



2021 Annual Groundwater Monitoring and Corrective Action Report

**JH Campbell Power Plant
Pond 3 North and 3 South CCR Unit**

West Olive, Michigan

January 2022

A handwritten signature in black ink, appearing to read "Sarah B. Holmstrom".

Sarah B. Holmstrom, P.G.
Project Manager/Sr. Hydrogeologist

Prepared For:

Consumers Energy Company

Prepared By:

TRC
1540 Eisenhower Place
Ann Arbor, Michigan 48108

A handwritten signature in black ink, appearing to read "Graham Crockford".

Graham Crockford, C.P.G.
Program Manager

TABLE OF CONTENTS

Executive Summary	iii
1.0 Introduction	1
1.1 Program Summary	1
1.2 Site Overview	2
1.3 Geology/Hydrogeology	2
2.0 Groundwater Monitoring	3
2.1 Monitoring Well Network.....	3
2.2 Semiannual Groundwater Monitoring.....	4
2.2.1 Data Summary	4
2.2.2 Data Quality Review.....	4
2.2.3 Groundwater Flow Rate and Direction.....	4
3.0 Statistical Evaluation	6
3.1 Establishing Groundwater Protection Standards.....	6
3.2 Data Comparison to Groundwater Protection Standards	6
4.0 Corrective Action	7
5.0 Conclusions and Recommendations	8
6.0 References	9

TABLES

Table 1	Summary of Groundwater Elevation Data – April & October 2021
Table 2	Summary of Field Parameter Results – April & October 2021
Table 3	Summary of Background Groundwater Sampling Results (Analytical) – April & October 2021
Table 4	Summary of Pond 3 Groundwater Sampling Results (Analytical) – April & October 2021
Table 5	Summary of Groundwater Protection Standard Exceedances – April 2021
Table 6	Summary of Groundwater Protection Standard Exceedances – October 2021

FIGURES

Figure 1	Site Location Map
Figure 2	Site Plan With CCR Monitoring Well Locations
Figure 3	Groundwater Contour Map – April 2021
Figure 4	Groundwater Contour Map – October 2021

APPENDICES

Appendix A	Data Quality Reviews
Appendix B	April 2021 Assessment Monitoring Statistical Evaluation
Appendix C	October 2021 Assessment Monitoring Statistical Evaluation

Executive Summary

On behalf of Consumers Energy, TRC has prepared this report for the JH Campbell (JHC) Pond 3 to cover the period of January 1, 2021 to December 31, 2021 and document the status of groundwater monitoring and corrective action for 2021 in accordance with §257.90(e).

Consumers Energy first reported the potential for statistically significant increases (SSIs) for Appendix III constituents in the *Annual Groundwater Monitoring Report, JH Campbell Power Plant, Unit 3 North and 3 South CCR Unit* (TRC, January 2018). The statistical evaluation of the Appendix III indicator parameters confirming SSIs over background were as follows:

- Boron at JHC-MW-15012, JHC-MW-15013, JHC-MW-15015 and JHC-MW-15016;
- Calcium at JHC-MW-15015 and JHC-MW-15016;
- Sulfate at JHC-MW-15012, JHC-MW-15013, JHC-MW-15015 and JHC-MW-15016; and
- Total dissolved solids (TDS) at JHC-MW-15015 and JHC-MW-15016.

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 compared the assessment monitoring data to the groundwater protection standards (GWPSs) to determine whether or not Appendix IV constituents are detected at statistically significant levels above the GWPSs in accordance with §257.95. The eight semiannual statistical evaluations performed to date, included those in the 2021 reporting period, have showed that no Appendix IV constituents were present at statistically significant levels above the GWPSs. Therefore, Consumers Energy remains in assessment monitoring and will not seek to initiate an assessment of corrective measures pursuant to 257.95(g)(3).

Consumers Energy will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98. The next semiannual assessment monitoring events are tentatively scheduled for the second and fourth calendar quarter of 2022.

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) (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) Ponds 3 North and 3 South at the JH Campbell Power Plant Site (JHC Pond 3). 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).

On behalf of Consumers Energy, TRC has prepared this Annual Groundwater Monitoring Report for calendar year 2021 activities at the JHC Pond 3. Assessment monitoring is ongoing at Pond 3 as specified in §257.95. Data that have been collected and evaluated in 2021 are presented in this report.

1.1 Program Summary

Consumers Energy first reported the potential for statistically significant increases (SSIs) for Appendix III constituents in the *Annual Groundwater Monitoring Report, JH Campbell Power Plant, Unit 3 North and 3 South CCR Unit* (TRC, January 2018). The statistical evaluation of the Appendix III indicator parameters confirming SSIs over background were as follows:

- Boron at JHC-MW-15012, JHC-MW-15013, JHC-MW-15015 and JHC-MW-15016;
- Calcium at JHC-MW-15015 and JHC-MW-15016;
- Sulfate at JHC-MW-15012, JHC-MW-15013, JHC-MW-15015 and JHC-MW-15016; and
- Total dissolved solids (TDS) at JHC-MW-15015 and JHC-MW-15016.

As discussed in the *2018 Annual Groundwater Monitoring Report for the JH Campbell Power Plant Units 3 North and 3 South CCR Unit* (2018 Annual Report) (TRC, January 2019), Consumers Energy initiated an Assessment Monitoring Program for the JHC Pond 3 CCR unit pursuant to §257.95 of the CCR Rule that included sampling and analyzing groundwater within the groundwater monitoring system for all constituents listed in Appendix III and Appendix IV. On April 25, 2018, Consumers Energy entered assessment monitoring upon determining that an Alternate Source Demonstration for the Appendix III constituents was not successful.

In accordance with §257.93(h)(2) and within the compliance schedule clarified by the USEPA in April 2018, the first round of semiannual assessment monitoring data was statistically evaluated against the Groundwater Protection Standards (GWPSs) as reported on January 14, 2019 and placed in the operating record in accordance with §257.105(h)(8). This comparison showed that no Appendix IV constituents were present at statistically significant levels above the GWPSs. Therefore, Consumers Energy remained in assessment monitoring. The seven subsequent assessment monitoring evaluations, including those in the 2021 reporting period, have also indicated that no Appendix IV constituents have been present in downgradient monitoring wells

at statistically significant levels exceeding the GWPSs. Therefore, the Pond 3 monitoring system remained in assessment monitoring and has continued to be sampled for the Appendix III and Appendix IV constituents and statistically evaluated on a semiannual basis in accordance with §257.95. Assessment monitoring data that have been collected and evaluated in 2021 are presented in this report.

1.2 Site Overview

The JH Campbell Plant is a coal fired power generation facility located in West Olive, Michigan, on the eastern shore of Lake Michigan. It is bordered by the Pigeon River on the south, 156th Avenue on the east, and Croswell Street to the north with Lakeshore Drive bisecting the site from north to south. The power generating plant consists of three coal fired electric generating units located on the western side of the site and the CCR disposal area is on the east side of the site, east of Lakeshore Drive. Figure 1 is a site location map showing the facility and the surrounding area.

Currently, there are no remaining active CCR surface impoundments at the JHC solid waste disposal facility. The CCR surface impoundments located within the former wet ash pond area are Pond 1-2 Bottom Ash Ponds (Ponds 1-2), Pond 3 North and Pond 3 South Bottom Ash Pond (collectively Pond 3), and Pond A. Site features are shown on Figure 2.

The surface impoundments in the wet ash pond areas (Pond 3 and Ponds 1-2) were decommissioned throughout 2017 and 2018 and replaced with concrete bottom ash treatment tanks. Dry ash from all of the generating units is stored in silos until it is placed into the facility or is sold and shipped off site.

This report focuses on the former Pond 3 CCR Unit.

1.3 Geology/Hydrogeology

The upgradient/background wells are located to the north-northwest of the Dry Ash Landfill. Groundwater is typically encountered at elevations ranging from 604 feet near the background wells to 590 feet along the southeast corner of the Dry Ash Landfill and south of the former Ponds 1-2 and Pond A CCR surface impoundments and generally flows to the south-southeast toward the Pigeon River. The subsurface materials encountered at the JH Campbell site generally consist of approximately 40 to 60 feet of poorly graded, fine-grained lacustrine sand. A laterally extensive clay-rich till is generally encountered within approximately 40 to 60 ft bgs across the site that according to deep drilling logs conducted at the JH Campbell Power Plant (just west of the CCR units) is on the order of 80 feet thick and extends to the top of shale bedrock approximately 140 ft bgs.

2.0 Groundwater Monitoring

2.1 Monitoring Well Network

In accordance with 40 CFR 257.91, Consumers Energy established a groundwater monitoring system for Pond 3, which currently consists of 12 monitoring wells (6 background monitoring wells, 4 downgradient monitoring wells, and 2 upgradient monitoring wells) that are screened in the uppermost aquifer. The monitoring well locations are shown on Figure 2. Six monitoring wells located north-northwest of the Dry Ash Landfill provide data on background groundwater quality that has not been affected by CCR management at the site (JHC-MW-15023 through JHC-MW-15028). Background groundwater quality data from these six background wells are additionally used for the CCR groundwater monitoring program at three other JH Campbell CCR units.

Six Background Monitoring Wells:

- JHC-MW-15023 through JHC-MW-15028

Due to the cessation of hydraulic loading and decommissioning of Pond 3, the groundwater flow direction changed significantly from the previous baseline and assessment monitoring events such that groundwater flow is generally toward the south/southwest at Pond 3. As a result, Pond 3 monitoring wells JHC-MW-15015 and JHC-MW-15016 are no longer positioned downgradient from Pond 3. In response, as documented in the 2018 Annual Report, Consumers Energy installed three new downgradient wells on December 3 through December 5, 2018 and collected additional data from these new wells to reassess groundwater flow and ensure a sufficient number of wells were appropriately located to assess groundwater quality downgradient from the Pond 3 CCR Unit. As documented in the 2019 Annual Groundwater Monitoring Report, JH Campbell Power Plant, Unit 3 North and 3 South CCR Unit (2019 Annual Report) (TRC January 2020), sampling data from 2018 and 2019 confirmed that monitoring wells JHC-MW-18001, JHC-MW-18002, and JHC-MW-18003 are appropriately positioned to assess groundwater quality downgradient from the Pond 3 CCR Unit. Therefore, JHC-MW-18001, JHC-MW-18002, and JHC-MW-18003 were added to the downgradient monitoring network, in addition to existing downgradient monitoring well JHC-MW-15013, for Pond 3.

Monitoring wells JHC-MW-15015 and JHC-MW-15016 were historically located downgradient of Pond 3 when flow was radially outward and will continue to be sampled and evaluated as part of the assessment monitoring program to evaluate groundwater quality post-CCR removal.

The Pond 3 monitoring network consists of:

Pond 3 Downgradient Monitoring Wells:

- JHC-MW-18001
- JHC-MW-18002
- JHC-MW-18003
- JHC-MW-15013

Other Pond 3 Assessment Monitoring Wells (currently located upgradient):

- JHC-MW-15015
- JHC-MW-15016

As shown on Figure 2, monitoring wells JHC-MW-15029 and JHC-MW-15030 are used for water level measurements only. Static water level data are collected at additional wells throughout the JH Campbell CCR units and used to construct a site-wide groundwater contour map. No changes to the Pond 3 monitoring well network were made in 2021.

2.2 Semiannual Groundwater Monitoring

Per §257.95(d), all wells in the CCR unit monitoring program must be sampled at least semiannually. One semiannual event must include analysis for all constituents from Appendix III and Appendix IV constituents and one semiannual event may include analysis for those constituents in Appendix IV of the CCR Rule that were detected during prior sampling. In addition to the Appendix III and IV constituents, field parameters including dissolved oxygen, oxidation reduction potential, specific conductivity, temperature, and turbidity were collected at each well. Samples were collected and analyzed in accordance with the *Sample Analysis Plan for JH Campbell Ponds 1-2 and Pond 3* (SAP) (TRC, 2021).

2.2.1 Data Summary

The first semiannual groundwater assessment monitoring event for 2021 was performed on April 12 through 14, 2021 and the second semiannual groundwater assessment monitoring event for 2021 was performed on October 19 through 22, 2021. Both events were performed by Consumers Energy, and samples were analyzed by Consumers Energy Laboratory Services in Jackson, Michigan, with radium samples analyzed by TestAmerica Laboratories in St Louis, Missouri in accordance with the SAP. Static water elevation data were collected at all monitoring well locations. Groundwater samples were collected from the six background monitoring wells and six Pond 3 monitoring wells for the Appendix III and Appendix IV constituents and field parameters.

A summary of the groundwater data collected during April and October 2021 events are provided on Table 1 (static groundwater elevation data), Table 2 (field data), Table 3 (background analytical results), and Table 4 (Pond 3 analytical results).

2.2.2 Data Quality Review

Data from each round 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 CCR monitoring program. The data quality reviews are summarized in Appendix A.

2.2.3 Groundwater Flow Rate and Direction

Groundwater elevations measured across the Site during the April and October 2021 events are provided on Table 1. April 2021 and October 2021 groundwater elevations were used to construct the groundwater contour maps provided on Figure 3 and Figure 4, respectively. The

average hydraulic gradient of 0.0038 ft/ft in April 2021 was calculated using the following well pairs: JHC-MW-15029/JHC-MW-15030, JHC-MW-15029/JHC-MW-15005, JHC-MW-15019/JHC-MW-15035 and JHC-MW-15023/JHC-MW-15037 (Figure 2). The average hydraulic gradient of 0.0036 ft/ft in October 2021 was calculated using the following well pairs: JHC-MW-15026/PZ-23S, MW-15017/PZ-24S, and JHC-MW-15024/JHC-MW-15031 (Figure 2). Using the mean hydraulic conductivity of 62 ft/day (ARCADIS, 2016) and an assumed effective porosity of 0.4, the estimated average seepage velocity is approximately 0.59 ft/day or 215 ft/year for the April 2021 event, and approximately 0.56 ft/day or 200 ft/year for the October 2021 event.

The general groundwater flow direction is similar to that identified in previous monitoring rounds and continues to demonstrate that the downgradient wells are appropriately positioned to detect the presence of Appendix IV constituents that could potentially migrate from Pond 3.

3.0 Statistical Evaluation

Assessment monitoring is continuing at the JHC Pond 3 in accordance with §257.95. The following section summarizes the statistical approach applied to assess the 2021 groundwater data in accordance with the assessment monitoring program. The statistical evaluations details are provided in Appendix B (*April 2021 Assessment Monitoring Data Summary and Statistical Evaluation*) and Appendix C (*October 2021 Assessment Monitoring Data Summary and Statistical Evaluation*).

3.1 Establishing Groundwater Protection Standards

The Groundwater Protection Standards (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. The calculation of the GWPSs is documented in the Groundwater Protection Standards technical memorandum included in Appendix C of the 2018 Annual Report (TRC, January 2019).

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), 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. As presented in the 2020 Annual Report, the statistical data comparison for the 2020 semiannual assessment monitoring events indicated that no Appendix IV constituents were present at statistically significant levels exceeding the GWPSs. Therefore, assessment monitoring continued in 2021.

The statistical data comparison for the April 2021 (Appendix B) and October 2021 (Appendix C) semiannual assessment monitoring events continue to indicate that no Appendix IV constituents were present at statistically significant levels exceeding the GWPSs. Therefore, Consumers Energy has continued assessment monitoring.

Overall, the statistical assessments have confirmed that no Appendix IV constituents are present at statistically significant levels above the GWPSs. Due to the changes in groundwater flow direction subsequent to pond decommissioning, monitoring wells JHC-MW-15015 and JHC-MW-15016 are no longer downgradient of groundwater flow across the Pond 3 area. However, as discussed in Section 2.1, they will continue to be sampled and evaluated as part of the assessment monitoring program and used to evaluate groundwater quality post-CCR removal. A summary of the confidence intervals for April 2021 and October 2021 are provided in Table 5 and Table 6, respectively.

Per §257.95(e), Consumers Energy can return to detection monitoring at Pond 3 if the concentrations of all of the Appendix III and IV constituents are at or below background values for two consecutive events, using the statistical procedures included in §257.93(g). As shown on Table 4, several Appendix III and Appendix IV constituents are above the background upper tolerance limits (UTLs). Therefore, Consumers Energy will continue semiannual assessment monitoring per §257.95(d).

4.0 Corrective Action

There were no corrective actions needed or performed for Pond 3 within the calendar year 2021. The semiannual assessment monitoring analysis completed to-date indicate that no Appendix IV constituents are present at statistically significant levels exceeding the GWPSs. Therefore, Consumers Energy has continued semiannual assessment monitoring at Pond 3 per §257.95(d) and will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

5.0 Conclusions and Recommendations

Assessment monitoring groundwater samples are collected semiannually from the Pond 3 groundwater monitoring system wells and analyzed for Appendix III and Appendix IV constituents pursuant to §257.95(d). Pond 3 has been decommissioned and CCRs have been removed. The semiannual assessment monitoring analysis completed to-date indicates that no Appendix IV constituents are present at statistically significant levels exceeding the GWPSs. Therefore, Consumers Energy has continued semiannual assessment monitoring at Pond 3 and continues to evaluate groundwater quality post-CCR removal. Data that has been collected and evaluated in 2021 are presented in this report.

Per §257.95(e), Consumers Energy can return to detection monitoring at the Pond 3 if the concentrations of all of the Appendix III and IV constituents are at or below background values for two consecutive events, using the statistical procedures included in §257.93(g). Several Appendix III and Appendix IV constituents remain above the background levels. Therefore, Consumers Energy will continue semiannual assessment monitoring per §257.95(d) and will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

The next semiannual monitoring events are scheduled for the second and fourth calendar quarters of 2022.

6.0 References

- ARCADIS. May 13, 2016. Summary of Monitoring Well Design, Installation, and Development – Bottom Ash Pond Unit 3N/3S. JH Campbell Electric Generation Facility – West Olive, Michigan. Prepared for Consumers Energy Company.
- ARCADIS. May 18, 2016. Electric Generation Facilities RCRA CCR Detection Monitoring Program. JH Campbell Monitoring Program Sample and Analysis Plan, West Olive, Michigan. Prepared for Consumers Energy Company.
- Consumers Power Company. September 1996. Hydrogeological Monitoring Plan for JH Campbell Ash Storage Facility, Consumers Power Company, Solid Waste Disposal Area, Coal Ash, Type III.
- TRC Environmental Corporation. October 2017. Groundwater Statistical Evaluation Plan – JH Campbell Power Plant, Units 3 North and 3 South, West Olive, Michigan. Prepared for Consumers Energy Company.
- TRC Environmental Corporation. October 15, 2018. Groundwater Protection Standards, Consumers Energy, JH Campbell Site, Bottom Ash Pond Units 3 North and 3 South CCR Unit, technical memorandum prepared for Consumers Energy Company.
- TRC Environmental Corporation. January 2019. 2018 Annual Groundwater Monitoring Report, JH Campbell Power Plant, Unit 3 North and 3 South CCR Unit, West Olive, Michigan. Prepared for Consumers Energy Company.
- TRC. January 2020. 2019 Annual Groundwater Monitoring Report, JH Campbell Power Plant, Unit 3 North and 3 South CCR Unit, West Olive, Michigan. Prepared for Consumers Energy Company.
- TRC. January 2021. 2020 Annual Groundwater Monitoring Report, JH Campbell Power Plant, Unit 3 North and 3 South CCR Unit, West Olive, Michigan. Prepared for Consumers Energy Company.
- TRC. January 2021. Sample and Analysis Plan, JH Campbell Power Plant Ponds 1-2 and Pond 3, West Olive, Michigan. Prepared for Consumers Energy Company.
- USEPA. 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance. Office of Conservation and Recovery. EPA 530/R-09-007.
- USEPA. April 2015. 40 CFR Parts 257 and 261. Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule. 80 Federal Register 74 (April 17, 2015), pp. 21301-21501 (80 FR 21301).
- USEPA. July 2018. 40 CFR Part 257. Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; Amendments to the National Minimum Criteria (Phase One, Part One); Final Rule. 83 Federal Register 146 (July 30, 2018), pp. 36435-36456 (83 FR 36435).

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 – April & October 2021
 JH Campbell – RCRA CCR Monitoring Program
 West Olive, Michigan

Well Location	Ground Surface Elevation (ft)	TOC Elevation (ft)	Geologic Unit of Screen Interval	Screen Interval Elevation (ft)	April 12, 2021		October 19, 2021		
					Depth to Water (ft BTOC)	Groundwater Elevation (ft)	Depth to Water (ft BTOC)	Groundwater Elevation (ft)	
Background									
JHC-MW-15023	617.01	619.98	Sand	603.0 to 593.0	17.63	602.35	19.00	600.98	
JHC-MW-15024	613.79	616.62	Sand	606.8 to 596.8	12.92	603.70	14.15	602.47	
JHC-MW-15025	614.14	617.17	Sand	607.1 to 597.1	12.12	605.05	13.36	603.81	
JHC-MW-15026	615.09	618.04	Sand	607.1 to 597.1	13.85	604.19	15.11	602.93	
JHC-MW-15027	614.77	617.30	Sand	604.8 to 594.8	14.22	603.08	15.47	601.83	
JHC-MW-15028	611.02	613.80	Sand	603.0 to 593.0	14.03	599.77	15.06	598.74	
JHC-MW-15029	608.08	610.95	Sand	600.1 to 590.1	11.55	599.40	12.11	598.84	
JHC-MW-15030	604.05	607.17	Sand	600.1 to 590.1	9.58	597.59	10.32	596.85	
Pond 1N, 1S, 2N, 2S									
JHC-MW-15001	607.02	609.53	Sand	603.5 to 598.5	11.49	598.04	Dry		
JHC-MW-15002	618.18	621.27	Sand	590.2 to 580.2	25.16	596.11	25.35	595.92	
JHC-MW-15003	623.16	627.20	Sand	595.2 to 585.2	33.31	593.89	33.47	593.73	
JHC-MW-15005	606.22	609.99	Sand	579.2 to 569.2	18.50	591.49	18.50	591.49	
JHC-MW-18004	602.92	605.72	Sand	596.9 to 586.9	12.37	593.35	12.69	593.03	
JHC-MW-18005	600.30	603.16	Sand	595.3 to 585.3	10.50	592.66	11.90	591.26	
Pond 3N, 3S									
JHC-MW-15013	632.40	635.25	Sand	604.4 to 594.4	35.75	599.50	35.91	599.34	
JHC-MW-15015	632.46	635.20	Sand	604.5 to 594.5	35.07	600.13	35.30	599.90	
JHC-MW-15016	631.81	632.52	Sand	603.8 to 593.8	32.44	600.08	33.71	598.81 ⁽⁵⁾	
JHC-MW-18001	609.09	611.98	Sand	603.1 to 593.1	12.52	599.46	12.85	599.13	
JHC-MW-18002	605.53	608.93	Sand	602.0 to 592.0	9.48	599.45	9.67	599.26	
JHC-MW-18003	605.36	608.78	Sand	601.9 to 591.9	9.38	599.40	9.61	599.17	
Landfill									
JHC-MW-15017	613.69	616.61	Sand	603.7 to 593.7	15.57	601.04 ⁽³⁾	16.40	600.21	
JHC-MW-15018	614.26	617.02	Sand	604.3 to 594.3	16.30	600.72 ⁽³⁾	17.05	599.97	
JHC-MW-15019	609.81	612.86	Sand	603.8 to 593.8	12.64	600.22 ⁽³⁾	Decommissioned		
JHC-MW-15022	620.92	623.79	Sand	597.9 to 587.9	28.76	595.03 ⁽⁴⁾	29.53	594.26	
JHC-MW-15031	632.94	635.87	Sand	599.9 to 589.9	43.31	592.56 ⁽⁴⁾	43.65	592.22	
JHC-MW-15032	611.32	614.29	Sand	598.3 to 588.3	16.98	597.31 ⁽³⁾	17.99	596.30	
JHC-MW-15033	618.08	620.99	Sand	602.1 to 592.1	21.82	599.17 ⁽³⁾	23.03	597.96	
JHC-MW-15034	612.90	615.97	Sand	601.9 to 591.9	15.71	600.26 ⁽³⁾	16.97	599.00	
JHC-MW-15035	632.53	634.28	Sand	599.5 to 589.5	40.75	593.53	41.11	593.17	
JHC-MW-15036	617.94	618.34	Sand	597.9 to 587.9	26.70	591.64	27.13	591.21	
JHC-MW-15037	614.28	616.06	Sand	591.3 to 586.3	25.05	591.01	25.55	590.51	
Pond A									
JHC-MW-15006	624.74	627.58	Sand	599.7 to 589.7	35.22	592.36	35.91	591.67	
JHC-MW-15007	624.82	627.70	Sand	602.8 to 592.8	Dry		Decommissioned		
JHC-MW-15007R ⁽²⁾	625.73	628.26	Sand	595.7 to 585.7	Not Installed		37.00	591.26	
JHC-MW-15008R ⁽¹⁾	632.32	634.67	Sand	597.3 to 587.3	43.24	591.43	44.04	590.63	
JHC-MW-15009	632.33	635.32	Sand	602.3 to 592.3	Dry		Decommissioned		
JHC-MW-15009R ⁽²⁾	632.15	635.05	Sand	595.2 to 585.2	Not Installed		43.87	591.18	
JHC-MW-15010	632.55	635.57	Sand	602.6 to 592.6	Dry		Decommissioned		
JHC-MW-15011	627.71	630.83	Sand	600.7 to 590.7	38.87	591.96	Decommissioned		
JHC-MW-15011R ⁽²⁾	627.73	629.79	Sand	594.7 to 584.7	Not Installed		38.29	591.50	
Downgradient Wells									
MW-13	593.40	595.37	Clayey Silt	587.9 to 585.4	Dry		Dry		
MW-14S	587.36	590.98	Sand	582.9 to 577.9	9.60	581.38	10.02	580.96	
PZ-23S	602.84	604.97	Sand	591.8 to 586.8	15.96	589.01	15.61	589.36	
PZ-24S	586.56	590.15	Sand	584.6 to 579.6	7.23	582.92	8.59	581.56	
PZ-40S	589.51	593.25	Sand	585.5 to 575.5	10.83	582.42	11.99	581.26	
TW-19-04A	608.15	611.44	Sand	591.2 to 586.2	22.34	589.10	23.00	588.44	
TW-19-05	603.44	606.36	Sand	592.8 to 587.8	16.03	590.33	17.09	589.27	
TW-19-06A	599.61	602.54	Sand	592.3 to 587.3	13.18	589.36	14.13	588.41	

Notes:

Survey conducted by Nederveld, November 2015, October 2018, December 2018, August 2019, and July 2021.

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.

--: Not measured

(1) JHC-MW-15008R installed in June 2019.

(2) JHC-MW-15007R, JHC-MW-15009R, and JHC-MW-15011R installed in July 2021.

(3) Static water level data collected on April 13, 2021.

(4) Static water level data collected on April 14, 2021.

(5) Static water level data collected on October 20, 2021.

Table 2
 Summary of Field Parameter Results – April & October 2021
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

Sample Location	Sample Date	Dissolved Oxygen (mg/L)	Oxidation Reduction Potential (mV)	pH (SU)	Specific Conductivity (umhos/cm)	Temperature (°C)	Turbidity (NTU)
Background							
JHC-MW-15023	4/12/2021	0.71	242.9	5.3	108	10.8	3.4
	10/20/2021	0.93	208.3	5.8	91	13.8	2.1
JHC-MW-15024	4/13/2021	0.43	171.4	6.8	322	9.3	3.4
	10/20/2021	0.79	124.8	7.0	422	12.4	4.5
JHC-MW-15025	4/13/2021	1.53	209.8	6.7	254	7.5	2.5
	10/19/2021	0.74	144.5	7.8	340	13.1	4.5
JHC-MW-15026	4/13/2021	3.12	224.3	5.6	84	8.5	5.0
	10/19/2021	0.50	181.6	5.7	45	14.5	2.3
JHC-MW-15027	4/13/2021	1.75	130.7	5.7	76	7.9	5.7
	10/19/2021	0.63	69.4	5.9	107	16.0	8.3
JHC-MW-15028	4/12/2021	5.16	166.8	7.6	114	9.2	5.3
	10/19/2021	2.32	52.6	8.3	159	14.8	4.9
Ponds 3N/3S							
JHC-MW-15013	4/13/2021	0.31	-61.0	7.0	963	14.4	5.4
	10/20/2021	0.13	-86.2	7.0	1,081	20.6	8.6
JHC-MW-15015	4/14/2021	0.31	-110.7	7.1	772	15.1	2.6
	10/20/2021	0.84	-121.3	7.0	959	16.6	0.0
JHC-MW-15016	4/14/2021	0.19	-54.6	7.1	708	14.4	8.2
	10/21/2021	0.56	-12.2	7.0	760	15.0	1.0
JHC-MW-18001	4/13/2021	0.40	68.6	8.2	629	10.0	2.3
	10/20/2021	0.12	-29.8	8.1	707	17.3	3.5
JHC-MW-18002	4/13/2021	0.50	83.0	7.1	456	9.5	2.4
	10/20/2021	0.09	34.6	6.9	531	19.5	0.0
JHC-MW-18003	4/13/2021	0.42	-7.0	7.2	682	10.1	8.0
	10/19/2021	0.12	35.4	7.2	1,001	17.4	6.6

Notes:

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

Table 3
 Summary of Background Groundwater Sampling Results (Analytical) – April & October 2021
 JH Campbell Background – RCRA CCR Monitoring Program
 West Olive, Michigan

		Sample Location:				JHC-MW-15023		JHC-MW-15024		JHC-MW-15025		JHC-MW-15026		JHC-MW-15027		JHC-MW-15028	
		Sample Date:				4/12/2021	10/20/2021	4/13/2021	10/20/2021	4/13/2021	10/19/2021	4/13/2021	10/19/2021	4/13/2021	10/19/2021	4/12/2021	10/19/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI [^]	Background											
Appendix III⁽¹⁾																	
Boron	ug/L	NC	500	500	7,200	50	41	21	< 20	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Calcium	mg/L	NC	NC	NC	500 ^{EE}	11.1	10.7	36.8	40.2	19.8	24.2	9.23	4.01	10.9	13.4	14.0	20.0
Chloride	mg/L	250**	250 ^E	250 ^E	500 ^{EE}	2.64	3.60	21.5	47.1	19.5	23.3	4.05	1.09	< 1.00	< 1.00	< 1.00	< 1.00
Fluoride	ug/L	4,000	NC	NC	NC	< 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	250**	250 ^E	250 ^E	500 ^{EE}	12.2	11.8	8.14	7.53	9.02	8.98	6.88	5.81	7.09	7.89	5.99	5.90
Total Dissolved Solids	mg/L	500**	500 ^E	500 ^E	500	66	77	175	242	135	259	51	34	56	71	65	203
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5^E	6.5 - 8.5^E	6.5 - 9.0	5.3	5.8	6.8	7.0	6.7	7.8	5.6	5.7	5.7	5.9	7.6	8.3
Appendix IV⁽¹⁾																	
Antimony	ug/L	6	6.0	6.0	130	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	10	10	10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	2,000	2,000	820	17	21	17	25	6	6	10	8	8	15	5	8
Beryllium	ug/L	4	4.0	4.0	18	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	3.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6	< 6	< 6	< 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	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	39	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Mercury	ug/L	2	2.0	2.0	0.20 [#]	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	3,200	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NC	NC	NC	< 0.120	< 0.148	< 0.146	< 0.144	< 0.115	< 0.155	< 0.125	< 0.154	< 0.129	< 0.131	< 0.115	< 0.127
Radium-228	pCi/L	NC	NC	NC	NC	0.478	< 0.407	< 0.472	< 0.349	< 0.414	< 0.434	< 0.434	0.449	< 0.434	< 0.380	< 0.435	< 0.393
Radium-226/228	pCi/L	5	NC	NC	NC	0.501	< 0.407	< 0.472	0.364	< 0.414	< 0.434	0.449	0.573	< 0.434	< 0.380	< 0.435	< 0.393
Selenium	ug/L	50	50	50	5.0	< 1	< 1	< 1	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2	2.0	2.0	3.7	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

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 site-specific hardness of 180 mg CaCO3/L as measured at surface water sample SW-01 collected on April 9, 2018 from the Pigeon River. Chromium GSI criterion based on hexavalent chromium per footnote (H).
[#] - 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.
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 Pond 3 Groundwater Sampling Results (Analytical) – April & October 2021
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

		Sample Location:					JHC-MW-15013		JHC-MW-15015 ⁽²⁾		JHC-MW-15016 ⁽²⁾		JHC-MW-18001		JHC-MW-18002		JHC-MW-18003	
		Sample Date:					4/13/2021	10/20/2021	4/14/2021	10/20/2021	4/14/2021	10/20/2021	4/13/2021	10/20/2021	4/13/2021	10/20/2021	4/13/2021	10/19/2021
Constituent	Unit	UTL	EPA MCL	MI Residential*	MI Non-Residential*	MI GSI [^]	downgradient		upgradient		downgradient		downgradient		downgradient		downgradient	
Appendix III⁽¹⁾																		
Boron	ug/L	51	NC	500	500	7,200	259	274	1,980	1,910	4,950	5,400	388	459	207	273	193	336
Calcium	mg/L	46	NC	NC	NC	500 ^{EE}	133	140	127	138	86.8	94.0	62.3	65.6	59.5	67.9	90.4	151
Chloride	mg/L	43	250 ^{**}	250 ^E	250 ^E	500 ^{EE}	11.5	16.1	6.69	17.7	11.8	15.5	9.32	1.06	6.82	12.0	2.13	< 1.00
Fluoride	ug/L	1,000	4,000	NC	NC	NC	< 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	14	250 ^{**}	250 ^E	250 ^E	500 ^{EE}	103	230	33.2	41.6	17.6	20.9	109	36.0	68.8	84.1	194	359
Total Dissolved Solids	mg/L	258	500 ^{**}	500 ^E	500 ^E	500	592	740	480	577	399	435	401	412	277	340	463	881
pH, Field	SU	4.8 - 9.2	6.5 - 8.5 ^{**}	6.5 - 8.5 ^E	6.5 - 8.5 ^E	6.5 - 9.0	7.0	7.0	7.1	7.0	7.1	7.0	8.2	8.1	7.1	6.9	7.2	7.2
Appendix IV⁽¹⁾																		
Antimony	ug/L	2	6	6.0	6.0	130	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1	1	< 1	< 1
Arsenic	ug/L	1	10	10	10	10	< 1	1	< 1	< 1	< 1	< 1	1	2	< 1	< 1	< 1	< 1
Barium	ug/L	35	2,000	2,000	2,000	820	64	79	61	85	107	131	451	634	108	136	75	103
Beryllium	ug/L	1	4	4.0	4.0	18	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	0.2	5	5.0	5.0	3.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	2	100	100	100	11	11	5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	15	NC	40	100	100	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	1,000	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	1	NC	4.0	4.0	39	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	10	NC	170	350	440	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	11	< 10	< 10
Mercury	ug/L	0.2	2	2.0	2.0	0.20 [#]	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	5	NC	73	210	3,200	9	15	32	22	59	52	11	13	17	12	21	14
Radium-226	pCi/L	NA	NC	NC	NC	NC	0.319	< 0.336	< 0.106	0.235	0.205	0.263	0.398	0.359	0.129	0.274	< 0.122	0.239
Radium-228	pCi/L	NA	NC	NC	NC	NC	< 0.334	0.861	0.360	< 0.546	< 0.390	< 0.652	< 0.370	< 0.411	< 0.368	< 0.487	< 0.380	0.573
Radium-226/228	pCi/L	1.93	5	NC	NC	NC	0.548	1.18	0.441	< 0.546	0.560	0.692	0.639	0.734	< 0.368	< 0.487	0.417	0.812
Selenium	ug/L	5	50	50	50	5.0	< 1	1	< 1	< 1	< 1	< 1	6	57	101	8	< 1	< 1
Thallium	ug/L	2	2	2.0	2.0	3.7	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2

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.
 UTL - Upper Tolerance Limit of the background data set. Appendix III UTLs established in TRC's technical memorandum dated January 15, 2018. Appendix IV UTLs established in TRC's technical memorandum dated October 15, 2018.
 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 site-specific hardness of 180 mg CaCO3/L as measured at surface water sample SW-01 collected on April 9, 2018 from the Pigeon River. Chromium GSI criterion based on hexavalent chromium per footnote (H).
 # - 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) Monitoring wells JHC-MW-15015 and JHC-MW-15016 have been upgradient of Pond 3 since 2018 due to post-pond decommissioning groundwater flow direction changes. These wells are no longer considered downgradient wells.

 Indicates that the concentration in one or more wells exceeds the background level. If concentrations of all Appendix III and Appendix IV constituents are below the background level for two consecutive events, the unit may return to detection monitoring.

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 – April 2021
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

Constituent	Units	GWPS	JHC-MW-15015 ⁽¹⁾ (Upgradient)		JHC-MW-18002 (Downgradient)	
			LCL	UCL	LCL	UCL
Molybdenum	ug/L	100	9.6	140	--	--
Selenium	ug/L	50	--	--	13	64

Notes:

ug/L - micrograms per Liter.

-- - Not Applicable; well/parameter pair did not directly exceed the GWPS and was not included in further analysis.

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

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

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

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

(1) Monitoring wells JHC-MW-15015 and JHC-MW-15016 have been upgradient of Pond 3 since 2018 due to post-pond decommissioning groundwater flow direction changes. These wells are no longer considered downgradient monitoring wells.

Table 6
 Summary of Groundwater Protection Standard Exceedances – October 2021
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

Constituent	Units	GWPS	JHC-MW-15015 ⁽¹⁾ (Upgradient)		JHC-MW-18001 (Downgradient)		JHC-MW-18002 (Downgradient)	
			LCL	UCL	LCL	UCL	LCL	UCL
Molybdenum	ug/L	100	21	130	--	--	--	--
Selenium	ug/L	50	--	--	1.8	34	10	65

Notes:

ug/L - micrograms per Liter.

-- - Not Applicable; well/parameter pair did not directly exceed the GWPS and was not included in further analysis.

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

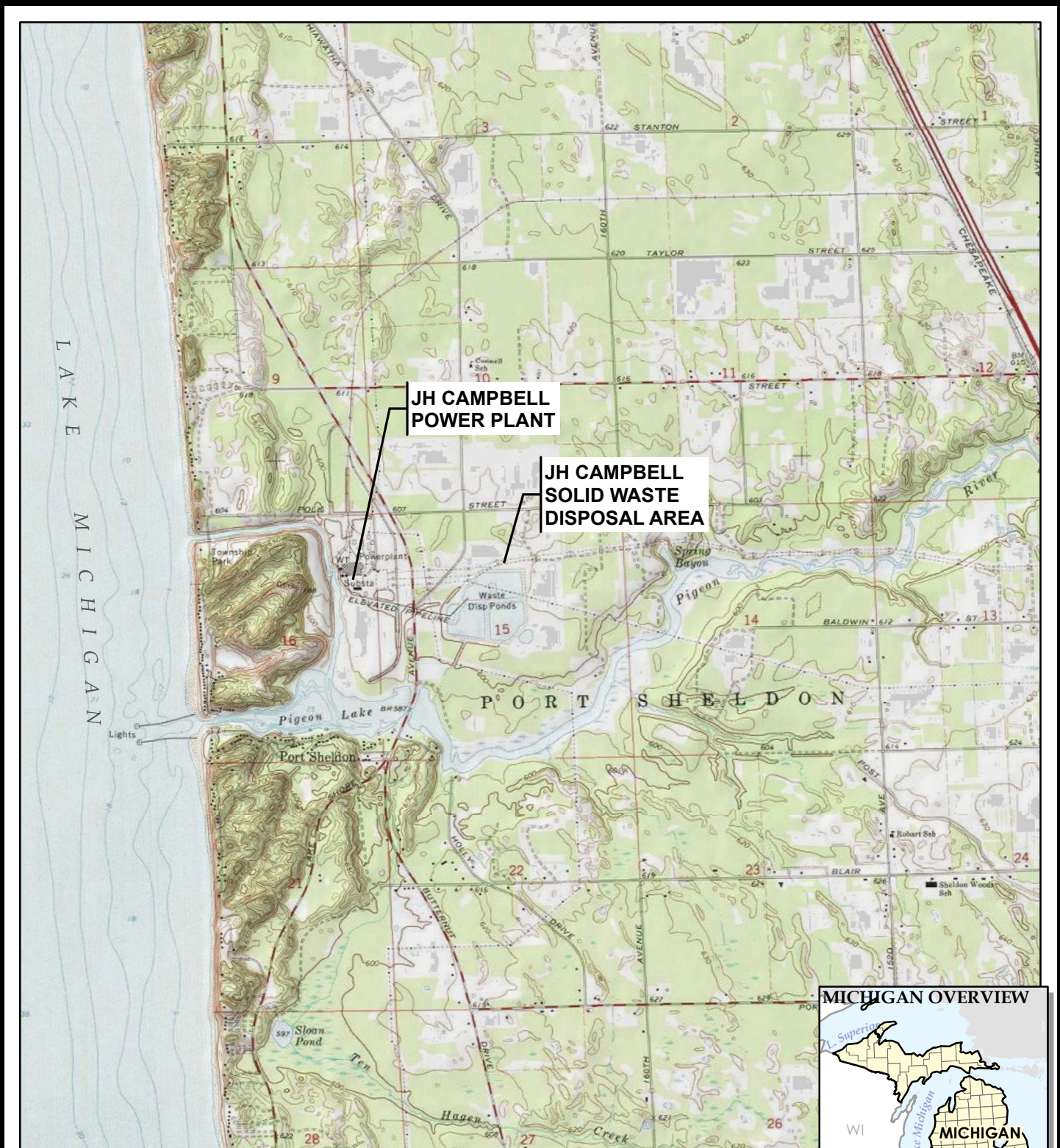
UCL - Upper Confidence Limit ($\alpha = 0.01$) of the downgradient data set.

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

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

(1) Monitoring wells JHC-MW-15015 and JHC-MW-15016 have been upgradient of Pond 3 since 2018 due to post-pond decommissioning groundwater flow direction changes. These wells are no longer considered downgradient monitoring wells.

Figures



BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.



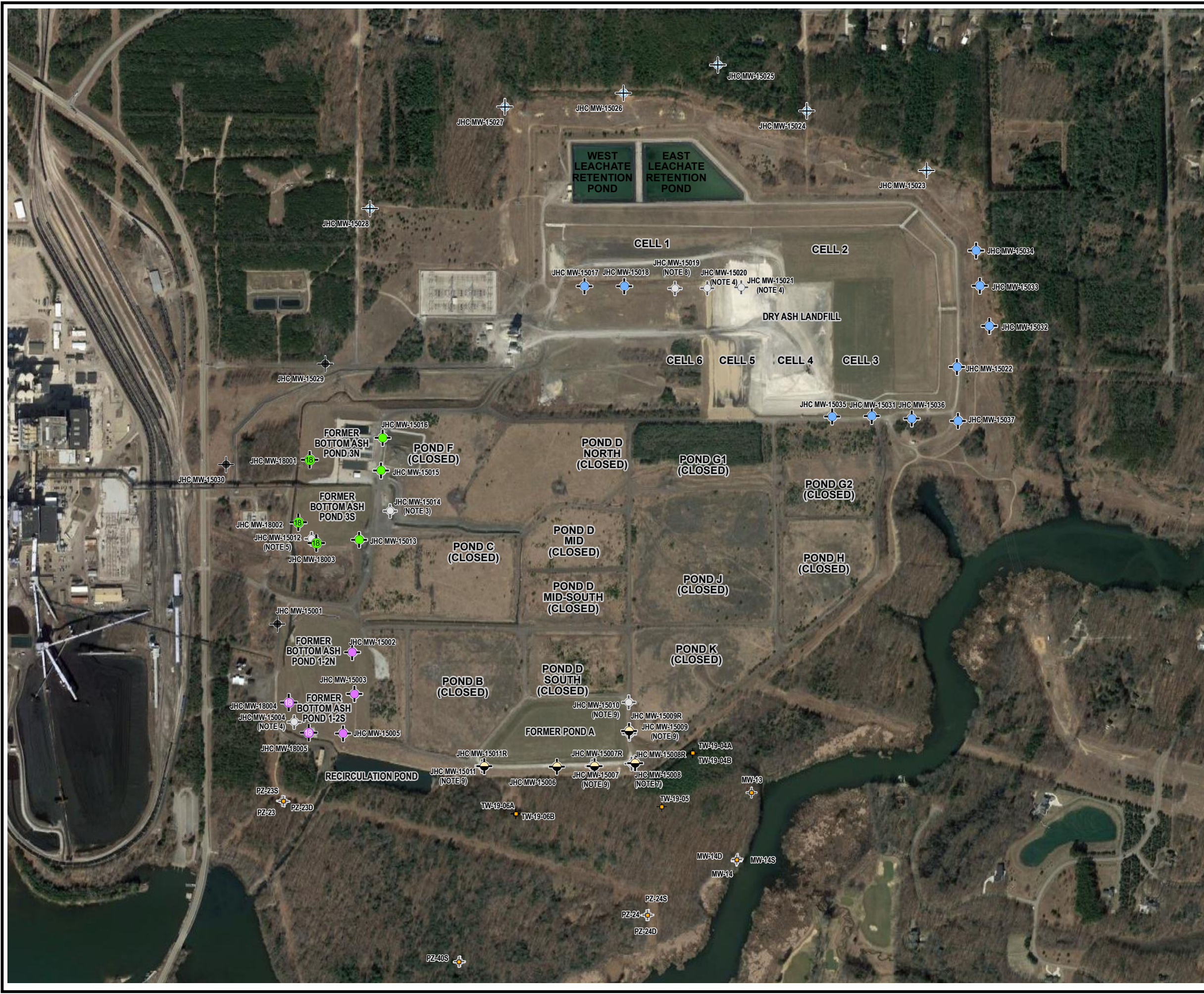
1540 Eisenhower Place
Ann Arbor, MI 48108-3284
Phone: 734.971.7080
www.trccompanies.com

PROJECT: **CONSUMERS ENERGY COMPANY
JH CAMPBELL POWER PLANT
WEST OLIVE, MICHIGAN**

TITLE: **SITE LOCATION MAP**

DRAWN BY:	S. MAJOR
CHECKED BY:	B. YELEN
APPROVED BY:	S. HOLMSTROM
DATE:	JANUARY 2022
PROJ. NO.:	418422
FILE:	418422-001-007.mxd

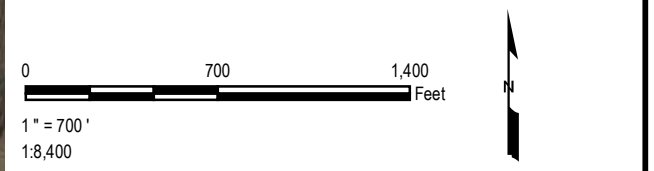
FIGURE 1



LEGEND

- BACKGROUND MONITORING WELL
- DOWNGRAIDENT BOTTOM ASH POND 1/2 N/S MONITORING WELL
- DOWNGRAIDENT BOTTOM ASH POND 3 N/S MONITORING WELL
- DOWNGRAIDENT LANDFILL MONITORING WELL
- PIEZOMETER 2021
- DOWNGRAIDENT POND A MONITORING WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL
- NEW DOWNGRAIDENT BOTTOM ASH POND 1/2 N/S MONITORING WELL (2018)
- NEW DOWNGRAIDENT BOTTOM ASH POND 3 N/S MONITORING WELL (2018)
- DOWNGRAIDENT MONITORING WELLS
- STAFF GAUGE
- TEMPORARY WELL
- HMP WELL

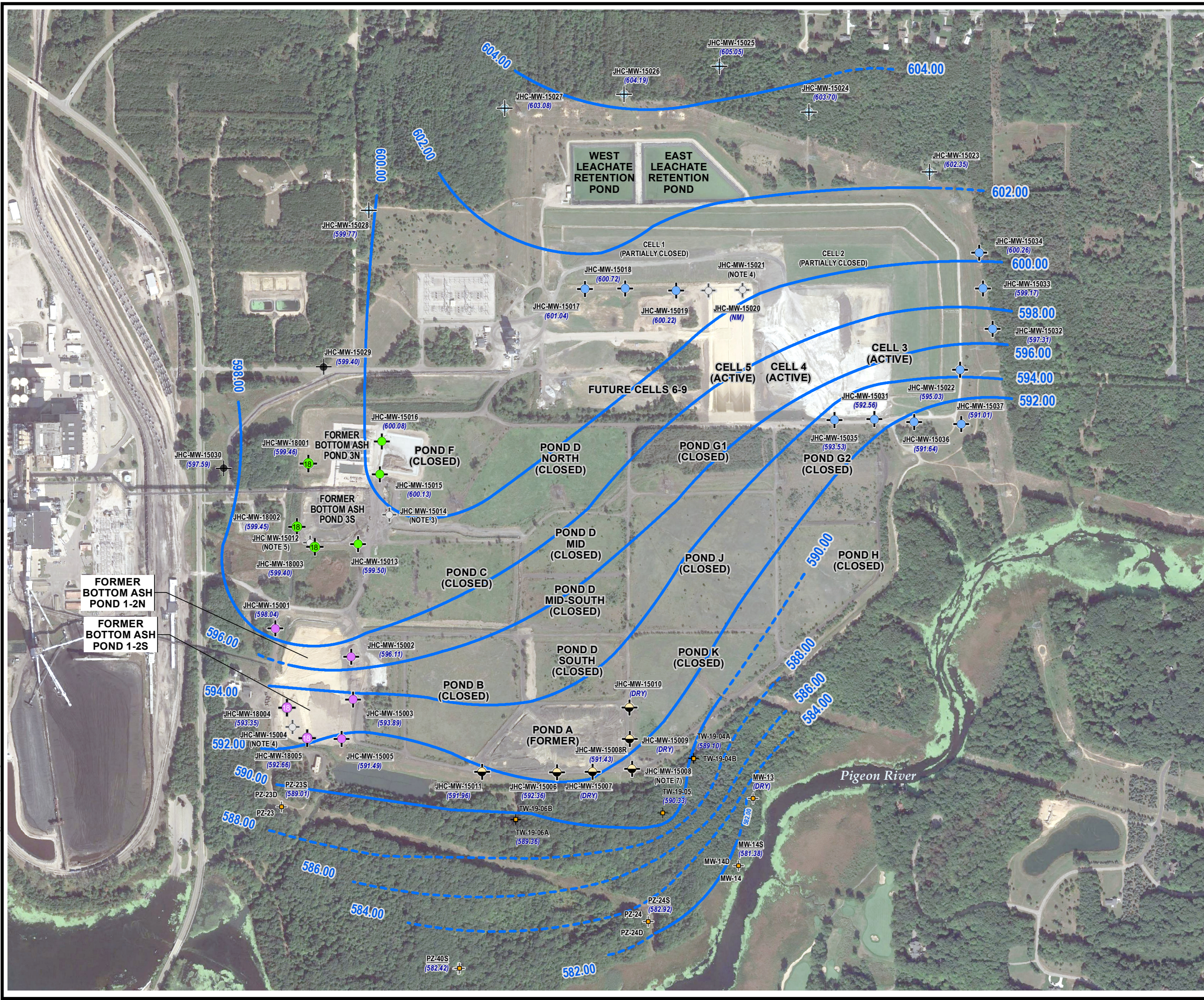
- ### NOTES
1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2021.
 2. WELL LOCATIONS BASED ON SURVEY DATA THROUGH 8/14/2019.
 3. MONITORING WELL DECOMMISSIONED NOVEMBER 13, 2017.
 4. MONITORING WELL DECOMMISSIONED JUNE 14, 2018.
 5. MONITORING WELL DECOMMISSIONED OCTOBER 10, 2018.
 6. JHC-MW-1800X MONITORING WELLS INSTALLED IN DECEMBER 2018.
 7. MONITORING WELL DECOMMISSIONED JUNE 24, 2019.
 8. JHC-MW-15008R AND TW-19-XX MONITORING WELLS INSTALLED IN JUNE 2019.
 9. MONITORING WELLS DECOMMISSIONED MAY 25, 2021.
 10. MONITORING WELLS DECOMMISSIONED JULY 20-21, 2021.
 11. STATIC WATER ELEVATIONS IN NORTH AMERICAN VERTICAL DATUM 1988, NAVD 88.



PROJECT:		CONSUMERS ENERGY COMPANY JH CAMPBELL POWER PLANT WEST OLIVE, MICHIGAN	
TITLE:		SITE PLAN WITH CCR MONITORING WELL LOCATIONS	
DRAWN BY:	A. FOJTIK	PROJ NO.:	418422-0000
CHECKED BY:	B. YELEN	FIGURE 2	
APPROVED BY:	S. HOLMSTROM		
DATE:	JANUARY 2022		

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

FILE NO.: 418422-003-002_fig2_af.mxd



LEGEND

- BACKGROUND MONITORING WELL
- BOTTOM ASH POND 1/2 N/S MONITORING WELL
- BOTTOM ASH POND 3 N/S MONITORING WELL
- DOWNGRAIDENT LANDFILL MONITORING WELL
- DOWNGRAIDENT POND A MONITORING WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL
- NEW DOWNGRAIDENT BOTTOM ASH POND 1/2 N/S MONITORING WELL (2018)
- NEW DOWNGRAIDENT BOTTOM ASH POND 3 N/S MONITORING WELL (2018)
- NATURE AND EXTENT WELL

(600.97) GROUNDWATER ELEVATION (FEET) SHALLOW WELLS
 (NM) NOT MEASURED

NOTES

1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
2. WELL LOCATIONS BASED ON SURVEY DATA THROUGH 12/07/2018.
3. MONITORING WELL DECOMMISSIONED NOVEMBER 13, 2017.
4. MONITORING WELL DECOMMISSIONED JUNE 14, 2018.
5. MONITORING WELL DECOMMISSIONED OCTOBER 10, 2018.
6. JHC-MW-1800X MONITORING WELLS INSTALLED IN DECEMBER 2018.
7. MONITORING WELL DECOMMISSIONED JUNE 24, 2019.
8. JHC-MW-15008R AND TW-19-XX MONITORING WELLS INSTALLED IN JUNE 2019.
9. STATIC WATER ELEVATIONS IN NORTH AMERICAN VERTICAL DATUM 1988, NAVD 88.

N

0 700 1,400
Feet

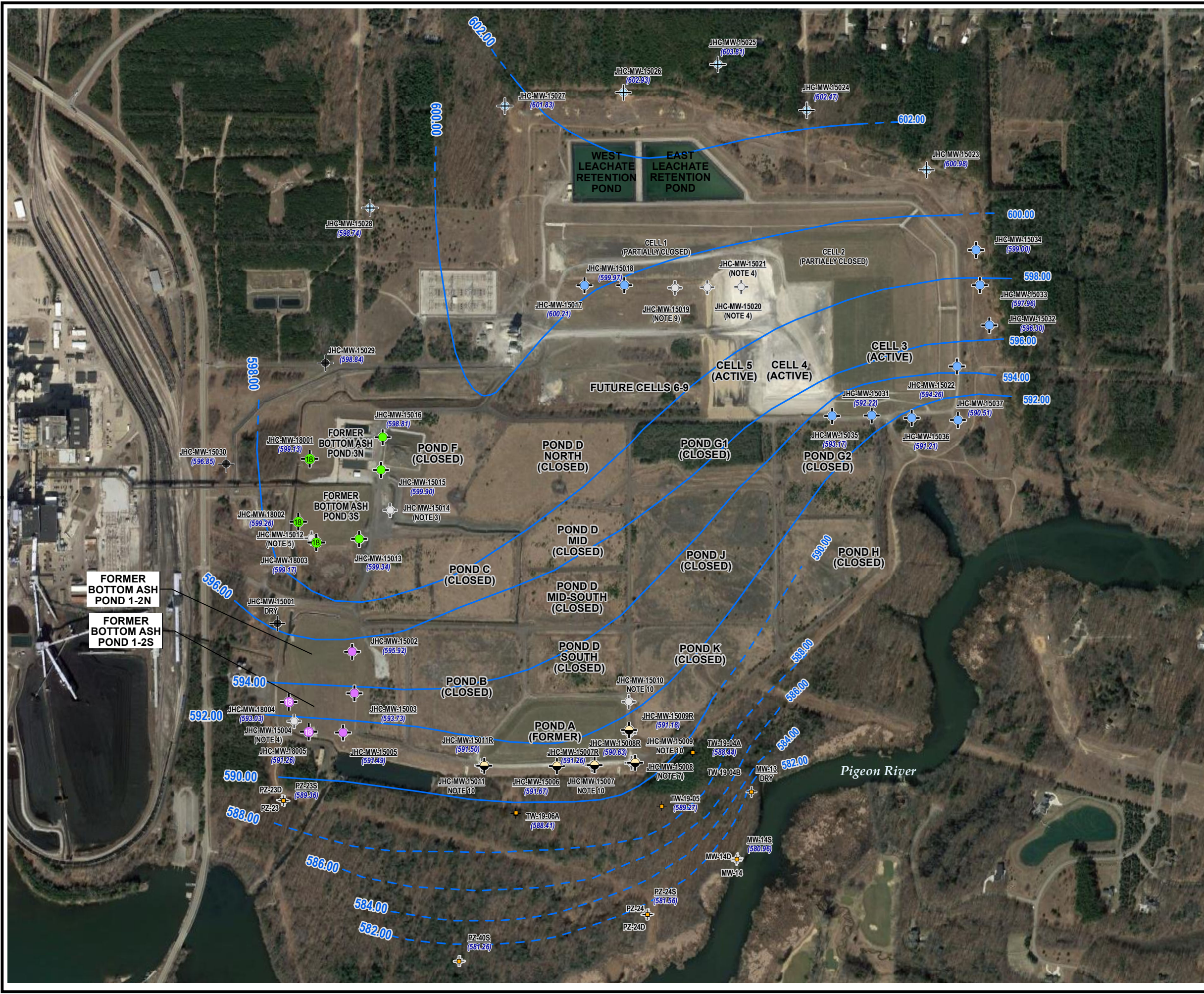
1" = 700'
1:8,400

PROJECT:		CONSUMERS ENERGY COMPANY JH CAMPBELL POWER PLANT WEST OLIVE, MICHIGAN	
TITLE:		GROUNDWATER CONTOUR MAP APRIL 2021	
DRAWN BY:	A. ADAIR	PROJ NO.:	418422.0000
CHECKED BY:	K. LOWERY	FIGURE 3	
APPROVED BY:	K. LOWERY		
DATE:	JULY 2021		

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

FILE NO.: 418422_200_003.mxd

Plot Date: 1/21/2022 13:16:33 PM by: AFOJTIK - LAYOUT: ANSI B(11"x17")
 Path: S:\1-PROJECTS\Consumers_Energy_Company\Michigan\CCR_GW\2017_2697672_JHC\2\Map\Water\004_Fall\418422-003-002_af.mxd



- ### LEGEND
- BACKGROUND MONITORING WELL
 - DOWNGRADIENT BOTTOM ASH POND 1/2 N/S MONITORING WELL
 - DOWNGRADIENT BOTTOM ASH POND 3 N/S MONITORING WELL
 - DOWNGRADIENT LANDFILL MONITORING WELL
 - PIEZOMETER 2021
 - DOWNGRADIENT POND A MONITORING WELL
 - MONITORING WELL (STATIC WATER LEVEL ONLY)
 - DECOMMISSIONED MONITORING WELL
 - NEW DOWNGRADIENT BOTTOM ASH POND 1/2 N/S MONITORING WELL (2018)
 - NEW DOWNGRADIENT BOTTOM ASH POND 3 N/S MONITORING WELL (2018)
 - DOWNGRADIENT MONITORING WELLS
 - STAFF GAUGE
 - TEMPORARY WELL
 - HMP WELL
- (591.25) GROUNDWATER ELEVATION (FEET ABOVE MSL)

- ### NOTES
1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2021.
 2. WELL LOCATIONS BASED ON SURVEY DATA THROUGH 8/14/2019.
 3. MONITORING WELL DECOMMISSIONED NOVEMBER 13, 2017.
 4. MONITORING WELL DECOMMISSIONED JUNE 14, 2018.
 5. MONITORING WELL DECOMMISSIONED OCTOBER 10, 2018.
 6. JHC-MW-1800X MONITORING WELLS INSTALLED IN DECEMBER 2018.
 7. MONITORING WELL DECOMMISSIONED JUNE 24, 2019.
 8. JHC-MW-15008R AND TW-19-XX MONITORING WELLS INSTALLED IN JUNE 2019.
 9. MONITORING WELLS DECOMMISSIONED MAY 25, 2021.
 10. MONITORING WELLS DECOMMISSIONED JULY 20-21, 2021.
 11. STATIC WATER ELEVATIONS IN NORTH AMERICAN VERTICAL DATUM 1988, NAVD 88.



PROJECT:	
CONSUMERS ENERGY COMPANY JH CAMPBELL POWER PLANT WEST OLIVE, MICHIGAN	
TITLE:	
GROUNDWATER CONTOUR MAP OCTOBER 2021	
DRAWN BY: A. FOJTIK	PROJ NO.: 418422-0000
CHECKED BY: B. YELEN	
APPROVED BY: S. HOLMSTROM	FIGURE 4
DATE: JANUARY 2022	
1540 Eisenhower Place Ann Arbor, MI 48108-3284 Phone: 734.971.7080 www.trccompanies.com	
FILE NO.: 418422-003-002_af.mxd	

Appendix A

Data Quality Reviews

Laboratory Data Quality Review Groundwater Monitoring Event April 2021 CEC JH Campbell Background Wells

Groundwater samples were collected by Consumers Energy (CE) Laboratory Services for the April 2021 sampling event. Samples were analyzed for total metals, anions, and total dissolved solids (TDS) by CE Laboratory Services in Jackson, Michigan. The radium analyses were subcontracted to Eurofins-TestAmerica in St. Louis, Missouri (Eurofins TA – St. Louis). The laboratory analytical results were reported in laboratory sample delivery groups (SDGs) 21-0446R and 160-41801-1 Revision 1.

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

- JHC-MW-15023
- JHC-MW-15024
- JHC-MW-15025
- JHC-MW-15026
- JHC-MW-15027
- JHC-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 6020/ 7470A
Alkalinity	SM 2320B
Radium (Ra-226, Ra-228, Combined Ra-226 & Ra-228)	EPA 903.0, EPA 904.0

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

Data Usability Review Procedure

The analytical data were reviewed using the USEPA National Functional Guidelines for Inorganic Superfund Methods Data Review (USEPA, 2020) and the Department of Energy Evaluation of Radiochemical Data Usability (USDOE, 1997). The following items were included in the evaluation of the data:

- Sample receipt, as noted in the cover page or case narrative;
- Technical holding times for analyses;
- Reporting limits (RLs) compared to project-required RLs;
- Data for method blanks, equipment blanks, and field blanks. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical procedures. Field and equipment blanks are used to assess potential contamination arising from field procedures;

- Data for laboratory control samples (LCSs) and laboratory control sample duplicates (LCSDs), when performed. The LCSs and/or LCSDs are used to assess the accuracy of the analytical method using a clean matrix;
- Percent recoveries for matrix spike (MS) and matrix spike duplicates (MSD), when performed on project samples. Percent recoveries are calculated for each analyte spiked and used to assess bias due to sample matrix effects;
- Percent recoveries for carriers, where applicable, for radiochemistry only. Carriers are used to assess the chemical yield for the preparation and/or instrument efficiency;
- Data for laboratory duplicates, when performed on project samples. The laboratory duplicates are replicate analyses of one sample and are used to assess the precision of the analytical method;
- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

It should be noted that results for method blanks and laboratory control samples were not provided for review by the laboratory. Therefore, potential contamination arising from laboratory sample preparation and/or analytical procedures and the accuracy of the analytical method using a clean matrix could not be evaluated for the total metals, anions, alkalinity, 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 and IV constituents will be utilized for the purposes of an assessment monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- A method blank was analyzed with each analytical batch for radium. Radium was not detected in the method blanks.
- One equipment blank (EB-02) and one field blank (FB-02) were collected. Target analytes were not detected in these blank samples.
- All samples were analyzed 12 or 13 days past holding time for alkalinity. Positive results for alkalinity in the samples are potentially biased low, as shown in the attached table, Attachment A.

- The LCS and LCSD recoveries and relative percent differences (RPDs) for radium were within QC limits.
- MS and MSD analyses were performed on sample JHC-MW-15025 for mercury, total metals, and anions. The recoveries were within the acceptance limits. RPDs were not provided by the laboratory and therefore were not evaluated; further, MS/MSD concentrations were not provided by the laboratory. However, since all recoveries were within the acceptance limits, there is no impact on data usability due to this issue.
- The field duplicate pair samples were DUP-02/JHC-MW-15028. All criteria were met.
- Carrier recoveries, where applicable, were within 40-110%.

Attachment A
 Summary of Data Non-Conformances
 JH Campbell Background – RCRA CCR Monitoring Program
 West Olive, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
JHC-MW-15023	4/12/2021	Alkalinity	Analysis run outside of holding time; results are potentially biased low
JHC-MW-15024	4/13/2021		
JHC-MW-15025	4/13/2021		
JHC-MW-15026	4/13/2021		
JHC-MW-15027	4/13/2021		
JHC-MW-15028	4/12/2021		
DUP-02	4/12/2021		

Laboratory Data Quality Review Groundwater Monitoring Event April 2021 Consumers Energy JH Campbell Pond 3

Groundwater samples were collected by Consumers Energy Laboratory Services for the April 2021 sampling event. Samples were analyzed for select total metals, anions, and total dissolved solids by Consumers Energy Laboratory Services in Jackson, Michigan. The radium analyses were subcontracted to Eurofins-TestAmerica in St. Louis, Missouri (Eurofins TA – St. Louis). The laboratory analytical results were reported in sample delivery groups (SDGs) 21-0448R and 160-41806-1.

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

- JHC-MW-15013
- JHC-MW-15015
- JHC-MW-15016
- JHC-MW-18001
- JHC-MW-18002
- JHC-MW-18003

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, SW-846 7470A
Alkalinity	SM 2320B
Radium (Ra-226, Ra-228, Combined Ra-226 & Ra-228)	EPA 903.0, EPA 904.0

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

Data Usability Review Procedure

The analytical data were reviewed using the USEPA National Functional Guidelines for Inorganic Superfund Data Review (USEPA, 2020) and the Department of Energy Evaluation of Radiochemical Data Usability (USDOE, 1997). The following items were included in the evaluation of the data:

- Sample receipt, as noted in the cover page or case narrative;
- Technical holding times for analyses;
- Reporting limits (RLs) compared to project-required RLs;
- Data for method blanks, equipment blanks, and field blanks. Method blanks are used to assess potential contamination arising from laboratory sample preparation and/or analytical

procedures. Field and equipment blanks are used to assess potential contamination arising from field procedures;

- Data for laboratory control samples (LCSs) and laboratory control sample duplicates (LCSDs), when performed. The LCSs and/or LCSDs are used to assess the accuracy of the analytical method using a clean matrix;
- Percent recoveries for matrix spike (MS) and matrix spike duplicates (MSD), when performed on project samples. Percent recoveries are calculated for each analyte spiked and used to assess bias due to sample matrix effects;
- Percent recoveries for carriers, where applicable, for radiochemistry only. Carriers are used to assess the chemical yield for the preparation and/or instrument efficiency;
- Data for laboratory duplicates, when performed on project samples. The laboratory duplicates are replicate analyses of one sample and are used to assess the precision of the analytical method;
- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

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

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

QA/QC Sample Summary

- A method blank was analyzed with each analytical batch for radium. Radium was not detected in the method blanks.
- One equipment blank (EB-02) was collected. Target analytes were not detected in the equipment blank sample with the exception of lead which was detected at 2 ug/L. Lead was not detected in any groundwater samples and therefore no data are adversely affected.

- All samples were analyzed 11 or 12 days past holding time for alkalinity. Positive results for alkalinity in the samples are potentially biased low, as shown in the attached table, Attachment A.
- The LCS and LCSD recoveries and relative percent differences (RPDs) for radium were within QC limits.
- MS and MSD analyses were performed on sample JHC-MW-18002 for total metals and anions. RPDs were not provided by the laboratory and therefore were not evaluated; further, MS/MSD concentrations were not provided by the laboratory. All recoveries were within the acceptance limits and there is no impact on data usability due to this issue.
- The field duplicate pair samples were DUP-04/JHC-MW-18001. All criteria were met.
- Carrier recoveries, where applicable, were within 40-110%.

Attachment A
 Summary of Data Non-Conformances
 JH Campbell Pond 3 – RCRA CCR Monitoring Program
 West Olive, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
JHC-MW-15013	4/13/2021	Alkalinity	Analysis run outside of holding time; results are potentially biased low
JHC-MW-15015	4/14/2021		
JHC-MW-15016	4/14/2021		
JHC-MW-18001	4/13/2021		
JHC-MW-18002	4/13/2021		
JHC-MW-18003	4/13/2021		
DUP-04	4/13/2021		

Laboratory Data Quality Review Groundwater Monitoring Event October 2021 CEC JH Campbell Background Wells

Groundwater samples were collected by Consumers Energy (CE) Laboratory Services for the October 2021 sampling event. Samples were analyzed for total metals, anions, total dissolved solids (TDS), and alkalinity by CE Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 21-1276.

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

- JHC-MW-15023
- JHC-MW-15024
- JHC-MW-15025
- JHC-MW-15026
- JHC-MW-15027
- JHC-MW-15028

Each sample was analyzed for the following constituents:

Analyte Group	Method
Anions (Fluoride, Chloride, Sulfate)	EPA 300.0
Total Dissolved Solids (TDS)	SM 2540C
Total Metals	SW-846 6020B/7470A
Alkalinity	SM 2320B

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

Data Usability Review Procedure

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

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

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

It should be noted that results for method blanks and laboratory control samples were not provided for review by the laboratory. Therefore, potential contamination arising from laboratory sample preparation and/or analytical procedures and the accuracy of the analytical method using a clean matrix could not be evaluated for the total metals, anions, alkalinity, 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 and IV constituents as well as iron, copper, nickel, silver, vanadium, and zinc will be utilized for the purposes of an assessment monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

QA/QC Sample Summary

- One equipment blank (EB-01) and one field blank (FB-01) were collected. Target analytes were not detected in these blank samples.
- MS and MSD analyses were performed on sample JHC-MW-15025 for mercury, total metals, and anions. The recoveries were within the acceptance limits. Relative percent differences (RPDs) were not provided by the laboratory and therefore were not evaluated; further, MS/MSD concentrations were not provided by the laboratory. However, since all recoveries were within the acceptance limits, there is no impact on data usability due to this issue.
- The field duplicate pair samples were DUP-01/JHC-MW-15028. All criteria were met with the following exception.

- The RPD for TDS (61%) was above the acceptance criteria. Therefore, potential uncertainty exists for the positive results for TDS in all groundwater samples, as summarized in the attached table, Attachment A.

Attachment A
 Summary of Data Non-Conformances
 JH Campbell Background – RCRA CCR Monitoring Program
 West Olive, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
JHC-MW-15023	10/20/2021		
JHC-MW-15024	10/20/2021		
JHC-MW-15025	10/19/2021		
JHC-MW-15026	10/19/2021	Total Dissolved Solids	Field duplicate variability; potential uncertainty exists.
JHC-MW-15027	10/19/2021		
JHC-MW-15028	10/19/2021		
DUP-01	10/19/2021		

**Laboratory Data Quality Review
Groundwater Monitoring Event October 2021
CEC JH Campbell Background Wells**

Groundwater samples were collected by Consumers Energy (CE) Laboratory Services for the October 2021 sampling event. Samples were analyzed for radium by Eurofins-TestAmerica laboratory in St. Louis, Missouri. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 160-43807-1.

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

- JHC-MW-15023
- JHC-MW-15024
- JHC-MW-15025
- JHC-MW-15026
- JHC-MW-15027
- JHC-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. 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) and one field blank (FB-01) were collected. Target analytes were not detected in the equipment and field blanks.
- LCS/LCSD recoveries and relative percent differences 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-01/JHC-MW-15028. All criteria were met.
- Carrier recoveries were within 40-110%.

Laboratory Data Quality Review Groundwater Monitoring Event October 2021 Consumers Energy JH Campbell Pond 3

Groundwater samples were collected by Consumers Energy Laboratory Services for the October 2021 sampling event. Samples were analyzed for select total metals, anions, total dissolved solids, and alkalinity by Consumers Energy Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in sample delivery group (SDG) 21-1278R.

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

- JHC-MW-15013
- JHC-MW-15015
- JHC-MW-15016
- JHC-MW-18001
- JHC-MW-18002
- JHC-MW-18003

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, SW-846 7470A
Alkalinity	SM 2320B

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

Data Usability Review Procedure

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

- Sample receipt, as noted in the cover page or case narrative;
- Technical holding times for analyses;
- Reporting limits (RLs) compared to project-required RLs;
- Data for method blanks, 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 total 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.

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

QA/QC Sample Summary

- One equipment blank (EB-03) and one field blank (FB-03) were collected. Target analytes were not detected in these blank samples.
- MS and MSD analyses were performed on sample JHC-MW-18002 for total metals and anions. 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. All recoveries were within the acceptance limits and there is no impact on data usability due to this issue.
- The field duplicate pair samples were DUP-03/JHC-MW-18003. All criteria were met.

Laboratory Data Quality Review Groundwater Monitoring Event October 2021 Consumers Energy JH Campbell Pond 3

Groundwater samples were collected by Consumers Energy Laboratory Services for the October 2021 sampling event. Samples were analyzed for radium by Eurofins-TestAmerica laboratory in St. Louis, Missouri. The laboratory analytical results were reported in sample delivery group (SDG) 160-43805-1.

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

- JHC-MW-15013
- JHC-MW-15015
- JHC-MW-15016
- JHC-MW-18001
- JHC-MW-18002
- JHC-MW-18003

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. 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 (MBs) with the exception of radium 228 which was detected at a concentration of 0.4989 pCi/L in MB 160-534796/23-A. Radium 228 detected in associated sample JHC-MW-15013 is potentially a false positive result as summarized in the attached table, Attachment A.
- One equipment blank (EB-03) and one field blank (FB-03) were collected. Target analytes were not detected in the equipment and field blank samples with the exception of radium 226 which was detected at concentrations of 0.226 pCi/L and 0.128 pCi/L, respectively. Radium 226 detected in groundwater samples are potentially false positive results as summarized in the attached table, 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-03/JHC-MW-18003. All criteria were met.
- Carrier recoveries were within 40-110%.

Attachment A
 Summary of Data Non-Conformances
 JH Campbell Pond 3 – RCRA CCR Monitoring Program
 West Olive, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
JHC-MW-15013	10/19/2021	Radium 228	Potential false positive result due to method blank contamination.
JHC-MW-15015	10/20/2021	Radium 226	Potential false positive results due to field and equipment blank contamination.
JHC-MW-15016	10/20/2021		
JHC-MW-18001	10/20/2021		
JHC-MW-18002	10/20/2021		
JHC-MW-18003	10/19/2021		
DUP-03	10/20/2021		

Appendix B

April 2021 Assessment Monitoring Statistical Evaluation

Technical Memorandum

Date: July 30, 2021

To: Bethany Swanberg, Consumers Energy

From: Sarah Holmstrom, TRC
Kristin Lowery, TRC

Project No.: 418422.0000.0000 Phase 1 Task 3

Subject: Statistical Evaluation of April 2021 Assessment Monitoring Sampling Event, JH Campbell Bottom Ash Pond 3 North and 3 South CCR Unit, Consumers Energy Company, West Olive, Michigan

During the statistical evaluation of the initial assessment monitoring event, no Appendix IV constituents were present at statistically significant levels exceeding the Groundwater Protections Standards (GWPSs). Therefore, Consumers Energy Company (Consumers Energy) is continuing semiannual assessment monitoring in accordance with §257.95 of the CCR Rule¹ at the JH Campbell Power Plant (JHC) Bottom Ash Pond 3 North and 3 South (Pond 3). The first semiannual assessment monitoring event for 2021 was conducted on April 12 through 14, 2021. In accordance with §257.95, the assessment monitoring data must be compared to GWPSs to determine whether or not Appendix IV constituents are detected at statistically significant levels above the GWPSs. GWPSs were established in accordance with §257.95(h), as described in the October 15, 2018 Groundwater Protection Standards technical memorandum, which was also included in the 2018 Annual Groundwater Monitoring Report (2018 Annual Report) (TRC, January 2019). The following narrative describes the methods that were employed for comparisons to the GWPSs. The results obtained and the Sanitas™ output files are included as an attachment.

The statistical evaluation of the first semiannual assessment monitoring event data for 2021 indicates that no constituents are present at statistically significant levels exceeding the GWPSs in downgradient monitoring wells at the JHC Pond 3 CCR unit. This result is consistent with the results of previous assessment monitoring data statistical evaluations and concentrations remain above background levels. Therefore, Consumers Energy will continue semiannual assessment monitoring per §257.95 and execute the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

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.

Technical Memorandum

Assessment Monitoring Statistical Evaluation

The compliance well network at the JHC Pond 3 CCR Unit consists of six monitoring wells. JHC-MW-15013, JHC-MW-15015, and JHC-MW-15016 are located on the eastern perimeter of the bottom ash ponds. Former downgradient monitoring well JHC-MW-15012 was decommissioned on October 10, 2018 during deconstruction of Bottom Ash Pond Unit 3 South; therefore, statistical analysis for JHC-MW-15012 terminates at the June 2018 monitoring event. Due to the cessation of hydraulic loading to Ponds 1-2 and Pond 3, the groundwater flow direction changed significantly from the previous baseline and assessment monitoring events. Because of the changes in site conditions and groundwater flow direction, monitoring wells JHC-MW-15015 and JHC-MW-15016 are no longer positioned downgradient from Pond 3. In response, as documented in the 2018 Annual Report, Consumers Energy installed three new downgradient wells (JHC-MW-18001 through JHC-MW-18003) on the west and southwest edge of former Pond 3 from December 3 through December 5, 2018 to reassess groundwater flow and ensure sufficient wells are appropriately located to assess groundwater quality downgradient from the Pond 3 CCR Unit. Data collected from December 2018 through April 2020 confirm that the monitoring wells are appropriately positioned to assess groundwater quality downgradient from Pond 3. Therefore, JHC-MW-18001 through JHC-MW-18003 were added to the downgradient monitoring network for Pond 3 and are included in the statistical evaluations.

Following the first semiannual assessment monitoring event for 2021, compliance well data for the JHC Pond 3 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 Guidance², 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. Based on the number of historical observations in the representative sample population, the population mean, the population standard deviation, and a selected confidence level (i.e. 99 percent), an upper and lower confidence limit is calculated. The actual mean concentration of the population, 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 there is 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

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

Technical Memorandum

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 for each well were first compared directly to the GWPS, as shown on Table B1. Constituent-well combinations with a direct exceedance of the GWPS within the past 8 events for JHC-MW-15013, JHC-MW-15015, and JHC-MW-15016 (June 2018 through May 2021) and JHC-MW-18001 through JHC-MW-18003 (December 2018 through May 2021) were retained for further analysis. Molybdenum in JHC-MW-15015 and selenium in JHC-MW-18002 at Pond 3 had individual results exceeding the GWPS within the past 8 sampling events.

As discussed above, JHC-MW-15015 and JHC-MW-15016 are located hydraulically upgradient of Pond 3 since 2018. During the timeframe between the last background monitoring event in August 2017 and the assessment monitoring events in 2018 (JHC-MW-15016) and 2019 (JHC-MW-15015), molybdenum concentrations at these wells showed an initial increase followed by a general decrease (see time-series charts in Attachment 1). Considering the timing of these increases, the location of the wells hydraulically upgradient from Pond 3, and the timing of CCR removal, it is likely that the groundwater quality measured at monitoring well JHC-MW-15015 and JHC-MW-15016 is more representative of groundwater flowing toward the CCR unit from the northeast, prior to being influenced by the Pond 3 CCR unit. CCR removal activities in the southern portion of JHC Pond 3 were completed in October 2018, so groundwater conditions were re-equilibrating at the time of the assessment monitoring sampling events during which the molybdenum concentration in JHC-MW-15015 and JHC-MW-15016 exceeded their GWPS by direct comparison. The molybdenum data have been retained in the assessment monitoring data set for this assessment monitoring data evaluation in order to remain conservative while hydrogeological conditions are stabilizing and to continue to monitor data quality at those locations post-CCR removal.

Groundwater data for the monitoring wells with individual results exceeding a GWPS by direct comparison 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 confidence intervals were calculated for each of the three CCR Appendix IV data sets with a direct exceedance of a GWPS using a 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;

Technical Memorandum

- 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.

Initially, the assessment monitoring results (June 2018 through May 2021) for molybdenum in JHC-MW-15015 and selenium in JHC-MW-18002 were observed visually for a potential trend. A visual decreasing trend is present in molybdenum concentrations at JHC-MW-1015; however, no statistically significant trends were identified (Attachment 1 trend tests). Due to the changes in site conditions discussed above, potential trends in data will continue to be assessed as more data are collected. 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. 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. 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 test was run with a per-well 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 on data transformations, as appropriate. The data set for molybdenum at JHC-MW-15015 was normally distributed and the data set for selenium at JHC-MW-18002 was normalized using a square root transformation. The confidence interval test compares the lower confidence limit to the GWPS. The evaluation of the Appendix IV constituents shows no statistically significant exceedances of the GWPSs. This result is consistent with the results of the initial assessment monitoring data statistical evaluation and concentrations remain above background levels. Consumers Energy will continue semiannual assessment monitoring per §257.95 and execute the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

Attachments

Table B1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation

Attachment 1 Sanitas™ Output

Table

Table B1
 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

Sample Location:						JHC-MW-15013										
Sample Date:						6/19/2018	11/14/2018	11/14/2018	2/27/2019	2/27/2019	4/29/2019	10/10/2019	4/16/2020	10/22/2020	10/22/2020	4/13/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS			Field Dup		Field Dup					Field Dup	
Appendix III																
Boron	ug/L	NC	NA	51	NA	258	318	312	330	330	320	300	55	279	278	259
Calcium	mg/L	NC	NA	46	NA	37.4	44.5	43.8	45	45	46	100	146	143	140	133
Chloride	mg/L	250*	NA	43	NA	16.2	16.9	17	18	18	16	17	9.48	11.7	11.6	11.5
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	< 1,000
Sulfate	mg/L	250*	NA	14	NA	34.8	32.9	32.3	30	30	30	230	276	205	202	103
Total Dissolved Solids	mg/L	500*	NA	258	NA	230	198	190	220	220	190	490	741	659	669	592
pH, Field	SU	6.5 - 8.5*	NA	4.8 - 9.2	NA	7.7	7.5	--	7.7 ⁽¹⁾	--	7.0	7.2	6.6	6.7	--	7.0
Appendix IV																
Antimony	ug/L	6	NA	2	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	1	10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	NA	35	2,000	21.4	22.1	22.4	25	23	25	53	73	66	65	64
Beryllium	ug/L	4	NA	1	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	2	100	2.9	2.3	3.2	< 1.0	< 1.0	2.0	7.3	< 1	1	1	11
Cobalt	ug/L	NC	6	15	15	< 15.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 15	< 15	< 15	< 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	< 1,000
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	10	40	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	5	100	< 5.0	12.2	11.7	11	10	8.5	7.2	6	7	6	9
Radium-226	pCi/L	NC	NA	NA	NA	< 0.548	0.626	0.834	< 0.101	0.0854	0.121	0.485	0.222	< 0.368	< 0.326	0.319
Radium-228	pCi/L	NC	NA	NA	NA	< 0.990	< 0.955	< 0.847	< 0.373	< 0.423	< 0.377	0.960	< 0.580	< 0.398	< 0.496	< 0.334
Radium-226/228	pCi/L	5	NA	1.93	5	< 1.54	< 1.14	1.47	0.402	0.436	< 0.377	1.45	0.729	0.603	< 0.496	0.548
Selenium	ug/L	50	NA	5	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 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) Field meter reading not usable due to malfunctioning groundwater meter. Displayed value is lab pH reading from an unpreserved bottle.
 (2) Monitoring wells JHC-MW-15015 and JHC-MW-15016 have been upgradient of Pond 3 since 2018 due to post-pond decommissioning groundwater flow direction changes and are no longer considered downgradient monitoring wells.

Table B1
 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

Sample Location:						JHC-MW-15015 ⁽²⁾								
Sample Date:						6/19/2018	11/14/2018	2/27/2019	4/29/2019	10/10/2019	4/16/2020	4/16/2020	10/23/2020	4/14/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS							Field Dup		
Appendix III														
Boron	ug/L	NC	NA	51	NA	194	270	860	1,000	1,300	1,400	1,360	1,770	1,980
Calcium	mg/L	NC	NA	46	NA	57.3	128	110	100	110	162	162	142	127
Chloride	mg/L	250*	NA	43	NA	22.0	89.5	22	15	14	11.0	11.2	7.21	6.69
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
Sulfate	mg/L	250*	NA	14	NA	54.6	99.4	41	38	39	56.6	57.0	36.6	33.2
Total Dissolved Solids	mg/L	500*	NA	258	NA	362	626	420	430	430	597	600	510	480
pH, Field	SU	6.5 - 8.5*	NA	4.8 - 9.2	NA	7.3	7.3	7.7 ⁽¹⁾	7.1	7.2	6.7	--	6.8	7.1
Appendix IV														
Antimony	ug/L	6	NA	2	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	1	10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	NA	35	2,000	36.7	71.7	47	44	49	67	66	53	61
Beryllium	ug/L	4	NA	1	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	2	100	< 1.0	< 1.0	1.7	< 1.0	4.3	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 15.0	< 6.0	< 6.0	< 6.0	< 6.0	< 15	< 15	< 15	< 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
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	10	40	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
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
Molybdenum	ug/L	NC	100	5	100	11.2	37.9	170	140	110	52	50	27	32
Radium-226	pCi/L	NC	NA	NA	NA	< 0.506	< 0.528	< 0.0793	< 0.0921	0.207	< 0.125	< 0.125	< 0.428	< 0.106
Radium-228	pCi/L	NC	NA	NA	NA	< 0.750	0.922	< 0.360	< 0.419	< 0.432	< 0.577	0.576	< 0.361	0.360
Radium-226/228	pCi/L	5	NA	1.93	5	< 1.26	< 1.34	< 0.360	< 0.419	< 0.432	< 0.577	0.682	< 0.428	0.441
Selenium	ug/L	50	NA	5	50	17.9	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 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) Field meter reading not usable due to malfunctioning groundwater meter. Displayed value is lab pH reading from an unpreserved bottle.
- (2) Monitoring wells JHC-MW-15015 and JHC-MW-15016 have been upgradient of Pond 3 since 2018 due to post-pond decommissioning groundwater flow direction changes and are no longer considered downgradient monitoring wells.

Table B1
 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

Sample Location:						JHC-MW-15016 ⁽²⁾								
Sample Date:						7/18/2018	11/15/2018	2/28/2019	4/29/2019	10/10/2019	10/10/2019	4/16/2020	10/23/2020	4/14/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS						Field Dup			
Appendix III														
Boron	ug/L	NC	NA	51	NA	291	340	1,100	2,100	4,200	4,200	5,060	6,390	4,950
Calcium	mg/L	NC	NA	46	NA	74.4	112	120	110	110	110	134	95.9	86.8
Chloride	mg/L	250*	NA	43	NA	43.6	73.8	27	26	16	17	8.76	5.88	11.8
Fluoride	ug/L	4,000	NA	1,000	NA	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	14	NA	31.9	23.5	23	23	26	26	18.2	15.8	17.6
Total Dissolved Solids	mg/L	500*	NA	258	NA	396	512	530	470	450	450	526	405	399
pH, Field	SU	6.5 - 8.5*	NA	4.8 - 9.2	NA	6.9	7.2	7.6 ⁽¹⁾	6.9	7.2	--	6.7	6.9	7.1
Appendix IV														
Antimony	ug/L	6	NA	2	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1
Arsenic	ug/L	10	NA	1	10	< 1.0	4.6	< 1.0	2.6	< 1.0	< 1.0	2	1	< 1
Barium	ug/L	2,000	NA	35	2,000	56.2	94.5	110	99	88	83	100	100	107
Beryllium	ug/L	4	NA	1	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	2	100	< 1.0	< 1.0	3.3	2.5	1.6	1.7	< 1	1	< 1
Cobalt	ug/L	NC	6	15	15	< 15.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 15	< 15	< 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
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1
Lithium	ug/L	NC	40	10	40	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	5	100	100	80.0	44	42	27	25	59	75	59
Radium-226	pCi/L	NC	NA	NA	NA	< 0.647	0.514	0.149	0.239	0.322	--	0.274	< 0.355	0.205
Radium-228	pCi/L	NC	NA	NA	NA	1.61	1.29	0.520	< 0.482	< 0.482	--	< 0.751	< 0.453	< 0.390
Radium-226/228	pCi/L	5	NA	1.93	5	1.88	1.80	0.669	0.711	0.540	--	< 0.751	0.506	0.560
Selenium	ug/L	50	NA	5	50	2.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2

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) Field meter reading not usable due to malfunctioning groundwater meter. Displayed value is lab pH reading from an unpreserved bottle.
- (2) Monitoring wells JHC-MW-15015 and JHC-MW-15016 have been upgradient of Pond 3 since 2018 due to post-pond decommissioning groundwater flow direction changes and are no longer considered downgradient monitoring wells.

Table B1
 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

Sample Location:						JHC-MW-18001								
Sample Date:						12/12/2018	2/28/2019	4/25/2019	8/13/2019	10/10/2019	4/15/2020	10/23/2020	4/13/2021	4/13/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS									
Appendix III														
Boron	ug/L	NC	NA	51	NA	304	310	300	330	390	376	476	388	411
Calcium	mg/L	NC	NA	46	NA	52.9	69	77	76	66	71.7	74.8	62.3	62.2
Chloride	mg/L	250*	NA	43	NA	13.4	15	11	2.6	2.2	5.01	9.24	9.32	9.64
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
Sulfate	mg/L	250*	NA	14	NA	51.7	86	130	140	82	94.1	174	109	111
Total Dissolved Solids	mg/L	500*	NA	258	NA	344	330	430	460	360	418	528	401	397
pH, Field	SU	6.5 - 8.5*	NA	4.8 - 9.2	NA	8.4	8.2 ⁽¹⁾	8.3	8.2	8.1	8.2	7.8	8.2	--
Appendix IV														
Antimony	ug/L	6	NA	2	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	1	10	< 1.0	1.5	1.4	1.7	1.5	2	2	1	1
Barium	ug/L	2,000	NA	35	2,000	225	360	440	610	390	529	659	451	457
Beryllium	ug/L	4	NA	1	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	2	100	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	1	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 15	< 15	< 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
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	10	40	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
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
Molybdenum	ug/L	NC	100	5	100	9.6	9.2	8.1	16	17	18	17	11	11
Radium-226	pCi/L	NC	NA	NA	NA	< 0.886	0.177	0.321	0.469	0.296	0.284	0.464	0.398	0.321
Radium-228	pCi/L	NC	NA	NA	NA	< 0.955	0.561	0.345	0.822	0.406	< 0.355	< 0.408	< 0.370	< 0.382
Radium-226/228	pCi/L	5	NA	1.93	5	< 1.84	0.738	0.667	1.29	0.702	0.463	0.621	0.639	0.611
Selenium	ug/L	50	NA	5	50	1.6	2.3	1.3	15	18	27	7	6	6
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2	< 2

Notes:

- ug/L - micrograms per liter.
- mg/L - milligrams per liter.
- SU - standard units; pH is a field parameter.
- pCi/L - picocuries per liter.
- NA - not applicable.
- NC - no criteria.
- - not analyzed.
- MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
- RSL - Regional Screening Level from 83 FR 36435.
- UTL - Upper Tolerance Limit (95%) of the background data set.
- GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL and UTL as established in TRC's Technical Memorandum dated October 15, 2018.
- * - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations (SDWR) April 2012.
- Bold** value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules.
- All metals were analyzed as total unless otherwise specified.
- (1) Field meter reading not usable due to malfunctioning groundwater meter. Displayed value is lab pH reading from an unpreserved bottle.
- (2) Monitoring wells JHC-MW-15015 and JHC-MW-15016 have been upgradient of Pond 3 since 2018 due to post-pond decommissioning groundwater flow direction changes and are no longer considered downgradient monitoring wells.

Table B1
 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

Sample Location:						JHC-MW-18002							
Sample Date:						12/12/2018	3/12/2019	4/25/2019	8/13/2019	10/10/2019	4/15/2020	10/22/2020	4/13/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS								
Appendix III													
Boron	ug/L	NC	NA	51	NA	301	300	290	340	330	273	272	207
Calcium	mg/L	NC	NA	46	NA	45.9	54	57	51	68	45.9	32.6	59.5
Chloride	mg/L	250*	NA	43	NA	14.9	17	15	18	17	3.32	< 1.00	6.82
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
Sulfate	mg/L	250*	NA	14	NA	35.6	46	83	67	58	45.9	11.8	68.8
Total Dissolved Solids	mg/L	500*	NA	258	NA	244	270	310	300	430	230	140	277
pH, Field	SU	6.5 - 8.5*	NA	4.8 - 9.2	NA	7.7	7.2	7.3	7.3	7.3	7.3	7.2	7.1
Appendix IV													
Antimony	ug/L	6	NA	2	6	< 1.0	< 1.0	< 1.0	1.0	2.7	< 1	1	1
Arsenic	ug/L	10	NA	1	10	< 1.0	1.2	< 1.0	1.4	< 1.0	< 1	< 1	< 1
Barium	ug/L	2,000	NA	35	2,000	79.5	96	110	130	130	108	53	108
Beryllium	ug/L	4	NA	1	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	0.24	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	2	100	< 1.0	1.1	< 1.0	< 1.0	< 1.0	< 1	1	< 1
Cobalt	ug/L	NC	6	15	15	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 15	< 15	< 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
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1
Lithium	ug/L	NC	40	10	40	< 10	< 10	< 10	12	< 10	< 10	< 10	< 10
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	5	100	12.4	11	10	13	15	15	20	17
Radium-226	pCi/L	NC	NA	NA	NA	0.631	0.125	0.144	< 0.195	0.198	< 0.105	< 0.323	0.129
Radium-228	pCi/L	NC	NA	NA	NA	< 0.711	< 0.356	< 0.610	< 0.607	< 0.413	< 0.415	< 0.501	< 0.368
Radium-226/228	pCi/L	5	NA	1.93	5	< 1.30	0.428	< 0.610	< 0.607	< 0.413	< 0.415	< 0.501	< 0.368
Selenium	ug/L	50	NA	5	50	18.3	30	26	23	31	57	12	101
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2

Notes:

- ug/L - micrograms per liter.
- mg/L - milligrams per liter.
- SU - standard units; pH is a field parameter.
- pCi/L - picocuries per liter.
- NA - not applicable.
- NC - no criteria.
- - not analyzed.
- MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
- RSL - Regional Screening Level from 83 FR 36435.
- UTL - Upper Tolerance Limit (95%) of the background data set.
- GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL and UTL as established in TRC's Technical Memorandum dated October 15, 2018.
- * - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations (SDWR) April 2012.
- Bold** value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules.
- All metals were analyzed as total unless otherwise specified.
- (1) Field meter reading not usable due to malfunctioning groundwater meter. Displayed value is lab pH reading from an unpreserved bottle.
- (2) Monitoring wells JHC-MW-15015 and JHC-MW-15016 have been upgradient of Pond 3 since 2018 due to post-pond decommissioning groundwater flow direction changes and are no longer considered downgradient monitoring wells.

Table B1
 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

Sample Location:						JHC-MW-18003									
Sample Date:						12/7/2018	3/12/2019	3/12/2019	4/25/2019	8/13/2019	8/13/2019	10/10/2019	4/15/2020	10/22/2020	4/13/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS			Field Dup			Field Dup				
Appendix III															
Boron	ug/L	NC	NA	51	NA	197	210	220	270	330	340	510	283	310	193
Calcium	mg/L	NC	NA	46	NA	63.6	200	200	160	100	110	140	78.5	75.1	90.4
Chloride	mg/L	250*	NA	43	NA	15.3	10	10	11	10	11	10	11.7	3.18	2.13
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	14	NA	116	640	630	450	250	250	340	88.9	74.5	194
Total Dissolved Solids	mg/L	500*	NA	258	NA	326	1,100	1,100	810	510	520	660	352	324	463
pH, Field	SU	6.5 - 8.5*	NA	4.8 - 9.2	NA	7.4	6.9	--	6.9	7.0	--	6.9	7.2	6.9	7.2
Appendix IV															
Antimony	ug/L	6	NA	2	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1
Arsenic	ug/L	10	NA	1	10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.4	< 1	< 1	< 1
Barium	ug/L	2,000	NA	35	2,000	81.5	150	150	120	100	96	130	97	92	75
Beryllium	ug/L	4	NA	1	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	2	100	< 1.0	1.1	1.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1	1	< 1
Cobalt	ug/L	NC	6	15	15	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 15	< 15	< 6
Fluoride	ug/L	4,000	NA	1,000	4,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1
Lithium	ug/L	NC	40	10	40	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	5	100	10.9	10	10	12	10	10	12	19	18	21
Radium-226	pCi/L	NC	NA	NA	NA	< 0.757	0.131	<0.132	0.270	< 0.235	< 0.160	< 0.161	< 0.118	< 0.276	< 0.122
Radium-228	pCi/L	NC	NA	NA	NA	0.833	< 0.497	0.501	0.623	< 0.570	< 0.360	< 0.556	< 0.465	0.405	< 0.380
Radium-226/228	pCi/L	5	NA	1.93	5	< 1.54	< 0.497	0.613	0.892	< 0.570	< 0.360	< 0.556	< 0.465	0.557	0.417
Selenium	ug/L	50	NA	5	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4	1	< 1
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2

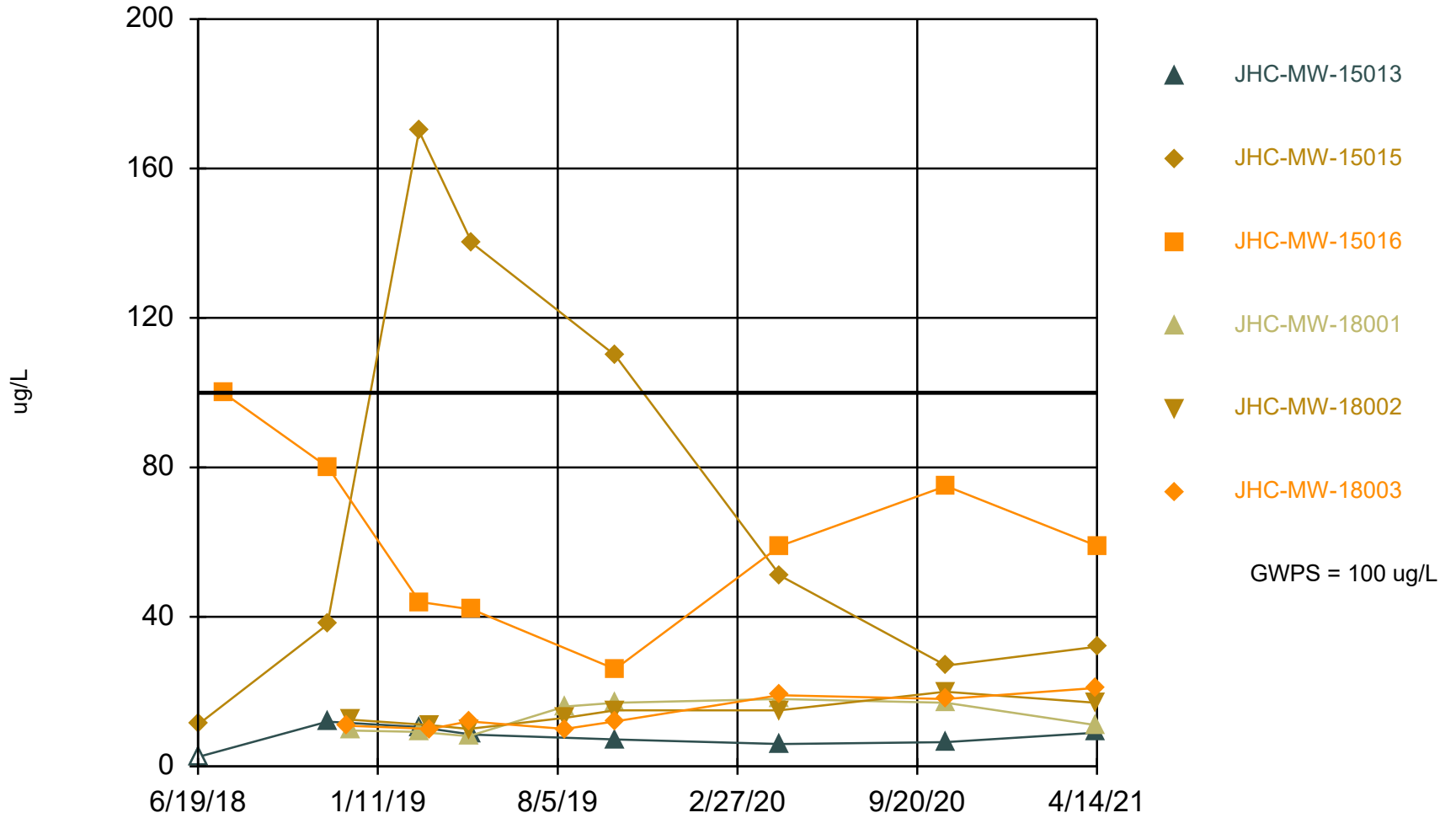
Notes:

- ug/L - micrograms per liter.
- mg/L - milligrams per liter.
- SU - standard units; pH is a field parameter.
- pCi/L - picocuries per liter.
- NA - not applicable.
- NC - no criteria.
- - not analyzed.
- MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
- RSL - Regional Screening Level from 83 FR 36435.
- UTL - Upper Tolerance Limit (95%) of the background data set.
- GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL and UTL as established in TRC's Technical Memorandum dated October 15, 2018.
- * - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations (SDWR) April 2012.
- Bold** value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules. All metals were analyzed as total unless otherwise specified.
- (1) Field meter reading not usable due to malfunctioning groundwater meter. Displayed value is lab pH reading from an unpreserved bottle.
- (2) Monitoring wells JHC-MW-15015 and JHC-MW-15016 have been upgradient of Pond 3 since 2018 due to post-pond decommissioning groundwater flow direction changes and are no longer considered downgradient monitoring wells.

Attachment 1

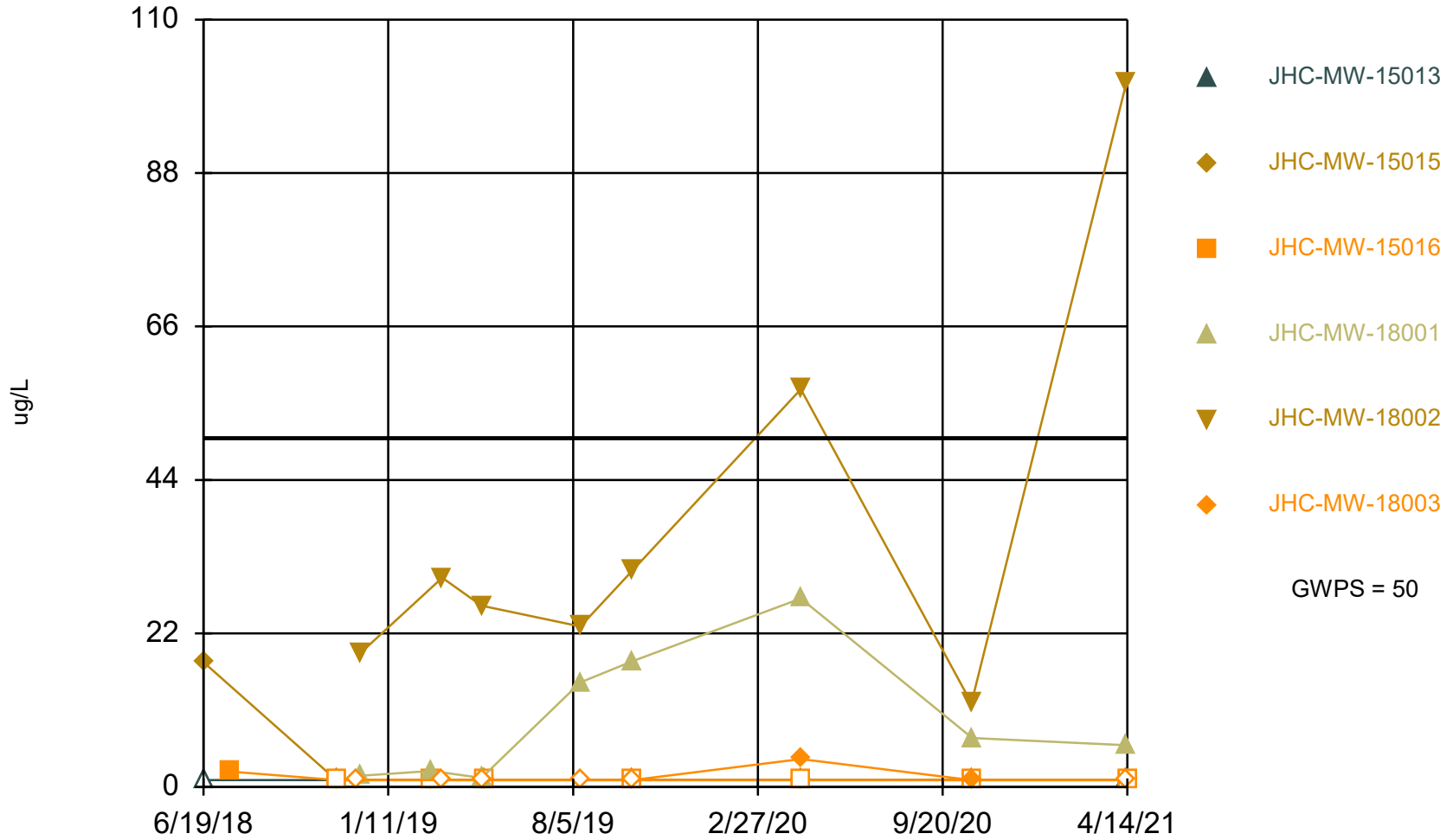
Sanitas™ Output

Molybdenum Comparison to GWPS



Time Series Analysis Run 6/9/2021 2:12 PM
Client: Consumers Energy Data: JHC CCR_Sanitas Data_1SA21

Selenium Comparison to GWPS



Time Series Analysis Run 6/9/2021 2:13 PM
Client: Consumers Energy Data: JHC CCR_Sanitas Data_1SA21

Summary Report

Constituent: Molybdenum, Total Analysis Run 6/9/2021 2:23 PM
 Client: Consumers Energy Data: JHC CCR_Sanitas Data_1SA21

For observations made between 6/19/2018 and 4/14/2021, a summary of the selected data set:

Observations = 48
 ND/Trace = 1
 Wells = 6
 Minimum Value = 5
 Maximum Value = 170
 Mean Value = 30.44
 Median Value = 15.5
 Standard Deviation = 36
 Coefficient of Variation = 1.183
 Skewness = 2.267

<u>Well</u>	<u>#Obs.</u>	<u>ND/Trace</u>	<u>Min</u>	<u>Max</u>	<u>Mean</u>	<u>Median</u>	<u>Std.Dev.</u>	<u>CV</u>	<u>Skewness</u>
JHC-MW-15013	8	1	5	11.95	8.081	7.85	2.359	0.2919	0.3492
JHC-MW-15015	8	0	11.2	170	72.39	44.45	59.28	0.8189	0.6255
JHC-MW-15016	8	0	26	100	60.63	59	23.78	0.3923	0.2124
JHC-MW-18001	8	0	8.1	18	13.24	13.5	4.133	0.3122	-0.05434
JHC-MW-18002	8	0	10	20	14.18	14	3.276	0.231	0.4706
JHC-MW-18003	8	0	10	21	14.11	12	4.464	0.3163	0.534

Summary Report

Constituent: Selenium, Total Analysis Run 6/9/2021 2:23 PM
 Client: Consumers Energy Data: JHC CCR_Sanitas Data_1SA21

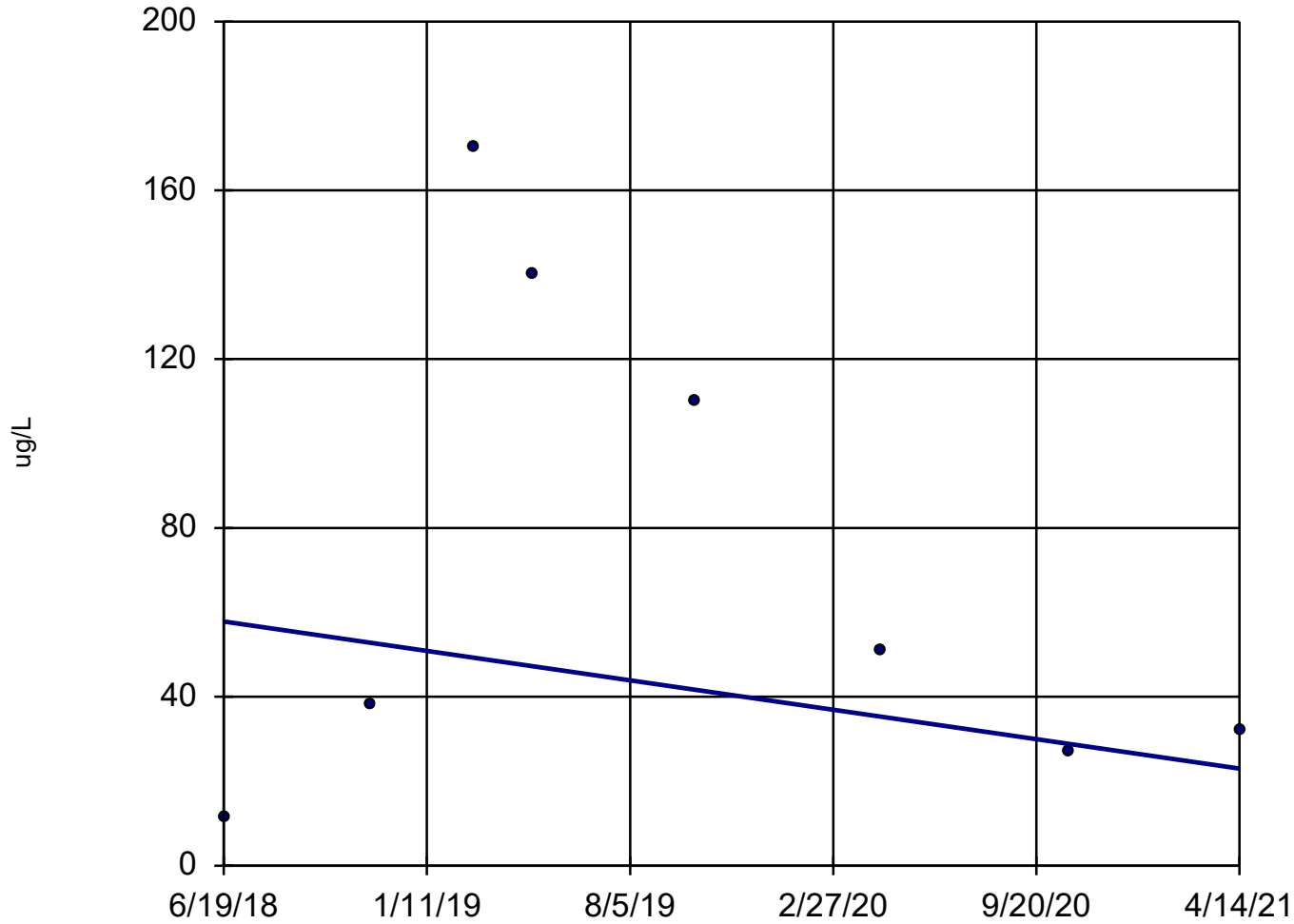
For observations made between 6/19/2018 and 4/14/2021, a summary of the selected data set:

Observations = 48
 ND/Trace = 28
 Wells = 6
 Minimum Value = 1
 Maximum Value = 101
 Mean Value = 8.971
 Median Value = 1
 Standard Deviation = 17.81
 Coefficient of Variation = 1.986
 Skewness = 3.463

<u>Well</u>	<u>#Obs.</u>	<u>ND/Trace</u>	<u>Min</u>	<u>Max</u>	<u>Mean</u>	<u>Median</u>	<u>Std.Dev.</u>	<u>CV</u>	<u>Skewness</u>
JHC-MW-15013	8	8	1	1	1	1	0	0	NaN
JHC-MW-15015	8	7	1	17.9	3.113	1	5.975	1.92	2.268
JHC-MW-15016	8	7	1	2.2	1.15	1	0.4243	0.3689	2.268
JHC-MW-18001	8	0	1.3	27	9.775	6.5	9.321	0.9535	0.7849
JHC-MW-18002	8	0	12	101	37.41	28	28.87	0.7717	1.505
JHC-MW-18003	8	6	1	4	1.375	1	1.061	0.7714	2.268

Molybdenum, Total

JHC-MW-15015

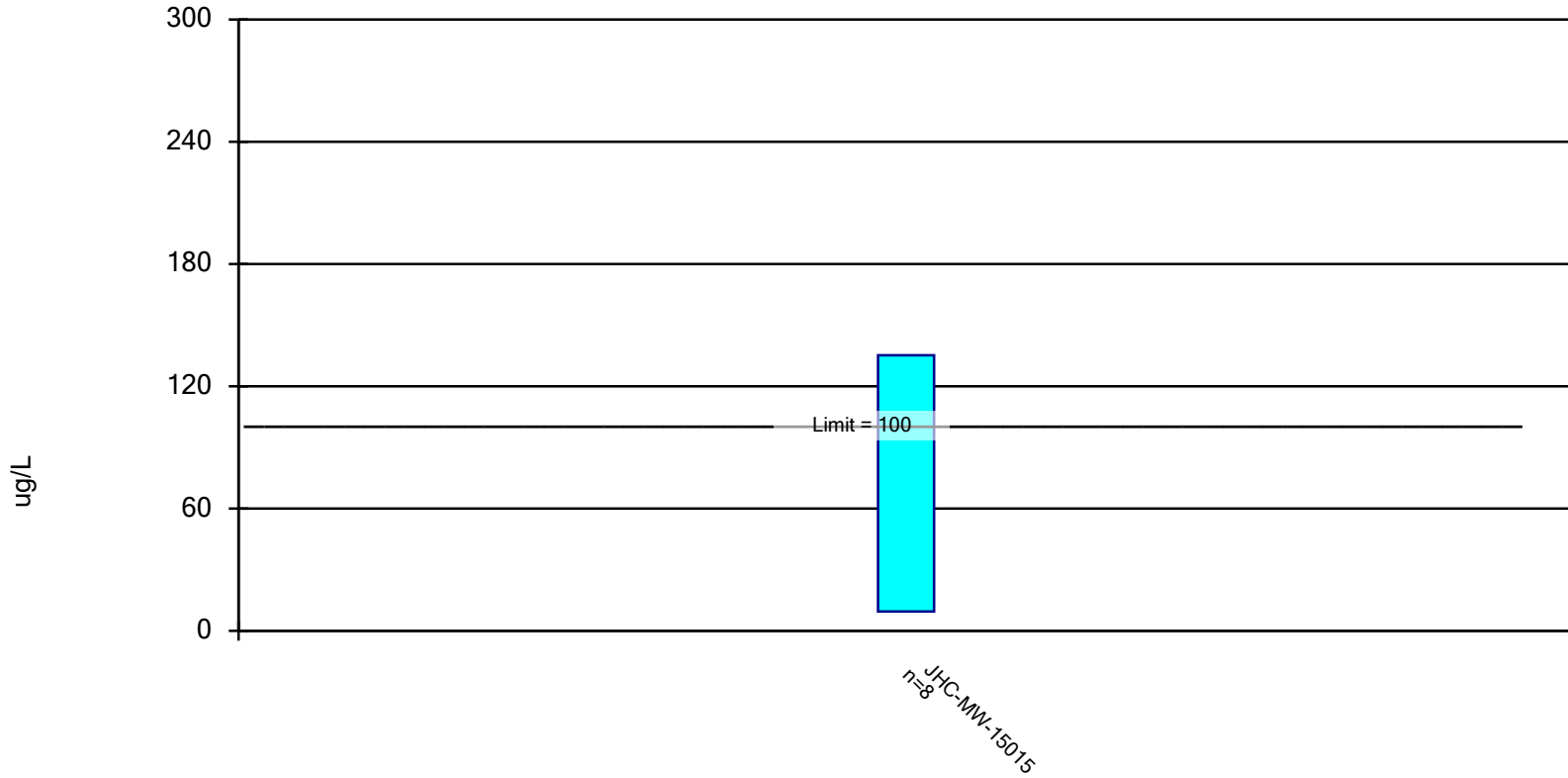


n = 8
Slope = -12.36
units per year.
Mann-Kendall
statistic = -4
critical = -17
Trend not sig-
nificant at 95%
confidence level
($\alpha = 0.025$ per
tail).

Sen's Slope Estimator Analysis Run 6/9/2021 2:17 PM
Client: Consumers Energy Data: JHC CCR_Sanitas Data_1SA21

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 6/9/2021 2:27 PM

Client: Consumers Energy Data: JHC CCR_Sanitas Data_1SA21

Confidence Interval

Constituent: Molybdenum, Total (ug/L) Analysis Run 6/9/2021 2:28 PM

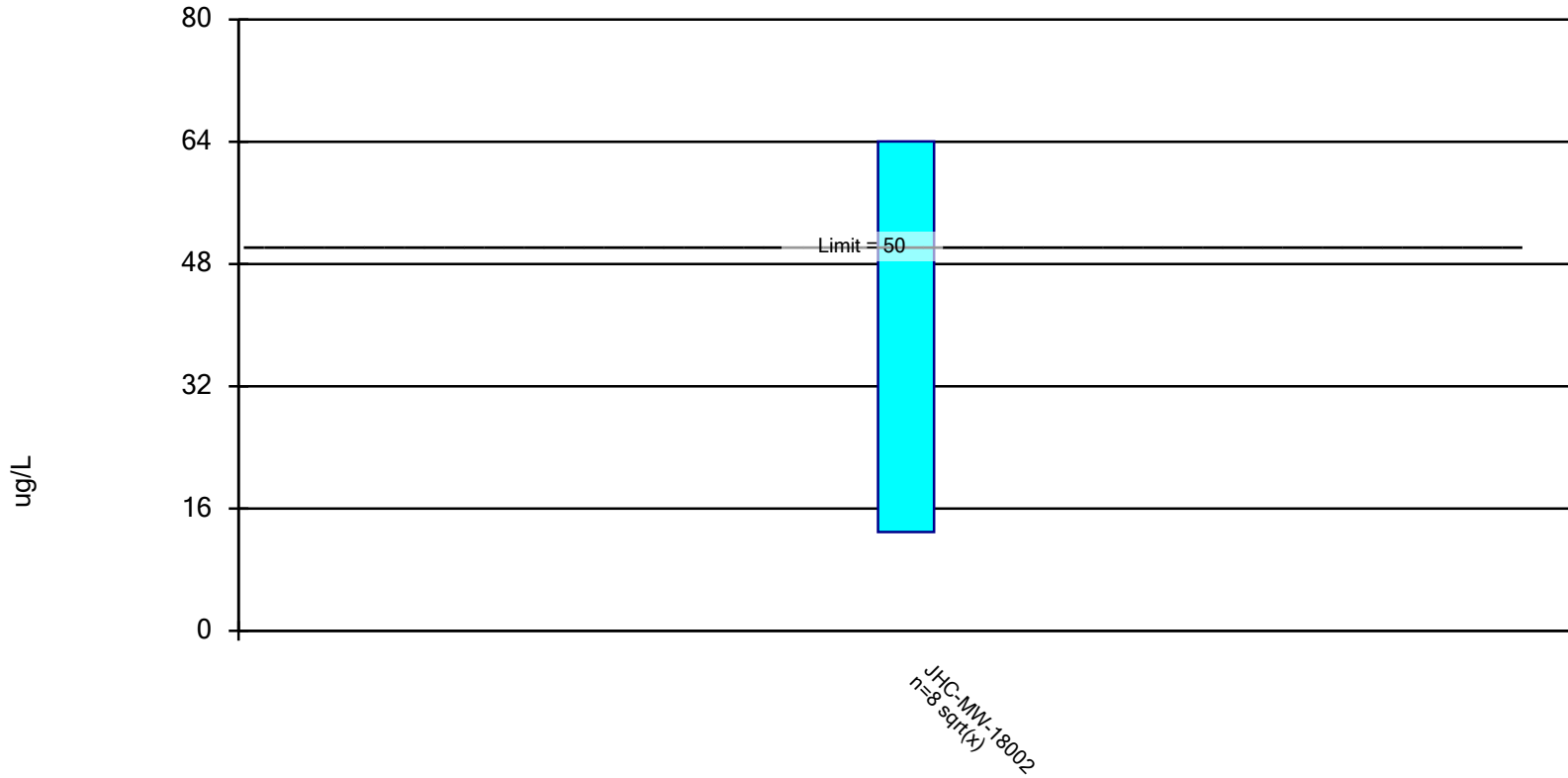
Client: Consumers Energy Data: JHC CCR_Sanitas Data_1SA21

JHC-MW-15015

6/19/2018	11.2
11/14/2018	37.9
2/27/2019	170
4/29/2019	140
10/10/2019	110
4/16/2020	51 (D)
10/23/2020	27
4/14/2021	32
Mean	72.39
Std. Dev.	59.28
Upper Lim.	135.2
Lower Lim.	9.558

Parametric Confidence Interval

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



Constituent: Selenium, Total Analysis Run 6/9/2021 2:27 PM
Client: Consumers Energy Data: JHC CCR_Sanitas Data_1SA21

Confidence Interval

Constituent: Selenium, Total (ug/L) Analysis Run 6/9/2021 2:28 PM

Client: Consumers Energy Data: JHC CCR_Sanitas Data_1SA21

JHC-MW-18002

12/12/2018	19.3 (D)
3/12/2019	30
4/25/2019	26
8/13/2019	23
10/10/2019	31
4/15/2020	57
10/22/2020	12
4/13/2021	101
Mean	37.41
Std. Dev.	28.87
Upper Lim.	64.03
Lower Lim.	12.94

Appendix C

October 2021 Assessment Monitoring Statistical Evaluation

Technical Memorandum

Date: January 28, 2022

To: Bethany Swanberg, Consumers Energy

From: Sarah Holmstrom, TRC
Kristin Lowery, TRC

Project No.: 418422.0000.0000 Phase 1 Task 3

Subject: Statistical Evaluation of October 2021 Assessment Monitoring Sampling Event, JH Campbell Bottom Ash Pond 3 North and 3 South CCR Unit, Consumers Energy Company, West Olive, Michigan

During the statistical evaluation of the initial assessment monitoring event, no Appendix IV constituents were present at statistically significant levels exceeding the Groundwater Protections Standards (GWPSs). Therefore, Consumers Energy Company (Consumers Energy) is continuing semiannual assessment monitoring in accordance with §257.95 of the CCR Rule¹ at the JH Campbell Power Plant (JHC) Bottom Ash Pond 3 North and 3 South (Pond 3). The second semiannual assessment monitoring event for 2021 was conducted on October 19 through 22, 2021. In accordance with §257.95, the assessment monitoring data must be compared to GWPSs to determine whether or not Appendix IV constituents are detected at statistically significant levels above the GWPSs. GWPSs were established in accordance with §257.95(h), as described in the October 15, 2018 Groundwater Protection Standards technical memorandum, which was also included in the 2018 Annual Groundwater Monitoring Report (2018 Annual Report) (TRC, January 2019). The following narrative describes the methods that were employed for comparisons to the GWPSs. The results obtained and the Sanitas™ output files are included as an attachment.

The statistical evaluation of the second semiannual assessment monitoring event data for 2021 indicates that no constituents are present at statistically significant levels exceeding the GWPSs in downgradient monitoring wells at the JHC Pond 3 CCR unit. This result is consistent with the results of previous assessment monitoring data statistical evaluations and concentrations remain above background levels. Therefore, Consumers Energy will continue semiannual assessment monitoring per §257.95 and execute the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

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.

Technical Memorandum

Assessment Monitoring Statistical Evaluation

The compliance well network at the JHC Pond 3 CCR Unit consists of six monitoring wells. JHC-MW-15013, JHC-MW-15015, and JHC-MW-15016 are located on the eastern perimeter of the bottom ash ponds. Former downgradient monitoring well JHC-MW-15012 was decommissioned on October 10, 2018 during deconstruction of Bottom Ash Pond Unit 3 South; therefore, statistical analysis for JHC-MW-15012 terminates at the June 2018 monitoring event. Due to the cessation of hydraulic loading to Ponds 1-2 and Pond 3, the groundwater flow direction changed significantly from the previous baseline and assessment monitoring events. Because of the changes in site conditions and groundwater flow direction, monitoring wells JHC-MW-15015 and JHC-MW-15016 are no longer positioned downgradient from Pond 3. In response, as documented in the 2018 Annual Report, Consumers Energy installed three new downgradient wells (JHC-MW-18001 through JHC-MW-18003) on the west and southwest edge of former Pond 3 from December 3 through December 5, 2018 to reassess groundwater flow and ensure sufficient wells are appropriately located to assess groundwater quality downgradient from the Pond 3 CCR Unit. Data collected from December 2018 through April 2020 confirm that the monitoring wells are appropriately positioned to assess groundwater quality downgradient from Pond 3. Therefore, JHC-MW-18001 through JHC-MW-18003 were added to the downgradient monitoring network for Pond 3 and are included in the statistical evaluations.

Following the second semiannual assessment monitoring event for 2021, compliance well data for Pond 3 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 Guidance², the preferred method for comparisons to a fixed standard is confidence limits. An exceedance of the standard occurs when the 99 percent lower confidence level of the downgradient data exceeds the GWPS. 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 actual mean concentration of the population, 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 there is 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

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

Technical Memorandum

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 for each well were first compared directly to the GWPS, as shown on Table C1. Constituent-well combinations with a direct exceedance of the GWPS within the past 8 events for JHC-MW-15013, JHC-MW-15015, and JHC-MW-15016 (November 2018 through October 2021) and JHC-MW-18001 through JHC-MW-18003 (February 2019 through October 2021) were retained for further analysis. Molybdenum in JHC-MW-15015 and selenium in JHC-MW-18001 and JHC-MW-18002 at Pond 3 had individual results exceeding the GWPS within the past 8 sampling events.

As discussed above, JHC-MW-15015 and JHC-MW-15016 are located hydraulically upgradient of Pond 3 since 2018. During the timeframe between the last background monitoring event in August 2017 and the assessment monitoring events in 2018 (JHC-MW-15016) and 2019 (JHC-MW-15015), molybdenum concentrations at these wells showed an initial increase followed by a general decrease (see time-series charts in Attachment 1). Considering the timing of these increases, the location of the wells hydraulically upgradient from Pond 3, and the timing of CCR removal, it is likely that the groundwater quality measured at monitoring well JHC-MW-15015 and JHC-MW-15016 is more representative of groundwater flowing toward the CCR unit from the northeast, prior to being influenced by the Pond 3 CCR unit. CCR removal activities in the southern portion of JHC Pond 3 were completed in October 2018, so groundwater conditions were re-equilibrating at the time of the assessment monitoring sampling events during which the molybdenum concentration in JHC-MW-15015 and JHC-MW-15016 exceeded their GWPS by direct comparison. The molybdenum data have been retained in the assessment monitoring data set for this assessment monitoring data evaluation in order to remain conservative while hydrogeological conditions are stabilizing and to continue to monitor data quality at those locations post-CCR removal.

Groundwater data for the monitoring wells with individual results exceeding a GWPS by direct comparison 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 confidence intervals were calculated for each of the three CCR Appendix IV data sets with a direct exceedance of a GWPS using a 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;

Technical Memorandum

- 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.

Initially, the assessment monitoring results (November 2018 through October 2021) for molybdenum in JHC-MW-15015 and selenium in JHC-MW-18001 and JHC-MW-18002 were observed visually for a potential trend. A visual decreasing trend is present in molybdenum concentrations at JHC-MW-1015; however, no statistically significant trends were identified (Attachment 1 trend tests). Due to the changes in site conditions discussed above, potential trends in data will continue to be assessed as more data are collected. 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. 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. 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 test was run with a per-well 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 on data transformations, as appropriate. The data sets for molybdenum at JHC-MW-15015 and selenium at JH-MW-18001 and JHC-MW-18002 were normalized using a square root transformation. The confidence interval test compares the lower confidence limit to the GWPS. The evaluation of the Appendix IV constituents shows no statistically significant exceedances of the GWPSs. This result is consistent with the results of the initial assessment monitoring data statistical evaluation and concentrations remain above background levels. Consumers Energy will continue semiannual assessment monitoring per §257.95 and execute the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98.

Attachments

Table C1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation

Attachment 1 Sanitas™ Output

Table

Table C1
 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

Sample Location:						JHC-MW-15013										
Sample Date:						11/14/2018	11/14/2018	2/27/2019	2/27/2019	4/29/2019	10/10/2019	4/16/2020	10/22/2020	10/22/2020	4/13/2021	10/20/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS		Field Dup		Field Dup					Field Dup		
Appendix III																
Boron	ug/L	NC	NA	51	NA	318	312	330	330	320	300	55	279	278	259	274
Calcium	mg/L	NC	NA	46	NA	44.5	43.8	45	45	46	100	146	143	140	133	140
Chloride	mg/L	250*	NA	43	NA	16.9	17	18	18	16	17	9.48	11.7	11.6	11.5	16.1
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	< 1,000
Sulfate	mg/L	250*	NA	14	NA	32.9	32.3	30	30	30	230	276	205	202	103	230
Total Dissolved Solids	mg/L	500*	NA	258	NA	198	190	220	220	190	490	741	659	669	592	740
pH, Field	SU	6.5 - 8.5*	NA	4.8 - 9.2	NA	7.5	--	7.7 ⁽¹⁾	--	7.0	7.2	6.6	6.7	--	7.0	7.0
Appendix IV																
Antimony	ug/L	6	NA	2	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	1	10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.1	< 1	< 1	< 1	< 1	1
Barium	ug/L	2,000	NA	35	2,000	22.1	22.4	25	23	25	53	73	66	65	64	79
Beryllium	ug/L	4	NA	1	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	2	100	2.3	3.2	< 1.0	< 1.0	2.0	7.3	< 1	1	1	11	5
Cobalt	ug/L	NC	6	15	15	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 15	< 15	< 15	< 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	< 1,000
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	10	40	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	5	100	12.2	11.7	11	10	8.5	7.2	6	7	6	9	15
Radium-226	pCi/L	NC	NA	NA	NA	0.626	0.834	< 0.101	0.0854	0.121	0.485	0.222	< 0.368	< 0.326	0.319	< 0.336
Radium-228	pCi/L	NC	NA	NA	NA	< 0.955	< 0.847	< 0.373	< 0.423	< 0.377	0.960	< 0.580	< 0.398	< 0.496	< 0.334	0.861
Radium-226/228	pCi/L	5	NA	1.93	5	< 1.14	1.47	0.402	0.436	< 0.377	1.45	0.729	0.603	< 0.496	0.548	1.18
Selenium	ug/L	50	NA	5	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	1
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

pCi/L - picocuries per liter.

NA - not applicable.

NC - no criteria.

-- - not analyzed.

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

RSL - Regional Screening Level from 83 FR 36435.

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

GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL and UTL as established in TRC's

Technical Memorandum dated October 15, 2018.

* - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations

(SDWR) April 2012.

Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the

GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules.

All metals were analyzed as total unless otherwise specified.

(1) Field meter reading not usable due to malfunctioning groundwater meter. Displayed value is lab pH reading from an unpreserved bottle.

(2) Monitoring wells JHC-MW-15015 and JHC-MW-15016 have been upgradient of Pond 3 since 2018 due to post-pond decommissioning groundwater flow direction changes and are no longer considered downgradient monitoring wells.

Table C1
 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

Sample Location:						JHC-MW-15015 ⁽²⁾								
Sample Date:						11/14/2018	2/27/2019	4/29/2019	10/10/2019	4/16/2020	4/16/2020	10/23/2020	4/14/2021	10/20/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS						Field Dup			
Appendix III														
Boron	ug/L	NC	NA	51	NA	270	860	1,000	1,300	1,400	1,360	1,770	1,980	1,910
Calcium	mg/L	NC	NA	46	NA	128	110	100	110	162	162	142	127	138
Chloride	mg/L	250*	NA	43	NA	89.5	22	15	14	11.0	11.2	7.21	6.69	17.7
Fluoride	ug/L	4,000	NA	1,000	NA	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250*	NA	14	NA	99.4	41	38	39	56.6	57.0	36.6	33.2	41.6
Total Dissolved Solids	mg/L	500*	NA	258	NA	626	420	430	430	597	600	510	480	577
pH, Field	SU	6.5 - 8.5*	NA	4.8 - 9.2	NA	7.3	7.7 ⁽¹⁾	7.1	7.2	6.7	--	6.8	7.1	7.0
Appendix IV														
Antimony	ug/L	6	NA	2	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	1	10	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	NA	35	2,000	71.7	47	44	49	67	66	53	61	85
Beryllium	ug/L	4	NA	1	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	2	100	< 1.0	1.7	< 1.0	4.3	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 6.0	< 6.0	< 6.0	< 6.0	< 15	< 15	< 15	< 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
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	10	40	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
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
Molybdenum	ug/L	NC	100	5	100	37.9	170	140	110	52	50	27	32	22
Radium-226	pCi/L	NC	NA	NA	NA	< 0.528	< 0.0793	< 0.0921	0.207	< 0.125	< 0.125	< 0.428	< 0.106	0.235
Radium-228	pCi/L	NC	NA	NA	NA	0.922	< 0.360	< 0.419	< 0.432	< 0.577	0.576	< 0.361	0.360	< 0.546
Radium-226/228	pCi/L	5	NA	1.93	5	< 1.34	< 0.360	< 0.419	< 0.432	< 0.577	0.682	< 0.428	0.441	< 0.546
Selenium	ug/L	50	NA	5	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 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) Field meter reading not usable due to malfunctioning groundwater meter. Displayed value is lab pH reading from an unpreserved bottle.
- (2) Monitoring wells JHC-MW-15015 and JHC-MW-15016 have been upgradient of Pond 3 since 2018 due to post-pond decommissioning groundwater flow direction changes and are no longer considered downgradient monitoring wells.

Table C1
 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

Sample Location:						JHC-MW-15016 ⁽²⁾								
Sample Date:						11/15/2018	2/28/2019	4/29/2019	10/10/2019	10/10/2019	4/16/2020	10/23/2020	4/14/2021	10/20/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS					Field Dup				
Appendix III														
Boron	ug/L	NC	NA	51	NA	340	1,100	2,100	4,200	4,200	5,060	6,390	4,950	5,400
Calcium	mg/L	NC	NA	46	NA	112	120	110	110	110	134	95.9	86.8	94.0
Chloride	mg/L	250*	NA	43	NA	73.8	27	26	16	17	8.76	5.88	11.8	15.5
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
Sulfate	mg/L	250*	NA	14	NA	23.5	23	23	26	26	18.2	15.8	17.6	20.9
Total Dissolved Solids	mg/L	500*	NA	258	NA	512	530	470	450	450	526	405	399	435
pH, Field	SU	6.5 - 8.5*	NA	4.8 - 9.2	NA	7.2	7.6 ⁽¹⁾	6.9	7.2	--	6.7	6.9	7.1	7.0
Appendix IV														
Antimony	ug/L	6	NA	2	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	1	10	4.6	< 1.0	2.6	< 1.0	< 1.0	2	1	< 1	< 1
Barium	ug/L	2,000	NA	35	2,000	94.5	110	99	88	83	100	100	107	131
Beryllium	ug/L	4	NA	1	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	2	100	< 1.0	3.3	2.5	1.6	1.7	< 1	1	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 15	< 15	< 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
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	10	40	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
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
Molybdenum	ug/L	NC	100	5	100	80.0	44	42	27	25	59	75	59	52
Radium-226	pCi/L	NC	NA	NA	NA	0.514	0.149	0.239	0.322	--	0.274	< 0.355	0.205	0.263
Radium-228	pCi/L	NC	NA	NA	NA	1.29	0.520	< 0.482	< 0.482	--	< 0.751	< 0.453	< 0.390	< 0.652
Radium-226/228	pCi/L	5	NA	1.93	5	1.80	0.669	0.711	0.540	--	< 0.751	0.506	0.560	0.692
Selenium	ug/L	50	NA	5	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 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) Field meter reading not usable due to malfunctioning groundwater meter. Displayed value is lab pH reading from an unpreserved bottle.

(2) Monitoring wells JHC-MW-15015 and JHC-MW-15016 have been upgradient of Pond 3 since 2018 due to post-pond decommissioning groundwater flow direction changes and are no longer considered downgradient monitoring wells.

Table C1
 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

Sample Location:						JHC-MW-18001								
Sample Date:						2/28/2019	4/25/2019	8/13/2019	10/10/2019	4/15/2020	10/23/2020	4/13/2021	4/13/2021	10/20/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS								Field Dup	
Appendix III														
Boron	ug/L	NC	NA	51	NA	310	300	330	390	376	476	388	411	459
Calcium	mg/L	NC	NA	46	NA	69	77	76	66	71.7	74.8	62.3	62.2	65.6
Chloride	mg/L	250*	NA	43	NA	15	11	2.6	2.2	5.01	9.24	9.32	9.64	1.06
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
Sulfate	mg/L	250*	NA	14	NA	86	130	140	82	94.1	174	109	111	36.0
Total Dissolved Solids	mg/L	500*	NA	258	NA	330	430	460	360	418	528	401	397	412
pH, Field	SU	6.5 - 8.5*	NA	4.8 - 9.2	NA	8.2 ⁽¹⁾	8.3	8.2	8.1	8.2	7.8	8.2	--	8.1
Appendix IV														
Antimony	ug/L	6	NA	2	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	1	10	1.5	1.4	1.7	1.5	2	2	1	1	2
Barium	ug/L	2,000	NA	35	2,000	360	440	610	390	529	659	451	457	634
Beryllium	ug/L	4	NA	1	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	2	100	< 1.0	< 1.0	< 1.0	< 1.0	< 1	1	< 1	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 6.0	< 6.0	< 6.0	< 6.0	< 15	< 15	< 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
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	10	40	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
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
Molybdenum	ug/L	NC	100	5	100	9.2	8.1	16	17	18	17	11	11	13
Radium-226	pCi/L	NC	NA	NA	NA	0.177	0.321	0.469	0.296	0.284	0.464	0.398	0.321	0.359
Radium-228	pCi/L	NC	NA	NA	NA	0.561	0.345	0.822	0.406	< 0.355	< 0.408	< 0.370	< 0.382	< 0.411
Radium-226/228	pCi/L	5	NA	1.93	5	0.738	0.667	1.29	0.702	0.463	0.621	0.639	0.611	0.734
Selenium	ug/L	50	NA	5	50	2.3	1.3	15	18	27	7	6	6	57
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2

Notes:

- ug/L - micrograms per liter.
- mg/L - milligrams per liter.
- SU - standard units; pH is a field parameter.
- pCi/L - picocuries per liter.
- NA - not applicable.
- NC - no criteria.
- - not analyzed.
- MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
- RSL - Regional Screening Level from 83 FR 36435.
- UTL - Upper Tolerance Limit (95%) of the background data set.
- GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL and UTL as established in TRC's Technical Memorandum dated October 15, 2018.
- * - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations (SDWR) April 2012.
- Bold** value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules.
- All metals were analyzed as total unless otherwise specified.
- (1) Field meter reading not usable due to malfunctioning groundwater meter. Displayed value is lab pH reading from an unpreserved bottle.
- (2) Monitoring wells JHC-MW-15015 and JHC-MW-15016 have been upgradient of Pond 3 since 2018 due to post-pond decommissioning groundwater flow direction changes and are no longer considered downgradient monitoring wells.

Table C1
 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

Sample Location:						JHC-MW-18002							
Sample Date:						3/12/2019	4/25/2019	8/13/2019	10/10/2019	4/15/2020	10/22/2020	4/13/2021	10/20/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS								
Appendix III													
Boron	ug/L	NC	NA	51	NA	300	290	340	330	273	272	207	273
Calcium	mg/L	NC	NA	46	NA	54	57	51	68	45.9	32.6	59.5	67.9
Chloride	mg/L	250*	NA	43	NA	17	15	18	17	3.32	< 1.00	6.82	12.0
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
Sulfate	mg/L	250*	NA	14	NA	46	83	67	58	45.9	11.8	68.8	84.1
Total Dissolved Solids	mg/L	500*	NA	258	NA	270	310	300	430	230	140	277	340
pH, Field	SU	6.5 - 8.5*	NA	4.8 - 9.2	NA	7.2	7.3	7.3	7.3	7.3	7.2	7.1	6.9
Appendix IV													
Antimony	ug/L	6	NA	2	6	< 1.0	< 1.0	1.0	2.7	< 1	1	1	1
Arsenic	ug/L	10	NA	1	10	1.2	< 1.0	1.4	< 1.0	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	NA	35	2,000	96	110	130	130	108	53	108	136
Beryllium	ug/L	4	NA	1	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	0.24	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	2	100	1.1	< 1.0	< 1.0	< 1.0	< 1	1	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 6.0	< 6.0	< 6.0	< 6.0	< 15	< 15	< 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
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	10	40	< 10	< 10	12	< 10	< 10	< 10	< 10	11
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	5	100	11	10	13	15	15	20	17	12
Radium-226	pCi/L	NC	NA	NA	NA	0.125	0.144	< 0.195	0.198	< 0.105	< 0.323	0.129	0.274
Radium-228	pCi/L	NC	NA	NA	NA	< 0.356	< 0.610	< 0.607	< 0.413	< 0.415	< 0.501	< 0.368	< 0.487
Radium-226/228	pCi/L	5	NA	1.93	5	0.428	< 0.610	< 0.607	< 0.413	< 0.415	< 0.501	< 0.368	< 0.487
Selenium	ug/L	50	NA	5	50	30	26	23	31	57	12	101	8
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2	< 2

Notes:

- ug/L - micrograms per liter.
- mg/L - milligrams per liter.
- SU - standard units; pH is a field parameter.
- pCi/L - picocuries per liter.
- NA - not applicable.
- NC - no criteria.
- - not analyzed.
- MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
- RSL - Regional Screening Level from 83 FR 36435.
- UTL - Upper Tolerance Limit (95%) of the background data set.
- GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL and UTL as established in TRC's Technical Memorandum dated October 15, 2018.
- * - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations (SDWR) April 2012.
- Bold** value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules. All metals were analyzed as total unless otherwise specified.
- (1) Field meter reading not usable due to malfunctioning groundwater meter. Displayed value is lab pH reading from an unpreserved bottle.
- (2) Monitoring wells JHC-MW-15015 and JHC-MW-15016 have been upgradient of Pond 3 since 2018 due to post-pond decommissioning groundwater flow direction changes and are no longer considered downgradient monitoring wells.

Table C1
 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation
 JH Campbell Ponds 3N/3S – RCRA CCR Monitoring Program
 West Olive, Michigan

Sample Location:						JHC-MW-18003										
Sample Date:						3/12/2019	3/12/2019	4/25/2019	8/13/2019	8/13/2019	10/10/2019	4/15/2020	10/22/2020	4/13/2021	10/19/2021	10/19/2021
Constituent	Unit	EPA MCL	EPA RSL	UTL	GWPS		Field Dup			Field Dup						Field Dup
Appendix III																
Boron	ug/L	NC	NA	51	NA	210	220	270	330	340	510	283	310	193	336	336
Calcium	mg/L	NC	NA	46	NA	200	200	160	100	110	140	78.5	75.1	90.4	151	153
Chloride	mg/L	250*	NA	43	NA	10	10	11	10	11	10	11.7	3.18	2.13	< 1.00	< 1.00
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	< 1,000
Sulfate	mg/L	250*	NA	14	NA	640	630	450	250	250	340	88.9	74.5	194	359	362
Total Dissolved Solids	mg/L	500*	NA	258	NA	1,100	1,100	810	510	520	660	352	324	463	881	777
pH, Field	SU	6.5 - 8.5*	NA	4.8 - 9.2	NA	6.9	--	6.9	7.0	--	6.9	7.2	6.9	7.2	7.2	--
Appendix IV																
Antimony	ug/L	6	NA	2	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	1	10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.4	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	NA	35	2,000	150	150	120	100	96	130	97	92	75	103	106
Beryllium	ug/L	4	NA	1	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	2	100	1.1	1.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1	1	< 1	< 1	< 1
Cobalt	ug/L	NC	6	15	15	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 15	< 15	< 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	< 1,000
Lead	ug/L	NC	15	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	10	40	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Mercury	ug/L	2	NA	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	5	100	10	10	12	10	10	12	19	18	21	14	15
Radium-226	pCi/L	NC	NA	NA	NA	0.131	<0.132	0.270	< 0.235	< 0.160	< 0.161	< 0.118	< 0.276	< 0.122	0.239	0.415
Radium-228	pCi/L	NC	NA	NA	NA	< 0.497	0.501	0.623	< 0.570	< 0.360	< 0.556	< 0.465	0.405	< 0.380	0.573	< 0.529
Radium-226/228	pCi/L	5	NA	1.93	5	< 0.497	0.613	0.892	< 0.570	< 0.360	< 0.556	< 0.465	0.557	0.417	0.812	0.721
Selenium	ug/L	50	NA	5	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4	1	< 1	< 1	< 1
Thallium	ug/L	2	NA	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2

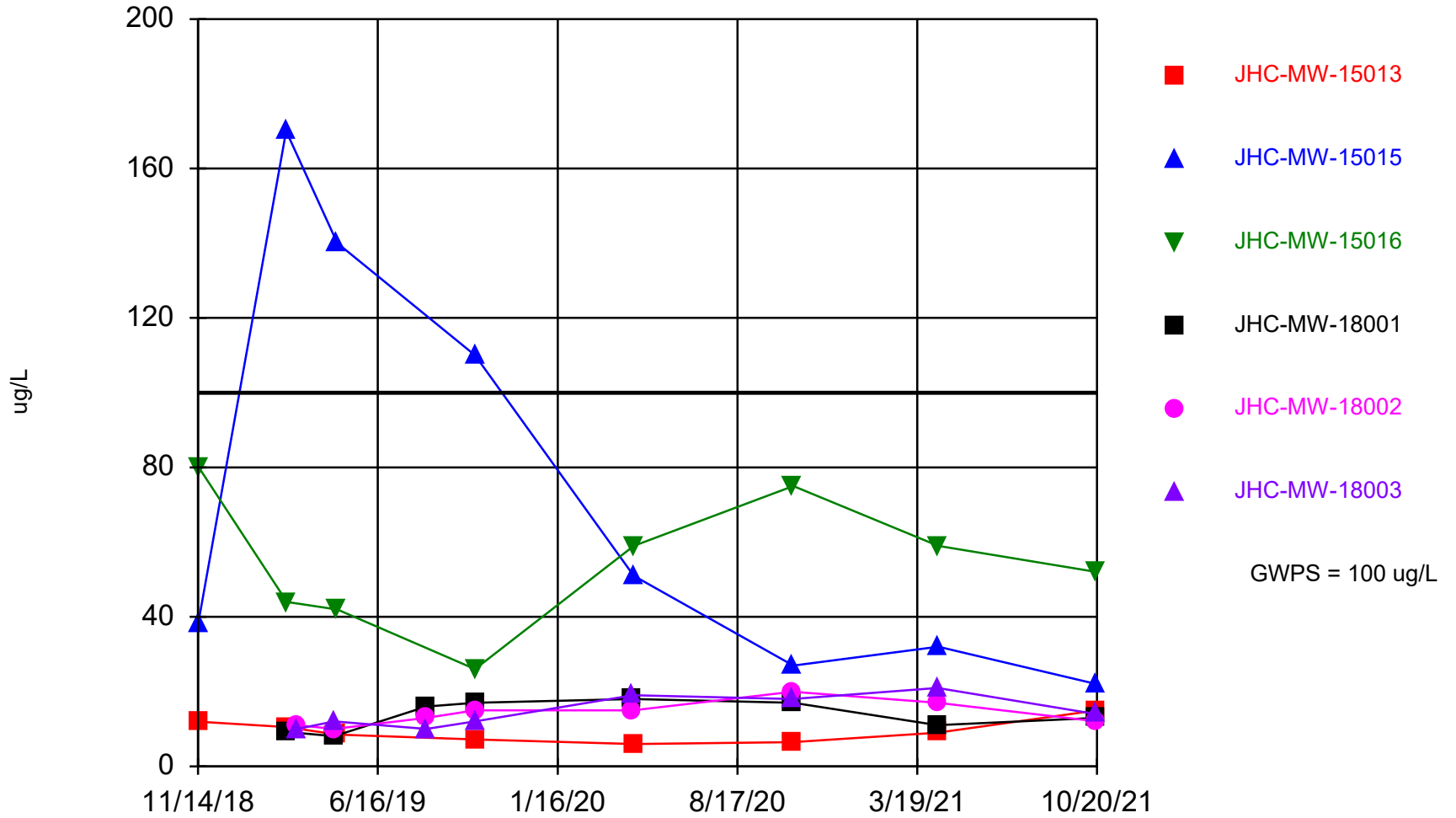
Notes:

- ug/L - micrograms per liter.
- mg/L - milligrams per liter.
- SU - standard units; pH is a field parameter.
- pCi/L - picocuries per liter.
- NA - not applicable.
- NC - no criteria.
- - not analyzed.
- MCL - Maximum Contaminant Level, EPA Drinking Water Standards and Health Advisories, April 2012.
- RSL - Regional Screening Level from 83 FR 36435.
- UTL - Upper Tolerance Limit (95%) of the background data set.
- GWPS - Groundwater Protection Standard. GWPS is the higher of the MCL/RSL and UTL as established in TRC's Technical Memorandum dated October 15, 2018.
- * - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations (SDWR) April 2012.
- Bold** value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the GWPS for evaluation purposes only. Confidence intervals will be used to determine compliance per the CCR rules. All metals were analyzed as total unless otherwise specified.
- (1) Field meter reading not usable due to malfunctioning groundwater meter. Displayed value is lab pH reading from an unpreserved bottle.
- (2) Monitoring wells JHC-MW-15015 and JHC-MW-15016 have been upgradient of Pond 3 since 2018 due to post-pond decommissioning groundwater flow direction changes and are no longer considered downgradient monitoring wells.

Attachment 1

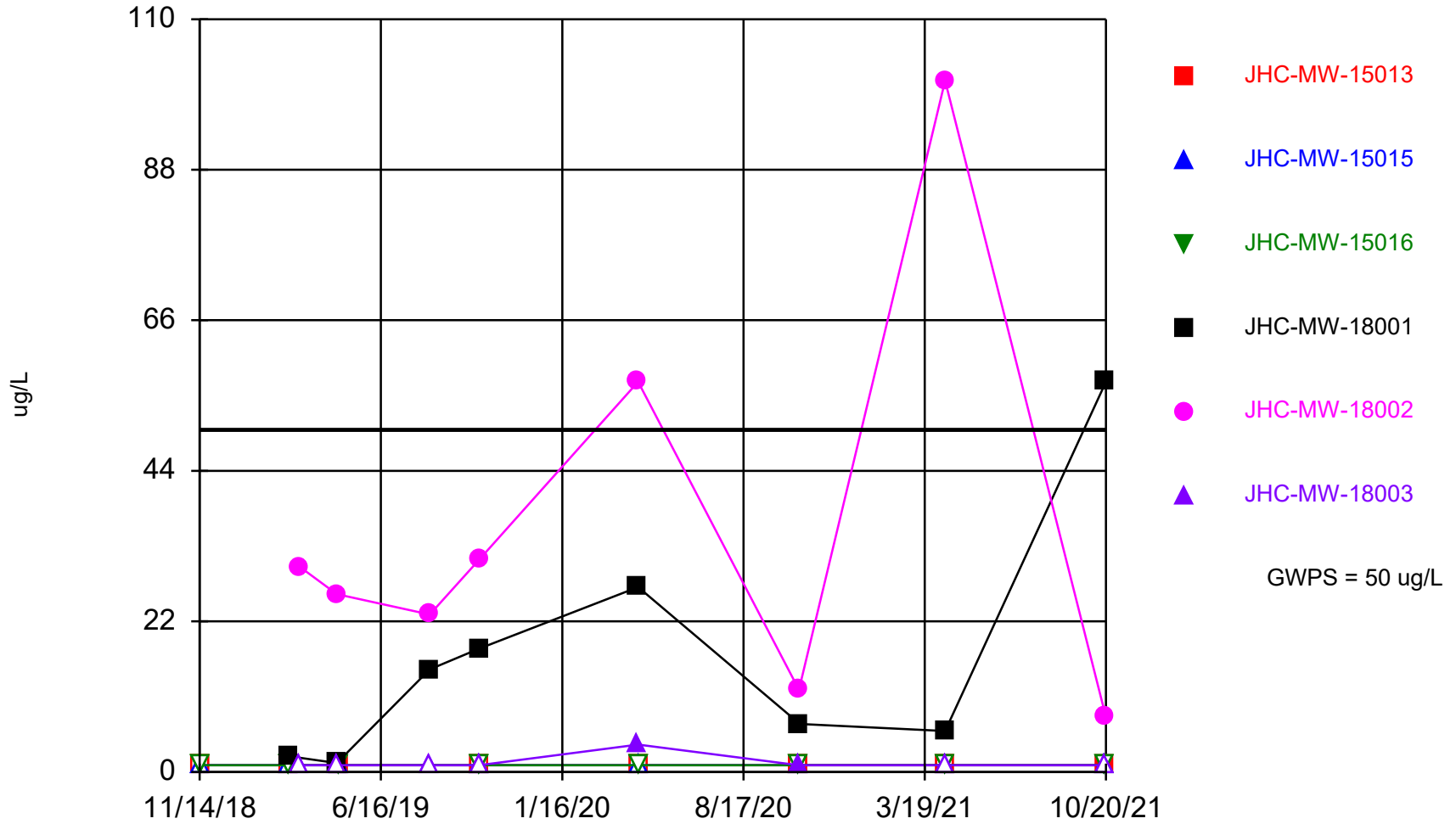
Sanitas™ Output

Molybdenum Comparison to GWPS



Time Series Analysis Run 12/3/2021 1:49 PM
Client: Consumers Energy Data: JHC CCR_Sanitas Data_4Q21

Selenium Comparison to GWPS



Time Series Analysis Run 12/3/2021 1:50 PM
Client: Consumers Energy Data: JHC CCR_Sanitas Data_4Q21

Summary Report

Constituent: Molybdenum, Total Analysis Run 12/3/2021 1:50 PM
 Client: Consumers Energy Data: JHC CCR_Sanitas Data_4Q21

For observations made between 11/14/2018 and 10/20/2021, a summary of the selected data set:

Observations = 48
 ND/Trace = 0
 Wells = 6
 Minimum Value = 6
 Maximum Value = 170
 Mean Value = 30
 Median Value = 16.5
 Standard Deviation = 34.39
 Coefficient of Variation = 1.147
 Skewness = 2.479

<u>Well</u>	<u>#Obs.</u>	<u>ND/Trace</u>	<u>Min</u>	<u>Max</u>	<u>Mean</u>	<u>Median</u>	<u>Std.Dev.</u>	<u>CV</u>	<u>Skewness</u>
JHC-MW-15013	8	0	6	15	9.331	8.75	3.043	0.3261	0.7142
JHC-MW-15015	8	0	22	170	73.74	44.45	57.79	0.7837	0.6802
JHC-MW-15016	8	0	26	80	54.63	55.5	17.71	0.3242	-0.04728
JHC-MW-18001	8	0	8.1	18	13.66	14.5	3.872	0.2834	-0.2931
JHC-MW-18002	8	0	10	20	14.13	14	3.314	0.2346	0.4874
JHC-MW-18003	8	0	10	21	14.5	13	4.276	0.2949	0.3809

Summary Report

Constituent: Selenium, Total Analysis Run 12/3/2021 1:51 PM
 Client: Consumers Energy Data: JHC CCR_Sanitas Data_4Q21

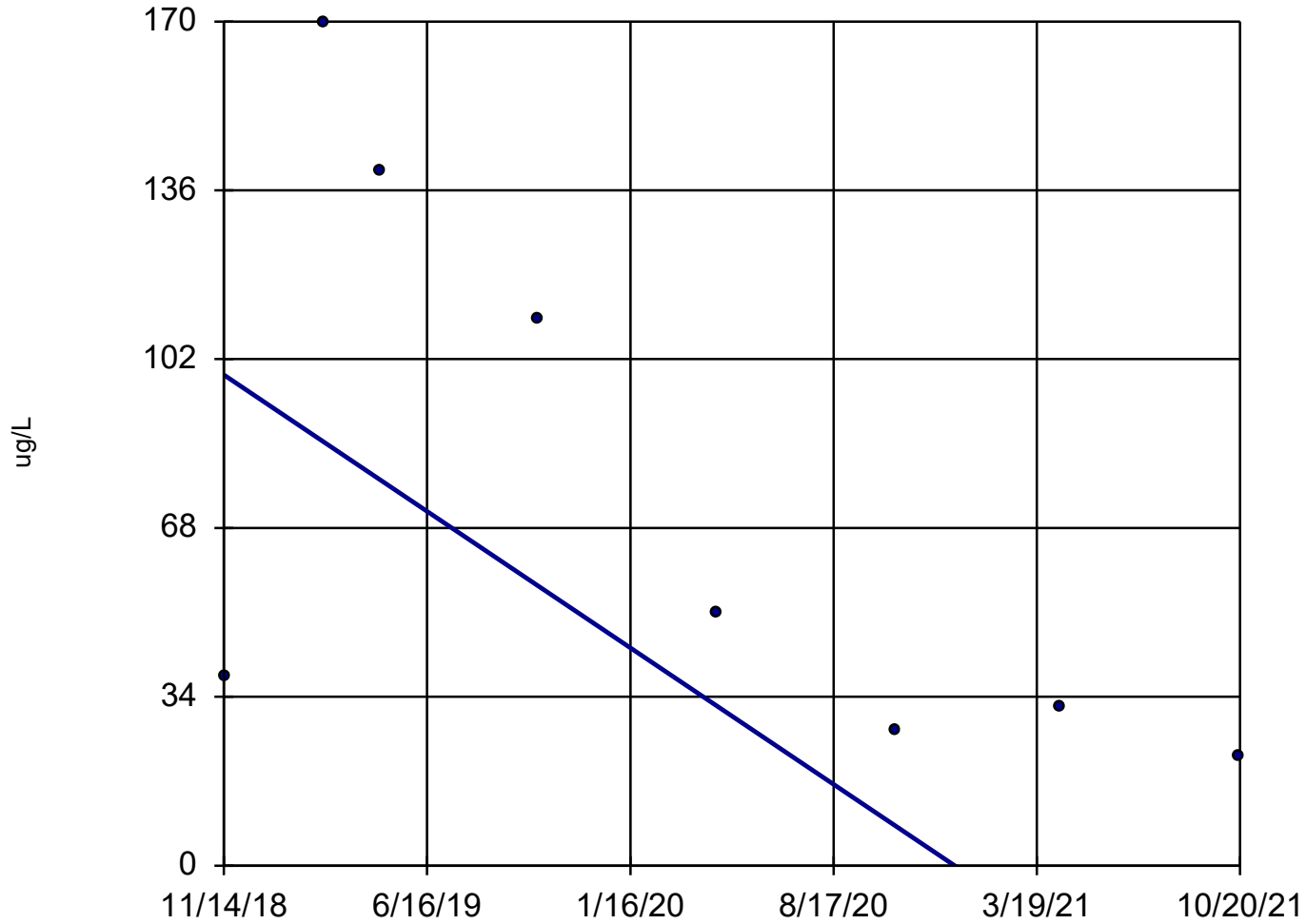
For observations made between 11/14/2018 and 10/20/2021, a summary of the selected data set:

Observations = 48
 ND/Trace = 29
 Wells = 6
 Minimum Value = 1
 Maximum Value = 101
 Mean Value = 9.513
 Median Value = 1
 Standard Deviation = 19.04
 Coefficient of Variation = 2.002
 Skewness = 3.086

<u>Well</u>	<u>#Obs.</u>	<u>ND/Trace</u>	<u>Min</u>	<u>Max</u>	<u>Mean</u>	<u>Median</u>	<u>Std.Dev.</u>	<u>CV</u>	<u>Skewness</u>
JHC-MW-15013	8	7	1	1	1	1	0	0	NaN
JHC-MW-15015	8	8	1	1	1	1	0	0	NaN
JHC-MW-15016	8	8	1	1	1	1	0	0	NaN
JHC-MW-18001	8	0	1.3	57	16.7	11	18.47	1.106	1.4
JHC-MW-18002	8	0	8	101	36	28	30.13	0.837	1.365
JHC-MW-18003	8	6	1	4	1.375	1	1.061	0.7714	2.268

Molybdenum, Total

JHC-MW-15015

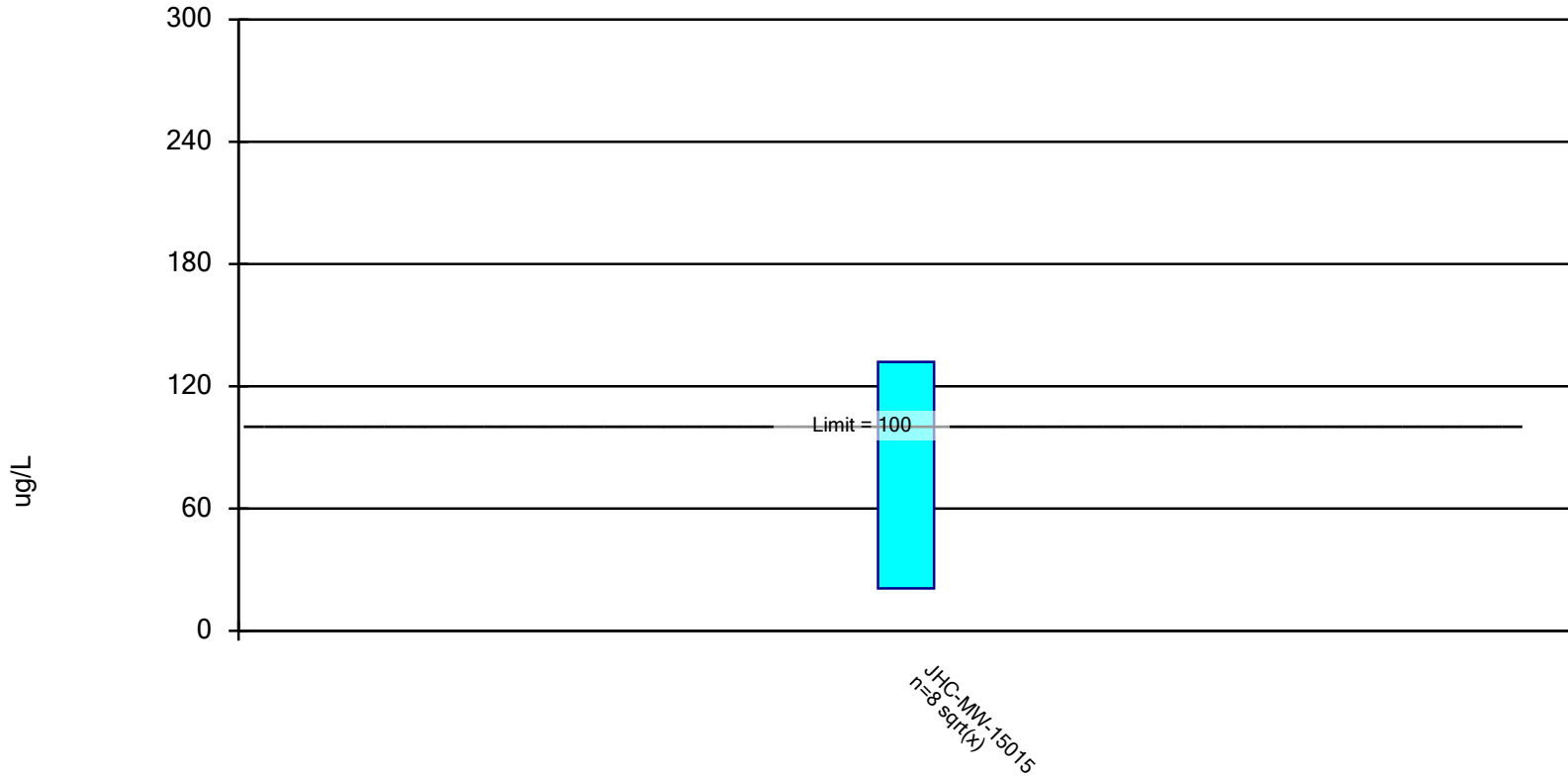


n = 8
Slope = -46.85
units per year.
Mann-Kendall
statistic = -18
critical = -20
Trend not sig-
nificant at 98%
confidence level
($\alpha = 0.01$ per
tail).

Sen's Slope Estimator Analysis Run 12/3/2021 1:52 PM
Client: Consumers Energy Data: JHC CCR_Sanitas Data_4Q21

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 12/3/2021 1:52 PM

Client: Consumers Energy Data: JHC CCR_Sanitas Data_4Q21

Confidence Interval

Constituent: Molybdenum, Total (ug/L) Analysis Run 12/3/2021 1:53 PM

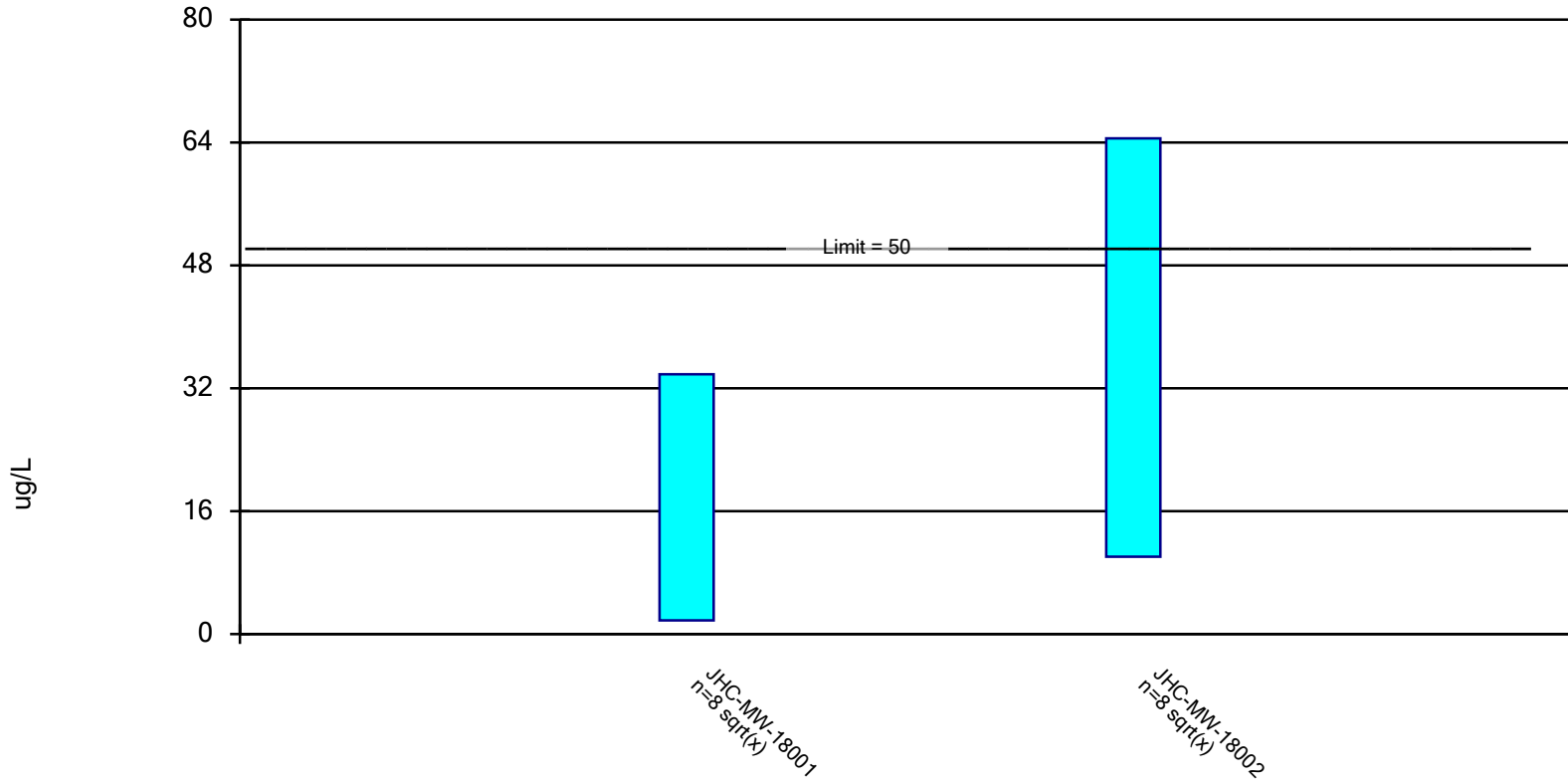
Client: Consumers Energy Data: JHC CCR_Sanitas Data_4Q21

JHC-MW-15015

11/14/2018	37.9
2/27/2019	170
4/29/2019	140
10/10/2019	110
4/16/2020	51 (D)
10/23/2020	27
4/14/2021	32
10/20/2021	22
Mean	73.74
Std. Dev.	57.79
Upper Lim.	132
Lower Lim.	20.82

Parametric Confidence Interval

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



Constituent: Selenium, Total Analysis Run 12/3/2021 1:52 PM
Client: Consumers Energy Data: JHC CCR_Sanitas Data_4Q21

Confidence Interval

Constituent: Selenium, Total (ug/L) Analysis Run 12/3/2021 1:53 PM

Client: Consumers Energy Data: JHC CCR_Sanitas Data_4Q21

	JHC-MW-18001	JHC-MW-18002
2/28/2019	2.3	
3/12/2019		30
4/25/2019	1.3	26
8/13/2019	15	23
10/10/2019	18	31
4/15/2020	27	57
10/22/2020		12
10/23/2020	7	
4/13/2021	6 (D)	101
10/20/2021	57	8
Mean	16.7	36
Std. Dev.	18.47	30.13
Upper Lim.	33.83	64.53
Lower Lim.	1.787	10.08