

2020 Annual Groundwater Monitoring and Corrective Action Report

JH Campbell Power Plant Pond A

West Olive, Michigan

January 2021

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1.0 Program Summary

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) Pond A CCR Unit at the JH Campbell Power Plant Site (JHC Pond A). 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 preceding year in accordance with §257.90(e). On behalf of Consumers Energy, TRC has prepared this Annual Groundwater Monitoring Report for JHC Pond A to cover the period of January 1, 2020 to December 31, 2020.

During the statistical evaluation of the initial assessment monitoring event (June 2018), arsenic was present in one or more downgradient monitoring wells at statistically significant levels exceeding the Groundwater Protection Standard (GWPS). Therefore, Consumers Energy initiated an Assessment of Corrective Measures (ACM) within 90 days from when the Appendix IV exceedance was determined. The ACM was completed on September 11, 2019. Consumers Energy will continue to evaluate corrective measures per §257.96 and §257.97 and is continuing semiannual assessment monitoring in accordance with §257.95. Pond A was in assessment monitoring at the beginning and at the end of the period covered by this report. Data that have been collected and evaluated in 2020 are presented in this report.

Consumers Energy will continue to evaluate corrective measures in accordance with §257.96 and §257.97. The groundwater management remedy for Pond A will be selected as soon as feasible to, at a minimum, meet the federal standards of §257.97(b) of the CCR Rule. Consumers Energy will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98. The next semiannual assessment monitoring event is tentatively scheduled for the second calendar quarter of 2021.



2.0 Groundwater Monitoring

Per §257.95, 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 all constituents in Appendix III and those constituents in Appendix IV of the CCR Rule that were detected during prior sampling. The 2020 semiannual assessment monitoring events at Pond A were completed in April and October 2020 to comply with both the CCR Rule and the Michigan Department of Environment, Great Lakes, and Energy (EGLE)-approved monitoring program established for Pond A in 2019. Given the congruencies between the two programs, data collected and evaluated under both programs are presented together in the semiannual reports.

2.1 First Semiannual Monitoring Event

A summary of the first semiannual groundwater monitoring event is provided in Appendix A.

2.2 Second Semiannual Monitoring Event

A summary of the second semiannual groundwater monitoring event is provided in Appendix B.



3.0 Corrective Action

3.1 Nature and Extent Groundwater Sampling

Per §257.95(g)(1), in the event that the facility determines, pursuant to §257.93(h), that there is a statistical exceedance of the GWPSs for one or more of the Appendix IV constituents, the facility must characterize the nature and extent of the release of CCR as well as any site conditions that may affect the remedy selected. A technical memorandum summarizing the nature and extent groundwater data collected in 2020 for Pond A is included in Appendix C.

3.2 Assessment of Corrective Measures

The ACM was completed on September 11, 2019 as a step towards developing a final remedy.

Several groundwater remediation alternatives evaluated in the ACM are considered technically feasible to reduce on-site groundwater concentrations. The following corrective measures were retained for further evaluation in conjunction with closure in place for Pond A:

- Groundwater Monitoring and Institutional Controls;
- Post Source Control/Removal Monitoring;
- Groundwater Capture/Control;
- Impermeable Barrier with Groundwater Capture/Control;
- Active Geochemical Sequestration; and
- Passive Geochemical Sequestration.

Consumers Energy plans to utilize an adaptive management strategy for selecting the final groundwater remedy for Pond A in coordination with the specified CCR source material management strategies discussed in the ACM. Under this remedy selection strategy, measures that remove source material, reduce infiltration, and/or minimize the potential for future migration during the closure process may be implemented to address existing conditions followed by monitoring and evaluation of the performance after closure. Adjustments will be made to the corrective measure remedy, as needed, to achieve the remedial goals (e.g. GWPS and/or risk/exposure/pathway-based criteria).

3.3 Remedy Selection

Consumers Energy has not selected a remedy pursuant to §257.97. The semiannual progress report describing the progress in selecting and designing the remedy required pursuant to §257.97(a) is included in Appendix D. Pond A has been closed according to the *JH Campbell Generating Facility Pond A Closure Plan, West Olive, Michigan* (Golder, October 2016) and the updated closure plan detailing the final cover system that was submitted to the EGLE in February 2019. Pond A was closed with waste place in accordance with the requirements for CCR landfills under RCRA (§257.102(d)). Cover construction was completed in summer 2019 and the Closure Certification Report was approved by the EGLE on November 25, 2019. Changes in groundwater chemistry continue to be evaluated following the completion of capping



at Pond A. Groundwater monitoring in 2021 will reduce uncertainty surrounding potential changes in redox conditions and the effect on contaminant transport. These observations will be critical for the comparison of corrective measures alternatives.



Appendix A First Semiannual Monitoring Report



2020 Semiannual Groundwater Monitoring Report and Second Quarter 2020 Hydrogeological Monitoring Report

JH Campbell Power Plant Pond A CCR Unit

West Olive, Michigan

July 2020

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- Appendix A Data Quality Review
- Appendix B April 2020 Assessment Monitoring Statistical Evaluation
- Appendix C GSI Time Series Charts
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1.0 Introduction

On April 17, 2015, the United States Environmental Protection Agency (USEPA) published the final rule for the regulation and management of Coal Combustion Residuals (CCR) under the Resource Conservation and Recovery Act (RCRA) (the CCR Rule) (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 Pond A CCR Unit at the JH Campbell Power Plant Site (JHC Pond A).

On December 28, 2018, the State of Michigan enacted Public Act No. 640 of 2018 (PA 640) to amend the Natural Resources and Environmental Protection Act, also known as Part 115 of PA 451 of 1994, as amended (a.k.a., Michigan Part 115 Solid Waste Management). On March 18, 2019, Consumers Energy submitted the *Pond A Hydrogeological Monitoring Plan, JH Campbell Power Plant, West Olive, Michigan* (Pond A HMP) (TRC, March 2019; Revised July 2019), which includes the *Pond A Assessment Monitoring Plan* (Pond A AMP), to EGLE to comply with the requirements of Part 115, Rule 299.4905 and the December 21, 2018 Consent Agreement No. 115-01-2018. The Pond A HMP and AMP were revised per EGLE comments on July 30, 2019 and approved by EGLE on August 13, 2019.

On behalf of Consumers Energy, TRC has prepared this 2020 Semiannual Groundwater Monitoring Report and Second Quarter 2020 Hydrogeological Monitoring Report for the JH Campbell Pond A CCR Unit (Semiannual Report) to cover the semiannual monitoring conducted in April 2020 to comply with the CCR Rule and the Pond A HMP and AMP. Pond A remains in assessment monitoring. Given the alignment of PA 640 to comply with the RCRA CCR Rule and the congruencies between the two programs, data collected and evaluated under both programs are presented together in this report.

1.1 Statement of Adherence to Approved Hydrogeological Monitoring Plan

This JH Campbell Pond A Second Quarter 2020 Hydrogeological Monitoring Report (Semiannual Report) has been prepared by TRC on behalf of Consumers Energy to present groundwater monitoring data collected from the JH Campbell Pond A. This report was prepared in accordance with the items listed in Appendix A (Solid Waste Monitoring Submittal Components) of the May 15, 2015 Michigan Department of Environmental Quality - Office of Waste Management and Radiological Protection (MDEQ-OWMRP), now the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Materials Management Division (MMD) communication prescribing the format for solid waste disposal facility monitoring submittals as published in OWMRP-115-29, dated July 5, 2013 Format for Solid Waste Disposal Monitoring Submittals. All references herein to the EGLE are inclusive of the MDEQ. Information contained in this report was prepared in adherence to the July 2019 Pond A HMP and AMP, approved by the EGLE on August 13, 2019.

1.2 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, Pond A 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-15006, JHC-MW-15007, JHC-MW-15008, JHC-MW-15009, JHC-MW-15010, and JHC-MW-15011; and
- Sulfate at JHC-MW-15006, JHC-MW-15007, JHC-MW-15008, JHC-MW-15009, JHC-MW-15010, and JHC-MW-15011.

As discussed in the 2018 Annual Groundwater Monitoring Report for the JH Campbell Power Plant Pond A CCR Unit (2018 Annual Report) (TRC, January 2019), Consumers Energy initiated an Assessment Monitoring Program for Pond A 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. After subsequent sampling for Appendix IV constituents, Consumers Energy provided notification that arsenic was present at statistically significant levels above the federal groundwater protection standards (GWPS) established at 10 ug/L (TRC, 2019) in one out of six downgradient monitoring wells at Pond A as follows:

Arsenic at JHC-MW-15011.

The CCR Rule 40 CFR §257.96(a) requires that an owner or operator initiate an assessment of corrective measures (ACM) to prevent further release, to remediate any releases, and to restore impacted areas to original conditions if any Appendix IV constituent has been detected at a statistically significant level exceeding a GWPS. The *Assessment of Corrective Measures* (ACM) (TRC, September 2019) was initiated on April 15, 2019 and was certified and submitted to EGLE on September 11, 2019 in accordance with the schedule in §257.96. In addition, Consumers Energy is preparing a site-wide remedial action plan (RAP) for the JH Campbell site per the Consent Agreement No. 115-01-2018 executed by Consumers Energy and the EGLE on December 21, 2018.

Consumers Energy will continue to evaluate corrective measures in accordance with §257.96 and §257.97 as outlined in the ACM and will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98, which includes semiannual assessment monitoring in accordance with §257.95. In addition, quarterly monitoring is performed in accordance with the Pond A HMP and AMP under Part 115. The initial implementation of the Pond A HMP and AMP was presented in the 2019 Annual Groundwater Monitoring and Corrective Action Report and Fourth Quarter 2019 Hydrogeological Monitoring Report (2019 Annual Report) (TRC, January 2020). This Semiannual Report presents the results of the second quarter 2020 Pond A HMP and AMP event, which also serves as the first semiannual assessment monitoring event for 2020 conducted in accordance with §257.95.

1.3 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.

1.4 Geology/Hydrogeology

The upgradient/background wells are located to the north-northwest of the JHC Dry Ash Landfill. Groundwater is typically encountered around 30 to 35 feet below ground surface (ft bgs), except in the recently excavated areas of Bottom Ash Ponds 1-2 and Bottom Ash Pond 3 South where groundwater is now within 5 to 10 ft bgs due to grade changes, 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

Consumers Energy established a groundwater monitoring system for the JHC Pond A, which consists of 12 monitoring wells (six background monitoring wells and six downgradient 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). The six downgradient wells (JHC-MW-15006, JHC-MW-15008R, JHC-MW-15009, JHC-MW-15010, and JHC-MW-15011) are located south and southeast of Pond A.

As shown on Figure 2, monitoring wells JHC-MW-15029 and JHC-MW-15030 are used for water level measurements only.

2.2 April 2020 Assessment Monitoring

Consumers Energy personnel performed gauging and sampling of monitoring wells associated with Pond A from April 13 through April 16, 2020. Per §257.95(d), all wells in the CCR monitoring program must be sampled at least semiannually. Groundwater monitoring was performed in accordance with the approved Pond A HMP and AMP and the *JH Campbell Monitoring Program Sample Analysis Plan* (SAP) (ARCADIS, May 2016). Groundwater samples collected during the April 2020 event were submitted to Consumers Energy Laboratory Services in Jackson, Michigan, for analysis of the following metals and inorganic indicator constituents:

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



Section 11511a(3)(c) – Detection Monitoring Constituents	Section 11519b(2) – Assessment Monitoring Constituents
	Nickel
	Radium 226 and 228
	Selenium
	Silver
	Thallium
	Vanadium
	Zinc

Static water level measurements were collected at all locations after equilibration to atmospheric pressure. The depth to water was measured according to ASTM D 4750, "Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well" and recorded to the nearest 0.01 foot. Static water elevation data are included in the attached field records (Appendix E) and summarized in Table 1.

Groundwater samples were collected using a peristaltic pump or submersible pump in accordance with low flow sampling protocol and were not field filtered to allow for total metals analysis. In addition, field parameters including dissolved oxygen, oxidation reduction potential, specific conductivity, temperature, and turbidity were collected at each well as shown on Table 2. All samples were collected in vendor-provided, nitric acid pre-preserved (metals only) and unpreserved sample containers and submitted to the laboratory for analysis. Consumers Energy followed chain of custody procedures to document the sample handling.

Monitoring well MW-13 had an insufficient amount of groundwater present to collect a sample during this sampling event for the Pond A HMP and AMP program; however, a sample was able to be collected and analyzed for several dissolved metals (boron, antimony, arsenic, chromium, lithium, molybdenum, selenium, nickel, vanadium) in accordance with the September 1996 *Hydrogeological Monitoring Plan (HMP) for JH Campbell Ash Storage Facility, Consumers Power Company, Solid Waste Disposal Area, Coal Ash, Type III at several monitoring wells sampled under both programs during the week of April 13, 2020. These results are reported in the <i>Second Quarter 2020 Groundwater Monitoring Report JH Campbell Solid Waste Disposal Area, West Olive, Michigan* prepared by TRC in July 2020 and, for the relevant Pond A wells, are also included in this quarterly monitoring report given that several of the constituents are the same for both programs (noted as dissolved).

Consumers Energy collected quality assurance/quality control (QA/QC) samples during the April 2020 groundwater sampling event. The QA/QC samples consisted of two field blanks, two equipment blanks, three field duplicates (JHC-MW-15009, JHC-MW-15023, and PZ-40S), and three field matrix spike/matrix spike duplicate (MS/MSD) samples collected from JHC-MW-15007, JHC-MW-15025, and TW-19-04A.



2.2.1 Analytical Data and Relevant Screening Criteria

Analytical results from the second quarter 2020 monitoring event are included in the attached laboratory reports (Appendix D). Second quarter 2020 groundwater analytical data is summarized in Table 3 (background monitoring wells), Table 4 (downgradient monitoring wells), and Table 5 (GSI monitoring wells), as well as the associated Part 201 generic drinking water criteria and generic GSI criteria.

2.2.2 Data Quality Review

Data were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The data were found to be complete and usable for the purposes of the Pond A HMP and AMP 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 2020 event using several wells throughout the RCRA CCR well network are provided on Table 1. April 2020 groundwater elevations were used to construct the groundwater contour map provided on Figure 3. The average hydraulic gradient of 0.0044 ft/ft was calculated using the following well pairs: JHC-MW-15027/JHC-MW-15028, JHC-MW-15026/JHC-MW-15007, and JHC-MW-15008R/MW-14S (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 0.68 ft/day or 250 ft/year for the April 2020 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 constituents that could potentially migrate from Pond A.



3.0 Statistical Evaluation

Assessment monitoring is continuing at Pond A in accordance with the AMP while corrective measures are further evaluated in accordance with §257.96 and §257.97 as outlined in the ACM. The following section summarizes the statistical approach applied to assess the second quarter 2020 groundwater data in accordance with the assessment monitoring program. The statistical evaluation details are provided in Appendix B (*Statistical Evaluation of April 2020 Assessment Monitoring Sampling Event*).

3.1 Establishing Groundwater Protection Standards

The Appendix IV GWPSs are used to assess Appendix IV constituent concentrations present in groundwater 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 Appendix IV GWPSs is documented in the *Groundwater Protection Standards* technical memorandum included in Appendix C of the 2018 Annual Report.

Pursuant to the Pond A AMP, GWPSs were established for the Appendix III constituents in accordance with 40 CFR 257.95(h)¹. The calculation of the Appendix III GWPSs is documented in the *Groundwater Protection Standards* technical memorandum included in Appendix G of the 2019 Annual Report. Per the Pond A AMP, GWPSs will be established for the Section 11511a(3) constituents not included in Appendix III of the CCR rule (i.e. iron) and the Section 11519b(2) constituents not included in Appendix IV of the CCR rule (i.e. copper, nickel, silver, vanadium, and zinc) following the collection of a minimum of four independent data points.

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 documented in the January 14, 2019 *Notification of Appendix IV Constituent Exceeding Groundwater Protection Standard per* §257.95(g), arsenic was present at statistically significant levels above the GWPSs in one of the six downgradient wells (JHC-MW-15011) at Pond A based on the statistical data comparison for the first semiannual assessment monitoring event (June 2018), included as Appendix D of the 2019 Annual Report.

The second quarter 2020 statistical evaluation confirms that arsenic at JHC-MW-15011 is the only Appendix IV constituent present at statistically significant levels above the GWPSs. As shown in the data tables and trend tests included in Appendix B, arsenic concentrations at monitoring well JHC-MW-15011 showed a general increase in 2018 and 2019. Arsenic concentrations in this well have begun to decline in 2020 but remain above the GWPS.. A summary of the confidence intervals for April 2020 are provided in Table 6. Table 7 provides a summary of the statistically significant GWPS exceedances over the most recent four

¹ As amended per Phase One, Part One of the CCR Rule (83 FR 36435).



monitoring events.

No other constituents were observed at statistically significant levels exceeding the Appendix III or Appendix IV GWPSs in downgradient monitoring wells at the JHC Pond A during the second quarter 2020.

Groundwater chemistry is currently changing as a result of closure activities performed at Pond A. As discussed in the ACM, Pond A has been decommissioned with final cover in place in the summer of 2019, and groundwater flow direction has changed such that groundwater generally flows to the south-southeast and mounding is no longer observed as it had been when hydraulic loading was actively taking place. The cessation of hydraulic loading and recharge of the aquifer are expected to have an influence on groundwater conditions, and many Appendix III and Appendix IV constituents may be affected by this change. Groundwater conditions will continue to be monitored while corrective measures continue to be evaluated and a remedy is selected. Groundwater monitoring in 2020 may reduce uncertainty surrounding the potential changes in groundwater oxidation-reduction conditions and the effect on contaminant transport. These observations will be critical for the comparison of corrective measures alternatives.

3.3 GSI Compliance Monitoring Trends

Pursuant to the AMP, trend tests will be used to evaluate groundwater quality at the GSI monitoring wells. The GSI monitoring wells will be evaluated for detected constituents (antimony, arsenic, barium, chromium (total), lithium, molybdenum, and selenium) that, based on monitoring data from Pond A, have the potential to exceed generic GSI criteria at the Pond A downgradient monitoring wells as detailed in the AMP. An insufficient number of data points exist for the GSI monitoring wells to complete a statistical evaluation of trends at all locations for second quarter 2020. Trend analysis will be completed following the collection of a minimum of four sampling events under the CCR monitoring program and the Pond A AMP². In the interim, time-series plots for the GSI monitoring wells MW-13, MW-14S, PZ-24S, and PZ-40S, including assessment monitoring data collected from June 2018 through April 2020³ for the aforementioned GSI monitoring constituents detailed in the Pond A AMP, are included in Appendix C.

All of the constituent concentrations at the GSI monitoring wells are below their respective Part 201 generic GSI criteria in April 2020 (Table 5) and there are no apparent trends based on review of the available data shown on the time series plots (Appendix C).

² Consistent with the Unified Guidance, a minimum of four observations, preferably eight or more, is required to construct trends using the Sen's Slope estimator.

³ An insufficient amount of groundwater was present in February and April 2020 to collect sample for total metals for MW-13. Select dissolved metal results collected at MW-13 in accordance with the JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP) are included in the time-series plots for February and April 2020.



4.0 Conclusions and Recommendations

Assessment monitoring is ongoing at Pond A while corrective action continues to be assessed. Pond A has been decommissioned and the final cover has been placed. Overall, the statistical evaluations have confirmed that arsenic is the only Appendix IV constituent present at statistically significant levels above the GWPSs and compliance for the GSI pathway is currently met based on data collected from the GSI monitoring wells located downgradient from Pond A.

The ACM also documents that groundwater nature and extent have been defined, as required in \$257.95(g)(1). Although arsenic concentrations had exceeded the GWPS in on-site groundwater, an evaluation of risk demonstrates that there are currently no adverse effects on human health or the environment from either surface water or groundwater due to CCR management at Pond A.

Consumers Energy has also completed the final cover for Pond A in summer of 2019. The ACM report provided a high-level assessment of groundwater remediation technologies that could potentially address site-specific constituents of concern (i.e. arsenic) under known groundwater conditions. Changes in groundwater chemistry continue to be evaluated following the completion of capping at Pond A. Groundwater monitoring in 2020 will reduce uncertainty surrounding potential changes in groundwater oxidation-reduction conditions and the effect on contaminant transport. These observations will be critical for the comparison of corrective measures alternatives.

Consumers Energy will continue to evaluate corrective measures in accordance with §257.96 and §257.97. The groundwater management remedy for the JHC Pond A will be selected as soon as feasible to, at a minimum, meet the federal standards of §257.97(b) of the CCR Rule. Consumers Energy will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98. The next quarterly Pond A HMP and AMP monitoring events are scheduled for July and October 2020.



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Minimum Criteria (Phase One, Part One); Final Rule. 83 Federal Register 146 (July 30, 2018), pp. 36435-36456 (83 FR 36435).

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Tables

Table 1 Summary of Groundwater Elevation Data – Second Quarter 2020 JH Campbell – Assessment Monitoring Program West Olive, Michigan

Well	Ground Surface	тос	Geologic Unit of	Scree	n In	terval	April	April 13, 2020		
Location	Flevation		Screen Interval	Ele	evat (ft)	ion	Depth to Water (ft BTOC)	Groundwater Elevation (ft)		
Background			11				(110100)	(11)		
JHC-MW-15023	617.01	619.98	Sand	603.0	to	593.0	15.00	604.98		
JHC-MW-15024	613.79	616.62	Sand	606.8	to	596.8	9.92	606.70		
JHC-MW-15025	614.14	617.17	Sand	607.1	to	597.1	8.93	608.24		
JHC-MW-15026	615.09	618.04	Sand	607.1	to	597.1	10.61	607.43		
JHC-MW-15027	614.77	617.30	Sand	604.8	to	594.8	10.87	606.43		
JHC-MW-15028 JHC-MW-15029	611.02 608.08	613.80 610.95	Sand Sand	603.0 600.1	to to	593.0 590.1	11.51 9.60	602.29 601.35		
JHC-MW-15029	604.05	607.17	Sand	600.1	to	590.1	8.22	598.95		
Pond 1N, 1S, 2N, 2S		007.17	Cana	000.1	10	000.1	0.22	000.00		
JHC-MW-15001	607.02	609.53	Sand	603.5	to	598.5	11.41	598.12		
JHC-MW-15002	618.18	621.27	Sand	590.2	to	580.2	23.88	597.39		
JHC-MW-15003	623.16	627.20	Sand	595.2	to	585.2	32.35	594.85		
JHC-MW-15005	606.22	609.99	Sand	579.2	to	569.2	18.01	591.98		
JHC-MW-18004	602.92	605.72	Sand	596.9	to	586.9	11.33	594.39		
JHC-MW-18005	600.30	603.16	Sand	595.3	to	585.3	10.18	592.98		
Pond 3N, 3S JHC-MW-15013	632.40	635.25	Sand	604.4	to	594.4	34.28	600.97		
JHC-MW-15015	632.46	635.20	Sand	604.4	to	594.5	33.44	601.76		
JHC-MW-15015	631.81	632.52	Sand	603.8	to	593.8	30.70	601.82		
JHC-MW-18001	609.09	611.98	Sand	603.1	to	593.1	11.04	600.94		
JHC-MW-18001	605.53	608.93	Sand	602.0	to	592.0	8.37	600.56		
JHC-MW-18002	605.36	608.78	Sand	601.9	to	591.9	8.30	600.48		
Landfill	000.00	000.70	Cana	001.0	10	001.0	0.00	000.10		
JHC-MW-15017	613.69	616.61	Sand	603.7	to	593.7	13.05	603.56		
JHC-MW-15018	614.26	617.02	Sand	604.3	to	594.3	13.80	603.22		
JHC-MW-15019	609.81	612.86	Sand	603.8	to	593.8	10.22	602.64		
JHC-MW-15022	620.92	623.79	Sand	597.9	to	587.9	27.28	596.51		
JHC-MW-15031	632.94	635.87	Sand	599.9	to	589.9	41.84	594.03		
JHC-MW-15032	611.32	614.29	Sand	598.3	to	588.3	15.31	598.98		
JHC-MW-15033	618.08	620.99	Sand	602.1	to	592.1	19.89	601.10		
JHC-MW-15034	612.90	615.97	Sand	601.9	to	591.9	13.55	602.42		
JHC-MW-15035	632.53	634.28	Sand	599.5	to	589.5	39.11	595.17		
JHC-MW-15036	617.94	618.34	Sand	597.9	to	587.9	25.43	592.91		
JHC-MW-15037	614.28	616.06	Sand	591.3	to	586.3	23.97	592.09		
Pond A	aa (= :	00 7			1. 1		00.05	500.00		
JHC-MW-15006	624.74	627.58	Sand	599.7	to	589.7	33.65	593.93		
JHC-MW-15007	624.82	627.70	Sand	602.8	to	592.8	33.95	593.75		
JHC-MW-15008	632.43	635.30	Sand	604.4	to	594.4		missioned		
JHC-MW-15008R ⁽³⁾	632.32	634.67	Sand	597.3	to	587.3	41.46	593.21		
JHC-MW-15009	632.33	635.32	Sand	602.3	to	592.3	41.77	593.55		
JHC-MW-15010	632.55	635.57	Sand	602.6	to	592.6	41.28	594.29		
JHC-MW-15011	627.71	630.83	Sand	600.7	to	590.7	37.83	593.00		
Downgradient Wells		E0E 27	Clavay Silt	E97 0	ta	E0E /	0.50	F0F 70		
MW-13 MW-14S	593.40 587.36	595.37 590.98	Clayey Silt Sand	587.9 582.9	to	585.4 577.9	9.59	585.78		
PZ-23S	602.84	604.97	Sand	591.8	to to	586.8	8.38	582.60		
PZ-235 PZ-24S	586.56	590.15	Sand	591.8	to to	579.6	14.81	590.16		
PZ-245 PZ-40S	589.50	590.15 593.25	Sand	585.5	to	575.5	7.94 9.86	582.21		
PZ-405 TW-19-04A								583.39		
TW-19-04A TW-19-05	608.15 603.44	611.44 606.36	Sand Sand	591.2 592.8	to to	586.2 587.8	20.85	590.59		
TW-19-05					to		14.37 11.81	591.99 590.73		
1W-19-00A	599.61	602.54	Sand	592.3	to	587.3	11.01	390.13		

Notes:

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

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

Table 2Summary of Field Parameters: Second Quarter 2020JH Campbell Pond A – Assessment Monitoring Program
West Olive, Michigan

Sample Location	Sample Date	Dissolved Oxygen	Oxidation Reduction Potential	рН	Specific Conductivity	Temperature	Turbidity
		ppm	mV	su	umhos/cm	deg C	ntu
Background							
JHC-MW-15023	4/16/2020	0.81	208.9	5.4	84	8.2	0.0
JHC-MW-15024	4/16/2020	0.87	203.3	6.5	321	7.5	0.0
JHC-MW-15025	4/16/2020	4.19	193.8	6.2	215	7.2	0.0
JHC-MW-15026	4/16/2020	2.86	189.4	6.4	185	8.1	0.0
JHC-MW-15027	4/16/2020	4.13	147.2	5.6	59	7.7	2.8
JHC-MW-15028	4/16/2020	7.13	186.4	6.0	82	8.8	0.0
Pond A							
JHC-MW-15006	4/14/2020	0.36	-11.6	7.2	807	13.7	0.0
JHC-MW-15007	4/14/2020	3.82	69.7	7.0	545	13.3	0.0
JHC-MW-15008R	4/14/2020	1.41	56.0	6.9	824	13.8	1.3
JHC-MW-15009	4/14/2020	3.52	66.6	7.2	587	14.3	0.3
JHC-MW-15010	4/14/2020	2.78	132.1	6.6	555	13.1	0.0
JHC-MW-15011	4/15/2020	0.32	-122.9	7.6	803	14.0	0.5
Pond A GSI							
MW-13	4/13/2020 ⁽¹⁾			7.5	56		
MW-14S	4/16/2020	3.72	152.4	5.0	24	8.5	1.6
PZ-24S	4/16/2020	3.24	107.6	5.0	31	7.1	1.3
PZ-40S	4/16/2020	1.29	198.3	4.4	23	7.0	1.4

Notes:

mg/L - Milligrams per Liter.

mV - Millivolts.

SU - Standard units

umhos/cm - Micromhos per centimeter.

°C - Degrees Celcius

NTU - Nephelometric Turbidity Unit.

-- - Not sampled.

(1) - Insufficient amount of groundwater present to collect sample for total metals. Reported results are from sampling completed in accordance with the

JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP).

Table 3 Summary of Groundwater Sampling Results (Analytical): Second Quarter 2020 JH Campbell Background – Assessment 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:	4/16/2020	4/16/2020	4/16/2020	4/16/2020	4/16/2020	4/16/2020
				MI Non-							
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^						
Appendix III											
Boron	ug/L	NC	500	500	7,200	45	22	26	< 20	< 20	< 20
Calcium	mg/L	NC	NC	NC	500	9.59	32.8	16.1	16.6	7.78	11.1
Chloride	mg/L	250**	250	250	500	1.84	20.1	15.8	7.21	< 1.00	< 1.00
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250**	250	250	500	9.75	6.26	8.63	6.94	7.86	5.22
Total Dissolved Solids	mg/L	500**	500	500	500	56	158	98	76	37	42
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5	6.5 - 8.5	6.5 - 9.0	5.4	6.5	6.2	6.4	5.6	6.0
Appendix IV											
Antimony	ug/L	6	6.0	6.0	130	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	10	10	10	< 1	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	2,000	2,000	820	20	18	20	15	25	14
Beryllium	ug/L	4	4.0	4.0	18	< 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
Chromium	ug/L	100	100	100	11	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	40	100	100	< 15	< 6	< 6	< 15	< 6	< 15
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	39	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	< 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
Molybdenum	ug/L	NC	73	210	3,200	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NC	NC	NC	< 0.165	< 0.222	< 0.280	< 0.139	< 0.184	< 0.262
Radium-228	pCi/L	NC	NC	NC	NC	< 0.634	< 0.717	< 1.90	< 0.676	< 1.37	< 0.651
Radium-226/228	pCi/L	5	NC	NC	NC	< 0.634	< 0.717	< 1.90	< 0.676	< 1.37	< 0.651
Selenium	ug/L	50	50	50	5.0	< 1	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2	2.0	2.0	3.7	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters	5										
Iron	ug/L	300**	300 ⁽¹⁾	300 ⁽¹⁾	500,000	38	182	33	25	33	29
Copper	ug/L	1,000**	1,000 ⁽¹⁾	1,000 ⁽¹⁾	15	< 1	< 1	< 1	< 1	< 1	< 1
Nickel	ug/L	NC	100	100	86	< 1	< 2	< 2	< 1	< 2	< 1
Silver	ug/L	100**	34	98	0.20	< 0.2	< 0.3	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	4.5	62	27	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000 ⁽¹⁾	190	< 10	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

pCi/L - picocuries per liter.

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

NC - no criteria.

-- - not analyzed.

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

- ** Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations (SDWR), April 2012.
- ^ Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using 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 EGLE policy and procedure 09-014 dated June 20, 2012.

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.

(1) - Criterion is the aesthetic drinking water value per footnote {E}.

Table 4 Summary of Groundwater Sampling Results (Analytical): Second Quarter 2020 JH Campbell Pond A – Assessment Monitoring Program West Olive, Michigan

					Sample Location:		JHC-MW-15007	JHC-MW-15008R		JHC-MW-15010	
					Sample Date:	4/14/2020	4/14/2020	4/14/2020	4/14/2020	4/14/2020	4/15/2020
				MI Non-							
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^						
Appendix III											
Boron	ug/L	NC	500	500	7,200	284	242	505	874	2,350	2,870
Calcium	mg/L	NC	NC	NC	500	102	62.1	99.9	78.7	82.7	112
Chloride	mg/L	250**	250	250	500	24.9	14.1	25.0	6.95	3.20	4.16
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250**	250	250	500	260	83.0	235	49.1	35.9	183
Total Dissolved Solids	mg/L	500**	500	500	500	562	336	566	354	333	542
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5	6.5 - 8.5	6.5 - 9.0	7.2	7.0	6.9	7.2	6.6	7.6
Appendix IV											
Antimony	ug/L	6	6.0	6.0	130	1	< 1	1	1	< 1	4
Arsenic	ug/L	10	10	10	10	5	3	< 1	< 1	< 1	25
Barium	ug/L	2,000	2,000	2,000	820	353	266	252	307	276	514
Beryllium	ug/L	4	4.0	4.0	18	< 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
Chromium	ug/L	100	100	100	11	1	2	< 1	1	1	< 1
Cobalt	ug/L	NC	40	100	100	< 15	< 15	< 15	< 15	< 15	< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	39	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	13	14	19	14	20	21
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	3,200	16	< 5	< 5	< 5	< 5	7
Radium-226	pCi/L	NC	NC	NC	NC	0.426	0.197	0.180	0.394	0.270	0.242
Radium-228	pCi/L	NC	NC	NC	NC	0.518	< 0.456	< 0.429	0.573	0.752	0.606
Radium-226/228	pCi/L	5	NC	NC	NC	0.944	< 0.456	0.549	0.967	1.02	0.848
Selenium	ug/L	50	50	50	5.0	9	22	6	77	158	29
Thallium	ug/L	2	2.0	2.0	3.7	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters											
Iron	ug/L	300**	300 ⁽¹⁾	300 ⁽¹⁾	500,000	26	< 20	134	< 20	< 20	145
Copper	ug/L	1,000**	1,000 ⁽¹⁾	1,000 ⁽¹⁾	15	1	1	2	1	1	1
Nickel	ug/L	NC	100	100	86	1	< 1	< 1	< 1	< 1	< 2
Silver	ug/L	100**	34	98	0.20	< 0.4	< 0.2	< 0.2	< 0.2	< 0.2	< 0.4
Vanadium	ug/L	NC	4.5	62	27	10	14	< 2	< 2	4	40
Zinc	ug/L	5,000**	2,400	5.000 ⁽¹⁾	190	< 10	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

pCi/L - picocuries per liter.

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

NC - no criteria.

-- - not analyzed.

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

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

^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using 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 EGLE policy and procedure 09-014 dated June 20, 2012.

 $\ensuremath{\textbf{BOLD}}$ 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.

(1) - Criterion is the aesthetic drinking water value per footnote {E}.

Table 5 Summary of Groundwater Sampling Results (Analytical): Second Quarter 2020 JH Campbell Pond A GSI - Assessment Monitoring Program West Olive, Michigan

					Sample Location:	MW-13	MW-14S	PZ-24S	
					Sample Date:	4/13/2020 ⁽¹⁾	4/16/2020	4/16/2020	
				MI Non-					
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^				
Antimony	ug/L	6	6.0	6.0	130	< 1	< 1	< 1	
Arsenic	ug/L	10	10	10	10	< 1	< 1	< 1	
Barium	ug/L	2,000	2,000	2,000	820		8	24	
Chromium	ug/L	100	100	100	11	< 1	< 1	2	
Lithium	ug/L	NC	170	350	440	20	< 10	< 10	
Molybdenum	ug/L	NC	73	210	3,200	< 5	< 5	< 5	
Selenium	ug/L	50	50	50	5.0	2	< 1	< 1	

Notes:

ug/L - micrograms per liter.

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

NC - no criteria.

-- - not analyzed.

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

^ - 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}.

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.

(1) - Insufficient amount of groundwater present to collect sample for total metals. Reported results are dissolved metals (boron, antimony, arsenic, chromium, lithium, molybdenum, selenium, nickel, vanadium) collected in accordance with the JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP).

PZ-40S
4/16/2020
< 1
< 1
22
1
< 10
< 5
< 1

Table 6 Summary of Groundwater Protection Standard Exceedances – Second Quarter 2020 JH Campbell Pond A – Assessment Monitoring Program West Olive, Michigan

Constituent	Units	GWPS	JHC-MW-15006		JHC-MW-15008R		JHC-MW-15009		JHC-MW-15010		JHC-MW-15011	
			LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL
Boron	ug/L	500			88	510	96	460	97	2,800	200	1,500
Sulfate	mg/L	250	27	260								
TDS	mg/L	500	140	460	160	480					150	650
pН	SU	5.5 - 8.8									7.4	8.9
Arsenic	ug/L	10									16	38
Chromium	ug/L	100							0.5	370		
Selenium	ug/L	50			1.7	110	0.73	51	2.3	150	1.0	100

Notes:

ug/L - micrograms per Liter

mg/L - milligrams per Liter

SU - standard units; pH is a field parameter.

--- 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 Memoranda dated October 15, 2018 and December 23, 2019.

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

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

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

Table 7Summary of Groundwater ExceedancesSecond Quarter 2020JH Campbell Plant Pond A, West Olive, Michigan

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

Data is in	(X) ug/L	or					
() mg/L							
unl	ess otherwis	se stated					

Facility: JH Campbell – WDS# 395496

Well #	Location	Parameter	Part 201 GRCC	Statistical Limit (or 'CC' for Control Charts)	2 Qtr. 2020 (bold >201)	1 Qtr. 2020 (bold >201)	4 Qtr. 2019 (bold >201)	2 Qtr. 2019 (bold >201)
JHC-MW-15011	Downgradient	Arsenic	10	LCL	25	31	44 ⁽¹⁾	36 ⁽¹⁾

Notes:

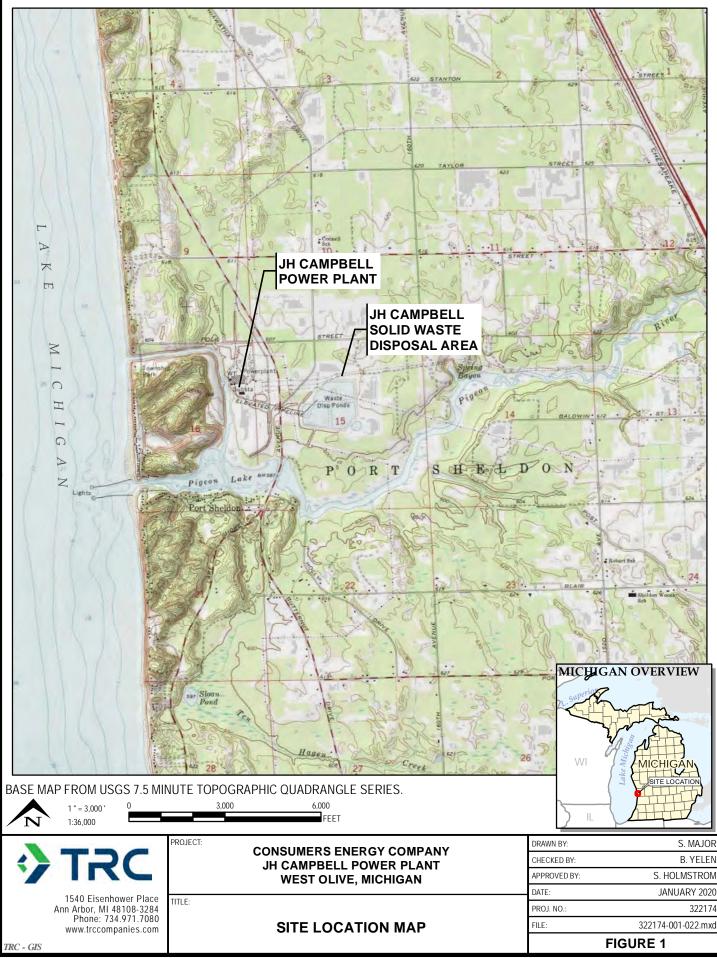
Table summarizes statistically significant Groundwater Protection Standards (GWPSs) exceedances as determined using confidence intervals.

LCL - Lower confidence limit

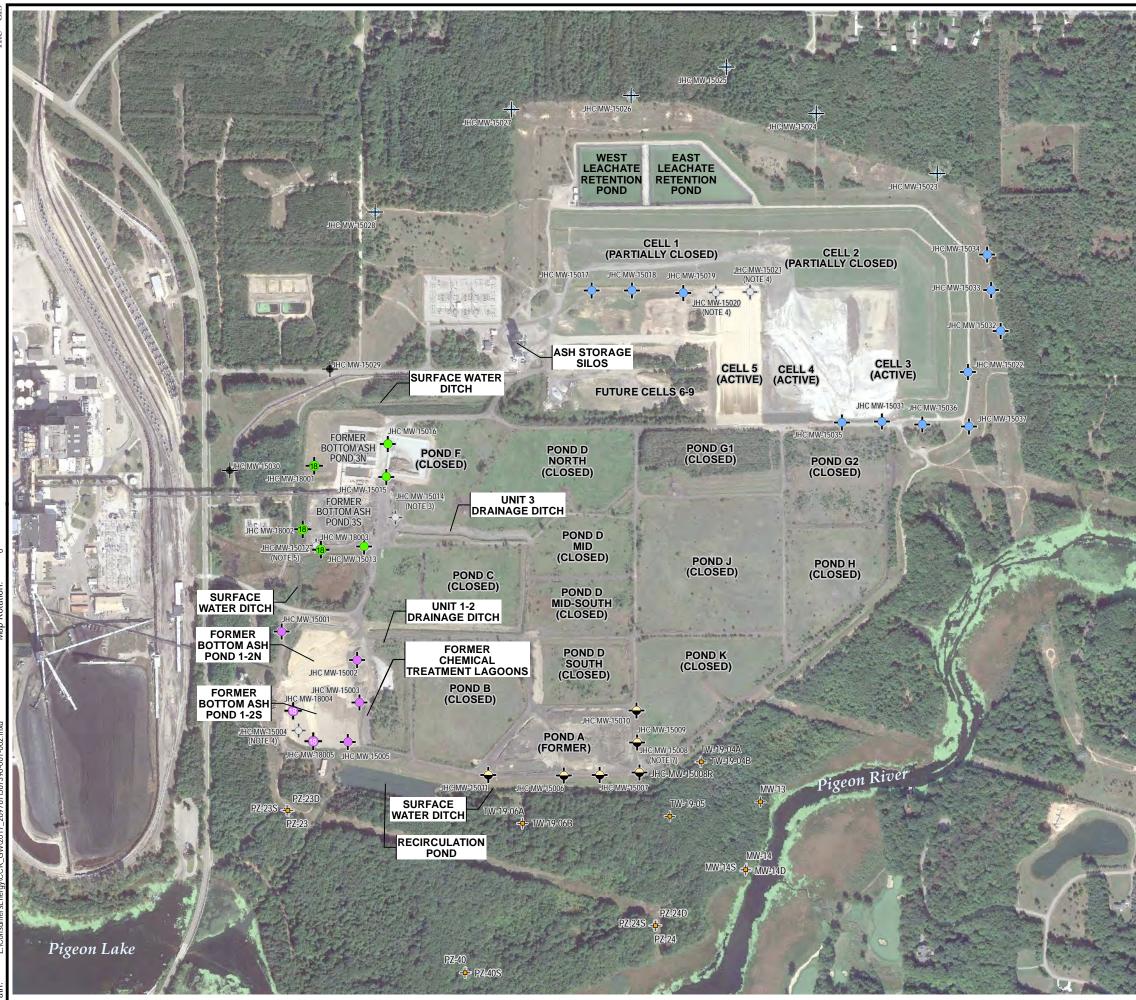
(1) - Exceeded Part 201 Generic Residential Cleanup Criteria (GRCC) but did not result in a statistically significant GWPS exceedance.



Figures



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LEGEND

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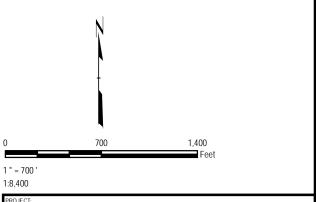
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- BACKGROUND MONITORING WELL DOWNGRADIENT BOTTOM ASH POND 1/2 N/S MONITORING WELL DOWNGRADIENT BOTTOM ASH POND
- **3 N/S MONITORING WELL**
- DOWNGRADIENT LANDFILL MONITORING WELL
- DOWNGRADIENT POND A MONITORING WELL
- MONITORING WELL (STATIC WATER 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)
- NATURE AND EXTENT WELL -**+**-

NOTES

- BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
- 2 WELL LOCATIONS BASED ON SURVEY DATA THROUGH 12/07/2018.
- MONITORING WELL DECOMMISSIONED NOVEMBER 13, 3 2017.
- MONITORING WELL DECOMMISSIONED JUNE 14, 2018.
- 5 MONITORING WELL DECOMMISSIONED OCTOBER 10, 2018.
- JHC-MW-1800X MONITORING WELLS INSTALLED IN DECEMBER 2018.
- MONITORING WELL DECOMMISSIONED JUNE 24, 2019
- JHC-MW-15008R AND TW-19-XX MONITORING WELLS INSTALLED IN JUNE 2019.



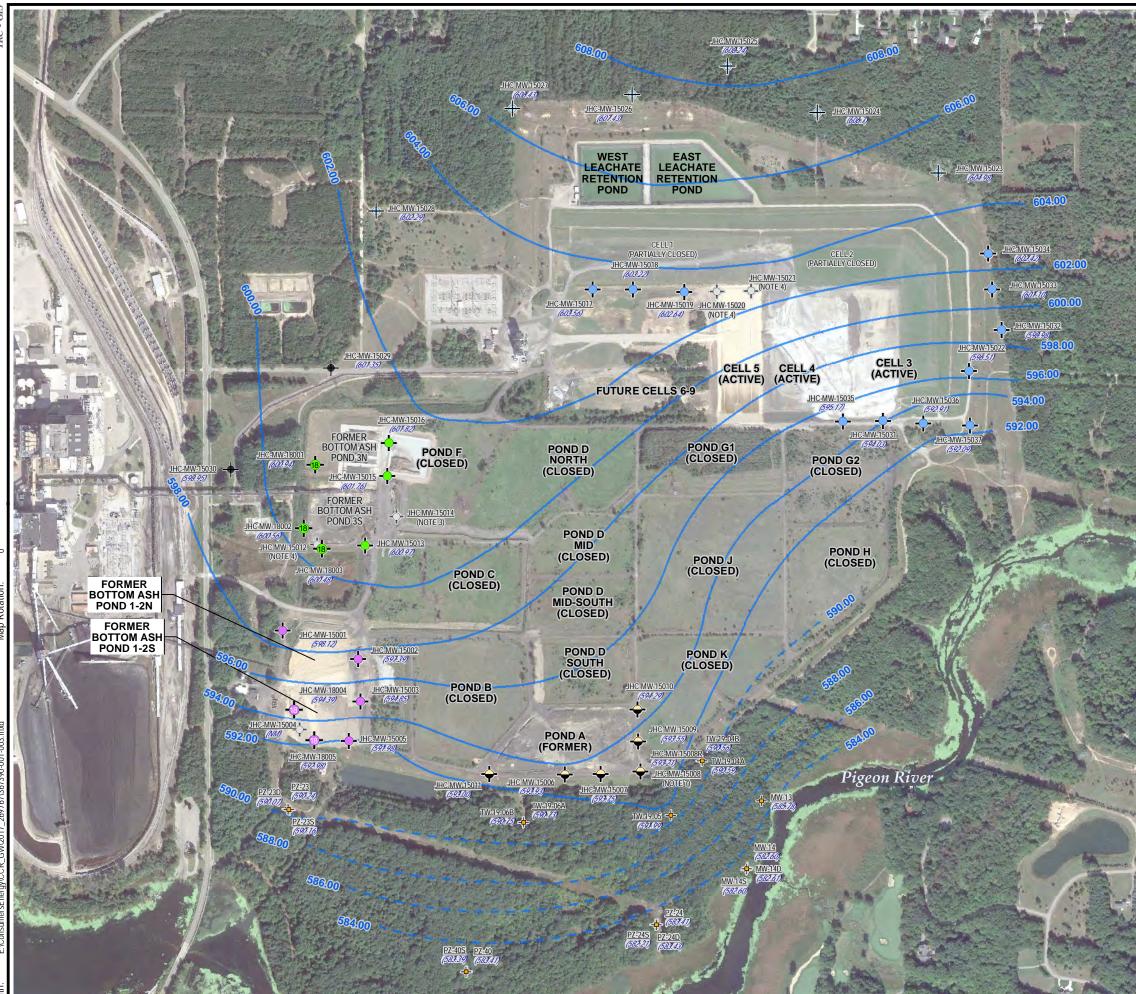
CONSUMERS ENERGY COMPANY JH CAMPBELL POWER PLANT WEST OLIVE, MICHIGAN

SITE PLAN WITH CCR MONITORING WELL LOCATIONS

DRAWN BY:	S. MAJOR	PROJ NO.:	367390.0001.0000
CHECKED BY:	B. YELEN		
APPROVED BY:	S. HOLMSTROM		FIGURE 2
DATE:	APRIL 2020		
🤣 T	RC		1540 Eisenhower Place Ann Arbor, MI 48108-3284 Phone: 734.971.7080 www.trccompanies.com

367390-001-002.mxd

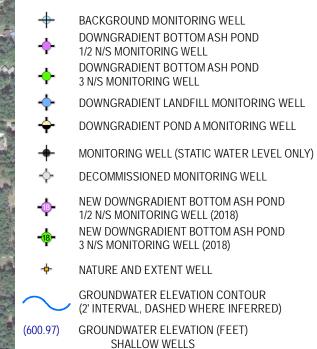
www.trccompanies.com



Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (Foo

lot Date: 7/26/2020, 19:03:02 PM by AHORRIE -- LAYOUT: ANSI B(11"X17")

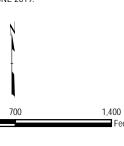




(NM) NOT MEASURED

<u>NOTES</u>

- 1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
- 2. WELL LOCATIONS BASED ON SURVEY DATA THROUGH 12/07/2018.
- MONITORING WELL DECOMMISSIONED NOVEMBER 13, 2017.
- 4. MONITORING WELL DECOMMISSIONED JUNE 14, 2018.
- MONITORING WELL DECOMMISSIONED OCTOBER 10, 2018.
- JHC-MW-1800X MONITORING WELLS INSTALLED IN DECEMBER 2018.
- MONITORING WELL DECOMMISSIONED JUNE 24, 2019.
 JHC-MW-15008R AND TW-19-XX MONITORING WELLS INSTALLED IN JUNE 2019.



1 " = 700

1:8,400

CONSUMERS ENERGY COMPANY JH CAMPBELL POWER PLANT WEST OLIVE, MICHIGAN

TITLE

GROUNDWATER CONTOUR MAP APRIL 2020

DRAWN BY:	S. MAJOR	PROJ NO.:	367390.0001.0000			
CHECKED BY:	K. LOWERY					
APPROVED BY:	S. HOLMSTROM		FIGURE 3			
DATE:	JULY 2020					
			1540 Eisenhower Place			



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FILE NO.:

367390-001-003.mxd



Appendix A Data Quality Review

Laboratory Data Quality Review Groundwater Monitoring Event April 2020 CEC JH Campbell Background Wells

Groundwater samples were collected by Consumers Energy (CE) Laboratory Services for the April 2020 sampling event. Samples were analyzed for metals, anions, and total dissolved solids (TDS) by CE Laboratory Services in Jackson, Missouri. The laboratory analytical results were reported in laboratory project number 20-0395.

During the April 2020 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, SW-846 7470A

Note that results for an extended list of metals (magnesium, potassium, and sodium), ammonia, nitrate, nitrite, alkalinity, and sulfide were provided for samples JHC-MW-15024, JHC-MW-15025, and JHC-MW-15027 as supplemental monitoring in laboratory project number 20-0395 but were not evaluated or included in this review. Further, the evaluation of radium results for samples collected during the April 2020 sampling event will be included in a supplemental review once results are available.

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, 2017). 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 equipment blanks and field blanks. Field and equipment blanks are used to assess potential contamination arising from field procedures;

- 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.

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

- Preparation dates were not provided by the laboratory. Since the analyses were performed within the preparation holding times, where applicable, there is no impact on data usability due to this issue.
- The cooler temperatures were between 6.1 and 8.2 degrees Celsius and the laboratory noted that samples were not received on ice. Samples were not received by the laboratory on the same day as collection. Therefore, results for TDS and anions in all samples collected during this sampling event should be considered estimated and may be biased low as summarized in the attached table. However, results for TDS and anions are consistent with historical results. Therefore, data usability is not affected.
- 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-15025 for mercury, 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-03/JHC-MW-15023. All criteria were met.
- It is unknown if laboratory duplicate analyses were performed on a sample from this data set since the QC reported by the laboratory was incomplete.
- Undiluted laboratory RLs were at the project-specified RLs in the monitoring plan with the following exceptions/notes:
 - RLs for total boron (20 µg/L), chloride (1,000 µg/L), and TDS (10,000 µg/L) were lower than the monitoring plan RLs (50 µg/L, 2,000 µg/L, and 50,000 µg/L, respectively). Boron in JHC-MW-15023, JHC-MW-15024, JHC-MW-15025, and DUP-03, TDS in JHC-MW-15027, JHC-MW-15028, and DUP-03, and chloride in JHC-MW-15023 were affected by the lower RL since boron, chloride, and/or TDS were detected in these samples above the laboratory's RL and below the monitoring plan RL. RLs are consistent with the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Op Memo WMRPD-115-14; therefore, data usability is not affected.
 - The RL for total barium (5 μg/L) in all samples was higher than the monitoring plan RL (1 μg/L). However, barium was detected in all samples except for the blanks (EB-03 and FB-03). The RL is consistent with the EGLE Op Memo; therefore, data usability is not affected.
 - The nondetect RL for total cobalt (15 μg/L) in all samples was higher than the monitoring plan RL (6 μg/L) and does not meet project needs.
 - The laboratory indicated in the case narrative that due to matrix interference/possible carry over effects, the RL for silver was increased to 0.3 μg/L for sample JHC-MW-15024; this RL does not meet the project-specified RL of 0.2 μg/L.

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

Samples	Collection Date	Analyte	Non-Conformance/Issue
JHC-MW-15023	4/16/2020		
JHC-MW-15024	4/16/2020		
JHC-MW-15025	4/16/2020		
JHC-MW-15026	4/16/2020	TDS,	Samples not received on ice with elevated cooler temperature; sample results should be considered estimated
JHC-MW-15027	4/16/2020	Chloride, Fluoride,	and may be biased low. However, results were consistent with historical results; therefore, data usability is not
JHC-MW-15028	4/16/2020	Sulfate	affected.
EB-03	4/16/2020		
FB-03	4/16/2020		
DUP-03	4/16/2020		

Laboratory Data Quality Review Groundwater Monitoring Event April 2020 – Radium Consumers Energy JH Campbell Background Wells

Groundwater samples were collected by Consumers Energy (CE) Laboratory Services for the April 2020 sampling event. Samples were analyzed for radium; radium analyses were subcontracted to Eurofins TA in St. Louis, Missouri (Eurofins TA – St. Louis). The laboratory analytical results were reported in laboratory project number 160-37918-1.

During the April 2020 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 (Radium-226, Radium-228, Combined Radium)	EPA 903.0, EPA 904.0

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

Data Usability Review Procedure

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

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

- Percent recoveries for carriers. Carriers are used to assess the chemical yield for the preparation and/or instrument efficiency;
- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

This data usability report addresses the following items:

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

Review Summary

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

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

QA/QC Sample Summary

- A method blank was analyzed with each analytical batch. Target analytes were not detected in the method blank samples.
- One equipment blank (EB-03) and one field blank (FB-03) were collected. Target analytes were not detected.
- The LCS and LCSD recoveries and relative percent differences (RPDs) were within QC limits with the following exceptions.
 - The recovery for radium-228 (24%) in the LCSD and the replicate error ratio (RER) in the LCS/LCSD analyses (3.46) performed with preparation batch 471099 were outside of the acceptance limits (75-125% and 1, respectively). The laboratory indicated that there was insufficient sample volume for re-preparation. There is no adverse impact on the data usability due to these issues since the recovery for radium-228 was acceptable in the LCS.
- MS and MSD analyses were not performed.
- The field duplicate pair samples were DUP-03/JHC-MW-15023; all criteria were met.
- Laboratory duplicate analyses were not performed.
- Carrier recoveries were within 40-110% with the following exceptions.
 - The barium carrier recoveries in the radium-228 analyses of samples JHC-MW-15025 (25.8%) and sample JHC-MW-15027 (34.7%) were below the acceptance criteria (40-110%). The laboratory indicated that there was physical evidence of matrix interference present during sample preparation; there was insufficient sample volume for re-

preparation. Therefore, the nondetect results for radium-228 in these samples should be considered estimated and biased low, as summarized in the attached table. However, the nondetect results were within or above the range of historical results. Therefore, data usability is not affected.

- Samples did not undergo a 21-day wait period prior to radium-226 analysis; however, combined radium results were < 5 pCi/L so there is no impact on data usability.</p>
- The minimum detectable concentrations (MDCs) for radium-228 in samples JHC-MW-15025 (1.90 pCi/L) and sample JHC-MW-15027 (1.37 pCi/L) were above the project-specified limit of 1.00 pCi/L likely due to matrix interference; however, combined radium results were < 5 pCi/L so there is no adverse impact on data usability.</p>

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

Date Date Date JHC-MW-15025 4/16/2020 Radium 228 Low barium carr	Non-Conformance/Issue								
JHC-MW-15025	4/16/2020	Radium 229	Low barium carrier recovery. Potential low bias exists for these nondetect results. However, results are within or						
JHC-MW-15027	4/16/2020	Raululli 220	above the range of historical results; therefore, data usability is not affected.						

Laboratory Data Quality Review Groundwater Monitoring Event April 2020 CEC JH Campbell Pond A and Downgradient Wells

Groundwater samples were collected by Consumers Energy (CE) Laboratory Services for the April 2020 sampling event. Samples were analyzed for select total and/or dissolved metals, anions, and total dissolved solids by CE Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory project numbers 20-0384 and 20-0405.

During the April 2020 sampling event, a groundwater sample was collected from each of the following wells:

- JHC-MW-15006 JHC-MW-15007 JHC-MW-15008R
- JHC-MW-15009 JHC-MW-15010 JHC-MW-15011
- MW-14S
 PZ-24S
 PZ-40S

Well MW-13 was purged dry, so a sample was not collected for total metals.

Each sample was analyzed for one or more of the following constituents:

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

Note that results for an extended list of metals (magnesium, sodium, and potassium), ammonia, nitrate, nitrite, alkalinity, and sulfide were provided for sample JHC-MW-15011 as supplemental monitoring in laboratory project number 20-0384 but were not evaluated or included in this review. Further, the evaluation of radium results for samples collected during the April 2020 sampling event will be included in a supplemental review once results are available.

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, 2017). 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 equipment blanks and field blanks. Field and equipment blanks are used to assess potential contamination arising from field procedures;
- 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. 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 all parameters included in this review.

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

- Preparation dates were not provided by CE Laboratory Services. Since the analyses were
 performed within the preparation holding times, where applicable, there is no impact on
 data usability due to this issue.
- One equipment blank (EB-02) and one field blank (FB-02) were collected. Target analytes were not detected in EB-02.
 - Zinc was detected at 13 μg/L in FB-02. There was no impact on data usability since zinc was not detected in the associated samples.
- MS and MSD analyses were performed on sample JHC-MW-15007 for mercury, 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-02/JHC-MW-15009. All criteria were met.
- It is unknown if laboratory duplicate analyses were performed on a sample from this data set since the QC reported by the laboratory was incomplete.
- Undiluted laboratory RLs were at the project-specified RLs in the monitoring plan with the following exceptions/notes:
 - RLs for total boron (20 μg/L), chloride (1,000 μg/L), nickel (1 μg/L) and TDS (10,000 μg/L) were lower than the monitoring plan RLs (50 μg/L, 2,000 μg/L, 2 μg/L, and 50,000 μg/L, respectively). Boron in sample MW-14S and TDS in samples MW-14S, PZ-24S, and PZ-40S were affected by the lower RLs since boron and/or TDS were detected in these samples above the laboratory's RL and below the monitoring plan RL. RLs are consistent with the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Op Memo WMRPD-115-14; therefore, data usability is not affected.
 - The RL for total barium (5 μg/L) in all samples was higher than the monitoring plan RL (1 μg/L). However, barium was detected in all samples except for the blanks (EB-03 and FB-03). The RL is consistent with the EGLE Op Memo; therefore, data usability is not affected.
 - The nondetect RL for total cobalt (15 μg/L) in all samples was higher than the monitoring plan RL (6 μg/L) and does not meet project needs.
 - The laboratory indicated in the case narrative that due to matrix interference/possible carry over effects, the RL for silver was increased to 0.4 μg/L for samples JHC-MW-15006 and JHC-MW-15011; this RL does not meet the project-specified RL of 0.2 μg/L.

Laboratory Data Quality Review Groundwater Monitoring Event April 2020 – Radium CEC JH Campbell Pond A Wells

Groundwater samples were collected by Consumers Energy (CE) Laboratory Services for the April 2020 sampling event. Samples were analyzed for radium; radium analyses were subcontracted to Eurofins TA in St. Louis, Missouri (Eurofins TA – St. Louis). The laboratory analytical results were reported in laboratory project numbers 160-37917-1.

During the April 2020 sampling event, a groundwater sample was collected from each of the following wells:

- JHC-MW-15006 JHC-MW-15007 JHC-MW-15008R
- JHC-MW-15009 JHC-MW-15010 JHC-MW-15011

Each sample was analyzed for the following constituents:

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

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

Data Usability Review Procedure

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

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

- Data for laboratory duplicates, when performed on project samples. The laboratory duplicates are replicate analyses of one sample and are used to assess the precision of the analytical method;
- Percent recoveries for carriers. Carriers are used to assess the chemical yield for the preparation and/or instrument efficiency;
- Data for blind field duplicates. Field duplicate samples are used to assess variability introduced by the sampling and analytical processes; and
- Overall usability of the data.

This data usability report addresses the following items:

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

Review Summary

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

- The reviewed Appendix IV 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. Target analytes were not detected in the method blank samples.
- One equipment blank (EB-02) and one field blank (FB-02) were collected. Target analytes were not detected.
- The LCS/LCSD recoveries and relative percent differences (RPDs) for all analytes were within QC limits.
- MS and MSD analyses were not performed.
- The field duplicate pair samples were DUP-02/JHC-MW-15009; RPDs between the parent and field duplicate samples were within the acceptance limits.
- Laboratory duplicate analyses were not performed.
- Carrier recoveries were within 40-110%.
- Samples did not undergo a 21-day wait period prior to radium-226 analysis; however, combined radium results were < 5 pCi/L so there is no impact on data usability.</p>



Appendix B April 2020 Assessment Monitoring Statistical Evaluation



Date:	July 21, 2020
То:	Bethany Swanberg, Consumers Energy
From:	Sarah Holmstrom, TRC Kristin Lowery, TRC
Project No.:	367390.0000.0000 Phase 1 Task 4
Subject:	Statistical Evaluation of April 2020 Assessment Monitoring Sampling Event, JH Campbell Pond A, Consumers Energy, West Olive, Michigan

Consumers Energy is conducting quarterly groundwater monitoring at Pond A in accordance with the Pond A HMP and AMP and semiannual monitoring in accordance with the CCR Rule per the JH Campbell Monitoring Program Sample Analysis Plan (SAP) (ARCADIS, May 2016). The second quarter 2020 monitoring event was conducted on April 13 through 16, 2020. In accordance with the Pond A AMP, the assessment monitoring data must be compared to GWPSs to determine whether or not Appendix III and Appendix IV constituents are detected at statistically significant levels above the GWPSs. Appendix IV GWPSs were established in accordance with §257.95(h), as detailed in the October 15, 2018 Groundwater Protection Standards technical memorandum, which was also included in the 2018 Annual Groundwater Monitoring Report (TRC, January 2019) and Appendix III GWPSs were established in accordance with §257.95(h) and the HMP, as detailed in the December 23, 2019 Groundwater Protection Standards – Consumers Energy, JH Campbell Site, Pond A CCR Unit memorandum, which was also included in the 2019 Annual Groundwater Monitoring Report. The following narrative describes the methods that were employed for the comparisons to the GWPSs. The results obtained and the Sanitas[™] output files are included as an attachment.

The statistical evaluation of the second quarter 2020 event data indicates that the following constituent is present at statistically significant levels exceeding the GWPS in downgradient monitoring wells at the JHC Pond A CCR Unit:

<u>Constituent</u>	GWPS	# Downgradient Wells Observed
Arsenic	10 ug/L	1 of 6

The results are consistent with the results of the previous assessment monitoring data statistical evaluations where arsenic at JHC-MW-15011 was the only constituent present at statistically significant levels above its GWPS.

Assessment Monitoring Statistical Evaluation

The downgradient compliance well network at the JHC Pond A consists of six wells (JHC-MW-15006 through JHC-MW-15011) located south and east of Pond A.

The water table in the area of Pond A has continued to drop as groundwater equilibrates following cessation of hydraulic loading and placement of the cover at Pond A. As a result, the water table had dropped below the well screen at JHC-MW-15008 such that the monitoring well could no longer be used to collect groundwater samples. Monitoring well JHC-MW-15008 was decommissioned in June 2019 and replaced with JHC-MW-15008R. The replacement well was installed at a location adjacent to and side-gradient from the original well location and screened at a lower depth (across the water table) in order to monitor groundwater quality downgradient from Pond A. Monitoring well JHC-MW-15008R replaces JHC-MW-15008 in the Pond A assessment monitoring program and data from the replacement well is combined with data from the existing well for statistical evaluation.

Following the second quarter 2020 sampling event, compliance well data for JHC Pond A were evaluated in accordance with the Groundwater Statistical Evaluation Plan (Stats Plan) (TRC, October 2017) and the Pond A HMP and AMP. 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 new 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 Guidance¹, 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 and lower and upper confidence limits.

For constituents at monitoring wells that have no previously identified statistically significant GWPS exceedances, 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 GWPS². If the confidence interval straddles the GWPS (i.e., the lower confidence level is below the GWPS but the upper confidence level is above), the statistical test result indicates that there is insufficient confidence that the measured concentrations are different from the GWPS and thus no compelling evidence that the measured concentration is a result of a release from the CCR unit versus the inherent variability of the sample data. This statistical approach is consistent with the statistical methods for assessment monitoring presented in §257.93(f) and (g). Statistical evaluation methodologies built into the CCR Rule, and numerous other federal rules, are key in determining whether or not individually measured data points represent a concentration increase over the baseline or a fixed standard (such as a GWPS in an assessment monitoring program).

For each detected Appendix III and Appendix IV constituent, the concentrations from each well were

¹ USEPA. 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance.* Office of Conservation and Recovery. EPA 530/R-09-007

² For pH, an exceedance occurs when the lower confidence level exceeds the upper GWPS or the upper confidence level is below the lower GWPS.

first compared directly to the GWPS, as shown on Table B1. Constituent-well combinations that included a direct exceedance of the GWPS within the past eight monitoring events (August 2017 to April 2020 for JHC-MW-15006, JHC-MW-15010, and JHC-MW-15011 and June 2017 to April 2020 for JHC-MW-15007, JHC-MW-15008/R, and JHC-MW-15009) were retained for further analysis (Attachment 1). Direct comparison GWPS exceedances include the following constituent well combinations:

- Sulfate and total dissolved solids (TDS) in JHC-MW-15006,
- Boron, TDS, and selenium in JHC-MW-15008/R,
- Boron and selenium in JHC-MW-15009,
- Boron, chromium, and selenium in JHC-MW-15010, and
- Boron, TDS, pH, arsenic, and selenium in JHC-MW-15011.

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

The statistical data evaluation included the following steps:

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

The results of these evaluations are presented and discussed below.

Initially, the baseline (December 2015 through August 2017) results and the assessment monitoring results (April 2018 through April 2020) were observed visually for potential trends and outliers (timeseries plots in Attachment 1). Potential increasing trends were noted for boron in JHC-MW-15008/R, JHC-MW-15009, and JHC-MW-15011, sulfate in JHC-MW-15006, TDS in JHC-MW-15008/R and JHC-MW-15011, and selenium in JHC-MW-15009 and JHC-MW-15010 (trend tests in Attachment 1). Groundwater conditions are re-equilibrating following capping activities at JHC Pond A that were completed in Summer 2019. Because hydrogeologic conditions are in the process of stabilizing, temporary trending and sporadic outlier data are not unexpected.

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 SanitasTM 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 an appropriate density of data as recommended per the Unified Guidance yet are collected recently enough to provide an indication of current condition. The tests were run with a per-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 were 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 distributions are as follows:

Distribution	Constituent-Well Combinations
Normal	pH in JHC-MW-15011 Arsenic in JHC-MW-15011
Normalized by natural log transformation	Boron in JHC-MW-15009 and JHC-MW-15011
Normalized by square root transformation	TDS in JHC-MW-15006 and JHC-MW-15008/R Selenium in JHC-MW-15009 and JHC-MW-15010
Non-Parametric (not able to be normalized)	Boron in JHC-MW-15008/R and JHC-MW-15010 Sulfate in JHC-MW-15006 TDS in JHC-MW-15011 Chromium in JHC-MW-15010 Selenium in JHC-MW-15008/R and JHC-MW-15011

Arsenic was identified at downgradient monitoring well JHC-MW-15011 at statistically significant levels exceeding the GWPS during the initial assessment monitoring event conducted in June 2018. As shown in Table B1 and Attachment 1, arsenic concentrations at monitoring well JHC-MW-15011 showed a general increase in 2018 and 2019. Arsenic concentrations in this well have begun to decline in 2020 but remain above the GWPS. Consumers Energy will continue to monitor changes in groundwater chemistry and the assessment of corrective measures per the Pond A HMP and AMP and §257.95(g).

Attachments

Table B1	Comparison of Groundwater Sampling Results to Groundwater Protection
	Standards – June 2017 to April 2020

Attachment 1 Sanitas[™] Output

Table

							S	ample Location:	n: JHC-MW-15006											
								Sample Date:	8/15/2017	9/26/2017	4/25/2018	6/20/2018	6/20/2018	11/15/2018	4/24/2019	10/10/2019	2/12/2020	4/14/2020		
Constituent	Unit	EPA MCL	EPA RSL	MI Residential*	MI Non- Residential*	MI GSI^	UTL	GWPS				·						·		
Appendix III													Field Dup							
Boron	ug/L	NC	NA	500	500	7,200	54	500	151	119		144	147	203	240	230	247	284		
Calcium	mg/L	NC	NA	NC	NC	500	40	500	40.0	32.8		38.5	38.6	26.8	41	35	101	102		
Chloride	mg/L	250**	NA	250	250	500	70	250	18.4	17.7		17.2	17.2	24.8	21	22	21.0	24.9		
Fluoride	ug/L	4,000	NA	NC	NC	NC	1,000	4,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000		
Sulfate	mg/L	250**	NA	250	250	500	13	250	28.9	31.1		27.5	27.5	27.0	75	55	217	260		
Total Dissolved Solids	mg/L	500**	NA	500	500	500	240	500	206	172		376	268	140	240	190	542	562		
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5	6.5 - 8.5	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.5	7.4	8.0	7.4		7.8	7.6	7.8	7.6	7.2		
Appendix IV																				
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	1		
Arsenic	ug/L	10	NA	10	10	10	1	10	8.5		4.8	4.3	4.7	4.7	5.1	4.3	6	5		
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	220		158	141	146	144	230	180	326	353		
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1		
Cadmium	ug/L	5	NA	5.0	5.0	3.5	0.2	5	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2		
Chromium	ug/L	100	NA	100	100	11	2	100	2.0		1.5	1.5	1.8	2.3	4.1	< 1.0	2	1		
Cobalt	ug/L	NC	6	40	100	100	15	15	< 15.0		< 15.0	< 15.0	< 15.0	< 6.0	< 6.0	< 6.0	< 6	< 15		
Fluoride	ug/L	4,000	NA	NC	NC	NC	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	4.0	4.0	39	1	15	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1		
Lithium	ug/L	NC	40	170	350	0.20#	10	40	16		13	12	12	13	< 10	< 10	13	13		
Mercury	ug/L	2	NA	2.0	2.0	0.2	0.2	2	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2		
Molybdenum	ug/L	NC	100	73	210	3,200	5	100	5.9		< 5.0	5.4	5.5	12.2	10	9.1	13	16		
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.807		< 0.896	< 0.540	< 0.483	< 0.740	0.234	0.310		0.426		
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.881		< 0.779	< 0.963	< 0.944	< 0.588	< 0.343	< 0.524		0.518		
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5	< 1.69		< 1.68	< 1.50	< 1.43	< 1.33	0.488	< 0.524		0.944		
Selenium	ug/L	50	NA	50	50	5.0	5	50	< 1.0		1.3	< 1.0	< 1.0	< 1.0	< 1.0	1.3	8	9		
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2	< 2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 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. Appendix IV GWPS is the higher of the MCL/RSL and UTL as established in TRC's

Technical Memorandum dated October 15, 2018. Appendix III GWPS is the most restrictive of the MCL/Part 201 criteria, or the UTL if the UTL exceeds the applicable criteria as established in TRC's Technical Memorandum dated December 23, 2019.

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

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

^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using 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 EGLE policy and procedure 09-014 dated June 20, 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) pH value potentially biased high due to groundwater quality meter malfunction.

(2) Not sampled; insufficient amount of groundwater present to collect sample.

							Sa	mple Location:	n: JHC-MW-15007											
Sample Date										8/15/2017	9/26/2017	4/26/2018	6/20/2018	11/15/2018	4/24/2019	10/9/2019 ⁽²⁾	2/12/2020	4/14/2020		
Constituent	Unit	EPA MCL	EPA RSL	MI Residential*	MI Non- Residential*	MI GSI^	UTL	GWPS					Downg	gradient						
Appendix III																				
Boron	ug/L	NC	NA	500	500	7,200	54	500	153	141	98		157	142	190		147	242		
Calcium	mg/L	NC	NA	NC	NC	500	40	500	42.4	32.1	32.2		38.7	42.6	79		55.2	62.1		
Chloride	mg/L	250**	NA	250	250	500	70	250	20.1	17.5	17.3		17.5	20.6	23		9.10	14.1		
Fluoride	ug/L	4,000	NA	NC	NC	NC	1,000	4,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000		< 1,000	< 1,000		
Sulfate	mg/L	250**	NA	250	250	500	13	250	29.1	31.6	32.3		26.2	19.2	54		31.9	83		
Total Dissolved Solids	mg/L	500**	NA	500	500	500	240	500	202	170	188		298	166	360		312	336		
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5	6.5 - 8.5	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.3	7.4	7.3	8.4 ⁽¹⁾	7.4	7.6	7.4		7.4	7.0		
Appendix IV																				
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0		< 1	< 1		
Arsenic	ug/L	10	NA	10	10	10	1	10	3.2	4.0		3.3	2.9	4.0	4.0		3	3		
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	143	130		121	115	177	320		231	266		
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0		< 1	< 1		
Cadmium	ug/L	5	NA	5.0	5.0	3.5	0.2	5	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20		< 0.2	< 0.2		
Chromium	ug/L	100	NA	100	100	11	2	100	1.2	1.1		< 1.0	1.2	31.3	35		3	2		
Cobalt	ug/L	NC	6	40	100	100	15	15	< 15.0	< 15.0		< 15.0	< 15.0	< 6.0	< 6.0		< 6	< 15		
Fluoride	ug/L	4,000	NA	NC	NC	NC	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	4.0	4.0	39	1	15	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0		< 1	< 1		
Lithium	ug/L	NC	40	170	350	0.20#	10	40	14	16		11	15	16	12		15	14		
Mercury	ug/L	2	NA	2.0	2.0	0.2	0.2	2	< 0.20	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20		< 0.2	< 0.2		
Molybdenum	ug/L	NC	100	73	210	3,200	5	100	6.1	6.1		< 5.0	< 5.0	7.6	7.2		< 5	< 5		
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.427	< 0.430		< 1.03	< 0.736	0.864	0.217			0.197		
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 1.15	< 0.904		< 1.02	< 1.12	< 0.688	0.392			< 0.456		
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5	< 1.58	< 1.33		< 2.05	< 1.86	1.40	0.609			< 0.456		
Selenium	ug/L	50	NA	50	50	5.0	5	50	2.2	1.1		< 1.0	1.3	< 1.0	4.1		23	22		
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2	< 2.0	< 2.0		< 2.0	< 2.0	< 2.0	< 2.0		< 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. Appendix IV GWPS is the higher of the MCL/RSL and UTL as established in TRC's

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^ - 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 EGLE policy and procedure 09-014 dated June 20, 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) pH value potentially biased high due to groundwater quality meter malfunction.

(2) Not sampled; insufficient amount of groundwater present to collect sample.

							S	ample Location:	JHC-MW-15008 ⁽³⁾							JHC-MW-15008R ⁽³⁾					
								Sample Date:	6/21/2017	8/15/2017	9/26/2017	4/26/2018	6/20/2018	11/15/2018(2)	4/24/2019 ⁽²⁾	8/13/2019	10/9/2019	10/9/2019	2/12/2020	4/14/2020	
Constituent	Unit	EPA MCL	EPA RSL	MI Residential*	MI Non- Residential*	MI GSI^	UTL	GWPS						Downg	radient						
Appendix III																		Field Dup			
Boron	ug/L	NC	NA	500	500	7,200	54	500	128	153	116		87.7			93	130	130	423	505	
Calcium	mg/L	NC	NA	NC	NC	500	40	500	42.5	47.1	37.5		39			33	100	100	94.7	99.9	
Chloride	mg/L	250**	NA	250	250	500	70	250	24.0	22.3	16.6		20.4			2.2	16	16	22.4	25.0	
Fluoride	ug/L	4,000	NA	NC	NC	NC	1,000	4,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000			170	< 1,000	< 1,000	< 1,000	< 1,000	
Sulfate	mg/L	250**	NA	250	250	500	13	250	29.8	31.8	28.4		25.5			20	220	220	219	235	
Total Dissolved Solids	mg/L	500**	NA	500	500	500	240	500	260	340	190		210			150	< 50	430	556	566	
oH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5	6.5 - 8.5	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.1	7.1	7.1	7.9 ⁽¹⁾	7.2			7.4	7.3		7.3	6.9	
Appendix IV																					
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	< 1.0	1.1		1.1	< 1.0			1.2	< 1.0	< 1.0	< 1	1	
Arsenic	ug/L	10	NA	10	10	10	1	10	< 1.0	< 1.0		< 1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1	< 1	
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	124	186		118	120			110	340	320	291	252	
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1.0	< 1.0		< 1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1	< 1	
Cadmium	ug/L	5	NA	5.0	5.0	3.5	0.2	5	< 0.20	< 0.20		< 0.20	< 0.20			< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	
Chromium	ug/L	100	NA	100	100	11	2	100	7.8	5.4		1.3	1.5			3.8	4.5	4.5	7	< 1	
Cobalt	ug/L	NC	6	40	100	100	15	15	< 15.0	< 15.0		< 15.0	< 15.0			< 6.0	< 6.0	< 6.0	< 6	< 15	
Fluoride	ug/L	4,000	NA	NC	NC	NC	1,000	4,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000			170	< 1,000	< 1,000	< 1,000	< 1,000	
_ead	ug/L	NC	15	4.0	4.0	39	1	15	< 1.0	< 1.0		< 1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1	< 1	
Lithium	ug/L	NC	40	170	350	0.20#	10	40	13	18		14	15			10	15	15	18	19	
Mercury	ug/L	2	NA	2.0	2.0	0.2	0.2	2	< 0.20	< 0.20		< 0.20	< 0.20			< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	
Molybdenum	ug/L	NC	100	73	210	3,200	5	100	9.4	8.6		5.8	5.1			6.8	< 5.0	< 5.0	< 5	< 5	
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.599	< 0.437		< 0.493	0.928			0.183	0.449	0.751		0.180	
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.892	< 1.06		< 0.847	< 0.698			0.468	0.817	0.744		< 0.429	
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5	< 1.49	< 1.50		< 1.34	1.56			0.651	1.27	1.49		0.549	
Selenium	ug/L	50	NA	50	50	5.0	5	50	2.3	2.4		1.7	2.0			12	110	110	11	6	
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2	< 2.0	< 2.0		< 2.0	< 2.0			< 2.0	< 2.0	< 2.0	< 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.

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applicable criteria as established in TRC's Technical Memorandum dated December 23, 2019.

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- If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway per Michigan Part 201 and EGLE policy and procedure 09-014 dated June 20, 2012.

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.

pH value potentially biased high due to groundwater quality meter malfunction.

(2) Not sampled; insufficient amount of groundwater present to collect sample.

(2) Not sampled, insumation allocation of groundwater present to concert sample.
 (3) JHC-MW-15008 was decommissioned on June 24, 2019. Replacement well JHC-MW-15008R was installed on June 25, 2019.

							Sa	ample Location:	on: JHC-MW-15009													
								Sample Date:	6/21/2017	8/15/2017	9/26/2017	4/26/2018	4/26/2018	6/20/2018	11/15/2018	11/15/2018	4/24/2019	4/24/2019	10/9/2019 ⁽²⁾	2/12/2020	4/14/2020	4/14/2020
Constituent	Unit	EPA MCL	EPA RSL	MI Residential*	MI Non- Residential*	MI GSI^	UTL	GWPS														
Appendix III													Field Dup			Field Dup		Field Dup				Field Dup
Boron	ug/L	NC	NA	500	500	7,200	54	500	126	156	144			91.4	188	187	200	190	-	468	874	881
Calcium	mg/L	NC	NA	NC	NC	500	40	500	40.1	41.2	34.3			41.2	46.2	46.4	92	89		74.5	78.7	79.9
Chloride	mg/L	250**	NA	250	250	500	70	250	23.8	20.1	17.7			22.9	17.7	17.7	17	16		10.7	6.95	6.78
Fluoride	ug/L	4,000	NA	NC	NC	NC	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	< 1,000	< 1,000
Sulfate	mg/L	250**	NA	250	250	500	13	250	28.6	31.6	32.7			18.2	26.9	27.1	130	130		40.5	49.1	49.9
Total Dissolved Solids	mg/L	500**	NA	500	500	500	240	500	188	208	178			214	234	202	430	440		332	354	341
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5	6.5 - 8.5	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.4	7.5	7.4	8.4 ⁽¹⁾		7.7	7.6		7.4			7.5	7.2	
Appendix IV																						
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	1.1	< 1.0		< 1.0	< 1.0	< 1.0	1.2	< 1.0	< 1.0	< 1.0		< 1	1	1
Arsenic	ug/L	10	NA	10	10	10	1	10	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1	< 1	< 1
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	132	198		130	125	130	178	181	360	360		287	307	298
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1	< 1	< 1
Cadmium	ug/L	5	NA	5.0	5.0	3.5	0.2	5	< 0.20	< 0.20		< 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	100	100	11	2	100	5	6.6		1.3	1.3	< 1.0	14.1	11.8	17	14		31	1	1
Cobalt	ug/L	NC	6	40	100	100	15	15	< 15.0	< 15.0		< 15.0	< 15.0	< 15.0	< 6.0	< 6.0	< 6.0	< 6.0	-	< 6	< 15	< 15
Fluoride	ug/L	4,000	NA	NC	NC	NC	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	< 1,000	< 1,000
Lead	ug/L	NC	15	4.0	4.0	39	1	15	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	-	< 1	< 1	< 1
Lithium	ug/L	NC	40	170	350	0.20#	10	40	11	11		< 10	< 10	< 10	14	14	11	11	-	14	14	14
Mercury	ug/L	2	NA	2.0	2.0	0.2	0.2	2	< 0.20	< 0.20		< 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	73	210	3,200	5	100	22.3	7.4		5.5	5.5	< 5.0	6.1	6.1	5.7	5.6		15	< 5	< 5
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA	0.553	< 0.455		< 0.169	< 0.709	< 0.631	< 0.896	< 0.705	0.351	0.289			0.394	0.307
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 1.08	1.04		< 1.26	< 1.14	< 0.634	0.800	< 0.663	0.674	0.509			0.573	0.459
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5	< 1.23	< 1.40		< 1.43	< 1.85	< 1.27	< 1.47	< 1.37	1.02	0.798			0.967	0.767
Selenium	ug/L	50	NA	50	50	5.0	5	50	4.7	< 1.0		< 1.0	1.0	10.3	12.6	12.6	61	63		20	77	79
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2	< 2.0	< 2.0		< 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.

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- If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway per Michigan Part 201 and EGLE policy and procedure 09-014 dated June 20, 2012.

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) pH value potentially biased high due to groundwater quality meter malfunction.

(2) Not sampled; insufficient amount of groundwater present to collect sample.

							Sar	mple Location:	JHC-MW-15010											
	Sample Date										4/26/2018	6/20/2018	11/14/2018	4/23/2019	10/9/2019	2/11/2020	2/11/2020	4/14/2020		
Constituent	nt Unit EPA MCL EPA RSL Residential* MI Non- GWPS								Downgradient											
Appendix III																	Field Dup			
Boron	ug/L	NC	NA	500	500	7,200	54	500	164	109		98.4	120	2,800	2,800	2,390	2,390	2,350		
Calcium	mg/L	NC	NA	NC	NC	500	40	500	39.4	33.0		40.9	59.6	58	84	82.9	88.0	82.7		
Chloride	mg/L	250**	NA	250	250	500	70	250	19.1	17.8		22.2	7.9	2.0	< 2.0	2.59	2.61	3.20		
Fluoride	ug/L	4,000	NA	NC	NC	NC	1,000	4,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000		
Sulfate	mg/L	250**	NA	250	250	500	13	250	37.0	32.6		39.9	33.3	24	32	30.7	31.2	35.9		
Total Dissolved Solids	mg/L	500**	NA	500	500	500	240	500	338	220		294	262	270	330	280	319	333		
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5	6.5 - 8.5	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.3	7.2	8.0 ⁽¹⁾	7.3	7.5	6.6	6.9	7.0		6.6		
Appendix IV																				
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	1.5		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		
Arsenic	ug/L	10	NA	10	10	10	1	10	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	179		137	122	211	250	270	266	267	276		
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		
Cadmium	ug/L	5	NA	5.0	5.0	3.5	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	100	100	11	2	100	< 1.0		1.4	1.1	1.5	1.2	370	4	5	1		
Cobalt	ug/L	NC	6	40	100	100	15	15	< 15.0		< 15.0	< 15.0	< 6.0	< 6.0	< 6.0	< 6	< 6	< 15		
Fluoride	ug/L	4,000	NA	NC	NC	NC	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	4.0	4.0	39	1	15	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1		
Lithium	ug/L	NC	40	170	350	0.20#	10	40	12		10	< 10	12	13	17	20	20	20		
Mercury	ug/L	2	NA	2.0	2.0	0.2	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	73	210	3,200	5	100	13.2		11.0	7.6	5.0	< 5.0	14	< 5	< 5	< 5		
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA	0.745	-	0.505	< 0.489	< 0.858	0.198	0.643			0.27		
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.808		< 1.03	< 0.655	0.814	< 0.326	1.12			0.752		
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5	1.36		< 1.20	< 1.14	< 1.43	0.515	1.76			1.02		
Selenium	ug/L	50	NA	50	50	5.0	5	50	< 1.0		3.0	11.0	34.1	32	210	126	126	158		
Thallium	ug/L	2	NA	2.0	2.0	3.7	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.

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- If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway per Michigan Part 201 and EGLE policy and procedure 09-014 dated June 20, 2012.

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) pH value potentially biased high due to groundwater quality meter malfunction.

(2) Not sampled; insufficient amount of groundwater present to collect sample.

							Sa	ample Location:	JHC-MW-15011											
								Sample Date:	8/15/2017	8/15/2017	9/26/2017	9/26/2017	4/25/2018	6/19/2018	11/15/2018	4/23/2019	10/10/2019	2/12/2020	4/15/2020	
Constituent	Unit	EPA MCL	EPA RSL	MI Residential*	MI Non- Residential*	MI GSI^	UTL	GWPS												
Appendix III										Field Dup		Field Dup								
Boron	ug/L	NC	NA	500	500	7,200	54	500	288	271	249	219		229	337	440	690	1,910	2,870	
Calcium	mg/L	NC	NA	NC	NC	500	40	500	32.9	32.9	31.7	33.6		30.3	29.1	43	110	122	112	
Chloride	mg/L	250**	NA	250	250	500	70	250	19.6	19.6	17.7	17.7		23.0	21.0	18	9.4	5.71	4.16	
Fluoride	ug/L	4,000	NA	NC	NC	NC	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	
Sulfate	mg/L	250**	NA	250	250	500	13	250	15.7	15.9	17.6	17.5		26.1	29.2	86	180	192	183	
Total Dissolved Solids	mg/L	500**	NA	500	500	500	240	500	188	174	230	154	-	180	150	280	550	654	542	
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5	6.5 - 8.5	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.6		7.5		8.5	8.1	9.1	8.8	8.4	8.0	7.6	
Appendix IV																				
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	1.1	1.2			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2	4	
Arsenic	ug/L	10	NA	10	10	10	1	10	18.2	17.5			16.8	15.0	32.2	36	44	31	25	
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	171	161			116	123	98.6	170	360	563	514	
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	
Cadmium	ug/L	5	NA	5.0	5.0	3.5	0.2	5	< 0.20	< 0.20			< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	0.2	
Chromium	ug/L	100	NA	100	100	11	2	100	< 1.0	< 1.0			< 1.0	< 1.0	< 1.0	9.0	1.4	1	< 1	
Cobalt	ug/L	NC	6	40	100	100	15	15	< 15.0	< 15.0			< 15.0	< 15.0	< 6.0	< 6.0	< 6.0	< 6	< 6	
Fluoride	ug/L	4,000	NA	NC	NC	NC	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	4.0	4.0	39	1	15	< 1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	
Lithium	ug/L	NC	40	170	350	0.20#	10	40	11	13			14	11	10	< 10	14	22	21	
Mercury	ug/L	2	NA	2.0	2.0	0.2	0.2	2	< 0.20	< 0.20			< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	
Molybdenum	ug/L	NC	100	73	210	3,200	5	100	13.0	13.0			8.2	8.2	9.3	21	11	12	7	
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA	0.291	< 0.707			< 0.702	< 0.463	< 0.512	0.0720	0.2980		0.242	
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.951	1.02			< 0.568	0.931	< 0.519	< 0.343	0.665		0.606	
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5	< 1.11	1.61			< 1.27	< 1.34	< 1.03	< 0.343	0.963		0.848	
Selenium	ug/L	50	NA	50	50	5.0	5	50	< 1.0	< 1.0			< 1.0	1.6	< 1.0	13	76	104	29	
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2	< 2.0	< 2.0			< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 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.

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

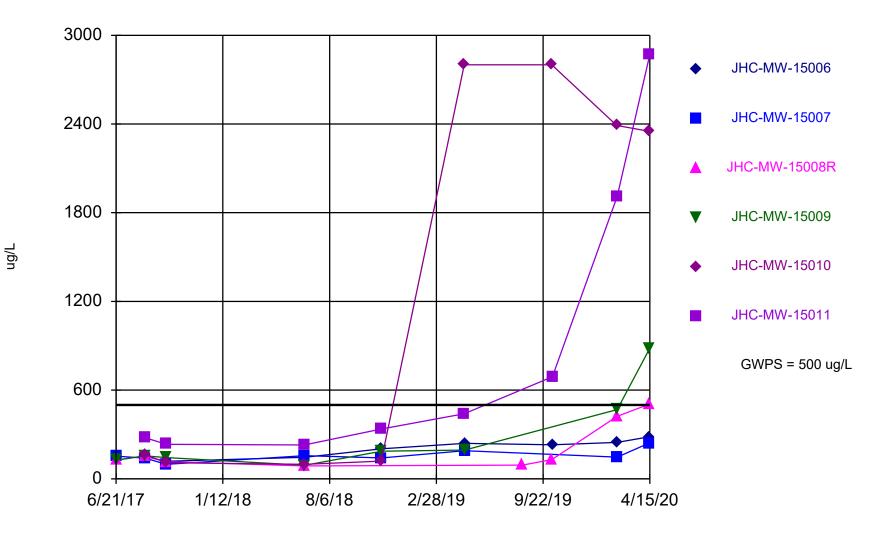
All metals were analyzed as total unless otherwise specified.

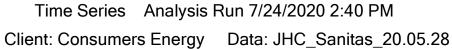
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(2) Not sampled; insufficient amount of groundwater present to collect sample.

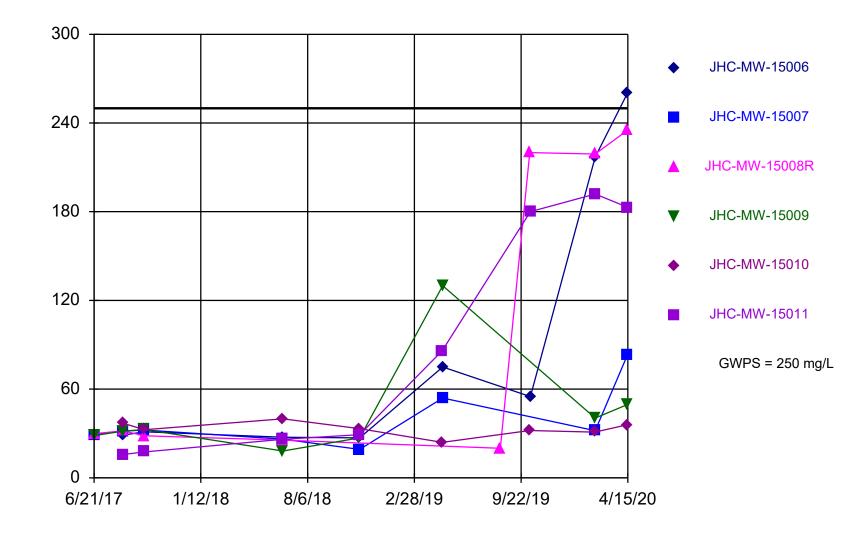
Attachment 1 Sanitas[™] Output

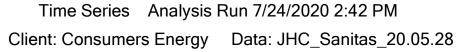
Boron, Total



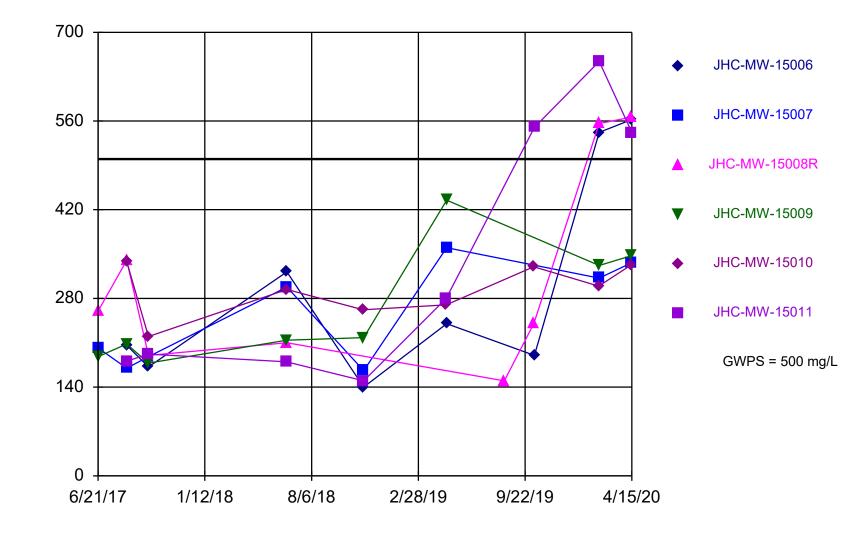


Sulfate

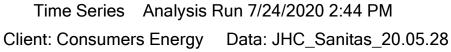




mg/L

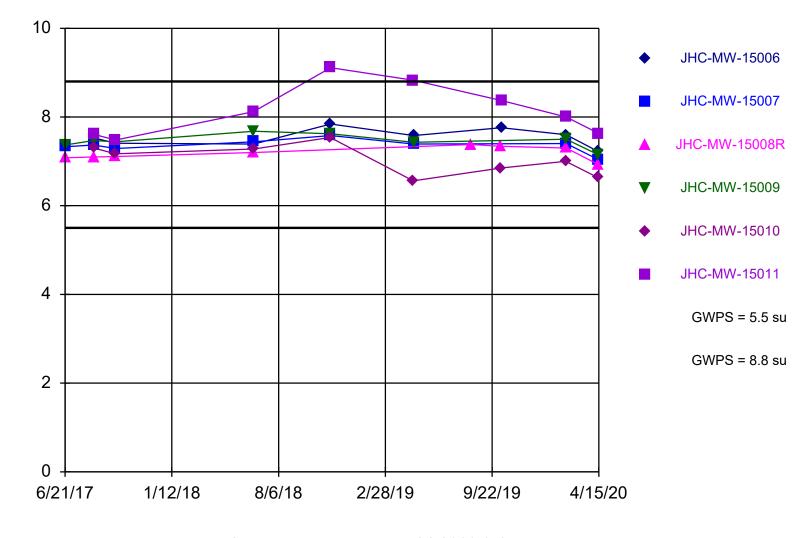


Total Dissolved Solids



mg/L

pH, Field

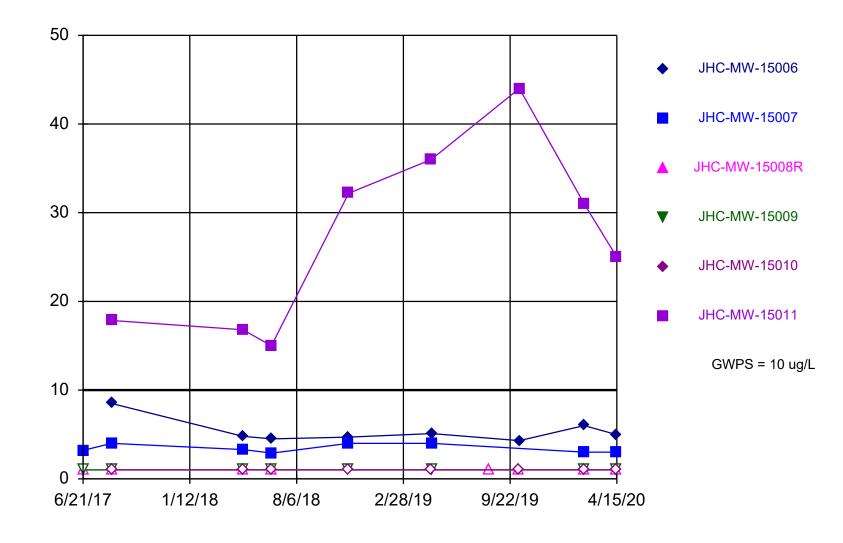


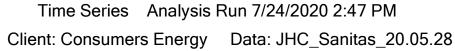
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su

Sanitas[™] v.9.6.26 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.

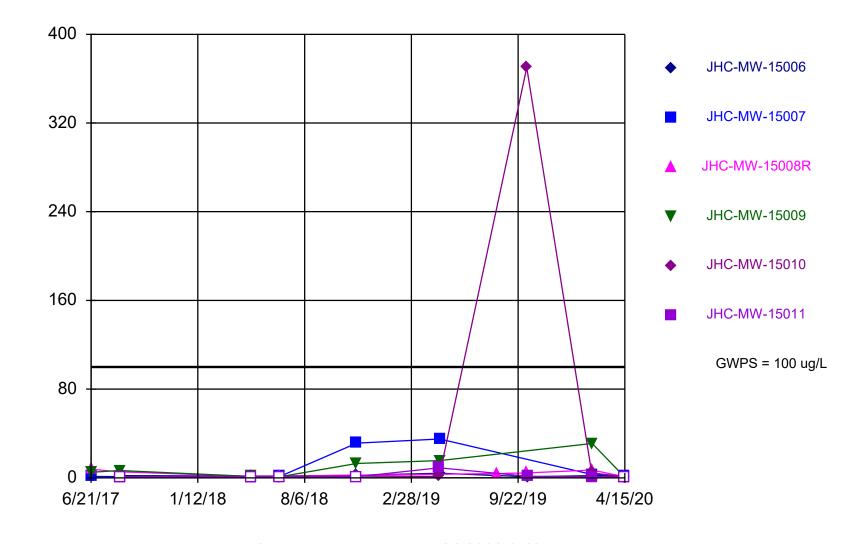
Arsenic, Total

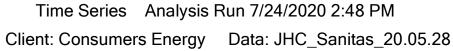




Sanitas[™] v.9.6.26 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.

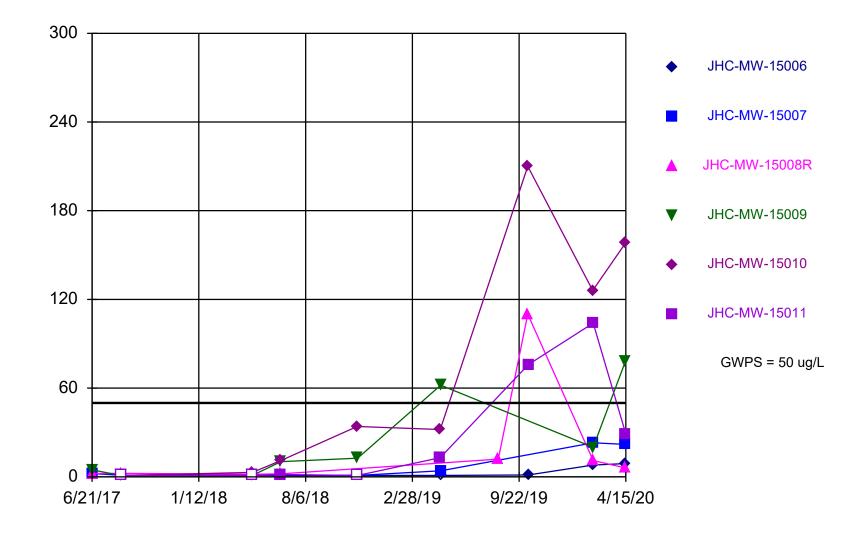


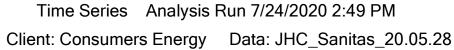


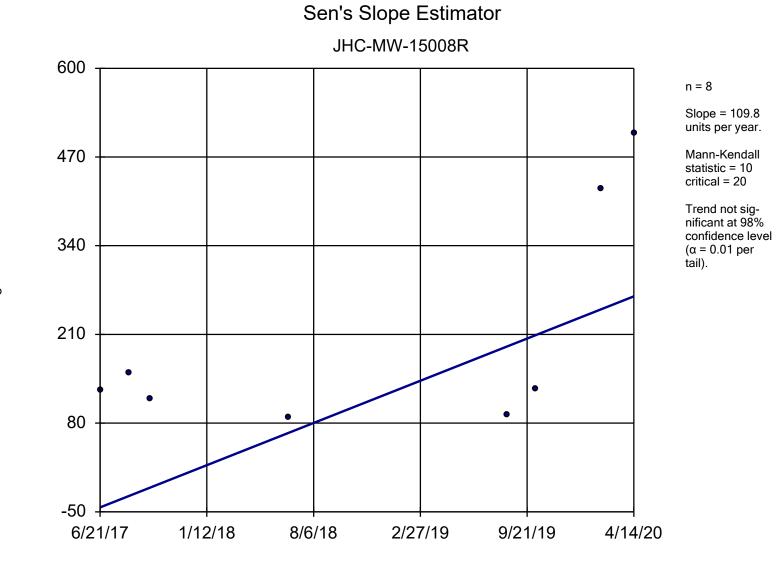


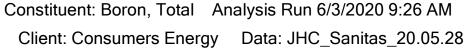
Sanitas[™] v.9.6.26 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.

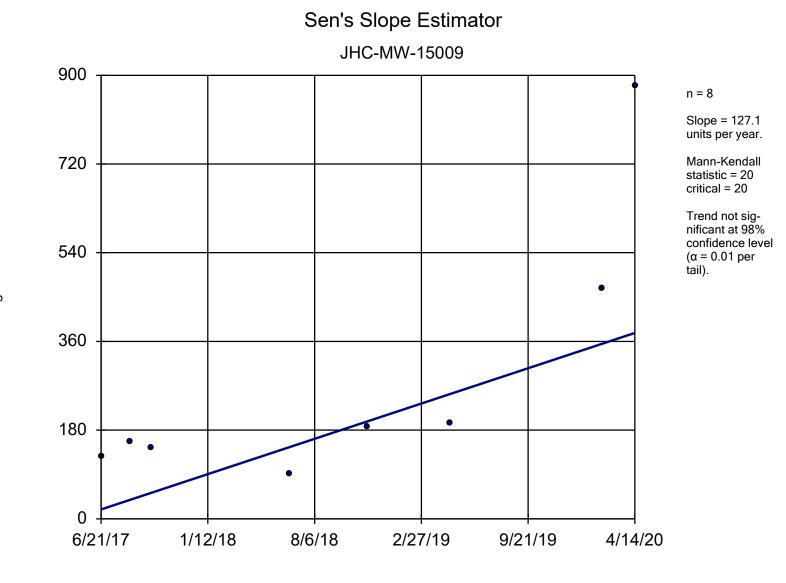


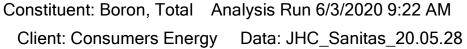


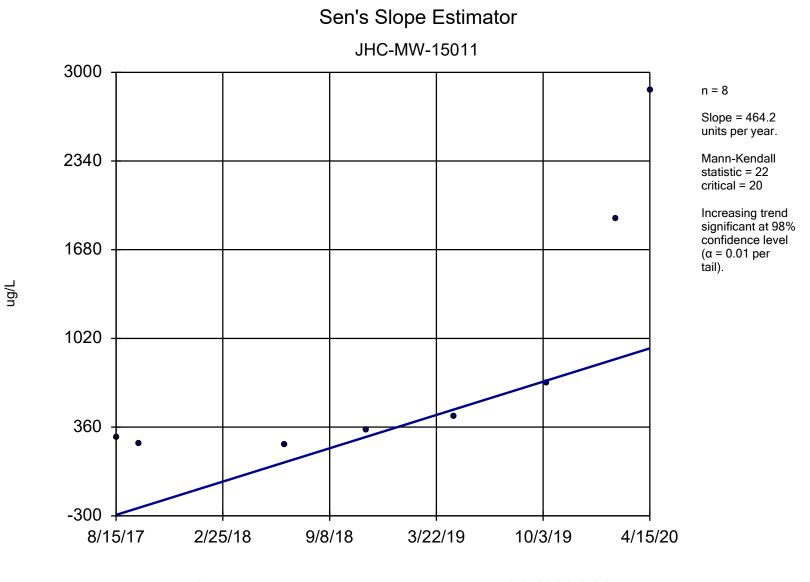




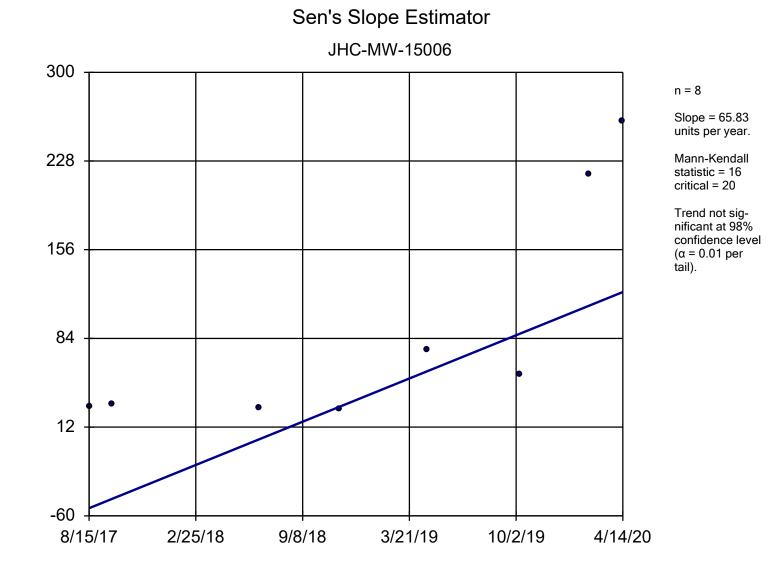








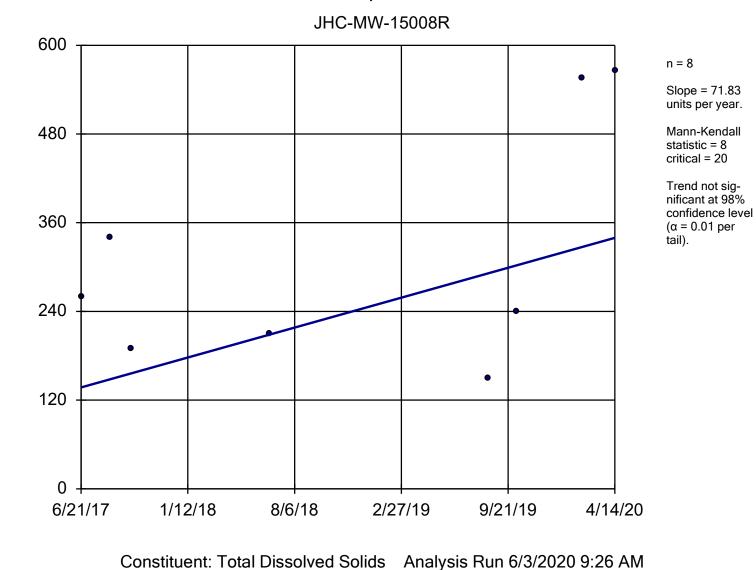
Constituent: Boron, Total Analysis Run 6/3/2020 9:21 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28



Constituent: Sulfate Analysis Run 6/3/2020 9:21 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

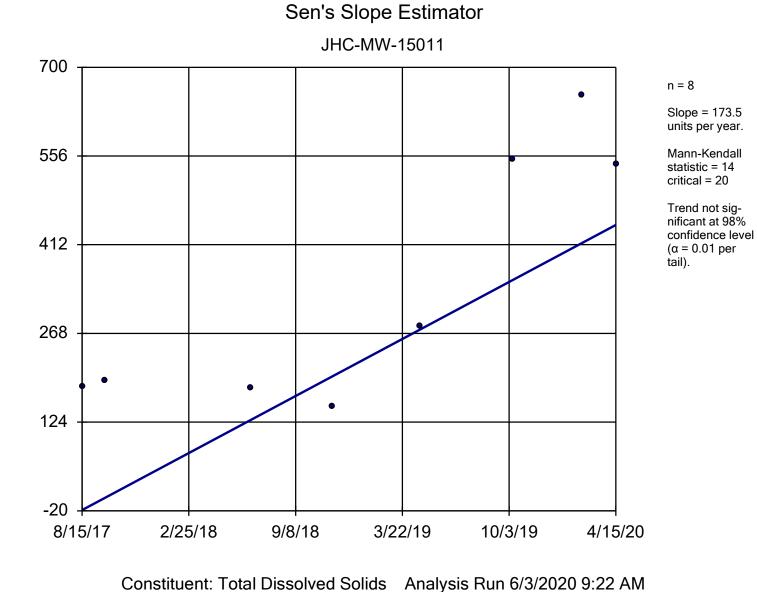
mg/L

mg/L



Client: Consumers Energy Data: JHC_Sanitas_20.05.28

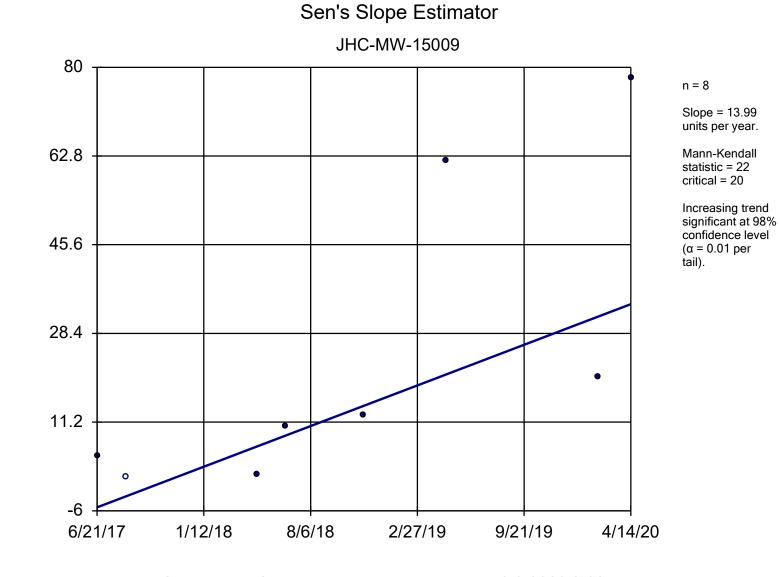
Sen's Slope Estimator



Client: Consumers Energy Data: JHC_Sanitas_20.05.28

mg/L

Sanitas[™] v.9.6.25 Sanitas software licensed to Consumers Energy. EPA Hollow symbols indicate censored values.

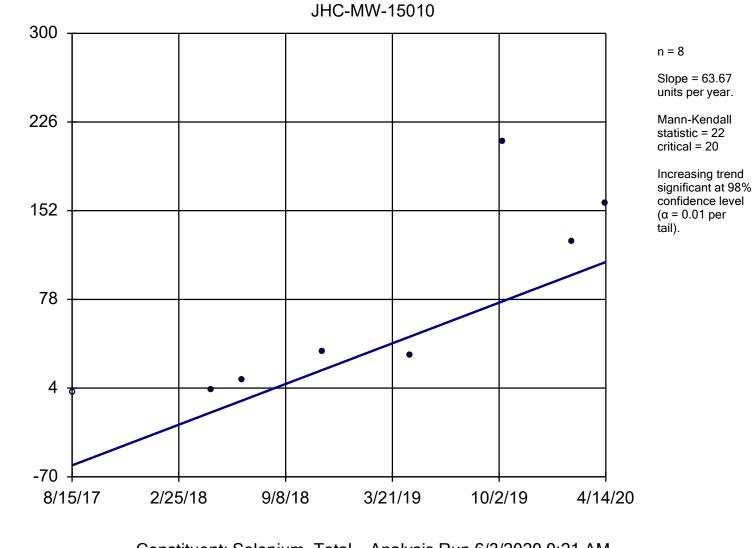


Constituent: Selenium, Total Analysis Run 6/3/2020 9:22 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

ng/L

Sanitas[™] v.9.6.25 Sanitas software licensed to Consumers Energy. EPA Hollow symbols indicate censored values.

Sen's Slope Estimator



Constituent: Selenium, Total Analysis Run 6/3/2020 9:21 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

ng/L

Constituent: Boron, Total Analysis Run 6/3/2020 9:17 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

For observations made between 6/21/2017 and 4/15/2020, a summary of the selected data set:

Observations = 48 ND/Trace = 0 Wells = 6 Minimum Value = 87.7 Maximum Value = 2870 Mean Value = 512.3 Median Value = 188.8 Standard Deviation = 791.6 Coefficient of Variation = 1.545 Skewness = 2.214

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	0	119	284	202.4	216.5	58.14	0.2872	-0.1528
JHC-MW-15007	8	0	98	242	158.8	150	42.03	0.2648	0.7633
JHC-MW-15008R	8	0	87.7	505	204.5	129	163	0.7973	1.161
JHC-MW-15009	8	0	91.4	877.5	280.7	171.8	267.6	0.9534	1.616
JHC-MW-15010	8	0	98.4	2800	1354	1257	1326	0.9796	0.04427
JHC-MW-15011	8	0	229	2870	873.7	388.5	981.8	1.124	1.305

Constituent: Sulfate Analysis Run 6/3/2020 9:17 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

For observations made between 6/21/2017 and 4/15/2020, a summary of the selected data set:

Observations = 48 ND/Trace = 0 Wells = 6 Minimum Value = 15.8 Maximum Value = 260 Mean Value = 66.49 Median Value = 31.95 Standard Deviation = 70.06 Coefficient of Variation = 1.054 Skewness = 1.626

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	<u>Skewness</u>
JHC-MW-15006	8	0	27	260	90.19	43.05	93.78	1.04	1.103
JHC-MW-15007	8	0	19.2	83	38.41	31.75	20.57	0.5355	1.437
JHC-MW-15008R	8	0	20	235	101.2	30.8	102.4	1.012	0.5197
JHC-MW-15009	8	0	18.2	130	44.76	32.15	35.67	0.7969	1.974
JHC-MW-15010	8	0	24	39.9	33.21	32.95	4.753	0.1431	-0.5969
JHC-MW-15011	8	0	15.8	192	91.21	57.6	80.79	0.8858	0.3344

Constituent: Total Dissolved Solids Analysis Run 6/3/2020 9:16 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

For observations made between 6/21/2017 and 4/15/2020, a summary of the selected data set:

Observations = 48 ND/Trace = 0 Wells = 6 Minimum Value = 140 Maximum Value = 654 Mean Value = 294 Median Value = 261 Standard Deviation = 133.2 Coefficient of Variation = 0.4529 Skewness = 1.136

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	0	140	562	296.8	223	166.5	0.5612	0.8429
JHC-MW-15007	8	0	166	360	254	250	80.29	0.3161	0.09455
JHC-MW-15008R	8	0	150	566	314	250	162.2	0.5166	0.7937
JHC-MW-15009	8	0	178	435	265.1	216	93.92	0.3543	0.7791
JHC-MW-15010	8	0	220	338	293.3	296.8	41.15	0.1403	-0.5172
JHC-MW-15011	8	0	150	654	341.1	236	205.6	0.6028	0.5099

Constituent: pH, Field Analysis Run 6/3/2020 9:15 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

For observations made between 6/21/2017 and 4/15/2020, a summary of the selected data set:

Observations = 48 ND/Trace = 0 Wells = 6 Minimum Value = 6.56 Maximum Value = 9.11 Mean Value = 7.453 Median Value = 7.395 Standard Deviation = 0.4613 Coefficient of Variation = 0.06189 Skewness = 1.419

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	<u>Skewness</u>
JHC-MW-15006	8	0	7.22	7.84	7.541	7.555	0.202	0.02678	-0.02751
JHC-MW-15007	8	0	7.04	7.58	7.355	7.38	0.1537	0.0209	-0.8159
JHC-MW-15008R	8	0	6.93	7.38	7.18	7.155	0.1532	0.02133	-0.1551
JHC-MW-15009	8	0	7.15	7.68	7.458	7.455	0.1609	0.02157	-0.5278
JHC-MW-15010	8	0	6.56	7.54	7.041	7.085	0.344	0.04885	-0.1161
JHC-MW-15011	8	0	7.48	9.11	8.144	8.06	0.5936	0.07289	0.4774

Constituent: Arsenic, Total Analysis Run 6/3/2020 9:15 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

For observations made between 6/21/2017 and 4/15/2020, a summary of the selected data set:

Observations = 48 ND/Trace = 24 Wells = 6 Minimum Value = 1 Maximum Value = 44 Mean Value = 6.503 Median Value = 1.95 Standard Deviation = 10.33 Coefficient of Variation = 1.588 Skewness = 2.25

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	0	4.3	8.5	5.363	4.9	1.367	0.2549	1.72
JHC-MW-15007	8	0	2.9	4	3.425	3.25	0.4921	0.1437	0.3316
JHC-MW-15008R	8	8	1	1	1	1	0	0	NaN
JHC-MW-15009	8	8	1	1	1	1	0	0	NaN
JHC-MW-15010	8	8	1	1	1	1	0	0	NaN
JHC-MW-15011	8	0	15	44	27.23	28	10.34	0.3797	0.2437

Constituent: Chromium, Total Analysis Run 6/3/2020 9:14 AM

Client: Consumers Energy Data: JHC_Sanitas_20.05.28

For observations made between 6/21/2017 and 4/15/2020, a summary of the selected data set:

Observations = 48 ND/Trace = 10 Wells = 6 Minimum Value = 1 Maximum Value = 370 Mean Value = 12.42 Median Value = 1.5 Standard Deviation = 53.29 Coefficient of Variation = 4.291 Skewness = 6.491

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	1	1	4.1	1.944	1.825	0.989	0.5088	1.307
JHC-MW-15007	8	1	1	35	9.475	1.6	14.66	1.547	1.164
JHC-MW-15008R	8	1	1	7.8	4.038	4.15	2.625	0.65	0.1436
JHC-MW-15009	8	1	1	31	9.294	5.8	10.35	1.114	1.206
JHC-MW-15010	8	1	1	370	47.71	1.3	130.2	2.729	2.267
JHC-MW-15011	8	5	1	9	2.05	1	2.812	1.372	2.257

Constituent: Selenium, Total Analysis Run 6/3/2020 9:14 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

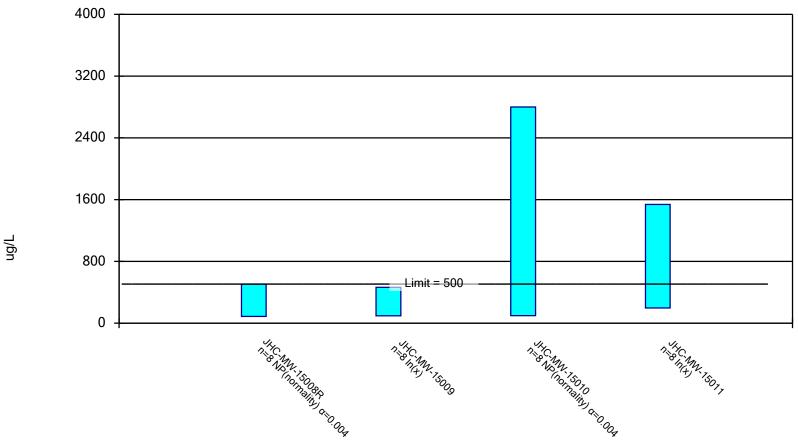
For observations made between 6/21/2017 and 4/15/2020, a summary of the selected data set:

Observations = 48 ND/Trace = 11 Wells = 6 Minimum Value = 1 Maximum Value = 210 Mean Value = 25.38 Median Value = 4.4 Standard Deviation = 45.71 Coefficient of Variation = 1.801 Skewness = 2.408

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	<u>Median</u>	Std.Dev.	CV	Skewness
JHC-MW-15006	8	4	1	9	2.95	1.15	3.438	1.166	1.171
JHC-MW-15007	8	2	1	23	6.963	1.75	9.649	1.386	1.12
JHC-MW-15008R	8	0	1.7	110	18.43	4.2	37.23	2.021	2.213
JHC-MW-15009	8	1	1	78	23.7	11.45	29.58	1.248	1.076
JHC-MW-15010	8	1	1	210	71.89	33.05	80.99	1.127	0.6915
JHC-MW-15011	8	3	1	104	28.33	7.3	39.98	1.411	1.094

Parametric and Non-Parametric (NP) Confidence Interval

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



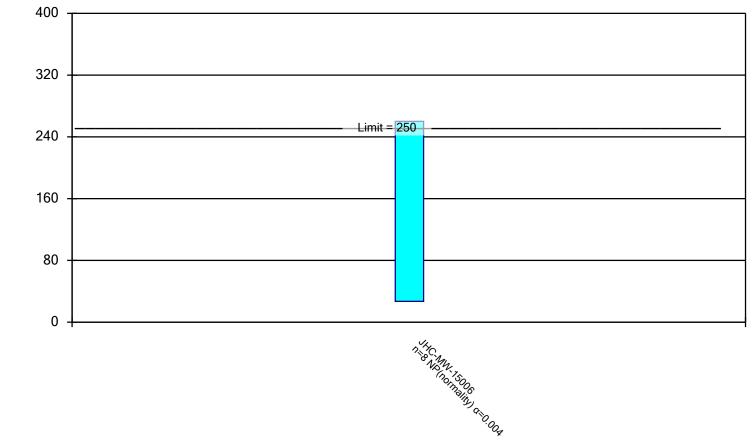
Constituent: Boron, Total Analysis Run 6/3/2020 9:34 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

Constituent: Boron, Total (ug/L) Analysis Run 6/3/2020 9:34 AM

	JHC-MW-15008R	JHC-MW-15009	JHC-MW-15010	JHC-MW-15011
6/21/2017	128	126		
8/15/2017	153	156	164	279.5 (D)
9/26/2017	116	144	109	234 (D)
6/19/2018				229
6/20/2018	87.7	91.4	98.4	
11/14/2018			120	
11/15/2018		187.5 (D)		337
4/23/2019			2800	440
4/24/2019		195 (D)		
8/13/2019	93			
10/9/2019	130 (D)		2800	
10/10/2019				690
2/11/2020			2390 (D)	
2/12/2020	423	468		1910
4/14/2020	505	877.5 (D)	2350	
4/15/2020				2870
Mean	204.5	280.7	1354	873.7
Std. Dev.	163	267.6	1326	981.8
Upper Lim.	505	464.3	2800	1537
Lower Lim.	87.7	95.62	98.4	196.9

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Sulfate Analysis Run 6/3/2020 9:38 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

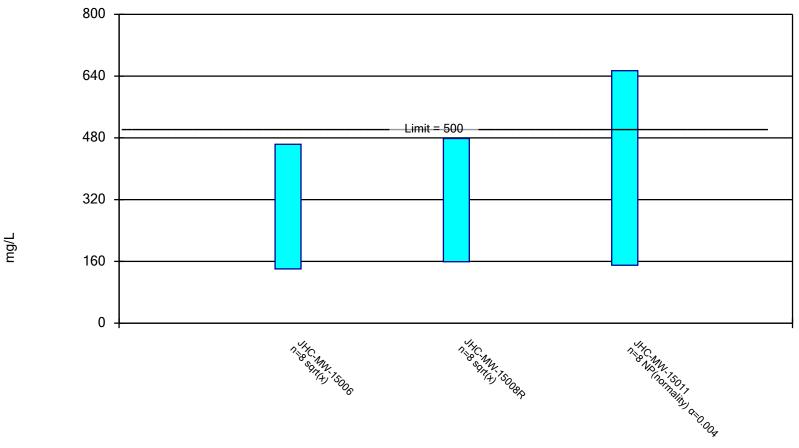
mg/L

Constituent: Sulfate (mg/L) Analysis Run 6/3/2020 9:38 AM

8/15/2017 28.9 9/26/2017 31.1 6/20/2018 27.5 (D) 11/15/2018 27 4/24/2019 75 10/10/2019 55 2/12/2020 217 4/14/2020 260 Mean 90.19 Std. Dev. 93.78 Upper Lim. 260		JHC-MW-15006
6/20/201827.5 (D)11/15/2018274/24/20197510/10/2019552/12/20202174/14/2020260Mean90.19Std. Dev.93.78Upper Lim.260	8/15/2017	28.9
11/15/2018274/24/20197510/10/2019552/12/20202174/14/2020260Mean90.19Std. Dev.93.78Upper Lim.260	9/26/2017	31.1
4/24/20197510/10/2019552/12/20202174/14/2020260Mean90.19Std. Dev.93.78Upper Lim.260	6/20/2018	27.5 (D)
10/10/2019552/12/20202174/14/2020260Mean90.19Std. Dev.93.78Upper Lim.260	11/15/2018	27
2/12/2020 217 4/14/2020 260 Mean 90.19 Std. Dev. 93.78 Upper Lim. 260	4/24/2019	75
4/14/2020 260 Mean 90.19 Std. Dev. 93.78 Upper Lim. 260	10/10/2019	55
Mean 90.19 Std. Dev. 93.78 Upper Lim. 260	2/12/2020	217
Std. Dev. 93.78 Upper Lim. 260	4/14/2020	260
Upper Lim. 260	Mean	90.19
	Std. Dev.	93.78
lowerlim 27	Upper Lim.	260
	Lower Lim.	27

Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Total Dissolved Solids Analysis Run 6/3/2020 9:36 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

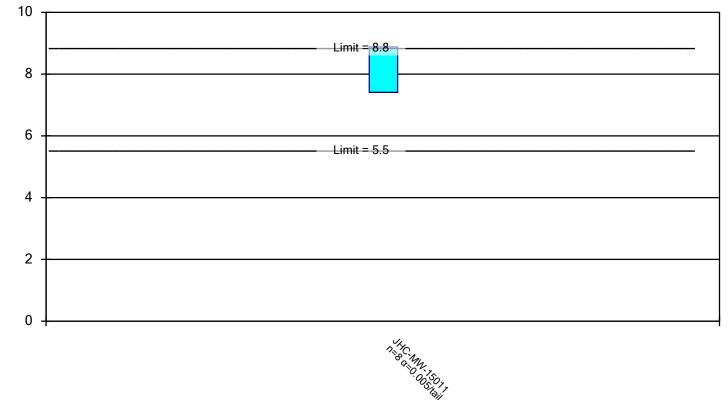
Constituent: Total Dissolved Solids (mg/L) Analysis Run 6/3/2020 9:37 AM

	JHC-MW-15006	JHC-MW-15008R	JHC-MW-15011
6/21/2017		260	
8/15/2017	206	340	181 (D)
9/26/2017	172	190	192 (D)
6/19/2018			180
6/20/2018	322 (D)	210	
11/15/2018	140		150
4/23/2019			280
4/24/2019	240		
8/13/2019		150	
10/9/2019		240 (D)	
10/10/2019	190		550
2/12/2020	542	556	654
4/14/2020	562	566	
4/15/2020			542
Mean	296.8	314	341.1
Std. Dev.	166.5	162.2	205.6
Upper Lim.	463.5	478.2	654
Lower Lim.	140.4	159.2	150

su

Parametric Confidence Interval

Compliance Limit is not exceeded. Normality Test: Shapiro Wilk, alpha based on n.



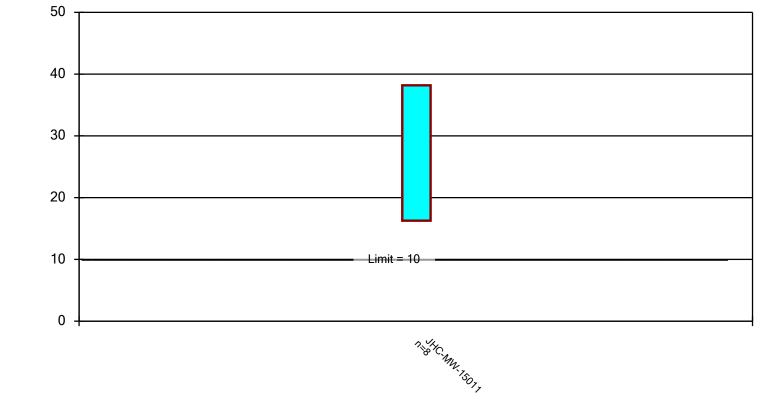
Constituent: pH, Field Analysis Run 6/3/2020 9:39 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

Constituent: pH, Field (su) Analysis Run 6/3/2020 9:39 AM

8/15/2017 7.61 9/26/2017 7.48 6/19/2018 8.12 11/15/2018 9.11
6/19/2018 8.12
11/15/2018 9.11
4/23/2019 8.83
10/10/2019 8.37
2/12/2020 8
4/15/2020 7.63
Mean 8.144
Std. Dev. 0.593
Upper Lim. 8.878
Lower Lim. 7.409

Parametric Confidence Interval

Compliance limit is exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Arsenic, Total Analysis Run 6/3/2020 9:39 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

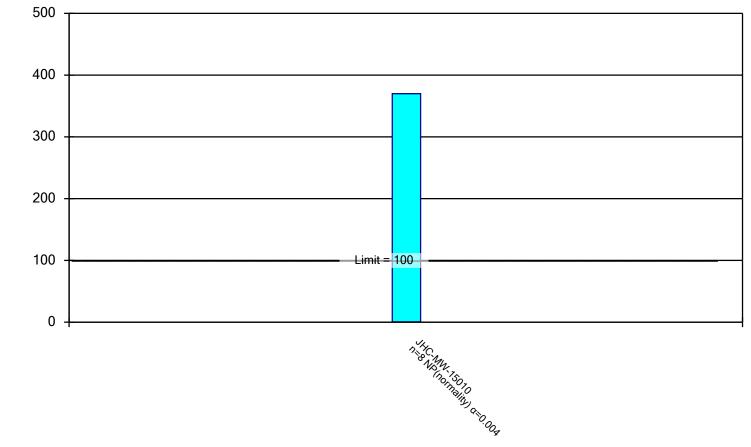
ng/L

Constituent: Arsenic, Total (ug/L) Analysis Run 6/3/2020 9:40 AM

	JHC-MW-15011
8/15/2017	17.85 (D)
4/25/2018	16.8
6/19/2018	15
11/15/2018	32.2
4/23/2019	36
10/10/2019	44
2/12/2020	31
4/15/2020	25
Mean	27.23
Std. Dev.	10.34
Upper Lim.	38.19
Lower Lim.	16.27

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Chromium, Total Analysis Run 6/3/2020 9:40 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

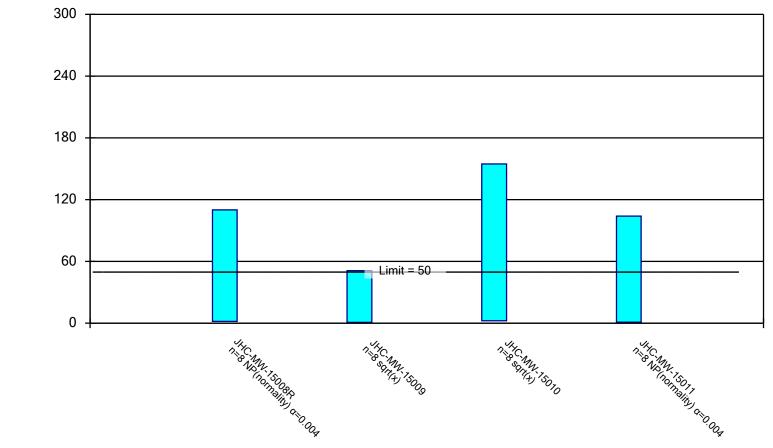
ng/L

Constituent: Chromium, Total (ug/L) Analysis Run 6/3/2020 9:41 AM

8/15/2017 <1 4/26/2018 1.4 6/20/2018 1.1 11/14/2018 1.5 4/23/2019 1.2 10/9/2019 370
6/20/2018 1.1 11/14/2018 1.5 4/23/2019 1.2
11/14/20181.54/23/20191.2
4/23/2019 1.2
10/9/2019 370
2/11/2020 4.5 (D)
4/14/2020 1
Mean 47.65
Std. Dev. 130.3
Upper Lim. 370
Lower Lim. 0.5

Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Selenium, Total Analysis Run 6/3/2020 9:42 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28

ng/L

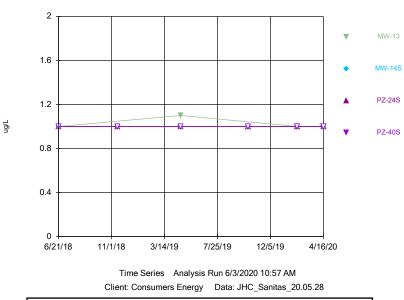
Constituent: Selenium, Total (ug/L) Analysis Run 6/3/2020 9:43 AM

	JHC-MW-15008R	JHC-MW-15009	JHC-MW-15010	JHC-MW-15011
6/21/2017	2.3	4.7		
8/15/2017	2.4	<1	<1	<1 (D)
4/25/2018				<1
4/26/2018	1.7	0.75 (D)	3	
6/19/2018				1.6
6/20/2018	2	10.3	11	
11/14/2018			34.1	
11/15/2018		12.6 (D)		<1
4/23/2019			32	13
4/24/2019		62 (D)		
8/13/2019	12			
10/9/2019	110 (D)		210	
10/10/2019				76
2/11/2020			126 (D)	
2/12/2020	11	20		104
4/14/2020	6	78 (D)	158	
4/15/2020				29
Mean	18.43	23.67	71.89	28.33
Std. Dev.	37.23	29.6	80.99	39.98
Upper Lim.	110	50.98	154.6	104
Lower Lim.	1.7	0.7268	2.32	1



Appendix C GSI Time Series Charts

Sanitas[™] v.9.6.25 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.

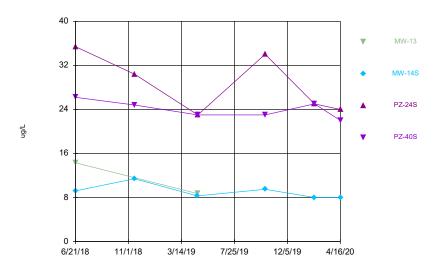


Antimony, Total

Insufficient amount of groundwater present in February and April 2020 to collect sample for total metals for MW-13. Reported February and April 2020 result is dissolved antimony result collected in accordance with the JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP).

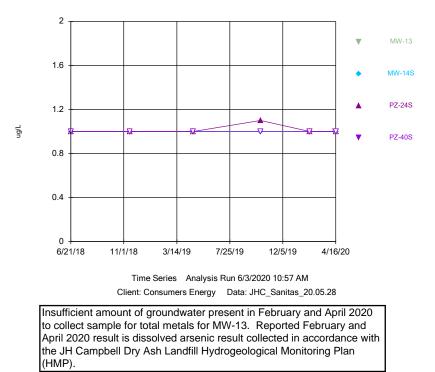
Sanitas™ v.9.6.25 Sanitas software licensed to Consumers Energy. UG





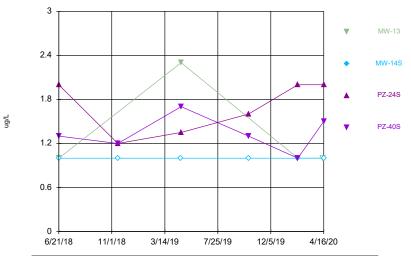
Time Series Analysis Run 6/3/2020 10:57 AM Client: Consumers Energy Data: JHC_Sanitas_20.05.28 Sanitas[™] v.9.6.25 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.





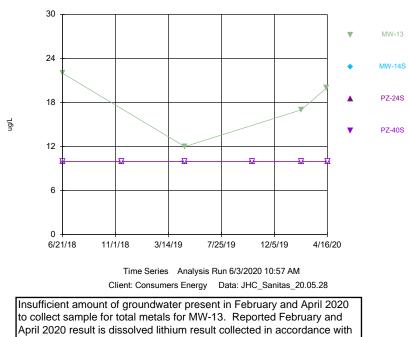
Sanitas[™] v.9.6.25 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.

Chromium, Total



Insufficient amount of groundwater present in February and April 2020 to collect sample for total metals for MW-13. Reported February and April 2020 result is dissolved chromium result collected in accordance with the JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP).

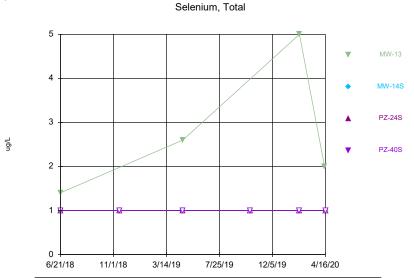
Sanitas¹¹⁴ v.9.6.25 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.



Lithium, Total

April 2020 result is dissolved lithium result collected in accordance with the JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP).

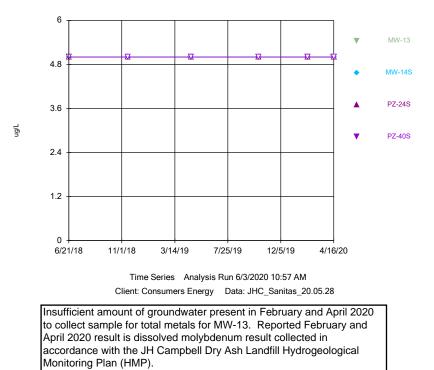
Sanitas[™] v.9.6.25 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.



Insufficient amount of groundwater present in February and April 2020 to collect sample for total metals for MW-13. Reported February and April 2020 result is dissolved selenium result collected in accordance with the JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP).

Sanitas[™] v.9.6.25 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.

Molybdenum, Total





Appendix D April 2020 Laboratory Reports



135 W. Trail St. Jackson, MI 49201

- To: KDStarken, JH Campbell Complex
- From: EBlaj, T-258
- Date: May 05, 2020
- Subject: JH CAMPBELL SOLID WASTE DISPOSAL AREA GROUNDWATER MONITORING 2nd Quarter, 2020 Background Wells
 - CC: BLSwanberg, P22-119 BTRunkel, P22-120 HDRegister, P22-521

Sarah Holmstrom, Project Manager TRC Companies, Inc. 1540 Eisenhower Place Ann Arbor, MI 48108

Chemistry Project: 20-0395

CE Laboratory Services conducted groundwater monitoring on 04/13/2020 through 04/16/2020 at the JH Campbell Solid Waste Disposal Area, for the 2nd Quarter monitoring requirements. The samples were received in the Chemistry department on 04/17/2020.

Samples for Radium analysis have been subcontracted to Eurofins/TestAmerica, Inc. and their results are being reported separately. Samples for Total Sulfide have been subcontracted to Merit Laboratories, Inc. The results are listed under the analyst initials "Merit" and the original report is attached. Please note that the subcontracted work is not reported under the CE laboratory scope of accreditation.

With the exception noted above, the report that follows presents the results of the requested analytical testing; the results apply only to the samples, as received. All samples have been analyzed in accordance with the 2009 TNI Standard and the applicable A2LA accreditation scope for Laboratory Services. Any exceptions to applicable test method criteria and standard compliance are noted in the Case Narrative, or flagged with applicable qualifiers in the analytical results section.

Reviewed and approved by:

Emil Blaj Sr. Technical Analyst Project Lead



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

CASE NARRATIVE

I. Sample Receipt

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

II. Methodology

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

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

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

NOTE: Due to matrix interference / possible carry over effects the reporting limit for Silver has been increased for sample 20-0395-01; the results have been flagged (K).

DEFINITIONS / QUALIFIERS

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

<u>Acronym</u>	<u>Description</u>
RL	Reporting Limit
ND	Result not detected or below Reporting Limit
NT	Not a TNI Analyte
LCS	Laboratory Control Sample
LRB	Laboratory Reagent Blank (also referred to as Method Blank)
DUP	Duplicate
MS	Matrix Spike
MSD	Matrix Spike Duplicate
RPD	Relative Percent Difference

- MDL Method Detection Limit
- PQL Practical Quantitation Limit

NOTE: Sample temperature measured upon receipt was found above the recommended range of 0-6°C. During the time samples were kept on the bench they warmed up to 6.1-8.2°C.

TDLTarget Detection LimitSMStandard Methods Compendium

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



Customer Name:JH Campbell ComplexWork Order ID:Background WellsDate Received:4/17/2020Chemistry Project:20-0395

Sample #	Field Sample ID	<u>Matrix</u>	Sample Date	Site
20-0395-01	JHC-MW-15024	Groundwater	04/16/2020 10:44 AM	JHC RCRA GW Monitoring - Background Wells
20-0395-02	JHC-MW-15025	Groundwater	04/16/2020 11:58 AM	JHC RCRA GW Monitoring - Background Wells
20-0395-03	JHC-MW-15027	Groundwater	04/16/2020 02:35 PM	JHC RCRA GW Monitoring - Background Wells
20-0395-04	JHC-MW-15023	Groundwater	04/16/2020 09:29 AM	JHC RCRA GW Monitoring - Background Wells
20-0395-05	JHC-MW-15026	Groundwater	04/16/2020 01:16 PM	JHC RCRA GW Monitoring - Background Wells
20-0395-06	JHC-MW-15028	Groundwater	04/16/2020 02:30 PM	JHC RCRA GW Monitoring - Background Wells
20-0395-07	DUP-03	Groundwater	04/16/2020 12:00 AM	JHC RCRA GW Monitoring - Background Wells
20-0395-08	EB-03	Groundwater	04/16/2020 02:46 PM	JHC RCRA GW Monitoring - Background Wells
20-0395-09	FB-03	Groundwater	04/16/2020 10:30 AM	JHC RCRA GW Monitoring - Background Wells
20-0395-10	JHC-MW-15025 Field MS	Water	04/16/2020 11:58 AM	JHC RCRA GW Monitoring - Background Wells
20-0395-11	JHC-MW-15025 Field MSD	Water	04/16/2020 11:58 AM	JHC RCRA GW Monitoring - Background Wells



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-0395
Field Sample ID:	JHC-MW-15024	Collect Date:	04/16/2020
Lab Sample ID:	20-0395-01	Collect Time:	10:44 AM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous					20-0395-01-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/21/2020	AB20-0421-01
Metals by EPA 6020B: CCR Rule Ap	pendix III-IV To	tal Metals	Expand	Aliquot:	20-0395-01-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	ND		ug/L	1	04/27/2020	AB20-0427-04
Barium	18		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	22		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	32800		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	ND		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	6	04/27/2020	AB20-0427-04
Copper	ND		ug/L	1	04/27/2020	AB20-0427-04
Iron	182		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	ND		ug/L	10	04/27/2020	AB20-0427-04
Magnesium	9630		ug/L	1000	04/28/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	2	04/27/2020	AB20-0427-04
Potassium	1010		ug/L	100	04/28/2020	AB20-0427-04
Selenium	ND		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND	К	ug/L	0.3	04/27/2020	AB20-0427-04
Sodium	15700		ug/L	1000	04/28/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	ND		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 Aqueous, NO2, NO3				20-0395-01-C03-A01	Analyst: DMW
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking #
Nitrate	750	ug/L	100	04/17/2020	AB20-0420-06
Nitrite	ND	ug/L	100	04/17/2020	AB20-0420-06

Anions by EPA 300.0 CCR	Rule Analyte List, Cl, F, S	O4, Aqu	eous	Aliquot:	20-0395-01-C03-A02	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	20100		ug/L	1000	04/22/2020	AB20-0422-05
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Sulfate	6260		ug/L	2000	04/22/2020	AB20-0422-05



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-0395
Field Sample ID:	JHC-MW-15024	Collect Date:	04/16/2020
Lab Sample ID:	20-0395-01	Collect Time:	10:44 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C				Aliquot:	20-0395-01-C04-A01	Analyst: DLR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	158		mg/L	10	04/21/2020	AB20-0423-03
Alkalinity by SM 2320B				Aliquot:	20-0395-01-C07-A01	Analyst: BEK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	107000		ug/L	10000	04/17/2020	AB20-0423-15
Alkalinity bicarbonate	107000		ug/L	10000	04/17/2020	AB20-0423-15
Alkalinity carbonate	ND		ug/L	10000	04/17/2020	AB20-0423-15
Nitrogen-Ammonia by SM4500NH3(h	n), Groundwate	r HL		Aliquot:	20-0395-01-C09-A01	Analyst: BEK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Ammonia	ND		ug/L	25	04/21/2020	AB20-0421-16
Sulfide, Total by SM 4500 S2D				Aliquot:	20-0395-01-C10-A01	Analyst: Merit
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Sulfide	ND		ug/L	40	04/20/2020	AB20-0429-12



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-0395
Field Sample ID:	JHC-MW-15025	Collect Date:	04/16/2020
Lab Sample ID:	20-0395-02	Collect Time:	11:58 AM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous			Aliquot: 20-0395-02-C02-A01		Analyst: TMR	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/21/2020	AB20-0421-01
Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Expand			Aliquot: 2	20-0395-02-C02-A02	Analyst: SLK	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	ND		ug/L	1	04/27/2020	AB20-0427-04
Barium	20		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	26		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	16100		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	ND		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	6	04/27/2020	AB20-0427-04
Copper	ND		ug/L	1	04/27/2020	AB20-0427-04
Iron	33		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	ND		ug/L	10	04/27/2020	AB20-0427-04
Magnesium	4510		ug/L	1000	04/28/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	2	04/27/2020	AB20-0427-04
Potassium	751		ug/L	100	04/28/2020	AB20-0427-04
Selenium	ND		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Sodium	12900		ug/L	1000	04/28/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	ND		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 Aqueous, NO2, NO3			Aliquot: 20-0395-02-C03-A01		Analyst: DMW
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking #
Nitrate	930	ug/L	100	04/17/2020	AB20-0420-06
Nitrite	ND	ug/L	100	04/17/2020	AB20-0420-06

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous			Aliquot: 20-0395-02-C03-A02		Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	15800		ug/L	1000	04/22/2020	AB20-0422-05
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Sulfate	8630		ug/L	2000	04/22/2020	AB20-0422-05



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-0395
Field Sample ID:	JHC-MW-15025	Collect Date:	04/16/2020
Lab Sample ID:	20-0395-02	Collect Time:	11:58 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C			Aliquot: 20-0395-02-C04-A01		Analyst: DLR	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	98		mg/L	10	04/21/2020	AB20-0423-03
Alkalinity by SM 2320B				Aliquot: 2	Analyst: BEK	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	45900		ug/L	10000	04/17/2020	AB20-0423-15
Alkalinity bicarbonate	45900		ug/L	10000	04/17/2020	AB20-0423-15
Alkalinity carbonate	ND		ug/L	10000	04/17/2020	AB20-0423-15
Nitrogen-Ammonia by SM4500NH3(h), Groundwater HL			Aliquot: 20-0395-02-C09-A01		Analyst: BEK	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Ammonia	ND		ug/L	25	04/21/2020	AB20-0421-16
Sulfide, Total by SM 4500 S2D			Aliquot: 20-0395-02-C10-A01		Analyst: Merit	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Sulfide	ND		ug/L	40	04/20/2020	AB20-0429-12



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-0395
Field Sample ID:	JHC-MW-15027	Collect Date:	04/16/2020
Lab Sample ID:	20-0395-03	Collect Time:	02:35 PM
Matrix:	Groundwater		

Total Mercury by EPA 74	70A, Aqueous			Aliquot: 2	20-0395-03-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/21/2020	AB20-0421-01
Metals by EPA 6020B: C	CR Rule Appendix III-IV Tota	al Metals	Expand	Aliquot: 2	20-0395-03-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	ND		ug/L	1	04/27/2020	AB20-0427-04
Barium	25		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	ND		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	7780		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	ND		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	6	04/27/2020	AB20-0427-04
Copper	ND		ug/L	1	04/27/2020	AB20-0427-04
Iron	33		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	ND		ug/L	10	04/27/2020	AB20-0427-04
Magnesium	1860		ug/L	1000	04/28/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	2	04/27/2020	AB20-0427-04
Potassium	264		ug/L	100	04/28/2020	AB20-0427-04
Selenium	ND		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Sodium	2200		ug/L	1000	04/28/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	ND		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 Aqueous, NO2, NO3			Aliquot: 20-0395-03-C03-A01		Analyst: DMW
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking #
Nitrate	ND	ug/L	100	04/17/2020	AB20-0420-06
Nitrite	ND	ug/L	100	04/17/2020	AB20-0420-06

Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous			Aliquot: 20-0395-03-C03-A02		Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Sulfate	7860		ug/L	2000	04/22/2020	AB20-0422-05



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-0395
Field Sample ID:	JHC-MW-15027	Collect Date:	04/16/2020
Lab Sample ID:	20-0395-03	Collect Time:	02:35 PM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C				Aliquot: 20-0395-03-C04-A01		Analyst: DLR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	37		mg/L	10	04/21/2020	AB20-0423-03
Alkalinity by SM 2320B				Aliquot: 2	20-0395-03-C07-A01	Analyst: BEK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	21400		ug/L	10000	04/17/2020	AB20-0423-15
Alkalinity bicarbonate	21400		ug/L	10000	04/17/2020	AB20-0423-15
Alkalinity carbonate	ND		ug/L	10000	04/17/2020	AB20-0423-15
Nitrogen-Ammonia by SM4500NH3(h), Groundwate	er HL		Aliquot: 2	20-0395-03-C09-A01	Analyst: BEK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Ammonia	ND		ug/L	25	04/21/2020	AB20-0421-16
Sulfide, Total by SM 4500 S2D				Aliquot: 2	20-0395-03-C10-A01	Analyst: Merit
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Sulfide	ND		ug/L	40	04/20/2020	AB20-0429-12



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-0395
Field Sample ID:	JHC-MW-15023	Collect Date:	04/16/2020
Lab Sample ID:	20-0395-04	Collect Time:	09:29 AM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous					20-0395-04-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/21/2020	AB20-0421-01
Metals by EPA 6020B: HM	P-AMP Detection & Asses	ssment M	onitorin	Aliquot:	20-0395-04-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	ND		ug/L	1	04/27/2020	AB20-0427-04
Barium	20		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	45		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	9590		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	ND		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	15	04/27/2020	AB20-0427-04
Copper	ND		ug/L	1	04/27/2020	AB20-0427-04
Iron	38		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	ND		ug/L	10	04/27/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	1	04/27/2020	AB20-0427-04
Selenium	ND		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	ND		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous				Aliquot: 20-0395-04-C03-A01		Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	1840		ug/L	1000	04/22/2020	AB20-0422-05
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Sulfate	9750		ug/L	2000	04/22/2020	AB20-0422-05
Total Dissolved Solids by SM 25400	>			Aliquot:	20-0395-04-C04-A01	Analyst: DLR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	56		mg/L	10	04/21/2020	AB20-0423-03



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-0395
Field Sample ID:	JHC-MW-15026	Collect Date:	04/16/2020
Lab Sample ID:	20-0395-05	Collect Time:	01:16 PM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous					20-0395-05-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/21/2020	AB20-0421-01
Metals by EPA 6020B: HM	P-AMP Detection & Asses	sment M	onitorin	Aliquot:	20-0395-05-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	ND		ug/L	1	04/27/2020	AB20-0427-04
Barium	15		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	ND		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	16600		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	ND		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	15	04/27/2020	AB20-0427-04
Copper	ND		ug/L	1	04/27/2020	AB20-0427-04
Iron	25		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	ND		ug/L	10	04/27/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	1	04/27/2020	AB20-0427-04
Selenium	ND		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	ND		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous				Aliquot: 20-0395-05-C03-A01		Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	7210		ug/L	1000	04/22/2020	AB20-0422-05
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Sulfate	6940		ug/L	2000	04/22/2020	AB20-0422-05
Total Dissolved Solids by SM 2540C				Aliquot:	20-0395-05-C04-A01	Analyst: DLR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	76		mg/L	10	04/21/2020	AB20-0423-03



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-0395
Field Sample ID:	JHC-MW-15028	Collect Date:	04/16/2020
Lab Sample ID:	20-0395-06	Collect Time:	02:30 PM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous				Aliquot:	Aliquot: 20-0395-06-C02-A01	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/21/2020	AB20-0421-01
Metals by EPA 6020B: HMF	P-AMP Detection & Asse	ssment M	onitorin	Aliquot:	20-0395-06-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	ND		ug/L	1	04/27/2020	AB20-0427-04
Barium	14		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	ND		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	11100		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	ND		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	15	04/27/2020	AB20-0427-04
Copper	ND		ug/L	1	04/27/2020	AB20-0427-04
Iron	29		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	ND		ug/L	10	04/27/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	1	04/27/2020	AB20-0427-04
Selenium	ND		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	ND		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous					Aliquot: 20-0395-06-C03-A01	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Sulfate	5220		ug/L	2000	04/22/2020	AB20-0422-05
Total Dissolved Solids by SM 2540	DC			Aliquot:	20-0395-06-C04-A01	Analyst: DLR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	42		mg/L	10	04/21/2020	AB20-0423-03



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-0395
Field Sample ID:	DUP-03	Collect Date:	04/16/2020
Lab Sample ID:	20-0395-07	Collect Time:	12:00 AM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous			Aliquot: 20-0395-07-C02-A01		Analyst: TMR	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/21/2020	AB20-0421-01
Metals by EPA 6020B: HMP-A	MP Detection & Asse	essment M	onitorin	Aliquot:	20-0395-07-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	ND		ug/L	1	04/27/2020	AB20-0427-04
Barium	17		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	41		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	8930		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	ND		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	15	04/27/2020	AB20-0427-04
Copper	ND		ug/L	1	04/27/2020	AB20-0427-04
Iron	41		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	ND		ug/L	10	04/27/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	1	04/27/2020	AB20-0427-04
Selenium	ND		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	ND		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous					Aliquot: 20-0395-07-C03-A01	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	2090		ug/L	1000	04/22/2020	AB20-0422-05
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Sulfate	10000		ug/L	2000	04/22/2020	AB20-0422-05
Total Dissolved Solids by SM 254	10C			Aliquot:	20-0395-07-C04-A01	Analyst: DLR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	49		mg/L	10	04/21/2020	AB20-0423-03



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-0395
Field Sample ID:	EB-03	Collect Date:	04/16/2020
Lab Sample ID:	20-0395-08	Collect Time:	02:46 PM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous					20-0395-08-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/21/2020	AB20-0421-01
Metals by EPA 6020B: HMP-AMP	Detection & Asse	ssment M	onitorin	Aliquot:	20-0395-08-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	ND		ug/L	1	04/27/2020	AB20-0427-04
Barium	ND		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	ND		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	ND		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	ND		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	15	04/27/2020	AB20-0427-04
Copper	ND		ug/L	1	04/27/2020	AB20-0427-04
Iron	ND		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	ND		ug/L	10	04/27/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	1	04/27/2020	AB20-0427-04
Selenium	ND		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	ND		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous					Aliquot: 20-0395-08-C03-A01	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	04/23/2020	AB20-0422-05
Fluoride	ND		ug/L	1000	04/23/2020	AB20-0422-05
Sulfate	ND		ug/L	2000	04/23/2020	AB20-0422-05
Total Dissolved Solids by SM 254	0C			Aliquot:	20-0395-08-C04-A01	Analyst: DLR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	ND		mg/L	10	04/21/2020	AB20-0423-03



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-0395
Field Sample ID:	FB-03	Collect Date:	04/16/2020
Lab Sample ID:	20-0395-09	Collect Time:	10:30 AM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous					20-0395-09-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/21/2020	AB20-0421-01
Metals by EPA 6020B: HM	P-AMP Detection & Asses	sment M	onitorin	Aliquot:	20-0395-09-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	ND		ug/L	1	04/27/2020	AB20-0427-04
Barium	ND		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	ND		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	ND		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	ND		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	15	04/27/2020	AB20-0427-04
Copper	ND		ug/L	1	04/27/2020	AB20-0427-04
Iron	ND		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	ND		ug/L	10	04/27/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	1	04/27/2020	AB20-0427-04
Selenium	ND		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	ND		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous					Aliquot: 20-0395-09-C03-A01	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	04/23/2020	AB20-0422-05
Fluoride	ND		ug/L	1000	04/23/2020	AB20-0422-05
Sulfate	ND		ug/L	2000	04/23/2020	AB20-0422-05
Total Dissolved Solids by SM 25	40C			Aliquot:	20-0395-09-C04-A01	Analyst: DLR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	ND		mg/L	10	04/21/2020	AB20-0423-03



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-0395
Field Sample ID:	JHC-MW-15025 Field MS	Collect Date:	04/16/2020
Lab Sample ID:	20-0395-10	Collect Time:	11:58 AM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueo	us		Alique	ot: 20-0395-10-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking #
Mercury	104	%	0.2	04/21/2020	AB20-0421-01
Metals by EPA 6020B: HMP-AMP Det	tection & Asse	essment Monitor	n Alique	ot: 20-0395-10-C02-A02	Analyst: SLK

Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	106	ç	%	1	04/27/2020	AB20-0427-04
Arsenic	105	c	%	1	04/27/2020	AB20-0427-04
Barium	107	c	%	5	04/27/2020	AB20-0427-04
Beryllium	110	C	%	1	04/27/2020	AB20-0427-04
Boron	106	c	%	20	04/27/2020	AB20-0427-04
Cadmium	108	C	%	0.2	04/27/2020	AB20-0427-04
Calcium	118	C	%	1000	04/28/2020	AB20-0427-04
Chromium	102	C	%	1	04/27/2020	AB20-0427-04
Cobalt	101	C	%	15	04/27/2020	AB20-0427-04
Copper	104	C	%	1	04/27/2020	AB20-0427-04
Iron	104	C	%	20	04/28/2020	AB20-0427-04
Lead	107	C	%	1	04/27/2020	AB20-0427-04
Lithium	110	c	%	10	04/27/2020	AB20-0427-04
Molybdenum	105	C	%	5	04/27/2020	AB20-0427-04
Nickel	103	c	%	1	04/27/2020	AB20-0427-04
Selenium	103	C	%	1	04/27/2020	AB20-0427-04
Silver	107	c	%	0.2	04/27/2020	AB20-0427-04
Thallium	104	c	%	2	04/27/2020	AB20-0427-04
Vanadium	105	c	%	2	04/27/2020	AB20-0427-04
Zinc	106	c	%	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCI	R Rule Analyte List, Cl, F,	SO4, Aqu	eous	Aliquot:	Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	97		%	1000	04/23/2020	AB20-0422-05
Fluoride	104		%	1000	04/23/2020	AB20-0422-05
Sulfate	106		%	2000	04/23/2020	AB20-0422-05



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-0395
Field Sample ID:	JHC-MW-15025 Field MSD	Collect Date:	04/16/2020
Lab Sample ID:	20-0395-11	Collect Time:	11:58 AM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, A	queous		Aliquot:	20-0395-11-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking #
Mercury	113	%	0.2	04/21/2020	AB20-0421-01
Metals by EPA 6020B: HMP-AM	P Detection & Asse	ssment Monitorin	Aliquot:	20-0395-11-C02-A02	Analyst: SLK

······		Aliquot: 20-0395-11				P-A02 Analyst: SLK		
arameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #		
Antimony	108		%	1	04/27/2020	AB20-0427-04		
Arsenic	105		%	1	04/27/2020	AB20-0427-04		
Barium	106		%	5	04/27/2020	AB20-0427-04		
Beryllium	108		%	1	04/27/2020	AB20-0427-04		
Boron	104		%	20	04/27/2020	AB20-0427-04		
Cadmium	106		%	0.2	04/27/2020	AB20-0427-04		
Calcium	115		%	1000	04/28/2020	AB20-0427-04		
Chromium	101		%	1	04/27/2020	AB20-0427-04		
Cobalt	100		%	15	04/27/2020	AB20-0427-04		
Copper	103		%	1	04/27/2020	AB20-0427-04		
Iron	116		%	20	04/28/2020	AB20-0427-04		
Lead	107		%	1	04/27/2020	AB20-0427-04		
Lithium	107		%	10	04/27/2020	AB20-0427-04		
Molybdenum	106		%	5	04/27/2020	AB20-0427-04		
Nickel	103		%	1	04/27/2020	AB20-0427-04		
Selenium	103		%	1	04/27/2020	AB20-0427-04		
Silver	105		%	0.2	04/27/2020	AB20-0427-04		
Thallium	104		%	2	04/27/2020	AB20-0427-04		
Vanadium	104		%	2	04/27/2020	AB20-0427-04		
Zinc	107		%	10	04/27/2020	AB20-0427-04		

Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous				Aliquot: 2	Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	98		%	1000	04/23/2020	AB20-0422-05
Fluoride	104		%	1000	04/23/2020	AB20-0422-05
Sulfate	107		%	2000	04/23/2020	AB20-0422-05



Data Qualifiers	Exception Summary
K Bl. in an analytic to matrix interference / acadible community	No other expensions accured

K = RL increased due to matrix interference/possible carry over.

No other exceptions occured.

Chemistry Department

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

	Inspection By:		
Sample Origin/Project Name: <u>TH</u> CAMPSE	r HMP/cck		
Shipment Delivered By: Enter the type of shipment ca	nrier.		
Pony FedEx UP Other/Hand Carry (whom) CET _ DM	USPSUSPS	Aiıb	oine
Tracking Number:	Shipping Form Attac	ched: Yes	No
Shipping Containers: Enter the type and number of sh	ipping containers received.		
Cooler Cardboard Box	Custom Case	Envelope	/Maileı
Loose/Unpackaged Containers	Other		····
Condition of Shipment: Enter the as-received condition	on of the shipment container.		
Damaged Shipment Observed: None			ing
Shipment Security: Enter if any of the shipping contai	nets were opened before tecei	int	
Shipping Containers Received: Opened	, ,	hr	
Enclosed Documents: Enter the type of documents enc	-		
CoC Work Request	Air Data Sheet	Other	
Femperature of Containers: Measure the temperature	of several sample containers.		و .
As-Received Temperature 6.1-8.3°C	Samples Received on Ice:	Yes No	V
Number and Type of Containers: Enter the total num	ber of sample containers recei	ved.	
<u>Container Type</u> <u>Water</u> <u>Soil</u>	Other	Broken	<u>Leakir</u>
VOA (40mL or 60mL)			
Quart/Liter (g/p)		• enderse das sizes stations are	<u></u>
9-oz (amber glass jar)			
2-oz (amber glass) $(125 \text{ mL (plastic)})$, <u></u>		400 - 000
125 mL (plastic)	<u> </u>		<u> </u>
24 mL vial (glass)			
$\frac{250}{\text{SAUTML}}$ (plastic) $\frac{1}{9}$	• · · · · · · · · · · · · · · · · · · ·		
20 500 mL (plastic) 9			

20-0395 Page 20 of 38

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

Consumers Energy

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

SAMPLING SITE PROJECT NUMBI				PROJECT NUMBER						43	TAT 37	OTO T		mom	70		PAGE <u>1</u> OF <u>1</u>		
л	HC 2 nd C			RA GW Moni d Wells	toring		20-03	895				AN		<u>515 F</u>	ŒŲĹ	ESTI	<u>.</u>		SEND REPORT TO Kevin Starken
SAMF	LING TE		8			DATE SHIPPED		SITE		ATTACHED ⁹									Beth Swanberg, TRC
CET	/ CLH /	DMV	V						CIRCLE		Total			Ţ	ity	nia			PHONE
L	~~~	1		0.13.07.7					NO		Metals,	Antons	S	Radium	Alkalınity	Ammonia	Sulfide	Nitiates	
	CE TROL #		MPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION	/ LOCATIO	N	DEPTH	# OF CONTAINERS	Me	An	TDS	Ra	All	An	Sul	N ^{II}	REMARKS
20-	0395-01	41	6/20	1044	GW	JHC-MW-15024				9	X	X	X	Х	X	X	x	X	Nitrates / Sulfide
	-02			1158	GW	JHC-MW-15025				9	X	x	X	x	x	x	x	x	Nitrates / Sulfide
	-03			1435	GW	JHC-MW-15027				9	X	x	x	x	x	x	x	x	Nitrates / Sulfide
	-04			0929	GW	ЛНС-MW-15023				5	X	x	X	х					
	-05			1316	GW	JHC-MW-15026				5	x	x	x	х					
	-06			1430	GW	JHC-MW-15028				5	X	x	x	х					
	-07				GW	DUP-03				5	x	x	X	x					
	-08			1446	GW	EB-03				5	X	x	X	x					
	-09			1030	GW	FB-03				5	X	x	X	x					
	-10		1.	1158	GW	JHC-MW-15025 Fi	ield MS			2	X	x							
	-11		,	1	GW	JHC-MW-15025 Fi	ield MSD)		2	X	x							
RELI	IQUISHE	DBY	(SIGNAT	TURE)	DATE/T	IME	RECEIVE	DBY (S	SIGNATURE)	•							COM	MEN	TTS
\int		9		`			$\left \right\rangle$	- t	EN	1									ercury
A	ulu	1 V	ull	lion		1.20 0915				The				04	n2	2.2	り		
RELI	QUISHE	DBY	(SIGNAT	TURE)	DATE/I	IME	RECEIVE	DBY (S	IGNATURE)		-	<u> </u>	,	-	~	2	0	•	
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													O	RIGII	NAL	TOL	AB	CC	DPY TO CUSTOMER



Report ID: S13359.01(01) Generated on 04/20/2020

Report to

Attention: Emil Blaj Consumers Energy Company 135 West Trail Street Jackson, MI 49201

Phone: D:517-788-5888 C:517-684-9467 FAX: 517-788-2533 Email: emil.blaj@cmsenergy.com

Report Summary

Lab Sample ID(s): S13359.01-S13359.09 Project: JHC GW Monitoring Q2 Collected Date(s): 04/15/2020 - 04/16/2020 Submitted Date/Time: 04/17/2020 16:40 Sampled by: CET / CLH / DHW P.O. #: 4400088825

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Naya Mushah

Maya Murshak Technical Director

Report produced by

Analytical Laboratory Report

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Contacts for report questions: John Laverty (johnlaverty@meritlabs.com) Barbara Ball (bball@meritlabs.com)



General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples

for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request. Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report



Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
В	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
Н	Sample submitted and run outside of holding time
1	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
М	Result reported to MDL not RDL
0	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
Т	No correction for total solids
Х	Elevated reporting limit due to matrix interference
Υ	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
е	Reported value estimated due to interference
j	Analyte also found in associated method blank
р	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
х	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Method Summary

Method

SM4500-S2 D

Version Standard Method 4450 S2 D 2011



Sample Summary (9 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S13359.01	20-0384-06 JHC-MW-15011	Groundwater	04/15/20 09:36
S13359.02	20-0395-01 JHC-MW-15024	Groundwater	04/16/20 10:44
S13359.03	20-0395-02 JHC-MW-15025	Groundwater	04/16/20 11:58
S13359.04	20-0395-03 JHC-MW-15027	Groundwater	04/16/20 14:35
S13359.05	20-0398-01 JHC-MW-15013	Groundwater	04/16/20 12:58
S13359.06	20-0398-02 JHC-MW-15015	Groundwater	04/16/20 10:16
S13359.07	20-0397-01 JHC-MW-15002	Groundwater	04/16/20 17:23
S13359.08	20-0397-02 JHC-MW-15005	Groundwater	04/16/20 18:11
S13359.09	20-0397-03 JHC-MW-18005	Groundwater	04/16/20 17:01



Lab Sample ID: S13359.01

Sample Tag: 20-0384-06 JHC-MW-15011 Collected Date/Time: 04/15/2020 09:36 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:22, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	Not detected	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.02

Sample Tag: 20-0395-01 JHC-MW-15024 Collected Date/Time: 04/16/2020 10:44 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:24, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	Not detected	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.03

Sample Tag: 20-0395-02 JHC-MW-15025 Collected Date/Time: 04/16/2020 11:58 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:26, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	Not detected	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.04

Sample Tag: 20-0395-03 JHC-MW-15027 Collected Date/Time: 04/16/2020 14:35 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:28, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	Not detected	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.05

Sample Tag: 20-0398-01 JHC-MW-15013 Collected Date/Time: 04/16/2020 12:58 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:30, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	Not detected	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.06

Sample Tag: 20-0398-02 JHC-MW-15015 Collected Date/Time: 04/16/2020 10:16 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:34, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	0.14	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.07

Sample Tag: 20-0397-01 JHC-MW-15002 Collected Date/Time: 04/16/2020 17:23 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:36, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	0.06	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.08

Sample Tag: 20-0397-02 JHC-MW-15005 Collected Date/Time: 04/16/2020 18:11 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:38, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	Not detected	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.09

Sample Tag: 20-0397-03 JHC-MW-18005 Collected Date/Time: 04/16/2020 17:01 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:40, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	Not detected	0.04	0.010	mg/L	2	18496-25-8	

Merit Laboratories Login Checklist

Lab Set ID:S13359

Client: CONSUMERS (Consumers Energy)

Project: JHC GW Monitoring Q2

Submitted: 04/17/2020 16:40 Login User: MMC

Attention: Emil Blaj Address: Consumers Energy Company 135 West Trail Street Jackson, MI 49201

Phone: D:517-788-5888 FAX:517-788-2533 Email:emil.blaj@cmsenergy.com

Selection	Description	Note
Sample Receiving		
01. X Yes No N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.3
02. X Yes No N/A	Received on ice/ cooling process begun	
03. Yes X No N/A	Samples shipped	
04. Yes X No N/A	Samples left in 24 hr. drop box	
05. Yes No X N/A	Are there custody seals/tape or is the drop box locked	
Chain of Custody		
06. X Yes No N/A	COC adequately filled out	
07. 🕱 Yes 🗌 No 🗌 N/A	COC signed and relinquished to the lab	
08. X Yes No N/A	Sample tag on bottles match COC	
09. Yes X No N/A	Subcontracting needed? Subcontacted to:	
Preservation		
10. X Yes No N/A	Do sample have correct chemical preservation	
11. X Yes No N/A	Completed pH checks on preserved samples? (no VOAs)	
12. Yes X No N/A	Did any samples need to be preserved in the lab?	
Bottle Conditions		
13. X Yes No N/A	All bottles intact	
14. X Yes No N/A	Appropriate analytical bottles are used	
15. X Yes No N/A	Merit bottles used	
16. X Yes No N/A	Sufficient sample volume received	
17. Yes X No N/A	Samples require laboratory filtration	
18. X Yes No N/A	Samples submitted within holding time	
19. Yes No X N/A	Do water VOC or TOX bottles contain headspace	

Corrective action for all exceptions is to call the client and to notify the project manager.

Merit Laboratories Bottle Preservation Check

Initials:<u>MM</u>C Lab Set ID: S13359

Client: CONSUMERS (Consumers Energy)

Project: JHC GW Monitoring Q2 Submitted: 04/17/2020 16:40 Login User:

Attention: Emil Blaj Address: Consumers Energy Company 135 West Trail Street Jackson, MI 49201

Phone: D:517-788-5888 FAX:517-788-2533 Email:emil.blaj@cmsenergy.com

	125 ml	250 ml	1 L	250 ml	125 ml	32 oz	125 ml	125 ml Amber			pН			
Lab ID	Plastic HNO ₃	Plastic HNO ₃	Plastic HNO ₃	Plastic H ₂ SO ₄	Amber H₂SO4	Glass HCl	Plastic NaOH	PbCO ₃ NaOH	<2	>12	other	ml add	new pH	Notes
S13359.01							х			х				
S13359.02							х			х				
S13359.03							х			х				
S13359.04							х			х				
S13359.05							х			х				
S13359.06							х			х				
S13359.07							х			х				
S13359.08							х			х				
S13359.09							х			х				



Merit 2680 East Lansing Dr., East Lansing, MI 48823 Phone (517) 332-0167 Fax (517) 332-4034 www.meritlabs.com

C.O.C. PAGE # _ I_OF _ I_ 134191

REPOR	1 10	A		CHAIN	N OF	CU		DDY RECO	RD			N.	INVOICE TO
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PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

20-0395 Page 38 of 38

Rev. 5.18.12

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Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

Laboratory Job ID: 160-37918-1

Client Project/Site: JH Campbell Background Wells

For:

Consumers Energy 135 W Trail Street Jackson, Michigan 49201

Attn: Emil Blaj

Authorized for release by: 6/3/2020 11:37:30 PM

Jayna Awalt, Project Manager II (314)298-8566 jayna.awalt@testamericainc.com

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

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

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Job ID: 160-37918-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Consumers Energy

Project: JH Campbell Background Wells

Report Number: 160-37918-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 4/29/2020 9:21 AM; the samples arrived in good condition, properly preserved. The temperatures of the 6 coolers at receipt time were 19.1°C, 19.3°C, 19.7°C, 20.1°C, 20.5°C and 21.3°C

RADIUM 226 AS TOTAL ALPHA RADIUM

Samples JHC-MW-15024 (160-37918-1), JHC-MW-15025 (160-37918-2), JHC-MW-15027 (160-37918-3), JHC-MW-15023 (160-37918-4), JHC-MW-15026 (160-37918-5), JHC-MW-15028 (160-37918-6), DUP-03 (160-37918-7), EB-03 (160-37918-8) and FB-03 (160-37918-9)

Job ID: 160-37918-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

were analyzed for Radium 226 as Total Alpha Radium in accordance with EPA 903.0_Total Alpha Radium. The samples were prepared on 05/12/2020 and analyzed on 05/21/2020.

Radium-226 Prep Batch 160-470052Ra-226 is reported without a 21-day waiting period to ensure short-lived alpha-emitting radium isotopes (e.g. Ra-224) have decayed out. The Ra-226 result should be considered to be potentially high biased. Associated samples have activity below the RL. The results are reported with this narrative.JHC-MW-15024 (160-37918-1), JHC-MW-15025 (160-37918-2), JHC-MW-15027 (160-37918-3), JHC-MW-15023 (160-37918-4), JHC-MW-15026 (160-37918-5), JHC-MW-15028 (160-37918-6), DUP-03 (160-37918-7), EB-03 (160-37918-8), FB-03 (160-37918-9), (LCS 160-470052/1-A), (LCSD 160-470052/2-A) and (MB 160-470052/12-A)

Insufficient sample volume was available to perform a sample duplicate for the following samples: JHC-MW-15024 (160-37918-1), JHC-MW-15025 (160-37918-2), JHC-MW-15027 (160-37918-3), JHC-MW-15023 (160-37918-4), JHC-MW-15026 (160-37918-5), JHC-MW-15028 (160-37918-6), DUP-03 (160-37918-7), EB-03 (160-37918-8) and FB-03 (160-37918-9). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

The Ba carrier recovery is outside the lower control limit (40%) for the following samples: JHC-MW-15025 (160-37918-2) and JHC-MW-15027 (160-37918-3). The samples produced a small pellet following barium sulfate precipitation. The samples were seeded with 3 additional drops of Barium carrier, but this did not yield a better result. Matrix interference is suspected.

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

RADIUM-228 (GFPC)

Samples JHC-MW-15024 (160-37918-1), JHC-MW-15025 (160-37918-2), JHC-MW-15027 (160-37918-3), JHC-MW-15023 (160-37918-4), JHC-MW-15026 (160-37918-5), JHC-MW-15028 (160-37918-6), DUP-03 (160-37918-7), EB-03 (160-37918-8) and FB-03 (160-37918-9) were analyzed for Radium-228 (GFPC) in accordance with EPA 904. The samples were prepared on 05/21/2020 and analyzed on 06/01/2020.

The laboratory control sample duplicate recovery (LCSD, 24%) was outside the lower limit (75%). The RER was also outside the upper limit; however, the laboratory control sample and method blank (LCS; MB) passed. There was not enough volume for re-extract. The data has been reported with this narrative. JHC-MW-15024 (160-37918-1), JHC-MW-15025 (160-37918-2), JHC-MW-15027 (160-37918-3), JHC-MW-15023 (160-37918-4), JHC-MW-15026 (160-37918-5), JHC-MW-15028 (160-37918-6), DUP-03 (160-37918-7), EB-03 (160-37918-8), FB-03 (160-37918-9), (LCS 160-471099/1-A), (LCSD 160-471099/2-A) and (MB 160-471099/13-A)

The barium carrier recovery is outside the lower control limit (40%) for the following samples: JHC-MW-15025 (160-37918-2), JHC-MW-15027 (160-37918-3) and (LCSD 160-471099/2-A). There was physical evidence of matrix interference apparent during the initial preparation of the sample. There is insufficient volume remaining for analysis.

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

COMBINED RADIUM-226 AND RADIUM-228

Samples JHC-MW-15024 (160-37918-1), JHC-MW-15025 (160-37918-2), JHC-MW-15027 (160-37918-3), JHC-MW-15023 (160-37918-4), JHC-MW-15026 (160-37918-5), JHC-MW-15028 (160-37918-6), DUP-03 (160-37918-7), EB-03 (160-37918-8) and FB-03 (160-37918-9) were analyzed for Combined Radium-226 and Radium-228 in accordance with EPA 903 Radium 226/EPA 904 Radium 228. The samples were analyzed on 06/02/2020.

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

Earth City, MO 63045-1205 phone 314.298.8566 fax 314.298.8757	Regula	Regulatory Program:		DW D	□ NPDES	SCRA	□ Other:	TestAmerica	 TestAmerica TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica 	I TestAmerica
	Project Manager: Emil Blaj	ager: Emi	l Blaj		П					
Client Contact	Email: Emil.Blaj@cmsenergy.com	laj@cmsen	ergy.com		S	e Contat	Site Contact: Bethany Swanberg	Date:	COC No:	
Consumers Energy, Laboratory Services	Tel/Fax: 517-788-5888	-788-5888			Lá	b Contac	Lab Contact: Emil Blaj	Carrier:	1 of	1 COCs
135 W. Trail Street	Ā	nalysis Tu	Analysis Turnaround Time	ime		_			Sampler: CLH/DMW/CET	/DMW/CET
Jackson, MI 49201	CALENDAR DAYS	DAYS	U WOR	WORKING DAYS					For Lab Use Only:	Only:
517-788-5888	TAT	TAT if different from Below	n Below	1					Walk-in Client:	
(xxx) xxx-xxxx FAX		2 weeks	eks			1.50	0.4		Lab Sampling:	
Project Name: JH Campbell Background Wells	5	1 week	iek			06 \	06.			
20-0395 P O #	00	2 days 1 day	ys Y		ЭV	493) ð	- 1-1 ×		Job / SDG No.	
Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp. G=Grab)	Matrix	Cont. Preservati	Perform M Radium 22 Radium 22	77 [[in]ons.		Sample	Sample Specific Notes:
JHC-MW-15024	4/16/20	1044	G	GW	2 2	×	×			
JHC-MW-15025	4/16/20	1158	თ	GW	2 2	×N	×			
JHC-MW-15027	4/16/20	1435	U	GW	2 2	×	×			
JHC-MW-15023	4/16/20	0929	U	GW	2 2	×	×			
JHC-MW-15026	4/16/20	1316	U	GW	2 2	×Z	×			
JHC-MW-15028	4/15/20	1430	IJ	GW	2 2	× N	×			
DUP-03	4/16/20	I.	ŋ	GW	2 2	×	×			
EB-03	4/16/20	1446	B	D	2 2	×N	- 	100-3/ 810 Chain of Custody		
FB-03	4/16/20	1030	ŋ	ū	2 2	×Z	×			
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other	03; 5=NaOH; 6=	Other								
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? P Comments Section if the lab is to dispose of the sample.	Please List any EPA Waste Codes for the sample in the	A Waste C	odes for th	e sample	in the	Sample	Disposal (A fee may be	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)	stained longer than	1 month)
Non-Hazard Flammable Skin Irritant	Doison B		🖂 Unknown	5		🗌 Retu	C Return to Client	Disposal by Lab	t for Months	
c requirements o										
	Custody Seal No.	I No.:					Cooler Temp. (°C): Obs'd		Therm ID No.:	
Relinquished by: OALUCHANDEN	Company	da		Date/Time:	e: 1830	Receiver	Received by: NS	Company:	Date/Time:	
	Company:			Date/Time:		Received by	in this	Company:	Date/Time:	1260
finquished by:	Company:			Date/Time	i d	Received	Received in Laboratory by:	Company.	Date/Time	

Laboratory Services

135 W. Trail Street Jackson, MI 49201

TestAmerica Michigan 10448 Citation Drive; Ste 200 Brighton, MI 48116

PROCUREMENT #: 20040554

QA Code: NQ

(Item 1) - Part Number: N/A - Quantity : 1 JHC CCR Rule GW Q2-2020 Samples

Groundwater Samples for Radium 226 (EPA 903.1) and Radium 228 (EPA 904.0)

Standard TAT Request.

Reference Quote #16009066-0

(Item 2) - Part Number: NA - Quantity : 1 Please include Consumers Energy Project Number and Procurement Number on all submitted invoices

For technical questions, please contact Emil Blaj at 517-788-5888, or Emil.Blaj@cmsenergy.com.

To expedite payment please provide the Procurement number on all invoices.

Send Invoices To:

Consumers Energy Company Attn: Accounts Payable 135 W Trail St. Jackson, MI 49201

Login Sample Receipt Checklist

Client: Consumers Energy

Login Number: 37918 List Number: 1 Creator: Lambert-Sykes, Chenise Y

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

Job Number: 160-37918-1 SDG Number:

List Source: Eurofins TestAmerica, St. Louis

Client: Consumers Energy Project/Site: JH Campbell Background Wells

Job ID: 160-37918-1

Qualifiers

Rad Qualifier	Qualifier Description	
*	LCS or LCSD is outside acceptance limits.	
*	RPD of the LCS and LCSD exceeds the control limits	E
G	The Sample MDC is greater than the requested RL.	
U	Result is less than the sample detection limit.	G
х	Carrier is outside acceptance limits.	

Glossary

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

Method Summary

Client: Consumers Energy Project/Site: JH Campbell Background Wells

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

None = None

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

Laboratory References:

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

Sample Summary

Client: Consumers Energy Project/Site: JH Campbell Background Wells

Job ID: 160-37918-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Ass
160-37918-1	JHC-MW-15024	Water	04/16/20 10:44	04/29/20 09:21	
160-37918-2	JHC-MW-15025	Water	04/16/20 11:58	04/29/20 09:21	
160-37918-3	JHC-MW-15027	Water	04/16/20 14:35	04/29/20 09:21	
160-37918-4	JHC-MW-15023	Water	04/16/20 09:29	04/29/20 09:21	
160-37918-5	JHC-MW-15026	Water	04/16/20 13:16	04/29/20 09:21	
160-37918-6	JHC-MW-15028	Water	04/15/20 14:30	04/29/20 09:21	
160-37918-7	DUP-03	Water	04/16/20 00:00	04/29/20 09:21	
160-37918-8	EB-03	Water	04/16/20 14:46	04/29/20 09:21	
160-37918-9	FB-03	Water	04/16/20 10:30	04/29/20 09:21	

Total

Uncert.

(2**σ+/-**)

0.110

Count Uncert.

(2**σ**+/-)

Limits

40 - 110

0.110

Client: Consumers Energy Project/Site: JH Campbell Background Wells

Client Sample ID: JHC-MW-15024

Method: 903.0 - Radium-226 (GFPC)

Date Collected: 04/16/20 10:44

Date Received: 04/29/20 09:21

Analyte

Carrier

Ba Carrier

Radium-226

Job ID: 160-37918-1

Matrix: Water

Dil Fac

Dil Fac

1

1

Lab Sample ID: 160-37918-1

05/12/20 06:58 05/21/20 11:48

05/12/20 06:58 05/21/20 11:48

Lab Sample ID: 160-37918-2

Matrix: Water

Analyzed

Analyzed

Prepared

Prepared

5
8

5
8

Method: 904.0 - Radium-228 (GFPC)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.263	U *	0.425	0.426	1.00	0.717	pCi/L	05/21/20 13:15	06/01/20 08:29	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	65.6		40 - 110					05/21/20 13:15	06/01/20 08:29	1
Y Carrier	87.1		40 - 110					05/21/20 13:15	06/01/20 08:29	1

RL

1.00

MDC Unit

0.222 pCi/L

Method: Ra226 Ra228 - Combined Radium-226 and Radium-228

Result Qualifier

%Yield Qualifier

0.00140 U

91.8

			Count	Total					
			Uncert.	Uncert.					
Analyte	Result	Qualifier	(2 σ+/-)	(2 σ+/-)	RL	MDC Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.264	U	0.439	0.440	5.00	0.717 pCi/L		06/02/20 13:55	1

Client Sample ID: JHC-MW-15025 Date Collected: 04/16/20 11:58

Date Received: 04/29/20 09:21

Method: 903.0 - Radium-226 (GFPC)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2 σ+/-)	(2 σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0395	U	0.146	0.147	1.00	0.280	pCi/L	05/12/20 06:58	05/21/20 11:48	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	64.2		40 - 110					05/12/20 06:58	05/21/20 11:48	1

Method: 904.0 - Radium-228 (GFPC)

		. ,	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.555	U * G	1.11	1.11	1.00	1.90	pCi/L	05/21/20 13:15	06/01/20 08:29	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	25.8	X	40 - 110					05/21/20 13:15	06/01/20 08:29	1
Y Carrier	83.7		40 - 110					05/21/20 13:15	06/01/20 08:29	1

Client: Consumers Energy Project/Site: JH Campbell Background Wells

			Clier	nt Samp	le Res	ults				
ient: Consumers Ene oject/Site: JH Campl		ground Well	S						Job ID: 160-3	37918-1
Client Sample ID: ate Collected: 04/16 ate Received: 04/29	5 <mark>/20 11:5</mark> 8	В						Lab Sample		7918-2 : Water
Method: Ra226_Ra2	:28 - Com	ibined Rad	ium-226 a Count Uncert.	nd Radium Total Uncert.	i -228					
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.594	<u> </u>	1.12	1.12	5.00	1.90	pCi/L		06/02/20 13:55	1
Client Sample ID:	JHC-M	W-15027						Lab Sample	D: 160-37	'918-3
Date Collected: 04/16 Date Received: 04/29	<mark>6/20 14:35</mark>	5						-		: Water
Method: 903.0 - Rad	ium-226	(GFPC)	Count	Tetal						
			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0908		0.112	0.112	1.00	0.184		05/12/20 06:58	05/21/20 11:48	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	95.9	·	40 - 110					•	05/21/20 11:48	1
Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.598	U * G	0.818	0.820	1.00	1.37	pCi/L	05/21/20 13:15	-	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	34.7	X	40 - 110					05/21/20 13:15	-	1
Y Carrier	86.7		40 - 110					05/21/20 13:15	06/01/20 08:29	1
Method: Ra226_Ra2	28 - Com	ibined Rad	ium-226 a Count	nd Radium Total	-228					
			Uncert.	Uncert.						
Analyte	0.689	Qualifier	(2σ+/-) 0.826	<u>(2σ+/-)</u> 0.828	RL 5.00	MDC	Unit pCi/L	Prepared	Analyzed 06/02/20 13:55	Dil Fac
Combined Radium 226 + 228	0.009	0	0.820	0.020	5.00	1.57	poi/L		00/02/20 15:55	I
Client Sample ID: Date Collected: 04/16 Date Received: 04/29	<mark>6/20 09:2</mark> 9	9						Lab Sample		7918-4 : Water
Method: 903.0 - Rad			Count	Total						
Analyte	Rosult	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Analyte			0.0873	0.0874	1.00	0.165		05/12/20 06:58	-	1
Radium-226	0.0346	0	0.001.0							
		Qualifier	Limits					Prepared	Analyzed	Dil Fac

Client: Consumers Energy

iant: Canaumara En	orau		Clief	nt Samp		uns			160 J	7010 1
ient: Consumers Ene oject/Site: JH Camp		ground We	lls						Job ID: 160-3	1910-1
client Sample ID: ate Collected: 04/16	6/ <mark>20 09:2</mark> 9	Ð						Lab Sample	e ID: 160-37 Matrix:	
ate Received: 04/29										
Method: 904.0 - Rad	lium-228	(GFPC)	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.0104		0.353	0.353	1.00	0.634	pCi/L	05/21/20 13:15	06/01/20 08:30	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	75.7		40 - 110						06/01/20 08:30	1
Y Carrier	89.3		40 - 110					05/21/20 13:15	06/01/20 08:30	1
Method: Ra226_Ra2	228 - Com	ibined Rac	d <mark>ium-226 a</mark> Count Uncert.	nd Radium Total Uncert.	-228					
Analyte	Result	Qualifier	(2 σ+/-)	(2 σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226	0.0242	U	0.364	0.364	5.00	0.634	pCi/L		06/02/20 13:55	1
Client Sample ID: Date Collected: 04/16	6/20 13:16	6						Lab Sample	e ID: 160-37 Matrix:	
Client Sample ID: Date Collected: 04/16 Date Received: 04/29	6/20 13:16 9/20 09:21	6						Lab Sample		
Client Sample ID: Date Collected: 04/16 Date Received: 04/29	6/20 13:16 9/20 09:21	6	Count	Total				Lab Sample		
Client Sample ID: Date Collected: 04/16 Date Received: 04/29 Method: 903.0 - Rad	6/20 13:16 9/20 09:21 dium-226	GFPC)	Count Uncert.	Uncert.		MDC	Unit		Matrix:	Water
Client Sample ID: ate Collected: 04/16 ate Received: 04/29 Method: 903.0 - Rad	6/20 13:16 9/20 09:21 dium-226 Result	GFPC) Qualifier	Count Uncert. (2σ+/-)	Uncert. (2σ+/-)	RL	MDC		Prepared	Matrix: Analyzed	Water
Client Sample ID: Date Collected: 04/16 Date Received: 04/29 Method: 903.0 - Rad	6/20 13:16 9/20 09:21 dium-226	GFPC) Qualifier	Count Uncert.	Uncert.	RL 1.00	MDC 0.139			Matrix:	Water
Client Sample ID: Date Collected: 04/16 Date Received: 04/29 Method: 903.0 - Rad Analyte Radium-226	6/20 13:16 0/20 09:21 dium-226 Result -0.0254	GFPC) Qualifier	Count Uncert. (2σ+/-)	Uncert. (2σ+/-)				Prepared	Matrix: Analyzed	Water
Client Sample ID: Date Collected: 04/16 Date Received: 04/29 Method: 903.0 - Rad Analyte Radium-226	6/20 13:16 0/20 09:21 dium-226 Result -0.0254	GFPC)	Count Uncert. (2σ+/-) 0.0519	Uncert. (2σ+/-)				Prepared 05/12/20 06:58	Matrix: Analyzed 05/21/20 11:49 Analyzed	Dil Fac
Client Sample ID: Date Collected: 04/16 Date Received: 04/29 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier	6/20 13:16 6/20 09:21 dium-226 Result -0.0254 %Yield 107	GFPC) Qualifier U Qualifier	Count Uncert. (2σ+/-) 0.0519 Limits	Uncert. (2σ+/-)				Prepared 05/12/20 06:58 Prepared	Matrix: Analyzed 05/21/20 11:49 Analyzed	Dil Fac
Client Sample ID: Date Collected: 04/16 Date Received: 04/29 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier	6/20 13:16 6/20 09:21 dium-226 Result -0.0254 %Yield 107	GFPC) Qualifier U Qualifier	Count Uncert. (2σ+/-) 0.0519 Limits	Uncert. (2σ+/-)				Prepared 05/12/20 06:58 Prepared	Matrix: Analyzed 05/21/20 11:49 Analyzed	Dil Fac
Client Sample ID: Date Collected: 04/16 Date Received: 04/29 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Rad	6/20 13:16 9/20 09:21 dium-226 Result -0.0254 %Yield 107 dium-228	GFPC) Qualifier U Qualifier (GFPC)	Count Uncert. (2σ+/-) 0.0519 Limits 40 - 110	Uncert. (2σ+/-) 0.0519		0.139	pCi/L	Prepared 05/12/20 06:58 Prepared 05/12/20 06:58	Matrix: Analyzed 05/21/20 11:49 Analyzed	Dil Fac
Client Sample ID: Date Collected: 04/16 Date Received: 04/29 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Rad Analyte	6/20 13:16 9/20 09:21 dium-226 Result -0.0254 %Yield 107 dium-228 Result	GFPC) Qualifier U Qualifier (GFPC) Qualifier	Count Uncert. (2σ+/-) 0.0519 Limits 40 - 110 Count Uncert. (2σ+/-)	Uncert. (2σ+/-) 0.0519 Total Uncert. (2σ+/-)	1.00	0.139	pCi/L Unit	Prepared 05/12/20 06:58 Prepared 05/12/20 06:58 Prepared	Matrix: Analyzed 05/21/20 11:49 Analyzed Analyzed	Dil Fac 1 Dil Fac 1 Dil Fac
Client Sample ID: Date Collected: 04/16 Date Received: 04/29 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Rad Analyte	6/20 13:16 9/20 09:21 dium-226 Result -0.0254 %Yield 107 dium-228	GFPC) Qualifier U Qualifier (GFPC) Qualifier	Count Uncert. (2σ+/-) 0.0519 Limits 40 - 110 Count Uncert.	Uncert. (2σ+/-) 0.0519 Total Uncert.	1.00	0.139	pCi/L Unit	Prepared 05/12/20 06:58 Prepared 05/12/20 06:58 Prepared	Matrix: Analyzed 05/21/20 11:49 Analyzed 05/21/20 11:49	Dil Fac 1 Dil Fac 1
Client Sample ID: Date Collected: 04/16 Date Received: 04/29 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Rad Analyte	6/20 13:16 6/20 09:21 dium-226 Result -0.0254 %Yield 107 dium-228 Result 0.176	GFPC) Qualifier U Qualifier (GFPC) Qualifier	Count Uncert. (2σ+/-) 0.0519 Limits 40 - 110 Count Uncert. (2σ+/-) 0.394 Limits	Uncert. (2σ+/-) 0.0519 Total Uncert. (2σ+/-)	1.00	0.139	pCi/L Unit	Prepared 05/12/20 06:58 Prepared 05/12/20 06:58 Prepared	Matrix: Analyzed 05/21/20 11:49 Analyzed Analyzed	Dil Fac 1 Dil Fac 1 Dil Fac
Client Sample ID: Date Collected: 04/16 Date Received: 04/29 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Rad Analyte Radium-228 Carrier	6/20 13:16 6/20 09:21 dium-226 Result -0.0254 %Yield 107 dium-228 Result 0.176	GFPC) Qualifier Qualifier (GFPC) Qualifier U	Count Uncert. (2σ+/-) 0.0519 Limits 40 - 110 Count Uncert. (2σ+/-) 0.394	Uncert. (2σ+/-) 0.0519 Total Uncert. (2σ+/-)	1.00	0.139	pCi/L Unit	Prepared 05/12/20 06:58 Prepared 05/12/20 06:58 Prepared 05/12/20 06:58	Matrix: Analyzed 05/21/20 11:49 Analyzed 05/21/20 11:49 Analyzed 06/01/20 08:30 Analyzed	Dil Fac 1 Dil Fac 1 Dil Fac 1
Client Sample ID: Date Collected: 04/16 Date Received: 04/29 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Rad Analyte Radium-228 Carrier	6/20 13:16 6/20 09:21 dium-226 Result -0.0254 %Yield 107 dium-228 Result 0.176 %Yield	GFPC) Qualifier Qualifier (GFPC) Qualifier U	Count Uncert. (2σ+/-) 0.0519 Limits 40 - 110 Count Uncert. (2σ+/-) 0.394 Limits	Uncert. (2σ+/-) 0.0519 Total Uncert. (2σ+/-)	1.00	0.139	pCi/L Unit	Prepared 05/12/20 06:58 Prepared 05/12/20 06:58 Prepared 05/12/20 13:15 Prepared 05/21/20 13:15 Prepared 05/21/20 13:15	Matrix: Analyzed 05/21/20 11:49 Analyzed 05/21/20 11:49 Analyzed 06/01/20 08:30 Analyzed	Dil Fac 1 Dil Fac 1 Dil Fac 1 Dil Fac
Client Sample ID: Date Collected: 04/16 Date Received: 04/29 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Rad Analyte Radium-228 Carrier Ba Carrier Ba Carrier Y Carrier	6/20 13:16 6/20 09:21 dium-226 Result -0.0254 %Yield 107 dium-228 Result 0.176 %Yield 79.8 79.3	GFPC) Qualifier Qualifier (GFPC) Qualifier U* Qualifier	Count Uncert. $(2\sigma +/-)$ 0.0519 Limits 40 - 110 Count Uncert. $(2\sigma +/-)$ 0.394 Limits 40 - 110 40 - 110 40 - 110 dium-226 a	Uncert. (2σ+/-) 0.0519 Total Uncert. (2σ+/-) 0.394	1.00 RL 1.00	0.139	pCi/L Unit	Prepared 05/12/20 06:58 Prepared 05/12/20 06:58 Prepared 05/12/20 13:15 Prepared 05/21/20 13:15 Prepared 05/21/20 13:15	Matrix: Analyzed 05/21/20 11:49 Analyzed 05/21/20 11:49 Analyzed 06/01/20 08:30	Dil Fac 1 Dil Fac 1 Dil Fac 1 Dil Fac 1 Dil Fac
Client Sample ID: Date Collected: 04/16 Date Received: 04/29 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Rad Analyte Radium-228 Carrier Ba Carrier Ba Carrier Y Carrier	6/20 13:16 6/20 09:21 dium-226 Result -0.0254 %Yield 107 dium-228 Result 0.176 %Yield 79.8 79.3	GFPC) Qualifier Qualifier (GFPC) Qualifier U* Qualifier	Count Uncert. $(2\sigma +/-)$ 0.0519 <i>Limits</i> 40 - 110 Count Uncert. $(2\sigma +/-)$ 0.394 <i>Limits</i> 40 - 110 40 - 110 40 - 110 dium-226 a Count	Uncert. (2σ+/-) 0.0519 Total Uncert. (2σ+/-) 0.394 nd Radium Total	1.00 RL 1.00	0.139	pCi/L Unit	Prepared 05/12/20 06:58 Prepared 05/12/20 06:58 Prepared 05/12/20 13:15 Prepared 05/21/20 13:15 Prepared 05/21/20 13:15	Matrix: Analyzed 05/21/20 11:49 Analyzed 05/21/20 11:49 Analyzed 06/01/20 08:30	Dil Fac 1 Dil Fac 1 Dil Fac 1 Dil Fac 1 Dil Fac
Carrier Ba Carrier Method: 904.0 - Rad Analyte Radium-228 Carrier Ba Carrier	6/20 13:16 6/20 09:21 dium-226 Result -0.0254 %Yield 107 dium-228 Result 0.176 %Yield 79.8 79.3 228 - Com	GFPC) Qualifier Qualifier (GFPC) Qualifier U* Qualifier	Count Uncert. $(2\sigma +/-)$ 0.0519 Limits 40 - 110 Count Uncert. $(2\sigma +/-)$ 0.394 Limits 40 - 110 40 - 110 40 - 110 dium-226 a	Uncert. (2σ+/-) 0.0519 Total Uncert. (2σ+/-) 0.394	1.00 RL 1.00	0.139	Unit pCi/L	Prepared 05/12/20 06:58 Prepared 05/12/20 06:58 Prepared 05/12/20 13:15 Prepared 05/21/20 13:15 Prepared 05/21/20 13:15	Matrix: Analyzed 05/21/20 11:49 Analyzed 05/21/20 11:49 Analyzed 06/01/20 08:30	Dil Fac 1 Dil Fac 1 Dil Fac 1 Dil Fac 1 Dil Fac

+ 228

Eurofins TestAmerica, St. Louis

Total

Uncert.

(2**σ+/-**)

0.145

Count Uncert.

(2**σ**+/-)

Limits

40 - 110

0.144

Client: Consumers Energy Project/Site: JH Campbell Background Wells

Client Sample ID: JHC-MW-15028

Method: 903.0 - Radium-226 (GFPC)

Date Collected: 04/15/20 14:30 Date Received: 04/29/20 09:21

Analyte

Carrier

Ba Carrier

Radium-226

Job ID: 160-37918-1

9

Dil Fac

	-
Lab Sample ID: 160-37918-6 Matrix: Water	3
	4
	5
Prepared Analyzed Dil Fac 05/12/20 06:58 05/21/20 11:49 1	6

Analyzed

05/12/20 06:58 05/21/20 11:49

Lab Sample ID: 160-37918-7

Matrix: Water

Analyte	Result Q	huglifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Broporod	Analvzed	Dil Fac
Analyte	Result Q	uanner	(20+/-)	(20+/-)	RL	NDC	Unit	Prepared	Analyzeu	Dirfac
Radium-228	-0.220 U	*	0.342	0.343	1.00	0.651	pCi/L	05/21/20 13:15	06/01/20 08:30	1
Carrier	%Yield Q	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	76.9		40 - 110					05/21/20 13:15	06/01/20 08:30	1
Y Carrier	87.1		40 - 110					05/21/20 13:15	06/01/20 08:30	1

RL

1.00

MDC Unit

0.262 pCi/L

Prepared

Method: Ra226 Ra228 - Combined Radium-226 and Radium-228

Result Qualifier

%Yield Qualifier

0.0562 U

90.9

_			Count	Total					
			Uncert.	Uncert.					
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	-0.164	U	0.371	0.372	5.00	0.651 pCi/L		06/02/20 13:55	1

Client Sample ID: DUP-03

Date Collected: 04/16/20 00:00 Date Received: 04/29/20 09:21

Method: 903.0 - Radium-226 (GFPC)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0957	U	0.103	0.104	1.00	0.164	pCi/L	05/12/20 06:58	05/21/20 11:49	1
Carrier Ba Carrier	% Yield 96.9	Qualifier	Limits 40 - 110					Prepared 05/12/20 06:58	Analyzed 05/21/20 11:49	Dil Fac

Method: 904.0 - Radium-228 (GFPC)

		. ,	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.0794	U *	0.303	0.303	1.00	0.560	pCi/L	05/21/20 13:15	06/01/20 08:30	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	81.0		40 - 110					05/21/20 13:15	06/01/20 08:30	1
Y Carrier	90.5		40 - 110					05/21/20 13:15	06/01/20 08:30	1

lient: Consumers Ene	•••			nt Samp		uns			Job ID: 160-3	7918-1
roject/Site: JH Campl			ls							
lient Sample ID: ate Collected: 04/16								Lab Sample		
ate Received: 04/16									Wallix	Water
Method: Ra226_Ra2	28 - Com	ibined Rad	Count	nd Radium Total	-228					
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 σ+/-)	(2 σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.0163	U	0.320	0.320	5.00	0.560	pCi/L		06/02/20 13:55	1
Client Sample ID:	EB-03							Lab Sample	D: 160-37	'918-8
ate Collected: 04/16		3								Water
ate Received: 04/29	/20 09:21									
Method: 903.0 - Rad	lium_226	(GEPC)								
Method: 303.0 - Itau	num-220		Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.0239	U	0.107	0.107	1.00	0.235	pCi/L	05/12/20 06:58	05/21/20 11:49	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	82.7		40 - 110					05/12/20 06:58	•	1
Method: 904.0 - Rad	lium-228	(GFPC)								
			Count	Total						
• • •		o	Uncert.	Uncert.						
Analyte Radium-228	0.340	Qualifier	<u>(2σ+/-)</u> 0.339	<u>(2σ+/-)</u> 0.341	RL 1.00	0.551		Prepared	Analyzed 06/01/20 08:30	Dil Fac
Naululli-220	0.540	0	0.559	0.541	1.00	0.551	poi/L	03/21/20 13.13	00/01/20 08:30	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	80.7		40 - 110						06/01/20 08:30	1
Y Carrier	91.6		40 - 110					05/21/20 13:15	06/01/20 08:30	1
Method: Ra226 Ra2	228 - Com	binod Pac	lium_226 a	nd Padium	228					
	.20 - 0011		Count	Total	-220					
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 σ +/-)	(2 σ +/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.316	U –	0.355	0.357	5.00	0.551	pCi/L		06/02/20 13:55	1
Client Sample ID:	FB-03							Lab Sample	D: 160-37	'918-9
ate Collected: 04/16	6/20 10:30									Water
Date Received: 04/29	/20 09:21									
-	lium-226	(GFPC)								
Method: 903.0 - Red		(3.1.0)	Count	Total						
Method: 903.0 - Rad			Uncert.	Uncert.						
Method: 903.0 - Rad					ы	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL		Onit			
	Result -0.0736		(2σ+/-) 0.0954	(2σ+/-) 0.0956	1.00	0.240		05/12/20 06:58		1
Method: 903.0 - Rad Analyte Radium-226 Carrier	-0.0736							05/12/20 06:58 Prepared	-	1 Dil Fac

Eurofins TestAmerica, St. Louis

Client: Consumers Energy Project/Site: JH Campbell Background Wells

Job ID: 160-37918-1

Client Sample ID: FB-03 Date Collected: 04/16/20 10:30 Date Received: 04/29/20 09:21

Method: 904.0 - Rad	lium-228	(GFPC)	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.175	U *	0.307	0.307	1.00	0.520	pCi/L	05/21/20 13:15	06/01/20 08:30	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	89.0		40 - 110					05/21/20 13:15	06/01/20 08:30	1
Y Carrier	92.3		40 - 110					05/21/20 13:15	06/01/20 08:30	1
Method: Ra226_Ra2	228 - Com	bined Rad			-228					
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226	0.101	U	0.321	0.322	5.00	0.520	pCi/L		06/02/20 13:55	1

Matrix: Water

Method: 903.0 - Radium-226 (GFPC)

Carrier

Ba Carrier

Y Carrier

%Yield Qualifier

92.3

90.5

Limits

40 - 110

40 - 110

Lab Sample Matrix: Wate Analysis Bat	r		52/12-A						Client Sam	ple ID: Metho Prep Type: T Prep Batch:	otal/NA
-		мв	МВ	Count Uncert.	Total Uncert.						
Analyte			Qualifier	(2σ+/-)	(2 σ+/-)	RL		Unit	Prepared	Analyzed	Dil Fac
Radium-226		-0.06774	U	0.0617	0.0620	1.00	0.177	pCi/L	05/12/20 06:58	05/21/20 11:49	1
		МВ	МВ								
Carrier		%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier		101		40 - 110					05/12/20 06:58	3 05/21/20 11:49	1
Lab Sample		160-470	052/1_0					Cli	ent Sample ID:	Lab Control	Sample
Matrix: Wate		100-470	002/1-4						cint outliple ib.	Prep Type: T	
Analysis Bat		38								Prep Batch:	
		••				Total					
			Spike	LCS	LCS	Uncert.				%Rec.	
Analyte			Added	Result	Qual	(2 σ+/-)	RL	MDC	Unit %Rec	Limits	
Radium-226			11.3	10.19		1.22	1.00	0.244	pCi/L 90	75 - 125	
	100	LCS									
	LUS										
Carrier		Qualifier	Limits								
Carrier Ba Carrier		Qualifier	<i>Limits</i> 40 - 110	-							
Ba Carrier	%Yield 78.0		40 - 110	-				Olivert 0		0	
Ba Carrier Lab Sample	%Yield 78.0		40 - 110	-				Client S	ample ID: Lab		
Ba Carrier Lab Sample Matrix: Wate	%Yield 78.0 ID: LCSE	0 160-47	40 - 110	-				Client S	ample ID: Lab	Prep Type: T	otal/NA
Ba Carrier Lab Sample Matrix: Wate	%Yield 78.0 ID: LCSE	0 160-47	40 - 110	-		Total		Client S	ample ID: Lab		otal/NA
Ba Carrier Lab Sample Matrix: Wate	%Yield 78.0 ID: LCSE	0 160-47	40 - 110 0052/2-A		LCSD	Total Uncert.		Client S	ample ID: Lab	Prep Type: T Prep Batch:	otal/NA 470052
Ba Carrier Lab Sample Matrix: Wate Analysis Bat	%Yield 78.0 ID: LCSE	0 160-47	40 - 110		LCSD Qual	Total Uncert. (2σ+/-)	RL	Client S	·	Prep Type: T	otal/NA 470052 REF
Ba Carrier Lab Sample Matrix: Wate Analysis Bat	%Yield 78.0 ID: LCSE	0 160-47	40 - 110 20052/2-A Spike	LCSD		Uncert.		MDC	·	Prep Type: T Prep Batch: %Rec.	otal/NA 470052 RER R Limit
Ba Carrier Lab Sample Matrix: Wate Analysis Bat	%Yield 78.0 ID: LCSE er tch: 4710	38	40 - 110 20052/2-A Spike Added	LCSD Result		Uncert. (2σ+/-)	RL	MDC	Unit %Rec	Prep Type: T Prep Batch: %Rec. Limits RE	otal/NA 470052 RER R Limit
Ba Carrier Lab Sample Matrix: Wate Analysis Bat	%Yield 78.0 ID: LCSE tch: 4710 LCSD	38	40 - 110 0052/2-A Spike Added 11.3	LCSD Result		Uncert. (2σ+/-)	RL	MDC	Unit %Rec	Prep Type: T Prep Batch: %Rec. Limits RE	otal/NA 470052 RER R Limit
Ba Carrier Lab Sample Matrix: Wate Analysis Bat Analyte Radium-226	%Yield 78.0 ID: LCSE tch: 4710 LCSD) 160-47 38 	40 - 110 0052/2-A Spike Added 11.3	LCSD Result 9.811		Uncert. (2σ+/-)	RL	MDC	Unit %Rec	Prep Type: T Prep Batch: %Rec. Limits RE	otal/NA 470052 RER R Limit
Ba Carrier Lab Sample Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier	%Yield 78.0 ID: LCSE tch: 4710 LCSD %Yield 94.7	0 160-47 38 LCSD Qualifier	40 - 110 0052/2-A Spike Added 11.3 Limits 40 - 110	LCSD Result 9.811		Uncert. (2σ+/-)	RL	MDC	Unit %Rec	Prep Type: T Prep Batch: %Rec. Limits RE	otal/NA 470052 RER R Limit
Ba Carrier Lab Sample Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier	%Yield 78.0 ID: LCSE tch: 4710 LCSD %Yield 94.7	0 160-47 38 LCSD Qualifier	40 - 110 0052/2-A Spike Added 11.3 Limits 40 - 110	LCSD Result 9.811		Uncert. (2σ+/-)	RL	MDC	Unit %Rec	Prep Type: T Prep Batch: %Rec. Limits RE	otal/NA 470052 RER R Limit
Ba Carrier Lab Sample Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier Method: 904	%Yield 78.0 ID: LCSE tch: 4710 LCSD %Yield 94.7 4.0 - Ra	0 160-47 38 LCSD Qualifier dium-2	40 - 110 0052/2-A Spike Added 11.3 Limits 40 - 110 228 (GFPC	LCSD Result 9.811		Uncert. (2σ+/-)	RL	MDC	Unit %Rec pCi/L 86	Prep Type: T Prep Batch: %Rec. Limits RE	otal/NA 470052 RER <u>R</u> Limit 6 1
Ba Carrier Lab Sample Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier Method: 904	%Yield 78.0 ID: LCSE tch: 4710 LCSD %Yield 94.7 4.0 - Ra ID: MB 1	0 160-47 38 LCSD Qualifier dium-2	40 - 110 0052/2-A Spike Added 11.3 Limits 40 - 110 228 (GFPC	LCSD Result 9.811		Uncert. (2σ+/-)	RL	MDC	Unit %Rec pCi/L 86	Prep Type: T Prep Batch: %Rec. Limits RE 75 - 125 0.1	otal/NA 470052 REF 6 1
Ba Carrier Lab Sample Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier Idethod: 904 Lab Sample	%Yield 78.0 ID: LCSE sr tch: 4710	0 160-47 38 <i>LCSD</i> <i>Qualifier</i> dium-2 60-4710	40 - 110 0052/2-A Spike Added 11.3 Limits 40 - 110 228 (GFPC	LCSD Result 9.811		Uncert. (2σ+/-)	RL	MDC	Unit %Rec pCi/L 86	Prep Type: T Prep Batch: %Rec. Limits RE 75 - 125 0.1	d Blank
Ba Carrier Lab Sample Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier Method: 904 Lab Sample Matrix: Wate	%Yield 78.0 ID: LCSE sr tch: 4710	0 160-47 38 <i>LCSD</i> <i>Qualifier</i> dium-2 60-4710 06	40 - 110 0052/2-A Added 11.3 Limits 40 - 110 228 (GFPC 99/13-A	LCSD Result 9.811		Uncert. (2σ+/-)	RL	MDC	Unit %Rec pCi/L 86	Prep Type: T Prep Batch: %Rec. Limits RE 75-125 0.1	d Blank
Ba Carrier Lab Sample Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier Method: 904 Lab Sample Matrix: Wate Analysis Bat	%Yield 78.0 ID: LCSE sr tch: 4710	0 160-47 38 <i>LCSD</i> <i>Qualifier</i> dium-2 60-4710 06 MB	40 - 110 0052/2-A Spike Added 11.3 <u>Limits</u> 40 - 110 228 (GFPC 99/13-A MB	LCSD Result 9.811	Qual Total Uncert.	Uncert. (2σ+/-) 1.14	RL 1.00	MDC 0.198	Unit <u>%Rec</u> pCi/L 86	Prep Type: T Prep Batch: %Rec. Limits RE 75-125 0.1	d Blank d71099
Ba Carrier Lab Sample Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier Attinet Sample Matrix: Wate Analysis Bat Analysis Bat	%Yield 78.0 ID: LCSE sr tch: 4710	0 160-47 38 <i>LCSD</i> <i>Qualifier</i> dium-2 60-4710 06 MB Result	40 - 110 0052/2-A Spike Added 11.3 Limits 40 - 110 228 (GFPC 99/13-A MB Qualifier	LCSD Result 9.811	Qual Total Uncert. (2σ+/-)	Uncert. (2σ+/-) 1.14	RL 1.00	MDC 0.198	Unit %Rec pCi/L 86 Client Sam	Prep Type: T Prep Batch: %Rec. Limits RE 75 - 125 0.1	d Blank d71099
Ba Carrier Lab Sample Matrix: Wate Analysis Bat Analyte Radium-226 Carrier Ba Carrier Method: 904 Lab Sample Matrix: Wate Analysis Bat	%Yield 78.0 ID: LCSE sr tch: 4710	0 160-47 38 <i>LCSD</i> <i>Qualifier</i> dium-2 60-4710 06 MB	40 - 110 0052/2-A Spike Added 11.3 Limits 40 - 110 228 (GFPC 99/13-A MB Qualifier	LCSD Result 9.811	Qual Total Uncert.	Uncert. (2σ+/-) 1.14	RL 1.00	MDC 0.198	Unit <u>%Rec</u> pCi/L 86	Prep Type: T Prep Batch: %Rec. Limits RE 75 - 125 0.1	d Blank 471099

Prepared	Analyzed	Dil Fac
05/21/20 13:15	06/01/20 08:30	1
05/21/20 13:15	06/01/20 08:30	1

Eurofins TestAmerica, St. Louis

Job ID: 160-37918-1

Lab Sample	ID: LCS	160-47109	9/1-A					Clie	ent Sai	nple ID:	Lab Cont	rol Sa	mple	
Matrix: Wat											Prep Typ			
Analysis Ba	atch: 4716	;06									Prep Bat	ch: 47	′1099	
			• "			Total					~-			
			Spike	-	LCS	Uncert.					%Rec.			
Analyte			Added	Result	Qual	(2σ+/-)	RL		Unit	%Rec	Limits			
Radium-228			11.7	12.39		1.50	1.00	0.631	pCi/L	106	75 - 125			
	LCS	LCS												
Carrier	%Yield	Qualifier	Limits											
Ba Carrier	80.7		40 - 110											
Y Carrier	86.4		40 - 110											
Lab Sample	ID: LCS) 160-471()99/2-A					Client S	ample	ID: Lab	Control S	ample	a Dup	
Matrix: Wat											Prep Typ			1
Analysis Ba		606									Prep Bat			
,						Total								
			Spike	LCSD	LCSD	Uncert.					%Rec.		RER	
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit	
Radium-228			11.7	2.831	*	1.27	1.00	1.78	pCi/L	24	75 - 125	3.46	1	
	LCSD	LCSD												
Carrier	%Yield	Qualifier	Limits											
Ba Carrier	27.9	X	40 - 110											

Y Carrier 86.7 40 - 110

QC Association Summary

Prep Type

Total/NA

Matrix

Water

Client: Consumers Energy Project/Site: JH Campbell Background Wells

Client Sample ID

JHC-MW-15024

JHC-MW-15025

JHC-MW-15027

JHC-MW-15023

JHC-MW-15026

JHC-MW-15028

Method Blank

Lab Control Sample

Lab Control Sample Dup

DUP-03

EB-03

FB-03

Prep Batch

Method

PrecSep STD

4	
1	1

LCSD 160-470052/2-A Prep Batch: 471099

MB 160-470052/12-A

LCS 160-470052/1-A

Prep Batch: 470052

Lab Sample ID

160-37918-1

160-37918-2

160-37918-3

160-37918-4

160-37918-5

160-37918-6

160-37918-7

160-37918-8

160-37918-9

Rad

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-37918-1	JHC-MW-15024	Total/NA	Water	PrecSep_0	
160-37918-2	JHC-MW-15025	Total/NA	Water	PrecSep_0	
160-37918-3	JHC-MW-15027	Total/NA	Water	PrecSep_0	
160-37918-4	JHC-MW-15023	Total/NA	Water	PrecSep_0	
160-37918-5	JHC-MW-15026	Total/NA	Water	PrecSep_0	
160-37918-6	JHC-MW-15028	Total/NA	Water	PrecSep_0	
160-37918-7	DUP-03	Total/NA	Water	PrecSep_0	
160-37918-8	EB-03	Total/NA	Water	PrecSep_0	
160-37918-9	FB-03	Total/NA	Water	PrecSep_0	
MB 160-471099/13-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-471099/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-471099/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

Tracer/Carrier Summary

Eurofins TestAmerica, St. Louis

6/3/2020

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water

			Percent Yield (Acceptance Limits)
		Ba Carrier	
Lab Sample ID	Client Sample ID	(40-110)	
160-37918-1	JHC-MW-15024	91.8	
160-37918-2	JHC-MW-15025	64.2	
160-37918-3	JHC-MW-15027	95.9	
160-37918-4	JHC-MW-15023	95.6	
160-37918-5	JHC-MW-15026	107	
160-37918-6	JHC-MW-15028	90.9	
160-37918-7	DUP-03	96.9	
160-37918-8	EB-03	82.7	
160-37918-9	FB-03	82.7	
LCS 160-470052/1-A	Lab Control Sample	78.0	
LCSD 160-470052/2-A	Lab Control Sample Dup	94.7	
MB 160-470052/12-A	Method Blank	101	
Tracer/Carrier Legend	1		
Ba Carrier = Ba Carrier			

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water

				Percent Yield (Acceptance Limits)
		Ba Carrier	Y Carrier	
Lab Sample ID	Client Sample ID	(40-110)	(40-110)	
160-37918-1	JHC-MW-15024	65.6	87.1	
160-37918-2	JHC-MW-15025	25.8 X	83.7	
160-37918-3	JHC-MW-15027	34.7 X	86.7	
160-37918-4	JHC-MW-15023	75.7	89.3	
160-37918-5	JHC-MW-15026	79.8	79.3	
160-37918-6	JHC-MW-15028	76.9	87.1	
160-37918-7	DUP-03	81.0	90.5	
160-37918-8	EB-03	80.7	91.6	
160-37918-9	FB-03	89.0	92.3	
LCS 160-471099/1-A	Lab Control Sample	80.7	86.4	
LCSD 160-471099/2-A	Lab Control Sample Dup	27.9 X	86.7	
MB 160-471099/13-A	Method Blank	92.3	90.5	

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Y Carrier = Y Carrier

Prep Type: Total/NA

12



135 W. Trail St. Jackson, MI 49201

- To: KDStarken, JH Campbell Complex
- From: EBlaj, T-258
- Date: May 04, 2020
- Subject: JH CAMPBELL SOLID WASTE DISPOSAL AREA GROUNDWATER MONITORING 2nd Quarter, 2020 Pond A Wells
 - CC: BLSwanberg, P22-119 BTRunkel, P22-120 HDRegister, P22-521

Sarah Holmstrom, Project Manager TRC Companies, Inc. 1540 Eisenhower Place Ann Arbor, MI 48108

Chemistry Project: 20-0384

CE Laboratory Services conducted groundwater monitoring on 04/13/2020 through 04/16/2020 at the JH Campbell Solid Waste Disposal Area, for the 2nd Quarter monitoring requirements. The samples were received in the Chemistry department on 04/16/2020.

Samples for Radium analysis have been subcontracted to Eurofins/TestAmerica, Inc. and their results are being reported separately. Samples for Total Sulfide have been subcontracted to Merit Laboratories, Inc. The results are listed under the analyst initials "Merit" and the original report is attached. Please note that the subcontracted work is not reported under the CE laboratory scope of accreditation.

With the exception noted above, the report that follows presents the results of the requested analytical testing; the results apply only to the samples, as received. All samples have been analyzed in accordance with the 2009 TNI Standard and the applicable A2LA accreditation scope for Laboratory Services. Any exceptions to applicable test method criteria and standard compliance are noted in the Case Narrative, or flagged with applicable qualifiers in the analytical results section.

Reviewed and approved by:

Emil Blaj Sr. Technical Analyst Project Lead



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

CASE NARRATIVE

I. Sample Receipt

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

NOTE: A typo on the Chain of Custody form regarding the project number has been corrected upon laboratory sample receipt.

II. Methodology

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

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

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

NOTE: Due to matrix interference / possible carry over effects the reporting limit for Silver has been increased for sample 20-0384-01 and 20-0384-06; the results have been flagged (K).

DEFINITIONS / QUALIFIERS

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

Acronym	Description
RL	Reporting Limit
ND	Result not detected or below Reporting Limit
NT	Not a TNI Analyte
LCS	Laboratory Control Sample
LRB	Laboratory Reagent Blank (also referred to as Method Blank)
DUP	Duplicate
MS	Matrix Spike
MSD	Matrix Spike Duplicate
RPD	Relative Percent Difference

- MDL Method Detection Limit
- PQL Practical Quantitation Limit

TDLTarget Detection LimitSMStandard Methods Compendium

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



Customer Name:JH Campbell ComplexWork Order ID:Q2 Pond A WellsDate Received:4/16/2020Chemistry Project:20-0384

Sample #	Field Sample ID	Matrix	Sample Date	Site
20-0384-01	JHC-MW-15006	Groundwater	04/14/2020 03:01 PM	JHC RCRA GW Monitoring - Pond A Unit
20-0384-02	JHC-MW-15007	Groundwater	04/14/2020 12:12 PM	JHC RCRA GW Monitoring - Pond A Unit
20-0384-03	JHC-MW-15008R	Groundwater	04/14/2020 11:26 AM	JHC RCRA GW Monitoring - Pond A Unit
20-0384-04	JHC-MW-15009	Groundwater	04/14/2020 10:36 AM	JHC RCRA GW Monitoring - Pond A Unit
20-0384-05	JHC-MW-15010	Groundwater	04/14/2020 09:42 AM	JHC RCRA GW Monitoring - Pond A Unit
20-0384-06	JHC-MW-15011	Groundwater	04/15/2020 09:36 AM	JHC RCRA GW Monitoring - Pond A Unit
20-0384-07	DUP-02	Groundwater	04/14/2020 10:36 AM	JHC RCRA GW Monitoring - Pond A Unit
20-0384-08	EB-02	Groundwater	04/14/2020 09:46 AM	JHC RCRA GW Monitoring - Pond A Unit
20-0384-09	FB-02	Groundwater	04/14/2020 03:06 PM	JHC RCRA GW Monitoring - Pond A Unit
20-0384-10	JHC-MW-15007 Field MS	Groundwater	04/14/2020 12:12 PM	JHC RCRA GW Monitoring - Pond A Unit
20-0384-11	JHC-MW-15007 Field MSD	Groundwater	04/14/2020 12:12 PM	JHC RCRA GW Monitoring - Pond A Unit



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	20-0384
Field Sample ID:	JHC-MW-15006	Collect Date:	04/14/2020
Lab Sample ID:	20-0384-01	Collect Time:	03:01 PM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous				Aliquot:	20-0384-01-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/20/2020	AB20-0420-10
Metals by EPA 6020B: HMP-AMP Detection & Assessment Monitorin					20-0384-01-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	1		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	5		ug/L	1	04/27/2020	AB20-0427-04
Barium	353		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	284		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	102000		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	1		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	15	04/27/2020	AB20-0427-04
Copper	1		ug/L	1	04/27/2020	AB20-0427-04
Iron	26		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	13		ug/L	10	04/27/2020	AB20-0427-04
Molybdenum	16		ug/L	5	04/27/2020	AB20-0427-04
Nickel	1		ug/L	1	04/27/2020	AB20-0427-04
Selenium	9		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND	К	ug/L	0.4	04/27/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	10		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous			Aliquot:	Analyst: DMW		
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	24900		ug/L	1000	04/22/2020	AB20-0422-04
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-04
Sulfate	260000		ug/L	2000	04/24/2020	AB20-0422-04
Total Dissolved Solids by SM 2540	C			Aliquot:	20-0384-01-C04-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	562		mg/L	10	04/17/2020	AB20-0417-02



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	20-0384
Field Sample ID:	JHC-MW-15007	Collect Date:	04/14/2020
Lab Sample ID:	20-0384-02	Collect Time:	12:12 PM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous			Aliquot:	20-0384-02-C02-A01	Analyst: TMR	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/20/2020	AB20-0420-10
Metals by EPA 6020B: HMP-AMP Detection & Assessment Monitorin					20-0384-02-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	3		ug/L	1	04/27/2020	AB20-0427-04
Barium	266		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	242		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	62100		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	2		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	15	04/27/2020	AB20-0427-04
Copper	1		ug/L	1	04/27/2020	AB20-0427-04
Iron	ND		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	14		ug/L	10	04/27/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	1	04/27/2020	AB20-0427-04
Selenium	22		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	14		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule	Analyte List, CI, F,	SO4, Aqu	eous	Aliquot: 20-0384-02-C03-A01		Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	14100		ug/L	1000	04/22/2020	AB20-0422-04
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-04
Sulfate	83000		ug/L	2000	04/22/2020	AB20-0422-04
Total Dissolved Solids by SM 2	540C			Aliquot:	20-0384-02-C04-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	336		mg/L	10	04/17/2020	AB20-0417-02



Zinc

Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	20-0384
Field Sample ID:	JHC-MW-15008R	Collect Date:	04/14/2020
Lab Sample ID:	20-0384-03	Collect Time:	11:26 AM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous			Aliquot: 2	Aliquot: 20-0384-03-C02-A01		
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/20/2020	AB20-0420-10
Metals by EPA 6020B: HM	IP-AMP Detection & Asses	ssment M	onitorin	Aliquot: 2	20-0384-03-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	1		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	ND		ug/L	1	04/27/2020	AB20-0427-04
Barium	252		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	505		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	99900		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	ND		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	15	04/27/2020	AB20-0427-04
Copper	2		ug/L	1	04/27/2020	AB20-0427-04
Iron	134		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	19		ug/L	10	04/27/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	1	04/27/2020	AB20-0427-04
Selenium	6		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	ND		ug/L	2	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule Ana	alyte List, Cl, F,	SO4, Aqu	eous	Aliquot: 20-0384-03-C03-A01		01 Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #	
Chloride	25000		ug/L	1000	04/22/2020	AB20-0422-04	
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-04	
Sulfate	235000		ug/L	2000	04/24/2020	AB20-0422-04	
Total Dissolved Solids by SM 25400	>			Aliquot:	20-0384-03-C04-A01	Analyst: SLK	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #	
Total Dissolved Solids	566		mg/L	10	04/17/2020	AB20-0417-02	

ug/L

10

04/27/2020

AB20-0427-04

ND



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	20-0384
Field Sample ID:	JHC-MW-15009	Collect Date:	04/14/2020
Lab Sample ID:	20-0384-04	Collect Time:	10:36 AM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous			Aliquot:	20-0384-04-C02-A01	Analyst: TMR	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/20/2020	AB20-0420-10
Metals by EPA 6020B: HMP-AN	IP Detection & Asse	ssment M	onitorin	Aliquot:	20-0384-04-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	1		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	ND		ug/L	1	04/27/2020	AB20-0427-04
Barium	307		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	874		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	78700		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	1		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	15	04/27/2020	AB20-0427-04
Copper	1		ug/L	1	04/27/2020	AB20-0427-04
Iron	ND		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	14		ug/L	10	04/27/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	1	04/27/2020	AB20-0427-04
Selenium	77		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	ND		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule A	by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous Aliquot: 20-0384-04-C03-A01			Analyst: DMW		
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	6950		ug/L	1000	04/22/2020	AB20-0422-04
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-04
Sulfate	49100		ug/L	2000	04/22/2020	AB20-0422-04
Total Dissolved Solids by SM 254	0C			Aliquot:	20-0384-04-C04-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	354		mg/L	10	04/17/2020	AB20-0417-02



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	20-0384
Field Sample ID:	JHC-MW-15010	Collect Date:	04/14/2020
Lab Sample ID:	20-0384-05	Collect Time:	09:42 AM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous			Aliquot: 20-0384-05-C02-A01		Analyst: TMR	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/20/2020	AB20-0420-10
Metals by EPA 6020B: HMP	-AMP Detection & Asse	ssment M	onitorin	Aliquot:	20-0384-05-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	ND		ug/L	1	04/27/2020	AB20-0427-04
Barium	276		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	2350		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	82700		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	1		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	15	04/27/2020	AB20-0427-04
Copper	1		ug/L	1	04/27/2020	AB20-0427-04
Iron	ND		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	20		ug/L	10	04/27/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	1	04/27/2020	AB20-0427-04
Selenium	158		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	4		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule	Analyte List, Cl, F,	SO4, Aqu	eous	Aliquot: 20-0384-05-C03-A01		Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	3200		ug/L	1000	04/22/2020	AB20-0422-05
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Sulfate	35900		ug/L	2000	04/22/2020	AB20-0422-05
Total Dissolved Solids by SM 25	540C			Aliquot:	20-0384-05-C04-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	333		mg/L	10	04/17/2020	AB20-0417-02



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	20-0384
Field Sample ID:	JHC-MW-15011	Collect Date:	04/15/2020
Lab Sample ID:	20-0384-06	Collect Time:	09:36 AM
Matrix:	Groundwater		

Total Mercury by EPA 7470	A, Aqueous			Aliquot: 2	20-0384-06-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/20/2020	AB20-0420-10
Metals by EPA 6020B: CCR	Rule Appendix III-IV Tota	al Metals	Expand	Aliquot: 2	20-0384-06-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	4		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	25		ug/L	1	04/27/2020	AB20-0427-04
Barium	514		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	2870		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	0.2		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	112000		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	ND		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	6	04/27/2020	AB20-0427-04
Copper	1		ug/L	1	04/27/2020	AB20-0427-04
Iron	145		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	21		ug/L	10	04/27/2020	AB20-0427-04
Magnesium	39500		ug/L	1000	04/28/2020	AB20-0427-04
Molybdenum	7		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	2	04/27/2020	AB20-0427-04
Potassium	6640		ug/L	100	04/28/2020	AB20-0427-04
Selenium	29		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND	К	ug/L	0.4	04/27/2020	AB20-0427-04
Sodium	11700		ug/L	1000	04/28/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	40		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 Aqueous, NO2, NO3			Aliquot: 20-0384-06-C03-A01		Analyst: JDM
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking #
Nitrate	ND	ug/L	100	04/16/2020	AB20-0420-05
Nitrite	ND	ug/L	100	04/16/2020	AB20-0420-05

Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous			Aliquot: 20-0384-06-C03-A02		Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	4160		ug/L	1000	04/22/2020	AB20-0422-05
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Sulfate	183000		ug/L	2000	04/22/2020	AB20-0422-05



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	20-0384
Field Sample ID:	JHC-MW-15011	Collect Date:	04/15/2020
Lab Sample ID:	20-0384-06	Collect Time:	09:36 AM
Matrix:	Groundwater		

Total Dissolved Solids by SM 2540C				Aliquot: 20-0384-06-C04-A01		Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	542		mg/L	10	04/17/2020	AB20-0417-02
Nitrogen-Ammonia by SM4500NH3(h	n), Groundwate	er HL		Aliquot: 2	20-0384-06-C07-A01	Analyst: BEK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Ammonia	ND		ug/L	25	04/21/2020	AB20-0421-16
Alkalinity by SM 2320B				Aliquot: 2	20-0384-06-C08-A01	Analyst: BEK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Alkalinity total	260000		ug/L	10000	04/17/2020	AB20-0423-15
Alkalinity bicarbonate	260000		ug/L	10000	04/17/2020	AB20-0423-15
Alkalinity carbonate	ND		ug/L	10000	04/17/2020	AB20-0423-15
Sulfide, Total by SM 4500 S2D				Aliquot: 2	20-0384-06-C10-A01	Analyst: Merit
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Sulfide	ND		ug/L	40	04/20/2020	AB20-0429-12



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	20-0384
Field Sample ID:	DUP-02	Collect Date:	04/14/2020
Lab Sample ID:	20-0384-07	Collect Time:	10:36 AM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous				Aliquot: 20-0384-07-C02-A01		Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/20/2020	AB20-0420-10
Metals by EPA 6020B: HMP-/	AMP Detection & Asse	ssment M	onitorin	Aliquot:	20-0384-07-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	1		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	ND		ug/L	1	04/27/2020	AB20-0427-04
Barium	298		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	881		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	79900		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	1		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	15	04/27/2020	AB20-0427-04
Copper	2		ug/L	1	04/27/2020	AB20-0427-04
Iron	ND		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	14		ug/L	10	04/27/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	1		ug/L	1	04/27/2020	AB20-0427-04
Selenium	79		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	ND		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous		Aliquot: 20-0384-07-C03-A01		Analyst: DMW		
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	6780		ug/L	1000	04/22/2020	AB20-0422-05
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Sulfate	49900		ug/L	2000	04/22/2020	AB20-0422-05
Total Dissolved Solids by SM 254	0C			Aliquot:	20-0384-07-C04-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	341		mg/L	10	04/17/2020	AB20-0417-02



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	20-0384
Field Sample ID:	EB-02	Collect Date:	04/14/2020
Lab Sample ID:	20-0384-08	Collect Time:	09:46 AM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous			Aliquot: 20-0384-08-C02-A01		Analyst: TMR	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/20/2020	AB20-0420-10
Metals by EPA 6020B: HMP	-AMP Detection & Asses	ssment M	onitorin	Aliquot:	20-0384-08-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	ND		ug/L	1	04/27/2020	AB20-0427-04
Barium	ND		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	ND		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	ND		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	ND		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	15	04/27/2020	AB20-0427-04
Copper	ND		ug/L	1	04/27/2020	AB20-0427-04
Iron	ND		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	ND		ug/L	10	04/27/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	1	04/27/2020	AB20-0427-04
Selenium	ND		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	ND		ug/L	2	04/27/2020	AB20-0427-04
Zinc	ND		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous			Aliquot: 20-0384-08-C03-A01		Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Sulfate	ND		ug/L	2000	04/22/2020	AB20-0422-05
Total Dissolved Solids by SM 25	40C			Aliquot:	20-0384-08-C04-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	ND		mg/L	10	04/17/2020	AB20-0417-02



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	20-0384
Field Sample ID:	FB-02	Collect Date:	04/14/2020
Lab Sample ID:	20-0384-09	Collect Time:	03:06 PM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous			Aliquot: 20-0384-09-C02-A01		Analyst: TMR	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/20/2020	AB20-0420-10
Metals by EPA 6020B: HMP-AMP Detection & Assessment Monitorin				Aliquot:	20-0384-09-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2020	AB20-0427-04
Arsenic	ND		ug/L	1	04/27/2020	AB20-0427-04
Barium	ND		ug/L	5	04/27/2020	AB20-0427-04
Beryllium	ND		ug/L	1	04/27/2020	AB20-0427-04
Boron	ND		ug/L	20	04/27/2020	AB20-0427-04
Cadmium	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Calcium	ND		ug/L	1000	04/28/2020	AB20-0427-04
Chromium	ND		ug/L	1	04/27/2020	AB20-0427-04
Cobalt	ND		ug/L	15	04/27/2020	AB20-0427-04
Copper	ND		ug/L	1	04/27/2020	AB20-0427-04
Iron	ND		ug/L	20	04/28/2020	AB20-0427-04
Lead	ND		ug/L	1	04/27/2020	AB20-0427-04
Lithium	ND		ug/L	10	04/27/2020	AB20-0427-04
Molybdenum	ND		ug/L	5	04/27/2020	AB20-0427-04
Nickel	ND		ug/L	1	04/27/2020	AB20-0427-04
Selenium	ND		ug/L	1	04/27/2020	AB20-0427-04
Silver	ND		ug/L	0.2	04/27/2020	AB20-0427-04
Thallium	ND		ug/L	2	04/27/2020	AB20-0427-04
Vanadium	ND		ug/L	2	04/27/2020	AB20-0427-04
Zinc	13		ug/L	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous			Aliquot:	20-0384-09-C03-A01	Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Fluoride	ND		ug/L	1000	04/22/2020	AB20-0422-05
Sulfate	ND		ug/L	2000	04/22/2020	AB20-0422-05
Total Dissolved Solids by SM 2	540C			Aliquot:	20-0384-09-C04-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	ND		mg/L	10	04/17/2020	AB20-0417-02



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	20-0384
Field Sample ID:	JHC-MW-15007 Field MS	Collect Date:	04/14/2020
Lab Sample ID:	20-0384-10	Collect Time:	12:12 PM
Matrix:	Groundwater		

Total Mercury by EPA 747	/0A, Aqueous			Aliquot:	20-0384-10-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	100		%	0.2	04/20/2020	AB20-0420-10
Metals by EPA 6020B: HM	IP-AMP Detection & Asse	essment M	onitorin	Aliquot:	20-0384-10-C02-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	111		%	1	04/27/2020	AB20-0427-04

Antimony	111	%	1	04/27/2020	AB20-0427-04
Arsenic	105	%	1	04/27/2020	AB20-0427-04
Barium	111	%	5	04/27/2020	AB20-0427-04
Beryllium	108	%	1	04/27/2020	AB20-0427-04
Boron	107	%	20	04/27/2020	AB20-0427-04
Cadmium	108	%	0.2	04/27/2020	AB20-0427-04
Calcium	120	%	1000	04/28/2020	AB20-0427-04
Chromium	100	%	1	04/27/2020	AB20-0427-04
Cobalt	97	%	15	04/27/2020	AB20-0427-04
Copper	99	%	1	04/27/2020	AB20-0427-04
Iron	93	%	20	04/28/2020	AB20-0427-04
Lead	105	%	1	04/27/2020	AB20-0427-04
Lithium	107	%	10	04/27/2020	AB20-0427-04
Molybdenum	109	%	5	04/27/2020	AB20-0427-04
Nickel	99	%	1	04/27/2020	AB20-0427-04
Selenium	102	%	1	04/27/2020	AB20-0427-04
Silver	105	%	0.2	04/27/2020	AB20-0427-04
Thallium	104	%	2	04/27/2020	AB20-0427-04
Vanadium	102	%	2	04/27/2020	AB20-0427-04
Zinc	103	%	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous			Aliquot: 20-0384-10-C03-A01		Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	99		%	1000	04/22/2020	AB20-0422-05
Fluoride	106		%	1000	04/22/2020	AB20-0422-05
Sulfate	107		%	2000	04/22/2020	AB20-0422-05



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	20-0384
Field Sample ID:	JHC-MW-15007 Field MSD	Collect Date:	04/14/2020
Lab Sample ID:	20-0384-11	Collect Time:	12:12 PM
Matrix:	Groundwater		

Total Mercury by EPA 7470A, Aqueous				Aliquot:	20-0384-11-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	102		%	0.2	04/20/2020	AB20-0420-10
Metals by EPA 6020B: HMP-AMP Detection & Assessment Monitorin			Aliquot:	20-0384-11-C02-A02	Analyst: SLK	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	115		%	1	04/27/2020	AB20-0427-04
Arsenic	106		%	1	04/27/2020	AB20-0427-04
Barium	114		%	5	04/27/2020	AB20-0427-04
Beryllium	109		%	1	04/27/2020	AB20-0427-04
Boron	113		%	20	04/27/2020	AB20-0427-04
Cadmium	110		%	0.2	04/27/2020	AB20-0427-04

	-				
Cadmium	110	%	0.2	04/27/2020	AB20-0427-04
Calcium	125	%	1000	04/28/2020	AB20-0427-04
Chromium	100	%	1	04/27/2020	AB20-0427-04
Cobalt	97	%	15	04/27/2020	AB20-0427-04
Copper	98	%	1	04/27/2020	AB20-0427-04
Iron	94	%	20	04/28/2020	AB20-0427-04
Lead	107	%	1	04/27/2020	AB20-0427-04
Lithium	108	%	10	04/27/2020	AB20-0427-04
Molybdenum	111	%	5	04/27/2020	AB20-0427-04
Nickel	100	%	1	04/27/2020	AB20-0427-04
Selenium	105	%	1	04/27/2020	AB20-0427-04
Silver	106	%	0.2	04/27/2020	AB20-0427-04
Thallium	106	%	2	04/27/2020	AB20-0427-04
Vanadium	102	%	2	04/27/2020	AB20-0427-04
Zinc	104	%	10	04/27/2020	AB20-0427-04

Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous			Aliquot: 20-0384-11-C03-A01		Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	95		%	1000	04/22/2020	AB20-0422-05
Fluoride	101		%	1000	04/22/2020	AB20-0422-05
Sulfate	107		%	2000	04/22/2020	AB20-0422-05



Data Qualifiers	Exception Summary		
K. Bl. in an and then the matrix in the features (a secility) and the			

K = RL increased due to matrix interference/possible carry over.

No other exceptions occured.

Chemistry Department

PROC CHEM-1,2,01 PAGE 1 OF 2 REVISION 2 ATTACHMENT A

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN - SHIPMENT INSPECTION FORM

Project Log-In Number: 20 - 0384		
Inspection Date: 04 16 20	Inspection By:	SUK BEK
Sample Origin/Project Name: JHC QHR. 2	Pond A wells.	• ·
Shipment Delivered By: Enter the type of shipment carrie	ðr,	
Pony FedEx UPS _ Other/Hard Parry (whom) S. H Consu	USPS	Airboine
Tracking Number:		
Shipping Containers: Enter the type and number of shipp		
Cooler () Cardboard Box	Custom Case	
Loose/Unpackaged Containers	Other	, ,
Condition of Shipment: Enter the as-received condition o	f the shipment container.	
Damaged Shipment Observed: None	Dented	Leaking
Shipment Security: Enter if any of the shipping container	s were opened before receipt.	
Shipping Containers Received: Opened		
Enclosed Documents: Enter the type of documents enclos	ed with the shipment.	
CoC X Work Request	Air Data Sheet	Other
Temperature of Containers: Measure the temperature of s	everal sample containers.	
As-Received Temperature 3.3 - 5.0 °C	Samples Received on Ice: Ye	25 × No
Number and Type of Containers: Enter the total number	of sample containers received	1.
	Other	Broken Leaking
VOA (40mL or 6 mL)	· · · · · · · · · · · · · · · · · · ·	
Quart/Liter (p/p) lb		······································
9-oz (amber glass jar)		
2-oz (amber glass)		
125 mL (plastic) 25		·
24 mL vial (glass)	······································	······································
500 mL (plastic)	·····	
Other $\frac{250 \text{ ML}}{\rho \text{ astic}} = 9$		

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CONSUMERS ENERGY

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Chemistry Department

PROC CHEM-1.2.0 PAGE 2 OF 2 REVISION 2 ATTACHMENT A

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN - SHIPMENT INSPECTION FORM

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

Project Log-In Number:	20-0384		
Inspection Dates04	16 20	Inspection By:	SUK BER

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

Sample/Container ID	Damage/Exception Report										
All samples.	- CE control # on COC states										
	20-0383										
	-All Bottles state 20-0384										
	- project # on Coc states										
	20-0384-										
······································											
·											
·											

page 2 of 2

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

Consumers Energy

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

SAMPLING SITE				· · · · · · · · · · · · · · · · · · ·	PROJECT NUMBER					ANALYSIS REQUESTED								PAGE 1 OF 1
JHC 2 nd Qtr. 2020 RCRA GW Monitoring Pond A Wells					20-0384								1 616		11011			SEND REPORT TO
SAM	PLING TEA	AM			DATE SHIPPED SI		SITE	TE SKETCHED ATTACHED? CIRCLE ONE										Beth Swanberg, TRC
CET / CLH / DMW							NO			Anions	S	Radium	Alkalinity	Ammonia	Sulfide		PHONE	
																Nitrates		
CONTROL # DATE TIME MAT		SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION		DEPTH	# OF CONTAINERS	Metals,	An	TDS	Ra	All	An	Suj	Nii	REMARKS			
20-0383-01 4.14.20 1501		GW	JHC-MW-15006			5	X	X	x	х								
	-02	-02 4.14.20 1212 GW JHC-MW-15007					5	x	x	x	x							
	-03	4.14.20	1126	GW	GW JHC-MW-15008R				5	x	X	x	х					
-04 4.14.20 1036 GW		GW	JHC-MW-15009			5	x	x	x	x								
	-05	4.14.20	0942	GW	JHC-MW-15010				5	x	x	х	х					
	-06	4.15.20	4-15-20 09.26 GW JHC-MW-15011				10	X	X	x	X	x	x	X	x	Nitrates / Sulfide		
	-07	4.14.20	1036	GW	DUP-02				5	x	x	x	х			:		
	-08	08 4.14.20 0946 GW EB-02 09 4.14.20 1506 GW FB-02				5	x	x	x	x								
	-09					5	x	X	Х	х								
	-10	4114120	1212	GW	JHC-MW-15007 Field MS				2	x	X							
	-11	4.14.20	1212	GW	JHC-MW-15007 Field MSD				2	x	X							
		•																
RELINQUISHED BY (SIGNATURE) DATE/				IME RECEIVED BY (SIGNATURE)				COMMENTS										
Cased Hansen 4/1				s/2c 834			D		Total Metals = HMP-AMP Metals and N Total Metals = Expanded List Metals and									
RELINQUISHED BY (SIGNATURE) DATE/				IME RECEIVED BY (SIGNATURE)				3.3-5.0 onice Sur 04/16/20										
04-1				to 11:38 Juit offer				ORIGINAL TO LAB COPY TO CUSTOMER										



Report ID: S13359.01(01) Generated on 04/20/2020

Report to

Attention: Emil Blaj Consumers Energy Company 135 West Trail Street Jackson, MI 49201

Phone: D:517-788-5888 C:517-684-9467 FAX: 517-788-2533 Email: emil.blaj@cmsenergy.com

Report Summary

Lab Sample ID(s): S13359.01-S13359.09 Project: JHC GW Monitoring Q2 Collected Date(s): 04/15/2020 - 04/16/2020 Submitted Date/Time: 04/17/2020 16:40 Sampled by: CET / CLH / DHW P.O. #: 4400088825

Table of Contents

Cover Page (Page 1) General Report Notes (Page 2) Report Narrative (Page 2) Laboratory Certifications (Page 3) Qualifier Descriptions (Page 3) Glossary of Abbreviations (Page 3) Method Summary (Page 4) Sample Summary (Page 5)

Naya Mushah

Maya Murshak Technical Director

Report produced by

Analytical Laboratory Report

Merit Laboratories, Inc. 2680 East Lansing Drive East Lansing, MI 48823

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Contacts for report questions: John Laverty (johnlaverty@meritlabs.com) Barbara Ball (bball@meritlabs.com)



Analytical Laboratory Report

General Report Notes

Analytical results relate only to the samples tested, in the condition received by the laboratory.

Methods may be modified for improved performance.

Results reported on a dry weight basis where applicable.

'Not detected' indicates that parameter was not found at a level equal to or greater than the reporting limit (RL).

40 CFR Part 136 Table II Required Containers, Preservation Techniques and Holding Times for the Clean Water Act specify that samples

for acrolein and acrylonitrile need to be preserved at a pH in the range of 4 to 5 or if not preserved, analyzed within 3 days of sampling.

QA/QC corresponding to this analytical report is a separate document with the same Merit ID reference and is available upon request. Full accreditation certificates are available upon request. Starred (*) analytes are not NELAP accredited.

Samples are held by the lab for 30 days from the final report date unless a written request to hold longer is provided by the client.

Report shall not be reproduced except in full, without the written approval of Merit Laboratories, Inc.

Limits for drinking water samples, are listed as the MCL Limits (Maximum Contaminant Level Concentrations)

Report Narrative

There is no additional narrative for this analytical report



Laboratory Certifications

Authority	Certification ID
Michigan DEQ	#9956
DOD ELAP/ISO 17025	#69699
WBENC	#2005110032
Ohio VAP	#CL0002
Indiana DOH	#C-MI-07
New York NELAC	#11814
North Carolina DENR	#680
North Carolina DOH	#26702
Alaska CSLAP	#17-001

Qualifier Descriptions

Qualifier	Description
!	Result is outside of stated limit criteria
В	Compound also found in associated method blank
E	Concentration exceeds calibration range
F	Analysis run outside of holding time
G	Estimated result due to extraction run outside of holding time
Н	Sample submitted and run outside of holding time
1	Matrix interference with internal standard
J	Estimated value less than reporting limit, but greater than MDL
L	Elevated reporting limit due to low sample amount
М	Result reported to MDL not RDL
0	Analysis performed by outside laboratory. See attached report.
R	Preliminary result
S	Surrogate recovery outside of control limits
Т	No correction for total solids
Х	Elevated reporting limit due to matrix interference
Υ	Elevated reporting limit due to high target concentration
b	Value detected less than reporting limit, but greater than MDL
е	Reported value estimated due to interference
j	Analyte also found in associated method blank
р	Benzo(b)Fluoranthene and Benzo(k)Fluoranthene integrated as one peak.
х	Preserved from bulk sample

Glossary of Abbreviations

Abbreviation	Description
RL/RDL	Reporting Limit
MDL	Method Detection Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
SW	EPA SW 846 (Soil and Wastewater) Methods
E	EPA Methods
SM	Standard Methods
LN	Linear
BR	Branched



Method Summary

Method

SM4500-S2 D

Version Standard Method 4450 S2 D 2011



Sample Summary (9 samples)

Sample ID	Sample Tag	Matrix	Collected Date/Time
S13359.01	20-0384-06 JHC-MW-15011	Groundwater	04/15/20 09:36
S13359.02	20-0395-01 JHC-MW-15024	Groundwater	04/16/20 10:44
S13359.03	20-0395-02 JHC-MW-15025	Groundwater	04/16/20 11:58
S13359.04	20-0395-03 JHC-MW-15027	Groundwater	04/16/20 14:35
S13359.05	20-0398-01 JHC-MW-15013	Groundwater	04/16/20 12:58
S13359.06	20-0398-02 JHC-MW-15015	Groundwater	04/16/20 10:16
S13359.07	20-0397-01 JHC-MW-15002	Groundwater	04/16/20 17:23
S13359.08	20-0397-02 JHC-MW-15005	Groundwater	04/16/20 18:11
S13359.09	20-0397-03 JHC-MW-18005	Groundwater	04/16/20 17:01



Lab Sample ID: S13359.01

Sample Tag: 20-0384-06 JHC-MW-15011 Collected Date/Time: 04/15/2020 09:36 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:22, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	Not detected	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.02

Sample Tag: 20-0395-01 JHC-MW-15024 Collected Date/Time: 04/16/2020 10:44 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:24, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	Not detected	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.03

Sample Tag: 20-0395-02 JHC-MW-15025 Collected Date/Time: 04/16/2020 11:58 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:26, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	Not detected	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.04

Sample Tag: 20-0395-03 JHC-MW-15027 Collected Date/Time: 04/16/2020 14:35 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:28, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	Not detected	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.05

Sample Tag: 20-0398-01 JHC-MW-15013 Collected Date/Time: 04/16/2020 12:58 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:30, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	Not detected	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.06

Sample Tag: 20-0398-02 JHC-MW-15015 Collected Date/Time: 04/16/2020 10:16 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:34, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	0.14	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.07

Sample Tag: 20-0397-01 JHC-MW-15002 Collected Date/Time: 04/16/2020 17:23 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:36, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	0.06	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.08

Sample Tag: 20-0397-02 JHC-MW-15005 Collected Date/Time: 04/16/2020 18:11 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:38, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	Not detected	0.04	0.010	mg/L	2	18496-25-8	



Lab Sample ID: S13359.09

Sample Tag: 20-0397-03 JHC-MW-18005 Collected Date/Time: 04/16/2020 17:01 Matrix: Groundwater COC Reference: 134191

Sample Containers

#	Туре	Preservative(s)	Refrigerated?	Arrival Temp. (C)	Thermometer #
1	125ml Plastic	NaOH	Yes	5.3	IR

Inorganics

Method: SM4500-S2 D, Run Date: 04/20/20 13:40, Analyst: JDP

Parameter	Result	RL	MDL	Units	Dilution	CAS#	Flags
Sulfide	Not detected	0.04	0.010	mg/L	2	18496-25-8	

Merit Laboratories Login Checklist

Lab Set ID:S13359

Client: CONSUMERS (Consumers Energy)

Project: JHC GW Monitoring Q2

Submitted: 04/17/2020 16:40 Login User: MMC

Attention: Emil Blaj Address: Consumers Energy Company 135 West Trail Street Jackson, MI 49201

Phone: D:517-788-5888 FAX:517-788-2533 Email:emil.blaj@cmsenergy.com

Selection	Description	Note							
Sample Receiving									
01. X Yes No N/A	Samples are received at 4C +/- 2C Thermometer #	IR 5.3							
02. X Yes No N/A	•								
	Received on ice/ cooling process begun								
03. Yes X No N/A	Samples shipped								
04. Yes X No N/A	Samples left in 24 hr. drop box								
05. Yes No X N/A	Are there custody seals/tape or is the drop box locked	Are there custody seals/tape or is the drop box locked							
Chain of Custody									
06. X Yes No N/A	COC adequately filled out								
07. X Yes No N/A	COC signed and relinquished to the lab								
08. X Yes No N/A	Sample tag on bottles match COC								
09. Yes X No N/A	Subcontracting needed? Subcontacted to:								
Preservation									
10. X Yes No N/A	Do sample have correct chemical preservation								
11. X Yes No N/A	Completed pH checks on preserved samples? (no VOAs)								
12. Yes X No N/A	Did any samples need to be preserved in the lab?								
Bottle Conditions									
13. X Yes No N/A	All bottles intact								
14. X Yes No N/A	Appropriate analytical bottles are used								
15. X Yes No N/A	Merit bottles used								
16. X Yes No N/A	Sufficient sample volume received								
17. Yes X No N/A	Samples require laboratory filtration								
18. X Yes No N/A	Samples submitted within holding time								

Corrective action for all exceptions is to call the client and to notify the project manager.

Merit Laboratories Bottle Preservation Check

Initials:<u>MM</u>C Lab Set ID: S13359

Client: CONSUMERS (Consumers Energy)

Project: JHC GW Monitoring Q2 Submitted: 04/17/2020 16:40 Login User:

Attention: Emil Blaj Address: Consumers Energy Company 135 West Trail Street Jackson, MI 49201

Phone: D:517-788-5888 FAX:517-788-2533 Email:emil.blaj@cmsenergy.com

	125 ml	250 ml	1 L	250 ml	125 ml	Recipiente Amber	pН							
Lab ID	Plastic HNO ₃	Plastic HNO ₃	Plastic HNO ₃	Plastic H ₂ SO ₄	Amber H₂SO4	HCI	NaOH	PbCO ₃ NaOH	<2	<2 >12 other add pH		new pH	Notes	
S13359.01							х			х				
S13359.02							х			х				
S13359.03							х			х				
S13359.04							х			х				
S13359.05							х			х				
S13359.06							х			х				
S13359.07							х			х				
S13359.08							х			х				
S13359.09							х			х				



Merit 2680 East Lansing Dr., East Lansing, MI 48823 Phone (517) 332-0167 Fax (517) 332-4034 www.meritlabs.com

C.O.C. PAGE # _ I_OF _ I 34191

REPORT	г то		Laboratories, Inc.	CHAIN	OF C	US	STOD	PY RECO	ORD				INVOICE	TC
ONTACT NAME	EMIL	BLAD	5				CONT	ACT NAME					SAME	_
			ENERGY				COMP	PANY						
DRESS	35 V.	TRAL	STREET				ADDRI	ESS '/						
TY JA	CKSON)		STATE ZIP C	9201		CITY					- STA	TE ZIP CODE	
HONE NO. SI7-	18-5	888	FAX NO.	P.O. NO. 44 000 81	88 25		PHON	E NO.		E-MAIL ADDRES	SS			
MAIL ADDRESS	I.Blai	G CMS	energy.com	QUOTE NO.				0.00	ANAL	YSIS (ATTACH LIS	ST IF MORE S	PACE IS RI	EQUIRED)	
OJECT NO./NAM	ETHE	Cu) Ho	energy.com mitoring Q2	SAMPLER(S) - PLEASE P	RINT/SIGN I	NAME	E					Cer	tifications	
IRNAROUND	TIME RE	QUIRED	DIDAY DEDAYS DED	AYS STANDARD		R _			3				HIO VAP	Wat
						-	1		su ltide			D		
ATRIX G	W=GROU	NDWATER	WW=WASTEWATER S=S	DIL L=LIQUID SD	=SOLID		# Co	ontainers &				1.1.8.2	ject Locations	
	SL=SLUDG		DRINKING WATER O=OIL			5	Pre	eservatives	Total				etroit New You there	ŕK
MERIT LAB NO.	DATE	AR	SAMPLE IDENTIFICATION-D		MATRIX # OF	OTTLE	HCI	HNO ₃ H ₂ SO ₄ NaOH MeOH	P P				ther ecial Instructions	
3359D			20-0384-06 JH	c-MW-15011	GW	1		×	~					
			20-0395-01	T 15024	1	1	1	x	~					
.03	1	1158		15025	11	1		×	V					
.04	4	1435	-03	15027		1		×	V			1		
.05		1258	20-0398-01	15013		(×	~					
.06	¥	1016	1 -02	15015	4	1		x	~					
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08		1811	T -02	15005		1		×	V					
09	1	1701	-03	18005		1		×	V					
		120	1 1e - 1as		100								- 16	
RELINQUISHED B		te	Consumers Energy	Sampler DATE				INQUISHED BY:			-		DATE	TIME
SIGNATURE/ORG/ RECEIVED BY: SIGNATURE/ORG/	al calman	0	M Milen	D 4/12/9	70 17	EIT	REC	NATURE/ORGAN EIVED BY: NATURE/ORGAN	in the second		-		DATE	TIME
RELINQUISHED B	Y:			DATE	TIM	IE		L NO.	SEAL IN		S NO	ES:	TEMP. ON ARRIVAL	-
SIGNATURE/ORG/ RECEIVED BY:	0			DATE	E TIM	IE	SEA	L NO.	YES D SEAL IN	ITACT INITIAL	S		5.3	
IGNATURE/ORG	ANIZATION								YESE					

PLEASE NOTE: SIGNING ACKNOWLEDGES ADHERENCE TO MERIT'S SAMPLE ACCEPTANCE POLICY ON REVERSE SIDE

20-0384 Page 37 of 37

Rev. 5.18.12

🛟 eurofins

Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

Laboratory Job ID: 160-37917-1

Client Project/Site: JH Campbell Pond A Wells

For:

Consumers Energy 135 W Trail Street Jackson, Michigan 49201

Attn: Emil Blaj

Authorized for release by: 5/25/2020 8:41:06 PM

Jayna Awalt, Project Manager II (314)298-8566 jayna.awalt@testamericainc.com

Total Access Have a Question?



LINKS

Review your project results through

Visit us at: www.eurofinsus.com/Env This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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

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QC Association Summary	19
Tracer Carrier Summary	20

Job ID: 160-37917-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Case Narrative

Client: Consumers Energy

Project: JH Campbell Pond A Wells

Report Number: 160-37917-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 4/29/2020 9:21 AM; the samples arrived in good condition, properly preserved. The temperatures of the 6 coolers at receipt time were 20.0°C, 20.2°C, 20.6°C, 21.0°C, 21.4°C and 22.2°C

RADIUM 226 AS TOTAL ALPHA RADIUM

Samples JHC-MW-15006 (160-37917-1), JHC-MW-15007 (160-37917-2), JHC-MW-15008R (160-37917-3), JHC-MW-15009 (160-37917-4), JHC-MW-15010 (160-37917-5), JHC-MW-15011 (160-37917-6), DUP-02 (160-37917-7), EB-02 (160-37917-8) and FB-02

Job ID: 160-37917-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

(160-37917-9) were analyzed for Radium 226 as Total Alpha Radium in accordance with EPA 903.0_Total Alpha Radium. The samples were prepared on 05/11/2020 and analyzed on 05/21/2020.

Insufficient sample volume was available to perform a sample duplicate for the following samples: JHC-MW-15006 (160-37917-1), JHC-MW-15007 (160-37917-2), JHC-MW-15008R (160-37917-3), JHC-MW-15009 (160-37917-4), JHC-MW-15010 (160-37917-5), JHC-MW-15011 (160-37917-6), DUP-02 (160-37917-7), EB-02 (160-37917-8) and FB-02 (160-37917-9). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) was prepared to demonstrate batch precision.

Ra-226 is reported without a 21-day waiting period to ensure short-lived alpha-emitting radium isotopes (e.g. Ra-224) have decayed out. The Ra-226 result should be considered to be potentially high biased. Associated samples have activity below the RL. The results are reported with this narrative.JHC-MW-15006 (160-37917-1), JHC-MW-15007 (160-37917-2), JHC-MW-15008R (160-37917-3), JHC-MW-15009 (160-37917-4), JHC-MW-15010 (160-37917-5), JHC-MW-15011 (160-37917-6), DUP-02 (160-37917-7), EB-02 (160-37917-8), FB-02 (160-37917-9), (LCS 160-470026/1-A), (LCSD 160-470026/2-A) and (MB 160-470026/24-A)

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

RADIUM-228 (GFPC)

Samples JHC-MW-15006 (160-37917-1), JHC-MW-15007 (160-37917-2), JHC-MW-15008R (160-37917-3), JHC-MW-15009 (160-37917-4), JHC-MW-15010 (160-37917-5), JHC-MW-15011 (160-37917-6), DUP-02 (160-37917-7), EB-02 (160-37917-8) and FB-02 (160-37917-9) were analyzed for Radium-228 (GFPC) in accordance with EPA 904. The samples were prepared on 05/11/2020 and analyzed on 05/18/2020.

Insufficient sample volume was available to perform a sample duplicate for the following samples: JHC-MW-15006 (160-37917-1), JHC-MW-15007 (160-37917-2), JHC-MW-15008R (160-37917-3), JHC-MW-15009 (160-37917-4), JHC-MW-15010 (160-37917-5), JHC-MW-15011 (160-37917-6), DUP-02 (160-37917-7), EB-02 (160-37917-8) and FB-02 (160-37917-9). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) was prepared to demonstrate batch precision.

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

COMBINED RADIUM-226 AND RADIUM-228

Samples JHC-MW-15006 (160-37917-1), JHC-MW-15007 (160-37917-2), JHC-MW-15008R (160-37917-3), JHC-MW-15009 (160-37917-4), JHC-MW-15010 (160-37917-5), JHC-MW-15011 (160-37917-6), DUP-02 (160-37917-7), EB-02 (160-37917-8) and FB-02 (160-37917-9) were analyzed for Combined Radium-226 and Radium-228 in accordance with EPA 903 Radium 226/EPA 904 Radium 228. The samples were analyzed on 05/22/2020.

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

t. Louis	
a, St	
estAmerica,	Trail North
est	Trail
Fins 7	Rider
Eurofins	13715 Rider 7

Chain of Custody Record

Reurofins TestAmenca

	Project Manager: Emil Blaj	lager: Em	il Blaj								
Client Contact	Email: Emil.Blaj@cmsenergy.com	3laj@cmse	nergy.com			te Contac	Site Contact: Bethany Swanberd		Date:	COC No:	
Consumers Energy, Laboratory Services	Tel/Fax: 517-788-5888	-788-588				ab Contac	Lab Contact: Emil Blai		Carrier:	1 of	1 000s
135 W. Trail Street	A	nalysis Tu	Analysis Turnaround Time	Time				-		Sampler: CI H/DMM//CE1	MMICET
Jackson, MI 49201	CALENDAR DAYS	R DAYS	D WOR	WORKING DAYS						For Lab Use Only.	ly:
		TAT if different from Below	m Below			1		_		Walk-in Client:	-
(xxx) xxx-xxxx FAX		2 W	2 weeks			(1.50	10:+:			Lab Sampling:	
20-0384		1 week	1 week 7 dave			6 V c					
PO#		1 day	AL AL		0/	13)9 W/S		_		Job / SDG No.:	
Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	Cont. Preservati	Perform M. Radium 22 Radium 22	77 (110100)			Samole S	Sample Specific Notes:
JHC-MW-15006	4/14/20	1501	U	GW	2 2	×	×				
JHC-MW-150047	4/14/20	1212	თ	GW	2 2	×	×				
JHC-MW-15008R	4/14/20	1126	G	GW	2 2	×	×				
JHC-MW-15009	4/14/20	1036	U	GW	2 2	×	×				
JHC-MW-15010	4/14/20	0942	U	GW	2 2	× Z	×	-			
0 JHC-MW-15011	4/15/20	0936	U	GW	2 2	×	×	-			
DUP-02	4/14/20	1036	ß	GW	2 2	××		+	160-37917 Chain of Custody		
EB-02	4/14/20	0946	IJ	DI	2 2	×× ×		-	-	1	
FB-02	4/14/20	1506	G	D	2 2	× × N					
Preservation Used: 1= Ice, 2= HCI; 3= H2SO4; 4=HNO3; Possible Hazard Identification:	INO3; 5=NaOH; 6= Other	Other		t		Sample	Disposal (A fee m	Tay be as	sessed if samples are	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)	onth)
es from a listed EPA Hazardou ction if the lab is to dispose of t	Please List any EP	A Waste C	odes for th	e sample	in the						
Von-Hazard Flammable Skin Irritant	ant 🗌 Poison B		Unknowr	un		🗌 Retu	C Return to Client	E Dispos	🖸 Disposal by Lab	Archive for Months	
C Requirements & O											
Custody Seals Intact: Ves 0	Custody Seal No.:	I No.:		i	1 Martin		Cooler Temp. (°C): Obs'd:	D): Obs'd		Therm ID No.:	
CALUCATION CALUCATION AL	Company	lab		424 2	e: wsi	Hay and	PAC NPS		Company:	Date/Time:	
Creinquished by: CPC UPS	Company:			Date/Time;	e,	Received by	Num	. 2	Company:	Date/Time:	1660
Relinquished by:	Company:			Date/Time	ď	Recomed	Received in Lahoraton hv.		Company:		17:2

4

5 6

Laboratory Services

135 W. Trail Street Jackson, MI 49201

TestAmerica Michigan 10448 Citation Drive; Ste 200 Brighton, MI 48116

PROCUREMENT #: 20040554

QA Code: NQ

(Item 1) - Part Number: N/A - Quantity : 1 JHC CCR Rule GW Q2-2020 Samples

Groundwater Samples for Radium 226 (EPA 903.1) and Radium 228 (EPA 904.0)

Standard TAT Request.

Reference Quote #16009066-0

(Item 2) - Part Number: NA - Quantity : 1 Please include Consumers Energy Project Number and Procurement Number on all submitted invoices

For technical questions, please contact Emil Blaj at 517-788-5888, or Emil.Blaj@cmsenergy.com.

To expedite payment please provide the Procurement number on all invoices.

Send Invoices To:

Consumers Energy Company Attn: Accounts Payable 135 W Trail St. Jackson, MI 49201

Client: Consumers Energy

Login Number: 37917 List Number: 1 Creator: Lambert-Sykes, Chenise Y

Question	Answer	Comment
Radioactivity wasn't checked or is = background as measured by a survey meter.</td <td>True</td> <td></td>	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	False	The client has confirmed that sample -2 should be listed as JHC-MW-15007
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Job Number: 160-37917-1

List Source: Eurofins TestAmerica, St. Louis

Client: Consumers Energy Project/Site: JH Campbell Pond A Wells

Qualifiers

Qualifiers		
Rad		
Qualifier	Qualifier Description	
U	Result is less than the sample detection limit.	
Glossary		5
Abbreviation	These commonly used abbreviations may or may not be present in this report.	6
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis	
%R	Percent Recovery	
CFL	Contains Free Liquid	
CNF	Contains No Free Liquid	0
DER	Duplicate Error Ratio (normalized absolute difference)	0
Dil Fac	Dilution Factor	
DL	Detection Limit (DoD/DOE)	9
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample	
DLC	Decision Level Concentration (Radiochemistry)	
EDL	Estimated Detection Limit (Dioxin)	
LOD	Limit of Detection (DoD/DOE)	
LOQ	Limit of Quantitation (DoD/DOE)	
MDA	Minimum Detectable Activity (Radiochemistry)	
MDC	Minimum Detectable Concentration (Radiochemistry)	
MDL	Method Detection Limit	
ML	Minimum Level (Dioxin)	
MQL	Method Quantitation Limit	
NC	Not Calculated	
ND	Not Detected at the reporting limit (or MDL or EDL if shown)	
PQL	Practical Quantitation Limit	
QC	Quality Control	
RER	Relative Error Ratio (Radiochemistry)	
RL	Reporting Limit or Requested Limit (Radiochemistry)	
RPD	Relative Percent Difference, a measure of the relative difference between two points	
TEF	Toxicity Equivalent Factor (Dioxin)	

TEQ Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Consumers Energy Project/Site: JH Campbell Pond A Wells

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	TAL SL
904.0	Radium-228 (GFPC)	EPA	TAL SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	TAL SL
PrecSep STD	Preparation, Precipitate Separation (Standard In-Growth)	None	TAL SL
PrecSep_0	Preparation, Precipitate Separation	None	TAL SL
Protocol Ref	erences:		
EPA = US	Environmental Protection Agency		

None = None

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

Laboratory References:

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

Sample Summary

Client: Consumers Energy Project/Site: JH Campbell Pond A Wells

Job ID: 160-37917-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-37917-1	JHC-MW-15006	Water	04/14/20 15:01	04/29/20 09:21
160-37917-2	JHC-MW-15007	Water	04/14/20 12:12	04/29/20 09:21
160-37917-3	JHC-MW-15008R	Water	04/14/20 11:26	04/29/20 09:21
160-37917-4	JHC-MW-15009	Water	04/14/20 10:36	04/29/20 09:21
60-37917-5	JHC-MW-15010	Water	04/14/20 09:42	04/29/20 09:21
60-37917-6	JHC-MW-15011	Water	04/15/20 09:36	04/29/20 09:21
60-37917-7	DUP-02	Water	04/14/20 10:36	04/29/20 09:21
60-37917-8	EB-02	Water	04/14/20 09:46	04/29/20 09:21
60-37917-9	FB-02	Water	04/14/20 15:06	04/29/20 09:21

Eurofins TestAmerica, St. Louis

Client Sample ID: JHC-MW-15006

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Lab Sample ID: 160-37917-1 **Matrix: Water**

Date Collected: 04/14/20 15:01 Date Received: 04/29/20 09:21

Method: 903.0 -	Radium-226	(GFPC)								
			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.426		0.170	0.174	1.00	0.185	pCi/L	05/11/20 17:01	05/21/20 16:03	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	85.8		40 - 110					05/11/20 17:01	05/21/20 16:03	1

Method: 904.0 - Radium-228 (GFPC)

Analyte Radium-228	Result 0.518	Qualifier	Count Uncert. (2σ+/-) 0.297	Total Uncert. (2σ+/-) 0.301	RL 1.00	MDC Unit	Prepared 05/11/20 17:18	Analyzed 05/18/20 15:04	Dil Fac
Carrier	%Yield	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Ba Carrier	85.8		40 - 110				05/11/20 17:18	05/18/20 15:04	1
Y Carrier	87.9		40 - 110				05/11/20 17:18	05/18/20 15:04	1

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

			Count	Total					
			Uncert.	Uncert.					
Analyte	Result	Qualifier	(2σ+/-)	(2 σ+/-)	RL	MDC Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.944		0.342	0.348	5.00	0.450 pCi/L		05/22/20 07:53	1

Client Sample ID: JHC-MW-15007 Date Collected: 04/14/20 12:12

Date Received: 04/29/20 09:21

Lab Sample ID: 160-37917-2 **Matrix: Water**

Method: 903.0 -	Radium-226	(GFPC)								
			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.197		0.128	0.129	1.00	0.178	pCi/L	05/11/20 17:01	05/21/20 16:03	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	98.8		40 - 110					05/11/20 17:01	05/21/20 16:03	1

Method: 904.0 - Radium-228 (GFPC)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2 σ+/-)	(2 σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.234	U	0.276	0.277	1.00	0.456	pCi/L	05/11/20 17:18	05/18/20 15:09	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	98.8		40 - 110					05/11/20 17:18	05/18/20 15:09	1
Y Carrier	88.2		40 - 110					05/11/20 17:18	05/18/20 15:09	1

Client Sample Results

			Clier	nt Samp	le Res	ults				
Client: Consumers En Project/Site: JH Camp		A Wells							Job ID: 160-3	37917-1
Client Sample ID: Date Collected: 04/14 Date Received: 04/29	4/20 12:12	2						Lab Sample		7917-2 : Water
Method: Ra226_Ra2			lium-226 a	Ind Radium	-228					
			Count Uncert.	Total Uncert.						
Analyte		Qualifier	(2 σ+/-)	(2σ+/-)	RL	MDC		Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.431	U	0.304	0.306	5.00	0.456	pCi/L		05/22/20 07:53	1
Client Sample ID:	JHC-M	W-15008	R					Lab Sample	ID: 160-37	′917-3
Date Collected: 04/14 Date Received: 04/29	4/20 11:26	6								: Water
Method: 903.0 - Rac										
		. ,	Count	Total						
			Uncert.	Uncert.						
Analyte		Qualifier	(2σ+/-)	(2σ+/-)	RL _	MDC		Prepared	Analyzed	Dil Fac
Radium-226	0.180		0.115	0.116	1.00	0.158	pCi/L	05/11/20 17:01	05/21/20 22:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	101		40 - 110					05/11/20 17:01	05/21/20 22:53	1
_ Method: 904.0 - Rac	dium-228	(GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte		Qualifier	(2σ+/-)	(2σ+/-)	RL _	MDC		Prepared	Analyzed	Dil Fac
Radium-228	0.369	U	0.272	0.274	1.00	0.429	pCi/L	05/11/20 17:18	05/18/20 15:09	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	101		40 - 110					05/11/20 17:18	05/18/20 15:09	1
Y Carrier	87.1		40 - 110					05/11/20 17:18	05/18/20 15:09	1
Method: Ra226_Ra2	228 - Com	bined Rad	lium-226 a Count	I <mark>nd Radium</mark> Total	-228					
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.549		0.295	0.298	5.00	0.429	pCi/L		05/22/20 07:53	1
Client Sample ID:								Lab Sample		
Date Collected: 04/14 Date Received: 04/29									Matrix	: Water
 Method: 903.0 - Rac	dium-226	(GFPC)								
			Count	Total						
• • • •		• ····	Uncert.	Uncert.				_ .		B
Analyte		Qualifier	<u>(2σ+/-)</u>	<u>(2σ+/-)</u>		MDC		Prepared	Analyzed	Dil Fac
Radium-226	0.394		0.143	0.148	1.00	0.147	pCI/L	05/11/20 17:01	05/21/20 22:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac

ient: Consumers Er	arav		Unci	nt Samp		Junto			Job ID: 160-3	7017 1
lient: Consumers En oject/Site: JH Camp		A Wells							JOD ID. 100-3	91917-1
lient Sample ID ate Collected: 04/1								Lab Sample	e ID: 160-37 Matrix:	
ate Received: 04/29										
Method: 904.0 - Ra	dium-228	(GFPC)								
			Count	Total						
		.	Uncert.	Uncert.			,			
Analyte		Qualifier	(2σ+/-)	<u>(2σ+/-)</u>	RL			Prepared	Analyzed	Dil Fac
Radium-228	0.573		0.320	0.324	1.00	0.490	pCi/L	05/11/20 17:18	05/18/20 15:09	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	101		40 - 110						05/18/20 15:09	1
Y Carrier	82.2		40 - 110					05/11/20 17:18	05/18/20 15:09	1
Method: Ra226_Ra	228 - Com	ibined Rad		nd Radium Total	-228					
			Count Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
•	0.967		0.350	0.356	5.00	0.490		FIEparea	05/22/20 07:53	
				0.000	0.00	0.400	po"L		00/22/20 01:00	
226 + 228 Client Sample ID Pate Collected: 04/1 Pate Received: 04/29	: JHC-M 4/20 09:42 9/20 09:21	2						Lab Sample		'917-5 : Water
Combined Radium 226 + 228 Client Sample ID Date Collected: 04/1 Date Received: 04/29 Method: 903.0 - Rad	: JHC-M 4/20 09:42 9/20 09:21	2		Total				Lab Sample		
226 + 228 Client Sample ID Date Collected: 04/1 Date Received: 04/29	: JHC-M 4/20 09:42 9/20 09:21	2	Count	Total				Lab Sample		
226 + 228 Client Sample ID Pate Collected: 04/1 Pate Received: 04/29 Method: 903.0 - Rad	: JHC-M 4/20 09:42 9/20 09:21 dium-226	2 (GFPC)	Count Uncert.	Uncert.	RL	MDC	Unit		Matrix	Water
226 + 228 Client Sample ID Pate Collected: 04/1 Pate Received: 04/2 Method: 903.0 - Rac	: JHC-M 4/20 09:42 9/20 09:21 dium-226	2	Count		RL 1.00	MDC 0.140		Lab Sample		
226 + 228 Client Sample ID Date Collected: 04/12 Date Received: 04/29 Method: 903.0 - Rac Analyte Radium-226	: JHC-M 4/20 09:42 9/20 09:21 dium-226 Result 0.270	(GFPC)	Count Uncert. (2σ+/-) 0.124	Uncert. (2σ+/-)				Prepared 05/11/20 17:01	Matrix: Analyzed 05/21/20 22:54	Dil Fac
226 + 228 Client Sample ID Date Collected: 04/12 Date Received: 04/29 Method: 903.0 - Rad Analyte Radium-226 Carrier	: JHC-M 4/20 09:42 9/20 09:21 dium-226 Result 0.270 %Yield	2 (GFPC)	Count Uncert. (2σ+/-) 0.124 Limits	Uncert. (2σ+/-)				Prepared 05/11/20 17:01 Prepared	Matrix: Analyzed 05/21/20 22:54 Analyzed	Dil Fac
226 + 228 Client Sample ID Pate Collected: 04/12 Pate Received: 04/29 Method: 903.0 - Rac Analyte Radium-226 Carrier	: JHC-M 4/20 09:42 9/20 09:21 dium-226 Result 0.270	(GFPC)	Count Uncert. (2σ+/-) 0.124	Uncert. (2σ+/-)				Prepared 05/11/20 17:01	Matrix: Analyzed 05/21/20 22:54	Dil Fac
226 + 228 Client Sample ID Date Collected: 04/12 Date Received: 04/29 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier	: JHC-M 4/20 09:42 9/20 09:21 dium-226 Result 0.270 %Yield 97.0	2 (GFPC) Qualifier Qualifier	Count Uncert. (2σ+/-) 0.124 Limits	Uncert. (2σ+/-)				Prepared 05/11/20 17:01 Prepared	Matrix: Analyzed 05/21/20 22:54 Analyzed	Dil Fac
226 + 228 Client Sample ID Date Collected: 04/12 Date Received: 04/29 Method: 903.0 - Rad Analyte Radium-226 Carrier	: JHC-M 4/20 09:42 9/20 09:21 dium-226 Result 0.270 %Yield 97.0	2 (GFPC) Qualifier Qualifier	Count Uncert. (2σ+/-) 0.124 Limits	Uncert. (2σ+/-)				Prepared 05/11/20 17:01 Prepared	Matrix: Analyzed 05/21/20 22:54 Analyzed	Dil Fac
226 + 228 Client Sample ID Date Collected: 04/12 Date Received: 04/23 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier	: JHC-M 4/20 09:42 9/20 09:21 dium-226 Result 0.270 %Yield 97.0	2 (GFPC) Qualifier Qualifier	Count Uncert. (2σ+/-) 0.124 Limits 40 - 110	Uncert. (2σ+/-) 0.126				Prepared 05/11/20 17:01 Prepared	Matrix: Analyzed 05/21/20 22:54 Analyzed	Dil Fac
226 + 228 Client Sample ID Pate Collected: 04/1 Pate Received: 04/2 Method: 903.0 - Rac Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Rac	: JHC-M 4/20 09:42 9/20 09:21 dium-226 Result 0.270 %Yield 97.0 dium-228	2 (GFPC) Qualifier Qualifier	Count Uncert. (2σ+/-) 0.124 Limits 40 - 110 Count	Uncert. (2σ+/-) 0.126 Total Uncert. (2σ+/-)	1.00	0.140	pCi/L Unit	Prepared 05/11/20 17:01 Prepared	Matrix: Analyzed 05/21/20 22:54 Analyzed	Dil Fac
226 + 228 Client Sample ID Date Collected: 04/12 Date Received: 04/23 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier	: JHC-M 4/20 09:42 9/20 09:21 dium-226 Result 0.270 %Yield 97.0 dium-228	(GFPC) Qualifier Qualifier (GFPC)	Count Uncert. (2σ+/-) 0.124 Limits 40 - 110 Count Uncert.	Uncert. (2σ+/-) 0.126 Total Uncert.	1.00	0.140	pCi/L Unit	Prepared 05/11/20 17:01 Prepared 05/11/20 17:01 Prepared	Matrix: Analyzed 05/21/20 22:54 Analyzed 05/21/20 22:54	Dil Fac
226 + 228 Client Sample ID Date Collected: 04/1 Date Received: 04/2 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Rad Analyte	: JHC-M 4/20 09:42 9/20 09:21 dium-226 Result 0.270 %Yield 97.0 dium-228 Result 0.752	(GFPC) Qualifier Qualifier (GFPC)	Count Uncert. (2σ+/-) 0.124 Limits 40 - 110 Count Uncert. (2σ+/-)	Uncert. (2σ+/-) 0.126 Total Uncert. (2σ+/-)	1.00	0.140	pCi/L Unit	Prepared 05/11/20 17:01 Prepared 05/11/20 17:01 Prepared	Matrix: <u>Analyzed</u> 05/21/20 22:54 <u>Analyzed</u> <u>Analyzed</u>	Dil Fac 1 Dil Fac 1 Dil Fac
226 + 228 Client Sample ID Date Collected: 04/12 Date Received: 04/22 Method: 903.0 - Rac Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Rac Analyte Radium-228	: JHC-M 4/20 09:42 9/20 09:21 dium-226 Result 0.270 %Yield 97.0 dium-228 Result 0.752	2 (GFPC) Qualifier Qualifier (GFPC) Qualifier	Count Uncert. (2σ+/-) 0.124 Limits 40 - 110 Count Uncert. (2σ+/-) 0.324	Uncert. (2σ+/-) 0.126 Total Uncert. (2σ+/-)	1.00	0.140	pCi/L Unit	Prepared 05/11/20 17:01 Prepared 05/11/20 17:01 Prepared 05/11/20 17:18 Prepared	Matrix: <u>Analyzed</u> 05/21/20 22:54 <u>Analyzed</u> 05/21/20 22:54 <u>Analyzed</u> 05/18/20 15:09	Dil Fac 1 Dil Fac 1 Dil Fac 1
226 + 228 Client Sample ID Date Collected: 04/12 Date Received: 04/23 Method: 903.0 - Rac Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Rac Analyte Radium-228 Carrier	: JHC-M 4/20 09:42 9/20 09:21 dium-226 Result 0.270 %Yield 97.0 dium-228 Result 0.752 %Yield	2 (GFPC) Qualifier Qualifier (GFPC) Qualifier	Count Uncert. (2σ+/-) 0.124 <u>Limits</u> 40 - 110 Count Uncert. (2σ+/-) 0.324 Limits	Uncert. (2σ+/-) 0.126 Total Uncert. (2σ+/-)	1.00	0.140	pCi/L Unit	Prepared 05/11/20 17:01 Prepared 05/11/20 17:01 05/11/20 17:01 Prepared 05/11/20 17:18 Prepared 05/11/20 17:18 05/11/20 17:18	Matrix: Analyzed 05/21/20 22:54 Analyzed 05/21/20 22:54 Analyzed 05/18/20 15:09 Analyzed	Dil Fac 1 Dil Fac 1 Dil Fac 1 Dil Fac
226 + 228 Client Sample ID Date Collected: 04/12 Date Received: 04/23 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Rad Analyte Radium-228 Carrier Ba Carrier Ba Carrier	: JHC-M 4/20 09:42 9/20 09:21 dium-226 Result 0.270 %Yield 97.0 dium-228 Result 0.752 %Yield 97.0 87.5	2 (GFPC) Qualifier (GFPC) Qualifier Qualifier	Count Uncert. $(2\sigma+l-)$ 0.124 - 40 - 110 Count Uncert. $(2\sigma+l-)$ 0.324 - Limits - 40 - 110 40 - 110 40 - 110 40 - 110 dium-226 a	Uncert. (2σ+/-) 0.126 Total Uncert. (2σ+/-) 0.331	1.00 RL 1.00	0.140	pCi/L Unit	Prepared 05/11/20 17:01 Prepared 05/11/20 17:01 05/11/20 17:01 Prepared 05/11/20 17:18 Prepared 05/11/20 17:18 05/11/20 17:18	Matrix: Analyzed 05/21/20 22:54 Analyzed 05/21/20 22:54 Analyzed 05/18/20 15:09 Analyzed 05/18/20 15:09	Dil Fac 1 Dil Fac 1 Dil Fac 1 Dil Fac 1 Dil Fac
226 + 228 Client Sample ID Date Collected: 04/12 Date Received: 04/23 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Rad Analyte Radium-228 Carrier Ba Carrier Ba Carrier Ba Carrier Y Carrier	: JHC-M 4/20 09:42 9/20 09:21 dium-226 Result 0.270 %Yield 97.0 dium-228 Result 0.752 %Yield 97.0 87.5	2 (GFPC) Qualifier (GFPC) Qualifier Qualifier	Count Uncert. $(2\sigma+/-)$ 0.124 <i>Limits</i> 40 - 110 Count Uncert. $(2\sigma+/-)$ 0.324 <i>Limits</i> 40 - 110 40 - 110 40 - 110 dium-226 a Count	Uncert. (2σ+/-) 0.126 Total Uncert. (2σ+/-) 0.331 nd Radium Total	1.00 RL 1.00	0.140	pCi/L Unit	Prepared 05/11/20 17:01 Prepared 05/11/20 17:01 05/11/20 17:01 Prepared 05/11/20 17:18 Prepared 05/11/20 17:18 05/11/20 17:18	Matrix: Analyzed 05/21/20 22:54 Analyzed 05/21/20 22:54 Analyzed 05/18/20 15:09 Analyzed 05/18/20 15:09	Dil Fac 1 Dil Fac 1 Dil Fac 1 Dil Fac 1 Dil Fac
226 + 228 Client Sample ID Date Collected: 04/12 Date Received: 04/23 Method: 903.0 - Rad Analyte Radium-226 Carrier Ba Carrier Method: 904.0 - Rad Analyte Radium-228 Carrier Ba Carrier Ba Carrier Ba Carrier Y Carrier	: JHC-MV 4/20 09:42 9/20 09:21 dium-226 Result 0.270 %Yield 97.0 dium-228 Result 0.752 %Yield 97.0 87.5 228 - Com	2 (GFPC) Qualifier (GFPC) Qualifier Qualifier	Count Uncert. $(2\sigma+l-)$ 0.124 - 40 - 110 Count Uncert. $(2\sigma+l-)$ 0.324 - Limits - 40 - 110 40 - 110 40 - 110 40 - 110 dium-226 a	Uncert. (2σ+/-) 0.126 Total Uncert. (2σ+/-) 0.331	1.00 RL 1.00	0.140	pCi/L Dnit pCi/L	Prepared 05/11/20 17:01 Prepared 05/11/20 17:01 05/11/20 17:01 Prepared 05/11/20 17:18 Prepared 05/11/20 17:18 05/11/20 17:18	Matrix: Analyzed 05/21/20 22:54 Analyzed 05/21/20 22:54 Analyzed 05/18/20 15:09 Analyzed 05/18/20 15:09	Dil Fac 1 Dil Fac 1 Dil Fac 1 Dil Fac 1 Dil Fac

Total

Count

40 - 110

Date Collected: 04/15/20 09:36

Date Received: 04/29/20 09:21

Client Sample ID: JHC-MW-15011

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID: 160-37917-6

05/11/20 17:18 05/18/20 15:09

Lab Sample ID: 160-37917-7

Matrix: Water

Matrix: Water

1

			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.242		0.116	0.118	1.00	0.127	pCi/L	05/11/20 17:01	05/21/20 22:54	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	95.5		40 - 110					05/11/20 17:01	05/21/20 22:54	1
Method: 904.0 - Rac			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.606		0.280	0.286	1.00	0.408	pCi/L	05/11/20 17:18	05/18/20 15:09	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	95.5		40 - 110					05/11/20 17:18	05/18/20 15:09	1

Method: Ra226 Ra228 - Combined Radium-226 and Radium-228

89.0

			Count	Total					
			Uncert.	Uncert.					
Analyte	Result	Qualifier	(2σ+/-)	(2 σ+/-)	RL	MDC Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.848		0.303	0.309	5.00	0.408 pCi/L		05/22/20 07:53	1

Client Sample ID: DUP-02

Y Carrier

Date Collected: 04/14/20 10:36

Date Received: 04/29/20 09:21

Method: 903.0 -	Radium-226	(GFPC)								
		. ,	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2 σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.307		0.122	0.125	1.00	0.115	pCi/L	05/11/20 17:01	05/21/20 22:54	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	98.2		40 - 110					05/11/20 17:01	05/21/20 22:54	1

Method: 904.0 - Radium-228 (GFPC)

Analyte Radium-228	Result	Qualifier	Count Uncert. (2σ+/-) 0.261	Total Uncert. (2σ+/-) 0.264	RL 1.00	MDC 0.393	 Prepared 05/11/20 17:18	Analyzed 05/18/20 15:09	Dil Fac
Carrier	%Yield	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Ba Carrier	98.2		40 - 110				05/11/20 17:18	05/18/20 15:09	1
Y Carrier	87.5		40 - 110				05/11/20 17:18	05/18/20 15:09	1

Client Sample Results

Client: Consumers Energy Project/Site: JH Campbell Pond A Wells

Client Sample ID: DUP-02 Date Collected: 04/14/20 10:36

Date Collected: 04/14									Matrix	: Wate
ate Received: 04/29	9/20 09:21									
Method: Ra226_Ra	228 - Com	bined Ra	dium-226 a	nd Radium	-228					
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 σ+/-)	(2 σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Combined Radium 226 + 228	0.767		0.288	0.292	5.00	0.393	pCi/L		05/22/20 07:53	
lient Sample ID:	· FB-02							Lab Sample	D: 160-37	917.
ate Collected: 04/14		5							Matrix	
ate Received: 04/29	9/20 09:21									
Method: 903.0 - Rac	dium-226	(GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil F
Radium-226	-0.0130	U	0.0942	0.0942	1.00	0.192	pCi/L	05/11/20 17:01	05/21/20 22:54	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil F
Ba Carrier	96.4		40 - 110					05/11/20 17:01	05/21/20 22:54	
Method: 904.0 - Rac	dium-228	(GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 σ+/-)	(2 σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil F
Radium-228	0.329	U	0.290	0.292	1.00	0.467	pCi/L	05/11/20 17:18	05/18/20 15:09	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil F
Ba Carrier	96.4		40 - 110					05/11/20 17:18	05/18/20 15:09	
Y Carrier	86.4		40 - 110					05/11/20 17:18	05/18/20 15:09	
Method: Ra226_Ra	228 - Com	nbined Ra	dium-226 a		-228					
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil F
Combined Radium 226 + 228	0.316	U	0.305	0.307	5.00	0.467	pCi/L		05/22/20 07:53	
lient Sample ID:	FB-02							Lab Sample	D: 160-37	'917
ate Collected: 04/14		5							Matrix	
ate Received: 04/29										
Method: 903.0 - Rad	dium-226	(GFPC)								
			Count	Total						
			Uncert.	Uncert.						
	Result	Qualifier	(2 σ+/-)	(2 σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil F
Analyte	rtoount			<u> </u>	4 00 -	0 100	pCi/L	05/11/20 17:01	05/21/20 22:54	
	-0.00386	U	0.0575	0.0575	1.00	0.120	poi/L		00/21/20 22.04	
Analyte Radium-226	-0.00386	U Qualifier	0.0575 <i>Limits</i>	0.0575	1.00	0.120	poi/L	Prepared	Analyzed	Dil F

Eurofins TestAmerica, St. Louis

Client Sample ID: FB-02 Date Collected: 04/14/20 15:06 Date Received: 04/29/20 09:21

Method: 904.0 - Radium-2		Count	Total						
		Uncert.	Uncert.						
Analyte Re	ult Qualifier	(2 σ+/-)	(2 σ +/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228 0.0	348 U	0.238	0.238	1.00	0.411	pCi/L	05/11/20 17:18	05/18/20 15:09	1
Carrier %Y	eld Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	7.3	40 - 110					05/11/20 17:18	05/18/20 15:09	1
Y Carrier	9.7	40 - 110					05/11/20 17:18	05/18/20 15:09	1
_ Method: Ra226_Ra228 - (a sector in the		a di Dia dia an						

			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC Unit	Prepared	Analyzed	Dil Fac	
Combined Radium 226	0.0810	U	0.245	0.245	5.00	0.411 pCi/L		05/22/20 07:53	1	
+ 228										

```
2
3
4
5
6
7
8
9
10
```

Job ID: 160-37917-1

Matrix: Water

Lab Sample ID: 160-37917-9

Carrier

Ba Carrier

Y Carrier

%Yield Qualifier

98.2

87.1

Limits

40 - 110

40 - 110

QC Sample Results

Job ID: 160-37917-1

Method: 903.0 - Radium-226 (GFPC)

Lab Sample ID:	: MB 16	0-4700	26/24-A						Client Sa	mple ID: Me		
Matrix: Water		_								Prep Type		
Analysis Batch	n: 47103	8		•						Prep Bat	ch: 4	70026
				Count	Total							
A		MB		Uncert.	Uncert.			11	D	• • • • • • • • •		D11 E
Analyte			Qualifier	(2σ+/-)	(2σ+/-)		MDC		Prepared	-		Dil Fac
Radium-226	Ŭ	0.09078	U	0.0982	0.0986	1.00	0.157	pCi/L	05/11/20 17	:01 05/21/20 2	2:54	
		MB	МВ									
Carrier		%Yield	Qualifier	Limits					Prepareo	d Analyze	d	Dil Fac
Ba Carrier		98.2		40 - 110					05/11/20 17	:01 05/21/20 2	2:54	
Lab Sample ID:	: LCS 16	60-470	026/1-A					Clie	ent Sample I	D: Lab Cont	rol S	ample
Matrix: Water										Prep Type		
Analysis Batch	n: 47103	8								Prep Bat		
						Total						
			Spike	LCS	LCS	Uncert.				%Rec.		
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit %Re	c Limits		
Radium-226			11.3	10.98		1.20	1.00	0.159	pCi/L 9	75 - 125		
		22										
	LCS L	.03										
Carrier %	LCS L ۲%Yield ۵%		Limits									
Carrier %			<i>Limits</i> 40 - 110	-								
Ba Carrier	% Yield 99.1	Qualifier	40 - 110	-				Client S	ample ID: La	ab Control S	amnl	e Dur
Ba Carrier Lab Sample ID:	% Yield 99.1	Qualifier	40 - 110	-				Client S	ample ID: La	ab Control S Pren Typ		
Ba Carrier Lab Sample ID: Matrix: Water	%Yield G 99.1	Qualifier 160-47	40 - 110	-				Client S	ample ID: La	Prep Type	e: To	tal/NA
Ba Carrier Lab Sample ID:	%Yield G 99.1	Qualifier 160-47	40 - 110	-		Total		Client S	ample ID: La		e: To	tal/NA
Ba Carrier Lab Sample ID: Matrix: Water	%Yield G 99.1	Qualifier 160-47	40 - 110		LCSD	Total Uncert.		Client S	ample ID: La	Prep Type	e: To	tal/NA 70026
Ba Carrier Lab Sample ID: Matrix: Water	%Yield G 99.1	Qualifier 160-47	40 - 110 20026/2-A				RL	Client S		Prep Type Prep Bat %Rec.	e: To	tal/NA 70026 RER
Ba Carrier Lab Sample ID: Matrix: Water Analysis Batch	%Yield G 99.1	Qualifier 160-47	40 - 110 0026/2-A Spike	LCSD		Uncert.			Unit %Re	Prep Type Prep Bat %Rec. Limits	e: To ch: 4	tal/NA 70026 REF Limi
Ba Carrier Lab Sample ID: Matrix: Water Analysis Batch Analyte	%Yield 99.1 : LCSD 1: 47103	Qualifier 160-47 8	40 - 110 0026/2-A Spike Added	LCSD Result		Uncert. (2σ+/-)	RL	MDC	Unit %Re	Prep Type Prep Bat %Rec. Limits	e: To ch: 4 RER	tal/NA 70026 REF
Ba Carrier Lab Sample ID: Matrix: Water Analysis Batch Analyte Radium-226	%Yield G 99.1 : LCSD 1: 47103	Qualifier 160-47 8 .CSD	40 - 110 0026/2-A Spike Added 11.3	LCSD Result		Uncert. (2σ+/-)	RL	MDC	Unit %Re	Prep Type Prep Bat %Rec. Limits	e: To ch: 4 RER	tal/NA
Ba Carrier Lab Sample ID: Matrix: Water Analysis Batch Analyte Radium-226	%Yield 99.1 : LCSD 1: 47103	Qualifier 160-47 8 .CSD	40 - 110 0026/2-A Spike Added 11.3 Limits	LCSD Result 11.91		Uncert. (2σ+/-)	RL	MDC	Unit %Re	Prep Type Prep Bat %Rec. Limits	e: To ch: 4 RER	tal/NA 70026 RER Limit
Ba Carrier Lab Sample ID: Matrix: Water Analysis Batch Analyte Radium-226 Carrier Ba Carrier	%Yield G 99.1 : LCSD 1: 47103 LCSD L %Yield G 99.4	Qualifier 160-47 8 CSD Qualifier	40 - 110 0026/2-A Spike Added 11.3 Limits 40 - 110	LCSD Result 11.91		Uncert. (2σ+/-)	RL	MDC	Unit %Re	Prep Type Prep Bat %Rec. Limits	e: To ch: 4 RER	tal/NA 70026 RER Limit
Ba Carrier Lab Sample ID: Matrix: Water Analysis Batch Analyte Radium-226 Carrier	%Yield G 99.1 : LCSD 1: 47103 LCSD L %Yield G 99.4	Qualifier 160-47 8 CSD Qualifier	40 - 110 0026/2-A Spike Added 11.3 Limits 40 - 110	LCSD Result 11.91		Uncert. (2σ+/-)	RL	MDC	Unit %Re	Prep Type Prep Bat %Rec. Limits	e: To ch: 4 RER	tal/NA 70020 REF Limi
Ba Carrier Lab Sample ID: Matrix: Water Analysis Batch Analyte Radium-226 Carrier Ba Carrier Ethod: 904.0	%Yield G 99.1 : LCSD n: 47103 LCSD L %Yield G 99.4 D - Rad	Qualifier 160-47 8 .CSD Qualifier	40 - 110 0026/2-A Spike Added 11.3 Limits 40 - 110 228 (GFPC	LCSD Result 11.91		Uncert. (2σ+/-)	RL	MDC	Unit %Re pCi/L 10	Prep Type Prep Bat %Rec. Limits 75 - 125	e: To ch: 4 <u>RER</u> 0.37	tal/NA 70026 REF Limi
Ba Carrier Lab Sample ID: Matrix: Water Analysis Batch Analyte Radium-226 Carrier Ba Carrier lethod: 904.0 Lab Sample ID:	%Yield G 99.1 : LCSD n: 47103 LCSD L %Yield G 99.4 D - Rad	Qualifier 160-47 8 .CSD Qualifier	40 - 110 0026/2-A Spike Added 11.3 Limits 40 - 110 228 (GFPC	LCSD Result 11.91		Uncert. (2σ+/-)	RL	MDC	Unit %Re pCi/L 10	Prep Type Prep Bat %Rec. Limits 75 - 125	e: To ch: 4 <u>RER</u> 0.37	tal/NA 70026 REF Limit
Ba Carrier Lab Sample ID: Matrix: Water Analysis Batch Analyte Radium-226 Carrier Ba Carrier Iethod: 904.0 Lab Sample ID: Matrix: Water	%Yield G 99.1 - : LCSD - : 47103 - . 47103 - . 47103 - Rad - . MB 160 -	Qualifier 160-47 8 .CSD Qualifier lium-2 0-4700	40 - 110 0026/2-A Spike Added 11.3 Limits 40 - 110 228 (GFPC	LCSD Result 11.91		Uncert. (2σ+/-)	RL	MDC	Unit %Re pCi/L 10	Prep Type Prep Bat %Rec. Limits 75 - 125	e: To ch: 4 <u>RER</u> 0.37 thod e: To	tal/NA 70026 REF Limit 1 Blank tal/NA
Ba Carrier Lab Sample ID: Matrix: Water Analysis Batch Analyte Radium-226 Carrier Ba Carrier lethod: 904.0 Lab Sample ID:	%Yield G 99.1 - : LCSD - : 47103 - . 47103 - . 47103 - Rad - . MB 160 -	Qualifier 160-47 8 .CSD Qualifier lium-2 0-4700	40 - 110 0026/2-A Spike Added 11.3 Limits 40 - 110 228 (GFPC	LCSD Result 11.91	Qual	Uncert. (2σ+/-)	RL	MDC	Unit %Re pCi/L 10	Prep Type Prep Bat %Rec. Limits 75 - 125	e: To ch: 4 <u>RER</u> 0.37 thod e: To	tal/NA 70026 REF Limit 1 Blank tal/NA
Ba Carrier Lab Sample ID: Matrix: Water Analysis Batch Analyte Radium-226 Carrier Ba Carrier Iethod: 904.0 Lab Sample ID: Matrix: Water	%Yield G 99.1 - : LCSD - : 47103 - . 47103 - . 47103 - Rad - . MB 160 -	Qualifier 160-47 8 .CSD Qualifier lium-2 0-4700 0	40 - 110 0026/2-A Spike Added 11.3 Limits 40 - 110 228 (GFPC 27/24-A	LCSD Result 11.91	Qual	Uncert. (2σ+/-)	RL	MDC	Unit %Re pCi/L 10	Prep Type Prep Bat %Rec. Limits 75 - 125	e: To ch: 4 <u>RER</u> 0.37 thod e: To	tal/NA 70026 RER Limit 1 Blank tal/NA
Ba Carrier Lab Sample ID: Matrix: Water Analysis Batch Analyte Radium-226 Carrier Ba Carrier Iethod: 904.0 Lab Sample ID: Matrix: Water Analysis Batch	%Yield Q 99.1 99.1 : LCSD 1 : 47103 1 LCSD L %Yield Q 99.4 1 O - Rad 1 : MB 160 1 : 47067 1	Qualifier 160-47 8 .CSD Qualifier lium-2 0-4700 0 MB	40 - 110 0026/2-A Spike Added 11.3 <u>Limits</u> 40 - 110 228 (GFPC 27/24-A MB	LCSD Result 11.91	Qual Total Uncert.	Uncert. (2σ+/-) 1.28	RL 1.00	MDC 0.152	Unit %Re pCi/L 10	Prep Type Prep Bat %Rec. Limits 75-125	e: To ch: 4 RER 0.37 thod e: To ch: 4	tal/NA 70026 RER Limit 1 Blank tal/NA 70027
Ba Carrier Lab Sample ID: Matrix: Water Analysis Batch Analyte Radium-226 Carrier Ba Carrier Iethod: 904.0 Lab Sample ID: Matrix: Water	%Yield Q 99.1 99.1 : LCSD 1 : 47103 1 LCSD L %Yield Q 99.4 1 0 - Rad 1 : MB 160 1 : 47067 1	Qualifier 160-47 8 .CSD Qualifier lium-2 0-4700 0 MB	40 - 110 0026/2-A Spike Added 11.3 Limits 40 - 110 228 (GFPC 27/24-A MB Qualifier	LCSD Result 11.91	Qual	Uncert. (2σ+/-)	RL	MDC 0.152	Unit %Re pCi/L 10	Prep Type Prep Bat %Rec. Limits 75-125 mple ID: Mer Prep Type Prep Bat	e: To ch: 4 RER 0.37 thod e: To ch: 4	tal/NA 70026 RER Limit 1 Blank tal/NA

Eurofins TestAmerica, St. Louis

Analyzed

Prepared

05/11/20 17:18 05/18/20 15:09

05/11/20 17:18 05/18/20 15:09

Dil Fac

1

1

QC Sample Results

Job ID: 160-37917-1

Project/Site: J	JH Campb	ell Pond A	Wells											
lethod: 90)4.0 - Ra	idium-22	8 (GFPC)) (Conf	tinued))								
Lab Sample Matrix: Wat	ter		.7/1-A					Clie	ent Sar	mple ID:	: Lab Cont Prep Typ	e: Tota	al/NA	
Analysis Ba	atcn: 4/06	071	Orelles	1.00		Total					Prep Bat	:cn: 4 <i>1</i>	0027	
Analyte			Spike Added	LCS Result	LCS Qual	Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits			
Radium-228			8.83	7.418		0.907	1.00	0.394	pCi/L	84	75 - 125			
	LCS	LCS												
Carrier		Qualifier	Limits											
Ba Carrier	99.1		40 - 110											
Y Carrier	86.7		40 - 110											
Lab Sample Matrix: Wate Analysis Ba	ter		127/2-A				1	Client S	ample	ID: Lab	Control S Prep Typ Prep Bat	e: Tota	al/NA	
						Total								
A a la sta			Spike		LCSD	Uncert.	ы	MDO			%Rec.	050	RER	
Analyte Radium-228			Added	7.125		<u>(2σ+/-)</u> 0.881	RL 1.00	0.388			Limits	RER 0.16	Limit	
			0.00			0.00.	1.00	0.000	po	•••	/0-/_0	0.10		
		LCSD	l inside											
Carrier Ba Carrier	- <u>% Yield</u> 99.4	Qualifier	Limits 40 - 110											
Ba Carrier Y Carrier	99.4 86.0		40 - 110 40 - 110											
	00.0		+0 - 110											

QC Association Summary

Client: Consumers Energy Project/Site: JH Campbell Pond A Wells

Prep Batch: 470026

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-37917-1	JHC-MW-15006	Total/NA	Water	PrecSep STD	
160-37917-2	JHC-MW-15007	Total/NA	Water	PrecSep STD	
160-37917-3	JHC-MW-15008R	Total/NA	Water	PrecSep STD	
160-37917-4	JHC-MW-15009	Total/NA	Water	PrecSep STD	
160-37917-5	JHC-MW-15010	Total/NA	Water	PrecSep STD	
160-37917-6	JHC-MW-15011	Total/NA	Water	PrecSep STD	
160-37917-7	DUP-02	Total/NA	Water	PrecSep STD	
160-37917-8	EB-02	Total/NA	Water	PrecSep STD	
160-37917-9	FB-02	Total/NA	Water	PrecSep STD	
MB 160-470026/24-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-470026/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
LCSD 160-470026/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	

Rad					
Prep Batch: 470026					
Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-37917-1	JHC-MW-15006	Total/NA	Water	PrecSep STD	
160-37917-2	JHC-MW-15007	Total/NA	Water	PrecSep STD	
160-37917-3	JHC-MW-15008R	Total/NA	Water	PrecSep STD	
160-37917-4	JHC-MW-15009	Total/NA	Water	PrecSep STD	
160-37917-5	JHC-MW-15010	Total/NA	Water	PrecSep STD	
160-37917-6	JHC-MW-15011	Total/NA	Water	PrecSep STD	
160-37917-7	DUP-02	Total/NA	Water	PrecSep STD	
160-37917-8	EB-02	Total/NA	Water	PrecSep STD	
160-37917-9	FB-02	Total/NA	Water	PrecSep STD	
MB 160-470026/24-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-470026/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
LCSD 160-470026/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	
Prep Batch: 470027					
Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-37917-1	JHC-MW-15006	Total/NA	Water	PrecSep_0	
160-37917-2	JHC-MW-15007	Total/NA	Water	PrecSep_0	
160-37917-3	JHC-MW-15008R	Total/NA	Water	PrecSep_0	
160-37917-4	JHC-MW-15009	Total/NA	Water	PrecSep_0	
160-37917-5	JHC-MW-15010	Total/NA	Water	PrecSep_0	
160-37917-6	JHC-MW-15011	Total/NA	Water	PrecSep_0	
160-37917-7	DUP-02	Total/NA	Water	PrecSep_0	
160-37917-8	EB-02	Total/NA	Water	PrecSep_0	
160-37917-9	FB-02	Total/NA	Water	PrecSep_0	
MB 160-470027/24-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-470027/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-470027/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

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

Prep Type: Total/NA

			Percent Yield (Acceptance Limits)	
		Ba Carrier		
Lab Sample ID	Client Sample ID	(40-110)		1
160-37917-1	JHC-MW-15006	85.8		
160-37917-2	JHC-MW-15007	98.8		
160-37917-3	JHC-MW-15008R	101		
160-37917-4	JHC-MW-15009	101		
160-37917-5	JHC-MW-15010	97.0		
160-37917-6	JHC-MW-15011	95.5		5
160-37917-7	DUP-02	98.2		
160-37917-8	EB-02	96.4		C
160-37917-9	FB-02	97.3		~
LCS 160-470026/1-A	Lab Control Sample	99.1		
LCSD 160-470026/2-A	Lab Control Sample Dup	99.4		
MB 160-470026/24-A	Method Blank	98.2		
Tracer/Carrier Legend	4			
Ba Carrier = Ba Carrier				
Da Camer – Da Camer				1

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water

				Percent Yield (Acceptance Limits)
		Ba Carrier	Y Carrier	
Lab Sample ID	Client Sample ID	(40-110)	(40-110)	
160-37917-1	JHC-MW-15006	85.8	87.9	
160-37917-2	JHC-MW-15007	98.8	88.2	
160-37917-3	JHC-MW-15008R	101	87.1	
160-37917-4	JHC-MW-15009	101	82.2	
160-37917-5	JHC-MW-15010	97.0	87.5	
160-37917-6	JHC-MW-15011	95.5	89.0	
160-37917-7	DUP-02	98.2	87.5	
160-37917-8	EB-02	96.4	86.4	
160-37917-9	FB-02	97.3	89.7	
LCS 160-470027/1-A	Lab Control Sample	99.1	86.7	
LCSD 160-470027/2-A	Lab Control Sample Dup	99.4	86.0	
MB 160-470027/24-A	Method Blank	98.2	87.1	

Tracer/Carrier Legend

Ba Carrier = Ba Carrier

Y Carrier = Y Carrier

Prep Type: Total/NA



135 W. Trail St. Jackson, MI 49201

- To: KDStarken, JH Campbell Complex
- From: EBlaj, T-258
- Date: July 28, 2020
- Subject: JH CAMPBELL SOLID WASTE DISPOSAL AREA GROUNDWATER MONITORING 2nd Quarter, 2020 Pond A AMP/GSI Wells
 - CC: BLSwanberg, P22-119 BTRunkel, P22-120 HDRegister, P22-521

Sarah Holmstrom, Project Manager TRC Companies, Inc. 1540 Eisenhower Place Ann Arbor, MI 48108

Chemistry Project: 20-0405R

CE Laboratory Services conducted groundwater monitoring on 04/13/2020 through 04/16/2020 at the JH Campbell Solid Waste Disposal Area, for the 2nd Quarter monitoring requirements. The samples were received in the Chemistry department on 04/17/2020.

Samples for Radium analysis have been subcontracted to Eurofins/TestAmerica, Inc. and their results are being reported separately. Please note that the subcontracted work is not reported under the CE laboratory scope of accreditation.

With the exception noted above, the report that follows presents the results of the requested analytical testing; the results apply only to the samples, as received. All samples have been analyzed in accordance with the 2009 TNI Standard and the applicable A2LA accreditation scope for Laboratory Services. Any exceptions to applicable test method criteria and standard compliance are noted in the Case Narrative, or flagged with applicable qualifiers in the analytical results section.

The original report has been revised to include only the required total metals list, all results remained unchanged.

Reviewed and approved by:

Emil Blaj Sr. Technical Analyst Project Lead



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

CASE NARRATIVE

I. Sample Receipt

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

II. Methodology

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

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

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

DEFINITIONS / QUALIFIERS

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

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

NOTE: Sample temperature measured upon receipt was found above the recommended range of 0-6°C. During the time samples were kept on the bench they warmed up to 5.0-8.3°C.

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



Customer Name:JH Campbell ComplexWork Order ID:Q2 N&E AMP GSI WellsDate Received:4/17/2020Chemistry Project:20-0405

<u>Sample #</u>	Field Sample ID	<u>Matrix</u>	Sample Date	Site
20-0405-01	MW-14S	Groundwater	04/16/2020 03:36 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-0405-02	PZ-24S	Groundwater	04/16/2020 02:33 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-0405-03	PZ-40S	Groundwater	04/16/2020 11:02 AM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-0405-04	TW-19-04A	Groundwater	04/14/2020 06:17 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-0405-05	TW-19-05	Groundwater	04/16/2020 03:51 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-0405-06	TW-19-06A	Groundwater	04/16/2020 04:06 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-0405-07	PZ-23S	Groundwater	04/16/2020 04:52 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-0405-08	PZ-24	Groundwater	04/16/2020 12:55 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-0405-09	PZ-40	Groundwater	04/16/2020 09:38 AM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-0405-10	DUP-05	Groundwater	04/16/2020 12:00 AM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-0405-11	EB-05	Water	04/16/2020 06:25 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-0405-12	FB-05	Water	04/16/2020 11:00 AM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-0405-13	TW-19-04A Field MS	Groundwater	04/14/2020 06:17 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-0405-14	TW-19-04A Field MSD	Groundwater	04/14/2020 06:17 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells



Molybdenum

Nickel

Boron

Selenium

Vanadium

Sample Site:	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells (395496)	Laboratory Project:	20-0405
Field Sample ID:	MW-14S	Collect Date:	04/16/2020
Lab Sample ID:	20-0405-01	Collect Time:	03:36 PM
Matrix:	Groundwater		

Mercury ND ug/L 0.2 04/21/2020 AB20-0421-02 Metals by EPA 6020; HMP/AMP Detection & Assessment Monitoring Aliquot: 20-0405-01-C02-A02 Analysis ELF Parameter(s) Result Flag Units RL Analysis Date Tracking is Antimony ND ug/L 1 04/24/2020 AB20-0424-00 Arsenic ND ug/L 1 04/24/2020 AB20-0424-00 Barium 8 ug/L 1 04/24/2020 AB20-0424-00 Chromium ND ug/L 1 04/24/2020 AB20-0424-00 Lithium ND ug/L 10 04/24/2020 AB20-0424-00 Molybdenum ND ug/L 10 04/24/2020 AB20-0424-00 Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous Aliquot: 20-0405-01-C03-A01 Analysis Date Tracking is Chloride ND ug/L 1000 04/23/2020 AB20-0423-00 Fluoride ND ug/L 1000 04/23/2020 AB20-0423-00 <th>Mercury by EPA 7470A, Total, A</th> <th>Aqueous</th> <th></th> <th></th> <th>Aliquot:</th> <th>20-0405-01-C02-A01</th> <th>Analyst: TMR</th>	Mercury by EPA 7470A, Total, A	Aqueous			Aliquot:	20-0405-01-C02-A01	Analyst: TMR
Metals by EPA 6020; HMP/AMP Detection & Assessment Monitoring Aliquot: 20-0405-01-C02-A02 Analysis SLP Parameter(s) Result Flag Units RL Analysis Date Tracking is Antimony ND ug/L 1 04/24/2020 AB20-0424-0 Arsenic ND ug/L 1 04/24/2020 AB20-0424-0 Barium 8 ug/L 5 04/24/2020 AB20-0424-0 Chromium ND ug/L 1 04/24/2020 AB20-0424-0 Chromium ND ug/L 1 04/24/2020 AB20-0424-0 Molybdenum ND ug/L 10 04/24/2020 AB20-0424-0 Selenium ND ug/L 1 04/24/2020 AB20-0424-0 Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqu=-us Aliquot: 20-0405-01-C03-A01 Analysis D4E Tracking i Chloride ND ug/L 1000 04/23/2020 AB20-0423-0 Sulfate 2290 ug/L 1000 04/23/2020 AB20-0423-0 <th>Parameter(s)</th> <th>Result</th> <th>Flag</th> <th>Units</th> <th>RL</th> <th>Analysis Date</th> <th>Tracking #</th>	Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Parameter(s) Result Flag Units RL Analysis Date Tracking Antimony ND ug/L 1 04/24/2020 AB20-0424-0 Arsenic ND ug/L 1 04/24/2020 AB20-0424-0 Barium 8 ug/L 5 04/24/2020 AB20-0424-0 Chromium ND ug/L 1 04/24/2020 AB20-0424-0 Chromium ND ug/L 1 04/24/2020 AB20-0424-0 Lithium ND ug/L 1 04/24/2020 AB20-0424-0 Molybdenum ND ug/L 1 04/24/2020 AB20-0424-0 Selenium ND ug/L 1 04/24/2020 AB20-0424-0 Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous Aliquot: 20-0405-01-C03-A01 Analysis Date Tracking in Chioride Parameter(s) Result Flag Units RL Analysis Date Tracking in Chioride Sulfate 2290 ug/L 1000 04/23/2020	Mercury	ND		ug/L	0.2	04/21/2020	AB20-0421-02
Antimony ND ug/L 1 04/24/2020 AB20-0424-04 Arsenic ND ug/L 1 04/24/2020 AB20-0424-04 Barium 8 ug/L 5 04/24/2020 AB20-0424-04 Barium 8 ug/L 1 04/24/2020 AB20-0424-04 Chromium ND ug/L 1 04/24/2020 AB20-0424-04 Lithium ND ug/L 10 04/24/2020 AB20-0424-04 Molybdenum ND ug/L 10 04/24/2020 AB20-0424-04 Selenium ND ug/L 1 04/24/2020 AB20-0424-04 Antions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous Aliquot: 20-0405-01-C03-A01 Analyst: DMM Parameter(s) Result Flag Units RL Analysis Date Tracking in tracki	Metals by EPA 6020; HMP/AMP	Detection & Assess	sment Mo	nitoring	Aliquot:	20-0405-01-C02-A02	Analyst: SLK
Arsenic ND ug/L 1 04/24/2020 AB20-0424-04 Barium 8 ug/L 5 04/24/2020 AB20-0424-04 Chromium ND ug/L 1 04/24/2020 AB20-0424-04 Lithium ND ug/L 1 04/24/2020 AB20-0424-04 Molybdenum ND ug/L 10 04/24/2020 AB20-0424-04 Selenium ND ug/L 5 04/24/2020 AB20-0424-04 Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous Aliquot: 20-0405-01-C03-A01 Analysi: DMM Parameter(s) Result Flag Units RL Analysi: DMM Parameter(s) Result Flag Units RL Analysi: D42 Tracking in Choride ND ug/L 1000 04/23/2020 AB20-0423-0 AB20-0423-0 Sulfate 2290 ug/L 1000 04/23/2020 AB20-0421-0 Total Dissolved Solids by SM 2540C Result Flag Units RL	Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Barium 8 ug/L 5 04/24/2020 AB20-0424-00 Chromium ND ug/L 1 04/24/2020 AB20-0424-00 Lithium ND ug/L 10 04/24/2020 AB20-0424-00 Molybdenum ND ug/L 5 04/24/2020 AB20-0424-00 Selenium ND ug/L 5 04/24/2020 AB20-0424-00 Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aque-us Aliquot: 20-0405-01-C03-A01 Analyst: DMW Parameter(s) Result Flag Units RL Analysis Date Tracking at Chloride Fluoride ND ug/L 1000 04/23/2020 AB20-0423-00 Sulfate 2290 ug/L 1000 04/23/2020 AB20-0423-00 Total Dissolved Solids by SM 2540C Result Flag Units RL Analysis Date Tracking at Chloride Parameter(s) Result Flag Units RL Analysis Date Tracking at Chloride Otal Dissolved Solids 29	Antimony	ND		ug/L	1	04/24/2020	AB20-0424-04
Chromium ND ug/L 1 04/24/2020 AB20-0424-04 Lithium ND ug/L 10 04/24/2020 AB20-0424-04 Molybdenum ND ug/L 5 04/24/2020 AB20-0424-04 Selenium ND ug/L 5 04/24/2020 AB20-0424-04 Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aque-us Aliquot: 20-0405-01-C03-A01 Analyst: DMW Parameter(s) Result Flag Units RL Analysis Date Tracking a Chloride ND ug/L 1000 04/23/2020 AB20-0423-00 Fluoride ND ug/L 1000 04/23/2020 AB20-0423-00 Sulfate 2290 ug/L 1000 04/23/2020 AB20-0423-00 Total Dissolved Solids by SM 2540C Result Flag Units RL Analysis Date Tracking a Total Dissolved Solids 29 mg/L 10 04/21/2020 AB20-0421-03 Groundwater Metals by EPA 6020A, Dissolved, JHC List Aliquot: 20-0405-01-C07-	Arsenic	ND		ug/L	1	04/24/2020	AB20-0424-04
Lithium ND ug/L 1 OH/24/2020 AB20-0424-0 Molybdenum ND ug/L 5 04/24/2020 AB20-0424-0 Selenium ND ug/L 1 04/24/2020 AB20-0424-0 Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous Aliquot: 20-0405-01-C03-A01 Analyst: DMW Parameter(s) Result Flag Units RL Analysis Date Tracking at Chloride Chloride ND ug/L 1000 04/23/2020 AB20-0423-0 AB20-0423-0 Fluoride ND ug/L 1000 04/23/2020 AB20-0423-0 Fluoride ND ug/L 1000 04/23/2020 AB20-0423-0 Sulfate 2290 ug/L 1000 04/23/2020 AB20-0423-0 Total Dissolved Solids by SM 2540C Result Flag Units RL Analysis Date Tracking at Tracking a	Barium	8		ug/L	5	04/24/2020	AB20-0424-04
Molybdenum ND ug/L 5 04/24/2020 AB20-0424-04 Selenium ND ug/L 1 04/24/2020 AB20-0424-04 Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous Aliquot: 20-0405-01-C03-A01 Analysis DMW Parameter(s) Result Flag Units RL Analysis Date Tracking a Chloride ND ug/L 1000 04/23/2020 AB20-0423-07 AB20-0420-17 AB20-0423-07 AB20	Chromium	ND		ug/L	1	04/24/2020	AB20-0424-04
SeleniumNDug/L104/24/2020AB20-0424-04Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, AqueousAliquot: 20-0405-01-C03-A01Analyst: DMWParameter(s)ResultFlagUnitsRLAnalysis DateTracking aChlorideNDug/L100004/23/2020AB20-0423-02FluorideNDug/L100004/23/2020AB20-0423-02Sulfate2290ug/L200004/23/2020AB20-0423-02Total Dissolved Solids by SM 2540CResultFlagUnitsRLAnalysis DateTracking aParameter(s)ResultFlagUnitsRLAnalysis DateTracking aTotal Dissolved SolidsSM 2540CKesultFlagUnitsRLAnalysis DateTracking aParameter(s)ResultFlagUnitsRLAnalysis DateTracking aGroundwater Metals by EPA 6020A, Dissolved, JHC ListAliquot: 20-0405-01-C07-A01Analysis SLPParameter(s)ResultFlagUnitsRLAnalysis DateTracking aAntimonyNDug/L104/21/2020AB20-042-012AntimonyNDug/L104/21/2020AB20-042-012AntimonyNDug/L104/21/2020AB20-042-012AntimonyNDug/L104/21/2020AB20-042-012AntimonyNDug/L104/21/2020AB20-042-012AntimonyNDug/L104/21/2020 </td <td>Lithium</td> <td>ND</td> <td></td> <td>ug/L</td> <td>10</td> <td>04/24/2020</td> <td>AB20-0424-04</td>	Lithium	ND		ug/L	10	04/24/2020	AB20-0424-04
Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous Aliquot: 20-0405-01-C03-A01 Analysi: DMW Parameter(s) Result Flag Units RL Analysis Date Tracking and the provide of the pr	Molybdenum	ND		ug/L	5	04/24/2020	AB20-0424-04
Parameter(s)ResultFlagUnitsRLAnalysis DateTracking aChlorideNDug/L100004/23/2020AB20-0423-07FluorideNDug/L100004/23/2020AB20-0423-07Sulfate2290ug/L200004/23/2020AB20-0423-07Total Dissolved Solids by SM 2540CAliquot: 20-0405-01-C04-A01Analysis DateTracking aParameter(s)ResultFlagUnitsRLAnalysis DateTracking aTotal Dissolved Solids29mg/L1004/21/2020AB20-0421-03Groundwater Metals by EPA 6020A, Dissolved, JHC ListAliquot: 20-0405-01-C07-A01Analyst: SLPParameter(s)ResultFlagUnitsRLAnalysis DateTracking aAntimonyNDug/L104/21/2020AB20-0420-12ArsenicNDug/L104/21/2020AB20-0420-12ChromiumNDug/L104/21/2020AB20-0420-12	Selenium	ND		ug/L	1	04/24/2020	AB20-0424-04
Chloride ND ug/L 1000 04/23/2020 AB20-0423-07 Fluoride ND ug/L 1000 04/23/2020 AB20-0423-07 Sulfate 2290 ug/L 2000 04/23/2020 AB20-0423-07 Total Dissolved Solids by SM 2540C Aliquot: 20-0405-01-C04-A01 Analysi: DLF Parameter(s) Result Flag Units RL Analysis Date Tracking at analysi: DLF Total Dissolved Solids 29 mg/L 10 04/21/2020 AB20-0421-09 Groundwater Metals by EPA 6020A, Dissolved, JHC List Aliquot: 20-0405-01-C07-A01 Analyst: SLP Parameter(s) Result Flag Units RL Analysis Date Tracking at analysi: SLP Parameter(s) Result Flag Units RL Analysis Date Tracking at analysi: SLP Antimony ND ug/L 1 04/21/2020 AB20-0420-12 Arsenic ND ug/L 1 04/21/2020 AB20-0420-12 Chromium ND ug/L 1 <td>Anions by EPA 300.0 CCR Rule</td> <td>Analyte List, CI, F,</td> <td>SO4, Aqu</td> <td>eous</td> <td>Aliquot:</td> <td>20-0405-01-C03-A01</td> <td>Analyst: DMW</td>	Anions by EPA 300.0 CCR Rule	Analyte List, CI, F,	SO4, Aqu	eous	Aliquot:	20-0405-01-C03-A01	Analyst: DMW
Fluoride ND ug/L 1000 04/23/2020 AB20-0423-02 Sulfate 2290 ug/L 2000 04/23/2020 AB20-0423-02 Total Dissolved Solids by SM 2540C Analysis Date Analysis Date Analysis Date Parameter(s) Result Flag Units RL Analysis Date Tracking and analysis Date Groundwater Metals by EPA 6020A, Dissolved, JHC List Aliquot: 20-0405-01-C07-A01 Analysis SLM Parameter(s) Result Flag Units RL Analysis Date Tracking and analysis Date Antimony ND ug/L 1 04/21/2020 AB20-0420-12 Arsenic ND ug/L 1 04/21/2020 AB20-0420-12 Chromium ND ug/L 1 04/21/2020 AB20-0420-12	Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Sulfate2290ug/L200004/23/2020AB20-0423-01Total Dissolved Solids by SM 2540CResultFlagUnitsRLAnalysis DateTracking aParameter(s)ResultFlagUnitsRLAnalysis DateTracking aTotal Dissolved Solids29mg/L1004/21/2020AB20-0421-03Groundwater Metals by EPA 6020A, Dissolved, JHC ListAliquot: 20-0405-01-C07-A01Analyst: SLPParameter(s)ResultFlagUnitsRLAnalysis DateTracking aAntimonyNDug/L104/21/2020AB20-0420-12ArsenicNDug/L104/21/2020AB20-0420-12ChromiumNDug/L104/21/2020AB20-0420-12	Chloride	ND		ug/L	1000	04/23/2020	AB20-0423-01
Total Dissolved Solids by SM 2540CAliquot: 20-0405-01-C04-A01Analysi: DLFParameter(s)ResultFlagUnitsRLAnalysis DateTracking a Tracking a Dissolved SolidsGroundwater Metals by EPA 6020A, Dissolved, JHC ListAliquot: 20-0405-01-C07-A01Analyst: SLFParameter(s)ResultFlagUnitsRLAnalysis DateTracking a Tracking a Dissolved SolidsAntimonyNDug/L104/21/2020AB20-0420-12 AB20-0420-12 Dissolved SolidsAntimonyNDug/L104/21/2020AB20-0420-12 AB20-0420-12AntimonyNDug/L104/21/2020AB20-0420-12 AB20-0420-12AntimonyNDug/L104/21/2020AB20-0420-12 AB20-0420-12AntimonyNDug/L104/21/2020AB20-0420-12 AB20-0420-12AntimonyNDug/L104/21/2020AB20-0420-12 AB20-0420-12AntimonyNDug/L104/21/2020AB20-0420-12 AB20-0420-12AntimonyNDug/L104/21/2020AB20-0420-12 AB20-0420-12AntimonyNDug/L104/21/2020AB20-0420-12 AB20-0420-12	Fluoride	ND		ug/L	1000	04/23/2020	AB20-0423-01
Parameter(s)ResultFlagUnitsRLAnalysis DateTracking a Tracking a MB20-0421-09Total Dissolved Solids29mg/L1004/21/2020AB20-0421-09Groundwater Metals by EPA 6020A, Dissolved, JHC ListAliquot: 20-0405-01-C07-A01Analyst: SLMParameter(s)ResultFlagUnitsRLAnalysis DateTracking a Tracking a AntimonyAntimonyNDug/L104/21/2020AB20-0420-12 AB20-0420-12 AB20-0420-12 ChromiumNDug/L104/21/2020NDug/L104/21/2020AB20-0420-12 AB20-0420-12NDug/L104/21/2020	Sulfate	2290		ug/L	2000	04/23/2020	AB20-0423-01
Total Dissolved Solids29mg/L1004/21/2020AB20-0421-09Groundwater Metals by EPA 6020A, Dissolved, JHC ListAliquot: 20-0405-01-C07-A01Analyst: SLMParameter(s)ResultFlagUnitsRLAnalysis DateTracking and analysisAntimonyNDug/L104/21/2020AB20-0420-12ArsenicNDug/L104/21/2020AB20-0420-12ChromiumNDug/L104/21/2020AB20-0420-12	Total Dissolved Solids by SM 2	540C			Aliquot:	20-0405-01-C04-A01	Analyst: DLR
Groundwater Metals by EPA 6020A, Dissolved, JHC ListAliquot: 20-0405-01-C07-A01Analysi: SLMParameter(s)ResultFlagUnitsRLAnalysis DateTracking and analysisAntimonyNDug/L104/21/2020AB20-0420-12ArsenicNDug/L104/21/2020AB20-0420-12ChromiumNDug/L104/21/2020AB20-0420-12	Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Parameter(s)ResultFlagUnitsRLAnalysis DateTracking and a structureAntimonyNDug/L104/21/2020AB20-0420-12ArsenicNDug/L104/21/2020AB20-0420-12ChromiumNDug/L104/21/2020AB20-0420-12	Total Dissolved Solids	29		mg/L	10	04/21/2020	AB20-0421-09
Antimony ND ug/L 1 04/21/2020 AB20-0420-12 Arsenic ND ug/L 1 04/21/2020 AB20-0420-12 Chromium ND ug/L 1 04/21/2020 AB20-0420-12	Groundwater Metals by EPA 60	20A, Dissolved, JH	C List		Aliquot:	20-0405-01-C07-A01	Analyst: SLK
Arsenic ND ug/L 1 04/21/2020 AB20-0420-12 Chromium ND ug/L 1 04/21/2020 AB20-0420-12	Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Arsenic ND ug/L 1 04/21/2020 AB20-0420-12 Chromium ND ug/L 1 04/21/2020 AB20-0420-12	Antimony	ND		ug/L	1	04/21/2020	AB20-0420-12
Chromium ND ug/L 1 04/21/2020 AB20-0420-12	•	ND		-	1	04/21/2020	AB20-0420-12
Lithium ND ug/L 10 04/20/2020 AB20-0420-12	Chromium	ND		ug/L	1	04/21/2020	AB20-0420-12
	Lithium	ND		ug/L	10	04/20/2020	AB20-0420-12

ug/L

ug/L

ug/L

ug/L

ug/L

5

2

1

2

20

04/21/2020

04/21/2020

04/21/2020

04/21/2020

04/20/2020

AB20-0420-12

AB20-0420-12

AB20-0420-12

AB20-0420-12

AB20-0420-12

ND

ND

ND

ND

ND



Sample Site:	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells (395496)	Laboratory Project:	20-0405
Field Sample ID:	PZ-24S	Collect Date:	04/16/2020
Lab Sample ID:	20-0405-02	Collect Time:	02:33 PM
Matrix:	Groundwater		

eous			Aliquot:	20-0405-02-C02-A01	Analyst: TMR
Result	Flag	Units	RL	Analysis Date	Tracking #
ND		ug/L	0.2	04/21/2020	AB20-0421-02
ection & Asses	sment Mo	nitoring	Aliquot:	20-0405-02-C02-A02	Analyst: SLK
Result	Flag	Units	RL	Analysis Date	Tracking #
ND		ug/L	1	04/24/2020	AB20-0424-04
ND		ug/L	1	04/24/2020	AB20-0424-04
24		ug/L	5	04/24/2020	AB20-0424-04
2		ug/L	1	04/24/2020	AB20-0424-04
ND		ug/L	10	04/24/2020	AB20-0424-04
ND		ug/L	5	04/24/2020	AB20-0424-04
ND		ug/L	1	04/24/2020	AB20-0424-04
alyte List, Cl, F,	SO4, Aqu	eous	Aliquot:	20-0405-02-C03-A01	Analyst: DMW
Result	Flag	Units	RL	Analysis Date	Tracking #
ND		ug/L	1000	04/23/2020	AB20-0423-01
ND		ug/L	1000	04/23/2020	AB20-0423-01
2730		ug/L	2000	04/23/2020	AB20-0423-01
2			Aliquot:	20-0405-02-C04-A01	Analyst: DLR
Result	Flag	Units	RL	Analysis Date	Tracking #
28		mg/L	10	04/21/2020	AB20-0421-09
, Dissolved, JH	C List		Aliquot:	20-0405-02-C07-A01	Analyst: SLK
Result	Flag	Units	RL	Analysis Date	Tracking #
ND		ug/L	1	04/21/2020	AB20-0420-12
ND		ug/L	1	04/21/2020	AB20-0420-12
ND		ug/L	1	04/21/2020	AB20-0420-12
	ND ection & Assess Result ND ND 24 2 ND ND ND Alyte List, Cl, F, Result ND 2730 C Result 28 , Dissolved, JH0 Result ND ND	Result Flag ND ND ection & Assessment Mode Result Flag ND ND 24 2 24 2 ND ND ND ND Alyte List, Cl, F, SO4, Aque ND ND ND ND ND ND ND ND 2730 2730 C Result Result Flag 28 ND ND JHC List ND JHC List ND ND 28 ND ND ND 2730 28	ResultFlagUnitsNDug/Lection & Assessment MorringResultFlagUnitsNDug/LNDug/L24ug/L24ug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/L2730ug/L28mg/LPlesultFlagInitsInitsAgesultFlagNDug/LNDug/LNDug/LNDug/Lug/Lug/Lug/Lug/LNDug/Lug/Lug/Lug/Lug/LNDug/Lug/Lug/LNDug/Lug/Lug/Lug/Lug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LUug/LUug/LUug/LUug/LUug/LU	ResultFlagUnitsRLNDug/L0.2ection & Assessment MonitoringResultFlagUnitsRLNDug/L1NDug/L1NDug/L124ug/L52ug/L1NDug/L10NDug/L10NDug/L10NDug/L10NDug/L100NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L100NDug/L10CKesultFlagUnitsResultFlagUnitsRL28mg/L10MDug/L1NDug/L1NDug/L1	Result Flag Units RL Analysis Date ND ug/L 0.2 04/21/2020 action & Assessment Monitoring Aliquot: 20-0405-02-C02-A02 Result Flag Units RL Analysis Date ND ug/L 1 04/24/2020 Aliquot: 20-0405-02-C02-A02 Result Flag Units RL Analysis Date ND ug/L 1 04/24/2020 AD ug/L 1 04/24/2020 24 ug/L 5 04/24/2020 ND ug/L 10 04/24/2020 ND ug/L 10 04/24/2020 ND ug/L 10 04/24/2020 ND ug/L 10 04/24/2020 ND ug/L 1 04/24/2020 ND ug/L 1 04/24/2020 ND ug/L 1000 04/23/2020 ND ug/L 1000 04/23/2020 ND ug/L

Alsenic	ND	ug/L	I	04/21/2020	AB20-0420-12
Chromium	ND	ug/L	1	04/21/2020	AB20-0420-12
Lithium	ND	ug/L	10	04/20/2020	AB20-0420-12
Molybdenum	ND	ug/L	5	04/21/2020	AB20-0420-12
Nickel	ND	ug/L	2	04/21/2020	AB20-0420-12
Selenium	ND	ug/L	1	04/21/2020	AB20-0420-12
Vanadium	2	ug/L	2	04/21/2020	AB20-0420-12
Boron	ND	ug/L	20	04/20/2020	AB20-0420-12



Sample Site:	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells (395496)	Laboratory Project:	20-0405
Field Sample ID:	PZ-40S	Collect Date:	04/16/2020
Lab Sample ID:	20-0405-03	Collect Time:	11:02 AM
Matrix:	Groundwater		

ieous			Aliquot:	20-0405-03-C02-A01	Analyst: TMR
Result	Flag	Units	RL	Analysis Date	Tracking #
ND		ug/L	0.2	04/21/2020	AB20-0421-02
etection & Asses	sment Mo	nitoring	Aliquot:	20-0405-03-C02-A02	Analyst: SLK
Result	Flag	Units	RL	Analysis Date	Tracking #
ND		ug/L	1	04/24/2020	AB20-0424-04
ND		ug/L	1	04/24/2020	AB20-0424-04
22		ug/L	5	04/24/2020	AB20-0424-04
1		ug/L	1	04/24/2020	AB20-0424-04
ND		ug/L	10	04/24/2020	AB20-0424-04
ND		ug/L	5	04/24/2020	AB20-0424-04
ND		ug/L	1	04/24/2020	AB20-0424-04
nalyte List, Cl, F,	SO4, Aqu	eous	Aliquot:	20-0405-03-C03-A01	Analyst: DMW
Result	Flag	Units	RL	Analysis Date	Tracking #
ND		ug/L	1000	04/23/2020	AB20-0423-01
ND		ug/L	1000	04/23/2020	AB20-0423-01
2720		ug/L	2000	04/23/2020	AB20-0423-01
C			Aliquot:	20-0405-03-C04-A01	Analyst: DLR
Result	Flag	Units	RL	Analysis Date	Tracking #
33		mg/L	10	04/21/2020	AB20-0421-09
A, Dissolved. JH	C List		Aliquot:	20-0405-03-C07-A01	Analyst: SLK
Result	Flag	Units	RL	Analysis Date	Tracking #
ND		ug/L	1	04/21/2020	AB20-0420-12
ND		uy/L	1	07/21/2020	71020 0420 12
	Result ND etection & Assess Result ND 22 1 ND 22 1 ND ND ND ND ND ND ND 2720 OC Result 33 A, Dissolved, JH0 Result	ResultFlagNDetection & Assessment ModeResultFlagNDND221NDNDNDNDNDNDNDNDNDNDNDNDNDNDNDND2720720OCResultFlag3333A, Dissolved, JHC ListFlag	ResultFlagUnitsNDug/Letection & Assessment MonitoringResultFlagUnitsNDug/LNDug/L22ug/L1ug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/LNDug/L2720ug/L2720ug/LA, Dissolved, JHC ListResultFlagVintsA, Dissolved, JHC ListFlagUnits	ResultFlagUnitsRLNDug/L0.2Aliquot:ResultFlagUnitsRLNDug/L1NDug/L1NDug/L122ug/L51ug/L10NDug/L10NDug/L5NDug/L10NDug/L10NDug/L10NDug/L10NDug/L100NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDug/L1000NDUnitsRL33mg/L10A, Dissolved, JHC ListAliquot:ResultFlagUnitsRL	ResultFlagUnitsRLAnalysis DateNDug/L0.204/21/2020Aliquot: 20-0405-03-C02-A02Aliquot: 20-0405-03-C02-A02ResultFlagUnitsRLAnalysis DateNDug/L104/24/2020NDug/L104/24/202022ug/L504/24/20201ug/L104/24/202022ug/L504/24/2020NDug/L1004/24/2020NDug/L1004/24/2020NDug/L1004/24/2020NDug/L104/24/2020NDug/L104/24/2020NDug/L1004/24/2020NDug/L1004/24/2020NDug/L100004/23/2020NDug/L100004/23/2020NDug/L100004/23/2020NDug/L100004/23/2020NDug/L100004/23/20202720ug/L200004/23/2020OCAliquot: 20-0405-03-C04-A01ResultResultFlagUnitsRLAnalysis Date33mg/L1004/21/2020A, Dissolved, JHC ListAliquot: 20-0405-03-C07-A01ResultFlagUnitsRLAnalysis Date

Antimony	ND	ug/L	1	04/21/2020	AB20-0420-12
Arsenic	ND	ug/L	1	04/21/2020	AB20-0420-12
Chromium	ND	ug/L	1	04/21/2020	AB20-0420-12
Lithium	ND	ug/L	10	04/20/2020	AB20-0420-12
Molybdenum	ND	ug/L	5	04/21/2020	AB20-0420-12
Nickel	ND	ug/L	2	04/21/2020	AB20-0420-12
Selenium	ND	ug/L	1	04/21/2020	AB20-0420-12
Vanadium	ND	ug/L	2	04/21/2020	AB20-0420-12
Boron	ND	ug/L	20	04/20/2020	AB20-0420-12



Data Qualifiers

Exception Summary

No exceptions occured.

Chemistry Department

General Standard Operating Procedure

1

1

TITLE: SAMPLE LOG-IN - SHIPMENT INSPECTION FORM

Inspection Date:	04-17-2020		Inspection By	ble		
Sample Origin/Pr	oject Name: JH	l CAMPBEL	L HMP /	uh		
Shipment Deliver	ed By: Enter the ty	pe of shipment	caírier.			
*	• •	• •		USPS	Air	borne
Other/Han	d Carry (whom)	CET	un D	nw		
			Shipping			
Shipping Contain	ers: Enter the type	and number of a	shipping containers r	eceived.		
	Cardboa			e	Envelor	e/Mailer
	paokaged Container			· 、		
_			ion of the shipment o		1. 11	
-		,	-		т.,	1
_	Shipment Observed			1		king
Shipment Security Shipping (Containers Received	e shipping conta 1: Opened	iiners were opened b	efore receipt.		
Shipment Security Shipping (Enclosed Documer	 Enter if any of th Containers Received Inter the type 	e shipping conta l: Opened of documents er	iners were opened b Sealed	efore receipt.	Other	
Shipment Security Shipping C Enclosed Documer CoC	$ \begin{array}{c} \text{Enter if any of th} \\ \text{Containers Received} \\ \text{its: Enter the type} \\ \underline{\checkmark} \\ \text{Work,Requ} \end{array} $	e shipping conta 1: Opened of documents er est	iners were opened b Sealed uclosed with the ship.	efore receipt.	Other	
Shipment Security Shipping (Enclosed Documer CaC Femperature of Co	$ \begin{array}{c} \text{Enter if any of th} \\ \text{Containers Received} \\ \text{its: Enter the type} \\ \underline{\checkmark} \\ \text{Work,Requ} \end{array} $	e shipping contr l: Opened of documents en est the temperature	iners were opened b Sealed aclosed with the ship Air Data Shee e of several sample c	efore receipt.		
Shipment Security Shipping C Enclosed Documer CoC Femperature of Co As-Receive	r: Enter if any of th Containers Received nts: Enter the type Work Require Containers: Measure ed Temperature <u>5.</u>	e shipping conta l: Opened of documents en est the temperature .D - &.3	iners were opened b Sealed aclosed with the ship Air Data Shee e of several sample c	efore receipt.		
Shipment Security Shipping C Enclosed Documer CoC Femperature of Co As-Receive	 c: Bnter if any of the Containers Received onts: Enter the type work, Required to the type on tainers: Measure of Containers: Enter the type of Con	e shipping contr l: Opened of documents er est the temperature $\underline{O - 8.3^{\circ}}_{O}$ ther the total num	iners were opened b Sealed aclosed with the ship Air Data Shee e of several sample c Samples Receiv	efore receipt.		
Shipment Security Shipping C Enclosed Documer CaC Femperature of Co As-Receive Number and Type <u>Container</u>	 c: Bnter if any of the Containers Received onts: Enter the type work, Required to the type on tainers: Measure of Containers: Enter the type of Con	e shipping contained in the opened is a contained set in the temperature is the temperature is $(\underline{O} - \underline{\& \cdot 3})^{\circ} (\underline{O} - \underline{O} - \underline{\& \cdot 3})^{\circ} (\underline{O} - \underline{O} - \underline{O} - \underline{O} - \underline{O} - \underline{O})^{\circ} (\underline{O} - \underline{O} - \underline{O} - \underline{O}$	ainers were opened b Sealed aclosed with the ship Air Data Shee of several sample c Samples Receiv aber of sample conta	efore receipt.	No_	V
Shipment Security Shipping C Enclosed Documer CaC Femperature of Co As-Receive Number and Type <u>Container</u>	x: Enter if any of the containers Received ints: Enter the type of Work, Required the type ontainers: Measure of Containers: Enter the type of Containers: Enter type the contai	e shipping contained in the opened is a contained set in the temperature is the temperature is $(\underline{O} - \underline{\& \cdot 3})^{\circ} (\underline{O} - \underline{O} - \underline{\& \cdot 3})^{\circ} (\underline{O} - \underline{O} - \underline{O} - \underline{O} - \underline{O} - \underline{O})^{\circ} (\underline{O} - \underline{O} - \underline{O} - \underline{O}$	ainers were opened b Sealed aclosed with the ship Air Data Shee e of several sample c Samples Receiv aber of sample conta Other	efore receipt.	No_	V
Shipment Security Shipping C Enclosed Documer CaC Femperature of Ca As-Receive Number and Type <u>Container</u> VOA (40m	 r: Bnter if any of the Containers Received and the type of Containers: Measure of Containers: Entrype the type of Containers: Entrype	e shipping contained in the opened is a contained set in the temperature is the temperature is $(\underline{O} - \underline{\& \cdot 3})^{\circ} (\underline{O} - \underline{O} - \underline{\& \cdot 3})^{\circ} (\underline{O} - \underline{O} - \underline{O} - \underline{O} - \underline{O} - \underline{O})^{\circ} (\underline{O} - \underline{O} - \underline{O} - \underline{O}$	ainers were opened b Sealed aclosed with the ship Air Data Shee e of several sample c Samples Receiv aber of sample conta Other	efore receipt.	No_	V
Shipment Security Shipping C Enclosed Documer CoC Femperature of Co As-Receive Number and Type <u>Container</u> VOA (40m Quart/Liter 9-oz (ambe 2-oz (ambe	r: Enter if any of the containers Received and the type of type	e shipping contained in the opened is a contained set in the temperature is the temperature is $(\underline{O} - \underline{\& \cdot 3})^{\circ} (\underline{O} - \underline{O} - \underline{\& \cdot 3})^{\circ} (\underline{O} - \underline{O} - \underline{O} - \underline{O} - \underline{O} - \underline{O})^{\circ} (\underline{O} - \underline{O} - \underline{O} - \underline{O}$	ainers were opened b Sealed aclosed with the ship Air Data Shee e of several sample c Samples Receiv aber of sample conta Other	efore receipt.	No_	V
Shipment Security Shipping C Enclosed Documer CoC Femperature of Co As-Receive Number and Type <u>Container</u> VOA (40m Quart/Liter 9-oz (ambe 2-oz (ambe 125 mL (pl	x: Enter if any of the containers Received interpretent the type of work, Required the type of type water type of type o	e shipping contained in the opened is a contained set in the temperature is the temperature is $(\underline{O} - \underline{\& \cdot 3})^{\circ} (\underline{O} - \underline{O} - \underline{\& \cdot 3})^{\circ} (\underline{O} - \underline{O} - \underline{O} - \underline{O} - \underline{O} - \underline{O})^{\circ} (\underline{O} - \underline{O} - \underline{O} - \underline{O}$	ainers were opened b Sealed aclosed with the ship Air Data Shee e of several sample c Samples Receiv aber of sample conta Other	efore receipt.	No_	V
Shipment Security Shipping C Enclosed Documer CoC Femperature of Co As-Receive Number and Type <u>Container</u> VOA (40m Quart/Liter 9-oz (ambe 2-oz (ambe	x: Enter if any of the containers Received ints: Enter the type of Work, Required the type on tainers: Measure ed Temperature 5 , of Containers: Enter the type of Containers: Enter type of Containers:	e shipping contained in the opened is a contained set in the temperature is the temperature is $(\underline{O} - \underline{\& \cdot 3})^{\circ} (\underline{O} - \underline{O} - \underline{\& \cdot 3})^{\circ} (\underline{O} - \underline{O} - \underline{O} - \underline{O} - \underline{O} - \underline{O})^{\circ} (\underline{O} - \underline{O} - \underline{O} - \underline{O}$	ainers were opened b Sealed aclosed with the ship Air Data Shee e of several sample c Samples Receiv aber of sample conta Other	efore receipt.	No_	V

PH VERIFICO 22 ON 04-17-2020 by ble

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

Consumers Energy

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

SAMI	PLING SIT	E				PROJECT NUMBER						۵۸		SIS R	FOIL	ESTE	<u>ר</u>	PAGE1OF1
J				A GW Monit GSI Wells	toring		20-04	05						1 010				SEND REPORT TO
SAMI	LING TEA		· · · ·			DATE SHIPPED		SITE SK	CIRCLE (ATTACHED?	-							Beth Swanberg, TRC
CET	/ CLH /]	DMW							NO		s, Total	s		в		1		PHONE
	CE	SAM		SAMPLE	SAMPLE				110	# OF	Metals,	Anions	TDS	Radium				
	TROL #	DA		TIME	MATRIX	SAMPLE DESCRIPTION / I	LOCATION	N	DEPTH	CONTAINERS	M	Ą	E	R				REMARKS
20-	0405-01	4/16	120	1536	GW	MW-14S				5	x	x	х	x				
	-02			1433	GW	PZ-248				5	x	х	x	x				
	-03	J	,	1102	GW	PZ-40S				5	X	X	x	x				
	-04	4/4	20	1817	GW	TW-19-04A				5	x	x	x	x				
	-05		0/20	1551	GW	TW-19-05				5	X	х	х	x				
	-06			1666	GW	TW-19-06A				5	x	X	х	x				
	-07			1652	GW	PZ-23S				5	x	X	x	x				
	-08			1255	GW	PZ-24				5	x	x	x	x				
	-09			0938	GW	PZ-40				5	x	x	х	x				
	-10			1102	GW	DUP-05				5	x	x	х	x				
	-11			1825	AQ	EB-05				5	x	x	х	x				
	-12			(100	AQ	FB-05				5	x	X	X	X				
RELI	NQUISHE	DBY (SIGNAT	TURE)	DATE/T	TIME 1	RECEIVEI	DBY (SIG	NATURE)							C	OMM	ENTS
R	Dan bullen 4		4.5	17.20 oris grite			Kr.		Tot	al Me	tals =	Appe	ndıx 🛛			and Mercury (01-06) etals and Mercury (07-09)		
RELI	<u>v</u> -			DATE/I	E/TIME RECEIVED BY (SIGNATURE)			5.0-8.3°C										
													O	NGIN	[Α]. Τ	TO LA	B	COPY TO CUSTOMER

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

Consumers Energy

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

SAMPLING SIT	E			PROJECT NUMBER												
JHC 2 nd Q	etr. 2020 RCF &E / AMP /	RA GW Moni	toring		20-04	105					ALYS	<u>SIS R</u>	EQU	ESTI	ED	PAGE <u>1</u> OF <u>1</u> SEND REPORT TO Kevin Starken
SAMPLING TEA		GSI wells	<u></u>	DATE SHIPPED		SITE	SKETCHED CIRCLE	ATTACHED?	I							Beth Swanberg, TRC
CET/CLH/	DMW	2					NO		ls, Total	ns						PHONE
CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION	/ LOCATIO	N	DEPTH	# OF CONTAINERS	Metals,	Anions						REMARKS
20-0405-13	4/14/20	1817	GW	TW-19-04A Field	MS			2	x	x						
-14	J	1817	GW	TW-19-04A Field	MSD			2	x	x						
					a canada ana ang sa											
RELINQUISHE			DATE/1	1220 <i>B</i> IS	RECEIVE		IGNATURE)	4						P Lıs	COMME t Metals a	NTS nd Mercury
RELINQUISHE			DATE/I	TIME	RECEIVE	DBY (S	IGNATURE)		2	50	- :			C ro la	AB C	OPY TO CUSTOMER



Appendix E April 2020 Field Notes

Laboratory S	an th			Consumers Er itoring Well S					
Well ID JH	C-MW-15	000	Date <u>4</u> · I	4-2020		Control Num	ber 20 - 03	88-01	
Location	tc Pond A	t		Well Materia	I: 🔽 PVC	SS	Iron 🙆	Galv. S	iteel
Purge Metho	od:	Peristaltic	1	Submersible	'h'] Fultz		Bailer	
Depth to Wa	ter Tape:		s/r	1:					
QC SAMPLE:		MS/MSD	DUP-		Sonde ID:	08C	11M	15H	✓ 19M
Depth-to-wa	ter T/PVC (ft)	33.31	Depth-To-B	ottom T/PVC	(ft) 39.40	<u> </u>	Completed b	v_cu4	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3% Stablizati	+/- 10% on parameters	+/- 0.3ppm for the last thre	+/- 10mV e readinas	*	< 0.33	+/- 10%
1426		2-11					360	33.65	
1436	1.33	13.7	814	2.8	0.28	-32.4	300	33.45	4.64
1439	7.28	14.2	418	2.7	0.27	-32.1	300	33.65	3.43
1442	7.26	14.1	813	2.6	0.27	-31.4	300	33.65	2.18
1445	7.25	13.8	810	2.8	0.29	-22.0	300	33.65	1.54
1448	7.24	13.8	804	3,0	0.31	-20.0	300	33.65	1.13
1461	7.22	13.7	805	3.7	0.38	-17.3	300	33,65	1.06
1464	7.22	13.8	807	2.4	0.34	-12.7	300	23.65	0.18
1467	7.22	13.6	808	3.5	0.35	-12.3	300	33.65	0.11
1500	1.22		807	3.5	0,36	-11.6	300	33.65	0.00
1501		ed San			0.04				
Fotal Pump T			Total Purge V		15		Reviewed by:		04/27/20
Weather: Comments:	<u>307, 5</u>	unny/clou	og, ver	y wag	1 5+0	ivted to	STOW .	~ 1965	
Bottle	s Filled	Preservat	ive Codes:	A-NONE B-	HNO3 C-H25	04 D-NaOH I	- HCI F		
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
1	125 ML	HDDE	BA	N					
1	125mL	1-		1					
2	250mL		A						
۲ ۲ Pump rate show	11	in for low-flow an	B	high Volume.					

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				itoring Well S	ampling Wor		1.2	4 (4)	.1
	C-MW-KE		Date 4.14					82-02 -1	7
Location J	ic pont			Well Materia	I: PVC	SS	Iron	Galv. S	iteel
Purge Metho	od:	Peristaltic	1	Submersible	3/8"	Fultz		Bailer	
Depth to Wa	ter Tape: GF	otech	S/N	1:1003				A 15	-
QC SAMPLE:	V	MS/MSD	DUP-		Sonde ID:	08C	11M	15H	₩ 19M
Depth-to-wa	ter T/PVC (ft)	33.92	Depth-To-B	ottom T/PVC	(ft) 36.18		Completed b	v_UH_	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3% Stablizati	+/- 10% on parameters ;	+/- 0.3ppm for the last thre	+/- 10mV	*	< 0.33	+/- 10%
1143							280		
1153	7.03	13.2	578	38.4	3.99	+45.8	280	-	2.06
1156	7.04	13.2	569	38.2	3.95	+45.2	280	-	0.54
1159	7.04	13.2	541	37.8	3.90	+45,7	280	-	0.06
1202	7.05	13.3	555	37.6	3.88	+62.8	280	-	66.0
1205	7.04	13.3	549	37.3	3.85	+48.4	280	-	0.00
1208	7.04	13.2	546	37.1	3.83	+69.1	280	-	0.00
1211	7.04	13.3	545	37.1	3.82	+69.7	280		0.00
1212	2. 11.	ted Sar							
							5		
Fotal Pump T	ime (min):	32	Total Purge V	olume (gal) :	~ 2.8		Reviewed by:	EB	
Weather:	35°F, 4	unny, 1	1ery W	indy		_		04-	27-20
	(mt)	colo L.	1 Full	NG L					
Comments:	wheat	- CONECTER	FMSM	VED I WAH	Rubel	a) Puni	p-can+m	leasure u	while pwa
Bottle	s Filled	Preservat	tive Codes:	A-NONE B-	HNO3 C-H2S	04 D - NaOH	E - HCI F		
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
333	HDPE	125ML	B	N	Samuel		.,,,,,,		
2	HDPE	125mL	A A	N					
×	1 14 10	250ML							

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Page 1 of 1

Laboratory S	cm Us			Consumers Er itoring Well S				ч	
	-MW-1 HC Pon		Date <u>4.1</u>	4 · 2020 Well Materia	I: PVC	Control Num	ber <u>20-03</u> Iron (W		teel
Purge Metho	od:	Peristaltic	1	Submersible	318"	Fultz		Bailer	
Depth to Wa	ter Tape: G	eotech	S/M	1: 1003		-			_
QC SAMPLE:	n	MS/MSD	DUP-		Sonde ID:	08C	11M	15H	✓ 19M
Depth-to-wa	ter T/PVC (ft)	41.43	Depth-To-B	ottom T/PVC	(ft) 48.07	<u> </u>	Completed b	v_CUH_	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min 3-5 min	units +/- 0.1	°C NA	uS/cm +/- 3%	% sat. +/- 10%	ppm +/- 0.3ppm	mV +/- 10mV	mL/min *	Drawdown ft < 0.33	NTU +/- 10%
				on parameters j					
1101		1.1.1	1				384	41.49	1.1
IIID	6.97	13.4	857	9.0	0.91	+73.8	384	41.49	27.95
1113	6.96	13.8	832	13.1	1.33	+ 55.4	384	41.49	9.59
1116	4.94	13.8	829	13.8	1.41	+54,7	384	41.49	7.79
1119	4.93	13.8	827	13.9	1.42	+ 55.8	384	41.49	2.33
1122	4.93	13.4	826	13.7	1.40	+55.8	384	41.49	1.90
1125	4.93	13.8	824	13.7	1.41	156.0	384	41,49	1.31
1124		ed Sar							
Total Pump T	ime (min):	15	Total Purge V	olume (gal) :	25ga	(Reviewed by:		
Weather:	1350F	, Svnny	Very	windy			_	04-2	7-20
Comments:			_			_	_		_
Bottle	s Filled	Preserva	tive Codes:	A - NONE B - I	HNO3 C - H25	04 D-NaOH E	- HCI F	1	
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
1	HISML	HOPE	A	N			40		
1	12SmL		B	N					
2	250ml 580/1000n	n I	B	2	1				
Pump rate sho			nd <1 gal/min for	high Volume.					

Laboratory S	ants			Consumers En itoring Well Sa		the second		4	
	L-MW-1 HC Pon		Date <u> </u>	{ · 202 ⊅ Well Material	: PVC	Control Num	ber <u>20 · 6</u> Iron (w)		teel
Purge Metho	od:	Peristaltic	V	Submersible	18	Fultz		Bailer	
Depth to Wa	ter Tape: Ge	otech	S/N	1003					
QC SAMPLE:		MS/MSD	V DUP-		Sonde ID:	08C	11M	15H	✓ 19M
Depth-to-wa	ter T/PVC (ft)	41.68	Depth-To-B	ottom T/PVC	(ft) 42,42	5	Completed b	y_Cull_	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3% Stablizati	+/- 10% on parameters f	+/- 0.3ppm	+/- 10mV	*	< 0.33	+/- 10%
1010			Stubillatio				200		
1020	7.14	13.7	593	39.0	3.97	+69.8	200	-	4.60
1073	7.13	13.8	591	37.8	3.85	-	200	-	2.22
1026	7.15	14.0	590	36.7	3.72	+64.8	200	-	0,71
1029	7.14	14.2	589	34.0	3.63		200	-	0.42
1032		14.3	588	35.9	3.61		200		0.40
1035	7.15	14.3	587	34.9	3.52	the second second	200		0.25
1036		ed Sam						4171	
			1.02						
1007000		0.1.			2.0				
Fotal Pump T		24		olume (gal) : •	2.0	-	Reviewed by	EB 04-2	7.7.
Weather: Comments:		etted File	HENY WIN	•	evel be	low Pur	np : Can	4 measu	
Bottle	s Filled	Preserva	ative Codes:	A-NONE B-H	INO3 C-H2S	O4 D - NaOH I	E - HCI F		purging
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
1	126ml	HOPE	B	N	1	126mL	HDPE	BA	
1	125ml 250ml	HDDE	A	N N		12Sml 2Soml	HDPE HDPE	A	

Laboratory S				Consumers Er itoring Well S		20		4	
and the second se	C- MW- K HC Pond		Date <u><u><u>4</u>,14</u></u>				ber 20-03	687-05 Galv. S	teel
Purge Metho		Peristaltic	V	Submersible	5/8'	Fultz		Bailer	
Depth to Wa	iter Tape: Geo	Tech	S/M	1: 1003					
QC SAMPLE:		MS/MSD	DUP-	1000	Sonde ID:	08C	11M	15 H	✓ 19M
Depth-to-wa	iter T/PVC (ft)	41.32	Depth-To-B	ottom T/PVC	(ft) <u>43.37</u>	_	Completed b	v_UH_	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min 3-5 min	units +/- 0.1	°C NA	uS/cm +/- 3%	% sat. +/- 10%	ppm +/- 0.3ppm	mV +/- 10mV	mL/min *	Drawdown ft < 0.33	NTU +/- 10%
Ano.)	1		Stablizati	on parameters ;	for the last thre	e readings			
0920	6.63	12.4	558	27.5	2.87	+154.3	380	un o41420 941.30	0.52
0929	6.63	13.0	557	27.8	2.88	+144.0	380	41.30	
0932	6.63	13.6	556	27.5	2.85	+142.6	380	41.30	0.00
0935	6.63	13.1	553	27.5	2.89	+136.1	380	41.30	6.03
0938	6.63	13.1	554	27.0	2.79	+132.9	380	41. 30	0.00
0941	6.63	13.1	555	27.0	2.78		380	41.30	0.00
0942	Collected		e						
otal Pump T		22	Total Purge V		3.5		Reviewed by:		
Weather: Comments:	(-02) (-02) (-02)	ogy w	.,	unny 10	lovdy			94-27	-20
Bottle	s Filled	Preservat	ive Codes:	A-NONE B-I	HNO3 C - H2SC	04 D-NaOH E	- HCI F -		
Quantity	Size	Type HDPC	Preservative Code B	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
1	125 ML 125 ML	INTE	A	22					
1	250mL IL		AB	NN					
		✓ nin for low-flow an	1						

Laboratory S	anth			Consumers Er itoring Well S		Contraction of the second s			
	C-MW-19	5011	Date 4.15	5.2020		Control Num	ber 20 - 034	4-04	
	JHC Por			Well Materia	I: VPVC	SS	Iron	Galv. S	teel
Purge Metho	od:	Peristaltic	\checkmark	Submersible	318	Fultz		Bailer	
Depth to Wa	ter Tape: Ge	otech	S/M	N: 1003				_	_
QC SAMPLE:		MS/MSD	DUP-		Sonde ID:	080	11M	15H	✓ 19M
Depth-to-wa	ter T/PVC (ft)	37.83	Depth-To-B	Bottom T/PVC	(ft) 40.5	3	Completed b	V CUH	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3%	+/- 10% on parameters	+/- 0.3ppm	+/- 10mV	*	< 0.33	+/- 10%
0910			Stubiizdti	on parameters,	ior the fust thre	c readings	300	37.85	
0920	7.65	13.8	801	2.4.	0.39	-123.1	300	37.85	0.79
0923			802	3.9.1 3.5		-121.7		37.85	0.79
0926	7.63	13.9			0.35	The second second	300	37.85	0.46
0929	7.43	14.0	802	3.4	0,34	-122.4	300	31.85	1.0.0
	7.63	14.0	803	3.3	0.33	-122.8	300	37.85	0.43
0932	7:63	14.0	803	3.2					
0935	7,63	14.0	803	2.6	0.32	-122.9	300	37.85	0.45
0936	louit	uted s	ample						
Total Pump 1		26		/olume (gal) :	1.5		Reviewed by:		22
Weather:	29°F, CI	oudy, sr	now		-			٥५-27-	20
Comments:									
Bottle	s Filled	Preserva	tive Codes:	A-NONE B-	HNO3 C - H2S	04 D - NaOH	-HCIF-ZIC		Naot
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
1	125mL	HOPE	B	N	2	1L	HDDE	B	N
1	125mL	HOPE	Å	N	2	60 mL	NOA	A	N
1+1=2	250m	HADDE.	A	N	1	125ml	YDPE	F	N
1	125mL	HOPE	C	N					

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Well ID	tc MW-	15024	Date _ 4.16	5.20	-	Control Num	ber 20.03	95 01	- 1
Location)H Campb	24		Well Material	I: X PVC	SS	Iron	Galv. S	teel
Purge Metho	d: 1	Peristaltic		Submersible		Fultz		Bailer	
Depth to Wat	er Tape: S	olinst	S/N	1: 31238	56				
QC SAMPLE:	N	IS/MSD	DUP-		Sonde ID:	X 08C	11M	15H	19N
Depth-to-wat	er T/PVC (ft)	16.05	Depth-To-B	ottom T/PVC	(ft)	_	Completed b	v_dmw_	-
Time	рН	Тетр	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidit
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3% Stablizati	+/- 10% on parameters f	+/- 0.3ppm	+/- 10mV	*	< 0.33	+/- 10%
1008			Stubilzuti	on purumeters j	or the fast three	e reduings		10.06	
1013	6.31	7.56	378	34.5	4.08	+ 207.4	200	10.06	9.5
1018	6.43	7.40	346	11.4	1.36	+221.7	2,00	10.06	8.8
1023	6.36	7.48	336	9.8	1.17	+220.1	200	10.06	8.1
1028	6.40	7.41	325	7.9	0.94	+213.5	200	10.06	0.D
1033	6.46	7.53	322	7.2	6.90	+209.5	200	10.06	0.0
1038	6.52	7.58	320	7.1	0.88	+ 205.4	200	10.06	0.0
1031643		7.52	321	7.0	0.87	+203.3	200	10.06	0.0
1044	v								
1058									
20									
		21			10				-
Total Pump Ti Weather:		- 26.2.3.7.E	Total Purge V	olume (gal) :	1.9		Reviewed by:	EP	
vveather.	Sunny	, JSOF				-		04-27-	
Comments:									
Bottles	Filled	Preservativ	va Codas:	A-NONE B-H	-NO3 C - H250	DA D-NOH E	HCI E NALH	2n Actat	c
		, reservati	Preservative					Preservative	
Quantity	Size	Туре	Code	Filtered Y/N	Quantity	Size	Туре	Code	Filtered Y/
1	125 ml	HORE	Bo	NN	2	60 ml 125 ml	HORE	F	NN
1	250 MI	1	A	N	1	L	L	-PC	N
2	al		B	N		0 4/16/20	J.	amw 4.16.20	1

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Laboratory Se	onth			Consumers En itoring Well Si					
	HC MW	-15005	Date 4.1k				ber 20.07	395-62	
	H Campl		Date	Well Materia			Iron	Galv. S	teel
Purge Metho	d: X	Peristaltic		Submersible		Fultz		Bailer	
Depth to Wa	ter Tape: S	olinst	S/M	: 31238	56				
QC SAMPLE:		MS/MSD	DUP-		Sonde ID:	X 08C	11M	15H	19M
Depth-to-wai	ter T/PVC (ft)	9.04	Depth-To-B	ottom T/PVC	(ft)	_	Completed b	v demen	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3% Stablizati	+/- 10% on parameters f	+/- 0.3ppm	+/- 10mV	*	< 0.33	+/- 10%
1107			Stubilzuti		or the lost thre			9.06	
1112	7.24	7.04	334	35.6	4.30	+193.8	200	9.06	0.0
1117	7.03	6.78	332	18.3	2.22	4 208.2	200	9.06	0.0
1122	7.00	6.65	326	14.5	1.77	+ 209.5	200	9.06	0.0
1127	6.68	6.71	299	17.3	2.12	+202.8	200	9.06	0.0
1132	6.43	6.71	264	26.7	3.26	+200.2	200	9.06	0.0
1137	6.28	6.78	241	32.0	3.90	+198.2	200	9.06	6.0
1142	624	6.99	221	33.9	4.11	+196.1	200	9.06	0.0
1147	6.24	7.13	221	34.5	4.17	+194.0	200	9.06	00
1152	6.23	2.14	218	34.6	4.18	+193.7	200	9.06	0-0
1157	6.23	7.18	215	34.7	4.19	+193.8	200	206	6.0
1158			2.5			1.1.0			
1214									
Fotal Pump Ti	ime (min):	SI	Total Purge V	olume (gal) :	2.7		Reviewed by:	EB	
Veather:	Sunna			olume (gal) .	0.1		Reviewed by.	04-27-	20
······	Junit	11-11	_	-					
Comments:									
Bottles	s Filled	Preservatio	ve Codes:	A-NONE B-H	INO3 C - H250	04 D-NaOH E	- HCI F		
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
2	125 ml	HDRE	B	N	2	60m1	VOA	A	
2	T	1	A	N	1	125m1	HOPE	CF	
2	250 ml		AB	N	1	*	7	F	
-	Id he <500 ml /m	in for low-flow and		1.			-		

Laboratory S	ervices			Consumers En itoring Well S					
Well ID J	HC-MW	- 15027	Date 4.16	.2020		Control Num	ber 20.03	395.03	
	th Back			Well Materia	II: PVC	SS	Iron	Galv. S	iteel
Purge Metho	od: 🔽	Peristaltic		Submersible		Fultz		Bailer	
Depth to Wa	ter Tape: Geo	oTech	S/N	1: 1003				_	
QC SAMPLE:		MS/MSD	DUP-		Sonde ID:	08C	11M	15 H	19M
Depth-to-wa	ter T/PVC (ft)	10.98	Depth-To-B	ottom T/PVC	(ft) 12.91	-	Completed b	v CUH	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3% Stablizati	+/- 10%	+/- 0.3ppm for the last thre	+/- 10mV ee readings		< 0.33	+/-10%
1333							146	10.99	
1343	4.87	7.0	31.5	56.4	6.44	+139.7	160	10.99	11.80
1340	4.90	7.7	32.0	55.8	6.60	+140.1	160	10.99	11.64
1349	4.90	7.7	32.8	54.2	6.41	+143.6	160	10.99	9.63
1352	4.98	7.8	33.5	53.3	1.28	+148.4	140	10.99	8.10
1355	5.03	7.7	35.0	51.7	4.12	+150.7	100	10.99	7.44
1358	5.10	7.4	37.5	50.5	5.98	+151.0	140	10.99	10.101
1401	5.20	7.7	40.4	48.4	5.75	+ 151.4	160	10.99	4.00
1404	5,25	7.8	42.5	47.4	5.59	+151.6	160	10.99	5.74
1407	5.30	7.7	44.3	44.7	5.52	+ 151.1	140	10.99	5.21
1410	5.34	7.7	48.9	44.7	5.28	+152.2	1000	10.99	3.50
1413	5.37	7.7	49.2	43.9	5.18	+151.9	40000	10.99	3.37
1410	5.44	7.8	52.9	41.0	4.91	+ 150,7	300	10.29	2.92
1419	5.47	7.7	\$3.2	40.2	4.74	+150.3	300	10.97	2.94
1422	5.50	1.7	54.7	37.4	4.43	1148.5	300	10.99	2.76
Total Pump T	ime (min):		Total Purge V	olume (gal) :			Reviewed by:	EB	
Weather:	320F, U	rindy, c	row, Sun	ny				04-	27-20
Comments:	increase	d pump	speed	to stal	oalize P	11	_	_	_
Bottle	s Filled	Preserva	tive Codes:	A-NONE B-	HNO3 C-H25	04 D-NaOH E	- HOI F-Zin		Juidt
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
)	125ML	HOPE	B	N	1	250mL	HDPE	A	N
1+1=2	T	I	A	N.	2	Leame	NOAS	A	N
1			C	N	2	11	HAPE	B	N
1	4	L	F	N					

Laboratory S	ervices			Consumers En itoring Well Sa					
Location 👌 🛛	HC-MW- HC Ba	ukgrou	Date <u>4.16</u> Nd	Well Materia	I: PVC	ss [ber <u>20 - 6 -</u> Iron	315-03 Galv. S	
Purge Metho		Peristaltic	C/N	Submersible		Fultz		Bailer	
Depth to Wa		MS/MSD	S/N	41	Sonde ID:	080	11M	15H	V 19M
1	ter T/PVC (ft)			ottom T/PVC	1.000	L A A A A A A A A A A A A A A A A A A A	Completed b		1511
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
Time					00				
min 3-5 min	units +/- 0.1	°C NA	uS/cm +/- 3%	% sat. +/- 10%	ppm +/- 0.3ppm	mV +/- 10mV	mL/min *	Drawdown ft < 0.33	NTU +/- 10%
			Stablizati	on parameters f	or the last thre	e readings			
1425	5.56	7.8	54.4	37.9	4.48	+1485	300	10.99	2,50
1428	5.42	7.7	41.4	34.2	4.28	+147.2	300	10.99	2.52
1431	5.44	7.7	59.7	35.7	4.22	+147.2	300	10.99	2.73
1434	5.43	7.7	59.2	34.9	4.13	+147.2	300	10.99	2.78
Total Pump T	imo (min):		Total Purge V	olumo (gal) :			Reviewed by:	L PA	
Weather:	ane (many.		Total Fulge v	olume (gal) :	1	-	Reviewed by.	EB 04-2	7-20
Comments:			Sec	PG. 1	62				
Bottle	s Filled	Preserva	tive Codes:	A-NONE B-H	1NO3 C - H25	04 D-NaOH E	- HCI F-		
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
			nd <1 gal/min for I						

				itoring Well Sa	ampling wor	ksneet		-		
a the second sec	HC MW-15		Date 4.16-20 Control Number 20-0395-04							
Location)It Campl	bell		Well Materia	I: X PVC	SS	Iron	Galv. S	iteel	
Purge Metho	d: 🔨	Peristaltic		Submersible		Fultz		Bailer		
Depth to Wat	er Tape:	Solinst	S/M	N: 3123	386				_	
QC SAMPLE:		IS/MSD	X DUP-	03	Sonde ID:	X 08C	11M	15H	191	
Depth-to-wat	er T/PVC (ft)	15-11_	Depth-To-B	Bottom T/PVC	(ft)_27. C	35	Completed b	y_dmus		
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidit	
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU	
3-5 min	+/- 0.1	NA	+/- 3% Stablizati	+/- 10% on parameters f	+/- 0.3ppm	+/- 10mV	*	< 0.33	+/- 10%	
0 853			Stabilzati	on parameters J	o, the last thire	e readings		15.11		
0858	6.20	7.63	78	30.0	3.56	+ 203.3	200	15.11	0'D	
0903	5.27	D.Dle	83	12.6	1.41	+ 218.1	200	15.11	00	
0908	5.28	8.10	84	10.1	1.20	1209.0	200	15.11	00	
0913	5.33	7.93	84	8.9	1.05	+206.1	200	15.11	0.0	
6918	6.33	8.09	82	7.4	0.87	+ 208.4	200	15.11	0.0	
0928	5.34	8.06	83	7.6	0.83	+208.1	200	15.11	0.0	
093092		8.19	84	6.8	0.81	+ 208.9	200	15.11	0.0	
0928 0923 0923 0930424 0929										
0952										
Total Pump Ti	me (min):	36	Total Purge V	olume (gal) :	1.9		Reviewed by:	助		
Weather:	Sunny	, 34°F						04-2	1-20	
Comments:										
Bottles	Filled	Preservati		A-NONE B-H	NO3 C-H2SC	04 D - NaOH E	- HCI F			
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y	
2	250 ml	HDRE	A	N	1					
2	125 ml	1	A	N						
1162074	¥		B	NN						

ervices			Consumers Er itoring Well S					
HC MW-	15026	Date 4.16	.20		Control Num	ber 20-03	15-05	
			and the second second	I: PVC	ss [Iron		iteel
d: 🛛	Peristaltic		Submersible		Fultz		Bailer	
ter Tape: S	olinst	S/M	1: 3123	86		_	_	_
N	ns/msd	DUP-		Sonde ID:	X 08C	11M	15H	19M
ter T/PVC (ft)	10:73	Depth-To-B	ottom T/PVC	(ft)	_	Completed b	v_dimus	
рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
+/- 0.1	NA	+/- 3% Stablizati	+/- 10%	+/-0.3ppm	+/- 10mV	*	< 0.33	+/- 10%
		Stablizati		or the last thre	le reduings		10.74	
698	832	264	485	5,67	+1971	265		0.0
and the second se					-			0.0
								0.D
					-			0.0
					-			0,0
4								0.0
	v							0.0
								0.0
								0.0
								00
0.04	0.11	.00	001.2	9.00	1.0.1	200		0.0
me (min):	446	Total Purge V	olume (gal) :	Q.S		Reviewed by:	512	
		i e tai i eige i	eranne (Beil) i			neneneu sy		7-20
3) 21							
s Filled	Preservati	ve Codes:	A-NONE B-I	INO3 C-H2S	04 D - NaOH E	- HCI F		
Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
125ml	HORE	A	N					
LOUMI		Н	NN					
	JH CAMP d: X ter Tape: S D ter T/PVC (ft) PH units +/-0.1 6.98 6.97 6.97 6.97 6.97 6.97 6.97 6.97 6.97 6.97 6.97 6.35 6.35 6.35 6.35 6.35 6.35 6.35 6.35	ter Tape: $ShinSt$ MS/MSD ter T/PVC (ft) <u>10.73</u> PH Temp units "C $\pm 7-0.1$ NA 6.98 8.33 6.97 8.18 6.97 8.18 6.91 8.19 6.73 8.12 6.57 8.12 6.57 8.12 6.57 8.12 6.41 8.04 6.35 8.10 6.35 8.10 6.35 8.10 6.35 8.10 6.35 8.10 6.35 8.10 6.35 8.10 5.10 6.35 8.10 6.35 8.	HC MW-15026 Date 4.16 JH CAM pb(1) Date 4.16 d: X Peristaltic Image: Soliwst status Status ter Tape: Soliwst status Status Status MS/MSD Dup- ter T/PVC (ft) 10:73 Depth-To-B pH Temp Sp Cond units 'C us/cm $+/-0.2$ NA $+/-3\%$ Stabilization Stabilization 6.97 8.18 3.54 6.97 8.18 3.54 6.97 8.18 3.54 6.97 8.18 3.54 6.97 8.12 2.17 6.97 8.12 2.17 6.97 8.12 2.17 6.93 8.10 1.95 (4.38 7.96 1.95 (5.35 8.10 1.94 (6.35 8.12 1.95 9 9 9 9 9 9 9 9 10.35 8.14<	HC MW-15026 Date U.B. 20 JH CAMpbUl Well Materia d: X Peristaltic Submersible ter Tape: Solin St S/N: 3123 MS/MSD DUP- ter T/PVC (ft) 10:73 Depth-To-Bottom T/PVC pH Temp Sp Cond DO units 'C us/cm % sat. +/-0.1 NA +/-3% +/-10% b H Temp Sp Cond DO units 'C us/cm % sat. +/-0.1 NA +/-3% +/-10% stablization parameters) Stablization parameters) 6.99 8.32 2.64 4.8.5 6.91 8.18 3.54 3.5.9 6.91 8.18 3.54 3.6.9 6.91 8.12 2.11 2.6.9 6.93 7.96 1.95 3.6.7 6.35 8.12 1.84 3.4.2 6.35 8.12 1.84 3.4.2 6.35 8.	HC MW-1502b Date $44.6.2D$ JH CAPA pb(J) Well Material: \sqrt{PVC} d: X Peristaltic Submersible d: X Peristaltic Submersible ms/MSD DUP Sonde ID: ter Tape: Solin St S/N: 312386 MS/MSD DUP Sonde ID: ter T/PVC (ft) 10.73 Depth-To-Bottom T/PVC (ft) pH Temp Sp Cond DO units 'C US/cm % sat. ppm $4/-0.1$ NA $4/-3\%$ $4/-0.3pm$ stabilization parameters for the last three 6.98 8.33 2.64 48.5 5.67 6.97 8.18 3.54 35.9 4.22 4.22 6.97 8.18 3.54 36.7 4.23 6.91 8.12 2.11 26.9 3.17 6.37 8.12 2.11 26.9 3.17 6.35 8.12 195 $3(4.2)$ 2.88 <	JH (AM, pb(J) well Material: X PVC SS d: X Peristaltic Submersible Fultz ter Tape: SN: SI 2386 Sonde ID: X 08C ms/MSD DUP Sonde ID: X 08C ter T/PVC (ft) LO:T3 Depth-To-Bottom T/PVC (ft)	HC MW-1502b Date 4.16.20 Control Number 20:025 JA COMp0CU Well Material: PVC SS Iron d: X Peristaltic Submersible Fultz Iron d: X Peristaltic Submersible Fultz Iron d: X Peristaltic Submersible Fultz Image: Control Number 20:025 MS/MSD DUP Sonde ID: X 08C 11M ter T/PVC (ft) 10:13 Depth-To-Bottom T/PVC (ft) Completed b pH Temp Sp Cond DO DO ORP Pump Rate units 'C us/cm %sat. ppm mV mL/min \$J:0.1 NA 1/13% 1/10% 1/10% 1/10% 1/10% 1/10% 6:01 8:18 A:54 3:5.7 4:182.1 2:00 0 0 0 0 0 0 0 0 0 0 0 0	HC MW-1502b Date U.B. U.B. Control Number 20:03:95:05 JH COPA pb(L) Well Material: PVC SS Iron Galv.S d: X Peristaltic Submersible Fultz Bailer ter Tape: Sol:nSA S/N: 31/2306 Sonde ID: X 08C 1111 15H ter Tape: Sol:nSA S/N: 31/2306 Sonde ID: X 08C 1111 15H ter Tape: Sol:nSA S/N: 31/2306 Sonde ID: X 08C 1111 15H ter T/PVC (ft) 10:73 Depth-To-Bottom T/PVC (ft) Completed by CMMP units 'C uS/cm % sat. ppm mV m//min Drawdown ft 1/-0.2 MA Y-33 4/.108 10.74 C.033 Stabilization parameters for the last three readings <0.33

Laboratory S	Services		Mor	Consumers En itoring Well Sa						
Well ID	HC MW.	15028	Date 4.16	.20		Control Num	ber 20.03	395-06		
Location SH Campbell		pell	Date <u>4.16-20</u> Control Number <u>20-03</u> Well Material: XPVC SS Iron					Galv. Steel		
Purge Metho	- ter	Peristaltic		Submersible		Fultz		Bailer		
Depth to Wa	ater Tape:	olinst	S/M	N: 3123	86					
QC SAMPLE:	· 🗌 I	MS/MSD	DUP-		Sonde ID:	X 08C	11M	15 H	19M	
Depth-to-wa	iter T/PVC (ft)	11.22	Depth-To-B	Bottom T/PVC	(ft)	_	Completed b	y domes		
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	
min	units	°с	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU	
3-5 min	+/- 0.1	NA	+/- 3%	+/-10%	+/- 0.3ppm	+/- 10mV	*	< 0.33	+/- 10%	
	1	1	Stablizati	on parameters f	or the last thre	e readings				
1349		1.1.5			_			11.22		
1354	6.63	9.37	48	80.0	9.17	+167.5	. 200	11.22	7.2	
1359	5.69	9.07	51	73.4	8.47	+195.9	200	11.22	0.0	
1404	5.53	889	64	682	7.91	+206.3	200	11.22	0.0	
1409	5.72	8.84	-73	66.0	7.66	+198.2	200	11.22	0.D	
1414	5.81	8.91	78	64.0	7.41	+195.5	200	11.22	0.0	
1419	5.95	8.77	81	63.1	7.33	+193.1				
		14	82				200	11.22	0.0	
1424	6.01	882		62.7	7.29	+190.6	200	11.22	0.0	
1429	6.04	8.79	82	61.4	7.13	+186.4	200	11.22	0.0	
1430										
1441										
Fotal Pump 1	Time (min):	41	Total Purge V	olume (gal) :	2.2		Reviewed by:	हाउ		
Weather:	Sunnu							24	7.20	
		31								
Comments:										
Bottle	es Filled	Preservati	ve Codes: Preservative	A-NONE B-H	INO3 C - H2SC	04 D-NaOH E	- HCI F	Descentition		
Quantity	Size	Туре	Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N	
1	125 ml	HDRE	A	N						
1	J	T	в	N						
1	250 ml		A	N						
2	IL	X	6	N			-			

Commentation States	haniba		Mor	Consumers En nitoring Well S		the second second			_	
Well ID MW-145			Date 4-16-20 Control Number 20-0405-01							
Location J	HC			Well Materia	I: X PVC	SS	Iron	Galv. S	teel	
Purge Metho	od: 🔨	Peristaltic		Submersible		Fultz		Bailer		
Depth to Wa	ter Tape: Ge	otech	S/I	N: 1005				_		
QC SAMPLE:		MS/MSD	DUP-		Sonde ID:	08C	11M	X 15H	19M	
Depth-to-wa	ter T/PVC (ft)	8.71	Depth-To-E	Bottom T/PVC	(ft) <u> </u>	_	Completed b	y CET		
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU	
3-5 min	+/-0.1	NA	+/- 3% Stablizat	+/- 10% ion parameters	+/- 0.3ppm for the last thre	+/- 10mV	*	< 0.33	+/- 10%	
1458			Stubillut				-180	8.75		
1500	5.29	7.9	21.8	64.3	7.61	120.2	180	8.75	1.96	
1505	5.02	7.9	23.9	39.3	4.65	131.0	180	8.75	224	
1510	5.00	7.9	23.8	35.3	4.19	135.3	180	8.75	2.10	
1515	4.98	7.8	23.7	33.5	3.98	140.3	180	8.75	2.04	
1520	4,98	8.1	23.8	32.5	3.85	143.9	180	8.75	1.58	
1525	4.99	8.2	23.9	31.6	3.75	148.0	180	8.75	1.65	
1530	5.04	8.4	24.0	31.7	3.71	149.0	180	8.75	1.61	
1535 WHE 1536	5.03	G.S	24.2	31.8	3.72	152.4	180	8.75	1.63	
1547										
					-					
Total Dump T	ime (min): 4	19	Total Durge \	/olume (gal) :	2 0		Reviewed by:	20	-	
Weather:	ime (mm).	1	Total Pulge V	volume (gal) .	a. o gul		Reviewed by.	EB 04-27-	20	
Comments:									~	
Bottle	s Filled	Preservat	tive Codes:	A-NONE B-	HNO3 C - H2SC	D4 D-NaOH I	E - HCI F	Deservation		
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N	
	250ml	BHOPE Entra A	BA A							
Pump rate cho	1000 ~1	nin for low-flow a	d <1 gal/min for	hiah Volume						

Well ID PZ-245			Date 4-1	Date <u>4-16-20</u> Control Number <u>20-0405-02</u>						
Location				Well Materia	al: PVC	SS [Iron	Galv. S	steel	
Purge Meth	od: 🔀	Peristaltic		Submersible		Fultz		Bailer		
Depth to W	ater Tape: 60	otech	S/I	N:1005		-				
QC SAMPLE	:	MS/MSD	DUP-		Sonde ID:	08C	11M	🗙 15Н	19M	
Depth-to-wa	ater T/PVC (ft)	8.86	Depth-To-E	Bottom T/PVC	(ft) NM	-	Completed b	V LES	_	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU	
3-5 min	+/- 0.1	NA	+/- 3%	+/-10%	+/- 0.3ppm for the last thre	+/- 10mV	*	< 0.33	+/- 10%	
1325	1		Stubilzuti	on parameters	for the last thre	e reaaings	200	6,92		
	1 -	7.3	29.9	46.4	150	24.6	200	6.92	2.26	
1327	6.01	7.2	20.3	38.2	5.58 4.59	64.9	200	6.92	1.75	
1332	4.63	7.7	21.3	35.3	4.22	76.5	200	6.92	1,61	
1337		7.5	22.2	33.4	4.00				1.61	
1342	4.57		1			61.1	200	6.92		
1347	4.62	7.1	23.3	31,9	3.83	86.4	200		1.62	
1352	4.71	7.6	25.3		3.59		200	6.92	1.79	
1357	4.74	7.4	25.8	29.7	3.56	96.7	200	6.92	1.56	
1402	4.82	7.5	27.6	28.5	3.42	101.2	200	6.92	1.51	
1407	4.86	7.2	28.8	28.0	3.38	103.4	300	6.92	1.42	
1412	4.87	7.2	28.8	28.8	3.48	103.9	300	6:92	1.50	
1417	4.89	7.0	29.4	28.2	3.42	107.6	300	6.92	1.36	
1422	4.90	7.0	29.6	27.9	3.38	108.1	300	6.92	1.34	
1427	4.94	7,0	30.3	27.2	3.30	107.7	300	6.92	1.34	
1432	4.97	7,1	30.9	26.8	3.24	107.6	300	6.92	1:33	
	Time (min): 7	8	Total Purge V	olume (gal) :	4.0921		Reviewed by:	EB		
Neather:			_		0			04-3	17-20	
Comments								-		
Bottl	es Filled	Preserva	tive Codes:	A-NONE B-	HNO3 C - H2SC	04 D - NaOH I	E - HCI F			
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N	
1	125ml	HOPE	B	2						
	L.		A		-					
	250ml		A	1						

Laboratory		_		Consumers En itoring Well S		ksheet				
Well ID <u>PZ-405</u> Location <u>JHC</u>			Date 4/16	120	-	Control Num	Control Number 20 - 0405 - 03			
			Well Material: X PVC				Iron	Galv. S	teel	
Purge Meth	od: 🔨	Peristaltic		Submersible		Fultz		Bailer		
Depth to W	ater Tape: 64	otech	S/N	: 100 5					_	
QC SAMPLE		MS/MSD	X DUP-	05	Sonde ID:	08C	11M	χ 15H	19M	
Depth-to-wa	ater T/PVC (ft)	9.94	Depth-To-B	ottom T/PVC	(ft) NM	-	Completed b	y_47		
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU	
3-5 min	+/- 0.1	NA	+/- 3% Stablizatio	+/- 10% on parameters f	+/-0.3ppm	+/- 10mV	*	< 0.33	+/- 10%	
1000				, purumeters j	or the last time		200	9.97		
1001	4.73	6.6	25.0	26.6	3.26	116.3	200	9.98	2.36	
1006	4.32	6.4	22.4	22.3	2.75	139.1	200	9.98	2.07	
1011	4.29	6.2	22.0	19.7	2.45	149.4	200	9.98	1.98	
1016	4.28	6.8	18 7 21.8	19.9	2.26	158.5	200	9.98	1.98	
1021	4.28	6.8	6.721.8	1.9616.1	1.96	169.5	200	9.98	1.66	
1026	4.30	7.1	22.0	14.2	1.73	181.6	200	9.98	1.57	
1031	4.33	6.9 .	22.1	13.6	1.64	173.1	280	9.98	1.64	
1036	4.44	6.8	22.3	13.0	1.58	168.6	280	9.98	1.44	
1041	4.36	7.1	22.6	12.0	1.55	185.6	300	9.98	1.53	
1046	4.38	7.1	22.7	11.4	1.44	189.6	300	9.98	1.43	
1051	4.38	1.0	22.8	11.0	1.31	195.2	300	9.98	1.42	
1056	4.39	7.0	22.8	10.3	1.26	197,1	300	9.98	1.37	
1101	4.40	7.0	22.8	10.7	1.29	198.3	300	9.98	1.41	
1102										
	Time (min): 7	19	Total Purge V	olume (gal) :	4.0ga)		Reviewed by:	Æ	3	
Weather:	(L		-		0				-27-20	
Dyp Comments	11 M P. 19 PK	4.68 C:	time of sam	ple 134	3.88C 8.82C	4 standard	Trulled.	sons 15H		
	es Filled		-	-	1NO3 C - H2SO	04 D-NaOH I	- HCI F-			
Quantity	Size	Туре	Preservative Code	Filtered Y/N		Size	Contract of	Preservative Code	Filtered Y/N	
Quantity	125ml	HDPE	B	N	Quantity	5128	Туре	coue	intered I/N	
527	1	1	A	1						
	250 ml		A		-					
4	1000ml	V	B	V				· · · · · · · · · · · · · · · · · · ·		

Laboratory S	timbs		Mor	Consumers En hitoring Well S		and the second se			
Well 10 P2-235		Date 4-16-20 Control Number 20-0405-07							
Location J	AC			Well Materia	II: X PVC	SS	Iron	Galv. S	iteel
Purge Metho	od: 🗙	Peristaltic		Submersible] Fultz		Bailer	
Depth to Wa	ter Tape: Ge	lotech	S/1	N: 1005					
QC SAMPLE:		MS/MSD	DUP-		Sonde ID:	08C	11M	V 15H	19M
Depth-to-wa	ter T/PVC (ft)	14.85	Depth-To-E	Bottom T/PVC	(ft) NM	_	Completed b	y_CET	
Time	pH	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/-0.1	NA	+/- 3% Stablizati	+/- 10% ion parameters	+/- 0.3ppm	+/- 10mV	*	< 0.33	+/- 10%
1614							140	14,91	
1616	6.08	8.5	19.0	66.0	7.74	163.7	140	14.91	2.38
1621	6,26	8.4	64.6	71.9	8.44	158.1	140	14.91	2.32
1626	6.35	8.5	61.7	74.1	8.68	155.4	140	14.91	2.40
1631	6.44	8.4	61.0	73.9	8.67	152.5	140	14.91	2.00
1636	6,49	8.6	60.3	- 14.7 6419 6418/20	8.72	150.6	140	14.91	1.94
1641	6.53	8.7	60.2	15.1	8.74	149.0	140	14.91	1.88
1646	6,57	8.9	60.7	75.4	8.74	147.8	140	14.91	1.84
1651	6.60	9.0	60.3	15.8	8.77	147.2	140	14.91	1.82
1652 1708									
Fotal Pump T	ime (min): 5	4	Total Purge V	/olume (gal) :	1.5 gal		Reviewed by:	EJ	
Weather:								94	-27-20
Comments:	_	1							
Bottle	s Filled	Preserva	tive Codes:	A-NONE B-I	HNO3 C-H250	D4 D-NaOH E	- HCI F	Dreamwett	
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
1	125~1	HOPE	B	N					
1	250 m		A						
2	1000 ml	- J	A	1					



Appendix B Second Semiannual Monitoring Report



2020 Semiannual Groundwater Monitoring Report and Fourth Quarter Hydrogeological Monitoring Report

JH Campbell Power Plant Pond A CCR Unit

West Olive, Michigan

January 2021

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FIGURES

- Figure 1 Site Location Map
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APPENDICES

- Appendix A Data Quality Review
- Appendix B October 2020 Assessment Monitoring Statistical Evaluation
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- Appendix D October 2020 Laboratory Reports
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1.0 Introduction

On April 17, 2015, the United States Environmental Protection Agency (USEPA) published the final rule for the regulation and management of Coal Combustion Residuals (CCR) under the Resource Conservation and Recovery Act (RCRA) (the CCR Rule) (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 Pond A CCR Unit at the JH Campbell Power Plant Site (JHC Pond A).

On December 28, 2018, the State of Michigan enacted Public Act No. 640 of 2018 (PA 640) to amend the Natural Resources and Environmental Protection Act, also known as Part 115 of PA 451 of 1994, as amended (a.k.a., Michigan Part 115 Solid Waste Management). On March 18, 2019, Consumers Energy submitted the *Pond A Hydrogeological Monitoring Plan, JH Campbell Power Plant, West Olive, Michigan* (Pond A HMP) (TRC, March 2019; Revised July 2019), which includes the *Pond A Assessment Monitoring Plan* (Pond A AMP), to the EGLE to comply with the requirements of Part 115, Rule 299.4905 and the December 21, 2018 Consent Agreement No. 115-01-2018. The Pond A HMP and AMP were revised per EGLE comments on July 30, 2019 and approved by EGLE on August 13, 2019.

On behalf of Consumers Energy, TRC has prepared this 2020 Semiannual Groundwater Monitoring Report and Fourth Quarter 2020 Hydrogeological Monitoring Report for the JH Campbell Pond A CCR Unit (Semiannual Report) to cover the semiannual groundwater monitoring conducted in October 2020 to comply with the CCR Rule and the Pond A HMP and AMP. Pond A remains in assessment monitoring. Given the alignment of PA 640 to comply with the CCR Rule and the congruencies between the two programs, data collected and evaluated under both programs are presented together in this report.

1.1 Statement of Adherence to Approved Hydrogeological Monitoring Plan

This Semiannual Report has been prepared by TRC on behalf of Consumers Energy to present groundwater monitoring data collected from the JH Campbell Pond A. This report was prepared in accordance with the items listed in Appendix A (Solid Waste Monitoring Submittal Components) of the May 15, 2015 Michigan Department of Environmental Quality - Office of Waste Management and Radiological Protection (MDEQ-OWMRP), now the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Materials Management Division (MMD) communication prescribing the format for solid waste disposal facility monitoring submittals as published in OWMRP-115-29, dated July 5, 2013 Format for Solid Waste Disposal Monitoring Submittals. All references herein to the EGLE are inclusive of the MDEQ. Information contained in this report was prepared in adherence to the July 2019 Pond A HMP and AMP, approved by the EGLE on August 13, 2019.

1.2 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, Pond A 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-15006, JHC-MW-15007, JHC-MW-15008, JHC-MW-15009, JHC-MW-15010, and JHC-MW-15011; and
- Sulfate at JHC-MW-15006, JHC-MW-15007, JHC-MW-15008, JHC-MW-15009, JHC-MW-15010, and JHC-MW-15011.

As discussed in the 2018 Annual Groundwater Monitoring Report for the JH Campbell Power Plant Pond A CCR Unit (2018 Annual Report) (TRC, January 2019), Consumers Energy initiated an Assessment Monitoring Program for Pond A 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. After subsequent sampling for Appendix IV constituents, Consumers Energy provided notification that arsenic was present at statistically significant levels above the federal groundwater protection standards (GWPS) established at 10 ug/L (TRC, 2019) in one out of six downgradient monitoring wells at Pond A as follows:

Arsenic at JHC-MW-15011.

The CCR Rule 40 CFR §257.96(a) requires that an owner or operator initiate an assessment of corrective measures (ACM) to prevent further release, to remediate any releases, and to restore impacted areas to original conditions if any Appendix IV constituent has been detected at a statistically significant level exceeding a GWPS. The *Assessment of Corrective Measures* (ACM) (TRC, September 2019) was initiated on April 15, 2019 and was certified and submitted to the EGLE on September 11, 2019 in accordance with the schedule in §257.96. In addition, Consumers Energy is preparing a site-wide remedial action plan (RAP) for the JH Campbell site per the Consent Agreement No. 115-01-2018 executed by Consumers Energy and the EGLE on December 21, 2018.

Consumers Energy will continue to evaluate corrective measures in accordance with §257.96 and §257.97 as outlined in the ACM and will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98, which includes semiannual assessment monitoring in accordance with §257.95. In addition, quarterly monitoring is performed in accordance with the Pond A HMP and AMP under Part 115. The initial implementation of the Pond A HMP and AMP was presented in the *2019 Annual Groundwater Monitoring Report* (2019 Annual Report) (TRC, January 2020). This Semiannual Report presents the results of the fourth quarter 2020 Pond A HMP and AMP event, which also serves as the second semiannual assessment monitoring event for 2020 conducted in accordance with §257.95.

1.3 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.

1.4 Geology/Hydrogeology

The upgradient/background wells are located to the north-northwest of the JHC Dry Ash Landfill. Groundwater is typically encountered around 30 to 35 feet below ground surface (ft bgs), except in the recently excavated areas of Bottom Ash Ponds 1-2 and Bottom Ash Pond 3 South where groundwater is now within 5 to 10 ft bgs due to grade changes, 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

Consumers Energy established a groundwater monitoring system for the JHC Pond A, which consists of 12 monitoring wells (six background monitoring wells and six downgradient 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). The six downgradient wells (JHC-MW-15006, JHC-MW-15008R, JHC-MW-15009, JHC-MW-15010, and JHC-MW-15011) are located south and southeast of Pond A.

As shown on Figure 2, monitoring wells JHC-MW-15029 and JHC-MW-15030 are used for water level measurements only.

2.2 October 2020 Assessment Monitoring

Consumers Energy personnel performed gauging and sampling of monitoring wells associated with Pond A from October 19 through October 23, 2020. Groundwater monitoring was performed in accordance with the approved Pond A HMP and AMP and the *JH Campbell Monitoring Program Sample Analysis Plan* (SAP) (ARCADIS, May 2016). Groundwater samples collected during the October 2020 event were submitted to Consumers Energy Laboratory Services in Jackson, Michigan, for analysis of the following metals and inorganic indicator constituents:

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



Section 11511a(3)(c) – Detection Monitoring Constituents	Section 11519b(2) – Assessment Monitoring Constituents
	Nickel
	Radium 226 and 228
	Selenium
	Silver
	Thallium
	Vanadium
	Zinc

Static water level measurements were collected at all locations after equilibration to atmospheric pressure. The depth to water was measured according to ASTM D 4750, "Standard Test Method for Determining Subsurface Liquid Levels in a Borehole or Monitoring Well" and recorded to the nearest 0.01 foot. Static water elevation data are included in the attached field records (Appendix E) and summarized in Table 1.

Groundwater samples were collected using a peristaltic pump or submersible pump in accordance with low flow sampling protocol and were not field filtered to allow for total metals analysis. In addition, field parameters including dissolved oxygen, oxidation reduction potential, specific conductivity, temperature, and turbidity were collected at each well as shown on Table 2. All samples were collected in vendor-provided, nitric acid pre-preserved (metals only) and unpreserved sample containers and submitted to the laboratory for analysis. Consumers Energy followed chain of custody procedures to document the sample handling.

Monitoring wells JHC-MW-15007, JHC-MW-15009, JHC-MW-15010, and MW-13 had an insufficient amount of groundwater present to collect a sample during the October 2020 sampling event.

Consumers Energy collected quality assurance/quality control (QA/QC) samples during the October 2020 groundwater sampling event. The QA/QC samples consisted of two field blanks, two equipment blanks, three field duplicates (JHC-MW-15028, JHC-MW-15006, and MW-14S), and one field matrix spike/matrix spike duplicate (MS/MSD) samples collected from JHC-MW-15025.

2.2.1 Analytical Data and Relevant Screening Criteria

Analytical results from the fourth quarter 2020 monitoring event are included in the attached laboratory reports (Appendix D). Fourth quarter 2020 groundwater analytical data is summarized in Table 3 (background monitoring wells), Table 4 (downgradient monitoring wells), and Table 5 (GSI monitoring wells), as well as the associated Part 201 generic drinking water criteria and generic GSI criteria.



2.2.2 Data Quality Review

Data were evaluated for completeness, overall quality and usability, method-specified sample holding times, precision and accuracy, and potential sample contamination. The data were found to be complete and usable for the purposes of the Pond A HMP and AMP program, with the exception of TDS for the GSI monitoring wells during the October 2020 event. The TDS data collected from the GSI wells during the October 2020 event varied significantly from historical data at the well locations and contained potential errors introduced from inaccurate pre-determined bag weights provided by the lab materials manufacturer; therefore, the TDS data at the GSI locations are considered unusable for the purposes of the monitoring program during the semiannual event. The data quality reviews for the Pond A network wells are summarized in Appendix A.

2.2.3 Groundwater Flow Rate and Direction

Groundwater elevations measured across the Site during the October 2020 event using several wells throughout the RCRA CCR well network are provided on Table 1. October 2020 groundwater elevations were used to construct the groundwater contour map provided on Figure 3. The average hydraulic gradient of 0.0040 ft/ft 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). 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 0.63 ft/day or 230 ft/year for the October 2020 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 constituents that could potentially migrate from Pond A.



3.0 Statistical Evaluation

Assessment monitoring is continuing at Pond A in accordance with the AMP and §257.95 while corrective measures are further evaluated in accordance with §257.96 and §257.97 as outlined in the ACM. The following section summarizes the statistical approach applied to assess the fourth quarter 2020 groundwater data in accordance with the assessment monitoring program. The statistical evaluation details are provided in Appendix B (*Statistical Evaluation of October 2020 Assessment Monitoring Sampling Event*).

3.1 Establishing Groundwater Protection Standards

The GWPSs are used to assess constituent concentrations present in groundwater as a result of CCR Unit operations by statistically comparing concentrations in the downgradient wells to the GWPSs for each detection and assessment monitoring constituent. The calculation of the Appendix IV GWPSs is documented in the *Groundwater Protection Standards* technical memorandum included in Appendix C of the 2018 Annual Report. Pursuant to the Pond A AMP, GWPSs were established for the Appendix III constituents and the Part 115 Section 11511a(3) constituents not included in Appendix IV of the CCR Rule (i.e. iron) and Section 11519b(2) constituents not included in Appendix IV of the CCR Rule (i.e. copper, nickel, silver, vanadium, and zinc) in accordance with 40 CFR 257.95(h), as amended. The calculation of the Appendix III GWPSs is documented in the *Groundwater Protection Standards* technical memorandum included in Appendix G of the 2019 Annual Report. The calculation of the additional Part 115-specific constituent GWPSs is documented in the *PA 640 Constituent Groundwater Protection Standards* technical memorandum included in Appendix G of the 2019 Annual Report. The calculation of the additional Part 115-specific constituent GWPSs is documented in the *PA 640 Constituent Groundwater Protection Standards* technical memorandum included in Appendix B of the Third *Quarter 2020 Hydrogeological Monitoring Report* (TRC, October 2020).

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 documented in the January 14, 2019 *Notification of Appendix IV Constituent Exceeding Groundwater Protection Standard per* §257.95(g), arsenic was present at statistically significant levels above the GWPSs in one of the six downgradient wells (JHC-MW-15011) at Pond A based on the statistical data comparison for the first semiannual assessment monitoring event (June 2018), included as Appendix D of the 2019 Annual Report.

The fourth quarter 2020 statistical evaluation indicates that arsenic at JHC-MW-15011, in addition to the statistically evaluated Part 115 constituents boron at JHC-MW-15010 and vanadium at JHC-MW-15006 and JHC-MW-15011, are present at statistically significant levels above the GWPSs. Arsenic was identified at downgradient monitoring well JHC-MW-15011 at statistically significant levels exceeding the GWPS during the initial assessment monitoring event conducted in June 2018. As shown in the data tables and trend tests included in Appendix B, arsenic concentrations at JHC-MW-15011 have begun to decline in 2020 but remain above the GWPS. Boron at JHC-MW-15010 was identified at statistically significant levels exceeding the third quarter 2020 monitoring event. Boron concentrations at



monitoring well JHC-MW-15010 showed an initial increase in 2019, around the timing of the completion of Pond A capping activities and have remained generally stable in 2019 and 2020. Vanadium concentrations at JHC-MW-15006 and JHC-MW-15011 have been generally stable at levels above the GWPS since monitoring for vanadium began in fourth quarter 2019. The addition of the fourth quarter 2020 monitoring event data to the dataset provided sufficient confidence that vanadium exceeds the GWPS.

No other constituents were observed at statistically significant levels exceeding the GWPSs in downgradient monitoring wells at the JHC Pond A during the fourth quarter 2020. A summary of the confidence intervals for October 2020 are provided in Table 6. Table 7 provides a summary of the statistically significant GWPS exceedances over the most recent four monitoring events.

Groundwater chemistry is currently changing as a result of closure activities performed at Pond A. As discussed in the ACM, Pond A has been decommissioned with final cover in place in the summer of 2019, and groundwater flow direction has changed such that groundwater generally flows to the south-southeast and mounding is no longer observed as it had been when hydraulic loading was actively taking place. The cessation of hydraulic loading and recharge of the aquifer are expected to have an influence on groundwater conditions, and many Appendix III and Appendix IV, and Part 115-specific constituents may be affected by this change. Groundwater conditions will continue to be monitored while corrective measures continue to be evaluated and a remedy is selected. Continued groundwater monitoring may reduce uncertainty surrounding the potential changes in groundwater oxidation-reduction conditions and the effect on contaminant transport. These observations will be critical for the comparison of corrective measures alternatives.

3.3 GSI Compliance Monitoring Trends

Pursuant to the AMP, trend tests will be used to evaluate groundwater quality at the GSI monitoring wells. The GSI monitoring wells will be evaluated for detected constituents (antimony, arsenic, barium, chromium (total), lithium, molybdenum, and selenium) that, based on monitoring data from Pond A, have the potential to exceed generic GSI criteria at the Pond A downgradient monitoring wells as detailed in the AMP. Groundwater data collected from the Pond A wells indicates the presence of TDS and vanadium above generic GSI criterion in one or more of the Pond A wells (e.g. JHC-MW-15011) (Table 4). Given that TDS and vanadium data at the Pond A monitoring wells are above the generic GSI criterion for several consecutive quarterly events, vanadium and TDS will be added to the list of constituents evaluated at the GSI compliance wells associated with the Pond A AMP.

Separately, TDS and vanadium were analyzed at the GSI compliance wells in the fourth quarter as part of supplemental sampling in support of the site-wide RAP. As such, the vanadium data has been included in the fourth quarter data summary table (Table 5) and shows that vanadium concentrations in groundwater are detected at levels below or slightly above the laboratory reporting limit, well below the GSI criterion. As discussed in Section 2.2.2 and noted on Table 5, TDS data collected from the GSI wells for the October 2020 event were determined to be unusable and are not included in Table 5, however, data collected from the GSI wells during



previous events have remained well below GSI criteria as shown in Appendix C and will be confirmed as such in the upcoming 2021 sampling events. Although boron concentrations have shown an increase at several of the Pond A wells subsequent to capping activities (discussed above in Section 3.2), the boron concentrations at the Pond A boundary remain well below the associated GSI criterion (Table 4).

Time-series plots for the GSI monitoring wells MW-13, MW-14S, PZ-24S, and PZ-40S, including assessment monitoring data collected from June 2018 through October 2020¹ for the aforementioned GSI monitoring constituents detailed in the Pond A AMP, are included in Appendix C. In accordance with the Pond A AMP, the detected constituents at the GSI monitoring wells were evaluated using trend analysis. Specifically, the Mann-Kendall test for trend was performed at a significance level (α) of 0.01 per tail for each constituent/sampling point dataset to assess trends. Sen's Slope estimator was used to assess the magnitude of the slope and the Mann-Kendall test was used to determine if the slope was statistically significant. Trend analysis was not performed on constituent/sampling point datasets that were primarily not detected. The trend analysis shows that there are no statistically significant trends at the GSI wells.

All of the constituent concentrations at the GSI monitoring wells are below their respective Part 201 generic GSI criteria in October 2020 (Table 5) and there are no statistically significant trends based on the trend analysis (Appendix C).

¹ An insufficient amount of groundwater was present in February and April 2020 to collect samples for total metals for MW-13. Select dissolved metal results collected at MW-13 in accordance with the JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP) are included in the time-series plots for February and April 2020.



4.0 Conclusions and Recommendations

Assessment monitoring is ongoing at Pond A while corrective action continues to be assessed. Pond A has been decommissioned and the final cover has been placed. The statistical evaluations have confirmed that arsenic is the only Appendix IV constituent present at statistically significant levels above the GWPSs. In addition, boron and vanadium exceeds the GWPSs established under the Part 115-specific program. Compliance for the GSI pathway is currently met based on data collected from the GSI monitoring wells located downgradient from Pond A.

The ACM also documents that groundwater nature and extent of arsenic has been defined, as required in §257.95(g)(1). Although arsenic concentrations had exceeded the GWPS in on-site groundwater, an evaluation of risk demonstrates that there are currently no adverse effects on human health or the environment from either surface water or groundwater due to CCR management at Pond A.

Consumers Energy also completed the final cover for Pond A in summer of 2019. The ACM report provided a high-level assessment of groundwater remediation technologies that could potentially address site-specific constituents of concern (i.e. arsenic) under known groundwater conditions. Changes in groundwater chemistry continue to be evaluated following the completion of capping at Pond A. Groundwater monitoring in 2021 will reduce uncertainty surrounding potential changes in groundwater oxidation-reduction conditions and the effect on contaminant transport. These observations will be critical for the comparison of corrective measures alternatives.

Consumers Energy will continue to evaluate corrective measures in accordance with §257.96 and §257.97. The groundwater management remedy for the JH Campbell Pond A will be selected as soon as feasible to, at a minimum, meet the federal standards of §257.97(b) of the CCR Rule. Consumers Energy will continue executing the self-implementing groundwater compliance schedule in conformance with §257.90 - §257.98. The next quarterly Pond A HMP and AMP monitoring event, is scheduled for the first calendar quarter of 2021. The next semiannual assessment monitoring event in accordance with §257.95 is scheduled for the second calendar quarter or 2021.



5.0 References

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Tables

Table 1 Summary of Groundwater Elevation Data – Fourth Quarter 2020 JH Campbell – Assessment Monitoring Program West Olive, Michigan

Well	Ground Surface	тос	Geologic Unit of	Scree	n Ir	iterval	October	19, 2020
Location	Elevation (ft)	Elevation (ft)	Screen Interval	Elevation (ft)		ion	Depth to Water (ft BTOC)	Groundwater Elevation (ft)
Background	1						(
JHC-MW-15023	617.01	619.98	Sand	603.0	to	593.0	17.70	602.28
JHC-MW-15024	613.79	616.62	Sand	606.8	to	596.8	12.49	604.13
JHC-MW-15025	614.14	617.17	Sand	607.1	to	597.1	11.40	605.77
JHC-MW-15026	615.09	618.04	Sand	607.1	to	597.1	12.90	605.14
JHC-MW-15027	614.77	617.30	Sand	604.8	to	594.8	13.13	604.17
JHC-MW-15028	611.02	613.80	Sand	603.0	to	593.0	12.75	601.05
JHC-MW-15029	608.08	610.95	Sand	600.1	to	590.1	10.57	600.38
JHC-MW-15030	604.05	607.17	Sand	600.1	to	590.1	9.17	598.00
Pond 1N, 1S, 2N, 2S		000 50		000 5	4	500 5	44 70	507.75
JHC-MW-15001 JHC-MW-15002	607.02 618.18	609.53 621.27	Sand Sand	603.5 590.2	to to	598.5 580.2	<u>11.78</u> 24.61	597.75 596.66
JHC-MW-15002	623.16	627.20	Sand	590.2 595.2	to	585.2	32.94	596.66
JHC-MW-15003	606.22	609.99	Sand	595.2 579.2	to	569.2	18.27	594.20
JHC-MW-18004	602.92	605.72	Sand	579.2 596.9	to	586.9	12.17	593.55
	600.30	603.16			-		12.17	
JHC-MW-18005	600.30	603.16	Sand	595.3	to	585.3	10.69	592.47
Pond 3N, 3S JHC-MW-15013	632.40	635.25	Sand	604.4	to	594.4	34.98	600.27
					-			
JHC-MW-15015	632.46	635.20	Sand	604.5	to	594.5	34.13	601.07
JHC-MW-15016	631.81	632.52	Sand	603.8	to	593.8	31.46	601.06
JHC-MW-18001	609.09	611.98	Sand	603.1	to	593.1	11.71	600.27
JHC-MW-18002	605.53	608.93	Sand	602.0	to	592.0	8.88	600.05
JHC-MW-18003	605.36	608.78	Sand	601.9	to	591.9	8.86	599.92
Landfill					-			
JHC-MW-15017	613.69	616.61	Sand	603.7	to	593.7	14.54	602.07
JHC-MW-15018	614.26	617.02	Sand	604.3	to	594.3	15.23	601.79
JHC-MW-15019	609.81	612.86	Sand	603.8	to	593.8	11.66	601.20
JHC-MW-15022	620.92	623.79	Sand	597.9	to	587.9	28.78	595.01
JHC-MW-15031	632.94	635.87	Sand	599.9	to	589.9	42.82	593.05
JHC-MW-15032	611.32	614.29	Sand	598.3	to	588.3	17.15	597.14
JHC-MW-15033	618.08	620.99	Sand	602.1	to	592.1	22.07	598.92
JHC-MW-15034	612.90	615.97	Sand	601.9	to	591.9	15.90	600.07
JHC-MW-15035	632.53	634.28	Sand	599.5	to	589.5	40.09	594.19
JHC-MW-15036	617.94	618.34	Sand	597.9	to	587.9	26.41	591.93
JHC-MW-15037	614.28	616.06	Sand	591.3	to	586.3	24.95	591.11
Pond A								
JHC-MW-15006	624.74	627.58	Sand	599.7	to	589.7	34.98	592.60
JHC-MW-15007	624.82	627.70	Sand	602.8	to	592.8)ry
JHC-MW-15008	632.43	635.30	Sand	604.4	to	594.4		nissioned
JHC-MW-15008R ⁽¹⁾	632.32	634.67	Sand	597.3	to	587.3	42.98	591.69
JHC-MW-150081	632.33	635.32	Sand	602.3	to	592.3)ry
JHC-MW-15010	632.55	635.57	Sand	602.6	to	592.6	42.38	593.19
JHC-MW-15010	627.71	630.83	Sand	6002.0	to	590.7	38.71	593.19
		030.03	Sanu	000.7	10	590.7	30.71	J3Z.1Z
Downgradient Wells		E0E 27	Clayer Citt	E07 0	+-	585.4		
MW-13	593.40	595.37	Clayey Silt	587.9	to			Dry
MW-14S	587.36	590.98	Sand	582.9	to	577.9	9.02	581.96
PZ-23S	602.84	604.97	Sand	591.8	to	586.8	15.34	589.63
PZ-24S	586.56	590.15	Sand	584.6	to	579.6	7.53	582.62
PZ-40S	589.51	593.25	Sand	585.5	to	575.5	10.91	582.34
TW-19-04A	608.15	611.44	Sand	591.2	to	586.2	22.15	589.29
TW-19-05	603.44	606.36	Sand	592.8	to	587.8	16.14	590.22
TW-19-06A	599.61	602.54	Sand	592.3	to	587.3	13.44	589.10

Notes:

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

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.

Table 2Summary of Field Parameters: Fourth Quarter 2020JH Campbell Pond A - Assessment Monitoring ProgramWest Olive, Michigan

Sample Location	Sample Date	Dissolved Oxygen	Oxidation Reduction Potential	рН	Specific Conductivity	Temperature	Turbidity
		(mg/L)	(mV)	(SU)	(umhos/cm)	(°C)	(NTU)
Background							
JHC-MW-15023	10/20/2020	0.62	225.8	5.5	74	12.1	9.4
JHC-MW-15024	10/20/2020	0.28	116.1	6.9	308	11.9	9.1
JHC-MW-15025	10/20/2020	1.42	136.7	6.6	262	12.0	9.2
JHC-MW-15026	10/20/2020	3.77	138.1	6.4	127	11.5	8.6
JHC-MW-15027	10/20/2020	1.87	94.3	6.0	81	11.0	5.7
JHC-MW-15028	10/20/2020	4.92	101.4	7.3	82	12.5	7.6
Pond A	-						
JHC-MW-15006	10/22/2020	0.62	-55.4	7.5	790	15.0	8.8
JHC-MW-15007	10/22/2020 ⁽¹⁾						
JHC-MW-15008R	10/22/2020	1.59	45.2	7.0	880	14.4	8.6
JHC-MW-15009	10/22/2020 ⁽¹⁾						
JHC-MW-15010	10/22/2020 ⁽¹⁾						
JHC-MW-15011	10/22/2020	0.35	-46.1	7.6	800	14.7	4.9
Pond A GSI	-						
MW-13	10/20/2020 ⁽¹⁾						
MW-14S	10/20/2020	1.62	171.8	5.2	20	12.7	9.3
PZ-24S	10/21/2020	1.53	123.5	5.2	29	13.2	7.8
PZ-40S	10/21/2020	0.35	215.2	4.6	17	10.8	9.5

Notes:

mg/L -Milligrams per Liter.

mV - Millivolts.

SU - Standard Units.

umhos/cm - Micromhos per centimeter.

°C - Degrees Celcius.

NTU - Nephelmetric Turbidity Unit.

-- - Not Measured.

(1) - Not sampled; insufficient amount of groundwater present to collect sample.

Table 3 Summary of Groundwater Sampling Results (Analytical): Fourth Quarter 2020 JH Campbell Background – Assessment 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:	10/20/2020	10/20/2020	10/20/2020	10/20/2020	10/20/2020	10/20/2020
				MI Non-							
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^						
Appendix III											
Boron	ug/L	NC	500	500	7,200	71	35	33	25	< 20	< 20
Calcium	mg/L	NC	NC	NC	500 ⁽²⁾	11.1	39.0	23.2	17.1	12.9	17.4
Chloride	mg/L	250**	250 ⁽¹⁾	250 ⁽¹⁾	500 ⁽²⁾	1.60	17.1	22.6	5.33	< 1.00	< 1.00
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250**	250 ⁽¹⁾	250 ⁽¹⁾	500 ⁽²⁾	10.1	8.93	9.82	7.87	6.54	6.15
Total Dissolved Solids	mg/L	500**	500 ⁽¹⁾	500 ⁽¹⁾	500	57	181	142	75	49	68
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5 ⁽¹⁾	6.5 - 8.5 ⁽¹⁾	6.5 - 9.0	5.5	6.9	6.6	6.4	6.0	7.3
Appendix IV											
Antimony	ug/L	6	6.0	6.0	130	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	10	10	10	< 1	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	2,000	2,000	820	21	20	11	14	14	7
Beryllium	ug/L	4	4.0	4.0	18	< 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
Chromium	ug/L	100	100	100	11	< 1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	39	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	< 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
Molybdenum	ug/L	NC	73	210	3,200	< 5	< 5	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NC	NC	NC	< 0.262	< 0.294	< 0.269	< 0.264	< 0.368	< 0.258
Radium-228	pCi/L	NC	NC	NC	NC	< 0.182	< 0.582	< 0.209	< 0.364	< 0.411	0.346
Radium-226/228	pCi/L	5	NC	NC	NC	< 0.262	< 0.582	< 0.269	< 0.364	< 0.411	0.403
Selenium	ug/L	50	50	50	5.0	< 1	1	1	< 1	< 1	< 1
Thallium	ug/L	2	2.0	2.0	3.7	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Paramete	rs										
Iron	ug/L	300**	300 ⁽¹⁾	300 ⁽¹⁾	500,000 ⁽²⁾	177	664	20	39	194	33
Copper	ug/L	1,000**	1,000 ⁽¹⁾	1,000 ⁽¹⁾	15	< 1	2	1	< 1	< 1	< 1
Nickel	ug/L	NC	100	100	86	< 2	< 2	< 2	< 2	< 2	< 2
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	4.5	62	27	< 2	< 2	< 2	< 2	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000 ⁽¹⁾	190	< 10	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

pCi/L - picocuries per liter.

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

NC - no criteria.

-- - not analyzed.

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

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

- ^ Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using 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 EGLE policy and procedure 09-014 dated June 20, 2012.

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.

(1) - Criterion is the aesthetic drinking water value per footnote {E}.

(2) - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

Table 4 Summary of Groundwater Sampling Results (Analytical): Fourth Quarter 2020 JH Campbell Pond A – Assessment Monitoring Program West Olive, Michigan

					Sample Location:	JHC-MW-15006	JHC-MW-15007	JHC-MW-15008R	JHC-MW-15009	JHC-MW-15010	JHC-MW-15011
					Sample Date:	10/22/2020	10/22/2020 ⁽³⁾	10/22/2020	10/22/2020 ⁽³⁾	10/22/2020 ⁽³⁾	10/22/2020
				MI Non-							
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^						
Appendix III											
Boron	ug/L	NC	500	500	7,200	272		285			4,120
Calcium	mg/L	NC	NC	NC	500 ⁽²⁾	87.2		109			122
Chloride	mg/L	250**	250 ⁽¹⁾	250 ⁽¹⁾	500 ⁽²⁾	22.0		18.8			3.79
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000		< 1,000			< 1,000
Sulfate	mg/L	250**	250 ⁽¹⁾	250 ⁽¹⁾	500 ⁽²⁾	253		215			141
Total Dissolved Solids	mg/L	500**	500 ⁽¹⁾	500 ⁽¹⁾	500	515		577			546
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5 ⁽¹⁾	6.5 - 8.5 ⁽¹⁾	6.5 - 9.0	7.5		7.0			7.6
Appendix IV											
Antimony	ug/L	6	6.0	6.0	130	1		1			2
Arsenic	ug/L	10	10	10	10	9		< 1			22
Barium	ug/L	2,000	2,000	2,000	820	382		216			430
Beryllium	ug/L	4	4.0	4.0	18	< 1		< 1			< 1
Cadmium	ug/L	5	5.0	5.0	3.5	< 0.2		< 0.2			0.5
Chromium	ug/L	100	100	100	11	5		< 1			< 1
Cobalt	ug/L	NC	40	100	100	< 6		< 6			< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000		< 1,000			< 1,000
Lead	ug/L	NC	4.0	4.0	39	< 1		< 1			< 1
Lithium	ug/L	NC	170	350	440	15		19			17
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2		< 0.2			< 0.2
Molybdenum	ug/L	NC	73	210	3,200	38		5			< 5
Radium-226	pCi/L	NC	NC	NC	NC	0.289		0.553			0.344
Radium-228	pCi/L	NC	NC	NC	NC	< 0.274		0.33			< 0.264
Radium-226/228	pCi/L	5	NC	NC	NC	0.318		0.883			0.497
Selenium	ug/L	50	50	50	5.0	2		68			308
Thallium	ug/L	2	2.0	2.0	3.7	< 2		< 2			< 2
MI Part 115 Paramete											
Iron	ug/L	300**	300 ⁽¹⁾	300 ⁽¹⁾	500,000 ⁽²⁾	929		56			< 20
Copper	ug/L	1,000**	1,000 ⁽¹⁾	1,000 ⁽¹⁾	15	4		2			1
Nickel	ug/L	NC	100	100	86	5		< 2			< 2
Silver	ug/L	100**	34	98	0.2	< 0.2		< 0.2			< 0.2
Vanadium	ug/L	NC	4.5	62	27	19		< 2			49
Zinc	ug/L	5,000**	2,400	5,000 ⁽¹⁾	190	11		< 10			< 10

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

pCi/L - picocuries per liter.

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

NC - no criteria.

-- - not analyzed.

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

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

^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using 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 EGLE policy and procedure 09-014 dated June 20, 2012.

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.

(1) - Criterion is the aesthetic drinking water value per footnote {E}.

(2) - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

(3) - Not sampled; insufficient amount of groundwater present to collect sample.

Table 5 Summary of Groundwater Sampling Results (Analytical): Fourth Quarter 2020 JH Campbell Pond A GSI – Assessment Monitoring Program West Olive, Michigan

					Sample Location:	MW-13	MW-14S	PZ-24S	PZ-40S
					Sample Date:	10/19/2020 ⁽²⁾	10/20/2020	10/21/2020	10/21/2020
Constituent	Unit	EPA MCL	MI Residential*	MI Non- Residential*	MI GSI^	GSI			
Appendix III									
Total Dissolved Solids	mg/L	500**	500 ⁽¹⁾	500 ⁽¹⁾	500		NA ⁽³⁾	NA ⁽³⁾	NA ⁽³⁾
Appendix IV									
Antimony	ug/L	6	6.0	6.0	130		< 1	< 1	< 1
Arsenic	ug/L	10	10	10	10		< 1	1	< 1
Barium	ug/L	2,000	2,000	2,000	820		8	32	19
Chromium	ug/L	100	100	100	11		< 1	1	2
Lithium	ug/L	NC	170	350	440		< 10	< 10	< 10
Molybdenum	ug/L	NC	73	210	3,200		< 5	< 5	< 5
Selenium	ug/L	50	50	50	5.0		< 1	< 1	< 1
MI Part 115 Paramete	ers								
Vanadium	ug/L	NC	4.5	62	27		< 2	3	< 2

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

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

NA - not applicable.

-- - not analyzed.

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

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

^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using 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}.

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.

(1) - Criterion is the aesthetic drinking water value per footnote {E}.

(2) - Not sampled; insufficient amount of groundwater present to collect sample.

(3) - Total dissolved solids data for the October 2020 event contained errors introduced by the laboratory materials manufacturer and were determined to be unusable.

Table 6 Summary of Groundwater Protection Standard Exceedances – Fourth Quarter 2020 JH Campbell Pond A – Assessment Monitoring Program West Olive, Michigan

Constituent	Units	GWPS	JHC-M\	N-15006	JHC-MV	V-15007	JHC-MW	/-15008R	JHC-M	W-15009	JHC-M\	N-15010	JHC-MV	N-15011
Constituent	Units	GWF3	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL
Appendix IV														
Arsenic	ug/L	10											19	38
Chromium	ug/L	100									1.0	370		
Selenium	ug/L	50	-				1.5	58	2.6	64	6.0	180	0.37	150
Additional Mic	Additional Michigan Part 115 Parameters													
Boron*	ug/L	500					75	430	93	560	530	2,700	120	3,200
Sulfate*	mg/L	250	27	260										
TDS*	mg/L	500	200	570			25	580					220	630
pH*	SU	5.5 - 8.8	-										7.5	8.9
lron*	ug/L	870	-13	930							10	2,100		
Nickel*	ug/L	100									1.0	200		
Vanadium*	ug/L	4.5	6.1	21	NC	NC					4.0	5.5	12	58

Notes:

ug/L - micrograms per Liter

mg/L - milligrams per Liter

SU - standard units; pH is a field parameter.

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

NC - Not Calculated; insufficient data to calculate confidence limits.

GWPS - Groundwater Protection Standard as established in TRC's Technical Memoranda dated October 15, 2018 and December 23, 2019.

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

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

*Statistically evaluated per Michigan Part 115.

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

Table 7Summary of Groundwater ExceedancesFourth Quarter 2020JH Campbell Plant Pond A, West Olive, Michigan

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

Data is in	(X) ug/L	or
	() mg/L	
unl	ess otherwis	se stated

Facility: JH Campbell – WDS# 395496

Well #	Location	Parameter	Part 201 GRCC	Statistical Limit (or 'CC' for Control Charts)	4 Qtr. 2020 (bold >201)	3 Qtr. 2020 (bold >201)	2 Qtr. 2020 (bold >201)	1 Qtr. 2020 (bold >201)
JHC-MW-15010	Downgradient	Boron	500	LCL	NS	2,130	2,350 ⁽¹⁾	2,390 ⁽¹⁾
JHC-MW-15011	Downgradient	Arsenic	10	LCL	22	22	25	31
JHC-MW-15006	Downgradient	Vanadium	4.5	LCL	19	15 ⁽¹⁾	10 ⁽¹⁾	16 ⁽¹⁾
JHC-MW-15011	Downgradient	Vanadium	4.5	LCL	49	30 ⁽¹⁾	40 ⁽¹⁾	42 ⁽¹⁾

Notes:

Table summarizes statistically significant Groundwater Protection Standards (GWPSs) exceedances as determined using confidence intervals.

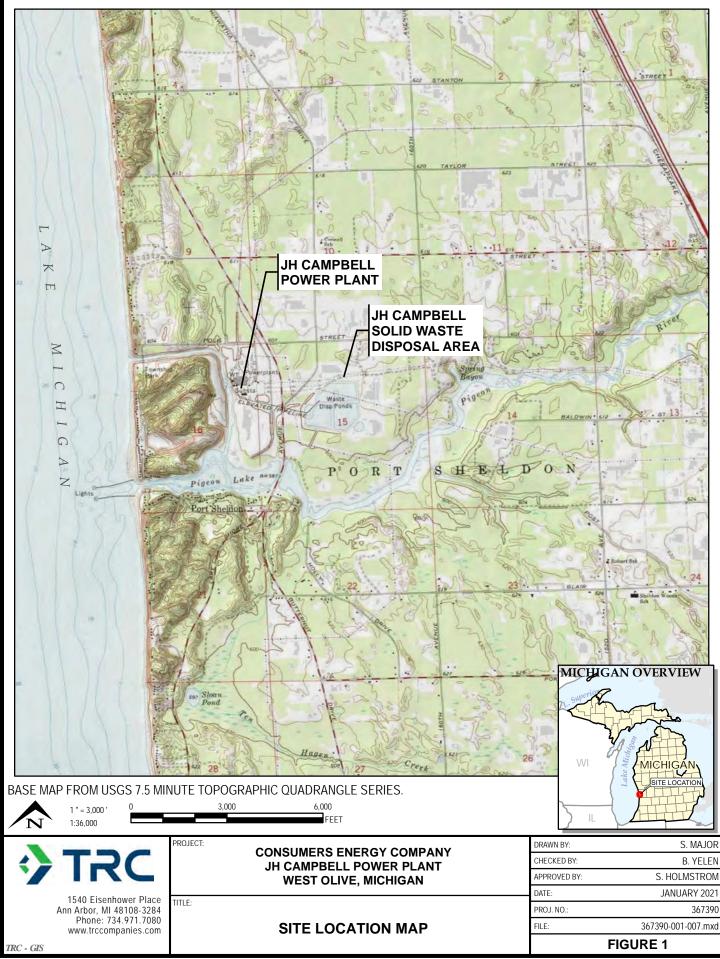
LCL - Lower confidence limit

NS - Not sampled; insufficient amount of groundwater present to collect sample.

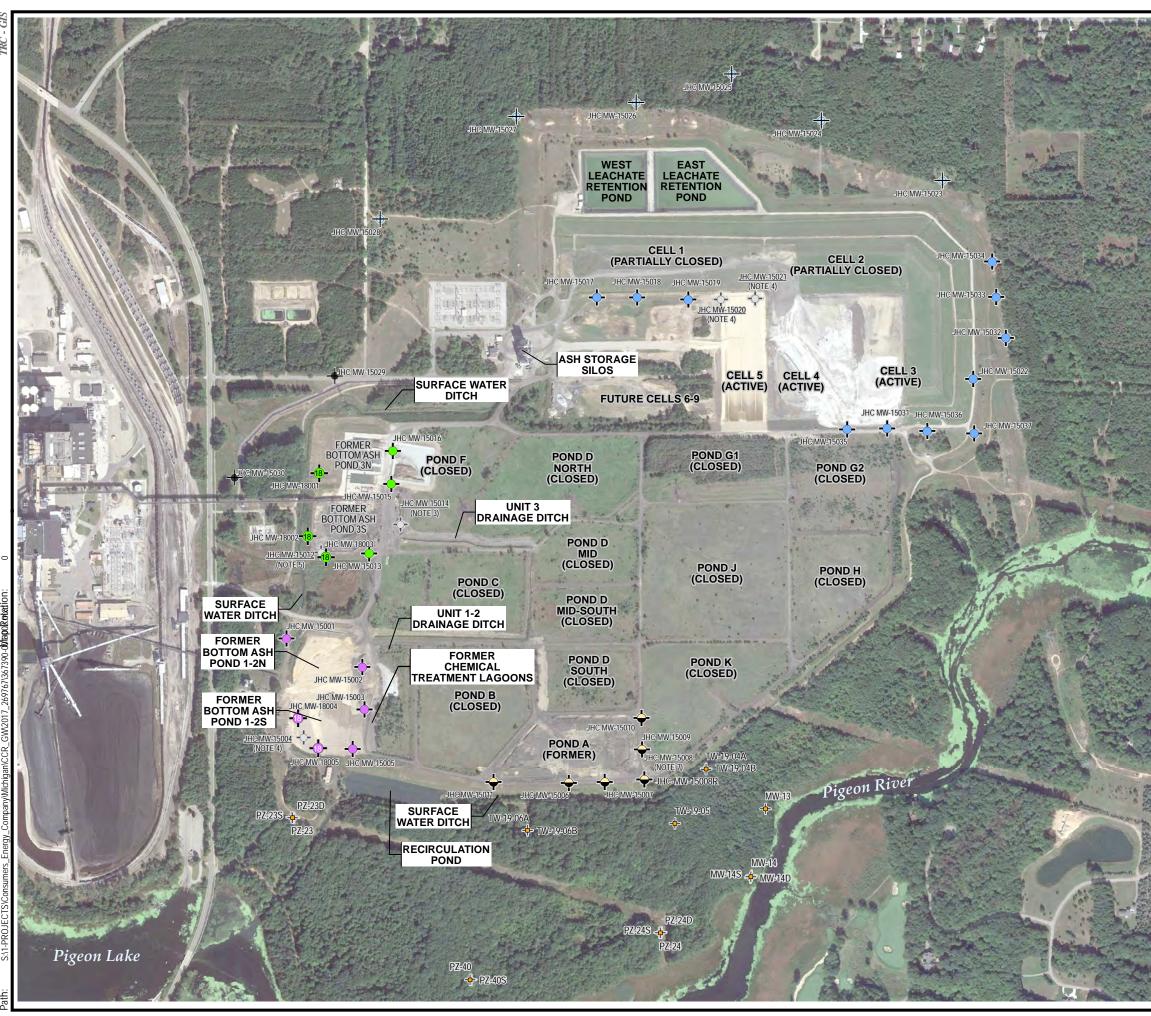
(1) - Exceeded Part 201 Generic Residential Cleanup Criteria (GRCC) but did not result in a statistically significant GWPS exceedance.



Figures



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LEGEND

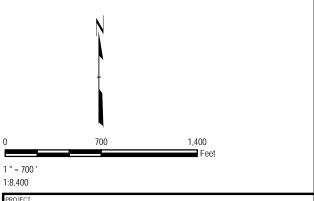
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- BACKGROUND MONITORING WELL -
 - BOTTOM ASH POND
 - 1/2 N/S MONITORING WELL
 - BOTTOM ASH POND **3 N/S MONITORING WELL**
 - DOWNGRADIENT LANDFILL MONITORING WELL
- DOWNGRADIENT POND A MONITORING WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- ÷ 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)
- NATURE AND EXTENT WELL -**þ**-

NOTES

- BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2018.
- 2 WELL LOCATIONS BASED ON SURVEY DATA THROUGH 12/07/2018.
- MONITORING WELL DECOMMISSIONED NOVEMBER 13, 3 2017.
- MONITORING WELL DECOMMISSIONED JUNE 14, 2018.
- 5 MONITORING WELL DECOMMISSIONED OCTOBER 10, 2018.
- JHC-MW-1800X MONITORING WELLS INSTALLED IN DECEMBER 2018.
- MONITORING WELL DECOMMISSIONED JUNE 24, 2019.
- JHC-MW-15008R AND TW-19-XX MONITORING WELLS INSTALLED IN JUNE 2019.



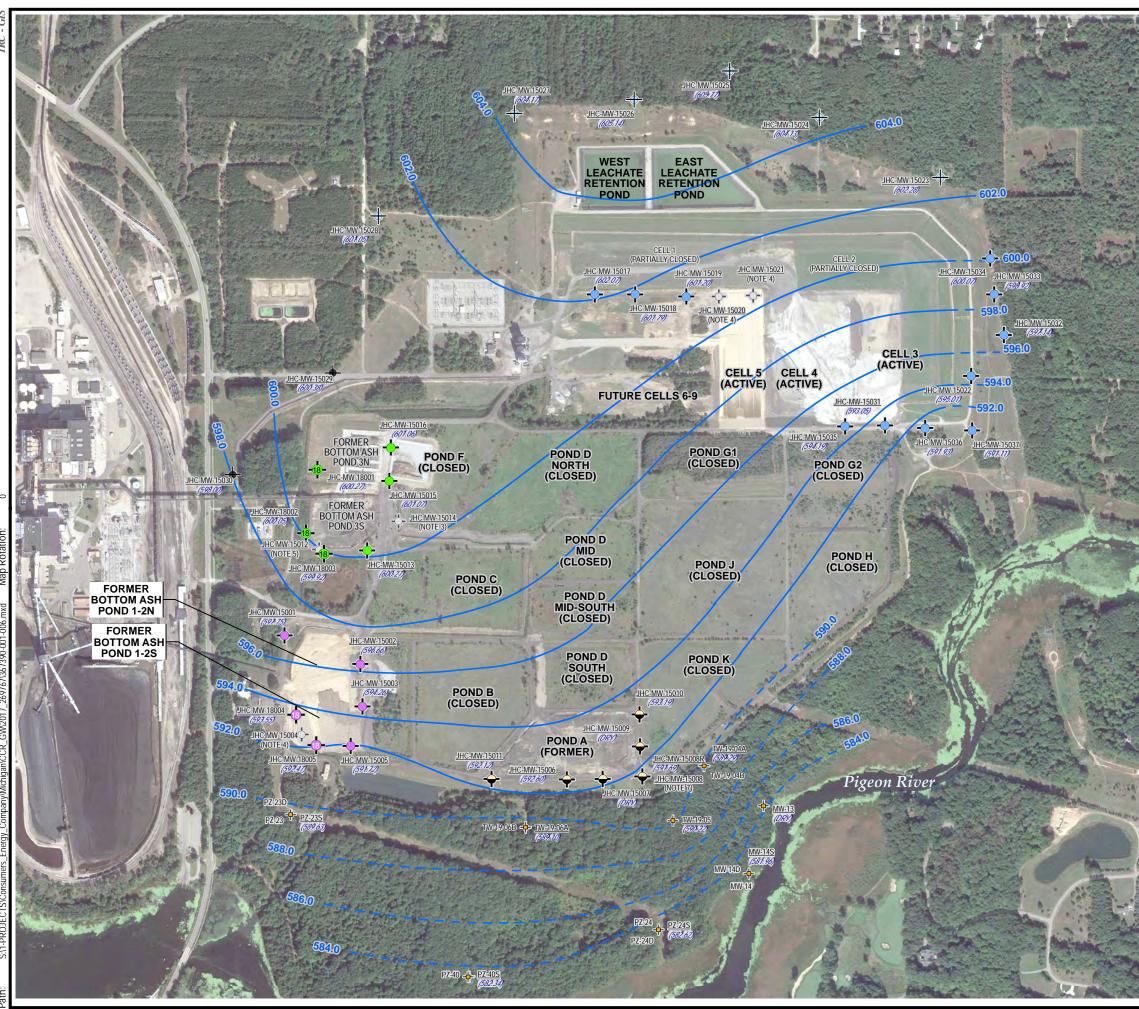
CONSUMERS ENERGY COMPANY JH CAMPBELL POWER PLANT WEST OLIVE, MICHIGAN

SITE PLAN WITH CCR MONITORING WELL LOCATIONS

DRAWN BY:	S. MAJOR	PROJ NO.:	367390.0000.0000		
CHECKED BY:	B. YELEN				
APPROVED BY:	S. HOLMSTROM		FIGURE 2		
DATE:	JANUARY 2021	TIOORE 2			
🤣 T	RC		1540 Eisenhower Place Ann Arbor, MI 48108-3284 Phone: 734.971.7080 www.trccompanies.com		

367390-001-002.mx

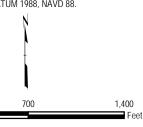
www.trccompanies.com







- MONITORING WELL DECOMMISSIONED JUNE 14, 2018.
- MONITORING WELL DECOMMISSIONED OCTOBER 10, 2018.
- JHC-MW-1800X MONITORING WELLS INSTALLED IN DECEMBER 2018.
- MONITORING WELL DECOMMISSIONED JUNE 24, 2019.
- JHC-MW-15008R AND TW-19-XX MONITORING WELLS INSTALLED IN JUNE 2019.
- STATIC WATER ELEVATIONS IN NORTH AMERICAN VERTICAL DATUM 1988, NAVD 88.



1 " = 700 1:8,400 O IEC

CONSUMERS ENERGY COMPANY JH CAMPBELL POWER PLANT WEST OLIVE, MICHIGAN



DRAWN BY:	S. MAJOR	PROJ NO.:	367390.0000
CHECKED BY:	B. YELEN		
APPROVED BY:	S. HOLMSTROM		FIGURE 3
DATE:	JANUARY 2021		
12500			1540 Eisenhower Place



Phone: 734.971.7080 www.trccompanies.com

367390-001-006.mxd



Appendix A Data Quality Review

Laboratory Data Quality Review Groundwater Monitoring Event October 2020 CEC JH Campbell Background Wells

Groundwater samples were collected by Consumers Energy (CE) Laboratory Services for the October 2020 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 20-1192 and 160-40223-1.

During the October 2020 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
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, 2017) 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.

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

- A method blank was analyzed with each analytical batch for radium. Radium 228 was detected in MB 160-490784/23-A at 0.5069 +/- 0.266 pCi/L. There was no impact on data usability since radium 228 was not detected in the associated samples.
- One equipment blank (EB-01) and one field blank (FB-01) were collected. Target analytes were not detected in these blank samples.
- An LCS and LCSD were analyzed with each analytical batch for radium; the following issues were noted.

- Radium 226 recovered above the acceptance limits (75-125%) in LCS 160-490013/1-A (132%). No data are affected as no associated samples had positive detections for radium 226.
- Radium 228 recovered above the acceptance limits (75-125%) in LCSD 160-490784/1-A (132%). Further, the replicate error ratio was above the acceptance limit (1.0) for LCS 160-490784/1-A and LCSD 160-490784/2-A (1.02) for radium 228. No data are affected as no associated samples had positive detections for radium 228.
- 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.
- The barium carrier in samples JHC-MW-15023 (146%), JHC-MW-15025 (182%), JHC-MW-15026 (154%), and JHC-MW-15028 (140%) recovered above the acceptance limits (40-110%) for the radium 226 and 228 analyses. The carrier results were truncated by the laboratory to 100% to minimize potential high bias. The positive and nondetect results of radium 226 and 228 for these samples are potentially uncertain as summarized in the attached table, Attachment A.
- The barium carrier in sample JHC-MW-15024 (124%) recovered above the acceptance limits (40-110%) for the radium 226 analysis. The carrier result was truncated by the laboratory to 100% to minimize potential high bias. The nondetect result for radium 226 in this sample is uncertain as summarized in the attached table, Attachment A.
- CE Laboratory identified that the pre-determined weights of the bags used in the TDS analyses were inaccurate and this issue could not be resolved to determine the potential bias on the individual sample results. Therefore, the positive and nondetect results for TDS in all samples are potentially uncertain as summarized in the attached table, Attachment A. However, the results do not vary significantly from historical data for each monitoring well, therefore, the TDS data are considered usable for purposes of this monitoring program.

Attachment A Summary of Data Non-Conformances for Landfill Groundwater Analytical Data JH Campbell Background Wells– CCR Monitoring Program West Olive, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue
JHC-MW-15023	10/20/2020		
JHC-MW-15024	10/20/2020		
JHC-MW-15025	10/20/2020		
JHC-MW-15026	10/20/2020		
JHC-MW-15027	10/20/2020	TDS	Pre-weighed sample bag weights were potentially inaccurate. Indicates uncertainty in results.
JHC-MW-15028	10/20/2020		
DUP-01	10/20/2020		
FB-01	10/20/2020		
EB-01	10/20/2020		
JHC-MW-15024	10/20/2020	Radium 226	Barium carrier recovery above acceptance criteria (40-110%); carrier results truncated by laboratory to 100%. Indicates potential uncertainty in results.
JHC-MW-15023	10/20/2020		
JHC-MW-15025	10/20/2020	Radium 226,	Barium carrier recovery above acceptance criteria (40-110%); carrier results truncated by laboratory to 100%.
JHC-MW-15026	10/20/2020	Radium 228	Indicates potential uncertainty in results.
JHC-MW-15028	10/20/2020		

Laboratory Data Quality Review Groundwater Monitoring Event October 2020 CEC JH Campbell Pond A Wells

Groundwater samples were collected by Consumers Energy (CE) Laboratory Services for the October 2020 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 20-1195R and 160-40221-1.

During the October 2020 sampling event, a groundwater sample was collected from each of the following wells:

JHC-MW-15006 JHC-MW-15008R JHC-MW-15011

Wells JHC-MW-15007, JHC-MW-15009, and JHC-MW-15010 were dry so a sample was not collected from these wells during this event.

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
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, 2017) 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 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.

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

- A method blank was analyzed with each analytical batch for radium. Radium was not detected in the method blank samples.
- One equipment blank (EB-04) and one field blank (FB-04) were collected. Target analytes were not detected in these blank samples.

- An LCS and LCSD were analyzed with each analytical batch for radium. Radium 226 recovered above the acceptance limits (75-125%) in LCS 160-490013/1-A (132%). The positive detections of radium 226 in samples JHC-MW-15006, JHC-MW-15008R, and JHC-MW-15011 are potentially biased high as summarized in the attached table, Attachment A.
- MS and MSD analyses were not performed on a sample from this data set.
- The field duplicate pair samples were DUP-04/JHC-MW-15006. The relative percent differences (RPDs) for the following analytes were outside of the acceptance criteria:
 - The RPD for arsenic (40%) exceeded the acceptance limit. Potential uncertainty exists for positive results for arsenic in groundwater samples in this data set as noted in the attached table, Attachment A.
 - The RPD for barium (65.3%) exceeded the acceptance limit. Potential uncertainty exists for positive results for barium in all groundwater samples in this data set as noted in the attached table, Attachment A.
 - The RPD for chromium (133%) exceeded the acceptance limit. Potential uncertainty exists for positive results for chromium in groundwater samples in this data set as noted in the attached table, Attachment A.
 - The RPD for iron (125%) exceeded the acceptance limit. Potential uncertainty exists for positive results for iron in groundwater samples in this data set as noted in the attached table, Attachment A.
 - The RPD for nickel (5 ug/L; <1 ug/L) was not calculable but the variability exceeded the acceptance limit. Potential uncertainty exists for the positive and non-detect results for nickel in groundwater samples in this data set as noted in the attached table, Attachment A.
 - The RPD for selenium (66.7%) exceeded the acceptance limit. Potential uncertainty exists for positive results for selenium in all groundwater samples in this data set as noted in the attached table, Attachment A.
 - The RPD for vanadium (71.4%) exceeded the acceptance limit. Potential uncertainty exists for positive results for vanadium in groundwater samples in this data set as noted in the attached table, Attachment A.
 - The RPD for zinc (70.6%) exceeded the acceptance limit. Potential uncertainty exists for positive results for zinc in groundwater samples in this data set as noted in the attached table, Attachment A.
- The barium carrier in samples JHC-MW-15006 (148%), JHC-MW-15008R (121%), JHC-MW-15011 (132%), FB-04 (169%), and EB-4 (132%) above the acceptance limits (40-110%) for the radium 226 and 228 analyses. The carrier results were truncated by Eurofins-TA St. Louis to 100% to minimize potential high bias. The positive and nondetect results of radium 226 and 228 for these samples are potentially uncertain as summarized in the attached table, Attachment A.
- CE Laboratory identified that the pre-determined weights of the bags used in the TDS analyses were inaccurate and this issue could not be resolved to determine the potential bias on the individual sample results. Therefore, the positive and nondetect results for TDS in all samples are potentially uncertain as summarized in the attached table, Attachment A. However, the results do not vary significantly from historical data for each monitoring well, therefore, the TDS data are considered usable for purposes of this monitoring program.

Attachment A Summary of Data Non-Conformances for Landfill Groundwater Analytical Data JH Campbell Pond A – CCR Monitoring Program West Olive, Michigan

Samples	Collection Date	Analyte	Non-Conformance/Issue	
JHC-MW-15006	10/22/2020		Pre-weighed sample bag weights were potentially inaccurate. Indicates uncertainty in results.	
JHC-MW-15008R	10/22/2020			
JHC-MW-15011	10/22/2020	TDS		
DUP-04	10/22/2020	103		
EB-04	10/22/2020			
FB-04	10/22/2020			
JHC-MW-15006	10/22/2020	Barium.	Field duplicate relative percent difference (RPD) exceeds acceptance criteria (<30%); indicates potential uncertainty in results.	
JHC-MW-15008R	10/22/2020	Selenium, Nickel		
JHC-MW-15011	10/22/2020			
DUP-04	10/22/2020			
JHC-MW-15006	10/22/2020	Chromium,	Field duplicate RPD exceeds acceptance criteria (<30%); indicates potential uncertainty in results.	
DUP-04	10/22/2020	Zinc	Tield duplicate fri D'exceeds acceptance citteria (~50%), indicates potential differtality in results.	
JHC-MW-15006	10/22/2020	Arsenic, Vanadium	Field duplicate RPD exceeds acceptance criteria (<30%); indicates potential uncertainty in results.	
JHC-MW-15011	10/22/2020			
DUP-04	10/22/2020			
JHC-MW-15006	10/22/2020		Field duplicate RPD exceeds acceptance criteria (<30%); indicates potential uncertainty in results.	
JHC-MW-15008R	10/22/2020	Iron		
DUP-04	10/22/2020			
JHC-MW-15006	10/22/2020		Laboratory Control Sample (LCS) percent recovery (%R) above acceptance criteria (75-125%); indicates potentia	
JHC-MW-15008R	10/22/2020	Radium 226	high bias in results.	
JHC-MW-15011	10/22/2020		nigh bias in results.	
JHC-MW-15006	10/22/2020	Radium 226, Radium 228	Barium carrier recovery above acceptance criteria (40-110%); carrier results truncated to 100% by laboratory. Indicates potential uncertainty in results.	
JHC-MW-15008R	10/22/2020			
JHC-MW-15011	10/22/2020			
EB-04	10/22/2020			
FB-04	10/22/2020			



Appendix B October 2020 Assessment Monitoring Statistical Evaluation



Date:	January 27, 2021
То:	Bethany Swanberg, Consumers Energy
From:	Sarah Holmstrom, TRC Kristin Lowery, TRC
Project No.:	367390.0000.0000 Phase 1 Task 4
Subject:	Statistical Evaluation of October 2020 Assessment Monitoring Sampling Event, JH Campbell Pond A, Consumers Energy, West Olive, Michigan

Consumers Energy is conducting quarterly groundwater monitoring at Pond A in accordance with the Pond A Hydrogeological Monitoring Plan (HMP) and Assessment Monitoring Plan (AMP) and semiannual monitoring in accordance with the CCR Rule per the JH Campbell Monitoring Program Sample Analysis Plan (SAP) (ARCADIS, May 2016). The fourth quarter 2020 monitoring event was conducted on October 19 through 23, 2020. In accordance with the Pond A AMP, the assessment monitoring data must be compared to groundwater protection standards (GWPSs) to determine whether or not Appendix III and Appendix IV constituents, and additional Michigan Part 115 (as amended by PA 640) Section 11511a(3) and Section 11519b(2) constituents, are detected at statistically significant levels above the GWPSs. GWPSs were established as follows:

- Appendix IV GWPSs were established in accordance with §257.95(h), as detailed in the October 15, 2018, Groundwater Protection Standards technical memorandum, included as Appendix C of the 2018 Annual Groundwater Monitoring Report (TRC, January 2019).
- Appendix III GWPSs were established in accordance with §257.95(h) and the HMP, as detailed in the December 23, 2019, Groundwater Protection technical memorandum, included as Appendix G of the 2019 Annual Groundwater Monitoring Report (TRC, January 2020).
- GWPSs were established for additional Section 11511a(3) constituent (iron) and Section 11519b(2) constituents (copper, nickel, silver, vanadium, and zinc) in accordance with §257.95(h) and the HMP, as detailed in the 2020 PA 640 Constituent Groundwater Protection Standards technical memorandum that was included in the Third Quarter 2020 Hydrogeological Monitoring Report (TRC, October 2020).

The following narrative describes the methods that were employed for the comparisons to the GWPSs. The results obtained and the Sanitas[™] output files are included as an attachment.

The statistical evaluation of the fourth quarter 2020 event data indicates that the following constituents are present at statistically significant levels exceeding the GWPS in downgradient monitoring wells at the JHC Pond A CCR Unit:

Constituent	GWPS	# Downgradient Wells Observed
Arsenic	10 ug/L	1 of 6
Boron	500 ug/L	1 of 6
Vanadium	4.5 ug/L	2 of 6

Assessment Monitoring Statistical Evaluation

The downgradient compliance well network at the JHC Pond A consists of six wells (JHC-MW-15006 through JHC-MW-15011) located south and east of Pond A. During the fourth quarter 2020 sampling event, JHC-MW-15007, JHC-MW-15009, and JHC-MMW-15010 had an insufficient amount of groundwater present for samples to be collected.

Following the fourth quarter 2020 sampling event, compliance well data for JHC Pond A were evaluated in accordance with the Groundwater Statistical Evaluation Plan (Stats Plan) (TRC, October 2017) and the Pond A HMP and AMP. The assessment monitoring program evaluates concentrations of CCR constituents present in the uppermost aquifer relative to acceptable levels (i.e., GWPSs). To evaluate whether or not a new 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 Guidance¹, the preferred method for comparisons to a fixed standard are confidence limits. Based on the number of historical observations in the representative sample population, the population mean, the population standard deviation, and a selected confidence level (i.e., 99 percent), upper and lower confidence limits are calculated. The actual mean concentration of the population, with 99 percent confidence, will fall between and lower and upper confidence limits.

For constituents at monitoring wells that have no previously identified statistically significant GWPS exceedances, 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 GWPS². If the confidence interval straddles the GWPS (i.e., the lower confidence level is below the GWPS but the upper confidence level is above), the statistical test result indicates that there is insufficient confidence that the measured concentrations are different from the GWPS and thus no compelling evidence that the measured concentration is a result of a release from the CCR unit versus the inherent variability of the sample data. This statistical approach is consistent with the statistical methods for assessment monitoring presented in §257.93(f) and (g). Statistical evaluation methodologies built into the CCR Rule, and numerous other federal rules, are key in determining whether or not individually measured data points represent a concentration increase over the baseline or a fixed standard (such as a GWPS in an assessment monitoring program).

For each detected constituent, the concentrations from each well were first compared directly to the

¹ USEPA. 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance*. Office of Conservation and Recovery. EPA 530/R-09-007

² For pH, an exceedance occurs when the lower confidence level exceeds the upper GWPS or the upper confidence level is below the lower GWPS.

GWPS, as shown on Table B1. Constituent-well combinations that included a direct exceedance of the GWPS within the past eight monitoring events for Appendix III and Appendix IV (June 2018 to October 2020 for JHC-MW-15006 and JHC-MW-15011, August 2017 to October 2020 for JHC-MW-15007 and JHC-MW-15009, and September 2017 to October 2020 for JHC-MW-15008/R and JHC-MW-15010) and the past five events for the additional Section 11511a(3) constituents (iron) and Section 11519b(2) (copper, nickel, silver, vanadium, and zinc) (October 2019 through October 2020) were retained for further analysis (Attachment 1). Direct comparison GWPS exceedances include the following constituent well combinations:

- Sulfate, total dissolved solids (TDS), iron, and vanadium in JHC-MW-15006;
- Vanadium in JHC-MW-15007³;
- Boron, TDS, and selenium in JHC-MW-15008/R;
- Boron and selenium in JHC-MW-15009;
- Boron, chromium, selenium, iron, nickel, and vanadium in JHC-MW-15010; and
- Boron, TDS, pH, arsenic, selenium, and vanadium in JHC-MW-15011.

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

The statistical data evaluation included the following steps:

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

The results of these evaluations are presented and discussed below.

³ JHC-MW-15007 was not sampled in October 2019 and October 2020 due to an insufficient quantity of groundwater present. Therefore, only three sampling events have been completed for vanadium at JHC-MW-15007 and there is insufficient data for statistical analysis. Per the AMP, a confidence interval will be calculated following the collection of a minimum of four data points.

Initially, results for the past eight events were observed visually for potential trends and outliers (timeseries plots in Attachment 1). Potential outliers were noted for chromium, iron, and nickel in JHC-MW-15010 in October 2019. Potential increasing trends were noted for boron and vanadium in JHC-MW-15011 (trend tests in Attachment 1). Groundwater conditions are re-equilibrating following capping activities at JHC Pond A that were completed in Summer 2019. Because hydrogeologic conditions are in the process of stabilizing, temporary trending and sporadic outlier data are not unexpected.

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 SanitasTM 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 an appropriate density of data as recommended per the Unified Guidance yet are collected recently enough to provide an indication of current condition. For the Section 11511a(3) constituents (iron) and Section 11519b(2) (copper, nickel, silver, vanadium, and zinc), the most recent five sampling events were used to calculate confidence intervals. These data sets will increase each event until there are a total of eight data points, which will then become a rolling window of the most recent eight data points moving forward, for confidence interval analysis. The tests were 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 were 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 distributions are as follows:

Distribution	Constituent-Well Combinations
	Boron in JHC-MW-15008/R and JHC-MW-15011
	TDS in JHC-MW-15006 and JHC-MW-15011
Normal	pH in JHC-MW-15011
Normai	Arsenic in JHC-MW-15011
	Selenium in JHC-MW-15010
	Vanadium in JHC-MW-15006 and JHC-MW-15011
	Boron in JHC-MW-15009
Normalized by square root	Selenium in JHC-MW-15011
transformation	Iron in JHC-MW-15006
Normalized by cube root transformation	Selenium in JHC-MW-15008/R
Normalize by Kaplan-Meier square root transformation	Selenium in JHC-MW-15009

Distribution	Constituent-Well Combinations
Normalized by cubic transformation	Boron in JHC-MW-15010
	Sulfate in JHC-MW-15006
	TDS in JHC-MW-15008/R
Non-Parametric (not able to	Chromium in JHC-MW-15010
be normalized)	Iron in JHC-MW-15010
	Nickel in JHC-MW-15010
	Vanadium in JHC-MW-15010

Arsenic was identified at downgradient monitoring well JHC-MW-15011 at statistically significant levels exceeding the GWPS during the initial assessment monitoring event conducted in June 2018. As shown in Table B1 and Attachment 1, arsenic concentrations in this well have begun to decline in 2020 but remain above the GWPS. Boron at JHC-MW-15010 was identified at statistically significant levels exceeding the GWPS in July 2020. Boron concentrations at monitoring well JHC-MW-15010 showed an increase in 2019 and have remained generally stable in 2019 and 2020. Vanadium at JHC-MW-15006 and JHC-MW-15011 were identified at statistically significant levels exceeding the GWPS in October 2020. Vanadium concentrations at these monitoring wells have consistently been above the GWPS since monitoring for vanadium under the Pond A HMP and AMP began in October 2019. As discussed above, completion of JHC Pond A capping activities occurred in Summer 2019 and groundwater conditions are re-equilibrating. Consumers Energy will continue to monitor changes in groundwater chemistry and the assessment of corrective measures per the Pond A HMP and AMP and AMP and S257.95(g).

Attachments

Table B1Comparison 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 Pond A – HMP/AMP West Olive, Michigan

							Sa	mple Location:					JHC-M	N-15006				
								Sample Date:	6/20/2018	6/20/2018	11/15/2018	4/24/2019	10/10/2019	2/12/2020	4/14/2020	7/16/2020	10/22/2020	10/22/2020
Constituent	Unit	EPA MCL	EPA RSL	MI Residential*	MI Non- Residential*	MI GSI^	UTL	GWPS					Downg	radient				
Appendix III										Field Dup								Field Dup
Boron	ug/L	NC	NA	500	500	7,200	54	500	144	147	203	240	230	247	284	242	272	331
Calcium	mg/L	NC	NA	NC	NC	500	40	500	38.5	38.6	26.8	41	35	101	102	91.4	87.2	84.3
Chloride	mg/L	250**	NA	250 ⁽¹⁾	250 ⁽¹⁾	500	70	250	17.2	17.2	24.8	21	22	21.0	24.9	27.7	22	22.2
Fluoride	ug/L	4,000	NA	NC	NC	NC	1,000	4,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250**	NA	250 ⁽¹⁾	250 ⁽¹⁾	500	13	250	27.5	27.5	27.0	75	55	217	260	195	253	251
Total Dissolved Solids	mg/L	500**	NA	500 ⁽¹⁾	500 ⁽¹⁾	500	240	500	376	268	140	240	190	542	562	521	515	511
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5 ⁽¹⁾	6.5 - 8.5 ⁽¹⁾	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.4		7.8	7.6	7.8	7.6	7.2	7.4	7.5	
Appendix IV																		
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	1	< 1	1	< 1
Arsenic	ug/L	10	NA	10	10	10	1	10	4.3	4.7	4.7	5.1	4.3	6	5	5	9	6
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	141	146	144	230	180	326	353	291	382	194
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	5.0	5.0	3.5	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	100	100	11	2	100	1.5	1.8	2.3	4.1	< 1.0	2	1	18	5	1
Cobalt	ug/L	NC	6	40	100	100	15	15	< 15.0	< 15.0	< 6.0	< 6.0	< 6.0	< 6	< 15	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	NC	NC	NC	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	4.0	4.0	39	1	15	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	170	350	440	10	40	12	12	13	< 10	< 10	13	13	13	15	14
Mercury	ug/L	2	NA	2.0	2.0	0.20#	0.2	2	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	73	210	3,200	5	100	5.4	5.5	12.2	10	9.1	13	16	22	38	37
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.540	< 0.483	< 0.740	0.234	0.310		0.426		0.289	< 0.345
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.963	< 0.944	< 0.588	< 0.343	< 0.524		0.518		< 0.274	< 0.399
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5	< 1.50	< 1.43	< 1.33	0.488	< 0.524		0.944		0.318	0.453
Selenium	ug/L	50	NA	50	50	5.0	5	50	< 1.0	< 1.0	< 1.0	< 1.0	1.3	8	9	5	2	1
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2
MI Part 115 Paramete	ers																	
Iron	ug/L	300**	NA	300 ⁽¹⁾	300 ⁽¹⁾	500,000	870	870					43	189	26	128	929	213
Copper	ug/L	1,000**	NA	1,000 ⁽¹⁾	1,000 ⁽¹⁾	15	2.1	1,000					< 1.0	2	1	11	4	4
Nickel	ug/L	NC	NA	100	100	86	2	100					< 2.0	14	1	13	5	< 2
Silver	ug/L	100**	NA	34	98	0.20	0.2	34					< 0.20	< 0.2	< 0.4	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	NA	4.5	62	27	2	4.5					8	16	10	15	19	9
Zinc	ug/L	5,000**	NA	2,400	5,000 ⁽¹⁾	190	18	2,400	-				< 10	< 10	< 10	< 30	11	23

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 analvzed.

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. Appendix IV GWPS is the higher of the MCL/RSL and UTL as established in TRC's

Technical Memorandum dated October 15, 2018. Appendix III GWPS is the most restrictive of the MCL/Part 201 criteria, or the UTL if the UTL exceeds the applicable criteria as established in TRC's Technical Memorandum dated December 23, 2019.

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

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

(SDWR) April 2012.

^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using 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 EGLE policy and procedure 09-014 dated June 20, 2012. Bold value indicates an exceedance of the GWPS. Data from downgradient monitoring wells are screened against the

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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) Criterion is the aesthetic drinking water value per footnote {E}.

(2) pH value potentially biased high due to groundwater quality meter malfunction.

(3) Not sampled; insufficient amount of groundwater present to collect sample.

Table B1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation JH Campbell Pond A – HMP/AMP West Olive, Michigan

							Sa	ample Location:					J	HC-MW-1500)7				
								Sample Date:	8/15/2017	9/26/2017	4/26/2018	6/20/2018	11/15/2018	4/24/2019	10/9/2019 ⁽³⁾	2/12/2020	4/14/2020	7/16/2020	10/22/2020 ⁽³⁾
Constituent	Unit	EPA MCL	EPA RSL	MI Residential*	MI Non- Residential*	MI GSI^	UTL	GWPS						Downgradient					
Appendix III																			
Boron	ug/L	NC	NA	500	500	7.200	54	500	141	98		157	142	190		147	242	162	
Calcium	mg/L	NC	NA	NC	NC	500	40	500	32.1	32.2		38.7	42.6	79		55.2	62.1	52.8	
Chloride	mg/L	250**	NA	250 ⁽¹⁾	250 ⁽¹⁾	500	70	250	17.5	17.3		17.5	20.6	23		9.10	14.1	9.16	
Fluoride	ug/L	4,000	NA	NC	NC	NC	1,000	4,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000		< 1,000	< 1,000	< 1,000	
Sulfate	mg/L	250**	NA	250 ⁽¹⁾	250 ⁽¹⁾	500	13	250	31.6	32.3		26.2	19.2	54		31.9	83	68.3	
Total Dissolved Solids	mg/L	500**	NA	500 ⁽¹⁾	500 ⁽¹⁾	500	240	500	170	188		298	166	360		312	336	357	
pH, Field	รบ	6.5 - 8.5**	NA	6.5 - 8.5 ⁽¹⁾	6.5 - 8.5 ⁽¹⁾	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.4	7.3	8.4 ⁽²⁾	7.4	7.6	7.4		7.4	7.0	7.1	
Appendix IV																			
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0		< 1	< 1	< 1	
Arsenic	ug/L	10	NA	10	10	10	1	10	4.0		3.3	2.9	4.0	4.0		3	3	3	
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	130		121	115	177	320		231	266	248	
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0		< 1	< 1	< 1	
Cadmium	ug/L	5	NA	5.0	5.0	3.5	0.2	5	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20		< 0.2	< 0.2	< 0.2	
Chromium	ug/L	100	NA	100	100	11	2	100	1.1		< 1.0	1.2	31.3	35		3	2	2	
Cobalt	ug/L	NC	6	40	100	100	15	15	< 15.0		< 15.0	< 15.0	< 6.0	< 6.0		< 6	< 15	< 6	
Fluoride	ug/L	4,000	NA	NC	NC	NC	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	4.0	4.0	39	1	15	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0		< 1	< 1	< 1	
Lithium	ug/L	NC	40	170	350	440	10	40	16		11	15	16	12		15	14	13	
Mercury	ug/L	2	NA	2.0	2.0	0.20#	0.2	2	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20		< 0.2	< 0.2	< 0.2	
Molybdenum	ug/L	NC	100	73	210	3,200	5	100	6.1		< 5.0	< 5.0	7.6	7.2		< 5	< 5	< 5	
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.430		< 1.03	< 0.736	0.864	0.217			0.197		
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.904		< 1.02	< 1.12	< 0.688	0.392			< 0.456		
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5	< 1.33		< 2.05	< 1.86	1.40	0.609			< 0.456		
Selenium	ug/L	50	NA	50	50	5.0	5	50	1.1		< 1.0	1.3	< 1.0	4.1		23	22	22	
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2	< 2.0		< 2.0	< 2.0	< 2.0	< 2.0		< 2	< 2	< 2	
MI Part 115 Paramete																			↓┃
Iron	ug/L	300**	NA	300 ⁽¹⁾	300 ⁽¹⁾	500,000	870	870								71	< 20	< 20	
Copper	ug/L	1,000**	NA	1,000 ⁽¹⁾	1,000 ⁽¹⁾	15	2.1	1,000								2	1	< 1	
Nickel	ug/L	NC	NA	100	100	86	2	100								7	< 1	< 2	
Silver	ug/L	100**	NA	34	98	0.20	0.2	34								< 0.2	< 0.2	< 0.2	
Vanadium	ug/L	NC	NA	4.5	62	27	2	4.5								16	14	15	
Zinc	ug/L	5,000**	NA	2,400	5,000 ⁽¹⁾	190	18	2,400								10	< 10	< 30	

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.

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Technical Memorandum dated October 15, 2018. Appendix III GWPS is the most restrictive of the MCL/Part 201 criteria, or the UTL if the UTL exceeds the applicable criteria as established in TRC's Technical Memorandum dated December 23, 2019.

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** - 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 EGLE policy and procedure 09-014 dated June 20, 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) Criterion is the aesthetic drinking water value per footnote {E}. (2) pH value potentially biased high due to groundwater quality meter malfunction.

- (3) Not sampled; insufficient amount of groundwater present to collect sample.

Table B1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation JH Campbell Pond A – HMP/AMP West Olive, Michigan

							Sa	mple Location:		J	HC-MW-15008	B ⁽⁴⁾				Jŀ	IC-MW-15008	R ⁽⁴⁾		
								Sample Date:	9/26/2017	4/26/2018	6/20/2018	11/15/2018(3)	4/24/2019 ⁽³⁾	8/13/2019	10/9/2019	10/9/2019	2/12/2020	4/14/2020	7/16/2020	10/22/2020
Constituent	Unit	EPA MCL	EPA RSL	MI Residential*	MI Non- Residential*	MI GSI^	UTL	GWPS						Downg	radient					
Appendix III																Field Dup				
Boron	ug/L	NC	NA	500	500	7,200	54	500	116		87.7			93	130	130	423	505	384	285
Calcium	mg/L	NC	NA	NC	NC	500	40	500	37.5		39			33	100	100	94.7	99.9	79.8	109
Chloride	mg/L	250**	NA	250 ⁽¹⁾	250 ⁽¹⁾	500	70	250	16.6		20.4			2.2	16	16	22.4	25.0	25.4	18.8
Fluoride	ug/L	4,000	NA	NC	NC	NC	1,000	4,000	< 1,000	< 1,000	< 1,000			170	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250**	NA	250 ⁽¹⁾	250 ⁽¹⁾	500	13	250	28.4		25.5			20	220	220	219	235	183	215
Total Dissolved Solids	mg/L	500**	NA	500 ⁽¹⁾	500 ⁽¹⁾	500	240	500	190		210			150	< 50	430	556	566	536	577
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5 ⁽¹⁾	6.5 - 8.5 ⁽¹⁾	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.1	7.9 ⁽²⁾	7.2			7.4	7.3		7.3	6.9	7.1	7.0
Appendix IV																				
Antimony	ug/L	6	NA	6.0	6.0	130	2	6		1.1	< 1.0			1.2	< 1.0	< 1.0	< 1	1	< 1	1
Arsenic	ug/L	10	NA	10	10	10	1	10		< 1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000		118	120			110	340	320	291	252	219	216
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4		< 1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	5.0	5.0	3.5	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	100	100	11	2	100		1.3	1.5			3.8	4.5	4.5	7	< 1	< 1	< 1
Cobalt	ug/L	NC	6	40	100	100	15	15		< 15.0	< 15.0			< 6.0	< 6.0	< 6.0	< 6	< 15	< 6	< 6
Fluoride	ug/L	4,000	NA	NC	NC	NC	1,000	4,000	< 1,000	< 1,000	< 1,000			170	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	15	4.0	4.0	39	1	15		< 1.0	< 1.0			< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	170	350	440	10	40		14	15			10	15	15	18	19	17	19
Mercury	ug/L	2	NA	2.0	2.0	0.20#	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	73	210	3,200	5	100		5.8	5.1			6.8	< 5.0	< 5.0	< 5	< 5	< 5	5
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA		< 0.493	0.928			0.183	0.449	0.751		0.180		0.553
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA		< 0.847	< 0.698			0.468	0.817	0.744		< 0.429		0.330
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5		< 1.34	1.56			0.651	1.27	1.49		0.549		0.883
Selenium	ug/L	50	NA	50	50	5.0	5	50		1.7	2.0			12	110	110	11	6	13	68
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2		< 2.0	< 2.0			< 2.0	< 2.0	< 2.0	< 2	< 2	2	< 2
MI Part 115 Paramete		00011		(4)	(1)	500.000														
Iron	ug/L	300**	NA	300 ⁽¹⁾	300 ⁽¹⁾	500,000	870	870							99	150	164	134	48	56
Copper	ug/L	1,000**	NA	1,000 ⁽¹⁾	1,000 ⁽¹⁾	15	2.1	1,000							< 1.0	1.1	2	2	2	2
Nickel	ug/L	NC	NA	100	100	86	2	100							2.7	2.6	8	< 1	< 2	< 2
Silver	ug/L	100**	NA	34	98	0.20	0.2	34							< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	NA	4.5	62	27	2	4.5							< 2.0	< 2.0	< 2	< 2	< 2	< 2
Zinc	ug/L	5,000**	NA	2,400	5,000 ⁽¹⁾	190	18	2,400							< 10	< 10	< 10	< 10	< 30	< 10

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

pCi/L - picocuries per liter.

NA - not applicable.

NC - no criteria.

-- - not analyzed.

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- ^ 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 EGLE policy and procedure 09-014 dated June 20, 2012.

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(3) Not sampled; insufficient amount of groundwater present to collect sample.

Table B1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation JH Campbell Pond A – HMP/AMP West Olive, Michigan

Appendix III Boron ug Calcium mg	Unit	EPA MCL						mple Location:								HC-MW-1500							
Appendix III Boron ug Calcium mg	Unit	EPA MCL						Sample Date:	8/15/2017	9/26/2017	4/26/2018	4/26/2018	6/20/2018	11/15/2018	11/15/2018	4/24/2019	4/24/2019	10/9/2019 ⁽³⁾	2/12/2020	4/14/2020	4/14/2020	7/16/2020	10/22/2020(3)
Appendix III Boron ug Calcium mg	Unit	EPA MCL		MI	MI Non-			Cumpie Dutei	0,10,2011	0/20/2011		1/20/2010	0/20/2010	11/10/2010					2, 12, 2020				
Boron ug Calcium mg			EPA RSL	Residential*	Residential*	MI GSI^	UTL	GWPS								Downgradient							
Calcium mg												Field Dup			Field Dup		Field Dup				Field Dup		
-	ıg/L	NC	NA	500	500	7,200	54	500	156	144			91.4	188	187	200	190		468	874	881	401	
	ng/L	NC	NA	NC	NC	500	40	500	41.2	34.3			41.2	46.2	46.4	92	89		74.5	78.7	79.9	84.2	
Chloride mg	ng/L	250**	NA	250 ⁽¹⁾	250 ⁽¹⁾	500	70	250	20.1	17.7			22.9	17.7	17.7	17	16		10.7	6.95	6.78	6.18	
Fluoride ug	ıg/L	4,000	NA	NC	NC	NC	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	< 1,000	< 1,000	
Sulfate mg	ng/L	250**	NA	250 ⁽¹⁾	250 ⁽¹⁾	500	13	250	31.6	32.7			18.2	26.9	27.1	130	130		40.5	49.1	49.9	64.4	
Total Dissolved Solids mg	ng/L	500**	NA	500 ⁽¹⁾	500 ⁽¹⁾	500	240	500	208	178			214	234	202	430	440		332	354	341	397	
pH, Field SL	SU	6.5 - 8.5**	NA	6.5 - 8.5 ⁽¹⁾	6.5 - 8.5 ⁽¹⁾	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.5	7.4	8.4 ⁽²⁾		7.7	7.6		7.4			7.5	7.2		7.2	
Appendix IV																							
Antimony ug	ıg/L	6	NA	6.0	6.0	130	2	6	< 1.0		< 1.0	< 1.0	< 1.0	1.2	< 1.0	< 1.0	< 1.0		< 1	1	1	< 1	
Arsenic ug	ıg/L	10	NA	10	10	10	1	10	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1	< 1	< 1	< 1	
Barium ug	ıg/L	2,000	NA	2,000	2,000	820	35	2,000	198		130	125	130	178	181	360	360		287	307	298	290	
Beryllium ug	ıg/L	4	NA	4.0	4.0	18	1	4	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1	< 1	< 1	< 1	
Cadmium ug	ıg/L	5	NA	5.0	5.0	3.5	0.2	5	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20		< 0.2	< 0.2	< 0.2	< 0.2	
Chromium ug	ıg/L	100	NA	100	100	11	2	100	6.6		1.3	1.3	< 1.0	14.1	11.8	17	14		31	1	1	1	
Cobalt ug	ıg/L	NC	6	40	100	100	15	15	< 15.0		< 15.0	< 15.0	< 15.0	< 6.0	< 6.0	< 6.0	< 6.0		< 6	< 15	< 15	< 6	
Fluoride ug	ıg/L	4,000	NA	NC	NC	NC	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	< 1,000	< 1,000	
Lead ug	0	NC	15	4.0	4.0	39	1	15	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0		< 1	< 1	< 1	< 1	
Lithium ug	ıg/L	NC	40	170	350	440	10	40	11		< 10	< 10	< 10	14	14	11	11		14	14	14	14	
Mercury ug	ıg/L	2	NA	2.0	2.0	0.20#	0.2	2	< 0.20		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20		< 0.2	< 0.2	< 0.2	< 0.2	
Molybdenum ug	5	NC	100	73	210	3,200	5	100	7.4		5.5	5.5	< 5.0	6.1	6.1	5.7	5.6		15	< 5	< 5	6	
	oCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.455		< 0.169	< 0.709	< 0.631	< 0.896	< 0.705	0.351	0.289			0.394	0.307		
	oCi/L	NC	NA	NC	NC	NC	NA	NA	1.04		< 1.26	< 1.14	< 0.634	0.800	< 0.663	0.674	0.509			0.573	0.459		
	oCi/L	5	NA	NC	NC	NC	1.93	5	< 1.40		< 1.43	< 1.85	< 1.27	< 1.47	< 1.37	1.02	0.798			0.967	0.767		
Selenium ug	ıg/L	50	NA	50	50	5.0	5	50	< 1.0		< 1.0	1.0	10.3	12.6	12.6	61	63		20	77	79	76	
Thallium ug	ıg/L	2	NA	2.0	2.0	3.7	2	2	< 2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0		< 2	< 2	< 2	< 2	
MI Part 115 Parameters	s																						
lron ug	ıg/L	300**	NA	300 ⁽¹⁾	300 ⁽¹⁾	500,000	870	870											420	< 20	< 20	34	
Copper ug	ıg/L	1,000**	NA	1,000 ⁽¹⁾	1,000 ⁽¹⁾	15	2.1	1,000											4	1	2	3	
Nickel ug	ıg/L	NC	NA	100	100	86	2	100											41	< 1	1	< 2	
Silver ug	ıg/L	100**	NA	34	98	0.20	0.2	34											< 0.2	< 0.2	< 0.2	< 0.2	
Vanadium ug	ıg/L	NC	NA	4.5	62	27	2	4.5											3	< 2	< 2	< 2	
Zinc ug	ıg/L	5,000**	NA	2,400	5,000 ⁽¹⁾	190	18	2,400											< 10	< 10	< 10	< 30	

Notes:

ug/L - micrograms per liter.

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SU - standard units; pH is a field parameter.

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RSL - Regional Screening Level from 83 FR 36435.

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

GWPS - Groundwater Protection Standard. Appendix IV GWPS is the higher of the MCL/RSL and UTL as established in TRC's Technical Memorandum dated October 15, 2018. Appendix III GWPS is the most restrictive of the MCL/Part 201 criteria, or the UTL if the UTL exceeds the applicable criteria as established in TRC's Technical Memorandum dated December 23, 2019.

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

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

^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using 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 EGLE policy and procedure 09-014 dated June 20, 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) Criterion is the aesthetic drinking water value per footnote {E}.

(2) pH value potentially biased high due to groundwater quality meter malfunction. (3) Not sampled; insufficient amount of groundwater present to collect sample.

(4) JHC-MW-15008 was decommissioned on June 24, 2019. Replacement well JHC-MW-15008R was installed on June 25, 2019.

TRC | Consumers Energy x:\WPAAM\PJT2\367390\00002020Q4 Pond A\Appx B - T367390.0-001

Table B1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation JH Campbell Pond A – HMP/AMP West Olive, Michigan

							Sa	mple Location:					J	HC-MW-1501	0				
								Sample Date:	9/26/2017	4/26/2018	6/20/2018	11/14/2018	4/23/2019	10/9/2019	2/11/2020	2/11/2020	4/14/2020	7/16/2020	10/22/2020(3)
Constituent	Unit	EPA MCL	EPA RSL	MI Residential*	MI Non- Residential*	MI GSI^	UTL	GWPS						Downgradient	•				
Appendix III																Field Dup			
Boron	ug/L	NC	NA	500	500	7,200	54	500	109		98.4	120	2,800	2,800	2,390	2,390	2,350	2,130	
Calcium	mg/L	NC	NA	NC	NC	500	40	500	33.0		40.9	59.6	58	84	82.9	88.0	82.7	78.1	
Chloride	mg/L	250**	NA	250 ⁽¹⁾	250 ⁽¹⁾	500	70	250	17.8		22.2	7.9	2.0	< 2.0	2.59	2.61	3.20	1.94	
Fluoride	ug/L	4,000	NA	NC	NC	NC	1,000	4,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	
Sulfate	mg/L	250**	NA	250 ⁽¹⁾	250 ⁽¹⁾	500	13	250	32.6		39.9	33.3	24	32	30.7	31.2	35.9	39.8	
Total Dissolved Solids	mg/L	500**	NA	500 ⁽¹⁾	500 ⁽¹⁾	500	240	500	220		294	262	270	330	280	319	333	361	
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5 ⁽¹⁾	6.5 - 8.5 ⁽¹⁾	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.2	8.0 ⁽²⁾	7.3	7.5	6.6	6.9	7.0		6.6	6.6	
Appendix IV																			
Antimony	ug/L	6	NA	6.0	6.0	130	2	6		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	
Arsenic	ug/L	10	NA	10	10	10	1	10		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000		137	122	211	250	270	266	267	276	290	
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	
Cadmium	ug/L	5	NA	5.0	5.0	3.5	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	100	100	11	2	100		1.4	1.1	1.5	1.2	370	4	5	1	1	
Cobalt	ug/L	NC	6	40	100	100	15	15		< 15.0	< 15.0	< 6.0	< 6.0	< 6.0	< 6	< 6	< 15	< 6	
Fluoride	ug/L	4,000	NA	NC	NC	NC	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	4.0	4.0	39	1	15		< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	
Lithium	ug/L	NC	40	170	350	440	10	40		10	< 10	12	13	17	20	20	20	19	
Mercury	ug/L	2	NA	2.0	2.0	0.20#	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	73	210	3,200	5	100		11.0	7.6	5.0	< 5.0	14	< 5	< 5	< 5	< 5	
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA		0.505	< 0.489	< 0.858	0.198	0.643			0.270		
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA		< 1.03	< 0.655	0.814	< 0.326	1.12			0.752		
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5		< 1.20	< 1.14	< 1.43	0.515	1.76			1.02		
Selenium	ug/L	50	NA	50	50	5.0	5	50		3.0	11.0	34.1	32	210	126	126	158	179	
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2	< 2	
MI Part 115 Paramete	ers																		
Iron	ug/L	300**	NA	300 ⁽¹⁾	300 ⁽¹⁾	500,000	870	870						2,100	25	31	< 20	27	
Copper	ug/L	1,000**	NA	1,000 ⁽¹⁾	1,000 ⁽¹⁾	15	2.1	1,000						12	2	2	1	2	
Nickel	ug/L	NC	NA	100	100	86	2	100						200	2	2	< 1	< 2	
Silver	ug/L	100**	NA	34	98	0.20	0.2	34						0.48	< 0.2	< 0.2	< 0.2	< 0.2	
Vanadium	ug/L	NC	NA	4.5	62	27	2	4.5						5.5	4	4	4	4	
Zinc	ug/L	5,000**	NA	2,400	5,000 ⁽¹⁾	190	18	2,400						<10	11	12	< 10	< 30	

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. Appendix IV GWPS is the higher of the MCL/RSL and UTL as established in TRC's

Technical Memorandum dated October 15, 2018. Appendix III GWPS is the most restrictive of the MCL/Part 201 criteria, or the UTL if the UTL exceeds the

applicable criteria as established in TRC's Technical Memorandum dated December 23, 2019.

* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 30, 2013. ** - Secondary Maximum Contaminant Level (SMCL), EPA Secondary Drinking Water Regulations

(SDWR) April 2012.

^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using 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 EGLE policy and procedure 09-014 dated June 20, 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) Criterion is the aesthetic drinking water value per footnote {E}. (2) pH value potentially biased high due to groundwater quality meter malfunction.

(3) Not sampled; insufficient amount of groundwater present to collect sample.

Table B1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation JH Campbell Pond A – HMP/AMP West Olive, Michigan

							Sa	mple Location:				JHC-MV	V-15011			ī
								Sample Date:	6/19/2018	11/15/2018	4/23/2019	10/10/2019	2/12/2020	4/15/2020	7/16/2020	10/22/2020
Constituent	Unit	EPA MCI	FPA RSI	MI Residential*	MI Non- Residential*	MI GSI^	UTL	GWPS	0,10,2010	1.1.10,2010		Downg		., 10,2020	.,	10,22,2020
Appendix III	0	2.7.1.102			. tooluonidai		0.1	00								
Boron	ug/L	NC	NA	500	500	7.200	54	500	229	337	440	690	1,910	2.870	2.720	4.120
Calcium	mg/L	NC	NA	NC	NC	500	40	500	30.3	29.1	43	110	122	112	86.7	122
Chloride	mg/L	250**	NA	250 ⁽¹⁾	250 ⁽¹⁾	500	70	250	23.0	21.0	18	9.4	5.71	4.16	10.4	3.79
Fluoride	ug/L	4.000	NA	NC 250	NC NC	NC	1,000	4.000	< 1.000	< 1.000	< 1.000	< 1.000	< 1.000	< 1.000	< 1.000	< 1.000
Sulfate	mg/L	250**	NA	250 ⁽¹⁾	250 ⁽¹⁾	500	13	250	26.1	29.2	86	180	192	183	136	141
Total Dissolved Solids	mg/L	500**	NA	500 ⁽¹⁾	500 ⁽¹⁾	500	240	500	180	150	280	550	654	542	499	546
pH. Field	-	000	NA			6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	8.1		8.8	8.4	8.0	7.6	7.7	7.6
F ,	SU	6.5 - 8.5**	NA	6.5 - 8.5 ⁽¹⁾	6.5 - 8.5 ⁽¹⁾	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	8.1	9.1	8.8	8.4	8.0	7.6	1.1	7.0
Appendix IV		-					_							-	_	
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	< 1.0	< 1.0	< 1.0	< 1.0	2	4	2	2
Arsenic	ug/L	10	NA	10	10	10	1	10	15.0	32.2	36	44	31	25	22	22
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	123	98.6	170	360	563	514	419	430
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	5.0	5.0	3.5	0.2	5	< 0.20	< 0.20	< 0.20	< 0.20	< 0.2	0.2	< 0.2	0.5
Chromium	ug/L	100	NA	100	100	11	2	100	< 1.0	< 1.0	9.0	1.4	1	< 1	< 1	< 1
Cobalt	ug/L	NC 1.000	6	40 NC	100	100	15	15	< 15.0	< 6.0	< 6.0	< 6.0	< 6	< 6	< 6	< 6
Fluoride Lead	ug/L	4,000 NC	NA 15	4.0	NC 4.0	NC 39	1,000	4,000 15	< 1,000 < 1.0	< 1,000 < 1.0	< 1,000 < 1.0	< 1,000 < 1.0	< 1,000 < 1	< 1,000 < 1	< 1,000 < 1	< 1,000 < 1
Lithium	ug/L	-	-	4.0	4.0 350	440	1	40			< 1.0	14	22		20	
Mercurv	ug/L ug/L	NC 2	40 NA	2.0	2.0	0.20#	10 0.2	40	11 < 0.20	10 < 0.20	< 0.20	< 0.20	< 0.2	21 < 0.2	< 0.2	17 < 0.2
Mercury Molybdenum	ug/L ug/L	NC 2	100	73	2.0	3,200	<u> </u>	100	< 0.20 8.2	9.3	21	< 0.20 11	< 0.2 12	< 0.2 7	28	< 0.2
Radium-226	pCi/L	NC	NA	NC NC	NC	3,200 NC	NA S	NA	< 0.463	9.3	0.0720	0.2980	12	0.242		0.344
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA	0.931	< 0.512	< 0.343	0.665		0.606		< 0.264
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5	< 1.34	< 1.03	< 0.343	0.963		0.848		0.497
Selenium	ug/L	50	NA	50	50	5.0	5	50	1.6	< 1.0	13	76	104	29	20	308
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2	< 2.0	< 2.0	< 2.0	< 2.0	< 2	< 2	< 2	< 2
MI Part 115 Paramet	, v	_					_	_						_	_	
Iron	ug/L	300**	NA	300 ⁽¹⁾	300 ⁽¹⁾	500,000	870	870				120	178	145	115	< 20
Copper	ug/L ug/L	1.000**	NA	1.000 ⁽¹⁾	1.000 ⁽¹⁾	15	2.1	1.000				< 1.0	1	1	2	1
Nickel	ug/L ug/L	NC	NA	1,000	1,000	86	2.1	1,000 100				< 2.0	4	< 2	< 2	< 2
Silver	ug/L ug/L	100**	NA	34	98	0.20	0.2	1 00 34				< 2.0	4	< 0.4	< 0.2	< 0.2
Vanadium	ug/L ug/L	NC	NA	4.5	98 62	27	2	34 4.5				< 0.20 14	< 0.2 42	< 0.4 40	< 0.2 30	< 0.2 49
Zinc	ug/L ug/L	5.000**	NA	2.400	5.000 ⁽¹⁾	190	18	4.5 2.400				< 10	42 < 10	40	30 < 30	49 < 10
	uy/L	5,000	INA	2,400	5,000`'	190	10	2,400				× 10	< 10	× 10	× 30	× 10

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

pCi/L - picocuries per liter.

pei/e - picocuries per inte

NA - not applicable.

NC - no criteria.

-- - not analyzed.

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RSL - Regional Screening Level from 83 FR 36435.

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

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- ** 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 EGLE policy and procedure 09-014 dated June 20, 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.

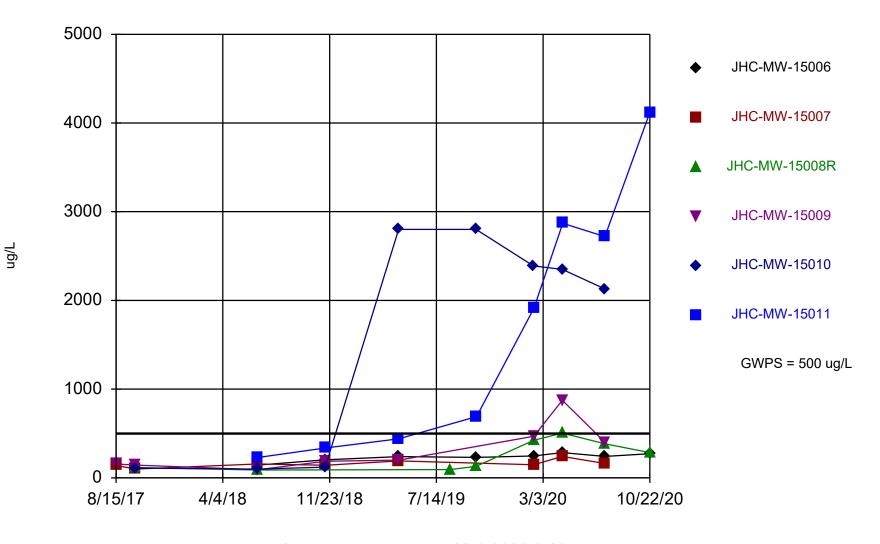
(1) Criterion is the aesthetic drinking water value per footnote {E}.

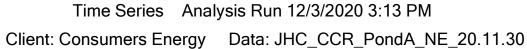
(2) pH value potentially biased high due to groundwater quality meter malfunction.

(3) Not sampled; insufficient amount of groundwater present to collect sample.

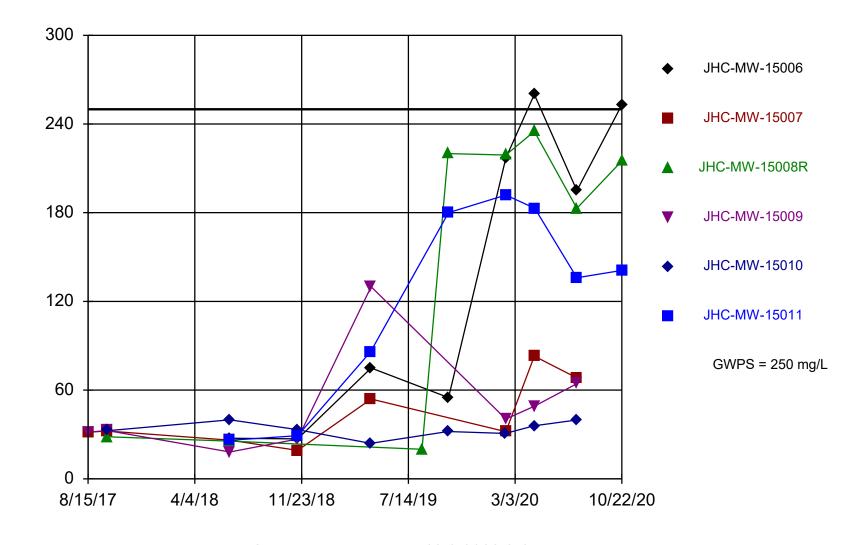
Attachment 1 Sanitas[™] Output

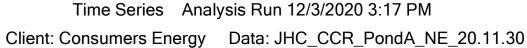
Boron Comparison to GWPS





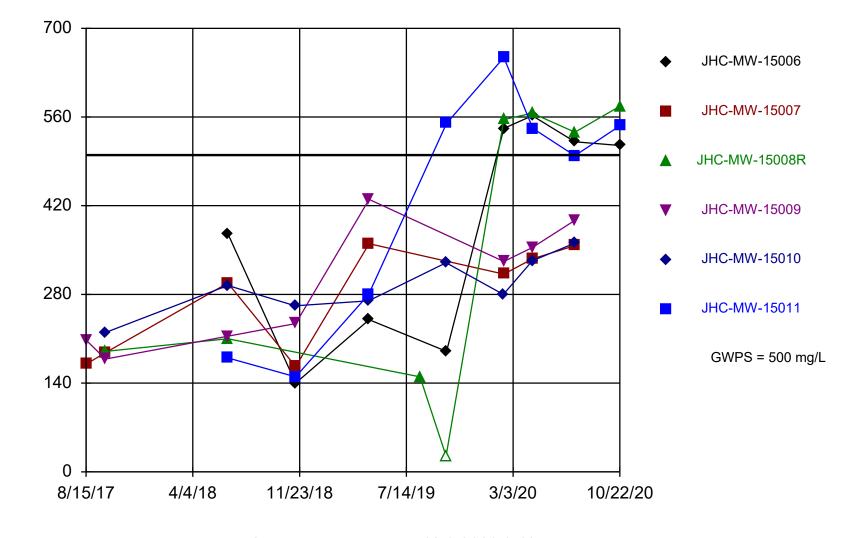
Sulfate Comparison to GWPS

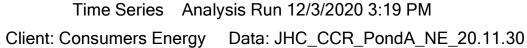




mg/L

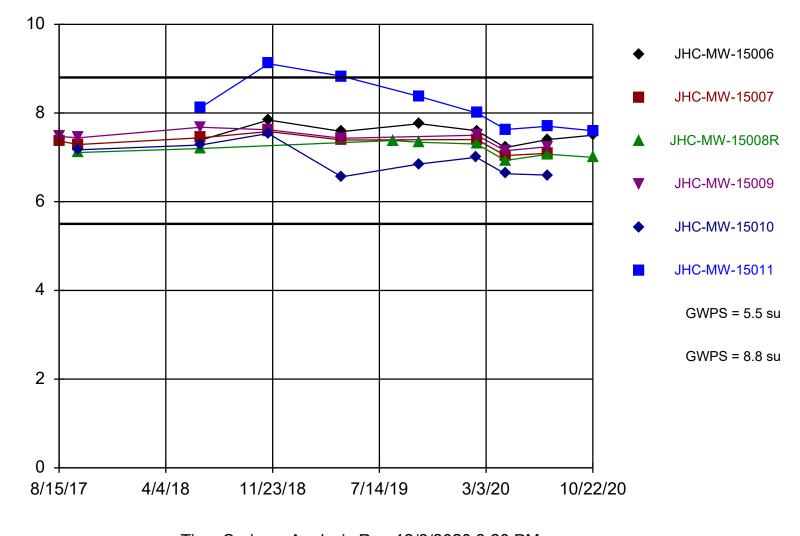


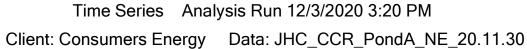




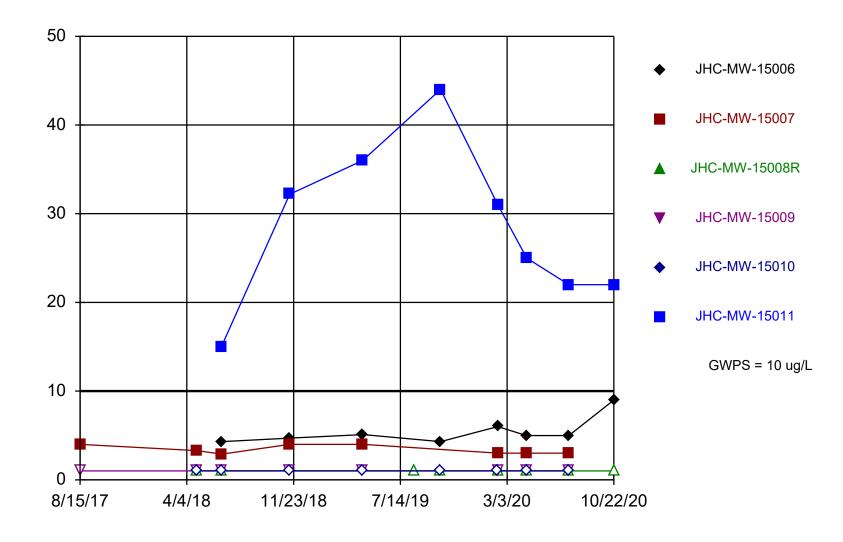
mg/L

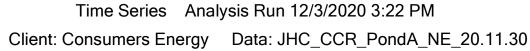
pH Comparison to GWPS



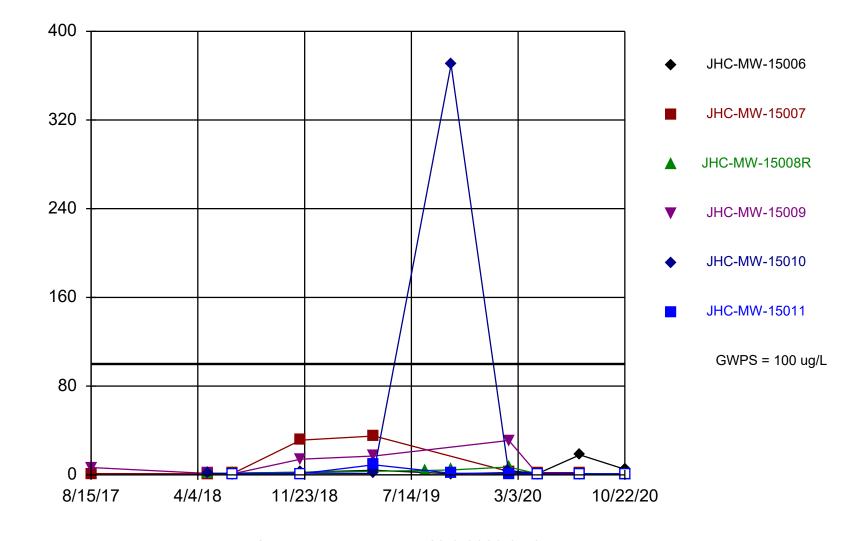


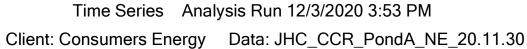
Arsenic Comparison to GWPS



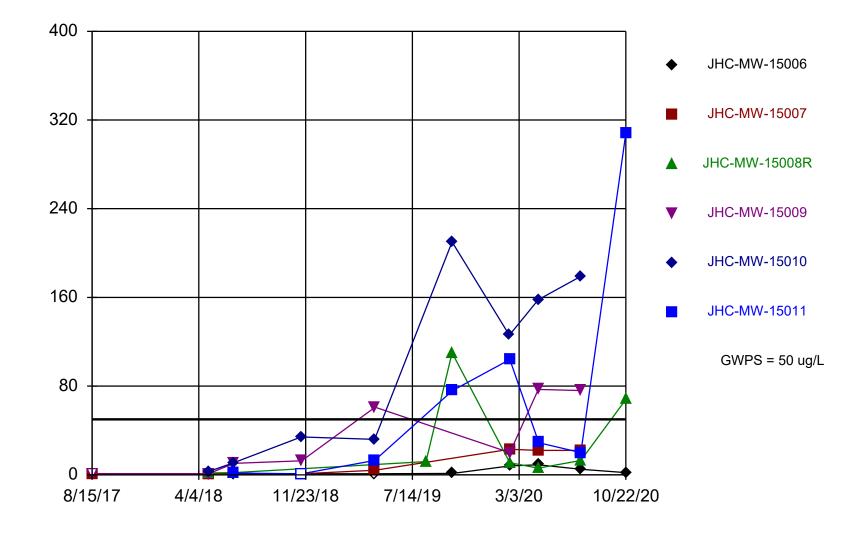


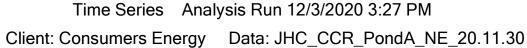
Chromium Comparison to GWPS



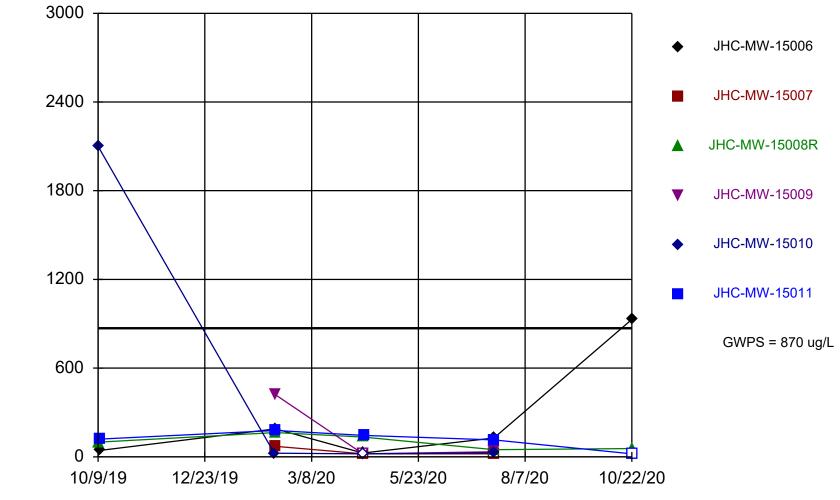


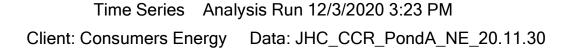
Selenium Comparison to GWPS



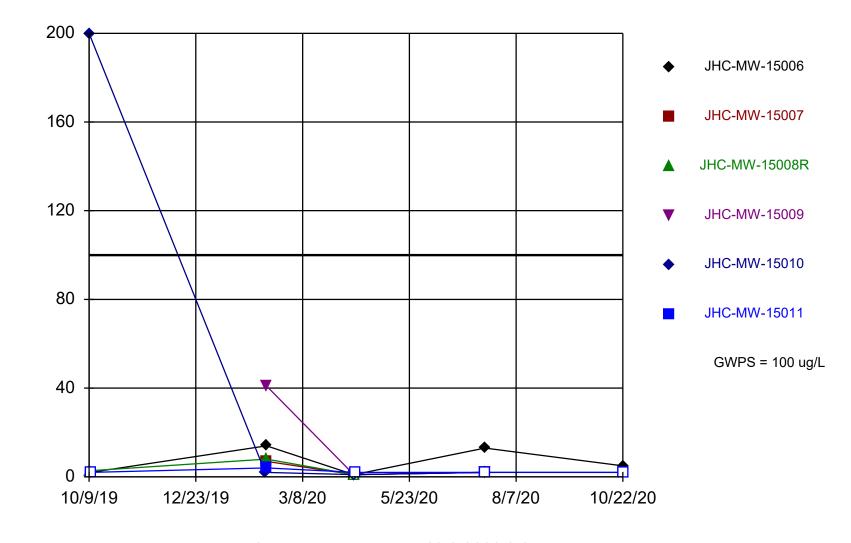


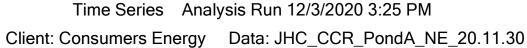
Iron Comparison to GWPS



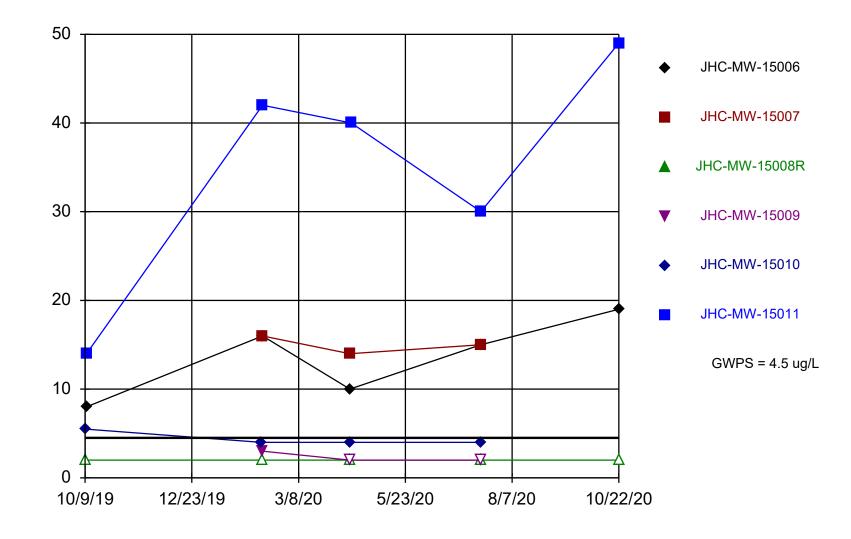


Nickel Comparison to GWPS





Vanadium Comparison to GWPS



Time Series Analysis Run 12/3/2020 3:28 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

Constituent: Boron, Total Analysis Run 12/3/2020 3:16 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

For observations made between 8/15/2017 and 10/22/2020, a summary of the selected data set:

Observations = 48 ND/Trace = 0 Wells = 6 Minimum Value = 87.7 Maximum Value = 4120 Mean Value = 704.2 Median Value = 241 Standard Deviation = 1005 Coefficient of Variation = 1.426 Skewness = 1.818

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	0	144	284	232.8	241	43.55	0.1871	-0.9729
JHC-MW-15007	8	0	98	242	159.9	152	41.98	0.2626	0.6808
JHC-MW-15008R	8	0	87.7	505	253	207.5	167.9	0.6639	0.3281
JHC-MW-15009	8	0	91.4	874	315.3	194	261.1	0.8281	1.327
JHC-MW-15010	8	0	98.4	2800	1600	2240	1254	0.7842	-0.4187
JHC-MW-15011	8	0	229	4120	1665	1300	1460	0.8774	0.4751

Constituent: Sulfate Analysis Run 12/3/2020 3:18 PM

Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

For observations made between 8/15/2017 and 10/22/2020, a summary of the selected data set:

Observations = 48 ND/Trace = 0 Wells = 6 Minimum Value = 18.2 Maximum Value = 260 Mean Value = 88.27 Median Value = 40.2 Standard Deviation = 78.83 Coefficient of Variation = 0.8931 Skewness = 0.9299

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	0	27	260	138.7	135	102.1	0.7363	0.04673
JHC-MW-15007	8	0	19.2	83	43.31	32.1	22.6	0.5219	0.7388
JHC-MW-15008R	8	0	20	235	143.2	199	99.3	0.6932	-0.4564
JHC-MW-15009	8	0	18.2	130	49.18	36.6	35.61	0.7241	1.624
JHC-MW-15010	8	0	24	39.9	33.53	32.95	5.177	0.1544	-0.4089
JHC-MW-15011	8	0	26.1	192	121.7	138.5	67.24	0.5527	-0.4628

Constituent: Total Dissolved Solids Analysis Run 12/3/2020 3:20 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

For observations made between 8/15/2017 and 10/22/2020, a summary of the selected data set:

Observations = 48 ND/Trace = 1 Wells = 6 Minimum Value = 25 Maximum Value = 654 Mean Value = 337.1 Median Value = 321 Standard Deviation = 153.7 Coefficient of Variation = 0.4559 Skewness = 0.3031

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	0	140	562	385.8	445.5	173.4	0.4496	-0.3372
JHC-MW-15007	8	0	166	360	273.4	305	84.53	0.3092	-0.357
JHC-MW-15008R	8	1	25	577	351.3	373	228.7	0.651	-0.1736
JHC-MW-15009	8	0	178	430	293.4	283	96.36	0.3285	0.1837
JHC-MW-15010	8	0	220	361	293.8	287	45.63	0.1554	-0.05928
JHC-MW-15011	8	0	150	654	425.1	520.5	192.2	0.4521	-0.4498

Constituent: pH, Field Analysis Run 12/3/2020 3:21 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

For observations made between 8/15/2017 and 10/22/2020, a summary of the selected data set:

Observations = 48 ND/Trace = 0 Wells = 6 Minimum Value = 6.56 Maximum Value = 9.11 Mean Value = 7.432 Median Value = 7.395 Standard Deviation = 0.4834 Coefficient of Variation = 0.06504 Skewness = 1.23

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	<u>Skewness</u>
JHC-MW-15006	8	0	7.22	7.84	7.536	7.54	0.2034	0.02699	0.04057
JHC-MW-15007	8	0	7.04	7.58	7.325	7.38	0.1804	0.02463	-0.4495
JHC-MW-15008R	8	0	6.93	7.38	7.166	7.155	0.1651	0.02304	-0.0478
JHC-MW-15009	8	0	7.15	7.68	7.441	7.455	0.1768	0.02375	-0.3681
JHC-MW-15010	8	0	6.56	7.54	6.954	6.925	0.3575	0.05142	0.3544
JHC-MW-15011	8	0	7.6	9.11	8.17	8.06	0.5642	0.06905	0.5737

Constituent: Arsenic, Total Analysis Run 12/3/2020 3:22 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

For observations made between 8/15/2017 and 10/22/2020, a summary of the selected data set:

Observations = 48 ND/Trace = 24 Wells = 6 Minimum Value = 1 Maximum Value = 44 Mean Value = 6.704 Median Value = 1.95 Standard Deviation = 10.58 Coefficient of Variation = 1.578 Skewness = 2.124

Well	<u>#Obs.</u>	ND/Trace	<u>Min</u>	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	0	4.3	9	5.425	5	1.542	0.2842	1.77
JHC-MW-15007	8	0	2.9	4	3.4	3.15	0.5099	0.15	0.3801
JHC-MW-15008R	8	8	1	1	1	1	0	0	NaN
JHC-MW-15009	8	8	1	1	1	1	0	0	NaN
JHC-MW-15010	8	8	1	1	1	1	0	0	NaN
JHC-MW-15011	8	0	15	44	28.4	28	9.222	0.3247	0.2605

Constituent: Chromium, Total Analysis Run 12/3/2020 3:53 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

For observations made between 8/15/2017 and 10/22/2020, a summary of the selected data set:

Observations = 48 ND/Trace = 11 Wells = 6 Minimum Value = 1 Maximum Value = 370 Mean Value = 12.57 Median Value = 1.4 Standard Deviation = 53.32 Coefficient of Variation = 4.243 Skewness = 6.473

Well	#Obs.	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	1	1	18	4.363	2.15	5.696	1.306	1.996
JHC-MW-15007	8	1	1	35	9.575	2	14.6	1.525	1.164
JHC-MW-15008R	8	3	1	7	2.638	1.4	2.235	0.8475	1.012
JHC-MW-15009	8	1	1	31	9.125	3.95	10.9	1.194	1.06
JHC-MW-15010	8	0	1	370	47.65	1.3	130.3	2.734	2.268
JHC-MW-15011	8	5	1	9	2.05	1	2.812	1.372	2.257

Constituent: Selenium, Total Analysis Run 12/3/2020 3:28 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

For observations made between 8/15/2017 and 10/22/2020, a summary of the selected data set:

Observations = 48 ND/Trace = 8 Wells = 6 Minimum Value = 1 Maximum Value = 308 Mean Value = 39.42 Median Value = 11.5 Standard Deviation = 64.01 Coefficient of Variation = 1.624 Skewness = 2.372

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	3	1	9	3.538	1.65	3.35	0.9471	0.7761
JHC-MW-15007	8	2	1	23	9.438	2.7	10.73	1.137	0.4928
JHC-MW-15008R	8	0	1.7	110	27.96	11.5	39.54	1.414	1.378
JHC-MW-15009	8	2	1	77	32.36	16.3	33.2	1.026	0.4737
JHC-MW-15010	8	0	3	210	94.14	80.05	83.15	0.8833	0.1783
JHC-MW-15011	8	1	1	308	69.08	24.5	103.3	1.496	1.76

Constituent: Iron, Total Analysis Run 12/3/2020 3:25 PM

Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

For observations made between 10/9/2019 and 10/22/2020, a summary of the selected data set:

Observations = 25 ND/Trace = 5 Wells = 6 Minimum Value = 20 Maximum Value = 2100 Mean Value = 206 Median Value = 71 Standard Deviation = 437.5 Coefficient of Variation = 2.123 Skewness = 3.611

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	5	0	26	929	263	128	378.1	1.438	1.389
JHC-MW-15007	3	2	20	71	37	20	29.44	0.7958	0.7071
JHC-MW-15008R	5	0	48	164	100.2	99	49.73	0.4963	0.1584
JHC-MW-15009	3	1	20	420	158	34	227	1.437	0.7041
JHC-MW-15010	4	1	20	2100	543	26	1038	1.912	1.155
JHC-MW-15011	5	1	20	178	115.6	120	58.99	0.5103	-0.8243

Constituent: Nickel, Total Analysis Run 12/3/2020 3:26 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

For observations made between 10/9/2019 and 10/22/2020, a summary of the selected data set:

Observations = 25 ND/Trace = 14 Wells = 6 Minimum Value = 1 Maximum Value = 200 Mean Value = 12.87 Median Value = 2 Standard Deviation = 39.85 Coefficient of Variation = 3.097 Skewness = 4.401

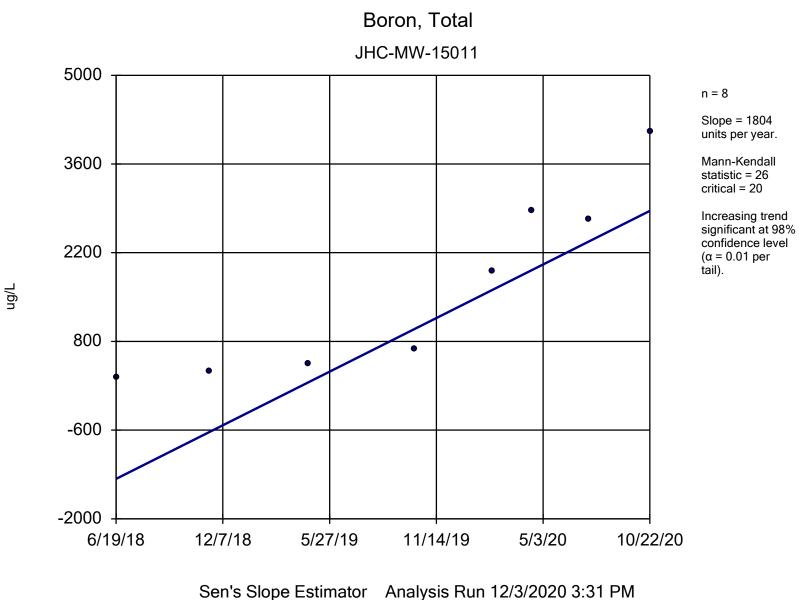
Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	5	1	1	14	7	5	6.124	0.8748	0.2556
JHC-MW-15007	3	2	1	7	3.333	2	3.215	0.9644	0.6309
JHC-MW-15008R	5	3	1	8	3.14	2	2.784	0.8865	1.321
JHC-MW-15009	3	2	1	41	14.67	2	22.81	1.555	0.7056
JHC-MW-15010	4	2	1	200	51.25	2	99.17	1.935	1.155
JHC-MW-15011	5	4	2	4	2.4	2	0.8944	0.3727	1.5

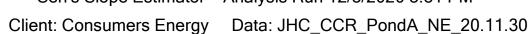
Constituent: Vanadium, Total Analysis Run 12/3/2020 3:29 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

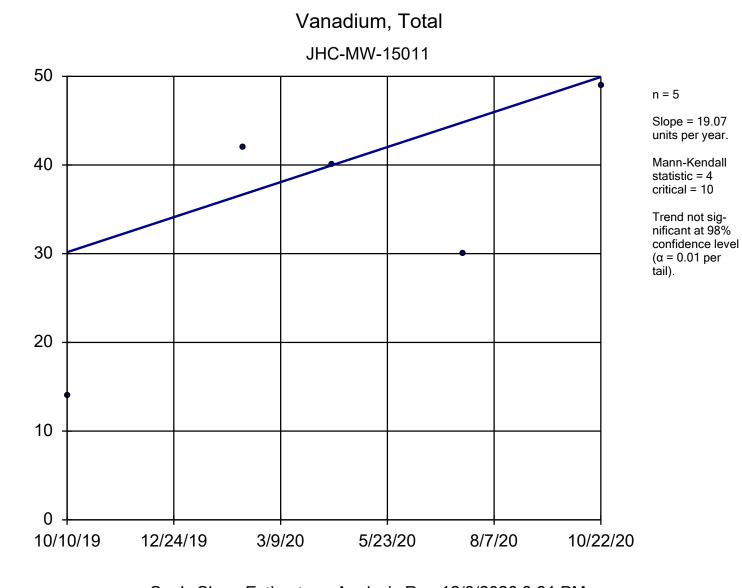
For observations made between 10/9/2019 and 10/22/2020, a summary of the selected data set:

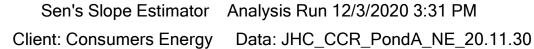
Observations = 25 ND/Trace = 7 Wells = 6 Minimum Value = 2 Maximum Value = 49 Mean Value = 12.9 Median Value = 8 Standard Deviation = 13.69 Coefficient of Variation = 1.061 Skewness = 1.395

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	5	0	8	19	13.6	15	4.506	0.3313	-0.1474
JHC-MW-15007	3	0	14	16	15	15	1	0.06667	0
JHC-MW-15008R	5	5	2	2	2	2	0	0	NaN
JHC-MW-15009	3	2	2	3	2.333	2	0.5774	0.2474	0.7071
JHC-MW-15010	4	0	4	5.5	4.375	4	0.75	0.1714	1.155
JHC-MW-15011	5	0	14	49	35	40	13.56	0.3876	-0.6914





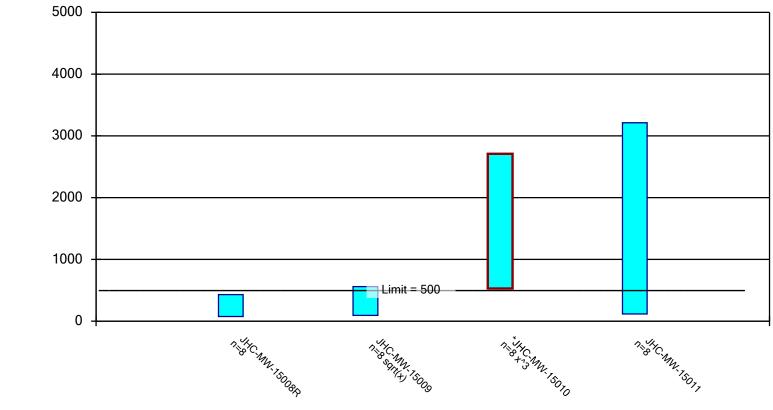




ng/L

Parametric Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Boron, Total Analysis Run 12/3/2020 3:36 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

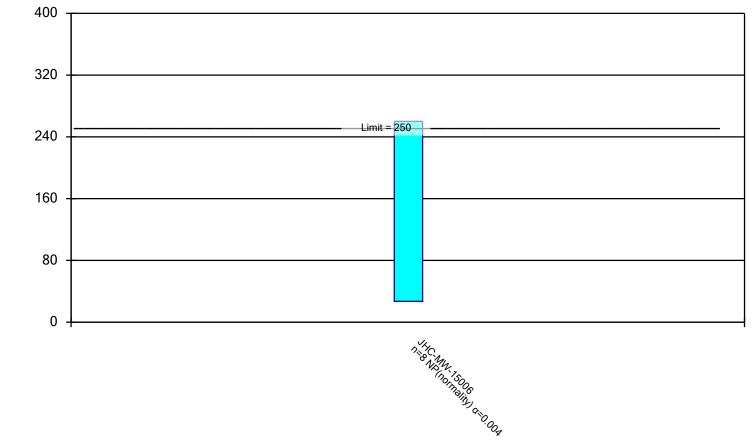
Confidence Interval

Constituent: Boron, Total (ug/L) Analysis Run 12/3/2020 3:36 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

	JHC-MW-15008R	JHC-MW-15009	JHC-MW-15010	JHC-MW-15011
8/15/2017		156		
9/26/2017	116	144	109	
6/19/2018				229
6/20/2018	87.7	91.4	98.4	
11/14/2018			120	
11/15/2018		188		337
4/23/2019			2800	440
4/24/2019		200		
8/13/2019	93			
10/9/2019	130		2800	
10/10/2019				690
2/11/2020			2390	
2/12/2020	423	468		1910
4/14/2020	505	874	2350	
4/15/2020				2870
7/16/2020	384	401	2130	2720
10/22/2020	285			4120
Mean	253	315.3	1600	1665
Std. Dev.	167.9	261.1	1254	1460
Upper Lim.	431	559.9	2710	3212
Lower Lim.	74.96	92.55	528.2	116.6

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Sulfate Analysis Run 12/3/2020 3:34 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

mg/L

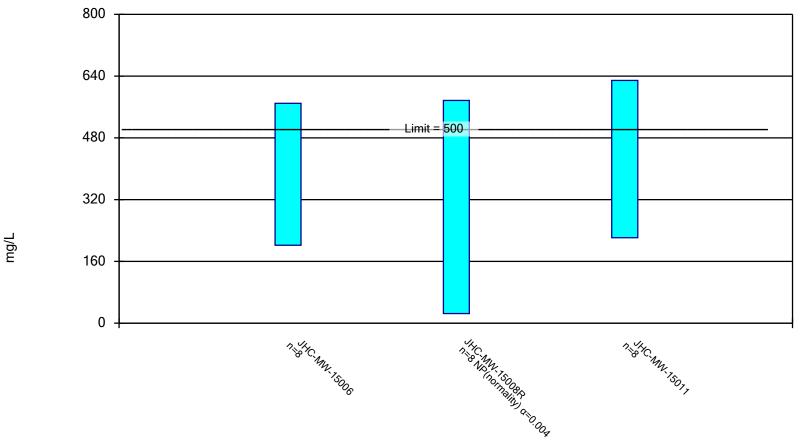
Confidence Interval

Constituent: Sulfate (mg/L) Analysis Run 12/3/2020 3:35 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

	JHC-MW-15006
6/20/2018	27.5
11/15/2018	27
4/24/2019	75
10/10/2019	55
2/12/2020	217
4/14/2020	260
7/16/2020	195
10/22/2020	253
Mean	138.7
Std. Dev.	102.1
Upper Lim.	260
Lower Lim.	27

Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Total Dissolved Solids Analysis Run 12/3/2020 3:37 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

Confidence Interval

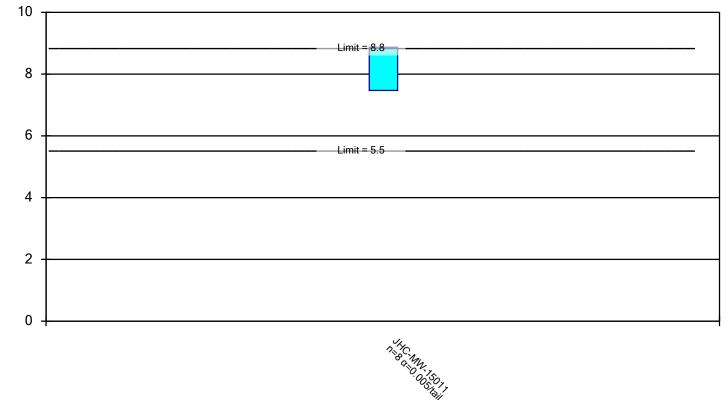
Constituent: Total Dissolved Solids (mg/L) Analysis Run 12/3/2020 3:38 PM

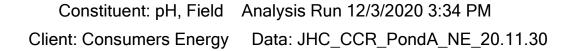
Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

	JHC-MW-15006	JHC-MW-15008R	JHC-MW-15011
9/26/2017		190	
6/19/2018			180
6/20/2018	376	210	
11/15/2018	140		150
4/23/2019			280
4/24/2019	240		
8/13/2019		150	
10/9/2019		<50	
10/10/2019	190		550
2/12/2020	542	556	654
4/14/2020	562	566	
4/15/2020			542
7/16/2020	521	536	499
10/22/2020	515	577	546
Mean	385.8	351.3	425.1
Std. Dev.	173.4	228.7	192.2
Upper Lim.	569.6	577	628.8
Lower Lim.	201.9	25	221.4

Parametric Confidence Interval

Compliance Limit is not exceeded. Normality Test: Shapiro Wilk, alpha based on n.





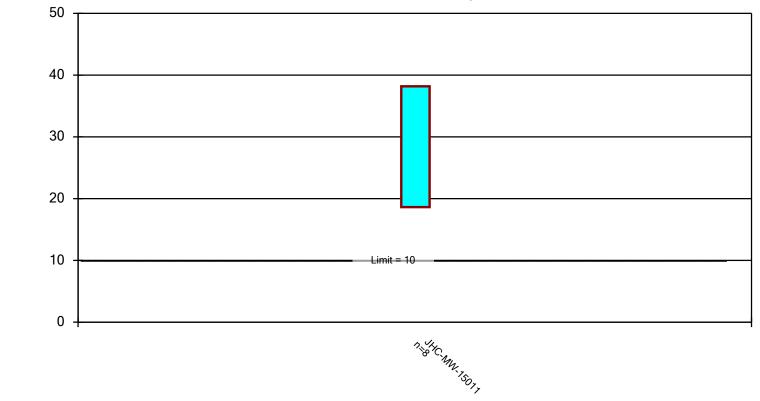
su

Constituent: pH, Field (su) Analysis Run 12/3/2020 3:34 PM

	JHC-MW-15011
6/19/2018	8.12
11/15/2018	9.11
4/23/2019	8.83
10/10/2019	8.37
2/12/2020	8
4/15/2020	7.63
7/16/2020	7.7
10/22/2020	7.6
Mean	8.17
Std. Dev.	0.5642
Upper Lim.	8.868
Lower Lim.	7.472

Parametric Confidence Interval

Compliance limit is exceeded. Per-well alpha = 0.01. Normality Test: Shapiro Wilk, alpha based on n.



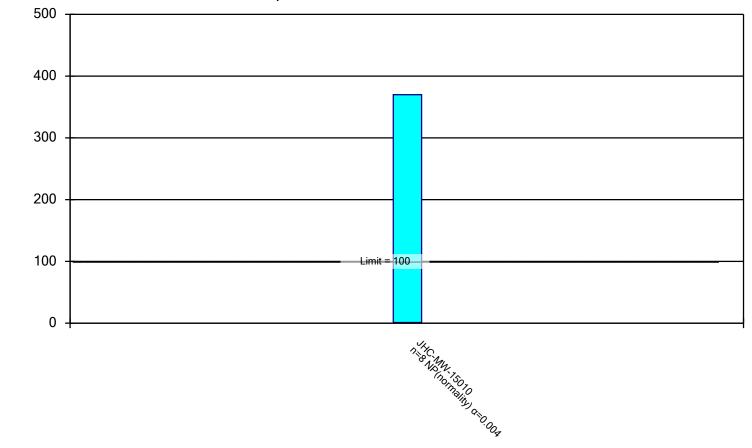
Constituent: Arsenic, Total Analysis Run 12/3/2020 3:34 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

Constituent: Arsenic, Total (ug/L) Analysis Run 12/3/2020 3:34 PM

6/19/2018 15 11/15/2018 32.2 4/23/2019 36 10/10/2019 44 2/12/2020 31 4/15/2020 25 7/16/2020 22 10/22/2020 22 Mean 28.4
4/23/20193610/10/2019442/12/2020314/15/2020257/16/20202210/22/202022
10/10/2019 44 2/12/2020 31 4/15/2020 25 7/16/2020 22 10/22/2020 22
2/12/2020 31 4/15/2020 25 7/16/2020 22 10/22/2020 22
4/15/2020257/16/20202210/22/202022
7/16/20202210/22/202022
10/22/2020 22
Mean 28.4
Std. Dev. 9.222
Upper Lim. 38.18
Lower Lim. 18.62

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



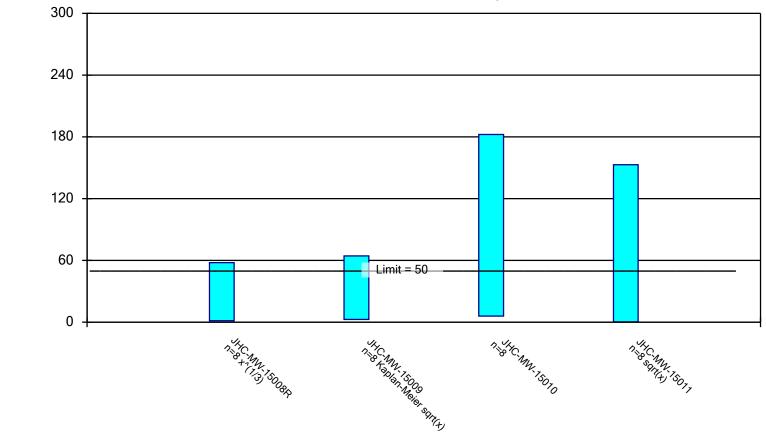
Constituent: Chromium, Total Analysis Run 12/3/2020 3:54 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

Constituent: Chromium, Total (ug/L) Analysis Run 12/3/2020 3:54 PM

	JHC-MW-15010
4/26/2018	1.4
6/20/2018	1.1
11/14/2018	1.5
4/23/2019	1.2
10/9/2019	370
2/11/2020	4
4/14/2020	1
7/16/2020	1
Mean	47.65
Std. Dev.	130.3
Upper Lim.	370
Lower Lim.	1

Parametric Confidence Interval

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



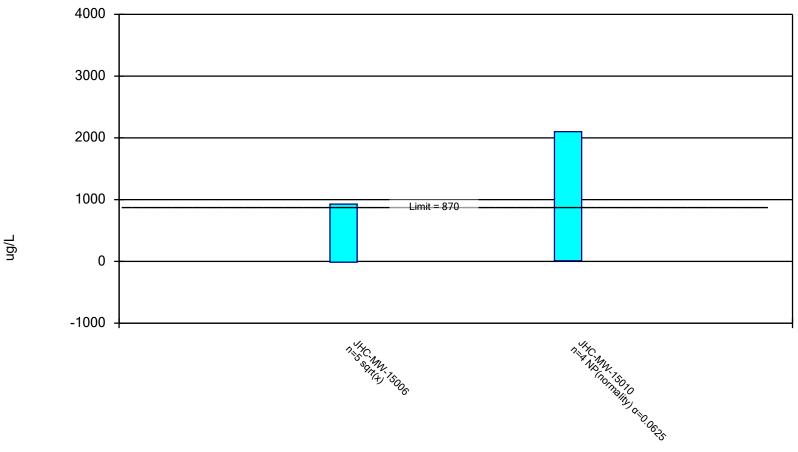
Constituent: Selenium, Total Analysis Run 12/3/2020 3:38 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

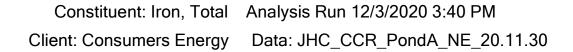
Constituent: Selenium, Total (ug/L) Analysis Run 12/3/2020 3:39 PM

	JHC-MW-15008R	JHC-MW-15009	JHC-MW-15010	JHC-MW-15011
8/15/2017		<1		
4/26/2018	1.7	<1	3	
6/19/2018				1.6
6/20/2018	2	10.3	11	
11/14/2018			34.1	
11/15/2018		12.6		<1
4/23/2019			32	13
4/24/2019		61		
8/13/2019	12			
10/9/2019	110		210	
10/10/2019				76
2/11/2020			126	
2/12/2020	11	20		104
4/14/2020	6	77	158	
4/15/2020				29
7/16/2020	13	76	179	20
10/22/2020	68			308
Mean	27.96	32.24	94.14	69.01
Std. Dev.	39.54	33.33	83.15	103.3
Upper Lim.	57.77	64.4	182.3	152.9
Lower Lim.	1.467	2.588	5.999	0.3697

Parametric and Non-Parametric (NP) Confidence Interval

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



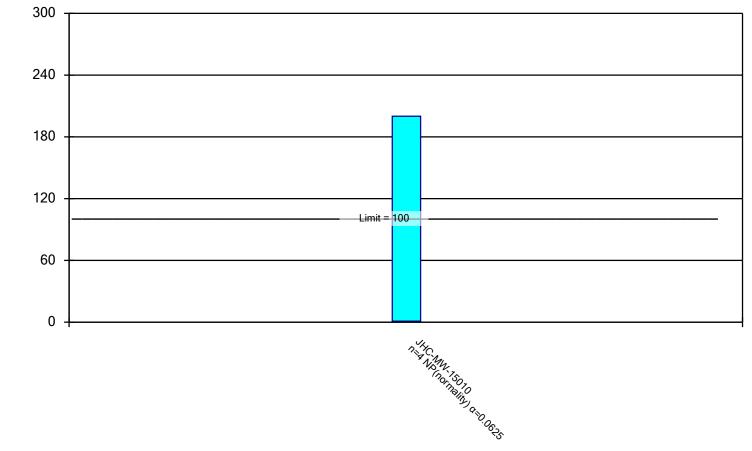


Constituent: Iron, Total (ug/L) Analysis Run 12/3/2020 3:40 PM

	JHC-MW-15006	JHC-MW-15010
10/9/2019		2100
10/10/2019	43	
2/11/2020		25
2/12/2020	189	
4/14/2020	26	<20
7/16/2020	128	27
10/22/2020	929	
Mean	263	540.5
Std. Dev.	378.1	1040
Upper Lim.	926.8	2100
Lower Lim.	-12.71	10

Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



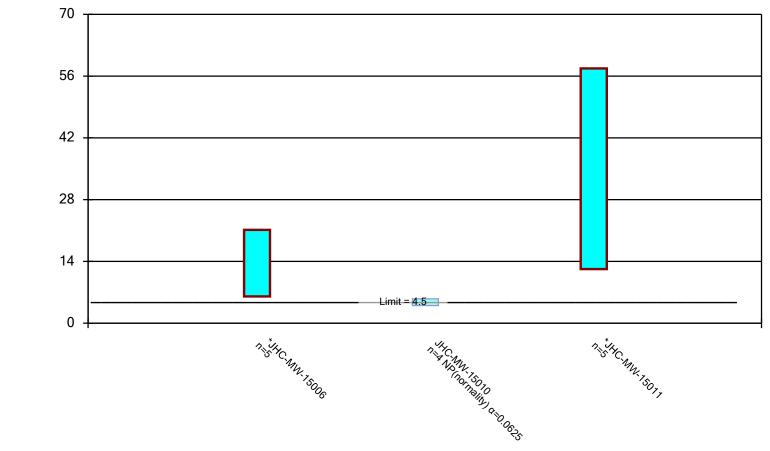
Constituent: Nickel, Total Analysis Run 12/3/2020 3:40 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

Constituent: Nickel, Total (ug/L) Analysis Run 12/3/2020 3:40 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

	JHC-MW-15010
10/9/2019	200
2/11/2020	2
4/14/2020	<1
7/16/2020	<2
Mean	51.25
Std. Dev.	99.17
Upper Lim.	200
Lower Lim.	1

Parametric and Non-Parametric (NP) Confidence Interval

Compliance limit is exceeded.* Per-well alpha = 0.01 except as noted. Normality Test: Shapiro Wilk, alpha based on n.



Constituent: Vanadium, Total Analysis Run 12/3/2020 3:40 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30

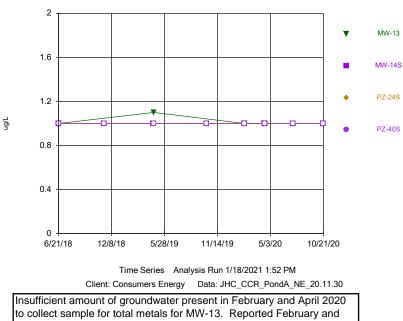
Constituent: Vanadium, Total (ug/L) Analysis Run 12/3/2020 3:40 PM

	JHC-MW-15006	JHC-MW-15010	JHC-MW-15011
10/9/2019		5.5	
10/10/2019	8		14
2/11/2020		4	
2/12/2020	16		42
4/14/2020	10	4	
4/15/2020			40
7/16/2020	15	4	30
10/22/2020	19		49
Mean	13.6	4.375	35
Std. Dev.	4.506	0.75	13.56
Upper Lim.	21.15	5.5	57.73
Lower Lim.	6.05	4	12.27



Appendix C GSI Time Series Charts

Sanitas[™] v.9.6.27 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.

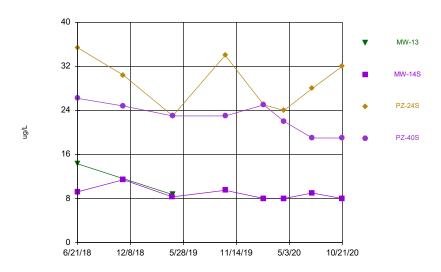


Antimony, Total

to collect sample for total metals for MW-13. Reported February and April 2020 result is dissolved antimony result collected in accordance with the JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP).

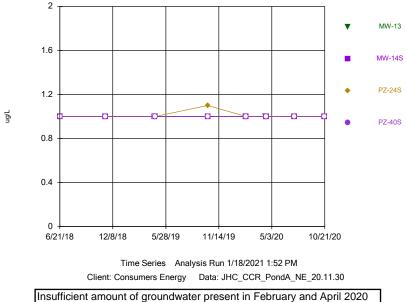
Sanitas™ v.9.6.27 Sanitas software licensed to Consumers Energy. UG

Barium, Total



Time Series Analysis Run 1/18/2021 1:52 PM Client: Consumers Energy Data: JHC_CCR_PondA_NE_20.11.30 Sanitas[™] v.9.6.27 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.

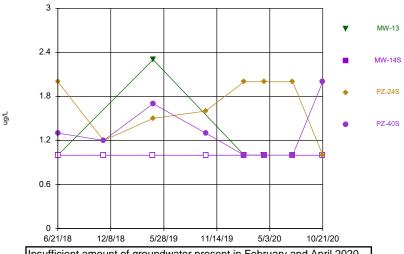




to collect sample for total metals for MW-13. Reported February and April 2020 April 2020 result is dissolved arsenic result collected in accordance with the JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP).

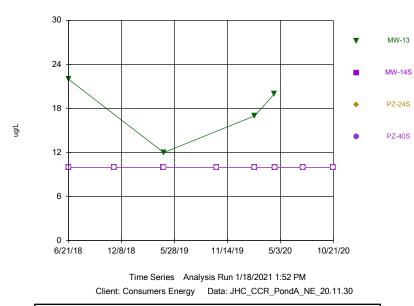
Sanitas[™] v.9.6.27 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.

Chromium, Total



Insufficient amount of groundwater present in February and April 2020 to collect sample for total metals for MW-13. Reported February and April 2020 result is dissolved chromium result collected in accordance with the JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP).

Sanitas^m v.9.6.27 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.

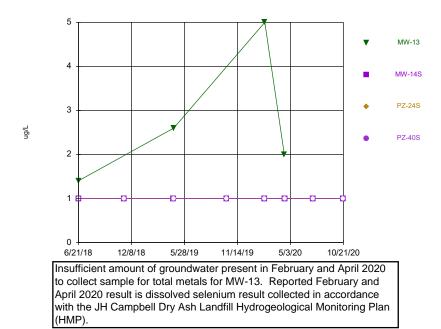


Lithium, Total

Insufficient amount of groundwater present in February and April 2020 to collect sample for total metals for MW-13. Reported February and April 2020 result is dissolved lithium result collected in accordance with the JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP).

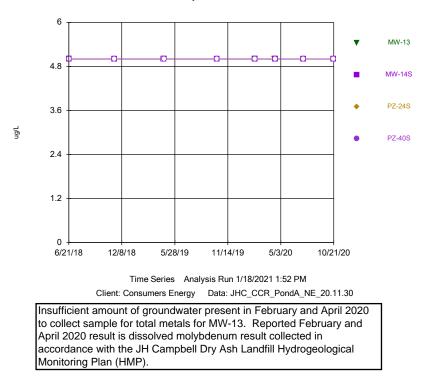
Sanitas[™] v.9.6.27 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.





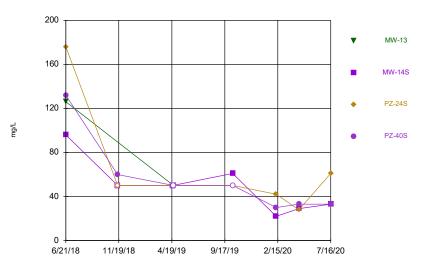
Sanitas[™] v.9.6.27 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.

Molybdenum, Total

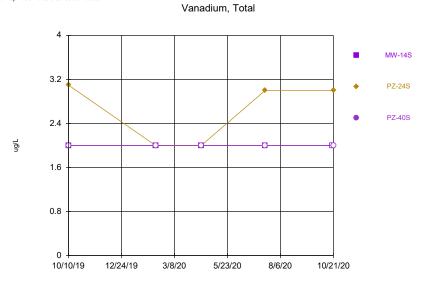


Sanitas[™] v.9.6.27 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.

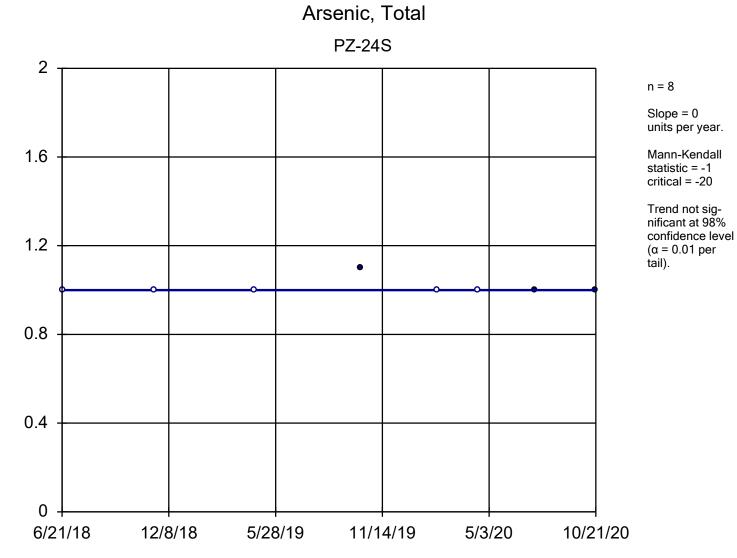
Total Dissolved Solids

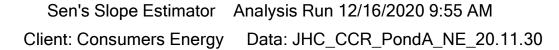


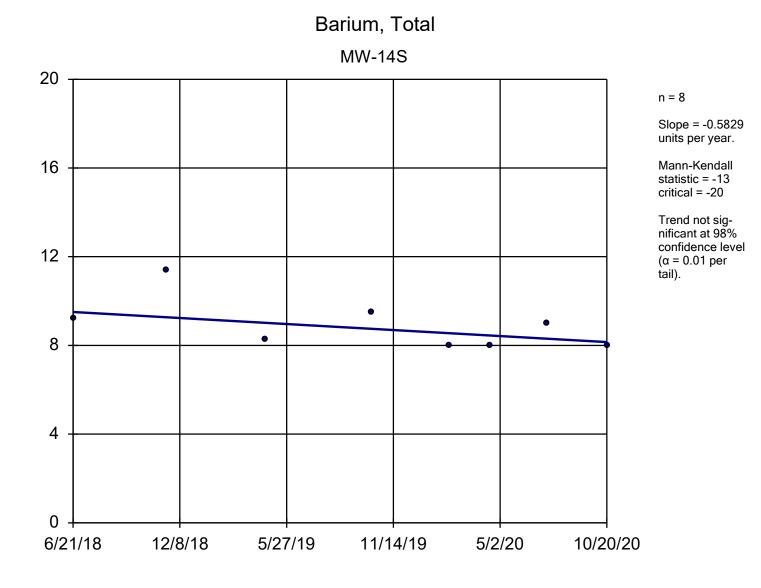
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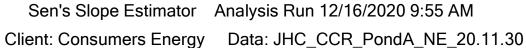


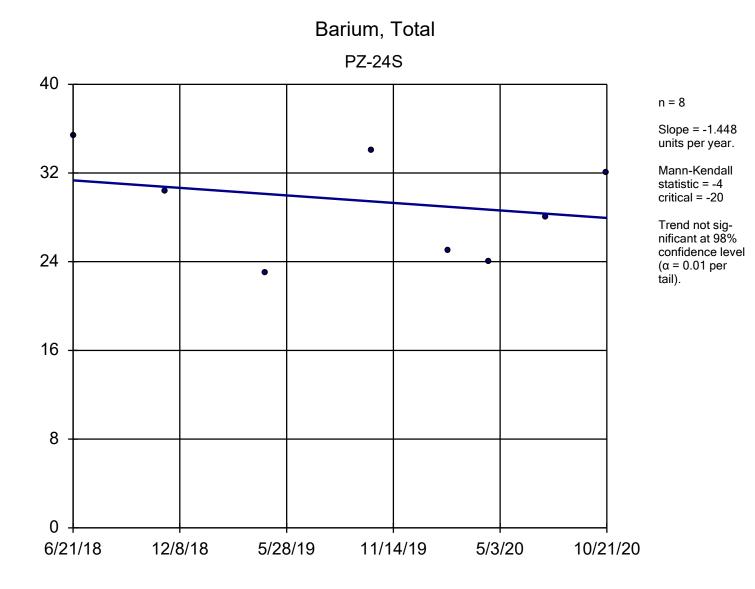
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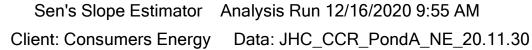


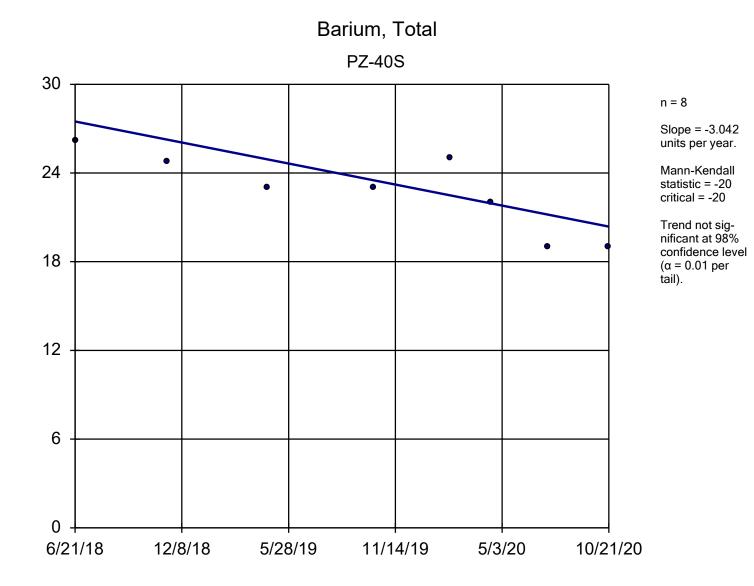


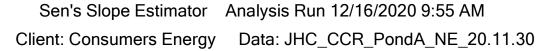


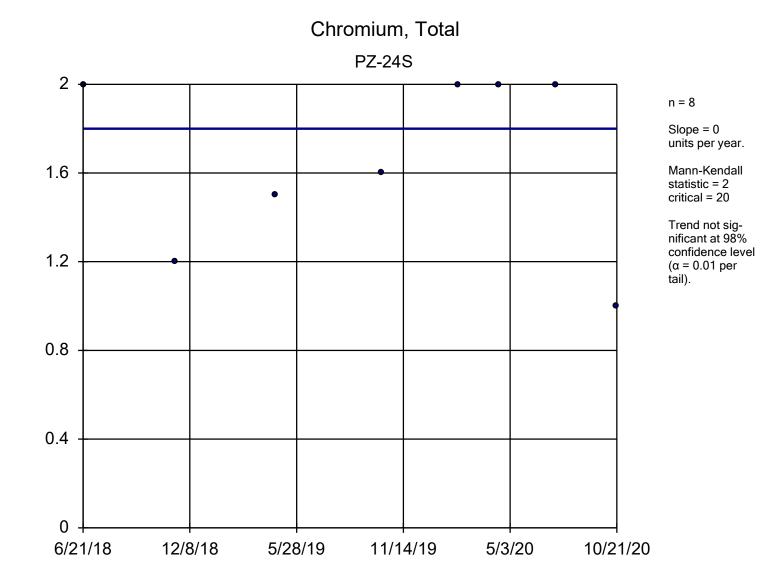


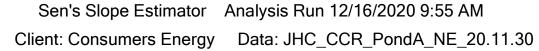


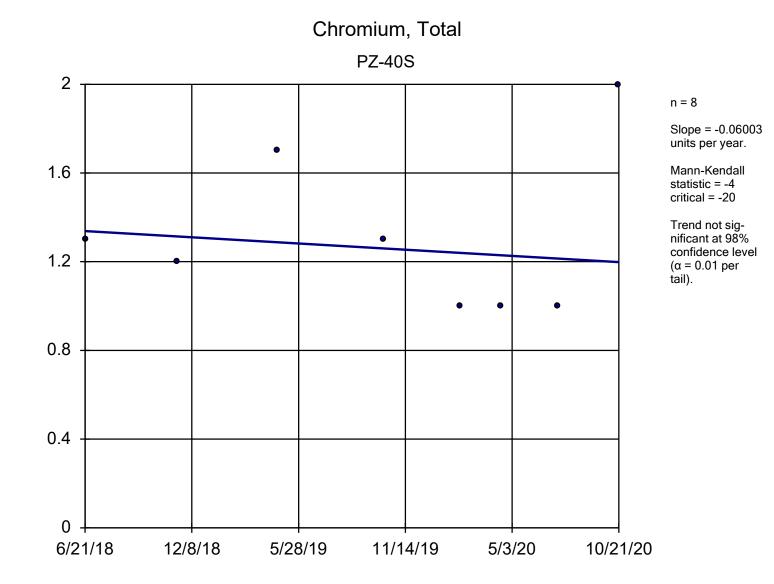


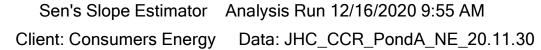


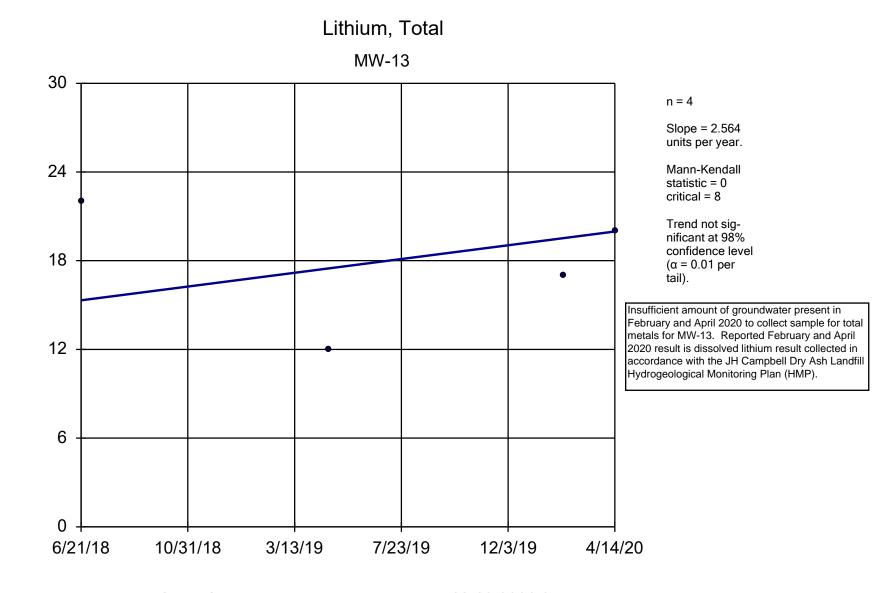


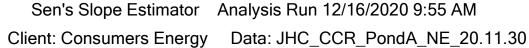


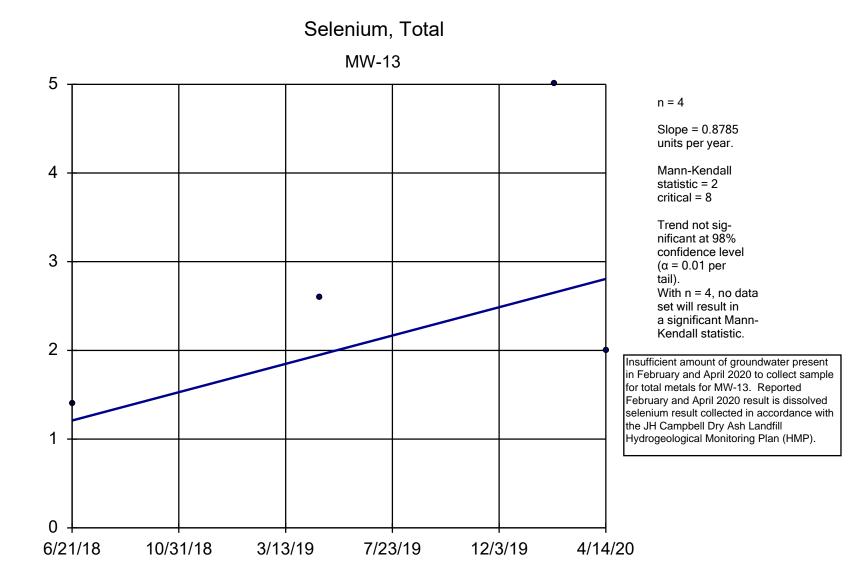


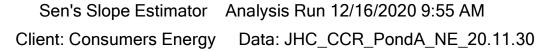














Appendix D October 2020 Laboratory Reports



135 W. Trail St. Jackson, MI 49201

- To: CDBatts, JH Campbell Complex
- From: EBlaj, T-258
- Date: November 11, 2020
- Subject: JH CAMPBELL SOLID WASTE DISPOSAL AREA GROUNDWATER MONITORING 4th Quarter, 2020 Background Wells
 - CC: BLSwanberg, P22-119 BTRunkel, P22-120 HDRegister, P22-521

Sarah Holmstrom, Project Manager TRC Companies, Inc. 1540 Eisenhower Place Ann Arbor, MI 48108

Chemistry Project: 20-1192

CE Laboratory Services conducted groundwater monitoring on 10/20/2020 at the JH Campbell Solid Waste Disposal Area, for the 4th Quarter monitoring requirements. The samples were received for analysis by the Chemistry department on 10/22/2020.

Samples for Radium analysis have been subcontracted to Eurofins/TestAmerica, Inc. and their results are being reported separately. Please note that the subcontracted work is not reported under the CE laboratory scope of accreditation.

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

Reviewed and approved by:

Emil Blaj Sr. Technical Analyst Project Lead



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

CASE NARRATIVE

I. Sample Receipt

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

II. Methodology

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

III. Results/Quality Control

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

DEFINITIONS / QUALIFIERS

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

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

Qualifier Description

- * Generic data flag, applicable description added in the corresponding notes section
- B The analyte was detected in the LRB at a level which is significant relative to sample result

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



Customer Name:JH Campbell ComplexWork Order ID:Q4-2020 RCRA GW Monitoring Background WellsDate Received:10/22/2020Chemistry Project:20-1192

Sample #	Field Sample ID	<u>Matrix</u>	Sample Date	Site
20-1192-01	JHC-MW-15023	Groundwater	10/20/2020 04:03 PM	JHC RCRA GW Monitoring - Background Wells
20-1192-02	JHC-MW-15024	Groundwater	10/20/2020 02:52 PM	JHC RCRA GW Monitoring - Background Wells
20-1192-03	JHC-MW-15025	Groundwater	10/20/2020 01:55 PM	JHC RCRA GW Monitoring - Background Wells
20-1192-04	JHC-MW-15026	Groundwater	10/20/2020 12:51 PM	JHC RCRA GW Monitoring - Background Wells
20-1192-05	JHC-MW-15027	Groundwater	10/20/2020 12:00 PM	JHC RCRA GW Monitoring - Background Wells
20-1192-06	JHC-MW-15028	Groundwater	10/20/2020 10:38 AM	JHC RCRA GW Monitoring - Background Wells
20-1192-07	DUP-01	Groundwater	10/20/2020 12:00 AM	JHC RCRA GW Monitoring - Background Wells
20-1192-08	FB-01	Water	10/20/2020 04:12 PM	JHC RCRA GW Monitoring - Background Wells
20-1192-09	EB-01	Water	10/20/2020 02:14 PM	JHC RCRA GW Monitoring - Background Wells
20-1192-10	JHC-MW-15025 Field MS	Groundwater	10/20/2020 01:55 PM	JHC RCRA GW Monitoring - Background Wells
20-1192-11	JHC-MW-15025 Field MSD	Groundwater	10/20/2020 01:55 PM	JHC RCRA GW Monitoring - Background Wells



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-1192
Field Sample ID:	JHC-MW-15023	Collect Date:	10/20/2020
Lab Sample ID:	20-1192-01	Collect Time:	04:03 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aque	eous			Aliquot:	20-1192-01-C01-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	10/30/2020	AB20-1030-01
Metals by EPA 6020; HMP/AMP Det	ection & Asses	sment Mo	nitoring	Aliquot:	20-1192-01-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	11/05/2020	AB20-1105-07
Arsenic	ND		ug/L	1	11/05/2020	AB20-1105-07
Barium	21		ug/L	5	11/05/2020	AB20-1105-07
Beryllium	ND		ug/L	1	11/05/2020	AB20-1105-07
Boron	71		ug/L	20	11/05/2020	AB20-1105-07
Cadmium	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Calcium	11100		ug/L	1000	11/05/2020	AB20-1105-07
Chromium	ND		ug/L	1	11/05/2020	AB20-1105-07
Cobalt	ND		ug/L	6	11/05/2020	AB20-1105-07
Copper	ND		ug/L	1	11/05/2020	AB20-1105-07
Iron	177		ug/L	20	11/05/2020	AB20-1105-07
Lead	ND		ug/L	1	11/05/2020	AB20-1105-07
Lithium	ND		ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	ND		ug/L	5	11/05/2020	AB20-1105-07
Nickel	ND		ug/L	2	11/05/2020	AB20-1105-07
Selenium	ND		ug/L	1	11/05/2020	AB20-1105-07
Silver	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Thallium	ND		ug/L	2	11/05/2020	AB20-1105-07
Vanadium	ND		ug/L	2	11/05/2020	AB20-1105-07
Zinc	ND		ug/L	10	11/05/2020	AB20-1105-07

Anions by EPA 300.0 CCR Rule A	nalyte List, Cl, F,	SO4, Aqu	eous	Aliquot:	20-1192-01-C02-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	1600		ug/L	1000	10/29/2020	AB20-1029-06
Fluoride	ND		ug/L	1000	10/29/2020	AB20-1029-06
Sulfate	10100		ug/L	1000	10/29/2020	AB20-1029-06
Total Dissolved Solids by SM 254	0C			Aliquot:	20-1192-01-C03-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	57		mg/L	10	10/23/2020	AB20-1028-07



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-1192
Field Sample ID:	JHC-MW-15024	Collect Date:	10/20/2020
Lab Sample ID:	20-1192-02	Collect Time:	02:52 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous			Aliquot:	20-1192-02-C01-A01	Analyst: SLK	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	10/30/2020	AB20-1030-01
Metals by EPA 6020; HMP/AMP	Detection & Asses	sment Mo	nitoring	Aliquot:	20-1192-02-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	11/05/2020	AB20-1105-07
Arsenic	ND		ug/L	1	11/05/2020	AB20-1105-07
Barium	20		ug/L	5	11/05/2020	AB20-1105-07
Beryllium	ND		ug/L	1	11/05/2020	AB20-1105-07
Boron	35		ug/L	20	11/05/2020	AB20-1105-07
Cadmium	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Calcium	39000		ug/L	1000	11/05/2020	AB20-1105-07
Chromium	ND		ug/L	1	11/05/2020	AB20-1105-07
Cobalt	ND		ug/L	6	11/05/2020	AB20-1105-07
Copper	2		ug/L	1	11/05/2020	AB20-1105-07
Iron	664		ug/L	20	11/05/2020	AB20-1105-07
Lead	ND		ug/L	1	11/05/2020	AB20-1105-07
Lithium	ND		ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	ND		ug/L	5	11/05/2020	AB20-1105-07
Nickel	ND		ug/L	2	11/05/2020	AB20-1105-07
Selenium	1		ug/L	1	11/05/2020	AB20-1105-07
Silver	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Thallium	ND		ug/L	2	11/05/2020	AB20-1105-07
Vanadium	ND		ug/L	2	11/05/2020	AB20-1105-07
Zinc	ND		ug/L	10	11/05/2020	AB20-1105-07

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous				Aliquot: 20-1192-02-C02-A01		Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	17100		ug/L	1000	10/29/2020	AB20-1029-06
Fluoride	ND		ug/L	1000	10/29/2020	AB20-1029-06
Sulfate	8930		ug/L	1000	10/29/2020	AB20-1029-06
Total Dissolved Solids by SM 25	540C			Aliquot:	20-1192-02-C03-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	181		mg/L	10	10/23/2020	AB20-1028-07



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-1192
Field Sample ID:	JHC-MW-15025	Collect Date:	10/20/2020
Lab Sample ID:	20-1192-03	Collect Time:	01:55 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous			Aliquot:	20-1192-03-C01-A01	Analyst: SLK	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	10/30/2020	AB20-1030-01
Metals by EPA 6020; HMP/	AMP Detection & Assess	sment Mo	nitoring	Aliquot:	20-1192-03-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	11/05/2020	AB20-1105-07
Arsenic	ND		ug/L	1	11/05/2020	AB20-1105-07
Barium	11		ug/L	5	11/05/2020	AB20-1105-07
Beryllium	ND		ug/L	1	11/05/2020	AB20-1105-07
Boron	33		ug/L	20	11/05/2020	AB20-1105-07
Cadmium	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Calcium	23200		ug/L	1000	11/05/2020	AB20-1105-07
Chromium	ND		ug/L	1	11/05/2020	AB20-1105-07
Cobalt	ND		ug/L	6	11/05/2020	AB20-1105-07
Copper	1		ug/L	1	11/05/2020	AB20-1105-07
Iron	20		ug/L	20	11/05/2020	AB20-1105-07
Lead	ND		ug/L	1	11/05/2020	AB20-1105-07
Lithium	ND		ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	ND		ug/L	5	11/05/2020	AB20-1105-07
Nickel	ND		ug/L	2	11/05/2020	AB20-1105-07
Selenium	1		ug/L	1	11/05/2020	AB20-1105-07
Silver	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Thallium	ND		ug/L	2	11/05/2020	AB20-1105-07
Vanadium	ND		ug/L	2	11/05/2020	AB20-1105-07
Zinc	ND		ug/L	10	11/05/2020	AB20-1105-07

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous				Aliquot: 20-1192-03-C02-A01		Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	22600		ug/L	1000	10/29/2020	AB20-1029-06
Fluoride	ND		ug/L	1000	10/29/2020	AB20-1029-06
Sulfate	9820		ug/L	1000	10/29/2020	AB20-1029-06
Total Dissolved Solids by SM 25	40C			Aliquot:	20-1192-03-C03-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	142		mg/L	10	10/23/2020	AB20-1028-07



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-1192
Field Sample ID:	JHC-MW-15026	Collect Date:	10/20/2020
Lab Sample ID:	20-1192-04	Collect Time:	12:51 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous			Aliquot: 20-1192-04-C01-A01		Analyst: SLK	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	10/30/2020	AB20-1030-01
Metals by EPA 6020; HMP/AMP D	etection & Asses	sment Mo	nitoring	Aliquot:	20-1192-04-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	11/05/2020	AB20-1105-07
Arsenic	ND		ug/L	1	11/05/2020	AB20-1105-07
Barium	14		ug/L	5	11/05/2020	AB20-1105-07
Beryllium	ND		ug/L	1	11/05/2020	AB20-1105-07
Boron	25		ug/L	20	11/05/2020	AB20-1105-07
Cadmium	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Calcium	17100		ug/L	1000	11/05/2020	AB20-1105-07
Chromium	ND		ug/L	1	11/05/2020	AB20-1105-07
Cobalt	ND		ug/L	6	11/05/2020	AB20-1105-07
Copper	ND		ug/L	1	11/05/2020	AB20-1105-07
Iron	39		ug/L	20	11/05/2020	AB20-1105-07
Lead	ND		ug/L	1	11/05/2020	AB20-1105-07
Lithium	ND		ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	ND		ug/L	5	11/05/2020	AB20-1105-07
Nickel	ND		ug/L	2	11/05/2020	AB20-1105-07
Selenium	ND		ug/L	1	11/05/2020	AB20-1105-07
Silver	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Thallium	ND		ug/L	2	11/05/2020	AB20-1105-07
Vanadium	ND		ug/L	2	11/05/2020	AB20-1105-07
Zinc	ND		ug/L	10	11/05/2020	AB20-1105-07

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous				Aliquot: 20-1192-04-C02-A01		Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	5330		ug/L	1000	10/29/2020	AB20-1029-06
Fluoride	ND		ug/L	1000	10/29/2020	AB20-1029-06
Sulfate	7870		ug/L	1000	10/29/2020	AB20-1029-06
Total Dissolved Solids by SM 254	0C			Aliquot:	20-1192-04-C03-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	75		mg/L	10	10/23/2020	AB20-1028-07



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-1192
Field Sample ID:	JHC-MW-15027	Collect Date:	10/20/2020
Lab Sample ID:	20-1192-05	Collect Time:	12:00 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous			Aliquot: 2	Aliquot: 20-1192-05-C01-A01		
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	10/30/2020	AB20-1030-01
Metals by EPA 6020; HMP/A	MP Detection & Assess	ment Mo	nitoring	Aliquot: 2	20-1192-05-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	11/05/2020	AB20-1105-07
Arsenic	ND		ug/L	1	11/05/2020	AB20-1105-07
Barium	14		ug/L	5	11/05/2020	AB20-1105-07
Beryllium	ND		ug/L	1	11/05/2020	AB20-1105-07
Boron	ND		ug/L	20	11/05/2020	AB20-1105-07
Cadmium	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Calcium	12900		ug/L	1000	11/05/2020	AB20-1105-07
Chromium	ND		ug/L	1	11/05/2020	AB20-1105-07
Cobalt	ND		ug/L	6	11/05/2020	AB20-1105-07
Copper	ND		ug/L	1	11/05/2020	AB20-1105-07
Iron	194		ug/L	20	11/05/2020	AB20-1105-07
Lead	ND		ug/L	1	11/05/2020	AB20-1105-07
Lithium	ND		ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	ND		ug/L	5	11/05/2020	AB20-1105-07
Nickel	ND		ug/L	2	11/05/2020	AB20-1105-07
Selenium	ND		ug/L	1	11/05/2020	AB20-1105-07
Silver	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Thallium	ND		ug/L	2	11/05/2020	AB20-1105-07
Vanadium	ND		ug/L	2	11/05/2020	AB20-1105-07
Zinc	ND		ug/L	10	11/05/2020	AB20-1105-07

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous				Aliquot: 20-1192-05-C02-A01		Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	10/29/2020	AB20-1029-06
Fluoride	ND		ug/L	1000	10/29/2020	AB20-1029-06
Sulfate	6540		ug/L	1000	10/29/2020	AB20-1029-06
Total Dissolved Solids by SM 254	0C			Aliquot:	20-1192-05-C03-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	49		mg/L	10	10/23/2020	AB20-1028-07



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-1192
Field Sample ID:	JHC-MW-15028	Collect Date:	10/20/2020
Lab Sample ID:	20-1192-06	Collect Time:	10:38 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous			Aliquot: 20-1192-06-C01-A01		Analyst: SLK	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	10/30/2020	AB20-1030-01
Metals by EPA 6020; HMP/AMP Detection & Assessment Monitoring					20-1192-06-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	11/05/2020	AB20-1105-07
Arsenic	ND		ug/L	1	11/05/2020	AB20-1105-07
Barium	7		ug/L	5	11/05/2020	AB20-1105-07
Beryllium	ND		ug/L	1	11/05/2020	AB20-1105-07
Boron	ND		ug/L	20	11/05/2020	AB20-1105-07
Cadmium	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Calcium	17400		ug/L	1000	11/05/2020	AB20-1105-07
Chromium	ND		ug/L	1	11/05/2020	AB20-1105-07
Cobalt	ND		ug/L	6	11/05/2020	AB20-1105-07
Copper	ND		ug/L	1	11/05/2020	AB20-1105-07
Iron	33		ug/L	20	11/05/2020	AB20-1105-07
Lead	ND		ug/L	1	11/05/2020	AB20-1105-07
Lithium	ND		ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	ND		ug/L	5	11/05/2020	AB20-1105-07
Nickel	ND		ug/L	2	11/05/2020	AB20-1105-07
Selenium	ND		ug/L	1	11/05/2020	AB20-1105-07
Silver	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Thallium	ND		ug/L	2	11/05/2020	AB20-1105-07
Vanadium	ND		ug/L	2	11/05/2020	AB20-1105-07
Zinc	ND		ug/L	10	11/05/2020	AB20-1105-07

Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous				Aliquot: 20-1192-06-C02-A01		Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	10/29/2020	AB20-1029-06
Fluoride	ND		ug/L	1000	10/29/2020	AB20-1029-06
Sulfate	6150		ug/L	1000	10/29/2020	AB20-1029-06
Total Dissolved Solids by SM 2540C			Aliquot:	20-1192-06-C03-A01	Analyst: SLK	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	68		mg/L	10	10/23/2020	AB20-1028-07



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-1192
Field Sample ID:	DUP-01	Collect Date:	10/20/2020
Lab Sample ID:	20-1192-07	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous				Aliquot: 2	Aliquot: 20-1192-07-C01-A01	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	10/30/2020	AB20-1030-01
Metals by EPA 6020; HMP	AMP Detection & Assess	ment Mo	nitoring	Aliquot: 2	20-1192-07-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	11/05/2020	AB20-1105-07
Arsenic	ND		ug/L	1	11/05/2020	AB20-1105-07
Barium	7		ug/L	5	11/05/2020	AB20-1105-07
Beryllium	ND		ug/L	1	11/05/2020	AB20-1105-07
Boron	ND		ug/L	20	11/05/2020	AB20-1105-07
Cadmium	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Calcium	19300		ug/L	1000	11/05/2020	AB20-1105-07
Chromium	ND		ug/L	1	11/05/2020	AB20-1105-07
Cobalt	ND		ug/L	6	11/05/2020	AB20-1105-07
Copper	ND		ug/L	1	11/05/2020	AB20-1105-07
Iron	32		ug/L	20	11/05/2020	AB20-1105-07
Lead	2		ug/L	1	11/05/2020	AB20-1105-07
Lithium	ND		ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	ND		ug/L	5	11/05/2020	AB20-1105-07
Nickel	ND		ug/L	2	11/05/2020	AB20-1105-07
Selenium	ND		ug/L	1	11/05/2020	AB20-1105-07
Silver	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Thallium	ND		ug/L	2	11/05/2020	AB20-1105-07
Vanadium	ND		ug/L	2	11/05/2020	AB20-1105-07
Zinc	ND		ug/L	10	11/05/2020	AB20-1105-07

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous			Aliquot: 20-1192-07-C02-A01		Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	10/29/2020	AB20-1029-06
Fluoride	ND		ug/L	1000	10/29/2020	AB20-1029-06
Sulfate	6260		ug/L	1000	10/29/2020	AB20-1029-06
Total Dissolved Solids by SM 254	0C			Aliquot:	20-1192-07-C03-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	72		mg/L	10	10/23/2020	AB20-1028-07



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-1192
Field Sample ID:	FB-01	Collect Date:	10/20/2020
Lab Sample ID:	20-1192-08	Collect Time:	04:12 PM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous				Aliquot:	20-1192-08-C01-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	10/30/2020	AB20-1030-01
Metals by EPA 6020; HMP/	AMP Detection & Asses	sment Mo	nitoring	Aliquot:	20-1192-08-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	11/05/2020	AB20-1105-07
Arsenic	ND		ug/L	1	11/05/2020	AB20-1105-07
Barium	ND		ug/L	5	11/05/2020	AB20-1105-07
Beryllium	ND		ug/L	1	11/05/2020	AB20-1105-07
Boron	ND		ug/L	20	11/05/2020	AB20-1105-07
Cadmium	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Calcium	ND		ug/L	1000	11/05/2020	AB20-1105-07
Chromium	ND		ug/L	1	11/05/2020	AB20-1105-07
Cobalt	ND		ug/L	6	11/05/2020	AB20-1105-07
Copper	ND		ug/L	1	11/05/2020	AB20-1105-07
Iron	ND		ug/L	20	11/05/2020	AB20-1105-07
Lead	ND		ug/L	1	11/05/2020	AB20-1105-07
Lithium	ND		ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	ND		ug/L	5	11/05/2020	AB20-1105-07
Nickel	ND		ug/L	2	11/05/2020	AB20-1105-07
Selenium	ND		ug/L	1	11/05/2020	AB20-1105-07
Silver	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Thallium	ND		ug/L	2	11/05/2020	AB20-1105-07
Vanadium	ND		ug/L	2	11/05/2020	AB20-1105-07
Zinc	ND		ug/L	10	11/05/2020	AB20-1105-07

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous				Aliquot: 20-1192-08-C02-A01		Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	10/29/2020	AB20-1029-06
Fluoride	ND		ug/L	1000	10/29/2020	AB20-1029-06
Sulfate	ND		ug/L	1000	10/29/2020	AB20-1029-06
Total Dissolved Solids by SM 25	40C			Aliquot:	20-1192-08-C03-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	ND		mg/L	10	10/23/2020	AB20-1028-07



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-1192
Field Sample ID:	EB-01	Collect Date:	10/20/2020
Lab Sample ID:	20-1192-09	Collect Time:	02:14 PM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous			Aliquot: 20-1192-09-C01-A01		Analyst: SLK	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	10/30/2020	AB20-1030-01
Metals by EPA 6020; HMP//	AMP Detection & Asses	sment Mo	nitoring	Aliquot:	20-1192-09-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	11/05/2020	AB20-1105-07
Arsenic	ND		ug/L	1	11/05/2020	AB20-1105-07
Barium	ND		ug/L	5	11/05/2020	AB20-1105-07
Beryllium	ND		ug/L	1	11/05/2020	AB20-1105-07
Boron	ND		ug/L	20	11/05/2020	AB20-1105-07
Cadmium	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Calcium	ND		ug/L	1000	11/05/2020	AB20-1105-07
Chromium	ND		ug/L	1	11/05/2020	AB20-1105-07
Cobalt	ND		ug/L	6	11/05/2020	AB20-1105-07
Copper	ND		ug/L	1	11/05/2020	AB20-1105-07
Iron	ND		ug/L	20	11/05/2020	AB20-1105-07
Lead	ND		ug/L	1	11/05/2020	AB20-1105-07
Lithium	ND		ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	ND		ug/L	5	11/05/2020	AB20-1105-07
Nickel	ND		ug/L	2	11/05/2020	AB20-1105-07
Selenium	ND		ug/L	1	11/05/2020	AB20-1105-07
Silver	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Thallium	ND		ug/L	2	11/05/2020	AB20-1105-07
Vanadium	ND		ug/L	2	11/05/2020	AB20-1105-07
Zinc	ND		ug/L	10	11/05/2020	AB20-1105-07

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous				Aliquot: 20-1192-09-C02-A01		Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	10/29/2020	AB20-1029-06
Fluoride	ND		ug/L	1000	10/29/2020	AB20-1029-06
Sulfate	ND		ug/L	1000	10/29/2020	AB20-1029-06
Total Dissolved Solids by SM 254	0C			Aliquot:	20-1192-09-C03-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	ND		mg/L	10	10/23/2020	AB20-1028-07



Thallium

Zinc

Vanadium

AB20-1105-07

AB20-1105-07

AB20-1105-07

Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-1192
Field Sample ID:	JHC-MW-15025 Field MS	Collect Date:	10/20/2020
Lab Sample ID:	20-1192-10	Collect Time:	01:55 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous				Aliquot: 20-1192-10-C01-A01		Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	85.8		%	0.2	10/30/2020	AB20-1030-01
Metals by EPA 6020; HMP/AMP De	tection & Asses	sment Mo	nitoring	Aliquot:	20-1192-10-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	110		%	1	11/05/2020	AB20-1105-07
Arsenic	105		%	1	11/05/2020	AB20-1105-07
Barium	108		%	5	11/05/2020	AB20-1105-07
Beryllium	111		%	1	11/05/2020	AB20-1105-07
Boron	101		%	20	11/05/2020	AB20-1105-07
Cadmium	107		%	0.2	11/05/2020	AB20-1105-07
Calcium	108		%	1000	11/05/2020	AB20-1105-07
Chromium	106		%	1	11/05/2020	AB20-1105-07
Cobalt	106		%	6	11/05/2020	AB20-1105-07
Copper	103		%	1	11/05/2020	AB20-1105-07
Iron	106		%	20	11/05/2020	AB20-1105-07
Lead	103		%	1	11/05/2020	AB20-1105-07
Lithium	111		%	10	11/05/2020	AB20-1105-07
Molybdenum	107		%	5	11/05/2020	AB20-1105-07
Nickel	104		%	2	11/05/2020	AB20-1105-07
Selenium	105		%	1	11/05/2020	AB20-1105-07
Silver	105		%	0.2	11/05/2020	AB20-1105-07

Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous			Aliquot: 20-1192-10-C02-A01		Analyst: DMW
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking #
Chloride	95	%	1000	10/29/2020	AB20-1029-06
Fluoride	96	%	1000	10/29/2020	AB20-1029-06
Sulfate	95	%	1000	10/29/2020	AB20-1029-06

%

%

%

2

2

10

11/05/2020

11/05/2020

11/05/2020

103

109

106



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	20-1192
Field Sample ID:	JHC-MW-15025 Field MSD	Collect Date:	10/20/2020
Lab Sample ID:	20-1192-11	Collect Time:	01:55 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous					20-1192-11-C01-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	101		%	0.2	10/30/2020	AB20-1030-01
Metals by EPA 6020; HMP/AM	P Detection & Assess	sment Mo	nitoring	Aliquot:	20-1192-11-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	110		%	1	11/05/2020	AB20-1105-07
Arsenic	106		%	1	11/05/2020	AB20-1105-07
Barium	107		%	5	11/05/2020	AB20-1105-07
Beryllium	111		%	1	11/05/2020	AB20-1105-07
Boron	102		%	20	11/05/2020	AB20-1105-07
Cadmium	108		%	0.2	11/05/2020	AB20-1105-07
Calcium	107		%	1000	11/05/2020	AB20-1105-07
Chromium	106		%	1	11/05/2020	AB20-1105-07
Cobalt	107		%	6	11/05/2020	AB20-1105-07
Copper	104		%	1	11/05/2020	AB20-1105-07
Iron	105		%	20	11/05/2020	AB20-1105-07
Lead	103		%	1	11/05/2020	AB20-1105-07
Lithium	111		%	10	11/05/2020	AB20-1105-07
Molybdenum	108		%	5	11/05/2020	AB20-1105-07
Nickel	104		%	2	11/05/2020	AB20-1105-07
Selenium	105		%	1	11/05/2020	AB20-1105-07
Silver	104		%	0.2	11/05/2020	AB20-1105-07
Thallium	104		%	2	11/05/2020	AB20-1105-07
Vanadium	108		%	2	11/05/2020	AB20-1105-07
Zinc	107		%	10	11/05/2020	AB20-1105-07

Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous			Aliquot:	Analyst: DMW		
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	96		%	1000	10/29/2020	AB20-1029-06
Fluoride	98		%	1000	10/29/2020	AB20-1029-06
Sulfate	97		%	1000	10/29/2020	AB20-1029-06



Data Qualifiers

Exception Summary

No exceptions occured.

CONSUMERS
ENERGY

Chemistry Department

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN - SHIPMENT INSPECTION FORM

Inspection Date: 10-22-2			and the second se		
Sample Origin/Project Nam	ie: JHC	04 2020	RCZA GW Monis	bring	
Shipment Delivered By: En	iter the type o	of shipment ca	rrier.		
Pony	FedEx	UP	S USPS_	Air	borne
Other/Hand Carry (v					
Tracking Number:			Shipping Form At	tached: Yes	No
Shipping Containers: Enter					
			Custom Case	Envelop	e/Mailer
			Other		
Condition of Shipment: Ent					
			Dented		king
			Denteu		King
Shipment Security: Enter if		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
Shipping Containers	Received: O	pened	Sealed	-	
Enclosed Documents: Enter	the type of de	ocuments enc	losed with the shipment.		
			Air Data Sheet	Other	
Femperature of Containers:					
As-Received Temper	ature Range_	1.2 - 2.8 °C	Samples Received or	Ice: Yes / N	lo
M&TE # and Expirat	ion orstor	6/4/21			
Number and Type of Contai	ners: Enter t	he total numb	per of sample containers rec	eived.	
Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or 60mL)					
Quart/Liter (g/p)	18	_			
9-oz (amber glass jar)) (_			_
2-oz (amber glass)		_			
125 mL (plastic)	22				_
24 mL vial (glass)					
500 mL (plastic)	_	_			

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

Consumers Energy

U

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

SAMPLING SIT	E:			PROJECT NUMBER:			-	43		SIS REQ	IESTED	7	PAGE _ 1_OF _ 1	
JHC Q4	JHC Q4-2020 RCRA GW Monitoring Background Wells								ALY	SIS KEQ	UESTED		SEND REPORT TO: Caleb Batts	
SAMPLING TEA	AM:			DATE SHIPPED	SITE SKETCHE CIRCLI	E ONE:	Total		ons				Beth Swanberg, TRC PHONE:	
					N		Metals,	Anions		S	ions	Radium		
CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATION	ON DEPTH	# OF CONTAINERS	Me	An	TDS	Rac		_	REMARKS	
20-1192-01	10.20.20	1603	GW	JHC-MW-15023		5	x	х	x	x			the second second second	
-02	T	1452	GW	JHC-MW-15024		5	X	x	х	X				
-03		1355	GW	JHC-MW-15025		5	x	x	x	x				
-04		1251	GW	JHC-MW-15026	. (g+6)	5	x	x	x	x				
-05		1200	GW	JHC-MW-15027		5	X	x	x	X				
-06		1038	GW	JHC-MW-15028	-	5	x	x	x	x				
-07		-	GW	DUP-01		5	x	х	x	х				
-08		1612	GW	FB-01		5	X	х	х	X				
-09		1414	GW	EB-01	104	5	x	х	x	х				
-10		1355	GW	JHC-MW-15025 Field MS	-	2	X	х						
-11	L	1	GW	JHC-MW-15025 Field MS	D 0	2	x	x						
RELINQUISHE	n Wil	hem	DATE/1	н/2020 17:30 ТМЕ: RECEIV	ED BY: (SIGNATURI						cc	OMME	NTS	
	Y		10/2	2/2020 09:30	- Kuta	-			OF	UGINAL	TO LAB	С	OPY TO CUSTOMER	



135 W. Trail St. Jackson, MI 49201

- To: CDBatts, JH Campbell Complex
- From: EBlaj, T-258
- Date: November 11, 2020
- Subject: JH CAMPBELL SOLID WASTE DISPOSAL AREA GROUNDWATER MONITORING 4th Quarter, 2020 Pond A CCR Wells
 - CC: BLSwanberg, P22-119 BTRunkel, P22-120 HDRegister, P22-521

Sarah Holmstrom, Project Manager TRC Companies, Inc. 1540 Eisenhower Place Ann Arbor, MI 48108

Chemistry Project: 20-1195

CE Laboratory Services conducted groundwater monitoring on 10/19/2020 through 10/23/2020 at the JH Campbell Solid Waste Disposal Area, for the 4th Quarter monitoring requirements. Samples were not collected from MW-15007, MW-15009, and MW-15010 due to wells being dry. All other samples were received for analysis by the Chemistry department on 10/26/2020.

Samples for Radium analysis have been subcontracted to Eurofins/TestAmerica, Inc. and their results are being reported separately. Please note that the subcontracted work is not reported under the CE laboratory scope of accreditation.

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

Reviewed and approved by:

Emil Blaj Sr. Technical Analyst Project Lead



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

CASE NARRATIVE

I. Sample Receipt

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

II. Methodology

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

III. Results/Quality Control

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

DEFINITIONS / QUALIFIERS

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

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

Qualifier Description

- * Generic data flag, applicable description added in the corresponding notes section
- B The analyte was detected in the LRB at a level which is significant relative to sample result

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



Customer Name:JH Campbell ComplexWork Order ID:Q4-2020 RCRA GW Monitoring Pond A WellsDate Received:10/26/2020Chemistry Project:20-1195

Sample #	Field Sample ID	<u>Matrix</u>	Sample Date	Site
20-1195-01	JHC-MW-15006	Groundwater	10/22/2020 05:37 PM	JHC RCRA GW Monitoring - Pond A AMP-HMP
20-1195-02	JHC-MW-15007	Well dry, sample	e not collected	JHC RCRA GW Monitoring - Pond A AMP-HMP
20-1195-03	JHC-MW-15008R	Groundwater	10/22/2020 04:12 PM	JHC RCRA GW Monitoring - Pond A AMP-HMP
20-1195-04	JHC-MW-15009	Well dry, sample	e not collected	JHC RCRA GW Monitoring - Pond A AMP-HMP
20-1195-05	JHC-MW-15010	Well dry, sample	e not collected	JHC RCRA GW Monitoring - Pond A AMP-HMP
20-1195-06	JHC-MW-15011	Groundwater	10/22/2020 04:50 PM	JHC RCRA GW Monitoring - Pond A AMP-HMP
20-1195-07	DUP-04	Groundwater	10/22/2020 05:37 PM	JHC RCRA GW Monitoring - Pond A AMP-HMP
20-1195-08	FB-04	Water	10/22/2020 07:11 PM	JHC RCRA GW Monitoring - Pond A AMP-HMP
20-1195-09	EB-04	Water	10/22/2020 07:11 PM	JHC RCRA GW Monitoring - Pond A AMP-HMP

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Sample Site:	JHC RCRA GW Monitoring - Pond A AMP-HMP (395496)	Laboratory Project:	20-1195
Field Sample ID:	JHC-MW-15006	Collect Date:	10/22/2020
Lab Sample ID:	20-1195-01	Collect Time:	05:37 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous				Aliquot:	20-1195-01-C01-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	10/29/2020	AB20-1029-04
Metals by EPA 6020; HMP/AMP D	etection & Asses	sment Mo	nitoring	Aliquot:	20-1195-01-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	1		ug/L	1	11/05/2020	AB20-1105-07
Arsenic	9		ug/L	1	11/05/2020	AB20-1105-07
Barium	382		ug/L	5	11/05/2020	AB20-1105-07
Beryllium	ND		ug/L	1	11/05/2020	AB20-1105-07
Boron	272		ug/L	20	11/05/2020	AB20-1105-07
Cadmium	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Calcium	87200		ug/L	1000	11/05/2020	AB20-1105-07
Chromium	5		ug/L	1	11/05/2020	AB20-1105-07
Cobalt	ND		ug/L	6	11/05/2020	AB20-1105-07
Copper	4		ug/L	1	11/05/2020	AB20-1105-07
Iron	929		ug/L	20	11/05/2020	AB20-1105-07
Lead	ND		ug/L	1	11/05/2020	AB20-1105-07
Lithium	15		ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	38		ug/L	5	11/05/2020	AB20-1105-07
Nickel	5		ug/L	2	11/05/2020	AB20-1105-07
Selenium	2		ug/L	1	11/05/2020	AB20-1105-07
Silver	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Thallium	ND		ug/L	2	11/05/2020	AB20-1105-07
Vanadium	19		ug/L	2	11/05/2020	AB20-1105-07
Zinc	11		ug/L	10	11/05/2020	AB20-1105-07

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous			Aliquot:	20-1195-01-C02-A01	Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	22000		ug/L	1000	10/29/2020	AB20-1029-07
Fluoride	ND		ug/L	1000	10/29/2020	AB20-1029-07
Sulfate	253000		ug/L	1000	10/29/2020	AB20-1029-07
Total Dissolved Solids by SM 254	0C			Aliquot:	20-1195-01-C03-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	515		mg/L	10	10/26/2020	AB20-1028-04



Sample Site:	JHC RCRA GW Monitoring - Pond A AMP-HMP (395496)	Laboratory Project:	20-1195
Field Sample ID:	JHC-MW-15008R	Collect Date:	10/22/2020
Lab Sample ID:	20-1195-03	Collect Time:	04:12 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Ac	queous			Aliquot:	20-1195-03-C01-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	10/29/2020	AB20-1029-04
Metals by EPA 6020; HMP/AMP [Detection & Assess	sment Mo	nitoring	Aliquot:	20-1195-03-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	1		ug/L	1	11/05/2020	AB20-1105-07
Arsenic	ND		ug/L	1	11/05/2020	AB20-1105-07
Barium	216		ug/L	5	11/05/2020	AB20-1105-07
Beryllium	ND		ug/L	1	11/05/2020	AB20-1105-07
Boron	285		ug/L	20	11/05/2020	AB20-1105-07
Cadmium	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Calcium	109000		ug/L	1000	11/05/2020	AB20-1105-07
Chromium	ND		ug/L	1	11/05/2020	AB20-1105-07
Cobalt	ND		ug/L	6	11/05/2020	AB20-1105-07
Copper	2		ug/L	1	11/05/2020	AB20-1105-07
Iron	56		ug/L	20	11/05/2020	AB20-1105-07
Lead	ND		ug/L	1	11/05/2020	AB20-1105-07
Lithium	19		ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	5		ug/L	5	11/05/2020	AB20-1105-07
Nickel	ND		ug/L	2	11/05/2020	AB20-1105-07
Selenium	68		ug/L	1	11/05/2020	AB20-1105-07
Silver	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Thallium	ND		ug/L	2	11/05/2020	AB20-1105-07
Vanadium	ND		ug/L	2	11/05/2020	AB20-1105-07
Zinc	ND		ug/L	10	11/05/2020	AB20-1105-07

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous		Aliquot:	Analyst: DMW			
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	18800		ug/L	1000	10/29/2020	AB20-1029-07
Fluoride	ND		ug/L	1000	10/29/2020	AB20-1029-07
Sulfate	215000		ug/L	1000	10/29/2020	AB20-1029-07
Total Dissolved Solids by SM 254	40C			Aliquot:	20-1195-03-C03-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	577		mg/L	10	10/26/2020	AB20-1028-04



Sample Site:	JHC RCRA GW Monitoring - Pond A AMP-HMP (395496)	Laboratory Project:	20-1195
Field Sample ID:	JHC-MW-15011	Collect Date:	10/22/2020
Lab Sample ID:	20-1195-06	Collect Time:	04:50 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, To	tal, Aqueous			Aliquot:	20-1195-06-C01-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	10/29/2020	AB20-1029-04
Metals by EPA 6020; HMP/	AMP Detection & Assess	sment Mo	nitoring	Aliquot:	20-1195-06-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	2		ug/L	1	11/05/2020	AB20-1105-07
Arsenic	22		ug/L	1	11/05/2020	AB20-1105-07
Barium	430		ug/L	5	11/05/2020	AB20-1105-07
Beryllium	ND		ug/L	1	11/05/2020	AB20-1105-07
Boron	4120		ug/L	20	11/05/2020	AB20-1105-07
Cadmium	0.5		ug/L	0.2	11/05/2020	AB20-1105-07
Calcium	122000		ug/L	1000	11/05/2020	AB20-1105-07
Chromium	ND		ug/L	1	11/05/2020	AB20-1105-07
Cobalt	ND		ug/L	6	11/05/2020	AB20-1105-07
Copper	1		ug/L	1	11/05/2020	AB20-1105-07
Iron	ND		ug/L	20	11/05/2020	AB20-1105-07
Lead	ND		ug/L	1	11/05/2020	AB20-1105-07
Lithium	17		ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	ND		ug/L	5	11/05/2020	AB20-1105-07
Nickel	ND		ug/L	2	11/05/2020	AB20-1105-07
Selenium	308		ug/L	1	11/05/2020	AB20-1105-07
Silver	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Thallium	ND		ug/L	2	11/05/2020	AB20-1105-07
Vanadium	49		ug/L	2	11/05/2020	AB20-1105-07
Zinc	ND		ug/L	10	11/05/2020	AB20-1105-07

Anions by EPA 300.0 CCR Rule An	Analyte List, CI, F, SO4, Aqueous Aliquot: 20-1195-06-C02-A01 A		Analyst: DMW			
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	3790		ug/L	1000	10/29/2020	AB20-1029-07
Fluoride	ND		ug/L	1000	10/29/2020	AB20-1029-07
Sulfate	141000		ug/L	1000	10/29/2020	AB20-1029-07
Total Dissolved Solids by SM 2540	с			Aliquot:	20-1195-06-C03-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	546		mg/L	10	10/26/2020	AB20-1028-04



Sample Site:	JHC RCRA GW Monitoring - Pond A AMP-HMP (395496)	Laboratory Project:	20-1195
Field Sample ID:	DUP-04	Collect Date:	10/22/2020
Lab Sample ID:	20-1195-07	Collect Time:	05:37 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Tota	l, Aqueous			Aliquot:	20-1195-07-C01-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	10/29/2020	AB20-1029-04
Metals by EPA 6020; HMP/AI	MP Detection & Asses	sment Mo	nitoring	Aliquot:	20-1195-07-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	11/05/2020	AB20-1105-07
Arsenic	6		ug/L	1	11/05/2020	AB20-1105-07
Barium	194		ug/L	5	11/05/2020	AB20-1105-07
Beryllium	ND		ug/L	1	11/05/2020	AB20-1105-07
Boron	331		ug/L	20	11/05/2020	AB20-1105-07
Cadmium	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Calcium	84300		ug/L	1000	11/05/2020	AB20-1105-07
Chromium	1		ug/L	1	11/05/2020	AB20-1105-07
Cobalt	ND		ug/L	6	11/05/2020	AB20-1105-07
Copper	4		ug/L	1	11/05/2020	AB20-1105-07
Iron	213		ug/L	20	11/05/2020	AB20-1105-07
Lead	ND		ug/L	1	11/05/2020	AB20-1105-07
Lithium	14		ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	37		ug/L	5	11/05/2020	AB20-1105-07
Nickel	ND		ug/L	2	11/05/2020	AB20-1105-07
Selenium	1		ug/L	1	11/05/2020	AB20-1105-07
Silver	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Thallium	ND		ug/L	2	11/05/2020	AB20-1105-07
Vanadium	9		ug/L	2	11/05/2020	AB20-1105-07
Zinc	23		ug/L	10	11/05/2020	AB20-1105-07

Anions by EPA 300.0 CCR Rule	e Analyte List, Cl, F,	SO4, Aqu	eous	Aliquot:	20-1195-07-C02-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	22200		ug/L	1000	10/29/2020	AB20-1029-07
Fluoride	ND		ug/L	1000	10/29/2020	AB20-1029-07
Sulfate	251000		ug/L	1000	10/29/2020	AB20-1029-07
Total Dissolved Solids by SM 2	540C			Aliquot:	20-1195-07-C03-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	511		mg/L	10	10/26/2020	AB20-1028-04



Sample Site:JHC RCRA GW Monitoring - Pond A AMP-HMP (395496)Laboratory Project:20-1195Field Sample ID:FB-04Collect Date:10/22/2020Lab Sample ID:20-1195-08Collect Time:07:11 PMMatrix:WaterWaterCollect Time:07:11 PM

Mercury by EPA 7470A, To	tai, Aqueous				20-1195-08-C01-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	10/29/2020	AB20-1029-04
Metals by EPA 6020; HMP/AMP Detection & Assessment Monitoring					20-1195-08-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	11/05/2020	AB20-1105-07
Arsenic	ND		ug/L	1	11/05/2020	AB20-1105-07
Barium	ND		ug/L	5	11/05/2020	AB20-1105-07
Beryllium	ND		ug/L	1	11/05/2020	AB20-1105-07
Boron	ND		ug/L	20	11/05/2020	AB20-1105-07
Cadmium	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Calcium	ND		ug/L	1000	11/05/2020	AB20-1105-07
Chromium	ND		ug/L	1	11/05/2020	AB20-1105-07
Cobalt	ND		ug/L	6	11/05/2020	AB20-1105-07
Copper	ND		ug/L	1	11/05/2020	AB20-1105-07
Iron	ND		ug/L	20	11/05/2020	AB20-1105-07
Lead	ND		ug/L	1	11/05/2020	AB20-1105-07
Lithium	ND		ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	ND		ug/L	5	11/05/2020	AB20-1105-07
Nickel	ND		ug/L	2	11/05/2020	AB20-1105-07
Selenium	ND		ug/L	1	11/05/2020	AB20-1105-07
Silver	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Thallium	ND		ug/L	2	11/05/2020	AB20-1105-07
Vanadium	ND		ug/L	2	11/05/2020	AB20-1105-07
Zinc	ND		ug/L	10	11/05/2020	AB20-1105-07
Anions by EPA 300.0 CCR	Bula Analyta List CL E	SO4 Acres	00115	A 15 mm - 1		Analysis Dans
Amons by EFA 300.0 CCK	Rule Allalyte List, Ci, F,				20-1195-08-C02-A01	Analyst: DMW

AIIIOIIS BY LI A 300.0 CON Nule Allary		<u> </u>	eous	Allquot.	20-1193-06-C02-A01	Analyst. Diviv
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	10/29/2020	AB20-1029-07
Fluoride	ND		ug/L	1000	10/29/2020	AB20-1029-07
Sulfate	ND		ug/L	1000	10/29/2020	AB20-1029-07
Total Dissolved Solids by SM 2540C				Aliquot:	20-1195-08-C03-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	ND		mg/L	10	10/26/2020	AB20-1028-04



Sample Site:JHC RCRA GW Monitoring - Pond A AMP-HMP (395496)Laboratory Project:20-1195Field Sample ID:EB-04Collect Date:10/22/2020Lab Sample ID:20-1195-09Collect Time:07:11 PMMatrix:WaterVaterVaterVater

Mercury by EPA 7470A, To		Elag	Unito		20-1195-09-C01-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	10/29/2020	AB20-1029-04
Metals by EPA 6020; HMP/	AMP Detection & Asses	sment Mo	nitoring	Aliquot:	20-1195-09-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	11/05/2020	AB20-1105-07
Arsenic	ND		ug/L	1	11/05/2020	AB20-1105-07
Barium	ND		ug/L	5	11/05/2020	AB20-1105-07
Beryllium	ND		ug/L	1	11/05/2020	AB20-1105-07
Boron	ND		ug/L	20	11/05/2020	AB20-1105-07
Cadmium	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Calcium	ND		ug/L	1000	11/05/2020	AB20-1105-07
Chromium	ND		ug/L	1	11/05/2020	AB20-1105-07
Cobalt	ND		ug/L	6	11/05/2020	AB20-1105-07
Copper	ND		ug/L	1	11/05/2020	AB20-1105-07
Iron	ND		ug/L	20	11/05/2020	AB20-1105-07
Lead	ND		ug/L	1	11/05/2020	AB20-1105-07
Lithium	ND		ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	ND		ug/L	5	11/05/2020	AB20-1105-07
Nickel	ND		ug/L	2	11/05/2020	AB20-1105-07
Selenium	ND		ug/L	1	11/05/2020	AB20-1105-07
Silver	ND		ug/L	0.2	11/05/2020	AB20-1105-07
Thallium	ND		ug/L	2	11/05/2020	AB20-1105-07
Vanadium	ND		ug/L	2	11/05/2020	AB20-1105-07
Zinc	ND		ug/L	10	11/05/2020	AB20-1105-07
Anions by EPA 300.0 CCR	Rule Analyte List, CI, F,	SO4, Aqu	eous	Aliquot:	20-1195-09-C02-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #

						·
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	10/29/2020	AB20-1029-07
Fluoride	ND		ug/L	1000	10/29/2020	AB20-1029-07
Sulfate	ND		ug/L	1000	10/29/2020	AB20-1029-07
Total Dissolved Solids by SM 2540C				Aliquot:	20-1195-09-C03-A01	Analyst: SLK
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	ND		mg/L	10	10/26/2020	AB20-1028-04



Data Qualifiers

Exception Summary

No exceptions occured.

CONSUMERS ENERGY Chemistry Department

General Standard Operating Procedure

PROC CHEM-1.2.01 PAGE 1 OF 2 REVISION 3 ATTACHMENT A

1

TITLE: SAMPLE LOG-IN - SHIPMENT INSPECTION FORM

Project Log-In Number: 20- 1195			
Inspection Date: 10 26 20	Inspection By:	six tome	
	A .		
Shipment Delivered By: Enter the type of shipme			
		Airb	orne
Pony FedEx Other/HandCarry (whom)	ICET consumers		
Tracking Number: SW 10/26/20		Attached: Yes	No
Shipping Containers: Enter the type and number	of shipping containers receive	ed.	
Cooler Cardboard Box	Custom Case	Envelope	Mailer
Loose/Unpackaged Containers	and the second s	and the second sec	
Condition of Shipment: Enter the as-received con			
Damaged Shipment Observed: None			ing
Other			
CoC <u>7</u> Work Request CoC <u>7</u> Work Request Cope and Containers: Measure the tempera As-Received Temperature Range <u>4.6-1</u> M&TE # and Expiration <u>015402</u> Number and Type of Containers: Enter the total	Air Data Sheet ture of several sample contain 5.0 Samples Received 06[04[2]	Other ners. on Ice: Yes_X N	
Container Type Water Soil	Other	Broken	Leaking
VOA (40mL or 60mL)			-
Quart/Liter (g/p)		· · · · · · · · · · · · · · · · · · ·	
9-oz (amber glass jar)			4
2-oz (amber glass)	· · · · · · · · · · · · · · · · · · ·		-
125 mL (plastic) <u>12</u>		-	
24 mL vial (glass)			
500 mL (plastic) Other 250 ML 6			_
1000mL 12	5 Page 12 of 13 Page 2	of 2 not w	reded

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

Consumers Energy

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

	ING SIT	-2020 RCRA	. GW Monito	ring	PROJECT NUMBER:	20-1195				AN	ALY	SIS R	EQUESTI	ED	PAGE _ 1_OF _ 1 SEND REPORT TO:
1.1.1	ING TE	Pond A V AM:	Wells		DATE SHIPPED	- All and a second	E SKETCHED CIRCLE NC		als, Total	Suc		um			Caleb Batts Beth Swanberg, TRC PHONE:
	E ROL#	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / L	OCATION	DEPTH	# OF CONTAINERS	Metals,	Anions	TDS	Radium			REMARKS
20-1	195-01	10-22-20	1737	GW	JHC-MW-15006			5	х	х	х	x			
1	-02	10-22-20	ORY	GW	JHC-MW-15007		1. Q. (5	х	х	х	x	S		PRY
	-03	10-22-20	16-12 20	GW	JHC-MW-15008R		\sim	5	х	х	х	x			
	-04	10-22-20	DRY	GW	JHC-MW-15009		-	5	x	x	x	x			DRY
	-05	10.22.20	DRY	GW	JHC-MW-15010			5	х	x	x	x			Bry/Low volume
	-06	1022.20	1650	GW	JHC-MW-15011		(5	x	х	x	x			
		10-22-20	1737	GW	DUP-04		li ter s	5	x	x	х	x			
	-08	10-22-20	1911	GW	FB-04		244	5	x	x	х	x			11
+	-09	10 22.20	1911	GW	EB-04		-	5	x	x	x	x		II.	
															- 1
														10	
														17-	
RELIN		D BY: (SIGNAT	URE)	DATE/T	10/26/20 1040	RECEIVED BY: (SIGNATURE)							COMME	ENTS
RELIN	QUISHE	SBY: (SIGNAT	ſURE)	DATE/T	TME: F	RECEIVED BY: (SIGNATURE)				OF	NGIN	AL TO L	AB (COPY TO CUSTOMER



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

- To: CDBatts, JH Campbell Complex
- From: EBlaj, T-258
- Date: November 11, 2020
- Subject: JH CAMPBELL SOLID WASTE DISPOSAL AREA GROUNDWATER MONITORING 4th Quarter, 2020 Pond A GSI Wells
 - CC: BLSwanberg, P22-119 BTRunkel, P22-120 HDRegister, P22-521

Sarah Holmstrom, Project Manager TRC Companies, Inc. 1540 Eisenhower Place Ann Arbor, MI 48108

Chemistry Project: 20-1197

CE Laboratory Services conducted groundwater monitoring on 10/19/2020 through 10/23/2020 at the JH Campbell Solid Waste Disposal Area, for the 4th Quarter monitoring requirements. Samples were not collected from MW-13 due to well being dry. All other samples were received for analysis by the Chemistry department on 10/26/2020.

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

Reviewed and approved by:

Emil Blaj Sr. Technical Analyst Project Lead



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

CASE NARRATIVE

I. Sample Receipt

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

II. Methodology

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

III. Results/Quality Control

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

DEFINITIONS / QUALIFIERS

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

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

Qualifier Description

- * Generic data flag, applicable description added in the corresponding notes section
- B The analyte was detected in the LRB at a level which is significant relative to sample result

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



Customer Name:JH Campbell ComplexWork Order ID:Q4-2020 RCRA GW Monitoring N&E / AMP / GSI / SupplementalDate Received:10/26/2020Chemistry Project:20-1197

Sample #	Field Sample ID	<u>Matrix</u>	Sample Date	Site
20-1197-01	MW-14S	Groundwater	10/20/2020 05:47 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-02	PZ-24S	Groundwater	10/21/2020 12:44 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-03	PZ-40S	Groundwater	10/21/2020 09:54 AM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-04	TW-19-04A	Groundwater	10/21/2020 06:01 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-05	TW-19-05	Groundwater	10/21/2020 04:32 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-06	TW-19-06A	Groundwater	10/21/2020 05:21 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-07	DUP-08	Groundwater	10/20/2020 12:00 AM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-08	FB-08	Water	10/21/2020 05:48 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-09	EB-08	Water	10/21/2020 06:25 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-10	TW-19-04A Field MS	Groundwater	10/21/2020 06:01 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-11	TW-19-04A Field MSD	Groundwater	10/21/2020 06:01 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-12	PZ-23S	Groundwater	10/21/2020 02:21 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-13	PZ-24	Groundwater	10/21/2020 11:09 AM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-14	PZ-40	Groundwater	10/21/2020 08:50 AM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-15	DUP-09	Groundwater	10/21/2020 12:00 AM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-16	MW-9AR	Groundwater	10/21/2020 03:22 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells
20-1197-17	MW-10AR	Well dry, sample	e not collected	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells



Sample Site:	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells (395496)	Laboratory Project:	20-1197
Field Sample ID:	MW-14S	Collect Date:	10/20/2020
Lab Sample ID:	20-1197-01	Collect Time:	05:47 PM
Matrix:	Groundwater		

Metals by EPA 6020; HMP/AMP Detection & Assessment Monitoring

Metals by EPA 6020; HMP/AM	P Detection & Asses	sment Monitoring	Aliquot:	20-1197-01-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking #
Antimony	ND	ug/L	1	11/05/2020	AB20-1105-07
Arsenic	ND	ug/L	1	11/05/2020	AB20-1105-07
Barium	8	ug/L	5	11/05/2020	AB20-1105-07
Chromium	ND	ug/L	1	11/05/2020	AB20-1105-07
Lithium	ND	ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	ND	ug/L	5	11/05/2020	AB20-1105-07
Selenium	ND	ug/L	1	11/05/2020	AB20-1105-07
Vanadium	ND	ug/L	2	11/05/2020	AB20-1105-07



Sample Site:	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells (395496)	Laboratory Project:	20-1197
Field Sample ID:	PZ-24S	Collect Date:	10/21/2020
Lab Sample ID:	20-1197-02	Collect Time:	12:44 PM
Matrix:	Groundwater		

Metals by EPA 6020; HMP/AMP Detection & Assessment Monitoring

Metals by EPA 6020; HMP/AMP L	etection & Asses	sment Monitoring	Aliquot:	20-1197-02-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking #
Antimony	ND	ug/L	1	11/05/2020	AB20-1105-07
Arsenic	1	ug/L	1	11/05/2020	AB20-1105-07
Barium	32	ug/L	5	11/05/2020	AB20-1105-07
Chromium	1	ug/L	1	11/05/2020	AB20-1105-07
Lithium	ND	ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	ND	ug/L	5	11/05/2020	AB20-1105-07
Selenium	ND	ug/L	1	11/05/2020	AB20-1105-07
Vanadium	3	ug/L	2	11/05/2020	AB20-1105-07



Sample Site:	JHC RCRA GW Monitoring - N&E/AMP/GSI Wells (395496)	Laboratory Project:	20-1197
Field Sample ID:	PZ-40S	Collect Date:	10/21/2020
Lab Sample ID:	20-1197-03	Collect Time:	09:54 AM
Matrix:	Groundwater		

Metals by EPA 6020; HMP/AMP Detection & Assessment Monitoring

Metals by EPA 6020; HMP/AMP I	Detection & Asses	sment Monitoring	Aliquot:	20-1197-03-C01-A02	Analyst: SLK
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking #
Antimony	ND	ug/L	1	11/05/2020	AB20-1105-07
Arsenic	ND	ug/L	1	11/05/2020	AB20-1105-07
Barium	19	ug/L	5	11/05/2020	AB20-1105-07
Chromium	2	ug/L	1	11/05/2020	AB20-1105-07
Lithium	ND	ug/L	10	11/05/2020	AB20-1105-07
Molybdenum	ND	ug/L	5	11/05/2020	AB20-1105-07
Selenium	ND	ug/L	1	11/05/2020	AB20-1105-07
Vanadium	ND	ug/L	2	11/05/2020	AB20-1105-07



Data Qualifiers

Exception Summary

No exceptions occured.

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Chemistry Department

PROC CHEM-1.2.01 PAGE 1 OF 2 REVISION 3 ATTACHMENT A

General Standard Operating Procedure

TITLE: SAMPLE LOG-IN - SHIPMENT INSPECTION FORM

Inspection Date: 10 26 20		Inspection By:	SUL	
Sample Origin/Project Name:(in Q4			
Shipment Delivered By: Enter the typ		arrier.		
Pony FedEx Other/HardCarry (whom) D	W) LET-	USPS USPS	S Airb	oorne
Tracking Number:			Attached: Yes	
Shipping Containers: Enter the type a	nd number of sl	ipping containers receive	d.	
Cooler <u> </u>	d Box	Custom Case	Envelope	e/Mailer
Loose/Unpackaged Containers				
Condition of Shipment: Enter the as-r				
Damaged Shipment Observed:				cing
Other				
CoC X Work Reque	est	Air Data Sheet	Other	
As-Received Temperature Ran	ge 4.2-5.1	Samples Received		io
Femperature of Containers: Measure As-Received Temperature Ran M&TE # and Expiration61 Number and Type of Containers: Ent	ge 4.2-5.1 5402 06	Samples Received	on Ice: Yes 🗶 N	ío
As-Received Temperature Ran M&TE # and Expiration619	$\frac{9}{99} \frac{4.2 - 5.1}{06}$	Samples Received	on Ice: Yes 🗶 N	o Leaking
As-Received Temperature Ran M&TE # and Expiration61 Number and Type of Containers: Ent	$\frac{9}{99} \frac{4.2-5.1}{06}$	Samples Received	on Ice: Yes 🗶 N received.	
As-Received Temperature Ran M&TE # and Expiration <u>619</u> Number and Type of Containers: Ent <u>Container Type</u> <u>Water</u>	$\frac{9}{99} \frac{4.2-5.1}{06}$	Samples Received	on Ice: Yes 🗶 N received.	
As-Received Temperature Ran M&TE # and Expiration6L Number and Type of Containers: Ent <u>Container Type</u> <u>Water</u> VOA (40mL or 60mL)	$\frac{9}{99} \frac{4.2-5.1}{06}$	Samples Received	on Ice: Yes 🗶 N received.	
As-Received Temperature Ran M&TE # and Expiration Number and Type of Containers: Ent Container Type Water VOA (40mL or 60mL) Quart/Liter (g/p) 9-oz (amber glass jar) 2-oz (amber glass)	$\frac{9}{99} \frac{4.2-5.1}{06}$	Samples Received	on Ice: Yes 🗶 N received.	
As-Received Temperature Ran M&TE # and Expiration	$\frac{9}{99} \frac{4.2-5.1}{06}$	Samples Received	on Ice: Yes 🗶 N received.	
As-Received Temperature Ran M&TE # and Expiration Number and Type of Containers: Ent Container Type Water VOA (40mL or 60mL) Quart/Liter (g/p) 9-oz (amber glass jar) 2-oz (amber glass) 125 mL (plastic) 24 mL vial (glass)	$\frac{9}{99} \frac{4.2-5.1}{06}$	Samples Received	on Ice: Yes 🗶 N received.	
As-Received Temperature Ran M&TE # and Expiration Number and Type of Containers: Ent Container Type Water VOA (40mL or 60mL) Quart/Liter (g/p) 9-oz (amber glass jar) 2-oz (amber glass) 125 mL (plastic)	$\frac{9}{99} \frac{4.2-5.1}{06}$	Samples Received	on Ice: Yes 🗶 N received.	

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

Consumers Energy

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

SAM	PLING SIT	E:			PROJECT NUMBER:											and the second second second
		-2020 RCRA &E / AMP /		oring	20-1197					AN	ALY	SIS F	REQUI	STED	T	PAGE 1 OF 2 SEND REPORT TO: Caleb Batts
	PLING TE	AM:			DATE SHIPPED SITE SKETCHED ATTACHED? CIRCLE ONE: NO			ONE:	als, Total	SUC	32	m				Beth Swanberg, TRC PHONE:
CO	CE NTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTIO	N / LOCATION	DEPTH	# OF CONTAINERS	Metals,	Anions	TDS	Radium				REMARKS
20	-1197-01	10-20.20	1747	GW	MW-14S		5	х	x	х	х					
	-02	10.21.20	1244	GW	PZ-24S			5	x	х	х	x				
1.4	-03	10.21.20	0954	GW	PZ-40S		5	x	x	x	x					
-04		1	1901 1721 dm	6W	TW-19-04A			5	x	x	x	x				1
	-05	-05 10.21.20 1632 GW TW-19-05			5	x	x	x	x							
-06			1721	GW	TW-19-06A			5 X	x	x	x	x				
1.4	-07		-	GW	DUP-08			5	X	x	х	x				
7.4	-08	dmin 11.10.2	1748	GW	FB-08		-	5	x	x	x	x				
-0		1	1825	GW	EB-08			5	x	x	x	x				
-10		10.21.20	1801	GW	TW-19-04A Field MS			2	x	x						· · · · · · · · · · · · · · · · · · ·
1	-11	1	T	AQ	TW-19-04A Field	I MSD		2	x	x						
Dawn Will 10/7				DATE/T	1/20 1040 all				COMMENTS Total Metals = HMP-AMP List Metals and Mercury (01-11)							
											OI	RIGIN	JAL TO	LAB	С	OPY TO CUSTOMER

20-1197 Pond A GSI Page 10 of 11

CHAIN OF CUSTODY

CONSUMERS ENERGY COMPANY – LABORATORY SERVICES

Consumers Energy

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SAMPLING SITE:				PROJECT NUMBER:						5.56			5.00	
	-2020 RCRA E / AMP / S			20-1197						JALY	m		ESTED	PAGE <u>2_OF 2</u> SEND REPORT TO: <u>Caleb Batts</u> <u>Beth Swanberg, TRC</u> PHONE:
SAMPLING TE.	AM:			DATE SHIPPED SITE SKETCHED ATTACHED? CIRCLE ONE: NO			Metals, Total			Metals, Dissolved				
CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION	N/LOCATION	DEPTH	# OF CONTAINERS	Meta	Anions	TDS	Radium	Meta		REMARKS
20-1197-12	10.21.20	1421	GW	PZ-23S	(a) (Chi Ch	10000	x	x	x	х				
-13	10.24.20	1109	GW	PZ-24				x	x	x	x			
	10.21.20		GW	PZ-40				x	x	x	х			
	10.21.20		GW	DUP-09				x	x	x	x			
-16	10.21.20	1522	GW	MW-9AR				x				x		
-17 GW		MW-10AR		_	Х	x				x		DRY		
÷	-					-		-	-		-			
			_											
			-											
RELINQUISHED BY: (SIGNATURE) DATE/I RELINQUISHED BY: (SIGNATURE) DATE/I				26/20 1040 all		COMMENTS Total Metals = Appendix III-IV List Metals and Mercury (12-15) Total Metals = JHC GW List (16-17)								
										OI	RIGIN	VAL T	O LAB	COPY TO CUSTOMER

🔅 eurofins

Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

Laboratory Job ID: 160-40221-1

Client Project/Site: JH Campbell Pond A Wells

For: Consumers Energy

135 W Trail Street Jackson, Michigan 49201

Attn: Emil Blaj

Elizabeth M. Hercher

Authorized for release by: 1/13/2021 5:50:19 PM Elizabeth Hoerchler, Project Manager I Elizabeth.Hoerchler@Eurofinset.com

Designee for

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Expert

Jayna Awalt, Project Manager II (314)298-8566 Jayna.Awalt@Eurofinset.com

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

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

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QC Sample Results	15
QC Association Summary	17
Tracer Carrier Summary	18

Job ID: 160-40221-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Case Narrative

Client: Consumers Energy

Project: JH Campbell Pond A Wells

Report Number: 160-40221-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client.

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 11/02/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 13.6° C.

RADIUM 226 AS TOTAL ALPHA RADIUM

Job ID: 160-40221-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Samples JHC-MW-15006 (160-40221-1), JHC-MW-15008R (160-40221-2), JHC-MW-15011 (160-40221-3), DUP-04 (160-40221-4), FB-04 (160-40221-6) were analyzed for Radium 226 as Total Alpha Radium in accordance with EPA 903.0_Total Alpha Radium. The samples were prepared on 11/24/2020 and analyzed on 12/23/2020.

Insufficient sample volume was available to perform a sample duplicate for the following samples: JHC-MW-15006 (160-40221-1), JHC-MW-15008R (160-40221-2), JHC-MW-15011 (160-40221-3), DUP-04 (160-40221-4), FB-04 (160-40221-5) and EB-04 (160-40221-6). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

The Barium carrier recovery is outside the upper control limit (110%) for the following samples: JHC-MW-15006 (160-40221-1), JHC-MW-15008R (160-40221-2), JHC-MW-15011 (160-40221-3), FB-04 (160-40221-5) and EB-04 (160-40221-6). Samples turned brown on hot plate and weighed over the 110% threshold.

The LCS for Ra226 was outside the upper QC limit (132%). The LCSD was within control limits and the precision (RER/RPD) were acceptable. Additionally the activity in the associated samples was below the reporting limit indicating no adverse effect from the potential high bias. Original results will be reported. (LCS 160-490013/1-A)

The Barium recovery is above the 110% QC limit for the QC and client samples. The client requested the samples be reported without a native barium calculation applied. The LCS/LCSD spike recovery is within control limits, which demonstrates acceptable sample preparation and instrument performance. As such, this was an apparent anomaly in the sample preparation. which did not affect the sample results. The associated samples have been truncated to 100% in order to minimize any potential bias a high carrier recovery may have on the results. JHC-MW-15006 (160-40221-1), JHC-MW-15008R (160-40221-2), JHC-MW-15011 (160-40221-3), DUP-04 (160-40221-4), FB-04 (160-40221-5), EB-04 (160-40221-6), (LCS 160-490013/1-A), (LCSD 160-490013/2-A) and (MB 160-490013/2-A)

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

RADIUM-228 (GFPC)

Samples JHC-MW-15006 (160-40221-1), JHC-MW-15008R (160-40221-2), JHC-MW-15011 (160-40221-3), DUP-04 (160-40221-4), FB-04 (160-40221-5) and EB-04 (160-40221-6) were analyzed for Radium-228 (GFPC) in accordance with EPA 904. The samples were prepared on 11/24/2020 and analyzed on 12/22/2020.

The Barium recovery is above the 110% QC limit for the QC and client samples. The client requested the samples be reported without a native barium calculation applied. The LCS/LCSD spike recovery is within control limits, which demonstrates acceptable sample preparation and instrument performance. As such, this was an apparent anomaly in the sample preparation. which did not affect the sample results. The associated samples have been truncated to 100% in order to minimize any potential bias a high carrier recovery may have on the results. JHC-MW-15006 (160-40221-1), JHC-MW-15008R (160-40221-2), JHC-MW-15011 (160-40221-3), DUP-04 (160-40221-4), FB-04 (160-40221-5), EB-04 (160-40221-6), (LCS 160-490016/1-A), (LCSD 160-490016/2-A) and (MB 160-490016/23-A)

Insufficient sample volume was available to perform a sample duplicate for the following samples: JHC-MW-15006 (160-40221-1), JHC-MW-15008R (160-40221-2), JHC-MW-15011 (160-40221-3), DUP-04 (160-40221-4), FB-04 (160-40221-5) and EB-04 (160-40221-6). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

The Barium carrier recovery is outside the upper control limit (110%) for the following samples: JHC-MW-15006 (160-40221-1), JHC-MW-15008R (160-40221-2), JHC-MW-15011 (160-40221-3), FB-04 (160-40221-5) and EB-04 (160-40221-6). Samples turned brown on hot plate and weighed over the 110% threshold.

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

COMBINED RADIUM-226 AND RADIUM-228

Samples JHC-MW-15006 (160-40221-1), JHC-MW-15008R (160-40221-2), JHC-MW-15011 (160-40221-3), DUP-04 (160-40221-4), FB-04 (160-40221-5) and EB-04 (160-40221-6) were analyzed for Combined Radium-226 and Radium-228 in accordance with EPA 903 Radium 226/EPA 904 Radium 228. The samples were analyzed on 01/11/2021.

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

									Environment Testing
Earth City, MO 63045-1205 phone 314.298.8566 fax 314.298.8757	Regula	Regulatory Program:		MD	NPDES	RCRA Other:		TestAmerica La	TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica
	Project Manager: Emil Blaj	ager: Emi	l Blaj		Г				
Client Contact	Email: Emil.Blaj@cmsenergy.com	laj@cmsen	ergy.com		Sit	Site Contact: Bethany Swanberg	Swanberg Date:		COC No:
Consumers Energy, Laboratory Services	Tel/Fax: 517-788-5888	-788-5888			La	Lab Contact: Emil Blaj	Carrier:	ier:	1 of 1 COCs
135 W. Trail Street	Ar	nalysis Tun	Analysis Turnaround Time	ime					Sampler: CLH/DMW/CET
Jackson, MI 49201	CALENDAR DAYS	S DAYS	WOR	WORKING DAYS					For Lab Use Only:
	TAT	TAT if different from Below	n Below	1		1			Walk-in Client:
(xxx) xxx-xxxx FAX		2 W	2 weeks			3.1			Lab Sampling:
Project Name: JH Campbell Pond A Wells	*	1 W	1 week			06			
Project #: 20-1195		2 days	ski			АЧЭ)			Job / SDG No.:
4400034730		1 day	Å		θVΪ) 97			
Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	Preservat Cont.	Perform 2: Radium 2: S muibsЯ			Sample Specific Notes:
JHC-MW-15006	10/22/2020	1737	ß	GW	2 2	× × N			
JHC-MW-15008R	10/22/20	1612	υ	GW	2 2	× × N			
JHC-MW-15011	10/22/20	1650	IJ	GW	2 2	×××			
DUP-04	1	4	U	GW	2 2	×××z			
20 22	10/22/20	1911	U	0	2 2	×××			
FB-04				i i		<			
EB-04	10/22/20		פ	5	7 7	×			
160-40221 Chain of Custody									
Preservation Used: 1= Ice, 2= HCI; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other	03; 5=NaOH; 6=	Other							
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? P Comments Section if the lab is to dispose of the sample.	Please List any EPA Waste Codes for the sample in the	A Waste C	odes for the	e sample	n the	Sample Disposal (A	fee may be asse	issed if samples are reta	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Non-Hazard Flammable Skin Irritant	Poison B		Unknowr	un		Return to Client	Disposal by Lab	by Lab Archive for	or Months
ial Instructions/QC Requirements & Comments:									
Custody Seals Intact: 🛛 Yes 🗍 No	Custody Seal No.	No.:				Cooler Ter	Cooler Temp. (°C); Obs'd:	Corr'd:	Therm ID No.:
Relinquished by.	Company:	. Com	Erry	Date/Time: Io/28/2423	s loris	Received by: ULPS	S	Company:	Date/Time:
Relinquished by:	Company:			Date/Time:	1.2	Received by Ker	Coninhina	Company ST	Date/Time:
	Company:			Data/Time	i	1 1	nu hur U	Company	-

Laboratory Services

135 W. Trail Street Jackson, MI 49201

TestAmerica Michigan 10448 Citation Drive; Ste 200 Brighton, MI 48116

PROCUREMENT #: 20101220

QA Code: NQ

(Item 1) - Part Number: N/A - Quantity : 1 JHC CCR Rule GW Q4-2020 Samples

Groundwater Samples for Radium 226 (EPA 903.1) and Radium 228 (EPA 904.0)

Standard TAT Request.

Reference Quote #16009066-0

(Item 2) - Part Number: NA - Quantity : 1 Please include Consumers Energy Project Number and Procurement Number on all submitted invoices

For technical questions, please contact Emil Blaj at 517-788-5888, or Emil.Blaj@cmsenergy.com.

To expedite payment please provide the Procurement number on all invoices.

Send Invoices To:

Consumers Energy Company Attn: Accounts Payable 135 W Trail St. Jackson, MI 49201

Client: Consumers Energy

Login Number: 40221 List Number: 1 Creator: Hoerchler, Elizabeth M

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

List Source: Eurofins TestAmerica, St. Louis

Definitions/Glossary

Client: Consumers Energy Project/Site: JH Campbell Pond A Wells

Qualifi

Rad
Qualifier

Flojeci/Sile.		
Qualifiers		
<mark>Rad</mark> Qualifier	Qualifier Description	
*	LCS or LCSD is outside acceptance limits.	
U	Result is less than the sample detection limit.	5
Х	Carrier is outside acceptance limits.	
Glossary		6
Abbreviation	These commonly used abbreviations may or may not be present in this report.	
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis	
%R	Percent Recovery	Q
CFL	Contains Free Liquid	0
CFU	Colony Forming Unit	0
CNF	Contains No Free Liquid	9
DER	Duplicate Error Ratio (normalized absolute difference)	
Dil Fac	Dilution Factor	
DL	Detection Limit (DoD/DOE)	
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample	
DLC	Decision Level Concentration (Radiochemistry)	
EDL	Estimated Detection Limit (Dioxin)	
LOD	Limit of Detection (DoD/DOE)	
LOQ	Limit of Quantitation (DoD/DOE)	
MCL	EPA recommended "Maximum Contaminant Level"	
MDA	Minimum Detectable Activity (Radiochemistry)	
MDC	Minimum Detectable Concentration (Radiochemistry)	

MDL Method Detection Limit Minimum Level (Dioxin) ML

MPN Most Probable Number

MQL Method Quantitation Limit

NC Not Calculated

ND Not Detected at the reporting limit (or MDL or EDL if shown)

NEG Negative / Absent

POS Positive / Present

PQL Practical Quantitation Limit PRES Presumptive

QC **Quality Control**

RER Relative Error Ratio (Radiochemistry)

RL Reporting Limit or Requested Limit (Radiochemistry)

RPD Relative Percent Difference, a measure of the relative difference between two points

Toxicity Equivalent Factor (Dioxin) TEF

TEQ Toxicity Equivalent Quotient (Dioxin)

TNTC Too Numerous To Count

Method Summary

Client: Consumers Energy Project/Site: JH Campbell Pond A Wells

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	TAL SL
904.0	Radium-228 (GFPC)	EPA	TAL SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	TAL SL
PrecSep STD	Preparation, Precipitate Separation (Standard In-Growth)	None	TAL SL
PrecSep_0	Preparation, Precipitate Separation	None	TAL SL
Protocol Ref	erences:		
EPA = US	Environmental Protection Agency		

None = None

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

Laboratory References:

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

Sample Summary

Client: Consumers Energy Project/Site: JH Campbell Pond A Wells

Job ID: 160-40221-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-40221-1	JHC-MW-15006	Water	10/22/20 17:37	11/02/20 11:04
160-40221-2	JHC-MW-15008R	Water	10/22/20 16:12	11/02/20 11:04
160-40221-3	JHC-MW-15011	Water	10/22/20 16:50	11/02/20 11:04
160-40221-4	DUP-04	Water	10/22/20 00:00	11/02/20 11:04
160-40221-5	FB-04	Water	10/22/20 19:11	11/02/20 11:04
160-40221-6	EB-04	Water	10/22/20 19:11	11/02/20 11:04

Total

Uncert.

(2**σ+/-**)

0.189

RL

1.00

MDC Unit

0.246 pCi/L

Count Uncert.

(20+/-)

0.187

Limits

40 - 110

~ ·

Date Collected: 10/22/20 17:37

Date Received: 11/02/20 11:04

Analyte

Carrier

Ba Carrier

Radium-226

Client Sample ID: JHC-MW-15006

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water

Dil Fac

Dil Fac

1

1

Lab Sample ID: 160-40221-1

Analyzed

Analyzed

11/24/20 07:52 12/23/20 09:55

11/24/20 07:52 12/23/20 09:55

Lab Sample ID: 160-40221-2

Matrix: Water

Prepared

Prepared

2 3 4 5 6 7

Method: 904.0 - Radium-228 (GFPC)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0292	U	0.157	0.157	1.00	0.274	pCi/L	11/24/20 08:31	12/22/20 08:32	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	148	X	40 - 110					11/24/20 08:31	12/22/20 08:32	1
Y Carrier	85.2		40 - 110					11/24/20 08:31	12/22/20 08:32	1

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Result Qualifier

%Yield Qualifier

148 X

0.289 *

			Count	Total					
			Uncert.	Uncert.					
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.318		0.244	0.246	5.00	0.274 pCi/L		01/11/21 21:18	1

Client Sample ID: JHC-MW-15008R Date Collected: 10/22/20 16:12

Date Received: 11/02/20 11:04

Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	lotal Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.553	*	0.265	0.270	1.00	0.316	pCi/L	11/24/20 07:52	12/23/20 09:55	1
Carrier Ba Carrier	% Yield 121	$\frac{\textbf{Qualifier}}{X}$	Limits 40 - 110					Prepared 11/24/20 07:52	Analyzed 12/23/20 09:55	Dil Fac

- . .

Method: 904.0 - Radium-228 (GFPC)

Analyte	Pocult	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analvzed	Dil Fac
Analyte	Result	Quaimer	(20+/-)	(20+/-)			Unit	Flepaleu	Allalyzeu	DIFAC
Radium-228	0.330		0.213	0.215	1.00	0.328	pCi/L	11/24/20 08:31	12/22/20 08:32	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	121	X	40 - 110					11/24/20 08:31	12/22/20 08:32	1
Y Carrier	80.0		40 - 110					11/24/20 08:31	12/22/20 08:32	1

			Clier	nt Samp	le Res	ults				
Client: Consumers Ene Project/Site: JH Campb		A Wells							Job ID: 160-4	0221-1
Client Sample ID: Date Collected: 10/22/	/20 16:12	2	R					Lab Sample)221-2 : Water
Date Received: 11/02/										
Method: Ra226_Ra22	28 - Com	bined Rac	dium-226 a Count	Ind Radium Total	- 228					
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.883		0.340	0.345	5.00	0.328	pCi/L		01/11/21 21:18	1
Client Sample ID:	JHC-M	W-15011						Lab Sample) ID: 160-40)221-3
Date Collected: 10/22/ Date Received: 11/02/	/20 16:50)								: Water
Method: 903.0 - Radi	ium_226									
Wethou: 505.0 - Rau	um-220		Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.344		0.234	0.236	1.00			11/24/20 07:52	12/23/20 09:55	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	132		40 - 110						12/23/20 09:55	1
-										
Method: 904.0 - Radi	ium-228	(GFPC)	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.153		0.162	0.162	1.00	0.264		11/24/20 08:31		1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	132		40 - 110					11/24/20 08:31		1
Y Carrier	92.7		40 - 110						12/22/20 08:32	1
Method: Ra226_Ra2	28 - Com	bined Rac	• ·		-228					
			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.497		0.285	0.286	5.00	0.332			01/11/21 21:18	1
Client Sample ID: Date Collected: 10/22/								Lab Sample)221-4 : Water
Date Received: 11/02/										
Method: 903.0 - Radi	ium-226	(GFPC)								
			Count	Total						
			Uncert.	Uncert.						- –
Analyte		Qualifier	(2σ+/-)	<u>(2σ+/-)</u>		MDC		Prepared	Analyzed	Dil Fac
	0.274	U *	0.231	0.232	1.00	0.345	pCi/L	11/24/20 07:52	12/23/20 09:55	1
Radium-226										
Radium-226 <i>Carrier</i>	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac

Total

Uncert.

(2σ+/-)

0.240

Method: 904.0 - Radium-228 (GFPC)

Client Sample ID: DUP-04 Date Collected: 10/22/20 00:00 Date Received: 11/02/20 11:04

Analyte

Carrier

Ba Carrier

Y Carrier

Radium-228

Lab Sample ID: 160-40221-4

Prepared

Prepared

160-40221-4 Matrix: Water

Dil Fac

Dil Fac

Matrix: Water

1

1

1

Job ID: 160-40221-1

Analyzed

Analyzed

11/24/20 08:31 12/22/20 08:33

11/24/20 08:31 12/22/20 08:33

11/24/20 08:31 12/22/20 08:33

Lab Sample ID: 160-40221-5

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

Result Qualifier

%Yield Qualifier

0.179 U

101

77.0

Count

Uncert.

(20+/-)

Limits

40 - 110

40 - 110

0.239

			Count	Total					
			Uncert.	Uncert.					
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC Unit	Prepared	Analyzed	Dil Fac
Combined Radium	0.453		0.332	0.334	5.00	0.399 pCi/L		01/11/21 21:18	1
226 + 228									

RL

1.00

MDC Unit

0.399 pCi/L

Client Sample ID: FB-04 Date Collected: 10/22/20 19:11 Date Received: 11/02/20 11:04

Method: 903.0 - Radium-226 (GFPC) Count Total Uncert. Uncert. Analyte **Result Qualifier** (2σ+/-) (2**σ**+/-) RL MDC Unit Prepared Analyzed Dil Fac Radium-226 -0.0460 U* 0.106 0.107 1.00 0.252 pCi/L 11/24/20 07:52 12/23/20 09:55 1 Carrier %Yield Qualifier Limits Prepared Analyzed Dil Fac 169 X 40 - 110 11/24/20 07:52 12/23/20 09:55 Ba Carrier 1

Method: 904.0 - Radium-228 (GFPC)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2 σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0446	U	0.135	0.135	1.00	0.234	pCi/L	11/24/20 08:31	12/22/20 08:33	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	169	X	40 - 110					11/24/20 08:31	12/22/20 08:33	1
Y Carrier	86.7		40 - 110					11/24/20 08:31	12/22/20 08:33	1

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

			Count	Total					
			Uncert.	Uncert.					
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	-0.00135	U	0.172	0.172	5.00	0.252 pCi/L		01/11/21 21:18	1

Client: Consumers Energy Project/Site: JH Campbell Pond A Wells

Lab Sample ID: 160-40221-6

Client Sample ID: EB-04 Date Collected: 10/22/20 19:11 Date Rec

: Water	
	÷
	Ē
Dil Fac	
1	

Carrier	%Yield	Qualifier	Limits	Prepared Analyzed	s Prepared
Ba Carrier	132	X	40 - 110	11/24/20 07:52 12/23/20 09:56	10 11/24/20 07:52

Method: 904.0 - Radium-228 (GFPC)

			Count Uncert.	Total Uncert.							
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac	
Radium-228	-0.122	U	0.155	0.155	1.00	0.295	pCi/L	11/24/20 08:31	12/22/20 08:33	1	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac	
Ba Carrier	132	X	40 - 110					11/24/20 08:31	12/22/20 08:33	1	
Y Carrier	87.1		40 - 110					11/24/20 08:31	12/22/20 08:33	1	

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	-0.0173	U	0.255	0.255	5.00	0.355	pCi/L		01/11/21 21:18	1

Job ID: 160-40221-1

5

9

Dil Fac

Y Carrier

QC Sample Results

Job ID: 160-40221-1

10

Method: 903.0 - Radium-226 (GFPC)

Lab Sample Matrix: Wate		60-4900	13/23-A						Client Samp	ole ID: Metho Prep Type: T	
Analysis Bat		889								Prep Batch:	
				Count	Total						
		МВ	МВ	Uncert.	Uncert.						
Analyte			Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226		-0.08283		0.124	0.124	1.00	0.300		11/24/20 07:52		
		МВ	МВ								
Carrier		%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Ba Carrier		137	<u>x</u>	40 - 110						12/23/20 12:08	
Lab Sample Matrix: Wate		160-490	013/1-A					Cli	ent Sample ID:	Lab Control Prep Type: T	
Analysis Bat		889								Prep Batch:	
						Total					
			Spike	-	LCS	Uncert.				%Rec.	
Analyte			Added	Result		(2σ+/-)	RL	MDC		Limits	
Radium-226			11.3	15.03	*	1.87	1.00	0.379	pCi/L 132	75 - 125	
	LCS	LCS									
Carrier	%Yield	Qualifier	Limits								
Ba Carrier	78.2		40 - 110	-							
Matrix: Wate Analysis Bat		889				Total				Prep Type: T Prep Batch:	
			Spike	I CSD	LCSD	Uncert.				%Rec.	REF
Analyte			Added	Result		(2σ+/-)	RL	MDC	Unit %Rec	Limits RE	
Radium-226	·			12.75		1.59	1.00		pCi/L 112	75 - 125 0.6	
									•		
. .		LCSD									
Carrier		Qualifier		-							
Ba Carrier	104		40 - 110								
lethod: 90	4.0 - Ra	dium-2	228 (GFPC								
Lab Sample	ID: MB 1	60-4900	16/23-A						Client Sam	ole ID: Metho	d Blanl
Matrix: Wate										Prep Type: T	
Analysis Bat		306								Prep Batch:	
				Count	Total						
		МВ	MB	Uncert.	Uncert.						
Analyte		Result	Qualifier	(2 σ +/-)	(2 σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fa
Radium-228		0.2258	U	0.171	0.172	1.00	0.269	pCi/L	11/24/20 08:31	12/22/20 08:31	
		MR	MB								
Carrier		MB %Yield		Limits					Prepared	Analvzed	Dil Fa
Carrier Ba Carrier			Qualifier	Limits 40 - 110					Prepared 11/24/20 08:31	Analyzed 12/22/20 08:31	Dil Fa

11/24/20 08:31 12/22/20 08:31

40 - 110

80.0

QC Sample Results

Job ID: 160-40221-1

roject/Site: J	IH Campb	ell Pond A	Wells											
ethod: 90)4.0 - Ra	dium-22	8 (GFPC)) (Cont	(inued))								
Lab Sample Matrix: Wat	ter		6/1-A					Clie	ent Sa	mple ID:	Lab Con Prep Typ	e: Tot	al/NA	
Analysis Ba	atch: 4928	300				Total					Prep Ba	tch: 49	90016	
			Spike	LCS	LCS	Uncert.					%Rec.			
Analyte			Added	Result		(2σ+/-)	RL	MDC	Unit	%Rec	Limits			
adium-228			7.56	7.794		0.991	1.00	0.484	pCi/L	103	75 - 125			
	LCS	LCS												
arrier		Qualifier	Limits											
a Carrier	78.2		40 - 110											
/ Carrier	85.2		40 - 110											
ab Sample	ID: LCSI	D 160-4900)16/2-A					Client S	ample	ID: Lab	Control S	ample	• Dup	
latrix: Wat											Prep Typ			ŀ
nalysis Ba	atch: 4928	300									Prep Ba			
						Total								
			Spike		LCSD	Uncert.					%Rec.		RER	
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC		%Rec	Limits	RER	Limit	
Radium-228			7.56	6.773		0.837	1.00	0.373	pCi/L	90	75 - 125	0.56	1	
	LCSD	LCSD												
Carrier	%Yield	Qualifier	Limits											
Ba Carrier	104		40 - 110											
Y Carrier	82.6		40 - 110											

QC Association Summary

Client: Consumers Energy Project/Site: JH Campbell Pond A Wells

Rad

Prep Batch: 490013

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch	
160-40221-1	JHC-MW-15006	Total/NA	Water	PrecSep STD	· · · · · · · · · · · · · · · · · · ·	
160-40221-2	JHC-MW-15008R	Total/NA	Water	PrecSep STD		k
160-40221-3	JHC-MW-15011	Total/NA	Water	PrecSep STD		
160-40221-4	DUP-04	Total/NA	Water	PrecSep STD		
160-40221-5	FB-04	Total/NA	Water	PrecSep STD		
160-40221-6	EB-04	Total/NA	Water	PrecSep STD		
MB 160-490013/23-A	Method Blank	Total/NA	Water	PrecSep STD		
LCS 160-490013/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD		
LCSD 160-490013/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD		
Prep Batch: 490016						
Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch	
160-40221-1	JHC-MW-15006	Total/NA	Water	PrecSep_0		
160-40221-2	JHC-MW-15008R	Total/NA	Water	PrecSep_0		1
160-40221-3	JHC-MW-15011	Total/NA	Water	PrecSep_0		
160-40221-4	DUP-04	Total/NA	Water	PrecSep_0		
160-40221-5	FB-04	Total/NA	Water	PrecSep_0		
160-40221-6	EB-04	Total/NA	Water	PrecSep_0		
MB 160-490016/23-A	Method Blank	Total/NA	Water	PrecSep_0		
LCS 160-490016/1-A	Lab Control Sample	Total/NA	Water	PrecSep 0		
		Total/Turt				
LCSD 160-490016/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0		

Method: 903.0 - Radium-226 (GFPC)

Matrix: Water

			Percent Yield (Acceptance Limits)
		Ва	
Lab Sample ID	Client Sample ID	(40-110)	
160-40221-1	JHC-MW-15006	148 X	
160-40221-2	JHC-MW-15008R	121 X	
160-40221-3	JHC-MW-15011	132 X	
160-40221-4	DUP-04	101	
160-40221-5	FB-04	169 X	
160-40221-6	EB-04	132 X	
LCS 160-490013/1-A	Lab Control Sample	78.2	
LCSD 160-490013/2-A	Lab Control Sample Dup	104	
MB 160-490013/23-A	Method Blank	137 X	

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC)

Matrix: Water

		Ва	Y
Lab Sample ID	Client Sample ID	(40-110)	(40-110)
160-40221-1	JHC-MW-15006	148 X	85.2
160-40221-2	JHC-MW-15008R	121 X	80.0
160-40221-3	JHC-MW-15011	132 X	92.7
160-40221-4	DUP-04	101	77.0
160-40221-5	FB-04	169 X	86.7
160-40221-6	EB-04	132 X	87.1
LCS 160-490016/1-A	Lab Control Sample	78.2	85.2
LCSD 160-490016/2-A	Lab Control Sample Dup	104	82.6
MB 160-490016/23-A	Method Blank	137 X	80.0

Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier

Prep Type: Total/NA

Prep Type: Total/NA

🛟 eurofins

Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis 13715 Rider Trail North Earth City, MO 63045 Tel: (314)298-8566

Laboratory Job ID: 160-40223-1

Client Project/Site: JH Campbell Background Wells

For:

Consumers Energy 135 W Trail Street Jackson, Michigan 49201

Attn: Emil Blaj

Authorized for release by: 1/23/2021 9:35:04 PM

Jayna Awalt, Project Manager II (314)298-8566 Jayna.Awalt@Eurofinset.com

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

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

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Expert

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Job ID: 160-40223-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Consumers Energy

Project: JH Campbell Background Wells

Report Number: 160-40223-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

RECEIPT

The samples were received on 11/02/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 12.6 C.

RADIUM 226 AS TOTAL ALPHA RADIUM

Samples JHC-MW-15023 (160-40223-1), JHC-MW-15024 (160-40223-2), JHC-MW-15025 (160-40223-3), JHC-MW-15026 (160-40223-4), JHC-MW-15027 (160-40223-5), JHC-MW-15028 (160-40223-6), DUP-01 (160-40223-7), EB-01 (160-40223-8) and FB-01 (160-40223-9)

Job ID: 160-40223-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

were analyzed for Radium 226 as Total Alpha Radium in accordance with EPA 903.0_Total Alpha Radium. The samples were prepared on 11/24/2020 and 12/03/2020 and analyzed on 12/23/2020 and 12/28/2020.

Batch: 490013

Insufficient sample volume was available to perform a sample duplicate for the following samples: JHC-MW-15023 (160-40223-1), JHC-MW-15024 (160-40223-2), JHC-MW-15025 (160-40223-3), JHC-MW-15026 (160-40223-4), JHC-MW-15027 (160-40223-5) and JHC-MW-15028 (160-40223-6). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) was prepared to demonstrate batch precision.

The LCS for Ra226 was outside the upper QC limit (132%). The LCSD was within control limits and the precision (RER/RPD) were acceptable. Additionally the activity in the associated samples was below the reporting limit indicating no adverse effect from the potential high bias. Original results will be reported. (LCS 160-490013/1-A)

The Barium recovery is above the 110% QC limit for the QC and client samples. The client requested the samples be reported without a native barium calculation applied. The LCS/LCSD spike recovery is within control limits, which demonstrates acceptable sample preparation and instrument performance. As such, this was an apparent anomaly in the sample preparation which did not affect the sample results. The associated samples have been truncated to 100% in order to minimize any potential bias a high carrier recovery may have on the results. JHC-MW-15023 (160-40223-1), JHC-MW-15024 (160-40223-2), JHC-MW-15025 (160-40223-3), JHC-MW-15026 (160-40223-4), JHC-MW-15027 (160-40223-5), JHC-MW-15028 (160-40223-6), (LCS 160-490013/1-A), (LCSD 160-490013/2-A) and (MB 160-490013/23-A)

Batch: 490781

Insufficient sample volume was available to perform a sample duplicate for the following samples: DUP-01 (160-40223-7), EB-01 (160-40223-8) and FB-01 (160-40223-9). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

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

RADIUM-228 (GFPC)

Samples JHC-MW-15023 (160-40223-1), JHC-MW-15024 (160-40223-2), JHC-MW-15025 (160-40223-3), JHC-MW-15026 (160-40223-4), JHC-MW-15027 (160-40223-5), JHC-MW-15028 (160-40223-6), DUP-01 (160-40223-7), EB-01 (160-40223-8) and FB-01 (160-40223-9) were analyzed for Radium-228 (GFPC) in accordance with EPA 904. The samples were prepared on 01/18/2021, 11/24/2020 and 12/03/2020 and analyzed on 01/21/2021, 12/22/2020 and 12/28/2020.

Batch: 490016

Insufficient sample volume was available to perform a sample duplicate for the following samples: JHC-MW-15023 (160-40223-1), JHC-MW-15024 (160-40223-2), JHC-MW-15025 (160-40223-3), JHC-MW-15026 (160-40223-4), JHC-MW-15027 (160-40223-5) and JHC-MW-15028 (160-40223-6). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

The Barium recovery is above the 110% QC limit for the QC and client samples. The client requested the samples be reported without a native barium calculation applied. The LCS/LCSD spike recovery is within control limits, which demonstrates acceptable sample preparation and instrument performance. As such, this was an apparent anomaly in the sample preparation. Which did not affect the sample results. The associated samples have been truncated to 100% in order to minimize any potential bias a high carrier recovery may have on the results. JHC-MW-15023 (160-40223-1), JHC-MW-15025 (160-40223-3), JHC-MW-15026 (160-40223-4), JHC-MW-15027 (160-40223-5), JHC-MW-15028 (160-40223-6), (LCS 160-490016/1-A), (LCSD 160-490016/2-A) and (MB 160-490016/2-A)

Batch: 490784

Insufficient sample volume was available to perform a sample duplicate for the following samples: DUP-01 (160-40223-7), EB-01 (160-40223-8) and FB-01 (160-40223-9). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

The LCS recovered at (132%) for Ra228. Samples are within the in-house statistical limits of (60-140%). No further action is required. (LCS 160-490784/1-A)

Job ID: 160-40223-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

The following samples have an RER (replicate error ratio) result outside of the acceptance criteria of 1 (1.02) for Ra228. Duplicate precision is demonstrated by acceptable relative percent difference (RPD), within the limit of 40% (25%). The data have been reported with this narrative. (LCSD 160-490784/2-A)

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

COMBINED RADIUM-226 AND RADIUM-228

Samples JHC-MW-15023 (160-40223-1), JHC-MW-15024 (160-40223-2), JHC-MW-15025 (160-40223-3), JHC-MW-15026 (160-40223-4), JHC-MW-15027 (160-40223-5), JHC-MW-15028 (160-40223-6), DUP-01 (160-40223-7), EB-01 (160-40223-8) and FB-01 (160-40223-9) were analyzed for Combined Radium-226 and Radium-228 in accordance with EPA 903 Radium 226/EPA 904 Radium 228. The samples were analyzed on 01/04/2021, 01/11/2021 and 01/22/2021.

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

Eurofins TestAmerica, St. Louis 13715 Rider Trail North				ч	ain o	Cust	Chain of Custody Record	#3	Seurofins Environment Teshog
Earth City, MO 63045-1205 phone 314.298.8566 fax 314.298.8757	Regul	Regulatory Program:		MD	NPDES	RCRA	Other:	TestAmerica La	TestAmerica Laboratories, Inc. d/b/a Eurofins TestAmerica
	Project Manager: Emil	ager: Em	il Blaj		Π				
Client Contact	Email: Emil.Blaj@cmsenergy.com	3laj@cmsei	nergy.com		S	e Contact	Swanberg	Date:	COC No:
Consumers Energy, Laboratory Services	Tel/Fax: 517-788-5888	7-788-5888			Ľ	b Contact	Lab Contact: Emil Blaj Ca	Carrier:	1 of 1 COCs
135 W. Irail Street	4	nalysis Tu	Analysis Turnaround Time	Time	T				Sampler: CLH/DMW/CET
Jackson, MI 49201	CALENDAR DAYS	IK DAYS	MON	WURKING DAYS		(For Lab Use Only:
Vvvv vvv vvv	TAT	TAT if different from Below	m Below			_			Walk-in Client:
JH Campbell Back		11	Z WEEKS 1 WEEK		-				Lab Sampling:
Project #: 20-1192 P O # 4400094796	ioc M	2 days	2 days 1 dav		ə	8 A93) i			Job / SDG No.:
Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	Cont. Preservativ	erform MS Radium 226 225 muibe?			
JHC-MW-15023	10/20/2020	1603	U	GW	11	×			outline opecific Notes:
JHC-MW-15024	10/20/20	1452	U	GW	2 2	× × Z			
JHC-MW-15025	10/20/20	1355	U	GW	2 2	× × Z			
JHC-MW-15026	10/20/20	1251	U	GW	2 2	N × ×			
JHC-MW-15027	10/20/20	1200	U	GW	2 2	N × ×			
0 JHC-MW-15028	10/20/20	1038	IJ	GW	2 2	× × N			
DUP-01	1	ţ.	IJ	GW	2 2	N × ×			
EB-01	10/20/2020	1612	Ð	DI	2 2	N × ×			
FB-01	10/20/2020	1414	g	D	2 2	N × ×			
								160-40223 C	160-40223 Chain of Custody
Preservation Used: 1= [ce. 2= HC]: 3= H2SO4: 4=HNO3: 5=NaOH: 6= Other	03: 5=NaOH·6=	Other						_	
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Comments Section if the lab is to dispose of the sample.	Please List any EPA Waste Codes for the sample in the	A Waste C	odes for th	e sample	in the	Sample D	isposal (A fee may be as	sessed if samples are reta	Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
Von-Hazard Flammable Skin Irritant	t Poison B		Unknown	um		Return	Return to Client	Disposal by Lab	or Months
special instructions/JC Kequirements & Comments:									
Custody Seals Intact:	Custody Seal No.:	I No.:					Cooler Temp. (°C): Obs'd:	Corr'd:	Therm ID No :
Relinquished by: This Rute	Company:	n Ene	2	Date/Time:	te lour	Received by:	N. LIR	Company:	Date/Time:
	Company:			Date/Time:		Progred by a L	Xa Parinhin	E that	Patertine 11.04
Relinquished by:	Company:			Date/Time:	le:	Received i	Received in Laboratory by:	T	Date/Time:
21								Form No. (Form No. CA-C-WI-002, Rev. 4.23, dated 4/16/2019



Laboratory Services

135 W. Trail Street Jackson, MI 49201

TestAmerica Michigan 10448 Citation Drive; Ste 200 Brighton, MI 48116

PROCUREMENT #: 20101220

QA Code: NQ

(Item 1) - Part Number: N/A - Quantity : 1 JHC CCR Rule GW Q4-2020 Samples

Groundwater Samples for Radium 226 (EPA 903.1) and Radium 228 (EPA 904.0)

Standard TAT Request.

Reference Quote #16009066-0

(Item 2) - Part Number: NA - Quantity : 1 Please include Consumers Energy Project Number and Procurement Number on all submitted invoices

For technical questions, please contact Emil Blaj at 517-788-5888, or Emil.Blaj@cmsenergy.com.

To expedite payment please provide the Procurement number on all invoices.

Send Invoices To:

Consumers Energy Company Attn: Accounts Payable 135 W Trail St. Jackson, MI 49201

Client: Consumers Energy

Login Number: 40223 List Number: 1 Creator: Hoerchler, Elizabeth M

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

Job Number: 160-40223-1

List Source: Eurofins TestAmerica, St. Louis

Definitions/Glossary

Client: Consumers Energy Project/Site: JH Campbell Background Wells

Job ID: 160-40223-1

5

6

Qualifiers

Rad Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
*	RPD of the LCS and LCSD exceeds the control limits
U	Result is less than the sample detection limit.
х	Carrier is outside acceptance limits.

Glossary

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

Method Summary

Client: Consumers Energy Project/Site: JH Campbell Background Wells

Method	Method Description	Protocol	Laboratory
903.0	Radium-226 (GFPC)	EPA	TAL SL
904.0	Radium-228 (GFPC)	EPA	TAL SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	TAL SL
PrecSep STD	Preparation, Precipitate Separation (Standard In-Growth)	None	TAL SL
PrecSep 0	Preparation, Precipitate Separation	None	TAL SL

None = None

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

Laboratory References:

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

Sample Summary

Client: Consumers Energy Project/Site: JH Campbell Background Wells

Job ID: 160-40223-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	As
160-40223-1	JHC-MW-15023	Water	10/20/20 16:03	11/02/20 11:04	
160-40223-2	JHC-MW-15024	Water	10/20/20 14:52	11/02/20 11:04	
160-40223-3	JHC-MW-15025	Water	10/20/20 13:55	11/02/20 11:04	
160-40223-4	JHC-MW-15026	Water	10/20/20 12:51	11/02/20 11:04	
160-40223-5	JHC-MW-15027	Water	10/20/20 12:00	11/02/20 11:04	
160-40223-6	JHC-MW-15028	Water	10/20/20 10:38	11/02/20 11:04	
160-40223-7	DUP-01	Water	10/20/20 00:00	11/02/20 11:04	
160-40223-8	EB-01	Water	10/20/20 16:12	11/02/20 11:04	
160-40223-9	FB-01	Water	10/20/20 14:14	11/02/20 11:04	

Client: Consumers Energy Project/Site: JH Campbell Background Wells

Client Sample ID: JHC-MW-15023

Date Collected: 10/20/20 16:03

Date Received: 11/02/20 11:04

Job ID: 160-40223-1

Fac 1 Fac 1 9

Lab Sample ID: 160-40223-1 Matrix: Water

Method: 903.0 -	Radium-226	(GFPC)								
			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analvzed	Dil Fa
Radium-226	0.0774		0.146	0.146	1.00	0.262		11/24/20 07:52	12/23/20 09:59	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Ba Carrier	146	x	40 - 110					11/24/20 07:52	12/23/20 09:59	

Method: 904.0 - Radium-228 (GFPC)

		. ,	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0481	U	0.105	0.105	1.00	0.182	pCi/L	11/24/20 08:31	12/22/20 08:38	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	146	X	40 - 110					11/24/20 08:31	12/22/20 08:38	1
Y Carrier	95.3		40 - 110					11/24/20 08:31	12/22/20 08:38	1

Method: Ra226_Ra228 - Combined Radium-226 and Radium-228

			Count	Total					
			Uncert.	Uncert.					
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.126	U	0.180	0.180	5.00	0.262 pCi/L		01/11/21 21:18	1

Client Sample ID: JHC-MW-15024 Date Collected: 10/20/20 14:52

Date Received: 11/02/20 11:04

Method: 903.0 - Radium-226 (GFPC)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2 σ+/-)	(2 σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.0300	U *	0.134	0.134	1.00	0.294	pCi/L	11/24/20 07:52	12/23/20 09:59	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	124	X	40 - 110					11/24/20 07:52	12/23/20 09:59	1

Method: 904.0 - Radium-228 (GFPC)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.199	U	0.309	0.310	1.00	0.582	pCi/L	01/18/21 08:52	01/21/21 08:54	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	86.9		40 - 110					01/18/21 08:52	01/21/21 08:54	1
Y Carrier	95.7		40 - 110					01/18/21 08:52	01/21/21 08:54	1

Lab Sample ID: 160-40223-2

Matrix: Water

Client: Consumers Energy Project/Site: JH Campbell Background Wells

ient: Consumers Ene				nt Samp					Job ID: 160-4	0223-1
roject/Site: JH Camp	bell Back	ground Wel	ls							
lient Sample ID: ate Collected: 10/20								Lab Sample		223-2 Water
ate Received: 11/02	/20 11:04									
Method: Ra226_Ra2	28 - Con	bined Rac	lium-226 a	nd Radium	-228					
-			Count	Total						
			Uncert.	Uncert.						
Analyte		Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC		Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	-0.229	U	0.337	0.338	5.00	0.582	pCi/L		01/22/21 21:47	1
lient Sample ID:	JHC-M	W-15025						Lab Sample	D: 160-40	223-3
ate Collected: 10/20										Water
Date Received: 11/02										
Method: 903.0 - Rad	lium-226	(GFPC)								
		. ,	Count	Total						
			Uncert.	Uncert.						
Analyte		Qualifier	(2 σ +/-)	(2σ+/-)	RL	MDC		Prepared	Analyzed	Dil Fac
Radium-226	0.0294	U *	0.140	0.140	1.00	0.269	pCi/L	11/24/20 07:52	12/23/20 09:59	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	182	-	40 - 110					11/24/20 07:52		1
Method: 904.0 - Rad	lium-228	(GFPC)	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.114		0.128	0.128	1.00	0.209		11/24/20 08:31		1
Carrier		Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier Y Carrier	182 80.4	X	40 - 110 40 - 110					11/24/20 08:31	12/22/20 08:30 12/22/20 08:30	1 1
	00.4		40-110					11/24/20 00.31	12/22/20 00.30	,
Method: Ra226_Ra2	28 - Com	nbined Rac	lium-226 a	nd Radium	-228					
			Count	Total						
• • •		o	Uncert.	Uncert.						
Analyte		Qualifier	<u>(2σ+/-)</u>	(2σ+/-)	RL	MDC		Prepared	Analyzed 01/11/21 21:18	Dil Fac
Combined Radium 226 + 228	0.144	0	0.190	0.190	5.00	0.269	pCI/L		01/11/21 21:18	1
light Sample ID:		W 15026						Lab Sample	D: 160 40	1002 A
Client Sample ID:								Lab Sample		
Date Collected: 10/20 Date Received: 11/02									watrix	Water
	20 11.04									
Method: 903.0 - Rad	lium-226	(GFPC)	• · ·							
			Count	Total						
Analysia	Decel	Qualifier	Uncert.	Uncert.		1100	115:14	Dura a succel	A	
Analyte Radium-226	0.0589	Qualifier	<u>(2σ+/-)</u> 0.143	<u>(2σ+/-)</u> 0.143	RL 1.00	0.264		Prepared 11/24/20 07:52	Analyzed 12/23/20 09:59	Dil Fac
1.441411-22U	0.0009	5	0.143	0.143	1.00	0.204	POIL	11/2 4 /20 07.32	12120120 03.09	
								Drenered	Analyzad	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac

Client: Consumers Energy Project/Site: JH Campbell Background Wells

roject/Site: JH Campb	rgy	around Wo		nt Samp					Job ID: 160-4	0223-1
									ID: 400.40	000 4
ate Collected: 10/20/	20 12:51	I						Lab Sample)223-4 : Water
Date Received: 11/02/2										
Method: 904.0 - Radi	um-228	(GFPC)	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2 σ +/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.107	U	0.213	0.213	1.00	0.364	pCi/L	11/24/20 08:31	12/22/20 08:30	1
Carrier	% Viold	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	154		40 - 110					<u>11/24/20 08:31</u>	12/22/20 08:30	1
Y Carrier	53.1		40 - 110						12/22/20 08:30	1
-										
Method: Ra226_Ra22	28 - Com	ibined Rac			-228					
			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226	0.166		0.257	0.257	5.00	0.364			01/11/21 21:18	1
+ 228		-					P = =			-
Method: 903.0 - Radi	um-220	(GFPC)	Count	Total						
			Uncert.	Uncert.						
Analyte		Qualifier	(2 σ+/-)	(2 σ+/-)	RL	MDC	Unit	Prepared	Analyzed	
Radium-226	0.123	U *	0.210	0.210	1.00		nCi/l	•		Dil Fac
					1.00	0.368	poi/L	11/24/20 07:52	12/23/20 09:59	Dil Fac 1
Carrier	%Yield	Qualifier	Limits		1.00	0.368	poi/L	11/24/20 07:52 Prepared	12/23/20 09:59 Analyzed	
Carrier Ba Carrier	% Yield 93.9	Qualifier	Limits 40 - 110		1.00	0.368	POIL	Prepared		1
Ba Carrier	93.9				1.00	0.368	point	Prepared	Analyzed	1 Dil Fac
	93.9		40 - 110		1.00	0.368	point	Prepared	Analyzed	1 Dil Fac
Ba Carrier	93.9		40 - 110 Count	Total	1.00	0.368	point	Prepared	Analyzed	1 Dil Fac
Ba Carrier Method: 904.0 - Radi	93.9 i um-228	(GFPC)	40 - 110 Count Uncert.	Total Uncert.	RL	0.368 MDC		Prepared 11/24/20 07:52	Analyzed 12/23/20 09:59	1 Dil Fac
Ba Carrier Method: 904.0 - Radi	93.9 i um-228	(GFPC) Qualifier	40 - 110 Count	Total			Unit	Prepared	Analyzed	1 <u>Dil Fac</u> 1
Ba Carrier Method: 904.0 - Radi Analyte	93.9 ium-228 Result -0.00875	(GFPC) Qualifier	40 - 110 Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared 11/24/20 07:52 Prepared	Analyzed 12/23/20 09:59 Analyzed	1 Dil Fac 1 Dil Fac
Ba Carrier Method: 904.0 - Radi Analyte Radium-228	93.9 ium-228 Result -0.00875	(GFPC) Qualifier U	40 - 110 Count Uncert. (2σ+/-) 0.229	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared 11/24/20 07:52 Prepared 11/24/20 08:31 Prepared	Analyzed 12/23/20 09:59 Analyzed 12/22/20 08:30	1 <u>Dil Fac</u> 1 <u>Dil Fac</u> 1
Ba Carrier Method: 904.0 - Radi Analyte Radium-228 Carrier	93.9 ium-228 Result -0.00875 %Yield	(GFPC) Qualifier U	40 - 110 Count Uncert. (2σ+/-) 0.229 Limits	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared 11/24/20 07:52 Prepared 11/24/20 08:31 Prepared 11/24/20 08:31	Analyzed 12/23/20 09:59 Analyzed 12/22/20 08:30 Analyzed	1 Dil Fac 1 Dil Fac 1 Dil Fac
Ba Carrier Method: 904.0 - Radi Analyte Radium-228 Carrier Ba Carrier Y Carrier	93.9 jum-228 Result -0.00875 %Yield 93.9 82.6	(GFPC) Qualifier U Qualifier	40 - 110 Count Uncert. (2σ+/-) 0.229 Limits 40 - 110 40 - 110 dium-226 a	Total Uncert. (2σ+/-) 0.229 nd Radium	RL 1.00	MDC	Unit	Prepared 11/24/20 07:52 Prepared 11/24/20 08:31 Prepared 11/24/20 08:31	Analyzed 12/23/20 09:59 Analyzed 12/22/20 08:30 Analyzed 12/22/20 08:30	1 Dil Fac 1 Dil Fac 1 Dil Fac 1
Ba Carrier Method: 904.0 - Radi Analyte Radium-228 Carrier Ba Carrier Y Carrier	93.9 jum-228 Result -0.00875 %Yield 93.9 82.6	(GFPC) Qualifier U Qualifier	40 - 110 Count Uncert. (2σ+/-) 0.229 Limits 40 - 110 40 - 110 dium-226 a Count	Total Uncert. (2σ+/-) 0.229 – nd Radium Total	RL 1.00	MDC	Unit	Prepared 11/24/20 07:52 Prepared 11/24/20 08:31 Prepared 11/24/20 08:31	Analyzed 12/23/20 09:59 Analyzed 12/22/20 08:30 Analyzed 12/22/20 08:30	1 Dil Fac 1 Dil Fac 1 Dil Fac 1
Ba Carrier Method: 904.0 - Radi Analyte Radium-228 Carrier Ba Carrier	93.9 ium-228 Result -0.00875 %Yield 93.9 82.6 28 - Com	(GFPC) Qualifier U Qualifier	40 - 110 Count Uncert. (2σ+/-) 0.229 Limits 40 - 110 40 - 110 dium-226 a	Total Uncert. (2σ+/-) 0.229 nd Radium	RL 1.00	MDC	Unit pCi/L	Prepared 11/24/20 07:52 Prepared 11/24/20 08:31 Prepared 11/24/20 08:31	Analyzed 12/23/20 09:59 Analyzed 12/22/20 08:30 Analyzed 12/22/20 08:30	1 Dil Fac 1 Dil Fac 1 Dil Fac 1

Total

Uncert.

(2**σ+/-**)

0.140

Count

Uncert.

(20+/-)

Limits

40 - 110

0.140

Client: Consumers Energy Project/Site: JH Campbell Background Wells

Client Sample ID: JHC-MW-15028

Method: 903.0 - Radium-226 (GFPC)

Date Collected: 10/20/20 10:38

Date Received: 11/02/20 11:04

Analyte

Carrier

Ba Carrier

Radium-226

Job ID: 160-40223-1

Matrix: Water

Lab Sample ID: 160-40223-6

Analyzed

Analyzed

11/24/20 07:52 12/23/20 12:08

11/24/20 07:52 12/23/20 12:08

Prepared

Prepared

Dil Fac 1 Dil Fac

1

8
Q

Method: 904.0 - Radium-228 (GFPC)

			Count Uncert.	Total Uncert.							
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac	
Radium-228	0.346		0.166	0.169	1.00	0.240	pCi/L	11/24/20 08:31	12/22/20 08:30	1	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac	
Ba Carrier	140	X	40 - 110					11/24/20 08:31	12/22/20 08:30	1	
Y Carrier	85.6		40 - 110					11/24/20 08:31	12/22/20 08:30	1	

RL

1.00

MDC Unit

0.258 pCi/L

Method: Ra226 Ra228 - Combined Radium-226 and Radium-228

Result Qualifier

%Yield Qualifier

140 X

0.0578 U*

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.403		0.217	0.219	5.00	0.258	pCi/L		01/11/21 21:18	1

Client Sample ID: DUP-01

Date Collected: 10/20/20 00:00 Date Received: 11/02/20 11:04

Lab Sample ID: 160-40223-7 Matrix: Water

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2 σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0810	U	0.171	0.171	1.00	0.313	pCi/L	12/03/20 08:22	12/28/20 13:17	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	83.1		40 - 110					12/03/20 08:22	12/28/20 13:17	1
Method: 904.0 -	Radium-228	(GFPC)								
			Count	Total						
			Uncert.	Uncert.						
	D 14	Qualifier	(2σ+/-)	(2 σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Analyte	Result	Quanner	(=0 1)	(=• .)						

Carrier	%Yield	Qualifier Limits	Prepared	Analyzed
Ba Carrier	83.1	40 - 110	12/03/20 08:51	12/28/20 08:25
Y Carrier	103	40 - 110	12/03/20 08:51	12/28/20 08:25

Dil Fac

1

Client: Consumers Energy Project/Site: JH Campbell Background Wells Job ID: 160-40223-1

Lab Sample ID: 160-40223-7 Client Sample ID: DUP-01 Date Collected: 10/20/20 00:00 Matrix: Water Date Received: 11/02/20 11:04 Method: Ra226_Ra228 - Combined Radium-226 and Radium-228 Count Total Uncert. Uncert. Analyte **Result Qualifier** (2σ+/-) (2σ+/-) RL MDC Unit Prepared Analyzed Dil Fac Combined Radium 226 0.302 U 0.300 0.301 5.00 0.406 pCi/L 01/04/21 20:59 + 228 Client Sample ID: EB-01 Lab Sample ID: 160-40223-8 Date Collected: 10/20/20 16:12 Matrix: Water Date Received: 11/02/20 11:04 Method: 903.0 - Radium-226 (GFPC) Count Total Uncert. Uncert. Analyte Result Qualifier (2**σ**+/-) (2σ+/-) RL MDC Unit Prepared Analyzed Dil Fac Radium-226 0.128 U 0.229 0.229 1.00 0.402 pCi/L 12/03/20 08:22 12/28/20 13:17 %Yield Qualifier Carrier Limits Prepared Analyzed Dil Fac Ba Carrier 81.7 40 - 110 12/03/20 08:22 12/28/20 13:17 Method: 904.0 - Radium-228 (GFPC) Count Total Uncert. Uncert. Analyte **Result Qualifier** (2**σ**+/-) (2σ+/-) RL MDC Unit Prepared Analyzed Dil Fac Radium-228 0.000 U* 0.443 pCi/L 12/03/20 08:51 12/28/20 08:25 0.248 0.248 1.00 1 Carrier %Yield Qualifier Limits Prepared Analyzed Dil Fac Ba Carrier 81.7 40 - 110 12/03/20 08:51 12/28/20 08:25 1 Y Carrier 87.5 40 - 110 12/03/20 08:51 12/28/20 08:25 1 Method: Ra226 Ra228 - Combined Radium-226 and Radium-228 Total Count Uncert. Uncert. (2**σ**+/-) MDC Unit Analyte **Result Qualifier** (2σ+/-) RL Prepared Analyzed Dil Fac Combined Radium 226 0.128 U 0.338 0.338 5.00 0.443 pCi/L 01/04/21 20:59 1 + 228 Client Sample ID: FB-01 Lab Sample ID: 160-40223-9 Date Collected: 10/20/20 14:14 Matrix: Water Date Received: 11/02/20 11:04 Method: 903.0 - Radium-226 (GFPC) Total Count Uncert. Uncert. (2**σ**+/-) Analyte **Result Qualifier** (2**σ**+/-) MDC Unit RL Prepared Analyzed Dil Fac 0.0751 U Radium-226 12/03/20 08:22 12/28/20 13:17 0.209 0.209 1.00 0.389 pCi/L 1 %Yield Qualifier Carrier Limits Prepared Analyzed Dil Fac Ba Carrier 73.9 40 - 110 12/03/20 08:22 12/28/20 13:17 1

Eurofins TestAmerica, St. Louis

Client: Consumers Energy Project/Site: JH Campbell Background Wells

Job ID: 160-40223-1

Lab Sample ID: 160-40223-9

Client Sample ID: FB-01 Date Collected: 10/20/20 14:14 Date Received: 11/02/20 11:04

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.225	U *	0.320	0.320	1.00	0.535	pCi/L	12/03/20 08:51	12/28/20 08:25	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	73.9		40 - 110					12/03/20 08:51	12/28/20 08:25	1
Y Carrier	81.1		40 - 110					12/03/20 08:51	12/28/20 08:25	1
Method: Ra226_Ra	228 - Com	nbined Rad	dium-226 a Count Uncert.	nd Radium Total Uncert.	-228					
Analyte	Result	Qualifier	(2 σ +/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac

Matrix: Water

Job ID: 160-40223-1

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Method: 903.0 - Radium-226 (GFPC)

Lab Sample Matrix: Wate		60-4900	13/23-A						Cli	ent Samp	Die ID: Met		
		00									Prep Type		
Analysis Bat	cn: 4928	89		0	Tatal						Prep Bato	n: 4	9001
		мв	MD	Count	Total Uncert.								
A				Uncert.		ы	MDC	11		Juanavad	A nobra d		
Analyte			Qualifier	(2σ+/-)	(2σ+/-)			Unit		Prepared	Analyzed		Dil F
Radium-226		-0.08283	U	0.124	0.124	1.00	0.300	pCI/L	11/2	24/20 07:52	12/23/20 12	:08	
• ·			MB						-				
Carrier		% Yield 137	Qualifier _	Limits						Prepared	Analyzed		Dil F
Ba Carrier		137	X	40 - 110					117.	24/20 07:52	12/23/20 12	:08	
Lab Sample Matrix: Wate		160-490	013/1-A					Cli	ent Sa	mple ID:	Lab Contr Prep Type		
Analysis Bat		89									Prep Bato		
-						Total							
			Spike	LCS	LCS	Uncert.					%Rec.		
Analyte			Added	Result	Qual	(2 σ+/-)	RL	MDC	Unit	%Rec	Limits		
Radium-226			11.3	15.03	*	1.87	1.00	0.379	pCi/L	132	75 - 125		
	LCS	LCS											
Carrier	%Yield	Qualifier	Limits										
Ba Carrier	78.2		40 - 110	-									
Lab Sample		160-49	0013/2-0					Client S	ample	D· I ah	Control Sa	mnl	
Matrix: Wate		7 100-43	0013/2-A					onent o	ampie		Prep Type		
Analysis Bat	-	80									Prep Bato		
		00				Total					Thep Bate		
			Spike		LCSD	Uncert.					%Rec.		R
Analyte			Added	Result		(2σ+/-)	RL	MDC	Unit	%Rec		RER	Li
Radium-226				12.75	<u>u</u> uai	1.59	1.00	0.360				0.66	
			11.0	12.10		1.00	1.00	0.000	p01/2		101120	0.00	
. .	LCSD												
Carrier		Qualifier		_									
Ba Carrier	104		40 - 110										
Lab Sample	ID: MB 1	60-4907	81/23-A						Cli	ent Samp	ole ID: Met	hod	Bla
Matrix: Wate	r										Prep Type	: Tot	tal/I
Analysis Bat	tch: 4931	76									Prep Bate	:h: 49	907
				Count	Total								
		MB		Uncert.	Uncert.								
Analyte			Qualifier	(2 σ +/-)	(2 σ +/-)	RL	MDC			Prepared	Analyzed		Dil F
Radium-226		0.09532	U	0.175	0.176	1.00	0.311	pCi/L	12/	03/20 08:22	12/28/20 19	:04	
		МВ	МВ										
Carrier			Qualifier	Limits						Prepared	Analyzed		Dil F
Ba Carrier		83.1		40 - 110					12/	03/20 08:22	12/28/20 19	:04	
Lab Sample	ID: LCS	160-490	781/1-A					Cli	ent Sa	mple ID:	Lab Contr	ol Sa	amp
Matrix: Wate											Prep Type		
Analysis Bat		76									Prep Bato		
						Total							
			Spike	LCS	LCS	Uncert.					%Rec.		
			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits		
Analyte			Audeu		Guui	(2017)		WDC	Unit	/01/00	Elinits		_

10

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

Lab Sample I Matrix: Water	r		781/1-A					Clie	ent Sa		Lab Cont Prep Typ	e: Tot	al/NA
Analysis Bate	ch: 4931	76									Prep Bat	ch: 4	90781
	LCS	LCS											
Carrier	%Yield	Qualifier	· Limits										
Ba Carrier	83.7		40 - 110	-									
_													_
Lab Sample I) 160-49	0781/2-A					Client S	ample		Control S		
Matrix: Water											Prep Typ		
Analysis Bate	cn: 4931	76				Total					Prep Bat	cn: 4	90781
			Spiko		LCSD	Total Uncert.					%Rec.		RER
Analyte			Spike Added	Result		(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Radium-226				10.46		1.41	1.00	0.394		92	75 - 125	0.15	1
			11.0	10.40		1.41	1.00	0.004	poi/L	02	10-120	0.10	
	LCSD												
Carrier		Qualifier		_									
Ba Carrier	76.8		40 - 110										
Method: 904	I.0 - Ra	dium-2	228 (GFPC	;)									
_				,									
Lab Sample I		60-4900	16/23-A						Clie		le ID: Me		
Matrix: Water											Prep Typ		
Analysis Bate	cn: 4928	06		Count	Total						Prep Bat	cn: 4	90016
		MD	МВ	Uncert.	Uncert.								
Analyte			Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Р	repared	Analyze	hd	Dil Fac
Radium-228		0.2258		0.171	0.172	1.00	0.269			24/20 08:31			1
Carrier			MB Qualifier	Limits						repared	Analyze	d	Dil Fac
Ba Carrier		137		40 - 110						24/20 08:31			1
Y Carrier		80.0	X	40 - 110						24/20 08:31			1
_									11/2		12/22/200	0.31	
I oh Comple l				40 - 110									
	D: LCS	160-490	016/1-A	40 - 110				Clie		mple ID:	Lab Cont	rol Sa	ample
Matrix: Water	r		016/1-A	40 - 110				Clie		mple ID:	Lab Cont Prep Typ	rol Sa e: Tot	ample al/NA
	r		016/1-A	40 - 110		_ / .		Clie		mple ID:	Lab Cont	rol Sa e: Tot	ample al/NA
Matrix: Water	r					Total		Clie		mple ID:	Lab Cont Prep Typ Prep Bat	rol Sa e: Tot	ample al/NA
Matrix: Water Analysis Bate	r		Spike	LCS	LCS	Uncert.	5		ent Sa	mple ID:	Lab Cont Prep Typ Prep Bat %Rec.	rol Sa e: Tot	ample al/NA
Matrix: Water Analysis Bate Analyte	r		Spike Added	LCS Result		Uncert. (2σ+/-)	<u></u>	MDC	ent Sa	mple ID: %Rec	Lab Cont Prep Typ Prep Bat %Rec. Limits	rol Sa e: Tot	ample al/NA
Matrix: Water Analysis Bate	r		Spike	LCS		Uncert.	RL 1.00		ent Sa	mple ID:	Lab Cont Prep Typ Prep Bat %Rec.	rol Sa e: Tot	ample al/NA
Matrix: Water Analysis Bate Analyte	r	300	Spike Added	LCS Result		Uncert. (2σ+/-)		MDC	ent Sa	mple ID: %Rec	Lab Cont Prep Typ Prep Bat %Rec. Limits	rol Sa e: Tot	ample al/NA
Matrix: Water Analysis Bate Analyte	r ch: 4928 <i>L</i> CS	300	Spike Added 7.56	LCS Result		Uncert. (2σ+/-)		MDC	ent Sa	mple ID: %Rec	Lab Cont Prep Typ Prep Bat %Rec. Limits	rol Sa e: Tot	ample al/NA
Matrix: Water Analysis Bate Analyte Radium-228	r ch: 4928 	800 LCS	Spike Added 7.56	LCS Result		Uncert. (2σ+/-)		MDC	ent Sa	mple ID: %Rec	Lab Cont Prep Typ Prep Bat %Rec. Limits	rol Sa e: Tot	ample al/NA
Matrix: Water Analysis Bate Analyte Radium-228 Carrier	r ch: 4928 LCS %Yield	800 LCS	Spike Added 7.56	LCS Result		Uncert. (2σ+/-)		MDC	ent Sa	mple ID: %Rec	Lab Cont Prep Typ Prep Bat %Rec. Limits	rol Sa e: Tot	ample al/NA
Matrix: Water Analysis Bato Analyte Radium-228 Carrier Ba Carrier	r ch: 4928 <u><i>LCS</i></u> %Yield 78.2 85.2	300 LCS Qualifier	Spike Added 7.56 Limits 40 - 110 40 - 110	LCS Result		Uncert. (2σ+/-)	1.00	MDC 0.484	unit pCi/L	mple ID: - <u>%Rec</u> 103 -	Lab Cont Prep Typ Prep Bat %Rec. Limits	crol Sa e: Tot ch: 4	ample al/NA 90016
Matrix: Water Analysis Bato Analyte Radium-228 Carrier Ba Carrier Y Carrier	r ch: 4928 <u><i>k</i>CS</u> <u>%Yield</u> 78.2 85.2 D: LCSE	300 LCS Qualifier	Spike Added 7.56 Limits 40 - 110 40 - 110	LCS Result		Uncert. (2σ+/-)	1.00	MDC 0.484	unit pCi/L	mple ID: - <u>%Rec</u> 103	Lab Cont Prep Typ Prep Bat %Rec. Limits 75 - 125	ample	ample cal/NA 90016
Matrix: Water Analysis Bato Analyte Radium-228 Carrier Ba Carrier Y Carrier Lab Sample I	r ch: 4928 <u><i>LCS</i></u> %Yield 78.2 85.2 D: LCSE	SOO LCS Qualifier D 160-49	Spike Added 7.56 Limits 40 - 110 40 - 110	LCS Result		Uncert. (2σ+/-)	1.00	MDC 0.484	unit pCi/L	mple ID: - <u>%Rec</u> 103	Lab Cont Prep Typ Prep Bat %Rec. Limits 75 - 125	arol Sa e: Tol ch: 4 	ample cal/NA 90016
Matrix: Water Analysis Bate Analysis Bate Radium-228 Carrier Ba Carrier Y Carrier Lab Sample I Matrix: Water	r ch: 4928 <u><i>LCS</i></u> %Yield 78.2 85.2 D: LCSE	SOO LCS Qualifier D 160-49	Spike Added 7.56 Limits 40 - 110 40 - 110	LCS Result		Uncert. (2σ+/-)	1.00	MDC 0.484	unit pCi/L	mple ID: - <u>%Rec</u> 103	Lab Cont Prep Typ Prep Bat %Rec. Limits 75 - 125	arol Sa e: Tol ch: 4 	ample cal/NA 90016
Matrix: Water Analysis Bate Analysis Bate Radium-228 Carrier Ba Carrier Y Carrier Lab Sample I Matrix: Water	r ch: 4928 <u><i>LCS</i></u> %Yield 78.2 85.2 D: LCSE	SOO LCS Qualifier D 160-49	Spike Added 7.56 Limits 40 - 110 40 - 110	LCS Result 7.794		Uncert. (2σ+/-) 0.991	1.00	MDC 0.484	unit pCi/L	mple ID: - <u>%Rec</u> 103	Lab Cont Prep Typ Prep Bat %Rec. Limits 75 - 125	arol Sa e: Tol ch: 4 	ample cal/NA 90016
Matrix: Water Analysis Bate Analysis Bate Radium-228 Carrier Ba Carrier Y Carrier Lab Sample I Matrix: Water	r ch: 4928 <u><i>LCS</i></u> %Yield 78.2 85.2 D: LCSE	SOO LCS Qualifier D 160-49	Spike Added 7.56 <u>Limits</u> 40 - 110 40 - 110 20016/2-A	LCS Result 7.794	Qual	Uncert. (2σ+/-) 0.991	1.00	MDC 0.484	Unit pCi/L ample Unit	mple ID: - <u>%Rec</u> 103	Lab Cont Prep Typ Prep Bat %Rec. Limits 75-125 Control S Prep Typ Prep Bat	arol Sa e: Tol ch: 4 	e Dup cal/NA 20016

QC Sample Results

10

Method: 904.0 - Radium-228 (GFPC) (Continued) Lab Sample ID: LCSD 160-490016/2-A **Client Sample ID: Lab Control Sample Dup Matrix: Water** Prep Type: Total/NA Analysis Batch: 492800 Prep Batch: 490016 LCSD LCSD %Yield Qualifier Carrier Limits Ba Carrier 104 40_110 Y Carrier 82.6 40 - 110 Lab Sample ID: MB 160-490784/23-A **Client Sample ID: Method Blank Matrix: Water Prep Type: Total/NA** Prep Batch: 490784 Analysis Batch: 493206 Count Total MB MB Uncert. Uncert. Analyte **Result Qualifier** (2**σ**+/-) (2σ+/-) RL MDC Unit Prepared Analyzed Dil Fac Radium-228 0.266 1.00 0.384 pCi/L 12/03/20 08:51 12/28/20 08:29 0.5069 0.262 1 MB MB Carrier %Yield Qualifier Limits Prepared Analyzed Dil Fac Ba Carrier 83.1 40 - 110 12/03/20 08:51 12/28/20 08:29 1 12/03/20 08:51 12/28/20 08:29 Y Carrier 90.8 40 - 110 1 Lab Sample ID: LCS 160-490784/1-A **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA Analysis Batch: 493174 **Prep Batch: 490784** Total LCS LCS Spike Uncert. %Rec. Analyte Added (2σ+/-) RL %Rec Limits **Result Qual** MDC Unit Radium-228 7.55 9 968 1.00 0.487 pCi/L 132 75 - 125 1.19 LCS LCS Carrier %Yield Qualifier Limits Ba Carrier 83.7 40 - 110 Y Carrier 78.9 40 - 110 Lab Sample ID: LCSD 160-490784/2-A **Client Sample ID: Lab Control Sample Dup** Matrix: Water Prep Type: Total/NA Prep Batch: 490784 Analysis Batch: 493174 Total Spike LCSD LCSD Uncert. %Rec. RER Analyte Added Result Qual (2σ+/-) RL MDC Unit %Rec Limits RER Limit Radium-228 7.55 7.788 0.935 1.00 0.381 pCi/L 103 75 - 125 1.02 1 LCSD LCSD %Yield Qualifier Carrier Limits Ba Carrier 76.8 40 - 110 Y Carrier 110 40 - 110 Lab Sample ID: MB 160-495466/14-A **Client Sample ID: Method Blank** Prep Type: Total/NA Matrix: Water Analysis Batch: 496078 Prep Batch: 495466 Count Total MB MB Uncert. Uncert. **Result Qualifier** Dil Fac Analyte (2**σ**+/-) (2**σ**+/-) RI MDC Unit Prepared Analyzed

Eurofins TestAmerica, St. Louis

01/18/21 08:52 01/21/21 08:54

1.00

0.481 pCi/L

0.284

0.283

0.1706 U

Radium-228

Lab Sample ID: MB 160-495466/14-A

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

QC Sample Results

Client Sample ID: Method Blank

Matrix: Wat	er										Prep Type: To	otal/NA	4
Analysis Ba	tch: 4960)78									Prep Batch:	495466	
		MB	МВ										5
Carrier		%Yield	Qualifier	Limits					ŀ	Prepared	Analyzed	Dil Fac	
Ba Carrier		83.8		40 - 110					01/	18/21 08:52	01/21/21 08:54	1	6
Y Carrier		95.0		40 - 110					01/	18/21 08:52	01/21/21 08:54	1	
													7
Lab Sample	D: LCS	160-495	466/1-A					Clie	ent Sa	mple ID:	Lab Control S	Sample	
Matrix: Wat	er										Prep Type: To	otal/NA	8
Analysis Ba	tch: 4960)73									Prep Batch:	495466	
						Total							Q
			Spike	LCS	LCS	Uncert.					%Rec.		
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits		10
Radium-228			9.98	9.708		1.24	1.00	0.612	pCi/L	97	75 - 125		
	LCS	LCS											11
Carrier	%Yield	Qualifier	· Limits										
Ba Carrier	82.6		40 - 110	-									12
Y Carrier	89.7		40 - 110										
Lab Sample Matrix: Wat Analysis Ba	er		E-8-B DU			Total					Sample ID: Du Prep Type: To Prep Batch:	otal/NA	
	Sampl	o Samnla		ווס	ווח	Uncert						RER	

	Sample Sample	DL	U DU	Uncert.						RER
Analyte	Result Qual	Resul	t Qual	(2σ+/-)	RL	MDC	Unit		RER	Limit
Radium-228	0.146 U	0.2712	2 U	0.342	1.00	0.565	pCi/L	 	0.20	1
	DU DU									
Carrier	%Yield Qualifier	Limits								

Ourrier	<i>////icia</i>	Quanner	Linits
Ba Carrier	87.2		40 - 110
Y Carrier	92.7		40 - 110

Eurofins TestAmerica, St. Louis

QC Association Summary

Client: Consumers Energy Project/Site: JH Campbell Background Wells

Job ID: 160-40223-1

Prep Batch: 490013

Rad

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batc
160-40223-1	40223-1 JHC-MW-15023		Water	PrecSep STD	
160-40223-2	JHC-MW-15024	Total/NA	Water	PrecSep STD	
160-40223-3	JHC-MW-15025	Total/NA	Water	PrecSep STD	
160-40223-4	JHC-MW-15026	Total/NA	Water	PrecSep STD	
160-40223-5	JHC-MW-15027	Total/NA	Water	PrecSep STD	
160-40223-6	JHC-MW-15028	Total/NA	Water	PrecSep STD	
MB 160-490013/23-A	Method Blank	Total/NA	Water	PrecSep STD	
LCS 160-490013/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
LCSD 160-490013/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	
rep Batch: 490016					
.ab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batc
160-40223-1	JHC-MW-15023	Total/NA	Water	PrecSep_0	
160-40223-3	JHC-MW-15025	Total/NA	Water	PrecSep_0	
160-40223-4	JHC-MW-15026	Total/NA	Water	PrecSep_0	
60-40223-5	JHC-MW-15027	Total/NA	Water	PrecSep_0	
160-40223-6	JHC-MW-15028	Total/NA	Water	PrecSep_0	
MB 160-490016/23-A	Method Blank	Total/NA	Water	PrecSep_0	
CS 160-490016/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
_CSD 160-490016/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep 0	
60-40223-7	DUP-01	Total/NA	Water	PrecSep STD	
Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Bato
160-40223-8	EB-01	Total/NA	Water	PrecSep STD	
160-40223-9	FB-01	Total/NA	Water	PrecSep STD	
MB 160-490781/23-A	Method Blank	Total/NA	Water	PrecSep STD	
_CS 160-490781/1-A	Lab Control Sample	Total/NA	Water	PrecSep STD	
_CSD 160-490781/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep STD	
ron Botobi 400794					
Tep Batch. 490704					
-	Client Sample ID	Prep Type	Matrix	Method	Prep Bato
_ab Sample ID	Client Sample ID	Prep Type Total/NA	Matrix Water	Method PrecSep_0	Prep Bato
_ab Sample ID 160-40223-7	•			PrecSep_0	Prep Bato
Lab Sample ID 160-40223-7 160-40223-8	DUP-01	Total/NA	Water	PrecSep_0 PrecSep_0	Prep Bato
Lab Sample ID 160-40223-7 160-40223-8 160-40223-9	DUP-01 EB-01	Total/NA Total/NA	Water Water	PrecSep_0 PrecSep_0 PrecSep_0	Prep Bato
Lab Sample ID 160-40223-7 160-40223-8 160-40223-9 MB 160-490784/23-A	DUP-01 EB-01 FB-01 Method Blank	Total/NA Total/NA Total/NA Total/NA	Water Water Water Water Water	PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0	Prep Bato
Lab Sample ID 160-40223-7 160-40223-8 160-40223-9 MB 160-490784/23-A LCS 160-490784/1-A	DUP-01 EB-01 FB-01	Total/NA Total/NA Total/NA	Water Water Water	PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0	Prep Bato
rep Batch: 490784 Lab Sample ID 160-40223-7 160-40223-8 160-40223-9 MB 160-490784/23-A LCS 160-490784/1-A LCSD 160-490784/2-A rep Batch: 495466	DUP-01 EB-01 FB-01 Method Blank Lab Control Sample	Total/NA Total/NA Total/NA Total/NA Total/NA	Water Water Water Water Water Water	PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0	Prep Bato
Lab Sample ID 160-40223-7 160-40223-8 160-40223-9 MB 160-490784/23-A LCS 160-490784/1-A LCSD 160-490784/2-A rep Batch: 495466	DUP-01 EB-01 FB-01 Method Blank Lab Control Sample Lab Control Sample Dup	Total/NA Total/NA Total/NA Total/NA Total/NA Total/NA	Water Water Water Water Water Water	PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0	
Lab Sample ID 160-40223-7 160-40223-8 160-40223-9 MB 160-490784/23-A LCS 160-490784/1-A LCSD 160-490784/2-A rep Batch: 495466 Lab Sample ID	DUP-01 EB-01 FB-01 Method Blank Lab Control Sample Lab Control Sample Dup Client Sample ID	Total/NA Total/NA Total/NA Total/NA Total/NA Total/NA Prep Type	Water Water Water Water Water Water Matrix	PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 Method	
Lab Sample ID 160-40223-7 160-40223-8 160-40223-9 MB 160-490784/23-A LCS 160-490784/1-A LCSD 160-490784/2-A rep Batch: 495466 Lab Sample ID 160-40223-2	DUP-01 EB-01 FB-01 Method Blank Lab Control Sample Lab Control Sample Dup Client Sample ID JHC-MW-15024	Total/NA Total/NA Total/NA Total/NA Total/NA Total/NA Prep Type Total/NA	Water Water Water Water Water Water Matrix Water	PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 Method PrecSep_0	
Lab Sample ID 160-40223-7 160-40223-8 160-40223-9 MB 160-490784/23-A LCS 160-490784/1-A LCSD 160-490784/2-A rep Batch: 495466 Lab Sample ID 160-40223-2 MB 160-495466/14-A	DUP-01 EB-01 FB-01 Method Blank Lab Control Sample Lab Control Sample Dup Client Sample ID JHC-MW-15024 Method Blank	Total/NA Total/NA Total/NA Total/NA Total/NA Total/NA Prep Type Total/NA Total/NA	Water Water Water Water Water Water Water Water Water	PrecSep_0 PrecSep_0	
Lab Sample ID 160-40223-7 160-40223-8 160-40223-9 MB 160-490784/23-A LCS 160-490784/1-A LCSD 160-490784/2-A rep Batch: 495466 Lab Sample ID	DUP-01 EB-01 FB-01 Method Blank Lab Control Sample Lab Control Sample Dup Client Sample ID JHC-MW-15024	Total/NA Total/NA Total/NA Total/NA Total/NA Total/NA Prep Type Total/NA	Water Water Water Water Water Water Matrix Water	PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 PrecSep_0 Method PrecSep_0	Prep Batc

Tracer/Carrier Summary

Job ID: 160-40223-1

Prep Type: Total/NA

Prep Type: Total/NA

5

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

			Percent Yield (Acceptance Limits)
		Ва	
Lab Sample ID	Client Sample ID	(40-110)	
160-40223-1	JHC-MW-15023	146 X	
160-40223-2	JHC-MW-15024	124 X	
160-40223-3	JHC-MW-15025	182 X	
160-40223-4	JHC-MW-15026	154 X	
160-40223-5	JHC-MW-15027	93.9	
160-40223-6	JHC-MW-15028	140 X	
160-40223-7	DUP-01	83.1	
160-40223-8	EB-01	81.7	
160-40223-9	FB-01	73.9	
LCS 160-490013/1-A	Lab Control Sample	78.2	
LCS 160-490781/1-A	Lab Control Sample	83.7	
LCSD 160-490013/2-A	Lab Control Sample Dup	104	
LCSD 160-490781/2-A	Lab Control Sample Dup	76.8	
MB 160-490013/23-A	Method Blank	137 X	
MB 160-490781/23-A	Method Blank	83.1	
Tracer/Carrier Legend			

Ba = Ba Carrier

Method: 904.0 - Radium-228 (GFPC) Matrix: Water

Percent Yield (Acceptance Limits) Ва Υ (40-110) (40-110) Lab Sample ID **Client Sample ID** 160-40223-1 JHC-MW-15023 146 X 95.3 160-40223-2 JHC-MW-15024 86.9 95.7 160-40223-3 JHC-MW-15025 80.4 182 X 160-40223-4 JHC-MW-15026 154 X 53.1 160-40223-5 JHC-MW-15027 93.9 82.6 JHC-MW-15028 85.6 160-40223-6 140 X 160-40223-7 **DUP-01** 83.1 103 160-40223-8 EB-01 81.7 87.5 160-40223-9 FB-01 73.9 81.1 500-192070-E-8-B DU Duplicate 87.2 92.7 LCS 160-490016/1-A Lab Control Sample 78.2 85.2 78.9 LCS 160-490784/1-A Lab Control Sample 83.7 LCS 160-495466/1-A Lab Control Sample 89.7 82.6 LCSD 160-490016/2-A Lab Control Sample Dup 82.6 104 LCSD 160-490784/2-A Lab Control Sample Dup 76.8 110 MB 160-490016/23-A Method Blank 137 X 80.0 MB 160-490784/23-A Method Blank 83.1 90.8 MB 160-495466/14-A Method Blank 83.8 95.0

Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier



Appendix E October 2020 Field Notes

				ers Energy Co					
				Well Sampling		1.	-		
Well ID	HC. MW	15023						20-1192-0	
		ampbell						Casing ID (in)	
Depth-to-N	lidscreen (ft	.)				Protective C	asing Mo	unt (y/n)	
		221		Aeasureme				10201040404	4
Depth-to-w	ater (ft) 🔟	1.11	HC Layer Dete	ected (Y/N) _	N		and the	Completed by	amu
-							Pump	Sector and the	-
Time	рН	Temp	Sp Cond	DO	DO	ORP	Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3%	+/- 10%	+/- 10%	+/- 10mV	*	< 0.33	+/- 10%
1536								17,71	_
1537	6.82	12.0	60.2	21.0	5.39	+163.7	200	17.71	19.74
1542	5.54	12.1	69.0	6.5	0.69	+224.3	20D	1271	9.42
1547	5.52	12.1	71.3	6.2	0.66	+224.7	200	17:71	897
1582	5.51	12.3	74.4	5.8	0.62				9.29
	10000					1224.1	200	171	
1557	5.51	12.0	74.1	5.8	0.61	+2252	200	12.71	9.43
1602	5,51	1.61	74.3	5.8	0.62	1225.8	200	17.71	9.36
1603									
			1						
			\						
								<u> </u>	
Fotal Pump	Time (min)	27	Total Purge Vo	olume (gal) _	1.4		Reviewed		
Comments	5:							11-0	4-20
								v	
2.5	-								
Bottle	s Filled	Preservativ		A - NONE	B - HNO3	C - H2SO4	D - Na	OH E-HCIF.	
Number	Size	Tuno	Preservative Code	Filtered Y/N	Number	Size	Tuno	Preservative Code	Filtered Y/N
I I	125 m	Type HOP6	A	N	Number	Size	Туре	coue	1/14
1	T	nor o	B	T				-	1
1	250 M		A						
			B						
2	11		10						1

Well ID <u></u> Location <u></u> Depth-to-Mi)H Camp	obell	Date <u>10</u> . Screen Length	Depth-to-Se		n (ft)	Control Number		
		Fie	ld Measureme	ents			Sonde ID	: 19M	
Depth-to-wa	ter (ft) 12	.50	HC Layer Dete	ected (Y/N)_	N		1.0	Completed by	demu
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°с	uS/cm	% sat.	ppm	mV	mL/min	ft	NTU
3-5 min	+/- 0.1	NA	+/- 3%	+/- 10%	+/- 10%	+/- 10mV	*	< 0.33	+/- 10%
1424	6.75	11.9	353.D	21.0	2.15	+144.7	200	12.50	110 70
1426		11.9							48.70
1431	7.14		347.1	5.7	0.61	+132.6	200	12.50	2803
1436	7.28		330.9	2.8		+124.6		12.50	12.14
1441	206	11.9	317.9		0.30	+124.6	200	12.50	8.88
1446	6.97	11.9	312.1	2.7	0.28	+120.1	200	12.50	9.01
1452									
Total Pump T Weather:	Гіте (min)	28	Total Purge Ve	olume (gal) _	1.5		Reviewed	by Y	
Comments:						_		V	
Bottles	Filled	Preservati	1	-	B - HNO3	C-H2SO4 E	- NaOH		_
Number	Size	Туре	Preservative Code	Filtered Y/N	Number	Size	Туре	Preservative Code	Filtered Y/N
	125m	HORE	A		1	-			
	250M		A		-				
2	IL	ł	B						

	HC MW-1	SUJE	Date 0.7	020		Control Num	ber 20-11	92.03	-
	JH Campb			Well Material	: XPVC	SS	Iron	Galv. S	teel
			-						
Purge Metho		Peristaltic		Submersible		Fultz		Bailer	
Depth to Wat	ter Tape:		S/N	:			_	_	
QC SAMPLE:	X	IS/MSD	DUP-		Sonde ID:	08C	11M	15H	19N
Depth-to-wat	er T/PVC (ft)	11.44	Depth-To-Bo	ottom T/PVC	(ft)	_	Completed by	dimes	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3% Stablizatio	+/- 10% on parameters f	+/- 10%	+/- 10mV	*	< 0.33	+/- 10%
1313			Stubilzutit	in parameters j	or the last three			11.44	
1314	671	12.1	380.8	37.8	3.95	+146.6	200	11.44	11.60
1319	7.37	[2.1	395.5	7.2	0.76	+127.9	2,00	11.44	9.27
1224	7.49	12.0	392.4	6.5	0.69	+122.5	2.00	11.44	9.50
» A2-132		12.0	327.1	8.1	0.86	+121.4	200	11.44	9.11
1334	6.78	12.2	272.2	10.3	1.10	+127.1	200	11.44	897
1339	6.74	12.2	269.1	10.7	1.13	+1282	2 200	11/14	8.94
1344	6.68	12,1	261.3	12.6	1.34	+132.0	7.00	ILUV	9.05
1349	6.56	12.1	251.6	13.4	1.43	+135.5	2.100	11-44	9.16
1354	6.55	12.0	262.3	13.3	1.42	4136.7	200	11.44	9.23
1355									
Total Pump T	ime (min):	42	Total Purge V	olume (gal) :	2.2		Reviewed by:	A	
Weather:	Cloude							1	24-20
		1						V	
Comments:						_			_
Bottle	s Filled	Preservat	ive Codes:	A-NONE B-H	INO3 C - H2S	O4 D-NaOH E	-HCI F		
			Preservative	S. S. S. S. S.				Preservative	File-mained and
Quantity	Size	Type HDPC	Code	Filtered Y/N	Quantity	Size	Туре	Code	Filtered Y/
3	125 WI	Inte	B	1					
327	250 mil		A						
2	L	1	8	1	1 mar 1 m	and the second s			

Location _	HC MW JH (uw idscreen (ft)	pbell	Date <u>10.2</u> Screen Length	Depth-to-So	reen Bottom	(ft)		20_ (192 Casing ID (in) punt (y/n)	
		Fiel	d Measureme	ents			Sonde II	: 19M	
Depth-to-wa	ater (ft)		HC Layer Dete		N			Completed by	dmu
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
							1	Drawdown	
min 3-5 min	units +/- 0.1	°C NA	uS/cm +/- 3%	% sat. +/- 10%	ppm +/- 10%	mV +/- 10mV	mL/min *	ft < 0.33	NTU +/- 10%
1224	+/-0.1	NA	+/- 570	+/- 10%	+/- 10%	+/- 1000		12.93	+/- 10%
1225	6.50	11.3	247.3	489	5.27	+119.1	200	12.93	9.75
1230	6.79	11.3	190.1	41.3	4.48	15 m m 6 m2	1		8.03
	6.56	11.3		36.4	3.95		200		
1235	6.45	11.5	133.5	35.2	3.81	+125.2	200	12.93	8.40
	6.44	11.4	128.1	35.0	3.79			12,93	8.61
1245	6.42	11.5	126.8	34.8		+135.2	200	12.93	8.60
1 +255 Junus 2021	•								
Fatal Duma	time (min)	n	Total Dunce V		1.4		Daudaura	- A	
Weather:		ay', 41	Total Purge V	olume (gal) _	1.9		Reviewed		al-20
Comments Bottle		Preservatio	ve Codes		B-HNO3 C	- H2SO4	D - NaOH	E-HCIF-	
Number	Size	Туре	Preservative Code	Filtered Y/N	Number	Size	Туре	Preservative Code	Filtered Y/N
1	125ml	HORE	B	N					
	1 amul	1	BA	1					
2	250 M		B			-	_		
		W							

ocation _	JH Car dscreen (ft)	pbell	Date <u>10.7</u> Screen Length	Depth-to-Sc		(ft)		<mark>みー ミタン・</mark> Casing ID (in) punt (y/n)			
11		Fiel	d Measureme	ents			Sonde II	: 19 M			
Depth-to-wa	ter (ft) <u>3</u>	5.13	HC Layer Dete	cted (Y/N) _	N		Completed by AMIN				
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level Drawdown	Turbidity		
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	ft	NTU		
3-5 min	+/- 0.1	NA	+/- 3%	+/- 10%	+/- 10%	+/- 10mV	*	< 0.33	+/- 10%		
1118								13.16			
1119	7.07	1.1	40.0	33.7	3.62	+122.1	200	13.16	60.11		
1124	6.21	10.7	30.9	11.5		+150.5	200	13.16	47.38		
1129	5.85	10.7	48.0	11.4	1.25	+128.4	200	13.16	19.44		
1134	5.86	10.7	63.5	12.3	1.35	4117.6	200	13.16	11.71		
1139	5.89	10.8	71.2	14.7	1.62	+115.8		13.16	5.11		
		10.9	74.1	15.2							
1144	591		78.2			+111.6	200	13.16	5.64		
1149	5.93	10.9		16.4		+ 102.8		13.16	5.71		
1154	5.95	10.9	79.6	16.6	1.84	+98.4	200	13.16	5.66		
1159	6.01	11.0	80.7	17.1	1.87	1914.3	200	13.16	5.74		
1200											
		42		1 1 1	2.2			iby V			
Total Pump		ody'i L	Total Purge Vo	blume (gal) _	0.0		Reviewed		-04-20		
Weather: Comments:		say) -						(```	-1-2		
Bottles	s Filled	Preservati	-	New York and the second	B - HNO3 (C - H2SO4	D - NaOH	E-HCIF-	Filtered		
Number	Size	Туре	Preservative Code	Filtered Y/N	Number	Size	Туре	Preservative Code	Filtered Y/N		
2	12Sml	HOPE	AB	N			-	-			
2	250ml	1	B	NN							
d	10		2	1							
				-							

tic Submersible Fultz Bailer S/N: DUP- 01 Sonde ID: 08C 11M 15H 19W Depth-To-Bottom T/PVC (ft) Completed by MW Depth-To-Bottom T/PVC (ft) Completed by MW P Depth-To-Bottom T/PVC (ft) Completed by MWP Depth-To-Bottom T/PVC (ft) Do	Well ID			Date 10,7	S			ber 20-1		
S/N: Image: Dup- 01 Sonde ID: 08C 11M 15H 19N Image: Dup- 01 Sonde ID: 08C 11M 15H 19N Image: Dup- 01 Depth-To-Bottom T/PVC (ft) Completed by $\Delta M \omega$ pepth-To-Bottom T/PVC (ft) Completed by $\Delta M \omega$ us/cm % Sp Cond DO ORP Pump Rate Water level Turbidit us/cm % Sp Cond DO ORP Pump Rate Water level Turbidit us/cm % Sp Cond DO ORP Pump Rate Water level Turbidit us/cm % Sp Cond DO ORP Pump Rate Water level Turbidit us/cm % Sp Cond DO O O 12.77 %	Location	DH CAMPO			Well Material	PVC	SS	Iron	Galv. S	teel
N DUP- Dup Sonde ID: 08C 11M 15H 19N 1 Depth-To-Bottom T/PVC (ft)	Purge Methoo	d:	Peristaltic		Submersible		Fultz		Bailer	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Depth to Wate	er Tape:		S/N	l:		_			
ppSp CondDODOORPPump RateWater levelTurbidituS/cm% sat.ppmmVmL/minDrawdown ftNTU $4/-3\%$ $4/-10\%$ $4/-0.3ppm$ $4/-10mV$ *<0.33 $4/-10\%$ stablization parameters for the last three readings12.77b155.1 61.3 6.35 $4 24.0$ 16012.7732.983136.840.9 4.34 441.5 16012.7716.64487.941.7 4.43 471.4 16012.779.14484.343.4 4.60 485.5 16012.778.23382.245.2 4.80 496.0 16012.777.78482.44.62 4.99 499.6 16012.777.76	QC SAMPLE:	l IV	IS/MSD	V DUP-	01	Sonde ID:	08C	11M	15H	191
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Depth-to-wate	er T/PVC (ft)	12.77	Depth-To-B	ottom T/PVC	(ft)	_	Completed b	v dnw	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidit
Stablization parameters for the last three readings 12.77 12.77 155.1 1.3 1.35 1.44.0 1.60 12.77 32.98 3 136.8 40.9 4.34 1.41.5 1.60 12.77 1.664 4 87.9 41.7 4.43 17.4 1.60 12.77 9.14 4 84.3 43.4 4.60 185.5 1.60 12.77 8.23 3 82.2 45.2 4.80 196.0 1.20 12.77 8.23 3 82.2 45.2 4.80 196.0 12.77 8.23 4 84.3 43.4 4.60 185.5 1.60 12.77 8.23 3 82.2 45.2 4.80 196.0 1.60 12.77 7.78 4 82.4 4.99 494.6 1.60 12.77 7.76	min	units	°C					mL/min	Drawdown ft	NTU
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	3-5 min	+/- 0.1	NA					*	< 0.33	+/- 10%
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1005								12.77	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1007	8.59	12.6	155.1	61.3	6.35	+ 24.0	160		32.98
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	1012	8.29	12.3							
4 84.3 43.4 4.60 +855 160 12.77 8.23 3 82.2 45.2 4.80 +96.0 160 12.77 7.78 4 82.4 46.2 4.89 +99.6 160 12.77 7.76	1017	7.67	12.4							
3 82.2 45.2 4.80 +96.0 160 12.77 7.78 4 82.4 46.2 4.89 +99.6 160 12.77 7.76	1022	7.52	12.4	84.3		4.60	-		12.77	8.23
	1077	734	12.3	82.2	45.2	4.80	+96.0	ALL AND A		
5 82.2 46.5 4.92 +101.4 160 12.77 7.60	° 12-21032	7.26	12.4	82.4	46.2	4.89	+99.6	160	12.77	7.76
	1037	7.27	12.5	82.2	46.5	4.92	+101.4	160	12.77	7.60
	1038									
	Total Pump Ti	me (min):	33	Total Purge V	olume (gal) :	1.4		Reviewed by:	×	
Total Purge Volume (gal) :	Weather:	cloude	NI H						A	04-20
	° 10-21032 1037	7.26	12.4	82.4	46.2	4.89	+99.6	160	12.77	
	Total Pump Ti	me (min):	33	Total Purge V	olume (gal) :	1.4		Reviewed by:	×	
Total Purge Volume (gal) : I.Ч Reviewed by: Y	Weather:	cloude	41 4	3°F					011-	04-20
Тоtal Purge Volume (gal): I.Ч Reviewed by: ЧЗ°F III-04-20										
	Comments:									_
	Bottles	Filled	Preservat	ive Codes:	A-NONE B-H	INO3 C-H2SC	04 D - NaOH I	E - HCI F		
	Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y
H3°F Servative Codes: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F Preservative Preservative Preservative	2	125pm	HOPE	A	N					
H3°F II-0Y-20 servative Codes: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F Preservative Preservative e Code Filtered Y/N Quantity Size Type Code Filtered Y/N Quantity	2	T	T	B	N					
H3°F Servative Codes: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F Preservative Code Filtered Y/N Quantity Size Type Code Filtered Y, Code A N		250 ml			A I					

Laboratory S	Services Services			Consumers En itoring Well Sa					
Well ID <u>M</u> Location <u>J</u>	i mw - 150 HC	06	Date 10-23	y -20 Well Material	: VPVC	Control Num	iber <u>20-</u> Iron	1195- 01 Galv. S	iteel
Purge Meth	od:	Peristaltic	V	Submersible		Fultz		Bailer	
Depth to Wa	ater Tape: Ge	otech	S/M	1:1003					
QC SAMPLE	:	MS/MSD	DUP-	64	Sonde ID:	08C	11M	1 5H	19M
Depth-to-wa	ater T/PVC (ft)	34.99	Depth-To-B	Sottom T/PVC	(ft) <u>37.98</u>	_	Completed b	Y CET	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3%	+/- 10%	+/- 10%	+/- 10mV	*	< 0.33	+/- 10%
1434		1	Stablizati	on parameters f	or the last thin	ee reaamgs	160	34,99	
1036	7.17	13.7	835	12.2	1.26	64.9	160	34,99	630.44
21441	7.24	13.8	829	10,9	1.12	30.4	160	34,99	247.41
31446	7.36	14.0	823	9-1	0.93	-19.4	160	34,99	82.92
EINSI	7.38	14.6	805	8.1	0.82	-39.7	160	34,99	29.76
12 56	7.36	14.6	802	7.9	0.80	-42.2	160	34.99	24.49
1301	7,42	14.9	798	7.5	0.76	-44.5	160	34.99	17.24
1306	7.39	14.9	796	7.3	0.74	-46.1	160	34,99	14.85
1311	7.42	15.1	193	6.8	0.68	-49.1	160	34.99	11.92
1316	2.44	15.1	792	6.7	0.67	-49.4		34.99	11.34
~ 1	7.46	15.3	791	6.5	0.65	- 50.8	160	34.99	10.22
1421	7.46	15.1	791	6.4	0.64	- 51.9	160	34,99	9.37
61331	7.44	15.0	790	6.2	6.63	-54.7	160	34.99	8.71
1336	1.48	15.0	790	6.2	0.62	-55.4	160	34,99	8.78
1857		1		-			/ • •		
	Time (min): 🖇	3	Total Purge V	′olume (gal) :🌫	2.564		Reviewed by:	the	
Weather:					ung ji			1	04-20
Comments									
Bottl	es Filled	Preserva	tive Codes:	A-NONE B-H	INO3 C - H2S	O4 D - NaOH	E - HCI F -		
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
2	125ml	HDPE	B	ĩ					-
2	250ml		A		1				
4	1000-1	l	5						
* Pump rate she	ould be <500 mL/i	min for low-flow a	nd <1 gal/min for	high Volume.					_

Energy

Well ID <u>いれ</u> Location <u>しれ</u> Purge Method		100	Date 10-22-20 Control Number 20-1195-02								
	(Date 10 G	The second second							
^o urge Method	~			Well Material	: PVC	SS	Iron	Galv. S	teel		
	:	Peristaltic	\checkmark	Submersible		Fultz		Bailer			
Depth to Wate	r Tape: Gu	otech	S/N	: 1003							
QC SAMPLE:		MS/MSD [DUP-		Sonde ID:	08C	11M	1 5H	19M		
Depth-to-wate	r T/PVC (ft)	ORY	Depth-To-B	ottom T/PVC	ft) <u>34,65</u>			Completed by	<u>(ET</u>		
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity		
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU		
3-5 min	+/- 0.1	NA	+/- 3%	+/- 10%	+/- 0.3ppm	+/- 10mV	*	< 0.33	+/- 10%		
unh			Stablizati	on parameters f	or the last three	readings		0.011			
1423					-			ORY			
		-									
			-								
				_							
Tatal Duran Th	e a fuerturte		Tatal Duran M	aluma (mal) c			Daviawad hu	the			
Fotal Pump Tin	ne (min):		Total Purge V	olume (gal) :	-		Reviewed by:		10		
Weather: _								11-04	(-)0		
	01	1 1 10.	23·20, s	1.11 000							
Comments:	Rechal	(ed no	- 500, 5	DRY DRY			-				
Bottles	Filled	Preserva	tive Codes:	A-NONE B-H	INO3 C-H2SO	4 D - NaOH F	- HCI F-				
			Preservative	51.000				Preservative	Sec. and		
Quantity	Size	Туре	Code	Filtered Y/N	Quantity	Size	Туре	Code	Filtered Y/N		
	125~1	HOPE	ß	2							
	1		A								
	250 ml		A								

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Laboratory S	Services			Consumers En itoring Well Sa						
Well ID JAC	-mw-150	08-R	Date 10 - 22	7-20		Control Num	ber 20-	1195-03	-	
Location 3				Well Materia	I: VPVC	SS	Iron	Galv. S	teel	
Purge Meth	od:	Peristaltic	1	Submersible		Fultz		Bailer		
Depth to Wa	ater Tape: Go	otch	s/r	1:1003						
QC SAMPLE		MS/MSD	DUP-		Sonde ID:	080	11M	V 15H 19M		
Depth-to-wa	ater T/PVC (ft)	43.00	Depth-To-E	Sottom T/PVC	(ft) 47.60	-	Completed by <u>CET</u>			
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU	
3-5 min	+/- 0.1	NA	+/- 3%	+/- 10%	+/- 0.3ppm	+/-10mV	*	< 0.33	+/- 10%	
14-01	1	1	Stablizati	on parameters f	or the last three	e readings	A(1)	112 00		
1530				1.0.0	1.44		360	43.00		
1531	7.00	14.0	886	19.5	1.96	141.7	360	43.00	261.5	
1536	6.95	14.4	889	13.1	1.26	82.1	360	43.00	123.65	
1541	6.97	14.3	887	13.1	1.34	51.4	360	43.00	21.78	
1346	6.97	14.3	883	14.6	1.49	46.0	360	43.00	12.86	
1551	6.97	14.2	881	14.9	1.53	45.2	360	43.00	10.75	
1556	6.97	14.3	879	16.0	1.64	45.3	360	43.00	10.26	
1601	6.97	14.3	879	15.4	1.57	45.0	360	43.00	9.88	
1606	6.97	14.3	879	15.4	1.58	44.8	360	43.00	8.75	
1611	6.97	14.4	880	15.6	1.59	45.2	360	43.00	8.61	
1612		1.1.1	00-	1						
1620									1	
Fotal Pump ⁻	Time (min): S	ic i	Total Purge V	olume (gal) : २	= 4,0gal		Reviewed by:	¥		
Weather:					0			0112	9-20	
Comments		_					_		-	
Bottle	es Filled	Preserva	tive Codes:	A-NONE B-H	INO3 C-H2SC	04 D - NaOH I	E - HCI F			
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N	
1	Izsul	MPPE	B	N,						
1	1	1	A							
í	250ml		P							
2	1000 ml		B							

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Commers Energy Control Laboratory Set A ack tony of LAG	w rvices			Consumers En itoring Well Sa					
Well ID JHC	NW -150	001	Date 10- 2	1-20		Control Num	ber 20-	1195-04	
Location				Well Material		SS	Iron	Galv. S	
Purge Methoc	l:	Peristaltic		Submersible		Fultz		Bailer	
Depth to Wate	er Tape: (50	otech	S/N	1: 1003					7.55
QC SAMPLE:		MS/MSD	DUP-		Sonde ID:	080	11M	✓ 15H	19M
Depth-to-wate	er T/PVC (ft)	PRY	Depth-To-B	ottom T/PVC				Completed by	LET
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0,1	NA	+/- 3% Stablizati	+/- 10% on parameters f	+/- 0.3ppm	+/- 10mV	*	< 0.33	+/- 10%
1277		1	Stubilzuti			reduings		DRY	
1322								UNY	
_									
				1					
-								1	
					1				
						_			
							-		
			1.502.00.0				1.5.0.3.0.0		
Fotal Pump Ti	me (min):		Total Purge V	olume (gal) :			Reviewed by:	V	
Weather: -								11-4	4-20
Comments:	Rechart	red 10-0	13-20, 5	till DRY					
Bottles	Filled	Preserva	tive Codes:	A-NONE B-H	INO3 C-H2SO	4 D - NaOH I	E-HCIF		
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
		-							

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				Consumers En itoring Well Sa		Sec. Sec.			
Well ID JHC	MW-150	10	Date 10-2	9-20		Control Num	ber 20-1	195-05	
Location <u>JH(</u>				Well Material	: V _{PVC}	SS	Iron	Galv. S	teel
Purge Method	:	Peristaltic		Submersible		Fultz		Bailer	
Depth to Wate	er Tape: Ge	otich	S/N	1:1003		_			
QC SAMPLE:		MS/MSD	DUP-		Sonde ID:	08C	11M	✓ 15H	19M
Depth-to-wate	er T/PVC (ft)	42.40	Depth-To-B	ottom T/PVC	(ft) 42.82	-	Completed b	V_CET_	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3%	+/- 10%	+/- 0.3ppm	+/- 10mV	*	< 0.33	+/- 10%
			Stablizati	on parameters f	or the last three	e readings	1		
1249	-								
Atterater	d rell a		10-22-	10 Semi	results	monthle	to huma	low volue	~ 4
P		gaine on	10 0 0		1000110,	DUME DIG	10 partip	100 00101	
or water						-			-
1.000								· · · · · ·	
_									
		1							
1									
Total Pump Tin	ne (min):	-	Total Purge V	olume (gal) :	-	-	Reviewed by:	×	-
Weather:								1 11-0	1-20
			~	,					
Comments:	Canno	toet i	water A	o pump	out 10	ry			
Contraction of the					-				10 10 10
Bottles	Filled	Preservati	and a station of the	A-NONE B-H	INO3 C - H2SC	D4 D - NaOH	E - HCI F		
Quantity	Size	Tuna	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
quantity	JILE	Туре	Souc		quantity	SILE	Type	eoue	intered I/N
Pump rate should	d be <500 mL/m	nin for low-flow an	d <1 gal/min for	high Volume.					

Consumers Energ Coust Laboratory S	nalla.			Consumers En itoring Well Sa	100	and the second se			
	te MW-	15011	Date 10	2.2.20		Control Num	ber 20-1	195-06	
Location	SHCAM	pbell		Well Materia		ss [Iron	Galv. S	teel
Purge Metho	d:	Peristaltic	X	Submersible		Fultz		Bailer	
Depth to Wa	ter Tape:		S/N	l;					
QC SAMPLE:	N	ns/msd	DUP-		Sonde ID:	08C	11M	15H	X 19M
Depth-to-wa	ter T/PVC (ft)	38.72	Depth-To-B	ottom T/PVC	(ft)	-	Completed b	v_dmw_	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/-3%	+/- 10%	+/- 0.3ppm	+/- 10mV	*	< 0.33	+/- 10%
1623			Stablizati	on parameters f	or the last thre	e reaaings	1		1
1624	7.06	14.6	836	10.8	104-	-25.9	300		125
1629	7.52		823	4.8	1.06	-48.2	300		12.56
1634	7.56	14.7	815	4.2	0.42	-49.4	300		5.96
1639	7.57	14.7	809	3.9	0.38	-49.1	300		4.97
1644	7.57		803	3.6	0.36	-47.4	300		4.93
1649	1.51	14.7	800	3.5	0.35	-46.1	300		4.98
	1.51	14.7	000	0.0	0.00	1	300	20 72	1.00
1650								38.72	
							1		
					1				
-									
Fotal Pump T	ime (min):	27	Total Purge V	olume (gal) :	2.1		Reviewed by:	¥	
Weather:								0 11 -	04-20
Comments:									
Carlos A.S.	s Filled	Preservat	ive Codes:	A-NONE B-H	INO3 C - H2S	04 D - NaOH I	E-HCIF-		
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
1	125 ml	HOPE	A	N					
1	1	T	B	T					
2	250 ml		AB	T					
	uld be <500 mL/m	in for low-flow an		high Volume.		1	1		-

Consumers Energ Courte Laboratory Se	ntis			Consumers En itoring Well Sa		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			
Well ID	PZ 245		Date 10.2	1.20	-	Control Num	ber Jo-	1197-02	-
Location) It camp	bell		Well Material	: 🗙 рус	SS	Iron	Galv. S	teel
Purge Metho	d: 🔀	Peristaltic		Submersible		Fultz		Bailer	
Depth to Wat	ter Tape:	_	S/N	:					
QC SAMPLE:	N	ns/msd	DUP-		Sonde ID:	08C	11M	15H	X 19M
Depth-to-wat	ter T/PVC (ft)	7.41	Depth-To-B	ottom T/PVC	(ft)	-	Completed b	, dmw	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3% Stablizatiu	+/- 10% on parameters fo	+/- 0.3ppm	+/- 10mV e readinas	*	< 0.33	+/- 10%
1217			Stabilzado	, parameters j				7.45	
1218	6.18	13.1	29.0	22.1	2.29	+770	200	7.45	9.13
1223	5.26	13.2	27.1	17.6	1.84	+125.7	200	7.45	7.55
1228	5.16	13.0	27.6	Amw13.16.0		+130.0	200	7.45	6.88
1233	5.16	13.2	27.8	14.2	1.48	+129.1	200	7.45	7.64
(238	5.16	13.2	28.4	14.6	1.51	+125.9	200	7.45	7.71
1243	5.16	(3.2	28.5	14.7	1.53	+123.5	200	7.45	7.75
1244						1.2.3	-		10
Fotal Pump Ti	ime (min):	27	Total Purge V	olume (gal) :	1.4		Reviewed by:	×	
Weather:				10 7				-	4-20
Comments:									
Bottles	s Filled	Preservat	ive Codes:	A-NONE B-H	INO3 C-H2SC	04 D-NaOH E	- HCI F	and the second	
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
1	125m1	HPLE	A						1
	260.01	1	B		_				
2	250 ml	1	B						
Pump rate shou	Id be <500 mL/mi	n for low-flow an	nd <1 gal/min for h	igh Volume.					

Consumers Energy Countries Laboratory Se	vates		Consumers Energy Company Monitoring Well Sampling Worksheet							
Well ID	nw-145		Date 0.	20.20		Control Num	ber 20-11	07.01		
Location _	1H Camp	bell		Well Materia		SS	Iron	Galv. S	teel	
Purge Metho	d:	Peristaltic		Submersible		Fultz		Bailer		
Depth to Wat	ter Tape:		S/M	1:						
QC SAMPLE:		ns/msd	DUP-		Sonde ID:	08C	11M	15H	X 19M	
Depth-to-wat	ter T/PVC (ft)	8.91	Depth-To-B	ottom T/PVC	(ft)		Completed b	v_dmw		
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU	
3-5 min	+/- 0.1	NA	+/- 3% Stablizati	+/- 10% on parameters f	+/- 0.3ppm	+/- 10mV	*	< 0.33	+/- 10%	
1709			Stubilzuti		or the last three			8.95		
1711	5.98	12.8	44.9	14.2	1.46	-5.8	160	8.95	30.53	
1716		12.7	24.53	14.2	1.08	+65.8	160	8.95	12.39	
1721	1 540 12-		20.8	10.20.20	1.29	+103.2	160	8.95	10.11	
1726	5.29	127	20.2	14.0	1.47	+125.5	160	8.95	9.84	
1731	5.25	12.7	20.0	14.9	1.57	+142.6	160	8.95	9.36	
1736	5.18	127	19.8	15.1	1.59	+163.5	160	8.95	9.14	
1741	5.17	12.7	19.7	15.3	1.60	+166.1	160	8.95	9.31	
1746	5.17	12.7	19.7	15.5	1.62	+171.8	160	8.95	9.26	
1747	<i></i>			10.0						
Fotal Pump Ti	ima (min):	38	Total Durga V	aluma (col) :	1.6		Deviewed by	9F		
Weather:	1	y & Win	Total Purge V	C C C	1.0	1	Reviewed by:		4-20	
	CTOUAT	<u>}</u>	1) JL	F					(-20	
Comments:										
Bottles	s Filled	Preservat	ive Codes:	A-NONE B-H	INO3 C-H2SO	D4 D-NaOH E	- HCI F -			
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N	
1	125m	HOPE	A	N	quantity		1160			
1	T	1	BA	Ĩ						
2	250 m		AB							
	Ild be <500 mL/mi	n for low-flow or								

Contractory S	cally			Consumers En itoring Well S		-			
Well ID	PZ 405	S	Date 10.2	4.20		Control Num	ber 20-1	197-03	
Location	JH cam	pbell		Well Materia	I: PVC	SS	Iron	Galv. S	teel
Purge Metho	d:	Peristaltic		Submersible		Fultz		Bailer	
Depth to Wa	ter Tape:		S/M	۷:					
QC SAMPLE:		ns/msd	DUP-		Sonde ID:	08C	11M	15H	X 19M
Depth-to-wa	ter T/PVC (ft)	10.90	Depth-To-B	ottom T/PVC	(ft)		Completed b	y dmw	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3%	+/-10%	+/- 0.3ppm	+/-10mV	*	< 0.33	+/- 10%
			Stablizati	on parameters f	for the last thre	e readings			
0927								10.95	
0928	5.11	10.7	19.0	13.2	1.38	+189.9	200	10.95	13.36
0933	4.67	10.8	17.3	4.4	0.48	+ 206.3	200	10.95	10.17
0938	4.65	10.8	17.1	3.5	0.44	+211.4	200	10.95	9.75
0943	4.63	(0.8	17.2	3.1	0.34	+215.8	200	10.95	9.48
0948	4.63	10.9	17.1	3.1	0.34	+216.6	200	10.95	9.32
		10.8						10.95	
0953	4.64	10.0	17.2	3.2	0.35	+215.2	200	10.75	9.51
0954									
Fotal Pump T Weather:	ime (min):	27	Total Purge V	'olume (gal) :	1.4		Reviewed by:	Y- 11-04	-20
Comments:	Civia	31 1							
	s Filled	Preserva	tive Codes:	A-NONE B-F	INO3 C - H2SC	04 D-NaOH E	- HCI F -		
50000			Preservative					Preservative	La serie
Quantity	Size	Туре	Code	Filtered Y/N	Quantity	Size	Туре	Code	Filtered Y/N
	125m1	HDEE	AB	N					
	0	-							
2	250 ml	1	A				-		
	Ild be <500 ml /m	in for low-flow a	nd <1 gal/min for I	hiah Volume					

Cont Laboratory S	021/2			Consumers En itoring Well Sa					
	W 19-0- JH Camp		Date <u>10.2</u>	. <mark>1. 20</mark> Well Materia	I: X PVC	Control Num	ber <u>20-</u> Iron	۲ ۱۹۶- ۵۹ Galv. S	iteel
Purge Metho	od:	Peristaltic		Submersible		Fultz		Bailer	
Depth to Wa	ter Tape:		S/N	l:				_	
QC SAMPLE:	X	ns/msd	DUP-		Sonde ID:	08C	11M	15H	X 19M
Depth-to-wa	ter T/PVC (ft)	22.17	Depth-To-B	ottom T/PVC	(ft)	1	Completed b	v_dmw_	-
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/-0.1	NA	+/- 3% Stablizatio	+/- 10% on parameters f	+/- 0.3ppm or the last thre	+/- 10mV e readinas	*	< 0.33	+/- 10%
1734			Stubizuti	, parameters j	or the last the	e reduings		22.20	
1135	6.97	12.8	535	21.1	2.18	+44.4	200	22.20	12.89
1740	7,03	12.9	450.6	9.3	0.98	+339	200	22.20	8.09
1745	7.00	13.0	444.8	12.6	1.31	+43.5	2.00	22.20	7.08
(750	6.98	12.9	443.5	13.2	1.38	+51.0	200	22.20	5.43
1755	6.97	13.0	444.5	13.3	1.39	+ 57.1	200	22.20	4.97
1800	6.97	12.9	443.3	13.5	1.40	+ 60.8	200	22.20	5.07
1801						1 00.0		27.2	
Total Pump T	ime (min):	อา	Total Purge V	olume (gal) :	1.4		Reviewed by:	¥	
Weather:								11-04	-20
Comments:									
Bottle	s Filled	Preservat	ive Codes:	A-NONE B-H	INO3 C-H2SC	04 D-NaOH E	- HCl F		
Quantity	size	Type	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
3	T	T	B	í í					
1	250 ml	1	R						
* Pump rate shou	Ild be <500 mL/mii	n for low-flow an	d <1 gal/min for h	igh Volume.					

Concumers Energ Genet Laboratory Se	anthi				ergy Compan ampling Work	·			
Well ID	TW 19-1	05	Date 10.2	.20		Control Num	ber 20-1	1197-05	
Location	JH Cam	(pbu)		Well Materia	: X PVC	SS	Iron	Galv. S	teel
Purge Metho	d: X	Peristaltic		Submersible		Fultz		Bailer	
Depth to Wa	ter Tape:		S/N					_	_
QC SAMPLE:		ns/msd	DUP-		Sonde ID:	08C	11M	15H	19M
Depth-to-wa	ter T/PVC (ft)	16.13	Depth-To-Bo	ottom T/PVC	(ft)	_	Completed b	v_dmw	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3% Stablizatio	+/- 10%	+/- 0.3ppm or the last three	+/- 10mV	*	< 0.33	+/- 10%
1550			Jubizudo	in parameters j	or the fast time.			16.25	
1851	7.44	12.5	182.6	37.7	3.91	+29.5	240	16.25	9.80
1556	7.34	12.4	182.7	18.1	1.91	-2.5	240	16.25	9.71
1601	7.11	12.3	369.2	13.0	1.37	-51.6	240	16.25	9.64
1600	7.25	12.2	469.4	10.7	1.13	-31.8	240	16.25	9.70
1611	7.28	12.4	501	10.1	1.06	-24.1	240	16.25	9.25
1616	7.31	12.2	536	9.7	1.02	-14.7	240	16.25	9.01
1621	7.32	12.2	556	9.1	0.96	-8.2	240	16.25	8.99
1626	1.33	12.2	570	8.6	0.91	-4.9	240	16.25	8.90
1631	7.33	12.3	575	8.6	0.90	- 1.5	240	16.25	8.84
1632									
Total Pump T	ime (min):	42	Total Purge Vo	blume (gal) :	2.6		Reviewed by:	1	
Weather:									1-20
Comments:			10000	241-2	100 C		1.0		
Bottle	s Filled	Preservati	1	A - NONE B - H	INO3 C - H2SC	04 D-NaOH E	- HCl F		
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
1	125m1	HOPE	A	N	2 1 2 3				
	J	1	B	1					
2	250 MI		B	L					
	uld be <500 mL/mi	in for low-flow an		igh Volume.					

Concurrers Energy Country Laboratory Se	arvices			Consumers Er		•			
0.0	1904	T THE LAD	-	itoring Well S	ampling Worl		1		
well ID	WIIVI	MIN	Date 0.	21.20		Control Num	ber 20-	-1197-06	
Location	JH CUN	ipbed		Well Materia	I: PVC	SS	Iron	Galv. S	steel
Purge Metho	~	Peristaltic		Submersible		Fultz		Bailer	
Depth to Wat	ter Tape:		S/N	1:	-				
QC SAMPLE:	N	ns/msd	DUP-		Sonde ID:	08C	11M	15H	X 19M
Depth-to-wat	ter T/PVC (ft)	13.42	Depth-To-B	ottom T/PVC	(ft)	-	Completed b	y_dmw	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3%	+/- 10%	+/- 0.3ppm	+/- 10mV	*	< 0.33	+/- 10%
11.04	2011			on parameters f	V 2 2		410-	1211	
1654	7.84	12.9	144.6	43.2	4.32	11.2	260	13.45	0.01
1655	7.84	12.9	144.0	43.2	4.32	+17.2	260	13.45	91.01
1700	7.49	12.8	126.8	4.4	0,46	-80.1	260	13.45	9.39
1705	7.39	12.9	128.7	3.5	0.37	-92.2	260	13.45	8.16
1710	7.37	12.7	128.4	3.3	0.35	-95.0	260	13.45	7.32
1715	7.36	12.8	130.1	3.2	0.33	-98.6	260	13.45	7.53
1720	7.36	12.8	130.6	3.1	0.33	-99.9	260	13.45	7.05
1721					+*				
					*				
						-			
					_				
	-		_						
Total Pump Ti	ime (min):	27	Total Purge V	olume (gal) :	1.8		Reviewed by:	¥	
Weather:								11-00	1-20
								/	
Comments:								_	_
Bottles	s Filled	Preservati	ve Codes:	A-NONE B-H	1NO3 C - H2SC	04 D-NaOH E	- HCI F-		11-12-12
			Preservative					Preservative	
Quantity	Size	Туре	Code	Filtered Y/N	Quantity	Size	Туре	Code	Filtered Y/N
	125ml	HOPE	H	N					
	250ml	1	2						-
2	IL		B	1					1
	Ild be <500 mL/mi	n for low-flow and		nigh Volume.					

K:\CHEM\Field Sampling\JH Campbell Forms\2020-Q4\Monitoring Well Sampling Worksheet_REV1_041220

Courts Laboratory Se	02103		Mor	Consumers En hitoring Well Sa		and the second se			
the state of the s	P2-235 H Cima	nell	Date <u>10</u> .	21.20 Well Materia	I: XPVC	Control Num	ber ጋ୦- Iron	Galv. S	
Purge Metho	d: 🔀	Peristaltic		Submersible		Fultz		Bailer	
Depth to Wa	ter Tape:		s/r	N:			_	_	
QC SAMPLE:		ns/msd	DUP-		Sonde ID:	080	11M	15H	X 19M
Depth-to-wat	ter T/PVC (ft)	15.35	Depth-To-E	Bottom T/PVC	(ft)	_	Completed b	v_dmw	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min 3-5 min	units +/- 0.1	°C NA	uS/cm +/- 3%	% sat. +/- 10%	ppm +/- 0.3ppm	mV +/- 10mV	mL/min *	Drawdown ft < 0.33	NTU +/- 10%
			Stablizati	ion parameters f		e readings			
1354			_					15.41	
1355	5.80	14.0	35.6	94.3	9.60	+114.2	200	15.41	11.67
1400.	6.18	13.9	44.8	87.0	8.83	+118.5	200	16.41	10.08
1405.	6.30	13.8	47.7	86.0	8.80	+121.2	200	15.41	9.55
1410	6.38	13.9	49.2	85.6	8.75	+12.4.6	200	15.41	9.71
1415	6.43	139	49.7	86.4	8.73	+127.3	200	15.41	9.80
1420	6.44	13.9	50.D	85.4	8.72	+128.2	200	15.41	9.86
1421					-				
		2-							
Total Pump T	10 × 1 × 1	27	Total Purge V	olume (gal) :	1.4		Reviewed by:		1.15.17
Weather:	Cloud	91 52	2°F					J 11-04	1-20
Comments:									
Bottle	s Filled	Preserva	tive Codes:	A-NONE B-H	INO3 C-H2SC	04 D - NaOH E	- HCI F		-
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
1	125 ml	HORE	A	N					
1	250 ml		BA						
2	TL		B	1					
* Pump rate shou	ıld be <500 mL/mi	n for low-flow a	nd <1 gal/min for	high Volume.					

Location H CUMPDEI Well Material: PVC SS Iron Galv.Steel Purge Method: Peristaltic Submersible Fultz Bailer Depth to Water Tape: S/N: Sonde ID: 08C 11M 15H X 19M Depth to Water Tape: S/N: Sonde ID: 08C 11M 15H X 19M Depth-to-water T/PVC (ft) H-91 Depth-To-Bottom T/PVC (ft) 13.8 Completed by Annu> Turbidity min units C us/cm % sat. ppm mV m/min Dravdown ft NTU 3.5 min r/r.0.1 NA r/r.3% r/r.10% r/r.03pm r/r.00% 5.33 1039 0.38 12.5 194.0 11-3 1.19 -166.0 100 5.43 104.40 1043 6.65 12.4 21.5 7.3 0.77 -198.2 100 6.11 93.20 1053 6.78 12.4 23.3 4/2 0.45 100 6.25 9.87 1103 6.81	Contro Laboratory Se	abs			Consumers En itoring Well Sa			_	_	
Purge Method: Peristaltic Submersible Fultz Bailer Depth to Water Tape: 5/N: Sonde ID: 08C 11M 15H 319M QC SAMPLE: MS/MSD DUP- Sonde ID: 08C 11M 15H 319M Depth-To-water T/PVC (th) 4-93 Depth-To-Bottom T/PVC (th) 3:5 33 Completed by Appub Time pH Temp Sp Cond DO DO ORP Pump Rate Water level Turbidity min units 'C us/cm % sat. ppm mV mU/min Drawdown ft NTU 35 min y-0.2 NA y-3.3% y-1.0% y-0.389 y-1.0% <0.38 y-1.0% 1039 0.38 12.5 144.0 11.3 1.19 -166.0 100 5.86 104.0 1043 6.38 12.5 144.0 11.3 1.19 -186.0 100 6.18 y-1.0% 1050 6.78 12.4 23.3 4.2 0.45 -178.2 100 6.25 9.67	Well ID 💡	224		Date 10.	21.20		Control Num	ber 20-	1197-13	
S/N: OQC SAMPLE: S/N: OQC SAMPLE: S/N: OQC SAMPLE: Sond DUP- Sonde ID: 0.8C 11.11 1.5 H J 19M Depth-10-water T/PVC (ft) IS-00 DO OR Pump Rate Water level Turbidity Time PH Temp Sp Cond DO OR Pump Rate Water level Turbidity Time PH Temp Sp Cond DO OR Pump Rate Water level Turbidity min units Turbidity min OC OR Cond DO OR Cond DO OR Cond DO OR Cond DO OR Cond MIV MIV MIV MIV MIV OR Colspan= MIV Tend	Location)H cum	pbell		Well Materia	I: PVC	SS	Iron	Galv. S	teel
QC SAMPLE: MS/MSD DUP- Sonde ID: 08C 11M 15H X 19M Depth-to-water T/PVC (ft) H Time PH Temp Sp Cond DO DO ORP Pump Rate Water level Turhidity min units 'C uS/cm % sat. ppm mV mL/min Drawdown ft NTU 3-3 min +/-0.1 NA +/-3% % sat. ppm mV mL/min Drawdown ft NTU 3-3 min +/-0.1 NA +/-3% % sat. ppm mV mL/min Drawdown ft NTU 1039	Purge Metho	d:	Peristaltic		Submersible		Fultz		Bailer	
Depth-to-water T/PVC (It) H.91 Depth-To-Bottom T/PVC (It) 13.93 Completed by Amula Time pH Temp Sp Cond DO DO ORP Pump Rate Water level Turbidity 35 min units 'C us/cm % sat. ppm mV ml/min Drawdown ft NTU 35 min +/-0.1 NA +/-3% +/-1.0% +/-0.2pm mV ml/min Drawdown ft NTU 35 min +/-0.1 NA +/-0.3% +/-1.0% +/-0.2pm mV ml/min Drawdown ft NTU 35 min +/-0.1 NA +/-0.3% +/-1.0% +/-0.3% +/-1.0% +/-1.0% +/-1.0% +/-1.0% 1053 6.38 12.5 19.4 0.100 5.86 104.0 10-3 6.18 ¥11.98 1053 6.71 12.4 233.3 4.2 0.42 -178.2 100 6.25 9.67 1103 6.81 12.4	Depth to Wat	ter Tape:		S/N	:					
Time pH Temp Sp Cond DO DO OR Pump Rate Water level Turbidity $3.5 min$ $4/2.08$ $55 ast.$ ppm mV ml/min Drawdown ft NTU $3.5 min$ $4/2.08$ $4/2.08$ $4/2.08$ $4/2.08$ $4/2.08$ $4/2.08$ 1039 0.3 12.5 194.0 11-3 1.19 $-1.08.2$ 100 5.33 104.8 1043 $6.3.8$ 12.5 194.0 11-3 1.19 $-1.96.2$ 100 6.11 $93.2b$ 1053 $6.7.8$ 12.4 21.5 7.3 0.77 -196.2 100 6.18 41.16 1055 6.78 12.4 23.3.3 4.2 0.45 -178.2 100 6.18 41.16 1056 6.81 12.3 247.3 3.0 0.32 -163.4 100 6.25 9.67 1103 6.72 12.2 249.5 3.0 0.31 -162.0 1000 6.25 9.67	QC SAMPLE:		ws/msd	DUP-		Sonde ID:	08C	11M	15H	X 19M
min units 'C us/cm % sat. ppm mV mL/min Drawdown ft. NTU 35 min 4/-0.1 NA 4/-38% 4/-30% 4/-0.07 * <0.33	Depth-to-wat	er T/PVC (ft)	4.90	Depth-To-B	ottom T/PVC	(ft) 13.87	3	Completed b	r dmw	
3.5 min +/-0.1 NA +/-28% +/-20% +/-20% +/-20% +/-20% 1039 Stabilization parameters for the last three readings 5.33 +/-20% 5.33 104 1043 6.38 12.5 144.0 11.3 1.19 -186.0 100 5.86 104.0 1048 6.65 12.4 211.5 7.3 0.77 -196.2 100 6.11 93.20 1053 6.78 12.4 23.3 4.2 0.45 -178.2 100 6.11 93.20 1053 6.78 12.4 23.3 4.2 0.45 -178.2 100 6.18 41.98 1053 6.78 12.2 240.5 3.0 0.31 -162.0 100 6.25 9.87 1103 6.81 12.4 250.4 2.8 0.30 -158.5 100 6.26 9.87 1109 6.81 12.4 250.4 2.8 0.30 -158.5 100 6.26 9.95 104 6.81 12.4 250.4 2.8	Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
3.5 min +/-0.1 NA +/-3% +/-0.00 +/-0.00 * <0.33	min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	-			+/- 3%	+/- 10%	+/- 0.3ppm	+/- 10mV	*		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1020			Stablizatio	on parameters f	or the last thre	e readings		1.22	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		128	10.0	AUD		1.0				
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$										104.01
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$								100		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		6.78	12.4		4.2	0.45		100	6.18	
1100 6.81 12.4 250.4 2.8 0.30 -158.5 100 6.26 9.95 1109 100 6.26 9.95 100 6.26 9.95 1109 100 6.26 9.95 100 6.26 9.95 1109 100 6.26 9.95 100 6.26 9.95 1109 100 100 6.26 9.95 100 6.26 9.95 Image: State of the state of th		6.81	12.3	247.3	3.0	0.32	-163.4	100	6.24	9.96
1110 6.81 12.4 250.4 2.8 0.30 .158.5 100 6.26 9.95 1109 100	1103	6.82	12.3	248.5	3.0	031	-162.0	100	6.25	
II b9 III b9 IIII b9 III b9 III b9					2.8	0.30	-158.5	100	6.26	9.95
Weather: II-04-20 Comments:	1109									
Weather: II-04-20 Comments:										
Bottles Filled Preservative Codes: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F Quantity Size Type Preservative Filtered Y/N Quantity Size Type Code Filtered Y/N I ISSE Type Code Filtered Y/N Quantity Size Type Code Filtered Y/N I ISSE Type ISSE IS		me (min):	30	Total Purge V	olume (gal) :	0.8		Reviewed by:	Å	
Bottles Filled Preservative Codes: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F Quantity Size Type Preservative Code Filtered Y/N Quantity Size Type Preservative Code Filtered Y/N 1 1250ml 1350ml 14	weather.								1 11-0	9-20
Quantity Size Type Preservative Code Filtered Y/N Quantity Size Type Preservative Code Filtered Y/N 1 125 ml 100 ft A N A <td>Comments:</td> <td></td> <td></td> <td></td> <td>1.27</td> <td></td> <td></td> <td></td> <td></td> <td></td>	Comments:				1.27					
Quantity Size Type Code Filtered Y/N Quantity Size Type Code Filtered Y/N 1 125 M1 100 C A N - - - - - - 1 125 M1 100 C A N - - - - - - 1 250 M1 A I - - - - - - 2 1L J B J - - - - - -	Bottles	Filled	Preservat	tive Codes:	A-NONE B-H	INO3 C-H2SC	04 D - NaOH E	- HCI F		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Quantity	Size	Type	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	Filtered Y/N	Quantity	Size	Type	0.0000000000000000000000000000000000000	Filtered V/N
2 2 Somi J A J	Lucinity	23.87	1		N	quantity	5128	iybe	ouc	. increa 1/19
2 IL J B Y	1	T	I		1					
	1	2SOM1		A						
	6	16	V	10	X					_

Consumers Energ Dank Laboratory S	net la	_		Consumers Er itoring Well S		•			_
Well ID	P2-40)	Date 10.	21.20		Control Num	ber 20-	1197-14	
Location	off Cump	hell		Well Materia	I: X PVC	SS	Iron	Galv. S	teel
Purge Metho	d: X	Peristaltic		Submersible		Fultz		Bailer	
Depth to Wa	ter Tape:		S/M	1:	_			_	
QC SAMPLE:		ns/msd	X DUP-	09	Sonde ID:	080	11M	15H	19M
Depth-to-wa	ter T/PVC (ft)	8.09	Depth-To-B	ottom T/PVC	(ft) 22.5	4	Completed b	v dmw	
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU
3-5 min	+/- 0.1	NA	+/- 3%	+/- 10%	+/- 0.3ppm	+/- 10mV	*	< 0.33	+/- 10%
0833			Stablizati	on parameters f	or the last three	e readings		0.1	
	r.,	16 at	121	211	120	Same.	201	8.11	0.00
0834	5.66	10.4	13.6	22.1	2.39	+194.5	200	8.11	9.42
0839	5.80	(0.1	82.4	11.7	1.30	+135.5	200	8.11	9.22
0844	5.83	10.1	82.5	11.2	1.25	+135.1	200	8.11	9.38
0849	5.85	10.1	82.7	11.0	1.23	+141.0	200	811	9.41
0850									
Total Pump T	ime (min):	17	Total Purge V	olume (gal) :	-1.0		Reviewed by:	¥	
Weather:	cloud	y', 48°	F					1 11-0	14-20
Comments:	-							8.19 gal	
Bottle	s Filled	Preserva	tive Codes:	A-NONE B-H	INO3 C - H2SC	04 D-NaOH E	- HCI F		
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
22	125m1	HDRE	A	N					
	nrh i	1	B	1					
24	250ml		AB	1					
	Id he <500 ml /mi	in for low-flow a	nd <1 gal/min for I	viah Volume		-			

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Carrier Laboratory Se			Consumers Energy Company Monitoring Well Sampling Worksheet							
	NW-9AR SHE COMP	bell	Date 10.2	4.20 Well Materia		Control Num	iber <u>20-</u> Iron	1197-16 Galv. S	iteel	
Purge Metho	d:	Peristaltic		Submersible		Fultz		Bailer		
Depth to Wa	ter Tape:		S/N	:						
QC SAMPLE:		MS/MSD	DUP-		Sonde ID:	080	11M	15H	19M	
Depth-to-wat	ter T/PVC (ft)	21.35	Depth-To-B	ottom T/PVC	(ft) Completed			v dm w		
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	
min 3-5 min	units +/- 0.1	°C NA	uS/cm +/- 3%	% sat. +/- 10%	ppm +/- 0.3ppm	mV +/- 10mV	mL/min *	Drawdown ft < 0.33	NTU +/- 10%	
				on parameters f						
1429								21.35		
1501	6.68	14.5	501	25.9	2.60	+110.9	180	21.35	5.93	
1506.	6.98	14.9	460.2	31.8	3.19	+94.2	180	al.35	5.28	
1511	511. 7.07 14:		445.8	37.3	3.74	+88.9	180	21.35	5.10	
1516	7.11	14.7	443.9	39.0	3.91	+87.5	180	21.35	5.23	
1521	7.12	14.8	4445	39.7	3.97	+87.4	180	21.35	5.14	
(522										
Total Pump T	ime (min):	23	Total Purge V	olume (gal) :	1.1		Reviewed by:			
Weather:		6.0								
Comments:										
Bottle	s Filled	Preservat	ive Codes:	A-NONE B-H	INO3 C-H2SC	04 D-NaOH E	- HCI F			
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N	
1	125 mi	more	BB	X						
* Pump rate shou	uld be <500 mL/m	in for low-flow ar	nd <1 gal/min for h	igh Volume,						

Laboratory Se				Consumers En itoring Well Sa							
Well ID Location Purge Methor	MW-10A 21 Canyoh d: X	R RU Peristaltic	Date 16.21.20 Control Number 20 - 1197 - 17 Well Material: PVC SS Iron Galv. Steel Submersible Fultz Bailer								
Depth to Wat	er Tape:		S/N	1:							
QC SAMPLE:	N	IS/MSD	DUP-		Sonde ID:	08C	11M	15 H	19M		
Depth-to-wat	er T/PVC (ft)	13.95	Depth-To-B	ottom T/PVC	(ft)		Completed b	v_dmw			
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	e Water level	Turbidity		
min 3-5 min	units +/- 0.1	°C NA	uS/cm +/- 3% Stablization	% sat. +/- 10% on parameters f	ppm +/- 0.3ppm for the last three	mV +/- 10mV e readings	mL/min *	Drawdown ft < 0.33	NTU +/- 10%		
1535	- well	went Dr	η								
10.22	.20 - Well	Dry									
Fotal Pump Ti	me (min):	-	Total Purge V	olume (gal) :	J		Reviewed by:	1			
Weather:								V 11-0	4-20		
Bottles	Filled	Preservat	ive Codes:	A-NONE B-H	INO3 C - H2SO	4 D-NaOH E	- HCI F				
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N		
	ld be <500 mL/min	6-1-0									

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Appendix C Nature and Extent Data Summary



Technical Memorandum

Date:	January 30, 2021
То:	Bethany Swanberg, Consumers Energy
From:	Sarah Holmstrom, TRC Kristin Lowery, TRC
cc:	Brad Runkel, Consumers Energy
Project No.:	367390.0000
Subject:	2020 Nature and Extent Data Summary, JH Campbell Pond A, Consumers Energy, West Olive, Michigan

In response to the United States Environmental Protection Agency's (U.S. EPA's) Resource Conservation and Recovery Act (RCRA) Coal Combustion Residual rule ("CCR Rule") promulgated on April 17, 2015, as amended, Consumers Energy Company (Consumers Energy) has conducted groundwater monitoring at the JH Campbell (JHC) Pond A CCR Unit. During the statistical evaluation of the initial assessment monitoring event (June 2018) for Pond A, arsenic was present in one or more downgradient monitoring well(s) at statistically significant levels exceeding the Groundwater Protection Standards (GWPSs)¹.

The CCR Rule 40 CFR §257.96(a) requires that an owner or operator initiate an assessment of corrective measures (ACM) to prevent further release, to remediate any releases, and to restore impacted areas to original conditions if any Appendix IV constituent has been detected at a statistically significant level exceeding a GWPS. The *Assessment of Corrective Measures* (ACM) (TRC, September 2019) was initiated on April 15, 2019 and was certified and submitted to the Michigan Department of Environment, Great Lakes, and Energy (EGLE) on September 11, 2019 in accordance with the schedule in §257.96.

Per §257.95(g)(1), in the event that the facility determines, pursuant to §257.93(h), that there is a statistical exceedance of the GWPSs for one or more of the Appendix IV constituents, the facility must characterize the nature and extent of the release of CCR as well as any site conditions that may affect the remedy selected. The nature and extent data consist of Appendix III and IV constituents collected from the background and downgradient CCR monitoring well networks and from supplemental downgradient wells in the EGLE-approved JHC Dry Ash Landfill Hydrogeological Monitoring Plan (HMP)² monitoring network. In addition to the existing HMP wells, TRC, on behalf of Consumers

¹ TRC. 2019. Statistical Evaluation of Initial Assessment Monitoring Sampling Event, JH Campbell Pond A CCR Unit, Consumers Energy Company, West Olive, Michigan. January 14.

² Consumers Power Company. 1996. *Hydrogeological Monitoring Plan for JH Campbell Ash Storage Facility, Consumers Power Company, Solid Waste Disposal Area, Coal Ash, Type III.* September.

Technical Memorandum

Energy, installed shallow and deep step out wells (MW-14S, MW-14D, PZ-23S, PZ-23D, PZ-24S, PZ-24D, PZ-40S) nested with existing downgradient wells MW-14, PZ-23, PZ-24, and PZ-40 (shallow well only) in April 2018 to further characterize the horizontal and vertical distribution of Appendix III and IV constituents in groundwater downgradient from the CCR units. Several of these monitoring wells (MW-14S, PZ-24S, PZ-40S), in addition to existing HMP monitoring well MW-13, were also incorporated into the EGLE-approved Pond A Assessment Monitoring Plan (Pond A AMP) (TRC, July 2019), which was developed to comply with the Michigan Part 115 program. Five shallow and deep step-out temporary monitoring wells were installed downgradient of Pond A (TW-19-04A, TW-19-04B, TW-19-05, TW-19-06A, and TW-19-06B) in June 2019. The locations of the additional downgradient step out wells are shown on Figure 1. Nature and extent sampling in 2020 included shallow step-out wells in addition to wells and parameters monitored guarterly as part of the Pond A HMP. A summary of the nature and extent groundwater data collected in 2020 are provided on Table 1. The TDS data collected from the supplemental downgradient wells during the October 2020 event contained potential errors introduced from inaccurate pre-determined bag weights provided by the lab materials manufacturer and results varied significantly from historical data at each of the monitoring wells; therefore, the TDS data have been considered unusable for the purposes of the nature and extent monitoring program. The soil boring logs and well construction diagrams for the step out monitoring wells utilized for the nature and extent groundwater sampling are included in Appendix A of the 2019 Annual Groundwater Monitoring and Corrective Action Report and Fourth Quarter 2019 Hydrogeological Monitoring Report (TRC, January 2020).

As discussed in the ACM, the nature and extent of contamination (e.g. arsenic in groundwater) relative to GWPSs has been defined per the RCRA CCR Rule requirements based on the site-specific hydrogeology. The presence of nearby surface water bodies (Recirculation Pond and the Pigeon River) as well as the unimpacted background monitoring wells to the north provide the boundaries for the extent of the GWPS exceedances. In addition, the underlying clay unit prevents the downward vertical migration of groundwater. Although Michigan Part 201 residential drinking water criteria are exceeded, there are no onsite drinking water wells downgradient from Pond A and the closest downgradient drinking water wells are located south and east of the Pigeon River, separated hydraulically by the river. Shallow groundwater has the potential to vent to nearby surface water boundaries that are not used for drinking water. Several Appendix III and IV constituents exceed the Michigan Part 201 generic groundwater-surface water interface (GSI) criteria in on-site wells; however, compliance for the GSI pathway is currently met for the Appendix III and IV constituents, including arsenic, based on data collected from the step out wells/GSI monitoring wells and the National pollutant Discharge Elimination System (NPDES) outfall at the Recirculation Pond. Compliance for the GSI pathway will continue to be monitored in accordance with the EGLE-approved Pond A AMP.

Table

					Sample Location:	MW-14S				PZ-23S			
					Sample Date:	2/11/2020	4/16/2020	7/16/2020	10/20/2020	2/11/2020	4/16/2020	7/15/2020	10/21/2020
				MI Non-			•					•	
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^								
Appendix III													
Boron	ug/L	NC	500	500	7,200	28	21	28	44	30	22	113	25
Calcium	mg/L	NC	NC	NC	500 ⁽²⁾	2.32	2.14	1.82	6.39		7.48		10.7
Chloride	mg/L	250**	250 ⁽¹⁾	250 ⁽¹⁾	500 ⁽²⁾	< 1.00	< 1.00	< 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
Sulfate	mg/L	250**	250 ⁽¹⁾	250 ⁽¹⁾	500 ⁽²⁾	3.15	2.29	2.80	2.78		3.83		3.05
Total Dissolved Solids	mg/L	500**	500 ⁽¹⁾	500 ⁽¹⁾	500	22	29	33	NA ⁽³⁾		40		NA ⁽³⁾
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5 ⁽¹⁾	6.5 - 8.5 ⁽¹⁾	6.5 - 9.0	5.8	5.0	5.4	5.2	7.2	6.6	6.8	6.4
Appendix IV													
Antimony	ug/L	6	6.0	6.0	130	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	10	10	10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	2,000	2,000	820	8	8	9	8		< 5		< 5
Beryllium	ug/L	4	4.0	4.0	18	< 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
Chromium	ug/L	100	100	100	11	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1
Cobalt	ug/L	NC	40	100	100	< 6	< 15	< 6	< 6		< 15		< 15
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000		< 1,000		< 1,000
Lead	ug/L	NC	4.0	4.0	39	< 1	< 1	< 1	< 1		< 1		< 1
Lithium	ug/L	NC	170	350	440	< 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
Molybdenum	ug/L	NC	73	210	3,200	< 5	< 5	< 5	< 5	6	6	8	6
Radium-226	pCi/L	NC	NC	NC	NC		< 0.172		< 0.493		< 0.131		< 0.475
Radium-228	pCi/L	NC	NC	NC	NC		< 0.414		< 0.383		< 0.403		< 0.294
Radium-226/228	pCi/L	5	NC	NC	NC		0.450		< 0.493		< 0.403		< 0.475
Selenium	ug/L	50	50	50	5.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2	2.0	2.0	3.7	< 2	< 2	< 2	< 2		< 2		< 2
Michigan Part 115 Pa	arameters												
Iron	ug/L	300**	300 ⁽¹⁾	300 ⁽¹⁾	500,000 ⁽²⁾	278	75	151	102		134		
Copper	ug/L	1,000**	1,000 ⁽¹⁾	1,000 ⁽¹⁾	15	1	< 1	5	< 1		< 1		
Nickel	ug/L	NC	100	100	86	< 1	< 1	< 2	< 2	< 2	< 1	< 2	
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2		< 0.2		
Vanadium	ug/L	NC	4.5	62	27	< 2	< 2	< 2	< 2	< 2	< 2	< 2	
Zinc	ug/L	5,000**	2,400	5.000 ⁽¹⁾	190	11	< 10	17	< 10		< 10		

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

pCi/L - picocuries per liter.

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

NA - not applicable.

NC - no criteria.

-- - not analyzed.

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

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

^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using 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 EGLE policy and procedure 09-014 dated June 20, 2012.

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.

(1) - Criterion is the aesthetic drinking water value per footnote {E}.

(2) - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

(3) - Total dissolved solids data for the October 2020 event contained errors introduced by the laboratory materials manufacturer and were determined to be unusable.

	Sample Locatio						PZ-24		PZ-24S				
					Sample Date:	4/16/2020	10/21/2020	2/11/2020	4/16/2020	7/16/2020	10/21/2020		
				MI Non-	•				•		•		
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^								
Appendix III													
Boron	ug/L	NC	500	500	7,200	176	183	26	< 20	57	42		
Calcium	mg/L	NC	NC	NC	500 ⁽²⁾	20.9	26.0	2.39	3.16	2.88	7.58		
Chloride	mg/L	250**	250 ⁽¹⁾	250 ⁽¹⁾	500 ⁽²⁾	2.51	5.49	< 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		
Sulfate	mg/L	250**	250 ⁽¹⁾	250 ⁽¹⁾	500 ⁽²⁾	31.3	15.2	2.59	2.73	2.62	3.06		
Total Dissolved Solids	mg/L	500**	500 ⁽¹⁾	500 ⁽¹⁾	500	157	NA ⁽³⁾	42	28	61	NA ⁽³⁾		
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5 ⁽¹⁾	6.5 - 8.5 ⁽¹⁾	6.5 - 9.0	6.9	6.8	5.6	5.0	5.5	5.2		
Appendix IV													
Antimony	ug/L	6	6.0	6.0	130	< 1	< 1	< 1	< 1	< 1	< 1		
Arsenic	ug/L	10	10	10	10	< 1	< 1	< 1	< 1	1	1		
Barium	ug/L	2,000	2,000	2,000	820	13	15	25	24	28	32		
Beryllium	ug/L	4	4.0	4.0	18	< 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		
Chromium	ug/L	100	100	100	11	1	< 1	2	2	2	1		
Cobalt	ug/L	NC	40	100	100	< 15	< 15	< 6	< 15	< 6	< 6		
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000		
Lead	ug/L	NC	4.0	4.0	39	< 1	< 1	< 1	< 1	< 1	< 1		
Lithium	ug/L	NC	170	350	440	< 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		
Molybdenum	ug/L	NC	73	210	3,200	11	9	< 5	< 5	< 5	< 5		
Radium-226	pCi/L	NC	NC	NC	NC	0.274	< 0.734		< 0.156		< 0.538		
Radium-228	pCi/L	NC	NC	NC	NC	< 0.480	< 0.390		< 0.376		0.517		
Radium-226/228	pCi/L	5	NC	NC	NC	< 0.480	< 0.734		< 0.376		< 0.538		
Selenium	ug/L	50	50	50	5.0	< 1	< 1	< 1	< 1	< 1	< 1		
Thallium	ug/L	2	2.0	2.0	3.7	< 2	< 2	< 2	< 2	< 2	< 2		
Michigan Part 115 Pa	arameters												
Iron	ug/L	300**	300 ⁽¹⁾	300 ⁽¹⁾	500,000 ⁽²⁾	8,100		283	488	687	552		
Copper	ug/L	1,000**	1,000 ⁽¹⁾	1,000 ⁽¹⁾	15	< 1		2	< 1	1	2		
Nickel	ug/L	NC	100	100	86	< 1		2	< 1	< 2	< 2		
Silver	ug/L	100**	34	98	0.2	< 0.2		< 0.2	< 0.2	< 0.2	< 0.2		
Vanadium	ug/L	NC	4.5	62	27	3		< 2	2	3	3		
Zinc	ug/L	5,000**	2,400	5.000 ⁽¹⁾	190	32		< 10	< 10	19	< 10		

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

pCi/L - picocuries per liter.

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

NA - not applicable.

NC - no criteria.

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

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

- ^ Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using 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 EGLE policy and procedure 09-014 dated June 20, 2012.

 $\ensuremath{\textbf{BOLD}}$ 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.

(1) - Criterion is the aesthetic drinking water value per footnote {E}.

(2) - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

(3) - Total dissolved solids data for the October 2020 event contained errors introduced by the laboratory materials manufacturer and were determ

					Sample Location:	PZ-40			PZ-	PZ-40S		
					Sample Date:	4/16/2020	10/21/2020	2/11/2020	4/14/2020	7/16/2020	10/21/2020	
				MI Non-								
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^							
Appendix III												
Boron	ug/L	NC	500	500	7,200	153	67	< 20	< 20	30	27	
Calcium	mg/L	NC	NC	NC	500 ⁽²⁾	11.2	12.6	1.36	1.65	1.35	3.51	
Chloride	mg/L	250**	250 ⁽¹⁾	250 ⁽¹⁾	500 ⁽²⁾	2.58	2.85	< 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	
Sulfate	mg/L	250**	250 ⁽¹⁾	250 ⁽¹⁾	500 ⁽²⁾	13.3	8.62	2.65	2.72	2.47	1.51	
Total Dissolved Solids	mg/L	500**	500 ⁽¹⁾	500 ⁽¹⁾	500	79	NA ⁽³⁾	30	33	33	NA ⁽³⁾	
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5 ⁽¹⁾	6.5 - 8.5 ⁽¹⁾	6.5 - 9.0	5.9	5.9	5.1	4.4	4.9	4.6	
Appendix IV												
Antimony	ug/L	6	6.0	6.0	130	< 1	< 1	< 1	< 1	< 1	< 1	
Arsenic	ug/L	10	10	10	10	< 1	< 1	< 1	< 1	< 1	< 1	
Barium	ug/L	2,000	2,000	2,000	820	15	12	25	22	19	19	
Beryllium	ug/L	4	4.0	4.0	18	< 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	
Chromium	ug/L	100	100	100	11	< 1	< 1	1	1	1	2	
Cobalt	ug/L	NC	40	100	100	< 15	< 15	< 6	< 15	< 6	< 6	
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	
Lead	ug/L	NC	4.0	4.0	39	< 1	< 1	< 1	< 1	< 1	< 1	
Lithium	ug/L	NC	170	350	440	< 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	
Molybdenum	ug/L	NC	73	210	3,200	7	6	< 5	< 5	< 5	< 5	
Radium-226	pCi/L	NC	NC	NC	NC	< 0.165	< 0.548		< 0.142		< 0.614	
Radium-228	pCi/L	NC	NC	NC	NC	< 0.356	< 0.302		< 0.370		< 0.442	
Radium-226/228	pCi/L	5	NC	NC	NC	0.392	< 0.548		< 0.370		< 0.614	
Selenium	ug/L	50	50	50	5.0	< 1	< 1	< 1	< 1	< 1	< 1	
Thallium	ug/L	2	2.0	2.0	3.7	< 2	< 2	< 2	< 2	< 2	< 2	
Michigan Part 115 Pa	arameters											
Iron	ug/L	300**	300 ⁽¹⁾	300 ⁽¹⁾	500,000 ⁽²⁾	69		144	168	174	582	
Copper	ug/L	1,000**	1,000 ⁽¹⁾	1,000 ⁽¹⁾	15	< 1		1	< 1	2	2	
Nickel	ug/L	NC	100	100	86	< 1		< 1	< 1	< 2	< 2	
Silver	ug/L	100**	34	98	0.2	< 0.2		< 0.2	< 0.2	< 0.2	< 0.2	
Vanadium	ug/L	NC	4.5	62	27	< 2		< 2	< 2	< 2	< 2	
Zinc	ug/L	5,000**	2,400	5.000 ⁽¹⁾	190	< 10		< 10	< 10	19	< 10	

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

pCi/L - picocuries per liter.

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

NA - not applicable.

NC - no criteria.

-- - not analyzed.

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

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

- ^ Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using 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 EGLE policy and procedure 09-014 dated June 20, 2012.

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.

(1) - Criterion is the aesthetic drinking water value per footnote {E}.

(2) - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

(3) - Total dissolved solids data for the October 2020 event contained errors introduced by the laboratory materials manufacturer and were determ

					Sample Location:	TW-19-04A				TW-19-05		TW-19-06A		
					Sample Date:	2/11/2020	4/14/2020	10/21/2020	2/11/2020	4/16/2020	10/21/2020	2/11/2020	4/16/2020	10/21/2020
				MI Non-										
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^									
Appendix III														
Boron	ug/L	NC	500	500	7,200	1,350	760	1,610	79	95	152	228	210	214
Calcium	mg/L	NC	NC	NC	500 ⁽²⁾	58.0	54.6	60.9	22.1	38.6	74.2	20.7	19.6	18.3
Chloride	mg/L	250**	250 ⁽¹⁾	250 ⁽¹⁾	500 ⁽²⁾	3.03	3.28	1.18	1.10	5.67	22.5	< 1.00	< 1.00	1.10
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
Sulfate	mg/L	250**	250 ⁽¹⁾	250 ⁽¹⁾	500 ⁽²⁾	31.9	28.6	37.3	6.35	49.7	80.3	11.2	10.8	8.47
Total Dissolved Solids	mg/L	500**	500 ⁽¹⁾	500 ⁽¹⁾	500	242	234	NA ⁽³⁾	81	199	NA ⁽³⁾	113	107	NA ⁽³⁾
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5 ⁽¹⁾	6.5 - 8.5 ⁽¹⁾	6.5 - 9.0	7.6	7.2	7.0	7.9	7.3	7.3	7.8	6.6	7.4
Appendix IV														
Antimony	ug/L	6	6.0	6.0	130	3	3	3	3	2	2	< 1	< 1	< 1
Arsenic	ug/L	10	10	10	10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	2,000	2,000	820	78	71	86	6	12	26	7	8	6
Beryllium	ug/L	4	4.0	4.0	18	< 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
Chromium	ug/L	100	100	100	11	< 1	< 1	< 1	1	< 1	< 1	< 1	< 1	< 1
Cobalt	ug/L	NC	40	100	100	< 6	< 15	< 6	< 6	< 15	< 6	< 6	< 15	< 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
Lead	ug/L	NC	4.0	4.0	39	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	19	18	21	17	20	26	< 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
Molybdenum	ug/L	NC	73	210	3,200	166	69	56	< 5	< 5	< 5	56	41	24
Radium-226	pCi/L	NC	NC	NC	NC		0.162	< 0.475		< 0.119	< 0.382		< 0.204	< 0.442
Radium-228	pCi/L	NC	NC	NC	NC		< 0.381	< 0.420		< 0.386	< 0.172		< 0.403	< 0.332
Radium-226/228	pCi/L	5	NC	NC	NC		< 0.381	0.576		< 0.386	< 0.382		< 0.403	< 0.442
Selenium	ug/L	50	50	50	5.0	162	213	308	38	31	19	7	13	< 1
Thallium	ug/L	2	2.0	2.0	3.7	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Michigan Part 115 Pa	arameters													
Iron	ug/L	300**	300 ⁽¹⁾	300 ⁽¹⁾	500,000 ⁽²⁾	35	38	< 20	71	23	< 20	265	200	134
Copper	ug/L	1,000**	1,000 ⁽¹⁾	1,000 ⁽¹⁾	15	< 1	< 1	< 1	1	1	2	1	1	< 1
Nickel	ug/L	NC	100	100	86	1	< 1	< 2	2	< 1	< 2	< 1	< 1	< 2
Silver	ug/L	100**	34	98	0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	4.5	62	27	< 2	< 2	< 2	< 2	< 2	< 2	< 2	2	< 2
Zinc	ug/L	5,000**	2,400	5.000 ⁽¹⁾	190	< 10	14	< 10	< 10	< 10	< 10	< 10	< 10	< 10

Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

SU - standard units; pH is a field parameter.

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

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** - 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 EGLE policy and procedure 09-014 dated June 20, 2012.

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

RED value indicates an exceedance of the MCL.

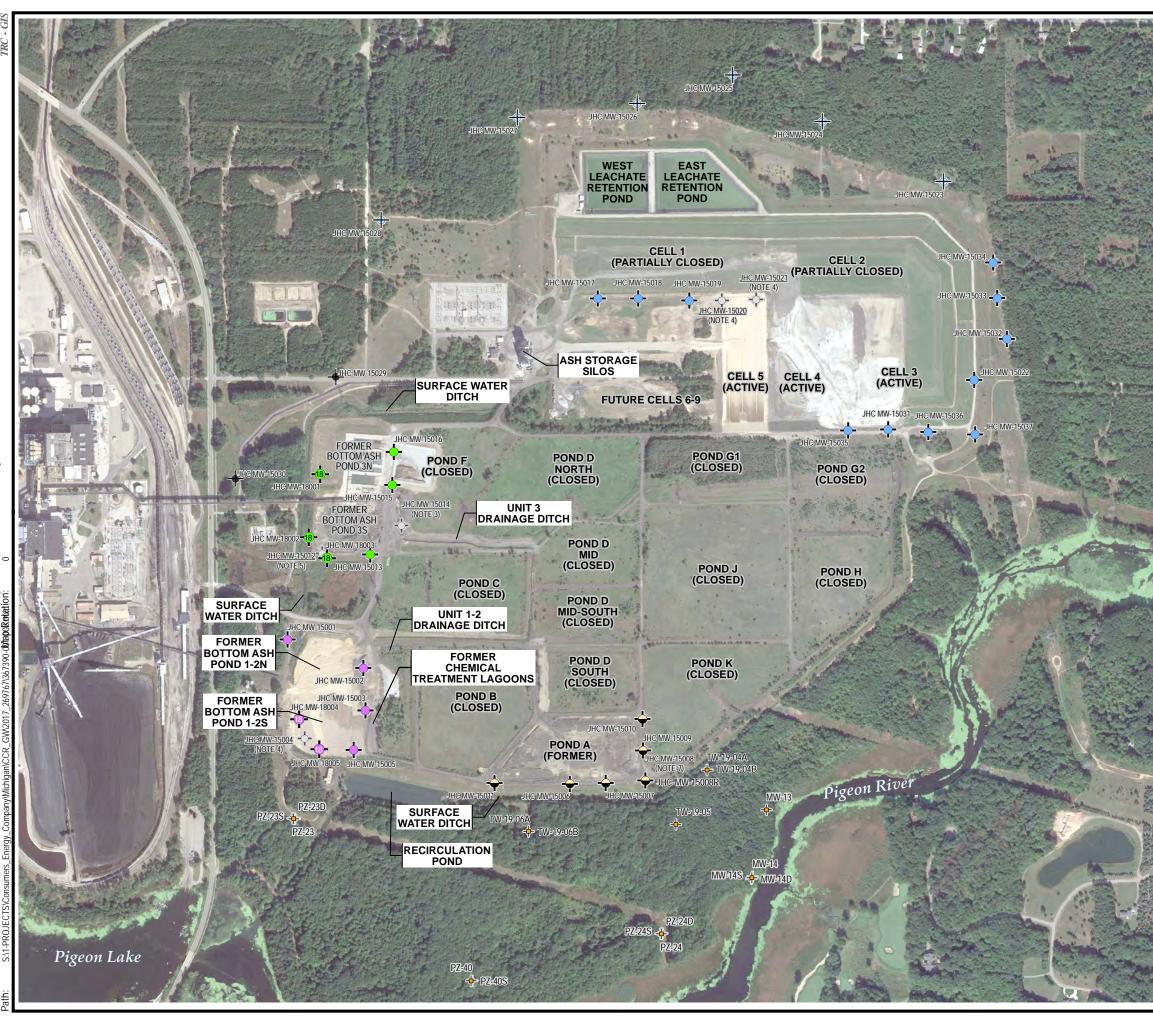
All metals were analyzed as total unless otherwise specified.

(1) - Criterion is the aesthetic drinking water value per footnote {E}.

(2) - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

(3) - Total dissolved solids data for the October 2020 event contained errors introduced by the laboratory materials manufacturer and were determ

Figure



LEGEND

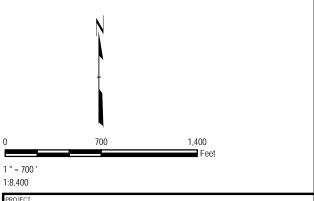
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- BACKGROUND MONITORING WELL
 - BOTTOM ASH POND
 - 1/2 N/S MONITORING WELL
- BOTTOM ASH POND 3 N/S MONITORING WELL
- DOWNGRADIENT LANDFILL MONITORING WELL
- DOWNGRADIENT POND A MONITORING WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED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

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.
- 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.



CONSUMERS ENERGY COMPANY JH CAMPBELL POWER PLANT WEST OLIVE, MICHIGAN

TITLE:

SITE PLAN WITH CCR MONITORING WELL LOCATIONS

DRAWN BY:	S. MAJOR	PROJ NO.:	367390.0000.0000
CHECKED BY:	B. YELEN		
APPROVED BY:	S. HOLMSTROM	F	IGURE 1
DATE:	JANUARY 2021	•	
🤣 T	RC		1540 Eisenhower Place Ann Arbor, MI 48108-3284 Phone: 734.971.7080 www.frccompanies.com

www.trccompanies.com 367390-001-002.mx



Appendix D Semiannual Progress Report



January 30, 2021

Subject: Semiannual Progress Report - Selection of Remedy JH Campbell Bottom Ash Ponds 1-2 CCR Unit JH Campbell Pond A CCR Unit

This Semiannual Progress Report, prepared as a requirement of §257.97(a) of 40 CFR Parts 257 and 261, Disposal of Coal Combustion Residuals from Electric Utilities, under subtitle D of the Resource Conservation and Recovery Act (RCRA), also known as the Coal Combustion Residuals (CCR) rule, describes progress toward selecting and designing remedies for two CCR units that triggered Assessment of Corrective Measures (ACM) under the CCR Rule at the JH Campbell Solid Waste Disposal Area: Bottom Ash Ponds 1-2 and Pond A. Based on the schedule of self-implementation prescribed in the CCR Rule, a progress report is required to be prepared semiannually upon completion of the Assessment of Corrective Measures Report until the remedy is selected. It is noteworthy that remedy selection for the Bottom Ash Ponds 1-2 and Pond A, prescribed by the CCR Rule, is being undertaken in coordination with a Michigan Department of Environment, Great Lakes, and Energy (EGLE) Consent Agreement 115-01-2018, which was executed on December 28, 2018.

Consumers Energy (CE) reported statistically significant exceedances above the groundwater protection standard (GWPS) for a single Appendix IV constituent, arsenic, in the "Notification of Appendix IV Constituent Exceeding Groundwater Protection Standard per §257.95(g)" (Consumers Energy Company, January 2019).

Unit with GWPS Exceedance	Constituent	# of Downgradient Wells Observed
Pond A	Arsenic	1 of 6
Bottom Ash Ponds 1-2	Arsenic	2 of 5

Subsequently, Assessment of Corrective Measures Reports (TRC, September 2019) were completed on September 11, 2019 for Bottom Ash Ponds 1-2 and Pond A.

Environmental Services



An initial semi-annual progress report dated January 30th, 2020 was made available on the CE public-facing website as part of the "2019 Annual Groundwater Monitoring and Corrective Action *Report*" (TRC, January 2020) for Bottom Ash Ponds 1-2 and Pond A.

Assessment Activities

Bottom Ash Ponds 1-2

Consumers Energy has performed CCR removal at Bottom Ash Ponds 1-2 as documented in the "JH Campbell Generating Facility Bottom Ash Ponds 1-2 Closure Plan," (Golder, January 2018). Following the permanent cessation of hydraulic loading, CCR removal activities were completed in October 2018. On October 22, 2019 EGLE provided written concurrence that all bottom ash had been removed from Bottom Ash Ponds 1-2 based on multiple lines of evidence described in the approved closure work plan.

Consumers Energy continues to monitor Bottom Ash Ponds 1-2 semiannually for Appendix III and IV constituents.

Pond A

Consumers Energy closed Pond A according to the "JH Campbell Generating Facility Pond A Closure Plan, West Olive, Michigan" (Golder, October 2016) and an updated closure plan detailing the final cover system submitted to EGLE in February 2019. The state closure certification as required by Paragraph 4.2 of Consent Agreement WMRPD No. 115-01-2018 was approved by EGLE on November 25, 2019.

Since the installation of the final cover, three rounds of semiannual sampling have been conducted at Pond A. In accordance with Consent Agreement 115-01-2018, a revised Hydrogeological Monitoring Plan, Pond A Hydrogeological Monitoring Plan, JH Campbell Power Plant, West Olive, Michigan (HMP) (TRC, March 2019; Revised July 2019) was submitted to EGLE and approved in August 2019. The Pond A well network is being sampled quarterly under the EGLE-approved HMP.



2020 Data Analysis

Analytical results and details of the statistical evaluations from semiannual sampling are detailed in the respective "2020 Annual Groundwater Monitoring and Corrective Action Report" (TRC, January 2021) for each unit, to which this memo is appended. A summary of the results is included below.

Bottom Ash Ponds 1-2

Arsenic concentrations at MW-15002 reached a local maximum in 2018, during the same time period that significant earthwork was being completed to remove ash from the pond. There has been a steady decrease in observed concentrations of arsenic at MW-15002 since ash removal was completed, including the most recent results collected in 2020. Concentrations of arsenic at MW-15003 have remained steady at or near the GWPS since 2018.

Since the cessation of hydraulic loading and removal of CCR at Bottom Ash Ponds 1-2, groundwater flow direction has changed significantly and MW-15002 and MW-15003 are no longer downgradient of the former CCR unit. Concentrations at these wells are not necessarily representative of groundwater that is solely influenced by Bottom Ash Ponds 1-2. The wells continue to be monitored to evaluate groundwater quality since the removal of CCR.

As detailed in Section 4.1 of the 2020 Annual Groundwater Monitoring and Corrective Action Report" (TRC, January 2021) for Bottom Ash Ponds 1-2, Nature and Extent sampling performed pursuant to 257.95(g)(1) demonstrates that arsenic is not observed at levels which threaten human health or the environment in downgradient wells, and exceedances of the GWPS for arsenic are limited to Consumers Energy property near the solid waste boundary of the former unit.

Pond A

Arsenic concentrations exceed the GWPS at a single well, MW-15011. These concentrations reached an apparent local maximum coincidental to the installation of the final cover system in 2019. Subsequent rounds of quarterly and semiannual sampling for arsenic at MW-15011 show a visual decline since final cover installation. Semiannual sampling results in 2020 may indicate that arsenic concentrations are equilibrating.

No additional statistically significant observations were made in the 2020 data set. Nature and Extent sampling continues to demonstrate the arsenic is not found at wells downgradient of Pond A at levels which exceed the GWPS. The dewatering of the impoundment in 2018 followed by the



completion of the final cover in 2019 has changed groundwater flow direction. Mounding is no longer observed near the unit, and static water levels have dropped by multiple feet.

Conclusions

Bottom Ash Ponds 1-2

The general decrease in arsenic concentrations suggest that source removal continues to have an observable impact on groundwater quality. Changing concentrations indicate that the system is establishing a new equilibrium following source removal. Nature and Extent sampling suggests that the GWPS exceedances do not pose an immediate threat to human health or the environment. Continued monitoring at Bottom Ash Ponds 1-2 is appropriate to understand the new geochemical equilibrium being established at the former unit and determine if the formal selection of a remedy beyond source control is required.

Pond A

Additional data gathering activities will be conducted downgradient of Pond A in 2021 to support the development of the Remedial Action Plan being submitted to the State of Michigan under Consent Agreement 115-01-2018. These data collection activities will further refine the definition of the nature and extent of arsenic concentrations associated with CCR management at the JH Campbell site and inform the selection of a final remedy, if necessary, following source control at Pond A.

Remedy Selection Process

The ACM Report identified source removal and final cover as primary corrective actions for Ponds 1-2 and Pond A, respectively, but also considered five technically feasible groundwater management alternatives to address the potential for residual arsenic. Additional data collected under the state and federal groundwater monitoring programs is being used to inform remedy selection and the creation of a Remedial Action Plan under the December 2018 agreement with EGLE.

If necessary, following the source control activities, the remedy for Ponds 1-2 and Pond A will be formally selected per §257.97 once the selected option is reviewed and commented on by EGLE and a public meeting is conducted at least 30-days prior to the final selection as required under §257.96(e).



References

- Consumers Energy Company. January 2020. Initial Semiannual Progress Report, JH Campbell Bottom Ash Ponds 1-2 CCR Unit, JH Campbell Pond A CCR Unit.
- Consumers Energy Company. January 14, 2019. Notification of Appendix IV Constituent Exceeding Groundwater Protection Standard per §257.95(g), JH Campbell Ponds 1-2 CCR Unit.
- Consumers Energy Company. January 14, 2019. Notification of Appendix IV Constituent Exceeding Groundwater Protection Standard per §257.95(g), JH Campbell Pond A CCR Unit.
- Golder Associates. January 2018. JH Campbell Generating Facility Bottom Ash Ponds 1-2 Closure Plan, West Olive, Michigan. Prepared for Consumers Energy Company.
- Golder Associates. October 2016. JH Campbell Generating Facility Pond A Closure Plan, West Olive, Michigan. Prepared for Consumers Energy Company.
- TRC Environmental Corporation. January 2021. 2020 Annual Groundwater Monitoring and Corrective Action Report, JH Campbell Power Plant, Ponds 1-2 North and 1-2 South CCR Unit. Prepared for Consumers Energy Company.
- TRC Environmental Corporation. January 2021. 2020 Annual Groundwater Monitoring and Corrective Action Report, JH Campbell Power Plant, Pond A CCR Unit. Prepared for Consumers Energy Company.
- TRC Environmental Corporation. January 2020. 2019 Annual Groundwater Monitoring and Corrective Action Report, JH Campbell Power Plant, Ponds 1-2 North and 1-2 South CCR Unit. Prepared for Consumers Energy Company.
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- TRC Environmental Corporation. September 2019. Assessment of Corrective Measures, Consumers Energy Company JH Campbell Ponds 1-2 North and 1-2 South and Pond A Coal Combustion Residual Units. Prepared for Consumers Energy Company.
- TRC Environmental Corporation. March 2019; Revised July 2019. Pond A Hydrogeological Monitoring Plan, JH Campbell Power Plant, West Olive, Michigan. Prepared for Consumers Energy Company