7/2022			826	
3/8/2022	4100	2330		
3/9/2022				2030
5/9/2022	3880	1830		
5/10/2022			642	1990
8/1/2022	4300	1560	698 (D)	
8/2/2022				1570
Mean	3794	1795	748.9	1788
Std. Dev.	467.2	279.7	104.8	162.4
Upper Lim.	4190	2092	859.9	1960
Lower Lim.	3410	1498	637.8	1615

Parametric Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Calcium, Total Analysis Run 9/1/2022 11:32 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Confidence Interval

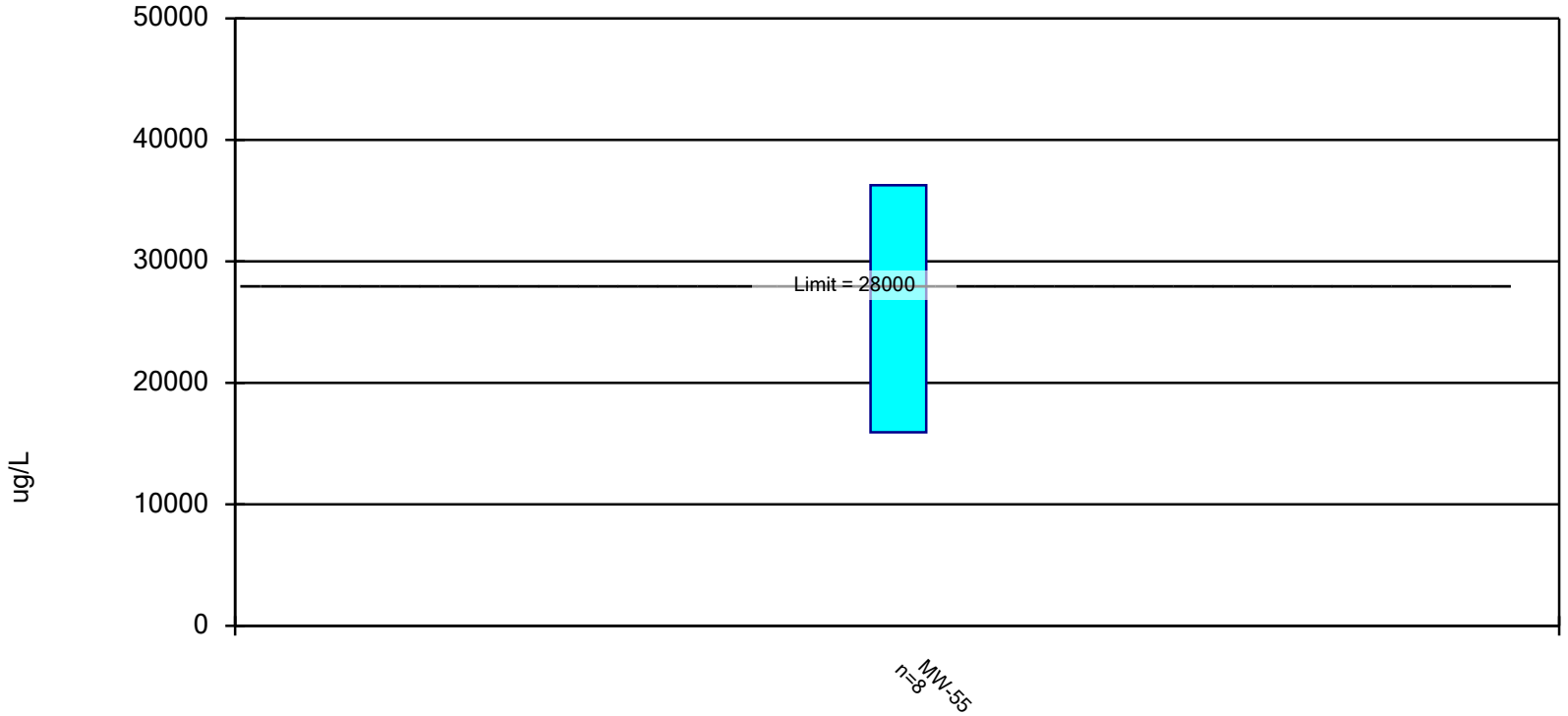
Constituent: Calcium, Total (mg/L) Analysis Run 9/1/2022 11:33 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

	JCW-MW-18001	JCW-MW-18004	JCW-MW-18005	MW-51
10/13/2020	282			
10/14/2020		323	195	333.5 (D)
3/8/2021	270	252		293
3/9/2021			286	
5/10/2021	305			303
5/11/2021		266	202	
8/2/2021	348			276
8/3/2021		203	149	
10/11/2021	373			316
10/12/2021		264	193	
3/7/2022	412	236	161.5 (D)	
3/8/2022				255
5/9/2022	335			247
5/10/2022		235	280	
8/1/2022	389	215		211
8/2/2022			165	
Mean	339.3	249.3	203.9	279.3
Std. Dev.	51.06	37.1	52.18	40.26
Upper Lim.	393.4	288.6	258	322
Lower Lim.	285.1	209.9	151.5	236.6

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 9/1/2022 11:32 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Confidence Interval

Constituent: Iron, Total (ug/L) Analysis Run 9/1/2022 11:33 AM

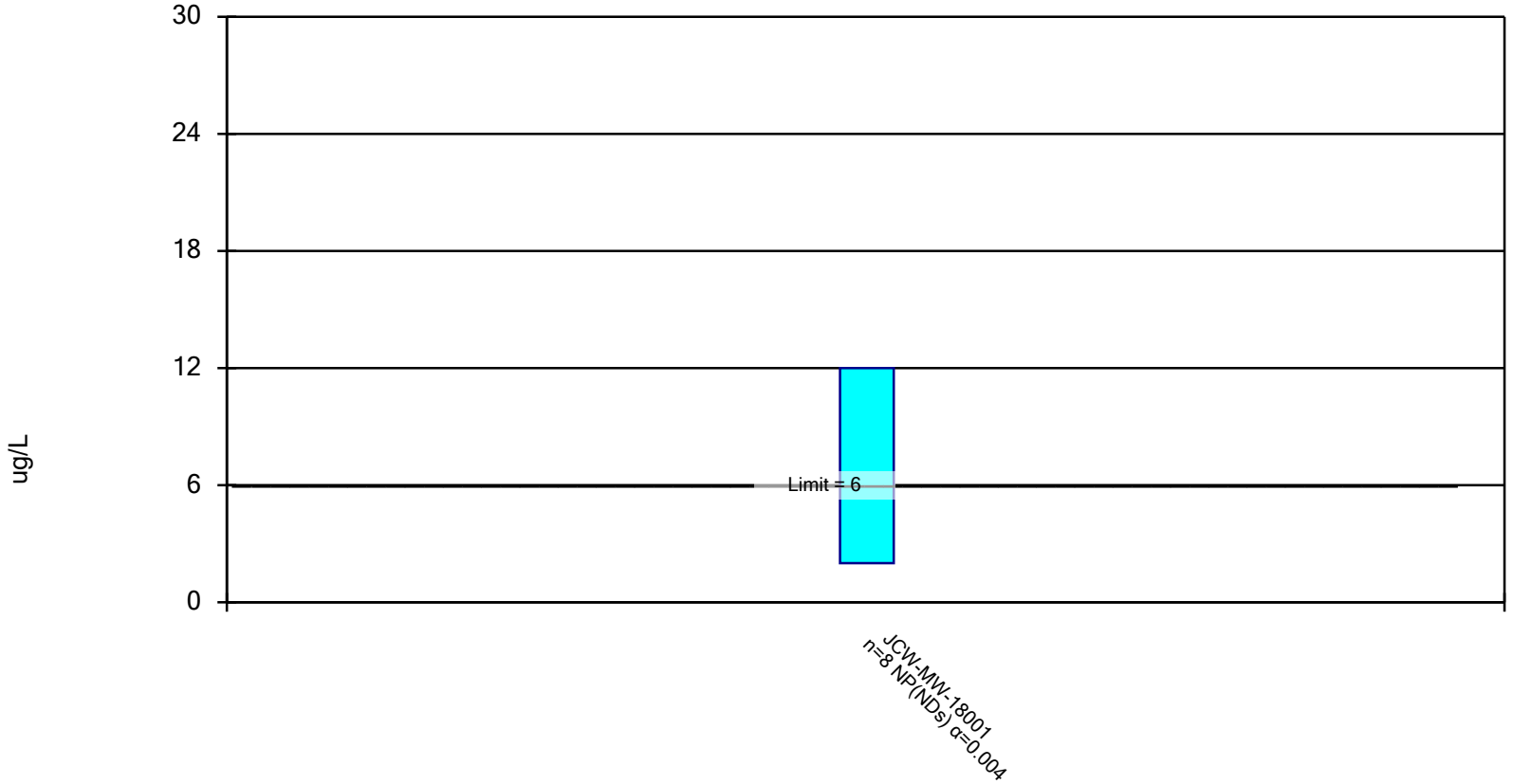
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

	MW-55
10/14/2020	21800
3/9/2021	23500
5/11/2021	21500
8/3/2021	39400
10/12/2021	40500
3/7/2022	29800
5/10/2022	15000
8/1/2022	17300 (D)
Mean	26100
Std. Dev.	9599
Upper Lim.	36274
Lower Lim.	15926

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Vanadium, Total Analysis Run 9/6/2022 9:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Confidence Interval

Constituent: Vanadium, Total (ug/L) Analysis Run 9/6/2022 9:44 AM

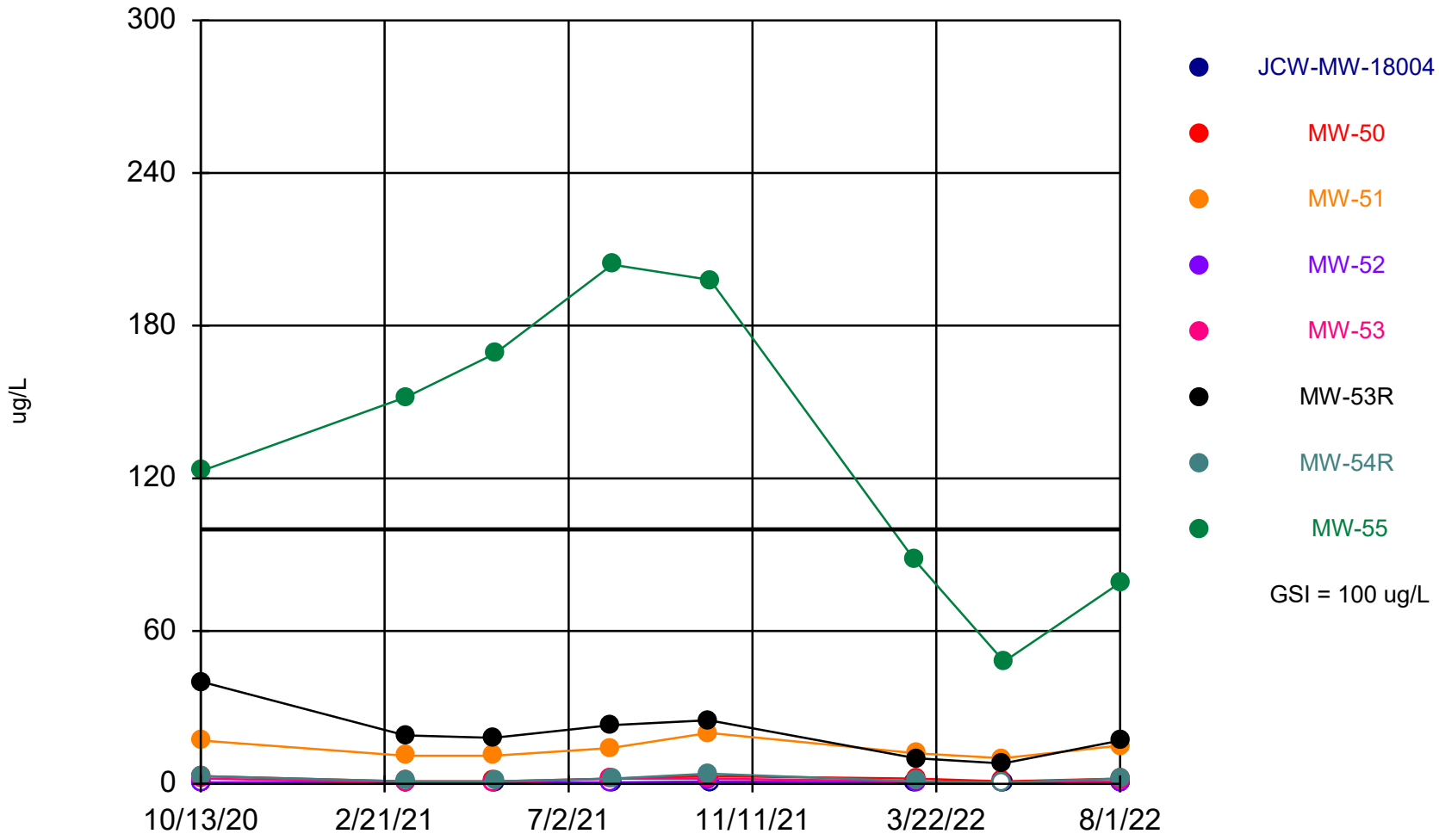
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

	JCW-MW-18001
10/13/2020	<2
3/8/2021	<2
5/10/2021	2
8/2/2021	12
10/11/2021	<2
3/7/2022	<2
5/9/2022	<2
8/1/2022	<2
Mean	3.25
Std. Dev.	3.536
Upper Lim.	12
Lower Lim.	2

Attachment 2
GSI Evaluation Sanitas™ Output Files

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Arsenic Comparison to GSI

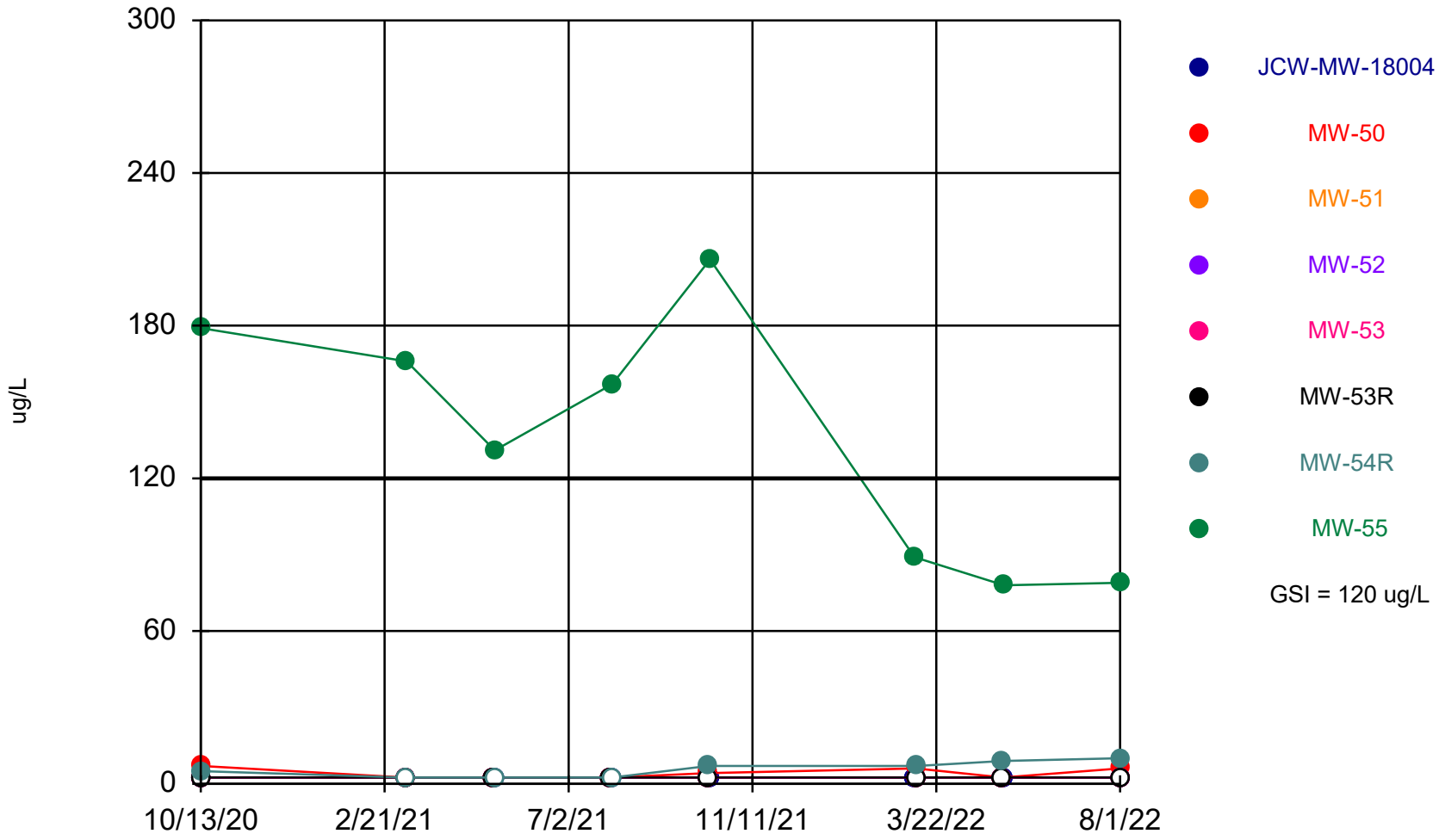


Time Series Analysis Run 9/1/2022 10:11 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Molybdenum Comparison to GSI



Time Series Analysis Run 9/1/2022 10:12 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Arsenic, Total Analysis Run 9/1/2022 10:13 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

For observations made between 10/13/2020 and 8/1/2022, a summary of the selected data set:

Observations = 64
ND/Trace = 19
Wells = 8
Minimum Value = 0.5
Maximum Value = 204
Mean Value = 21.54
Median Value = 2
Standard Deviation = 47.1
Coefficient of Variation = 2.187
Skewness = 2.786

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	8	0.5	0.5	0.5	0.5	0	0	NaN
MW-50	8	0	1	3	1.875	2	0.8345	0.4451	0.2217
MW-51	8	0	10	20	13.75	13	3.454	0.2512	0.67
MW-52	8	7	0.5	1	0.5625	0.5	0.1768	0.3143	2.268
MW-53	8	3	0.5	2	1.188	1	0.7039	0.5928	0.2719
MW-53R	8	0	8	40	20	18.5	9.943	0.4971	0.8372
MW-54R	8	1	0.5	4	1.813	1.5	1.193	0.6584	0.7445
MW-55	8	0	48	204	132.6	137.5	57.55	0.434	-0.1214

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Summary Report

Constituent: Molybdenum, Total Analysis Run 9/1/2022 10:13 AM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

For observations made between 10/13/2020 and 8/1/2022, a summary of the selected data set:

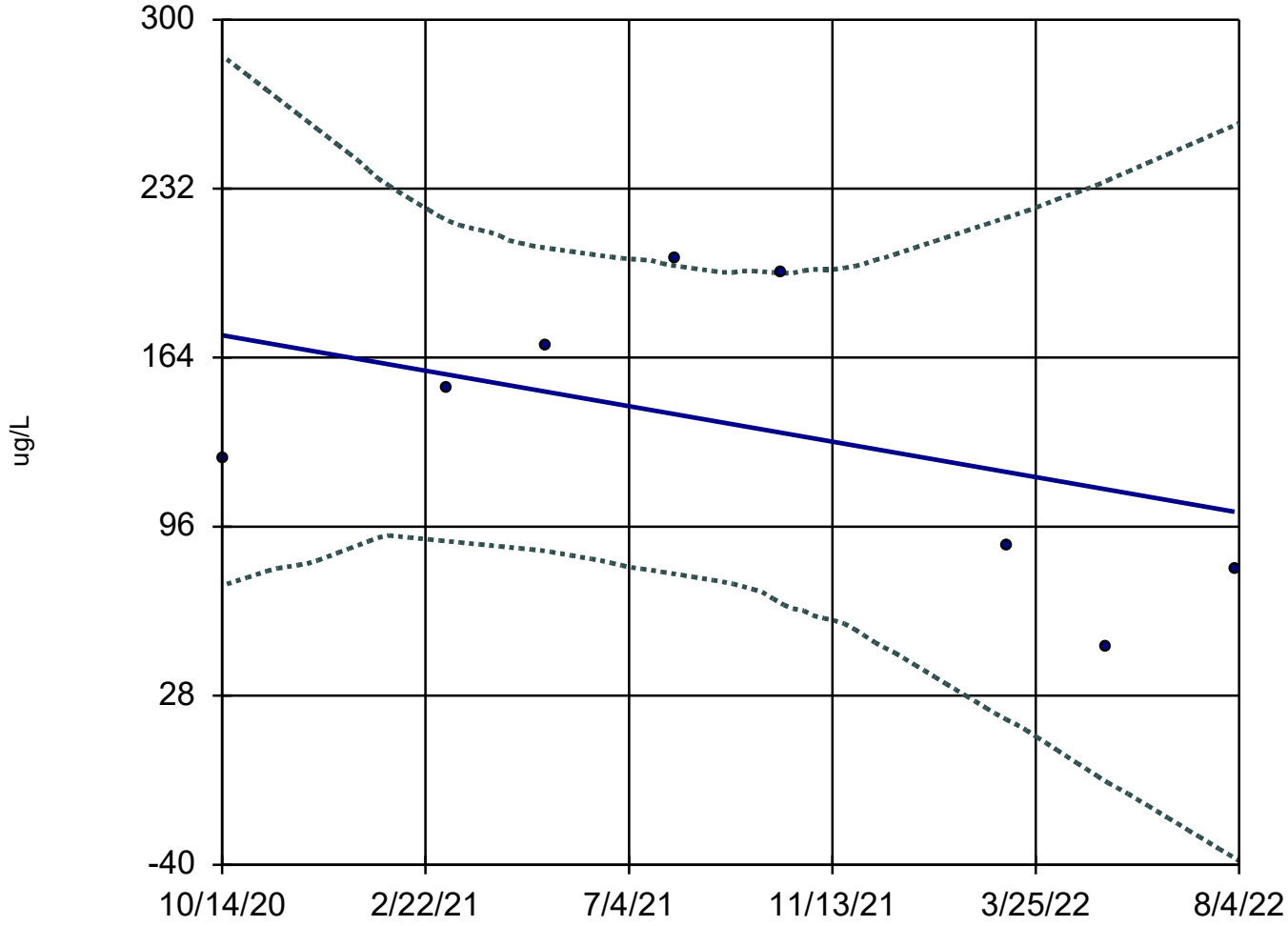
Observations = 64
ND/Trace = 47
Wells = 8
Minimum Value = 2.5
Maximum Value = 206
Mean Value = 19.75
Median Value = 2.5
Standard Deviation = 47.12
Coefficient of Variation = 2.386
Skewness = 2.763

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	7	4.156	3.375	1.922	0.4625	0.3732
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	3	2.5	10	5.688	6	3.023	0.5315	0.1304
MW-55	8	0	78	206	135.6	144	49.19	0.3627	-0.008254

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Arsenic, Total

MW-55



n = 8

Slope = -39.53 units per year.

Mann-Kendall statistic = -8
critical = -20

Trend not significant at 98% confidence level (α = 0.01 per tail).

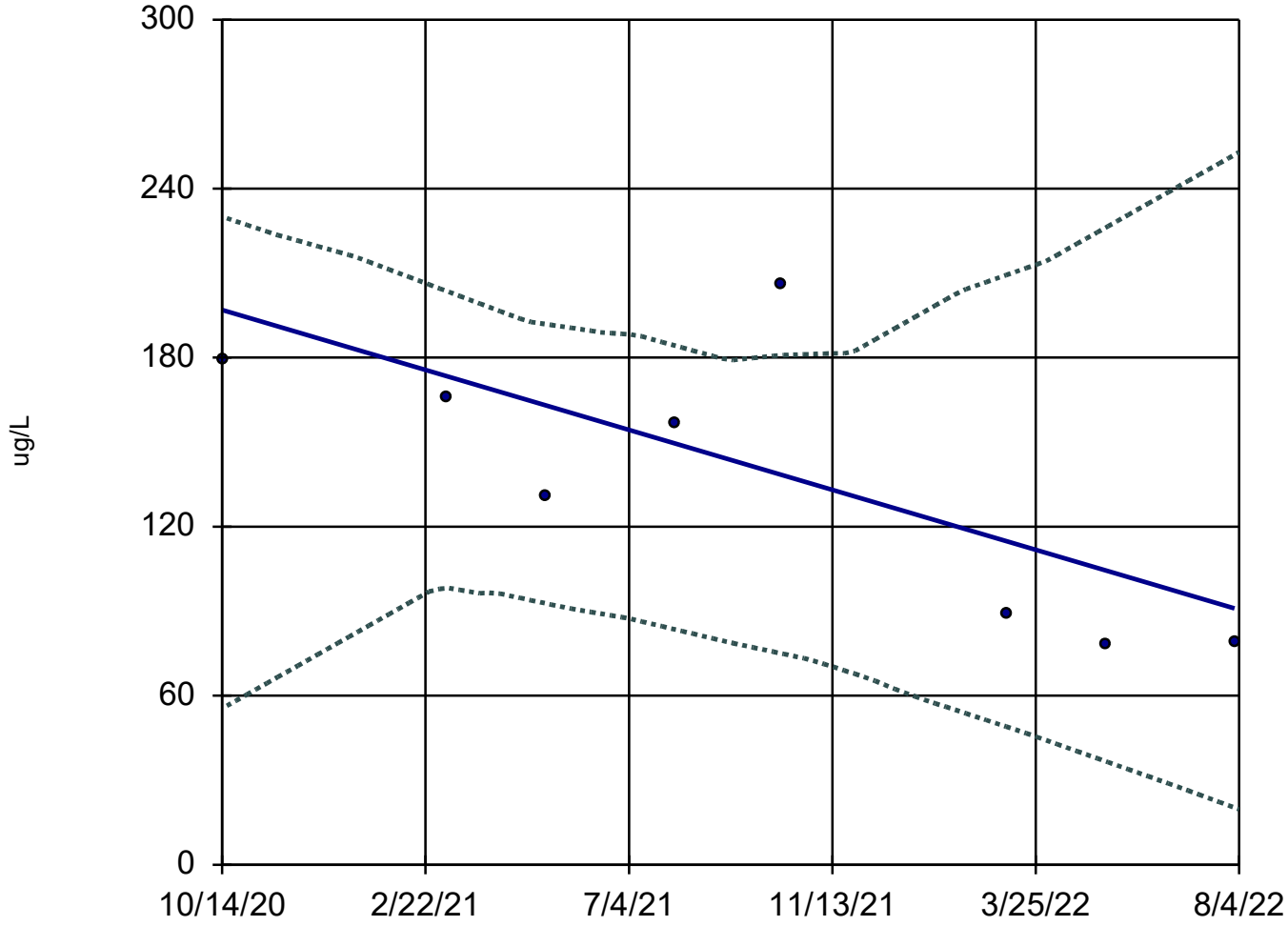
Sen's Slope and 98% Confidence Band Analysis Run 9/1/2022 10:14 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Molybdenum, Total

MW-55



n = 8

Slope = -58.95 units per year.

Mann-Kendall statistic = -16
critical = -20

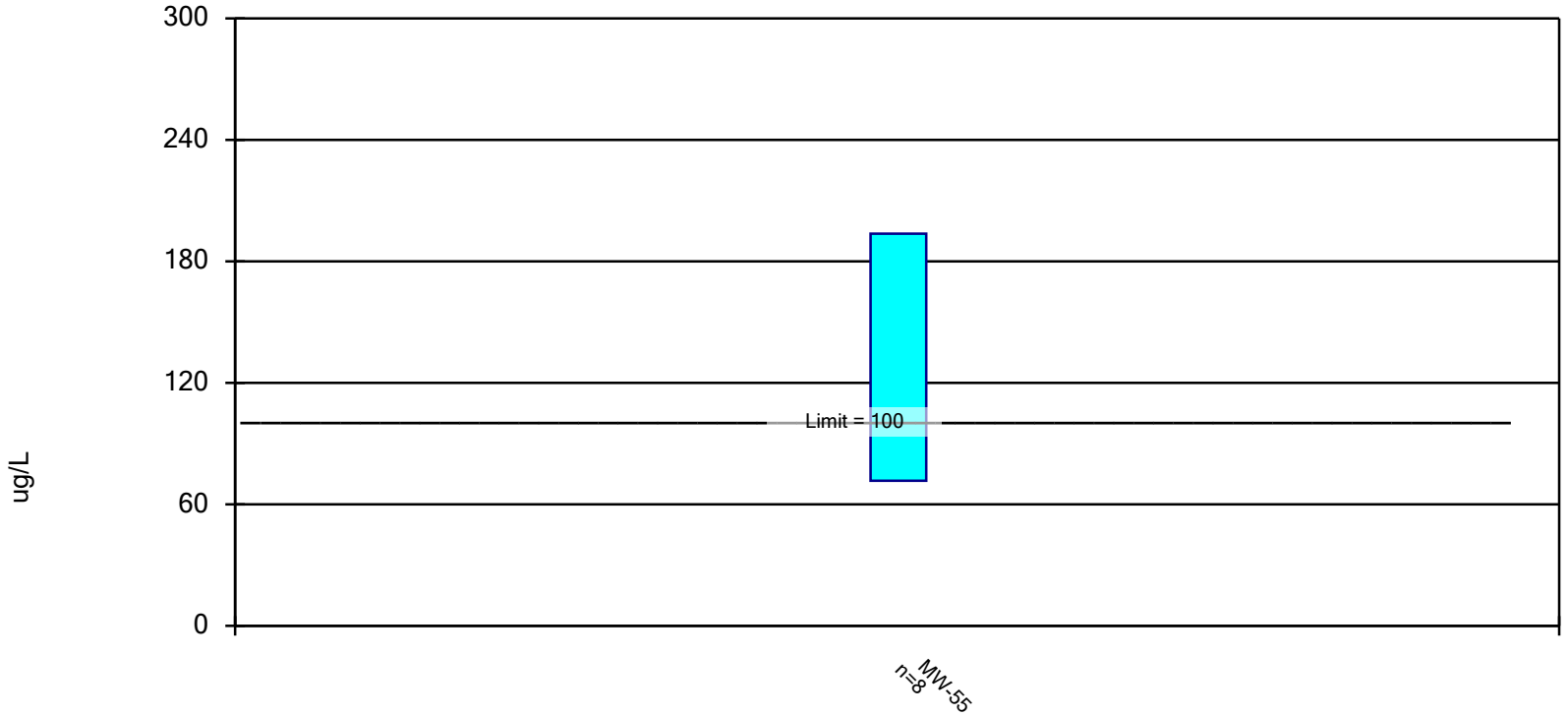
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope and 98% Confidence Band Analysis Run 9/1/2022 10:14 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

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 9/1/2022 10:25 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Confidence Interval

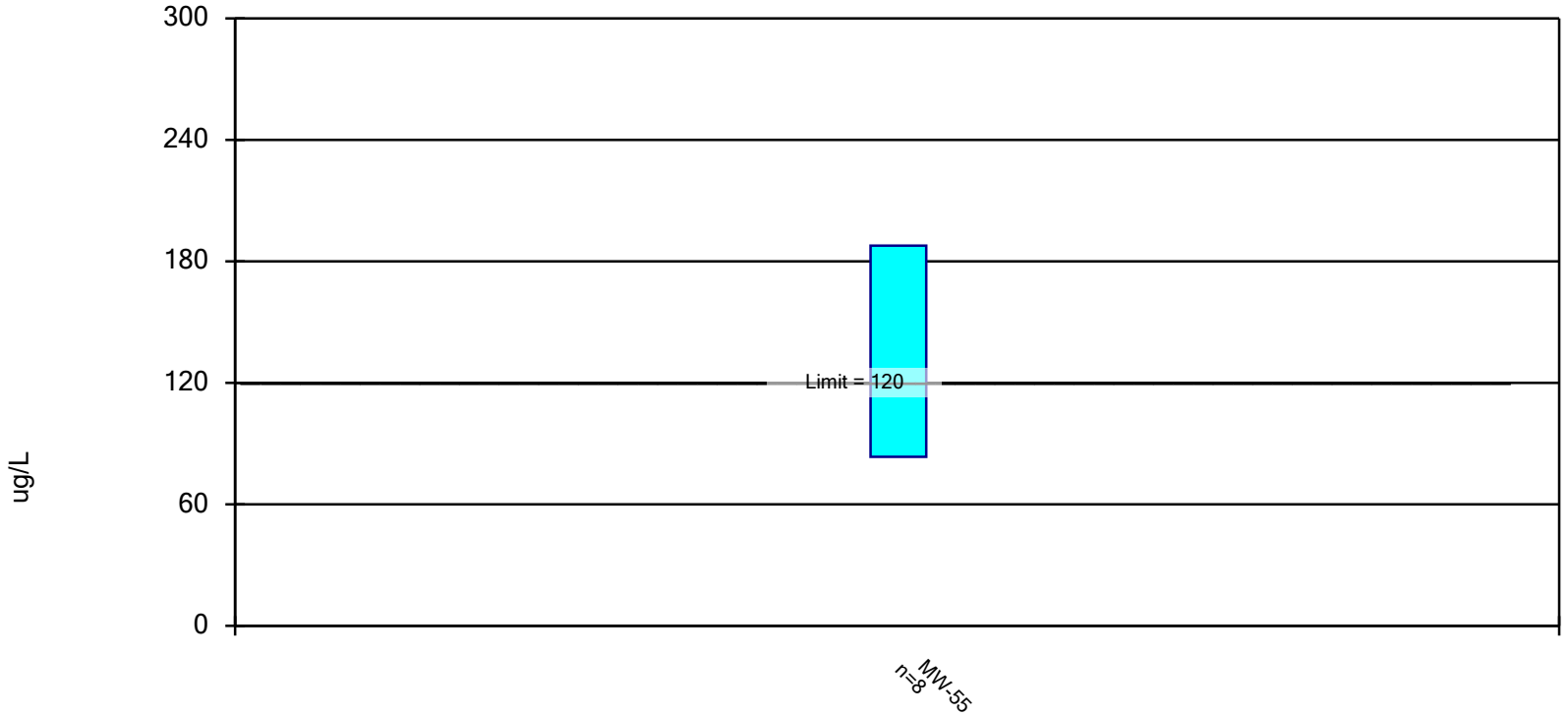
Constituent: Arsenic, Total (ug/L) Analysis Run 9/1/2022 10:26 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

	MW-55
10/14/2020	123
3/9/2021	152
5/11/2021	169
8/3/2021	204
10/12/2021	198
3/7/2022	88
5/10/2022	48
8/1/2022	79 (D)
Mean	132.6
Std. Dev.	57.55
Upper Lim.	193.6
Lower Lim.	71.62

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Molybdenum, Total Analysis Run 9/1/2022 10:25 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

Confidence Interval

Constituent: Molybdenum, Total (ug/L) Analysis Run 9/1/2022 10:26 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

	MW-55
10/14/2020	179
3/9/2021	166
5/11/2021	131
8/3/2021	157
10/12/2021	206
3/7/2022	89
5/10/2022	78
8/1/2022	79 (D)
Mean	135.6
Std. Dev.	49.19
Upper Lim.	187.8
Lower Lim.	83.49

Appendix E
Laboratory Analytical Report

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: August 17, 2022

Subject: PART 115 GROUNDWATER MONITORING – JCW POREWATER – 2022 Q3

CC: HDRegister, P22-521
BLSwanberg, P22-119

Darby Litz, Project Manager
TRC Environmental Corporation
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 22-0773

TRC Environmental, Inc. conducted groundwater monitoring at the JCWeadock site on 08/01/2022 and 08/02/2022, for the 3rd Quarter requirements, as specified in the Hydrogeological Monitoring Plan for the site. The samples were received for analysis by the Chemistry department of Laboratory Services on 08/02/2022.

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, 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

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q3-2022 Weadock Porewater Wells
Date Received: 8/2/2022
Chemistry Project: 22-0773

Sample #	Field Sample ID	Matrix	Sample Date	Site
22-0773-01	JCW-MW-18001	Groundwater	08/01/2022 06:45 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-02	JCW-MW-18004	Groundwater	08/01/2022 11:42 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-03	JCW-MW-18005	Groundwater	08/02/2022 06:40 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-04	JCW-MW-18006	Groundwater	08/02/2022 07:32 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-05	MW-50	Groundwater	08/01/2022 07:28 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-06	MW-51	Groundwater	08/01/2022 08:09 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-07	MW-52	Groundwater	08/01/2022 08:40 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-08	MW-53	Groundwater	08/01/2022 09:18 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-09	MW-53R	Groundwater	08/01/2022 09:55 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-10	MW-54R	Groundwater	08/01/2022 11:13 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-11	MW-55	Groundwater	08/01/2022 01:40 PM	JCW Solid Waste Disposal Area, Porewater
22-0773-12	OW-57R OUT	Groundwater	08/02/2022 07:10 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-13	MW-58	Groundwater	08/02/2022 08:00 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-14	DUP-JCW-LF-01	Groundwater	08/01/2022 12:00 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-15	DUP-JCW-LF-02	Groundwater	08/01/2022 12:00 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-16	JCW-MW-18001 MS	Groundwater	08/01/2022 06:45 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-17	JCW-MW-18001 MSD	Groundwater	08/01/2022 06:45 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-18	FB-01	Water	08/02/2022 08:10 AM	JCW Solid Waste Disposal Area, Porewater
22-0773-19	EB-01	Water	08/02/2022 08:08 AM	JCW Solid Waste Disposal Area, Porewater

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**JCW-MW-18001**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-01	Collect Time:	06:45 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-01-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	61		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	1470		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	389000		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	2		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	196		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	95		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	106000		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	1000		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	ND		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	14		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	14300		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	3		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	157000		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	64600		ug/L	1000.0	08/10/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	1180000		ug/L	1000.0	08/10/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**JCW-MW-18001**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-01	Collect Time:	06:45 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0773-01-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	2580		mg/L	10.0	08/05/2022	AB22-0803-04

Alkalinity by SM 2320B

Aliquot #: 22-0773-01-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	692000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Bicarbonate	692000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-02	Collect Time:	11:42 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-02-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	31		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	313		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	215000		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	2		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	45		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	51		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	78500		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	48		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	ND		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	2		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	1420		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	1		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	26900		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	12500		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	512000		ug/L	1000.0	08/10/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-02	Collect Time:	11:42 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0773-02-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1290		mg/L	10.0	08/04/2022	AB22-0803-04

Alkalinity by SM 2320B

Aliquot #: 22-0773-02-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	459000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Bicarbonate	459000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	08/02/2022
Lab Sample ID:	22-0773-03	Collect Time:	06:40 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-03-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	4		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	71		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	981		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	165000		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	2810		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	32		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	57200		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	203		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	ND		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	9		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	2050		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	53900		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	50900		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	213000		ug/L	1000.0	08/10/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	08/02/2022
Lab Sample ID:	22-0773-03	Collect Time:	06:40 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0773-03-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	967		mg/L	10.0	08/04/2022	AB22-0803-04

Alkalinity by SM 2320B

Aliquot #: 22-0773-03-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	539000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Bicarbonate	539000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **JCW-MW-18006**
Lab Sample ID: 22-0773-04
Matrix: Groundwater

Laboratory Project: **22-0773**
Collect Date: 08/02/2022
Collect Time: 07:32 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-04-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	21		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	452		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	2260		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	109000		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	7670		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	52		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	40800		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	298		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	ND		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	5		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	5300		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	79400		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	3		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	79000		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	14900		ug/L	1000.0	08/09/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**JCW-MW-18006**	Collect Date:	08/02/2022
Lab Sample ID:	22-0773-04	Collect Time:	07:32 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0773-04-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	709		mg/L	10.0	08/04/2022	AB22-0803-04

Alkalinity by SM 2320B

Aliquot #: 22-0773-04-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	571000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Bicarbonate	571000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**MW-50**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-05	Collect Time:	07:28 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-05-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/02/5202	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-05-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	2		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	90		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	1290		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	161000		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	1830		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	64		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	50500		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	446		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	6		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	6		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	8920		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	2		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	70900		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	54200		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	324000		ug/L	1000.0	08/10/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**MW-50**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-05	Collect Time:	07:28 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0773-05-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1080		mg/L	10.0	08/04/2022	AB22-0803-04

Alkalinity by SM 2320B

Aliquot #: 22-0773-05-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	452000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Bicarbonate	452000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **MW-51**
Lab Sample ID: 22-0773-06
Matrix: Groundwater

Laboratory Project: **22-0773**
Collect Date: 08/01/2022
Collect Time: 08:09 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-06-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-06-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	15		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	169		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	1270		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	211000		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	1860		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	53		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	61300		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	833		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	ND		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	6		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	5700		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	2		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	142000		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	102000		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	404000		ug/L	1000.0	08/10/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**MW-51**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-06	Collect Time:	08:09 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0773-06-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1450		mg/L	10.0	08/04/2022	AB22-0803-04

Alkalinity by SM 2320B

Aliquot #: 22-0773-06-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	652000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Bicarbonate	652000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**MW-52**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-07	Collect Time:	08:40 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-07-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-07-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	118		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	1070		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	222000		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	2		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	5020		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	29		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	101000		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	477		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	ND		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	5		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	2990		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	2		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	67100		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-07-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	45100		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	663000		ug/L	1000.0	08/10/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**MW-52**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-07	Collect Time:	08:40 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0773-07-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1580		mg/L	10.0	08/04/2022	AB22-0803-04

Alkalinity by SM 2320B

Aliquot #: 22-0773-07-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	488000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Bicarbonate	488000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**MW-53**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-08	Collect Time:	09:18 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-08-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-08-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	1		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	313		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	4300		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	116000		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	1240		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	42		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	35500		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	403		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	ND		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	4		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	6580		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	3		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	83900		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-08-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	66500		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	119000		ug/L	1000.0	08/09/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**MW-53**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-08	Collect Time:	09:18 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0773-08-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	820		mg/L	10.0	08/04/2022	AB22-0803-04

Alkalinity by SM 2320B

Aliquot #: 22-0773-08-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	494000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Bicarbonate	494000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **MW-53R**
Lab Sample ID: 22-0773-09
Matrix: Groundwater

Laboratory Project: **22-0773**
Collect Date: 08/01/2022
Collect Time: 09:55 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-09-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-09-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	17		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	97		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	1560		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	219000		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	2		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	1030		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	70		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	64900		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	278		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	ND		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	5		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	5700		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	2		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	142000		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-09-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	50400		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	533000		ug/L	1000.0	08/10/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**MW-53R**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-09	Collect Time:	09:55 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0773-09-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1530		mg/L	10.0	08/04/2022	AB22-0803-04

Alkalinity by SM 2320B

Aliquot #: 22-0773-09-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	671000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Bicarbonate	671000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**MW-54R**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-10	Collect Time:	11:13 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-10-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-10-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	2		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	109		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	4970		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	158000		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	1		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	367		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	74		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	43400		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	109		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	10		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	2		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	2210		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	1		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	28400		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-10-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	43900		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	72100		ug/L	1000.0	08/09/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**MW-54R**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-10	Collect Time:	11:13 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0773-10-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	800		mg/L	10.0	08/04/2022	AB22-0803-04

Alkalinity by SM 2320B

Aliquot #: 22-0773-10-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	565000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Bicarbonate	565000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**MW-55**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-11	Collect Time:	01:40 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-11-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-11-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	80		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	232		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	709		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	159000		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	18000		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	29		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	31600		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	354		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	80		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	6		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	2790		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	3		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	99300		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-11-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	11800		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	248000		ug/L	1000.0	08/10/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**MW-55**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-11	Collect Time:	01:40 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0773-11-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	930		mg/L	10.0	08/04/2022	AB22-0803-04

Alkalinity by SM 2320B

Aliquot #: 22-0773-11-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	535000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Bicarbonate	535000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **OW-57R OUT**
Lab Sample ID: 22-0773-12
Matrix: Groundwater

Laboratory Project: **22-0773**
Collect Date: 08/02/2022
Collect Time: 07:10 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-12-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-12-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	67		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	1570		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	113000		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	1		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	1		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	37		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	23		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	67900		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	51		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	7		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	17		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	1200		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	1		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	54200		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-12-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	52000		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	85000		ug/L	1000.0	08/09/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**OW-57R OUT**	Collect Date:	08/02/2022
Lab Sample ID:	22-0773-12	Collect Time:	07:10 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0773-12-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	714		mg/L	10.0	08/04/2022	AB22-0803-04

Alkalinity by SM 2320B

Aliquot #: 22-0773-12-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	541000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Bicarbonate	541000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**MW-58**	Collect Date:	08/02/2022
Lab Sample ID:	22-0773-13	Collect Time:	08:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-13-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-13-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	2		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	118		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	148		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	110000		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	1		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	9820		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	25		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	19700		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	311		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	ND		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	4		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	6120		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	208000		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	4		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-13-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	464000		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	3160		ug/L	1000.0	08/09/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**MW-58**	Collect Date:	08/02/2022
Lab Sample ID:	22-0773-13	Collect Time:	08:00 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0773-13-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1170		mg/L	10.0	08/04/2022	AB22-0803-04

Alkalinity by SM 2320B

Aliquot #: 22-0773-13-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	329000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Bicarbonate	329000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**DUP-JCW-LF-01**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-14	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-14-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-14-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	2		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	94		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	1290		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	164000		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	1850		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	61		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	51200		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	462		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	6		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	7		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	8690		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	2		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	72800		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-14-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	54900		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	325000		ug/L	1000.0	08/10/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**DUP-JCW-LF-01**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-14	Collect Time:	12:00 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0773-14-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1040		mg/L	10.0	08/04/2022	AB22-0803-04

Alkalinity by SM 2320B

Aliquot #: 22-0773-14-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	452000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Bicarbonate	452000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**DUP-JCW-LF-02**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-15	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-15-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-15-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	78		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	231		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	687		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	165000		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	1		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	16600		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	28		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	33400		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	335		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	78		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	6		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	3120		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	4		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	102000		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	10		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-15-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	11800		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	245000		ug/L	1000.0	08/10/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**DUP-JCW-LF-02**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-15	Collect Time:	12:00 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0773-15-C03-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1040		mg/L	10.0	08/04/2022	AB22-0803-04

Alkalinity by SM 2320B

Aliquot #: 22-0773-15-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	541000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Bicarbonate	541000		ug/L	10000.0	08/04/2022	AB22-0804-01
Alkalinity Carbonate	ND		ug/L	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**JCW-MW-18001 MS**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-16	Collect Time:	06:45 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-16-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	103		%	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-16-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	103		%	1.0	08/16/2022	AB22-0811-10
Arsenic	104		%	1.0	08/16/2022	AB22-0811-10
Barium	97		%	5.0	08/16/2022	AB22-0811-10
Beryllium	88		%	1.0	08/16/2022	AB22-0811-10
Boron	90		%	20.0	08/16/2022	AB22-0811-10
Cadmium	98.5		%	0.2	08/16/2022	AB22-0811-10
Calcium	121		%	1000.0	08/17/2022	AB22-0811-10
Chromium	89		%	1.0	08/16/2022	AB22-0811-10
Cobalt	83		%	6.0	08/16/2022	AB22-0811-10
Copper	87		%	1.0	08/16/2022	AB22-0811-10
Iron	88		%	20.0	08/16/2022	AB22-0811-10
Lead	94		%	1.0	08/16/2022	AB22-0811-10
Lithium	91		%	10.0	08/16/2022	AB22-0811-10
Magnesium	117		%	1000.0	08/17/2022	AB22-0811-10
Manganese	97		%	5.0	08/16/2022	AB22-0811-10
Molybdenum	115		%	5.0	08/16/2022	AB22-0811-10
Nickel	78		%	2.0	08/16/2022	AB22-0811-10
Potassium	112		%	100.0	08/17/2022	AB22-0811-10
Selenium	90		%	1.0	08/16/2022	AB22-0811-10
Silver	98.1		%	0.2	08/16/2022	AB22-0811-10
Sodium	121		%	1000.0	08/17/2022	AB22-0811-10
Thallium	95		%	2.0	08/16/2022	AB22-0811-10
Vanadium	94		%	2.0	08/16/2022	AB22-0811-10
Zinc	86		%	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-16-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	94		%	1000.0	08/10/2022	AB22-0809-05
Fluoride	87		%	1000.0	08/09/2022	AB22-0809-05
Sulfate	97		%	1000.0	08/10/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**JCW-MW-18001 MS**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-16	Collect Time:	06:45 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-0773-16-C03-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	92.0		%	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**JCW-MW-18001 MSD**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-17	Collect Time:	06:45 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-17-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	102		%	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-17-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	101		%	1.0	08/16/2022	AB22-0811-10
Arsenic	103		%	1.0	08/16/2022	AB22-0811-10
Barium	95		%	5.0	08/16/2022	AB22-0811-10
Beryllium	87		%	1.0	08/16/2022	AB22-0811-10
Boron	95		%	20.0	08/16/2022	AB22-0811-10
Cadmium	94.6		%	0.2	08/16/2022	AB22-0811-10
Calcium	109		%	1000.0	08/17/2022	AB22-0811-10
Chromium	88		%	1.0	08/16/2022	AB22-0811-10
Cobalt	83		%	6.0	08/16/2022	AB22-0811-10
Copper	87		%	1.0	08/16/2022	AB22-0811-10
Iron	84		%	20.0	08/16/2022	AB22-0811-10
Lead	94		%	1.0	08/16/2022	AB22-0811-10
Lithium	91		%	10.0	08/16/2022	AB22-0811-10
Magnesium	110		%	1000.0	08/17/2022	AB22-0811-10
Manganese	101		%	5.0	08/16/2022	AB22-0811-10
Molybdenum	114		%	5.0	08/16/2022	AB22-0811-10
Nickel	81		%	2.0	08/16/2022	AB22-0811-10
Potassium	109		%	100.0	08/17/2022	AB22-0811-10
Selenium	91		%	1.0	08/16/2022	AB22-0811-10
Silver	97.0		%	0.2	08/16/2022	AB22-0811-10
Sodium	117		%	1000.0	08/17/2022	AB22-0811-10
Thallium	94		%	2.0	08/16/2022	AB22-0811-10
Vanadium	92		%	2.0	08/16/2022	AB22-0811-10
Zinc	86		%	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-17-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	94		%	1000.0	08/10/2022	AB22-0809-05
Fluoride	90		%	1000.0	08/09/2022	AB22-0809-05
Sulfate	99		%	1000.0	08/10/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-0773**
Field Sample ID:	**JCW-MW-18001 MSD**	Collect Date:	08/01/2022
Lab Sample ID:	22-0773-17	Collect Time:	06:45 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-0773-17-C03-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	91.6		%	10000.0	08/04/2022	AB22-0804-01

Analytical Report

Report Date: 08/17/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **FB-01**
Lab Sample ID: 22-0773-18
Matrix: Water

Laboratory Project: **22-0773**
Collect Date: 08/02/2022
Collect Time: 08:10 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-18-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-18-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	ND		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	ND		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	ND		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	ND		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	ND		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	ND		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	ND		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	ND		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	ND		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	ND		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-18-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	ND		ug/L	1000.0	08/09/2022	AB22-0809-05

Analytical Report

Report Date: 08/17/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **EB-01**
Lab Sample ID: 22-0773-19
Matrix: Water

Laboratory Project: **22-0773**
Collect Date: 08/02/2022
Collect Time: 08:08 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0773-19-C01-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	08/05/2022	AB22-0805-04

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0773-19-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Arsenic	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Barium	ND		ug/L	5.0	08/16/2022	AB22-0811-10
Beryllium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Boron	ND		ug/L	20.0	08/16/2022	AB22-0811-10
Cadmium	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Calcium	ND		ug/L	1000.0	08/17/2022	AB22-0811-10
Chromium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Cobalt	ND		ug/L	6.0	08/16/2022	AB22-0811-10
Copper	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Iron	ND		ug/L	20.0	08/16/2022	AB22-0811-10
Lead	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Lithium	ND		ug/L	10.0	08/16/2022	AB22-0811-10
Magnesium	ND		ug/L	1000.0	08/17/2022	AB22-0811-10
Manganese	ND		ug/L	5.0	08/16/2022	AB22-0811-10
Molybdenum	ND		ug/L	5.0	08/16/2022	AB22-0811-10
Nickel	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Potassium	ND		ug/L	100.0	08/17/2022	AB22-0811-10
Selenium	ND		ug/L	1.0	08/16/2022	AB22-0811-10
Silver	ND		ug/L	0.2	08/16/2022	AB22-0811-10
Sodium	ND		ug/L	1000.0	08/17/2022	AB22-0811-10
Thallium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Vanadium	ND		ug/L	2.0	08/16/2022	AB22-0811-10
Zinc	ND		ug/L	10.0	08/16/2022	AB22-0811-10

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0773-19-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Fluoride	ND		ug/L	1000.0	08/09/2022	AB22-0809-05
Sulfate	ND		ug/L	1000.0	08/09/2022	AB22-0809-05

Data Qualifiers		Exception Summary
H	Maximum recommended holding time exceeded	No exceptions occurred.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-0773

Inspection Date: 8/2/22 **Inspection By:** MH

Sample Origin/Project Name: 08-2022 Porewater Meadock

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 3.6 -5.7°C Samples Received on Ice: Yes Y No ____

M&TE # and Expiration 015484 10.14.22

Number and Type of Containers: Enter the total number of sample containers received.

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or 60mL)	34				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	38				
24 mL vial (glass)					
250/500 mL (plastic)	15				
Other					

PG. 292 not needed

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

Page ____ of ____

SAMPLING SITE / CUSTOMER: Q3-2022 Weadock Porewater Wells	PROJECT NUMBER: 22-0773	SAP CC or WO#	ANALYSIS REQUESTED (Attach List if More Space is Needed)
SAMPLING TEAM	TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER ____	REQUESTER Harold Register	QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP B ☐ INTERNAL INFO ☐ OTHER ____
SEND REPORT TO: Caleb Batts	email:	phone:	
COPY TO: Harold Register; TRC	MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other ____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste		

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0773-01	8/1/22	0645	GW	JCW-MW-18001	5	4	1						x	x	x	x	
-02	8/1/22	1145	GW	JCW-MW-18004	5	4	1						x	x	x	x	
-03	8/2/22	0645	GW	JCW-MW-18005	5	4	1						x	x	x	x	
-04	8/2/22	0735	GW	JCW-MW-18006	5	4	1						x	x	x	x	
-05	8/1/22	0832	GW	MW-50	5	4	1						x	x	x	x	
-06	8/1/22	0809	GW	MW-51	5	4	1						x	x	x	x	
-07	8/1/22	0840	GW	MW-52	5	4	1						x	x	x	x	
-08	8/1/22	0918	GW	MW-53	5	4	1						x	x	x	x	
-09	8/1/22	0945	GW	MW-53R	5	4	1						x	x	x	x	
-10	8/1/22	1113	GW	MW-54R	5	4	1						x	x	x	x	
-11	8/1/22	1340	GW	MW-55	5	4	1						x	x	x	x	
-12	8/2/22	0710	GW	OW-57R OUT	5	4	1						x	x	x	x	

RELINQUISHED BY	DATE/TIME	RECEIVED BY
[signature]	8/2/22 1030	[signature]
RELINQUISHED BY	DATE/TIME	RECEIVED BY

COMMENTS

Received on Ice? ☑ Yes ☐ No M&TE # 015484

Temperature 3.6-5.7 °C Cal Due Date 10-14-22

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

Page _____ of _____

SAMPLING SITE / CUSTOMER	PROJECT NUMBER	SAP CC or WO#·
Q3-2022 Weadock Porewater Wells	**22-0773**	REQUESTER· Harold Register
SAMPLING TEAM	TURNAROUND TIME REQUIRED	
	☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____	
SEND REPORT TO. Caleb Batts	email	phone:
COPY TO Harold Register	MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste	
TRC		

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT

☐ NPDES
☒ TNI
☐ ISO 17025
☐ 10 CFR 50 APP B
☐ INTERNAL INFO
☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity						REMARKS
22-0773-13	8/2/22	0900	GW	MW-58	5	4	1						x	x	x	x						
-14	8/1/22	—	GW	DUP-JCW-LF-01	5	4	1						x	x	x	x						
-15	8/1/22	—	GW	DUP-JCW-LF-02	5	4	1						x	x	x	x						
-16	8/1/22	0641	GW	JCW-MW-18001 MS	4	3	1						x	x		x						
-17	8/1/22	0645	GW	JCW-MW-18001 MSD	4	3	1						x	x		x						
-18	8/2/22	0810	W	FB-01	2	1	1						x	x								
-19	8/2/22	0802	W	EB-01	2	1	1						x	x								

RELINQUISHED BY	DATE/TIME	RECEIVED BY
[signature]	8/2/22 1030	[signature]
RELINQUISHED BY	DATE/TIME	RECEIVED BY

COMMENTS

Received on Ice? ☑ Yes ☐ No M&TE # 015484

Temperature 3.6-5.7 °C Cal Due Date 10-14-22

Appendix F
Field Records

TRC

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance
PROJECT NUMBER:	464096.0000.0000
PROJECT MANAGER:	Darby Litz
SITE LOCATION:	2742 Weadock Hwy Essexville, MI 48732
DATES OF FIELDWORK:	8/1/22 TO 8/2/22
PURPOSE OF FIELDWORK:	Third Quarter HMP Sampling Event
WORK PERFORMED BY:	Javier Jasso

8/5/22
SIGNED DATE

8-5-22
CHECKED BY DATE

TRC

GENERAL NOTES

PROJECT NAME:	CEC Weadock LF: 2022 GW Com	DATE: 7/29/22	TIME ARRIVED: 0600
PROJECT NUMBER:	464096.0000.0000	AUTHOR: Javier Jasso	TIME LEFT: 0930

WEATHER		
TEMPERATURE: 60 °F	WIND: 10 MPH	VISIBILITY: clear

WORK / SAMPLING PERFORMED

water levels

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS

SIGNED 8/5/22 DATE

CHECKED BY 8-5-22 DATE

TRC

GENERAL NOTES

PROJECT NAME: CEC Weadock LF: 2022 GW Com	DATE: 8/1/22	TIME ARRIVED: 1000
PROJECT NUMBER: 464096.0000.0000	AUTHOR: Javier Jasso	TIME LEFT: 1355

WEATHER		
TEMPERATURE: 85 °F	WIND: 10 MPH	VISIBILITY: Overcast

WORK / SAMPLING PERFORMED

JCW-MW-18001, MS, MSD, MW50, Dup #01, 51, 52, 53, 53R, 54R
JCW MW-18004, JCW OW-18004, 55, Dup #02

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS

8/5/22
SIGNED DATE

8-5-22
CHECKED BY DATE

TRC

GENERAL NOTES

PROJECT NAME: CEC Weadock LF: 2022 GW Com	DATE: 8/2/22	TIME ARRIVED: 0800
PROJECT NUMBER: 464096.0000.0000	AUTHOR: Javier Jasso	TIME LEFT: 0815

WEATHER

TEMPERATURE: 60 °F WIND: 15 MPH VISIBILITY: Clear

WORK / SAMPLING PERFORMED

JCW-MW-18005, DUP-37R0814, JCW-MW-18004, MW-58
FIB # 01, EB #01
Dropping off Samples

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS

SIGNED 8/5/22 DATE

CHECKED BY 8-5-22 DATE

REVISED 04/2019

TRC

EQUIPMENT SUMMARY

PROJECT NAME:	CEC Weadock LF: 2022 GW Co	SAMPLER NAME:	Javier Jasso
PROJECT NO.:	464096.0000.0000		

WATER LEVEL MEASUREMENTS COLLECTED WITH:

HERON DIPPER-T	TRC A2
NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)

PRODUCT LEVEL MEASUREMENTS COLLECTED WITH:

NA	NA
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)
GEOTECH DISPOSABLE FILTER	0.45 MICRON
NAME AND MODEL OF FILTERATION DEVICE	FILTER TYPE AND SIZE
DEDICATED POLY TUBING	☑ LOW-FLOW SAMPLING EVENT
TUBING TYPE	

PURGE WATER DISPOSAL METHOD

☑ GROUND ☐ DRUM ☐ POTW ☐ POLYTANK ☐ OTHER _____

DECONTAMINATION AND FIELD BLANK WATER SOURCE

STORE BOUGHT	LABORATORY PROVIDED
POTABLE WATER SOURCE	DI WATER SOURCE
8/5/22	8-5-22
SIGNED DATE	CHECKED BY DATE

REVISED 04/2019

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	MODEL: YSI Pro DSS	SAMPLER: JJ
PROJECT NO.:	464096.0000.0000	SERIAL #: TRC A2	DATE: 8/1/22

PH CALIBRATION CHECK

pH 7 (LOT #): 26B1024 (EXP. DATE): 2/24	pH 4 / 10 (LOT #): 26B1457 (EXP. DATE): 2/24	CAL. RANGE	TIME
POST-CAL. READING / STANDARD	POST-CAL. READING / STANDARD		
700 / 700	400 / 400	☑ WITHIN RANGE	0610
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 1611687 (EXP. DATE): 6/22	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING / STANDARD			
1309 / 1309	22.	☑ WITHIN RANGE	0610
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 21B1006687 (EXP. DATE): 2/24	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING / STANDARD			
220 / 220	22.	☑ WITHIN RANGE	0610
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING /SATURATED AIR			
8.15 / 8.15	22.0	☐ WITHIN RANGE	0610
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A2172 (EXP. DATE): 6/24	(LOT #): (EXP. DATE):	CAL. RANGE	TIME
POST-CAL. READING / STANDARD	POST-CAL. READING / STANDARD		
0 / 0	/	☑ WITHIN RANGE	0610
100 / 100	/	☑ WITHIN RANGE	0610
/	/	☐ 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 8/5/22 DATE

CHECKED BY 8-5-22 DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	MODEL: YSI Pro DSS	SAMPLER: JJ
PROJECT NO.:	464096.0000.0000	SERIAL #: TRC A2	DATE: 8/2/22

PH CALIBRATION CHECK

pH 7 (LOT #): 26B1074 (EXP. DATE): 2/24	pH 4 / 10 (LOT #): 26B1075 (EXP. DATE): 2/24	CAL. RANGE	TIME
POST-CAL. READING / STANDARD	POST-CAL. READING / STANDARD		
700 / 700	400 / 400	☑ WITHIN RANGE	0510
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 1611+665 (EXP. DATE): 8/22	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING / STANDARD			
1360 / 1360	23.0	☑ WITHIN RANGE	0510
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 21B0068 (EXP. DATE): 2/26	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING / STANDARD			
220 / 220	22.0	☑ WITHIN RANGE	0515
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
POST-CAL. READING /SATURATED AIR			
8.35 / 8.35	22	☑ WITHIN RANGE	0510
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A2172 (EXP. DATE): 6/24	(LOT #): (EXP. DATE):	CAL. RANGE	TIME
POST-CAL. READING / STANDARD	POST-CAL. READING / STANDARD		
0 / 0	/	☑ WITHIN RANGE	0510
100 / 100	/	☑ 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] 8/5/22 DATE

CHECKED BY [signature] 8-5-22 DATE

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	DATE:	7/25/22
PROJECT NUMBER:	464096.0000.0000	AUTHOR:	Javier Jasso

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
JCW-MW-18001	0625	TOC	16.21	23.75	NA	NM
JCW-MW-18004	0725	TOC	12.12	14.72	NA	NM
JCW-MW-18005	0742	TOC	8.94	16.28	NA	NM
JCW-MW-18006	0802	TOC	15.34	23.68	NA	NM
JCW-OW-18001	0626	TOC	9.00	20.21	NA	NM
JCW-OW-18002	0638	TOC	10.47	19.41	NA	NM
JCW-OW-18003	0650	TOC	9.02	DNM	NA	NM
JCW-OW-18004	0726	TOC	9.90	14.87	NA	NM
JCW-OW-18006	0803	TOC	11.16	23.45	NA	NM
LH-103R	0704	TOC	24.00	33.47	NA	NM
LH-104	0734	TOC	12.09	14.00	NA	NM
JCW-MW-20	0742	TOC	7.81	14.00	NA	NM
~~JCW~~ MW-50	0636	TOC	12.79	19.40	NA	NM
MW-51	0644	TOC	13.70	20.00	NA	NM
MW-52	0649	TOC	14.30	19.74	NA	NM
MW-53	0657	TOC	13.16	18.18	NA	NM
MW-53R	0712	TOC	13.76	18.80	NA	NM
MW-54R	0718	TOC	13.27	17.22	NA	NM
MW-55	0737	TOC	13.41	16.38	NA	NM
MW-58	0843	TOC	5.53	18.18	NA	NM
OW-51	0645	TOC	9.90	17.28	NA	NM
OW-53	0658	TOC	7.26	18.00	NA	NM
OW-54	0720	TOC	7.37	16.48	NA	NM
OW-55	0738	TOC	8.35	18.47	NA	NM
OW-56R	0748	TOC	5.44	20.27	NA	NM

ALL WATER LEVELS MUST INCLUDE REFERENCE POINT AND TAPE CORRECTION FACTOR (E.G., 1.1 + 0.00 T/PVC).

SIGNED [signature] DATE 8/5/22

CHECKED [signature] DATE 8-5-22

REVISED 04/2019

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	DATE:	7/25/22
PROJECT NUMBER:	464096.0000.0000	AUTHOR:	Javier Jasso

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
OW-57 IN	0757	TOC	5.80	20.18	NA	NM
OW-57R IN	0758	TOC	5.95	19.66	NA	NM
OW-57 OUT	0755	TOC	10.54	18.98	NA	NM
OW-57R OUT	0754	TOC	10.31	20.31	NA	NM
OW-61	0629	TOC	12.30	37.60	NA	NM
OW-63	0809	TOC	could not locate		NA	NM
MW-15020	0636		5.18	17.35		
JCW-MW-15022	0633		15.16	Dwm		
JCW MW-15026	0714		14.95	19.87		
MW-14R	0719		13.54	19.87		
JCW-MW-15021	0726		15.31	Dwm		
OW-56	0749		5.37	19.73		
MW-19	0807		9.69	20.83		
MW-11R	0644		5.00	32.76		
MW-15024	0648		5.60	17.17		
MW-15019	0651		5.44	16.87		
MW-15018	0857		5.64	9.94		
MW-15002	0900		6.88	16.88		
MW-15001	0901		8.45	Dwm		
MW-15016	0905		3.84	8.10		

ALL WATER LEVELS MUST INCLUDE REFERENCE POINT AND TAPE CORRECTION FACTOR (E.G., 1.1 + 0.00 T/PVC).

SIGNED 8/17/22 DATE

CHECKED 8-5-22 DATE

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED			CHECKED		
PROJECT NUMBER:	464096.0000.0000	BY:	JJ	DATE: 8/1/22	BY: JK	DATE: 8-5-22	

SAMPLE ID: XW 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: 0620	DATE: 8/1/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER	
DEPTH TO WATER:	16.21 T/ PVC	
DEPTH TO BOTTOM:	23.75 T/ PVC	
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS	
VOLUME REMOVED:	5 ☑ LITERS ☐ GALLONS	
COLOR:	clear	ODOR: none
TURBIDITY	☐ NONE ☑ SLIGHT ☐ MODERATE ☐ VERY	
DISPOSAL METHOD:	☐ GROUND ☐ DRUM ☐ OTHER	

SAMPLE	TIME: 0645	DATE: 8/1/22
PH:	6.60 SU	CONDUCTIVITY: 3000 umhos/cm
ORP:	-86.5 mV	DO: 0.74 mg/L
TURBIDITY:	2.5 NTU	
☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
TEMPERATURE:	13.9 °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)
0630	200	4.00	2998	48.0	80	32.0	18.6	16.48	INITIAL
0635		6.52	3004	-2.8	1.18	3.5	14.0	16.58	1
0640		6.56	2977	-39.0	0.88	2.6	13.9	16.58	2
0645		6.60	2983	-65.8	0.84	2.5	13.9	16.58	3
0646		6.60	3004	-86.5	0.77	2.5	13.9	16.58	4
0647		6.60	3000	-86.1	0.74	2.1	13.9	16.60	5
									6

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	125	4/HCl	A	☐ Y ☑ N					☐ Y ☐ N
3	250	P1	A	☐ Y ☑ N					☐ Y ☐ N
3	125	P1	A	☐ Y ☑ N					☐ Y ☐ N
3	125	P1	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	8/3/22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	8/5/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 8/5/22	BY: JK	DATE: 8-5-22

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: 0703	DATE: 8/1/22	SAMPLE	TIME: 0728	DATE: 8/1/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 12.79 T/ PVC

DEPTH TO BOTTOM: 19.46 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 5 ☒ LITERS ☐ GALLONS

COLOR: Clear ODOR: none

TURBIDITY: ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

PH: 7.00 SU CONDUCTIVITY: 1493 umhos/cm

ORP: -108.1 mV DO: 0.63 mg/L

TURBIDITY: 2.4 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 14.9 °C OTHER:

COLOR: Clear ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☒ DUP-#1

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)
0703	200	7.02	1083	-33.1	8.4	7.5	17.3	13.14	INITIAL
0708		6.96	1509	-88.0	1.24	3.0	14.9	13.18	1.0
0713		7.00	1500	-100.1	1.00	2.8	14.8	13.18	2.0
0718		7.00	1495	-108.5	0.92	2.9	14.9	13.16	3.0
0723		7.00	1493	-108.0	0.84	2.5	14.9	13.12	4.0
0728		7.00	1492	-108.5	0.82	2.4	14.9	13.10	5.0
									5.0

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	125	g/ASI	A	☐ Y ☒ N					☐ Y ☐ N
2	250	pl	A	☐ Y ☒ N					☐ Y ☐ N
2	125	DI	A	☐ Y ☒ N					☐ Y ☐ N
2	125	pl	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	8-3-22	AIRBILL NUMBER:	N/A
COC NUMBER:	N/A	SIGNATURE:		DATE SIGNED:	8/5/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 8/1/22	BY: JK	DATE: 8-5-22

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: 0744	DATE: 8/1/22	SAMPLE	TIME: 0809	DATE: 8/1/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 13.76 T/ PVC

DEPTH TO BOTTOM: 20.00 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 2.5 ☒ LITERS ☐ GALLONS

COLOR: Cloudy ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☒ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

PH: 7.00 SU CONDUCTIVITY: 2033 umhos/cm

ORP: -97.0 mV DO: 0.77 mg/L

TURBIDITY: 2.9 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 13.7 °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)
0744	100	7.04	173 ↓	-14.↓	8.6	72.0	16.3	13.98	INITIAL
0749		7.00	202 ↓	-81.↓	1.19	2.8	13.8	140↑	.↓
0754		7.00	203 3	-90.↓	0.99	2.6	13.7	140↑	1
0759		7.00	2037	-96.↓	0.86	2.8	13.8	140↑	1.↓
0804		7.00	2033	-96.7	0.81	2.8	13.7	140↑	2
0809		7.00	2033	-97.0	0.77	2.9	13.7	140↑	2.↓
									3

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☒ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	8-7-22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	8/5/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 8/1/22	BY: JK	DATE: 8-5-22

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: 0820	DATE: 8/1/22	SAMPLE	TIME: 0840	DATE: 8/1/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 6.70 SU	CONDUCTIVITY: 1993	umhos/cm
			ORP: -78.5 mV	DO: 0.79	mg/L
DEPTH TO WATER: 14.30 T/ PVC			TURBIDITY: 2.1 NTU		
DEPTH TO BOTTOM: 19.74 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 13.7 °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	100	7.00	731	-19.2	8.7	19.5	12.5	14.61	INITIAL
0825		6.72	1968	-54.1	1.90	4.7	13.9	1483	.5
0830		6.70	1987	-78.8	0.92	2.5	13.7	1485	1
0835		6.70	1984	-79.3	0.83	2.5	13.7	1485	1.5
0840		6.70	1993	-78.5	0.99	2.1	13.7	1485	2 2+

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 . TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☒ N					☐ Y ☐ N
1	250	pl	A	☐ Y ☒ N					☐ Y ☐ N
1	125	pl	A	☐ Y ☒ N					☐ Y ☐ N
1	125	pl	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	8-3-22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	8/5/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 8/1/22	BY: JK	DATE: 8-5-22

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: 0853	DATE: 8/1/22	SAMPLE	TIME: 0918	DATE: 8/1/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 13.10 T/ PVC

DEPTH TO BOTTOM: 18.18 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 2.5 ☒ LITERS ☐ GALLONS

COLOR: clear ODOR: none

TURBIDITY ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☒ GROUND ☐ DRUM ☐ OTHER

PH: 7.00 SU CONDUCTIVITY: 1292 umhos/cm

ORP: -108.0 mV DO: 0.81 mg/L

TURBIDITY: 2.4 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)
0853	100	7.05	1384	-35.7	8.6	12.6	17.7	13.45	INITIAL
0858		7.09	1304	-99.1	1.25	3.3	14.8	13.55	.5
0903		7.09	1303	-102.8	1.00	2.9	14.9	13.55	1
0908		7.08	1296	-107.5	0.92	2.5	15.1	13.55	1.5
0913		7.08	1293	-107.9	0.87	2.4	15.0	13.55	2
0918		7.08	1292	-108.0	0.85	2.4	15.0	13.55	2.5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☒ N					☐ Y ☐ N
1	250	pl	A	☐ Y ☒ N					☐ Y ☐ N
1	125	pl	A	☐ Y ☒ N					☐ Y ☐ N
1	125	pl	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	8-3-22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	8/3/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED			CHECKED		
PROJECT NUMBER:	464096.0000.0000	BY:	JJ	DATE: 8/1/22	BY:	JK	DATE: 8-5-22

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: 0925	DATE: 8/1/22	SAMPLE	TIME: 0945	DATE: 8/1/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 13.74 T/ PVC

DEPTH TO BOTTOM: 18.82 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 3 ☒ LITERS ☐ GALLONS

COLOR: grayish ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☒ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

PH: 6.70 SU | CONDUCTIVITY: 2177 umhos/cm

ORP: -62.0 mV | DO: 0.88 mg/L

TURBIDITY: 80 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 15.1 °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)
0925	140	6.98	1171	-33.1	8.3	3000	14.9	1408	INITIAL
0930		6.70	2443	-60.1	1.78	300	16.3	1415	.5
0935		6.69	2397	-60.8	1.16	280	15.7	1415	1
0940		6.69	2269	-61.0	097	10.0	15.6	1415	1.5
0945		6.70	2178	-61.5	092	8.8	15.6	1415	2
0950		6.70	2137	-62.0	090	8.20	15.5	1415	2.5
0955		6.70	2125	-62.0	088	8.0	15.5	1418	3

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	9/45	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	8-3-22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	8/3/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 8/1/22	BY: JK	DATE: 8-5-22

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: 1038	DATE: 8/1/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 13.27 T/ PVC

DEPTH TO BOTTOM: 17.27 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 3.5 ☒ LITERS ☐ GALLONS

COLOR: Turbid ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☒ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1113	DATE: 8/1/22

PH: 6.87 SU CONDUCTIVITY: 1230 umhos/cm

ORP: -114.0 mV DO: 0.86 mg/L

TURBIDITY: 7.7 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)
1038	100	7.01	1233	-117.5	7.5	300	19.4	1371	INITIAL
1043		6.86	1269	-112.5	2.5	114.0	17.0	1385	.5
1048		6.86	1242	-94.0	1.30	30	16.6	1390	1
1053		6.87	1236	-105.0	1.16	13.0	16.4	1392	1.5
1058		6.87	1237	-115.5	1.00	10.0	16.2	1395	2
1103		6.87	1233	-115.8	0.96	8.0	16.2	1395	2.5
1108		6.87	1230	-115.7	0.89	7.8	16.1	1396	3
1113		6.87	1230	-116.0	0.86	7.7	16.1	1396	3.5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	250	g(GS)	A	☐ Y ☒ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	8-1-22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	8/1/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED			CHECKED		
PROJECT NUMBER:	464096.0000.0000	BY:	JJ	DATE: 8/1/22	BY: JK	DATE: 8-5-22	

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: 1127	DATE: 8/1/22	SAMPLE	TIME: 1142	DATE: 8/1/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.71 SU	CONDUCTIVITY: 1623 umhos/cm	
			ORP: -110.0 mV	DO: 4.2 mg/L	
DEPTH TO WATER: 12.12 T/ PVC			TURBIDITY: 3.8 NTU		
DEPTH TO BOTTOM: 14.72 T/ PVC			☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 18.7 °C	OTHER:	
VOLUME REMOVED: 1.5 ☒ 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)
1127	100	6.84	6615	-93.1	8.0	10.0	22.7	12.26	INITIAL
1132		6.71	1611	-110.1	4.3	3.8	18.8	1260	.5
1137		6.71	1616	-110.0	4.3	3.9	18.7	1281	1
1142		6.71	& 1623	-110.0	4.2	3.8	18.7	1290	1.5
~~1147~~									2
									2.5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☒ N					☐ Y ☐ N
1	250	pl	A	☐ Y ☒ N					☐ Y ☐ N
1	125	pl	A	☐ Y ☒ N					☐ Y ☐ N
1	125	pl	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	8-3-22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	8/1/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 8/5/22	BY: JK	DATE: 8-5-22

SAMPLE ID: JCW-GW-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: 1157	DATE: 8/1/22	SAMPLE	TIME: 1215	DATE: 8/1/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 9.00 T/ PVC

DEPTH TO BOTTOM: 20.35 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 2 ☒ LITERS ☐ GALLONS

COLOR: clear ODOR: none

TURBIDITY: ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

PH: 6.76 SU CONDUCTIVITY: 1540 umhos/cm

ORP: -140.3 mV DO: 092 mg/L

TURBIDITY: 5.1 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 15.9 °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)
1157	100	7.01	6726	-116.8	8.3	9.6	21.5	9.64	INITIAL
1200		6.76	1454	-137.0	1.80	12	16.4	9.94	.5
1205		6.76	1535	-140.0	099	5.3	16.0	9.95	1
1210		6.76	1535	-140.1	095	5.0	16.0	9.95	1.5
1215		6.76	1540	-140.3	092	5.1	15.9	9.95	2

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	9/ASN	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Dropoff	DATE SHIPPED:	8-3-22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	8/5/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED			CHECKED		
PROJECT NUMBER:	464096.0000.0000	BY:	JJ	DATE: 8/4/22	BY:	JK	DATE: 8-5-22

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: 1315	DATE: 8/1/22	SAMPLE	TIME: 1340	DATE: 8/1/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 6.85 SU	CONDUCTIVITY: 1404 umhos/cm	
			ORP: -155.0 mV	DO: 0.83 mg/L	
DEPTH TO WATER: 13.41 T/ PVC			TURBIDITY: 60.1 NTU		
DEPTH TO BOTTOM: 16.38 T/ PVC			☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 16.0 °C	OTHER:	
VOLUME REMOVED: 5 ☐ LITERS ☐ GALLONS			COLOR: clear	ODOR: non	
COLOR: Brownish	ODOR: none		FILTRATE (0.45 um) ☐ YES ☐ NO		
TURBIDITY ☐ NONE ☐ SLIGHT ☑ MODERATE ☐ VERY			FILTRATE COLOR:	FILTRATE ODOR:	
			QC SAMPLE: ☐ MS/MSD	☐ DUP: A 2	
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)
1315	200	6.92	493	-151.8	8.0	63.0	20.4	1361	INITIAL
1320		6.83	1378	-141.3	1.32	29.0	16.1	1372	1
1325		6.83	1401	-154.0	0.94	9.5	16.3	1372	2
1330		6.84	1404	-154.5	0.89	7.0	16.1	1372	3
1335		6.85	1404	-154.5	0.85	6.8	16.1	1372	4
1340		6.85	1404	-155.0	0.82	6.5	16.0	1378	5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	1L	glass	D	☐ Y ☑ N					☐ Y ☐ N
2	250	pl	A	☐ Y ☑ N					☐ Y ☐ N
2	125	pl	A	☐ Y ☑ N					☐ Y ☐ N
2	125	pl	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	8-3-22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	8/1/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 8/5/22	BY: 8-5-22	DATE: JK

SAMPLE ID: JCW-MW1 [8005] 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: 8/2/22	SAMPLE	TIME: 0640	DATE: 8/2/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 8.94 T/ PVC

DEPTH TO BOTTOM: 16.56 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 2 ☒ LITERS ☐ GALLONS

COLOR: Cloudy ODOR: non

TURBIDITY: ☐ NONE ☐ SLIGHT ☒ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

PH: 6.78 SU CONDUCTIVITY: 1538 umhos/cm

ORP: -100.8 mV DO: 1.11 mg/L

TURBIDITY: 5.0 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 13.3 °C OTHER:

COLOR: clear ODOR: non

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
0611	200	6.66	1464	-61.1	1.80	44	14.9	9.35	INITIAL
0620		6.53	1574	-41.0	2.11	32	12.9	10.00	0.5
0625		6.64	1548	-67.0	1.30	14.0	13.1	10.53	1
0630		6.70	1537	-99.5	1.17	5.7	13.2	10.61	1.5
0635		6.70	1524	-100.5	1.16	5.3	13.3	10.65	2
0640		6.70	1520	-100.8	1.11	5.0	13.3	10.67	2.5
									3

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☒ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	8-3-22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	8/5/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 8/1/22	BY: JL	DATE: 8-5-22

SAMPLE ID: GW-57R Dup | 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: 8/2/22	SAMPLE	TIME: 0710	DATE: 8/2/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.87 SU	CONDUCTIVITY: 1300 umhos/cm	
			ORP: -100.0 mV	DO: 1.17 mg/L	
DEPTH TO WATER: 10.31 T/ PVC			TURBIDITY: 3.0 NTU		
DEPTH TO BOTTOM: 26.31 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 13.0 °C	OTHER:	
VOLUME REMOVED: 21 ☑ 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	7.01	1362	-36.0	10.0	16.0	14.4	10.10	INITIAL
0655		6.81	1394	-67.0	2.16	6.3	13.0	11.10	1
0700		6.81	1354	-100.0	1.18	3.0	12.4	12.31	1
0705		6.82	1308	-100.0	1.17	3.0	13.0	13.10	1.5
0710		6.82	1300	-100.0	1.17	3.0	13.0	14.21	2
									2.5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	glass	A	☐ Y ☑ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	1L	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	1L	PL	A	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	8-3-22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	8/5/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED			CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 8/5/22		BY: JK	DATE: 8-5-22

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: 0717	DATE: 8/2/22	SAMPLE	TIME: 0732	DATE: 8/2/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.72 SU	CONDUCTIVITY: 1337 umhos/cm	
			ORP: -131.0 mV	DO: 1.03 mg/L	
DEPTH TO WATER: 19.30 T/ PVC			TURBIDITY: 2.95 NTU		
DEPTH TO BOTTOM: 23.68 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 12.6 °C	OTHER:	
VOLUME REMOVED: 1.5 ☒ 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)
0717	100	6.78	450	-61.0	10.0	9.0	14.3	15.56	INITIAL
0722		6.72	1346	-130.8	1.07	3.0	12.6	15.70	.5
0727		6.72	1341	-130.9	1.07	3.0	12.5	15.72	1
0732		6.72	1337	-131.0	1.03	2.95	12.6	15.72	1.5
0737									~~2~~
									~~2.5~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED		PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____							
NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	glass	B	☐ Y ☒ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	1L	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	1L	PL	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: Drop off	DATE SHIPPED: 8-3-22	AIRBILL NUMBER: NA
COC NUMBER: NA	SIGNATURE:	DATE SIGNED: 8/5/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED			CHECKED		
PROJECT NUMBER:	464096.0000.0000	BY:	JJ	DATE: 8/1/22	BY:	JK	DATE: 8-5-22

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: 0745	DATE: 8/2/22	SAMPLE	TIME: 0800	DATE: 8/2/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 6.71 SU	CONDUCTIVITY: 1960 umhos/cm	
			ORP: -139.8 mV	DO: 0.91 mg/L	
DEPTH TO WATER: 5.53 T/ PVC			TURBIDITY: 2.2 NTU		
DEPTH TO BOTTOM: 18.18 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 14.1 °C	OTHER:	
VOLUME REMOVED: 3 ☒ LITERS ☐ GALLONS			COLOR: clear	ODOR: non	
COLOR: clear	ODOR: non		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)
0745	200	6.83	1841	-78.4	9.6	10.6	15.0	5.58	INITIAL
0750		6.70	1990	-138.8	1.00	2.2	14.2	5.62	1
0755		6.71	1966	-139.5	1.00	2.2	14.1	5.62	2
0800		6.71	1960	-139.8	0.95	2.2	14.1	5.62	3
~~0805~~								~~5.62~~	~~4~~
									4
									5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED		PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F -							
NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	8-3-22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	8/5/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 8/1/22	BY: JK	DATE: 8-5-22

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:

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: ____ T/ PVC

DEPTH TO BOTTOM: ____ T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: ____ ☐ LITERS ☑ GALLONS

COLOR: ____ ODOR: ____

TURBIDITY

☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 0808	DATE: 8/2/22

PH: NR SU CONDUCTIVITY: NR umhos/cm

ORP: NR mV DO: NR mg/L

TURBIDITY: NR NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: NR °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)
									INITIAL

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - ____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	125	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PL	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Dropoff	DATE SHIPPED:	8-7-22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	8/5/22

REVISED 04/2019

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 8/1/22	BY: JK	DATE: 8-5-22

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:

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: T/ PVC

DEPTH TO BOTTOM: T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: ☐ LITERS ☐ GALLONS

COLOR: ODOR:

TURBIDITY
☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☐ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 0910	DATE: 8/2/22

PH: NM SU CONDUCTIVITY: NM umhos/cm

ORP: NM mV DO: NM mg/L

TURBIDITY: NM NTU

☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: NA °C OTHER:

COLOR: Clear ODOR: None

FILTRATE (0.45 um) ☐ YES ☑ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
									INITIAL

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	125	PL	A	☐ Y ☒ N					☐ Y ☐ N
1	125	PL	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Double Tree	DATE SHIPPED:	8-7-22	AIRBILL NUMBER:	NA
COC NUMBER:	DN	SIGNATURE:		DATE SIGNED:	8/7/22

28

26 of 28

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

Page ____ of ____

SAMPLING SITE / CUSTOMER: Q3-2022 Weadock Porewater Wells	PROJECT NUMBER: 22-0773	SAP CC or WO#	ANALYSIS REQUESTED (Attach List if More Space is Needed)
SAMPLING TEAM	TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER ____	REQUESTER: Harold Register	QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP B ☐ INTERNAL INFO ☐ OTHER ____
SEND REPORT TO: Caleb Batts	email:	phone:	
COPY TO: Harold Register; TRC	MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other ____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste		

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0773-01	8/1/22	0645	GW	JCW-MW-18001	5	4	1						x	x	x	x	
-02	8/1/22	1148	GW	JCW-MW-18004	5	4	1						x	x	x	x	
-03	8/2/22	0644	GW	JCW-MW-18005	5	4	1						x	x	x	x	
-04	8/2/22	0733	GW	JCW-MW-18006	5	4	1						x	x	x	x	
-05	8/1/22	0832	GW	MW-50	5	4	1						x	x	x	x	
-06	8/1/22	0809	GW	MW-51	5	4	1						x	x	x	x	
-07	8/1/22	0840	GW	MW-52	5	4	1						x	x	x	x	
-08	8/1/22	0918	GW	MW-53	5	4	1						x	x	x	x	
-09	8/1/22	0927	GW	MW-53R	5	4	1						x	x	x	x	
-10	8/1/22	1113	GW	MW-54R	5	4	1						x	x	x	x	
-11	8/1/22	1340	GW	MW-55	5	4	1						x	x	x	x	
-12	8/2/22	0710	GW	OW-57R OUT	5	4	1						x	x	x	x	

RELINQUISHED BY	DATE/TIME	RECEIVED BY
	8/2/22 1030	
RELINQUISHED BY	DATE/TIME	RECEIVED BY

COMMENTS

Received on Ice? ☑ Yes ☐ No M&TE # 015484

Temperature 3.6-5.7 °C Cal Due Date 10-14-22

CHAIN OF CUSTODY

28 27 of 28

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

Page _____ of _____

SAMPLING SITE / CUSTOMER: Q3-2022 Weadock Porewater Wells	PROJECT NUMBER: 22-0773	SAP CC or WO#:	ANALYSIS REQUESTED (Attach List if More Space is Needed)
SAMPLING TEAM	TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____	REQUESTER: Harold Register	
SEND REPORT TO: Caleb Batts	email	phone:	
COPY TO: Harold Register; TRC	MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste		

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0773-13	8/2/22	0900	GW	MW-58	5	4	1						x	x	x	x	
-14	8/1/22	—	GW	DUP-JCW-LF-01	5	4	1						x	x	x	x	
-15	8/1/22	—	GW	DUP-JCW-LF-02	5	4	1						x	x	x	x	
-16	8/1/22	0644	GW	JCW-MW-18001 MS	4	3	1						x	x		x	
-17	8/1/22	0645	GW	JCW-MW-18001 MSD	4	3	1						x	x		x	
-18	8/2/22	0810	W	FB-01	2	1	1						x	x			
-19	8/2/22	0802	W	EB-01	2	1	1						x	x			

RELINQUISHED BY	DATE/TIME	RECEIVED BY
	8/2/22 1030	
RELINQUISHED BY	DATE/TIME	RECEIVED BY

COMMENTS

Received on Ice? ☑ Yes ☐ No M&TE # 015484

Temperature 3.6-5.7 °C Cal Due Date 10-14-22

CHAIN OF CUSTODY

28 of 28

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

Page 1 of 1

SAMPLING SITE / CUSTOMER: Q3-2022 Weadock ASD	PROJECT NUMBER: 22-0774	SAP CC or WO#:	
SAMPLING TEAM:	TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER	REQUESTER: Harold Register	
SEND REPORT TO: Caleb Batts	email:	phone:	
COPY TO: Harold Register / TRC	MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other; SL = Sludge; A = Air; WP = Wipe; WT = General Waste		

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT:

☐ NPDES
☒ TNI
☐ ISO 17025
☐ 10 CFR 50 APP. B
☐ INTERNAL INFO
☐ OTHER

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	PRESERVATIVE HNO_3	PRESERVATIVE H_2SO_4	PRESERVATIVE NaOH	PRESERVATIVE HCl	PRESERVATIVE MeOH	PRESERVATIVE Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0774-01	8/1/22	1215	GW	JCW-MW-18004	5	4	1						x	x	x	x	

RELINQUISHED BY: DATE/TIME: 8/2/22 1030 RECEIVED BY:

RELINQUISHED BY: DATE/TIME: RECEIVED BY:

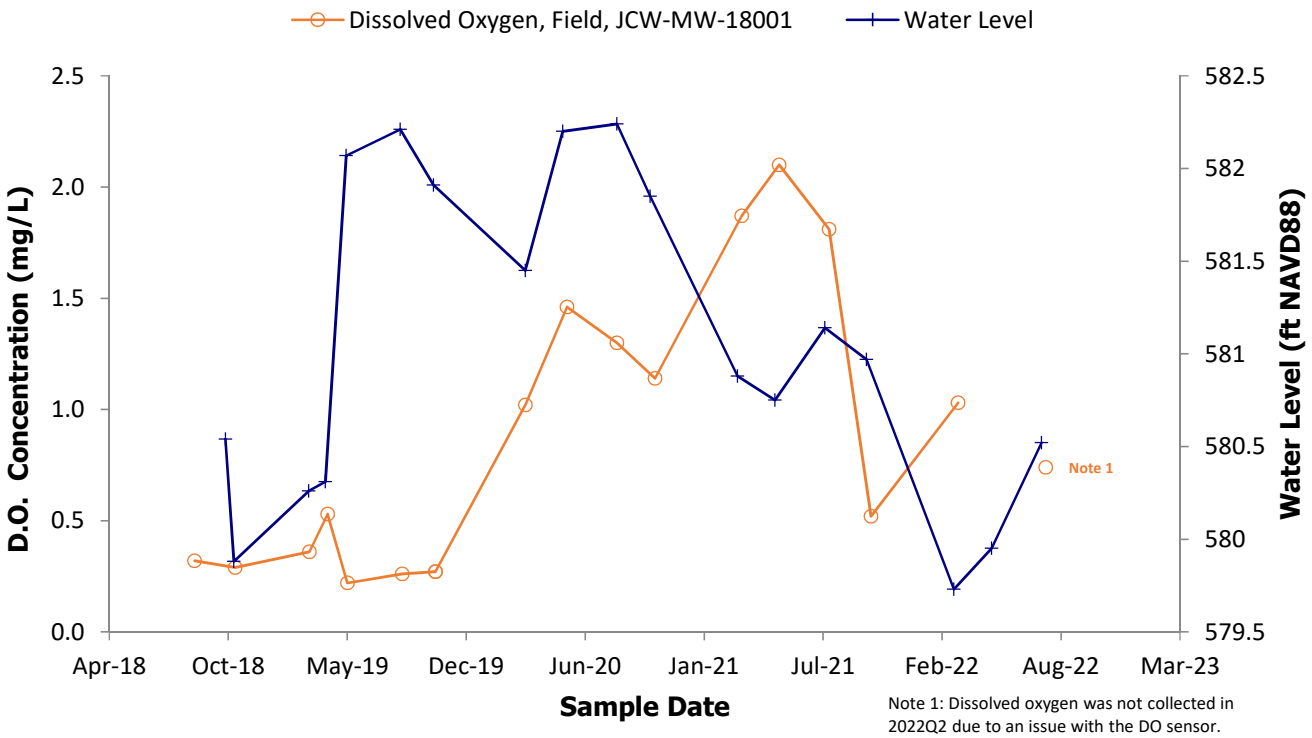
COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015484

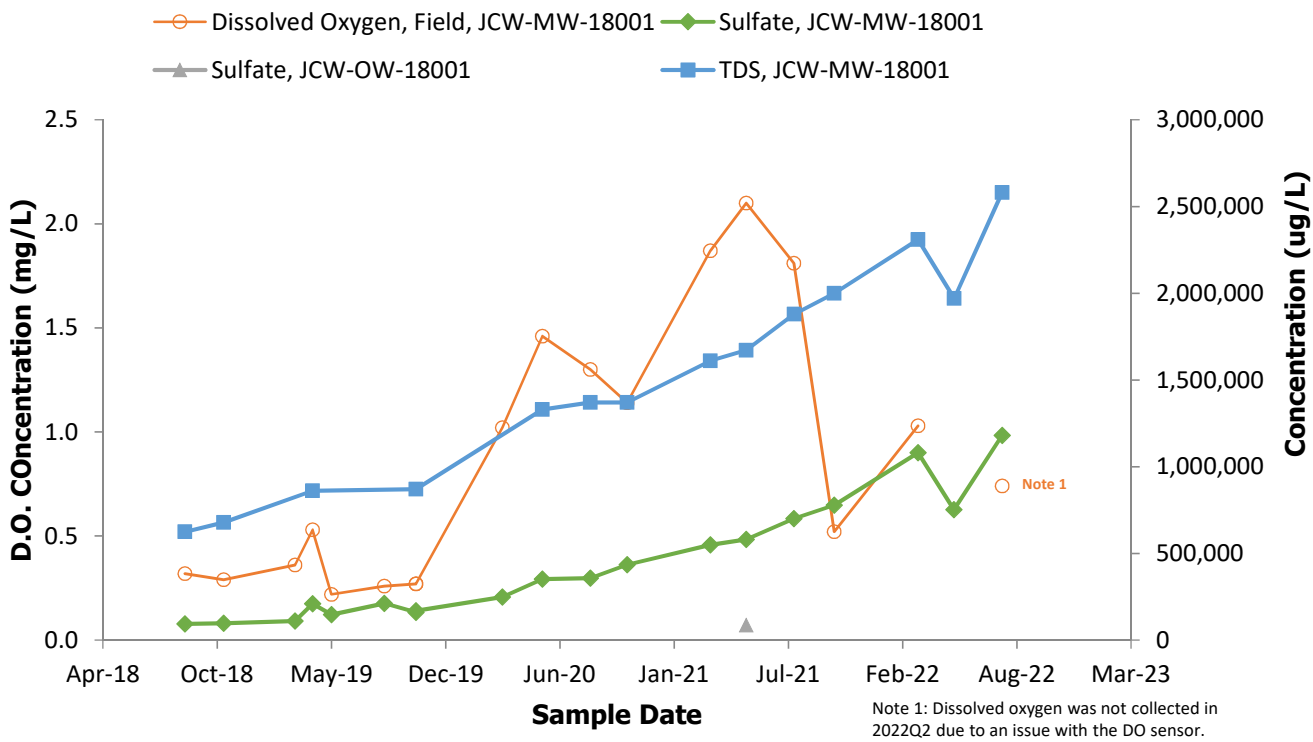
Temperature: 5.6 °C Cal. Due Date: 10-14-22

Appendix G
Alternate Source Demonstration Supporting Information

Figure G1: Time Series Plots for Sulfate at JCW-MW-18001 ASD

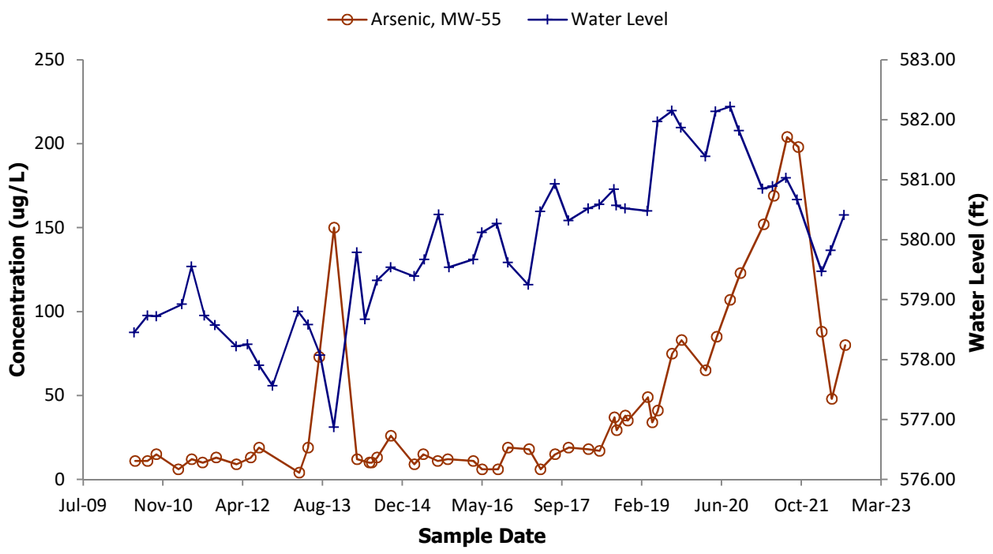


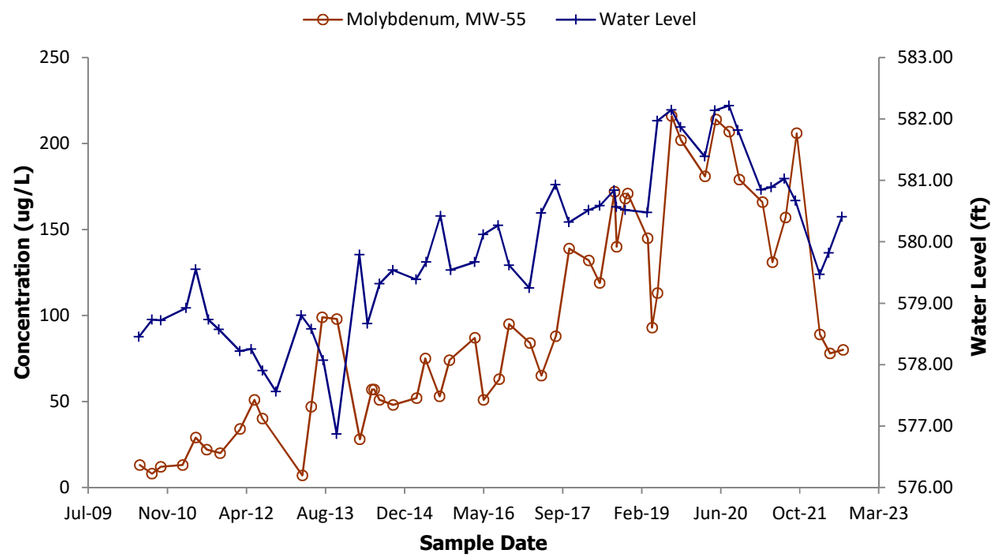
Note 1: Dissolved oxygen was not collected in 2022Q2 due to an issue with the DO sensor.

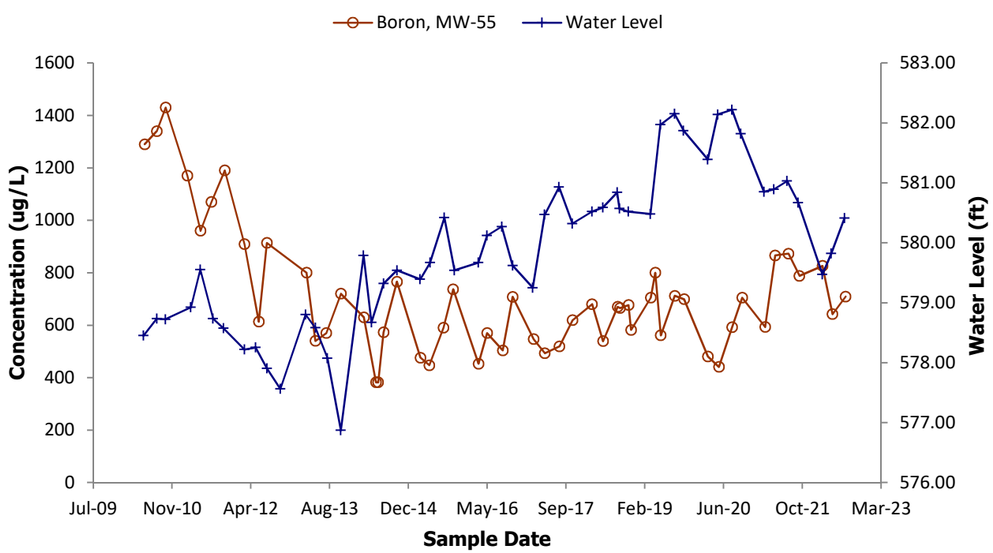


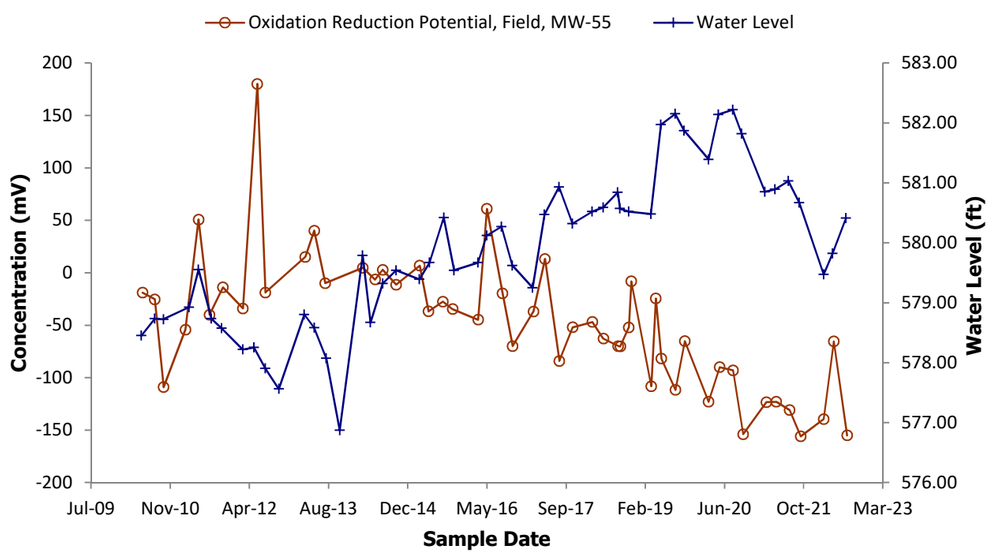
Note 1: Dissolved oxygen was not collected in 2022Q2 due to an issue with the DO sensor.

Figure G2: Time Series Plots for MW-55 ASD



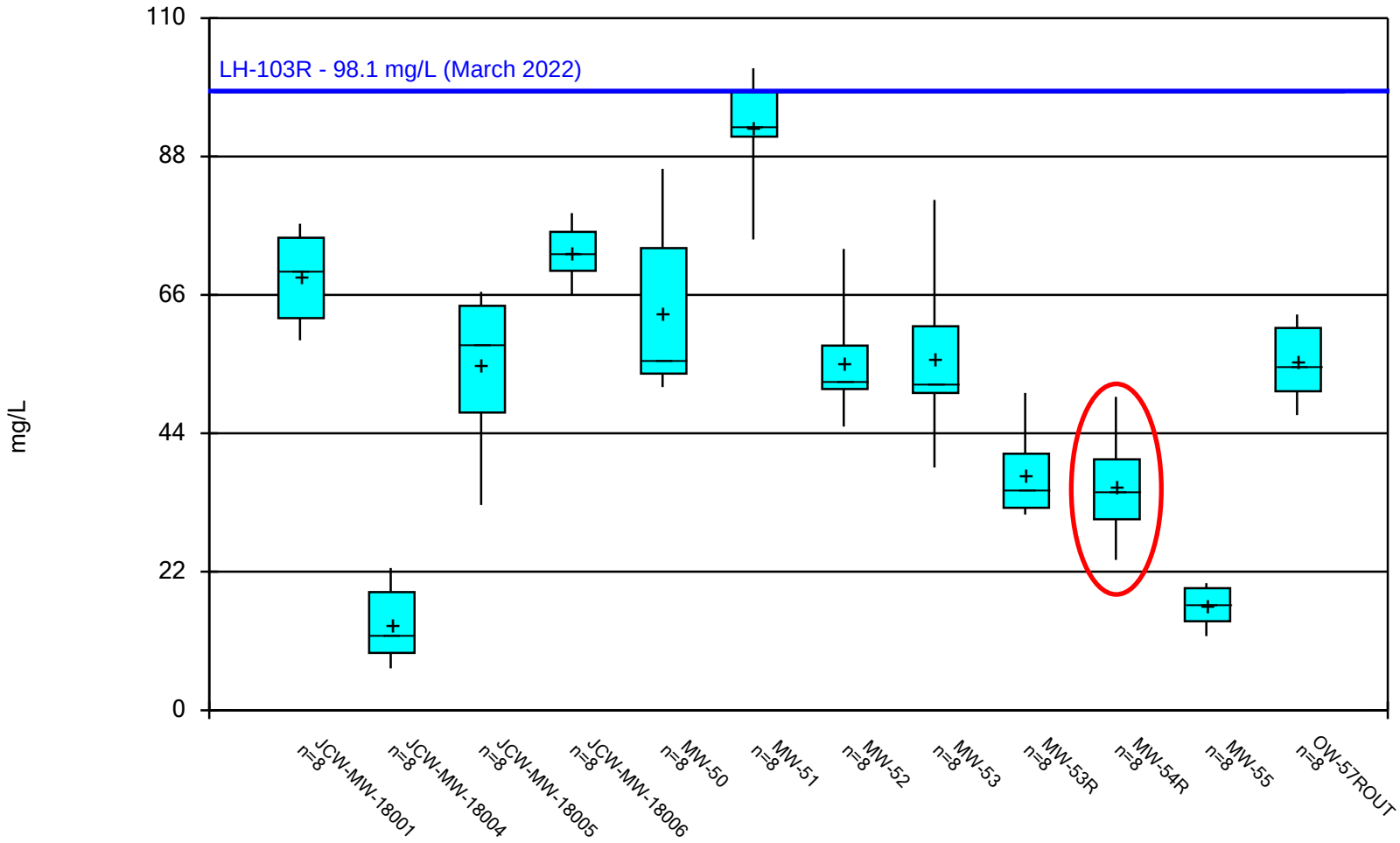






Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride



Box & Whiskers Plot Analysis Run 10/13/2022 10:46 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q3

2022 Semiannual Groundwater Monitoring Report and Fourth Quarter 2022 Hydrogeological Monitoring Report

JC Weadock Solid Waste Disposal Area

Essexville, Michigan

January 2023

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

TABLE OF CONTENTS

1.0 Introduction 1

1.1 Statement of Adherence to Approved Hydrogeological Monitoring Plan 1
1.2 Program Summary 1
1.3 Site Overview 3
1.4 Geology/Hydrogeology 3

2.0 Leachate Monitoring 5

3.0 Groundwater Monitoring 6

3.1 Monitoring Well Network 6
3.2 October 2022 Monitoring Event 7
3.2.1 Data Quality Review 8
3.3 Groundwater Flow Rate and Direction 8
3.4 Groundwater Analytical Data and Relevant Screening Criteria 9
3.4.1 Detection Monitoring 10
3.4.2 Assessment Monitoring Data Evaluation 11
3.4.2.1 Establishing Groundwater Protection Standards 11
3.4.2.2 Data Comparison to Groundwater Protection Standards 11
3.4.3 GSI Compliance Monitoring 12
3.5 Alternate Source Demonstration 13
3.5.1 Monitoring Well JCW-MW-18001: Calcium, Sulfate, and TDS 13
3.5.2 Monitoring Well MW-55: Arsenic and Molybdenum 14
3.5.3 Chloride at MW-53R and MW-54R 15

4.0 Conclusions and Recommendations 16

5.0 References 17

TABLES

Table 1 Summary of Groundwater Elevation Data
Table 2 Summary of Field Parameters
Table 3 Summary of Groundwater Sampling Results (Analytical): DE Karn & JC Weadock Background
Table 4 Summary of Groundwater Sampling Results (Analytical): JC Weadock Solid Waste Disposal Area
Table 5 Summary of Confidence Interval Evaluation: October 2022
Table 6 EGLE Exceedance Summary Table
Table 7 Leachate Headwell Results

FIGURES

Figure 1 Site Location Map
Figure 2 Site Map
Figure 3 Potentiometric Surface Map – October 2022

APPENDICES

Appendix A Static Water Level Evaluation
Appendix B Data Quality Review
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 and 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 Fourth Quarter 2022 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 2022 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, is 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 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-103R[1] and LH-104. This program was implemented to determine constituents in the leachate as measured under actual conditions in the field and to assess which constituents have the potential to exceed applicable criteria at the compliance well locations.

Field Leachate data for the leachate headwells (2020 through 2022) are shown in Table 7. In 2021, leachate headwell LH-103 was damaged, therefore, a sample could not be collected. Leachate headwell LH-103 was replaced with LH-03R in March 2022 (Figures 2 and 3). The location of LH-103R was selected to provide representative field leachate concentrations with considerations for accessibility during current and future landfill construction activities. Field Leachate data was collected from LH-103R in the first and fourth quarters of 2022.

Field leachate data collected from LH-103R and LH-104 in 2022 are generally consistent with data collected in previous years. The concentration of low-level mercury from the first quarter sample in LH-103R was above the GSI criterion of 1.3 nanograms per liter, however the results from the fourth quarter samples were below the GSI criterion in both LH-104 and LH-103R. Concentrations of mercury in the leachate headwells remain well below 200 ng/L (0.2 ug/L), which is the quantification level allowed per EGLE Policy 09-014 dated June 20, 2012. Mercury analysis occurs quarterly at the porewater monitoring compliance well locations and mercury has not been detected above 200 ng/L; therefore, the result in LH-103R is considered a *de minimis* condition pursuant to Section 20120e of Part 201.

[1] Leachate headwell LH-103 was decommissioned in March 2022 due to damage noted in Q4 2021. LH-103R was installed in March 2022. Well decommissioning and installation records were provided as Appendix H of the *First Quarter 2022 Hydrogeological Monitoring Report* (TRC, 2022).

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 and 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 2022 Monitoring Event

In accordance with the Weadock Landfill HMP, TRC conducted the fourth quarter 2022 monitoring event for the Weadock Landfill by collecting water levels on October 3 and collecting groundwater samples on October 4 through 11, 2022. 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 Environment Testing in St Louis Missouri. 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	Radium 226/228

Samples were also analyzed for additional constituents including magnesium, sodium, potassium, and bicarbonate, carbonate, and total alkalinity. Analytical results from the fourth quarter 2022 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 three field blank, two equipment blank, one trip blank, five field duplicates (JCW-MW-18006, LH-103R, LH-104, MW-15008, and MW-50), and

two field matrix spike/matrix spike duplicate samples collected at LH-103R and 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 laboratory 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 3.

Groundwater elevations measured at the Site in October 2022 are generally within the range of 578 to 590 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-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 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. 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. 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 A2 of Appendix A.

3.4 Groundwater Analytical Data and Relevant Screening Criteria

Groundwater analytical data are evaluated in accordance with the Weadock Landfill HMP 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 (Section 3.4.1 Detection Monitoring and Section 3.4.2 Assessment Monitoring). 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 3.4.3 below; however, analytical results and data trends in groundwater collected from the perimeter dike wells are evaluated to identify potential GSI compliance issues. Data are evaluated by using a combination of screening against relevant criteria, as well as utilizing statistical analyses.

Analytical results from the fourth quarter 2022 monitoring event are included in the attached laboratory report (Appendix E). Groundwater analytical data from the fourth quarter 2022 monitoring event are summarized in Table 3 (background monitoring wells) and Table 4 (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 2.

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 3.4.3 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 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 3.3, demonstrates that the slurry wall is performing as designed.

In addition to the comparison of analytical data to relevant screening criteria (Table 4), 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.

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:

- The previously observed increasing trend for boron at MW-54R has continued in Q4 2022.
- The increasing trend initially observed for calcium at JCW-MW-18001 in Q3 2022 was confirmed in the Q4 2022.
- The increasing trend initially observed for chloride at MW-53R in Q3 2022 was confirmed in the Q4 2022.
- The previously confirmed increasing trend for chloride at MW-54R has continued to be observed in Q4 2022.
- A new, unconfirmed increasing trend for iron was observed at MW-52 in Q4 2022.
- The previously confirmed increasing trend for sulfate at JCW-MW-18001 has continued to be observed in Q4 2022. Sulfate concentrations remain below the generic final acute value (FAV).
- The previously confirmed increasing trend for TDS at JCW-MW-18001 has continued to be observed in Q4 2022.

Although increasing trends for detection monitoring constituents were observed, individual constituent trends provide a *potential indication* that there may be a release coming from the monitored unit. When these indicator trends are evaluated with other co-monitored conditions and parameters at the Weadock Landfill, the increasing trends for detection monitoring constituents do not appear to be a result of a new release from operation of the landfill. The potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill. Several of these newly observed trends, such as those observed for calcium, chloride, sulfate, and TDS, are likely a result of localized geochemical changes influenced by changes in lake levels rather than a change in flux from the landfill and will continue to be evaluated. The increasing trends of calcium, sulfate, and TDS in JCW-MW-18001 and chloride in MW-53R and MW-54R are attributed to localized changes in

geochemistry proximal to each well, rather than a change in flux from the landfill, as discussed further in Section 3.5.

Consumers is further evaluating possible causes of the increasing boron concentrations at several porewater compliance monitoring wells. Previous studies (NRT, 2005) documented boron at significantly elevated concentrations at the Karn-Weadock Power Generating Complex. Boron was also identified at SSI background levels in the 2017 *Annual Groundwater Monitoring Report – JC Weadock Power Plant, Landfill CCR Unit* (TRC, 2018) and was one of the detection monitoring constituents that triggered the initiation of the assessment monitoring program. Statistical significance above the GWPS established for boron has been noted for these monitoring wells per the Part 115 groundwater monitoring program requirements, as discussed in Section 3.4.2.2. Continued monitoring and assessment for potential future actions is warranted at this time; however, observed concentrations of boron in each of the monitoring wells are less than the relevant Part 115 compliance standard - the GSI pathway standard (Section 3.4.3).

3.4.2 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 D (*Assessment Monitoring and GSI Statistical Evaluation of the October 2022 Sampling Event*). A summary of the confidence interval evaluation is provided in Table 5.

3.4.2.1 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.

3.4.2.2 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 (Part 115): The fourth quarter 2022 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, MW-55, and OW-57R OUT and calcium at JCW-MW-18001 were present at statistically significant levels above the GWPS. Boron was one of the

Appendix III SSIs that originally triggered assessment monitoring. Boron concentrations have been consistently above the GWPS but less than the chronic-based mixing zone-based GSI criterion of 44,000 ug/L within the Weadock Landfill monitoring well network since monitoring under the February 2021 HMP began. Calcium at JCW-MW-18001 was a confirmed GWPS exceedance in fourth quarter 2022 resulting from increases in calcium concentration since first quarter 2021. Consumers is asserting an ASD for the increases in calcium at JCW-MW-18001, as detailed in Section 3.5.1.

The GWPSs for boron and calcium were established based on background concentrations observed in wells unaffected by the Weadock Landfill or Weadock Bottom Ash Pond. Detection monitoring (i.e., Appendix III) constituents 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 below relevant GSI criteria, as discussed in Section 3.4.3. There are no health-based or GSI criteria specific to calcium.

Assessment Monitoring Constituents (Part 115 and Federal CCR): Based on the fourth quarter 2022 statistical evaluation, there are no assessment monitoring constituents present at statistically significant levels above the GWPSs 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 6.87 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.

3.4.3 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 2022 data from the GSI monitoring points are tabulated in Table 4. Consistent with the Weadock Landfill HMP, confidence limits 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 the October 2022 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.

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, MW-55, 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).

Arsenic and Molybdenum at MW-55: Concentrations of arsenic and molybdenum at MW-55 have at times exceeded the GSI criteria on a direct comparison to the fixed limit basis (Appendix D: Table 2). The October 2022 sampling event results show that the arsenic concentration is above applicable GSI criteria while the molybdenum concentration is below applicable GSI criteria. The statistical evaluation presented in Appendix D shows that the lower confidence limits of the arsenic and molybdenum data over the past 8 events do not exceed 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 (Appendix A).

3.5 Alternate Source Demonstration

At this time, Consumers Energy is continuing to assert an Alternate Source Demonstration (ASD), for the following, as detailed in the 2022 Semiannual Groundwater Monitoring Report and Second Quarter 2022 Hydrogeological Monitoring Report (TRC, July 2022):

- Sulfate and TDS in monitoring well JCW-MW-18001;
- Arsenic and molybdenum in monitoring well MW-55; and
- Chloride in monitoring well MW-54R.

The ASD has been updated this quarter to include:

- Calcium at JCW-MW-18001; and
- Chloride in monitoring well MW-53.

3.5.1 Monitoring Well JCW-MW-18001: Calcium, Sulfate, and TDS

Although confirmed increasing trends were observed at JCW-MW-18001 for calcium, sulfate, and TDS (through Q4 2022), these trends are not indicative of a new release from the landfill. Calcium and sulfate are two of several constituents that contribute to the overall TDS concentration and increasing calcium and sulfate concentrations would result in an increase in TDS as well. Increases of calcium, sulfate, and TDS 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 (ASD) for these constituents. The following lines of evidence

as well as additional time series charts included in Appendix G support this ASD:

- The potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill (Appendix A).
- Concentration data also support that the slurry wall is effective in reducing the flux of groundwater from the landfill, based on the following observations (Appendix G1):
  - JCW-MW-18001 was installed after the 1,600 linear foot gap in the landfill perimeter slurry wall was closed, as discussed in Section 1.2. Prior to the slurry wall expansion in July 2018, monitoring well JCW-MW-15023 was located within the gap of the slurry wall and was sampled between December 2015 and May 2018 as a part of the original Federal CCR program monitoring well network. The groundwater quality data collected from JCW-MW-15023 shows that groundwater in contact with CCR managed within the landfill was high in arsenic, and low in sulfate, calcium, and TDS (Appendix G1).
  - To accommodate the July 2018 slurry wall expansion, JCW-MW-15023 was decommissioned. Once slurry wall construction was completed, JCW-MW-18001 was installed within 10-ft of the location of the former JCW-MW-15023 well, on the discharge channel side of the slurry wall. Additionally, an observation well, JCW-OW-18001, was installed on the landfill side of the slurry wall to monitor water levels to assess the effectiveness of the hydraulic control. Both JCW-MW-18001 (outside) and JCW-OW-18001 (inside) have been sampled recently to assess concentration trends.
    - Concentrations of arsenic are much higher inside of the slurry wall, within the landfill, while arsenic concentration remain low on the outside of the landfill.
    - Concentrations of sulfate, calcium, and TDS are much lower on the inside of the slurry wall and are higher outside of the slurry wall.
- These combined lines of evidence support that increasing concentrations of calcium, sulfate, and TDS are not a result of a change in flux from the landfill and instead are a result of changing groundwater conditions on the outside of the slurry wall.

3.5.2 Monitoring Well MW-55: Arsenic and Molybdenum

Additionally, Consumers Energy is continuing to assert an Alternate Source Demonstration (ASD) for arsenic and molybdenum at MW-55 indicating elevated levels of constituents at that location are not related to materials management of the Weadock Landfill (*2021 Annual Groundwater Monitoring and Corrective Action Report*; TRC, January 2022). 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, concentrations of arsenic and molybdenum are generally much lower, and concentrations of boron are much higher within the landfill (LH-104; Table 7) than outside of the landfill at MW-55 (Table 4).

- **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 locations sampled as a part of this ASD. Additionally, boron concentrations at MW-55 have decreased since 2010 and have been relatively stable, as evidenced by the time series plots in Figure G2. Stable or decreasing concentrations of boron is further supports 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 observed at MW-55, as shown in Appendices A and G, increased over 4-ft since between 2010 and 2020. The oxidation-reduction potential (ORP) at MW-55 has generally decreased (i.e., is more reducing) since 2010. 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 increased solubility of arsenic and molybdenum.

3.5.3 Chloride at MW-53R and MW-54R

An observation of increasing trends of chloride at MW-53R and MW-54R without other corroborating lines of evidence is not indicative of a release from the Landfill. The potentiometric analysis demonstrates that the slurry wall is effective in reducing the flux of groundwater from the landfill. Changes in chloride at MW-53R and MW-54R are likely a result of localized geochemical changes influenced by changes in lake levels. Additionally, chloride was identified as naturally elevated in the Phase II Discharge Evaluation (NRT, September 2005) and was eliminated as a constituent of concern when the mixing zone was first authorized based on the data supporting that conclusion. The box and whiskers plot in Appendix G further illustrates that the chloride concentrations observed at MW-53R and MW-54R are within the range of concentrations observed regionally within other wells in the compliance well network and well below the chloride concentration observed at leachate headwell LH-103R in October 2022.

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 2022 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 *2021 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 2022 data in accordance with the Weadock Landfill HMP demonstrate that boron and calcium are present at concentrations above the GWPSs. 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 are below relevant GSI criteria, as discussed in Section 3.4.3. There is no GSI criteria specific to calcium.

The statistical evaluation in fourth quarter 2022 found that no 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 2023.

5.0 References

AECOM. November 6, 2009. Potential Failure Mode Analysis (PFMA) Report. JC Weadock Electric Generation Facility Ash Dike Risk Assessment Essexville, Michigan. Prepared for Consumers Energy Company

Consumers Energy Company. 2015. *Hydrogeological Monitoring Plan Rev. 2: JC Weadock Solid Waste Disposal Area.* June 9.

Consumers Energy. 2019. *JC Weadock Landfill Response Action Plan Submittal, JC Weadock Generating Facility (WDS# 395457), Essexville, Michigan.* March 15.

Golder Associates, Inc. 2018. *J.C. Weadock Generating Facility, Slurry Wall Vent Closure Construction Documentation Report*. October 30.

Michigan Department of Natural Resources (MDNR). 1986. *Determination of Permit Exemption No. GWE-0005.* August 25.

Michigan Department of Environmental Quality (MDEQ). 2015. *Implementation of a Mixing Zone Request Consumers Energy DE Karn/JC Weadock Complex.* December 23.

MDEQ. 2018. *Slurry Wall Construction Certification; JC Weadock Landfill, Bay County, Michigan, Waste Data System Number 395457.* December 19.

Michigan Department of Environment, Great Lakes, and Energy (EGLE). 2020. *Closure Certification, Consumers Weadock Complex (Weadock) Bottom Ash Pond, Bay County, Waste Data System No. 395457*. November 30. [Letter]

Natural Resource Technology. 2005. Phase II Groundwater Discharge Evaluation, Final Report.

Natural Resource Technology. 2010. Revised Hydrogeological Monitoring Plan – JC Weadock Solid Waste Disposal Area. TRC. 2018. Annual Groundwater Monitoring Report – JC Weadock Power Plant, Landfill CCR Unit. Prepared for Consumers Energy Company. January.

TRC. 2018. *Annual Groundwater Monitoring Report – JC Weadock Power Plant, Landfill CCR Unit*. Prepared for Consumers Energy Company.

TRC. 2019a. *2018 Annual Groundwater Monitoring Report – JC Weadock Power Plant Landfill CCR Unit. Prepared for Consumers Energy Company.* January.

TRC. 2019b. *Assessment of Corrective Measures – JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residual Units.* Prepared for Consumers Energy Company. September.

TRC. 2020. *2019 Annual Groundwater Monitoring Report – JC Weadock Power Plant Landfill CCR Unit.* Prepared for Consumers Energy Company. January.

TRC. 2021. *Landfill Hydrogeological Monitoring Plan – JC Weadock Power Plant, Essexville, Michigan.* Prepared for Consumers Energy Company. February.

TRC. 2021. *First Quarter 2021 Hydrogeological Monitoring Report – JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* Prepared for Consumers Energy Company. April.

TRC. 2022. *2021 Annual Groundwater Monitoring and Corrective Action Report – JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residuals (CCR) Units.* Prepared for Consumers Energy Company. January.

TRC. 2022. *2022 Semiannual Groundwater Monitoring Report and Second Quarter 2022 Hydrogeological Monitoring Report – JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* Prepared for Consumers Energy Company. July.

USEPA. 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance. Office of Conservation and Recovery. EPA 530/R-09-007.*

USEPA. 2015. *40 CFR Parts 257 and 261. Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule. 80 Federal Register 74 (April 17, 2015), pp. 21301-21501 (80 FR 21301*). April

USEPA. 2018. 40 CFR Part 257. Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; Amendments to the National Minimum Criteria (Phase One, Part One); Final Rule. 83 Federal Register 146 (July 30, 2018), pp. 36435-36456 (83 FR 36435). July.

Tables

Table 1
Summary of Groundwater Elevation Data
JC Weadock Solid Waste Disposal Area – Hydrogeological Monitoring Program
Essexville, Michigan

Well Location	TOC Elevation (ft)	Geologic Unit of Screen Interval	Screen Interval Elevation (ft)			October 3, 2022	
						Depth to Water (ft BTOC)	Groundwater Elevation (ft)
Background Monitoring Wells							
MW-15002	587.71	Sand	580.9	to	570.9	7.06	580.65
MW-15008	585.36	Sand with clay	578.7	to	568.7	4.75	578.61
MW-15016	586.49	Sand	581.2	to	578.2	4.84	581.63
MW-15019	586.17	Sand and Sand/Clay	579.5	to	569.5	5.68	580.49
Bottom Ash Pond: Downgradient Monitoring Wells							
JCW-MW-15007	587.40	Sand	582.7	to	579.2	4.37	583.03
JCW-MW-15009	589.64	Sand	581.9	to	576.9	8.59	581.05
JCW-MW-15010	597.76	Sand	579.7	to	578.2	17.35	580.41
JCW-MW-15028	589.64	Sand	567.7	to	564.7	8.32	581.32
Landfill: Downgradient Monitoring Wells (outside slurry wall)							
JCW-MW-18001	596.73	Sand and Sandy Clay	578.3	to	573.3	16.80	579.93
JCW-MW-18004	593.04	Sandy Clay	583.9	to	578.9	12.11	580.93
JCW-MW-18005	590.89	Sand and Sandy Clay	580.0	to	575.0	9.15	581.74
JCW-MW-18006	600.72	Fly Ash and Sandy Clay	582.8	to	577.8	15.05	585.67
MW-50	593.36	Sand	577.8	to	574.8	13.37	579.99
MW-51	594.29	Sand and Clay	577.8	to	574.8	14.10	580.19
MW-52	594.90	Sand	579.3	to	576.3	14.75	580.15
MW-53	593.68	Sand and Clay	579.1	to	576.1	13.85	579.83
MW-53R	594.25	Sand and Clay	580.4	to	575.4	14.30	579.95
MW-54R	593.89	Clay and Sand	581.3	to	576.3	14.25	579.64
MW-55	593.82	Sand	581.5	to	578.5	13.65	580.17
OW-57ROUT	591.00	Sandy Clay	577.0	to	572.0	10.00	581.00
Landfill: Static Water Level Only (inside slurry wall)							
JCW-OW-18001	595.84	Fly Ash and Sand	581.1	to	576.1	8.85	586.99
JCW-OW-18002	593.63	Sand	578.9	to	573.9	10.53	583.10
JCW-OW-18003	593.99	Sand and Clay	580.5	to	575.5	8.20	585.79
JCW-OW-18004	594.19	Sandy Clay	584.6	to	579.6	7.14	587.05
JCW-OW-18006	600.61	Fly Ash and Clay with Sand	582.9	to	577.9	11.00	589.61
MW-20	592.73	NR	~581.1	to	~578.1	7.31	585.42
OW-51	593.62	Clay and Sand	578.9	to	575.9	9.74	583.88
OW-53	593.64	Clay and Sand	579.0	to	576.0	7.15	586.49
OW-54	594.10	Clay and Sand	580.0	to	577.0	6.78	587.32
OW-55	594.67	Clay (or Sand and Clay)	580.9	to	577.9	7.63	587.04
OW-56R	592.01	Ash and Sand	577.5	to	572.5	5.83	586.18
OW-57R IN	590.86	Sandy Clay	575.7	to	570.7	6.00	584.86
OW-61	602.15	Ash and Sand	588.0	to	585.0	11.78	590.37
Landfill: Leachate Headwells							
LH-103R	612.70	Fly Ash	30.2	to	33.2	24.15	588.55
LH-104	596.56	Fly Ash	8.0	to	11.0	11.13	585.43

Notes:

Survey data from: Rowe Professional Services Company (Nov. 2015) and Consumers Energy Company drawings: SG-21733, Sheet 1, Rev. G (Karn, 11/27/18); and SG-21733, Sheet 2, Rev. C (Weadock, 11/27/18).

Elevation in feet relative to North American Vertical Datum 1988 (NAVD 88).

TOC: Top of well casing.

ft BTOC: Feet below top of well casing.

NR: Not Recorded

Table 2
Summary of Field Parameters
JC Weadock Solid Waste Disposal Area – Hydrogeological 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	10/5/2022	0.90	-66.7	6.7	4,577	14.9	2.0
MW-15008	10/4/2022	0.80	-93.0	6.7	1,474	15.6	1.6
MW-15016	10/5/2022	0.90	12.1	6.9	1,817	15.7	1.7
MW-15019	10/4/2022	0.80	-88.2	6.8	1,961	15.8	0.9
Weadock Landfill							
JCW-MW-18001	10/10/2022	0.23	-81.7	6.8	3,096	13.8	2.5
JCW-MW-18004	10/10/2022	4.60	86.5	6.8	1,456	16.1	4.7
JCW-MW-18005	10/11/2022	0.32	-49.5	6.8	1,324	12.7	3.8
JCW-MW-18006	10/11/2022	0.22	-86.3	6.9	1,248	9.4	2.4
MW-50	10/10/2022	0.16	-116.0	7.3	1,541	13.5	2.1
MW-51	10/10/2022	0.16	-109.0	7.2	1,916	13.3	2.8
MW-52	10/10/2022	0.24	-65.3	6.9	1,855	13.1	2.5
MW-53	10/10/2022	0.18	-110.0	7.3	1,155	14.0	2.6
MW-53R	10/10/2022	0.22	-18.9	6.8	1,687	14.3	9.0
MW-54R	10/10/2022	0.26	-23.8	6.9	1,241	14.8	6.5
MW-55	10/10/2022	0.30	-126.9	7.0	1,309	15.7	6.2
OW-57ROUT	10/11/2022	0.40	76.5	6.9	1,249	11.4	4.3

Notes:
mg/L - Milligrams per Liter.
mV - Millivolts.
SU - Standard Units.
umhos/cm - Micromhos per centimeter.
°C - Degrees Celcius.
NTU - Nephelometric Turbidity Unit.

Table 3
Summary of Groundwater Sampling Results (Analytical)
DE Karn & JC Weadock Background – RCRA CCR Monitoring Program
Essexville, Michigan

					Sample Location:	**MW-15002**	**MW-15008**	**MW-15016**	**MW-15019**
					Sample Date:	10/5/2022	10/4/2022	10/5/2022	10/4/2022
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Background			
Appendix III[(1)]									
Boron	ug/L	NC	**500**	**500**	4,000	147	175	**690**	297
Calcium	mg/L	NC	NC	NC	500[EE]	214	113	289	139
Chloride	mg/L	**250****	**250**[E]	**250**[E]	**50**	**1,820**	**261**	**236**	**355**
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]	2.66	19.3	**639**	59.7
Total Dissolved Solids	mg/L	**500****	**500**[E]	**500**[E]	**500**	**4,210**	**901**	**1,760**	**1,190**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	6.7	6.7	6.9	6.8
Appendix IV[(1)]									
Antimony	ug/L	6	6.0	6.0	2.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	10	10	10	9	2	3	2
Barium	ug/L	2,000	2,000	2,000	1,200	600	70	115	308
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	2	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	16	21	91	12
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	6	< 5
Radium-226	pCi/L	NC	NC	NC	NC	0.850	0.265	< 0.158	0.478
Radium-228	pCi/L	NC	NC	NC	NC	2.69	1.62	1.56	2.11
Radium-226/228	pCi/L	5	NC	NC	NC	3.54	1.88	1.71	2.59
Selenium	ug/L	50	50	50	**5.0**	**36**	< 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]	**15,300**	**17,500**	**427**	**20,700**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	2	1	3	1
Nickel	ug/L	NC	100	100	120	7	4	12	5
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	**4.5**	62	27	**11**	**6**	2	3
Zinc	ug/L	5,000**	2,400	5,000[E]	260	< 10	< 10	11	< 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 Amendment - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) addtional detection monitoring constituent (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

BOLD value indicates an exceedance of one or more of the listed criteria.

RED value indicates an exceedance of the MCL.

All metals were analyzed as total unless otherwise specified.

Table 4
Summary of Groundwater Sampling Results (Analytical)
JC Weadock Solid Waste Disposal Area – Hydrogeological Monitoring Program
Essexville, Michigan

Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Chronic-Based Mixing Zone GSI Criteria^	Acute-Based Mixing Zone GSI Criteria^	Sample Location: JCW-MW-18001	JCW-MW-18004	JCW-MW-18005	JCW-MW-18006	MW-50	MW-51
								Sample Date: 10/10/2022	10/10/2022	10/11/2022	10/11/2022	10/10/2022	10/10/2022
								Downgradient	Downgradient/ GSI	Downgradient	Downgradient	Downgradient/ GSI	Downgradient/ GSI
Appendix III[(1)]													
Boron	ug/L	NC	**500**	**500**	**4,000**	44,000	69,000	**1,790**	343	**1,290**	**2,720**	**1,730**	**1,490**
Calcium	mg/L	NC	NC	NC	500[EE]	NC	NC	465	193	150	118	186	211
Chloride	mg/L	250**	250[E]	250[E]	**50**	NC	NC	**63.6**	11.4	**53.9**	**74.2**	47.7	**101**
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]**	**500[EE]**	NC	NC	**1,400**	**428**	160	21.6	**376**	**394**
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	NC	NC	**3,020**	**1,130**	**868**	**720**	**1,120**	**1,380**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	NC	NC	6.8	6.8	6.8	6.9	7.3	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**	**10**	**100**	680	< 1	< 1	5	**25**	3	**18**
Barium	ug/L	2,000	2,000	2,000	1,200	NC	NC	66	37	80	480	106	188
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	97	46	32	52	62	50
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	6	< 5
Radium-226	pCi/L	NC	NC	NC	NC	NC	NC	< 0.142	< 0.135	0.193	0.516	0.158	< 0.397
Radium-228	pCi/L	NC	NC	NC	NC	NC	NC	0.852	< 0.742	< 0.800	< 0.609	1.14	2.19
Radium-226/228	pCi/L	5	NC	NC	NC	NC	NC	0.893	< 0.742	< 0.800	0.999	1.30	2.51
Selenium	ug/L	50	50	50	5.0	55	120	1	1	2	1	2	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	**818**	< 20	**3,220**	**7,620**	**2,460**	**2,880**
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	NC	NC	3	2	< 1	< 1	1	1
Nickel	ug/L	NC	100	100	120	NC	NC	15	5	11	5	4	4
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:

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 Amendment - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) addtional detection monitoring constituent (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

BOLD value indicates an exceedance of one or more of the listed criteria.

RED value indicates an exceedance of the MCL.

All metals were analyzed as total unless otherwise specified.

Table 4
Summary of Groundwater Sampling Results (Analytical)
JC Weadock Solid Waste Disposal Area – Hydrogeological Monitoring Program
Essexville, Michigan

						MW-52	MW-53	MW-53R	MW-54R	MW-55	OW-57ROUT
						10/10/2022	10/10/2022	10/10/2022	10/10/2022	10/10/2022	10/11/2022
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI^	Downgradient/ GSI	Downgradient/ GSI	Downgradient/ GSI	Downgradient/ GSI	Downgradient/ GSI	Downgradient
Appendix III[(1)]											
Boron	ug/L	NC	**500**	**500**	**4,000**	**1,330**	**4,140**	**2,340**	**5,310**	**976**	**1,830**
Calcium	mg/L	NC	NC	NC	500[EE]	224	108	203	160	141	114
Chloride	mg/L	250**	250[E]	250[E]	**50**	40.4	**53**	39.2	47.4	12.5	47.6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**250****	**250[E]**	**250[E]**	**500[EE]**	**603**	126	250	70.9	108	86.8
Total Dissolved Solids	mg/L	**500****	**500[E]**	**500[E]**	**500**	**1,670**	**740**	**1,160**	**799**	**786**	**722**
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5[E]	6.5 - 8.5[E]	6.5 - 9.0	6.9	7.3	6.8	6.9	7.0	6.9
Appendix IV[(1)]											
Antimony	ug/L	6	6.0	6.0	2.0	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**10**	**10**	**10**	**10**	< 1	2	**20**	2	**126**	< 1
Barium	ug/L	2,000	2,000	2,000	1,200	122	285	118	123	223	75
Beryllium	ug/L	4	4.0	4.0	33	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	2.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	14	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	26	38	63	74	30	22
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	**73**	210	120	< 5	< 5	< 5	12	**91**	8
Radium-226	pCi/L	NC	NC	NC	NC	0.205	0.269	0.239	0.208	0.365	0.199
Radium-228	pCi/L	NC	NC	NC	NC	< 0.694	1.15	0.967	1.31	0.966	< 0.711
Radium-226/228	pCi/L	5	NC	NC	NC	0.805	1.42	1.21	1.52	1.33	0.870
Selenium	ug/L	50	50	50	5.0	2	1	2	2	< 1	2
Thallium	ug/L	2	2.0	2.0	2.0	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115[(2)]											
Iron	ug/L	**300****	**300[E]**	**300[E]**	500,000[EE]	**6,340**	**1,140**	**702**	**1,090**	**22,100**	42
Copper	ug/L	1,000**	1,000[E]	1,000[E]	20	2	< 1	1	1	1	2
Nickel	ug/L	NC	100	100	120	3	2	3	< 2	4	16
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	4.5	62	27	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000[E]	260	< 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 Michiga Part 201 criteria tables. Chromium GSI criterion based on hexavalent chromium per footnote {H}. GSI criterion is protective for surface water used as a drinking water source as described in footnote {X}. GSI criterion for chloride is 50 mg/L when the discharge is to the Great Lakes or connecting waters per footnote {FF}

- If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway per Michigan Part 201 and MDEQ policy and procedure 09-014 dated June 20, 2012.

[E] - Criterion is the aesthetic drinking water value per footnote {E}.

[EE] - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

(1) 40 CFR Part 257 Appendix III Detection Monitoring Constituents and Appendix IV Assessment Monitoring Constituents.

(2) Per Michigan Part 115 Amendment - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) addtional detection monitoring constituent (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

BOLD value indicates an exceedance of one or more of the listed criteria.

RED value indicates an exceedance of the MCL.

All metals were analyzed as total unless otherwise specified.

Table 5
Summary of Confidence Interval Evaluation: October 2022
JC Weadock Solid Waste Disposal Area – Hydrogeological Monitoring Program
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-18005		JCW-MW-18006	
			LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL
Boron[(1)]	ug/L	560	**1,300**	1,700	**1,000**	1,400	**1,100**	1,300	**3,800**	4,200	**1,500**	2,200	**4,200**	6,300	**650**	920	**1,600**	2,000	**1,400**	1,700	**940**	1,200	**2,400**	3,000
Calcium	mg/L	280	54	290	220	310	--	--	--	--	--	--	--	--	--	--	--	--	**300**	430	150	290	--	--
Sulfate	mg/L	780	240	880	--	--	--	--	--	--	--	--	--	--	--	--	--	--	720	1,700	--	--	--	--
Arsenic	ug/L	21	--	--	--	--	--	--	--	--	11	24	--	--	--[(2)]	--[(2)]	--	--	1.0	38	--	--	21	31
Molybdenum	ug/L	73	--	--	--	--	--	--	--	--	--	--	--	--	--[(2)]	--[(2)]	--	--	--	--	--	--	--	--
Iron	ug/L	28,000	--	--	--	--	--	--	--	--	--	--	--	--	16,000	36,000	--	--	--	--	--	--	--	--
Vanadium	ug/L	6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.0	12	--	--	--	--

GSI Statistical Evaluation

Constituent	Units	GSI	MW-55	
			LCL	UCL
Arsenic	ug/L	100	72	190
Molybdenum	ug/L	120	74	180

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) Boron concentrations were confirmed as a statistically significant increase (SSI) over background levels and triggered assessment monitoring (2017 Annual Groundwater Monitoring Report – JC Weadock Power Plant, Landfill CCR Unit, TRC, 2018).

(2) 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, January 2022); therefore, confidence intervals were not calculated for comparison to GWPSs.

Table 6
EGLE Exceedance Summary Table
JC Weadock Solid Waste Disposal Area – Hydrogeological Monitoring Program
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. 2022 (**bold** >201)	3 Qtr. 2022 (**bold** >201)	2 Qtr. 2022 (**bold** >201)	1 Qtr. 2022 (**bold** >201)

No Exceedances at Compliance Locations

Table 7
Leachate Headwell Results
Fourth Quarter 2022 Quarterly Report
JC Weadock Solid Waste Disposal Area, Essexville, Michigan

Parameter	Reporting Limit	Units	2022Q4 Field Leachate		2022Q1 Field Leachate	2021 Field Leachate	2020 Field Leachate	
			LH103R	LH104	LH103R	LH104	LH103	LH104
Indicator Parameters								
Alkalinity, Bicarbonate	10,000	ug/L	1,100,000	547,000	1,200,000	351,000	202,000	886,000
Dissolved Oxygen	0.1	mg/L	0.10	1.95	1.16	0.49	1.35	1.32
O.R.P.	1	mV	-114	-86	-121.6	-119.6	-137.1	-88.8
pH	0.05	S.U.	6.75	7.35	6.95	7.47	7.52	7.39
Specific Conductance	1	uS/cm	2,095	1,489	2,498	1,715	805	2,000
Metals								
Antimony	1	ug/L	<1	1	<1	2	<1	<1
Arsenic	1	ug/L	41	16	87	26	394	23
Barium	5	ug/L	369	225	589	266	334	474
Beryllium	1	ug/L	<1	<1	<1	<1	<1	<1
Boron	20	ug/L	8,040	10,800	8,240	11,200	5,370	13,900
Cadmium	0.2	ug/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium	1	ug/L	<1	<1	1	<1	<1	<1
Cobalt	15	ug/L	<6	<6	<6	<6	<6	<6
Copper	1	ug/L	<1	<1	2	1	<1	1
Iron	20	ug/L	12,300	196	17,800	285	5,220	414
Lead	1	ug/L	<1	<1	<1	<1	<1	<1
Lithium	10	ug/L	139	45	188	58	84	61
Mercury (low-level)	0.5	ng/L	<0.5	0.54	2.25	0.58	0.86	0.69
Molybdenum	5	ug/L	<5	67	12	40	132	21
Nickel	2	ug/L	7	6	18	8	<2	6
Selenium	1	ug/L	<1	<1	21	5	2	2
Silver	0.2	ug/L	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Sodium	1,000	ug/L	111,000	77,900	156,000	80,500	72,300	59,500
Sulfate	1,000	ug/L	36,400	202,000	94,800	178,000	<1,000	62,900
Thallium	2	ug/L	<2	<2	<2	<2	<2	<2
Vanadium	2	ug/L	4	16	5	28	<2	11
Zinc	10	ug/L	<10	<10	<10	<10	<10	<10

Notes:

mg/L = milligrams per liter

ug/L = micrograms per liter

ng/L = nanograms per liter

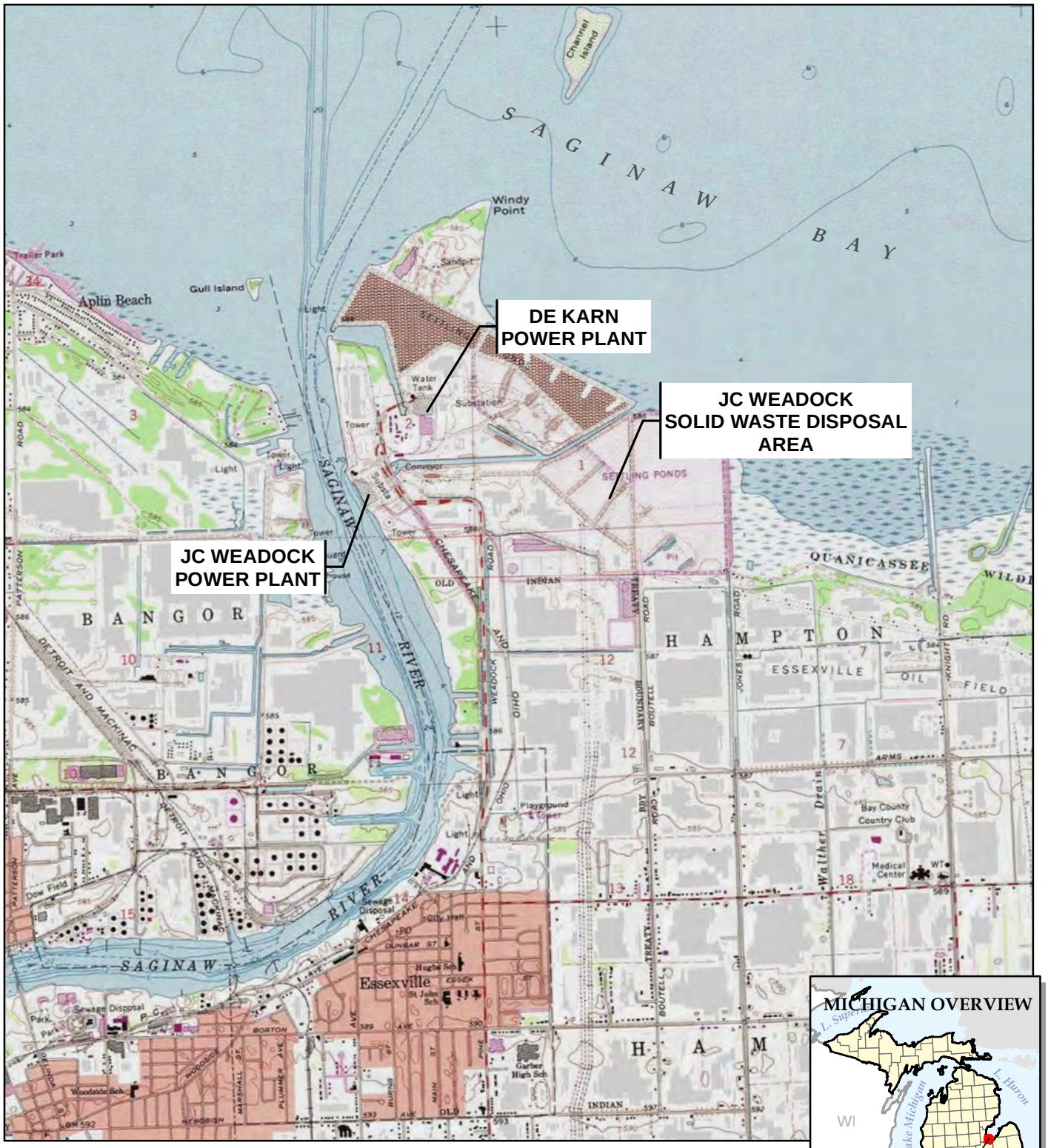
mV = Millivolts

S.U. = standard units

uS/cm = microSiemens per centimeter

O.R.P. = Oxidation-Reduction Potential

Figures



BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

N

1 " = 3,000 '
1:36,000

0 3,000 6,000 FEET

TRC

1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080

TRC - GIS

PROJECT:

CONSUMERS ENERGY COMPANY
DE KARN AND JC WEADOCK POWER PLANTS
ESSEXVILLE, MICHIGAN

TITLE:

SITE LOCATION MAP

DRAWN BY:	B. TRACY
CHECKED BY:	J. KRENZ
APPROVED BY:	D. LITZ
DATE:	JANUARY 2023
PROJ. NO.:	464096
FILE:	464096-001-001.mxd

FIGURE 1

S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_269767\3_WEADOCK\2022_MXDs\Q3_2022_OCTOBER\464096-001-001.mxd -- Saved By: BTRACY on 11/21/2022, 09:56:51 AM

LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING WELL
- JCW LANDFILL HMP WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- LEACHATE HEADWELL
- DECOMMISSIONED WELL
- SLURRY WALL (APPROXIMATE)

NOTES

1. BASE MAP IMAGERY FROM NEARMAP, (5/4/2022).
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).

1:7,200
1" = 600'

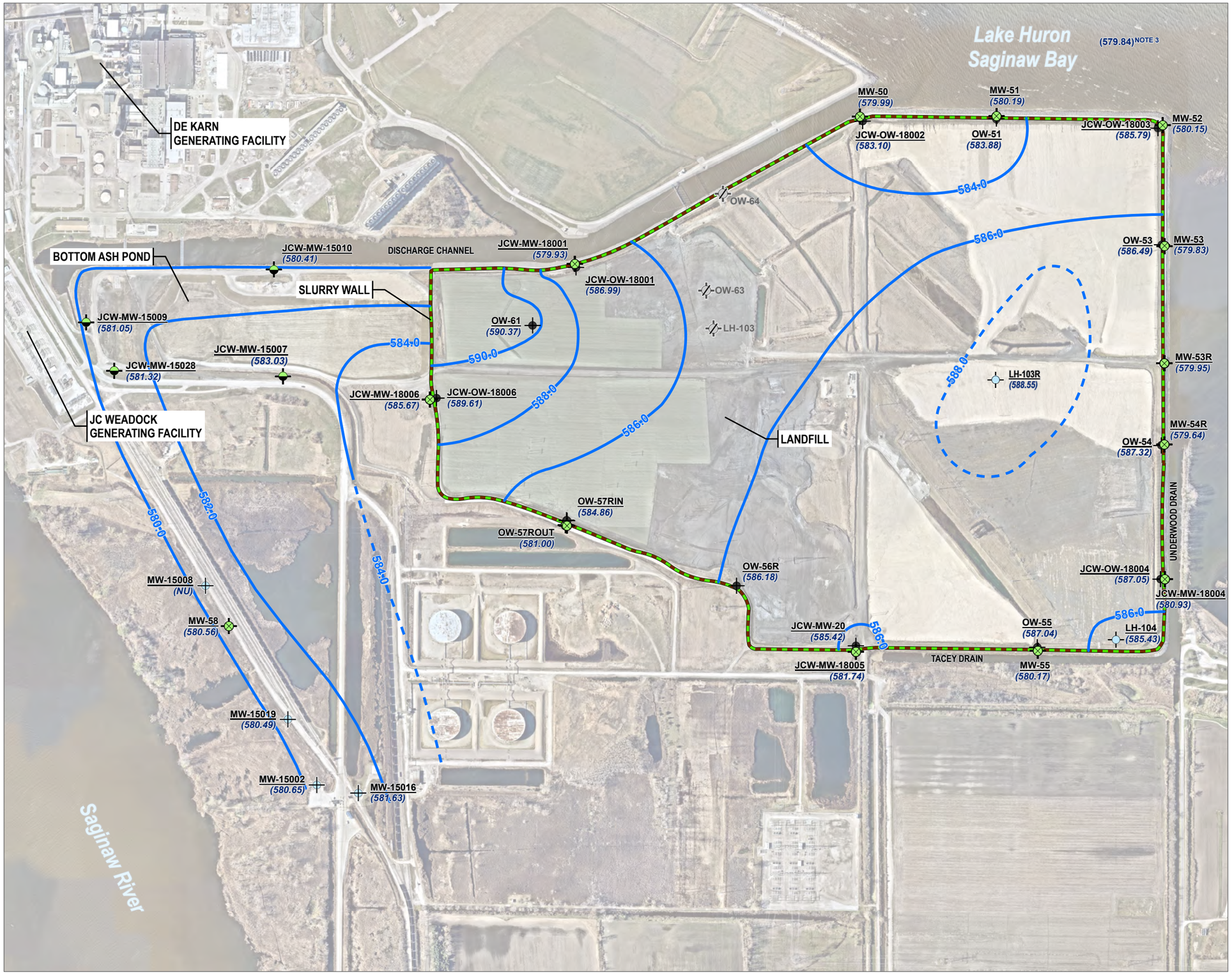
0 600 1,200 FEET

PROJECT:	CONSUMERS ENERGY COMPANY JC WEADOCK POWER PLANT ESSEXVILLE, MICHIGAN
TITLE:	SITE MAP
DRAWN BY: B. TRACY	PROJ. NO.: 464096
CHECKED BY: J. KRENZ	FIGURE 2
APPROVED BY: D. LITZ	
DATE: JANUARY 2023	

TRC
1540 EISENHOWER PLACE
ANN ARBOR, MI 48108-3284
PHONE: 734.971.7080

FILE: 464096_Weadock.aprx

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl; Map Rotation: 0
Saved By: BTRACY on 1/10/2023 - 8:34:54 PM; File Path: T:\PROJECT\Consumers_Energy\464096_Weadock\2-APRX\464096_Weadock.aprx; Layout Name: 464096-001-002



LEGEND

- BACKGROUND MONITORING WELL
- JCW BOTTOM ASH POND MONITORING WELL
- JCW LANDFILL HMP WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- LEACHATE HEADWELL
- DECOMMISSIONED WELL
- SLURRY WALL (APPROXIMATE)
- GROUNDWATER ELEVATION CONTOUR (2' INTERVAL, DASHED WHERE INFERRED)
- (NU) NOT USED TO DEVELOP CONTOURS

NOTES

1. BASE MAP IMAGERY FROM NEARMAP, (5/4/2022).
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.

1:7,200
1" = 600'

0 600 1,200 FEET

PROJECT: CONSUMERS ENERGY COMPANY
JC WEADOCK POWER PLANT
ESSEXVILLE, MICHIGAN

TITLE: POTENTIOMETRIC SURFACE MAP
OCTOBER 2022

DRAWN BY:	B. TRACY	PROJ. NO.:	464096
CHECKED BY:	J. KRENZ		FIGURE 3
APPROVED BY:	D. LITZ		
DATE:	JANUARY 2023		

TRC
1540 EISENHOWER PLACE
ANN ARBOR, MI 48108-3284
PHONE: 734.971.7080

FILE: 464096_Weadock.aprx

Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl - Map Rotation: 0
Saved By BTRACY on 1/10/2023 - 15:34:54 PM - File Path: T:\1_PROJECTS\Consumers_Energy\464096_Weadock\2-4.PRX\464096_Weadock.aprx - Layout Name: 464096_Weadock.aprx

Appendix A
Static Water Level Evaluation

Table A1

Static Water Levels for Select Perimeter Dike Monitoring Wells and NOAA Staff Gauge

Fourth Quarter 2022 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	10/3/2022	579.99	579.84	0.15
MW-51	10/3/2022	580.19		0.35
MW-52	10/3/2022	580.15		0.31
MW-53	10/3/2022	579.83		-0.01
MW-53R	10/3/2022	579.95		0.11
MW-54R	10/3/2022	579.64		-0.20
MW-55	10/3/2022	580.17		0.33
JCW-MW-18004	10/3/2022	580.93		1.09
Average:		**580.11**		

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 2022 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[6]	586.99		22.37	3.16E-01	2.00	2.88	1,010	2.30E-08	0.32	2,904	5.97E-02	0.45	163
JCW-MW-18001		579.93			3.75								
JCW-OW-18002	583.10		28.87	1.08E-01	4.00	4.25	970		0.11	4,123	2.90E-02	0.22	79
MW-50		579.99			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	583.88		14.38	2.57E-01	4.00	4.45	1,850	2.30E-08	0.26	8,223	1.38E-01	1.03	376
MW-51		580.19			4.89								
JCW-OW-18003	585.79		33.85	1.67E-01	3.50	3.93	740		0.17	2,908	3.16E-02	0.24	86
MW-52		580.15			4.36								
OW-53	586.49		20.14	3.31E-01	1.25	1.62	730		0.33	1,183	2.55E-02	0.19	70
MW-53		579.83			1.99								

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	587.32		21.23	3.62E-01	2.00	2.25	510	2.30E-08	0.36	1,148	2.71E-02	0.20	74
MW-54R		579.64			2.50								
JCW-OW-18004	587.05		26.59	2.30E-01	8.00	4.51	820		0.23	3,702	5.56E-02	0.42	152
JCW-MW-18004		580.93			1.03								
OW-55	587.04		23.95	2.87E-01	2.00	2.08	1,220		0.29	2,544	4.76E-02	0.36	130
MW-55		580.17			2.17								
MW-20	585.42		40.93	8.99E-02	1.50	1.38	1,120		0.09	1,540	9.03E-03	0.07	25
JCW-MW-18005		581.74			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

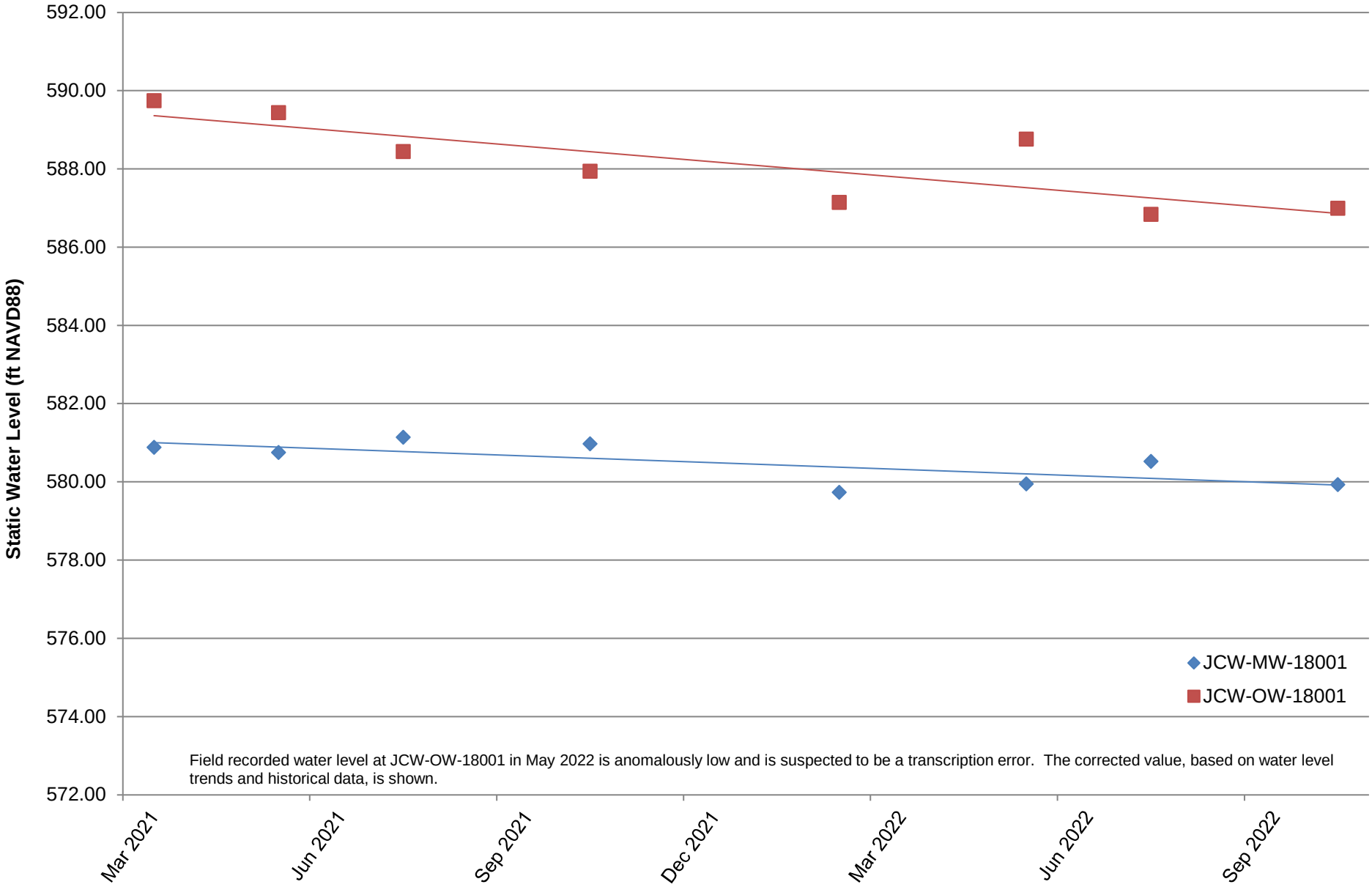
Notes:

Water level data collected on October 3, 2022 are shown by yellow cells:

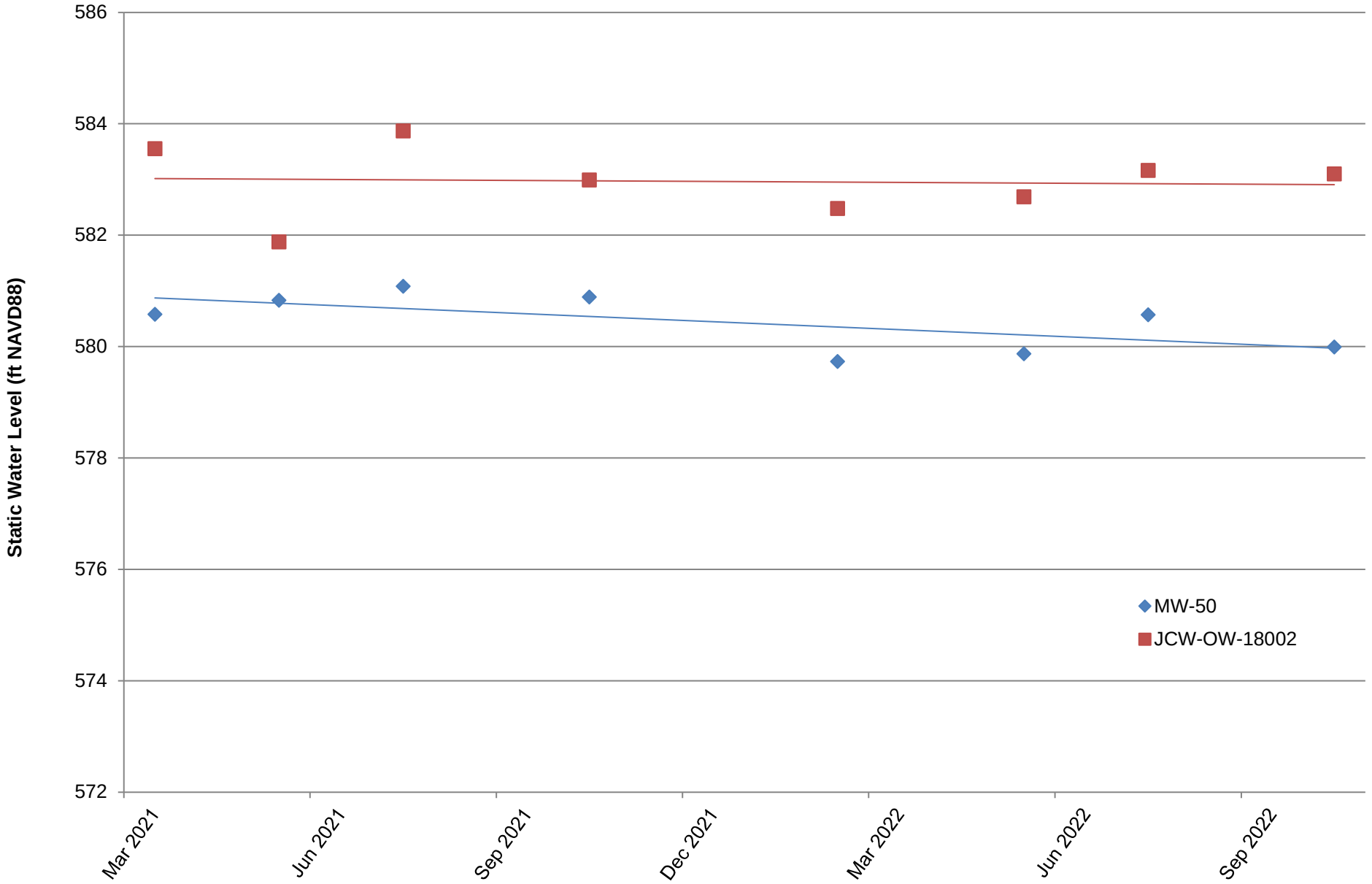
1. Monitoring Well Zones based on Phase II Evaluation, Appendix K Groundwater Discharge Calculations, September 30, 2005. Representative wells based on the Landfill Hydrogeological Monitoring Plan, February 2021.
2. Saturated thickness will be the thickness of the sand unit when the observed SWL is above 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.
6. Field recorded water level is anomalously low and is suspected to be a transcription error. The corrected value, based on water level trends and historical data, is used to calculate flux.

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

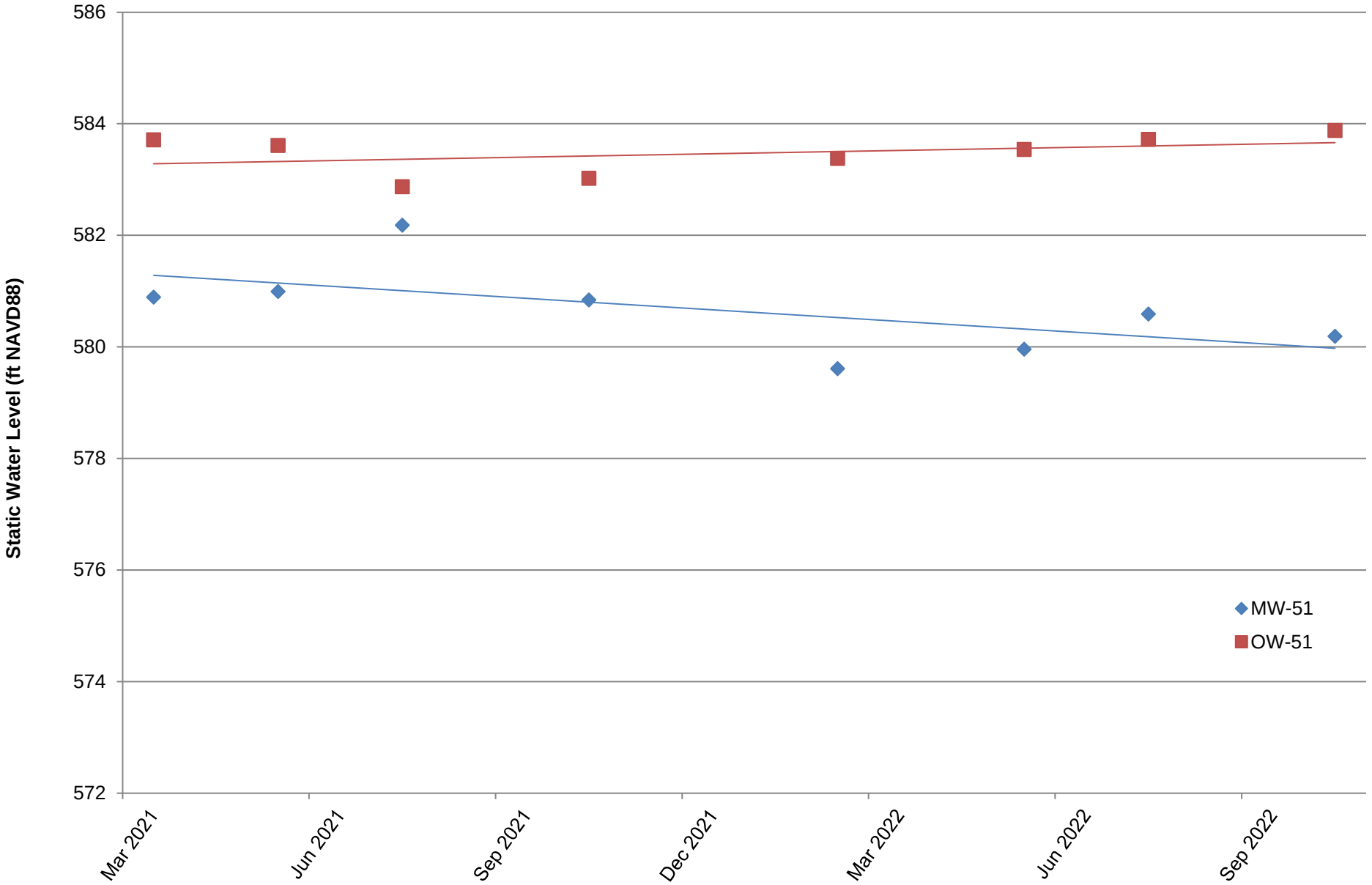
Appendix A
Static Water Level for JCW-MW-18001 and JCW-OW-18001



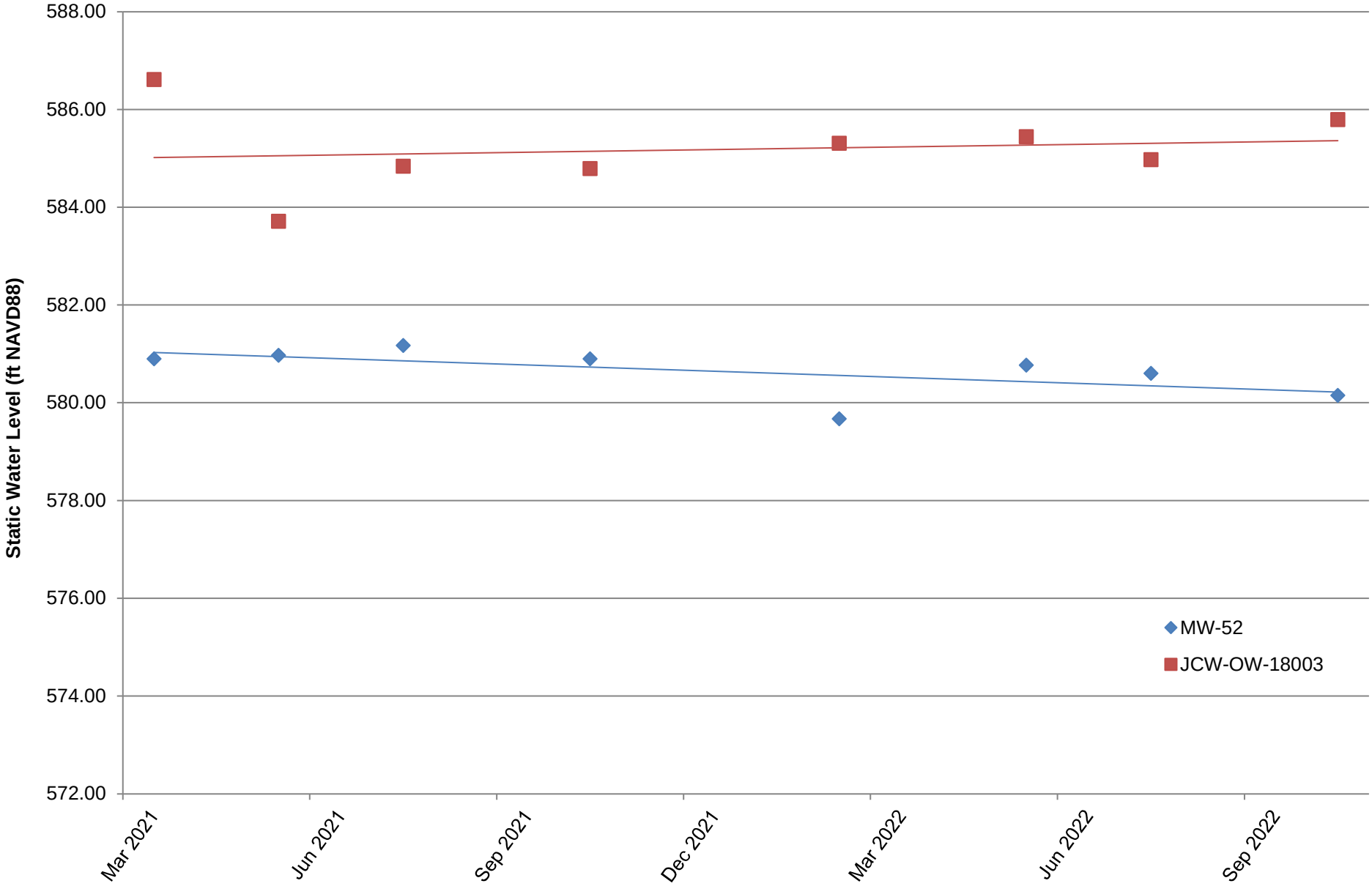
Appendix A
Static Water Level for MW-50 and JCW-OW-18002



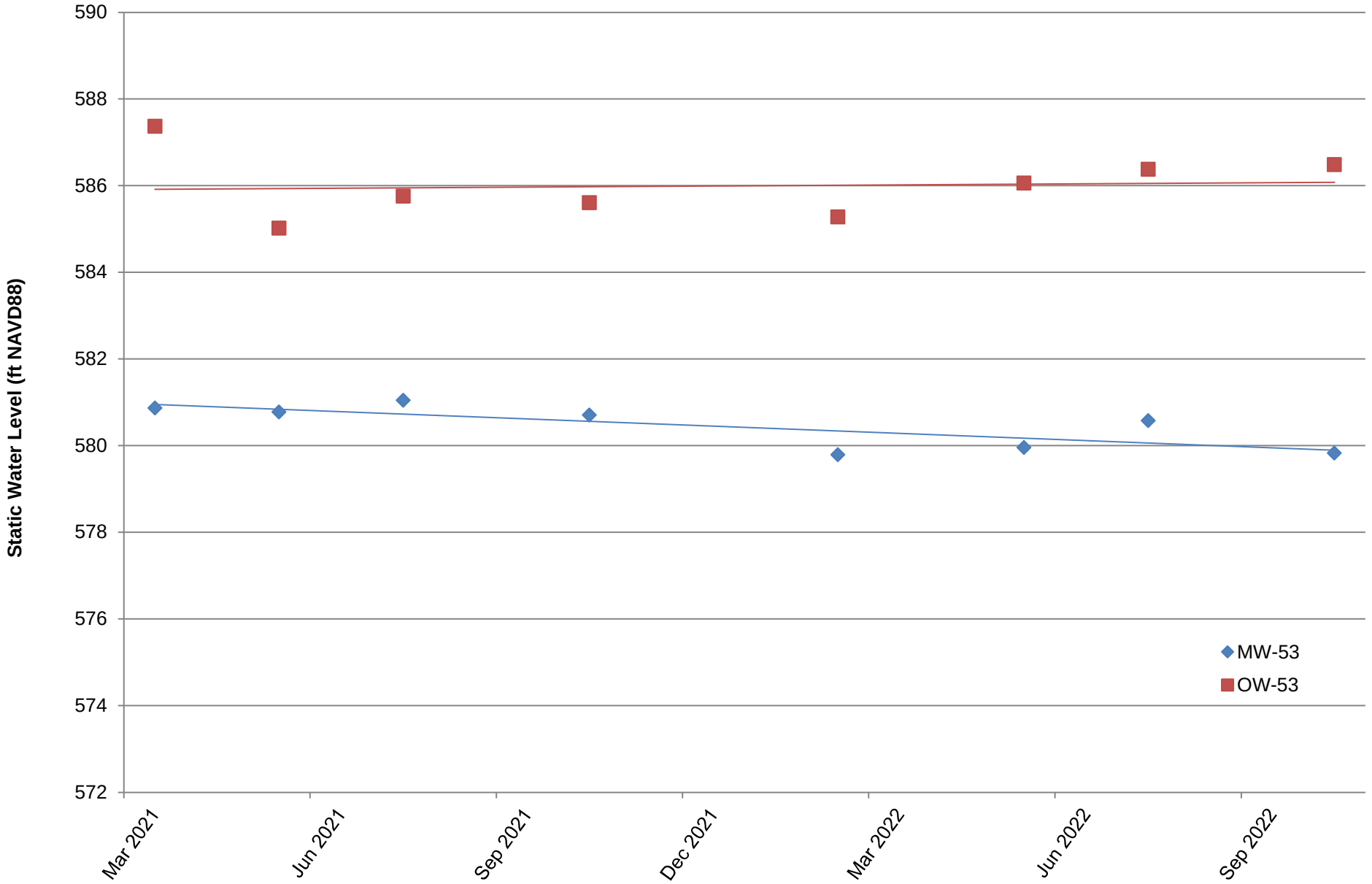
Appendix A
Static Water Level for MW-51 and OW-51



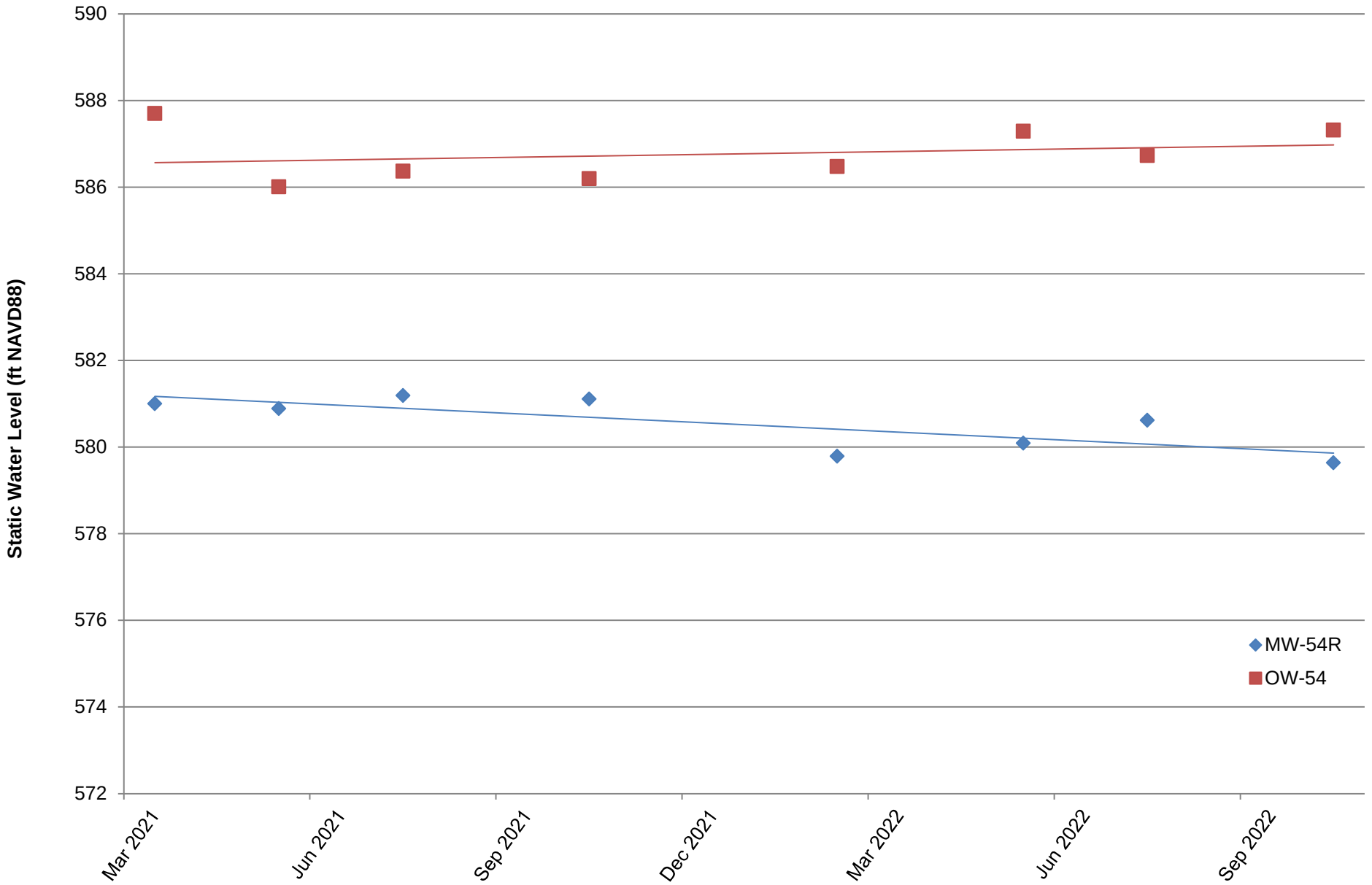
Appendix A
Static Water Level for MW-52 and JCW-OW-18003



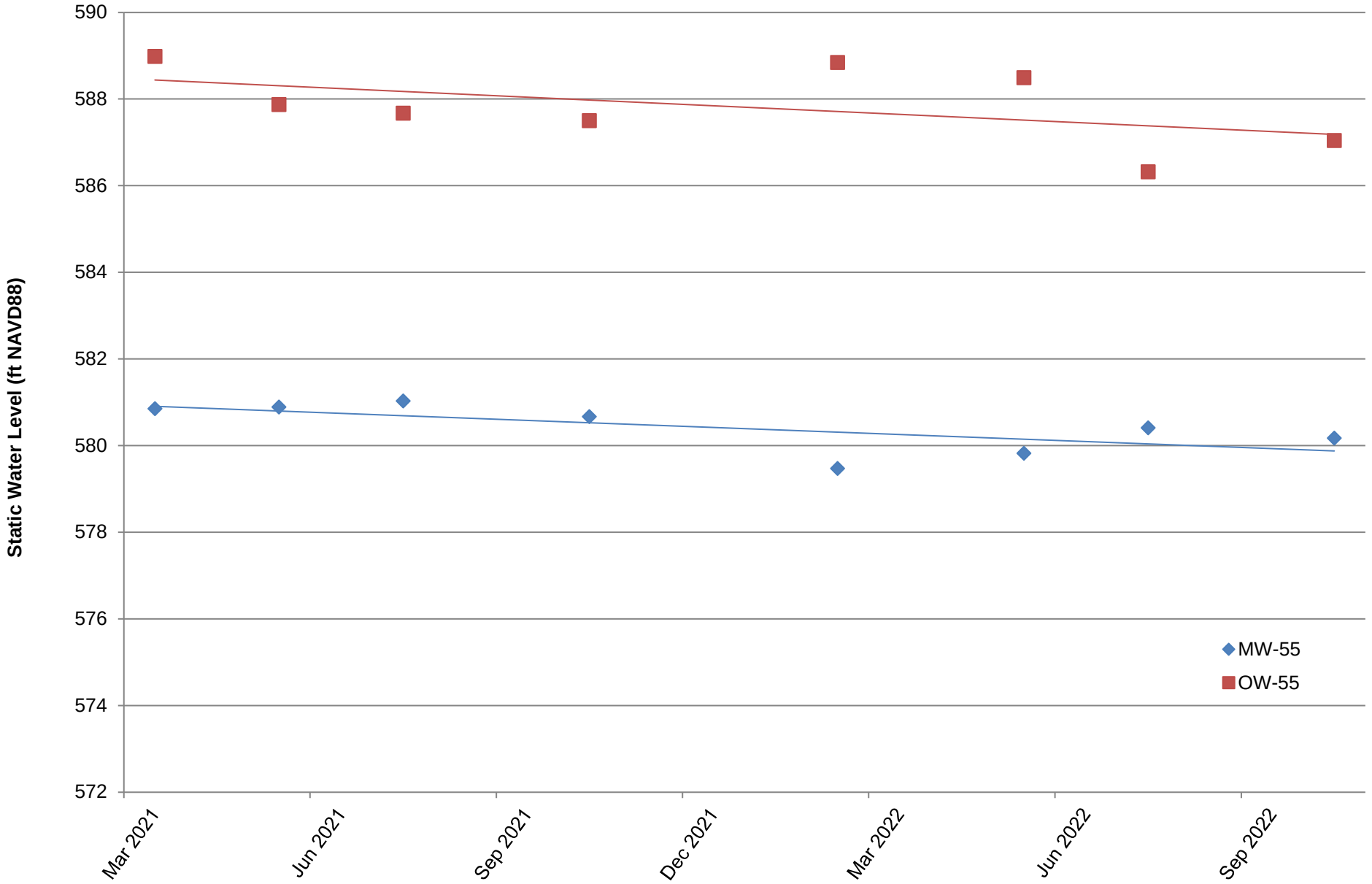
Appendix A
Static Water Level for MW-53 and OW-53



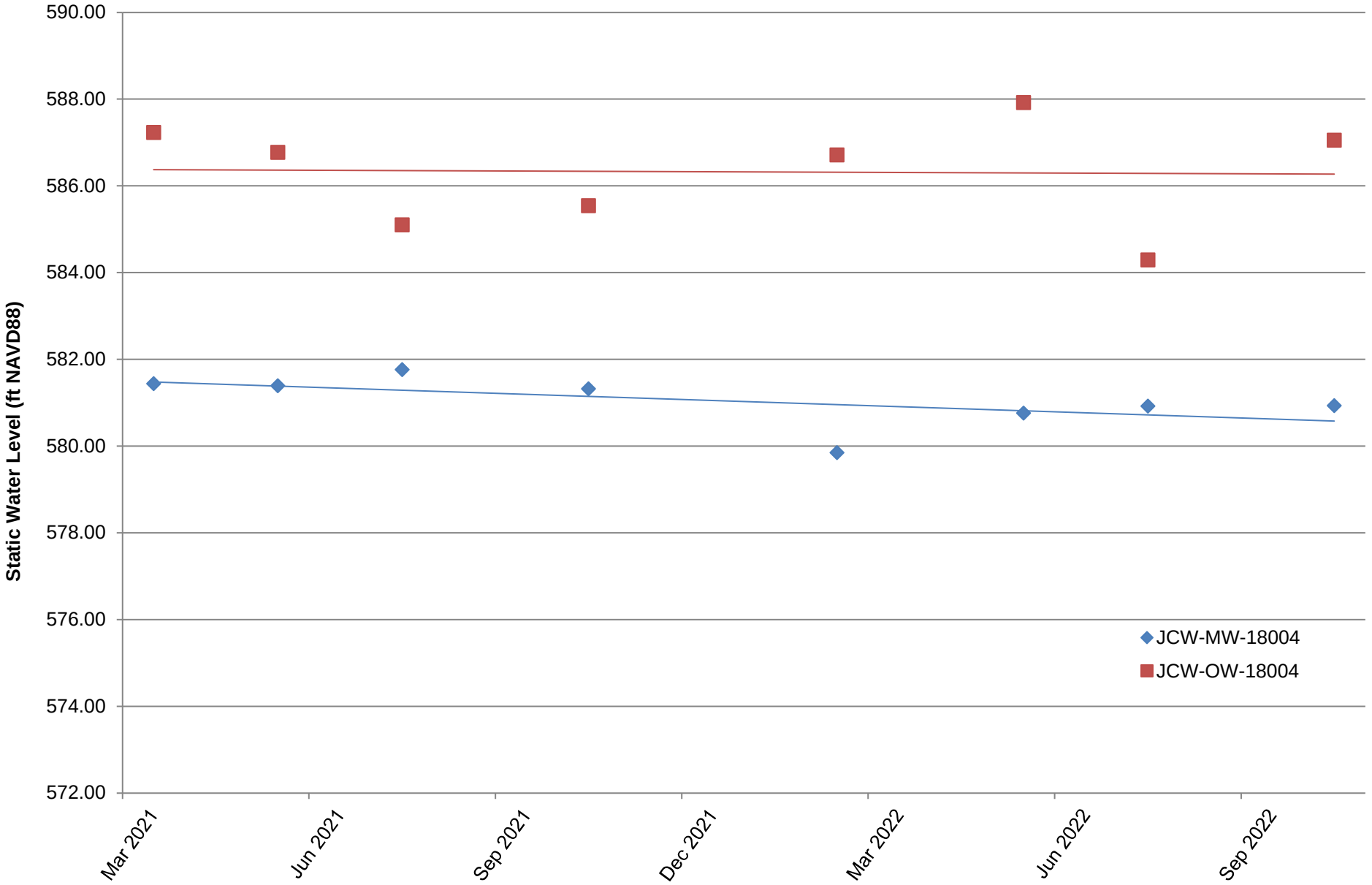
Appendix A
Static Water Level for MW-54R and OW-54



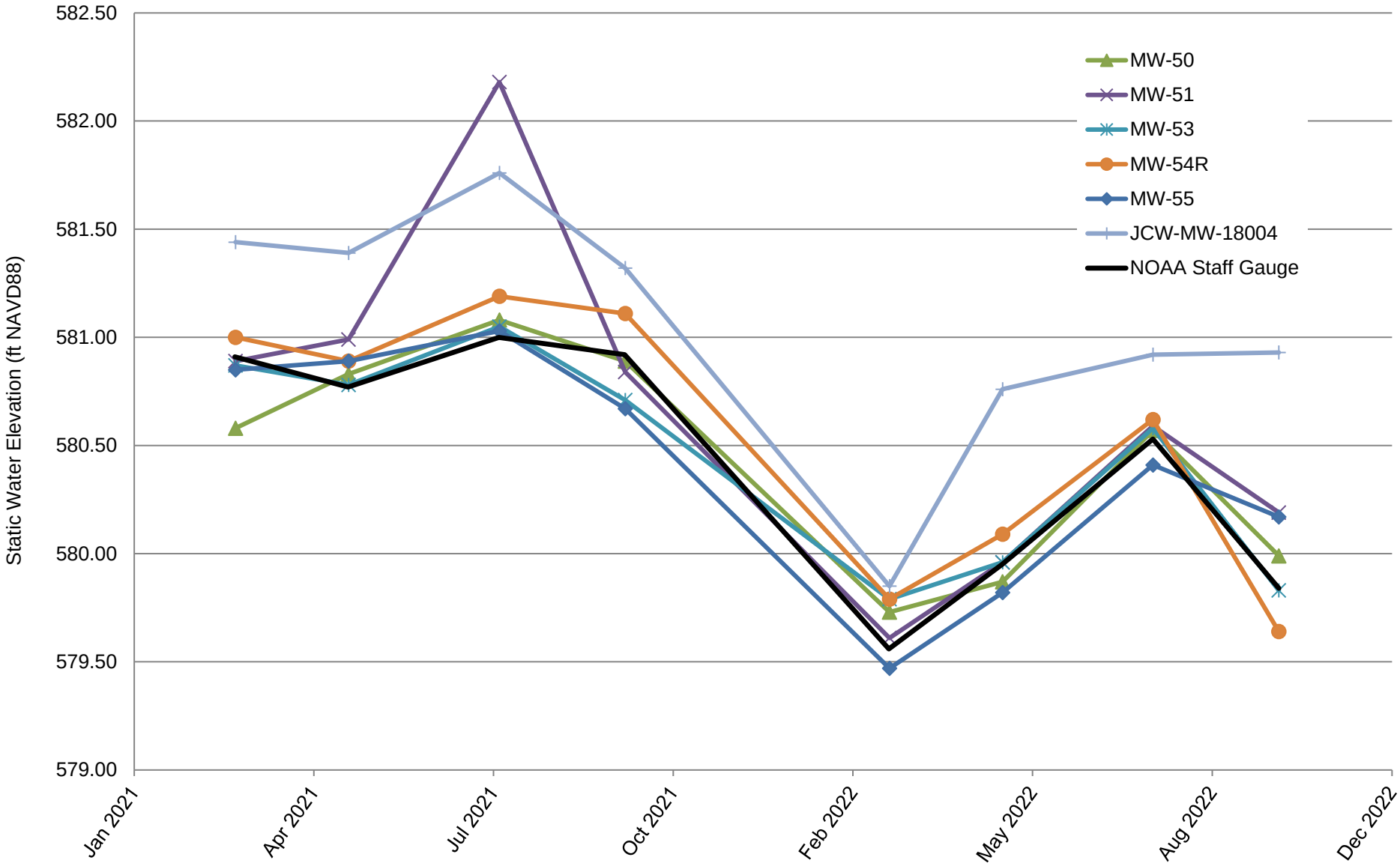
Appendix A
Static Water Level for MW-55 and OW-55



Appendix A
Static Water Level for JCW-MW-18004 and JCW-OW-18004



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 2022
JC Weadock/DE Karn Background

Groundwater samples were collected by TRC for the October 2022 sampling event. Samples were analyzed for total metals, anions, and total dissolved solids by Consumers Energy (CE) Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 22-1023.

During the October 2022 sampling event, a groundwater sample was collected from each of the following wells:

- MW-15002
- MW-15008
- MW-15016
- MW-15019

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Fluoride, Chloride, Sulfate)	EPA 300.0
Total Dissolved Solids (TDS)	SM 2540C
Total Metals	SW-846 6020B/7470A

TRC reviewed the laboratory data to assess data usability. The following sections summarize the data review procedure and the results of the review.

Data Usability Review Procedure

The analytical data were reviewed using the USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review (USEPA, 2020). The following items were included in the evaluation of the data:

- Sample receipt, as noted in the cover page or case narrative;
- Technical holding times for analyses;
- Reporting limits (RLs) compared to project-required RLs;
- Data for method blanks, equipment blanks, and field blanks. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. Field and equipment blanks are used to assess potential contamination arising from field procedures;
- Data for laboratory control samples (LCSs) and laboratory control sample duplicates (LCSDs), when performed. The LCSs and/or LCSDs are used to assess the accuracy of the analytical method using a clean matrix;
- Percent recoveries for matrix spike (MS) and matrix spike duplicates (MSD), when performed on project samples. Percent recoveries are calculated for each analyte spiked and used to assess bias due to sample matrix effects;

- Data for laboratory duplicates, when performed on project samples. The laboratory duplicates are replicate analyses of one sample and are used to assess the precision of the analytical method;
- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

It should be noted that results for method blanks and laboratory control samples were not provided for review by CE Laboratory Services. Therefore, potential contamination arising from laboratory sample preparation and/or analytical procedures and the accuracy of the analytical method using a clean matrix could not be evaluated for the metals, anions, and TDS analyses.

This data usability report addresses the following items:

- Usability of the data if quality control (QC) results suggest potential problems with all or some of the data;
- Actions regarding specific QC criteria exceedances.

Review Summary

The data quality objectives and laboratory completeness goals for the project were met, and the data are usable for their intended purpose. A summary of the data quality review, including non-conformances and issues identified in this evaluation, are noted below.

- The reviewed Appendix III, IV, and additional Part 115 constituents 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 were not detected in this blank sample.
- MS and MSD analyses were not performed on a sample from this data set.
- The field duplicate pair samples were DUP-Background and MW-15008; all criteria were met.
- Laboratory duplicate analyses were not performed on a sample from this data set.

Laboratory Data Quality Review
Groundwater Monitoring Event October 2022
JC Weadock/Karn DEK Background

Groundwater samples were collected by TRC for the October 2022 sampling event. Samples were analyzed for radium by Eurofins in St. Louis, Missouri (Eurofins – St. Louis). The laboratory analytical results were reported in laboratory sample delivery group (SDG) 240-174329-1.

During the October 2022 sampling event, a groundwater sample was collected from each of the following wells:

- MW-15002
- MW-15008
- MW-15016
- MW-15019

Each sample was analyzed for the following constituents:

Analyte Group	Method
Radium (Ra-226, Ra-228, Combined Ra-226 & Ra-228)	EPA 903.0, EPA 904.0

TRC reviewed the laboratory data to assess data usability. The following sections summarize the data review procedure and the results of the review.

Data Usability Review Procedure

The analytical data were reviewed using the Department of Energy Evaluation of Radiochemical Data Usability (USDOE, 1997). The following items were included in the evaluation of the data:

- Sample receipt, as noted in the cover page or case narrative
- Technical holding times for analyses;
- Reporting limits (RLs) compared to project-required RLs;
- Data for method blanks, equipment blanks, and field blanks, where applicable. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. Field and equipment blanks are used to assess potential contamination arising from field procedures;
- Data for laboratory control samples (LCSs) and laboratory control sample duplicates (LCSDs), when performed. The LCSs and/or LCSDs are used to assess the accuracy of the analytical method using a clean matrix;
- Percent recoveries for matrix spike (MS) and matrix spike duplicates (MSD), when performed on project samples. Percent recoveries are calculated for each analyte spiked and used to assess bias due to sample matrix effects;
- Percent recoveries for carriers, where applicable, for radiochemistry only. Carriers are used to assess the chemical yield for the preparation and/or instrument efficiency;

- Data for laboratory duplicates, when performed on project samples. The laboratory duplicates are replicate analyses of one sample and are used to assess the precision of the analytical method;
- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

This data usability report addresses the following items:

- Usability of the data if quality control (QC) results suggest potential problems with all or some of the data;
- Actions regarding specific QC criteria exceedances.

Review Summary

The data quality objectives and laboratory completeness goals for the project were met, and the data are usable for their intended purpose. A summary of the data quality review, including non-conformances and issues identified in this evaluation, are noted below.

- The reviewed constituents will be utilized for the purposes of an assessment monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- Target analytes were not detected in the method blanks with the following exception.
  - Radium-228 was detected in MB 160-586571/1-A at 1.001 +/- 0.433 pCi/L. Potential false positive exists for radium-228 results with normalized absolute differences (NADs) <1.96 and potential high bias exists for radium-228 results with NADs >1.96 but <2.48, as summarized in attachment A.
- One field blank (FB-Background) was collected. Target analytes were not detected in the field blank sample with the following exceptions.
  - Radium-228 was detected in FB-Background at 1.51 +/- 0.478 pCi/L. Associated samples are already qualified as potential false positive detections and potential high bias, as summarized in attachment A.
  - Combined radium 226+228 was detected in FB-Background at 1.55 +/- 0.483 pCi/L. Potential false positive exists for combined radium 226+228 results with NADs <1.96 and potential high bias exists for combined radium 226+228 results with NADs >1.96 but $\leq$2.48, as summarized in attachment A.
- LCS recoveries for all target analytes were within laboratory control limits.
- MS/MSD and laboratory duplicate analyses were not performed on a sample from this SDG.
- The field duplicate pair samples were DUP-Background/MW-15019. All criteria were met.
- Carrier recoveries were within 40-110%.

Attachment A
Summary of Data Non-Conformances for Landfill Groundwater Analytical Data
JC Weadock and DE Karn Background Wells– CCR Monitoring Program
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
MW-15008	10/4/2022	Radium 228	Detected result is potentially a false positive due to method blank contamination.
MW-15016	10/5/2022		
MW-15019	10/4/2022		
DUP-Background	10/4/2022		
FB-Background	10/5/2022		
MW-15002	10/5/2022	Radium 228	Detected result is potentially biased high due to method blank contamination.
MW-15008	10/4/2022	Combined Radium 226+228	Detected result is potentially a false positive due to field blank contamination.
MW-15016	10/5/2022		
MW-15019	10/4/2022		
DUP-Background	10/4/2022		
MW-15002	10/5/2022	Combined Radium 226+228	Detected result is potentially biased high due to field blank contamination.

Laboratory Data Quality Review
Groundwater Monitoring Event October 2022
JC Weadock Landfill

Porewater samples were collected by TRC for the October 2022 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) 22-1021.

During the October 2022 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-57R OUT

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, 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

- 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 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-JCW-LF-02/JCW-MW-18006 and DUP-JCW-LF-01/MW-50; all criteria between the parent and duplicate samples were within the QC limits with the following exception: the absolute difference of nickel was > RL in field

duplicate pair DUP-JCW-LF-01/MW-50 the results should be qualified as estimated as summarized in the attached table, Attachment A.

- Laboratory duplicate analyses were not performed on a sample from this data set.
- The cooler temperature (9.6 degrees C) was above the acceptance limits (0-6 degrees C) when received at the lab. The positive and nondetect results for anions, TDS, and alkalinity in all samples should be considered estimated as summarized in the attached table, Attachment A. There is no impact on data usability due to this issue for metals and mercury since these methods do not require thermal preservation.

Attachment A
Summary of Data Non-Conformances
JCW Landfill
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
JCW-MW-18001	10/10/2022	Nickel	Field duplicate variability (AbsD > RL) resulting in estimated values
JCW-MW-18004	10/10/2022		
JCW-MW-18005	10/11/2022		
MW-50	10/10/2022		
MW-51	10/10/2022		
MW-52	10/10/2022		
MW-53	10/10/2022		
MW-53R	10/10/2022		
MW-55	10/10/2022		
OW-57ROUT	10/11/2022		
MW-58	10/11/2022		
DUP-JCW-LF-01	10/10/2022		
All Samples	10/10-11/2022	Anions, TDS, and Alkalinity	Estimated values due to cooler temperature > 6 degrees Celcius

Laboratory Data Quality Review
Porewater Monitoring Event October 2022
JC Weadock Landfill

Porewater samples were collected by TRC for the October 2022 sampling event. Samples were analyzed for radium by Eurofins in St. Louis, Missouri (Eurofins – St. Louis). The laboratory analytical results were reported in laboratory sample delivery group (SDG) 240-174527-1 (revision 1).

During the October 2022 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-57ROUT

Each sample was analyzed for the following constituents:

Analyte Group	Method
Radium (Ra-226, Ra-228, Combined Ra-226 & Ra-228)	EPA 903.0, EPA 904.0

TRC reviewed the laboratory data to assess data usability. The following sections summarize the data review procedure and the results of the review.

Data Usability Review Procedure

The analytical data were reviewed using the Department of Energy Evaluation of Radiochemical Data Usability (USDOE, 1997). The following items were included in the evaluation of the data:

- Sample receipt, as noted in the cover page or case narrative
- Technical holding times for analyses;
- Reporting limits (RLs) compared to project-required RLs;
- Data for method blanks, equipment blanks, and field blanks, where applicable. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. Field and equipment blanks are used to assess potential contamination arising from field procedures;
- Data for laboratory control samples (LCSs) and laboratory control sample duplicates (LCSDs), when performed. The LCSs and/or LCSDs are used to assess the accuracy of the analytical method using a clean matrix;

- Percent recoveries for matrix spike (MS) and matrix spike duplicates (MSD), when performed on project samples. Percent recoveries are calculated for each analyte spiked and used to assess bias due to sample matrix effects;
- Percent recoveries for carriers, where applicable, for radiochemistry only. Carriers are used to assess the chemical yield for the preparation and/or instrument efficiency;
- Data for laboratory duplicates, when performed on project samples. The laboratory duplicates are replicate analyses of one sample and are used to assess the precision of the analytical method;
- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

This data usability report addresses the following items:

- Usability of the data if quality control (QC) results suggest potential problems with all or some of the data;
- Actions regarding specific QC criteria exceedances.

Review Summary

The data quality objectives and laboratory completeness goals for the project were met, and the data are usable for their intended purpose. A summary of the data quality review, including non-conformances and issues identified in this evaluation, are noted below.

- The reviewed constituents will be utilized for the purposes of an assessment monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- Target analytes were not detected in the method blanks.
- One equipment blank (EB-01) was collected. Target analytes were not detected in the equipment blank sample with the following exceptions.
  - Radium-228 was detected in EB-01 at 0.902 +/- 0.421 pCi/L. Detections of radium-228 in several samples are potential false positive results, as summarized in Attachment A.
  - Combined radium 226 + 228 was detected in EB-01 at 0.899 +/- 0.426 pCi/L. Detections of combined radium 226+228 in several samples are potential false positive results, as summarized in Attachment A.
- LCS recoveries for all target analytes were within laboratory control limits.
- MS/MSD analyses were not performed on a sample from this SDG.
- The field duplicate pair samples were DUP-01/MW-50 and DUP-02/JCW-MW-18006. All criteria were met.
- A laboratory duplicate analysis was performed on sample EB-01. All criteria were met.

- Carrier recoveries were within 40-110%.

Attachment A
Summary of Data Non-Conformances for Landfill Groundwater Analytical Data
JC Weadock Landfill– CCR Monitoring Program
Essexville, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
DUP-01	10/10/2022	Radium 228	Detected result is potentially a false positive due to equipment blank contamination.
DUP-02	10/11/2022		
JCW-MW-18001	10/10/2022		
MW-50	10/10/2022		
MW-51	10/10/2022		
MW-53	10/10/2022		
MW-53R	10/10/2022		
MW-54R	10/10/2022		
MW-55	10/10/2022		

Laboratory Data Quality Review
Groundwater Monitoring Event October 2022
JC Weadock Landfill

Groundwater samples were collected by TRC for the October 2022 sampling event. The samples were analyzed for total metals, low-level mercury, 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) 22-1024.

During the October 2022 sampling event, a groundwater sample was collected from each of the following wells:

- LH-103R
- LH-104

The samples were 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
Low-Level Mercury	EPA 1631E
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, field blanks, and trip 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 and trip blanks are used to assess potential contamination arising during shipment to the laboratory;
- 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 (including low-level mercury), 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, as well as low-level mercury, 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-02), one trip blank (TB-01), and one equipment blank (EB-02) were collected. Low-level mercury was not detected in these blank samples.
- MS and MSD analyses were performed on sample LH-103R for low-level mercury. The recoveries were within the acceptance limits. The relative percent difference (RPD) was not provided by the laboratory and therefore was not evaluated; further, MS/MSD concentrations were not provided by the laboratory. However, since the recoveries were within the acceptance limits, there is no impact on data usability due to this issue.
- The field duplicate pair samples were LH-103R Dup and LH-103R, LH-104 Dup and LH-104; the RPD between the parent and duplicate samples was within the QC limit.
- 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
Fourth Quarter 2022
Data from March 2021 to October 2022

Porewater Monitoring Points						
PARAMETER	**JCW-MW-18001**	**JCW-MW-18004**	**JCW-MW-18005**	**JCW-MW-18006**	**MW-50**	**MW-51**
Boron(1)	O	O	O	O	O	O
Calcium	↑ ASD	O	O	O	↓	↓
Chloride	O	O	O	O	↓	O
Fluoride	O*	O*	O*	O*	O*	O*
Iron	O	O	O	O	O	O
pH/Corrosivity(1)	O	O	O	O	O	O
Sulfate	↑ ASD	O	O	↓	↓	↓
Total Dissolved Solids	↑ ASD	O	O	O	↓	O

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 (Fourth Quarter 2022 Hydrogeological Monitoring Report for the Weadock Landfill, TRC, January 2023).

(1) Boron concentrations and pH levels were confirmed as statistically significant increases (SSIs) over background levels and triggered assessment monitoring (2017 Annual Groundwater Monitoring Report – JC Weadock Power Plant, Landfill CCR Unit, TRC, 2018).

Appendix C
Detection Monitoring Statistical Summary for JC Weadock Facility
Fourth Quarter 2022
Data from March 2021 to October 2022

Porewater Monitoring Points						
PARAMETER	**MW-52**	**MW-53**	**MW-53R**	**MW-54R**	**MW-55**	**OW-57R OUT**
Boron(1)	O	O	O	↑	O	O
Calcium	O	↓	O	O	O	O
Chloride	O	O	↑ ASD	↑ ASD	O	O
Fluoride	O*	O*	O*	O*	O*	O*
Iron	↑*	O	O	O	O	O
pH/Corrosivity(1)	O	O	O	O	O	O
Sulfate	O	O	O	O	O	O
Total Dissolved Solids	O	↓	O	O	O	O

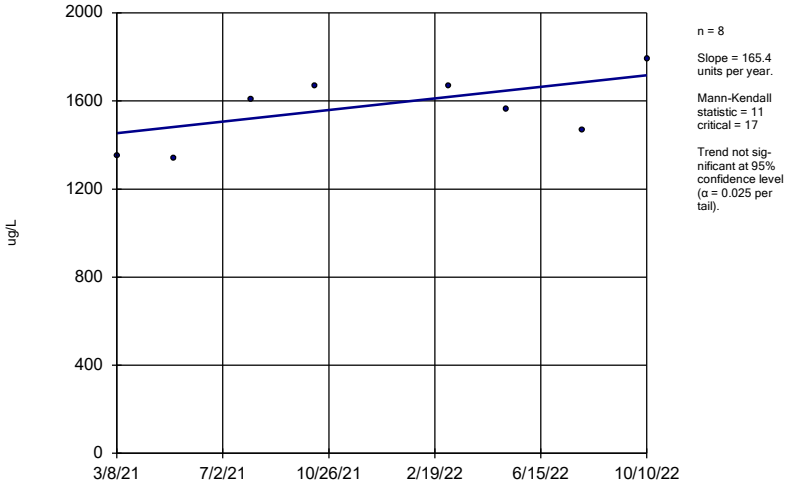
Notes:

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 (Fourth Quarter 2022 Hydrogeological Monitoring Report for the Weadock Landfill, TRC, January 2023).

(1) Boron concentrations and pH levels were confirmed as statistically significant increases (SSIs) over background levels and triggered assessment monitoring (2017 Annual Groundwater Monitoring Report – JC Weadock Power Plant, Landfill CCR Unit, TRC, 2018).

Boron, Total

JCW-MW-18001



n = 8

Slope = 165.4 units per year.

Mann-Kendall statistic = 11 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

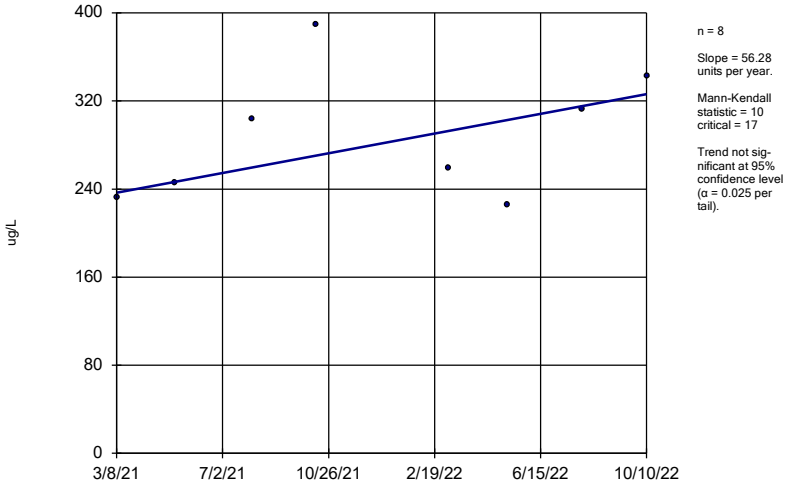
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

JCW-MW-18004



n = 8

Slope = 56.28 units per year.

Mann-Kendall statistic = 10 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

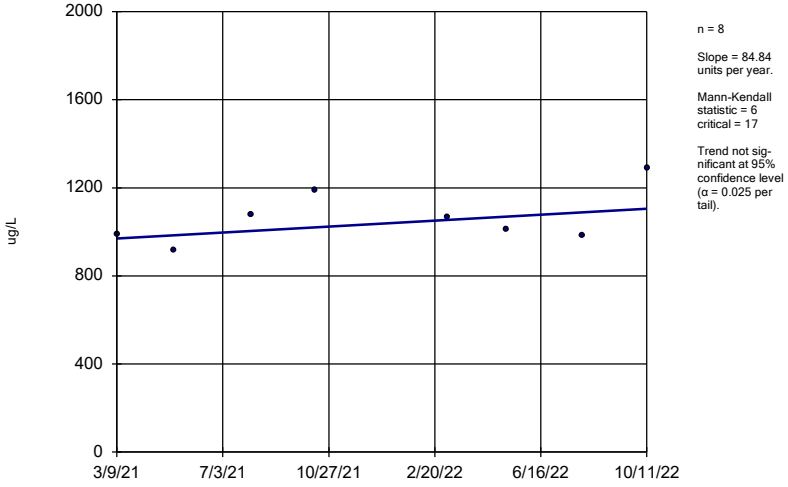
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

JCW-MW-18005



n = 8

Slope = 84.84 units per year.

Mann-Kendall statistic = 6 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

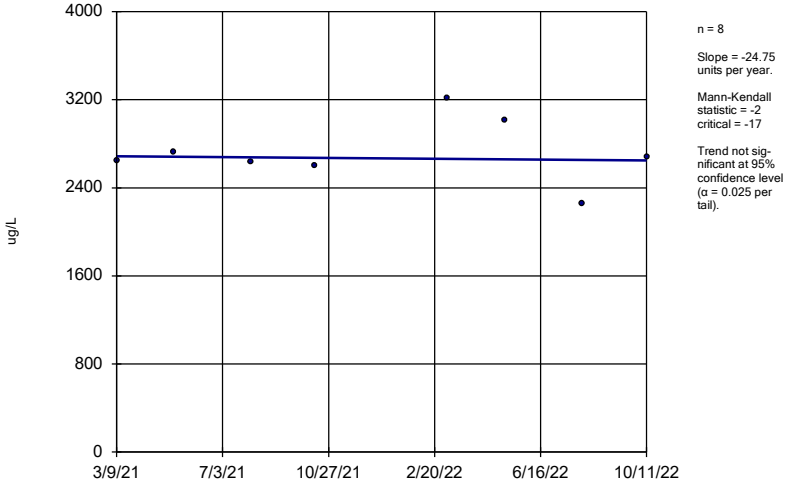
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

JCW-MW-18006



n = 8

Slope = -24.75 units per year.

Mann-Kendall statistic = -2 critical = -17

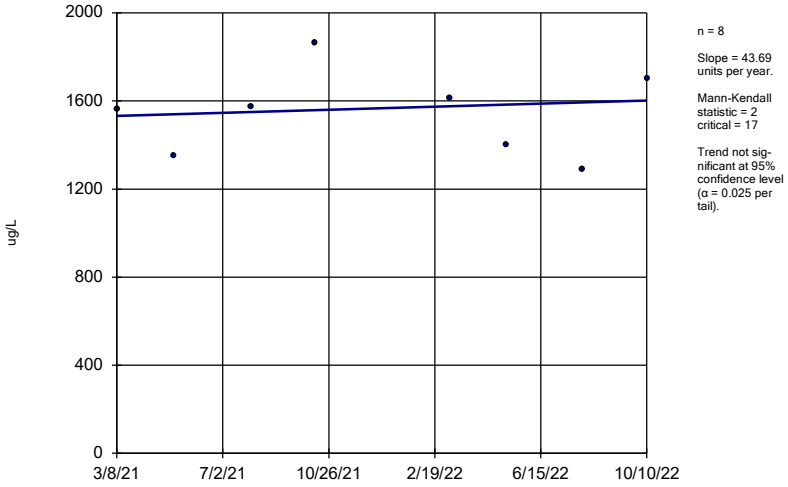
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Boron, Total

MW-50



n = 8

Slope = 43.69 units per year.

Mann-Kendall statistic = 2 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

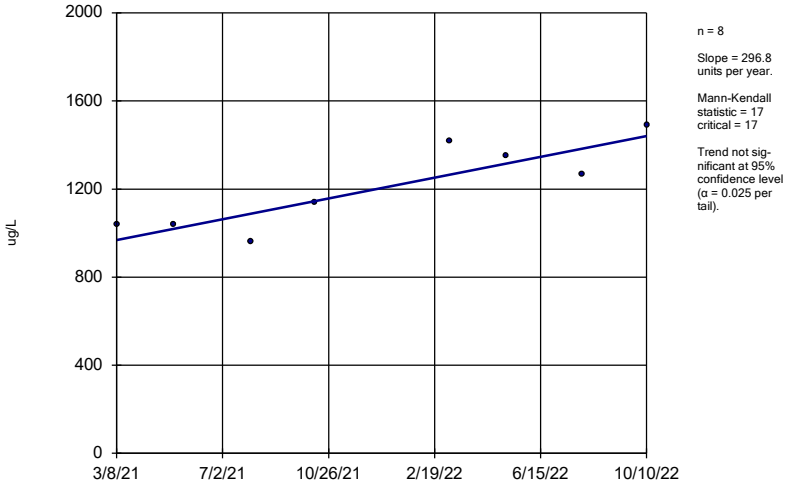
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

MW-51



n = 8

Slope = 296.8 units per year.

Mann-Kendall statistic = 17 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

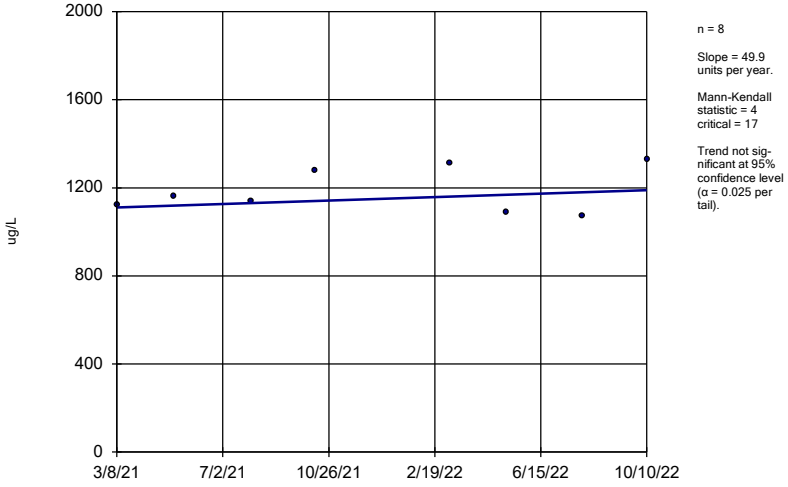
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

MW-52



n = 8

Slope = 49.9 units per year.

Mann-Kendall statistic = 4 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

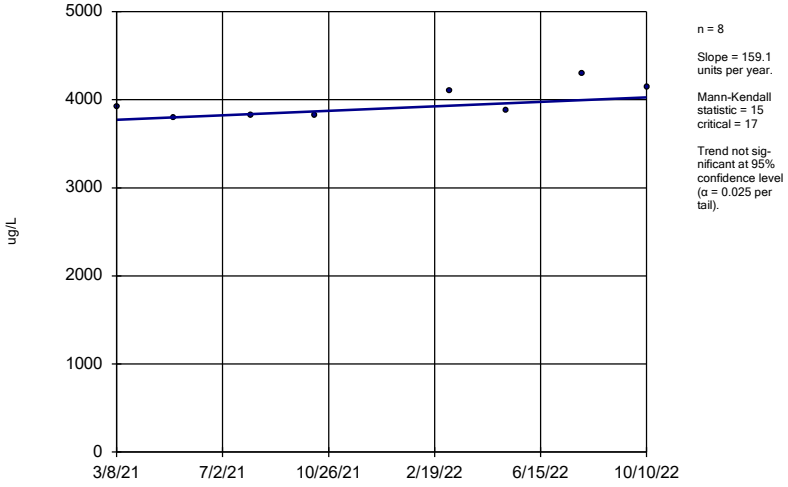
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

MW-53



n = 8

Slope = 159.1 units per year.

Mann-Kendall statistic = 15 critical = 17

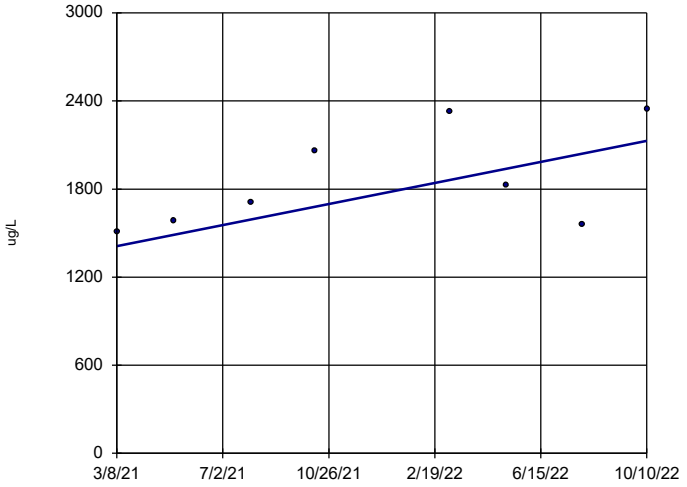
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Boron, Total

MW-53R



n = 8

Slope = 451.1 units per year.

Mann-Kendall statistic = 14 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

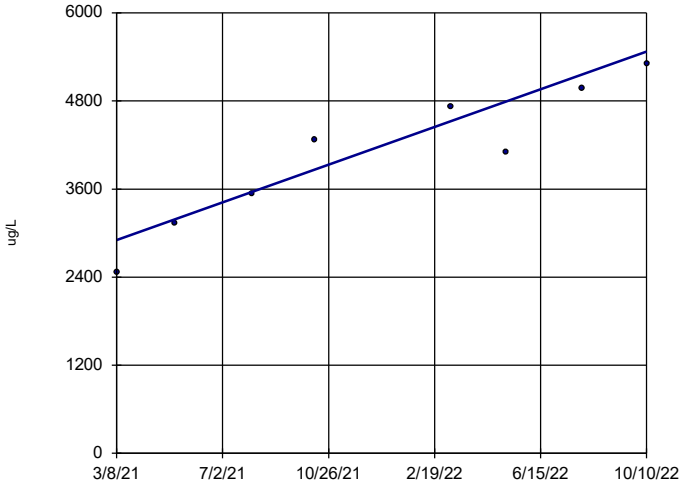
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

MW-54R



n = 8

Slope = 1613 units per year.

Mann-Kendall statistic = 24 critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

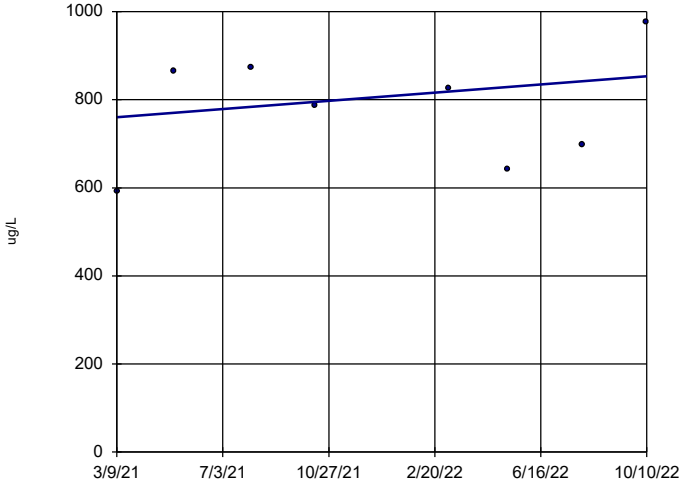
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

MW-55



n = 8

Slope = 58.52 units per year.

Mann-Kendall statistic = 4 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

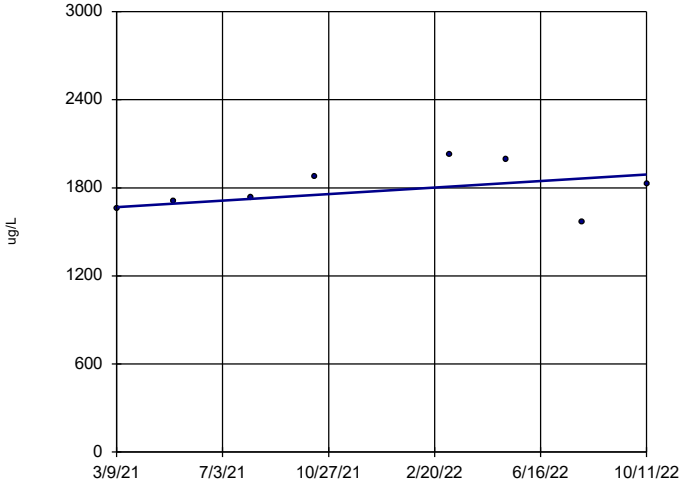
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

OW-57ROUT



n = 8

Slope = 140.3 units per year.

Mann-Kendall statistic = 8 critical = 17

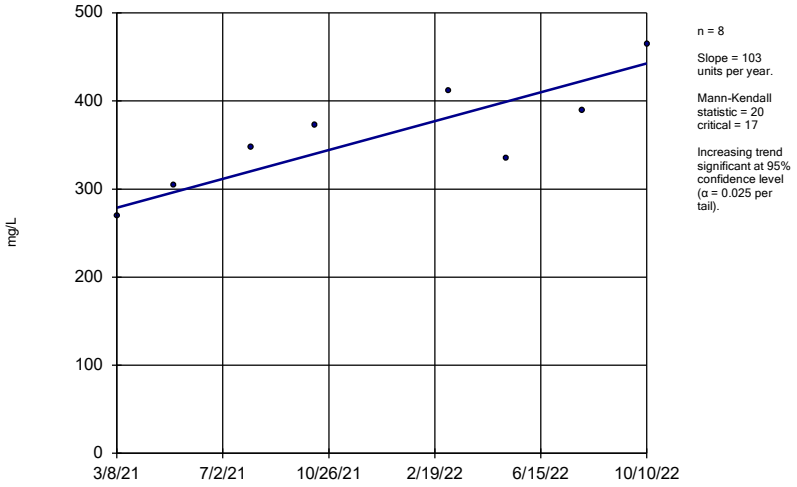
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Calcium, Total

JCW-MW-18001



n = 8

Slope = 103 units per year.

Mann-Kendall statistic = 20 critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

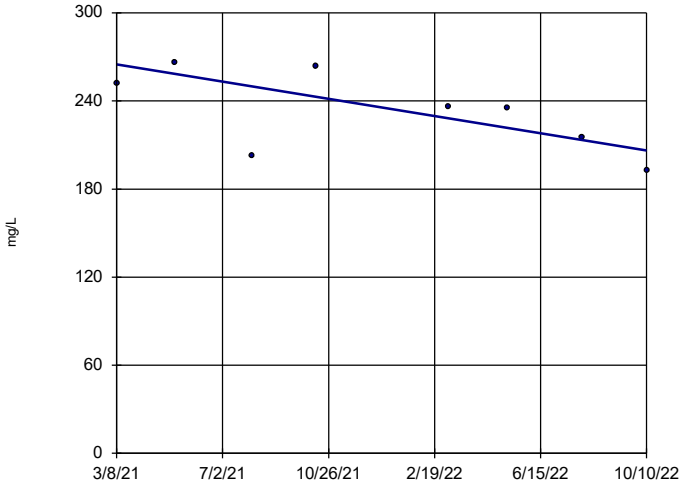
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

JCW-MW-18004



n = 8

Slope = -36.78 units per year.

Mann-Kendall statistic = -16 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

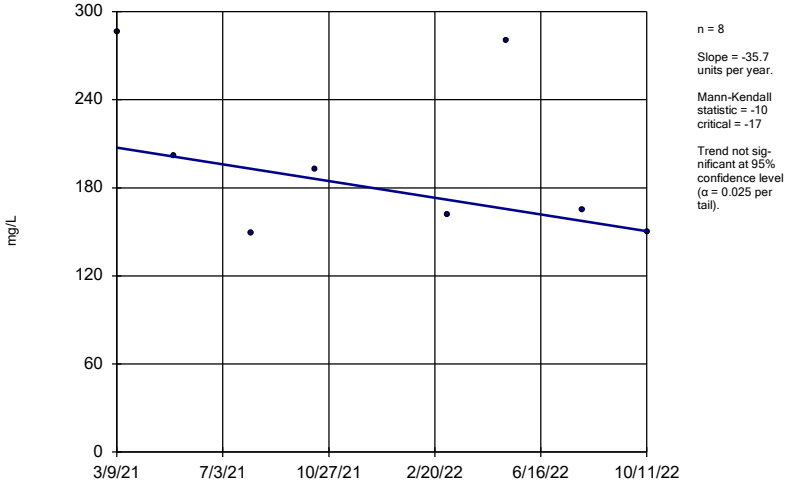
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

JCW-MW-18005



n = 8

Slope = -35.7 units per year.

Mann-Kendall statistic = -10 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

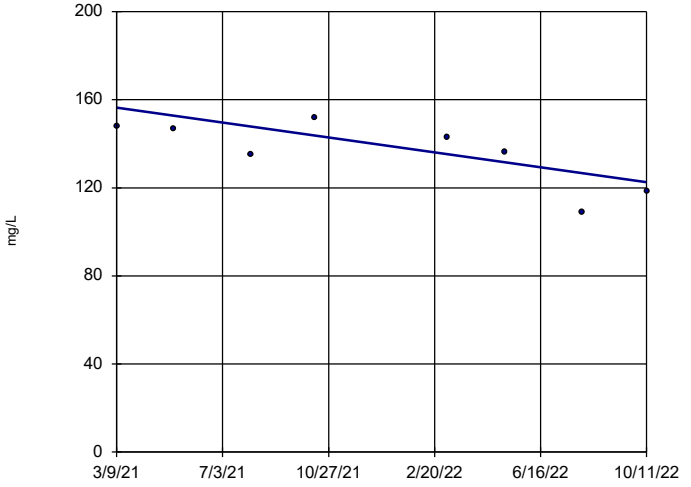
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

JCW-MW-18006



n = 8

Slope = -21.29 units per year.

Mann-Kendall statistic = -16 critical = -17

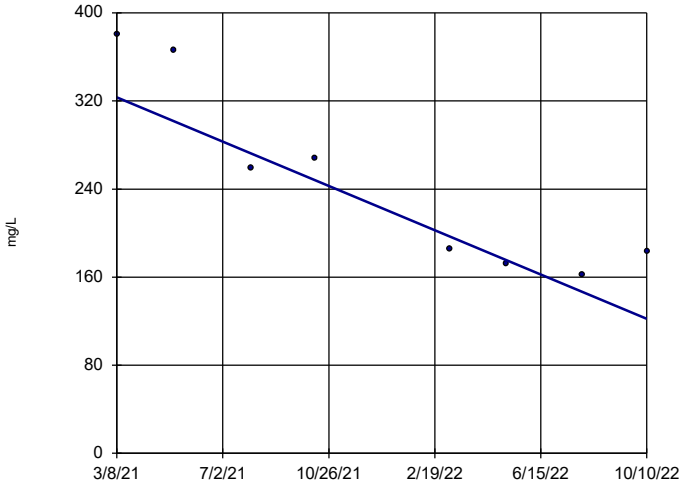
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Calcium, Total

MW-50



n = 8

Slope = -126.4 units per year.

Mann-Kendall statistic = -22 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

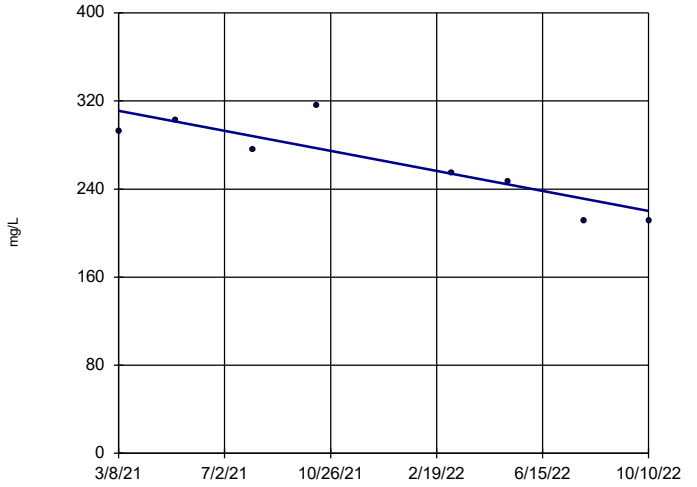
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

MW-51



n = 8

Slope = -57.08 units per year.

Mann-Kendall statistic = -19 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

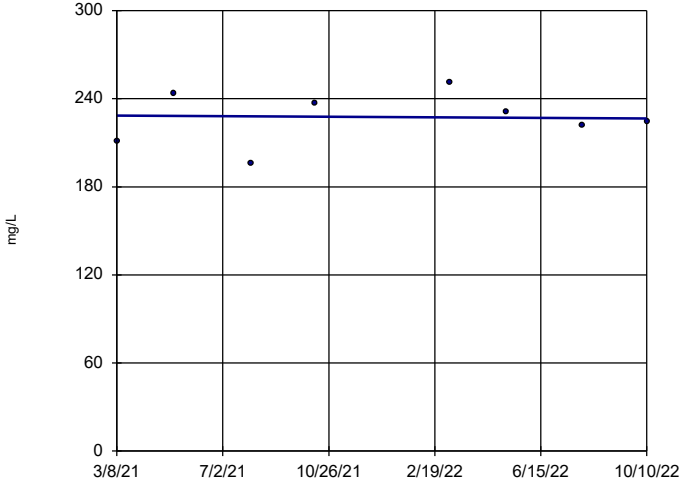
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

MW-52



n = 8

Slope = -1.286 units per year.

Mann-Kendall statistic = 0 critical = 17

Trend not sig-nificant at 95% confidence level (α = 0.025 per tail).

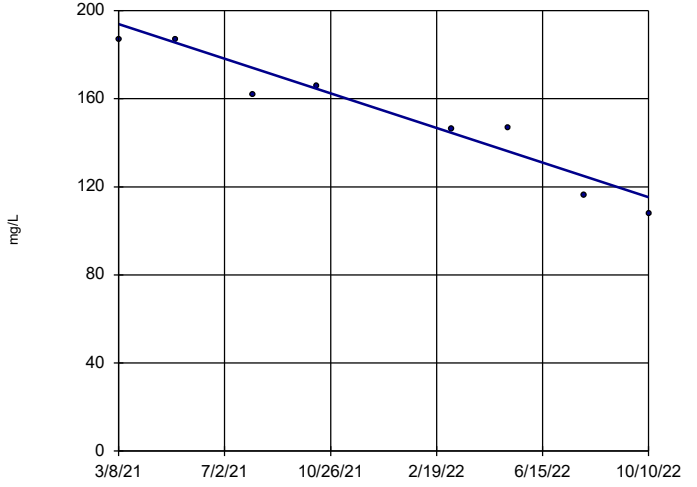
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

MW-53



n = 8

Slope = -49.44 units per year.

Mann-Kendall statistic = -23 critical = -17

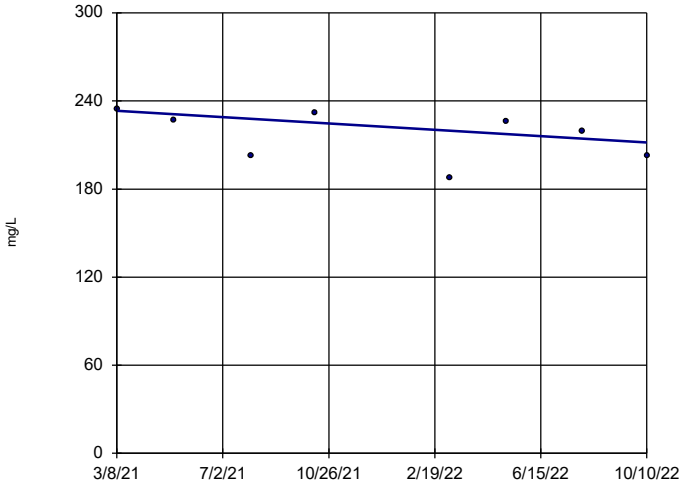
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Calcium, Total

MW-53R



n = 8

Slope = -13.43 units per year.

Mann-Kendall statistic = -13
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

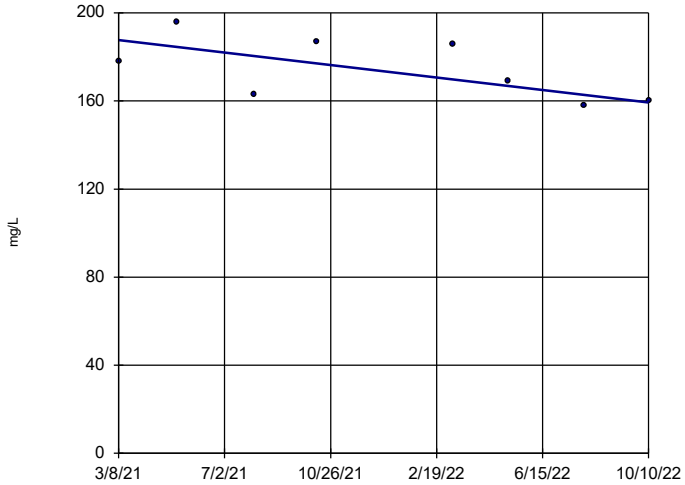
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

MW-54R



n = 8

Slope = -17.81 units per year.

Mann-Kendall statistic = -14
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

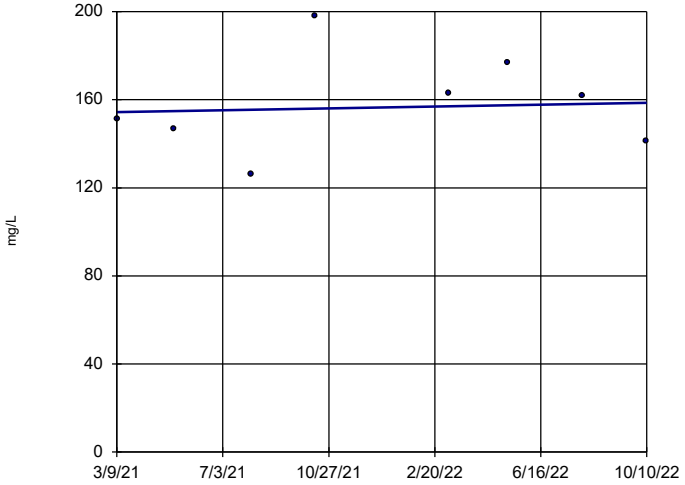
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

MW-55



n = 8

Slope = 2.695 units per year.

Mann-Kendall statistic = 0
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

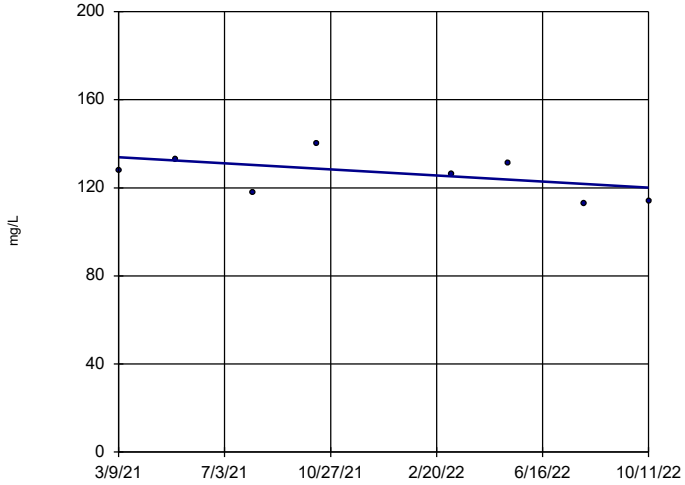
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

OW-57ROUT



n = 8

Slope = -8.628 units per year.

Mann-Kendall statistic = -10
critical = -17

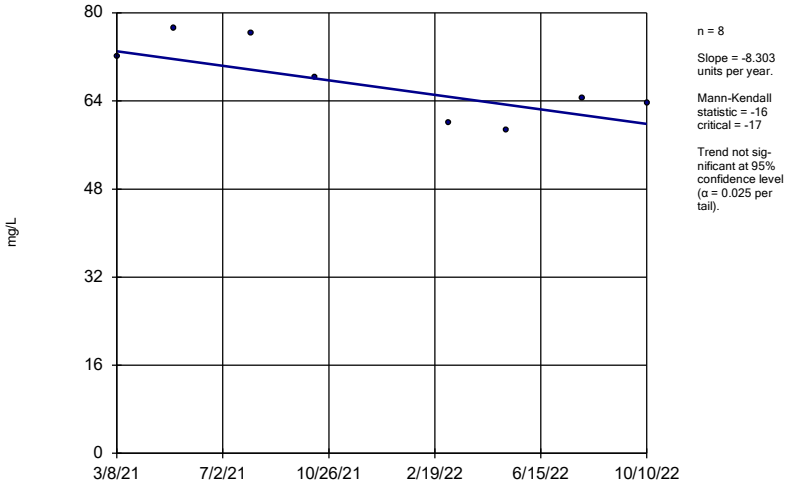
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Chloride

JCW-MW-18001



n = 8

Slope = -8.303 units per year.

Mann-Kendall statistic = -16
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

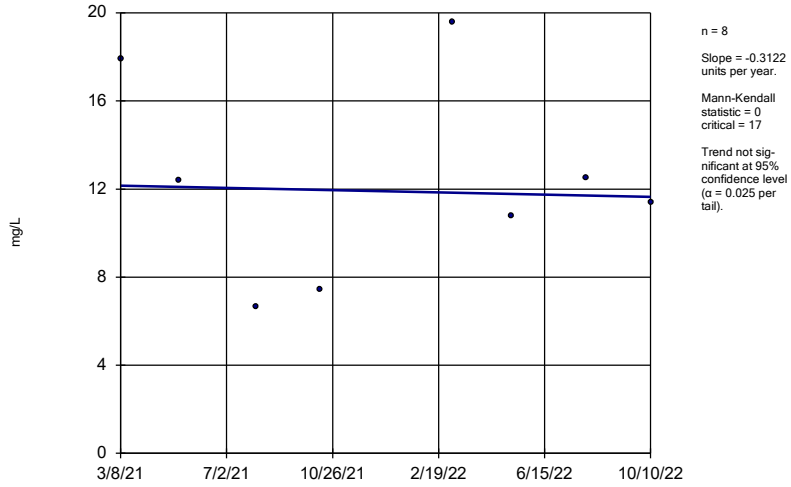
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

JCW-MW-18004



n = 8

Slope = -0.3122 units per year.

Mann-Kendall statistic = 0
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

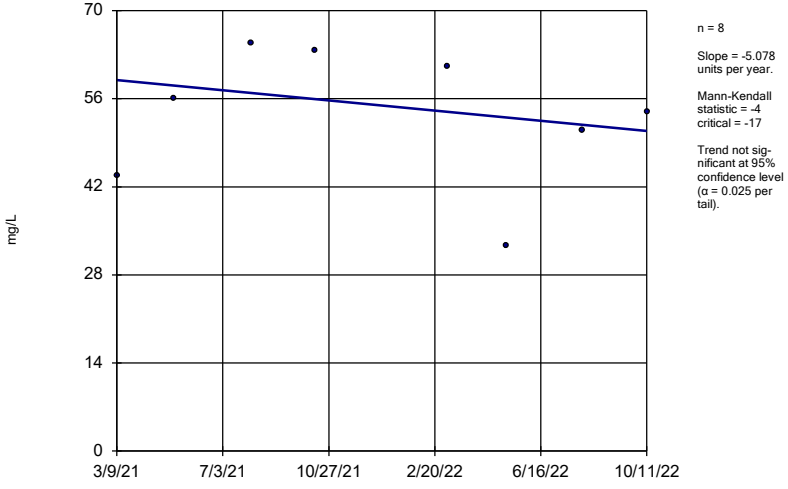
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

JCW-MW-18005



n = 8

Slope = -5.078 units per year.

Mann-Kendall statistic = -4
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

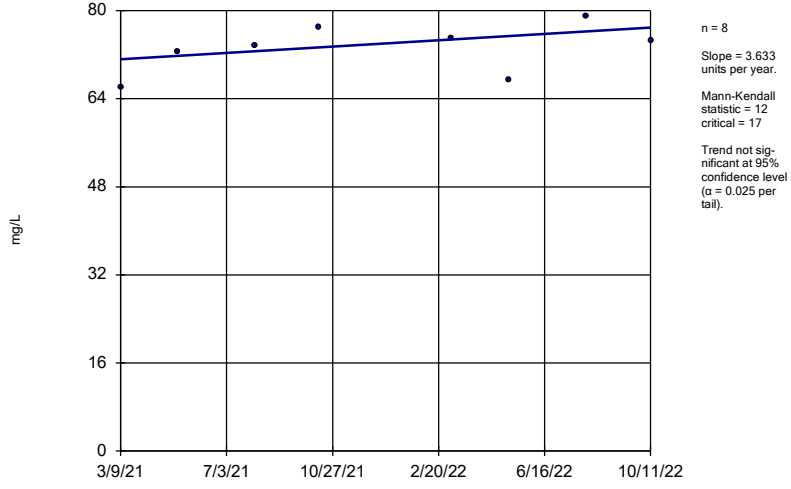
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

JCW-MW-18006



n = 8

Slope = 3.633 units per year.

Mann-Kendall statistic = 12
critical = 17

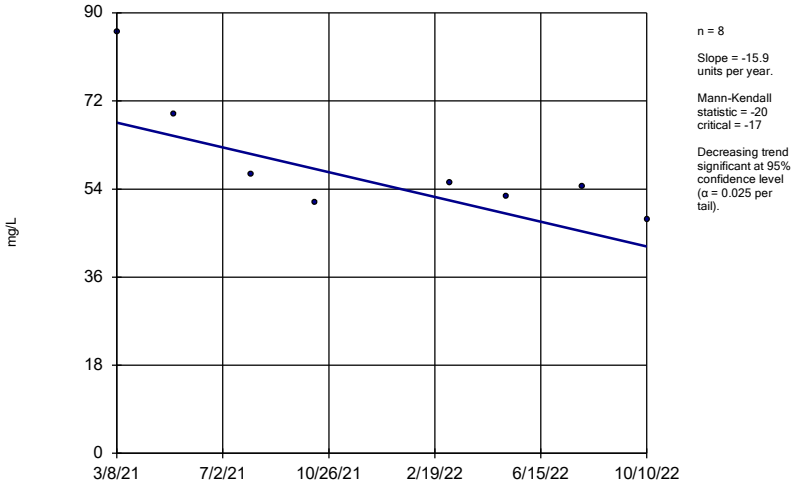
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Chloride

MW-50



n = 8

Slope = -15.9 units per year.

Mann-Kendall statistic = -20 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

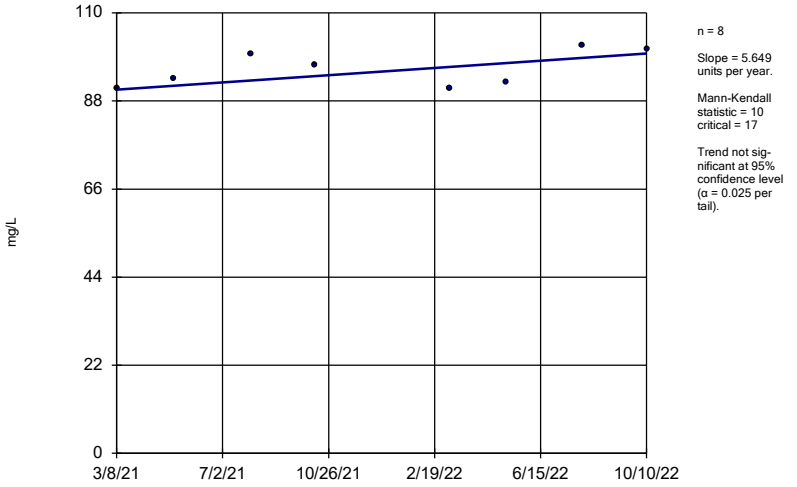
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

MW-51



n = 8

Slope = 5.649 units per year.

Mann-Kendall statistic = 10 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

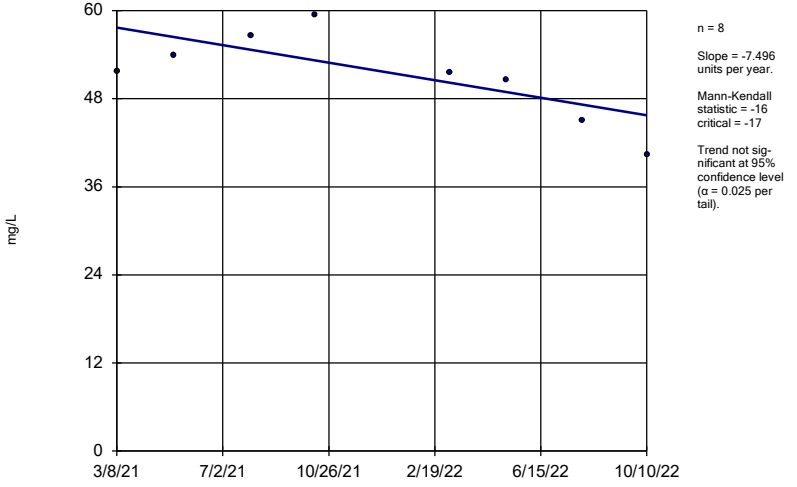
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

MW-52



n = 8

Slope = -7.496 units per year.

Mann-Kendall statistic = -16 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

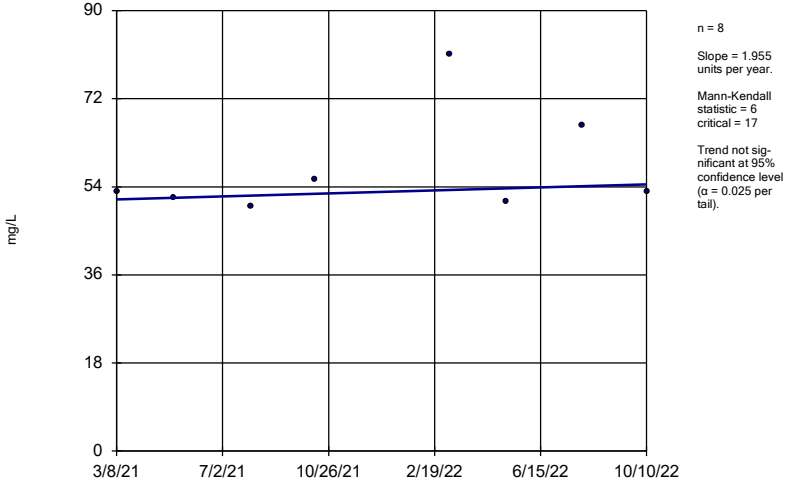
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

MW-53



n = 8

Slope = 1.955 units per year.

Mann-Kendall statistic = 6 critical = 17

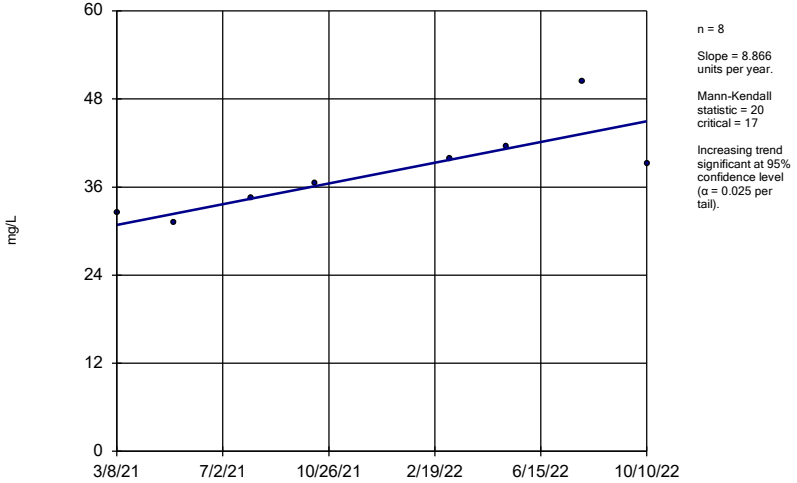
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Chloride

MW-53R



n = 8

Slope = 8.866 units per year.

Mann-Kendall statistic = 20 critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

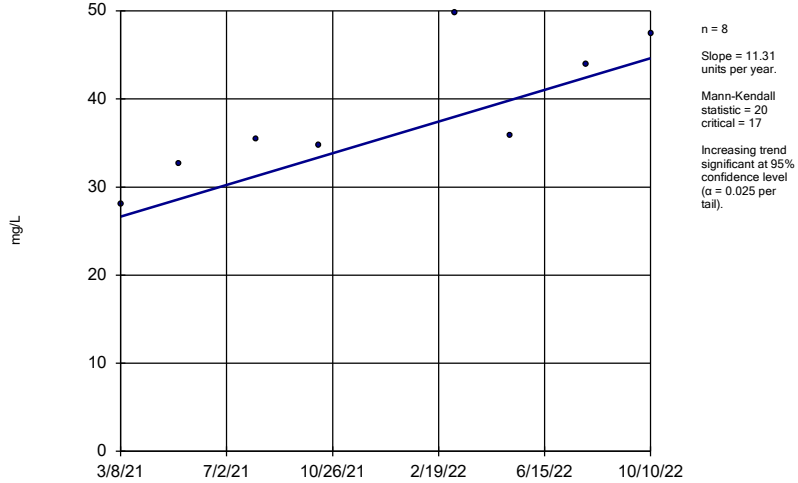
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

MW-54R



n = 8

Slope = 11.31 units per year.

Mann-Kendall statistic = 20 critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

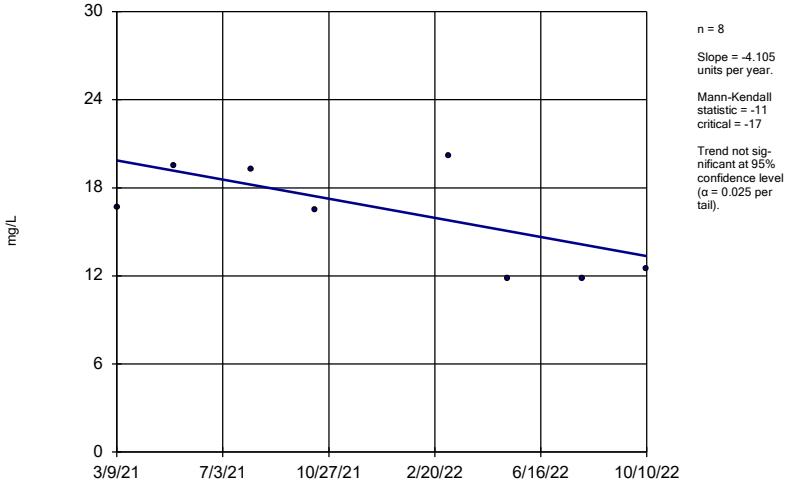
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

MW-55



n = 8

Slope = -4.105 units per year.

Mann-Kendall statistic = -11 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

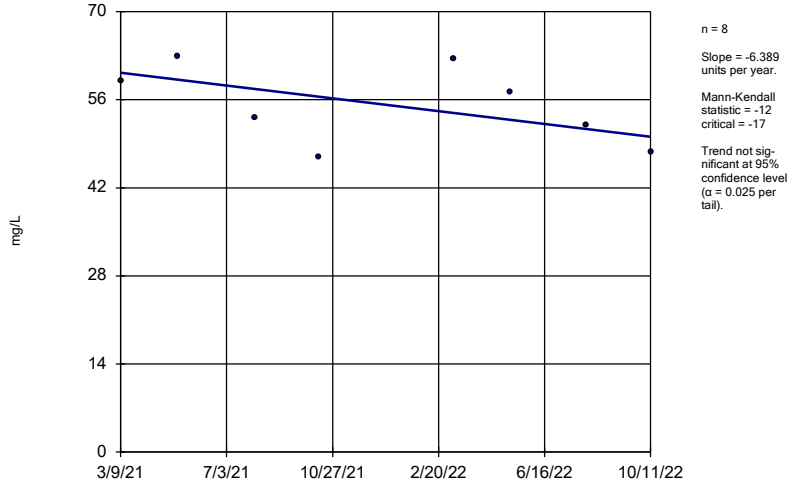
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Chloride

OW-57ROUT



n = 8

Slope = -6.389 units per year.

Mann-Kendall statistic = -12 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

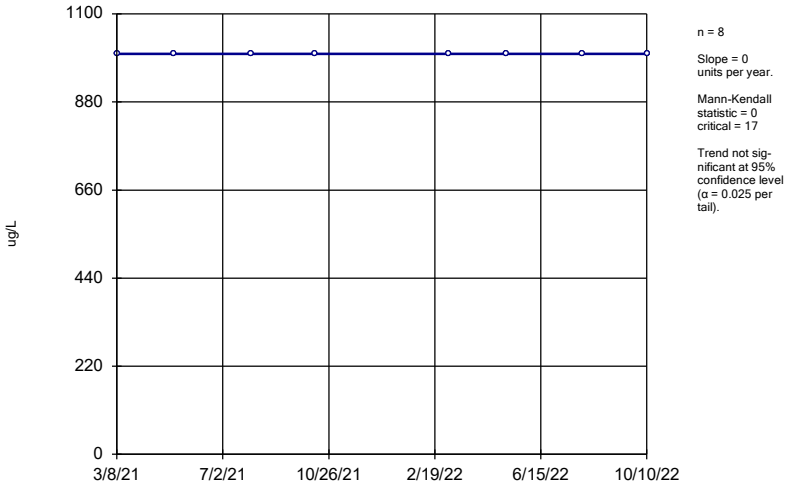
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

JCW-MW-18001



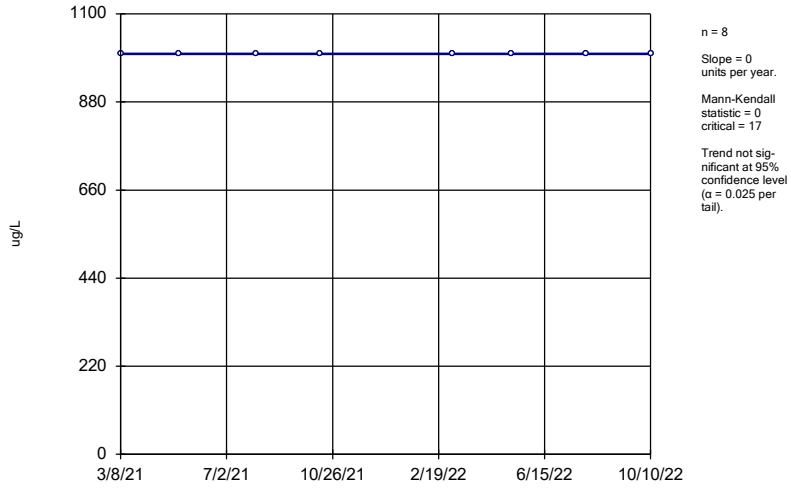
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

JCW-MW-18004



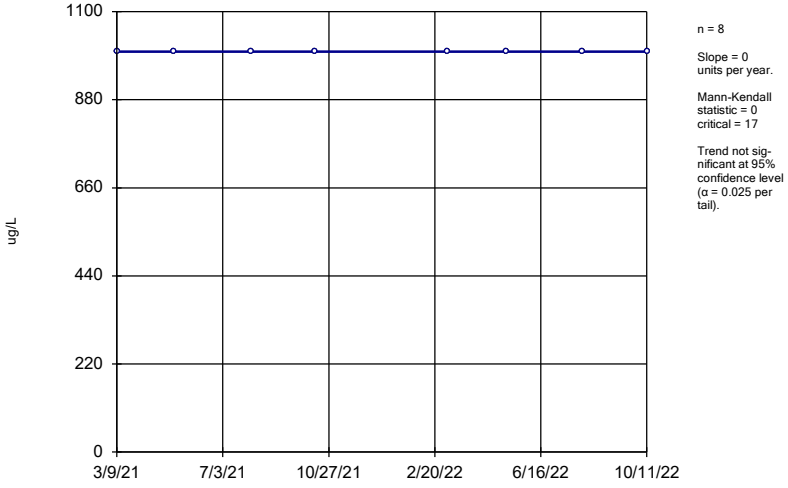
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

JCW-MW-18005



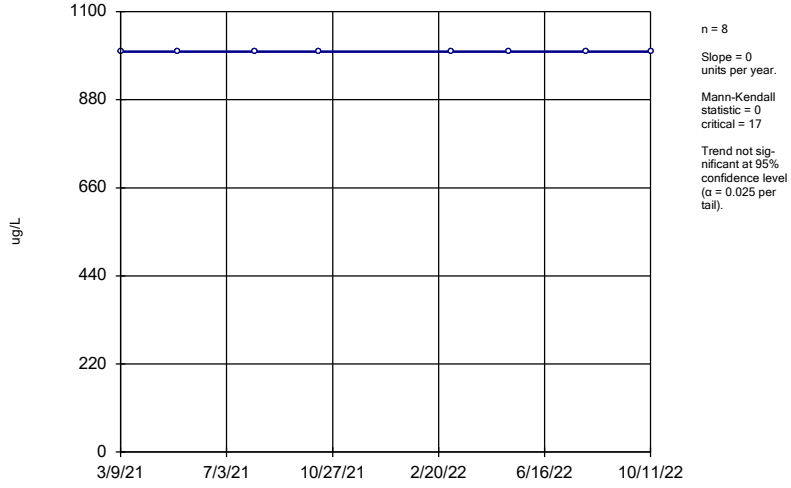
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

JCW-MW-18006



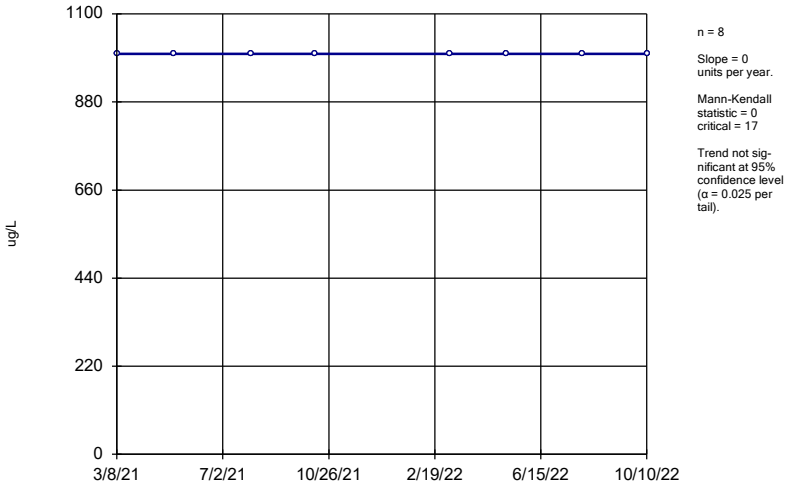
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

MW-50



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

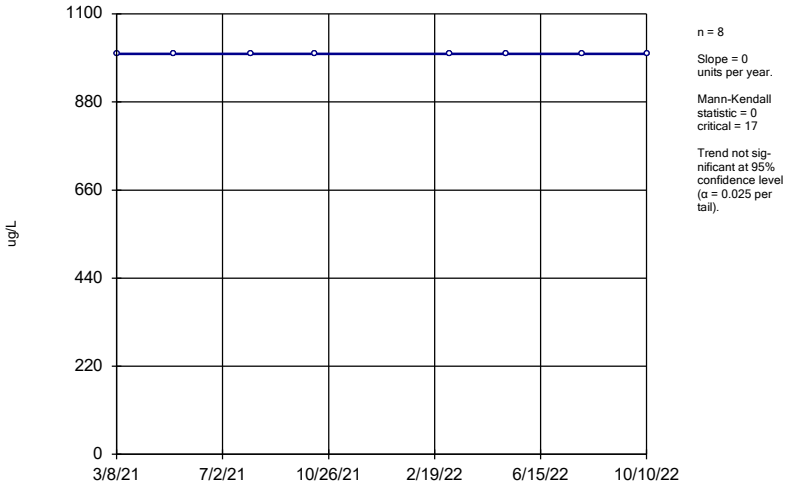
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

MW-51



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

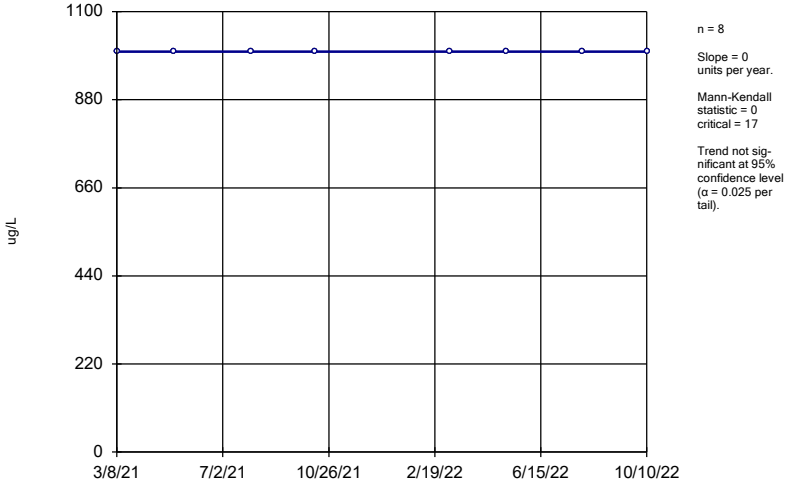
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

MW-52



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

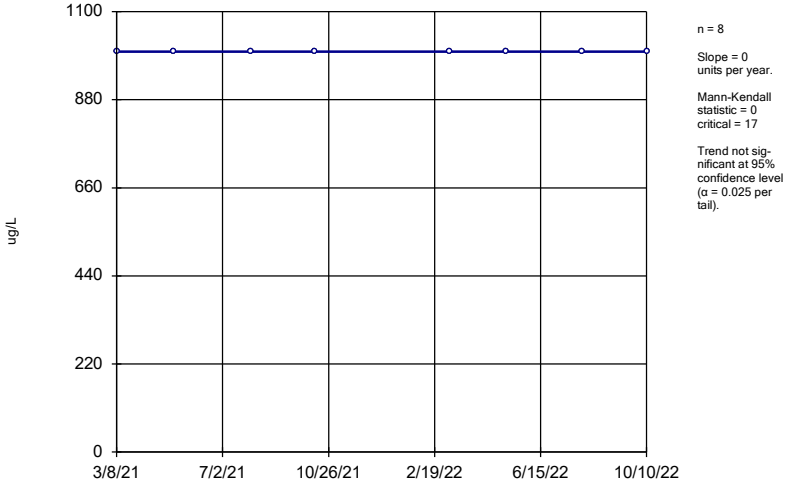
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

MW-53



n = 8

Slope = 0 units per year.

Mann-Kendall statistic = 0 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

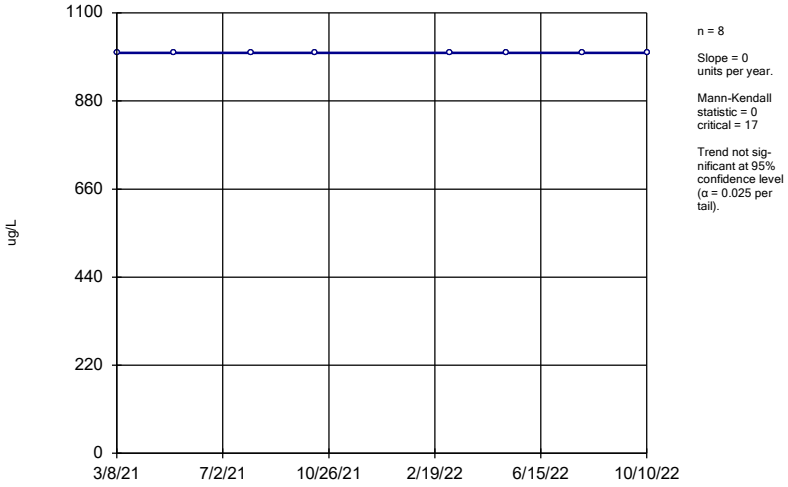
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

MW-53R



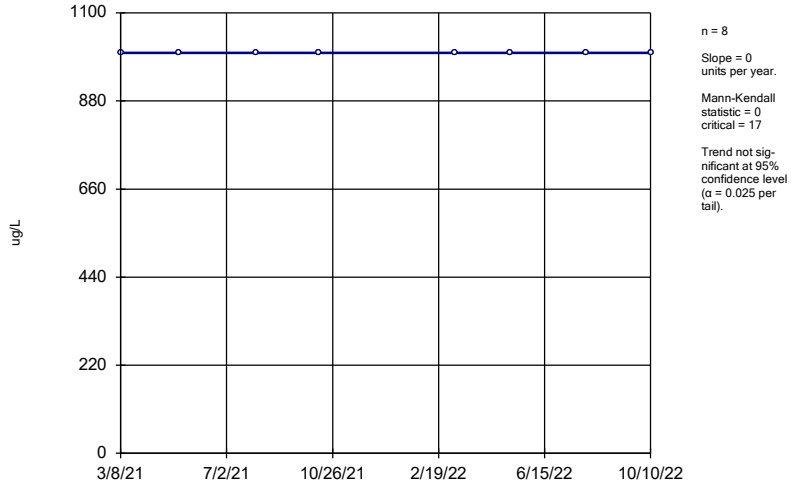
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

MW-54R



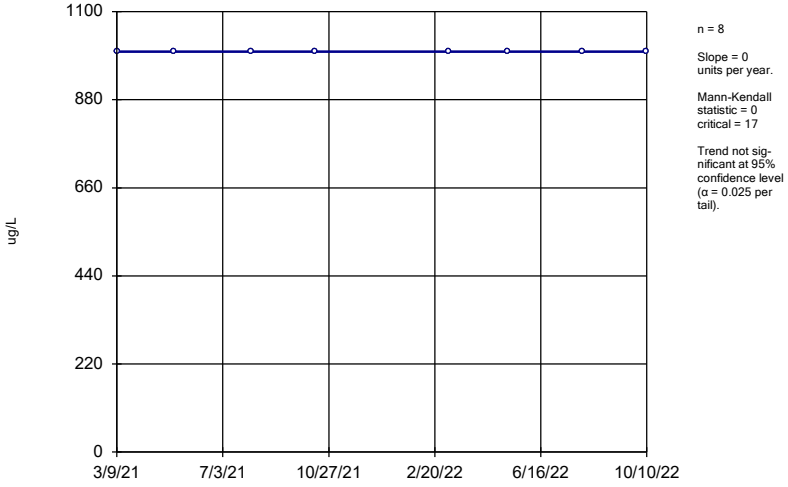
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

MW-55



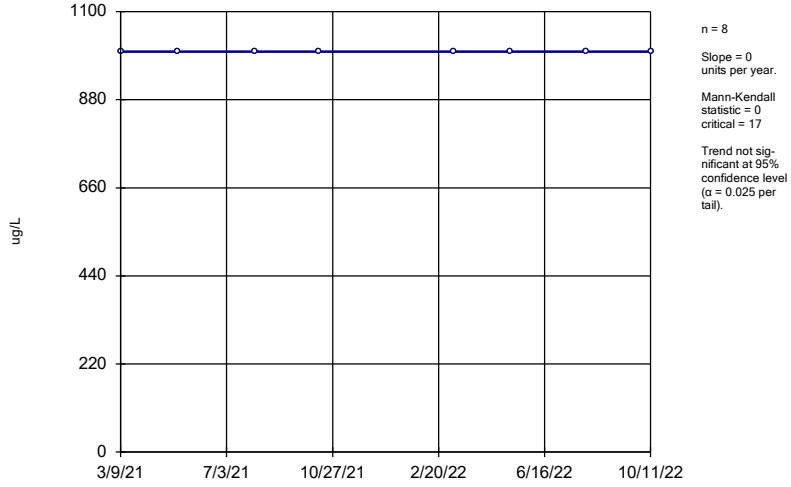
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Fluoride

OW-57ROUT



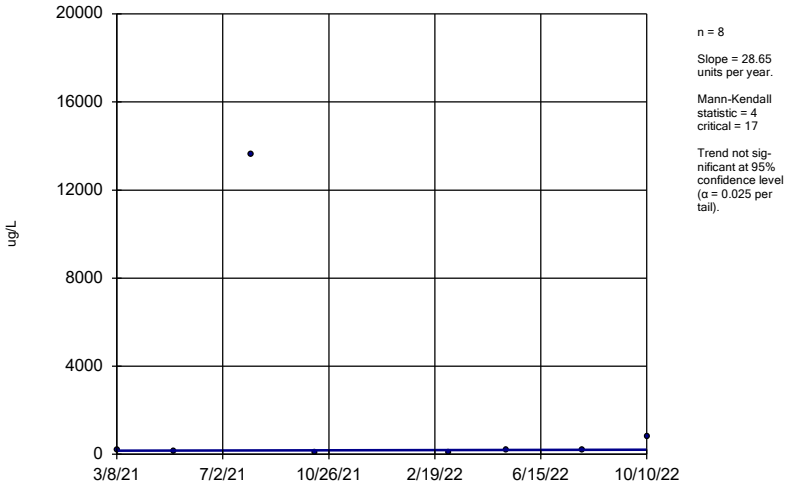
Sen's Slope Estimator Analysis Run 11/7/2022 11:43 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

JCW-MW-18001



Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

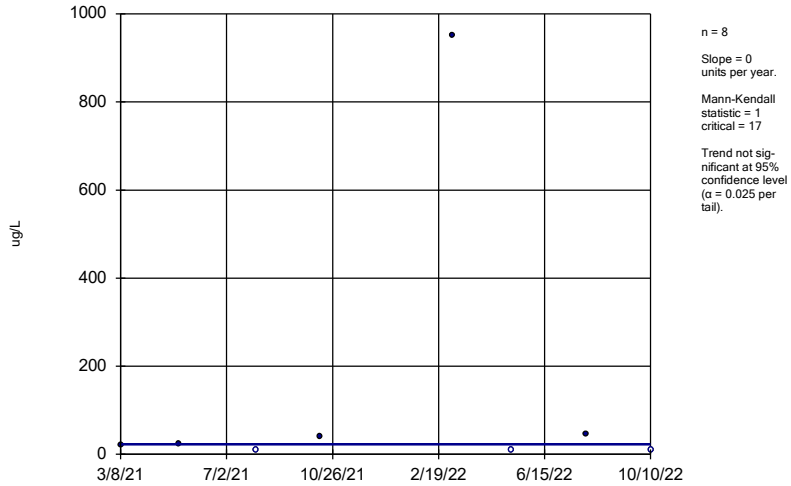
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Hollow symbols indicate censored values.

Iron, Total

JCW-MW-18004



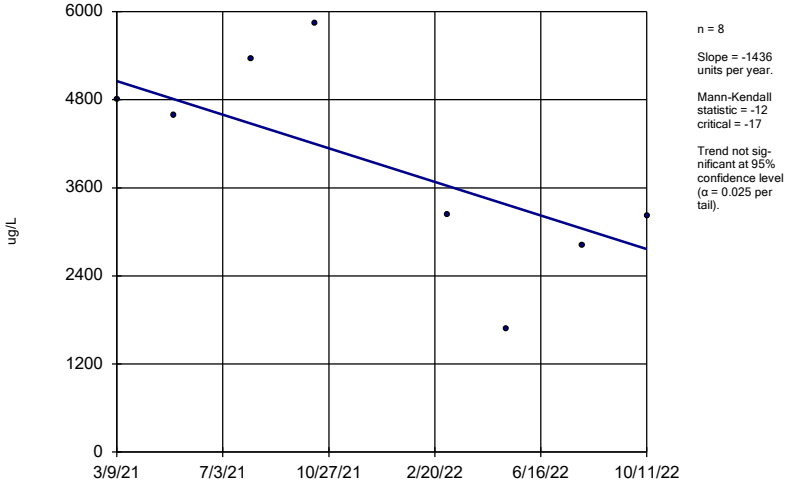
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

JCW-MW-18005



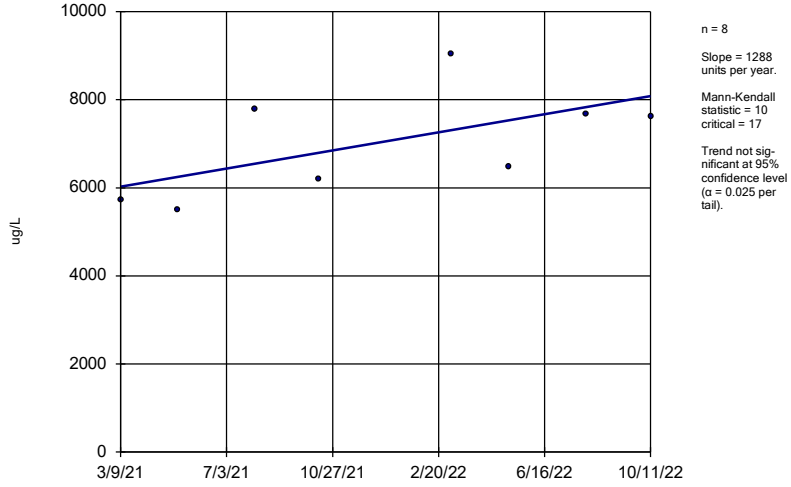
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

JCW-MW-18006

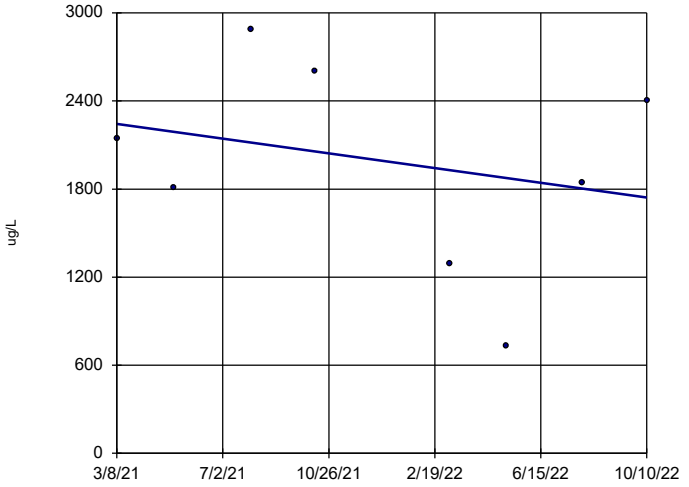


Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Iron, Total

MW-50



n = 8

Slope = -315 units per year.

Mann-Kendall statistic = -4 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

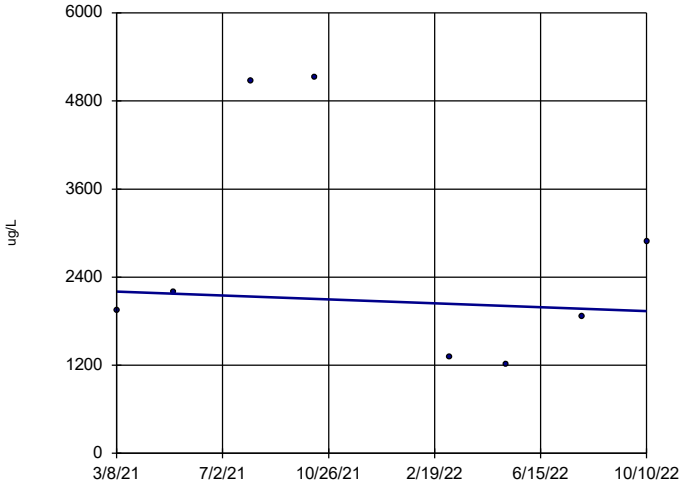
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

MW-51



n = 8

Slope = -167.1 units per year.

Mann-Kendall statistic = -2 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

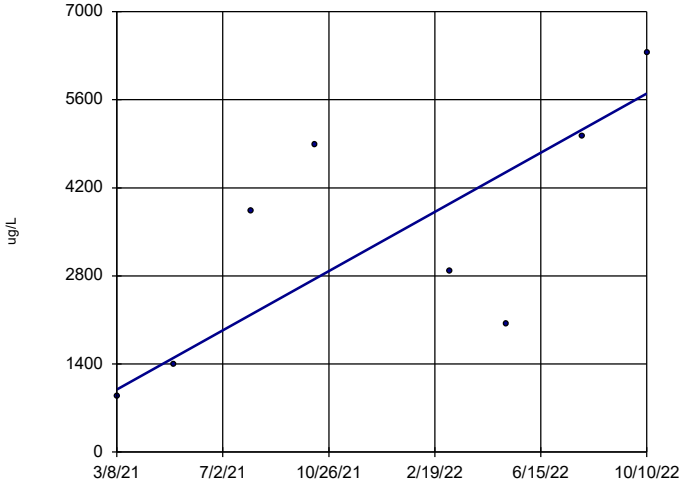
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

MW-52



n = 8

Slope = 2954 units per year.

Mann-Kendall statistic = 18 critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

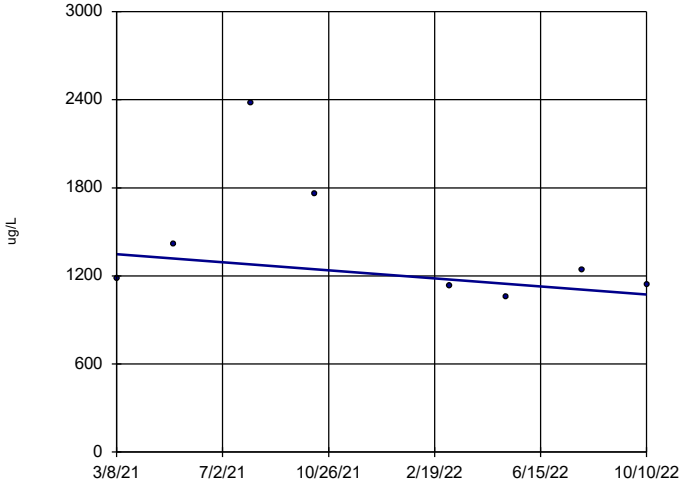
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

MW-53



n = 8

Slope = -172 units per year.

Mann-Kendall statistic = -8 critical = -17

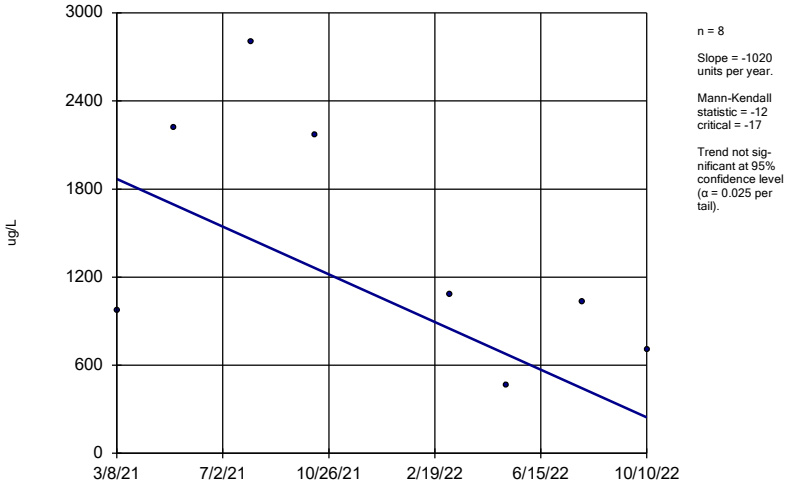
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Iron, Total

MW-53R



n = 8

Slope = -1020 units per year.

Mann-Kendall statistic = -12 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

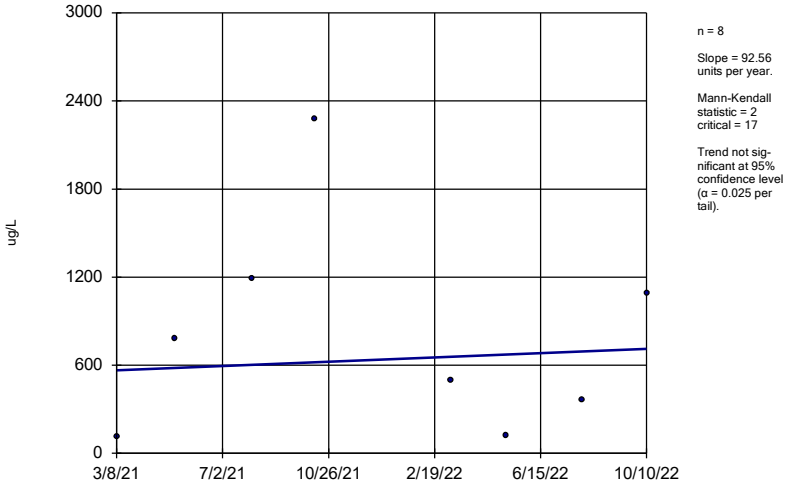
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

MW-54R



n = 8

Slope = 92.56 units per year.

Mann-Kendall statistic = 2 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

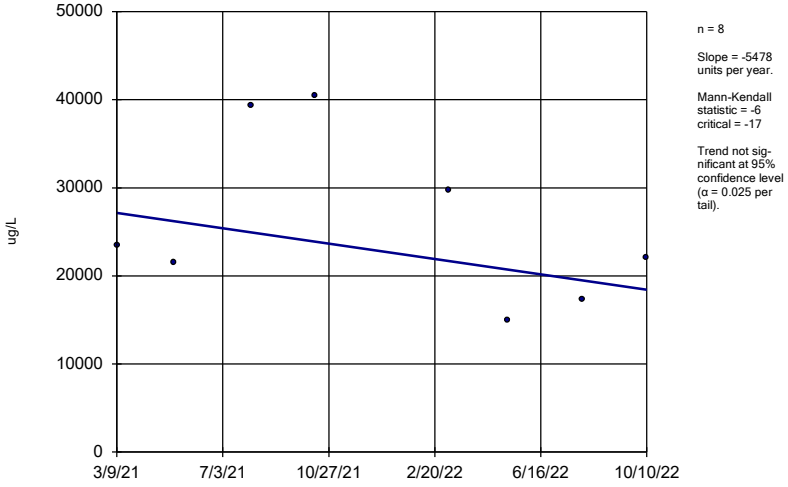
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

MW-55



n = 8

Slope = -5478 units per year.

Mann-Kendall statistic = -6 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

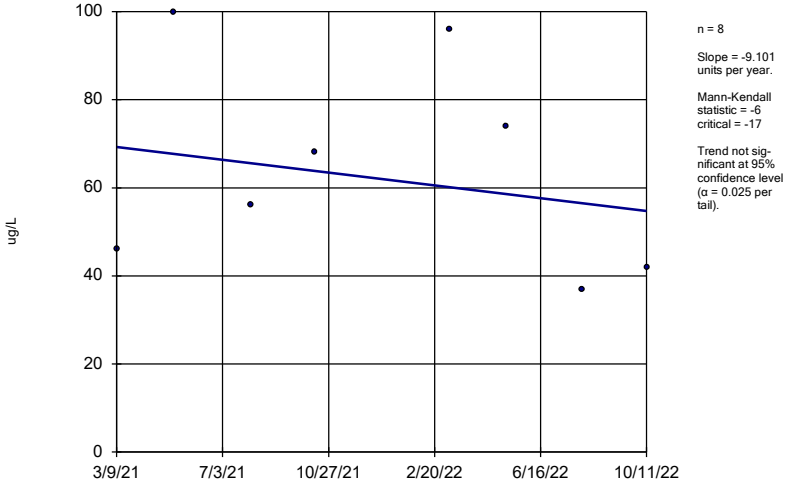
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

OW-57ROUT



n = 8

Slope = -9.101 units per year.

Mann-Kendall statistic = -6 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

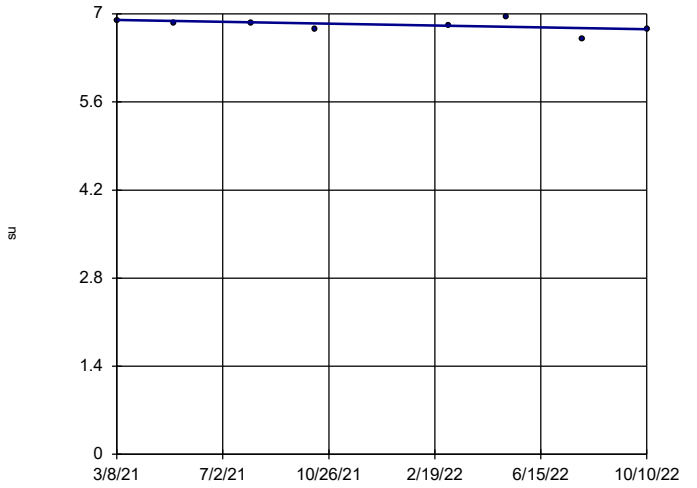
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

JCW-MW-18001



n = 8

Slope = -0.09337 units per year.

Mann-Kendall statistic = -12
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

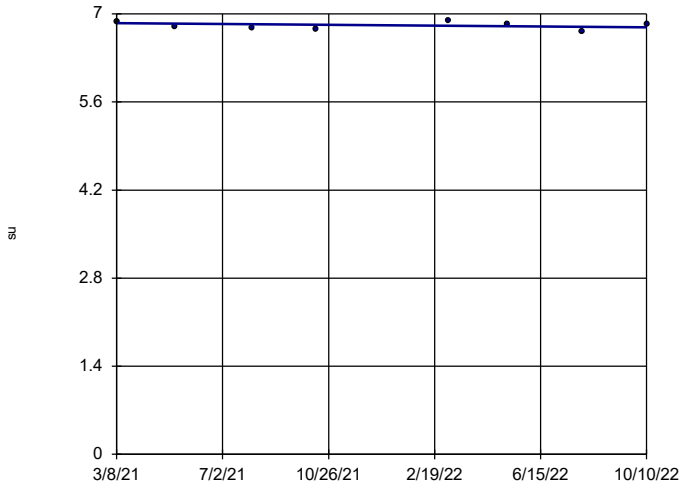
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

JCW-MW-18004



n = 8

Slope = -0.04197 units per year.

Mann-Kendall statistic = -5
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

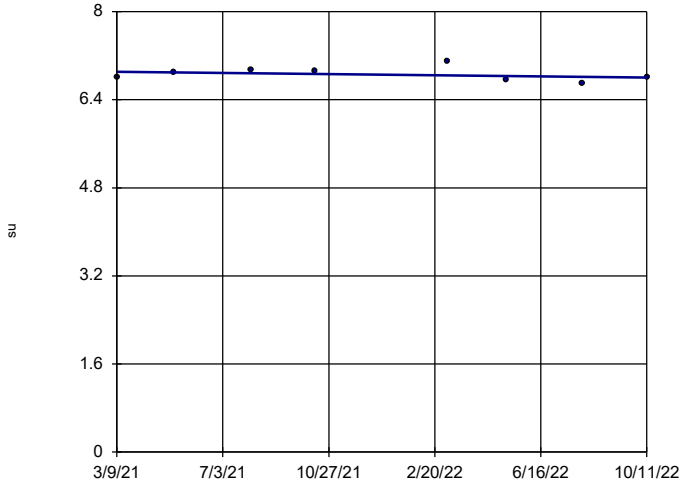
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

JCW-MW-18005



n = 8

Slope = -0.06742 units per year.

Mann-Kendall statistic = -4
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

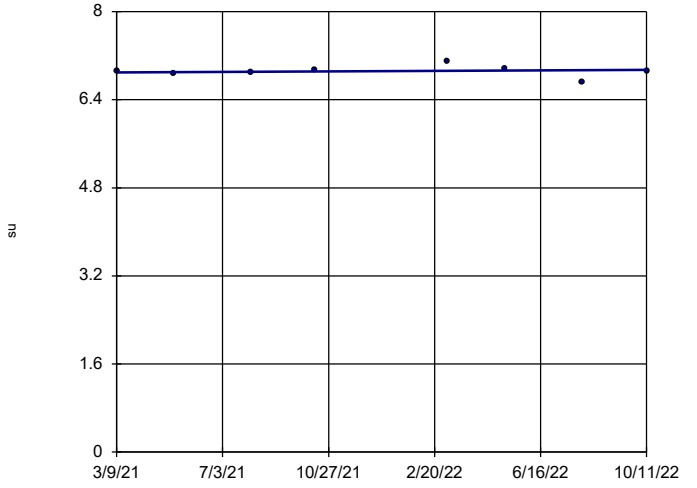
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

JCW-MW-18006



n = 8

Slope = 0.03008 units per year.

Mann-Kendall statistic = 4
critical = 17

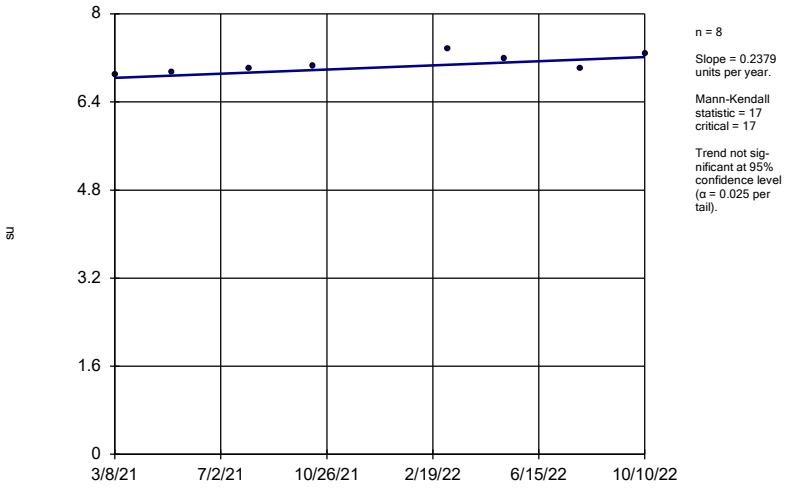
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

pH, Field

MW-50



n = 8

Slope = 0.2379 units per year.

Mann-Kendall statistic = 17 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

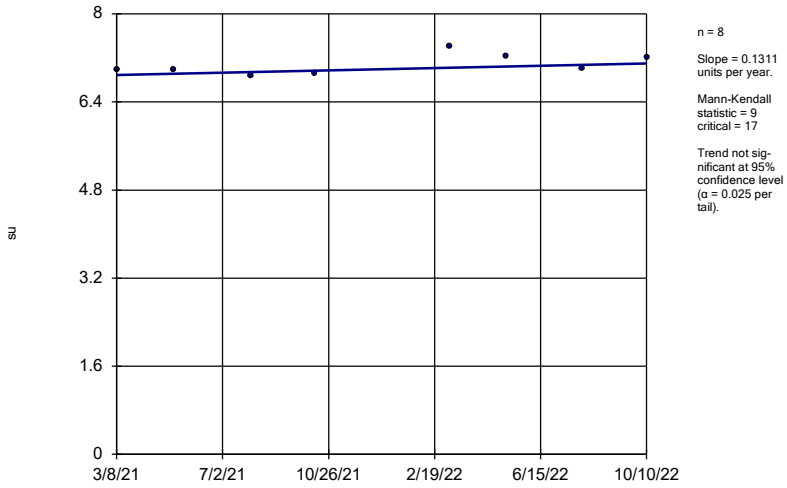
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

MW-51



n = 8

Slope = 0.1311 units per year.

Mann-Kendall statistic = 9 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

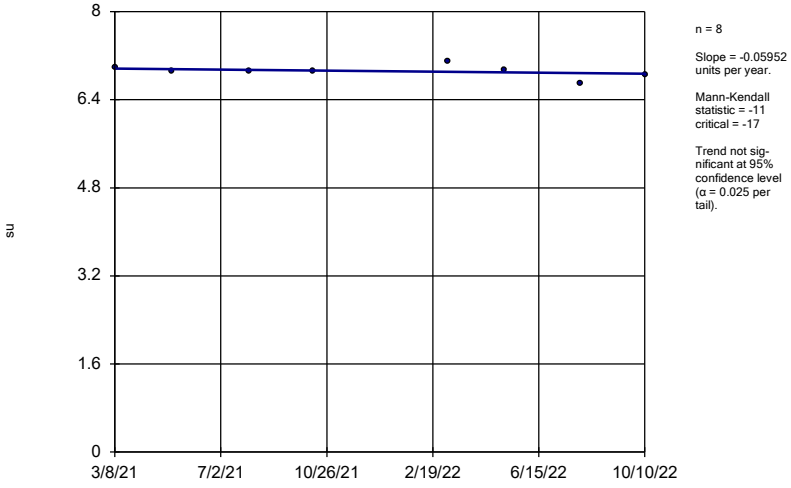
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

MW-52



n = 8

Slope = -0.05952 units per year.

Mann-Kendall statistic = -11 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

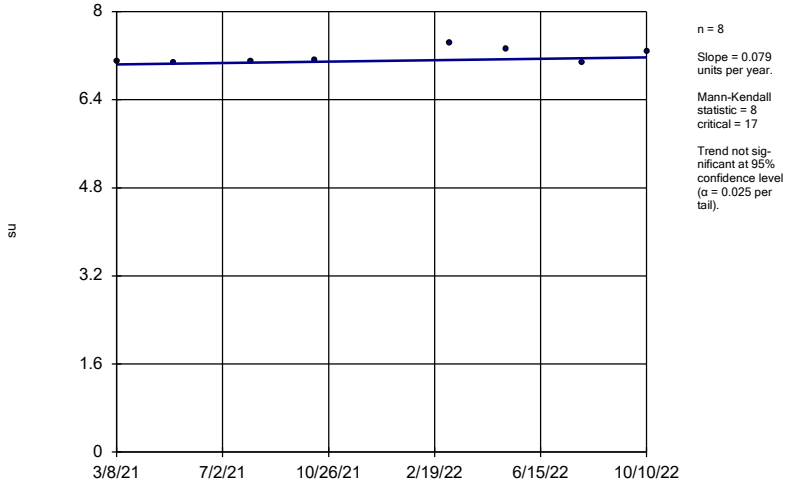
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

MW-53



n = 8

Slope = 0.079 units per year.

Mann-Kendall statistic = 8 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

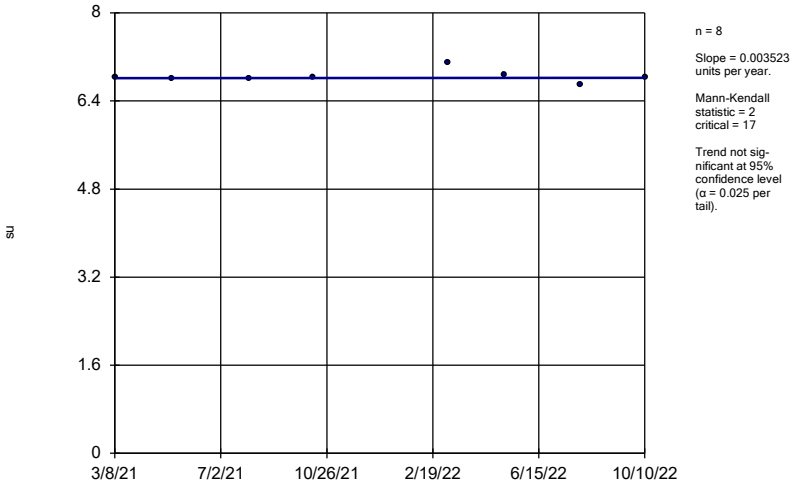
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

MW-53R



n = 8

Slope = 0.003523 units per year.

Mann-Kendall statistic = 2 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

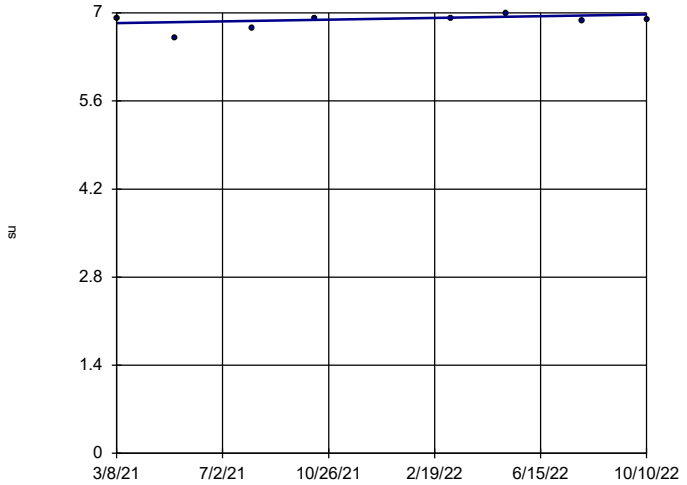
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

MW-54R



n = 8

Slope = 0.08522 units per year.

Mann-Kendall statistic = 3 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

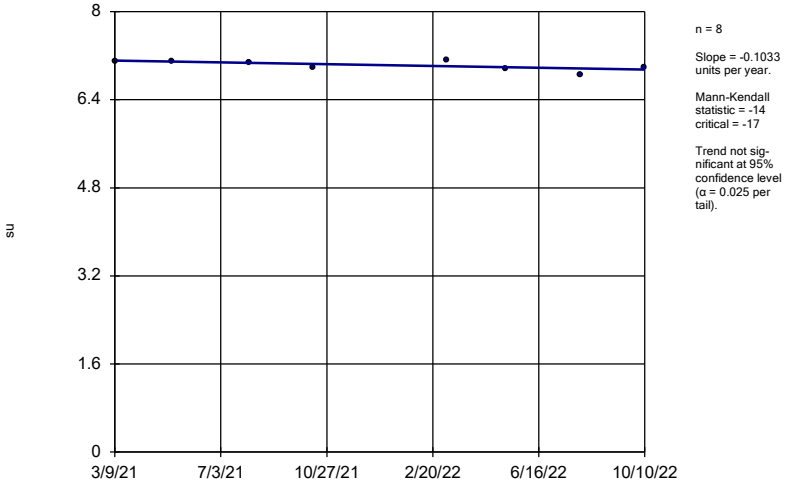
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

MW-55



n = 8

Slope = -0.1033 units per year.

Mann-Kendall statistic = -14 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

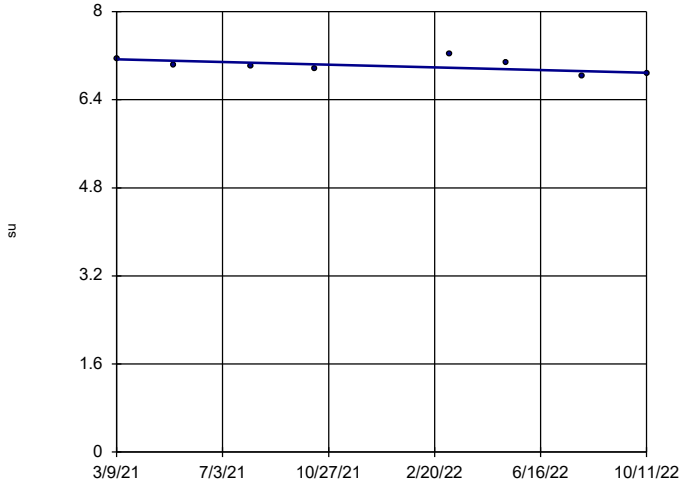
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

pH, Field

OW-57ROUT



n = 8

Slope = -0.1526 units per year.

Mann-Kendall statistic = -12 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

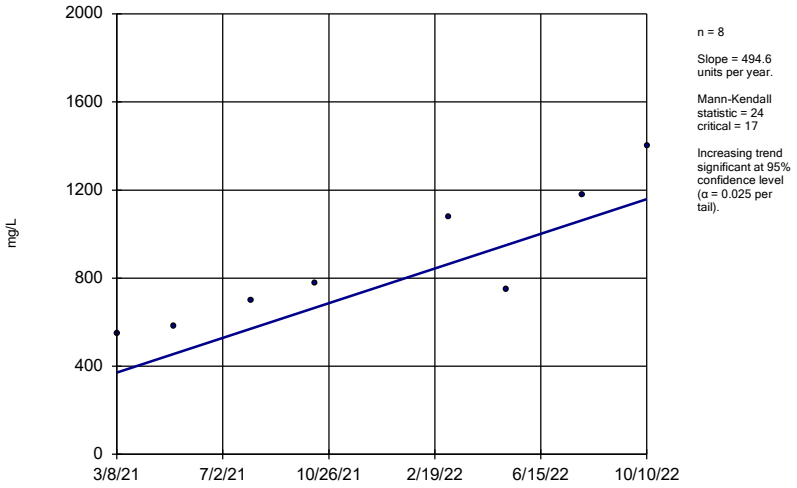
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

JCW-MW-18001



n = 8

Slope = 494.6 units per year.

Mann-Kendall statistic = 24 critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

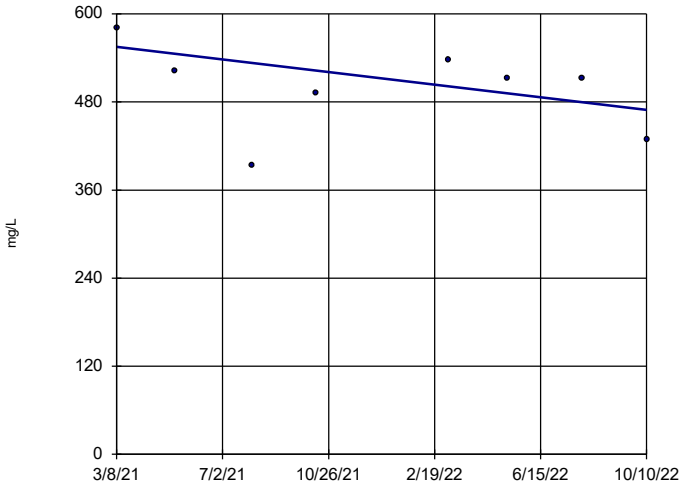
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

JCW-MW-18004



n = 8

Slope = -54.06 units per year.

Mann-Kendall statistic = -9 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

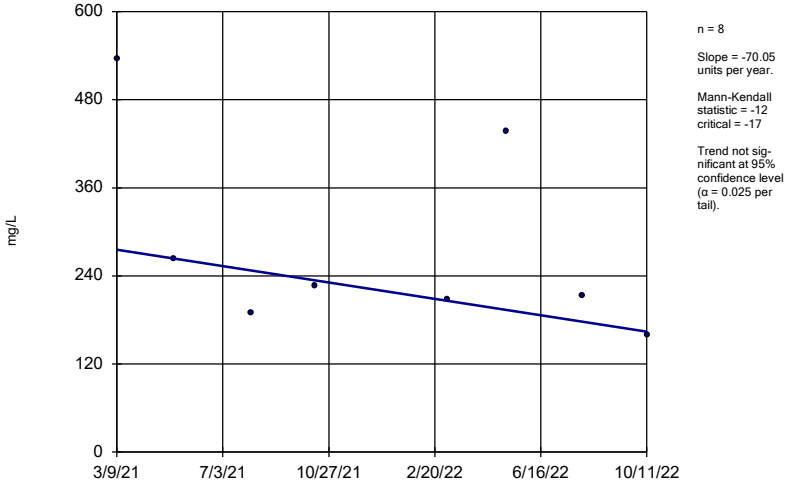
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

JCW-MW-18005



n = 8

Slope = -70.05 units per year.

Mann-Kendall statistic = -12 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

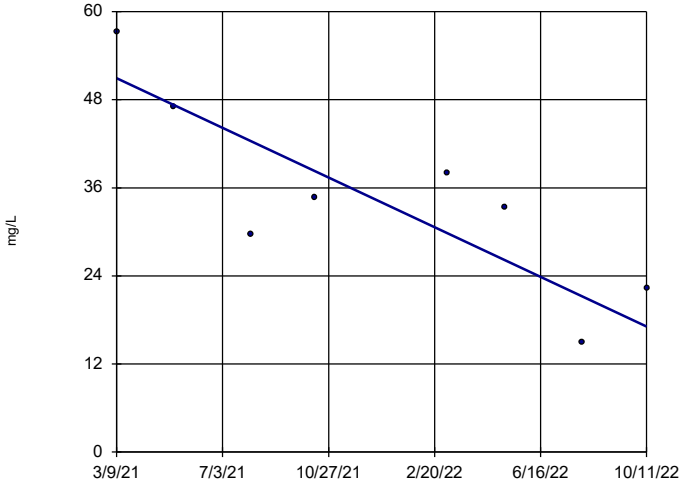
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

JCW-MW-18006



n = 8

Slope = -21.23 units per year.

Mann-Kendall statistic = -18 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

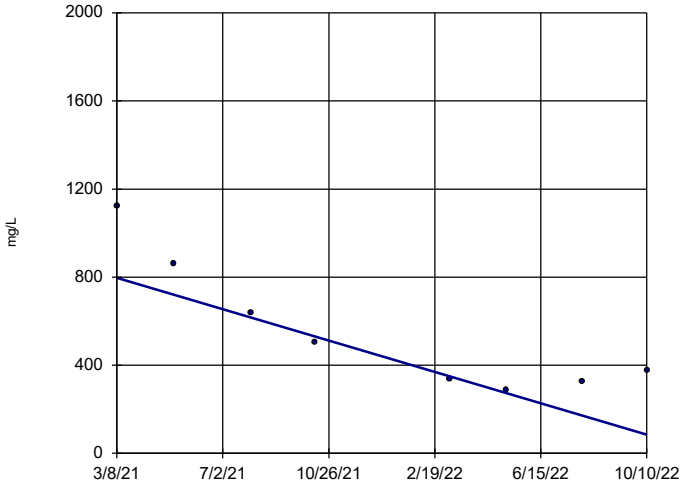
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

MW-50



n = 8

Slope = -447.2 units per year.

Mann-Kendall statistic = -20 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

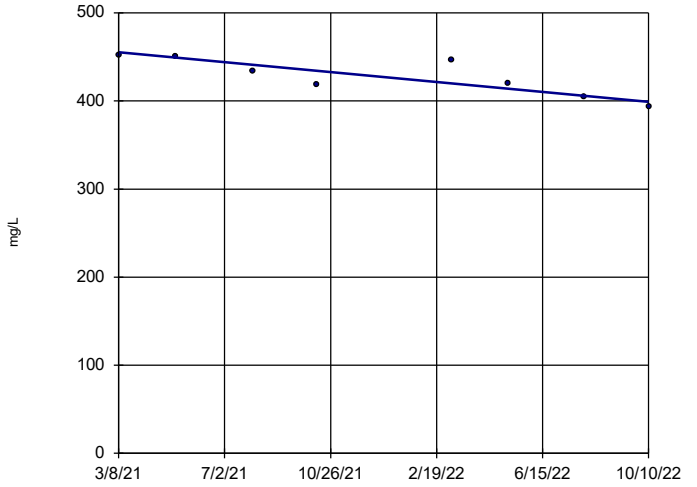
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

MW-51



n = 8

Slope = -35.36 units per year.

Mann-Kendall statistic = -22 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

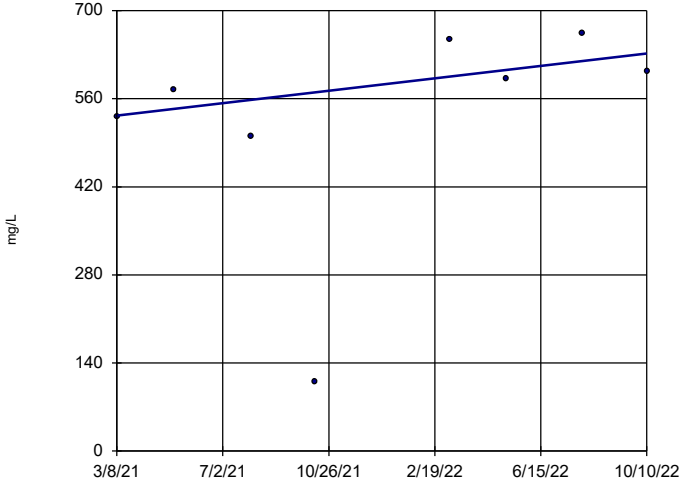
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

MW-52



n = 8

Slope = 61.9 units per year.

Mann-Kendall statistic = 12 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

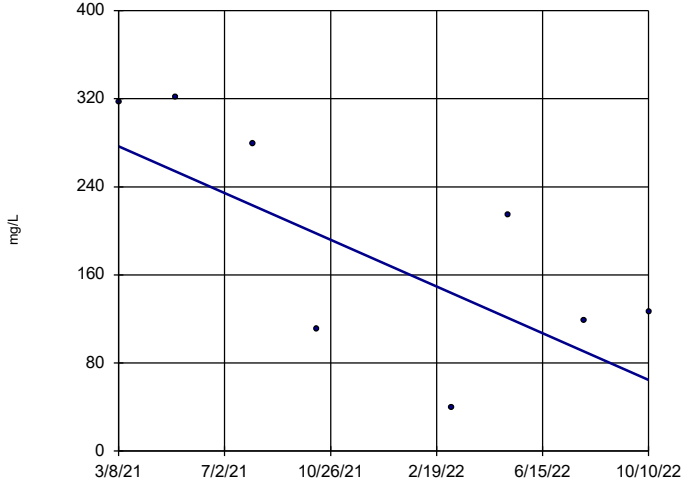
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

MW-53



n = 8

Slope = -133.4 units per year.

Mann-Kendall statistic = -12 critical = -17

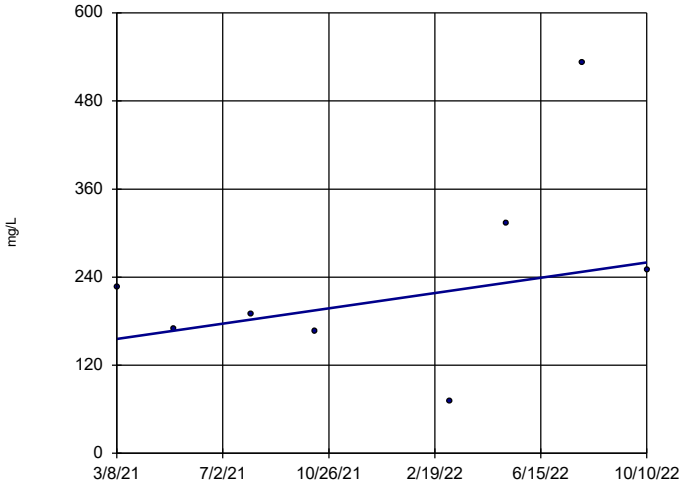
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sulfate

MW-53R



n = 8

Slope = 65.37 units per year.

Mann-Kendall statistic = 6 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

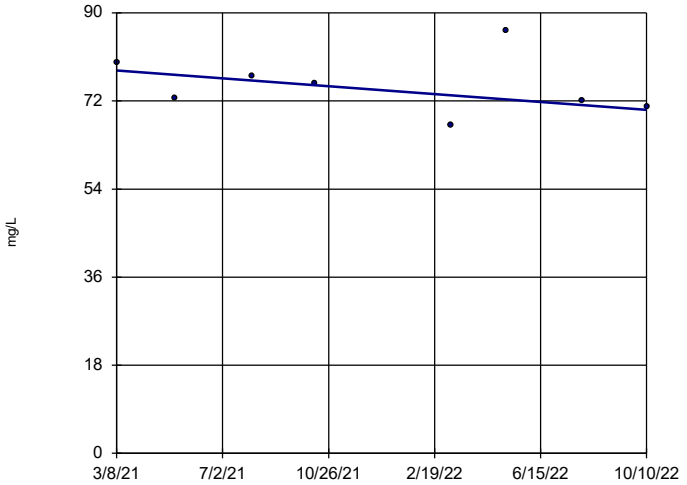
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

MW-54R



n = 8

Slope = -5.035 units per year.

Mann-Kendall statistic = -10 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

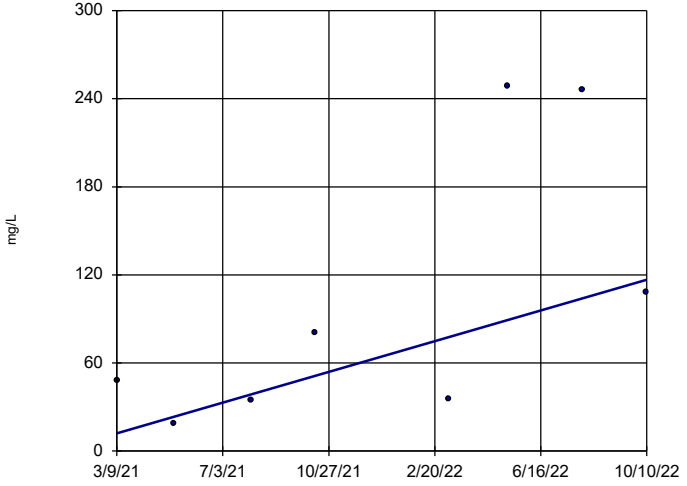
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

MW-55



n = 8

Slope = 65.92 units per year.

Mann-Kendall statistic = 14 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

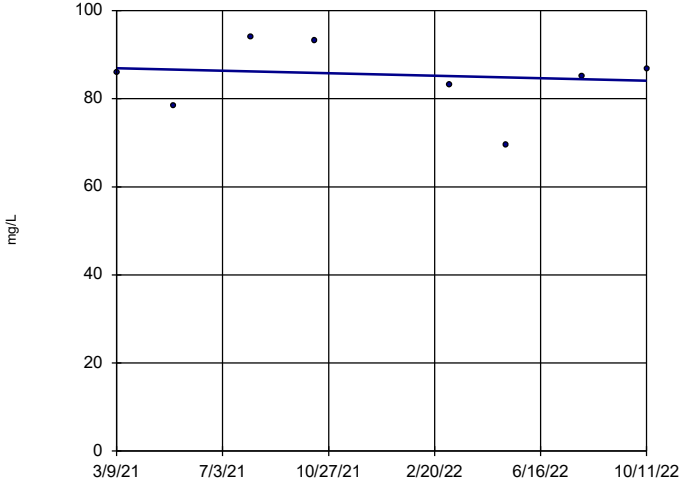
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

OW-57ROUT



n = 8

Slope = -1.807 units per year.

Mann-Kendall statistic = -2 critical = -17

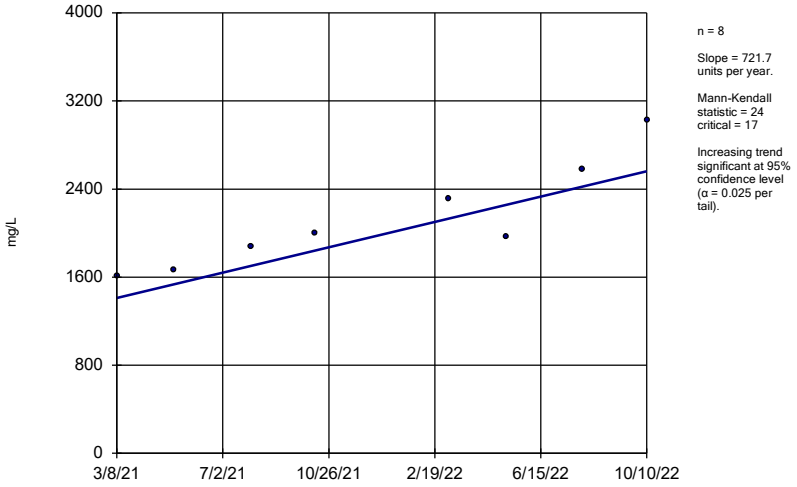
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Total Dissolved Solids

JCW-MW-18001



n = 8

Slope = 721.7 units per year.

Mann-Kendall statistic = 24
critical = 17

Increasing trend significant at 95% confidence level (α = 0.025 per tail).

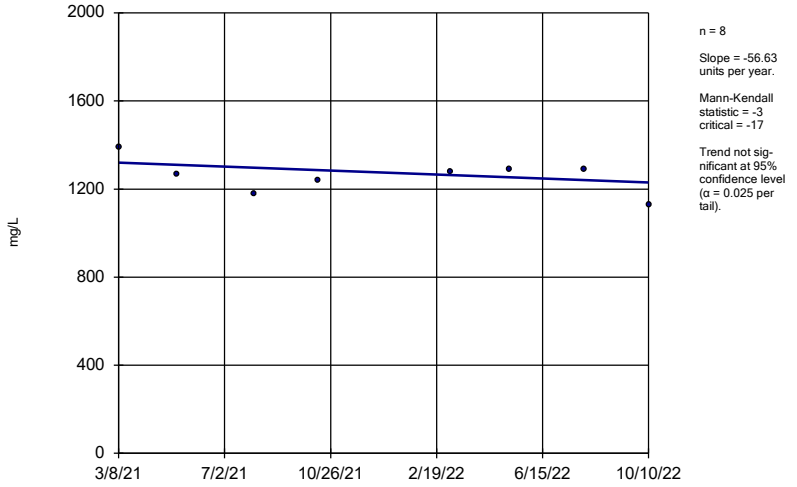
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

JCW-MW-18004



n = 8

Slope = -56.63 units per year.

Mann-Kendall statistic = -3
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

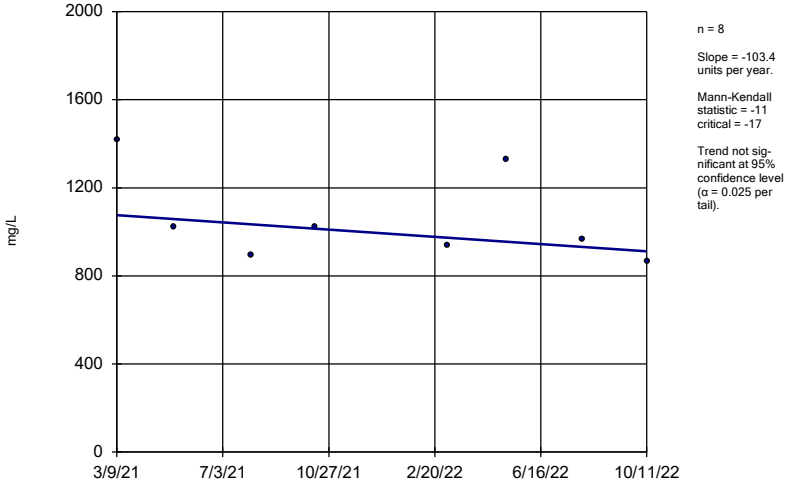
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

JCW-MW-18005



n = 8

Slope = -103.4 units per year.

Mann-Kendall statistic = -11
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

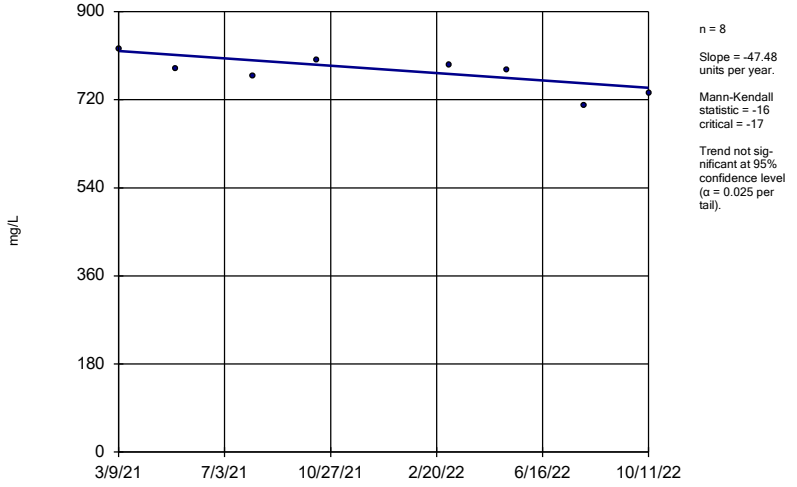
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

JCW-MW-18006



n = 8

Slope = -47.48 units per year.

Mann-Kendall statistic = -16
critical = -17

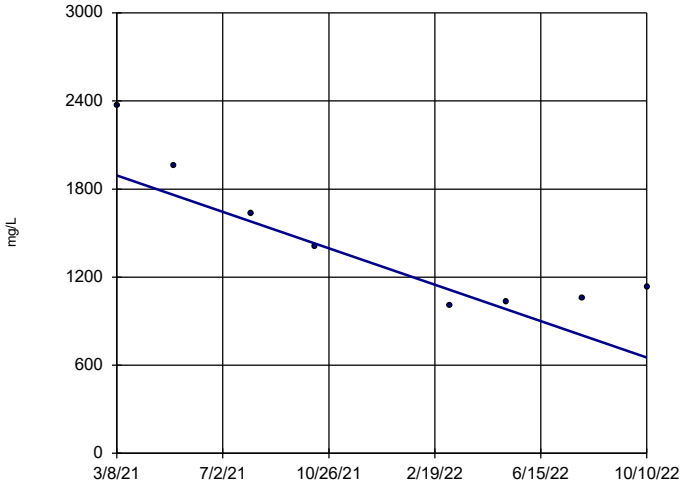
Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Total Dissolved Solids

MW-50



n = 8

Slope = -779 units per year.

Mann-Kendall statistic = -16 critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

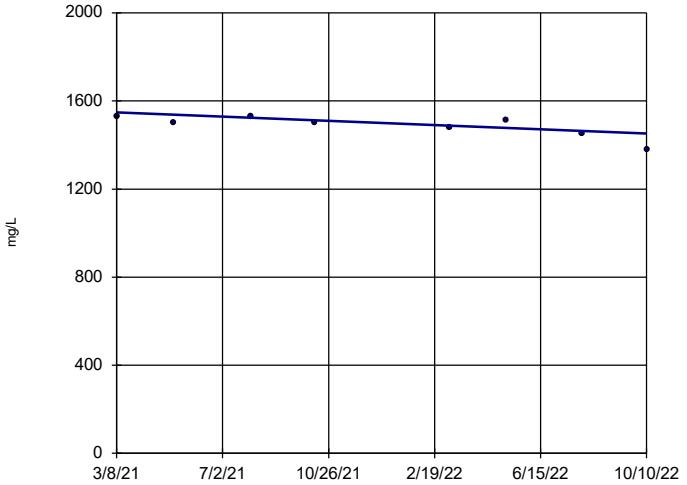
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

MW-51



n = 8

Slope = -59.61 units per year.

Mann-Kendall statistic = -18 critical = -17

Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

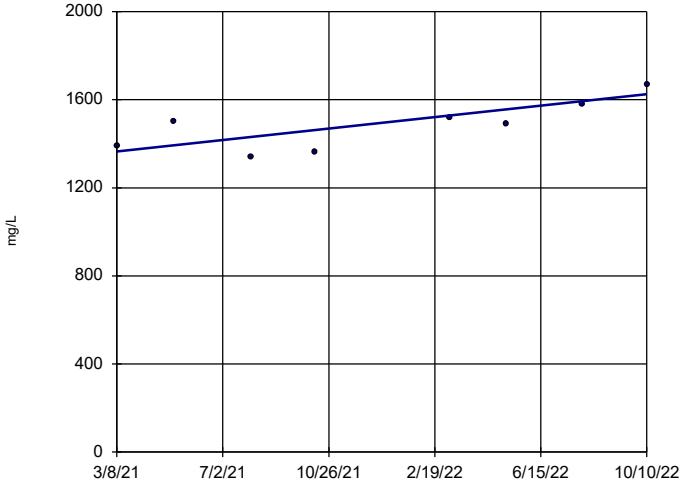
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

MW-52



n = 8

Slope = 163 units per year.

Mann-Kendall statistic = 16 critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

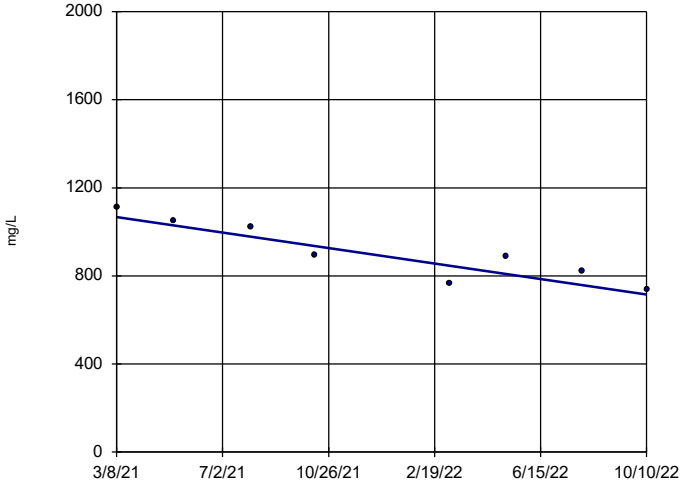
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

MW-53



n = 8

Slope = -221 units per year.

Mann-Kendall statistic = -24 critical = -17

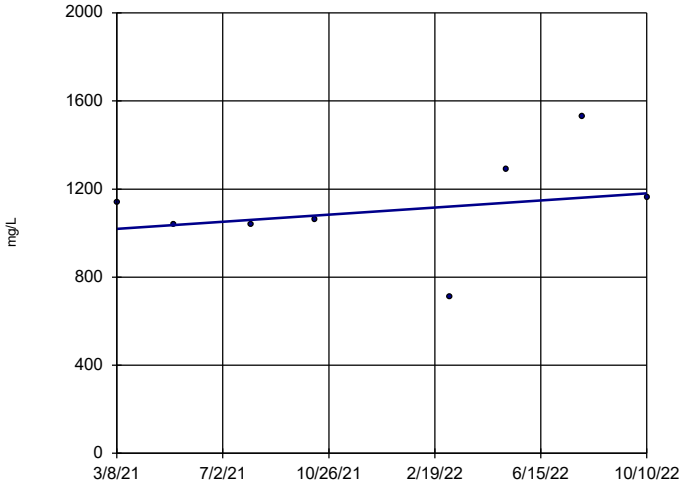
Decreasing trend significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Total Dissolved Solids

MW-53R



n = 8

Slope = 100.6 units per year.

Mann-Kendall statistic = 9
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

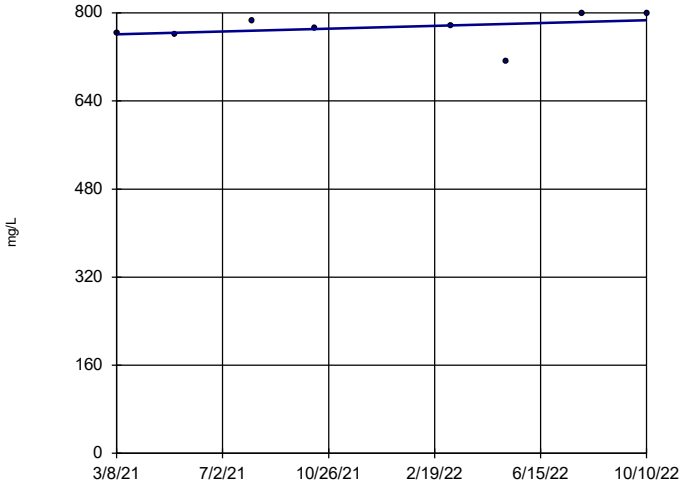
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

MW-54R



n = 8

Slope = 16.03 units per year.

Mann-Kendall statistic = 10
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

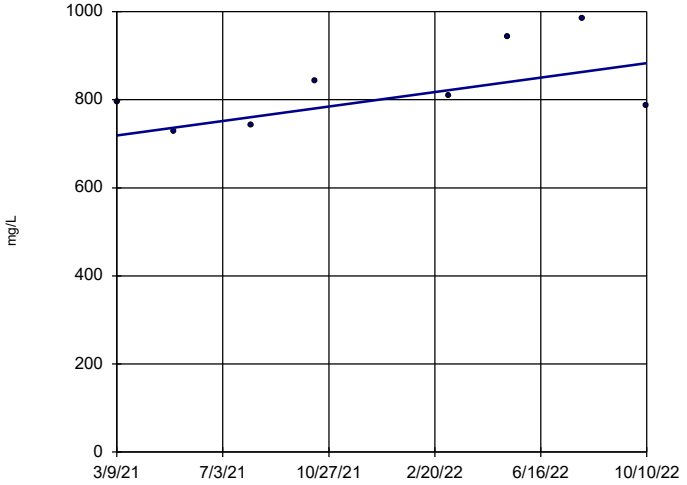
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

MW-55



n = 8

Slope = 103 units per year.

Mann-Kendall statistic = 12
critical = 17

Trend not significant at 95% confidence level (α = 0.025 per tail).

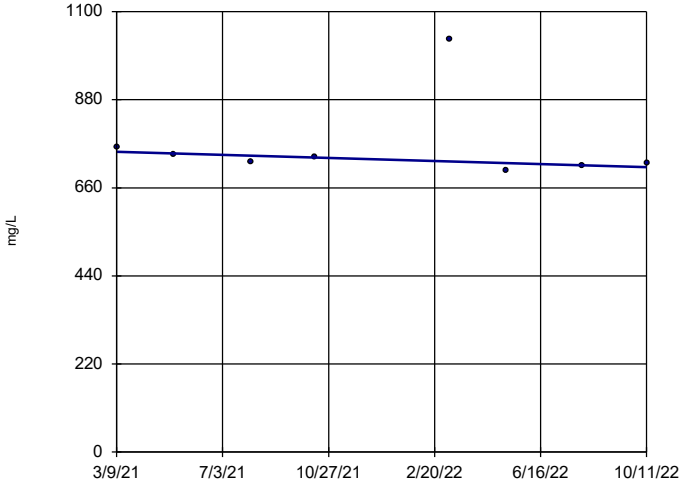
Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Total Dissolved Solids

OW-57ROUT



n = 8

Slope = -24.06 units per year.

Mann-Kendall statistic = -12
critical = -17

Trend not significant at 95% confidence level (α = 0.025 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 11:44 AM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Appendix D
Assessment Monitoring and GSI Statistical Evaluation

1540 Eisenhower Pl.
Ann Arbor, MI 48108

T 734.971.7080
TRCcompanies.com

Technical Memorandum

Date:	January 9, 2023
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC Alex Eklund, TRC
Project No.:	464096.0000 Phase 002, Task 002
Subject:	Assessment Monitoring and GSI Statistical Evaluation of the October 2022 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 2022 monitoring event was conducted on October 10 and 11, 2022. 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[2]. 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

[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).

[2] TRC. 2021. *First Quarter 2021 Hydrogeological Monitoring Report – JC Weadock Solid Waste Disposal Area, Essexville, Michigan.* Prepared for Consumers Energy Company. April.

former 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, the vent 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 2022 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	11 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 no constituents 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 [3], 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

[3] USEPA. 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance*. Office of Conservation and Recovery. EPA 530/R-09-007.

the upper confidence level is above), the statistical test result indicates that there is insufficient 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 2021 through October 2022) 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[4] 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.

[4] Confidence level is assessed for each individual comparison (i.e. per well and per constituent).

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 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 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, JCW-MW-18001, and JCW-MW-18005;
- Sulfate in MW-50 and JCW-MW-18001;
- 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.

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 arsenic, boron, calcium, 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 trends for boron at MW-54R, calcium at MW-50, and sulfate at JCW-MW-18001 are statistically significant (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 MW-54R, calcium at MW-50, and sulfate at JCW-MW-18001. 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 confidence bands and 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-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 and MW-51 Arsenic at JCW-MW-18006 and MW-53R Iron at MW-55 Sulfate at MW-50
Non-Parametric (not able to be normalized)	Arsenic at JCW-MW-18001 Calcium at JCW-MW-18005
Non-Parametric (over 50% non-detect)	Vanadium at JCW-MW-18001
Not Applicable – confidence bands used	Boron at MW-54R Calcium at MW-50 Sulfate at JCW-MW-18001

The confidence bands and interval tests compare the lower confidence limit to the GWPS. Arsenic concentrations at JCW-MW-18006 were previously considered statistically significant; however, the lower confidence limit has been at or below the GWPS since the second quarter 2021. Calcium concentrations at MW-51 were previously considered statistically significant; however, calcium concentrations are generally decreasing and the lower confidence limit has been below the GWPS since the first quarter 2022. Concentrations trends will continue to be monitored. Statistically significant exceedances of the GWPS 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, MW-55, and OW-57R OUT, and calcium at JCW-MW-18001. Boron concentrations have been consistently above the GWPS since monitoring under the February 2021 HMP began. Calcium at JCW-MW-18001 was a confirmed GWPS exceedance in fourth quarter 2022 resulting from increases in calcium concentration since first quarter 2021. 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; 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.

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	Arsenic at MW-55 Molybdenum at MW-55

The confidence interval tests compare the lower confidence limit to the GSI. The statistical evaluation found that no constituents were present at statistically significant levels exceeding the site-specific GSI criteria. Arsenic and molybdenum concentrations at MW-55 were previously considered statistically significant; however, the arsenic and molybdenum concentrations decreased in 2022. The lower confidence limits for arsenic and molybdenum continued to be below the GWPS in fourth quarter 2022.

Attachments

Table 1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards

Table 2 Comparison of Groundwater Sampling Results to GSI

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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

Sample Location:			MW-50															
Sample Date:			3/8/2021	3/8/2021	5/10/2021	5/10/2021	8/2/2021	8/2/2021	10/11/2021	10/11/2021	3/8/2022	3/8/2022	5/9/2022	5/9/2022	8/1/2022	8/1/2022	10/10/2022	10/10/2022
Constituent	Unit	GWPS																
Appendix III[1]				Field Dup		Field Dup		Field Dup		Field Dup		Field Dup		Field Dup		Field Dup		Field Dup
Boron	ug/L	**560**	**1,510**	**1,610**	**1,380**	**1,320**	**1,520**	**1,630**	**1,830**	**1,900**	**1,610**	**1,620**	**1,360**	**1,440**	**1,290**	**1,290**	**1,730**	**1,670**
Calcium	mg/L	**280**	**386**	**375**	**363**	**370**	267	252	274	261	186	185	169	175	161	164	186	181
Chloride	mg/L	2,300	86.5	85.6	68.9	69.9	57.0	57.2	51.0	51.7	54.9	55.6	53.3	51.6	54.2	54.9	47.7	47.6
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	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	**780**	**1,130**	**1,120**	**856**	**867**	638	634	496	512	346	330	285	286	324	325	376	376
Total Dissolved Solids	mg/L	4,700	2,360	2,380	1,950	1,970	1,630	1,640	1,440	1,380	999	1,010	1,020	1,050	1,080	1,040	1,120	1,150
pH, Field	SU	6.5 - 8.5	6.9	--	6.9	--	7.0	--	7.1	--	7.4	--	7.2	--	7.0	--	7.3	--
Appendix IV[1]																		
Antimony	ug/L	6.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**	1	1	1	1	2	2	3	3	2	2	1	1	2	2	3	3
Barium	ug/L	2,000	116	115	108	109	91	97	102	89	115	117	86	86	90	94	106	108
Beryllium	ug/L	4.0	< 1	< 1	< 1	< 1	< 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	< 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	< 1	< 1
Cobalt	ug/L	15	< 6	< 6	< 6	< 6	< 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	< 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	< 1	< 1
Lithium	ug/L	180	126	128	100	100	79	81	93	68	77	77	69	66	64	61	62	62
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	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	6	6	6	< 5	< 5	6	6	6	6
Radium-226	pCi/L	NA	--	--	< 0.237	< 0.245	--	--	< 0.215	0.243	--	--	< 0.310	< 0.287	--	--	0.158	0.343
Radium-228	pCi/L	NA	--	--	0.557	0.607	--	--	1.15	1.22	--	--	< 0.493	0.648	--	--	1.14	1.37
Radium-226/228	pCi/L	5.0	--	--	0.650	0.671	--	--	1.21	1.46	--	--	0.518	0.904	--	--	1.30	1.72
Selenium	ug/L	50	1	1	< 1	1	3	2	4	4	2	2	2	2	2	2	2	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]																		
Iron	ug/L	**28,000**	2,100	2,190	1,810	1,810	3,000	2,780	2,500	2,710	1,400	1,180	723	737	1,830	1,850	2,460	2,340
Copper	ug/L	1,000	4	4	< 1	2	1	< 1	1	< 1	< 1	< 1	1	1	< 1	< 1	1	< 1
Nickel	ug/L	100	< 2	< 2	< 2	< 2	11	12	16	11	< 2	19	< 2	6	6	7	4	7
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	< 0.2	< 0.2
Vanadium	ug/L	**6.0**	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

			Sample Location:	MW-51						
			Sample Date:	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022	10/10/2022
Constituent	Unit	GWPS									
Appendix III[(1)]											
Boron	ug/L	**560**		**1,040**	**1,040**	**960**	**1,140**	**1,420**	**1,350**	**1,270**	**1,490**
Calcium	mg/L	**280**		**293**	**303**	276	**316**	255	247	211	211
Chloride	mg/L	2,300		91.2	93.6	99.8	97.1	91.1	92.8	102	101
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**		452	450	434	418	446	420	404	394
Total Dissolved Solids	mg/L	4,700		1,530	1,500	1,530	1,500	1,480	1,510	1,450	1,380
pH, Field	SU	6.5 - 8.5		7.0	7.0	6.9	6.9	7.4	7.2	7.0	7.2
Appendix IV[(1)]											
Antimony	ug/L	6.0		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**		11	11	14	20	12	10	15	18
Barium	ug/L	2,000		143	148	148	197	198	150	169	188
Beryllium	ug/L	4.0		< 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
Chromium	ug/L	100		< 1	< 1	< 1	< 1	< 1	1	< 1	< 1
Cobalt	ug/L	15		< 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
Lead	ug/L	4.0		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180		62	57	47	64	58	56	53	50
Mercury	ug/L	2.0		< 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
Radium-226	pCi/L	NA		--	< 0.268	--	0.451	--	< 0.423	--	< 0.397
Radium-228	pCi/L	NA		--	0.626	--	2.01	--	< 0.494	--	2.19
Radium-226/228	pCi/L	5.0		--	0.851	--	2.46	--	0.576	--	2.51
Selenium	ug/L	50		1	< 1	1	3	3	2	2	1
Thallium	ug/L	2.0		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]											
Iron	ug/L	**28,000**		1,940	2,200	5,080	5,130	1,310	1,210	1,860	2,880
Copper	ug/L	1,000		2	< 1	< 1	1	< 1	2	< 1	1
Nickel	ug/L	100		< 2	< 2	11	18	< 2	< 2	6	4
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	< 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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

			Sample Location:	MW-52						
			Sample Date:	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022	10/10/2022
Constituent	Unit	GWPS									
Appendix III[(1)]											
Boron	ug/L	**560**		**1,120**	**1,160**	**1,140**	**1,280**	**1,310**	**1,090**	**1,070**	**1,330**
Calcium	mg/L	**280**		211	244	196	237	251	231	222	224
Chloride	mg/L	2,300		51.8	53.9	56.5	59.4	51.6	50.5	45.1	40.4
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**		531	574	501	110	654	591	663	603
Total Dissolved Solids	mg/L	4,700		1,390	1,500	1,340	1,360	1,520	1,490	1,580	1,670
pH, Field	SU	6.5 - 8.5		7.0	6.9	6.9	6.9	7.1	7.0	6.7	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		123	132	115	152	170	107	118	122
Beryllium	ug/L	4.0		< 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
Chromium	ug/L	100		< 1	< 1	< 1	< 1	< 1	1	< 1	< 1
Cobalt	ug/L	15		< 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
Lead	ug/L	4.0		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180		31	29	21	31	27	25	29	26
Mercury	ug/L	2.0		< 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
Radium-226	pCi/L	NA		--	< 0.237	--	< 0.274	--	< 0.489	--	0.205
Radium-228	pCi/L	NA		--	< 0.407	--	0.778	--	< 0.532	--	< 0.694
Radium-226/228	pCi/L	5.0		--	< 0.407	--	1.03	--	0.875	--	0.805
Selenium	ug/L	50		1	1	1	3	2	2	2	2
Thallium	ug/L	2.0		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]											
Iron	ug/L	**28,000**		879	1,400	3,830	4,880	2,870	2,030	5,020	6,340
Copper	ug/L	1,000		2	< 1	< 1	1	1	2	2	2
Nickel	ug/L	100		< 2	< 2	9	14	< 2	< 2	5	3
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	< 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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

			Sample Location:	MW-53						
			Sample Date:	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022	10/10/2022
Constituent	Unit	GWPS									
Appendix III[(1)]											
Boron	ug/L	**560**		**3,920**	**3,790**	**3,820**	**3,820**	**4,100**	**3,880**	**4,300**	**4,140**
Calcium	mg/L	**280**		187	187	162	166	146	147	116	108
Chloride	mg/L	2,300		52.9	51.8	49.9	55.5	81.1	50.9	66.5	53
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**		317	322	279	111	39.5	215	119	126
Total Dissolved Solids	mg/L	4,700		1,110	1,050	1,020	896	768	886	820	740
pH, Field	SU	6.5 - 8.5		7.1	7.1	7.1	7.1	7.4	7.3	7.1	7.3
Appendix IV[(1)]											
Antimony	ug/L	6.0		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**		< 1	< 1	2	2	1	< 1	1	2
Barium	ug/L	2,000		202	214	200	212	401	356	313	285
Beryllium	ug/L	4.0		< 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
Chromium	ug/L	100		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15		< 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
Lead	ug/L	4.0		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180		52	46	38	53	48	41	42	38
Mercury	ug/L	2.0		< 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
Radium-226	pCi/L	NA		--	< 0.239	--	0.399	--	0.406	--	0.269
Radium-228	pCi/L	NA		--	0.455	--	0.979	--	< 0.518	--	1.15
Radium-226/228	pCi/L	5.0		--	0.684	--	1.38	--	0.824	--	1.42
Selenium	ug/L	50		< 1	2	3	< 1	3	1	3	1
Thallium	ug/L	2.0		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]											
Iron	ug/L	**28,000**		1,180	1,420	2,380	1,760	1,130	1,060	1,240	1,140
Copper	ug/L	1,000		2	< 1	< 1	< 1	< 1	1	< 1	< 1
Nickel	ug/L	100		< 2	< 2	6	10	< 2	< 2	4	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	< 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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

			Sample Location:	MW-53R						
			Sample Date:	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022	10/10/2022
Constituent	Unit	GWPS									
Appendix III[(1)]											
Boron	ug/L	**560**		**1,510**	**1,580**	**1,710**	**2,060**	**2,330**	**1,830**	**1,560**	**2,340**
Calcium	mg/L	**280**		234	227	203	232	188	226	219	203
Chloride	mg/L	2,300		32.5	31.1	34.5	36.6	39.9	41.6	50.4	39.2
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**		227	170	189	166	71.7	314	533	250
Total Dissolved Solids	mg/L	4,700		1,140	1,040	1,040	1,060	709	1,290	1,530	1,160
pH, Field	SU	6.5 - 8.5		6.8	6.8	6.8	6.8	7.1	6.9	6.7	6.8
Appendix IV[(1)]											
Antimony	ug/L	6.0		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**		19	18	**23**	**25**	10	8	17	20
Barium	ug/L	2,000		202	208	204	189	203	147	97	118
Beryllium	ug/L	4.0		< 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
Chromium	ug/L	100		< 1	< 1	< 1	< 1	< 1	1	< 1	< 1
Cobalt	ug/L	15		< 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
Lead	ug/L	4.0		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180		64	59	56	57	56	61	70	63
Mercury	ug/L	2.0		< 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
Radium-226	pCi/L	NA		--	0.306	--	0.344	--	< 0.325	--	0.239
Radium-228	pCi/L	NA		--	0.822	--	1.05	--	< 0.480	--	0.967
Radium-226/228	pCi/L	5.0		--	1.13	--	1.40	--	< 0.480	--	1.21
Selenium	ug/L	50		< 1	< 1	2	3	2	2	2	2
Thallium	ug/L	2.0		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]											
Iron	ug/L	**28,000**		971	2,220	2,800	2,170	1,080	460	1,030	702
Copper	ug/L	1,000		2	1	1	< 1	2	2	2	1
Nickel	ug/L	100		< 2	< 2	10	2	< 2	< 2	5	3
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	< 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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

			Sample Location:	MW-54R						
			Sample Date:	3/8/2021	5/11/2021	8/3/2021	10/11/2021	3/9/2022	5/9/2022	8/1/2022	10/10/2022
Constituent	Unit	GWPS									
Appendix III[(1)]											
Boron	ug/L	**560**		**2,470**	**3,140**	**3,530**	**4,270**	**4,720**	**4,110**	**4,970**	**5,310**
Calcium	mg/L	**280**		178	196	163	187	186	169	158	160
Chloride	mg/L	2,300		28.0	32.7	35.5	34.7	49.8	35.8	43.9	47.4
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**		79.9	72.7	77.0	75.7	67.1	86.3	72.1	70.9
Total Dissolved Solids	mg/L	4,700		763	762	786	772	776	712	800	799
pH, Field	SU	6.5 - 8.5		6.9	6.6	6.8	6.9	6.9	7.0	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	2	4	1	< 1	2	2
Barium	ug/L	2,000		118	122	124	129	154	111	109	123
Beryllium	ug/L	4.0		< 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
Chromium	ug/L	100		< 1	< 1	< 1	< 1	< 1	2	< 1	< 1
Cobalt	ug/L	15		< 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
Lead	ug/L	4.0		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180		66	64	60	59	74	64	74	74
Mercury	ug/L	2.0		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**		< 5	< 5	< 5	7	7	9	10	12
Radium-226	pCi/L	NA		--	< 0.255	--	< 0.231	--	< 0.347	--	0.208
Radium-228	pCi/L	NA		--	0.782	--	0.759	--	< 0.552	--	1.31
Radium-226/228	pCi/L	5.0		--	0.900	--	0.965	--	< 0.552	--	1.52
Selenium	ug/L	50		< 1	< 1	1	2	2	2	1	2
Thallium	ug/L	2.0		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]											
Iron	ug/L	**28,000**		115	782	1,190	2,280	496	121	367	1,090
Copper	ug/L	1,000		1	2	1	< 1	1	1	1	1
Nickel	ug/L	100		< 2	3	9	< 2	< 2	< 2	2	< 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	< 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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

			Sample Location:	MW-55								
			Sample Date:	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	5/10/2022	8/1/2022	8/1/2022	10/10/2022
Constituent	Unit	GWPS									Field Dup	
Appendix III[1]												
Boron	ug/L	**560**		**593**	**866**	**873**	**788**	**826**	**642**	**709**	**687**	**976**
Calcium	mg/L	**280**		151	147	126	198	163	177	159	165	141
Chloride	mg/L	2,300		16.7	19.5	19.3	16.5	20.2	11.8	11.8	11.8	12.5
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**		48.0	18.5	34.3	80.7	35.4	249	248	245	108
Total Dissolved Solids	mg/L	4,700		794	729	743	844	808	942	930	1,040	786
pH, Field	SU	6.5 - 8.5		7.1	7.1	7.1	7.0	7.1	7.0	6.9	--	7.0
Appendix IV[1]												
Antimony	ug/L	6.0		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**		**152**	**169**	**204**	**198**	**88**	**48**	**80**	**78**	**126**
Barium	ug/L	2,000		366	323	347	330	299	222	232	231	223
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
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
Lithium	ug/L	180		28	24	25	34	28	24	29	28	30
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**		**166**	**131**	**157**	**206**	**89**	**78**	**80**	**78**	**91**
Radium-226	pCi/L	NA		--	0.525	--	0.467	--	< 0.478	--	--	0.365
Radium-228	pCi/L	NA		--	0.896	--	1.10	--	< 0.646	--	--	0.966
Radium-226/228	pCi/L	5.0		--	1.42	--	1.56	--	0.696	--	--	1.33
Selenium	ug/L	50		< 1	1	1	2	1	3	3	4	< 1
Thallium	ug/L	2.0		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]												
Iron	ug/L	**28,000**		23,500	21,500	**39,400**	**40,500**	**29,800**	15,000	18,000	16,600	22,100
Copper	ug/L	1,000		< 1	< 1	< 1	< 1	< 1	1	< 1	1	1
Nickel	ug/L	100		< 2	< 2	6	8	4	3	6	6	4
Silver	ug/L	34		< 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
Zinc	ug/L	2,400		< 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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	OW-57R OUT							
		Sample Date:	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/9/2022	5/10/2022	8/2/2022	10/11/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	**1,660**	**1,710**	**1,730**	**1,880**	**2,030**	**1,990**	**1,570**	**1,830**
Calcium	mg/L	**280**	128	133	118	140	126	131	113	114
Chloride	mg/L	2,300	59.0	62.9	53.1	46.9	62.5	57.3	52.0	47.6
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**	86.0	78.3	93.9	93.1	83.1	69.4	85.0	86.8
Total Dissolved Solids	mg/L	4,700	761	743	725	737	1,030	702	714	722
pH, Field	SU	6.5 - 8.5	7.2	7.0	7.0	7.0	7.2	7.1	6.8	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	70	73	72	75	85	79	67	75
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	1	1	1	< 1	1	2	1	< 1
Cobalt	ug/L	15	< 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
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	26	24	20	21	26	27	23	22
Mercury	ug/L	2.0	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**	7	6	7	9	8	7	7	8
Radium-226	pCi/L	NA	--	< 0.286	--	< 0.227	--	< 0.440	--	0.199
Radium-228	pCi/L	NA	--	0.606	--	1.12	--	< 0.539	--	< 0.711
Radium-226/228	pCi/L	5.0	--	0.615	--	1.26	--	< 0.539	--	0.870
Selenium	ug/L	50	< 1	< 1	< 1	2	1	3	1	2
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	46	100	56	68	96	74	37	42
Copper	ug/L	1,000	2	1	2	1	2	2	1	2
Nickel	ug/L	100	15	16	21	12	17	14	17	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**	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400	< 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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

			Sample Location:	JCW-MW-18001						
			Sample Date:	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/7/2022	5/9/2022	8/1/2022	10/10/2022
Constituent	Unit	GWPS									
Appendix III[(1)]											
Boron	ug/L	**560**		**1,350**	**1,340**	**1,610**	**1,670**	**1,670**	**1,560**	**1,470**	**1,790**
Calcium	mg/L	**280**		270	**305**	**348**	**373**	**412**	**335**	**389**	**465**
Chloride	mg/L	2,300		72.1	77.3	76.4	68.3	60.0	58.8	64.6	63.6
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**		549	580	700	777	**1,080**	752	**1,180**	**1,400**
Total Dissolved Solids	mg/L	4,700		1,610	1,670	1,880	2,000	2,310	1,970	2,580	3,020
pH, Field	SU	6.5 - 8.5		6.9	6.9	6.9	6.8	6.8	7.0	6.6	6.8
Appendix IV[(1)]											
Antimony	ug/L	6.0		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**		2	2	**38**	1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000		213	166	199	184	129	80	61	66
Beryllium	ug/L	4.0		< 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
Chromium	ug/L	100		< 1	< 1	8	< 1	< 1	2	< 1	< 1
Cobalt	ug/L	15		< 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
Lead	ug/L	4.0		< 1	< 1	2	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180		69	68	71	103	87	76	95	97
Mercury	ug/L	2.0		< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	**73**		< 5	< 5	9	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA		--	< 0.378	--	0.337	--	< 0.327	--	< 0.142
Radium-228	pCi/L	NA		--	< 0.558	--	1.05	--	0.494	--	0.852
Radium-226/228	pCi/L	5.0		--	< 0.558	--	1.39	--	0.586	--	0.893
Selenium	ug/L	50		< 1	< 1	2	3	2	2	3	1
Thallium	ug/L	2.0		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]											
Iron	ug/L	**28,000**		183	154	13,600	91	86	210	196	818
Copper	ug/L	1,000		2	3	6	2	2	3	2	3
Nickel	ug/L	100		8	2	16	20	6	8	14	15
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	**12**	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	2,400		< 10	< 10	12	< 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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

		Sample Location:	JCW-MW-18004							
		Sample Date:	3/8/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	5/10/2022	8/1/2022	10/10/2022
Constituent	Unit	GWPS								
Appendix III[(1)]										
Boron	ug/L	**560**	232	246	304	389	259	226	313	343
Calcium	mg/L	**280**	252	266	203	264	236	235	215	193
Chloride	mg/L	2,300	17.9	12.4	6.65	7.45	19.6	10.8	12.5	11.4
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**	581	523	393	493	537	512	512	428
Total Dissolved Solids	mg/L	4,700	1,390	1,270	1,180	1,240	1,280	1,290	1,290	1,130
pH, Field	SU	6.5 - 8.5	6.9	6.8	6.8	6.8	6.9	6.8	6.7	6.8
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	20	27	36	41	32	26	31	37
Beryllium	ug/L	4.0	< 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
Chromium	ug/L	100	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	< 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
Lead	ug/L	4.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180	35	36	47	63	34	42	51	46
Mercury	ug/L	2.0	< 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
Radium-226	pCi/L	NA	--	< 0.271	--	0.182	--	< 0.417	--	< 0.135
Radium-228	pCi/L	NA	--	< 0.425	--	0.796	--	0.790	--	< 0.742
Radium-226/228	pCi/L	5.0	--	< 0.425	--	0.978	--	0.910	--	< 0.742
Selenium	ug/L	50	7	1	4	3	2	2	1	1
Thallium	ug/L	2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]										
Iron	ug/L	**28,000**	21	24	< 20	39	952	< 20	45	< 20
Copper	ug/L	1,000	3	2	1	2	1	2	2	2
Nickel	ug/L	100	< 2	2	9	16	4	< 2	2	5
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	< 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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

			Sample Location:	JCW-MW-18005								
			Sample Date:	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	3/7/2022	5/10/2022	8/2/2022	10/11/2022
Constituent	Unit	GWPS							Field Dup			
Appendix III[1]												
Boron	ug/L	**560**		**987**	**919**	**1,080**	**1,190**	**1,030**	**1,100**	**1,010**	**981**	**1,290**
Calcium	mg/L	**280**		**286**	202	149	193	159	164	280	165	150
Chloride	mg/L	2,300		43.7	56.0	64.9	63.6	61.7	60.7	32.6	50.9	53.9
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**		535	263	190	227	204	211	437	213	160
Total Dissolved Solids	mg/L	4,700		1,420	1,020	895	1,020	942	934	1,330	967	868
pH, Field	SU	6.5 - 8.5		6.8	6.9	7.0	6.9	7.1	--	6.8	6.7	6.8
Appendix IV[1]												
Antimony	ug/L	6.0		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**		7	9	9	9	5	5	5	4	5
Barium	ug/L	2,000		135	93	98	124	108	110	110	71	80
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
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	2	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180		39	30	28	39	32	30	33	32	32
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	6	< 5	5
Radium-226	pCi/L	NA		--	< 0.224	--	< 0.262	--	--	< 0.414	--	0.193
Radium-228	pCi/L	NA		--	0.524	--	0.984	--	--	< 0.521	--	< 0.800
Radium-226/228	pCi/L	5.0		--	0.728	--	1.16	--	--	0.622	--	< 0.800
Selenium	ug/L	50		< 1	1	2	4	3	3	2	< 1	2
Thallium	ug/L	2.0		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[2]												
Iron	ug/L	**28,000**		4,800	4,590	5,350	5,840	3,300	3,170	1,680	2,810	3,220
Copper	ug/L	1,000		2	1	12	1	< 1	< 1	2	< 1	< 1
Nickel	ug/L	100		8	10	29	22	10	25	< 2	9	11
Silver	ug/L	34		< 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
Zinc	ug/L	2,400		< 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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

			Sample Location:	JCW-MW-18006									
			Sample Date:	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	5/9/2022	5/9/2022	8/2/2022	10/11/2022	10/11/2022
Constituent	Unit	GWPS											
Appendix III[(1)]										Field Dup			Field Dup
Boron	ug/L	**560**		**2,650**	**2,720**	**2,640**	**2,600**	**3,220**	**2,990**	**3,030**	**2,260**	**2,720**	**2,650**
Calcium	mg/L	**280**		148	147	135	152	143	136	136	109	118	119
Chloride	mg/L	2,300		66.1	72.6	73.6	77.0	75.0	67.3	67.7	79.0	74.2	74.7
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
Sulfate	mg/L	**780**		57.3	47.0	29.7	34.7	38.1	32.8	34.0	14.9	21.6	23.0
Total Dissolved Solids	mg/L	4,700		823	784	769	802	792	788	772	709	720	746
pH, Field	SU	6.5 - 8.5		6.9	6.9	6.9	7.0	7.1	7.0	--	6.7	6.9	--
Appendix IV[(1)]													
Antimony	ug/L	6.0		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	**21**		**30**	**30**	**25**	21	**33**	**22**	**23**	21	**25**	**25**
Barium	ug/L	2,000		477	472	492	351	665	514	509	452	480	499
Beryllium	ug/L	4.0		< 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
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	< 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	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	180		58	53	46	47	63	56	57	52	52	52
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
Molybdenum	ug/L	**73**		< 5	< 5	< 5	< 5	< 5	6	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NA		--	0.418	--	0.268	--	< 0.416	--	--	0.516	0.259
Radium-228	pCi/L	NA		--	< 0.483	--	0.872	--	< 0.518	--	--	< 0.609	0.869
Radium-226/228	pCi/L	5.0		--	0.888	--	1.14	--	0.690	--	--	0.999	1.13
Selenium	ug/L	50		< 1	1	2	4	2	< 1	1	< 1	1	1
Thallium	ug/L	2.0		< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters[(2)]													
Iron	ug/L	**28,000**		5,730	5,490	7,790	6,200	9,040	6,600	6,360	7,670	7,620	7,630
Copper	ug/L	1,000		< 1	2	< 1	< 1	< 1	1	< 1	< 1	< 1	< 1
Nickel	ug/L	100		3	3	6	10	6	< 2	< 2	5	5	6
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**		3	3	4	2	4	3	3	3	3	4
Zinc	ug/L	2,400		< 10	< 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 2
Comparison of Groundwater Sampling Results to GSI
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

						Sample Location:	MW-50														
						Sample Date:	3/8/2021	3/8/2021	5/10/2021	5/10/2021	8/2/2021	8/2/2021	10/11/2021	10/11/2021	3/8/2022	3/8/2022	5/9/2022	5/9/2022	8/1/2022	8/1/2022	10/10/2022	10/10/2022
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		Field Dup		Field Dup
Boron	ug/L	4,000	44,000	69,000	44,000		1,510	1,610	1,380	1,320	1,520	1,630	1,830	1,900	1,610	1,620	1,360	1,440	1,290	1,290	1,730	1,670
Sulfate	mg/L	1,200[F]	NC	NC	1,200		1,130	1,120	856	867	638	634	496	512	346	330	285	286	324	325	376	376
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0		6.9	--	6.9	--	7.0	--	7.1	--	7.4	--	7.2	--	7.0	--	7.3	--
Appendix IV(1)																					
Arsenic	ug/L	10	100	680	**100**		1	1	1	1	2	2	3	3	2	2	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	< 1	< 1
Lithium	ug/L	440	NC	NC	440		126	128	100	100	79	81	93	68	77	77	69	66	64	61	62	62
Molybdenum	ug/L	120	NC	NC	**120**		< 5	< 5	< 5	< 5	< 5	< 5	< 5	6	6	6	< 5	< 5	6	6	6	6
Selenium	ug/L	5.0	55	120	55		1	1	< 1	1	3	2	4	4	2	2	2	2	2	2	2	2
MI Part 115 Parameters(2)																					
Iron	ug/L	500,000[EE]	NC	NC	500,000		2,100	2,190	1,810	1,810	3,000	2,780	2,500	2,710	1,400	1,180	723	737	1,830	1,850	2,460	2,340
Vanadium	ug/L	27	NC	NC	27		< 2	< 2	< 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.

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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

					Sample Location:	MW-51							
					Sample Date:	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022	10/10/2022
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	1,040	1,040	960	1,140	1,420	1,350	1,270	1,490
Sulfate	mg/L	1,200[F]	NC	NC	1,200	452	450	434	418	446	420	404	394
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	7.0	7.0	6.9	6.9	7.4	7.2	7.0	7.2
Appendix IV(1)													
Arsenic	ug/L	10	100	680	**100**	11	11	14	20	12	10	15	18
Chromium	ug/L	11[H]	NC	NC	11	< 1	< 1	< 1	< 1	< 1	1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	62	57	47	64	58	56	53	50
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	5.0	55	120	55	1	< 1	1	3	3	2	2	1
MI Part 115 Parameters(2)													
Iron	ug/L	500,000[EE]	NC	NC	500,000	1,940	2,200	5,080	5,130	1,310	1,210	1,860	2,880
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.

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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

						Sample Location:	MW-52						
						Sample Date:	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022	10/10/2022
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		1,120	1,160	1,140	1,280	1,310	1,090	1,070	1,330
Sulfate	mg/L	1,200[F]	NC	NC	1,200		531	574	501	110	654	591	663	603
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0		7.0	6.9	6.9	6.9	7.1	7.0	6.7	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		31	29	21	31	27	25	29	26
Molybdenum	ug/L	120	NC	NC	**120**		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	5.0	55	120	55		1	1	1	3	2	2	2	2
MI Part 115 Parameters(2)														
Iron	ug/L	500,000[EE]	NC	NC	500,000		879	1,400	3,830	4,880	2,870	2,030	5,020	6,340
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.

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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

						Sample Location:	MW-53						
						Sample Date:	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022	10/10/2022
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		3,920	3,790	3,820	3,820	4,100	3,880	4,300	4,140
Sulfate	mg/L	1,200[F]	NC	NC	1,200		317	322	279	111	39.5	215	119	126
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0		7.1	7.1	7.1	7.1	7.4	7.3	7.1	7.3
Appendix IV(1)														
Arsenic	ug/L	10	100	680	**100**		< 1	< 1	2	2	1	< 1	1	2
Chromium	ug/L	11[H]	NC	NC	11		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440		52	46	38	53	48	41	42	38
Molybdenum	ug/L	120	NC	NC	**120**		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	5.0	55	120	55		< 1	2	3	< 1	3	1	3	1
MI Part 115 Parameters(2)														
Iron	ug/L	500,000[EE]	NC	NC	500,000		1,180	1,420	2,380	1,760	1,130	1,060	1,240	1,140
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.

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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

					Sample Location:	MW-53R							
					Sample Date:	3/8/2021	5/10/2021	8/2/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022	10/10/2022
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	1,510	1,580	1,710	2,060	2,330	1,830	1,560	2,340
Sulfate	mg/L	1,200[F]	NC	NC	1,200	227	170	189	166	71.7	314	533	250
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.8	6.8	6.8	6.8	7.1	6.9	6.7	6.8
Appendix IV(1)													
Arsenic	ug/L	10	100	680	**100**	19	18	23	25	10	8	17	20
Chromium	ug/L	11[H]	NC	NC	11	< 1	< 1	< 1	< 1	< 1	1	< 1	< 1
Lithium	ug/L	440	NC	NC	440	64	59	56	57	56	61	70	63
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	5.0	55	120	55	< 1	< 1	2	3	2	2	2	2
MI Part 115 Parameters(2)													
Iron	ug/L	500,000[EE]	NC	NC	500,000	971	2,220	2,800	2,170	1,080	460	1,030	702
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.

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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

					Sample Location:	MW-54R							
					Sample Date:	3/8/2021	5/11/2021	8/3/2021	10/11/2021	3/8/2022	5/9/2022	8/1/2022	10/10/2022
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	2,470	3,140	3,530	4,270	4,720	4,110	4,970	5,310
Sulfate	mg/L	1,200[F]	NC	NC	1,200	79.9	72.7	77.0	75.7	67.1	86.3	72.1	70.9
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.9	6.6	6.8	6.9	6.9	7.0	6.9	6.9
Appendix IV(1)													
Arsenic	ug/L	10	100	680	**100**	1	1	2	4	1	< 1	2	2
Chromium	ug/L	11[H]	NC	NC	11	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1
Lithium	ug/L	440	NC	NC	440	66	64	60	59	74	64	74	74
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	7	7	9	10	12
Selenium	ug/L	5.0	55	120	55	< 1	< 1	1	2	2	2	1	2
MI Part 115 Parameters(2)													
Iron	ug/L	500,000[EE]	NC	NC	500,000	115	782	1,190	2,280	496	121	367	1,090
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.

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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

						Sample Location:	MW-55							
						Sample Date:	3/9/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	5/10/2022	8/1/2022	8/1/2022	10/10/2022
Constituent	Unit	Generic GSI^	Chronic-Based Mixing Zone GSI Criteria*	Acute-Based Mixing Zone GSI Criteria*	GSI**									Field Dup	
Appendix III(1)															
Boron	ug/L	4,000	44,000	69,000	44,000		593	866	873	788	826	642	709	687	976
Sulfate	mg/L	1,200[F]	NC	NC	1,200		48.0	18.5	34.3	80.7	35.4	249	248	245	108
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0		7.1	7.1	7.1	7.0	7.1	7.0	6.9	--	7.0
Appendix IV(1)															
Arsenic	ug/L	10	100	680	**100**		**152**	**169**	**204**	**198**	88	48	80	78	**126**
Chromium	ug/L	11[H]	NC	NC	11		< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	440	NC	NC	440		28	24	25	34	28	24	29	28	30
Molybdenum	ug/L	120	NC	NC	**120**		**166**	**131**	**157**	**206**	89	78	80	78	91
Selenium	ug/L	5.0	55	120	55		< 1	1	1	2	1	3	3	4	< 1
MI Part 115 Parameters(2)															
Iron	ug/L	500,000[EE]	NC	NC	500,000		23,500	21,500	39,400	40,500	29,800	15,000	18,000	16,600	22,100
Vanadium	ug/L	27	NC	NC	27		< 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.

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
JC Weadock Landfill – Hydrogeological Monitoring Program
Essexville, Michigan

					Sample Location:	JCW-MW-18004							
					Sample Date:	3/8/2021	5/11/2021	8/3/2021	10/12/2021	3/7/2022	5/10/2022	8/1/2022	10/10/2022
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	232	246	304	389	259	226	313	343
Sulfate	mg/L	1,200[F]	NC	NC	1,200	581	523	393	493	537	512	512	428
pH, Field	SU	6.5-9.0	NC	NC	6.5-9.0	6.9	6.8	6.8	6.8	6.9	6.8	6.7	6.8
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	35	36	47	63	34	42	51	46
Molybdenum	ug/L	120	NC	NC	**120**	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Selenium	ug/L	5.0	55	120	55	7	1	4	3	2	2	1	1
MI Part 115 Parameters(2)													
Iron	ug/L	500,000[EE]	NC	NC	500,000	21	24	< 20	39	952	< 20	45	< 20
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.

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.

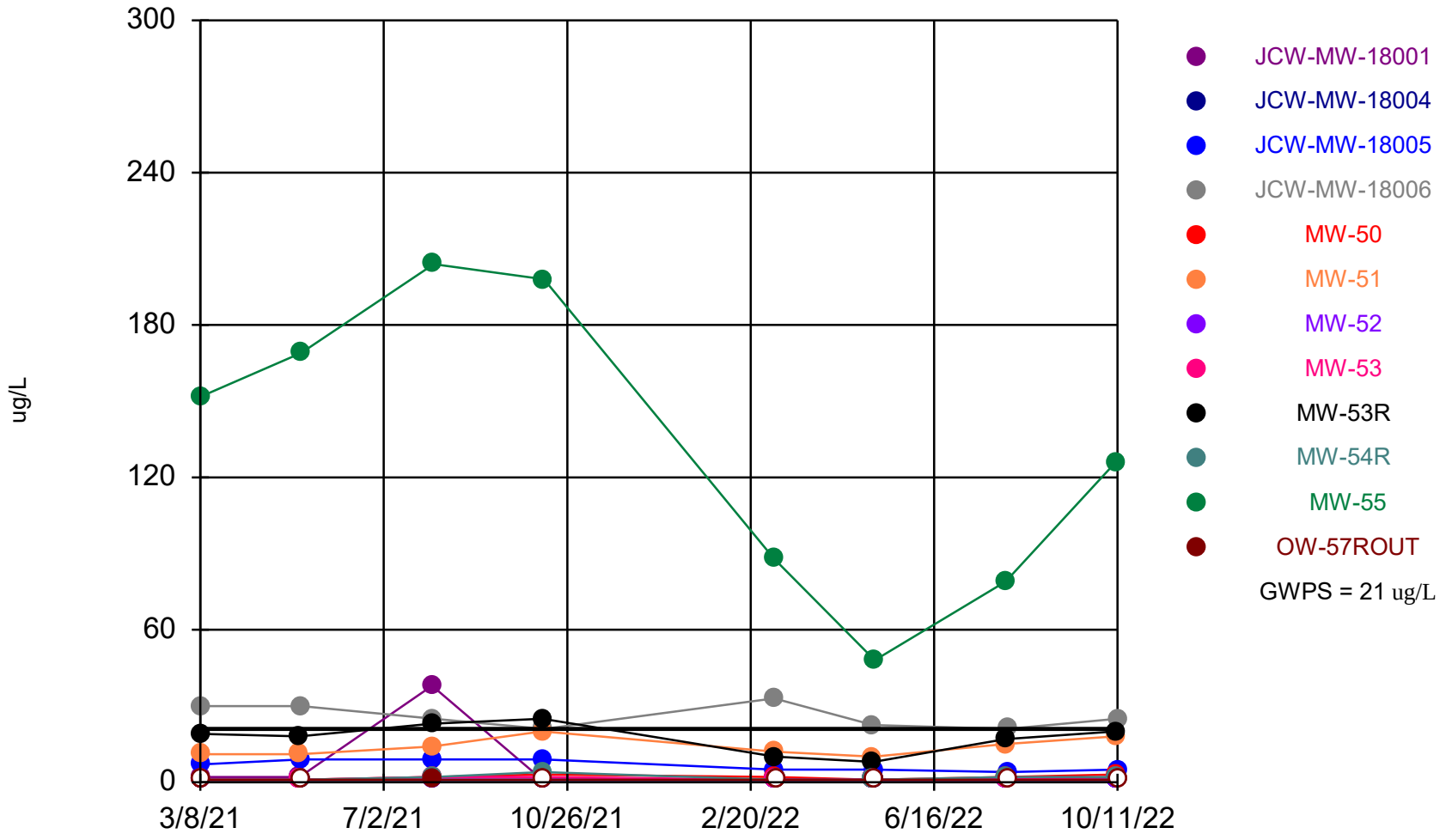
(1) 40 CFR Part 257 Appendix III Detection Monitoring Constituents and Appendix IV Assessment Monitoring Constituents.

(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.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Arsenic Comparison to GWPS

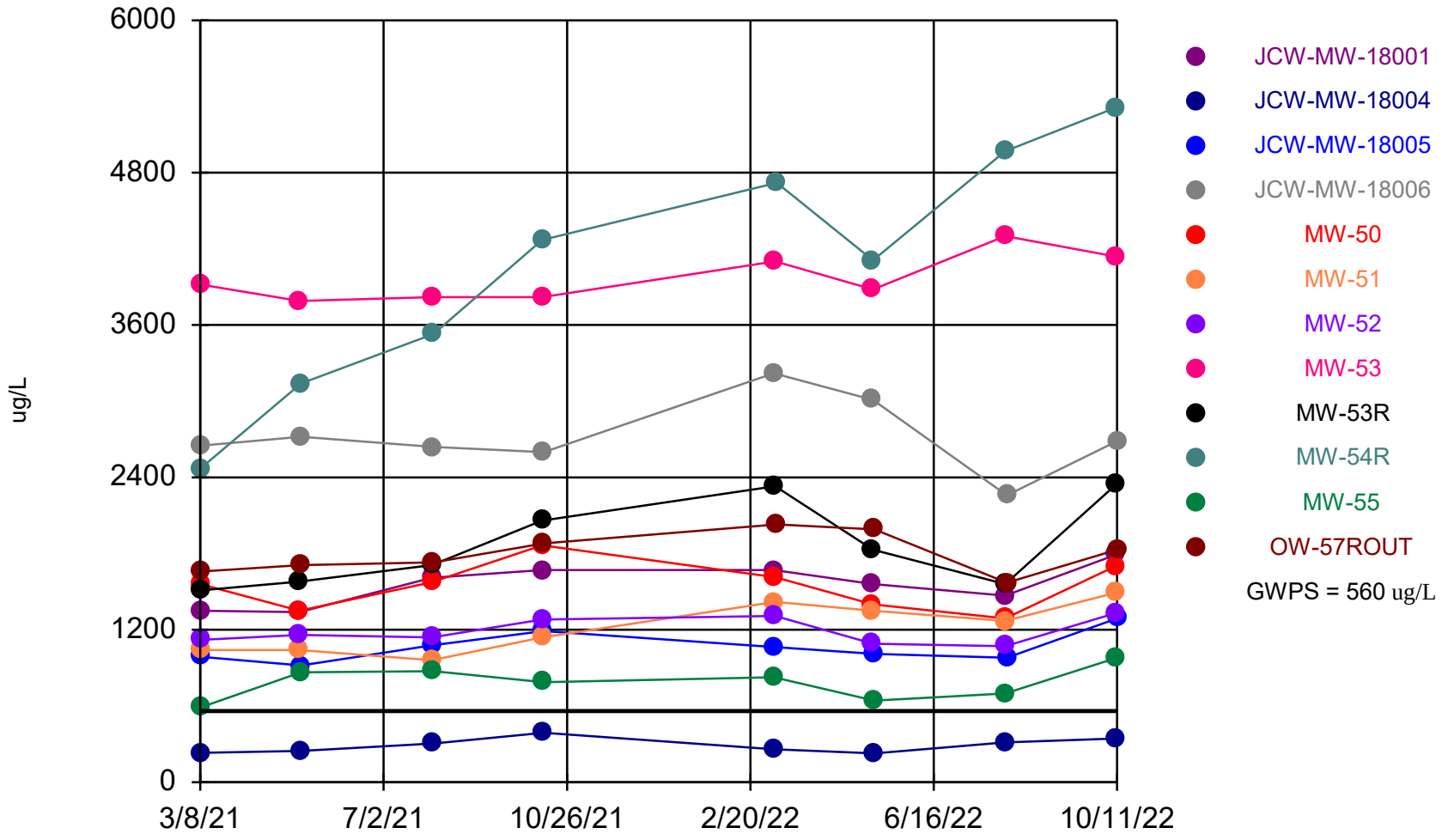


Time Series Analysis Run 11/7/2022 12:41 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron Comparison to GWPS

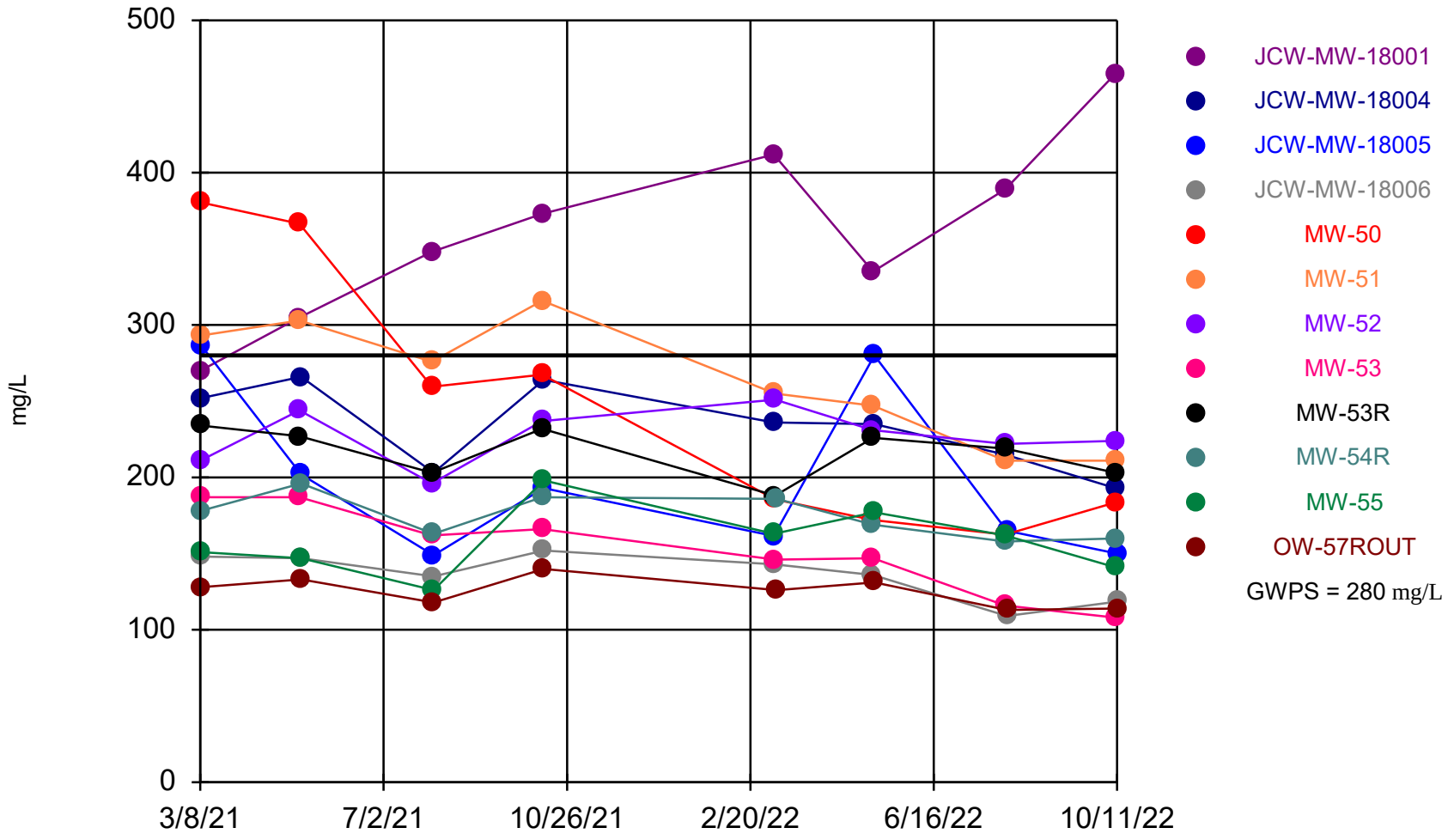


Time Series Analysis Run 11/7/2022 12:40 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium Comparison to GWPS

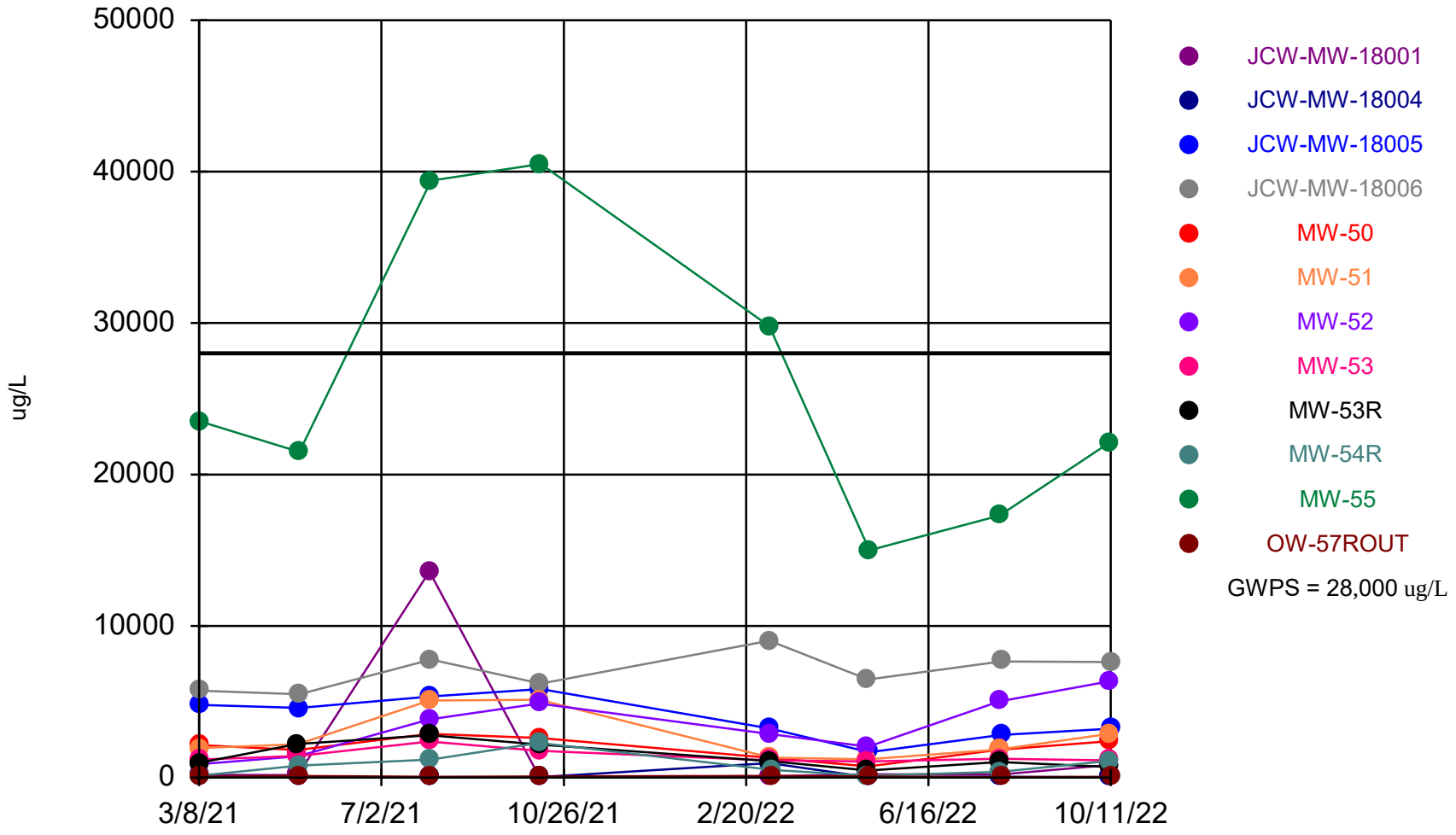


Time Series Analysis Run 11/7/2022 12:42 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Iron Comparison to GWPS

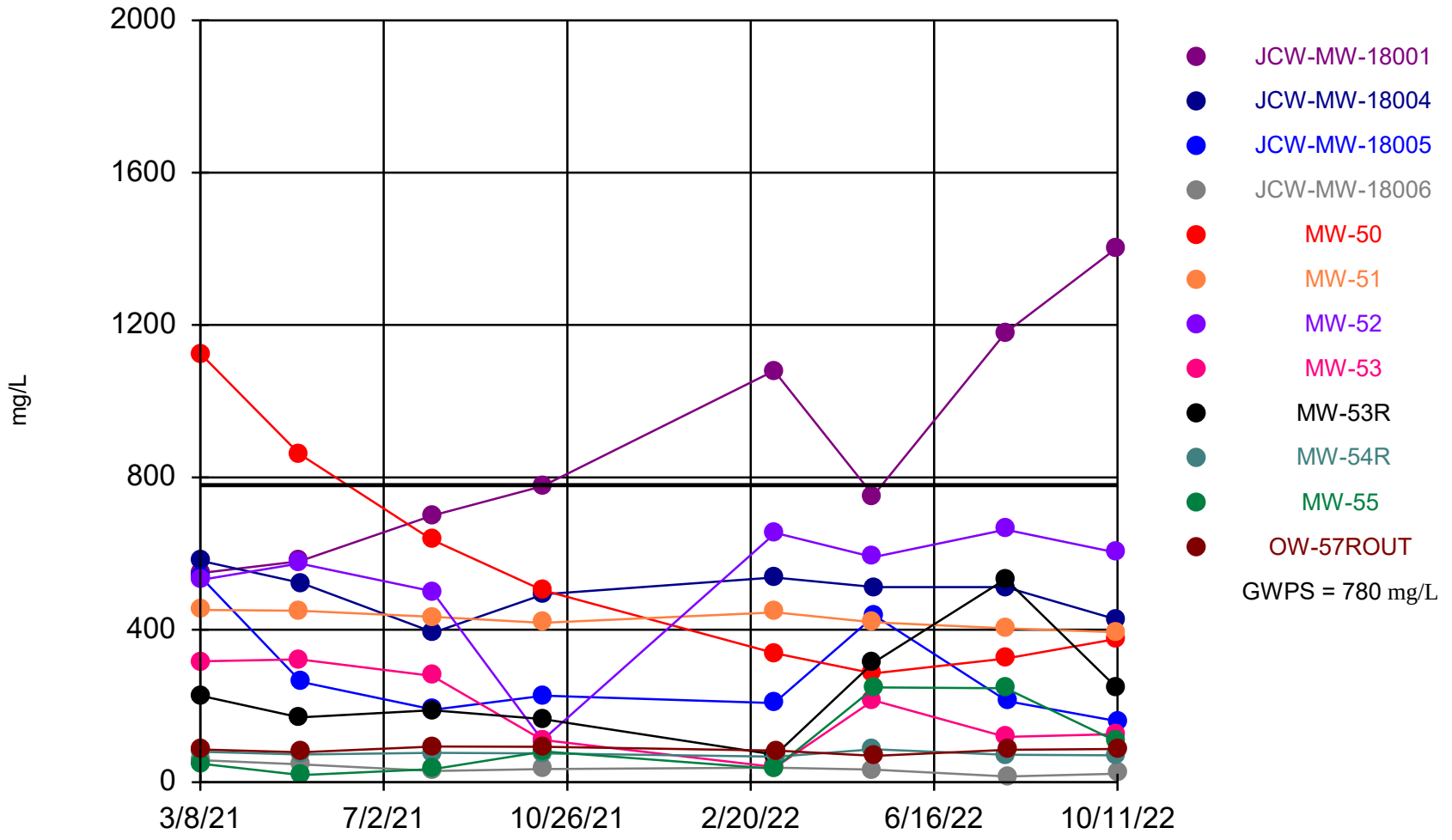


Time Series Analysis Run 11/7/2022 12:43 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate Comparison to GWPS

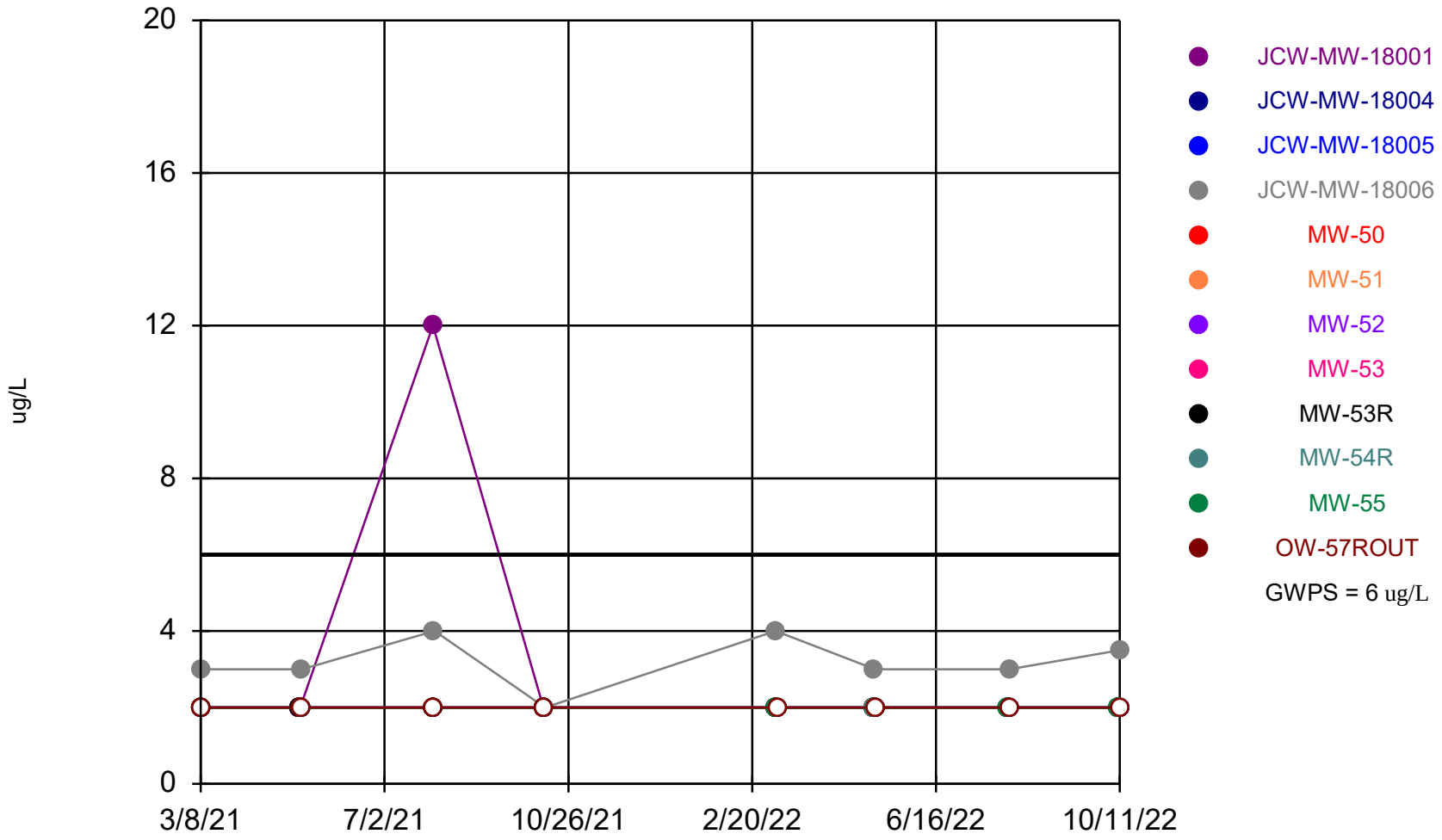


Time Series Analysis Run 11/7/2022 12:43 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Vanadium Comparison to GWPS



Time Series Analysis Run 11/7/2022 12:44 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Arsenic, Total Analysis Run 11/7/2022 12:45 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

For observations made between 3/8/2021 and 10/11/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 30
Wells = 12
Minimum Value = 1
Maximum Value = 204
Mean Value = 17.57
Median Value = 2
Standard Deviation = 39.31
Coefficient of Variation = 2.238
Skewness = 3.467

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	4	1	38	5.875	1	12.99	2.211	2.262
JCW-MW-18004	8	8	1	1	1	1	0	0	NaN
JCW-MW-18005	8	0	4	9	6.625	6	2.134	0.3221	0.1459
JCW-MW-18006	8	0	21	33	25.94	25	4.555	0.1756	0.3287
MW-50	8	0	1	3	1.875	2	0.8345	0.4451	0.2217
MW-51	8	0	10	20	13.88	13	3.603	0.2597	0.6174
MW-52	8	7	1	1	1	1	0	0	NaN
MW-53	8	3	1	2	1.375	1	0.5175	0.3764	0.5164
MW-53R	8	0	8	25	17.5	18.5	5.88	0.336	-0.5049
MW-54R	8	1	1	4	1.75	1.5	1.035	0.5915	1.343
MW-55	8	0	48	204	133	139	57.49	0.4323	-0.1422
OW-57ROUT	8	7	1	1	1	1	0	0	NaN

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Boron, Total Analysis Run 11/7/2022 12:45 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

For observations made between 3/8/2021 and 10/11/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 0
Wells = 12
Minimum Value = 226
Maximum Value = 5310
Mean Value = 1839
Median Value = 1560
Standard Deviation = 1181
Coefficient of Variation = 0.6421
Skewness = 1.074

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	1340	1790	1558	1585	160.4	0.103	-0.1603
JCW-MW-18004	8	0	226	389	289	281.5	58.17	0.2013	0.4911
JCW-MW-18005	8	0	919	1290	1065	1038	121.9	0.1144	0.753
JCW-MW-18006	8	0	2260	3220	2723	2668	286	0.105	0.2877
MW-50	8	0	1290	1865	1544	1568	191.4	0.124	0.2243
MW-51	8	0	960	1490	1214	1205	196.7	0.162	0.107
MW-52	8	0	1070	1330	1188	1150	103.3	0.08702	0.3514
MW-53	8	0	3790	4300	3971	3900	186.2	0.04689	0.679
MW-53R	8	0	1510	2340	1865	1770	339.2	0.1819	0.4504
MW-54R	8	0	2470	5310	4065	4190	965.7	0.2376	-0.3462
MW-55	8	0	593	976	782.8	807	129.5	0.1654	-0.114
OW-57ROUT	8	0	1570	2030	1800	1780	161.2	0.08953	0.1307

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Calcium, Total Analysis Run 11/7/2022 12:45 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

For observations made between 3/8/2021 and 10/11/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 0
Wells = 12
Minimum Value = 108
Maximum Value = 465
Mean Value = 207.9
Median Value = 193
Standard Deviation = 74.09
Coefficient of Variation = 0.3564
Skewness = 1.121

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	270	465	362.1	360.5	61.64	0.1702	0.1581
JCW-MW-18004	8	0	193	266	233	235.5	27.38	0.1175	-0.1801
JCW-MW-18005	8	0	149	286	198.3	179	55.59	0.2803	0.7997
JCW-MW-18006	8	0	109	152	136.1	139.5	15.15	0.1113	-0.7841
MW-50	8	0	162.5	380.5	247.2	222.5	87.23	0.3529	0.5874
MW-51	8	0	211	316	264	265.5	40	0.1515	-0.1846
MW-52	8	0	196	251	227	227.5	17.86	0.07866	-0.3819
MW-53	8	0	108	187	152.4	154.5	29.37	0.1927	-0.2983
MW-53R	8	0	188	234	216.5	222.5	16.6	0.0767	-0.5656
MW-54R	8	0	158	196	174.6	173.5	14.18	0.08121	0.1981
MW-55	8	0	126	198	158.1	156.5	22.31	0.1411	0.4178
OW-57ROUT	8	0	113	140	125.4	127	9.62	0.07673	-0.00004824

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Iron, Total Analysis Run 11/7/2022 12:45 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

For observations made between 3/8/2021 and 10/11/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 3
Wells = 12
Minimum Value = 10
Maximum Value = 40500
Mean Value = 4243
Median Value = 1720
Standard Deviation = 7528
Coefficient of Variation = 1.774
Skewness = 3.167

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	86	13600	1917	189.5	4726	2.465	2.257
JCW-MW-18004	8	3	10	952	138.9	22.5	328.8	2.368	2.26
JCW-MW-18005	8	0	1680	5840	3941	3913	1422	0.3609	-0.1679
JCW-MW-18006	8	0	5490	9040	7003	7053	1221	0.1743	0.276
MW-50	8	0	730	2890	1964	1993	707.8	0.3605	-0.4487
MW-51	8	0	1210	5130	2701	2070	1571	0.5818	0.8115
MW-52	8	0	879	6340	3406	3350	1933	0.5675	0.1218
MW-53	8	0	1060	2380	1414	1210	450.2	0.3185	1.402
MW-53R	8	0	460	2800	1429	1055	846.2	0.5921	0.4992
MW-54R	8	0	115	2280	805.1	639	720.8	0.8953	1.03
MW-55	8	0	15000	40500	26138	22800	9580	0.3665	0.5365
OW-57ROUT	8	0	37	100	64.88	62	24	0.3699	0.3672

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Sulfate Analysis Run 11/7/2022 12:45 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

For observations made between 3/8/2021 and 10/11/2022, a summary of the selected data set:

Observations = 96
ND/Trace = 0
Wells = 12
Minimum Value = 14.9
Maximum Value = 1400
Mean Value = 324.5
Median Value = 249.5
Standard Deviation = 285
Coefficient of Variation = 0.8782
Skewness = 1.295

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18001	8	0	549	1400	877.3	764.5	306.9	0.3498	0.5746
JCW-MW-18004	8	0	393	581	497.4	512	60.21	0.121	-0.5605
JCW-MW-18005	8	0	160	535	279.1	220	133.6	0.4789	1.121
JCW-MW-18006	8	0	14.9	57.3	34.68	34.05	13.34	0.3848	0.2405
MW-50	8	0	285.5	1125	556.3	440	300.7	0.5405	0.922
MW-51	8	0	394	452	427.3	427	21.75	0.05091	-0.2474
MW-52	8	0	110	663	528.4	582.5	177.8	0.3365	-1.85
MW-53	8	0	39.5	322	191.1	170.5	107	0.5599	0.03637
MW-53R	8	0	71.7	533	240.1	208	137.8	0.5739	1.16
MW-54R	8	0	67.1	86.3	75.21	74.2	5.961	0.07926	0.5852
MW-55	8	0	18.5	249	102.6	64.35	94.02	0.9169	0.8703
OW-57ROUT	8	0	69.4	93.9	84.45	85.5	7.915	0.09372	-0.6579

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Vanadium, Total Analysis Run 11/7/2022 12:45 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

For observations made between 3/8/2021 and 10/11/2022, a summary of the selected data set:

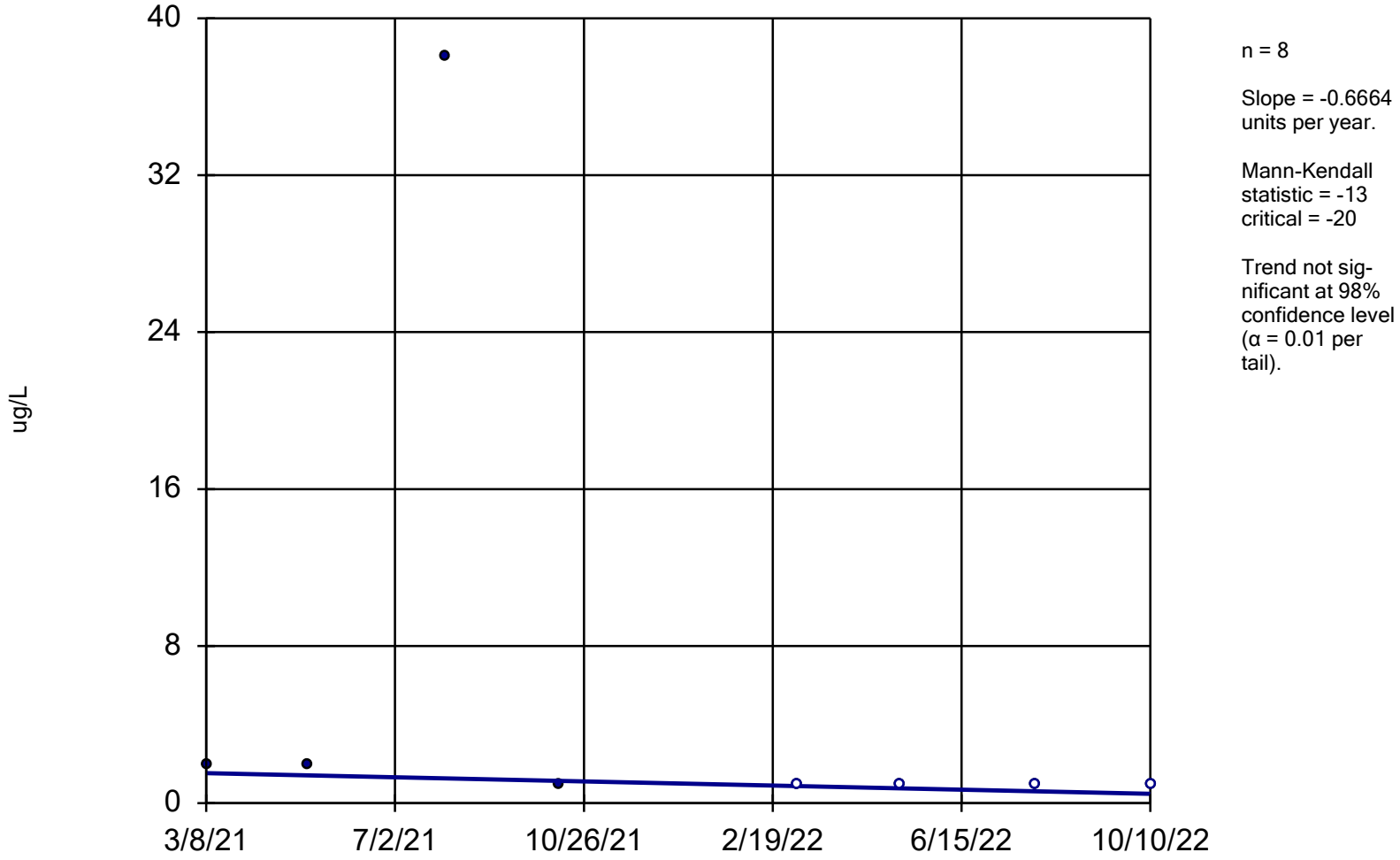
Observations = 96
ND/Trace = 86
Wells = 12
Minimum Value = 2
Maximum Value = 12
Mean Value = 2.203
Median Value = 2
Standard Deviation = 1.077
Coefficient of Variation = 0.4891
Skewness = 8.082

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	8	2	2	2	2	0	0	NaN
JCW-MW-18005	8	8	2	2	2	2	0	0	NaN
JCW-MW-18006	8	0	2	4	3.188	3	0.6512	0.2043	-0.3305
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

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Arsenic, Total

JCW-MW-18001



n = 8

Slope = -0.6664 units per year.

Mann-Kendall statistic = -13
critical = -20

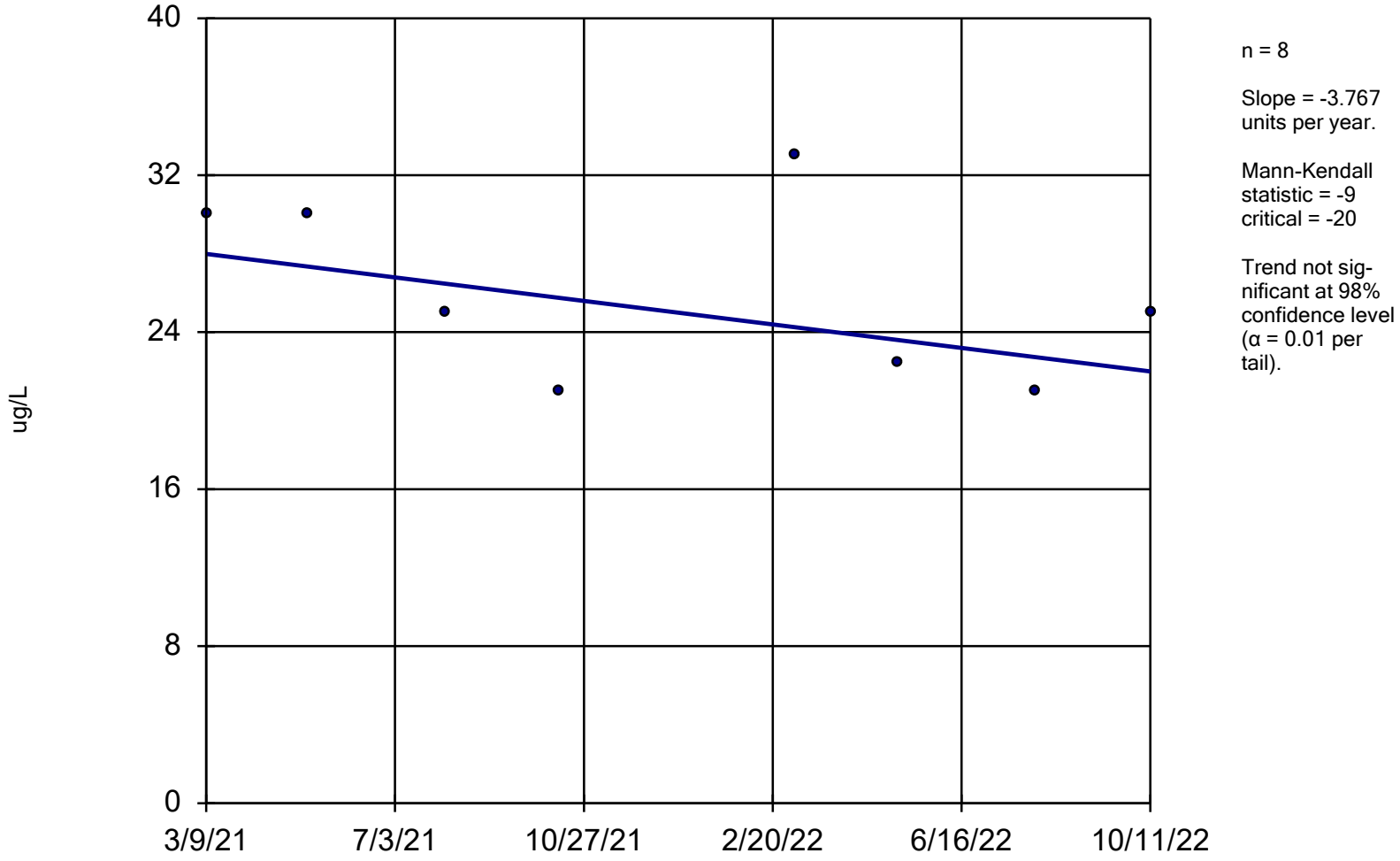
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Arsenic, Total

JCW-MW-18006



n = 8

Slope = -3.767 units per year.

Mann-Kendall statistic = -9
critical = -20

Trend not significant at 98% confidence level (α = 0.01 per tail).

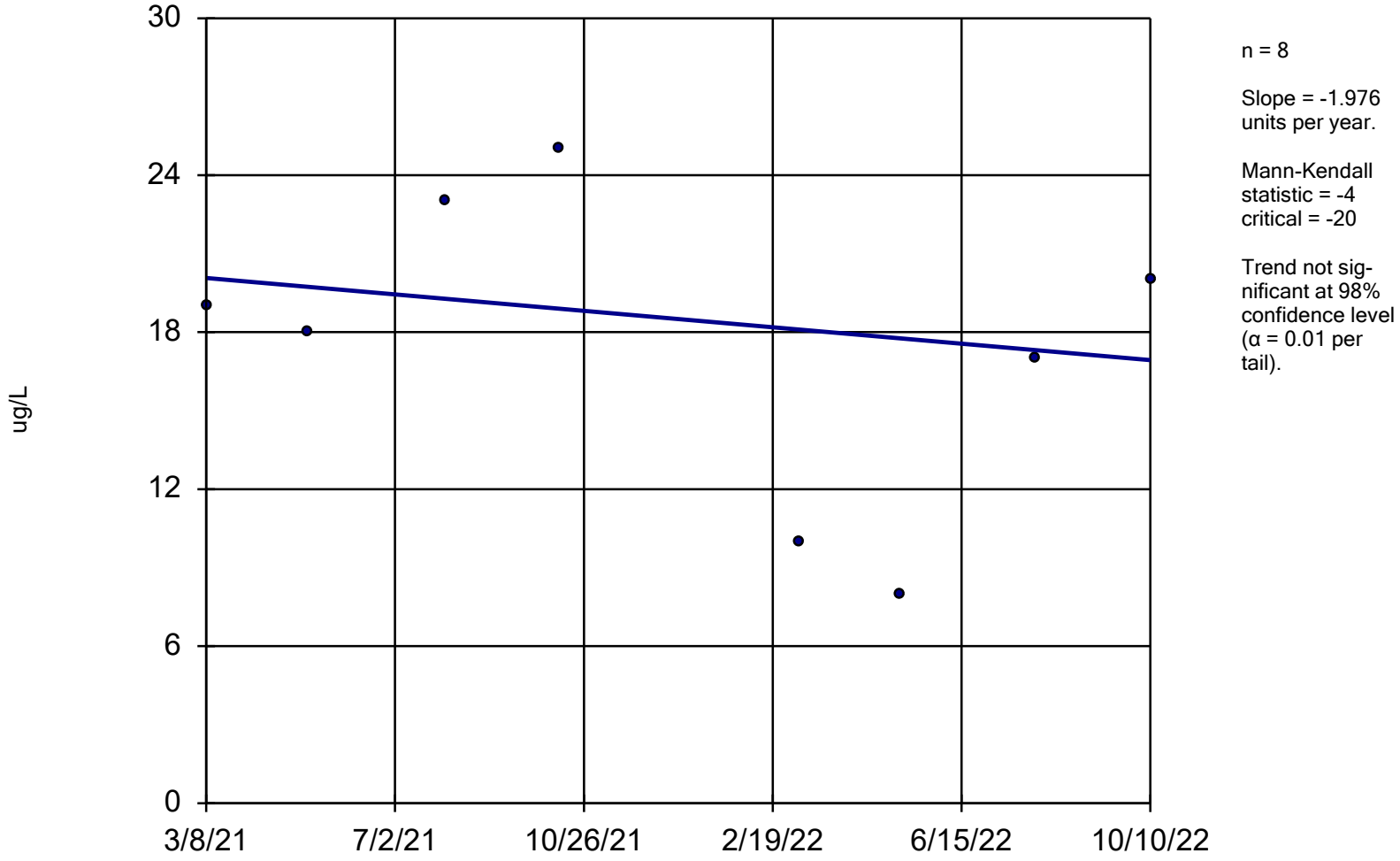
Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Arsenic, Total

MW-53R



n = 8

Slope = -1.976 units per year.

Mann-Kendall statistic = -4
critical = -20

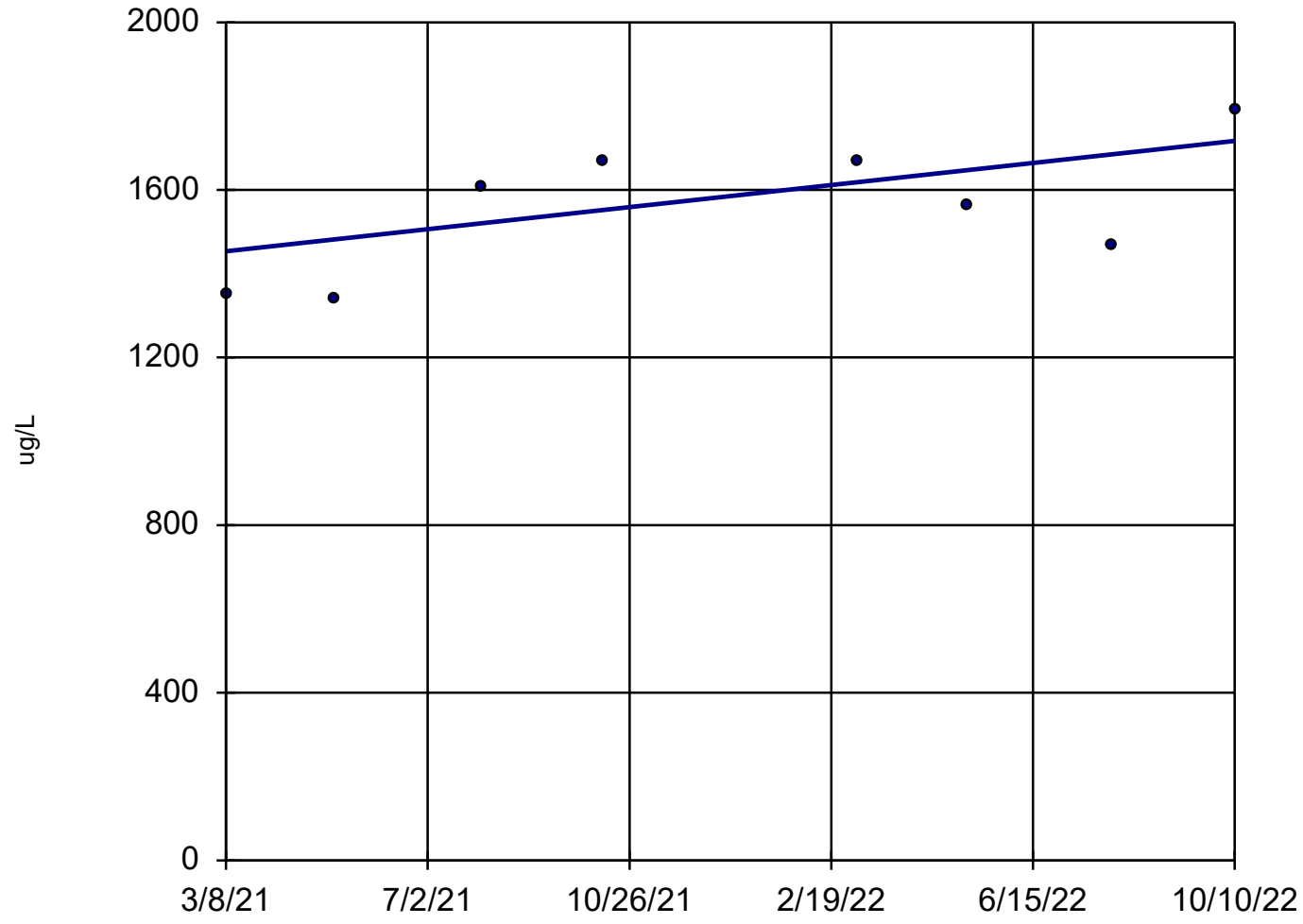
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Boron, Total

JCW-MW-18001



n = 8

Slope = 165.4 units per year.

Mann-Kendall statistic = 11
critical = 20

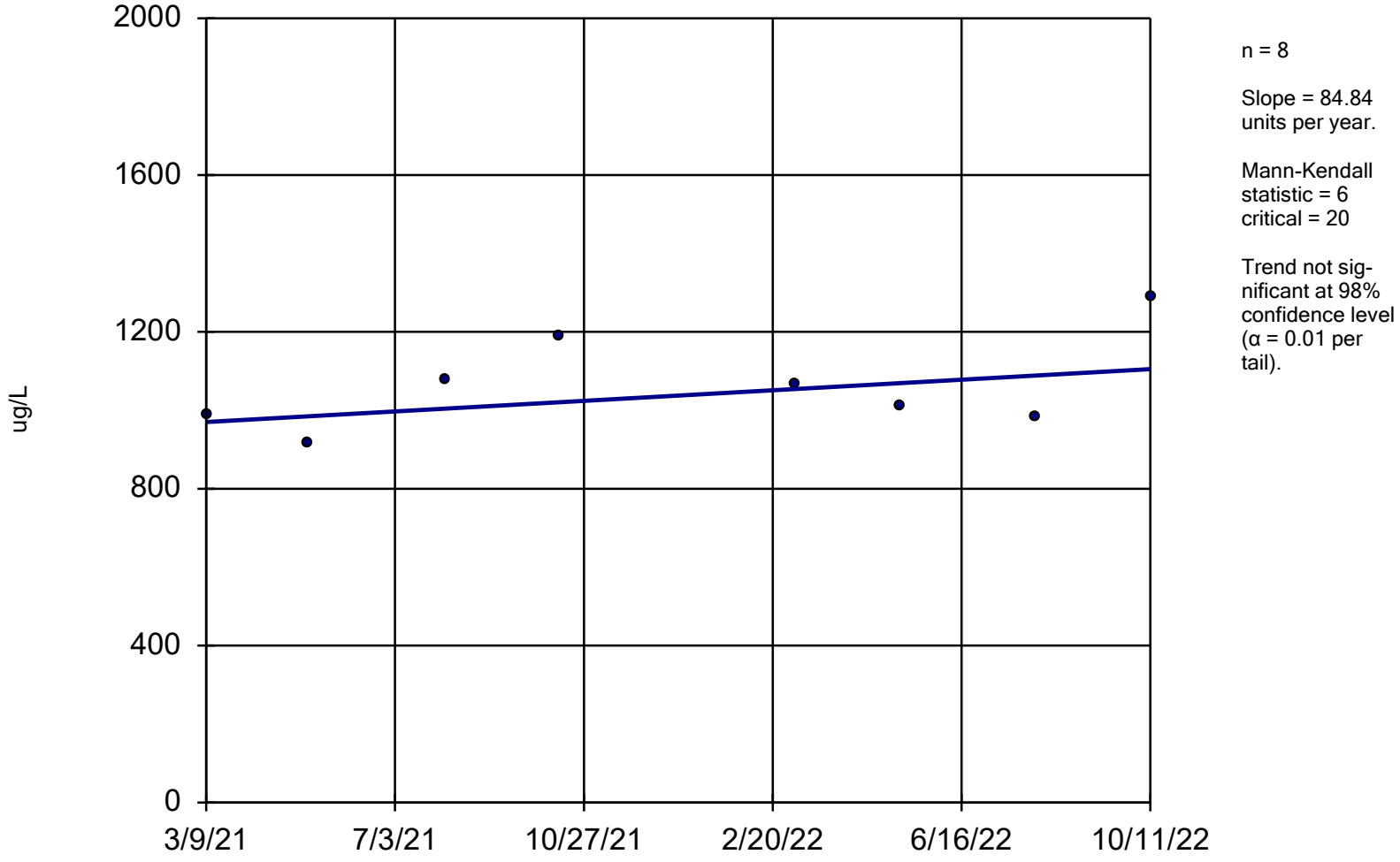
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Boron, Total

JCW-MW-18005



n = 8

Slope = 84.84 units per year.

Mann-Kendall statistic = 6
critical = 20

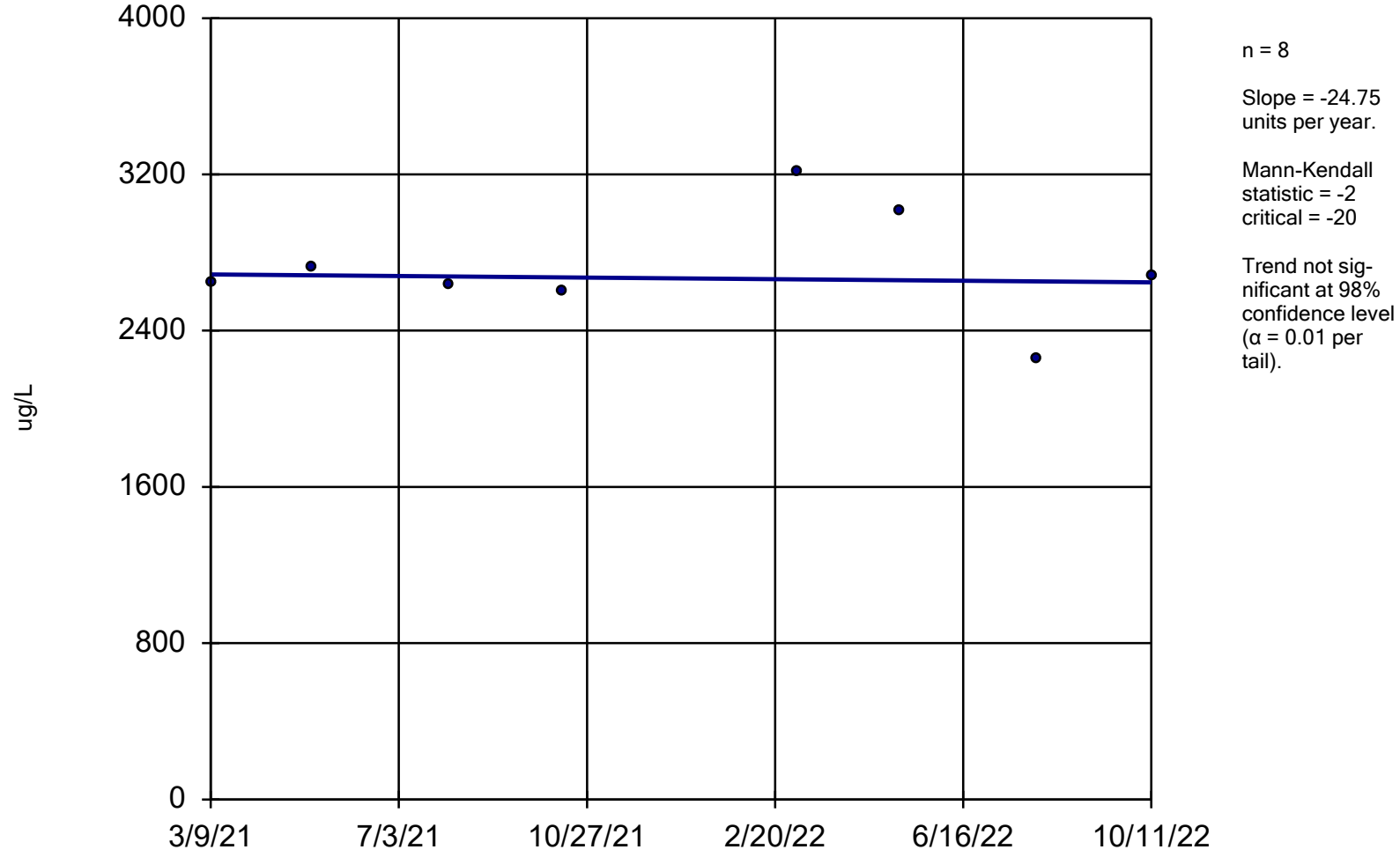
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Boron, Total

JCW-MW-18006



n = 8

Slope = -24.75 units per year.

Mann-Kendall statistic = -2
critical = -20

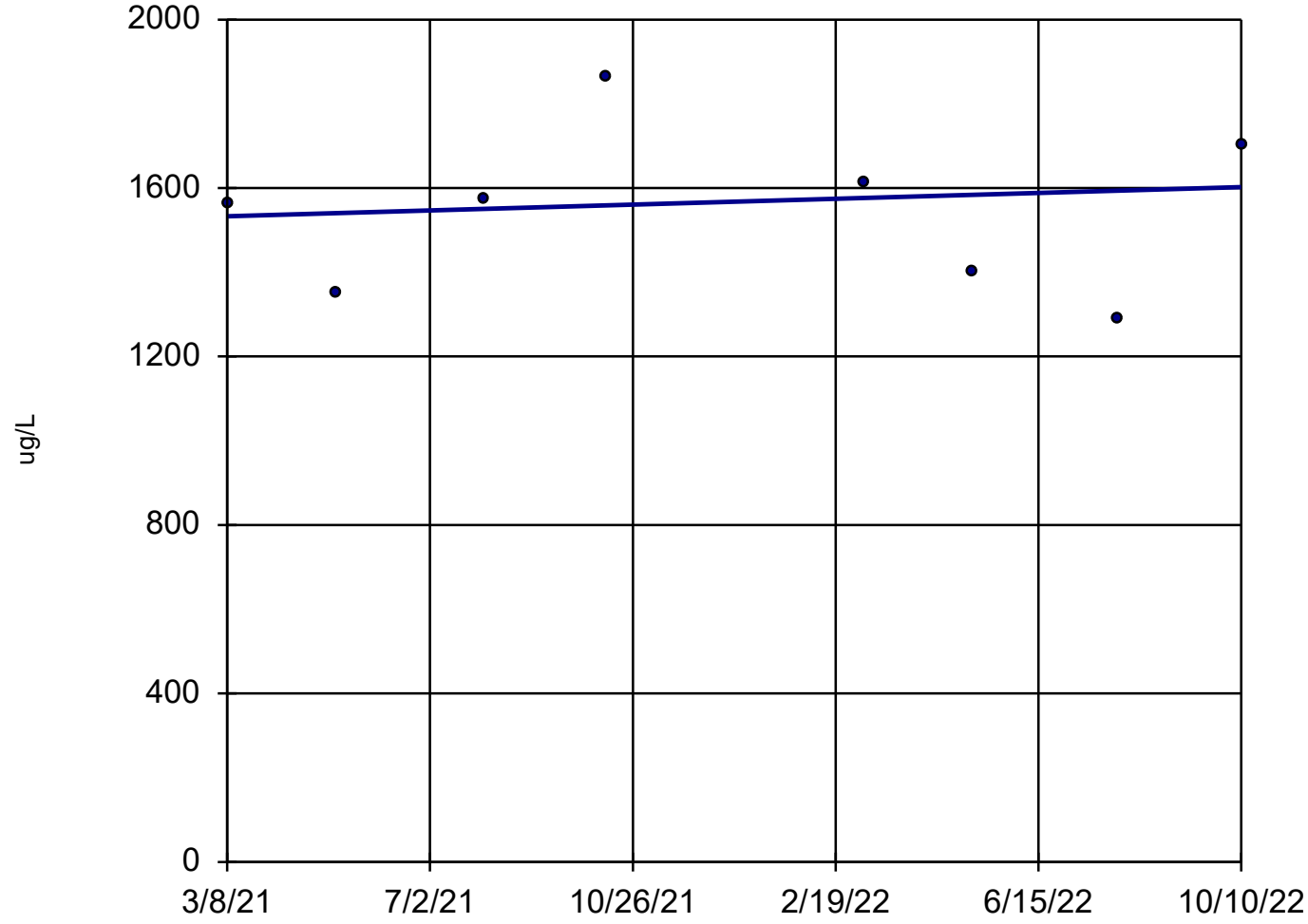
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Boron, Total

MW-50



n = 8

Slope = 43.69 units per year.

Mann-Kendall statistic = 2
critical = 20

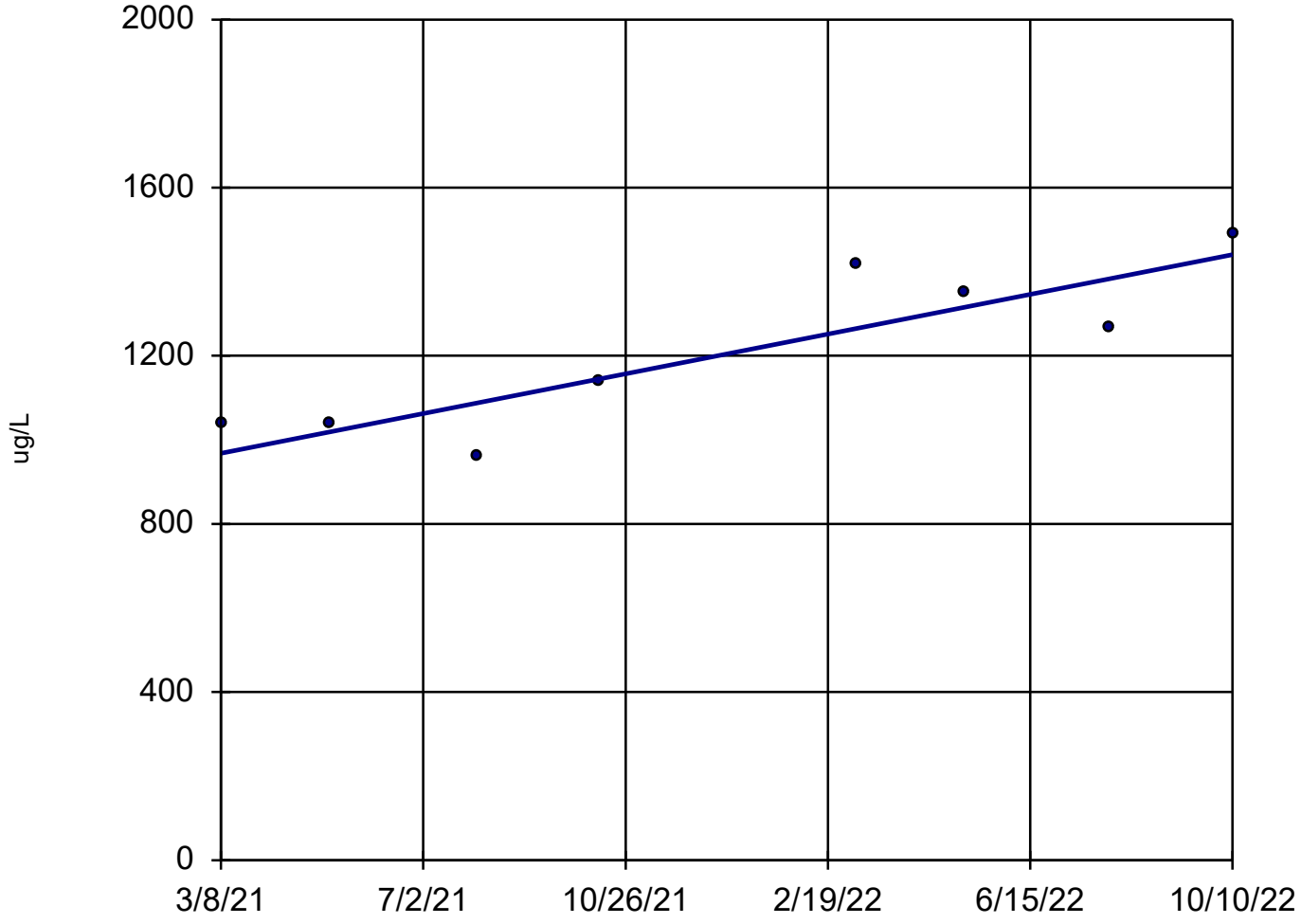
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Boron, Total

MW-51



n = 8

Slope = 296.8 units per year.

Mann-Kendall statistic = 17
critical = 20

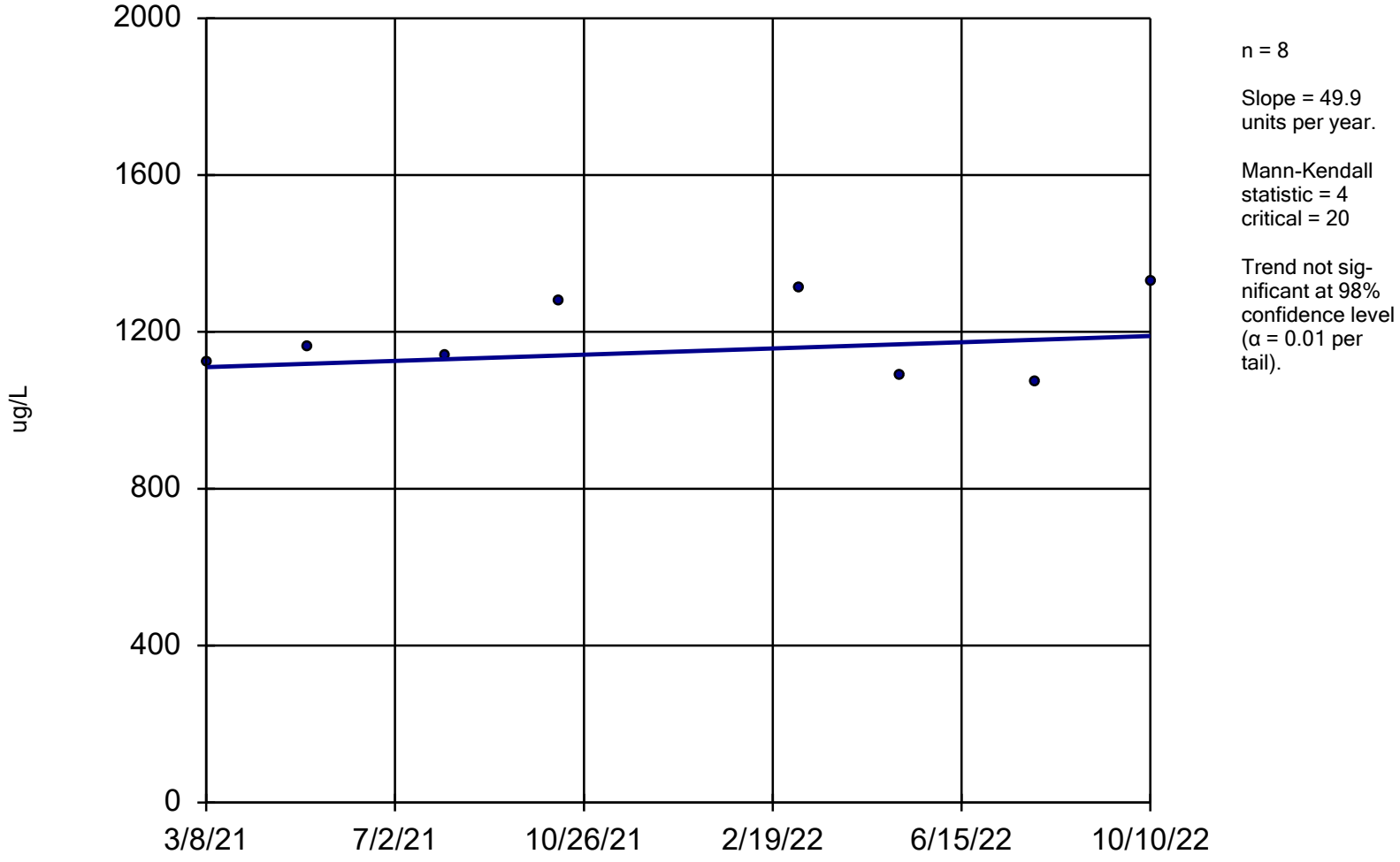
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Boron, Total

MW-52



n = 8

Slope = 49.9 units per year.

Mann-Kendall statistic = 4
critical = 20

Trend not significant at 98% confidence level (α = 0.01 per tail).

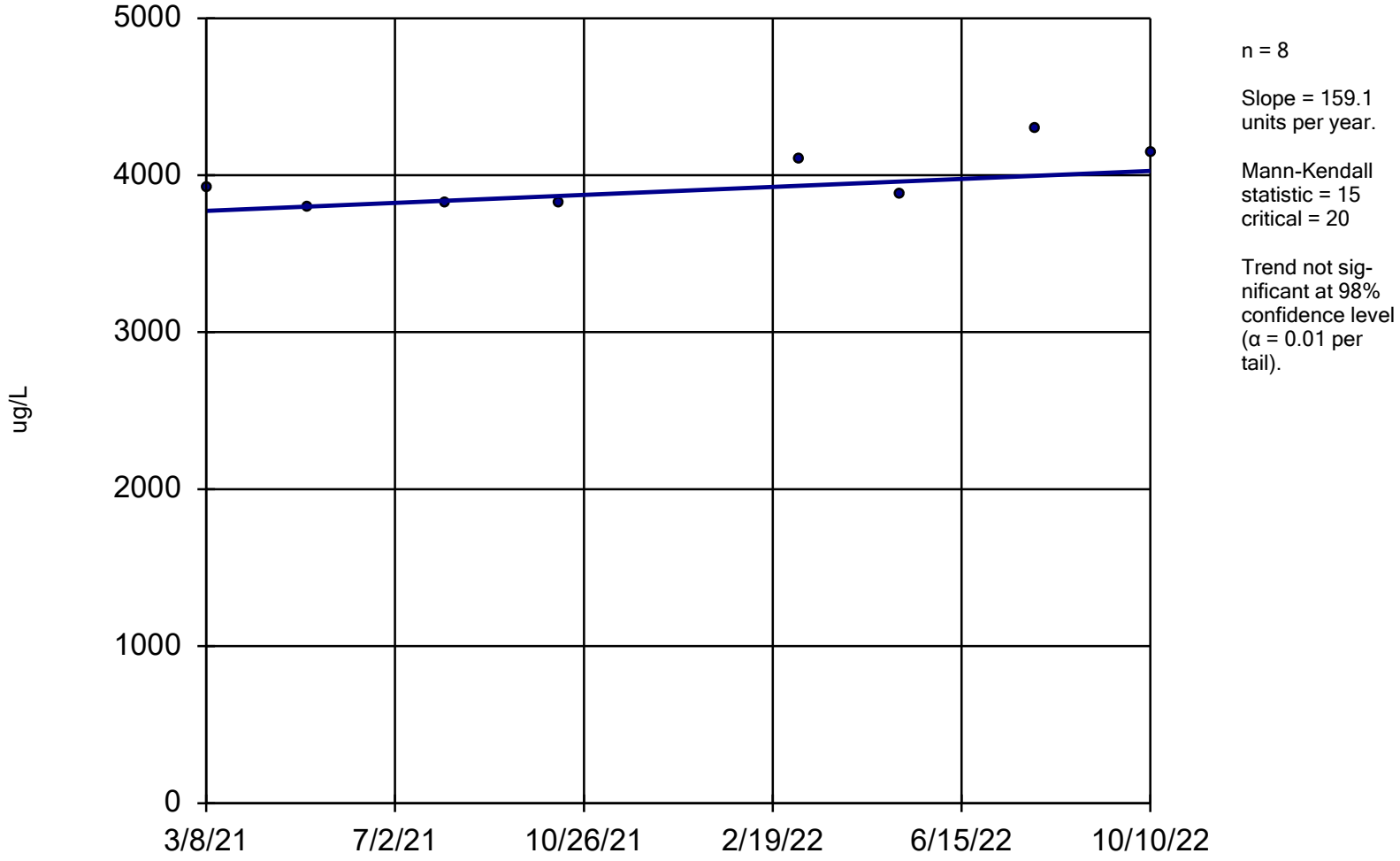
Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

MW-53



n = 8

Slope = 159.1 units per year.

Mann-Kendall statistic = 15
critical = 20

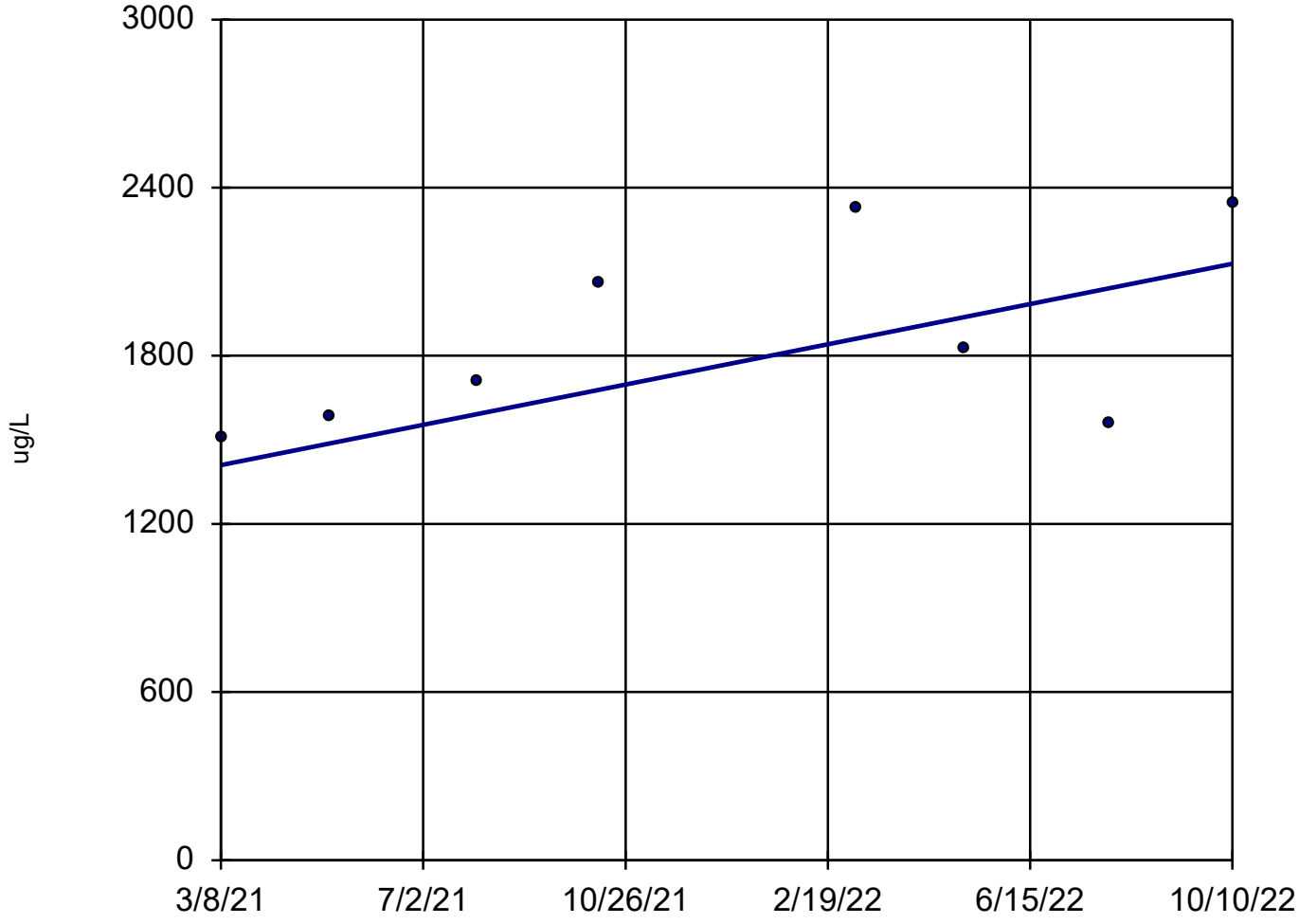
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Boron, Total

MW-53R



n = 8

Slope = 451.1 units per year.

Mann-Kendall statistic = 14
critical = 20

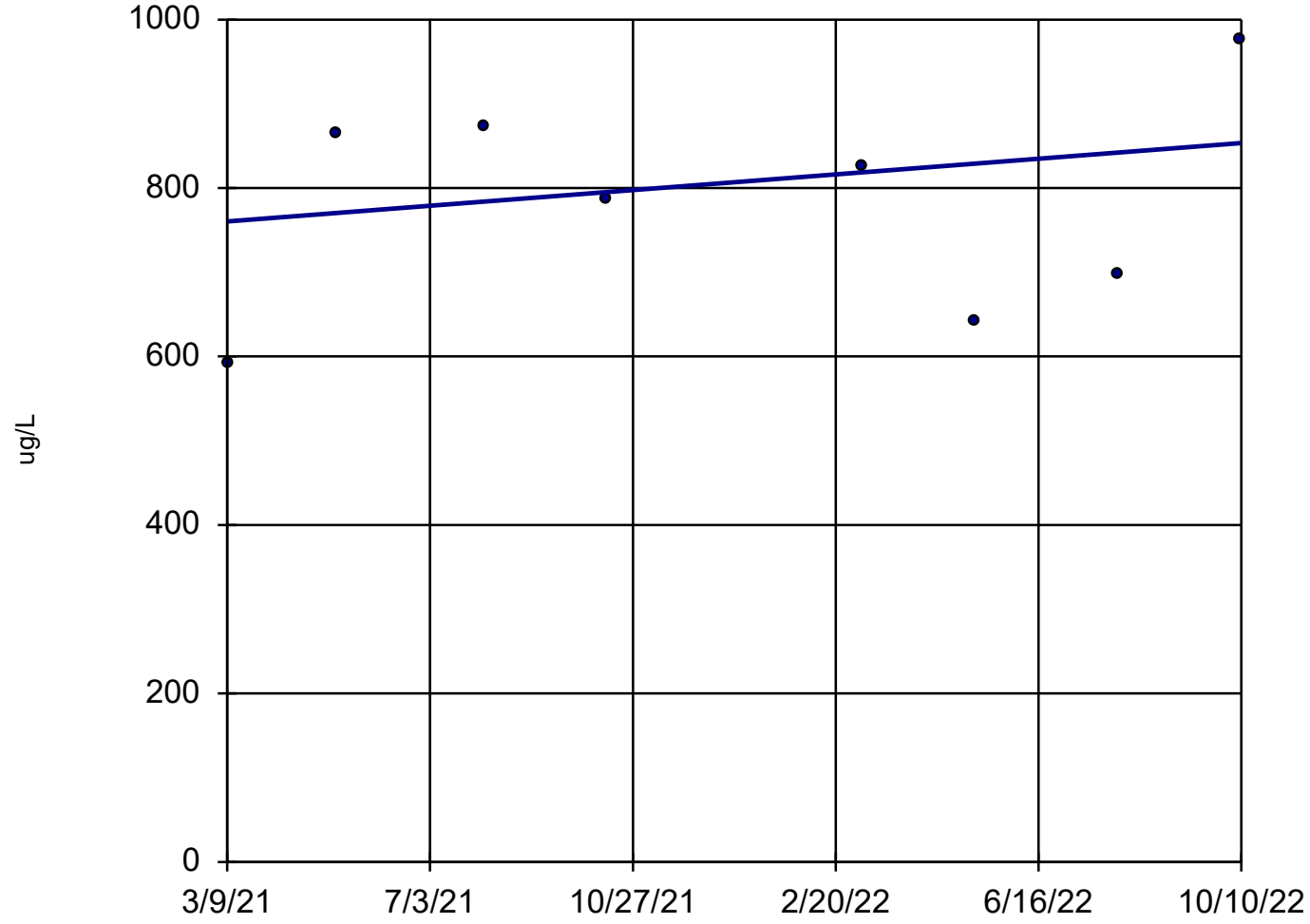
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Boron, Total

MW-55



n = 8

Slope = 58.52 units per year.

Mann-Kendall statistic = 4
critical = 20

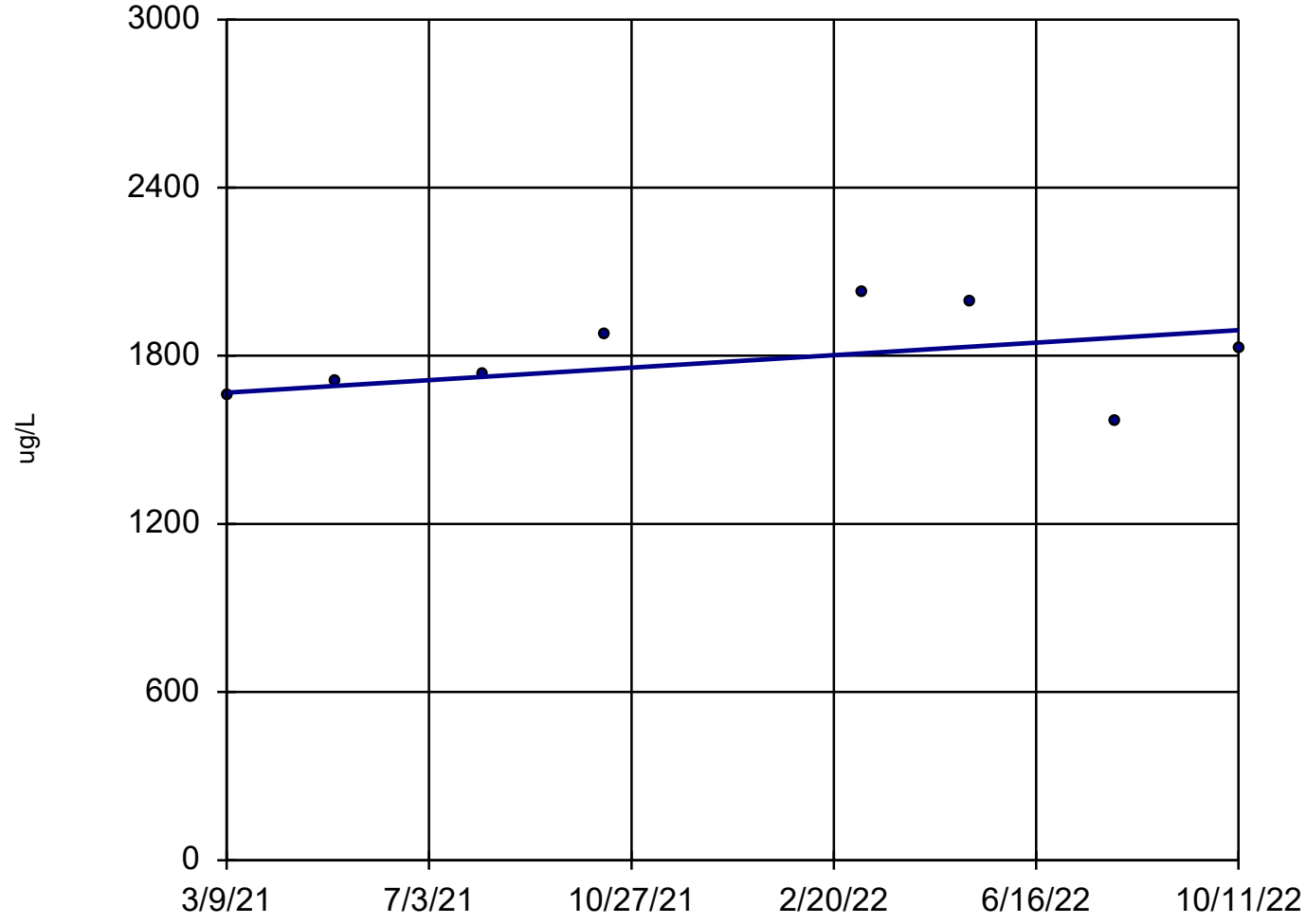
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Boron, Total

OW-57ROUT



n = 8

Slope = 140.3 units per year.

Mann-Kendall statistic = 8
critical = 20

Trend not significant at 98% confidence level (α = 0.01 per tail).

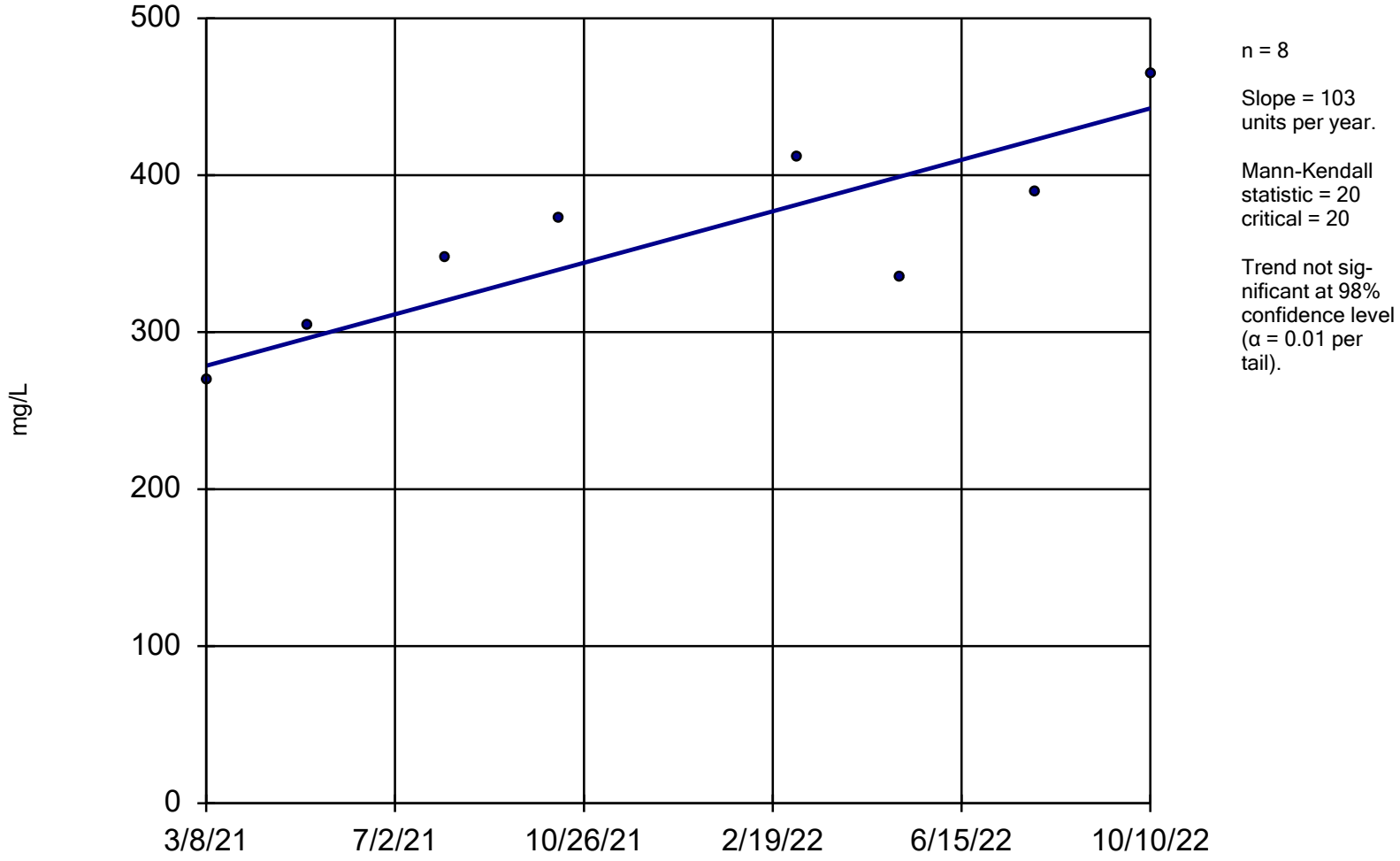
Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

JCW-MW-18001



n = 8

Slope = 103 units per year.

Mann-Kendall statistic = 20
critical = 20

Trend not significant at 98% confidence level (α = 0.01 per tail).

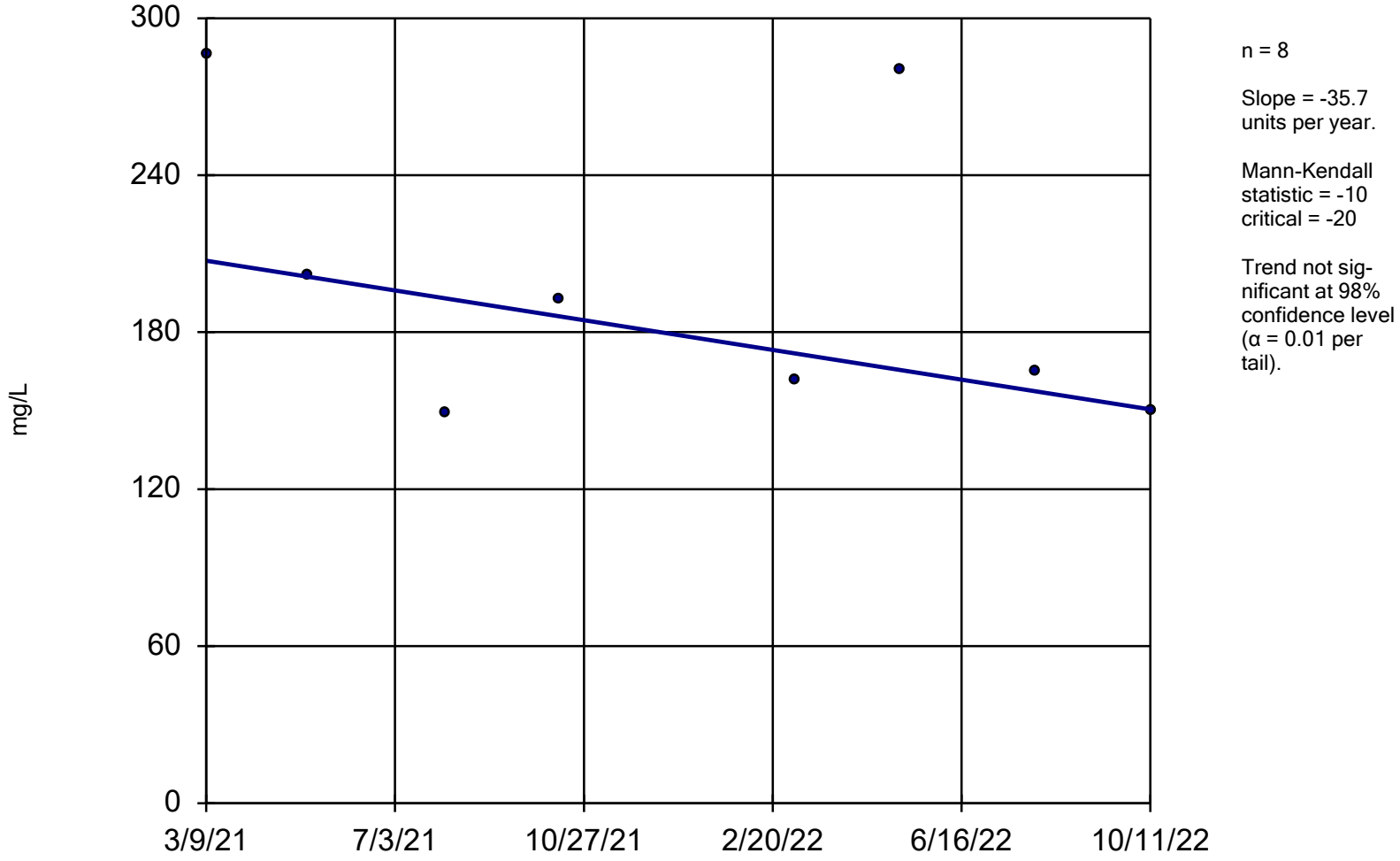
Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

JCW-MW-18005



n = 8

Slope = -35.7 units per year.

Mann-Kendall statistic = -10
critical = -20

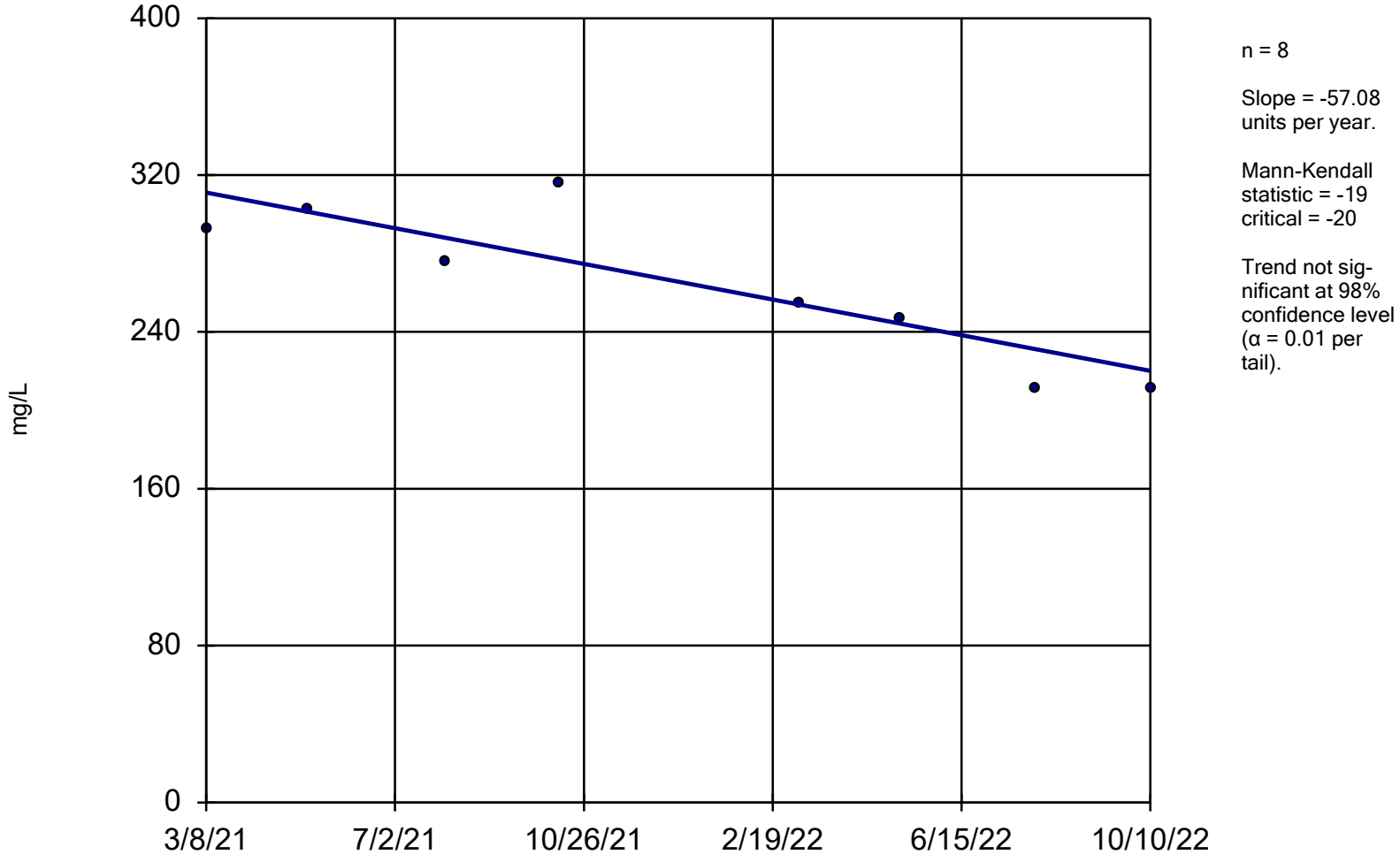
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Calcium, Total

MW-51



n = 8

Slope = -57.08 units per year.

Mann-Kendall statistic = -19
critical = -20

Trend not significant at 98% confidence level (α = 0.01 per tail).

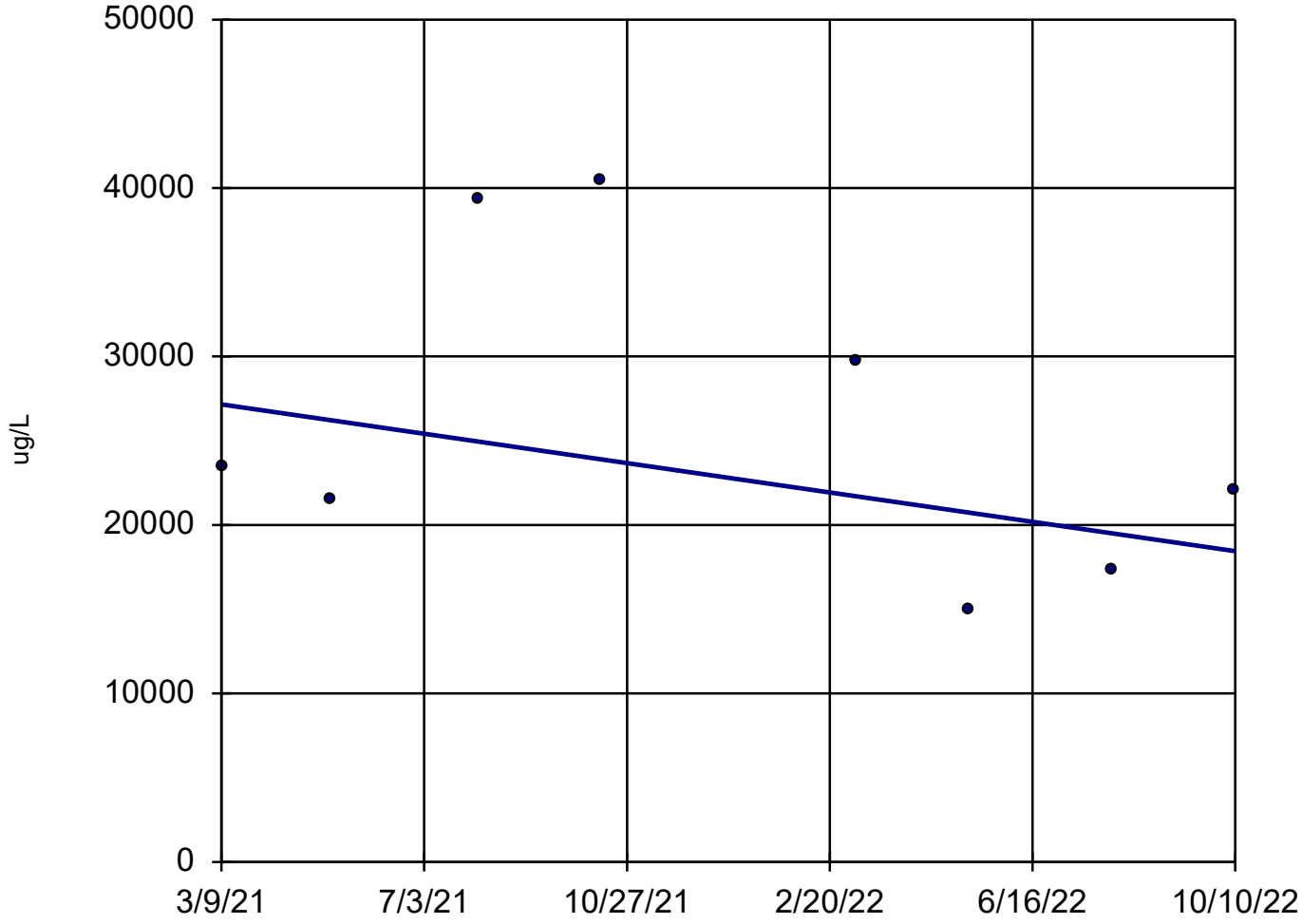
Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Iron, Total

MW-55



n = 8

Slope = -5478 units per year.

Mann-Kendall statistic = -6
critical = -20

Trend not significant at 98% confidence level (α = 0.01 per tail).

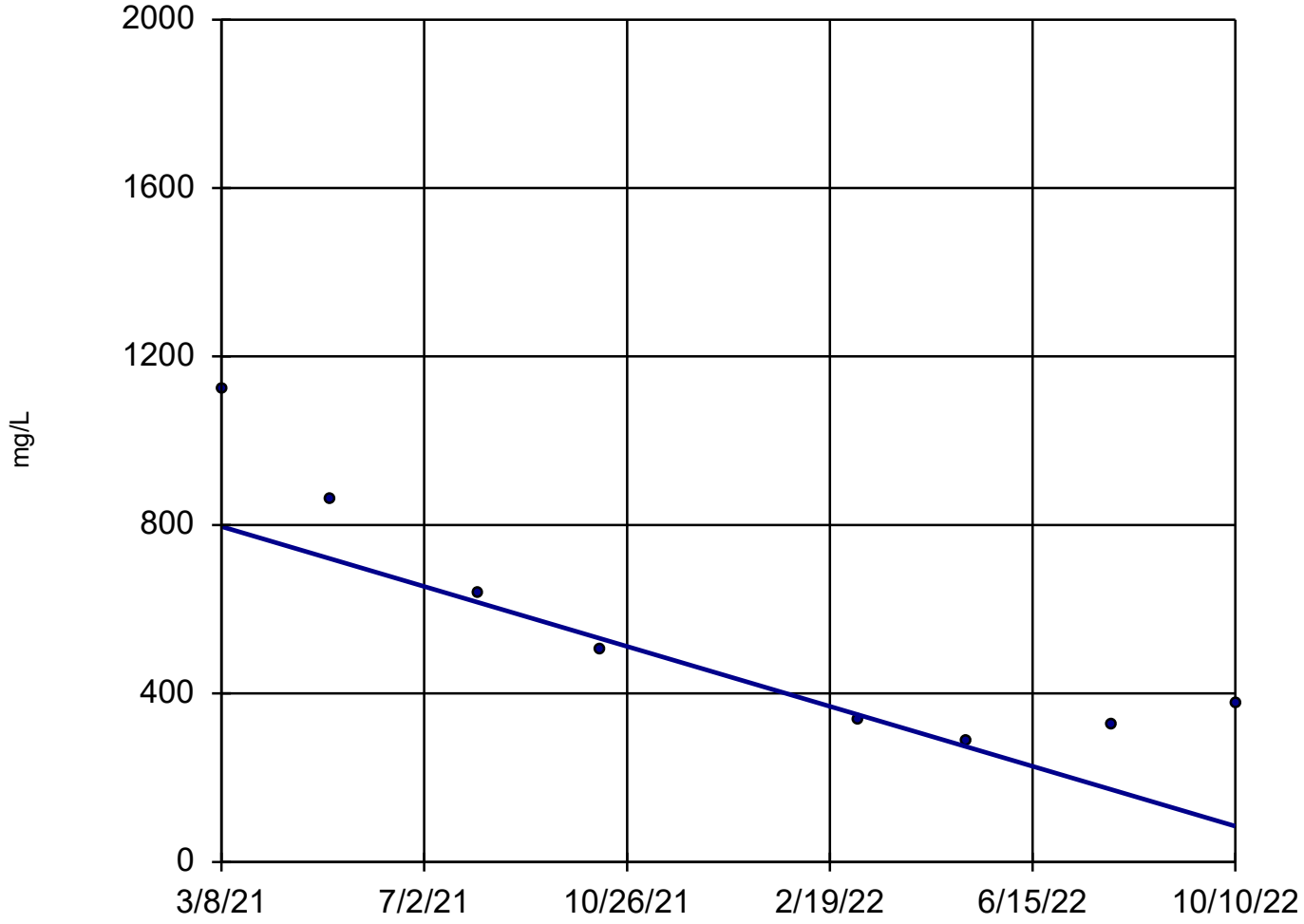
Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Sulfate

MW-50



n = 8

Slope = -447.2 units per year.

Mann-Kendall statistic = -20
critical = -20

Trend not significant at 98% confidence level (α = 0.01 per tail).

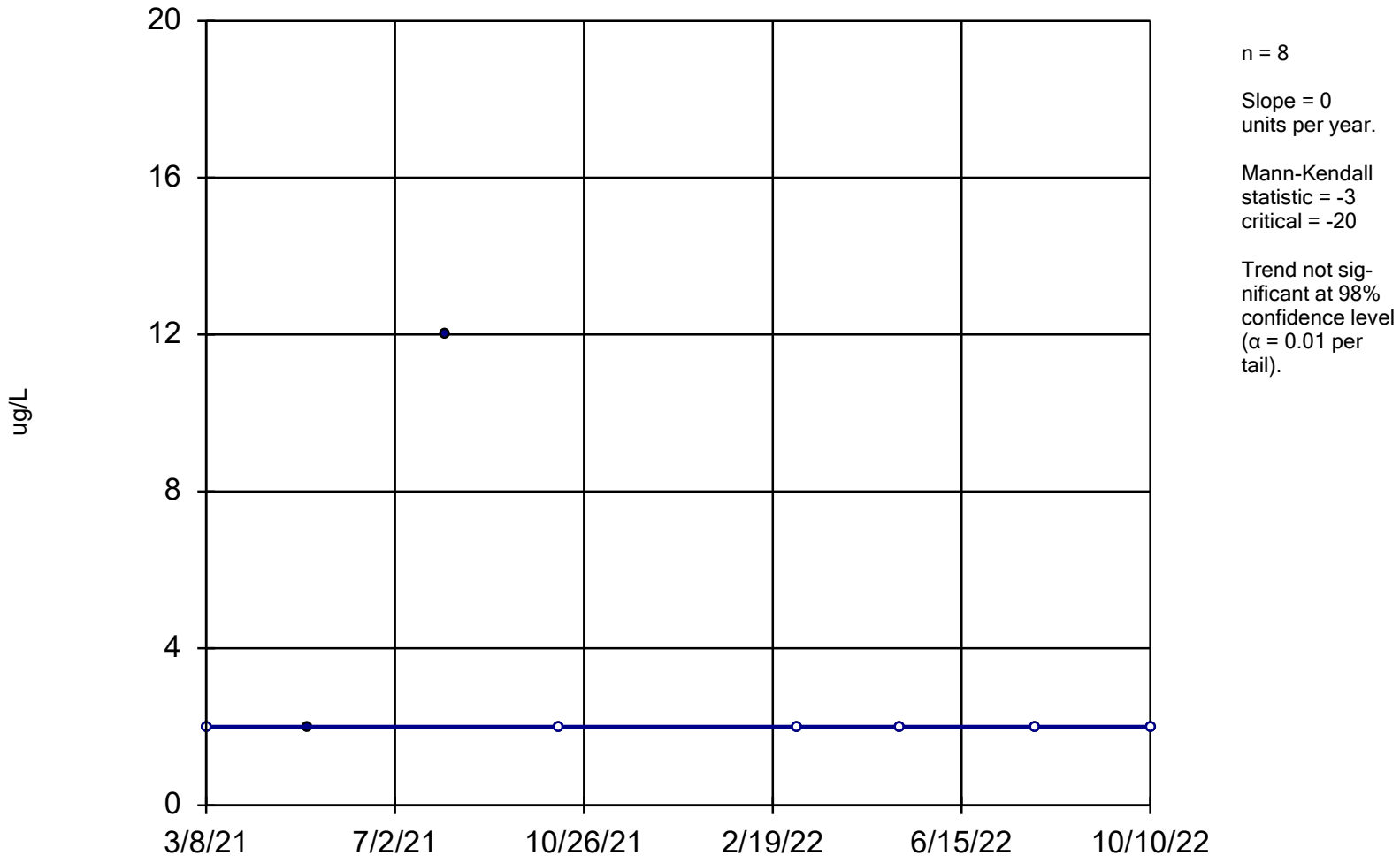
Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Vanadium, Total

JCW-MW-18001



n = 8

Slope = 0
units per year.

Mann-Kendall
statistic = -3
critical = -20

Trend not sig-
nificant at 98%
confidence level
(α = 0.01 per
tail).

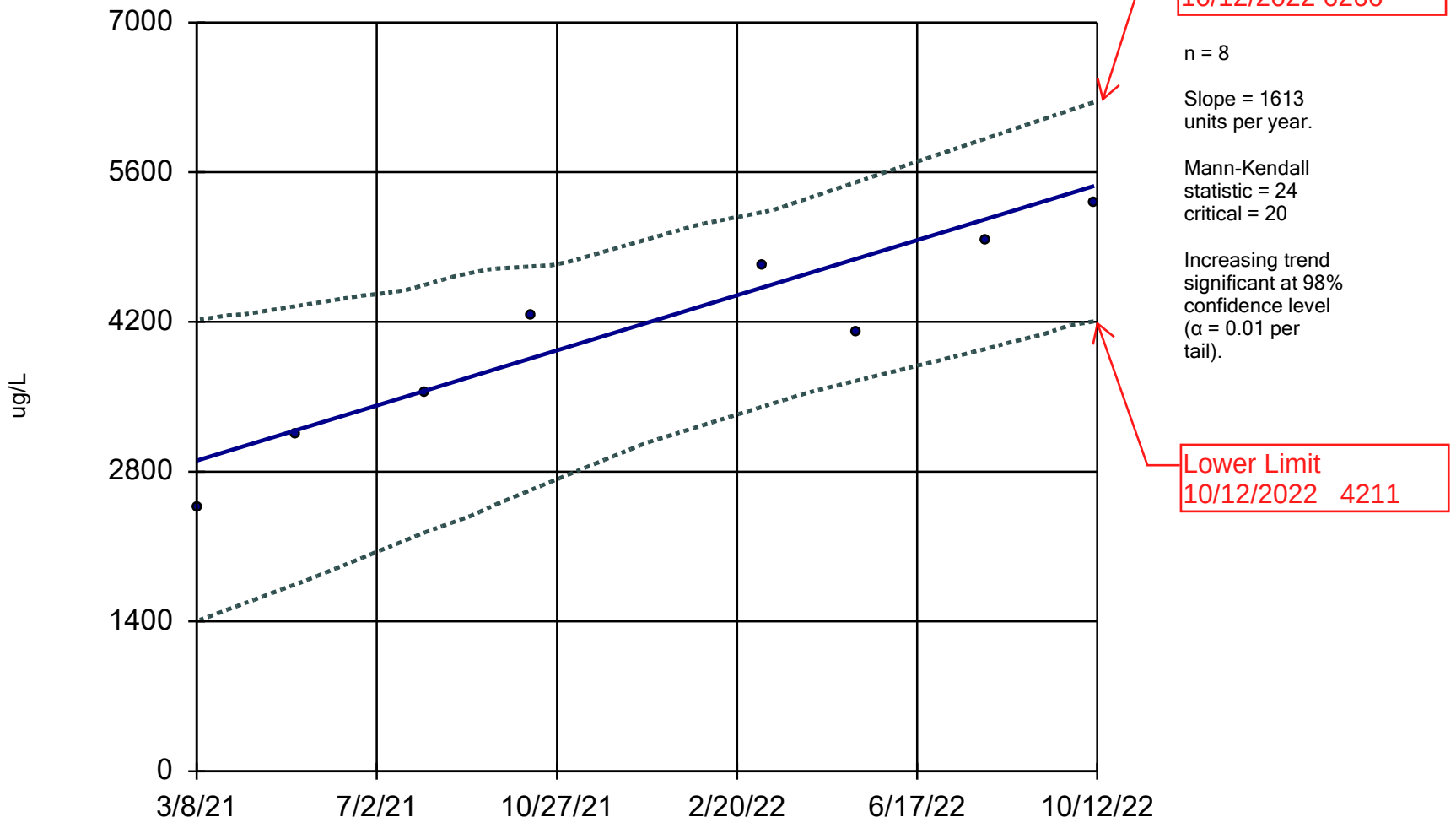
Sen's Slope Estimator Analysis Run 11/7/2022 12:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Boron, Total

MW-54R



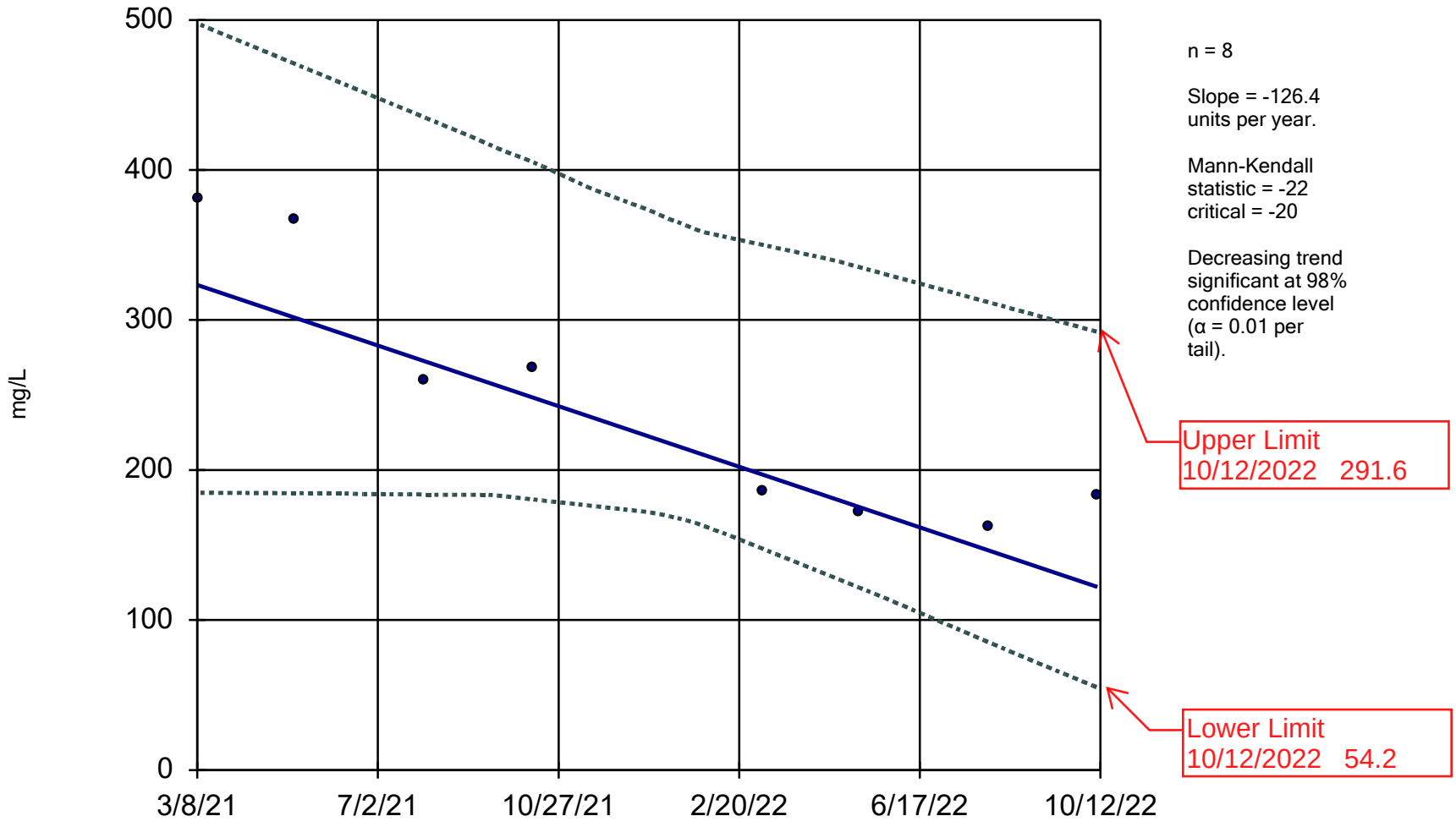
Sen's Slope and 98% Confidence Band Analysis Run 11/7/2022 12:54 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Calcium, Total

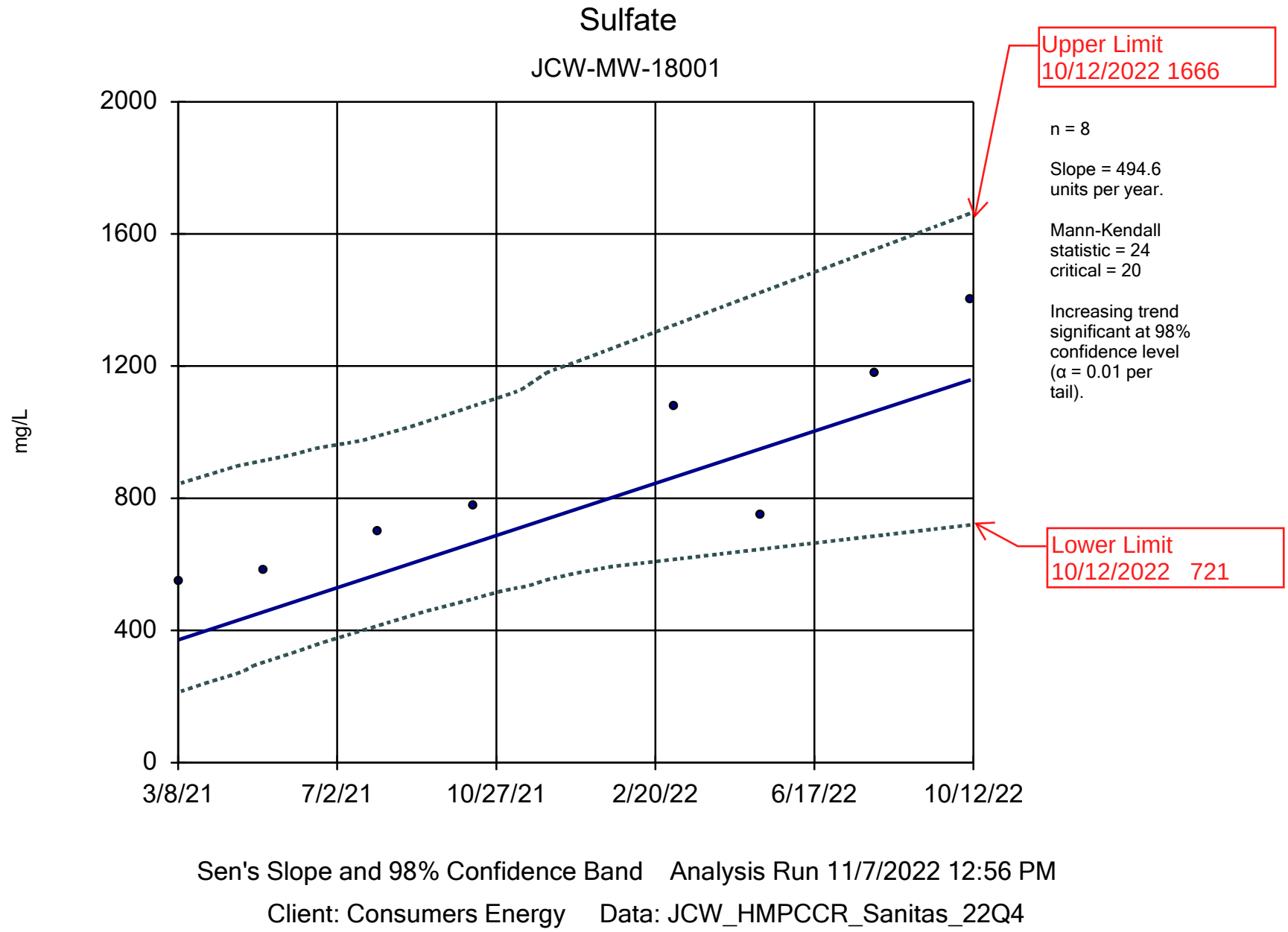
MW-50



Sen's Slope and 98% Confidence Band Analysis Run 11/7/2022 12:55 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

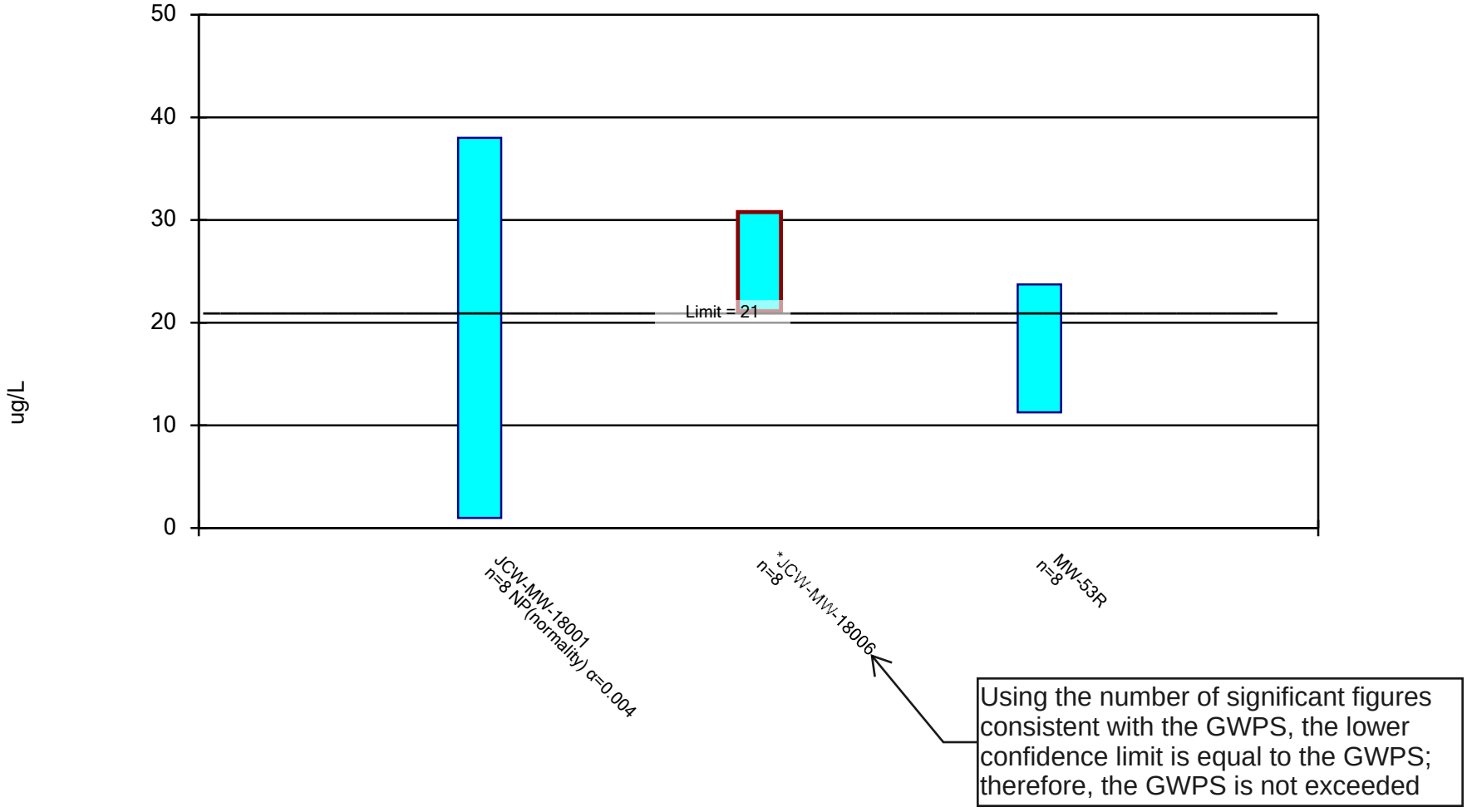
Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA



Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

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: Arsenic, Total Analysis Run 11/7/2022 12:59 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Confidence Interval

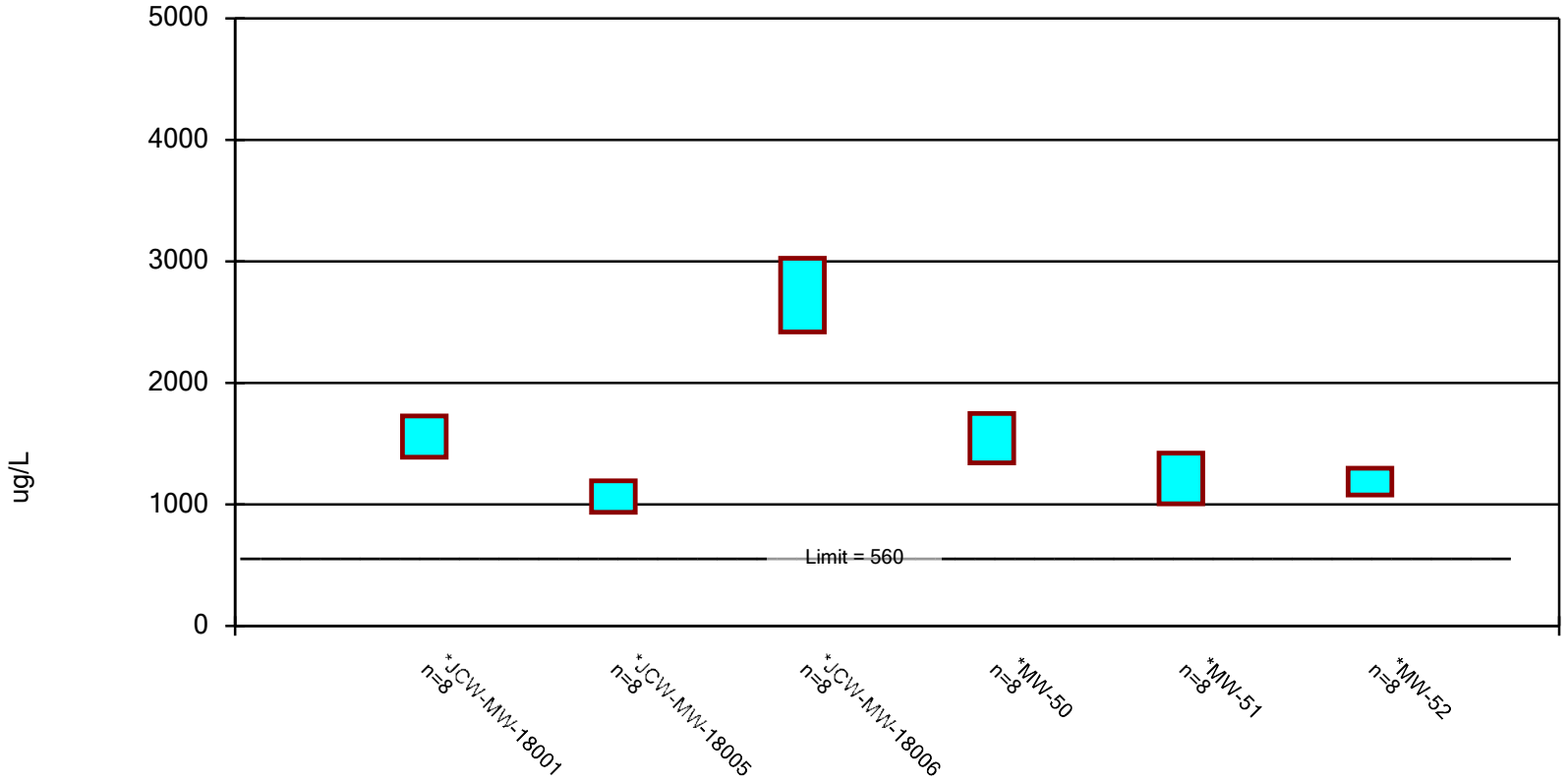
Constituent: Arsenic, Total (ug/L) Analysis Run 11/7/2022 1:01 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

	JCW-MW-18001	JCW-MW-18006	MW-53R
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	
3/7/2022	<1	33	
3/8/2022			10
5/9/2022	<1	22.5 (D)	8
8/1/2022	<1		17
8/2/2022		21	
10/10/2022	<1		20
10/11/2022		25 (D)	
Mean	5.875	25.94	17.5
Std. Dev.	12.99	4.555	5.88
Upper Lim.	38	30.77	23.73
Lower Lim.	1	21.11	11.27

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 11/7/2022 12:59 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Confidence Interval

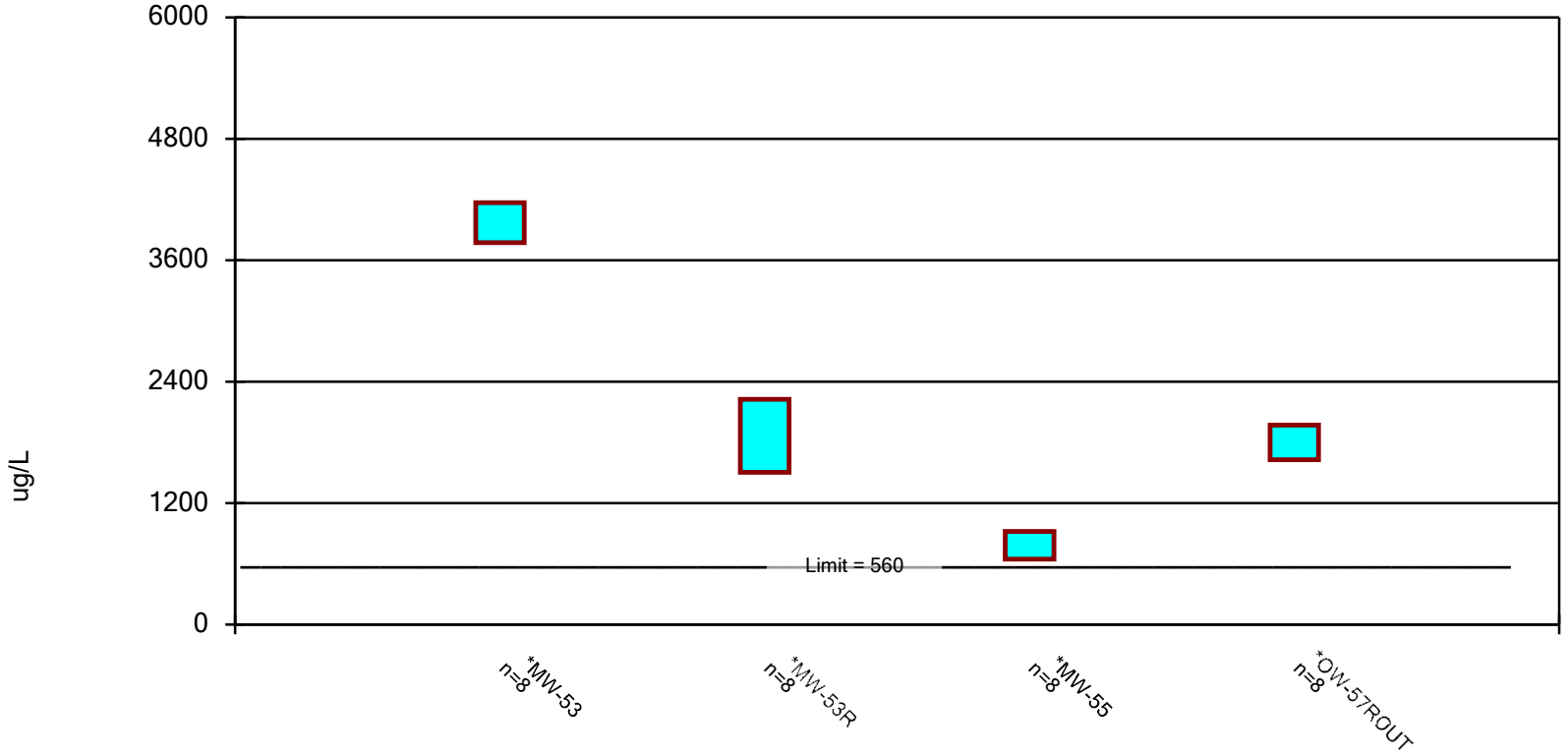
Constituent: Boron, Total (ug/L) Analysis Run 11/7/2022 1:01 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

	JCW-MW-18001	JCW-MW-18005	JCW-MW-18006	MW-50	MW-51	MW-52
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			
3/7/2022	1670	1065 (D)	3220			
3/8/2022				1615 (D)	1420	1310
5/9/2022	1560		3010 (D)	1400 (D)	1350	1090
5/10/2022		1010				
8/1/2022	1470			1290 (D)	1270	1070
8/2/2022		981	2260			
10/10/2022	1790			1700 (D)	1490	1330
10/11/2022		1290	2685 (D)			
Mean	1558	1065	2723	1544	1214	1188
Std. Dev.	160.4	121.9	286	191.4	196.7	103.3
Upper Lim.	1728	1194	3026	1747	1422	1297
Lower Lim.	1387	936.1	2420	1341	1005	1078

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 11/7/2022 12:59 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Confidence Interval

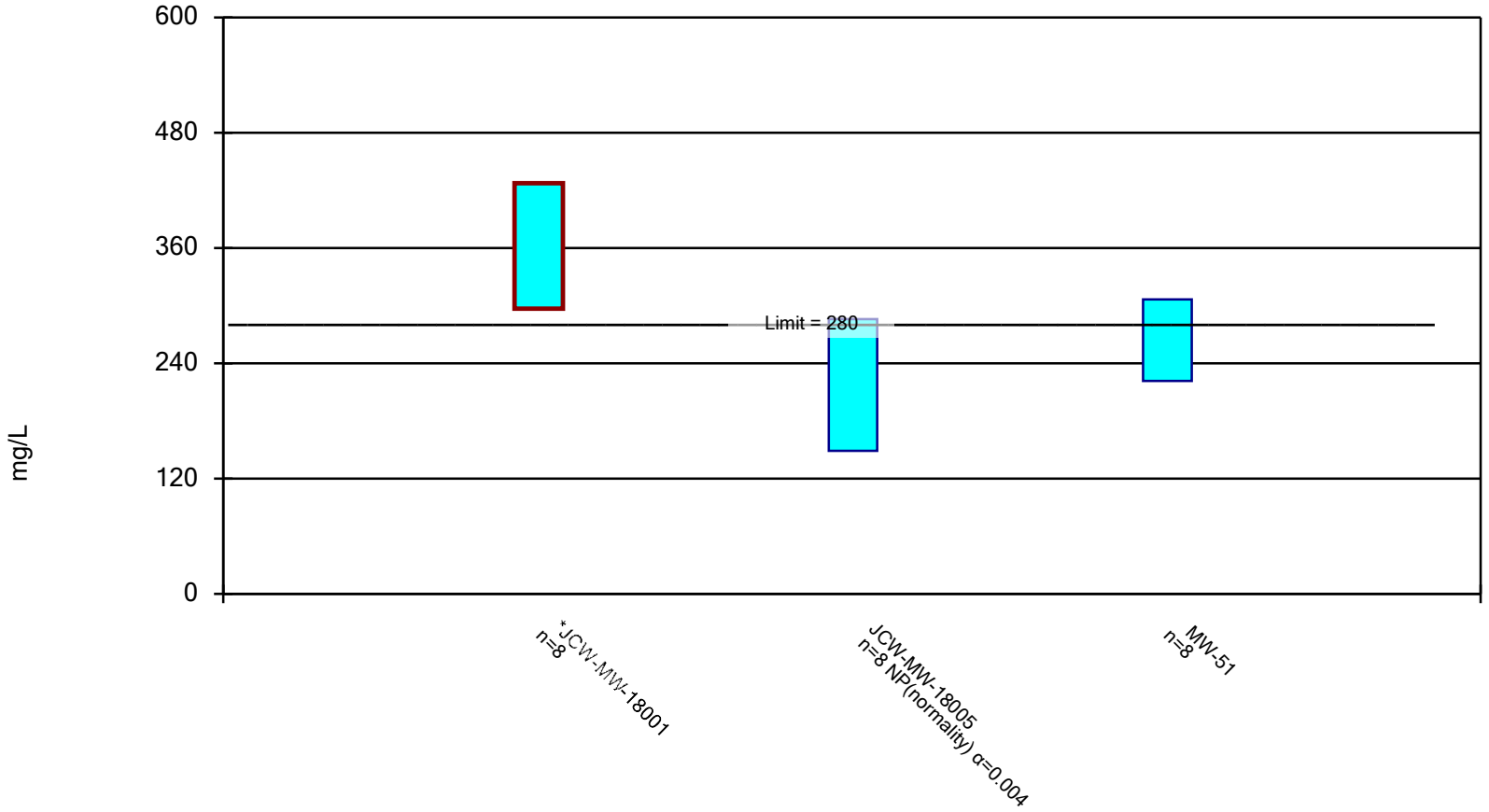
Constituent: Boron, Total (ug/L) Analysis Run 11/7/2022 1:01 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

	MW-53	MW-53R	MW-55	OW-57ROUT
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
3/7/2022			826	
3/8/2022	4100	2330		
3/9/2022				2030
5/9/2022	3880	1830		
5/10/2022			642	1990
8/1/2022	4300	1560	698 (D)	
8/2/2022				1570
10/10/2022	4140	2340	976	
10/11/2022				1830
Mean	3971	1865	782.8	1800
Std. Dev.	186.2	339.2	129.5	161.2
Upper Lim.	4169	2225	920	1971
Lower Lim.	3774	1505	645.5	1629

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 11/7/2022 12:59 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Confidence Interval

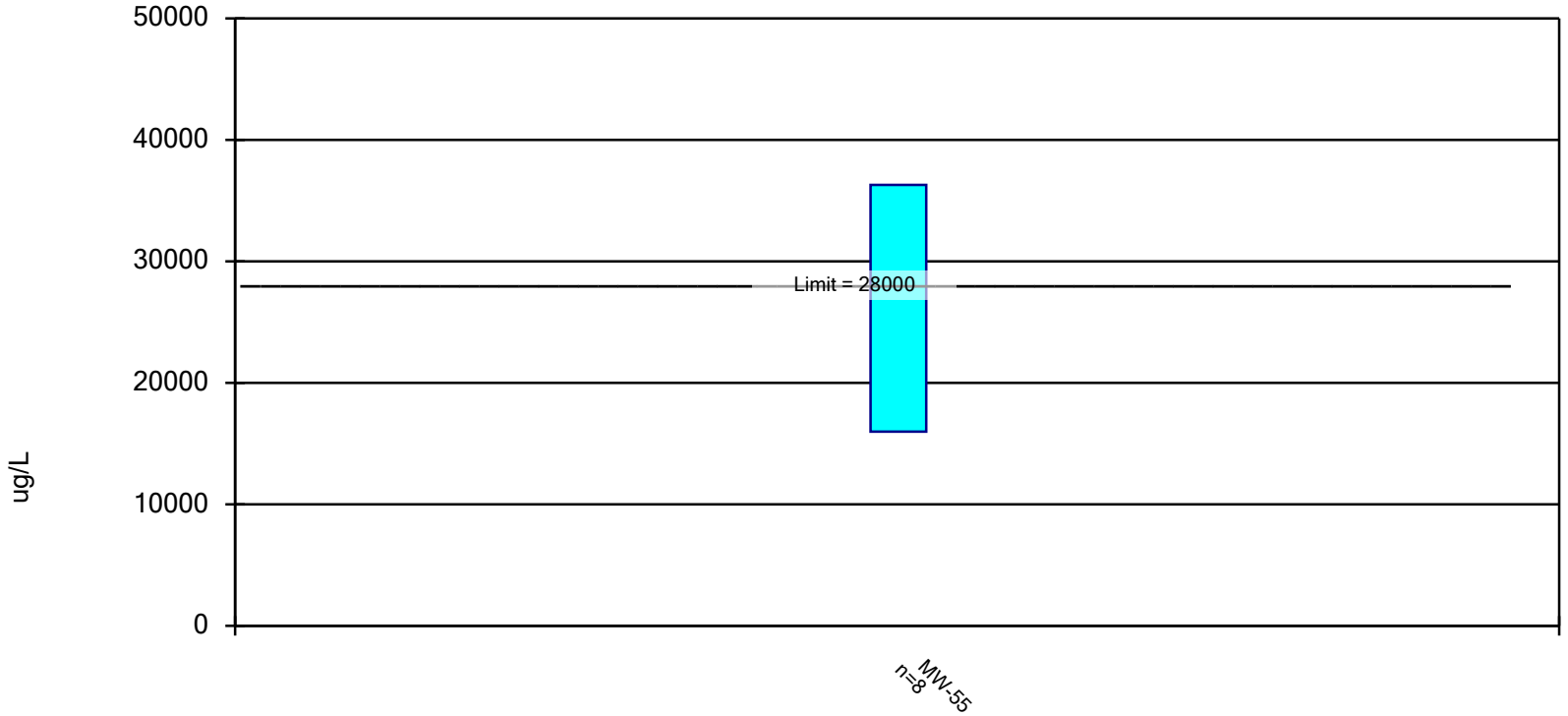
Constituent: Calcium, Total (mg/L) Analysis Run 11/7/2022 1:01 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

	JCW-MW-18001	JCW-MW-18005	MW-51
3/8/2021	270		293
3/9/2021		286	
5/10/2021	305		303
5/11/2021		202	
8/2/2021	348		276
8/3/2021		149	
10/11/2021	373		316
10/12/2021		193	
3/7/2022	412	161.5 (D)	
3/8/2022			255
5/9/2022	335		247
5/10/2022		280	
8/1/2022	389		211
8/2/2022		165	
10/10/2022	465		211
10/11/2022		150	
Mean	362.1	198.3	264
Std. Dev.	61.64	55.59	40
Upper Lim.	427.5	286	306.4
Lower Lim.	296.8	149	221.6

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 11/7/2022 12:59 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Confidence Interval

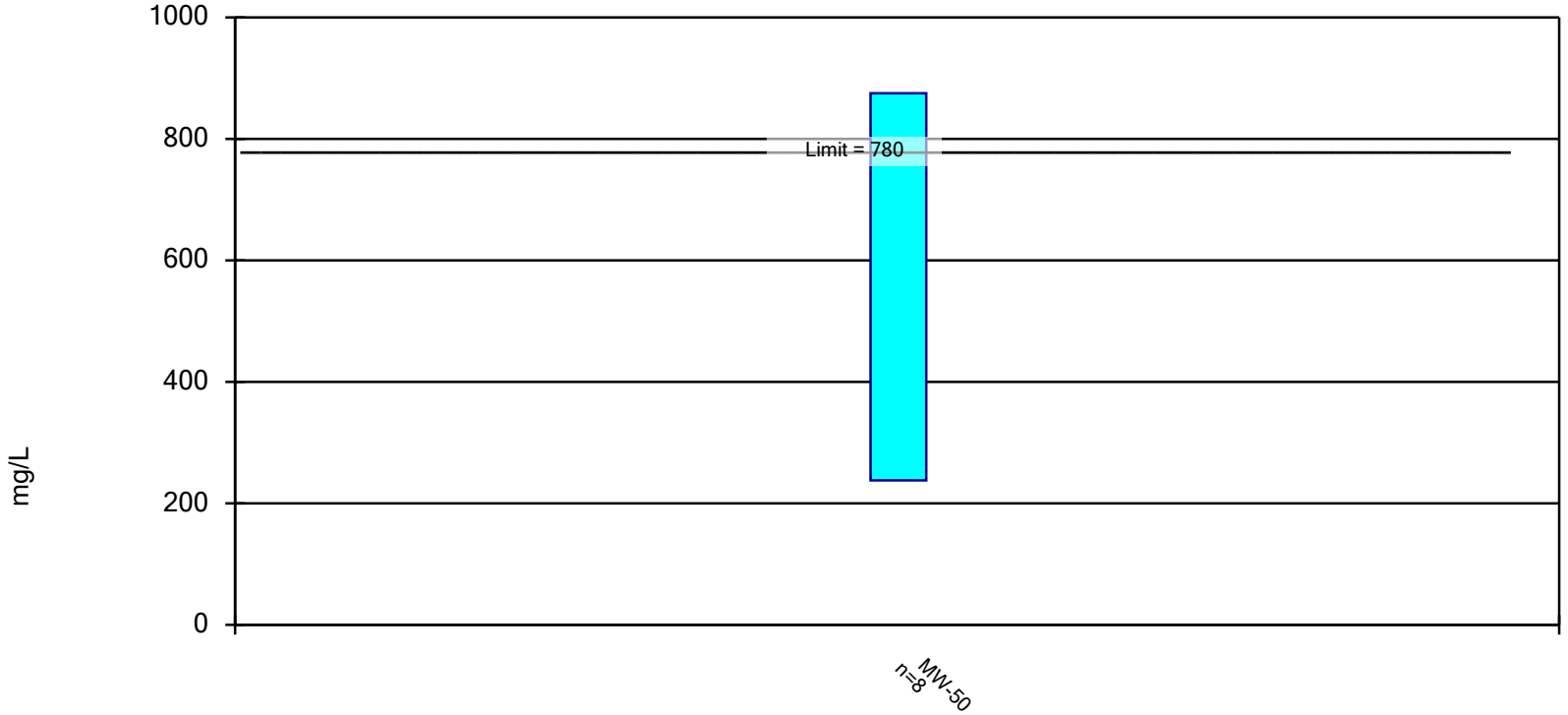
Constituent: Iron, Total (ug/L) Analysis Run 11/7/2022 1:01 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

	MW-55
3/9/2021	23500
5/11/2021	21500
8/3/2021	39400
10/12/2021	40500
3/7/2022	29800
5/10/2022	15000
8/1/2022	17300 (D)
10/10/2022	22100
Mean	26138
Std. Dev.	9580
Upper Lim.	36292
Lower Lim.	15983

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 11/7/2022 12:59 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Confidence Interval

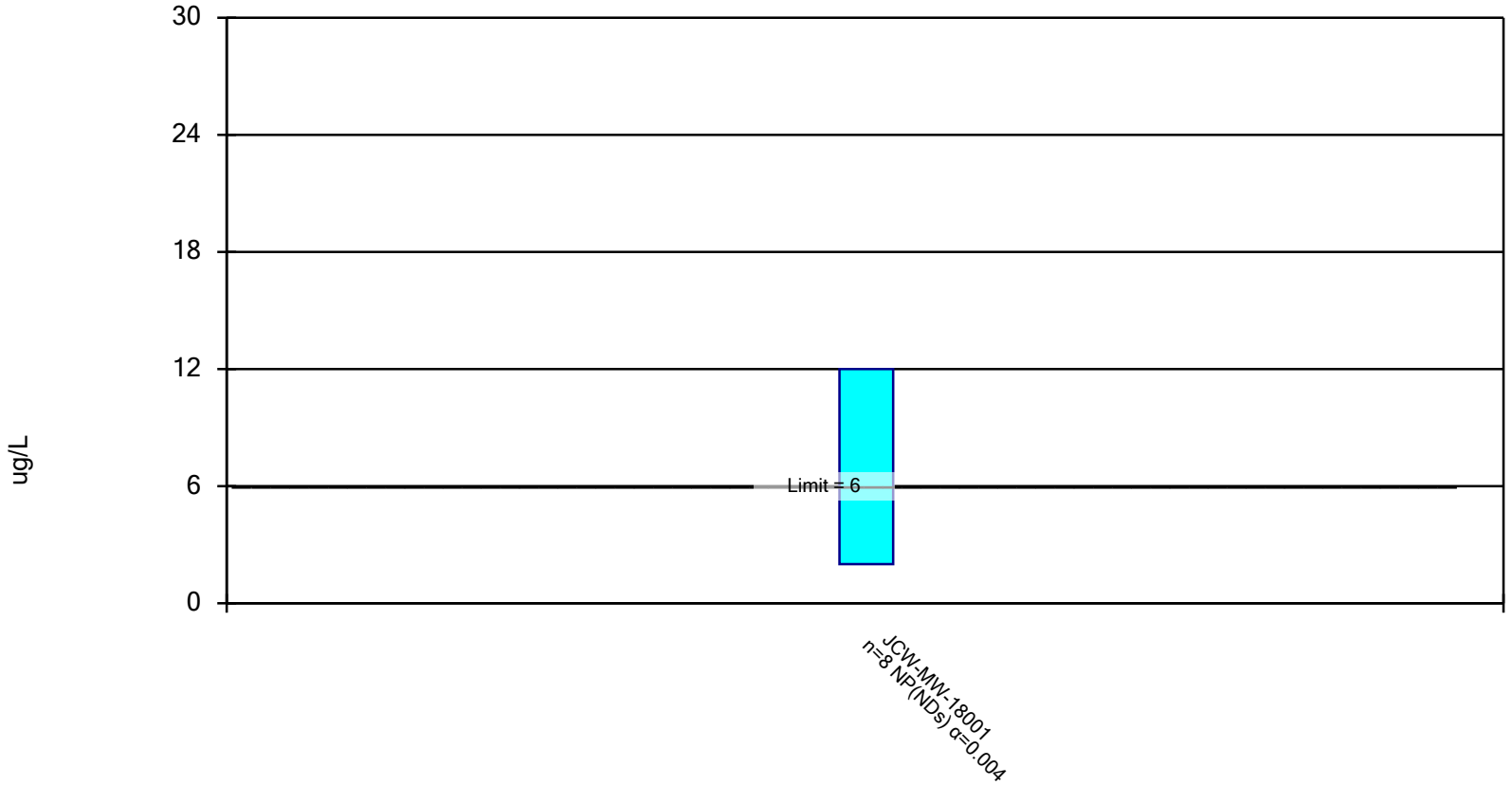
Constituent: Sulfate (mg/L) Analysis Run 11/7/2022 1:01 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

	MW-50
3/8/2021	1125 (D)
5/10/2021	861.5 (D)
8/2/2021	636 (D)
10/11/2021	504 (D)
3/8/2022	338 (D)
5/9/2022	285.5 (D)
8/1/2022	324.5 (D)
10/10/2022	376 (D)
Mean	556.3
Std. Dev.	300.7
Upper Lim.	875
Lower Lim.	237.6

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Vanadium, Total Analysis Run 11/7/2022 12:59 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Confidence Interval

Constituent: Vanadium, Total (ug/L) Analysis Run 11/7/2022 1:01 PM

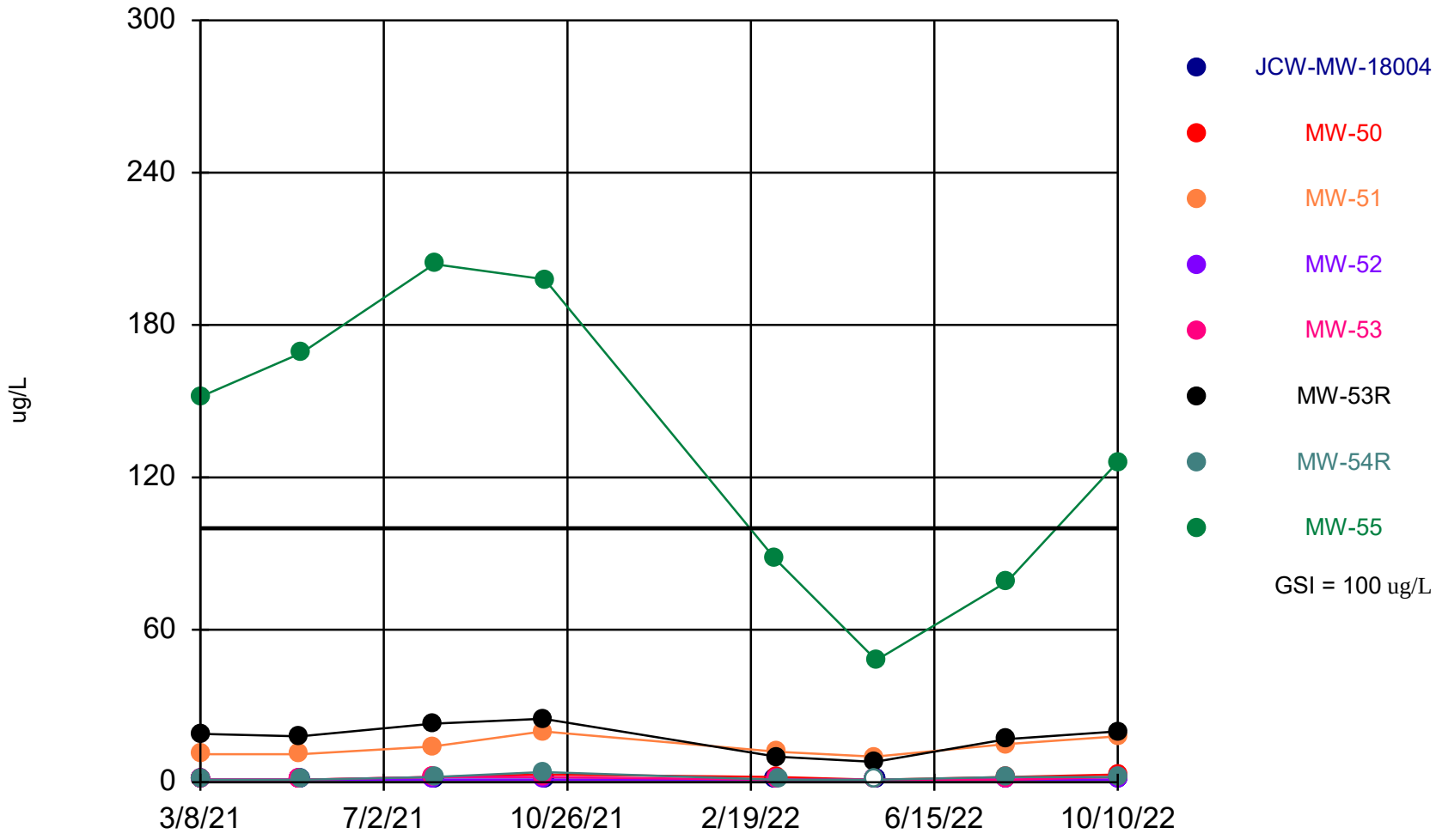
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

	JCW-MW-18001
3/8/2021	<2
5/10/2021	2
8/2/2021	12
10/11/2021	<2
3/7/2022	<2
5/9/2022	<2
8/1/2022	<2
10/10/2022	<2
Mean	3.25
Std. Dev.	3.536
Upper Lim.	12
Lower Lim.	2

Attachment 2
GSI Evaluation Sanitas™ Output Files

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Arsenic Comparison to GSI

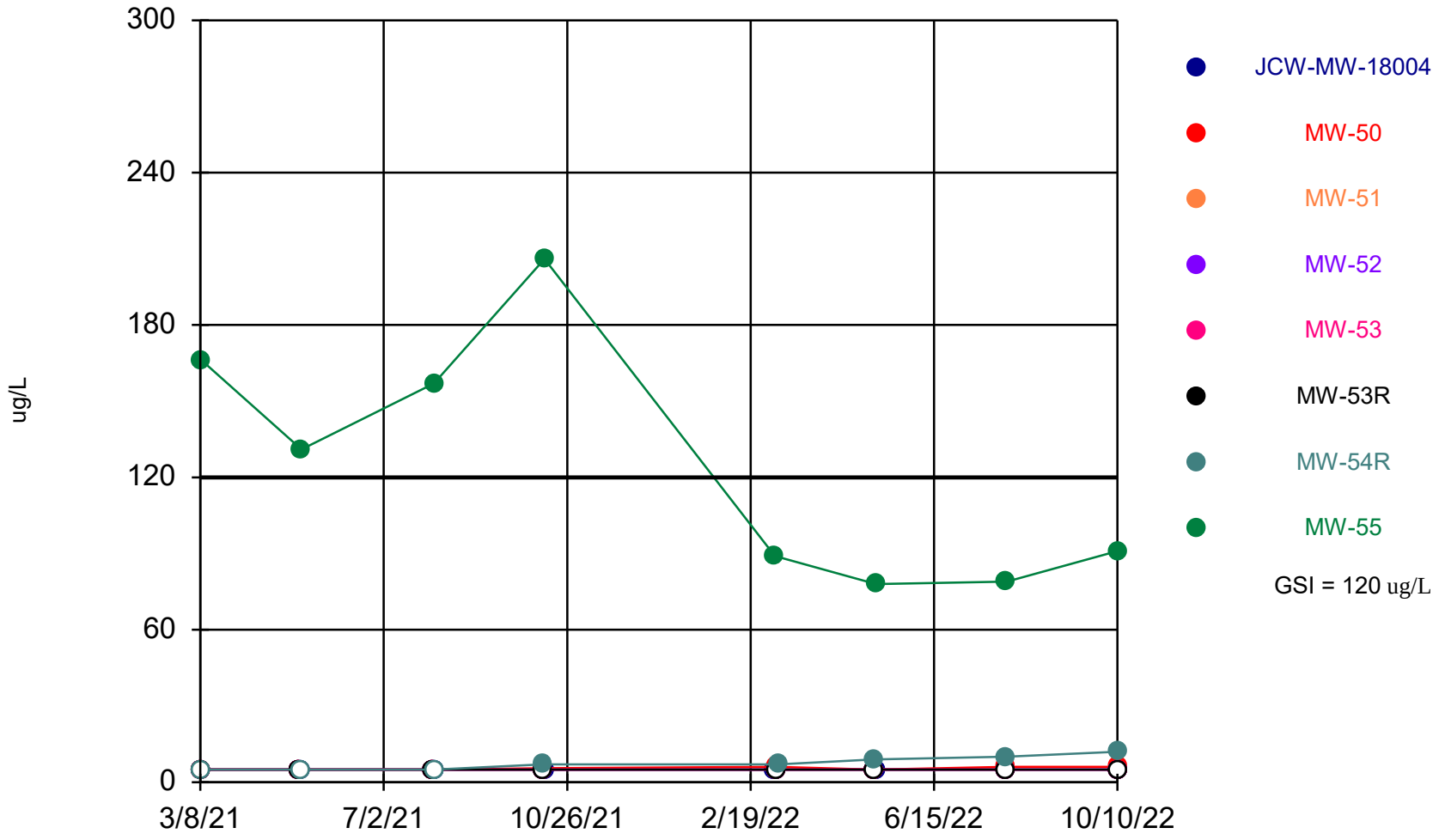


Time Series Analysis Run 11/7/2022 2:32 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA
Hollow symbols indicate censored values.

Molybdenum Comparison to GSI



Time Series Analysis Run 11/7/2022 2:29 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Arsenic, Total Analysis Run 11/7/2022 2:28 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

For observations made between 3/8/2021 and 10/10/2022, a summary of the selected data set:

Observations = 64
ND/Trace = 19
Wells = 8
Minimum Value = 1
Maximum Value = 204
Mean Value = 21.42
Median Value = 2
Standard Deviation = 47.09
Coefficient of Variation = 2.198
Skewness = 2.811

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JCW-MW-18004	8	8	1	1	1	1	0	0	NaN
MW-50	8	0	1	3	1.875	2	0.8345	0.4451	0.2217
MW-51	8	0	10	20	13.88	13	3.603	0.2597	0.6174
MW-52	8	7	1	1	1	1	0	0	NaN
MW-53	8	3	1	2	1.375	1	0.5175	0.3764	0.5164
MW-53R	8	0	8	25	17.5	18.5	5.88	0.336	-0.5049
MW-54R	8	1	1	4	1.75	1.5	1.035	0.5915	1.343
MW-55	8	0	48	204	133	139	57.49	0.4323	-0.1422

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. EPA

Summary Report

Constituent: Molybdenum, Total Analysis Run 11/7/2022 2:28 PM
Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

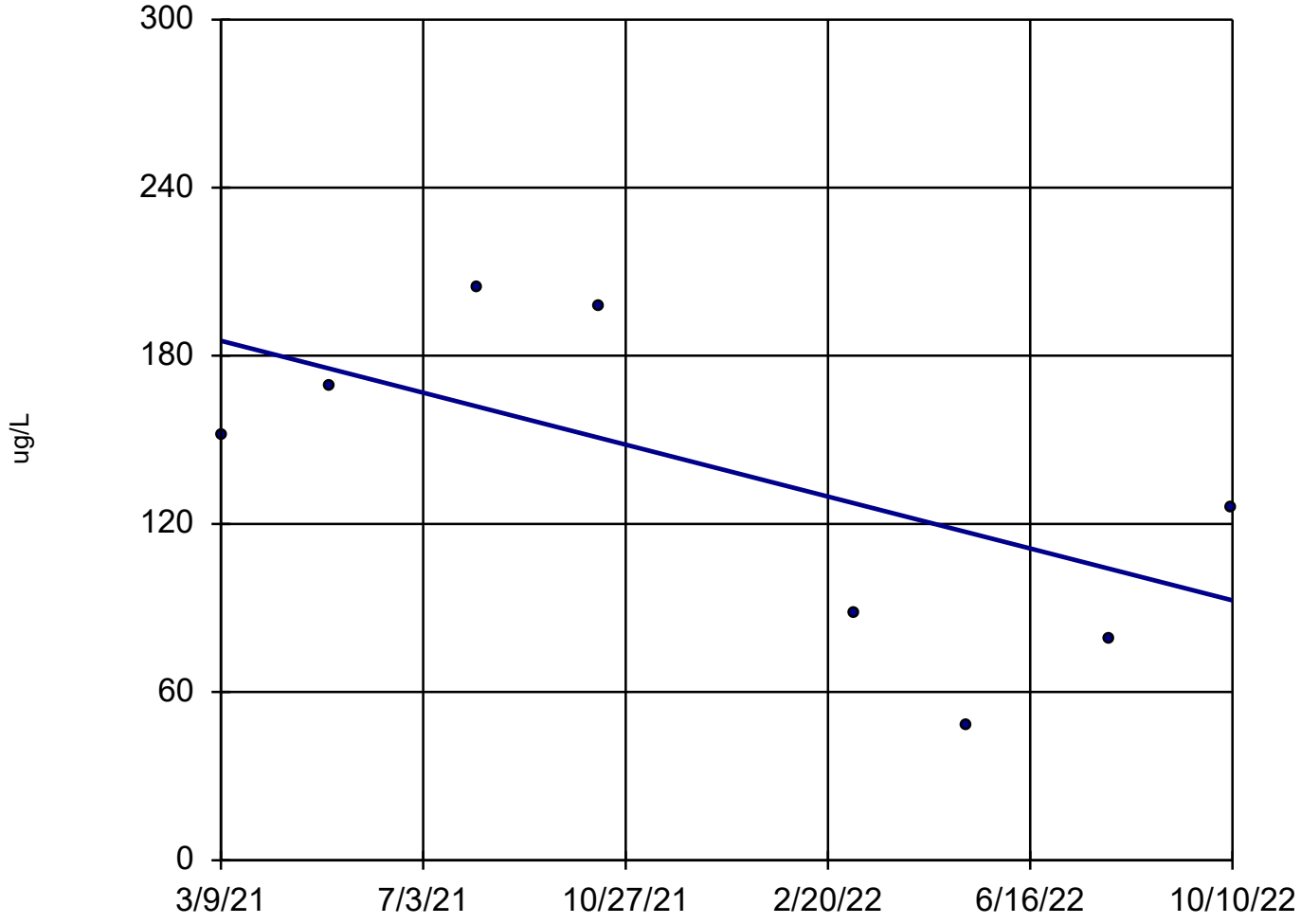
For observations made between 3/8/2021 and 10/10/2022, a summary of the selected data set:

Observations = 64
ND/Trace = 47
Wells = 8
Minimum Value = 5
Maximum Value = 206
Mean Value = 20.32
Median Value = 5
Standard Deviation = 42.84
Coefficient of Variation = 2.108
Skewness = 2.906

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	6	5.438	5.25	0.4955	0.09113	0.2501
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	3	5	12	7.5	7	2.619	0.3491	0.5358
MW-55	8	0	78	206	124.6	111	47.93	0.3846	0.5055

Arsenic, Total

MW-55



n = 8

Slope = -58.3 units per year.

Mann-Kendall statistic = -10
critical = -20

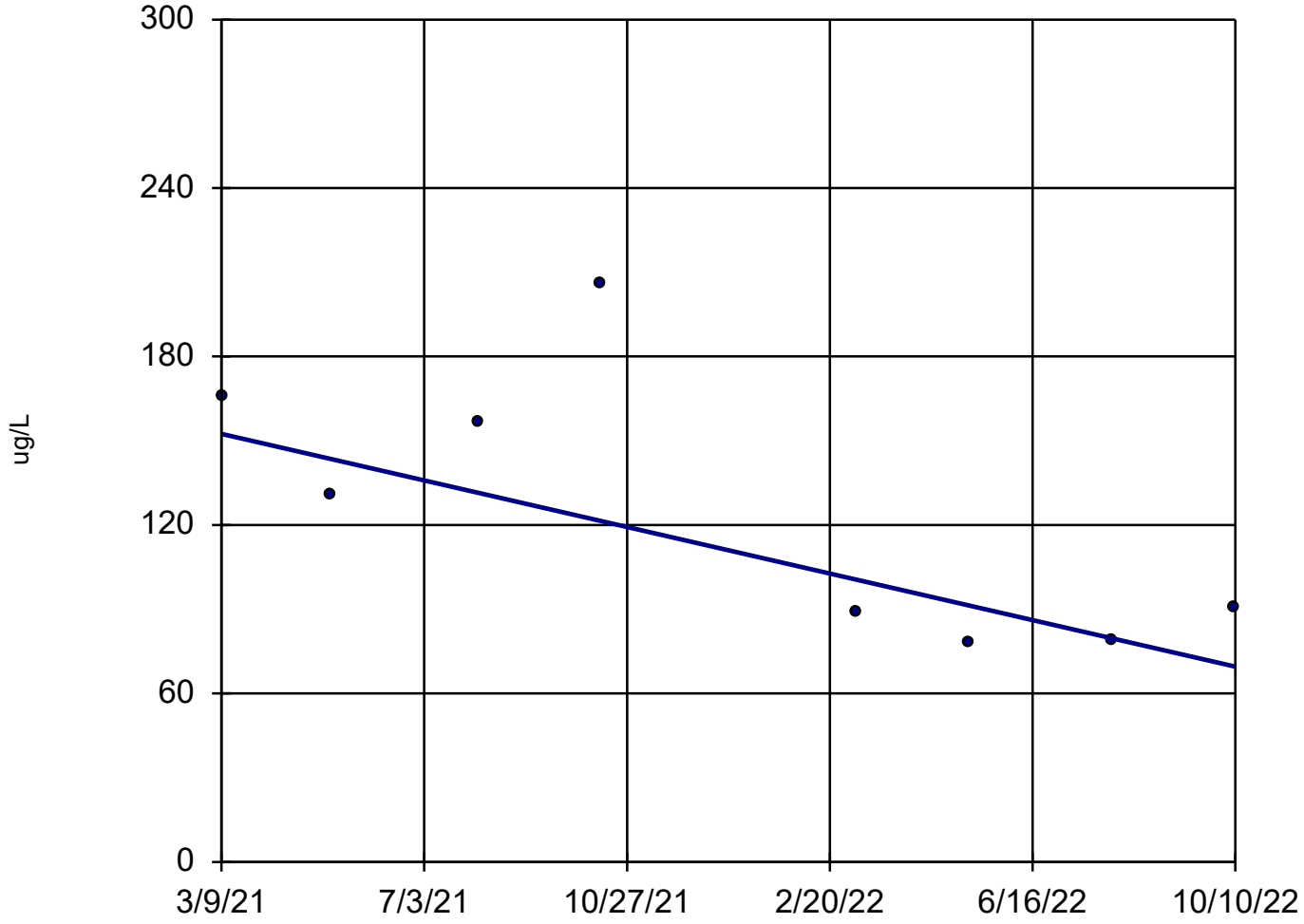
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 2:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Molybdenum, Total

MW-55



n = 8

Slope = -52.12 units per year.

Mann-Kendall statistic = -12 critical = -20

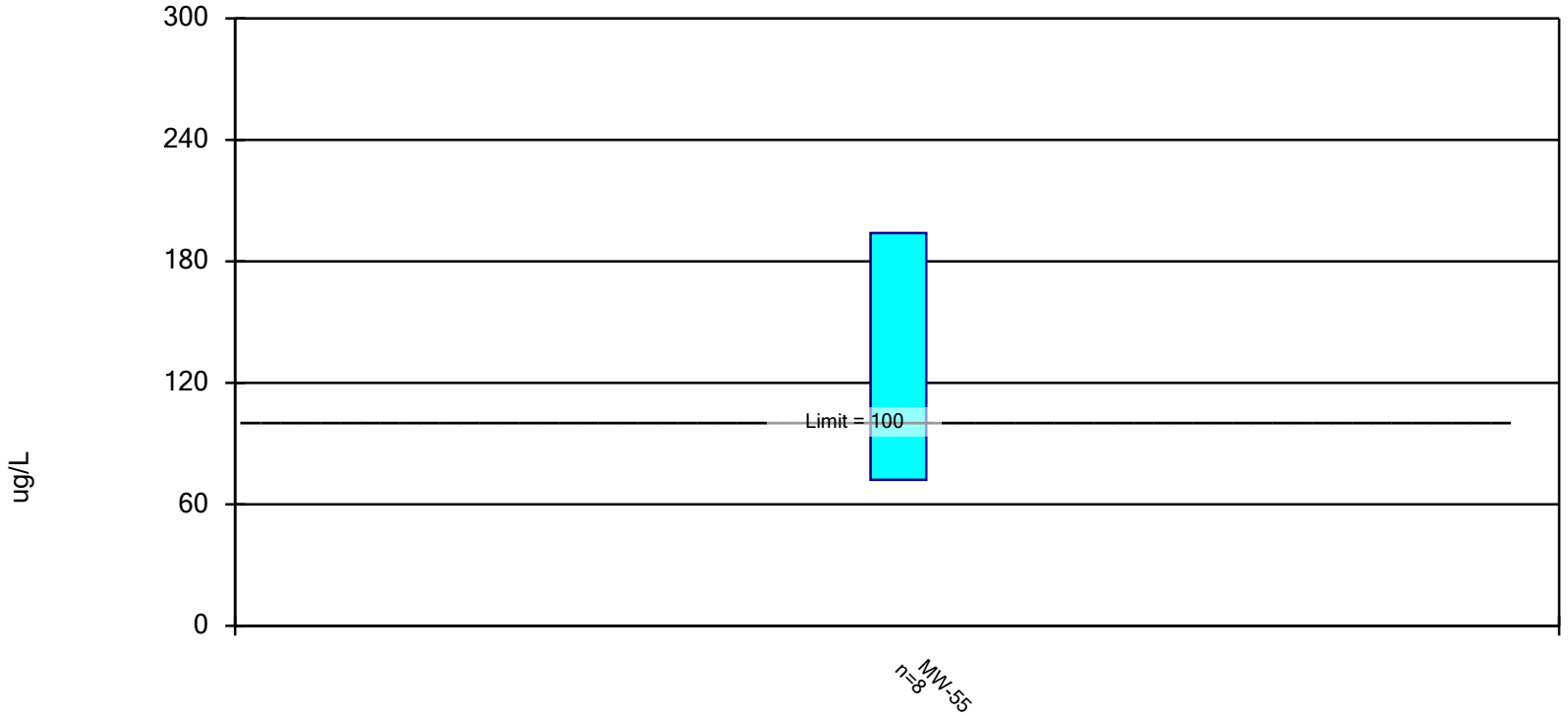
Trend not significant at 98% confidence level (α = 0.01 per tail).

Sen's Slope Estimator Analysis Run 11/7/2022 2:39 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

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 11/7/2022 2:49 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Confidence Interval

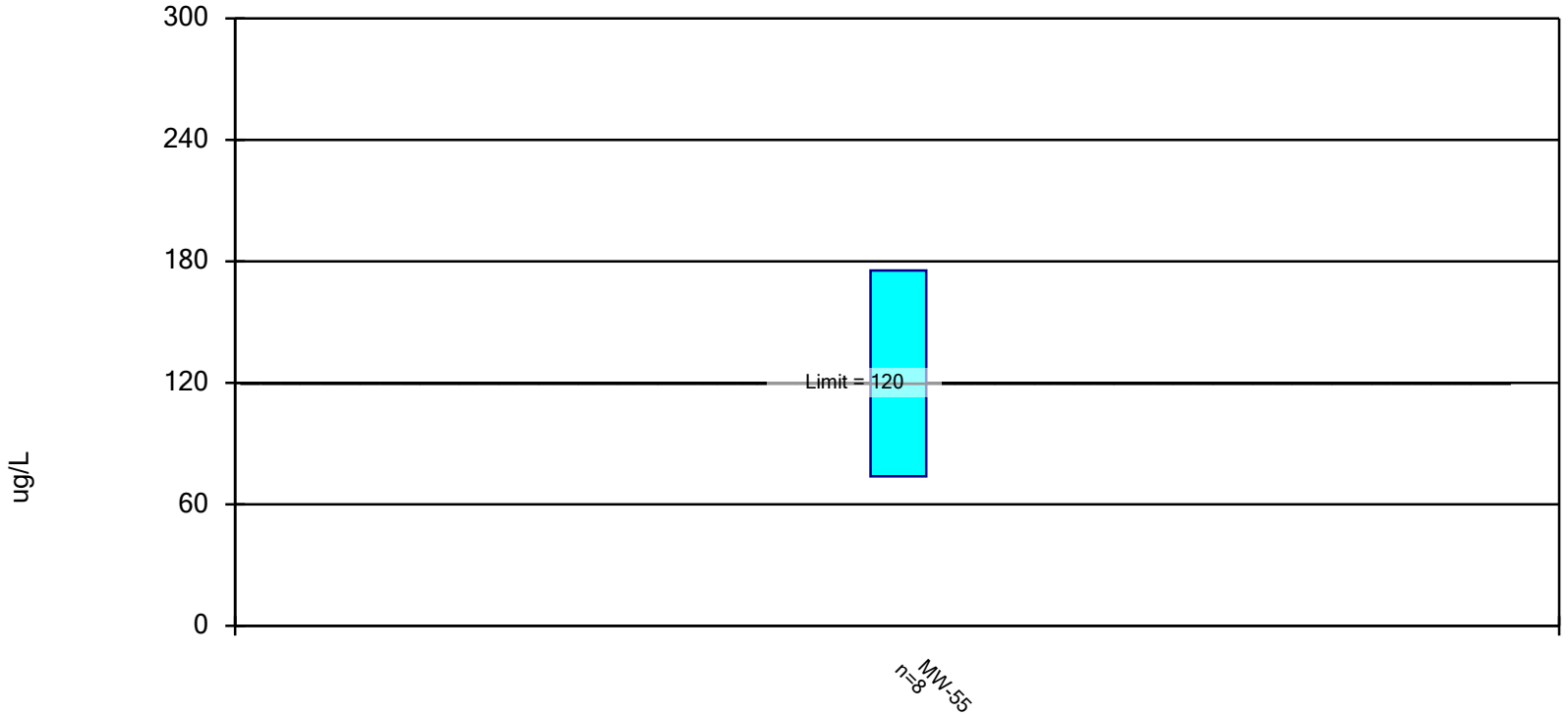
Constituent: Arsenic, Total (ug/L) Analysis Run 11/7/2022 2:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

	MW-55
3/9/2021	152
5/11/2021	169
8/3/2021	204
10/12/2021	198
3/7/2022	88
5/10/2022	48
8/1/2022	79 (D)
10/10/2022	126
Mean	133
Std. Dev.	57.49
Upper Lim.	193.9
Lower Lim.	72.06

Parametric Confidence Interval

Compliance Limit is not exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Molybdenum, Total Analysis Run 11/7/2022 2:49 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Confidence Interval

Constituent: Molybdenum, Total (ug/L) Analysis Run 11/7/2022 2:50 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

	MW-55
3/9/2021	166
5/11/2021	131
8/3/2021	157
10/12/2021	206
3/7/2022	89
5/10/2022	78
8/1/2022	79 (D)
10/10/2022	91
Mean	124.6
Std. Dev.	47.93
Upper Lim.	175.4
Lower Lim.	73.83

Appendix E
Laboratory Analytical Report

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: March 24, 2022

Subject: PART 115 GROUNDWATER MONITORING – JCW LEACHATE WELLS – 2022 Q1

CC: HDRegister, P22-521
BLSwanberg, P22-119

Darby Litz, Project Manager
TRC Companies, Inc.
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 22-0153R

TRC Environmental, Inc. conducted groundwater monitoring at the JC Weadock solid waste disposal area on 03/14/2022 for the 1st Quarter requirements, as specified in the Hydrogeological Monitoring Plan for the site. The samples were received for analysis by the Chemistry Department of Laboratory Services on 03/15/2022.

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 accreditation 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

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q1-2022 JCW Leachate Wells
Date Received: 3/10/2022
Chemistry Project: 22-0153

Sample #	Field Sample ID	Matrix	Sample Date	Site
22-0153-01	LH-103R	Groundwater	03/10/2022 07:03 AM	JCW Solid Waste Disposal Area
22-0153-02	LH-103R DUP	Groundwater	03/10/2022 07:03 AM	JCW Solid Waste Disposal Area
22-0153-03	LH-103R MS	Groundwater	03/10/2022 07:03 AM	JCW Solid Waste Disposal Area
22-0153-04	LH-103R MSD	Groundwater	03/10/2022 07:03 AM	JCW Solid Waste Disposal Area
22-0153-05	FB-02	Water	03/10/2022 07:05 AM	JCW Solid Waste Disposal Area
22-0153-06	EB-02	Water	03/10/2022 07:05 AM	JCW Solid Waste Disposal Area
22-0153-07	TB-01	Water	03/10/2022 12:00 AM	JCW Solid Waste Disposal Area

Analytical Report

Report Date: 03/24/22

Sample Site: **JCW Solid Waste Disposal Area (395457)**
Field Sample ID: **LH-103R**
Lab Sample ID: 22-0153-01
Matrix: Groundwater

Laboratory Project: **22-0153**
Collect Date: 03/10/2022
Collect Time: 07:03 AM

Mercury, Low Level by EPA 1631E

Aliquot #: 22-0153-01-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	2.25		ng/L	0.5	03/18/2022	AB22-0318-09

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-0153-01-C02-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	03/15/2022	AB22-0315-02

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-0153-01-C02-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Arsenic	87		ug/L	1.0	03/18/2022	AB22-0318-04
Barium	589		ug/L	5.0	03/18/2022	AB22-0318-04
Beryllium	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Boron	8240		ug/L	20.0	03/18/2022	AB22-0318-04
Cadmium	ND		ug/L	0.2	03/18/2022	AB22-0318-04
Calcium	253000		ug/L	1000.0	03/18/2022	AB22-0318-04
Chromium	1		ug/L	1.0	03/18/2022	AB22-0318-04
Cobalt	ND		ug/L	6.0	03/18/2022	AB22-0318-04
Copper	2		ug/L	1.0	03/18/2022	AB22-0318-04
Iron	17800		ug/L	20.0	03/18/2022	AB22-0318-04
Lead	ND		ug/L	1.0	03/18/2022	AB22-0318-04
Lithium	188		ug/L	10.0	03/18/2022	AB22-0318-04
Magnesium	87100		ug/L	1000.0	03/18/2022	AB22-0318-04
Manganese	1290		ug/L	5.0	03/18/2022	AB22-0318-04
Molybdenum	12		ug/L	5.0	03/18/2022	AB22-0318-04
Nickel	18		ug/L	2.0	03/18/2022	AB22-0318-04
Potassium	17900		ug/L	100.0	03/18/2022	AB22-0318-04
Selenium	21		ug/L	1.0	03/18/2022	AB22-0318-04
Silver	ND		ug/L	0.2	03/18/2022	AB22-0318-04
Sodium	156000		ug/L	1000.0	03/18/2022	AB22-0318-04
Thallium	ND		ug/L	2.0	03/18/2022	AB22-0318-04
Vanadium	5		ug/L	2.0	03/18/2022	AB22-0318-04
Zinc	ND		ug/L	10.0	03/18/2022	AB22-0318-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0153-01-C03-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	98100		ug/L	1000.0	03/15/2022	AB22-0315-05
Fluoride	ND		ug/L	1000.0	03/15/2022	AB22-0315-05

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**22-0153**
Field Sample ID:	**LH-103R**	Collect Date:	03/10/2022
Lab Sample ID:	22-0153-01	Collect Time:	07:03 AM
Matrix:	Groundwater		

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-0153-01-C03-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Sulfate	94800		ug/L	1000.0	03/15/2022	AB22-0315-05

Total Dissolved Solids by SM 2540C

Aliquot #: 22-0153-01-C04-A01 **Analyst: CLH**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1490		mg/L	10.0	03/14/2022	AB22-0314-06

Alkalinity by SM 2320B

Aliquot #: 22-0153-01-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	1200000		ug/L	10000.0	03/15/2022	AB22-0315-12
Alkalinity Bicarbonate	1200000		ug/L	10000.0	03/15/2022	AB22-0315-12
Alkalinity Carbonate	ND		ug/L	10000.0	03/15/2022	AB22-0315-12

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**22-0153**
Field Sample ID:	**LH-103R DUP**	Collect Date:	03/10/2022
Lab Sample ID:	22-0153-02	Collect Time:	07:03 AM
Matrix:	Groundwater		

Mercury, Low Level by EPA 1631E — **Aliquot #: 22-0153-02-C01-A01** — **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	1.74		ng/L	0.5	03/18/2022	AB22-0318-09

Analytical Report

Report Date: 03/24/22
04/01/22R

Sample Site: **JCW Solid Waste Disposal Area (395457)**
Field Sample ID: **LH-103R MS**
Lab Sample ID: 22-0153-03
Matrix: Groundwater

Laboratory Project: **22-0153**
Collect Date: 03/10/2022
Collect Time: 07:03 AM

Mercury, Low Level by EPA 1631E

Aliquot #: 22-0153-03-C01-A01 **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	79		%	0.5	03/18/2022	AB22-0318-09

Analytical Report

Report Date: 03/24/22
04/01/22R

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**22-0153**
Field Sample ID:	**LH-103R MSD**	Collect Date:	03/10/2022
Lab Sample ID:	22-0153-04	Collect Time:	07:03 AM
Matrix:	Groundwater		

Mercury, Low Level by EPA 1631E — **Aliquot #: 22-0153-04-C01-A01** — **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	81		%	0.5	03/18/2022	AB22-0318-09R

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**22-0153**
Field Sample ID:	**FB-02**	Collect Date:	03/10/2022
Lab Sample ID:	22-0153-05	Collect Time:	07:05 AM
Matrix:	Water		

Mercury, Low Level by EPA 1631E — **Aliquot #: 22-0153-05-C01-A01** — **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	ND		ng/L	0.5	03/18/2022	AB22-0318-09

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**22-0153**
Field Sample ID:	**EB-02**	Collect Date:	03/10/2022
Lab Sample ID:	22-0153-06	Collect Time:	07:05 AM
Matrix:	Water		

Mercury, Low Level by EPA 1631E — **Aliquot #: 22-0153-06-C01-A01** — **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	ND		ng/L	0.5	03/18/2022	AB22-0318-09

Analytical Report

Report Date: 03/24/22

Sample Site:	**JCW Solid Waste Disposal Area (395457)**	Laboratory Project:	**22-0153**
Field Sample ID:	**TB-01**	Collect Date:	03/10/2022
Lab Sample ID:	22-0153-07	Collect Time:	12:00 AM
Matrix:	Water		

Mercury, Low Level by EPA 1631E — **Aliquot #: 22-0153-07-C01-A01** — **Analyst: TMR**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	ND		ng/L	0.5	03/18/2022	AB22-0318-09

Data Qualifiers	Exception Summary
	No exceptions occured.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-0153

Inspection Date: 3-10-22 **Inspection By:** TJR

Sample Origin/Project Name: Weadock Leachate

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx _____ UPS _____ USPS _____ Airborne _____

Other/Hand Carry (whom) _____

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 5.4 °C (LLHg: 8.2 °C) Samples Received on Ice: Yes ✓ No _____ (Except LLHg)

M&TE # and Expiration 015484 10-14-22

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)					
500 mL (plastic)					
Other 250 mL plastic	1				
8 oz boston round	7				

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

SAMPLING SITE / CUSTOMER: Q1-2022 Weadock Leachate Wells

PROJECT NUMBER: 22-0153

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Mercury, Low Level	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-0153-01	3/10/22	0703	GW	LH-103R	6	4	1			1			x	x	x	x	x	
-02		0703	GW	LH-103R DUP	1					1			x					
-03		0703	GW	LH-103R MS	1					1			x					
-04		0703	GW	LH-103R MSD	1					1			x					
-05		0705	W	FB-02	1					1			x					
-06		0705	W	EB-02	1					1			x					
-07		N/A	W	TB-01	1					1			x					

RELINQUISHED BY: _____ DATE/TIME: 3/10/22 0721 RECEIVED BY: _____

RELINQUISHED BY: _____ DATE/TIME: _____ RECEIVED BY: _____

COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015402

Temperature: 5.4°C °C except LL Hg 8.2°C Cal. Due Date: 06/03/2022

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: October 27, 2022

Subject: PART 115 GROUNDWATER MONITORING – JCW POREWATER – 2022 Q4

CC: HDRegister, P22-521
BLSwanberg, P22-119

Darby Litz, Project Manager
TRC Environmental Corporation
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 22-1021

TRC Environmental, Inc. conducted groundwater monitoring at the JCWeadock site on 10/10/2022 and 10/11/2022, for the 4th Quarter requirements, as specified in the Hydrogeological Monitoring Plan for the site. The samples were received for analysis by the Chemistry department of Laboratory Services on 10/11/2022.

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, 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

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q4-2022 Weadock Porewater Wells
Date Received: 10/11/2022
Chemistry Project: 22-1021

Sample #	Field Sample ID	Matrix	Sample Date	Site
22-1021-01	JCW-MW-18001	Groundwater	10/10/2022 06:00 AM	JCW Solid Waste Disposal Area, Porewater
22-1021-02	JCW-MW-18004	Groundwater	10/10/2022 01:03 PM	JCW Solid Waste Disposal Area, Porewater
22-1021-03	JCW-MW-18005	Groundwater	10/11/2022 05:40 AM	JCW Solid Waste Disposal Area, Porewater
22-1021-04	JCW-MW-18006	Groundwater	10/11/2022 07:48 AM	JCW Solid Waste Disposal Area, Porewater
22-1021-05	MW-50	Groundwater	10/10/2022 07:15 AM	JCW Solid Waste Disposal Area, Porewater
22-1021-06	MW-51	Groundwater	10/10/2022 08:30 AM	JCW Solid Waste Disposal Area, Porewater
22-1021-07	MW-52	Groundwater	10/10/2022 09:14 AM	JCW Solid Waste Disposal Area, Porewater
22-1021-08	MW-53	Groundwater	10/10/2022 10:14 AM	JCW Solid Waste Disposal Area, Porewater
22-1021-09	MW-53R	Groundwater	10/10/2022 11:27 AM	JCW Solid Waste Disposal Area, Porewater
22-1021-10	MW-54R	Groundwater	10/10/2022 12:18 PM	JCW Solid Waste Disposal Area, Porewater
22-1021-11	MW-55	Groundwater	10/10/2022 02:01 PM	JCW Solid Waste Disposal Area, Porewater
22-1021-12	OW-57ROUT	Groundwater	10/11/2022 06:37 AM	JCW Solid Waste Disposal Area, Porewater
22-1021-13	MW-58	Groundwater	10/11/2022 09:00 AM	JCW Solid Waste Disposal Area, Porewater
22-1021-14	DUP-JCW-LF-01	Groundwater	10/10/2022 12:00 AM	JCW Solid Waste Disposal Area, Porewater
22-1021-15	DUP-JCW-LF-02	Groundwater	10/11/2022 12:00 AM	JCW Solid Waste Disposal Area, Porewater
22-1021-16	JCW-MW-18001 MS	Groundwater	10/10/2022 06:00 AM	JCW Solid Waste Disposal Area, Porewater
22-1021-17	JCW-MW-18001 MSD	Groundwater	10/10/2022 06:00 AM	JCW Solid Waste Disposal Area, Porewater
22-1021-18	FB-01	Water	10/11/2022 09:22 AM	JCW Solid Waste Disposal Area, Porewater
22-1021-19	EB-01	Water	10/11/2022 09:17 AM	JCW Solid Waste Disposal Area, Porewater

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**JCW-MW-18001**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-01	Collect Time:	06:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-01-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-01-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	66		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	1790		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	465000		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	3		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	818		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	97		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	121000		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	ND		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	15		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	16900		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	1		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	177000		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	63600		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	1400000		ug/L	1000.0	10/18/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1021-01-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	3020		mg/L	10.0	10/14/2022	AB22-1012-12

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**JCW-MW-18001**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-01	Collect Time:	06:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1021-01-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	682000		ug/L	10000.0	10/17/2022	AB22-1017-04
Alkalinity Bicarbonate	682000		ug/L	10000.0	10/17/2022	AB22-1017-04
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-04

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-02	Collect Time:	01:03 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-02-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-02-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	37		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	343		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	193000		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	2		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	ND		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	46		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	65300		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	ND		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	5		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	2120		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	1		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	18900		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	11400		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	428000		ug/L	1000.0	10/18/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1021-02-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1130		mg/L	10.0	10/12/2022	AB22-1012-12

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**JCW-MW-18004**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-02	Collect Time:	01:03 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1021-02-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	462000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Bicarbonate	462000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-10

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	10/11/2022
Lab Sample ID:	22-1021-03	Collect Time:	05:40 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-03-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-03-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	5		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	80		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	1290		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	150000		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	3220		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	32		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	57800		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	5		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	11		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	2360		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	2		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	60900		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	53900		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	160000		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1021-03-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	868		mg/L	10.0	10/12/2022	AB22-1012-12

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**JCW-MW-18005**	Collect Date:	10/11/2022
Lab Sample ID:	22-1021-03	Collect Time:	05:40 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1021-03-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	538000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Bicarbonate	538000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-10

Analytical Report

Report Date: 10/27/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **JCW-MW-18006**
Lab Sample ID: 22-1021-04
Matrix: Groundwater

Laboratory Project: **22-1021**
Collect Date: 10/11/2022
Collect Time: 07:48 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-04-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-04-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	25		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	480		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	2720		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	118000		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	7620		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	52		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	42200		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	ND		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	5		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	6600		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	1		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	82000		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	3		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	74200		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	21600		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1021-04-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	720		mg/L	10.0	10/12/2022	AB22-1012-12

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**JCW-MW-18006**	Collect Date:	10/11/2022
Lab Sample ID:	22-1021-04	Collect Time:	07:48 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1021-04-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	583000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Bicarbonate	583000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-10

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-50**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-05	Collect Time:	07:15 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-05-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-05-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	3		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	106		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	1730		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	186000		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	1		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	2460		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	62		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	59700		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	6		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	4		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	8560		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	2		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	68700		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	47700		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	376000		ug/L	1000.0	10/18/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1021-05-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1120		mg/L	10.0	10/12/2022	AB22-1012-12

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-50**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-05	Collect Time:	07:15 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 22-1021-05-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	475000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Bicarbonate	475000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-10

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-51**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-06	Collect Time:	08:30 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-06-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-06-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	18		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	188		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	1490		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	211000		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	1		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	2880		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	50		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	57900		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	ND		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	4		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	6190		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	1		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	120000		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-06-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	101000		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	394000		ug/L	1000.0	10/18/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1021-06-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1380		mg/L	10.0	10/12/2022	AB22-1012-12

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-51**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-06	Collect Time:	08:30 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1021-06-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	605000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Bicarbonate	605000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-10

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-52**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-07	Collect Time:	09:14 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-07-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-07-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	122		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	1330		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	224000		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	2		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	6340		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	26		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	89500		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	ND		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	3		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	3850		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	2		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	67200		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-07-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	40400		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	603000		ug/L	1000.0	10/18/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1021-07-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1670		mg/L	10.0	10/12/2022	AB22-1012-12

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-52**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-07	Collect Time:	09:14 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1021-07-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	491000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Bicarbonate	491000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-10

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-53**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-08	Collect Time:	10:14 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-08-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-08-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	2		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	285		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	4140		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	108000		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	1140		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	38		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	31700		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	ND		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	2		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	7610		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	1		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	81700		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-08-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	53000		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	126000		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1021-08-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	740		mg/L	10.0	10/12/2022	AB22-1012-12

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-53**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-08	Collect Time:	10:14 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1021-08-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	440000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Bicarbonate	440000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-10

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-53R**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-09	Collect Time:	11:27 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-09-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-09-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	20		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	118		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	2340		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	203000		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	1		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	702		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	63		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	60000		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	ND		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	3		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	6320		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	2		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	92100		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-09-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	39200		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	250000		ug/L	1000.0	10/18/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1021-09-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1160		mg/L	10.0	10/12/2022	AB22-1012-12

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-53R**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-09	Collect Time:	11:27 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1021-09-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	694000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Bicarbonate	694000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-10

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-54R**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-10	Collect Time:	12:18 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-10-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-10-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	2		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	123		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	5310		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	160000		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	1		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	1090		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	74		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	42700		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	12		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	2490		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	2		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	29600		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-10-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	47400		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	70900		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1021-10-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	799		mg/L	10.0	10/12/2022	AB22-1012-12

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-54R**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-10	Collect Time:	12:18 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1021-10-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	575000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Bicarbonate	575000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-10

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-55**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-11	Collect Time:	02:01 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-11-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-11-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	126		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	223		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	976		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	141000		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	1		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	22100		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	30		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	26100		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	91		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	4		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	3630		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	90600		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/26/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-11-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	12500		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	108000		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1021-11-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	786		mg/L	10.0	10/12/2022	AB22-1012-12

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-55**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-11	Collect Time:	02:01 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 22-1021-11-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	609000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Bicarbonate	609000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-10

Analytical Report

Report Date: 10/27/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **OW-57ROUT**
Lab Sample ID: 22-1021-12
Matrix: Groundwater

Laboratory Project: **22-1021**
Collect Date: 10/11/2022
Collect Time: 06:37 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-12-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-12-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	75		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	1830		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	114000		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	2		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	42		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	22		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	64000		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	8		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	16		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	1980		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	2		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	51000		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-12-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	47600		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	86800		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1021-12-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	722		mg/L	10.0	10/12/2022	AB22-1012-12

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**OW-57ROUT**	Collect Date:	10/11/2022
Lab Sample ID:	22-1021-12	Collect Time:	06:37 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1021-12-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	552000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Bicarbonate	552000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-10

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-58**	Collect Date:	10/11/2022
Lab Sample ID:	22-1021-13	Collect Time:	09:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-13-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-13-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	130		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	188		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	118000		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	11000		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	23		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	18500		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	ND		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	4		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	6850		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	1		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	227000		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	5		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-13-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	413000		ug/L	1000.0	10/18/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	7430		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1021-13-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1220		mg/L	10.0	10/12/2022	AB22-1012-12

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**MW-58**	Collect Date:	10/11/2022
Lab Sample ID:	22-1021-13	Collect Time:	09:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1021-13-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	305000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Bicarbonate	305000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-10

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**DUP-JCW-LF-01**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-14	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-14-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-14-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	3		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	108		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	1670		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	181000		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	2340		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	62		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	58700		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	6		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	7		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	8490		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	2		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	66500		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-14-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	47600		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	376000		ug/L	1000.0	10/18/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1021-14-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1150		mg/L	10.0	10/12/2022	AB22-1012-12

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**DUP-JCW-LF-01**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-14	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B — **Aliquot #: 22-1021-14-C04-A01** — **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	463000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Bicarbonate	463000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-10

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**DUP-JCW-LF-02**	Collect Date:	10/11/2022
Lab Sample ID:	22-1021-15	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-15-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-15-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	25		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	499		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	2650		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	119000		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	7630		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	52		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	41800		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	ND		ug/L	5.0	10/26/2022	AB22-1019-04
Nickel	6		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	6460		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	1		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	83400		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	4		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-15-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	74700		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	23000		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1021-15-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	746		mg/L	10.0	10/12/2022	AB22-1012-12

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**DUP-JCW-LF-02**	Collect Date:	10/11/2022
Lab Sample ID:	22-1021-15	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B

Aliquot #: 22-1021-15-C04-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	571000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Bicarbonate	571000		ug/L	10000.0	10/17/2022	AB22-1017-10
Alkalinity Carbonate	ND		ug/L	10000.0	10/17/2022	AB22-1017-10

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**JCW-MW-18001 MS**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-16	Collect Time:	06:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-16-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	99.0		%	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-16-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	102		%	1.0	10/19/2022	AB22-1019-04
Arsenic	105		%	1.0	10/19/2022	AB22-1019-04
Barium	100		%	5.0	10/19/2022	AB22-1019-04
Beryllium	88		%	1.0	10/19/2022	AB22-1019-04
Boron	109		%	20.0	10/19/2022	AB22-1019-04
Cadmium	95.5		%	0.2	10/19/2022	AB22-1019-04
Calcium	109		%	1000.0	10/19/2022	AB22-1019-04
Chromium	103		%	1.0	10/19/2022	AB22-1019-04
Cobalt	100		%	6.0	10/19/2022	AB22-1019-04
Copper	88		%	1.0	10/19/2022	AB22-1019-04
Iron	109		%	20.0	10/19/2022	AB22-1019-04
Lead	93		%	1.0	10/19/2022	AB22-1019-04
Lithium	93		%	10.0	10/19/2022	AB22-1019-04
Magnesium	110		%	1000.0	10/19/2022	AB22-1019-04
Molybdenum	114		%	5.0	10/19/2022	AB22-1019-04
Nickel	95		%	2.0	10/19/2022	AB22-1019-04
Potassium	109		%	100.0	10/19/2022	AB22-1019-04
Selenium	96		%	1.0	10/19/2022	AB22-1019-04
Silver	92.6		%	0.2	10/19/2022	AB22-1019-04
Sodium	115		%	1000.0	10/19/2022	AB22-1019-04
Thallium	96		%	2.0	10/19/2022	AB22-1019-04
Vanadium	103		%	2.0	10/19/2022	AB22-1019-04
Zinc	94		%	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-16-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	105		%	1000.0	10/17/2022	AB22-1017-07
Fluoride	91		%	1000.0	10/17/2022	AB22-1017-07
Sulfate	96		%	1000.0	10/18/2022	AB22-1017-07

Alkalinity by SM 2320B

Aliquot #: 22-1021-16-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	91.7		%	10000.0	10/17/2022	AB22-1017-04

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area, Porewater (395457)**	Laboratory Project:	**22-1021**
Field Sample ID:	**JCW-MW-18001 MSD**	Collect Date:	10/10/2022
Lab Sample ID:	22-1021-17	Collect Time:	06:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-17-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	99.0		%	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-17-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	103		%	1.0	10/19/2022	AB22-1019-04
Arsenic	111		%	1.0	10/19/2022	AB22-1019-04
Barium	97		%	5.0	10/19/2022	AB22-1019-04
Beryllium	89		%	1.0	10/19/2022	AB22-1019-04
Boron	112		%	20.0	10/19/2022	AB22-1019-04
Cadmium	95.4		%	0.2	10/19/2022	AB22-1019-04
Calcium	114		%	1000.0	10/19/2022	AB22-1019-04
Chromium	106		%	1.0	10/19/2022	AB22-1019-04
Cobalt	103		%	6.0	10/19/2022	AB22-1019-04
Copper	92		%	1.0	10/19/2022	AB22-1019-04
Iron	109		%	20.0	10/19/2022	AB22-1019-04
Lead	96		%	1.0	10/19/2022	AB22-1019-04
Lithium	89		%	10.0	10/19/2022	AB22-1019-04
Magnesium	116		%	1000.0	10/19/2022	AB22-1019-04
Molybdenum	119		%	5.0	10/19/2022	AB22-1019-04
Nickel	96		%	2.0	10/19/2022	AB22-1019-04
Potassium	111		%	100.0	10/19/2022	AB22-1019-04
Selenium	97		%	1.0	10/19/2022	AB22-1019-04
Silver	91.6		%	0.2	10/19/2022	AB22-1019-04
Sodium	117		%	1000.0	10/19/2022	AB22-1019-04
Thallium	97		%	2.0	10/19/2022	AB22-1019-04
Vanadium	109		%	2.0	10/19/2022	AB22-1019-04
Zinc	96		%	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-17-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	105		%	1000.0	10/17/2022	AB22-1017-07
Fluoride	92		%	1000.0	10/17/2022	AB22-1017-07
Sulfate	99		%	1000.0	10/18/2022	AB22-1017-07

Alkalinity by SM 2320B

Aliquot #: 22-1021-17-C03-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	94.6		%	10000.0	10/17/2022	AB22-1017-04

Analytical Report

Report Date: 10/27/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **FB-01**
Lab Sample ID: 22-1021-18
Matrix: Water

Laboratory Project: **22-1021**
Collect Date: 10/11/2022
Collect Time: 09:22 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-18-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-18-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	ND		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	ND		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	ND		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	ND		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	ND		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	ND		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	ND		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	ND		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	ND		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-18-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	ND		ug/L	1000.0	10/17/2022	AB22-1017-07

Analytical Report

Report Date: 10/27/22

Sample Site: **JCW Solid Waste Disposal Area, Porewater (395457)**
Field Sample ID: **EB-01**
Lab Sample ID: 22-1021-19
Matrix: Water

Laboratory Project: **22-1021**
Collect Date: 10/11/2022
Collect Time: 09:17 AM

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1021-19-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/12/2022	AB22-1012-06

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1021-19-C01-A02 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Arsenic	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Barium	ND		ug/L	5.0	10/19/2022	AB22-1019-04
Beryllium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Boron	ND		ug/L	20.0	10/19/2022	AB22-1019-04
Cadmium	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Calcium	ND		ug/L	1000.0	10/19/2022	AB22-1019-04
Chromium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Cobalt	ND		ug/L	6.0	10/19/2022	AB22-1019-04
Copper	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Iron	ND		ug/L	20.0	10/19/2022	AB22-1019-04
Lead	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Lithium	ND		ug/L	10.0	10/19/2022	AB22-1019-04
Magnesium	ND		ug/L	1000.0	10/19/2022	AB22-1019-04
Molybdenum	ND		ug/L	5.0	10/19/2022	AB22-1019-04
Nickel	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Potassium	ND		ug/L	100.0	10/19/2022	AB22-1019-04
Selenium	ND		ug/L	1.0	10/19/2022	AB22-1019-04
Silver	ND		ug/L	0.2	10/19/2022	AB22-1019-04
Sodium	ND		ug/L	1000.0	10/19/2022	AB22-1019-04
Thallium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Vanadium	ND		ug/L	2.0	10/19/2022	AB22-1019-04
Zinc	ND		ug/L	10.0	10/19/2022	AB22-1019-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1021-19-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	ND		ug/L	1000.0	10/17/2022	AB22-1017-07

Data Qualifiers	Exception Summary
	No exceptions occurred.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-1021

Inspection Date: 10.11.22 **Inspection By:** LMO/CET

Sample Origin/Project Name: Karn

Shipment Delivered By: Enter the type of shipment carrier.

Pony _____ FedEx _____ UPS _____ USPS _____ Airborne _____

Other/~~Hand Carry~~ (whom) _____

Tracking Number: _____ Shipping Form Attached: Yes _____ No _____

Shipping Containers: Enter the type and number of shipping containers received.

Cooler X 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 X Dented _____ Leaking _____

Other _____

Shipment Security: Enter if any of the shipping containers were opened before receipt.

Shipping Containers Received: Opened _____ Sealed X

Enclosed Documents: Enter the type of documents enclosed with the shipment.

CoC X Work Request _____ Air Data Sheet _____ Other _____

Temperature of Containers: Measure the temperature of several sample containers.

As-Received Temperature Range 4.4 - 9.6 °C Samples Received on Ice: Yes X No _____

M&TE # and Expiration 015402 5.25.23

Number and Type of Containers: Enter the total number of sample containers received.

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or 60mL)	34				
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	38				
24 mL vial (glass)					
500 mL (plastic)					
Other 250 mL Plastic	15				

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

SAMPLING SITE / CUSTOMER: Q4-2022 Weadock Porewater Wells

PROJECT NUMBER: 22-1021

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	PRESERVATIVE HNO_3	PRESERVATIVE H_2SO_4	PRESERVATIVE NaOH	PRESERVATIVE HCl	PRESERVATIVE MeOH	PRESERVATIVE Other	Total Metals	Anions	TDS	Alkalinity					REMARKS
22-1021-01	10/10/22	0900	GW	JCW-MW-18001	5	4	1						x	x	x	x					
-02	10/10/22	1303	GW	JCW-MW-18004	5	4	1						x	x	x	x					
-03	10/11/22	0540	GW	JCW-MW-18005	5	4	1						x	x	x	x					
-04	10/11/22	0748	GW	JCW-MW-18006	5	4	1						x	x	x	x					
-05	10/10/22	0755	GW	MW-50	5	4	1						x	x	x	x					
-06	10/10/22	0834	GW	MW-51	5	4	1						x	x	x	x					
-07	10/10/22	0914	GW	MW-52	5	4	1						x	x	x	x					
-08	10/10/22	1014	GW	MW-53	5	4	1						x	x	x	x					
-09	10/10/22	1127	GW	MW-53R	5	4	1						x	x	x	x					
-10	10/10/22	1310	GW	MW-54R	5	4	1						x	x	x	x					
-11	10/10/22	1401	GW	MW-55	5	4	1						x	x	x	x					
-12	10/11/22	0837	GW	OW-57ROUT	5	4	1						x	x	x	x					

RELINQUISHED BY: _____ DATE/TIME: 10/11/22 1210 RECEIVED BY: _____

RELINQUISHED BY: _____ DATE/TIME: _____ RECEIVED BY: _____

COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015402

Temperature: 4.4 - 9.6 °C Cal. Due Date: 05/25/2023

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

SAMPLING SITE / CUSTOMER: Q4-2022 Weadock Porewater Wells

PROJECT NUMBER: 22-1021

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	ANALYSIS REQUESTED (Attach List if More Space is Needed): Total Metals	Anions	TDS	Alkalinity	REMARKS
22-1021-13	10/4/22	0940	GW	MW-58	5	4	1						x	x	x	x	
-14	10/10/22	—	GW	DUP-JCW-LF-01	5	4	1						x	x	x	x	
-15	10/11/22	—	GW	DUP-JCW-LF-02	5	4	1						x	x	x	x	
-16	10/10/22	0900	GW	JCW-MW-18001 MS	4	3	1						x	x		x	
-17	10/10/22	0900	GW	JCW-MW-18001 MSD	4	3	1						x	x		x	
-18	10/11/22	0937	W	FB-01	2	1	1						x	x			
-19	10/11/22	0917	W	EB-01	2	1	1						x	x			

RELINQUISHED BY: [signature] DATE/TIME: 10/11/22 1210 RECEIVED BY: [signature]

RELINQUISHED BY: DATE/TIME: RECEIVED BY:

COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015402

Temperature: 4.4 - 9.6 °C Cal. Due Date: 5-25-23

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: October 27, 2022

Subject: RCRA GROUNDWATER MONITORING – DEK-JCW BACKGROUND WELLS – 2022 Q4

CC: HDRegister, P22-521
BLSwanberg, P22-119

Darby Litz, Project Manager
TRC Companies, Inc.
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 22-1023

TRC Environmental, Inc. conducted groundwater monitoring at the Karn/Weadock Background Wells area on 10/04/2022 and 10/05/2021, 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 10/06/2022.

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, when applicable; all other quality control data is listed in the Quality Control Summary associated with the particular test method, as appropriate. Unless specifically noted in the case narrative, all method quality control requirements have been met. If any results are qualified, the corresponding data flags/qualifiers are listed on the last page of the results section. Any additional information on method performance, when applicable, is presented in this section of the case narrative. When data flags are not needed, the qualifiers text box on the last page is left blank, and a statement confirms that no exceptions occurred.

DEFINITIONS / QUALIFIERS

The following qualifiers and/or acronyms are used in the report, where applicable:

Acronym	Description
RL	Reporting Limit
ND	Result not detected or below Reporting Limit
NT	Non TNI analyte
LCS	Laboratory Control Sample
LRB	Laboratory Reagent Blank (also referred to as Method Blank)
DUP	Duplicate
MS	Matrix Spike
MSD	Matrix Spike Duplicate
RPD	Relative Percent Difference
MDL	Method Detection Limit
PQL	Practical Quantitation Limit
TDL	Target Detection Limit
SM	Standard Methods Compendium

Qualifier	Description
*	Generic data flag, applicable description added in the corresponding notes section
B	The analyte was detected in the LRB at a level which is significant relative to sample result
D	Reporting limit elevated due to dilution
E	Estimated due to result exceeding the linear range of the analyzer
H	The maximum recommended hold time was exceeded
I	Dilution required due to matrix interference; reporting limit elevated
J	Estimated due to result found above MDL but below PQL (or RL)
K	Reporting limit raised due to matrix interference
M	The precision for duplicate analysis was not met; RPD outside acceptance criteria
N	Non-homogeneous sample made analysis questionable
PI	Possible interference may have affected the accuracy of the laboratory result
Q	Matrix Spike or Matrix Spike Duplicate recovery outside acceptance criteria
R	Result confirmed by new sample preparation and reanalysis
X	Other notation required; comment listed in sample notes and/or case narrative

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q4_2022 DEK & JCW RCRA Background Wells
Date Received: 10/6/2022
Chemistry Project: 22-1023

Sample #	Field Sample ID	Matrix	Sample Date	Site
22-1023-01	MW-15002	Groundwater	10/05/2022 08:55 AM	DEK JCW Background
22-1023-02	MW-15008	Groundwater	10/04/2022 03:08 PM	DEK JCW Background
22-1023-03	MW-15016	Groundwater	10/05/2022 09:56 AM	DEK JCW Background
22-1023-04	MW-15019	Groundwater	10/04/2022 04:10 PM	DEK JCW Background
22-1023-05	DUP-Background	Groundwater	10/04/2022 12:00 AM	DEK JCW Background
22-1023-06	FB-Background	Water	10/05/2022 08:55 AM	DEK JCW Background

Analytical Report

Report Date: 10/27/22

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15002**
Lab Sample ID: 22-1023-01
Matrix: Groundwater

Laboratory Project: **22-1023**
Collect Date: 10/05/2022
Collect Time: 08:55 AM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1023-01-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Arsenic	9		ug/L	1.0	10/18/2022	AB22-1018-03
Barium	600		ug/L	5.0	10/18/2022	AB22-1018-03
Beryllium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Boron	147		ug/L	20.0	10/18/2022	AB22-1018-03
Cadmium	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Calcium	214000		ug/L	1000.0	10/18/2022	AB22-1018-03
Chromium	2		ug/L	1.0	10/18/2022	AB22-1018-03
Cobalt	ND		ug/L	6.0	10/18/2022	AB22-1018-03
Copper	2		ug/L	1.0	10/18/2022	AB22-1018-03
Iron	15300		ug/L	20.0	10/18/2022	AB22-1018-03
Lead	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Lithium	16		ug/L	10.0	10/18/2022	AB22-1018-03
Magnesium	31600		ug/L	1000.0	10/18/2022	AB22-1018-03
Molybdenum	ND		ug/L	5.0	10/18/2022	AB22-1018-03
Nickel	7		ug/L	2.0	10/18/2022	AB22-1018-03
Potassium	3930		ug/L	100.0	10/18/2022	AB22-1018-03
Selenium	36		ug/L	1.0	10/18/2022	AB22-1018-03
Silver	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Sodium	1090000		ug/L	1000.0	10/18/2022	AB22-1018-03
Thallium	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Vanadium	11		ug/L	2.0	10/18/2022	AB22-1018-03
Zinc	ND		ug/L	10.0	10/18/2022	AB22-1018-03

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1023-01-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/19/2022	AB22-1019-01

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1023-01-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	1820000		ug/L	1000.0	10/18/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	2660		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1023-01-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	4210		mg/L	10.0	10/11/2022	AB22-1010-06

Analytical Report

Report Date: 10/27/22

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15008**
Lab Sample ID: 22-1023-02
Matrix: Groundwater

Laboratory Project: **22-1023**
Collect Date: 10/04/2022
Collect Time: 03:08 PM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1023-02-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Arsenic	2		ug/L	1.0	10/18/2022	AB22-1018-03
Barium	70		ug/L	5.0	10/18/2022	AB22-1018-03
Beryllium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Boron	175		ug/L	20.0	10/18/2022	AB22-1018-03
Cadmium	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Calcium	113000		ug/L	1000.0	10/18/2022	AB22-1018-03
Chromium	1		ug/L	1.0	10/18/2022	AB22-1018-03
Cobalt	ND		ug/L	6.0	10/18/2022	AB22-1018-03
Copper	1		ug/L	1.0	10/18/2022	AB22-1018-03
Iron	17500		ug/L	20.0	10/18/2022	AB22-1018-03
Lead	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Lithium	21		ug/L	10.0	10/18/2022	AB22-1018-03
Magnesium	16500		ug/L	1000.0	10/18/2022	AB22-1018-03
Molybdenum	ND		ug/L	5.0	10/18/2022	AB22-1018-03
Nickel	4		ug/L	2.0	10/18/2022	AB22-1018-03
Potassium	2970		ug/L	100.0	10/18/2022	AB22-1018-03
Selenium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Silver	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Sodium	147000		ug/L	1000.0	10/18/2022	AB22-1018-03
Thallium	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Vanadium	6		ug/L	2.0	10/18/2022	AB22-1018-03
Zinc	ND		ug/L	10.0	10/18/2022	AB22-1018-03

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1023-02-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/19/2022	AB22-1019-01

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1023-02-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	261000		ug/L	1000.0	10/18/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	19300		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1023-02-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	901		mg/L	10.0	10/10/2022	AB22-1010-08

Analytical Report

Report Date: 10/27/22

Sample Site: **DEK JCW Background**
Field Sample ID: **MW-15016**
Lab Sample ID: 22-1023-03
Matrix: Groundwater

Laboratory Project: **22-1023**
Collect Date: 10/05/2022
Collect Time: 09:56 AM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1023-03-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Arsenic	3		ug/L	1.0	10/18/2022	AB22-1018-03
Barium	115		ug/L	5.0	10/18/2022	AB22-1018-03
Beryllium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Boron	690		ug/L	20.0	10/18/2022	AB22-1018-03
Cadmium	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Calcium	289000		ug/L	1000.0	10/18/2022	AB22-1018-03
Chromium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Cobalt	ND		ug/L	6.0	10/18/2022	AB22-1018-03
Copper	3		ug/L	1.0	10/18/2022	AB22-1018-03
Iron	427		ug/L	20.0	10/18/2022	AB22-1018-03
Lead	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Lithium	91		ug/L	10.0	10/18/2022	AB22-1018-03
Magnesium	38600		ug/L	1000.0	10/18/2022	AB22-1018-03
Molybdenum	6		ug/L	5.0	10/18/2022	AB22-1018-03
Nickel	12		ug/L	2.0	10/18/2022	AB22-1018-03
Potassium	15600		ug/L	100.0	10/18/2022	AB22-1018-03
Selenium	2		ug/L	1.0	10/18/2022	AB22-1018-03
Silver	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Sodium	141000		ug/L	1000.0	10/18/2022	AB22-1018-03
Thallium	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Vanadium	2		ug/L	2.0	10/18/2022	AB22-1018-03
Zinc	11		ug/L	10.0	10/18/2022	AB22-1018-03

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1023-03-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/19/2022	AB22-1019-01

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1023-03-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	236000		ug/L	1000.0	10/18/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	639000		ug/L	1000.0	10/18/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1023-03-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1760		mg/L	10.0	10/10/2022	AB22-1010-08

Analytical Report

Report Date: 10/27/22

Sample Site:	**DEK JCW Background**	Laboratory Project:	**22-1023**
Field Sample ID:	**MW-15019**	Collect Date:	10/04/2022
Lab Sample ID:	22-1023-04	Collect Time:	04:10 PM
Matrix:	Groundwater		

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1023-04-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Arsenic	2		ug/L	1.0	10/18/2022	AB22-1018-03
Barium	308		ug/L	5.0	10/18/2022	AB22-1018-03
Beryllium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Boron	297		ug/L	20.0	10/18/2022	AB22-1018-03
Cadmium	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Calcium	139000		ug/L	1000.0	10/18/2022	AB22-1018-03
Chromium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Cobalt	ND		ug/L	6.0	10/18/2022	AB22-1018-03
Copper	1		ug/L	1.0	10/18/2022	AB22-1018-03
Iron	20700		ug/L	20.0	10/18/2022	AB22-1018-03
Lead	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Lithium	12		ug/L	10.0	10/18/2022	AB22-1018-03
Magnesium	34100		ug/L	1000.0	10/18/2022	AB22-1018-03
Molybdenum	ND		ug/L	5.0	10/18/2022	AB22-1018-03
Nickel	5		ug/L	2.0	10/18/2022	AB22-1018-03
Potassium	1980		ug/L	100.0	10/18/2022	AB22-1018-03
Selenium	1		ug/L	1.0	10/18/2022	AB22-1018-03
Silver	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Sodium	216000		ug/L	1000.0	10/18/2022	AB22-1018-03
Thallium	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Vanadium	3		ug/L	2.0	10/18/2022	AB22-1018-03
Zinc	ND		ug/L	10.0	10/18/2022	AB22-1018-03

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1023-04-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/19/2022	AB22-1019-01

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1023-04-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	355000		ug/L	1000.0	10/18/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	59700		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1023-04-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1190		mg/L	10.0	10/10/2022	AB22-1010-08

Analytical Report

Report Date: 10/27/22

Sample Site:	**DEK JCW Background**	Laboratory Project:	**22-1023**
Field Sample ID:	**DUP-Background**	Collect Date:	10/04/2022
Lab Sample ID:	22-1023-05	Collect Time:	12:00 AM
Matrix:	Groundwater		

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1023-05-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Arsenic	2		ug/L	1.0	10/18/2022	AB22-1018-03
Barium	70		ug/L	5.0	10/18/2022	AB22-1018-03
Beryllium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Boron	181		ug/L	20.0	10/18/2022	AB22-1018-03
Cadmium	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Calcium	112000		ug/L	1000.0	10/18/2022	AB22-1018-03
Chromium	1		ug/L	1.0	10/18/2022	AB22-1018-03
Cobalt	ND		ug/L	6.0	10/18/2022	AB22-1018-03
Copper	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Iron	17700		ug/L	20.0	10/18/2022	AB22-1018-03
Lead	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Lithium	20		ug/L	10.0	10/18/2022	AB22-1018-03
Magnesium	17200		ug/L	1000.0	10/18/2022	AB22-1018-03
Molybdenum	ND		ug/L	5.0	10/18/2022	AB22-1018-03
Nickel	4		ug/L	2.0	10/18/2022	AB22-1018-03
Potassium	2470		ug/L	100.0	10/18/2022	AB22-1018-03
Selenium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Silver	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Sodium	146000		ug/L	1000.0	10/18/2022	AB22-1018-03
Thallium	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Vanadium	6		ug/L	2.0	10/18/2022	AB22-1018-03
Zinc	ND		ug/L	10.0	10/18/2022	AB22-1018-03

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1023-05-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/19/2022	AB22-1019-01

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1023-05-C02-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	246000		ug/L	1000.0	10/18/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	18800		ug/L	1000.0	10/17/2022	AB22-1017-07

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1023-05-C03-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	885		mg/L	10.0	10/10/2022	AB22-1010-08

Analytical Report

Report Date: 10/27/22

Sample Site: **DEK JCW Background**
Field Sample ID: **FB-Background**
Lab Sample ID: 22-1023-06
Matrix: Water

Laboratory Project: **22-1023**
Collect Date: 10/05/2022
Collect Time: 08:55 AM

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1023-06-C01-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Arsenic	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Barium	ND		ug/L	5.0	10/18/2022	AB22-1018-03
Beryllium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Boron	ND		ug/L	20.0	10/18/2022	AB22-1018-03
Cadmium	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Calcium	ND		ug/L	1000.0	10/18/2022	AB22-1018-03
Chromium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Cobalt	ND		ug/L	6.0	10/18/2022	AB22-1018-03
Copper	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Iron	ND		ug/L	20.0	10/18/2022	AB22-1018-03
Lead	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Lithium	ND		ug/L	10.0	10/18/2022	AB22-1018-03
Magnesium	ND		ug/L	1000.0	10/18/2022	AB22-1018-03
Molybdenum	ND		ug/L	5.0	10/18/2022	AB22-1018-03
Nickel	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Potassium	ND		ug/L	100.0	10/18/2022	AB22-1018-03
Selenium	ND		ug/L	1.0	10/18/2022	AB22-1018-03
Silver	ND		ug/L	0.2	10/18/2022	AB22-1018-03
Sodium	ND		ug/L	1000.0	10/18/2022	AB22-1018-03
Thallium	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Vanadium	ND		ug/L	2.0	10/18/2022	AB22-1018-03
Zinc	ND		ug/L	10.0	10/18/2022	AB22-1018-03

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1023-06-C01-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/19/2022	AB22-1019-01

Analytical Report

Report Date: 10/27/22

Data Qualifiers	Exception Summary
	No exceptions occurred.

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-1023

Inspection Date: 10.6.22 **Inspection By:** dmw

Sample Origin/Project Name: Q4 2022 JCN-DEK Background Wells

Shipment Delivered By: Enter the type of shipment carrier.

Pony ____ FedEx ✓ UPS ____ USPS ____ Airborne ____

Other/Hand Carry (whom) ____

Tracking Number: 278184239294 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 3.6-5.1°C Samples Received on Ice: Yes ✓ No ____

M&TE # and Expiration 015402 | 5.25.23

Number and Type of Containers: Enter the total number of sample containers received.

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or 60mL)					
Quart/Liter (g/p)					
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	11				
24 mL vial (glass)					
250 ~~500~~ mL (plastic)	5				
Other					

pH paper
0.0-14.0
Cat No. 13-640-508
Lot: 22240
Exp: 8.1.23

dmw 10.6.22

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

SAMPLING SITE / CUSTOMER: Q4-2022 JCW-DEK Background Wells

PROJECT NUMBER: 22-1023

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM: Andrew Whaley

TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	PRESERVATIVE HNO_3	PRESERVATIVE H_2SO_4	PRESERVATIVE NaOH	PRESERVATIVE HCl	PRESERVATIVE MeOH	PRESERVATIVE Other	Total Metals	Anions	TDS	REMARKS
22-1023-01	10/5/22	855	GW	MW-15002	3	2	1						x	x	x	
-02	10/4/22	1508	GW	MW-15008	3	2	1						x	x	x	
-03	10/5/22	956	GW	MW-15016	3	2	1						x	x	x	
-04	10/4/22	1610	GW	MW-15019	3	2	1						x	x	x	
-05	10/4/22	—	GW	DUP-Background	3	2	1						x	x	x	
-06	10/5/22	855	W	FB- Background	1								x			

RELINQUISHED BY: [signature] — DATE/TIME: 10-5-22 1300 — RECEIVED BY: Fedex

RELINQUISHED BY: Fed Ex — DATE/TIME: 10-06-22 10:30 — RECEIVED BY: [signature]

COMMENTS:

Received on Ice? ☑ Yes ☐ No — M&TE #: 015402

Temperature: 3.6-5.1 °C — Cal. Due Date: 5-25-23

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: October 27, 2022

Subject: HMP GROUNDWATER MONITORING – JCW LEACHATE WELLS – 2022 Q4

CC: HDRegister, P22-521
BLSwanberg, P22-119

Darby Litz, Project Manager
TRC Companies, Inc.
1540 Eisenhower Place
Ann Arbor, MI 48108

Chemistry Project: 22-1024

TRC Environmental, Inc. conducted groundwater monitoring at the JC Weadock solid waste disposal area on 10/05/2022 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 10/06/2022.

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 accreditation 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. In order to minimize contamination, the samples submitted for Low Level Mercury analysis were preserved in the Mercury clean-room upon receipt at the laboratory, as specified in the corresponding test method.

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

Work Order Sample Summary

Customer Name: Karn/Weadock Complex
Work Order ID: Q4-2022 JCW Part 115 Leachate Wells
Date Received: 10/6/2022
Chemistry Project: 22-1024

Sample #	Field Sample ID	Matrix	Sample Date	Site
22-1024-01	LH-103R	Groundwater	10/05/2022 09:44 AM	JCW Solid Waste Disposal Area - Leachate Wells
22-1024-02	LH-103R Dup	Groundwater	10/05/2022 12:00 AM	JCW Solid Waste Disposal Area - Leachate Wells
22-1024-03	LH-103R MS	Groundwater	10/05/2022 09:44 AM	JCW Solid Waste Disposal Area - Leachate Wells
22-1024-04	LH-103R MSD	Groundwater	10/05/2022 09:44 AM	JCW Solid Waste Disposal Area - Leachate Wells
22-1024-05	LH-104	Groundwater	10/05/2022 10:56 AM	JCW Solid Waste Disposal Area - Leachate Wells
22-1024-06	LH-104 Dup	Groundwater	10/05/2022 12:00 AM	JCW Solid Waste Disposal Area - Leachate Wells
22-1024-07	FB-02	Water	10/05/2022 09:44 AM	JCW Solid Waste Disposal Area - Leachate Wells
22-1024-08	EB-02	Water	10/05/2022 10:00 AM	JCW Solid Waste Disposal Area - Leachate Wells
22-1024-09	TB-01	Water	10/05/2022 12:00 AM	JCW Solid Waste Disposal Area - Leachate Wells

Analytical Report

Report Date: 10/27/22

Sample Site: **JCW Solid Waste Disposal Area - Leachate Wells**
Field Sample ID: **LH-103R**
Lab Sample ID: 22-1024-01
Matrix: Groundwater

Laboratory Project: **22-1024**
Collect Date: 10/05/2022
Collect Time: 09:44 AM

Mercury, Low Level by EPA 1631E

Aliquot #: 22-1024-01-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	ND		ng/L	0.5	10/20/2022	AB22-1020-02

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1024-01-C02-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Arsenic	41		ug/L	1.0	10/13/2022	AB22-1013-08
Barium	369		ug/L	5.0	10/13/2022	AB22-1013-08
Beryllium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Boron	8040		ug/L	20.0	10/13/2022	AB22-1013-08
Cadmium	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Calcium	248000		ug/L	1000.0	10/16/2022	AB22-1013-08
Chromium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Cobalt	ND		ug/L	6.0	10/13/2022	AB22-1013-08
Copper	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Iron	12300		ug/L	20.0	10/13/2022	AB22-1013-08
Lead	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Lithium	139		ug/L	10.0	10/13/2022	AB22-1013-08
Magnesium	75200		ug/L	1000.0	10/16/2022	AB22-1013-08
Molybdenum	ND		ug/L	5.0	10/13/2022	AB22-1013-08
Nickel	7		ug/L	2.0	10/13/2022	AB22-1013-08
Potassium	13500		ug/L	100.0	10/16/2022	AB22-1013-08
Selenium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Silver	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Sodium	111000		ug/L	1000.0	10/16/2022	AB22-1013-08
Thallium	ND		ug/L	2.0	10/13/2022	AB22-1013-08
Vanadium	4		ug/L	2.0	10/13/2022	AB22-1013-08
Zinc	ND		ug/L	10.0	10/13/2022	AB22-1013-08

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1024-01-C02-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/19/2022	AB22-1019-01

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1024-01-C03-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	71300		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	36400		ug/L	1000.0	10/17/2022	AB22-1017-07

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area - Leachate Wells**	Laboratory Project:	**22-1024**
Field Sample ID:	**LH-103R**	Collect Date:	10/05/2022
Lab Sample ID:	22-1024-01	Collect Time:	09:44 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1024-01-C04-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	1330		mg/L	10.0	10/10/2022	AB22-1010-08

Alkalinity by SM 2320B

Aliquot #: 22-1024-01-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	1100000		ug/L	10000.0	10/15/2022	AB22-1015-01
Alkalinity Bicarbonate	1100000		ug/L	10000.0	10/15/2022	AB22-1015-01
Alkalinity Carbonate	ND		ug/L	10000.0	10/15/2022	AB22-1015-01

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area - Leachate Wells**	Laboratory Project:	**22-1024**
Field Sample ID:	**LH-103R Dup**	Collect Date:	10/05/2022
Lab Sample ID:	22-1024-02	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury, Low Level by EPA 1631E

Aliquot #: 22-1024-02-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	ND		ng/L	0.5	10/20/2022	AB22-1020-02

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area - Leachate Wells**	Laboratory Project:	**22-1024**
Field Sample ID:	**LH-103R MS**	Collect Date:	10/05/2022
Lab Sample ID:	22-1024-03	Collect Time:	09:44 AM
Matrix:	Groundwater		

Mercury, Low Level by EPA 1631E

Aliquot #: 22-1024-03-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	101		%	0.5	10/20/2022	AB22-1020-02

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area - Leachate Wells**	Laboratory Project:	**22-1024**
Field Sample ID:	**LH-103R MSD**	Collect Date:	10/05/2022
Lab Sample ID:	22-1024-04	Collect Time:	09:44 AM
Matrix:	Groundwater		

Mercury, Low Level by EPA 1631E

Aliquot #: 22-1024-04-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	105		%	0.5	10/20/2022	AB22-1020-02

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area - Leachate Wells**	Laboratory Project:	**22-1024**
Field Sample ID:	**LH-104**	Collect Date:	10/05/2022
Lab Sample ID:	22-1024-05	Collect Time:	10:56 AM
Matrix:	Groundwater		

Mercury, Low Level by EPA 1631E

Aliquot #: 22-1024-05-C01-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	0.54		ng/L	0.5	10/20/2022	AB22-1020-02

Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp

Aliquot #: 22-1024-05-C02-A01 **Analyst: EB**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	1		ug/L	1.0	10/13/2022	AB22-1013-08
Arsenic	16		ug/L	1.0	10/13/2022	AB22-1013-08
Barium	225		ug/L	5.0	10/13/2022	AB22-1013-08
Beryllium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Boron	10800		ug/L	20.0	10/13/2022	AB22-1013-08
Cadmium	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Calcium	142000		ug/L	1000.0	10/16/2022	AB22-1013-08
Chromium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Cobalt	ND		ug/L	6.0	10/13/2022	AB22-1013-08
Copper	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Iron	196		ug/L	20.0	10/13/2022	AB22-1013-08
Lead	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Lithium	45		ug/L	10.0	10/13/2022	AB22-1013-08
Magnesium	74800		ug/L	1000.0	10/16/2022	AB22-1013-08
Molybdenum	67		ug/L	5.0	10/13/2022	AB22-1013-08
Nickel	6		ug/L	2.0	10/13/2022	AB22-1013-08
Potassium	8300		ug/L	100.0	10/16/2022	AB22-1013-08
Selenium	ND		ug/L	1.0	10/13/2022	AB22-1013-08
Silver	ND		ug/L	0.2	10/13/2022	AB22-1013-08
Sodium	77900		ug/L	1000.0	10/16/2022	AB22-1013-08
Thallium	ND		ug/L	2.0	10/13/2022	AB22-1013-08
Vanadium	16		ug/L	2.0	10/13/2022	AB22-1013-08
Zinc	ND		ug/L	10.0	10/13/2022	AB22-1013-08

Mercury by EPA 7470A, Total, Aqueous

Aliquot #: 22-1024-05-C02-A02 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/19/2022	AB22-1019-01

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous

Aliquot #: 22-1024-05-C03-A01 **Analyst: DMW**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	67300		ug/L	1000.0	10/17/2022	AB22-1017-07
Fluoride	ND		ug/L	1000.0	10/17/2022	AB22-1017-07
Sulfate	202000		ug/L	1000.0	10/18/2022	AB22-1017-07

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area - Leachate Wells**	Laboratory Project:	**22-1024**
Field Sample ID:	**LH-104**	Collect Date:	10/05/2022
Lab Sample ID:	22-1024-05	Collect Time:	10:56 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C

Aliquot #: 22-1024-05-C04-A01 **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	930		mg/L	10.0	10/10/2022	AB22-1010-08

Alkalinity by SM 2320B

Aliquot #: 22-1024-05-C05-A01 **Analyst: DLS**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Alkalinity Total	547000		ug/L	10000.0	10/15/2022	AB22-1015-01
Alkalinity Bicarbonate	547000		ug/L	10000.0	10/15/2022	AB22-1015-01
Alkalinity Carbonate	ND		ug/L	10000.0	10/15/2022	AB22-1015-01

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area - Leachate Wells**	Laboratory Project:	**22-1024**
Field Sample ID:	**LH-104 Dup**	Collect Date:	10/05/2022
Lab Sample ID:	22-1024-06	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury, Low Level by EPA 1631E — **Aliquot #: 22-1024-06-C01-A01** — **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	ND		ng/L	0.5	10/20/2022	AB22-1020-02

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area - Leachate Wells**	Laboratory Project:	**22-1024**
Field Sample ID:	**FB-02**	Collect Date:	10/05/2022
Lab Sample ID:	22-1024-07	Collect Time:	09:44 AM
Matrix:	Water		

Mercury, Low Level by EPA 1631E — **Aliquot #: 22-1024-07-C01-A01** — **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	ND		ng/L	0.5	10/20/2022	AB22-1020-02

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area - Leachate Wells**	Laboratory Project:	**22-1024**
Field Sample ID:	**EB-02**	Collect Date:	10/05/2022
Lab Sample ID:	22-1024-08	Collect Time:	10:00 AM
Matrix:	Water		

Mercury, Low Level by EPA 1631E — **Aliquot #: 22-1024-08-C01-A01** — **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	ND		ng/L	0.5	10/20/2022	AB22-1020-02

Analytical Report

Report Date: 10/27/22

Sample Site:	**JCW Solid Waste Disposal Area - Leachate Wells**	Laboratory Project:	**22-1024**
Field Sample ID:	**TB-01**	Collect Date:	10/05/2022
Lab Sample ID:	22-1024-09	Collect Time:	12:00 AM
Matrix:	Water		

Mercury, Low Level by EPA 1631E — **Aliquot #: 22-1024-09-C01-A01** — **Analyst: CLE**

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury Low Level	ND		ng/L	0.5	10/20/2022	AB22-1020-02

Analytical Report

Report Date: 10/27/22

Data Qualifiers	Exception Summary
	No exceptions occurred.

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-1024 | 22-1025

Inspection Date: 10.6.22 **Inspection By:** dmw

Sample Origin/Project Name: Q4 2022 Weadock Leachate Wells / Q4 2022 Korn Landfill HMP- Leachate Wells

Shipment Delivered By: Enter the type of shipment carrier.

Pony ____ FedEx ✓ UPS ____ USPS ____ Airborne ____

Other/Hand Carry (whom) ____

Tracking Number: 278184239310 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 3.8-4.8°C Samples Received on Ice: Yes ✓ No ____

M&TE # and Expiration 015402 | 5.25.23

Number and Type of Containers: Enter the total number of sample containers received.

Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or 60mL)	8				
Quart/Liter (g/p)	4				
9-oz (amber glass jar)					
2-oz (amber glass)					
125 mL (plastic)	12				
24 mL vial (glass)					
250 ~~500~~ mL (plastic)	4				
Other					

dmw 10.6.22

pH paper
0.0 -14.0
Cat. No: 13-640-508
Lot: 22240
EXP: 8.1.23

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: 22-1024

Inspection Date: 10-6-22 **Inspection By:** LLE

Sample Origin/Project Name: JCW Leachate LLHg

Shipment Delivered By: Enter the type of shipment carrier.

Pony ____ FedEx ✓ UPS ____ USPS ____ Airborne ____

Other/Hand Carry (whom) ____

Tracking Number: 278784239320 Shipping Form Attached: Yes X 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 21.3°C Samples Received on Ice: Yes ____ No X

M&TE # and Expiration 015402 / 5.25.23

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 8oz BR	9				

PG. 2 of 2 not needed

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

SAMPLING SITE / CUSTOMER: Q4-2022 Weadock Leachate Wells

PROJECT NUMBER: 22-1024

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM: TRC

TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Low Level Mercury	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-1024-01	10-5-22	0944	GW	LH-103R	6	4	1			1			x	x	x	x	x	
-02		—	GW	LH-103R Dup	1					1			x					
-03		0944	GW	LH-103R MS	1					1			x					
-04		0944	GW	LH-103R MSD	1					1			x					
-05		1056	GW	LH-104	6	4	1			1			x	x	x	x	x	
-06		—	GW	LH-104 Dup	1					1			x					
-07		0944	W	FB-02	1					1			x					
-08		1000	W	EB-02	1					1			x					
-09		—	W	TB-02	1					1			x					

RELINQUISHED BY: [signature] — DATE/TIME: 10-5-22 / 1300 — RECEIVED BY: Fedex

RELINQUISHED BY: Fed Ex — DATE/TIME: 10-06-22 10:30 — RECEIVED BY: [signature]

COMMENTS:

Received on Ice? ☑ Yes ☐ No — M&TE #: 015402

Temperature: 3.8 - 4.8 °C — Cal. Due Date: 5-25-23

eurofins | Environment Testing

ANALYTICAL REPORT

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Tel: (330)497-9396

Laboratory Job ID: 240-174329-1
Client Project/Site: Karn/Weadock CCR Background Well

For:
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor, Michigan 48108-7080

Attn: Darby Litz

Authorized for release by:
11/10/2022 4:24:07 PM

Kris Brooks, Project Manager II
(330)966-9790
Kris.Brooks@et.eurofinsus.com

LINKS

Review your project results through my EOL

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.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the {0} Project Manager.

Table of Contents

Cover Page 1
Table of Contents 2
Definitions/Glossary 3
Case Narrative 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Tracer Carrier Summary 13
QC Sample Results 14
QC Association Summary 15
Lab Chronicle 16
Certification Summary 18
Chain of Custody 19
Receipt Checklists 24

Definitions/Glossary

Client: TRC Environmental Corporation. Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Case Narrative

Client: TRC Environmental Corporation. Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Job ID: 240-174329-1

Laboratory: Eurofins Canton

Narrative

Job Narrative
240-174329-1

Comments
All analysis were performed at Eurofins St. Louis Laboratory.

Receipt
The samples were received on 10/8/2022 9:55 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved and on ice. The temperatures of the 6 coolers at receipt time were 0.8º C, 1.2º C, 1.4º C, 2.2º C, 3.1º C and 4.1º C.

RAD
Method 903.0: Radium-226 batch 586489
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 (240-174329-1), MW-15008 (240-174329-2), MW-15016 (240-174329-3), MW-15019 (240-174329-4), DUP-BACKGROUND (240-174329-5), FB-BACKGROUND (240-174329-6), (LCS 160-586489/2-A), (MB 160-586489/1-A), (180-145631-A-1-A) and (180-145631-A-1-B DU)

Method 904.0: Radium-228 batch 586571
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 (240-174329-1), MW-15008 (240-174329-2), MW-15016 (240-174329-3), MW-15019 (240-174329-4), DUP-BACKGROUND (240-174329-5), FB-BACKGROUND (240-174329-6), (LCS 160-586571/2-A), (MB 160-586571/1-A), (180-145631-A-1-C) and (180-145631-A-1-D DU)

Method 904.0: Radium-228 batch 586571
The sample duplicate (DUP) precision was outside control limits. Sample matrix interference is suspected.
(180-145631-A-1-D DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Method Summary

Client: TRC Environmental Corporation.
Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	EET SL
904.0	Radium-228 (GFPC)	EPA	EET SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	EET SL
PrecSep STD	Preparation, Precipitate Separation (Standard In-Growth)	None	EET SL
PrecSep_0	Preparation, Precipitate Separation	None	EET SL

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: TRC Environmental Corporation.
Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-174329-1	MW-15002	Water	10/05/22 08:55	10/08/22 09:55
240-174329-2	MW-15008	Water	10/04/22 15:08	10/08/22 09:55
240-174329-3	MW-15016	Water	10/05/22 09:56	10/08/22 09:55
240-174329-4	MW-15019	Water	10/04/22 16:10	10/08/22 09:55
240-174329-5	DUP-BACKGROUND	Water	10/04/22 00:00	10/08/22 09:55
240-174329-6	FB-BACKGROUND	Water	10/05/22 08:55	10/08/22 09:55

Client Sample ID: MW-15002 — Lab Sample ID: 240-174329-1

Date Collected: 10/05/22 08:55 — **Matrix: Water**
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.850		0.196	0.210	1.00	0.131	pCi/L	10/19/22 12:19	11/09/22 15:56	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*97.5*		*40 - 110*	*10/19/22 12:19*	*11/09/22 15:56*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	2.69		0.687	0.730	1.00	0.743	pCi/L	10/19/22 13:40	11/02/22 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*97.5*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*
Y Carrier	*86.0*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	3.54		0.714	0.760	5.00	0.743	pCi/L		11/10/22 13:17	1

Client Sample ID: MW-15008 — Lab Sample ID: 240-174329-2

Date Collected: 10/04/22 15:08 — **Matrix: Water**
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.265		0.118	0.120	1.00	0.125	pCi/L	10/19/22 12:19	11/09/22 15:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*98.3*		*40 - 110*	*10/19/22 12:19*	*11/09/22 15:58*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.62		0.594	0.612	1.00	0.754	pCi/L	10/19/22 13:40	11/02/22 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*98.3*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*
Y Carrier	*87.9*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.88		0.606	0.624	5.00	0.754	pCi/L		11/10/22 13:17	1

Client Sample ID: MW-15016 — Lab Sample ID: 240-174329-3

Date Collected: 10/05/22 09:56 — **Matrix: Water**
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.151	U	0.112	0.113	1.00	0.158	pCi/L	10/19/22 12:19	11/09/22 15:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.0*		*40 - 110*	*10/19/22 12:19*	*11/09/22 15:58*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.56**		0.619	0.636	1.00	0.789	pCi/L	10/19/22 13:40	11/02/22 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*85.0*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*
Y Carrier	*86.7*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.71**		0.629	0.646	5.00	0.789	pCi/L		11/10/22 13:17	1

Client Sample ID: MW-15019 — Lab Sample ID: 240-174329-4

Date Collected: 10/04/22 16:10 — **Matrix: Water**
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.478		0.153	0.159	1.00	0.132	pCi/L	10/19/22 12:19	11/09/22 15:58	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*97.5*		*40 - 110*	*10/19/22 12:19*	*11/09/22 15:58*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	2.11		0.628	0.657	1.00	0.684	pCi/L	10/19/22 13:40	11/02/22 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*97.5*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*
Y Carrier	*83.7*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	2.59		0.646	0.676	5.00	0.684	pCi/L		11/10/22 13:17	1

Client Sample ID: DUP-BACKGROUND
Lab Sample ID: 240-174329-5

Date Collected: 10/04/22 00:00
Matrix: Water
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.439		0.157	0.162	1.00	0.163	pCi/L	10/19/22 12:19	11/09/22 16:00	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.8*		*40 - 110*	*10/19/22 12:19*	*11/09/22 16:00*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.77		0.702	0.720	1.00	0.956	pCi/L	10/19/22 13:40	11/02/22 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.8*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*
Y Carrier	*85.6*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	2.21		0.719	0.738	5.00	0.956	pCi/L		11/10/22 13:17	1

Client Sample ID: FB-BACKGROUND
Lab Sample ID: 240-174329-6
Date Collected: 10/05/22 08:55
Matrix: Water
Date Received: 10/08/22 09:55

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0435	U	0.0662	0.0663	1.00	0.114	pCi/L	10/19/22 12:19	11/09/22 16:00	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*96.8*		*40 - 110*	*10/19/22 12:19*	*11/09/22 16:00*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.51**		0.458	0.478	1.00	0.512	pCi/L	10/19/22 13:40	11/02/22 13:55	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*96.8*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*
Y Carrier	*87.5*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:55*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.55**		0.463	0.483	5.00	0.512	pCi/L		11/10/22 13:17	1

Tracer/Carrier Summary

Client: TRC Environmental Corporation.
Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water
Prep Type: Total/NA

		Percent Yield (Acceptance Limits)
		Ba
Lab Sample ID	Client Sample ID	(40-110)
240-174329-1	MW-15002	97.5
240-174329-2	MW-15008	98.3
240-174329-3	MW-15016	85.0
240-174329-4	MW-15019	97.5
240-174329-5	DUP-BACKGROUND	95.8
240-174329-6	FB-BACKGROUND	96.8
LCS 160-586489/2-A	Lab Control Sample	99.8
MB 160-586489/1-A	Method Blank	99.8

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water
Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
		Ba	Y
Lab Sample ID	Client Sample ID	(40-110)	(40-110)
240-174329-1	MW-15002	97.5	86.0
240-174329-2	MW-15008	98.3	87.9
240-174329-3	MW-15016	85.0	86.7
240-174329-4	MW-15019	97.5	83.7
240-174329-5	DUP-BACKGROUND	95.8	85.6
240-174329-6	FB-BACKGROUND	96.8	87.5
LCS 160-586571/2-A	Lab Control Sample	99.8	87.1
MB 160-586571/1-A	Method Blank	99.8	83.7

Tracer/Carrier Legend

Ba = Ba Carrier
Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-586489/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 589429 — **Prep Batch: 586489**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.01471	U	0.0601	0.0601	1.00	0.127	pCi/L	10/19/22 12:19	11/09/22 15:55	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.8*		*40 - 110*	*10/19/22 12:19*	*11/09/22 15:55*	*1*

Lab Sample ID: LCS 160-586489/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 589429 — **Prep Batch: 586489**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	11.66		1.20	1.00	0.0930	pCi/L	103	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*99.8*		*40 - 110*

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-586571/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 588252 — **Prep Batch: 586571**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.001		0.423	0.433	1.00	0.557	pCi/L	10/19/22 13:40	11/02/22 13:54	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*99.8*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:54*	*1*
Y Carrier	*83.7*		*40 - 110*	*10/19/22 13:40*	*11/02/22 13:54*	*1*

Lab Sample ID: LCS 160-586571/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 588252 — **Prep Batch: 586571**

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			8.48	9.458		1.48	1.00	0.776	pCi/L	112	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*99.8*		*40 - 110*
Y Carrier	*87.1*		*40 - 110*

QC Association Summary

Client: TRC Environmental Corporation. Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Rad

Prep Batch: 586489

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-174329-1	MW-15002	Total/NA	Water	PrecSep STD	
240-174329-2	MW-15008	Total/NA	Water	PrecSep STD	
240-174329-3	MW-15016	Total/NA	Water	PrecSep STD	
240-174329-4	MW-15019	Total/NA	Water	PrecSep STD	
240-174329-5	DUP-BACKGROUND	Total/NA	Water	PrecSep STD	
240-174329-6	FB-BACKGROUND	Total/NA	Water	PrecSep STD	
MB 160-586489/1-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-586489/2-A	Lab Control Sample	Total/NA	Water	PrecSep STD	

Prep Batch: 586571

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-174329-1	MW-15002	Total/NA	Water	PrecSep_0	
240-174329-2	MW-15008	Total/NA	Water	PrecSep_0	
240-174329-3	MW-15016	Total/NA	Water	PrecSep_0	
240-174329-4	MW-15019	Total/NA	Water	PrecSep_0	
240-174329-5	DUP-BACKGROUND	Total/NA	Water	PrecSep_0	
240-174329-6	FB-BACKGROUND	Total/NA	Water	PrecSep_0	
MB 160-586571/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-586571/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Client Sample ID: MW-15002 — Lab Sample ID: 240-174329-1

Date Collected: 10/05/22 08:55 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586489	ZR	EET SL	10/19/22 12:19
Total/NA	Analysis	903.0		1	589429	FLC	EET SL	11/09/22 15:56
Total/NA	Prep	PrecSep_0			586571	CMM	EET SL	10/19/22 13:40
Total/NA	Analysis	904.0		1	588252	JCB	EET SL	11/02/22 13:55
Total/NA	Analysis	Ra226_Ra228		1	589622	MLK	EET SL	11/10/22 13:17

Client Sample ID: MW-15008 — Lab Sample ID: 240-174329-2

Date Collected: 10/04/22 15:08 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586489	ZR	EET SL	10/19/22 12:19
Total/NA	Analysis	903.0		1	589429	FLC	EET SL	11/09/22 15:58
Total/NA	Prep	PrecSep_0			586571	CMM	EET SL	10/19/22 13:40
Total/NA	Analysis	904.0		1	588252	JCB	EET SL	11/02/22 13:55
Total/NA	Analysis	Ra226_Ra228		1	589622	MLK	EET SL	11/10/22 13:17

Client Sample ID: MW-15016 — Lab Sample ID: 240-174329-3

Date Collected: 10/05/22 09:56 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586489	ZR	EET SL	10/19/22 12:19
Total/NA	Analysis	903.0		1	589429	FLC	EET SL	11/09/22 15:58
Total/NA	Prep	PrecSep_0			586571	CMM	EET SL	10/19/22 13:40
Total/NA	Analysis	904.0		1	588252	JCB	EET SL	11/02/22 13:55
Total/NA	Analysis	Ra226_Ra228		1	589622	MLK	EET SL	11/10/22 13:17

Client Sample ID: MW-15019 — Lab Sample ID: 240-174329-4

Date Collected: 10/04/22 16:10 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586489	ZR	EET SL	10/19/22 12:19
Total/NA	Analysis	903.0		1	589429	FLC	EET SL	11/09/22 15:58
Total/NA	Prep	PrecSep_0			586571	CMM	EET SL	10/19/22 13:40
Total/NA	Analysis	904.0		1	588252	JCB	EET SL	11/02/22 13:55
Total/NA	Analysis	Ra226_Ra228		1	589622	MLK	EET SL	11/10/22 13:17

Lab Chronicle

Client: TRC Environmental Corporation. Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Client Sample ID: DUP-BACKGROUND — Lab Sample ID: 240-174329-5

Date Collected: 10/04/22 00:00 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586489	ZR	EET SL	10/19/22 12:19
Total/NA	Analysis	903.0		1	589434	FLC	EET SL	11/09/22 16:00
Total/NA	Prep	PrecSep_0			586571	CMM	EET SL	10/19/22 13:40
Total/NA	Analysis	904.0		1	588252	JCB	EET SL	11/02/22 13:55
Total/NA	Analysis	Ra226_Ra228		1	589622	MLK	EET SL	11/10/22 13:17

Client Sample ID: FB-BACKGROUND — Lab Sample ID: 240-174329-6

Date Collected: 10/05/22 08:55 — **Matrix: Water**
Date Received: 10/08/22 09:55

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586489	ZR	EET SL	10/19/22 12:19
Total/NA	Analysis	903.0		1	589434	FLC	EET SL	11/09/22 16:00
Total/NA	Prep	PrecSep_0			586571	CMM	EET SL	10/19/22 13:40
Total/NA	Analysis	904.0		1	588252	JCB	EET SL	11/02/22 13:55
Total/NA	Analysis	Ra226_Ra228		1	589622	MLK	EET SL	11/10/22 13:17

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: TRC Environmental Corporation. Job ID: 240-174329-1
Project/Site: Karn/Weadock CCR Background Well

Laboratory: Eurofins St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-06-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-22
California	Los Angeles County Sanitation Districts	10259	06-30-22 *
California	State	2886	07-01-22 *
Connecticut	State	PH-0241	03-31-23
Florida	NELAP	E87689	06-30-23
HI - RadChem Recognition	State	n/a	06-30-23
Illinois	NELAP	200023	11-30-23
Iowa	State	373	12-01-22
Kansas	NELAP	E-10236	10-31-22 *
Kentucky (DW)	State	KY90125	12-31-22
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-22
Louisiana (All)	NELAP	04080	06-30-23
Louisiana (DW)	State	LA011	12-31-22
Maryland	State	310	09-30-23
MI - RadChem Recognition	State	9005	06-30-23
Missouri	State	780	06-30-25
Nevada	State	MO000542020-1	07-31-23
New Jersey	NELAP	MO002	06-30-23
New York	NELAP	11616	04-01-23
North Dakota	State	R-207	06-30-23
NRC	NRC	24-24817-01	12-31-22
Oklahoma	NELAP	9997	08-31-23
Oregon	NELAP	4157	09-01-23
Pennsylvania	NELAP	68-00540	02-28-23
South Carolina	State	85002001	06-30-23
Texas	NELAP	T104704193	07-31-23
US Fish & Wildlife	US Federal Programs	058448	07-31-23
USDA	US Federal Programs	P330-17-00028	03-11-23
Utah	NELAP	MO000542021-14	07-31-23
Virginia	NELAP	10310	06-14-24
Washington	State	C592	08-30-23
West Virginia DEP	State	381	12-31-22

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Phone (330) 497-9396 Phone (330) 497-0772

MICHIGAN 190

Chain of Custody Record

eurofins | Environment Testing America

Client Information	Sampler: Andrew Whaley	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-99536-29047.1
Client Contact: Jacob Krenz	Phone: 734-210-9239	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin:	Page: Page 1 of 1
Company: TRC Environmental Corporation.	PWSID:			Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: Δ Yes Δ No			
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: 178829			
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, Y - Trizma, 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	10/5/22	855	G	Water	N	N	X	X		
MW-15008	10/4/22	1508	G	Water	N	N	X	X		
MW-15016	10/5/22	956	G	Water	N	N	X	X		
MW-15019	10/4/22	1610	G	Water	N	N	X	X		
DUP-Background	10/4/22	—	G	Water	N	N	X	X		
FB-Background	10/5/22	855	G	Water	N	N	X	X		
				~~Water~~						

240-174329 Chain of Custody

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)

☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		10-7-22/1016	TRC		10/7/22 1015	EETAC
2		10/7/22 1015			10-8-22-955	EETNC
3						

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.:

Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

11/10/2022

Eurofins - Canton Sample Receipt Form/Narrative Login # :_____
Barberton Facility

Client TRC Site Name_____ Cooler unpacked by: Jenny Koch

Cooler Received on 10-8-22 Opened on 10-8-22

FedEx: 1st Grd Exp UPS FAS Clipper Client Drop Off Eurofins Courier Other

Receipt After-hours: Drop-off Date/Time Storage Location

Eurofins Cooler # 1A Foam Box Client Cooler Box Other _____

Packing material used: Bubble Wrap Foam Plastic Bag None Other _____

COOLANT: Wet Ice Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt X See Multiple Cooler Form
   IR GUN# IR-13 (CF +0.7 °C) Observed Cooler Temp._____°C Corrected Cooler Temp._____°C
   IR GUN #IR-15 (CF 0.0°C) Observed Cooler Temp._____°C Corrected Cooler Temp._____°C
2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity 2 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# HC286797
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 # : ____________

Eurofins - 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-13 IR-15	3.1	3.1	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15	1.4	1.4	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15	2.2	2.2	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15	1.2	1.2	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15	4.1	4.1	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15	0.8	0.8	Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 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	240-174329-A-1	Plastic 1 liter - Nitric Acid	<2			
MW-15002	240-174329-B-1	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-174329-A-2	Plastic 1 liter - Nitric Acid	<2			
MW-15008	240-174329-B-2	Plastic 1 liter - Nitric Acid	<2			
MW-15016	240-174329-A-3	Plastic 1 liter - Nitric Acid	<2			
MW-15016	240-174329-B-3	Plastic 1 liter - Nitric Acid	<2			
MW-15019	240-174329-A-4	Plastic 1 liter - Nitric Acid	<2			
MW-15019	240-174329-B-4	Plastic 1 liter - Nitric Acid	<2			
DUP-BACKGROUND	240-174329-A-5	Plastic 1 liter - Nitric Acid	<2			
DUP-BACKGROUND	240-174329-B-5	Plastic 1 liter - Nitric Acid	<2			
FB-BACKGROUND	240-174329-A-6	Plastic 1 liter - Nitric Acid	<2			
FB-BACKGROUND	240-174329-B-6	Plastic 1 liter - Nitric Acid	<2			

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
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: 240-158469.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: Michigan	Page: Page 1 of 1
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-174329-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 11/8/2022			
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, Y - Trizma, 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-15002 (240-174329-1)	10/5/22	08:55 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15008 (240-174329-2)	10/4/22	15:08 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15016 (240-174329-3)	10/5/22	09:56 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-15019 (240-174329-4)	10/4/22	16:10 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-BACKGROUND (240-174329-5)	10/4/22	Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
FB-BACKGROUND (240-174329-6)	10/5/22	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 Environment Testing North Central, LLC 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 Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing North Central, LLC.

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: RA	Date/Time: 10/10/22 1000	Company: EBTNC	Received by: FED EX	Date/Time:	Company
Relinquished by: FED EX	Date/Time:	Company	Received by: [signature]	Date/Time: OCT 1 1 2022 0830	Company: FIA STC
Relinquished by:	Date/Time:	Company	Received by: Autumn R. Johnson	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: 240-174329-1

Login Number: 174329
List Number: 2
Creator: Worthington, Sierra M

List Source: Eurofins St. Louis
List Creation: 10/11/22 01:02 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

ANALYTICAL REPORT

PREPARED FOR

Attn: Darby Litz
TRC Environmental Corporation.
1540 Eisenhower Place
Ann Arbor Michigan 48108-7080

Generated 11/23/2022 10:42:58 AM Revision 1

JOB DESCRIPTION

Karn/Weadock CCR JCW Landfill

JOB NUMBER

240-174527-1

Eurofins Canton
180 S. Van Buren Avenue
Barberton OH 44203

myEOL

Table of Contents

Cover Page 1
Table of Contents 2
Definitions/Glossary 3
Case Narrative 4
Method Summary 5
Sample Summary 6
Client Sample Results 7
Tracer Carrier Summary 23
QC Sample Results 25
QC Association Summary 28
Lab Chronicle 29
Certification Summary 33
Chain of Custody 34
Receipt Checklists 41
Appendix 42

Definitions/Glossary

Client: TRC Environmental Corporation. Job ID: 240-174527-1
Project/Site: Karn/Weadock CCR JCW Landfill

Qualifiers

Rad

Qualifier	Qualifier Description
G	The Sample MDC is greater than the requested RL.
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: 240-174527-1

Laboratory: Eurofins Canton

Narrative

Job Narrative
240-174527-1

Receipt
The samples were received on 10/12/2022 10:20 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 2.7°C, 3.2°C and 4.6°C

Revision
The report being provided is a revision of the original report sent on 11/11/2022. The report (revision 1) is being revised due to: The sample dates were corrected for JCM-MW-18005, JCM-MW-18006, MW-50 and DUP-01..

Gas Flow Proportional Counter
Method 903.0: Radium-226 batch 586589Any 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 DateJCW-MW-18001 (240-174527-1), EB-01 (240-174527-15), DUP-02 (240-174527-16), (LCS 160-586589/2-A), (MB 160-586589/1-A) and (240-174527-B-15-A DU)

Method 903.0: Radium-226 batch 586581Any 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-18004 (240-174527-2), JCW-MW-18005 (240-174527-3), JCW-MW-18006 (240-174527-4), MW-50 (240-174527-5), MW-51 (240-174527-6), MW-52 (240-174527-7), MW-53 (240-174527-8), MW-53R (240-174527-9), MW-54R (240-174527-10), MW-55 (240-174527-11), OW-57ROUT (240-174527-12), MW-58 (240-174527-13), DUP-01 (240-174527-14), (LCS 160-586581/2-A), (MB 160-586581/1-A), (240-174332-A-1-A) and (240-174332-B-1-A DU)

Method 904.0: Radium-228 batch 586588The detection goal was not met for the following sample(s). Samples were prepped at a reduced volume due to the presence of matrix interferences: MW-51 (240-174527-6) and MW-58 (240-174527-13). Analytical results are reported with the detection limit achieved.

Method 904.0: Radium-228 batch 586588Any 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 DateJCW-MW-18004 (240-174527-2), JCW-MW-18005 (240-174527-3), JCW-MW-18006 (240-174527-4), MW-50 (240-174527-5), MW-51 (240-174527-6), MW-52 (240-174527-7), MW-53 (240-174527-8), MW-53R (240-174527-9), MW-54R (240-174527-10), MW-55 (240-174527-11), OW-57ROUT (240-174527-12), MW-58 (240-174527-13), DUP-01 (240-174527-14), (LCS 160-586588/2-A), (MB 160-586588/1-A), (240-174332-A-1-B) and (240-174332-B-1-B DU)

Method 904.0: Radium-228 Batch 586590Any 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 (240-174527-1), EB-01 (240-174527-15), DUP-02 (240-174527-16), (LCS 160-586590/2-A), (MB 160-586590/1-A) and (240-174527-B-15-B DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Rad
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Method Summary

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-174527-1

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	EET SL
904.0	Radium-228 (GFPC)	EPA	EET SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	EET SL
PrecSep STD	Preparation, Precipitate Separation (Standard In-Growth)	None	EET SL
PrecSep_0	Preparation, Precipitate Separation	None	EET SL

Protocol References:

EPA = US Environmental Protection Agency

None = None

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: TRC Environmental Corporation.
Job ID: 240-174527-1
Project/Site: Karn/Weadock CCR JCW Landfill

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-174527-1	JCW-MW-18001	Water	10/10/22 06:00	10/12/22 10:20
240-174527-2	JCW-MW-18004	Water	10/10/22 13:03	10/12/22 10:20
240-174527-3	JCW-MW-18005	Water	10/11/22 05:40	10/12/22 10:20
240-174527-4	JCW-MW-18006	Water	10/11/22 07:48	10/12/22 10:20
240-174527-5	MW-50	Water	10/10/22 07:25	10/12/22 10:20
240-174527-6	MW-51	Water	10/10/22 08:30	10/12/22 10:20
240-174527-7	MW-52	Water	10/10/22 09:14	10/12/22 10:20
240-174527-8	MW-53	Water	10/10/22 10:14	10/12/22 10:20
240-174527-9	MW-53R	Water	10/10/22 11:27	10/12/22 10:20
240-174527-10	MW-54R	Water	10/10/22 12:13	10/12/22 10:20
240-174527-11	MW-55	Water	10/10/22 14:01	10/12/22 10:20
240-174527-12	OW-57ROUT	Water	10/11/22 06:37	10/12/22 10:20
240-174527-13	MW-58	Water	10/11/22 09:00	10/12/22 10:20
240-174527-14	DUP-01	Water	10/10/22 00:00	10/12/22 10:20
240-174527-15	EB-01	Water	10/11/22 09:55	10/12/22 10:20
240-174527-16	DUP-02	Water	10/11/22 00:00	10/12/22 10:20

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-174527-1

Client Sample ID: JCW-MW-18001

Date Collected: 10/10/22 06:00
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-1

Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0416	U	0.0794	0.0795	1.00	0.142	pCi/L	10/19/22 15:13	11/10/22 13:47	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*107*		*40 - 110*	*10/19/22 15:13*	*11/10/22 13:47*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.852**		0.345	0.354	1.00	0.443	pCi/L	10/19/22 15:18	11/07/22 15:16	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*107*		*40 - 110*	*10/19/22 15:18*	*11/07/22 15:16*	*1*
Y Carrier	*87.1*		*40 - 110*	*10/19/22 15:18*	*11/07/22 15:16*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.893**		0.354	0.363	5.00	0.443	pCi/L		11/11/22 17:05	1

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-174527-1

Client Sample ID: JCW-MW-18004

Date Collected: 10/10/22 13:03
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-2

Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.128	U	0.0963	0.0970	1.00	0.135	pCi/L	10/19/22 14:28	11/11/22 09:53	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*69.9*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:53*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.526	U	0.469	0.471	1.00	0.742	pCi/L	10/19/22 15:04	11/04/22 13:51	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*69.9*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:51*	*1*
Y Carrier	*88.2*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:51*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.654	U	0.479	0.481	5.00	0.742	pCi/L		11/11/22 16:43	1

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-174527-1

Client Sample ID: JCW-MW-18005

Date Collected: 10/11/22 05:40
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-3

Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.193		0.118	0.119	1.00	0.153	pCi/L	10/19/22 14:28	11/11/22 09:53	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*63.7*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:53*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.268	U	0.466	0.467	1.00	0.800	pCi/L	10/19/22 15:04	11/04/22 13:51	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*63.7*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:51*	*1*
Y Carrier	*85.2*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:51*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.462	U	0.481	0.482	5.00	0.800	pCi/L		11/11/22 16:43	1

Client Sample ID: JCW-MW-18006
Lab Sample ID: 240-174527-4

Date Collected: 10/11/22 07:48
Matrix: Water

Date Received: 10/12/22 10:20

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.516**		0.151	0.158	1.00	0.122	pCi/L	10/19/22 14:28	11/11/22 09:53	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*76.5*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:53*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.484	U	0.393	0.396	1.00	0.609	pCi/L	10/19/22 15:04	11/04/22 13:51	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*76.5*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:51*	*1*
Y Carrier	*89.3*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:51*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.999**		0.421	0.426	5.00	0.609	pCi/L		11/11/22 16:43	1

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-174527-1

Client Sample ID: MW-50

Date Collected: 10/10/22 07:25
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-5

Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.158		0.110	0.111	1.00	0.153	pCi/L	10/19/22 14:28	11/11/22 09:53	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*67.6*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:53*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.14		0.514	0.525	1.00	0.670	pCi/L	10/19/22 15:04	11/04/22 13:51	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*67.6*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:51*	*1*
Y Carrier	*84.1*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:51*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.30		0.526	0.537	5.00	0.670	pCi/L		11/11/22 16:43	1

Client Sample ID: MW-51 — Lab Sample ID: 240-174527-6

Date Collected: 10/10/22 08:30 — **Matrix: Water**
Date Received: 10/12/22 10:20

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.319	U	0.261	0.262	1.00	0.397	pCi/L	10/19/22 14:28	11/11/22 09:53	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*45.8*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:53*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**2.19**	**G**	1.06	1.07	1.00	1.46	pCi/L	10/19/22 15:04	11/04/22 13:51	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*45.8*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:51*	*1*
Y Carrier	*87.9*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:51*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**2.51**		1.09	1.10	5.00	1.46	pCi/L		11/11/22 16:43	1

Client Sample ID: MW-52

Date Collected: 10/10/22 09:14
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-7

Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.205**		0.109	0.111	1.00	0.138	pCi/L	10/19/22 14:28	11/11/22 09:53	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*76.7*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:53*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.600	U	0.451	0.455	1.00	0.694	pCi/L	10/19/22 15:04	11/04/22 13:51	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*76.7*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:51*	*1*
Y Carrier	*87.1*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:51*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.805**		0.464	0.468	5.00	0.694	pCi/L		11/11/22 16:43	1

Client Sample ID: MW-53 — Lab Sample ID: 240-174527-8

Date Collected: 10/10/22 10:14 — **Matrix: Water**
Date Received: 10/12/22 10:20

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.269		0.128	0.130	1.00	0.154	pCi/L	10/19/22 14:28	11/11/22 09:53	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.2*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:53*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.15		0.459	0.471	1.00	0.585	pCi/L	10/19/22 15:04	11/04/22 13:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.2*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:52*	*1*
Y Carrier	*90.5*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:52*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.42		0.477	0.489	5.00	0.585	pCi/L		11/11/22 16:43	1

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-174527-1

Client Sample ID: MW-53R

Date Collected: 10/10/22 11:27
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-9

Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.239		0.119	0.121	1.00	0.140	pCi/L	10/19/22 14:28	11/11/22 09:46	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*68.4*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:46*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.967		0.483	0.491	1.00	0.653	pCi/L	10/19/22 15:04	11/04/22 13:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*68.4*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:52*	*1*
Y Carrier	*89.7*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:52*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.21		0.497	0.506	5.00	0.653	pCi/L		11/11/22 16:43	1

Client Sample ID: MW-54R
Date Collected: 10/10/22 12:13
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-10
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.208		0.125	0.126	1.00	0.170	pCi/L	10/19/22 14:28	11/11/22 09:46	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*70.1*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:46*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.31		0.672	0.682	1.00	0.976	pCi/L	10/19/22 15:04	11/04/22 13:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*70.1*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:52*	*1*
Y Carrier	*81.5*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:52*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.52		0.684	0.694	5.00	0.976	pCi/L		11/11/22 16:43	1

Client Sample ID: MW-55 — Lab Sample ID: 240-174527-11

Date Collected: 10/10/22 14:01 — **Matrix: Water**
Date Received: 10/12/22 10:20

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.365		0.154	0.157	1.00	0.158	pCi/L	10/19/22 14:28	11/11/22 09:48	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*74.0*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:48*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.966		0.588	0.595	1.00	0.850	pCi/L	10/19/22 15:04	11/04/22 13:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*74.0*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:52*	*1*
Y Carrier	*86.7*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:52*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.33		0.608	0.615	5.00	0.850	pCi/L		11/11/22 16:43	1

Client Sample ID: OW-57ROUT
Date Collected: 10/11/22 06:37
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-12
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.199**		0.0954	0.0970	1.00	0.102	pCi/L	10/19/22 14:28	11/11/22 09:48	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.9*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:48*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.672	U	0.466	0.470	1.00	0.711	pCi/L	10/19/22 15:04	11/04/22 13:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.9*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:52*	*1*
Y Carrier	*88.2*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:52*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.870**		0.476	0.480	5.00	0.711	pCi/L		11/11/22 16:43	1

Client Sample ID: MW-58 — Lab Sample ID: 240-174527-13

Date Collected: 10/11/22 09:00 — **Matrix: Water**
Date Received: 10/12/22 10:20

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	**0.543**		0.222	0.227	1.00	0.234	pCi/L	10/19/22 14:28	11/11/22 09:48	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*53.2*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:48*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.606	U G	0.689	0.691	1.00	1.13	pCi/L	10/19/22 15:04	11/04/22 13:52	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*53.2*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:52*	*1*
Y Carrier	*92.7*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:52*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**1.15**		0.724	0.727	5.00	1.13	pCi/L		11/11/22 16:43	1

Client Sample ID: DUP-01
Date Collected: 10/10/22 00:00
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-14
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.343		0.170	0.173	1.00	0.222	pCi/L	10/19/22 14:28	11/11/22 09:47	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*59.1*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:47*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	1.37		0.629	0.642	1.00	0.843	pCi/L	10/19/22 15:04	11/04/22 13:53	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*59.1*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:53*	*1*
Y Carrier	*84.5*		*40 - 110*	*10/19/22 15:04*	*11/04/22 13:53*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.72		0.652	0.665	5.00	0.843	pCi/L		11/11/22 16:43	1

Client Sample ID: EB-01 — Lab Sample ID: 240-174527-15

Date Collected: 10/11/22 09:55 — **Matrix: Water**
Date Received: 10/12/22 10:20

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.00226	U	0.0671	0.0671	1.00	0.145	pCi/L	10/19/22 15:13	11/10/22 11:20	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.6*		*40 - 110*	*10/19/22 15:13*	*11/10/22 11:20*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**0.902**		0.413	0.421	1.00	0.565	pCi/L	10/19/22 15:18	11/07/22 15:15	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*95.6*		*40 - 110*	*10/19/22 15:18*	*11/07/22 15:15*	*1*
Y Carrier	*84.9*		*40 - 110*	*10/19/22 15:18*	*11/07/22 15:15*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	**0.899**		0.418	0.426	5.00	0.565	pCi/L		11/11/22 17:06	1

Client Sample ID: DUP-02
Date Collected: 10/11/22 00:00
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-16
Matrix: Water

Method: EPA 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.259		0.148	0.149	1.00	0.202	pCi/L	10/19/22 15:13	11/10/22 13:46	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*100*		*40 - 110*	*10/19/22 15:13*	*11/10/22 13:46*	*1*

Method: EPA 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.869		0.394	0.402	1.00	0.541	pCi/L	10/19/22 15:18	11/07/22 15:16	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*100*		*40 - 110*	*10/19/22 15:18*	*11/07/22 15:16*	*1*
Y Carrier	*86.7*		*40 - 110*	*10/19/22 15:18*	*11/07/22 15:16*	*1*

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	1.13		0.421	0.429	5.00	0.541	pCi/L		11/11/22 17:07	1

Tracer/Carrier Summary

Client: TRC Environmental Corporation.
Job ID: 240-174527-1
Project/Site: Karn/Weadock CCR JCW Landfill

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
		Ba
Lab Sample ID	Client Sample ID	(40-110)
240-174527-1	JCW-MW-18001	107
240-174527-2	JCW-MW-18004	69.9
240-174527-3	JCW-MW-18005	63.7
240-174527-4	JCW-MW-18006	76.5
240-174527-5	MW-50	67.6
240-174527-6	MW-51	45.8
240-174527-7	MW-52	76.7
240-174527-8	MW-53	79.2
240-174527-9	MW-53R	68.4
240-174527-10	MW-54R	70.1
240-174527-11	MW-55	74.0
240-174527-12	OW-57ROUT	79.9
240-174527-13	MW-58	53.2
240-174527-14	DUP-01	59.1
240-174527-15	EB-01	95.6
240-174527-15 DU	EB-01	100
240-174527-16	DUP-02	100
LCS 160-586581/2-A	Lab Control Sample	85.8
LCS 160-586589/2-A	Lab Control Sample	94.1
MB 160-586581/1-A	Method Blank	79.9
MB 160-586589/1-A	Method Blank	87.5

Tracer/Carrier Legend

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)	
		Ba	Y
Lab Sample ID	Client Sample ID	(40-110)	(40-110)
240-174527-1	JCW-MW-18001	107	87.1
240-174527-2	JCW-MW-18004	69.9	88.2
240-174527-3	JCW-MW-18005	63.7	85.2
240-174527-4	JCW-MW-18006	76.5	89.3
240-174527-5	MW-50	67.6	84.1
240-174527-6	MW-51	45.8	87.9
240-174527-7	MW-52	76.7	87.1
240-174527-8	MW-53	79.2	90.5
240-174527-9	MW-53R	68.4	89.7
240-174527-10	MW-54R	70.1	81.5
240-174527-11	MW-55	74.0	86.7
240-174527-12	OW-57ROUT	79.9	88.2
240-174527-13	MW-58	53.2	92.7
240-174527-14	DUP-01	59.1	84.5
240-174527-15	EB-01	95.6	84.9
240-174527-15 DU	EB-01	100	86.4
240-174527-16	DUP-02	100	86.7
LCS 160-586588/2-A	Lab Control Sample	85.8	88.6
LCS 160-586590/2-A	Lab Control Sample	94.1	84.1

Tracer/Carrier Summary

Client: TRC Environmental Corporation. Job ID: 240-174527-1
Project/Site: Karn/Weadock CCR JCW Landfill

Method: 904.0 - Radium-228 (GFPC) (Continued)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)									
Lab Sample ID	Client Sample ID	Ba (40-110)	Y (40-110)								
MB 160-586588/1-A	Method Blank	79.9	77.0								
MB 160-586590/1-A	Method Blank	87.5	86.4								

Tracer/Carrier Legend

Ba = Ba Carrier
Y = Y Carrier

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: MB 160-586581/1-A
Matrix: Water
Analysis Batch: 589758

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 586581

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.005428	U	0.0568	0.0568	1.00	0.118	pCi/L	10/19/22 14:28	11/11/22 09:51	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*79.9*		*40 - 110*	*10/19/22 14:28*	*11/11/22 09:51*	*1*

Lab Sample ID: LCS 160-586581/2-A
Matrix: Water
Analysis Batch: 589758

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 586581

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	9.891		1.07	1.00	0.134	pCi/L	87	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*85.8*		*40 - 110*

Lab Sample ID: MB 160-586589/1-A
Matrix: Water
Analysis Batch: 589594

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 586589

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.04133	U	0.0872	0.0873	1.00	0.159	pCi/L	10/19/22 15:13	11/10/22 11:20	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*87.5*		*40 - 110*	*10/19/22 15:13*	*11/10/22 11:20*	*1*

Lab Sample ID: LCS 160-586589/2-A
Matrix: Water
Analysis Batch: 589594

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 586589

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	10.19		1.15	1.00	0.174	pCi/L	90	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*94.1*		*40 - 110*

Lab Sample ID: 240-174527-15 DU
Matrix: Water
Analysis Batch: 589594

Client Sample ID: EB-01
Prep Type: Total/NA
Prep Batch: 586589

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-226	-0.00226	U		-0.00314 1	U	0.0539	1.00	0.122	pCi/L			0.01	1

Method: 903.0 - Radium-226 (GFPC) (Continued)

Lab Sample ID: 240-174527-15 DU — **Client Sample ID: EB-01**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 589594 — **Prep Batch: 586589**

Carrier	DU %Yield	DU Qualifier	Limits
Ba Carrier	100		40 - 110

Method: 904.0 - Radium-228 (GFPC)

Lab Sample ID: MB 160-586588/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 588685 — **Prep Batch: 586588**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.2209	U	0.372	0.373	1.00	0.640	pCi/L	10/19/22 15:04	11/04/22 13:44	1

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	79.9		40 - 110	10/19/22 15:04	11/04/22 13:44	1
Y Carrier	77.0		40 - 110	10/19/22 15:04	11/04/22 13:44	1

Lab Sample ID: LCS 160-586588/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 588685 — **Prep Batch: 586588**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Radium-228	8.47	9.405		1.31	1.00	0.553	pCi/L	111	75 - 125

Carrier	LCS %Yield	LCS Qualifier	Limits
Ba Carrier	85.8		40 - 110
Y Carrier	88.6		40 - 110

Lab Sample ID: MB 160-586590/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 589090 — **Prep Batch: 586590**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.2275	U	0.338	0.338	1.00	0.571	pCi/L	10/19/22 15:18	11/07/22 15:15	1

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Ba Carrier	87.5		40 - 110	10/19/22 15:18	11/07/22 15:15	1
Y Carrier	86.4		40 - 110	10/19/22 15:18	11/07/22 15:15	1

Lab Sample ID: LCS 160-586590/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 589090 — **Prep Batch: 586590**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Radium-228	8.47	9.532		1.32	1.00	0.639	pCi/L	113	75 - 125

Method: 904.0 - Radium-228 (GFPC) (Continued)

Lab Sample ID: LCS 160-586590/2-A
Matrix: Water
Analysis Batch: 589090

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 586590

Carrier	LCS %Yield	LCS Qualifier	Limits
Ba Carrier	94.1		40 - 110
Y Carrier	84.1		40 - 110

Lab Sample ID: 240-174527-15 DU
Matrix: Water
Analysis Batch: 589090

Client Sample ID: EB-01
Prep Type: Total/NA
Prep Batch: 586590

Analyte	Sample Result	Sample Qual		DU Result	DU Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit			RER	RER Limit
Radium-228	0.902			1.117		0.399	1.00	0.456	pCi/L			0.26	1

Carrier	DU %Yield	DU Qualifier	Limits
Ba Carrier	100		40 - 110
Y Carrier	86.4		40 - 110

Rad

Prep Batch: 586581

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-174527-2	JCW-MW-18004	Total/NA	Water	PrecSep STD	
240-174527-3	JCW-MW-18005	Total/NA	Water	PrecSep STD	
240-174527-4	JCW-MW-18006	Total/NA	Water	PrecSep STD	
240-174527-5	MW-50	Total/NA	Water	PrecSep STD	
240-174527-6	MW-51	Total/NA	Water	PrecSep STD	
240-174527-7	MW-52	Total/NA	Water	PrecSep STD	
240-174527-8	MW-53	Total/NA	Water	PrecSep STD	
240-174527-9	MW-53R	Total/NA	Water	PrecSep STD	
240-174527-10	MW-54R	Total/NA	Water	PrecSep STD	
240-174527-11	MW-55	Total/NA	Water	PrecSep STD	
240-174527-12	OW-57ROUT	Total/NA	Water	PrecSep STD	
240-174527-13	MW-58	Total/NA	Water	PrecSep STD	
240-174527-14	DUP-01	Total/NA	Water	PrecSep STD	
MB 160-586581/1-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-586581/2-A	Lab Control Sample	Total/NA	Water	PrecSep STD	

Prep Batch: 586588

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-174527-2	JCW-MW-18004	Total/NA	Water	PrecSep_0	
240-174527-3	JCW-MW-18005	Total/NA	Water	PrecSep_0	
240-174527-4	JCW-MW-18006	Total/NA	Water	PrecSep_0	
240-174527-5	MW-50	Total/NA	Water	PrecSep_0	
240-174527-6	MW-51	Total/NA	Water	PrecSep_0	
240-174527-7	MW-52	Total/NA	Water	PrecSep_0	
240-174527-8	MW-53	Total/NA	Water	PrecSep_0	
240-174527-9	MW-53R	Total/NA	Water	PrecSep_0	
240-174527-10	MW-54R	Total/NA	Water	PrecSep_0	
240-174527-11	MW-55	Total/NA	Water	PrecSep_0	
240-174527-12	OW-57ROUT	Total/NA	Water	PrecSep_0	
240-174527-13	MW-58	Total/NA	Water	PrecSep_0	
240-174527-14	DUP-01	Total/NA	Water	PrecSep_0	
MB 160-586588/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-586588/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Prep Batch: 586589

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-174527-1	JCW-MW-18001	Total/NA	Water	PrecSep STD	
240-174527-15	EB-01	Total/NA	Water	PrecSep STD	
240-174527-16	DUP-02	Total/NA	Water	PrecSep STD	
MB 160-586589/1-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-586589/2-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
240-174527-15 DU	EB-01	Total/NA	Water	PrecSep STD	

Prep Batch: 586590

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-174527-1	JCW-MW-18001	Total/NA	Water	PrecSep_0	
240-174527-15	EB-01	Total/NA	Water	PrecSep_0	
240-174527-16	DUP-02	Total/NA	Water	PrecSep_0	
MB 160-586590/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-586590/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
240-174527-15 DU	EB-01	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-174527-1

Client Sample ID: JCW-MW-18001

Lab Sample ID: 240-174527-1

Date Collected: 10/10/22 06:00

Matrix: Water

Date Received: 10/12/22 10:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586589	ZR	EET SL	10/19/22 15:13
Total/NA	Analysis	903.0		1	589594	FLC	EET SL	11/10/22 13:47
Total/NA	Prep	PrecSep_0			586590	ZR	EET SL	10/19/22 15:18
Total/NA	Analysis	904.0		1	589090	FLC	EET SL	11/07/22 15:16
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 17:05

Client Sample ID: JCW-MW-18004

Lab Sample ID: 240-174527-2

Date Collected: 10/10/22 13:03

Matrix: Water

Date Received: 10/12/22 10:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589758	FLC	EET SL	11/11/22 09:53
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:51
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Client Sample ID: JCW-MW-18005

Lab Sample ID: 240-174527-3

Date Collected: 10/11/22 05:40

Matrix: Water

Date Received: 10/12/22 10:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589758	FLC	EET SL	11/11/22 09:53
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:51
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Client Sample ID: JCW-MW-18006

Lab Sample ID: 240-174527-4

Date Collected: 10/11/22 07:48

Matrix: Water

Date Received: 10/12/22 10:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589758	FLC	EET SL	11/11/22 09:53
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:51
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Lab Chronicle

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-174527-1

Client Sample ID: MW-50

Lab Sample ID: 240-174527-5
Date Collected: 10/10/22 07:25
Matrix: Water
Date Received: 10/12/22 10:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589758	FLC	EET SL	11/11/22 09:53
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:51
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Client Sample ID: MW-51

Lab Sample ID: 240-174527-6
Date Collected: 10/10/22 08:30
Matrix: Water
Date Received: 10/12/22 10:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589758	FLC	EET SL	11/11/22 09:53
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:51
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Client Sample ID: MW-52

Lab Sample ID: 240-174527-7
Date Collected: 10/10/22 09:14
Matrix: Water
Date Received: 10/12/22 10:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589758	FLC	EET SL	11/11/22 09:53
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:51
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Client Sample ID: MW-53

Lab Sample ID: 240-174527-8
Date Collected: 10/10/22 10:14
Matrix: Water
Date Received: 10/12/22 10:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589758	FLC	EET SL	11/11/22 09:53
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:52
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Lab Chronicle

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-174527-1

Client Sample ID: MW-53R
Date Collected: 10/10/22 11:27
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-9
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589658	FLC	EET SL	11/11/22 09:46
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:52
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Client Sample ID: MW-54R
Date Collected: 10/10/22 12:13
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-10
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589658	FLC	EET SL	11/11/22 09:46
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:52
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Client Sample ID: MW-55
Date Collected: 10/10/22 14:01
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-11
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589658	FLC	EET SL	11/11/22 09:48
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:52
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Client Sample ID: OW-57ROUT
Date Collected: 10/11/22 06:37
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-12
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589658	FLC	EET SL	11/11/22 09:48
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:52
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Lab Chronicle

Client: TRC Environmental Corporation.
Project/Site: Karn/Weadock CCR JCW Landfill

Job ID: 240-174527-1

Client Sample ID: MW-58
Date Collected: 10/11/22 09:00
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-13
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589658	FLC	EET SL	11/11/22 09:48
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:52
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Client Sample ID: DUP-01
Date Collected: 10/10/22 00:00
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-14
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586581	ZR	EET SL	10/19/22 14:28
Total/NA	Analysis	903.0		1	589658	FLC	EET SL	11/11/22 09:47
Total/NA	Prep	PrecSep_0			586588	ZR	EET SL	10/19/22 15:04
Total/NA	Analysis	904.0		1	588708	FLC	EET SL	11/04/22 13:53
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 16:43

Client Sample ID: EB-01
Date Collected: 10/11/22 09:55
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-15
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586589	ZR	EET SL	10/19/22 15:13
Total/NA	Analysis	903.0		1	589594	FLC	EET SL	11/10/22 11:20
Total/NA	Prep	PrecSep_0			586590	ZR	EET SL	10/19/22 15:18
Total/NA	Analysis	904.0		1	589090	FLC	EET SL	11/07/22 15:15
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 17:06

Client Sample ID: DUP-02
Date Collected: 10/11/22 00:00
Date Received: 10/12/22 10:20

Lab Sample ID: 240-174527-16
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Prep	PrecSep STD			586589	ZR	EET SL	10/19/22 15:13
Total/NA	Analysis	903.0		1	589594	FLC	EET SL	11/10/22 13:46
Total/NA	Prep	PrecSep_0			586590	ZR	EET SL	10/19/22 15:18
Total/NA	Analysis	904.0		1	589090	FLC	EET SL	11/07/22 15:16
Total/NA	Analysis	Ra226_Ra228		1	589771	MLK	EET SL	11/11/22 17:07

Laboratory References:
EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Accreditation/Certification Summary

Client: TRC Environmental Corporation. Job ID: 240-174527-1
Project/Site: Karn/Weadock CCR JCW Landfill

Laboratory: Eurofins St. Louis

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	Identification Number	Expiration Date
Alaska (UST)	State	20-001	05-06-25
ANAB	Dept. of Defense ELAP	L2305	04-06-25
ANAB	Dept. of Energy	L2305.01	04-06-25
ANAB	ISO/IEC 17025	L2305	04-06-25
Arizona	State	AZ0813	12-08-22
California	Los Angeles County Sanitation Districts	10259	06-30-22 *
California	State	2886	06-30-23
Connecticut	State	PH-0241	03-31-23
Florida	NELAP	E87689	06-30-23
HI - RadChem Recognition	State	n/a	06-30-23
Illinois	NELAP	200023	11-30-23
Iowa	State	373	12-01-22
Kansas	NELAP	E-10236	10-31-23
Kentucky (DW)	State	KY90125	12-31-22
Kentucky (WW)	State	KY90125 (Permit KY0004049)	12-31-22
Louisiana (All)	NELAP	04080	06-30-23
Louisiana (DW)	State	LA011	12-31-22
Maryland	State	310	09-30-23
MI - RadChem Recognition	State	9005	06-30-23
Missouri	State	780	06-30-25
Nevada	State	MO000542020-1	07-31-23
New Jersey	NELAP	MO002	06-30-23
New York	NELAP	11616	04-01-23
North Dakota	State	R-207	06-30-23
NRC	NRC	24-24817-01	12-31-22
Oklahoma	NELAP	9997	08-31-23
Oregon	NELAP	4157	09-01-23
Pennsylvania	NELAP	68-00540	02-28-23
South Carolina	State	85002001	06-30-23
Texas	NELAP	T104704193	07-31-23
US Fish & Wildlife	US Federal Programs	058448	07-31-23
USDA	US Federal Programs	P330-17-00028	03-11-23
Utah	NELAP	MO000542021-14	07-31-23
Virginia	NELAP	10310	06-14-24
Washington	State	C592	08-30-23
West Virginia DEP	State	381	12-31-22

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

4-6/46 3-2/3-2 2-7/27

urofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Phone (330) 497-9396 Phone (330) 497-0772

MICHIGAN 190

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: 240-99539-29048.1
Client Contact: Jacob Krenz	Phone: 734 904 3316	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin:	Page: Page of
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 #: 178828			
Email: JKrenz@trccompanies.com	WO #:			
Project Name: Karn/Weadock CCR JCW Lanfill	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
Y - Trizma
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:				D	D		
JCW-MW-18001	10/10/22	0666	G	Water	N	N	+	+	2	
JCW-MW-18004	10/10/22	1303	G	Water	N	N	+	+	2	
JCW-MW-18005	10/11/22	0346	G	Water	N	N	+	+	2	
JCW-MW-18006	10/11/22	0748	G	Water	N	N	+	+	2	
MW-50	10/10/22	0735	G	Water	N	N	+	+	2	
MW-51	10/10/22	0820	G	Water	N	N	+	+	2	
MW-52	10/10/22	0914	G	Water	N	N	+	+	2	
MW-53	10/10/22	1014	G	Water	N	N	+	+	2	
MW-53R	10/10/22	1127	G	Water	N	N	+	+	2	
MW-54R	10/10/22	1218	G	Water	N	N	+	+	2	
MW-55	10/10/22	1401	G	Water	N	N	+	+	2	

240-174527 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]	10/11/22 1107	TRC	[signature]	10/11/22 ~~10:7~~ 1107	EETA
[signature]	10/11/22 1107	EETA	[signature]	10-12-22 10:20	CEMC

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Phone (330) 497-9396 Phone (330) 497-0772

MICHIGAN 190

Chain of Custody Record

MICHIGAN 190

eurofins | Environment Testing America

Client Information	Sampler: JAVIER JHSS	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-99539-29048.2
Client Contact: Jacob Krenz	Phone: 734 904 3310	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin:	Page: Page of
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 #: 178828			
Email: JKrenz@trccompanies.com	WO #:			
Project Name: Karn/Weadock CCR JCW Lanfill	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
Y - Trizma
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-57ROUT	10/11/22	0637	G	Water	N	N	+	+	2	
MW-58	10/11/22	0900	G	Water	N	N	+	+	2	
DUP-01	10/11/22	—	G	Water	N	N	+	+	2	
EB-01	10/11/22	0917	G	Water	N	N	+	+	2	
Dup #03	10/11/22	—	G	Water	N	N	+	+	2	

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]	10/11/22 1107	TRC	[signature]	10/11/22 1107	EETA
[signature]	10/11/22 1107	EETA	[signature]	10-12-22 10:20	[illegible]

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

174521

Eurofins - Canton Sample Receipt Form/Narrative **Login # :** _____
Barberton Facility

Client TRC Site Name _____ Cooler unpacked by: Manoloy

Cooler Received on 10-12-22 Opened on 10-12-22

FedEx: 1st Grd Exp UPS FAS Clipper Client Drop Off Eurofins Courier Other _____

Receipt After-hours: Drop-off Date/Time _____ Storage Location _____

Eurofins Cooler # emc 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-13 (CF +0.7 °C) Observed Cooler Temp._____°C Corrected Cooler Temp._____°C
   IR GUN #IR-15 (CF 0.0°C) Observed Cooler Temp._____°C Corrected Cooler Temp._____°C

2. Were tamper/custody seals on the outside of the cooler(s)? If Yes Quantity_____	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# **HC286797**
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 - 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-13 **IR-15**	46	46	**Wet Ice** Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 **IR-15**	32	32	**Wet Ice** Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 **IR-15**	2.7	27	**Wet Ice** Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 IR-15			Wet Ice Blue Ice Dry Ice Water None
TA Client Box Other	IR-13 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)	Preservative Lot #
JCW-MW-18001	240-174527-A-1	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18001	240-174527-B-1	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18004	240-174527-A-2	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18004	240-174527-B-2	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18005	240-174527-A-3	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18005	240-174527-B-3	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18006	240-174527-A-4	Plastic 1 liter - Nitric Acid	<2			
JCW-MW-18006	240-174527-B-4	Plastic 1 liter - Nitric Acid	<2			
MW-50	240-174527-A-5	Plastic 1 liter - Nitric Acid	<2			
MW-50	240-174527-B-5	Plastic 1 liter - Nitric Acid	<2			
MW-51	240-174527-A-6	Plastic 1 liter - Nitric Acid	<2			
MW-51	240-174527-B-6	Plastic 1 liter - Nitric Acid	<2			
MW-52	240-174527-A-7	Plastic 1 liter - Nitric Acid	<2			
MW-52	240-174527-B-7	Plastic 1 liter - Nitric Acid	<2			
MW-53	240-174527-A-8	Plastic 1 liter - Nitric Acid	<2			
MW-53	240-174527-B-8	Plastic 1 liter - Nitric Acid	<2			
MW-53R	240-174527-A-9	Plastic 1 liter - Nitric Acid	<2			
MW-53R	240-174527-B-9	Plastic 1 liter - Nitric Acid	<2			
MW-54R	240-174527-A-10	Plastic 1 liter - Nitric Acid	<2			
MW-54R	240-174527-B-10	Plastic 1 liter - Nitric Acid	<2			
MW-55	240-174527-A-11	Plastic 1 liter - Nitric Acid	<2			
MW-55	240-174527-B-11	Plastic 1 liter - Nitric Acid	<2			
OW-57ROUT	240-174527-A-12	Plastic 1 liter - Nitric Acid	<2			
OW-57ROUT	240-174527-B-12	Plastic 1 liter - Nitric Acid	<2			
MW-58	240-174527-A-13	Plastic 1 liter - Nitric Acid	<2			
MW-58	240-174527-B-13	Plastic 1 liter - Nitric Acid	<2			
DUP-01	240-174527-A-14	Plastic 1 liter - Nitric Acid	<2			
DUP-01	240-174527-B-14	Plastic 1 liter - Nitric Acid	<2			
EB-01	240-174527-A-15	Plastic 1 liter - Nitric Acid	<2			
EB-01	240-174527-B-15	Plastic 1 liter - Nitric Acid	<2			
DUP#2	240-174527-A-16	Plastic 1 liter - Nitric Acid	<2			
DUP#2	240-174527-B-16	Plastic 1 liter - Nitric Acid	<2			

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
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: 240-158618.1
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: Michigan	Page: Page 1 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-174527-1
Address: 13715 Rider Trail North, .	Due Date Requested: 11/10/2022			
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, Y - Trizma, 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 (240-174527-1)	10/10/22	06:00 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-18004 (240-174527-2)	10/10/22	13:03 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-18005 (240-174527-3)	10/10/22	05:40 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
JCW-MW-18006 (240-174527-4)	10/10/22	07:48 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-50 (240-174527-5)	10/10/22	07:25 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-51 (240-174527-6)	10/10/22	08:30 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-52 (240-174527-7)	10/10/22	09:14 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-53 (240-174527-8)	10/10/22	10:14 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-53R (240-174527-9)	10/10/22	11:27 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte & accreditation compliance upon 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 Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing North Central, LLC.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:
Relinquished by:	Date/Time: 10-12-22 15:10	Company EENX	Received by: FED EX
Relinquished by: FED EX	Date/Time:	Company	Received by:
Relinquished by:	Date/Time:	Company	Received by: Autumn R. Johnson

Date/Time:	Company
Date/Time: OCT 13 2022 0900	Company FEDEX
Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks:

11/23/2022 (Rev. 1)

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
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: 240-158618.2
Client Contact: Shipping/Receiving	Phone:	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin: Michigan	Page: Page 2 of 2
Company: TestAmerica Laboratories, Inc.		Accreditations Required (See note):		Job #: 240-174527-1
Address: 13715 Rider Trail North, ,	Due Date Requested: 11/10/2022			
City: Earth City	TAT Requested (days):			
State, Zip: MO, 63045				
Phone: 314-298-8566(Tel) 314-298-8757(Fax)	PO #:			
Email:	WO #:			
Project Name: Kam/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, Y - Trizma, 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 (240-174527-10)	10/10/22	12:13 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-55 (240-174527-11)	10/10/22	14:01 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
OW-57ROUT (240-174527-12)	10/11/22	06:37 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
MW-58 (240-174527-13)	10/11/22	09:00 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP-01 (240-174527-14)	10/11/22	Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
EB-01 (240-174527-15)	10/11/22	09:55 Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.
DUP#2 (240-174527-16)	10/11/22	Eastern		Water			X	X	X	2	TVA protocol - Ra-226+228 action limit at 5.0 pCi/L.

Note: Since laboratory accreditations are subject to change, Eurofins Environment Testing North Central, LLC places the ownership of method, analyte & accreditation compliance upon 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 Environment Testing North Central, LLC laboratory or other instructions will be provided. Any changes to accreditation status should be brought to Eurofins Environment Testing North Central, LLC attention immediately. If all requested accreditations are current to date, return the signed Chain of Custody attesting to said complicance to Eurofins Environment Testing North Central, LLC.

Possible Hazard Identification	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Unconfirmed	☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months
Deliverable Requested: I, II, III, IV, Other (specify) Primary Deliverable Rank: 2	Special Instructions/QC Requirements:

Empty Kit Relinquished by:		Date:	Time:		Method of Shipment:		
Relinquished by: FED EX	Date/Time: 10-12-22 1510	Company EETNC	Received by: FED EX	Date/Time:	Company		
Relinquished by:	Date/Time:	Company	Received by:	Date/Time: OCT 13 2022 09:00	Company EASTC		
Relinquished by:	Date/Time:	Company	Received by: Autumn R. Johnson	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: 240-174527-1

Login Number: 174527
List Number: 2
Creator: Booker, Autumn R

List Source: Eurofins St. Louis
List Creation: 10/13/22 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	

Eurofins Canton

Job Notes

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to the NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory. This report is confidential and is intended for the sole use of Eurofins Environment Testing North Central, LLC and its client. All questions regarding this report should be directed to the Eurofins Environment Testing North Central, LLC Project Manager who has signed this report.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization

Generated
11/23/2022 10:42:58 AM
Revision 1

Authorized for release by
Kris Brooks, Project Manager II
Kris.Brooks@et.eurofinsus.com
(330)966-9790

Appendix F
Field Records

TRC

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance
PROJECT NUMBER:	464096.0000.0000
PROJECT MANAGER:	Darby Litz
SITE LOCATION:	2742 Weadock Hwy Essexville, MI 48732
DATES OF FIELDWORK:	10/10/22 TO 10/11/22
PURPOSE OF FIELDWORK:	Fourth Quarter HMP Sampling Event
WORK PERFORMED BY:	Javier Jasso

10/12/22
SIGNED DATE

10-14-22
CHECKED BY DATE

TRC

GENERAL NOTES

PROJECT NAME:	CEC Weadock LF: 2022 GW Com	DATE: 10/10/22	TIME ARRIVED: 0956
PROJECT NUMBER:	464096.0000.0000	AUTHOR: Javier Jasso	TIME LEFT: 1430

WEATHER		
TEMPERATURE: 41 °F	WIND: 10 MPH	VISIBILITY Clear

WORK / SAMPLING PERFORMED

Wells Sampled
JCW-MW-18001, MS-MSD, JCW-DW-18001, MW 50, Dup #1
MW 51, 52, 53, 53R, 54R JCW-MW-18004, 55.

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS

SIGNED 10/17/22 DATE

CHECKED BY 10-14-22 DATE

TRC

GENERAL NOTES

PROJECT NAME: CEC Weadock LF: 2022 GW Com	DATE: 10/11/22	TIME ARRIVED: 0457
PROJECT NUMBER: 464096.0000.0000	AUTHOR: Javier Jasso	TIME LEFT: 0930

WEATHER

TEMPERATURE: 47 °F WIND: 6 MPH VISIBILITY: Clear

WORK / SAMPLING PERFORMED

Wells Sampled JCW-MW-18005, OW-~~[illegible]~~ 57Rout
18006, Dup #02, 58, FB#1, EB#1,

PROBLEMS ENCOUNTERED	CORRECTIVE ACTION TAKEN

COMMUNICATION

NAME	REPRESENTING	SUBJECT / COMMENTS

INVESTIGATION DERIVED WASTE SUMMARY

WASTE MATRIX	QUANTITY	COMMENTS

SIGNED [signature] DATE 10/12/22

CHECKED BY [signature] DATE 10-14-22

REVISED 04/2019

TRC

EQUIPMENT SUMMARY

PROJECT NAME:	CEC Weadock LF: 2022 GW Co	SAMPLER NAME:	Javier Jasso
PROJECT NO.:	464096.0000.0000		

WATER LEVEL MEASUREMENTS COLLECTED WITH:

HERON DIPPER-T	TRC A2
NAME AND MODEL OF INSTRUMENT	SERIAL NUMBER (IF APPLICABLE)

PRODUCT LEVEL MEASUREMENTS COLLECTED WITH:

NA	NA
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)
GEOTECH DISPOSABLE FILTER	0.45 MICRON
NAME AND MODEL OF FILTERATION DEVICE	FILTER TYPE AND SIZE
DEDICATED POLY TUBING	☑ LOW-FLOW SAMPLING EVENT
TUBING TYPE	

PURGE WATER DISPOSAL METHOD

☑ GROUND ☐ DRUM ☐ POTW ☐ POLYTANK ☐ OTHER _____

DECONTAMINATION AND FIELD BLANK WATER SOURCE

STORE BOUGHT	LABORATORY PROVIDED
POTABLE WATER SOURCE	DI WATER SOURCE
SIGNED 10/12/22 DATE	CHECKED BY 10-14-22 DATE

REVISED 04/2019

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	MODEL: YSI Pro DSS	SAMPLER: JJ
PROJECT NO.:	464096.0000.0000	SERIAL #: TRC A2	DATE: 10/10/22

PH CALIBRATION CHECK

pH 7 (LOT #): 26F683 (EXP. DATE): 6/24 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 260849 (EXP. DATE): 4/25 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
7.00 / 7.00	4.00 / 4.00	☑ WITHIN RANGE	0911
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 26F716 (EXP. DATE): 6/23 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1300 / 1300	22.0	☑ WITHIN RANGE	0915
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 21K100307 (EXP. DATE): 11/26 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
220 / 220	22.0	☐ WITHIN RANGE	0917
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
8.71 / 8.71	22.0	☐ WITHIN RANGE	0917
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): A2172 (EXP. DATE): 6/24 POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
0 / 0	/	☐ WITHIN RANGE	0911
100 / 100	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

COMMENTS

☐ AUTOCAL SOLUTION (LOT #): (EXP. DATE):	☑ STANDARD SOLUTION (S) LIST LOT NUMBERS AND EXPIRATION DATES UNDER CALIBRATION CHECK
CALIBRATED PARAMETERS	CALIBRATION RANGES [1]
☐ pH	pH: +/- 0.2 S.U.
☐ COND	COND: +/- 1% OF CAL. STANDARD
☐ ORP	ORP: +/- 25 mV
☐ D.O.	D.O.: VARIES
☐ TURB	TURB: +/- 5% OF CAL. STANDARD
☐ _____	[1] CALIBRATION RANGES ARE SPECIFIC TO THE MODEL OF THE WATER QUALITY METER
☐ _____	

NOTES

PROBLEMS ENCOUNTERED	CORRECTIVE ACTIONS

SIGNED _____ 10/12/22 DATE

CHECKED BY _____ 10-14-22 DATE

TRC

WATER QUALITY METER CALIBRATION LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	MODEL: YSI Pro DSS	SAMPLER: JJ
PROJECT NO.:	464096.0000.0000	SERIAL #: TRC A2	DATE: 10/11/22

PH CALIBRATION CHECK

pH 7 (LOT #): 26F083 (EXP. DATE): 4/24 POST-CAL. READING / STANDARD	pH 4 / 10 (LOT #): 26D849 (EXP. DATE): 4/24 POST-CAL. READING / STANDARD	CAL. RANGE	TIME
700 / 700	400 / 400	☑ WITHIN RANGE	0940
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	
/	/	☐ WITHIN RANGE	

SPECIFIC CONDUCTIVITY CALIBRATION CHECK

CAL. READING (LOT #): 26F716 (EXP. DATE): 6/23 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
1309 / 1309	21.0	☑ WITHIN RANGE	0940
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

ORP CALIBRATION CHECK

CAL. READING (LOT #): 21K100367 (EXP. DATE): 11/24 POST-CAL. READING / STANDARD	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
220 / 220	21.0	☑ WITHIN RANGE	0940
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

D.O. CALIBRATION CHECK

CAL. READING POST-CAL. READING /SATURATED AIR	TEMPERATURE (°CELSIUS)	CAL. RANGE	TIME
8.35 / 8.3	23.0	☑ WITHIN RANGE	0940
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	
/		☐ WITHIN RANGE	

TURBIDITY CALIBRATION CHECK

CALIBRATION READING (NTU) (LOT #): 42172 (EXP. DATE): 6/24 POST-CAL. READING / STANDARD	(LOT #): (EXP. DATE): POST-CAL. READING / STANDARD	CAL. RANGE	TIME
0 / 0	/	☑ WITHIN RANGE	0940
10 / 10	/	☑ WITHIN RANGE	0940
/	/	☐ 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 _____ 10/12/22 DATE

CHECKED BY _____ 10-14-22 DATE

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	DATE: 10/3/22
PROJECT NUMBER:	464096.0000.0000	AUTHOR: Javier Jasso

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
JCW-MW-18001	0653	TOC	14.80	23.73	NA	NM
JCW-MW-18004	0741	TOC	12.11	14.72	NA	NM
JCW-MW-18005	0800	TOC	9.11	14.28	NA	NM
JCW-MW-18006	0815	TOC	1501	23.68	NA	NM
JCW-OW-18001	0653	TOC	8.81	20.31	NA	NM
JCW-OW-18002	0700	TOC	10.53	19.78	NA	NM
JCW-OW-18003	0711	TOC	8.20	DNM	NA	NM
JCW-OW-18004	0742	TOC	7.14	14.81	NA	NM
JCW-OW-18006	0814	TOC	1400	23.41	NA	NM
LH-103R	0723	TOC	24.11	33.46	NA	NM
LH-104	0750	TOC	1113	14.00	NA	NM
MW-20	0801	TOC	7.31	1400	NA	NM
MW-50	0658	TOC	13.37	19.46	NA	NM
MW-51	0704	TOC	14.10	20.00	NA	NM
MW-52	0710	TOC	14.75	19.74	NA	NM
MW-53	0717	TOC	13.85	18.18	NA	NM
MW-53R	0729	TOC	14.30	18.80	NA	NM
MW-54R	0735	TOC	1431	17.32	NA	NM
MW-55	0754	TOC	13.65	16.38	NA	NM
MW-58	0644	TOC	5.70	18.28	NA	NM
OW-51	0705	TOC	9.74	17.28	NA	NM
OW-53	0718	TOC	7.15	18.00	NA	NM
OW-54	0736	TOC	6.78	18.42	NA	NM
OW-55	0751	TOC	7.63	18.42	NA	NM
OW-56R	0803	TOC	583	DNM	NA	NM

ALL WATER LEVELS MUST INCLUDE REFERENCE POINT AND TAPE CORRECTION FACTOR (E.G., 1.1 + 0.00 T/PVC).

SIGNED 10/18/22 DATE

CHECKED 10-14-22 DATE

TRC

WATER LEVEL DATA

PROJECT NAME:	CEC Weadock LF: 2022 GW Compliance	DATE:	10/12/22
PROJECT NUMBER:	464096.0000.0000	AUTHOR:	Javier Jasso

WELL LOCATION	TIME	REFERENCE	DEPTH TO WATER (FEET)	DEPTH TO BOTTOM (FEET)	DEPTH TO PRODUCT (FEET)	WATER ELEVATION
OW-57 IN	0811	TOC	5.84	DUM	NA	NM
OW-57R IN	0810	TOC	6.00	DUM	NA	NM
OW-57 OUT	0809	TOC	10.33	20.30	NA	NM
OW-57R OUT	0804	TOC	10.00	19.48	NA	NM
OW-61	0823	TOC	11.78	DUM	NA	NM
OW-63		TOC	Could not locate		NA	NM
JCW-MW15021	0713		15.45	DUM		
JCW-MW15022	0731		14.64	DUM		
MW-16R	0737		14.18	DUM		
JCW-MW15021	0745		15.48	DUM		
OW-54	0804		5.78	DUM		
MW-19	0834		10.08	DUM		
MW-15020	0841		5.36	DUM		
MW-116B	0845		5.40	DUM		
MW-15024	0847		6.10	DUM		
MW 15018	0850		5.88	DUM		

ALL WATER LEVELS MUST INCLUDE REFERENCE POINT AND TAPE CORRECTION FACTOR (E.G., 1.1 + 0.00 T/PVC).

SIGNED 10/12/22 DATE

CHECKED 10-14-22 DATE

REVISED 04/2019

TRC

WATER SAMPLE LOG

Background

PROJECT NAME: CEC Karn ~~LF~~: 2022 GW Comp	PREPARED	CHECKED
PROJECT NUMBER: 464096.0000.0000	BY: AW, JJ, JK DATE: 10/14/22	BY: JK DATE: 10-14-22

SAMPLE ID: MW-15008 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1448	DATE: 10/14/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 4.76 T/ PVC

DEPTH TO BOTTOM: 17.42 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 9.0 ☒ LITERS ☐ GALLONS

COLOR: Clear ODOR: None

TURBIDITY

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1508	DATE: 10/14/22

PH: 6.71 SU CONDUCTIVITY: 1474 umhos/cm

ORP: -93.0 mV DO: 0.8 mg/L

TURBIDITY: 1.64 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 15.6 °C OTHER: -

COLOR: Clear ODOR: None

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☒ DUP- Background

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1448	200	6.74	1532	-99.4	3.3	9.36	15.8	4.76	INITIAL
1453	|	6.69	1500	-92.7	1.0	2.75	15.7	4.78	1.0
1458	|	6.71	1457	-92.5	0.9	2.45	15.7	|	2.0
1503	|	6.71	1462	-92.8	0.8	2.09	15.7	|	3.0
1508	|	6.71	1474	-93.0	0.8	1.64	15.6	|	4.0

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1000	Plastic	B	☐ Y ☒ N					☐ Y ☐ N
2	250	|	A	☐ Y ☒ N					☐ Y ☐ N
2	125	|	B	☐ Y ☒ N					☐ Y ☐ N
2	125	|	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: Fed EX DATE SHIPPED: 10/15/22 AIRBILL NUMBER: —

COC NUMBER: — SIGNATURE: AW DATE SIGNED: 10/14/22

TRC

WATER SAMPLE LOG

~~Jcw~~ Background

PROJECT NAME:	CEC ~~Kam LF~~ 2022 GW Compl	PREPARED	CHECKED
PROJECT NUMBER:	464096.0000.0000	BY: AW, JJ, JK DATE: 10/4/22	BY: JK DATE: 10-14-22

SAMPLE ID: MW-150 19 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 1550	DATE: 10/4/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 5.72 T/ PVC

DEPTH TO BOTTOM: 16.90 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 4.0 ☒ LITERS ☐ GALLONS

COLOR: Clear ODOR: None

TURBIDITY

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1610	DATE: 10/4/22

PH: 6.77 SU CONDUCTIVITY: 1961 umhos/cm

ORP: -88.2 mV DO: 0.8 mg/L

TURBIDITY: 0.88 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 15.8 °C OTHER: —

COLOR: Clear ODOR: None

FILTRATE (0.45 um) ☐ YES ☐ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☒ DUP- Background

COMMENTS: Radium dup

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)
1550	200	6.77	1961	-70.1	1.7	1.88	15.9	5.72	INITIAL
1555	|	6.76	1963	-79.5	1.1	1.62	15.8	5.78	1.0
1600	|	6.77	1965	-85.1	0.9	2.12	15.8	|	2.0
1605	|	6.77	1966	-86.9	0.9	1.45	15.8	|	3.0
1610	|	6.77	1961	-88.2	0.8	0.88	15.8	|	4.0

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	1000	Plastic	B	☐ Y ☒ N					☐ Y ☐ N
1	250	|	A	☐ Y ☒ N					☐ Y ☐ N
1	125	|	A	☐ Y ☒ N					☐ Y ☐ N
1	125	|	B	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: Fed EX DATE SHIPPED: 10/5/22 AIRBILL NUMBER: —

COC NUMBER: — SIGNATURE: AW DATE SIGNED: 10/11/22

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn ~~BAP/EL~~ 2022 GW C background	PREPARED	CHECKED
PROJECT NUMBER:	464096 0001.0000	BY: AW, JK, JJ DATE: 10/5/22	BY: JK DATE: 10-14-22

SAMPLE ID: MW-1500Z WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 750	DATE: 10/5/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 7.13 T/ PVC

DEPTH TO BOTTOM: 16.90 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 11.0 ☒ LITERS ☐ GALLONS

COLOR: Clear ODOR: None

TURBIDITY: ☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 855	DATE: 10/5/22

PH: 6.69 SU CONDUCTIVITY: 4577 umhos/cm

ORP: -66.7 mV DO: 0.9 mg/L

TURBIDITY: 1.98 NTU

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 14.9 °C OTHER: -

COLOR: Clear ODOR: None

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS: FB - Background

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
0750	200	6.48	786	32.2	1.9	17.6	14.0	7.13	INITIAL
0755	|	6.86	832	-33.8	1.2	2.92	14.4	7.30	1.0
800	|	7.01	848	-65.5	1.1	3.28	14.5	7.35	2.0
805	|	7.08	860	-81.8	1.0	2.12	14.5	|	3.0
810	|	7.10	865	-89.5	1.0	2.73	14.5	|	4.0
815	|	7.11	1400	-91.6	0.9	2.61	14.6	|	5.0
820	|	6.77	2950	-78.3	0.9	2.14	14.7	|	6.0
825	|	6.69	4630	-75.8	0.9	2.97	14.7	|	7.0
830	|	6.69	5070	-76.1	0.9	2.06	14.7	|	8.0
* 835	|	Recalibrate	Conductivity					|	

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	1000	Plastic	B	☐ Y ☒ N					☐ Y ☐ N
2	125	|	A	☐ Y ☒ N					☐ Y ☐ N
2	125	|	A	☐ Y ☒ N					☐ Y ☐ N
1	250	|	A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: Fed EX DATE SHIPPED: 10/5/22 AIRBILL NUMBER: -

COC NUMBER: - SIGNATURE: AW DATE SIGNED: 10/11/22

TRC

WATER SAMPLE LOG

(CONTINUED FROM PREVIOUS PAGE)

Background

PROJECT NAME:	CEC Karn ~~LF~~: 2022 GW Compli	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: (AW) JJ, JK	DATE: 10/8/22	BY: JK	DATE: 10-14-22

SAMPLE ID: MW-15002

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR (L))
845	200	6.67	4496	-60.3	1.0	2.26	14.8	7.35	9.0
850	|	6.68	4540	-64.3	0.9	2.12	14.9	|	10.0
855		6.69	4577	-66.7	0.9	1.98	14.9		11.0

SIGNATURE: A. Whaley

DATE SIGNED: 10/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Karn ~~BAP/LI~~ Background 2022 GW C	PREPARED	CHECKED
PROJECT NUMBER:	464096 0001.0000	BY: AW JK, JJ DATE: 10/5/22	BY: JK DATE: 10-14-22

SAMPLE ID: MW-15016 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 926	DATE: 10/5/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 4.78 T/ PVC

DEPTH TO BOTTOM: 7.65 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 6.0 ☒ LITERS ☐ GALLONS

COLOR: Clear ODOR: None

TURBIDITY

☒ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 956	DATE: 10/5/22

PH: 6.90 SU CONDUCTIVITY: 1817 umhos/cm

ORP: 12.1 mV DO: 0.9 mg/L

TURBIDITY: 1.70 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)
926	200	7.24	1830	4.5	4.1	4.16	15.5	4.78	INITIAL
931		7.04	1797	22.8	2.4	3.61	15.6	5.05	1.0
936		6.98	1769	20.4	1.7	2.97	15.6		2.0
941		6.95	1783	16.5	1.4	2.38	15.6		3.0
946		6.91	1810	13.8	1.0	2.08	15.7		4.0
951		6.91	1815	12.6	1.0	1.85	15.7		5.0
956		6.90	1817	12.1	0.9	1.70	15.7		6.0

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1000	Plastic	B	☐ Y ☒ N					☐ Y ☐ N
1	250		B	☐ Y ☒ N					☐ Y ☐ N
1	125		A	☐ Y ☒ N					☐ Y ☐ N
1	125		A	☐ Y ☒ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: Fed EX DATE SHIPPED: 10/5/22 AIRBILL NUMBER: —

COC NUMBER: — SIGNATURE: AW DATE SIGNED: 10/11/22

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER: 464096.0000.0000	BY: JJ	DATE: 10/12/22	BY: JK	DATE: 10-14-22

SAMPLE ID: LH-103 R

WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 0919	DATE: 10/5/22	SAMPLE	TIME: 0944	DATE: 10/5/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 24.15 T/ PVC

DEPTH TO BOTTOM: 37.40 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 2.5 ☑ LITERS ☐ GALLONS

COLOR: grayish ODOR: slight

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 6.75 SU CONDUCTIVITY: 2095 umhos/cm

ORP: -114.0 mV DO: 0.10 mg/L

TURBIDITY: 3.50 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 12.3 °C OTHER:

COLOR: Clear ODOR: None

FILTRATE (0.45 um) ☐ YES ☑ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☒ DUP- Low Level Hg

COMMENTS: Low level Hg FB collected

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
0919	100	7.02	2205	-123.5	9.80	380	12.6	24.15	INITIAL
0924		6.77	2194	-107.7	1.67	416	12.5	24.40	.5
0929		6.74	2096	-110.4	0.42	5.9	12.4	24.52	1
0934		6.74	2081	-112.5	0.22	4.37	12.4	24.52	1.5
0939		6.75	2092	-113.5	0.14	3.99	12.4	24.50	2
0944		6.75	2095	-114.0	0.10	3.50	12.3	24.50	2.5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☑ N	5	125 mL	Glass	A	☐ Y ☒ N
1	250	pl	A	☐ Y ☑ N		↑			☐ Y ☐ N
1	125	pl	A	☐ Y ☑ N		low level Hg			☐ Y ☐ N
1	125	pl	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD: ~~Drop off~~ Fedex	DATE SHIPPED: ~~10/11/22~~ 10/5/22	AIRBILL NUMBER: NA
COC NUMBER: NA	SIGNATURE: [signature]	DATE SIGNED: 10/12/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 10/5/22	BY: JK	DATE: 10-14-22

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: 1021	DATE: 10/5/22	SAMPLE	TIME: 1054	DATE: 10/5/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 11.17 T/ PVC

DEPTH TO BOTTOM: 14.0 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 4 ☐ LITERS ☐ GALLONS

COLOR: cloudy ODOR: Slight

TURBIDITY ☐ NONE ☐ SLIGHT ☑ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 2.31 SU | CONDUCTIVITY: 1489 umhos/cm

ORP: -86.0 mV | DO: 1.95 mg/L

TURBIDITY: 2.7 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- Low level Hg

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)
1021	160	7.46	975	-67.5	9.30	97	14.1	11.17	INITIAL
1026		7.33	1501	-79.5	076	4.0	14.1	12.10	.1
1031		7.48	1363	-83.0	045	3.4	14.4	12.46	1.1
1036		7.50	1313	-80.1	061	4.8	14.6	12.91	2
1041		7.41	1397	-83.5	1.5	2.8	14.9	1330	2.2
1046		7.37	1444	-84.8	1.89	3.3	14.9	1346	3
1051		7.35	1497	-86.4	1.99	2.7	15.1	1344	3.5
1056		7.35	1489	-86.0	1.95	2.9	15.0	1341	4

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☑ N	2	125	Glass	A	☐ Y ☒ N
1	250	P	A	☐ Y ☑ N		↑			☐ Y ☐ N
1	125	P	A	☐ Y ☑ N		low	level	Hg	☐ Y ☐ N
1	125	P	M	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Fedex	DATE SHIPPED:	10-5-22	AIRBILL NUMBER:	
COC NUMBER:		SIGNATURE:		DATE SIGNED:	10/11/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 10/11/22	BY: GK	DATE: 10-14-22

SAMPLE ID: JAW-MW1800 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 0535	DATE: 10/10/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 16.66 T/ PVC

DEPTH TO BOTTOM: 23.73 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 5 ☒ LITERS ☐ GALLONS

COLOR: Cloudy ODOR: NOE

TURBIDITY ☐ NONE ☐ SLIGHT ☒ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 0600	DATE: 10/11/22

PH: 6.71 SU CONDUCTIVITY: 3094 umhos/cm

ORP: -81.7 mV DO: 0.23 mg/L

TURBIDITY: 7.1 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)
0531	200	4.66	457	-53.0	8.5	33	15.8	16.68	INITIAL
0540		6.75	2957	-72.5	0.95	6.7	13.7	16.75	1
0545		6.71	2997	-78.5	0.51	3.2	13.8	16.76	2
0550		6.75	3040	-81.5	0.37	2.8	13.8	16.76	3
0555		6.75	3073	-81.5	0.27	2.6	13.9	16.76	4
0600		6.71	3094	-81.7	~~0.23~~ 0.23	2.5	13.8	16.76	5
~~0605~~									~~6~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
6	125	Plas	A	☐ Y ☒ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☒ N					☐ Y ☐ N
3	125	PL	A	☐ Y ☒ N					☐ Y ☐ N
3	125	PL	A	☐ Y ☒ N					☐ Y ☐ N
2	1L	PL	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	10/11/22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	10/11/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 10/11/22	BY: JK	DATE: 10-11-22

SAMPLE ID: JCW-OW-19001 WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 0630	DATE: 10/10/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER	
DEPTH TO WATER:	8.65 T/ PVC	
DEPTH TO BOTTOM:	20.15 T/ PVC	
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS	
VOLUME REMOVED:	3 ☑ LITERS ☐ GALLONS	
COLOR:	Clear	ODOR: none
TURBIDITY	☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY	
DISPOSAL METHOD:	☑ GROUND ☐ DRUM ☐ OTHER	

SAMPLE	TIME: 0645	DATE: 10/10/22
PH: 6.83 SU	CONDUCTIVITY: 1514 umhos/cm	
ORP: -101.7 mV	DO: 0.43 mg/L	
TURBIDITY: 2.3 NTU		
☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
TEMPERATURE: 13.9 °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)
0630	200	7.15	1457	-171.5	9.5	3.2	13.1	9.52	INITIAL
0635		6.83	1491	-101.1	0.91	2.4	13.6	9.33	1
0640		6.83	1515	-101.3	0.51	2.4	14.0	9.33	2
0645		6.83	1515	-101.7	0.43	2.3	13.9	9.33	3
~~0650~~									~~4~~
~~0655~~									~~5~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	40ml	glass	A	☐ Y ☑ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PL	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	10/11/22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	10/12/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 10/11/22	BY: JK	DATE: 10-14-22

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: 0720	DATE: 10/10/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 13.37 T/ PVC

DEPTH TO BOTTOM: 19.42 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 5 ☑ LITERS ☐ GALLONS

COLOR: Clear ODOR: NOR

TURBIDITY

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 0725	DATE: 10/10/22

PH: 7.27 SU CONDUCTIVITY: 1541 umhos/cm

ORP: -116.0 mV DO: 0.16 mg/L

TURBIDITY: 2.1 NTU

☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 13.5 °C OTHER:

COLOR: Clear ODOR: NOR

FILTRATE (0.45 um) ☐ YES ☑ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☑ DUP- 01

COMMENTS: DUP-JCW-LF-01

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)
0710	200	7.31	1637	-105.4	1.00	5.0	13.3	13.31	INITIAL
0715		7.24	1663	-110.0	0.73	2.1	13.4	13.34	1
0720		7.28	1594	-118.5	0.43	2.1	13.5	13.35	2
0725		7.28	1548	-116.0	0.23	2.1	13.6	13.36	3
0730		7.27	1545	-116.0	0.16	2.1	13.5	13.36	4
0735		7.27	1541	-114.0	0.14	2.1	13.5	13.36	5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	1L	glass	A	☐ Y ☑ N					☐ Y ☐ N
2	250	PL	A	☐ Y ☑ N					☐ Y ☐ N
2	1L	PL	A	☐ Y ☑ N					☐ Y ☐ N
2	1L	PL	B	☐ Y ☑ N					☐ Y ☐ N
4	1L	PL	B	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	Dropoff	DATE SHIPPED:	10/11/22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	10/11/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 10/17/22	BY: JK	DATE: 10-14-22

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: 0810	DATE: 10/10/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 14.16 T/ PVC

DEPTH TO BOTTOM: 20.66 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 4 ☑ LITERS ☐ GALLONS

COLOR: Clear ODOR: none

TURBIDITY: ☐ NONE ☑ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 0830	DATE: 10/10/22

PH: 7.20 SU | CONDUCTIVITY: 1916 umhos/cm

ORP: -109.0 mV | DO: 0.16 mg/L

TURBIDITY: 2.8 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 13.3 °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)
0810	200	7.22	860	-90.5	10.0	41.0	11.3	14.34	INITIAL
0815		7.19	1866	-106.5	0.81	5.5	13.1	14.46	1
0820		7.20	1904	-108.5	0.37	3.1	13.3	1446	2
0825		7.20	1914	-108.9	0.22	2.8	13.3	1446	3
0830		7.20	1916	-109.0	0.16	2.8	13.3	1446	4
~~0835~~								~~1446~~	~~5~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	4x4	A	☐ Y ☑ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☑ N					☐ Y ☐ N
1	125	P1	M	☐ Y ☑ N					☐ Y ☐ N
1	1L	P1	B	☐ Y ☑ N					☐ Y ☐ N
2	1L	P1	B	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	Dropoff	DATE SHIPPED:	10/11/22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	10/12/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 10/10/22	BY: JK	DATE: 10-14-22

SAMPLE ID: MW 32 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 0854	DATE: 10/10/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER	
DEPTH TO WATER:	14.71 T/ PVC	
DEPTH TO BOTTOM:	19.74 T/ PVC	
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS	
VOLUME REMOVED:	4 ☑ LITERS ☐ GALLONS	
COLOR:	clear	ODOR: non
TURBIDITY	☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY	
DISPOSAL METHOD:	☑ GROUND ☐ DRUM ☐ OTHER	

SAMPLE	TIME: 0914	DATE: 10/10/22
PH: 6.85 SU	CONDUCTIVITY: 1851 umhos/cm	
ORP: -65.3 mV	DO: 024 mg/L	
TURBIDITY: 2.1 NTU		
☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
TEMPERATURE: 13.1 °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)
0854	200	831	831	-100.3	80	11.3	12.2	1498	INITIAL
0859		6.86	1614	-63.8	079	3.3	12.9	1513	1
0904		6.85	1836	-64.5	035	2.9	13.0	1513	2
0909		6.85	1845	-65.0	024	2.5	13.0	1513	3
0914		6.85	1851	-65.3	024	2.5	13.1	1513	4

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☑ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☑ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☑ N					☐ Y ☐ N
1	125	P1	B	☐ Y ☑ N					☐ Y ☐ N
2	1L	P1	B	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	Dropoff	DATE SHIPPED:	10/11/22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	10/12/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 10/10/22	BY: JK	DATE: 10-14-22

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: 0944	DATE: 10/10/22	SAMPLE	TIME: 1014	DATE: 10/10/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 7.27 SU	CONDUCTIVITY: 1157	umhos/cm
DEPTH TO WATER:	13.81 T/ PVC		ORP: -110.0 mV	DO: ~~0.0~~ 0.18	mg/L
DEPTH TO BOTTOM:	18.88 T/ PVC		TURBIDITY: 2.6	NTU	
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS		☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
VOLUME REMOVED:	6 ☑ LITERS ☐ GALLONS		TEMPERATURE: 14.0 °C	OTHER:	
COLOR:	clear ODOR: none		COLOR: clear	ODOR: none	
TURBIDITY			FILTRATE (0.45 um) ☐ YES ☑ NO		
☑ 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)
0944	200	7.57	548	-109.4	10.0	5.0	12.3	13.71	INITIAL
0949		7.26	1173	-131.0	0.72	3.0	13.6	1383	1
0954		7.28	1221	-133.5	0.46	3.3	13.9	1383	2
0959		7.30	1185	-119.0	0.31	3.3	13.9	1383	3
1004		7.27	1160	-110.0	0.19	2.8	14.0	1383	4
1009		7.27	1157	-110.0	0.18	2.6	14.0	1383	5
1014		7.27	1157	-110.0	0.18	2.6	14.0	1383	6

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED		PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____							
NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	glass	A	☐ Y ☑ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	1L	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	1L	PL	B	☐ Y ☑ N					☐ Y ☐ N
2	1L	PL	B	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	Dropoff	DATE SHIPPED:	10/11/22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	10/12/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ.	DATE: 10/10/22	BY: JK	DATE: 10-14-22

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: 1042	DATE: 10/10/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 14.30 T/ PVC

DEPTH TO BOTTOM: 18.80 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 9 ☒ LITERS ☐ GALLONS

COLOR: Brown ODOR: None

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1127	DATE: 10/10/22

PH: 6.83 SU | CONDUCTIVITY: 1687 umhos/cm

ORP: -18.9 mV | DO: 0.53 mg/L

TURBIDITY: 9.6 NTU

☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 14.3 °C | OTHER:

COLOR: clear | ODOR: none

FILTRATE (0.45 um) ☐ YES ☒ NO

FILTRATE COLOR: | FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1043	200	7.00	815	-54.0	9.1	3000	13.1	14.48	INITIAL
1047		6.83	1999	-12.1	054	1935	13.9	1463	1
1052		6.83	1979	-4.2	051	1436	14.0	1463	2
1057		6.83	1939	-4.0	054	420	14.1	1463	3
1102		6.82	1801	16.7	054	70	14.3	1463	4
1107		6.83	1766	1.0	047	13	14.3	1463	5
1112		6.83	1731	-18.5	035	10	14.3	1463	6
1117		6.83	1716	-18.5	038	8.8	14.4	1463	7
1122		6.83	1700	-18.7	029	9.0	14.2	1463	8
1127		6.82	1687	-18.9	022	9.0	14.3	1463	9

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	Glass	A	☐ Y ☑ N					☐ Y ☐ N
1	250	P	A	☐ Y ☑ N					☐ Y ☐ N
1	1L	P	N	☐ Y ☑ N					☐ Y ☐ N
1	1L	P	B	☐ Y ☑ N					☐ Y ☐ N
2	1L	P	B	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: Drop off	DATE SHIPPED: 10/11/22	AIRBILL NUMBER: NA
COC NUMBER: NA	SIGNATURE:	DATE SIGNED: 10/12/22

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER: 464096.0000.0000	BY: JJ	DATE: 10/10/22	BY: JK	DATE: 10-14-22

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: 1153	DATE: 10/10/22	SAMPLE	TIME: 1218	DATE: 10/10/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 14.25 T/ PVC

DEPTH TO BOTTOM: 1222 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 5 ☑ LITERS ☐ GALLONS

COLOR: grayish ODOR: none

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 6.90 SU CONDUCTIVITY: 1241 umhos/cm

ORP: -25.8 mV DO: 026 mg/L

TURBIDITY: 6.1 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 14.8 °C OTHER:

COLOR: Clear ODOR: none

FILTRATE (0.45 um) ☐ YES ☑ NO

FILTRATE COLOR: FILTRATE ODOR:

QC SAMPLE: ☐ MS/MSD ☐ DUP-

COMMENTS:

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
1153	200	745	597	-30.5	9.80	300	12.9	1402	INITIAL
1158		6.88	1238	-21.3	1.25	84	14.3	1415	1
1203		6.90	1235	-24.7	040	13	14.6	1415	2
1208		6.90	1239	-25.0	036	6.7	14.7	1415	3
1213		6.90	1240	-25.8	029	6.5	14.7	1415	4
1218		6.90	1241	-25.8	026	6.5	14.8	1415	5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☑ N					☐ Y ☐ N
1	250	pl	A	☐ Y ☑ N					☐ Y ☐ N
1	125	pl	A	☐ Y ☑ N					☐ Y ☐ N
1	125	pl	B	☐ Y ☑ N					☐ Y ☐ N
2	1L	pl	B	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: Dronoff	DATE SHIPPED: 10/11/22	AIRBILL NUMBER: NA
COC NUMBER: NA	SIGNATURE: [signature]	DATE SIGNED: 10/12/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 10/10/22	BY: JK	DATE: 10-14-22

SAMPLE ID: JW-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: 1243	DATE: 10/10/22	SAMPLE	TIME: 1303	DATE: 10/10/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER		PH: 6.84 SU	CONDUCTIVITY: 1456 umhos/cm	
			ORP: 86.5 mV	DO: 4.60 mg/L	
DEPTH TO WATER:	12.11 T/ PVC		TURBIDITY: 4.7 NTU		
DEPTH TO BOTTOM:	(47.3) T/ PVC		☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS		TEMPERATURE: 16.1 °C	OTHER:	
VOLUME REMOVED:	2 ☑ 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)
1243	100	7.00	493	31.9	9.5	25	15.1	12.58	INITIAL
1248		6.84	1493	70.1	4.66	5.0	15.9	12.93	.5
1253		6.84	1456	85.8	4.60	4.8	16.1	13.13	1
1258		6.84	1456	86.0	4.60	4.7	16.1	13.32	1.5
1303		6.84	1456	86.5	4.60	4.7	16.1	13.41	2
~~1308~~									~~2.5~~
									~~3~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☑ N					☐ Y ☐ N
1	250	P	A	☐ Y ☑ N					☐ Y ☐ N
1	125	P	A	☐ Y ☑ N					☐ Y ☐ N
1	125	P	B	☐ Y ☑ N					☐ Y ☐ N
2	1L	P	B	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	10/11/22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	10/18/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 10/11/22	BY: JK	DATE: 10-14-22

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: 1341	DATE: 10/10/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 13.65 T/ PVC

DEPTH TO BOTTOM: 16.38 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 4 ☒ LITERS ☐ GALLONS

COLOR: cloudy ODOR: none

TURBIDITY

☐ NONE ☑ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 1401	DATE: 10/10/22

PH: 6.99 SU CONDUCTIVITY: 1309 umhos/cm

ORP: -126.9 mV DO: 0.30 mg/L

TURBIDITY: 6.2 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)
1341	200	7.16	587	-98.0	9.0	35.6	15.6	1400	INITIAL
1346		7.00	1294	-124.5	0.76	9.5	15.6	1400	1
1351		6.99	1302	-126.8	0.46	6.6	15.7	1400	2
1356		6.99	1309	-126.5	0.33	6.3	15.7	1400	3
1401		6.99	1309	-126.9	0.30	6.2	15.7	1400	4
~~1406~~									~~5~~
~~1411~~									~~6~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☒ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	A	☐ Y ☒ N					☐ Y ☐ N
1	125	P1	B	☐ Y ☒ N					☐ Y ☐ N
2	1L	P1	B	☐ Y ☒ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	10/11/22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	10/12/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 10/11/22	BY: SK	DATE: 10-14-22

SAMPLE ID: DCW 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: 0515	DATE: 10/11/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER	
DEPTH TO WATER:	9.11 T/ PVC	
DEPTH TO BOTTOM:	16.38 T/ PVC	
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS	
VOLUME REMOVED:	2.5 ☑ LITERS ☐ GALLONS	
COLOR:	clear	ODOR: none
TURBIDITY	☐ NONE ☐ SLIGHT ☑ MODERATE ☐ VERY	
DISPOSAL METHOD:	☑ GROUND ☐ DRUM ☐ OTHER	

SAMPLE	TIME: 0540	DATE: 10/11/22
PH: 6.81 SU	CONDUCTIVITY: 1324 umhos/cm	
ORP: -49.5 mV	DO: 0.33 mg/L	
TURBIDITY: 3.8 NTU		
☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
TEMPERATURE: 12.7 °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)
0515	100	4.48	6372	158.0	9.0	31.0	12.1	9.56	INITIAL
0520		6.75	1354	-13.1	1.66	16.3	12.2	10.10	0.5
0525		6.80	1342	-30.5	0.76	4.7	12.3	10.40	1.0
0530		6.80	1334	-48.5	0.49	4.0	12.5	10.11	1.5
0535		6.81	1330	-49.0	0.37	3.9	12.6	10.55	2.0
0540		6.81	1324	-49.5	0.32	3.8	12.7	11.00	2.5
									3.0

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	1L	4/VOA	A	☐ Y ☑ N					☐ Y ☐ N
1	250	P1	A	☐ Y ☑ N					☐ Y ☐ N
1	1L	P1	A	☐ Y ☑ N					☐ Y ☐ N
1	1L	P1	B	☐ Y ☑ N					☐ Y ☐ N
2	1L	P1	D	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	10/11/22	AIRBILL NUMBER:	N/A
COC NUMBER:	N/A	SIGNATURE:		DATE SIGNED:	10/12/22

TRC

WATER SAMPLE LOG

PROJECT NAME: CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER: 464096.0000.0000	BY: JJ	DATE: 10/12/22	BY: JK	DATE: 10-14-22

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: 0617	DATE: 10/11/22	SAMPLE	TIME: 0637	DATE: 10/11/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: 10.00 T/ PVC

DEPTH TO BOTTOM: 19.48 T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: 2 ☒ LITERS ☐ GALLONS

COLOR: Clear ODOR: none

TURBIDITY ☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: 6.88 SU CONDUCTIVITY: 1249 umhos/cm

ORP: 76.5 mV DO: 0.40 mg/L

TURBIDITY: 4.3 NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: 11.4 °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)
0617	100	7.51	587	45.3	10.0	15.3	10.0	9.83	INITIAL
0622		6.96	1297	64.5	2.3	9.7	10.9	10.43	.5
0627		6.88	1285	75.6	0.67	4.4	11.5	11.30	1
0632		6.88	1276	76.0	0.52	4.4	11.5	11.76	1.5
0637		6.88	1249	76.5	0.40	4.3	11.4	12.18	2
~~0642~~									~~2.5~~

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED | PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☑ N					☐ Y ☐ N
1	250	PI	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PI	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PI	B	☐ Y ☑ N					☐ Y ☐ N
2	1L	PI	B	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: Dropoff	DATE SHIPPED: 10/11/22	AIRBILL NUMBER: WA
COC NUMBER: NA	SIGNATURE: [signature]	DATE SIGNED: 10/12/22

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 10/11/22	BY: JK	DATE: 10-14-22

SAMPLE ID: SWMW18006 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME: 0723	DATE: 10/11/22
PURGE METHOD:	☑ PUMP PERISTALTIC PUMP ☐ BAILER	
DEPTH TO WATER:	15.01 T/ PVC	
DEPTH TO BOTTOM:	23.66 T/ PVC	
WELL VOLUME:	NA ☐ LITERS ☐ GALLONS	
VOLUME REMOVED:	5 ☐ LITERS ☐ GALLONS	
COLOR:	Brownish	ODOR: NON
TURBIDITY	☐ NONE ☐ SLIGHT ☐ MODERATE ☑ VERY	
DISPOSAL METHOD:	☑ GROUND ☐ DRUM ☐ OTHER	

SAMPLE	TIME: 0748	DATE: 10/11/22
PH: 6.93 SU	CONDUCTIVITY: 1248 umhos/cm	
ORP: -86.3 mV	DO: 0.02 mg/L	
TURBIDITY: 2.4 NTU		
☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
TEMPERATURE: 9.4 °C	OTHER:	
COLOR: Clear	ODOR: NON	
FILTRATE (0.45 um) ☐ YES ☑ NO		
FILTRATE COLOR:	FILTRATE ODOR:	
QC SAMPLE: ☐ MS/MSD ☐ DUP- MW3		
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)
0723	200	7.03	1206	-107.5	9.4	100	8.1	15.44	INITIAL
0728		7.03	1203	-107.0	1.60	20	9.6	15.58	1.0
0733		6.92	1252	-88.0	0.70	4.0	9.3	15.58	2.0
0738		6.93	1240	-85.8	0.39	2.4	9.4	15.58	3.0
0743		6.93	1246	-86.0	0.08	2.4	9.4	15.58	4.0
0748		6.93	1248	-86.3	0.02	2.4	9.4	15.58	5.0

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
4	125	glass	A	☐ Y ☑ N					☐ Y ☐ N
2	250	P1	A	☐ Y ☑ N					☐ Y ☐ N
2	125	P1	A	☐ Y ☑ N					☐ Y ☐ N
2	125	P1	B	☐ Y ☑ N					☐ Y ☐ N
2	1L	P1	B	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD:	Dropoff	DATE SHIPPED:	10/11/22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	10/12/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 10/10/22	BY: JK	DATE: 10-14-22

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: 0837	DATE: 10/11/22	SAMPLE	TIME: 0900	DATE: 10/11/22
PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER			PH: 6.89 SU	CONDUCTIVITY: 1961 umhos/cm	
			ORP: -90.5 mV	DO: 0.27 mg/L	
DEPTH TO WATER: 5.20 T/ PVC			TURBIDITY: 6.4 NTU		
DEPTH TO BOTTOM: 18.26 T/ PVC			☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY		
WELL VOLUME: NA ☐ LITERS ☐ GALLONS			TEMPERATURE: 13.9 °C	OTHER:	
VOLUME REMOVED: 5 ☒ LITERS ☐ GALLONS			COLOR: Blue	ODOR: non	
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)
0837	200	7.19	877	-116.5	10.0	146	16.9	5.90	INITIAL
0840		6.89	1973	-103.5	1.02	41.5	13.0	5.94	1
0845		6.89	1969	-88.0	0.97	10.0	13.1	5.94	2
0850		6.89	1971	-89.5	0.32	6.5	13.9	5.94	3
0855		6.89	1966	-90.5	0.28	6.5	13.9	5.94	4
0900		6.89	1961	-90.5	0.27	6.4	13.9	5.94	5

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
2	125	glass	A	☐ Y ☑ N					☐ Y ☐ N
1	250	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	125	PL	B	☐ Y ☑ N					☐ Y ☐ N
2	1L	PL	B	☐ Y ☑ N					☐ Y ☐ N

SHIPPING METHOD: Dron Off	DATE SHIPPED: 10/11/22	AIRBILL NUMBER: NA
COC NUMBER: NA	SIGNATURE:	DATE SIGNED: 10/12/22

REVISED 04/2019

TRC WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 10/11/22	BY: JK	DATE: 10-14-22

SAMPLE ID: EB #1 | WELL DIAMETER: ☑ 2" ☐ 4" ☐ 6" ☐ OTHER

WELL MATERIAL: ☑ PVC ☐ SS ☐ IRON ☐ GALVANIZED STEEL ☐ OTHER

SAMPLE TYPE: ☑ GW ☐ WW ☐ SW ☐ DI ☐ LEACHATE ☐ OTHER

PURGING	TIME:	DATE:

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: _____ TOC PVC

DEPTH TO BOTTOM: _____ TOC PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: _____ ☐ LITERS ☐ GALLONS

COLOR: _____ ODOR: _____

TURBIDITY

☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

SAMPLE	TIME: 0917	DATE: 10/11/22

PH: _____ SU CONDUCTIVITY: _____ umhos/cm

ORP: _____ mV DO: _____ mg/L

TURBIDITY: _____ NTU

☑ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: _____ °C OTHER: _____

COLOR: Clear ODOR: None

FILTRATE (0.45 um) ☐ YES ☑ NO

FILTRATE COLOR: _____ FILTRATE ODOR: _____

QC SAMPLE: ☐ MS/MSD ☐ DUP- _____

COMMENTS: EB-JCW-LF

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
									INITIAL

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- **0.1** COND.: +/- **3 %** ORP: +/- **10** D.O.: +/- **0.3** TURB: +/- **10 %** or </= **10** TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - _____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	1L	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	1L	PL	B	☐ Y ☑ N					☐ Y ☐ N
2	1L	PL	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	10/11/22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	10/12/22

TRC

WATER SAMPLE LOG

PROJECT NAME:	CEC Weadock LF: 2022 GW C	PREPARED		CHECKED	
PROJECT NUMBER:	464096.0000.0000	BY: JJ	DATE: 10/11/22	BY: JK	DATE: 10-14-22

SAMPLE ID: FB JC — 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: 0927	DATE: 10/11/22

PURGE METHOD: ☑ PUMP PERISTALTIC PUMP ☐ BAILER

DEPTH TO WATER: ____ T/ PVC

DEPTH TO BOTTOM: ____ T/ PVC

WELL VOLUME: NA ☐ LITERS ☐ GALLONS

VOLUME REMOVED: ____ ☐ LITERS ☐ GALLONS

COLOR: ____ ODOR: ____

TURBIDITY ☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

DISPOSAL METHOD: ☑ GROUND ☐ DRUM ☐ OTHER

PH: ____ SU CONDUCTIVITY: ____ umhos/cm

ORP: ____ mV DO: ____ mg/L

TURBIDITY: ____ NTU

☐ NONE ☐ SLIGHT ☐ MODERATE ☐ VERY

TEMPERATURE: ____ °C OTHER: ____

COLOR: Clear ODOR: None

FILTRATE (0.45 um) ☐ YES ☑ NO

FILTRATE COLOR: ____ FILTRATE ODOR: ____

QC SAMPLE: ☐ MS/MSD ☐ DUP- ____

COMMENTS: FB-JCW-LF

TIME	PURGE RATE (ML/MIN)	PH (SU)	CONDUCTIVITY (umhos/cm)	ORP (mV)	D.O. (mg/L)	TURBIDITY (NTU)	TEMPERATURE (°C)	WATER LEVEL (FEET)	CUMULATIVE PURGE VOLUME (GAL OR L)
									INITIAL

NOTE: STABILIZATION TEST IS COMPLETE WHEN 3 SUCCESSIVE READINGS ARE WITHIN THE FOLLOWING LIMITS:

pH: +/- 0.1 COND.: +/- 3 % ORP: +/- 10 D.O.: +/- 0.3 TURB: +/- 10 % or </= 10 TEMP.: +/-

BOTTLES FILLED — PRESERVATIVE CODES A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCL F - ____

NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED	NUMBER	SIZE	TYPE	PRESERVATIVE	FILTERED
1	1Pt	PL	A	☐ Y ☑ N					☐ Y ☐ N
1	1Pt	PL	B	☐ Y ☑ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N
				☐ Y ☐ N					☐ Y ☐ N

SHIPPING METHOD:	Drop off	DATE SHIPPED:	10/11/22	AIRBILL NUMBER:	NA
COC NUMBER:	NA	SIGNATURE:		DATE SIGNED:	10/12/22

Eurofins Canton
180 S. Van Buren Avenue
Barberton, OH 44203
Phone (330) 497-9396 Phone (330) 497-0772

Chain of Custody Record

eurofins | Environment Testing America

Client Information	Sampler: Andrew Whaley	Lab PM: Brooks, Kris M	Carrier Tracking No(s):	COC No: 240-99536-29047.1
Client Contact: Jacob Krenz	Phone: 734-210-9239	E-Mail: Kris.Brooks@et.eurofinsus.com	State of Origin:	Page: Page 1 of 1
Company: TRC Environmental Corporation.	PWSID:			Job #:
Address: 1540 Eisenhower Place	Due Date Requested:			
City: Ann Arbor	TAT Requested (days):			
State, Zip: MI, 48108-7080	Compliance Project: Δ Yes Δ No			
Phone: 734-971-7080(Tel) 734-971-9022(Fax)	PO #: 178829			
Email: JKrenz@trccompanies.com	WO #:			
Project Name: Karn/Weadock CCR Background Well	Project #: 24024154			
Site:	SSOW#:			

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	903.0, Ra226Ra228_GFPC	904.0 - Standard Target List	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	D		
MW-15002	10/5/22	855	G	Water	N	N	X	X		
MW-15008	10/4/22	1508	G	Water	N	N	X	X		
MW-15016	10/5/22	956	G	Water	N	N	X	X		
MW-15019	10/4/22	1610	G	Water	N	N	X	X		
DUP-Background	10/4/22	-	G	Water	N	N	X	X		
FB-Background	10/5/22	855	G	Water	N	N	X	X		
				~~Water~~						

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, Y - Trizma, Z - other (specify)
Other:

Possible Hazard Identification
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
1		10-7-22/1016	TRC		10/7/22 1015	EETA
2	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
3	Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company

Custody Seals Intact: Δ Yes Δ No | Custody Seal No.: | Cooler Temperature(s) °C and Other Remarks:

Ver: 01/16/2019

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

SAMPLING SITE / CUSTOMER: Q4-2022 Weadock Porewater Wells

PROJECT NUMBER: 22-1021

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-1021-01	10/10/22	0900	GW	JCW-MW-18001	5	4	1						x	x	x	x	
-02	10/10/22	1303	GW	JCW-MW-18004	5	4	1						x	x	x	x	
-03	10/11/22	0540	GW	JCW-MW-18005	5	4	1						x	x	x	x	
-04	10/11/22	0746	GW	JCW-MW-18006	5	4	1						x	x	x	x	
-05	10/10/22	0755	GW	MW-50	5	4	1						x	x	x	x	
-06	10/10/22	0902	GW	MW-51	5	4	1						x	x	x	x	
-07	10/10/22	0914	GW	MW-52	5	4	1						x	x	x	x	
-08	10/10/22	1014	GW	MW-53	5	4	1						x	x	x	x	
-09	10/10/22	1127	GW	MW-53R	5	4	1						x	x	x	x	
-10	10/10/22	1310	GW	MW-54R	5	4	1						x	x	x	x	
-11	10/10/22	1401	GW	MW-55	5	4	1						x	x	x	x	
-12	10/11/22	0857	GW	OW-57ROUT	5	4	1						x	x	x	x	

RELINQUISHED BY: [signature] DATE/TIME: 10/11/22 1210 RECEIVED BY: [signature]

RELINQUISHED BY: DATE/TIME: RECEIVED BY:

COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015402

Temperature: 4.4 - 9.6 °C Cal. Due Date: 05/25/2023

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

SAMPLING SITE / CUSTOMER: Q4-2022 Weadock Porewater Wells

PROJECT NUMBER: 22-1021

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM:

TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-1021-13	10/4/22	0940	GW	MW-58	5	4	1						x	x	x	x	
-14	10/10/22	—	GW	DUP-JCW-LF-01	5	4	1						x	x	x	x	
-15	10/11/22	—	GW	DUP-JCW-LF-02	5	4	1						x	x	x	x	
-16	10/10/22	0000	GW	JCW-MW-18001 MS	4	3	1						x	x		x	
-17	10/10/22	0000	GW	JCW-MW-18001 MSD	4	3	1						x	x		x	
-18	10/11/22	0932	W	FB-01	2	1	1						x	x			
-19	10/11/22	0917	W	EB-01	2	1	1						x	x			

RELINQUISHED BY: DATE/TIME: 10/11/22 1210 RECEIVED BY:

RELINQUISHED BY: DATE/TIME: RECEIVED BY:

COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015402

Temperature: 4.4 - 9.6 °C Cal. Due Date: 5-25-23

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

Page 1 of 1

SAMPLING SITE / CUSTOMER: Q4-2022 Weadock ASD	PROJECT NUMBER: 22-1022	SAP CC or WO#:	
SAMPLING TEAM:	TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____	REQUESTER: Harold Register	
SEND REPORT TO: Caleb Batts	email:	phone:	
COPY TO: Harold Register; TRC			

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-1022-01	10/10/23	0945	GW	JCW-OW-18001	5	4	1						x	x	x	x	

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT:
- ☐ NPDES
- ☒ TNI
- ☐ ISO 17025
- ☐ 10 CFR 50 APP. B
- ☐ INTERNAL INFO
- ☐ OTHER _____

RELINQUISHED BY:	DATE/TIME: 10/11/23 1210	RECEIVED BY:
RELINQUISHED BY:	DATE/TIME:	RECEIVED BY:

COMMENTS:

Received on Ice? ☑ Yes ☐ No M&TE #: 015402

Temperature: 0.4 °C Cal. Due Date: 05/25/2023

9 of 9

CHAIN OF CUSTODY

Consumers Energy — Count on Us®

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

135 WEST TRAIL ST., JACKSON, MI 49201 • (517) 788-1251

SAMPLING SITE / CUSTOMER: Q4-2022 Weadock Leachate Wells

PROJECT NUMBER: 22-1024

SAP CC or WO#:

REQUESTER: Harold Register

SAMPLING TEAM: TRC

TURNAROUND TIME REQUIRED: ☐ 24 HR ☐ 48 HR ☐ 3 DAYS ☐ STANDARD ☒ OTHER _____

SEND REPORT TO: Caleb Batts — email: — phone:

COPY TO: Harold Register; TRC

MATRIX CODES: GW = Groundwater; WW = Wastewater; W = Water / Aqueous Liquid; S = Soil / General Solid; O = Oil; OX = Other _____; SL = Sludge; A = Air; WP = Wipe; WT = General Waste

ANALYSIS REQUESTED (Attach List if More Space is Needed)

QA REQUIREMENT: ☐ NPDES ☒ TNI ☐ ISO 17025 ☐ 10 CFR 50 APP. B ☐ INTERNAL INFO ☐ OTHER _____

LAB SAMPLE ID	SAMPLE COLLECTION DATE	SAMPLE COLLECTION TIME	MATRIX	FIELD SAMPLE ID / LOCATION	CONTAINERS TOTAL #	PRESERVATIVE None	HNO_3	H_2SO_4	NaOH	HCl	MeOH	Other	Low Level Mercury	Total Metals	Anions	TDS	Alkalinity	REMARKS
22-1024-01	10-5-22	0944	GW	LH-103R	6	4	1			1			x	x	x	x	x	
-02		—	GW	LH-103R Dup	1					1			x					
-03		0944	GW	LH-103R MS	1					1			x					
-04		0944	GW	LH-103R MSD	1					1			x					
-05		1056	GW	LH-104	6	4	1			1			x	x	x	x	x	
-06		—	GW	LH-104 Dup	1					1			x					
-07		0944	W	FB-02	1					1			x					
-08		1000	W	EB-02	1					1			x					
-09		—	W	TB-02	1					1			x					

RELINQUISHED BY: [signature] — DATE/TIME: 10-5-22 / 1300 — RECEIVED BY: Fedex

RELINQUISHED BY: Fed Ex — DATE/TIME: 10-06-22 10:30 — RECEIVED BY: [signature]

COMMENTS:

Received on Ice? ☑ Yes ☐ No — M&TE #: 015402

Temperature: 3.8 - 4.8 °C — Cal. Due Date: 5-25-23

Appendix G
Alternate Source Demonstration Supporting Information

Consumers Energy
Count on Us®

A CMS Energy Company

Date: January 27, 2023

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]

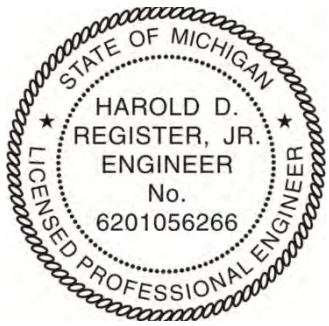
I hereby certify that the alternative source demonstration presented within this Fourth Quarter 2021 Hydrogeological Monitoring Report for the JC Weadock Landfill CCR unit has been prepared to meet the requirements of Title 40 CFR §257.94(e)2 of the Federal CCR Rule. This document is accurate and has 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.

Signature

January 27, 2023
Date of Certification

Harold D. Register, Jr., P.E.
Name

6201056266
Professional Engineer Certification Number

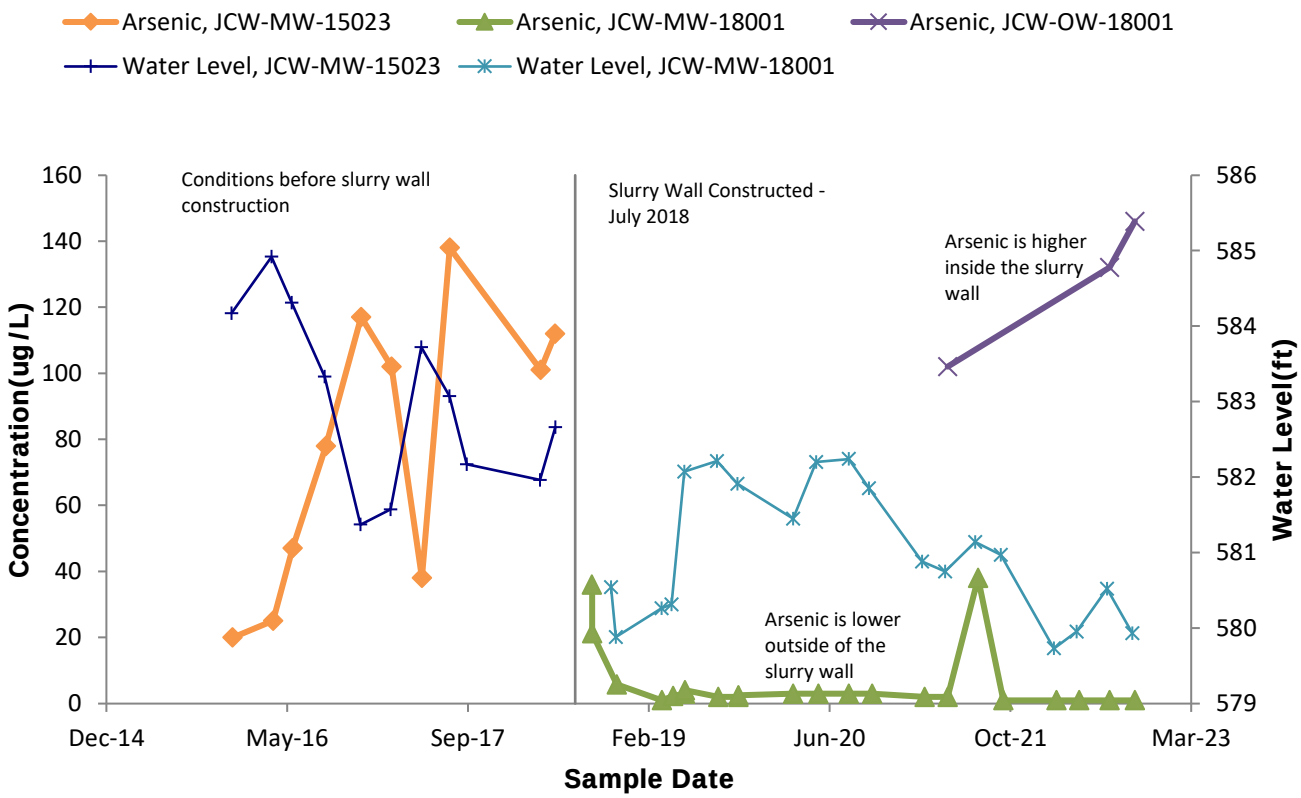


01/27/2023

References

TRC (January 2023). *2022 Semiannual Groundwater Monitoring Report and/Fourth Quarter 2022 Hydrogeological Monitoring Report, JC Weadock Landfill Solid Waste Disposal Area, Essexville, Michigan*

Figure G1: Time Series Plots for JCW-MW-18001 ASD



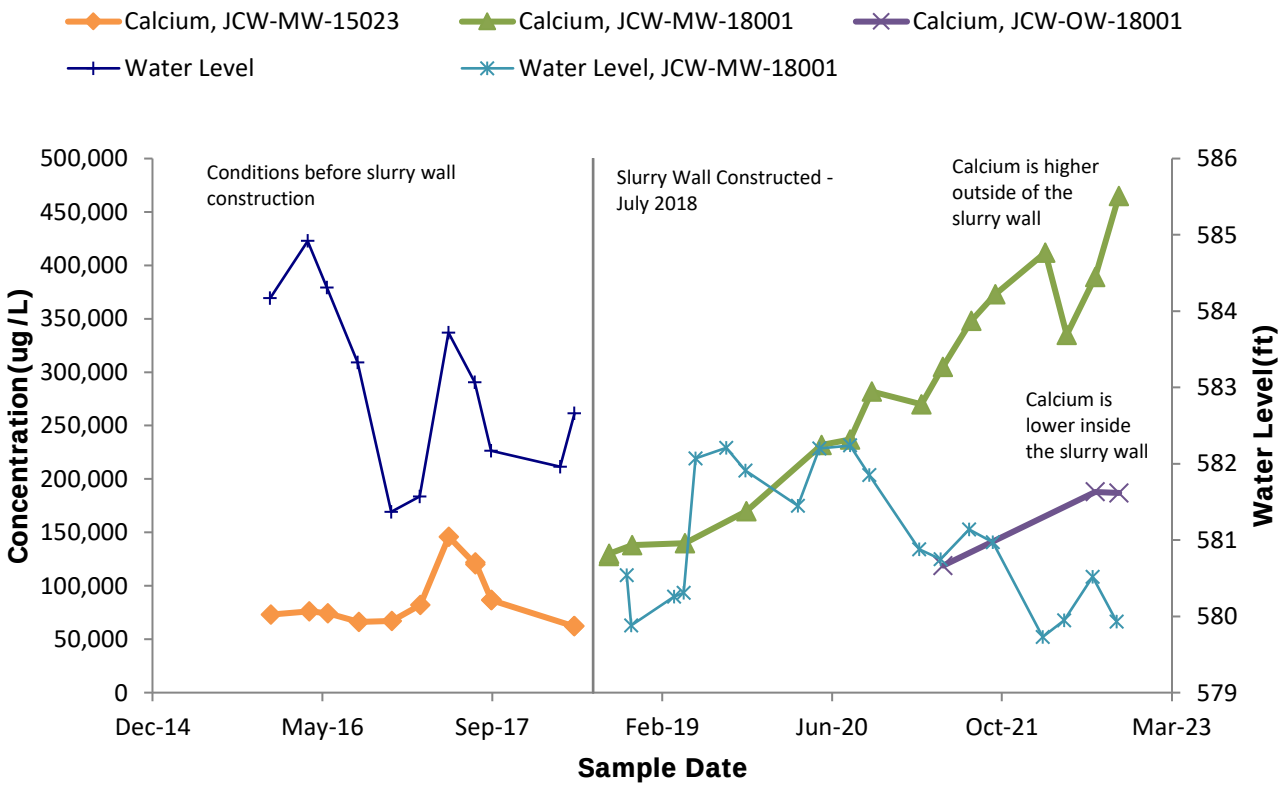
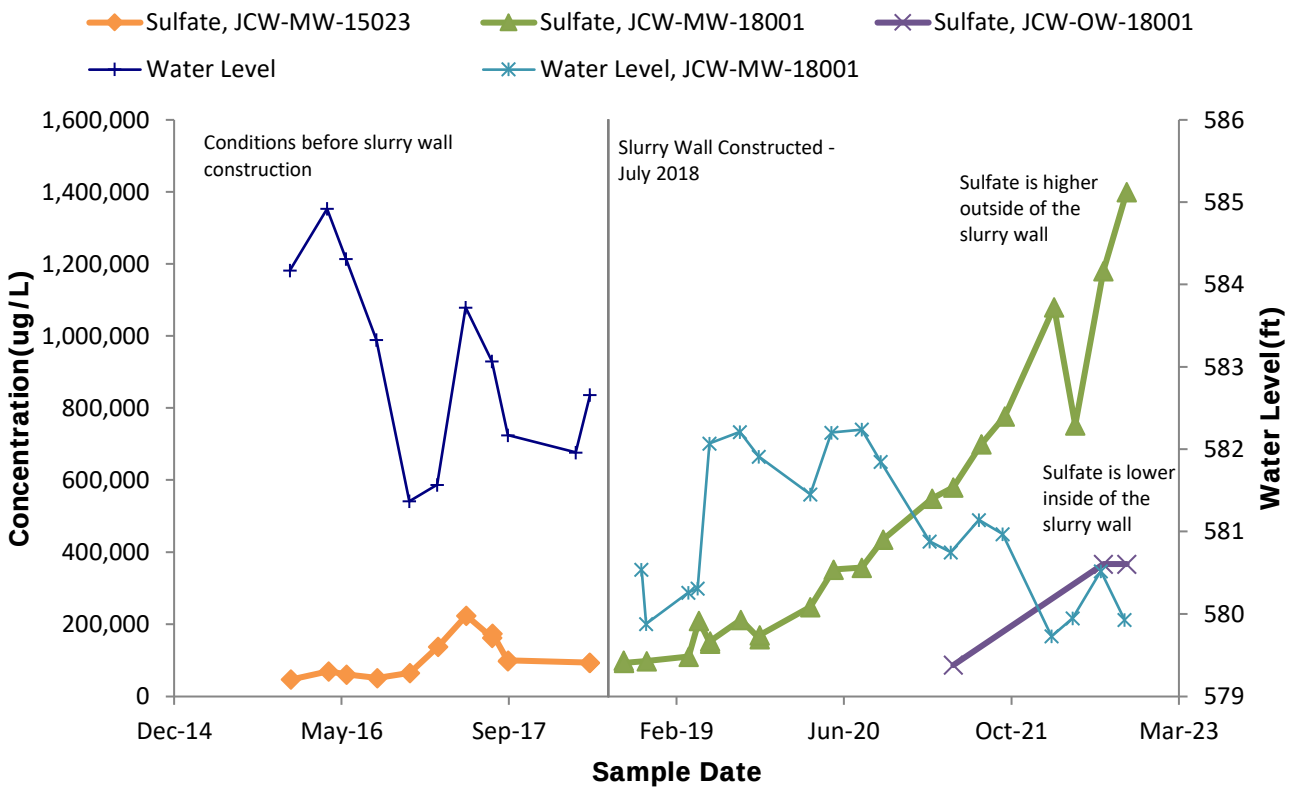


Figure G1: Time Series Plots for JCW-MW-18001 ASD



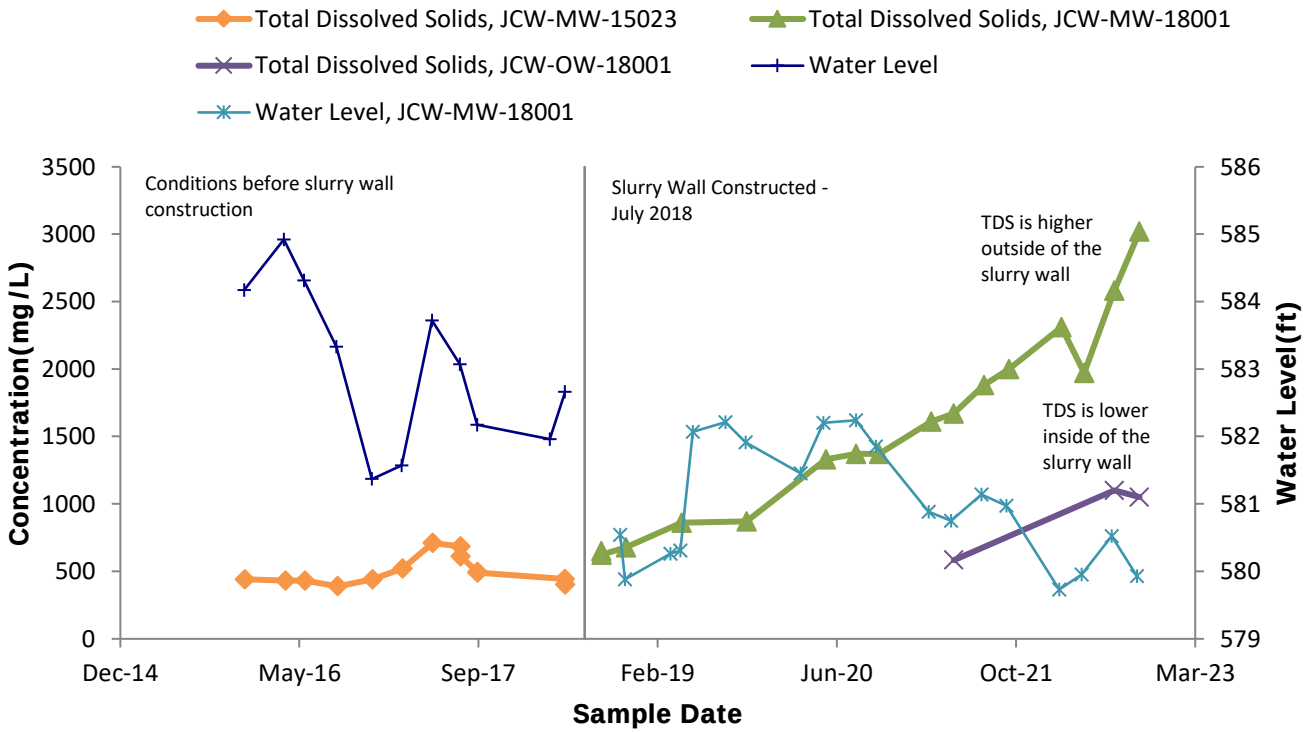
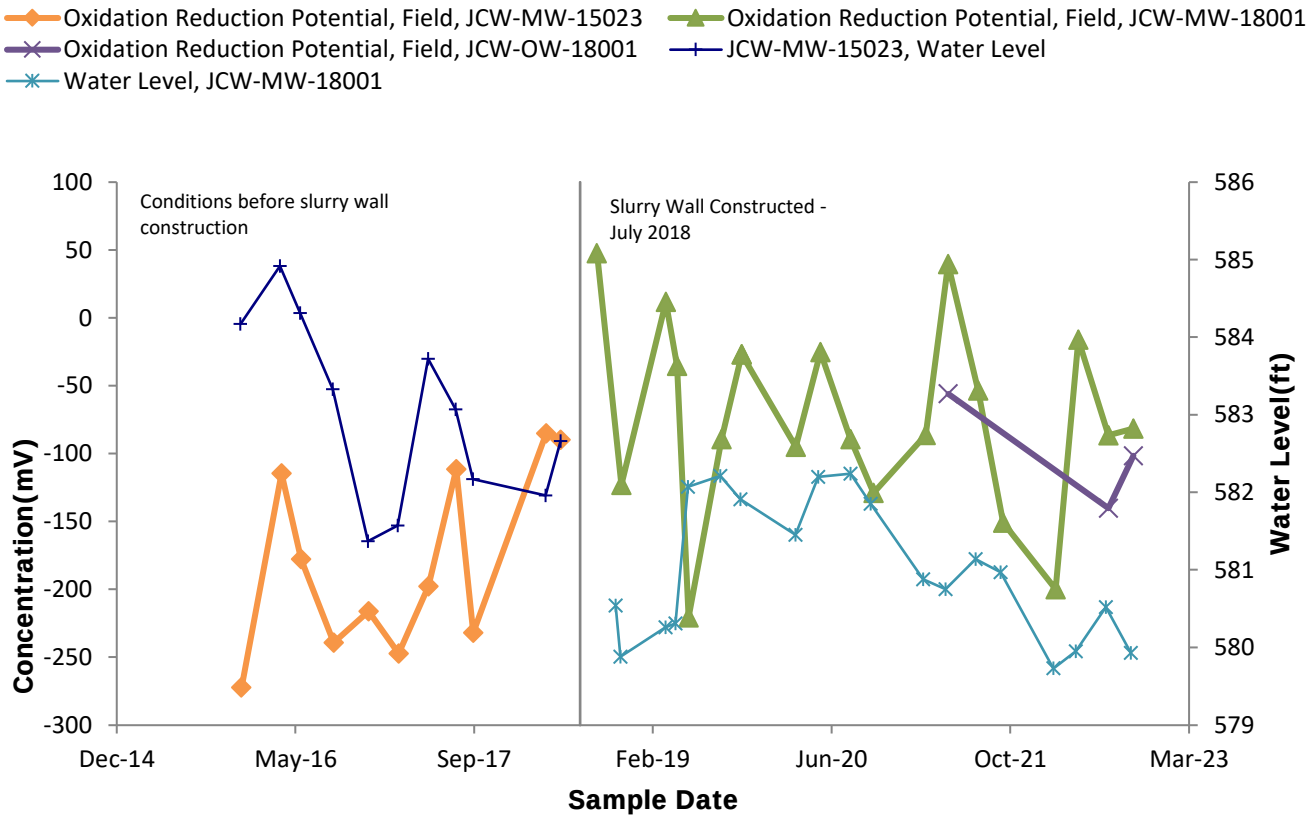


Figure G1: Time Series Plots for JCW-MW-18001 ASD



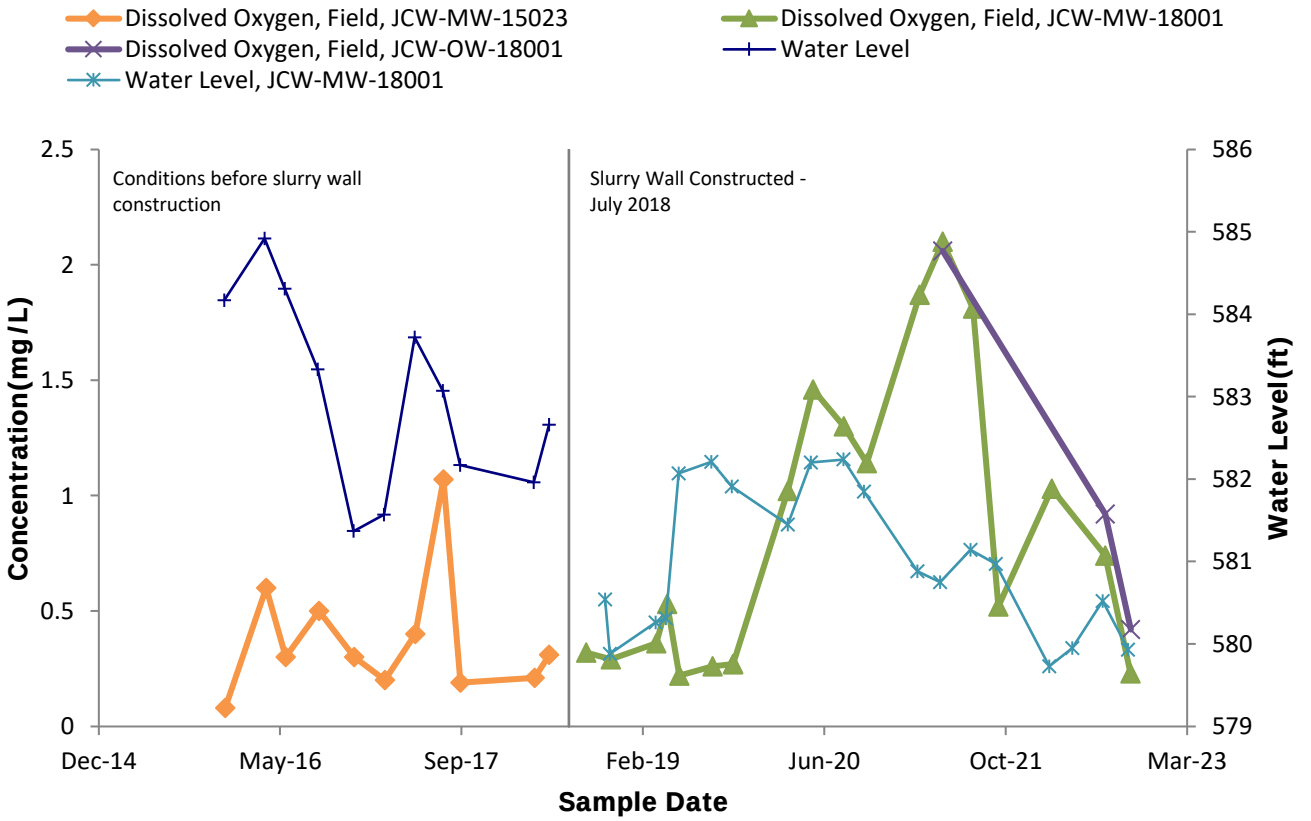
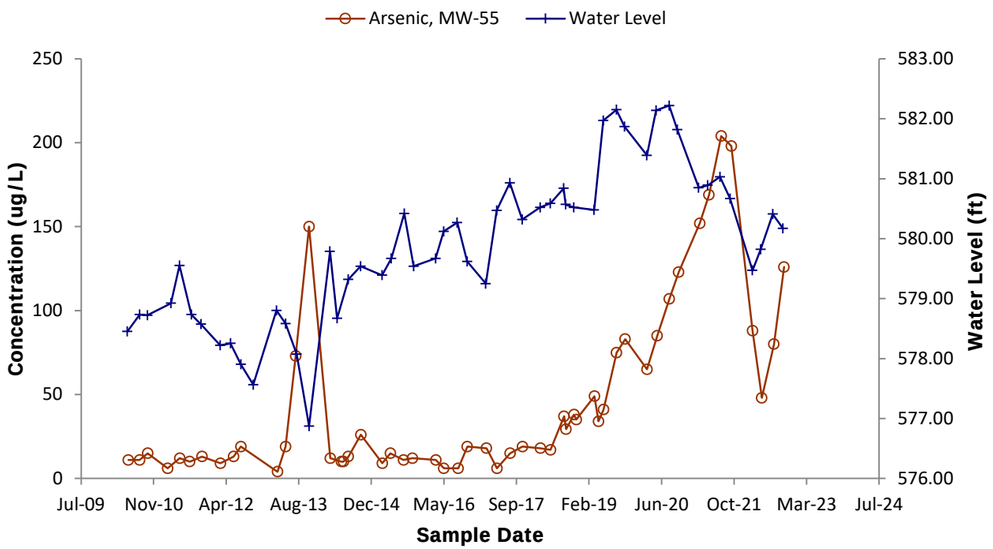
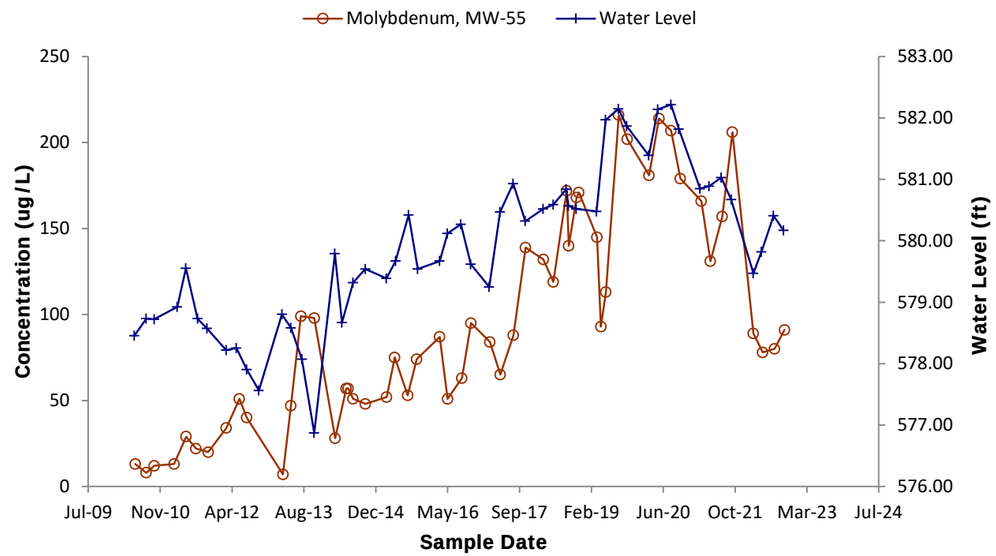
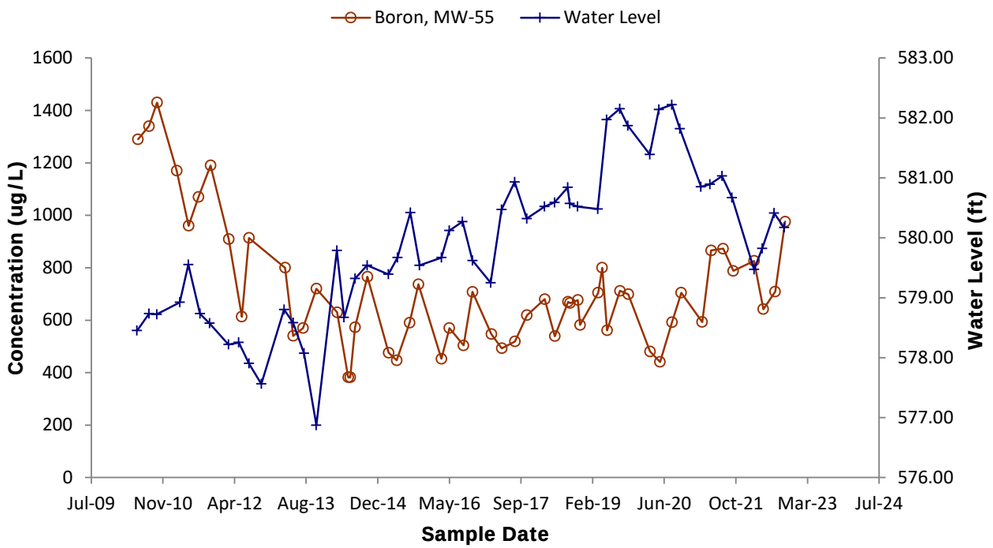
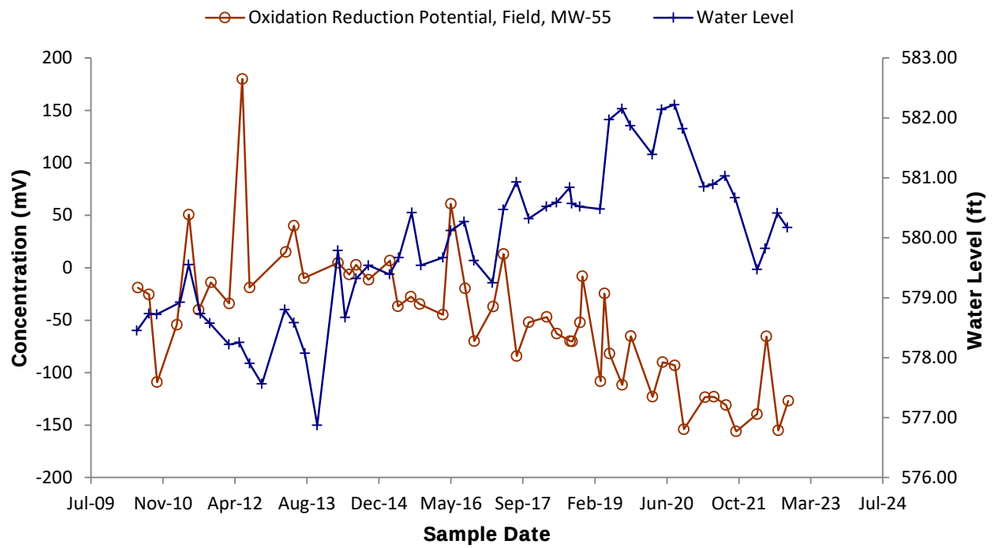


Figure G2: Time Series Plots for MW-55 ASD



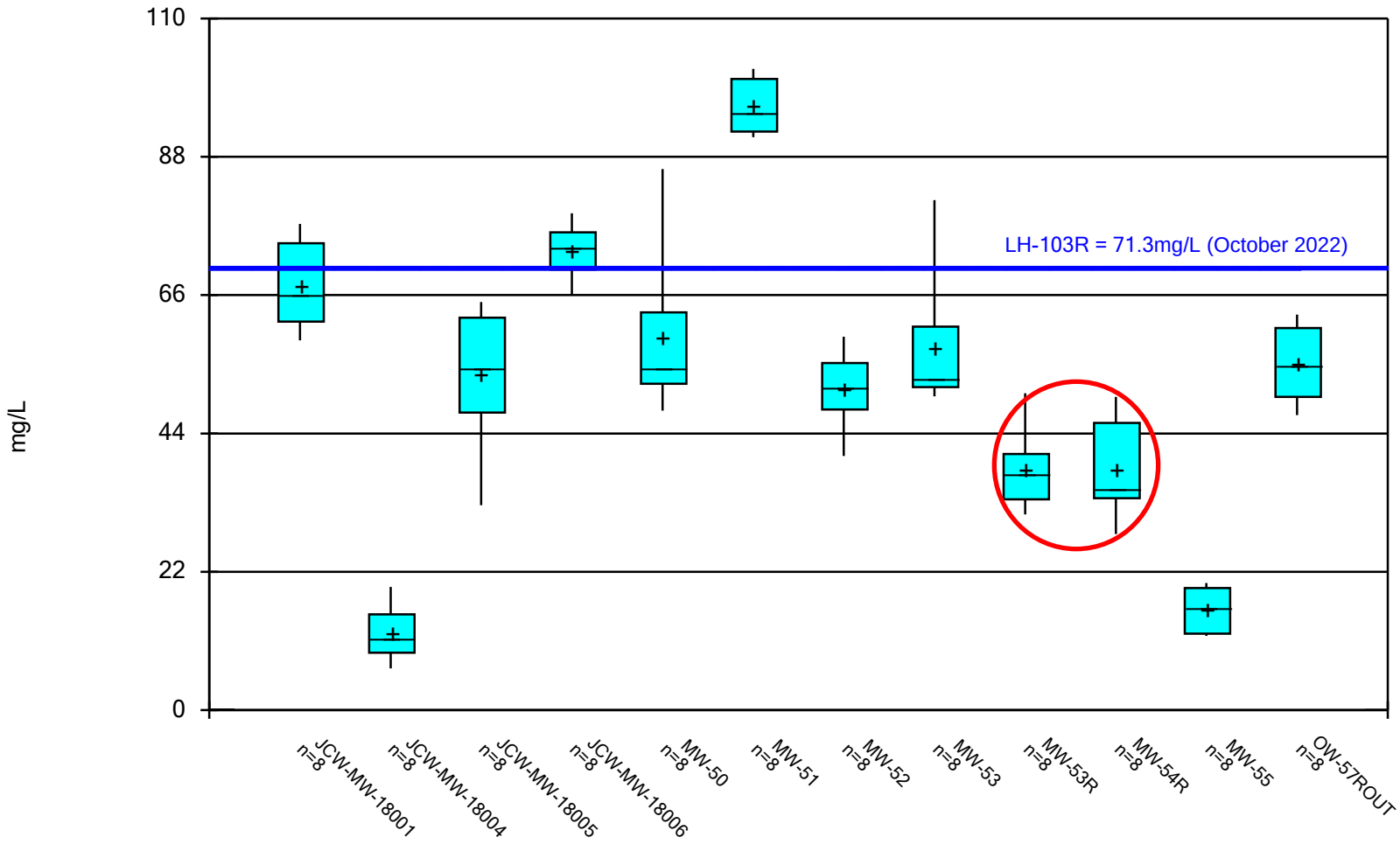






Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Chloride



Box & Whiskers Plot Analysis Run 12/22/2022 12:46 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

1540 Eisenhower Pl.
Ann Arbor, MI 48108

T 734.971.7080
TRCcompanies.com

Technical Memorandum

Date:	January 30, 2023
To:	J.R. Register, Consumers Energy
From:	Darby Litz, TRC
Project No.:	464096.0000.0000 Phase 2 Task 2, 464096.0001.0000 Phase 2 Task 2
Subject:	Second Semiannual 2022 Nature and Extent Data Summary, JC Weadock, Consumers Energy, Essexville, Michigan

Introduction

In response to the United States Environmental Protection Agency's (U.S. EPA's) Resource Conservation and Recovery Act (RCRA) Coal Combustion Residual rule ("CCR Rule") promulgated on April 17, 2015, as amended, Consumers Energy Company (Consumers Energy) has conducted groundwater monitoring at the 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 downgradient monitoring well at statistically significant levels exceeding the Groundwater Protection Standard (GWPS) at the Weadock Landfill[1] and beryllium and lithium were present in one downgradient monitoring well 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)[3] 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

[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.

[3] TRC. 2019*. Assessment of Corrective Measures – JC Weadock Bottom Ash Pond and Landfill Coal Combustion Residual Units.* Prepared for Consumers Energy Company. September.

wells are shown on Figure 1.

Approach

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.

Groundwater Nature and Extent Relative to Groundwater Protection Standards

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 have previously exceeded 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.

Graphs depicting concentrations versus time for arsenic, beryllium, and lithium observed within the Weadock Bottom Ash Pond and Weadock Landfill groundwater monitoring system wells are included in Attachment A. Data collected from April 2019 to October 2022 (i.e., a minimum of 8 semi-annual data points) were used to assess the current nature and extent of these constituents, as illustrated in Figure 1. Beryllium and lithium were previously present at statistically significant levels above the GWPSs at JCW-MW-15009; however, concentrations have decreased such that lithium was no longer present in groundwater above the GWPS as of the first semiannual event of 2022 and beryllium was no longer present in groundwater above the GWPS as of the second semiannual event of 2022. Since beryllium and lithium are currently below the GWPS, these constituents are not shown on Figure 1 and only the distribution of arsenic relative to the Weadock Landfill and Weadock Bottom Ash Pond in the shallow water-bearing unit as compared to the GWPS is presented.

Three categories were assigned to groundwater data collected from April 2019 to October 2022 to develop Figure 1, as follows:

- White – No Exceedances: all concentrations were below the GWPS

- Yellow – Two or More Exceedances: individual observations above the GWPS[4]
- Orange – Statistically Significant GWPS Exceedances[5]

The following is a summary of the RCRA Appendix IV nature and extent evaluation[6] organized by constituent:

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 2022 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 April 2018 through May 2020 semiannual events, 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 in May 2022, and the upper confidence limit in May 2022 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 three groundwater monitoring wells located along the Weadock Landfill perimeter (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 (*2019 Annual Report*)*[7]. The basis for this ASD is summarized below and updated time series plots in support of this ASD are included in the *2022 Semiannual Groundwater Monitoring Report and Fourth Quarter 2022 Hydrogeological Monitoring Report* (22Q4 HMP Report)[8].

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:

---

[4] 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)

[5] Lower confidence limit is above the GWPS based upon most recent assessment monitoring statistical evaluation using the past eight compliance sampling events.

[6] Comparison and discussion based on constituents that triggered corrective measures under the RCRA CCR program.

[7] TRC. 2020. *2019 Annual Groundwater Monitoring Report* – JC Weadock Power Plant Landfill CCR Unit. Prepared for Consumers Energy Company. January.

[8] TRC. 2023. *2022 Semiannual Groundwater Monitoring Report and Fourth Quarter 2022 Hydrogeological Monitoring Report* – JC Weadock Solid Waste Disposal Area. January.

- **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 Report. Additionally, Table G2 of the *2*2Q2 HMP Report 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 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 the ASD. Additionally, boron concentrations at MW-55 have decreased since 2010, as evidenced by the time series plots in Appendix G of the 22Q4 HMP Report. 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 22Q4 HMP Report 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 (Attachment A). 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 beryllium and lithium concentrations in JCW-MW-15009 have been below the GWPS for the past seven and eight semiannual sampling events, respectively.

Summary

The nature and extent of arsenic, beryllium, and lithium in the shallow water-bearing unit is defined in accordance with the Federal CCR rule 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. Risk from potential exposure to groundwater is managed.

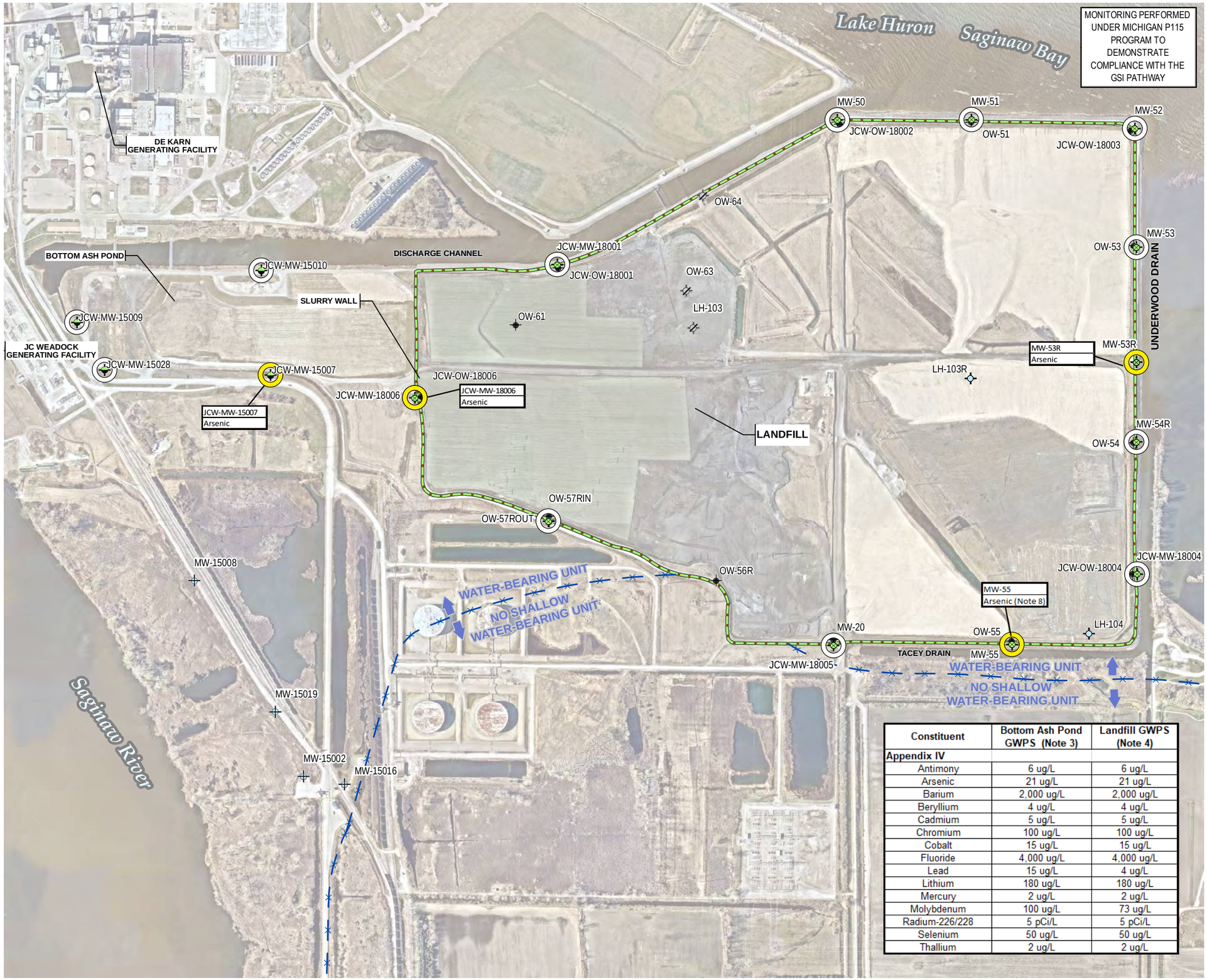
Attachments

Figure 1 Nature and Extent Summary: GWPS Exceedances

Attachment A Time Series Graphs

Figure

TRC - GIS
Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foot)
Projection: Transverse Mercator
Datum: North American 1983
False Easting: 13123359.580
False Northing: 0.000
Central Meridian: -84.366667
Scale Factor: 0.999909091
Latitude Of Origin: 41.083333
Linear Unit: Foot (0.304800)
Plot Date: 1/11/2023, 13:03:32 PM by B.LEE -- LAYOUT: ANSI B (11"x17")
Path: S:\1-PROJECTS\Consumers Energy Company\Michigan\CCR GW\2017 26976\418426-Base Mapping\GWPS 062022.mxd



Constituent	Bottom Ash Pond GWPS (Note 3)	Landfill GWPS (Note 4)
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-226/228	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
- DECOMMISSIONED MONITORING WELL
- JCW BOTTOM ASH POND MONITORING WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- LEACHATE HEADWELL
- NO EXCEEDANCES
- TWO OR MORE EXCEEDANCES (NOTES 5 & 6)
- STATISTICALLY SIGNIFICANT GWPS EXCEEDANCE (NOTE 7)
- SLURRY WALL (APPROXIMATE)
- APPROXIMATE WATER-BEARING UNIT BOUNDARY

WELL ID
CONSTITUENT(S) EXCEEDING GWPS

*GWPS EXCEEDANCE TRIGGERED ASSESSMENT OF CORRECTIVE MEASURES PURSUANT TO §257.96

NOTES

1. BASE MAP IMAGERY FROM NEARMAP, (5/4/2022).
2. MONITORING WELL AND SLURRY WALL LOCATIONS PROVIDED BY CEC; SG21733SHT2 REVB.DWG DATED 11/21/2018
3. GWPS (GROUNDWATER PROTECTION STANDARD) IS THE HIGHER OF THE MAXIMUM CONTAMINANT LEVEL (MCL)/REGIONAL SCREENING LEVEL FROM 83 FR 36435 (RSL) AND UPPER TOLERANCE LIMIT (UTL) AS ESTABLISHED IN TRC'S TECHNICAL MEMORANDUM DATED OCTOBER 15, 2018.
4. 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.
5. GROUNDWATER DATA FROM APRIL 2019 TO OCTOBER 2022 ARE SCREENED AGAINST THE GWPS FOR EVALUATION PURPOSES ONLY. AN EXCEEDANCE IS DEFINED AS A SINGLE DETECTION ABOVE THE GWPS, HOWEVER, CONFIDENCE INTERVALS ARE USED TO DETERMINE COMPLIANCE PER THE CCR RULES.
6. 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 JC WEADOCK BOTTOM ASH POND AND LANDFILL REMEDY SELECTION.
7. LOWER CONFIDENCE LIMIT IS ABOVE GWPS.
8. ALTERNATE SOURCE DEMONSTRATION INCLUDED IN 2019 ANNUALGROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT (TRC, JANUARY 2020).

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:	B. LEE	PROJ. NO.:	464096.0001
CHECKED BY:	K. LOWERY		
APPROVED BY:	D. LITZ		**FIGURE 1**
DATE:	JANUARY 2023		

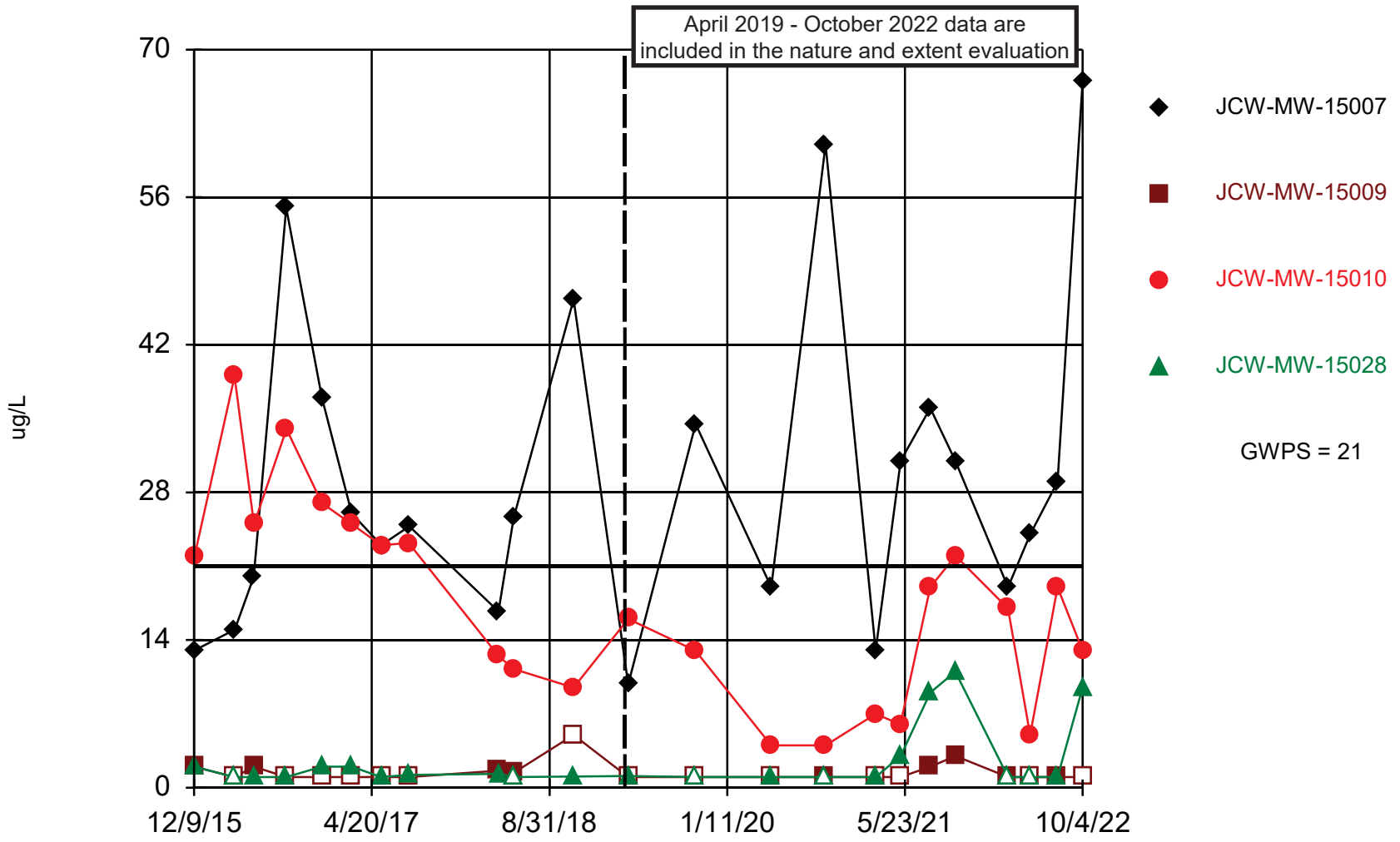
TRC
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
www.trcsolutions.com

FILE NO.: 418426-ExceedancesNE_GWPS_062022.mxd

Attachment A
Time Series Graphs

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Arsenic Comparison to GWPS

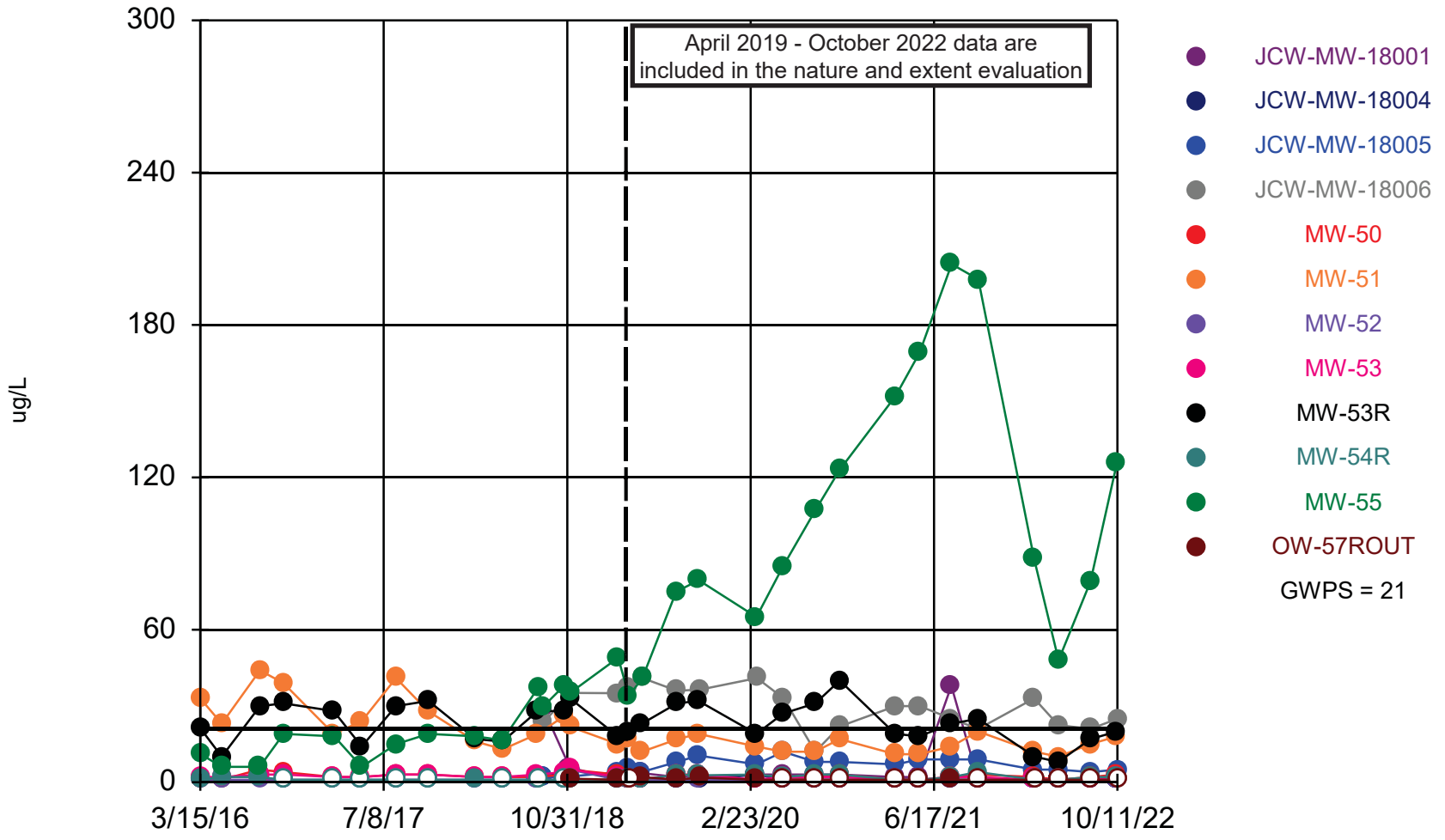


Time Series Analysis Run 12/6/2022 3:40 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Arsenic Comparison to GWPS

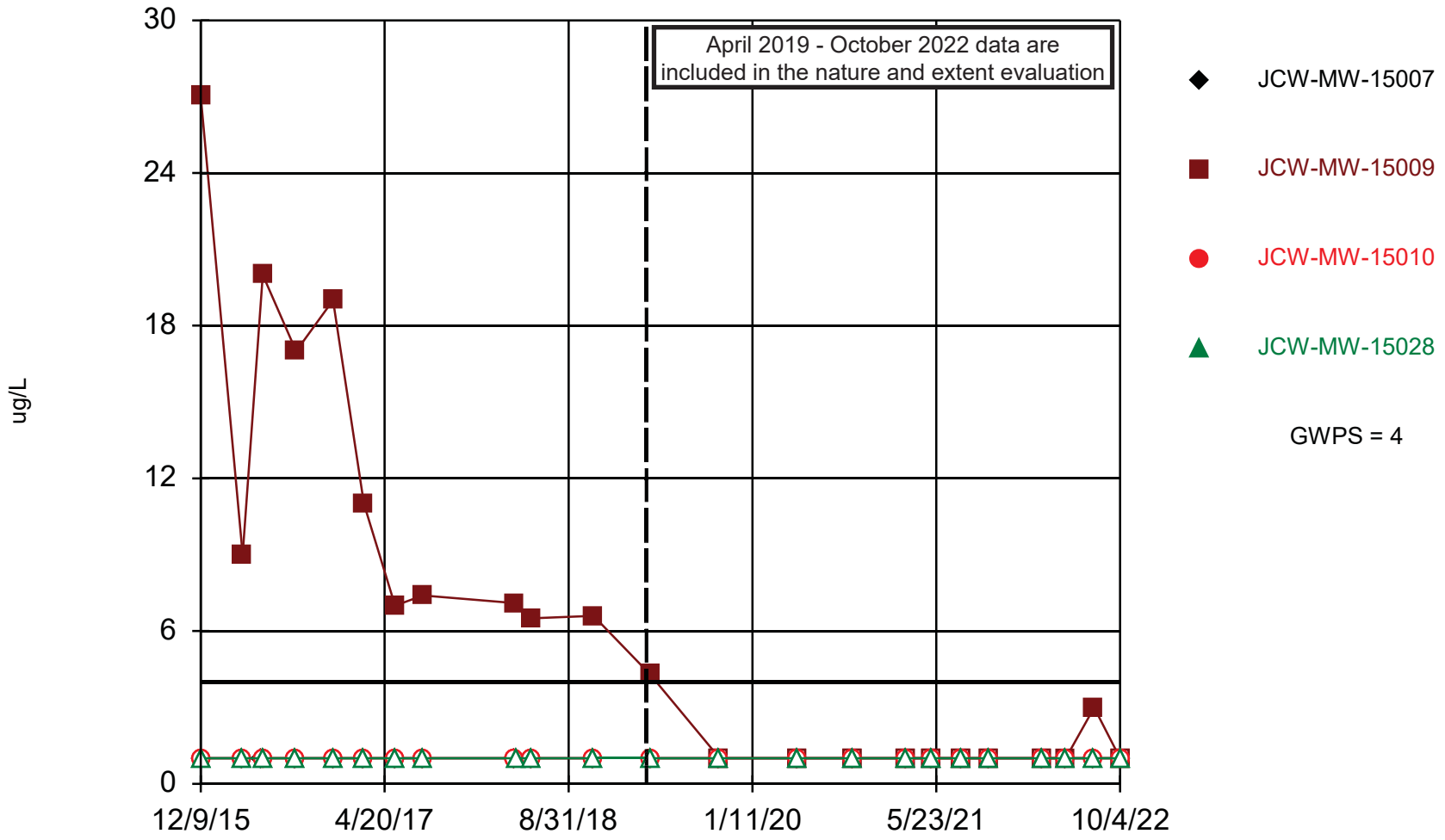


Time Series Analysis Run 12/6/2022 3:48 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Beryllium Comparison to GWPS

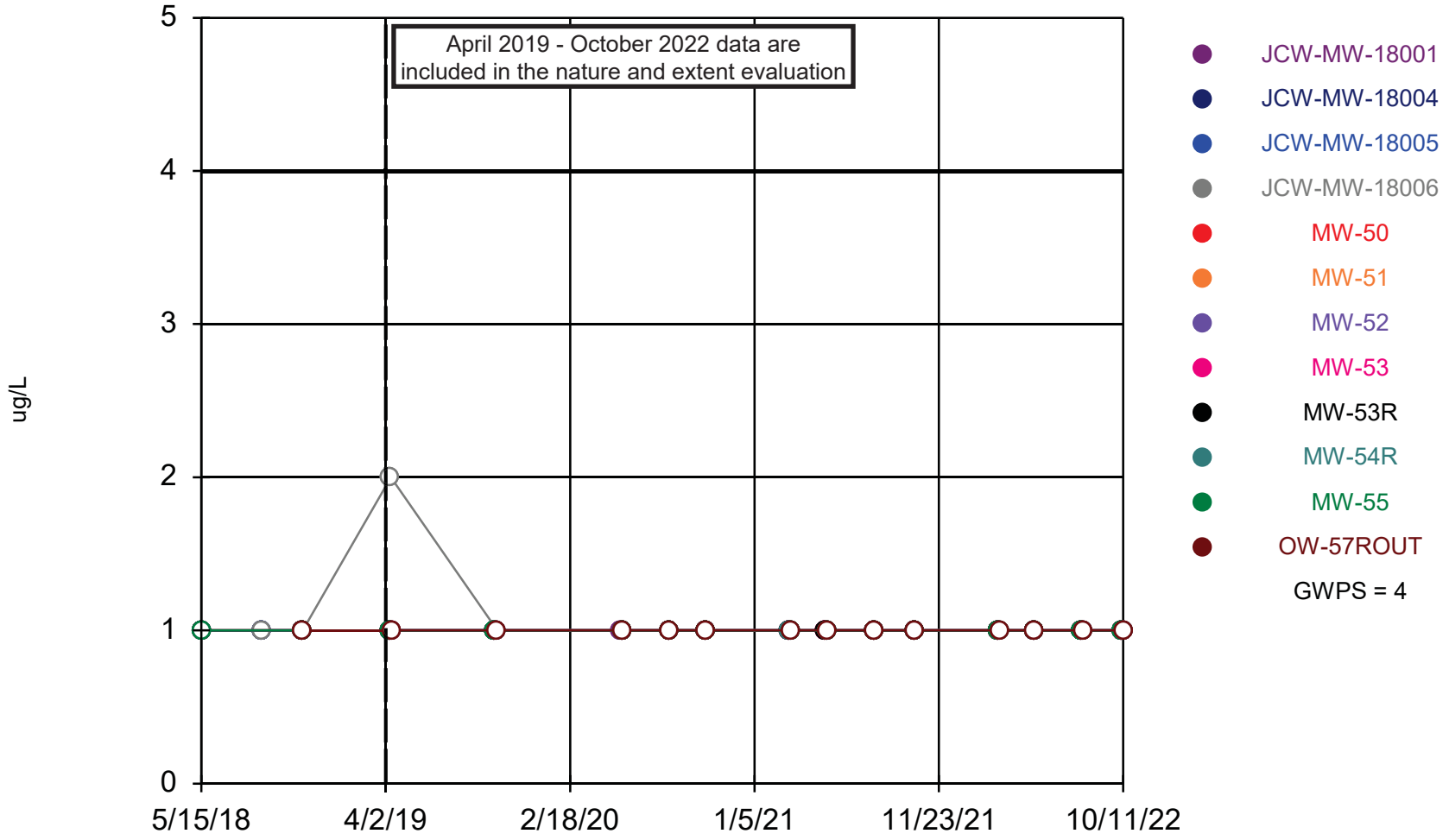


Time Series Analysis Run 12/6/2022 3:42 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG
Hollow symbols indicate censored values.

Beryllium Comparison to GWPS

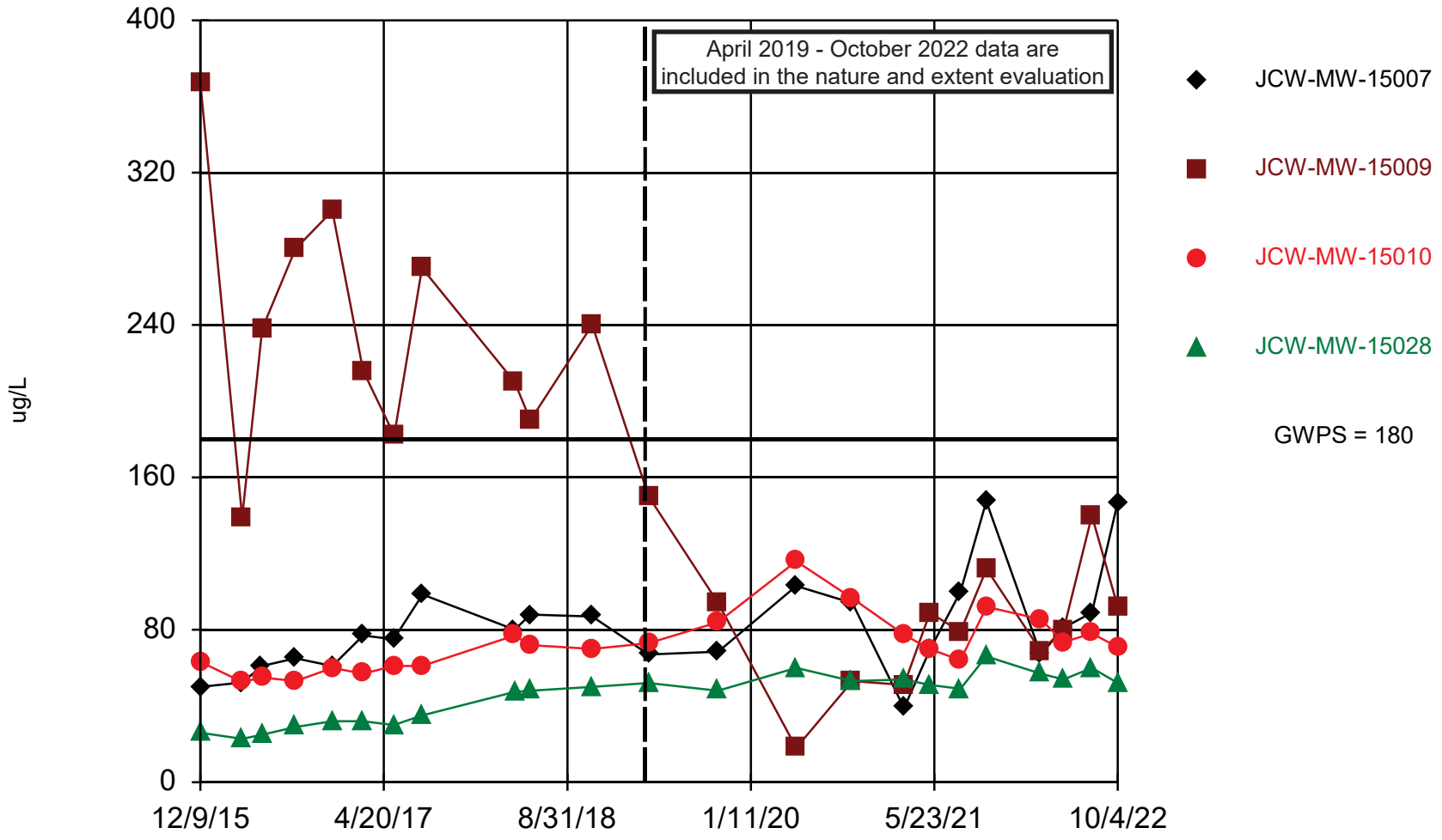


Time Series Analysis Run 12/6/2022 3:47 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Lithium Comparison to GWPS

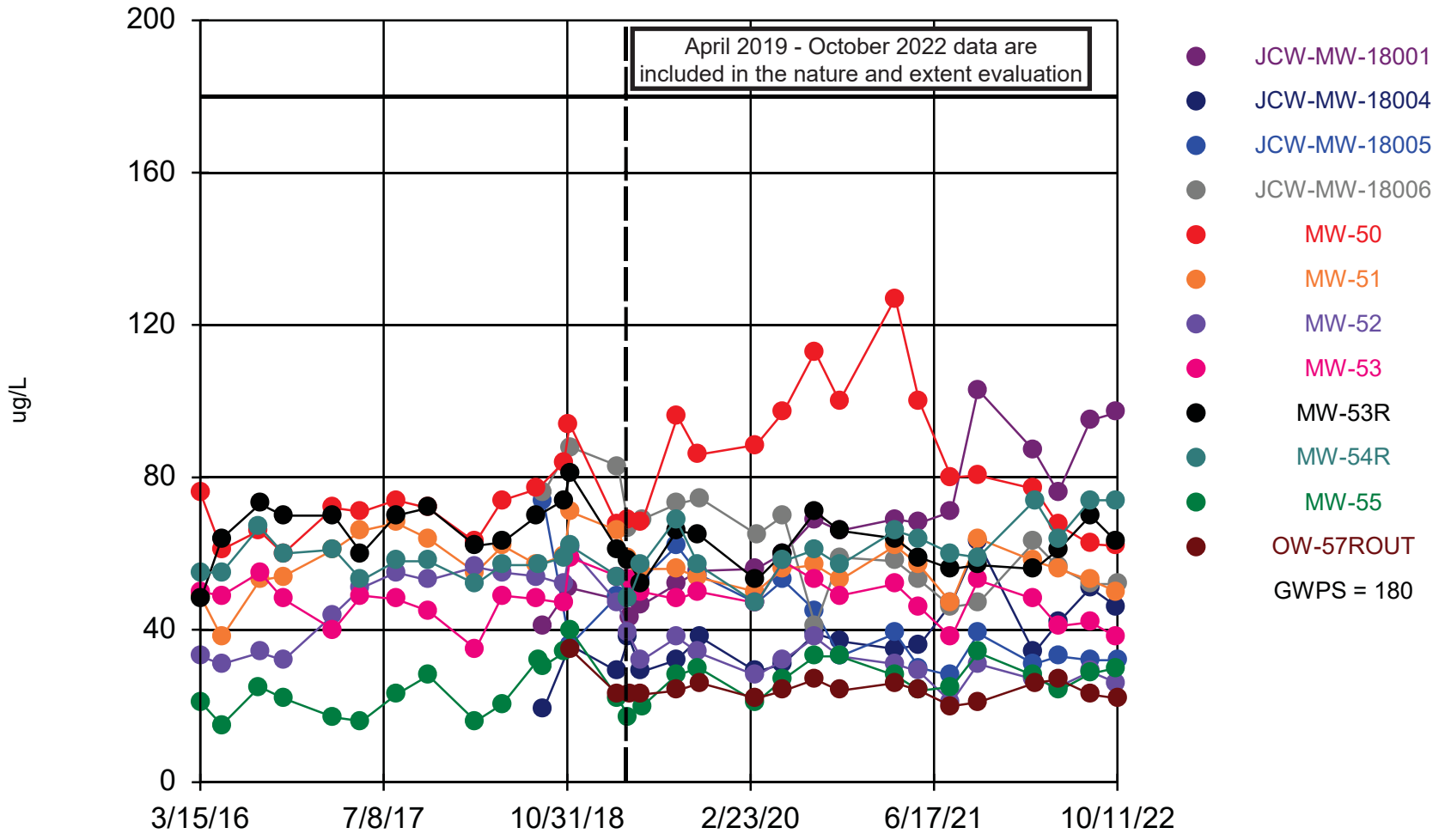


Time Series Analysis Run 12/6/2022 3:43 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4

Sanitas™ v.9.6.32 Sanitas software licensed to Consumers Energy. UG

Lithium Comparison to GWPS



Time Series Analysis Run 12/6/2022 3:46 PM

Client: Consumers Energy Data: JCW_HMPCCR_Sanitas_22Q4