

# 2021 Annual Groundwater Monitoring and Corrective Action Report

JH Campbell Power Plant Pond A

West Olive, Michigan

January 2022

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**Prepared For:** Consumers Energy

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# **APPENDICES**

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- Appendix C First Semiannual Monitoring Report
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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, 2021 to December 31, 2021.

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.

On April 25, 2018, Consumers Energy entered assessment monitoring at Pond A upon determining that an Alternate Source Demonstration for the Appendix III constituents was not successful. During the statistical evaluation of the initial assessment monitoring event (June 2018), arsenic was present in downgradient monitoring well JHC-MW-15011 at statistically significant levels exceeding the Groundwater Protection Standard (GWPS). Therefore, Consumers Energy initiated an Assessment of Corrective Measures (ACM) on April 14, 2019, 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 2021 are presented in this report.

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 2022.



# 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 2021 semiannual assessment monitoring events at Pond A were completed in April and October 2021 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. In addition to the semiannual assessment monitoring data, samples were collected from the Pond A monitoring well network from February 22 through 24, 2021 and from August 16 through 18, 2021 to comply with the EGLE-approved monitoring program requirement for quarterly monitoring. The quarterly data are consistent with the semiannual assessment monitoring events and are used in the statistical evaluation.

## 2.1 Monitoring Well Network

Consumers Energy initially established a groundwater monitoring system for the JHC Pond A in 2015 consisting of 12 monitoring wells (six background monitoring wells and six downgradient monitoring wells) screened in the uppermost aquifer. The initial installation for the Pond A monitoring well network was positioned to capture downgradient groundwater flow from the water table at a time where mounding was observed in the vicinity of Pond A. Since the permanent discontinuation of hydraulic loading in June 2018 and completion of the final cover installation in 2019, mounding is no longer present and the groundwater has equilibrated to a lower static water elevation. As documented in the Closure Certification Report approved by the EGLE on November 25, 2019, the cover construction was completed in summer 2019, eliminating infiltration at Pond A. This has caused the groundwater flow direction to shift to the south-southeast and the water levels to drop below the screened intervals for JHC-MW-15007, JHC-MW-15009, and JHC-MW-15010, and drop within a foot of the bottom of the screen at JHC-MW-15011 making it difficult to collect a sample. Consequently, JHC-MW-15010 was no longer located downgradient from Pond A and groundwater samples could not reliably be collected from JHC-MW-15007, JHC-MW-15009, and JHC-MW-15007, JHC-MW-15011.

On June 4, 2021, TRC, on behalf of Consumers Energy, submitted the *Pond A Monitoring Well Decommissioning and Replacement* letter to EGLE to request approval to decommission and replace monitoring wells JHC-MW-15007, JHC-MW-15009, and JHC-MW-15011, and remove monitoring well JHC-MW-15010 from the groundwater monitoring system. EGLE approved the proposed changes to groundwater monitoring system by email on June 4, 2021. On July 19, 2021, TRC field staff mobilized to the site to install replacement monitoring wells JHC-MW-15007R, JHC-MW-15009R, and JHC-MW-15011R and decommission JHC-MW-15007, JHC-MW-15009, JHC-MW-15010, and JHC-MW-15011. Documentation of the well decommissioning and well replacement activities are provided in the October 7, 2021 *Summary of Pond A Monitoring Well Decommissioning and Replacement* letter provided in Appendix A.



The groundwater monitoring network for Pond A now consists of 11 monitoring wells (six background monitoring wells and five downgradient monitoring wells) screened in the uppermost aquifer. 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 five downgradient wells (JHC-MW-15006, JHC-MW-15007R, JHC-MW-15008R, JHC-MW-15009R, and JHC-MW-15011R) are located south and southeast of Pond A. An updated groundwater monitoring network certification is included as Appendix B.

## 2.2 First Semiannual Monitoring Event

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

#### 2.3 Second Semiannual Monitoring Event

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



# 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 2021 for Pond A is included in Appendix E.

# 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.

## 3.3 Remedy Selection

Remedy selection for Pond A, prescribed by the CCR Rule, is being undertaken in coordination with the Michigan Department of Environment, Great Lakes, and Energy (EGLE) Consent Agreement WMRPD No. 115-01-2018, which was executed on December 28, 2018. The January 2022 semiannual progress report describing the progress in selecting and designing the remedy required pursuant to §257.97(a) is included in Appendix F. 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 in 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. The arsenic exceedance at MW-15011 which initially triggered corrective action continues to attenuate following the completion of the final cover for Pond A. Since the installation of the final cover, groundwater monitoring data for several other constituents indicate an observable influence from immediately adjacent, upgradient, closed, pre-existing units. A formal demonstration of this influence is in development. Remedial action for the upgradient units is being taken under Consent Agreement WMRPD No. 115-01-2018.



# Appendix A Pond A Well Decommissioning and Replacement



October 7, 2021

via email: WaltersK7@michigan.gov

Mr. Kent Walters, Geologist Material Management Division (MMD) Michigan Department of Environment, Great Lakes, and Energy (EGLE) Grand Rapids District Office 350 Ottawa Avenue NW, Unit 10 Grand Rapids, Michigan 49503-2341

Subject: Summary of Pond A Monitoring Well Decommissioning and Replacement at the Consumers Energy JH Campbell Solid Waste Management Area, West Olive, Michigan

Dear Mr. Walters:

TRC was retained by Consumers Energy to decommission monitoring wells JHC-MW-15007, JHC-MW-15009, JHC-MW-15010, and JHC-MW-15011 and install replacement monitoring wells JHC-MW-15007R, JHC-MW-15009R, and JHC-MW-15011R at the Consumers Energy JHC Campbell Solid Waste Management Area, Pond A (Pond A), located in West Olive, Michigan. These activities were completed as described in the notification letter titled Pond A Monitoring Well Decommissioning and Replacement at the Consumers Energy JH Campbell Solid Waste Management Area, West Olive, Michigan (June 4, 2021), approved by the EGLE via email on June 4, 2021. The well decommissioning and installation activities were completed to remove one well no longer down gradient of Pond A and reposition three monitoring well screen intervals to a lower elevation in order to capture groundwater which has equilibrated to a lower static water elevation. The locations of the four decommissioned monitoring wells and the three replacement wells are illustrated on Figure 1. This letter provides a detailed summary of the monitoring well installation and decommissioning procedures conducted at the site.

On July 19, 2021, TRC field staff mobilized to the site to install replacement monitoring wells JHC-MW-15007R, JHC-MW-15009R, and JHC-MW-15011R and decommission JHC-MW-15007, JHC-MW-15009, JHC-MW-15010, and JHC-MW-15011. Cascade Drilling of Flint, Michigan was retained by TRC to provide the well drilling and decommissioning services.

All monitoring wells were installed using a Boart Longyear LS 250 rotary sonic drill rig. Prior to well installation, the top five feet of each boring was hand cleared and soil samples were collected continuously to the remaining total depth for classification by TRC field staff using the Unified Soil Classification System and to verify the depth to groundwater. The soil boring logs are provided in Attachment A.

The monitoring wells are constructed using 2-inch inside diameter PVC casing with a 10-foot screen. The bottom of the well screen was set approximately 6 feet below the water table. The filter pack is comprised of medium washed silica sand and extends approximately 2 to 3 feet above the top of the screen. Following placement of the well screen and sand pack, the well annulus was sealed with 2 to 3 feet of bentonite chips, and the remaining annulus sealed with a bentonite grout slurry to approximately



Mr. Kent Walters EGLE October 7, 2021 Page 2

1 foot below ground surface (ft bgs). The sand pack and bentonite were pressure grouted into the borehole from the top of the drill casing. The well was finished with a 4"x 4" square, above-ground painted protective metal cover, which was set in a 1-foot thick concrete surface seal. The well was secured with two bollards placed between the monitoring well and the adjacent service road, finished with a vented and locking well cap, and clearly labeled for identification by modifying well IDs on existing signs. Soil cuttings were thin spread around the monitoring well and development water was managed onsite. Nederveld Inc. surveyors completed horizontal and vertical survey of the monitoring wells on July 23, 2021. Well construction forms are provided in Attachment A.

Monitoring wells, JHC-MW-15007, JHC-MW-15009, JHC-MW-15010, and JHC-MW-15011, were decommissioned by removing the concrete pad, removing the protective steel cover, and removing the two protective steel bollards. Each well was cut off to two ft bgs, backfilled with bentonite grout to two ft bgs, sealed with bentonite chips to one ft bgs, then filled with surrounding sand to grade. Monitoring well decommissioning logs are included as Attachment B.

If you have any questions or comments, please feel free to contact me by phone at (734) 585-7818.

Sincerely,

TRC

Saul & Holaston

Sarah Holmstrom, P.G. Project Manager/Senior Hydrogeologist

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Brian Yelen Project Geologist

Attachments:Figure 1 – Site Layout and Monitoring LocationsAttachment A – Soil Boring Logs and Well Construction DiagramsAttachment B – Monitoring Well Decommissioning Logs

cc: Bethany Swanberg, Consumers Energy Company



# Figure





oordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Intl (For

Plot Date: 9/23/2021, 09:05:26 AM by AFOJTIK -- LAYOUT: ANSI B(11"x17") ath: F-Proie-retConsumersEnerovICCR\_GM2017\_260767418423-003-000 m



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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
- PIEZOMETER 2021
- DOWNGRADIENT POND A MONITORING WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL

NEW DOWNGRADIENT BOTTOM ASH POND 1/2 N/S MONITORING WELL (2018) NEW DOWNGRADIENT BOTTOM ASH POND 3 N/S MONITORING WELL (2018)

- + DOWNGRADIENT MONITORING WELLS
- STAFF GAUGE
- TEMPORARY WELL



(591.25) GROUNDWATER ELEVATION (FEET ABOVE MSL)

# <u>NOTES</u>

- 1. BASE MAP IMAGERY FROM GOOGLE EARTH PRO, 2021.
- 2. WELL LOCATIONS BASED ON SURVEY DATA THROUGH 8/14/2019.
- 3. MONITORING WELL DECOMMISSIONED NOVEMBER 13, 2017.
- 4. MONITORING WELL DECOMMISSIONED JUNE 14, 2018.
- 5. MONITORING WELL DECOMMISSIONED OCTOBER 10, 2018.
- 6. JHC-MW-1800X MONITORING WELLS INSTALLED IN DECEMBER 2018.
- 7. MONITORING WELL DECOMMISSIONED JUNE 24, 2019.
- 8. MONITORING WELLS DECOMMISSIONED MAY 25, 2021.
- 9. MONITORING WELLS DECOMMISSIONED JULY, 2021.

0 1 " = 700 ' 1:8,400	700	1,400 Feet	ru
PROJECT:	CONSUMERS JH CAMPBE WEST OI	ENERGY COMP LL POWER PLA LIVE, MICHIGAN	ANY NT
TITLE:	SIT	E PLAN	
DRAWN BY:	A. FOJTIK	PROJ NO.:	418422-0003
CHECKED BY:	B. YELEN		
APPROVED BY:	S. HOLMSTROM	FIGU	IRE 1A
DATE:	SEPTEMBER 2021		
	RC		1540 Eisenhower Place Ann Arbor, MI 48108-3284 Phone: 734.971.7080 www.trccompanies.com
FILE NO.:			418422-003-000.mxd

# Attachment A Soil Boring Log and Well Construction Diagram





## WELL CONSTRUCTION LOG

#### WELL NO. JHC MW-15007R

			_										Page	1 of 2		
Facilit	y/Proje	ct Nam	e:					Date Drilling Started	te Drilling Started: Date Drilling Completed:					Project Number:		
		Cons	umers	Energy Co	ompany: J	H Campbell		7/20/2021	TOC	7/21/	2021		4	18422.0003		
Drillin	g Firm:		<b>-</b>		Drilling Meth	nod:		Surface Elev. (ft)	IOCE	ievation (ft)	I otal [	Jepth	(tt bgs)	Borehole Dia. (in)		
Porir	Ca	scade	e Drillin	ng Dand A		Rotary Sonic		625.7	6	28.26	Drilling	40.0	nmant	2.5/6		
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Civil T	own/C	ity/or Vi	llage:	County:		State:		Water Level Observa	ations:	7/21/21 00.0		enth (	(ft bas)	) 30		
	West	Olive		Otta	awa	MI		After Drilling: Date	e/Time	7/23/21 00:0		epth (	(ft, bgs) (ft, bgs)	) <u>33.61</u>		
SAM	IPLE															
NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET			LITHOLO	OGIC PTION			nscs	GRAPHIC LOG	WELL DIAGRAM	(	COMMENTS		
				TOPSOI	L							11				
			_	<b>SAND</b> M (10 YR 6	ostly fine to 5/6), no od	o medium sand, or, dry-moist, loo	trace s ose.	ilt, brownish yello	W	SW						
1	100		5-	COAL A	SH											
RS	100		-	SAND M (10 YR 6 Change moist at	ostly fine to 5/6), no od to trace to 8.0 feet be	o medium sand, or, dry-moist, loo few silt, few grav low ground surfa	trace s ose. vel, dar ace.	ilt, brownish yello k brown (10 YR 3	w 3/3),							
2 RS	100		10— - - 15— -	Change 10.0 fee	to trace sil	t, brownish yellov bund surface.	w (10 \	′R 6/6), no gravel	l at	SW						
3 RS	100		- 20 - - 25 - -	Change surface. Change	to yellowis to brownis	h red (5 YR 4/6) h yellow (10 YR	at 22.5	5 feet below groun 27.5 feet below g	nd groun	d						
			-	surrace.									•			
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	10	3-	- 4	uh	-	1	1540 Ei	senhower Place A	Ann Ar	bor, Michig	an		Fa	ax 734-971-9022		
Check	ed Bv	Je	nnifer R	eed												





## WELL CONSTRUCTION LOG

#### WELL NO. JHC MW-15009R

						Page 1 of 2
Facility/Project Name:			Date Drilling Started:	Date Drillin	g Completed:	Project Number:
Consum	ners Energy Compa	ny: JH Campbell	7/19/2021	7/20	0/2021	418422.0003
Drilling Firm:	Drillin	g Method:	Surface Elev. (ft)	TOC Elevation (ft)	Total Depth	(ft bgs) Borehole Dia. (in)
Cascade D	Drilling	Rotary Sonic	632.2	635.05	50.0	2.5/6
Boring Location: East State Plane N: 517799.3 E	of Pond A. E: 12636013.6		Personnel Logged By - Brian Ye Driller - Chris Bond	elen	Drilling Equi	<sup>pment:</sup> Longyear LS 250
Civil Town/City/or Villag	ge: County:	State:	Water Level Observa	tions:	.00 ∇ Donth (	ft bas) 40
West Olive	Ottawa	МІ	After Drilling: Date/	Time <u>7/20/21 00</u> Time <u>7/23/21 00</u>	: <u>00</u> ⊻ Depth ( <u>:00</u> ⊻ Depth (	ft, bgs) <u>40</u> ft, bgs) <u>40.23</u>
NUMBER AND TYPE RECOVERY (%) BLOW COUNTS		LITHOLOGIC DESCRIPTIO	C N	nscs	GRAPHIC LOG WELL DIAGRAM	COMMENTS
	TOPSOIL					
1 RS 100	SAND Mostly (10 YR 6/6), r	fine to medium sand, trace to odor, dry-moist, loose. bist at 5.0 feet below grour	e silt, brownish yellov nd surface.	N SW	,	
2 RS 100 1	0 - SAND Mostly (10 YR 6/6), r - - 5 - -	fine to medium sand, trace o odor, moist, loose.	e silt, brownish yellov	v		
<sup>3</sup> RS 100 2	Change to tra	ce to few silt, brown (10 Y e.	′R 4/3) at 28.0 feet b	elow		
Signatura						Dhama 704 074 7000
Signature:	11h	Firm: TRC   1540	Eisenhower Place A	nn Arbor, Michi	igan	Finone / 34-9/1-/080 Fax 734-971-9022
Checked By: Jennil	fer Reed				-	

				WELL CONSTRUCTION LOG				
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SAN	MPLE							rage z or z
NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	USCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
4 RS	100			Change to brownish yellow (10 YR 6/6) at 30.0 feet below ground surface	SW			
5 RS	100		40 — - - 45 — - - - - - - - - - - - - - - - - -	<sup>™</sup> Change to wet at 40.0 feet below ground surface.	SW			
SOIL BORING WELL CONSTRUCTION LOG 418422.0003.0004 - COPY.GPJ 9/23/21			50 — - - - - - - - - - - - - - - - - - - -	End of boring at 50.0 feet below ground surface.				



## WELL CONSTRUCTION LOG

## WELL NO. JHC MW-15011R

												Page	1 of 2
Facilit	y/Proje	ct Nam	e:				Date Drilling Started	d:	Date Drilling	Comple	eted:	Proje	ct Number:
		Cons	umers	s Energy Co	ompany: Jł	l Campbell	7/21/2021		7/22/	2022		4	18422.0003
Drillin	g Firm:				Drilling Meth	od:	Surface Elev. (ft)	TOC	Elevation (ft)	Total D	Depth	(ft bgs)	Borehole Dia. (in)
	Ca	scade	e Drilli	ng	F	Rotary Sonic	627.7	6	629.79		43.0		2.5/6
Boring State F	g Locati Plane N:	on: Sc	outhwe	st of Pond A 634946.9			Personnel Logged By - Brian N Driller - Chris Bond	Yelen	Drilling Equipment: Boart Longyear LS 250				year LS 250
Civil T	own/Ci	ty/or Vi	llage:	County:		State:	Water Level Observ	ations:	7/00/04 00:0		onth	(ft bac)	25.5
	West	Olive		Otta	awa	МІ	After Drilling: Date	e/Time	7/23/21 00:0		epth (	(ft, bgs)	36.64
SAM	PLE						•						
NUMBER AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	TOPSOI		LITHOLOGIC DESCRIPTION	l		nscs	GRAPHIC LOG	WELL DIAGRAM	0	COMMENTS
1 RS	100		- - 5 - - - - - - - - - - - - - - -	Change at 7.5 fee	<ul> <li>ostly fine to</li> <li>b)(6), no odd</li> <li>to trace to</li> <li>m density a</li> <li>to trace silt</li> <li>to trace silt</li> </ul>	o medium sand, trace or, dry-moist, loose. few silt, very dark bro at 4.5 feet below grou , brownish yellow (10 ound surface.	silt, brownish yelld wn (10 YR 2/2), dr nd surface. YR 6/6), dry-mois	ry, loo st, loos	ose sw				
2 RS	100		- - 15 — - - 20 —	SAND M (10 YR 6	SH ostly fine to 5/6), no odo	o medium sand, trace or, moist, loose.	silt, brownish yellc	w					
3 RS	100		- - - 25 - - - -						SW				
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	SAM	IPLE							
	AND TYPE	RECOVERY (%)	BLOW COUNTS	DEPTH IN FEET	LITHOLOGIC DESCRIPTION	NSCS	GRAPHIC LOG	WELL DIAGRAM	COMMENTS
				_	Change to brown (10 YR 4/3) at 30.0 feet below ground surface.	SW			
⊿ R	1 S	100		- 35—	<ul> <li>SAND with SILT Mostly fine to medium sand, little to some silt, dark gray (10 YR 4/1), organic odor, moist, loose.</li> <li>✓ Large wood piece at 35.0 feet below ground surface.</li> <li>✓ Change to trace silt, wet at 35.5 feet below ground surface.</li> </ul>	SW			
				- - 40-	<ul> <li>SAND Mostly fine to medium sand, trace silt, brownish yellow (10 YR 6/6), no odor, wet, loose.</li> </ul>	SW			
ę R	5 S	100		-	End of boring at 43.0 feet below ground surface.				
				- 45 — -					
				- 50 — - -					
1010				- 55 — -					
				- 60 — -					
				- 65 — -					
				-					

🤣 TR	RC	WELL CONST	RUCTION DIAGR	AM				
PROJ. NAME:	Consum	ers Energy JH Campbell Pond A		WELL ID:	JHC MW-15007R			
PROJ. NO:	418422.0	0003 DATE INSTALLED: 7/21/2021	INSTALLED BY: Brian Yelen		CHECKED BY: J. K	renz		
ELEVAT	ION	DEPTH BELOW OR ABOVE	CASING AN	ID SCREEI	N DETAILS			
(BENCHMAR)	K: USGS)	GROUND SURFACE (FEET)	TYPE OF RISER: 2-INCH P	VC				
628.26		2.5 TOP OF CASING	PIPE SCHEDULE: 40					
Î Î			PIPE JOINTS: <u>THREADI</u>	ED O-RINGS	<u>3</u>			
			SCREEN TYPE: 2-INCH P	VC				
625.73	4114	0.0 GROUND SURFACE	SCR. SLOT SIZE: 0.01-INCH	<u>1</u>				
		1.0 CEMENT SURFACE PLUG	BOREHOLE DIAMETER:	<u>6</u> IN. IN.	FROM <u>0</u> TO	40 FT. FT.		
т		GROUT/BACKFILL MATERIAL						
LENGT		BENTONITE SLURRY	SURF. CASING DIAMETER:	IN.	FROM TO	FT.		
32.53 H		GROUT/BACKFILL METHOD		IN.	FROM10	FI.		
			WELL	DEVELOP	MENT			
		<u>23.0</u> GROUT	DEVELOPMENT METHOD:	SURGE AN	ND PUMP			
		BENTONITE SEAL MATERIAL	TIME DEVELOPING:	1	HOURS			
		MEDIUM CHIPS	WATER REMOVED:	100	GALLONS			
		27.0 BENTONITE SEAL	WATER ADDED:	0	GALLONS			
<u>595.73</u>		30.0 TOP OF SCREEN	WATER CLARITY BE	FORE / AFT	ER DEVELOPMEN	IT		
Ē			CLARITY BEFORE: <u>Turbic</u>	<u>I</u>				
10.00			COLOR BEFORE: Brown	<u>l</u>				
CREEV		MEDIUM, WASHED SAND	CLARITY AFTER: <u>Clear</u>					
<u>585.73</u>		40.0 BOTTOM OF SCREEN	COLOR AFTER: <u>Clear</u>					
			ODOR (IF PRESENT): None					
		40.0 BOTTOM OF FILTER PACK	WATER		MMARY			
			MEASUREMENT (FE	ET)	DATE	TIME		
	· ·		DTB BEFORE DEVELOPING:	43.10	T/PVC 7/23/2021	10:06		
		BACKFILL MATERIAL	DTB AFTER DEVELOPING:	43.10	T/PVC 7/23/2021	16:25		
		NA	SWL BEFORE DEVELOPING:	36.18	T/PVC 7/23/2021	10:06		
			SWL AFTER DEVELOPING:	36.14	T/PVC 7/23/2021	16:25		
585.73		40.0 HOLE BOTTOM	OTHER SWL:		T/PVC			
			OTHER SWL:		T/PVC			
NOTES:			PROTECTI	VE CASING	DETAILS			
			PERMANENT, LEGIBLE WELL LABEL ADDED? VES NO					
			PROTECTIVE COVER AND LC	OCK INSTAL	LED? 🗸 YES	NO NO		
			LOCK KEY NUMBER: Consu	imers Energ	<u>y Lock</u>			

		WELL CONST	RUCTION D	IAGR	AIVI	1		
PROJ. NAME:	Consum	ers Energy JH Campbell Pond A			WELL ID:	JHC MV	V-15009R	
PROJ. NO:	418422.	0003 DATE INSTALLED: 7/20/2021	INSTALLED BY: Bri	ian Yelen		CHECK	ED BY: J. K	Krenz
ELEVATIO	ON	DEPTH BELOW OR ABOVE	CA	ASING AN	D SCREE	N DETA	<b>ILS</b>	
(BENCHMARK	: USGS)	GROUND SURFACE (FEET)	TYPE OF RISER:	2-INCH P	<u>/C</u>			
635.05		2.90 TOP OF CASING	PIPE SCHEDULE:	<u>40</u>				
<u> </u>			PIPE JOINTS:	THREADE	D O-RING	S		
			SCREEN TYPE	2-INCH P	/C	_		
000.45	1 IN							
632.15	H IA	0.0 GROUND SURFACE	SCR. SLOT SIZE:	<u>0.01-INCH</u>				
		1.0 CEMENT SURFACE PLUG	BOREHOLE DIAME	TER:	<u>6</u> IN.	FROM	<u>0</u> TO	50 FT.
					IN.	FROM	то	FT.
3TH		GROUT/BACKFILL MATERIAL			IN	FROM	то	FT
E LENG		GROUT/BACKFILL METHOD	SURF. CASING DIA	METER:	IN.	FROM	то	FT.
39.90 H		FILL FROM ABOVE						
RIS				WELL [	DEVELOP	MENT		
		33.0 GROUT	DEVELOPMENT ME	THOD:	SURGE AN		<u>P</u>	
		BENTONITE SEAL MATERIAL	TIME DEVELOPING	):	1	HOURS	;	
		MEDIUM CHIPS	WATER REMOVED	:	120	GALLO	NS	
		35.0 BENTONITE SEAL	WATER ADDED:		0	GALLO	NS	
595.15		37.0 TOP OF SCREEN	WATER CI	LARITY BEF	FORE / AFT	FER DEV	ELOPMEN	ΙT
Ĩ <sub>Ĕ</sub>			CLARITY BEFORE:	<u>Turbid</u>				
10.00		FILTER PACK MATERIAL	COLOR BEFORE:	Brown				
CREEN		MEDIUM, WASHED SAND	CLARITY AFTER:	<u>Clear</u>				
585.15 <b>v</b>		47.0 BOTTOM OF SCREEN	COLOR AFTER:	<u>Clear</u>				
			ODOR (IF PRESEN	T): <u>None</u>				
		50.0 BOTTOM OF FILTER PACK						
				WATER	LEVEL SU	MMARY		
		NA BENTONITE PLUG	MEASI		ET)	T/D) / 0	DATE	TIME
			DIB BEFORE DEVEL	OPING:	50.70		7/23/2021	9:05
		BACKFILL MATERIAL			50.80		7/23/2021	14:44
		WASHED SAND	SWL DEFORE DEVEL		43.10	T/P\/C	7/23/2021	9.00
592.15			OTHER SWI			T/PVC	.,20,2021	17.74
302.13		JUU TIULE BUTTUN	OTHER SWL:			T/PVC		
NOTES:				PROTECTI	/E CASING	DETAIL	S	
			PERMANENT, LEGIBLE WELL LABEL ADDED?					
			PROTECTIVE COVER AND LOCK INSTALLED?					
			LOCK KEY NUMBER: Consumers Energy Lock					

🗘 TR	C	WELL CONST	RUCTION D	IAGR/	٩M			
PROJ. NAME:	Consum	ers Energy JH Campbell Pond A			WELL ID:	ЈНС М\	W-15011R	
PROJ. NO:	418422.0	0003 DATE INSTALLED: 7/22/2021	INSTALLED BY: Bri	ian Yelen		СНЕСК	ED BY: J. K	Krenz
ELEVATIO	ON	DEPTH BELOW OR ABOVE	CA	ASING AN	D SCREE	N DETA	AILS	
(BENCHMARK	: USGS)	GROUND SURFACE (FEET)	TYPE OF RISER:	2-INCH PV	/ <u>C</u>			
629.79		2.06 TOP OF CASING	PIPE SCHEDULE:	<u>40</u>				
<b>↑</b>			PIPE JOINTS:	<u>THREADE</u>	D O-RINGS	<u> </u>		
			SCREEN TYPE:	2-INCH PV	/ <u>C</u>			
<u>627.73</u>		0.0 GROUND SURFACE	SCR. SLOT SIZE:	0.01-INCH				
		1.0 CEMENT SURFACE PLUG	BOREHOLE DIAME	TER:	<u>6</u> IN. IN.	FROM	<u>о</u> то то	<u>43</u> FT. FT.
		GROUT/BACKFILL MATERIAL						· · ·
ENGTH		BENTONITE SLURRY	SURF. CASING DIA	METER:	IN.	FROM	то	FT.
35.06 ×					IN.	FROM	TO	FT.
				WELL [	DEVELOP	MENT		
		GROUT	DEVELOPMENT ME	ETHOD:	SURGE AN		<u>P</u>	
		BENTONITE SEAL MATERIAL	TIME DEVELOPING	6:	1	HOURS	3	
		MEDIUM CHIPS	WATER REMOVED	:	100	GALLO	NS	
		31.0 BENTONITE SEAL	WATER ADDED:		0	GALLO	NS	
594.73		33.0 TOP OF SCREEN	WATER CI	LARITY BEF	FORE / AFT	ER DE	/ELOPMEN	ΙT
T <sub>E</sub>			CLARITY BEFORE:	<u>Turbid</u>				
10.00			COLOR BEFORE:	Brown				
CREEN		MEDIUM, WASHED SAND	CLARITY AFTER:	<u>Clear</u>				
<u>584.73</u> ▼		43.0 BOTTOM OF SCREEN	COLOR AFTER:	<u>Clear</u>				
			ODOR (IF PRESEN	T): <u>None</u>				
		43.0 BOTTOM OF FILTER PACK		WATER	EVEL SU	MMARY		
			MEASI	UREMENT (FEE	T)		DATE	TIME
		NA BENTONITE FLOG	DTB BEFORE DEVEL	.OPING:	45.20	T/PVC	7/23/2021	10:09
			DTB AFTER DEVELO	PING:	45.20	T/PVC	7/23/2021	16:21
		NA	SWL BEFORE DEVEL	_OPING:	37.70	T/PVC	7/23/2021	10:09
			SWL AFTER DEVELC	PING:	38.70	T/PVC	7/23/2021	16:21
584.73		43.0 HOLE BOTTOM	OTHER SWL:			T/PVC		
			OTHER SWL:			T/PVC		
NOTES:				PROTECTI	/E CASING	DETAIL	S	
			PERMANENT, LEGI	BLE WELL	LABEL AD	DED?	✓ YES	NO
			PROTECTIVE COVI	ER AND LO	CK INSTAL	LED?	✓ YES	NO NO
			LOCK KEY NUMBE	R: <u>Consu</u>	mers Energ	<u>iy Lock</u>		

# Attachment B Monitoring Well Decommissioning Log



# **TRC**

# MONITORING WELL DECOMMISSIONING LOG

PROJECT NAME: IH Campbell Pond & Well Penlacement	MONITORING WELL ID. HIC MW 4500	7
	LOCATION South of Dond A	
PROJECT NUMBER: 416422.0003 DATE: 07/21/2021	LUCATION: South of Pond A	
OBSERVED BY: Brian Yelen	4	N: 517540.502
DRILLING CONTRACTOR: CASCADE DRILLING		E: 12635742.72
CREW CHIEF: Chris Bond	TOP OF CASING ELEV.: 627.70	SURFACE ELEV.: 624.82
PROTECTIVE COVER TYPE: STICK-UP	NT TRAF. BOX OTHER	
PROTECTIVE COVER DIAMETER: 4" 8" 9" 10" 12"	OTHER	
WELL MATERIAL: PVC SS IRON	GALVANIZED STEEL	
WELL CASING DIAMETER: 1" 🗹 2" 4" 6" 8"	OTHER	
WELL SCREEN MATERIAL: PVC SS IRON	GALVANIZED STEEL OTHER	
WELL SCREEN LENGTH: 5-FT 🗹 10-FT 🗌 UNKNOWN	OTHER DTW:	DRY T/ PVC
WELL SCREEN SLOT SIZE: 0.01" 0.02" UNKNOWN	OTHER DTB:	<u>34.71</u> T/ PVC
DECOMMISSIONING PROCEDURE:		
NOTES:		
Well casing filled with bentonite slurry. Pro-cover, co	ncrete pad, and bollards remov	ed. Well casing cut
off at 2 feet below grade. Remaining hole backfilled	and brought to grade with the su	urrounding surface
sand.		
	1	
GROUTING PROCEDURE:	NOTES:	
GROUT TYPE: BENTONITE SLURRY		
GROUT MIX: Bentonite grout		
GROUT INTERVAL: 2 FT-BGS TO 32 FT-BGS	-	
BENTONITE SEAL: MEDIUM CHIPS		
SEAL INTERVAL: 1 FT-BGS TO 2 FT-BGS		
ADDITIONAL COMMENTS:		
The state of the second second		
1 1/1	0	
12-11- IPFPF	Saul & Holms	F€ÐÉÆF

SIGNED

ïb9F69F DATE

Saul & Holmston FED EDF

# **TRC**

# MONITORING WELL DECOMMISSIONING LOG

PROJECT NAME: JH Campbell Pond A Well Replacement	MONITORING WELL ID: IHC MW-1500	9
		LOCATION COORDINATES
		N: 517779 126
	4	L. 12626014 0
DRILLING CONTRACTOR: CASCADE DRILLING		E: 12030014.8
CREW CHIEF: Chris Bond	TOP OF CASING ELEV.: 635.32	SURFACE ELEV.: 632.33
PROTECTIVE COVER TYPE: STICK-UP	IT TRAF. BOX OTHER	
PROTECTIVE COVER DIAMETER: 🗹 4" 🗌 8" 🛄 9" 🗌 10" 🗌 12" 🗌	]OTHER	
WELL MATERIAL:	GALVANIZED STEEL	
WELL CASING DIAMETER: 1" 2" 4" 6" 8"	]OTHER	
WELL SCREEN MATERIAL:	GALVANIZED STEEL OTHER	
WELL SCREEN LENGTH: 5-FT I 10-FT UNKNOWN	OTHER DTW:	DRY T/ PVC
WELL SCREEN SLOT SIZE:0.01"0.02"UNKNOWN	OTHER DTB:	42.85 T/ PVC
DECOMMISSIONING PROCEDURE:		
off at 2 feet below grade. Remaining hole backfilled a sand.	and brought to grade with the ຣເ	urrounding surface
GROUTING PROCEDURE:	NOTES:	
GROUT TYPE: BENTONITE SLURRY	1	
GROUT MIX: Bentonite grout		
GROUT INTERVAL: 2 FT-BGS TO 40 FT-BGS		
BENTONITE SEAL: MEDIUM CHIPS		
SEAL INTERVAL: 1 FT-BGS TO 2 FT-BGS		
B-ULA Ï EDEEDF SIGNED DATE	Sund & Holm	F€Ó£QF DATE

# >TRC

# MONITORING WELL DECOMMISSIONING LOG

PROJECT NAME: JH Campbell Pond A Well Replacement	MONITORING WELL ID: JHC MW-15010	
PROJECT NUMBER: 418422.0003 DATE: 07/21/2021	LOCATION: Southwest of Pond A LOCATION COORD	INATES:
OBSERVED BY: Brian Yelen	N: 518009.361	
DRILLING CONTRACTOR: CASCADE DRILLING	E: 12636011.46	
CREW CHIEF: Chris Bond	TOP OF CASING ELEV.: 635.57 SURFACE ELEV.: 6	632.55
PROTECTIVE COVER TYPE: STICK-UP STICK-UP	IT TRAF. BOX OTHER	
PROTECTIVE COVER DIAMETER: 4" 8" 9" 10" 12"	OTHER	
WELL MATERIAL: PVC SS IRON	GALVANIZED STEEL	
WELL CASING DIAMETER: 1" 🗹 2" 4" 6" 8"	]OTHER	
WELL SCREEN MATERIAL: PVC SS IRON	GALVANIZED STEEL OTHER	
WELL SCREEN LENGTH:5-FT 🗹 10-FTUNKNOWN	]OTHER DTW: DRY -	T/ PVC
WELL SCREEN SLOT SIZE: 0.01" 0.02" UNKNOWN	OTHER DTB: <u>42.88</u> -	T/ PVC
DECOMMISSIONING PROCEDURE:		
GROUTING PROCEDURE:	NOTES:	
GROUT TYPE: BENTONITE SLURRY		
GROUT MIX: Bentonite grout		
GROUT INTERVAL: 2 FT-BGS TO 40 FT-BGS		
BENTONITE SEAL: MEDIUM CHIPS		

B- Ult

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# **TRC**

# MONITORING WELL DECOMMISSIONING LOG

PROJECT NAME: JH Campbell Pond A Well Replacement	MONITORING WELL ID: JHC MW-15011	
PROJECT NUMBER: 418422.0003 DATE: 07/21/2021	LOCATION: Northeast of Pond A LOCATION COORDINATES:	
OBSERVED BY: Brian Yelen	N: 517540.496	
DRILLING CONTRACTOR: CASCADE DRILLING	E: 12634931.59	
CREW CHIEF: Chris Bond	TOP OF CASING ELEV.: 630.83 SURFACE ELEV.: 627.71	
PROTECTIVE COVER TYPE: STICK-UP	IT TRAF. BOX OTHER	
PROTECTIVE COVER DIAMETER: 🗹 4" 🗌 8" 🛄 9" 🗌 10" 🗌 12" 🗌	OTHER	
WELL MATERIAL:		
WELL CASING DIAMETER:	]OTHER	
WELL SCREEN MATERIAL:		
WELL SCREEN LENGTH: 5-FT J 10-FT UNKNOWN	OTHER DTW: <u>38.71</u> T/ PVC	
WELL SCREEN SLOT SIZE:	OTHER         DTB:         40.10         T/ PVC	
DECOMMISSIONING PROCEDURE:		
GROUTING PROCEDURE:	NOTES:	
GROUT TYPE: BENTONITE SLURRY		
GROUT MIX: Bentonite grout		
GROUT INTERVAL: 2 FT-BGS TO 37 FT-BGS		
BENTONITE SEAL: MEDIUM CHIPS SEAL INTERVAL: 1 FT-BGS TO 2 FT-BGS		
ADDITIONAL COMMENTS:		

15- Uli SIGNED

7/21/21 Sul Stelliston 10/5/21 DATE DATE DATE



# Appendix B Groundwater Monitoring System Certification JH Campbell Pond A



#### A CMS Energy Company

Date: October 27, 2021

To: Operating Record

From: Harold D. Register, Jr., P.E.

RE: Groundwater Monitoring System Certification, §257.91(f) JH Campbell Power Plant, Pond A

#### Introduction

According to Title 40 Code of Federal Regulations (40 CFR) Part 257, Subpart D, §257.91(f); the owner or operator of a Coal Combustion Residual (CCR) management unit must obtain a certification from a qualified professional engineer stating that the groundwater monitoring system at the CCR management unit has been designed and constructed to meet the requirements of §257.91. Additionally, §257.91(a) details a performance standard requiring the system monitor the uppermost aquifer and include a minimum of at least one upgradient and three downgradient monitoring wells, and that if the uppermost aquifer monitoring system includes the minimum number of wells, the basis supporting use of only the minimum.

#### **Groundwater Monitoring System**

A groundwater monitoring system has been established for the JH Campbell Pond A, which established the following locations for determining background groundwater quality and detection monitoring.

Background:

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

Downgradient Monitoring Wells:

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

Provided herein, as required by §257.91(f), is certification from a qualified professional engineer that the groundwater monitoring system at Consumers Energy JH Campbell Pond A meets the requirements of §257.91.

## CERTIFICATION

Professional Engineer Certification Statement [40 CFR 257.94(e)2]

I hereby certify that having reviewed the *Pond A Monitoring Well Decommissioning and Replacement* letter to request the Michigan Department of Environment, Great Lakes, and Energy (EGLE) approval to decommission and replace monitoring wells JHC-MW-15007, JHC-MW-15009, and JHC-MW-15011, and remove monitoring well JHC-MW-15010 from the groundwater monitoring system (submitted to and approved by the EGLE on June 4, 2021) and the documentation of the well decommissioning and well replacement activities submitted to the EGLE on the October 7, 2021 in the *Summary of Pond A Monitoring Well Decommissioning and Replacement* letter for JH Campbell Pond A, and being familiar with the provisions of Title 40 of the Code of Federal Regulations §257.91 (40 CFR Part 257.91), I attest that this Groundwater Monitoring System has been designed and constructed to meet the requirements of 40 CFR 257.91. The report is accurate and has been prepared in accordance with good engineering practices, including the consideration of applicable industry standards, and with the requirements of 40 CFR Part 257.91.

Signature

October 27, 2021

Date of Certification

Harold D. Register, Jr., P.E. Name

6201056266 Professional Engineer Certification Number





# Appendix C First Semiannual Monitoring Report



2021 Semiannual Groundwater Monitoring Report and Second Quarter 2021 Hydrogeological Monitoring Report

JH Campbell Power Plant Pond A CCR Unit

West Olive, Michigan

July 2021

Saul & Holeston

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

**Prepared For:** Consumers Energy

Prepared By: TRC 1540 Eisenhower Place Ann Arbor, Michigan 48108

Kristin Lowery, E.I.T. Project Engineer



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	(GSI Monitoring Wells)
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# FIGURES

- Figure 1 Site Location Map
- Figure 2Site Plan with CCR Monitoring Well Locations
- Figure 3 Groundwater Contour Map April 2021



#### **APPENDICES**

- Appendix A Data Quality Review
- Appendix B April 2021 Assessment Monitoring Statistical Evaluation
- Appendix C GSI Time Series Charts
- Appendix D April 2021 Laboratory Reports
- Appendix E April 2021 Field Notes



# **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 Michigan Department of Environment, Great Lakes, and Energy (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 2021 Semiannual Groundwater Monitoring Report and Second Quarter 2021 Hydrogeological Monitoring Report for the JH Campbell Pond A CCR Unit (Semiannual Report) to cover the semiannual groundwater monitoring conducted in February 2021 to comply with the CCR Rule and the Pond A HMP and AMP. 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. Pond A remains in assessment monitoring.

## 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 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 since fourth quarter 2019. 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 2021 Pond A HMP and AMP event, which also serves as the first semiannual assessment monitoring event for 2021 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 2021 Assessment Monitoring

Consumers Energy personnel performed gauging and sampling of monitoring wells associated with Pond A from April 12 through 14, 2021. Groundwater monitoring was performed in accordance with the approved Pond A HMP and AMP and the *Sample and Analysis Plan for JH Campbell Power Plan Pond A* (SAP) (TRC, January 2021). Groundwater samples collected during the April 2021 event were submitted to Consumers Energy Laboratory Services in Jackson, Michigan, for analysis of the total metals and inorganic indicator constituents. Radium analysis was performed by Eurofins TestAmerica in St Louis, Missouri. Semi-annual monitoring constituents include:

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



Section 11511a(3)(c) – Detection Monitoring Constituents	Section 11519b(2) – Assessment Monitoring Constituents
	Molybdenum
	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 samples during the April 2021 sampling event. Static water level data indicate that the groundwater table is re-equilibrating at a lower elevation subsequent to the closure of Pond A. As a result, Consumers Energy replaced monitoring wells JHC-MW-15007, JHC-MW-15009, and JHC-MW-15011 in July 2021 and removed monitoring well JHC-MW-15010 from the monitoring well network, as described in the June 4, 2021 *Pond A Monitoring Well Decommissioning and Replacement*, approved by EGLE on June 4, 2021. Details on the July 2021 well replacement activities will be provided in the next quarterly monitoring report.

Consumers Energy collected quality assurance/quality control (QA/QC) samples during the April 2021 groundwater sampling event. The QA/QC samples consisted of two field blanks, two equipment blanks, three field duplicates (JHC-MW-15008R, JHC-MW-15028, and MW-14S), and two field matrix spike/matrix spike duplicate (MS/MSD) samples collected from JHC-MW-15006 and JHC-MW-15025.



# 2.2.1 Analytical Data and Relevant Screening Criteria

Analytical results from the second quarter 2021 monitoring event are included in the attached laboratory reports (Appendix D). Second quarter 2021 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 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 April 2021 event using several wells throughout the RCRA CCR well network are provided on Table 1. April 2021 groundwater elevations were used to construct the groundwater contour map provided on Figure 3. The average hydraulic gradient of 0.0038 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 0.59 ft/day or 215 ft/year for the April 2021 event.

The general groundwater flow direction is similar to that identified in previous monitoring rounds and continues to demonstrate that the downgradient wells are appropriately positioned to detect the presence of 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 second quarter 2021 groundwater data in accordance with the assessment monitoring program. The statistical evaluation details are provided in Appendix B (*Statistical Evaluation of April 2021 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 TWPS 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 second quarter 2021 statistical evaluation indicates that arsenic at JHC-MW-15011, in addition to the statistically evaluated Part 115 constituents boron at JHC-MW-15010 and JHC-MW-15011 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 and 2021 but remain slightly above the GWPS. Boron at JHC-MW-15010 was identified at statistically significant levels exceeding the GWPS in the third quarter 2020 monitoring event,



but has not been able to be sampled since then due to continued stabilization of the groundwater table at an elevation below the well screen. 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. Boron at JHC-MW-15011 is a new exceedance of the GWPS identified in second quarter 2021. Boron concentrations at monitoring well JHC-MW-15011 showed an initial increase in 2019, around the timing of the completion of Pond A capping activities and have remained generally stable at levels above 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 second quarter 2021. A summary of the confidence intervals for April 2021 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 as geochemistry changes occur and groundwater from other potential upgradient CCR sources reaches the Pond A well network, 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 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 (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 have been 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 first quarter as part of supplemental sampling in support of the site-wide RAP. As such, the TDS and vanadium data have been included in the second quarter data summary table (Table 5) and



show that concentrations in groundwater are detected at levels below or slightly above the laboratory reporting limit, well below the GSI criteria. 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 April 2021<sup>1</sup> 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 ( $\alpha$ ) of 0.01 per tail for each constituent/sampling point dataset to assess trends over the past 8 monitoring events (April 2019 through April 2021). 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 increasing trends at the GSI wells. A statistically significant decreasing trend is observed for barium at PZ-40S.

All of the constituent concentrations at the GSI monitoring wells are below their respective Part 201 generic GSI criteria in April 2021 (Table 5) and there are no statistically significant trends based on the trend analysis (Appendix C).

<sup>&</sup>lt;sup>1</sup> 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 and arsenic concentrations continue to show improvement post-closure. In addition, boron and vanadium are present at statistically significant levels above 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.

As part of the development of the Remedial Action Plan under Agreement No. 115-01-2018, wetlands between Pond A and the Pigeon River were field delineated in May 2021. Water quality monitoring for the wetlands as GSI receptors will be incorporated into the monitoring program for the site-wide RAP. 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 third calendar quarter of 2021.



# 5.0 References

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



# Tables

# Table 1 Summary of Groundwater Elevation Data – Second Quarter 2021 JH Campbell – Assessment Monitoring Program West Olive, Michigan

)Mall	Ground	тос	Coologia Unit of	Screen	n Interval	April 1	2, 2021
Location	Elevation (ft)	Elevation (ft)	Screen Interval	Elev (	vation (ft)	Depth to Water	Groundwater Elevation
Background							(11)
JHC-MW-15023	617.01	619.98	Sand	603.0	to 593.0	17.63	602.35
JHC-MW-15024	613.79	616.62	Sand	606.8	to 596.8	12.92	603.70
JHC-MW-15025	614.14	617.17	Sand	607.1	to 597.1	12.12	605.05
JHC-MW-15026	615.09	618.04	Sand	607.1	to 597.1	13.85	604.19
JHC-MW-15027	614.77	617.30	Sand	604.8	to 594.8	14.22	603.08
JHC-MW-15028	611.02	613.80	Sand	603.0	to 593.0	14.03	599.77
JHC-MW-15029	608.08	610.95	Sand	600.1	to 590.1	11.55	599.40
Dond 1N 1S 2N 29	004.05	607.17	Sanu	600.1	10 590.1	9.56	597.59
HC-MW-15001	607.02	609 53	Sand	603.5	to 598 5	11 / 9	598.04
IHC-MW-15001	618.18	621.27	Sand	500.2	to 580.2	25.16	596.04
	622.16	627.20	Sand	505.2	to 505.2	23.10	502.00
	606.22	600.00	Sand	570.2	to 560.2	19 50	593.09
	602.02	609.99 605.70	Sand	579.2	to 509.2	10.00	591.49
	602.92	602.12	Sand	596.9	to 505.9	12.37	593.35
JHC-10100-18005	600.30	603.16	Sand	595.3	10 585.3	10.50	592.00
HC-MW-15013	632.40	635 25	Sand	604.4	to 594.4	35 75	599 50
IHC-MW-15015	632.46	635.20	Sand	604.5	to 59/ 5	35.07	600.13
IHC-MW-15015	631.81	632.52	Sand	603.8	to 503.8	32.44	600.08
	600.00	611.09	Sand	602.1	to 502.1	12.44	500.08
	605.53	609.02	Sanu	602.0	to 593.1	0.49	599.40
	005.55	008.93	Sanu	002.0	10 592.0	9.40	599.45
JHC-IVIV-18003	605.36	608.78	Sand	601.9	10 591.9	9.38	599.40
HC-MW-15017	613.69	616 61	Sand	603.7	to 593.7	15 57	601 01 <sup>(2)</sup>
IHC-MW-15017	614.26	617.02	Sand	604.3	to 50/ 3	16.30	600 72 <sup>(2)</sup>
IHC-MW-15010	609.81	612.86	Sand	603.8	to 503.8	12.64	600.72 <sup>(2)</sup>
IHC-MW-15013	620.92	623.70	Sand	597.9	to 587.9	28.76	505.02 <sup>(3)</sup>
IHC-MW-15022	632.94	635.87	Sand	500.0	to 589.9	/3 31	502 56 <sup>(3)</sup>
IHC-MW-15031	611 32	61/ 29	Sand	508.3	to 588.3	16.98	592.30 <sup>(2)</sup>
IHC-MW-15032	618.08	620.00	Sand	602.1	to 502.1	21.82	500.17 <sup>(2)</sup>
IHC-MW-15033	612.00	615.97	Sand	601.0	to 501.0	15 71	599.17 600.26 <sup>(2)</sup>
IHC-MW-15034	632.53	63/1.28	Sand	500 5	to 589.5	10.71	593 53
IHC-MW-15035	617.94	618.3/	Sand	507.0	to 587.0	40.75	593.55
IHC-MW-15030	61/ 28	616.06	Sand	501.3	to 586.3	25.05	591.04
Pond A	014.20	010.00	Gand	001.0	10 000.0	23.05	551.01
JHC-MW-15006	624.74	627.58	Sand	599.7	to 589.7	35.22	592.36
JHC-MW-15007	624.82	627.70	Sand	602.8	to 592.8	D	rv
JHC-MW-15008	632 43	635.30	Sand	604.4	to 594.4	Decomm	nissioned
IHC-MW-15008R <sup>(1)</sup>	632.32	634 67	Sand	597.3	to 587.3	43 24	591 43
JHC-MW-150081	632.33	635.32	Sand	602.3	to 592.3	10.2 T	rv
JHC-MW-15010	632.55	635.57	Sand	602.6	to 592.6		rv
JHC-MW-15011	627 71	630.83	Sand	600.7	to 590.7	38.87	591.96
Downgradient Well	5	000.00	Cana	00011		00.01	001100
MW-13	593 40	595 37	Clavey Silt	587.9	to 585.4	D	rv
MW-14S	587.36	590.98	Sand	582.9	to 577.9	9.60	581.38
P7-23S	602.84	604.97	Sand	591.8	to 586.8	15.96	589.01
P7-24S	586.56	590 15	Sand	584.6	to 579.6	7 23	582.92
P7-40S	589.51	593.25	Sand	585.5	to 575.5	10.83	582.02
TW-19-044	608.15	611 //	Sand	591.2	to 586.2	22.34	589 10
TW-19-05	603.44	606.36	Sand	592.8	to 587.8	16.03	590.33
TW-19-06A	599.61	602.54	Sand	592.3	to 587.3	13.18	589.36

#### 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.

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

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

# Table 2 Summary of Field Parameters: Second Quarter 2021 JH Campbell Pond A - Assessment Monitoring Program West Olive, Michigan

Sample Location	Sample Date	Dissolved Oxygen	Oxidation Reduction Potential	рН	Specific Conductivity	Temperature	Turbidity
Bookeround		(mg/L)	(mv)	(50)	(umnos/cm)	(°C)	(NTU)
Баскугочно			Г — Т				
JHC-MW-15023	4/12/2021	0.71	242.9	5.3	108	10.8	3.4
JHC-MW-15024	4/13/2021	0.43	171.4	6.8	322	9.3	3.4
JHC-MW-15025	4/13/2021	1.53	209.8	6.7	254	7.5	2.5
JHC-MW-15026	4/13/2021	3.12	224.3	5.6	84	8.5	5.0
JHC-MW-15027	4/13/2021	1.75	130.7	5.7	76	7.9	5.7
JHC-MW-15028	4/12/2021	5.16	166.8	7.6	114	9.2	5.3
Pond A					•		
JHC-MW-15006	4/13/2021	0.27	-6.9	7.7	793	18.0	4.3
JHC-MW-15007	4/13/2021 <sup>(1)</sup>						
JHC-MW-15008R	4/13/2021	0.50	55.6	7.1	800	18.7	7.4
JHC-MW-15009	4/13/2021 <sup>(1)</sup>						
JHC-MW-15010	4/13/2021 <sup>(1)</sup>						
JHC-MW-15011	4/13/2021	0.42	43.0	7.2	563	14.1	5.0
Pond A GSI							
MW-13	4/12/2021 <sup>(1)</sup>						
MW-14S	4/14/2021	0.70	146.7	5.5	25	8.4	2.3
PZ-24S	4/14/2021	3.03	117.3	5.6	22	7.5	4.7
PZ-40S	4/14/2021	0.49	180.4	5.2	20	6.9	4.6

#### Notes:

mg/L - Milligrams per Liter.

mV - Millivolts.

SU - Standard Units.

umhos/cm - Micromhos per centimeter.

°C - Degrees Celsius.

NTU - Nephelometric Turbidity Unit.

-- - Not measured.

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

# Table 3 Summary of Groundwater Sampling Results (Analytical): Second Quarter 2021 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:	4/12/2021	4/13/2021	4/13/2021	4/13/2021	4/13/2021	4/12/2021
				MI Non-				Backa	round		
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^			Dacky	iouna		
Appendix III <sup>(1)</sup>											
Boron	ug/L	NC	500	500	7,200	50	21	20	< 20	< 20	< 20
Calcium	mg/L	NC	NC	NC	500 <sup>EE</sup>	11.1	36.8	19.8	9.23	10.9	14.0
Chloride	mg/L	250**	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	2.64	21.5	19.5	4.05	< 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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	12.2	8.14	9.02	6.88	7.09	5.99
Total Dissolved Solids	mg/L	500**	500 <sup>E</sup>	500 <sup>E</sup>	500	66	175	135	51	56	65
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>⊨</sup>	6.5 - 9.0	5.3	6.8	6.7	5.6	5.7	7.6
Appendix IV <sup>(1)</sup>											
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	17	17	6	10	8	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	< 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	< 0.120	< 0.146	< 0.115	< 0.125	< 0.129	< 0.115
Radium-228	pCi/L	NC	NC	NC	NC	0.478	< 0.472	< 0.414	< 0.434	< 0.434	< 0.435
Radium-226/228	pCi/L	5	NC	NC	NC	0.501	< 0.472	< 0.414	0.449	< 0.434	< 0.435
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
Additional MI Part 115	(2)										
Iron	ug/L	300**	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	< 20	67	< 20	< 20	343	< 20
Copper	ug/L	1,000**	1,000E	1,000E	15	1	< 1	< 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 <sup>E</sup>	190	< 10	< 10	< 10	< 10	< 10	< 10

#### Notes:

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

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

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

NC - no criteria

\* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 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 MDEQ policy and procedure 09-014 dated June 20, 2012.

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

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

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

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

# Table 4 Summary of Groundwater Sampling Results (Analytical): Second Quarter 2021 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:	4/13/2021	4/13/2021 <sup>(3)</sup>	4/13/2021	4/13/2021 <sup>(3)</sup>	4/13/2021 <sup>(3)</sup>	4/13/2021
				MI Non-					na al' a vat		
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^		downgradient				
Appendix III <sup>(1)</sup>	-										
Boron	ug/L	NC	500	500	7,200	288		352			5,070
Calcium	mg/L	NC	NC	NC	500EE	82.0		85.4			78.7
Chloride	mg/L	250**	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	22.9		17.2			2.65
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000		< 1,000			< 1,000
Sulfate	mg/L	250**	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	257		185			113
Total Dissolved Solids	mg/L	500**	500 <sup>E</sup>	500 <sup>E</sup>	500	497		517			359
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	6.5 - 9.0	7.7		7.1			7.2
Appendix IV <sup>(1)</sup>											
Antimony	ug/L	6	6.0	6.0	130	< 1		1			< 1
Arsenic	ug/L	10	10	10	10	3		< 1			13
Barium	ug/L	2,000	2,000	2,000	820	188		200			399
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			0.8
Chromium	ug/L	100	100	100	11	3		41			5
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	12		20			14
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2		< 0.2			< 0.2
Molybdenum	ug/L	NC	73	210	3,200	54		17			8
Radium-226	pCi/L	NC	NC	NC	NC	0.241		0.272			0.165
Radium-228	pCi/L	NC	NC	NC	NC	0.432		< 0.491			0.758
Radium-226/228	pCi/L	5	NC	NC	NC	0.673		0.496			0.923
Selenium	ug/L	50	50	50	5.0	< 1		6			143
Thallium	ug/L	2	2.0	2.0	3.7	< 2		2			< 2
Additional MI Part 115 <sup>0</sup>	(2)										
Iron	ug/L	300**	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	41		347			57
Copper	ug/L	1,000**	1,000E	1,000 <sup>E</sup>	15	4		5			2
Nickel	ug/L	NC	100	100	86	2		38			8
Silver	ug/L	100**	34	98	0.2	< 0.2		< 0.2			< 0.2
Vanadium	ug/L	NC	4.5	62	27	7		< 2			34
Zinc	ug/L	5,000**	2,400	5,000 <sup>E</sup>	190	< 10		< 10			< 10

#### Notes:

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

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

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

NC - no criteria; -- - not analyzed.

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

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

^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using site-specific hardness of 180 mg CaCO3/L as measured at surface water sample SW-01 collected on April 9, 2018

from the Pigeon River. Chromium GSI criterion based on hexavalent chromium per footnote {H}.

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

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

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

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

(2) Per Michigan Part 115 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection

monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

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

# Table 5 Summary of Groundwater Sampling Results (Analytical): Second Quarter 2021 JH Campbell Pond A GSI Wells – Assessment Monitoring Program West Olive, Michigan

					Completeesting	MMA/ 40	MINAL 4 4C	D7 040	D7 400
					Sample Location:	IVIVV-13	MW-145	PZ-245	PZ-405
					Sample Date:	4/12/2021 <sup>(3)</sup>	4/14/2021	4/14/2021	4/14/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non- Residential*	MI GSI^	downgradient			
Appendix III <sup>(1)</sup>									
Total Dissolved Solids	mg/L	500**	500 <sup>E</sup>	500 <sup>E</sup>	500		35	40	45
Appendix IV <sup>(1)</sup>									
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		10	23	16
Chromium	ug/L	100	100	100	11		< 1	1	1
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
Additional MI Part 115	2)								
Vanadium	ug/L	NC	4.5	62	27		< 2	2	< 2

#### Notes:

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

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}.

 $^{\rm E}$  - Criterion is the aesthetic drinking water value per footnote {E}.

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

(2) Per Michigan Part 115 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection

monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

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

# Table 6 Summary of Groundwater Protection Standard Exceedances – Second Quarter 2021 JH Campbell Pond A – Assessment Monitoring Program West Olive, Michigan

Constituont	stituent Units GWPS		JHC-M	W-15006	JHC-M	N-15007	JHC-MW	V-15008R	JHC-MV	W-15009	JHC-M	N-15010	JHC-M\	N-15011
Constituent	UTINS GVVF3	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	
Appendix IV														
Arsenic	ug/L	10											14	37
Chromium	ug/L	100									1.0	370		
Selenium	ug/L	50					6.0	110	1.7	69	6.0	180	2.3	210
Additional Mi	chigan Part	115 Param	eters											
Boron*	ug/L	500					160	460	92	560	530	2,700	970	4,600
Sulfate*	mg/L	250	130	280										
TDS*	mg/L	500	400	560			430	570					350	610
Iron*	ug/L	870	22	310							0.029	44,000		
Nickel*	ug/L	100									1.0	200		
Vanadium*	ug/L	4.5	6.3	16							4.0	5.5	22	48

#### 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 ( $\alpha = 0.01$ ) of the downgradient data set.

LCL - Lower Confidence Limit ( $\alpha = 0.01$ ) 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 7 Summary of Groundwater Exceedances Second Quarter 2021 JH 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 unless otherwise stated

Facility: JH Campbell – WDS# 395496

Well #	Location	Parameter	Part 201 GRCC	Statistical Limit (or 'CC' for Control Charts)	2 Qtr. 2021 ( <b>bold</b> >201)	1 Qtr. 2021 ( <b>bold</b> >201)	4 Qtr. 2020 ( <b>bold</b> >201)	3 Qtr. 2020 ( <b>bold</b> >201)
JHC-MW-15010	Downgradient	Boron	500	LCL	NS	NS	NS	2,130
JHC-MW-15011	Downgradient	Boron	500	LCL	5,070	4,720 <sup>(1)</sup>	4,120 <sup>(1)</sup>	2,720 <sup>(1)</sup>
JHC-MW-15011	Downgradient	Arsenic	10	LCL	13	14	22	22
JHC-MW-15006	Downgradient	Vanadium	4.5	LCL	7	7	19	15 <sup>(1)</sup>
JHC-MW-15011	Downgradient	Vanadium	4.5	LCL	34	35	49	<b>30</b> <sup>(1)</sup>

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

367390-001-002.mx

www.trccompanies.com





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- 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
- (600.97) GROUNDWATER ELEVATION (FEET) SHALLOW WELLS
- (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.
- 3. MONITORING WELL DECOMMISSIONED NOVEMBER 13, 2017.
- 4. MONITORING WELL DECOMMISSIONED JUNE 14, 2018.
- 5. MONITORING WELL DECOMMISSIONED OCTOBER 10, 2018.
- 6. JHC-MW-1800X MONITORING WELLS INSTALLED IN DECEMBER 2018.
- 7. MONITORING WELL DECOMMISSIONED JUNE 24, 2019.
- 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 PROJECT

#### CONSUMERS ENERGY COMPANY JH CAMPBELL POWER PLANT WEST OLIVE, MICHIGAN

TITLE

#### GROUNDWATER CONTOUR MAP APRIL 2021

DRAWN BY:	A. ADAIR	PROJ NO.:	418422.0000
CHECKED BY:	K. LOWERY		
APPROVED BY:	ROVED BY: K. LOWERY FIG		FIGURE 3
DATE:	JULY 2021		1.001.20
			1540 Eisenhower Place



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

NO.:

418422\_200\_003.mxd



# Appendix A Data Quality Review

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

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

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

- JHC-MW-15023
- JHC-MW-15024
- JHC-MW-15025

- JHC-MW-15026
- JHC-MW-15027
- JHC-MW-15028

Each sample was analyzed for the following constituents:

Analyte Group	Method				
Anions (Fluoride, Chloride, Sulfate)	EPA 300.0				
Total Dissolved Solids (TDS)	SM 2540C				
Total Metals	SW-846 6020/ 7470A				
Alkalinity	SM 2320B				
Radium (Ra-226, Ra-228, Combined Ra-226 & Ra- 228)	EPA 903.0, EPA 904.0				

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

# **Data Usability Review Procedure**

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

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

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

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

This data usability report addresses the following items:

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

# **Review Summary**

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

- The reviewed Appendix III and IV constituents 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 blanks.
- One equipment blank (EB-02) and one field blank (FB-02) were collected. Target analytes were not detected in these blank samples.
- All samples were analyzed 12 or 13 days past holding time for alkalinity. Positive results for alkalinity in the samples are potentially biased low, as shown in the attached table, Attachment A.

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

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

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

# Laboratory Data Quality Review Groundwater Monitoring Event April 2021 CEC JH Campbell Pond A

Groundwater samples were collected by Consumers Energy (CE) Laboratory Services for the April 2021 sampling event. Samples were analyzed for total metals, anions, and total dissolved solids (TDS) by CE Laboratory Services in Jackson, Michigan. The radium analyses were subcontracted to Eurofins-TestAmerica in St. Louis, Missouri (Eurofins TA – St. Louis). The laboratory analytical results were reported in laboratory sample delivery groups (SDGs) 21-0445R and 160-41804-1 Revision 1.

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

JHC-MW-15006 JHC-MW-15008R JHC-MW-15011

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

Analyte Group	Method
Anions (Fluoride, Chloride, Sulfate)	EPA 300.0
Total Dissolved Solids (TDS)	SM 2540C
Total Metals	SW-846 6020/7470A
Alkalinity	SM 2320B
Radium (Ra-226, Ra-228, Combined Ra-226 & Ra- 228)	EPA 903.0, EPA 904.0

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

# **Data Usability Review Procedure**

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

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

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

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

This data usability report addresses the following items:

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

# **Review Summary**

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

- 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 blanks.
- One equipment blank (EB-01) and one field blank (FB-01) were collected. Target analytes were not detected in these blank samples.
- All samples were analyzed 12 days past holding time for alkalinity. Positive results for alkalinity in the samples are potentially biased low, as shown in the attached table, Attachment A.

- The LCS and LCSD recoveries and relative percent differences (RPDs) for radium were within QC limits.
- MS and MSD analyses were performed on sample JHC-MW-15006 for mercury, total metals, and anions. The recoveries were within the acceptance limits. RPDs were not provided by the laboratory and therefore were not evaluated; further, MS/MSD concentrations were not provided by the laboratory. However, since all recoveries were within the acceptance limits, there is no impact on data usability due to this issue.
- The field duplicate pair sample was DUP-01/JHC-MW-15008R. All criteria were met with the following exception.
  - The RPD for chromium (31%) was above the acceptance criteria. Therefore, potential uncertainty exists for the positive results for chromium in wells JHC-MW-15006, JHC-MW-15008R, and JHC-MW-15011, as shown in the attached table, Attachment A.
- Carrier recoveries, where applicable, were within 40-110%.

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

Samples	Collection Date	Analyte	Non-Conformance/Issue
JHC-MW-15006	4/13/2021	Alkalinity	Analysis run outside of holding time; results are potentially biased low
JHC-MW-15008R	4/13/2021		
JHC-MW-15011	4/13/2021		
DUP-01	4/13/2021		
JHC-MW-15006	4/13/2021	Chromium	Field duplicate variability; potential uncertainty exists.
JHC-MW-15008R	4/13/2021		
JHC-MW-15011	4/13/2021		
DUP-01	4/13/2021		



# Appendix B April 2021 Assessment Monitoring Statistical Evaluation



# **Technical Memorandum**

Date:	July 20, 2021		
То:	Bethany Swanberg, Consumers Energy		
From:	Sarah Holmstrom, TRC Kristin Lowery, TRC		
Project No.:	418422.0000.0000 Phase 1 Task 3		
Subject:	Statistical Evaluation of April 2021 Assessment Monitoring Sampling Event, JH Campbell 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 second quarter 2021 monitoring event was conducted on April 12 through 14, 2021. 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<sup>™</sup> output files are included as an attachment.

The statistical evaluation of the second quarter 2021 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:

## **Technical Memorandum**

<u>Constituent</u>	GWPS	# Downgradient Wells Observed
Arsenic	10 ug/L	1 of 6
Boron	500 ug/L	2 of 6
Vanadium	4.5 ug/L	2 of 6

The results of the assessment monitoring statistical evaluation for the downgradient wells are consistent with the results of the previous assessment monitoring data statistical evaluations, indicating arsenic, boron, and vanadium are present at statistically significant concentrations above the 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. During the second quarter 2021 sampling event, JHC-MW-15007, JHC-MW-15009, and JHC-MW-15010 had an insufficient amount of groundwater present for samples to be collected.

Following the second quarter 2021 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 Guidance<sup>1</sup>, 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 GWPS<sup>2</sup>. 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

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

<sup>&</sup>lt;sup>2</sup> For pH, an exceedance occurs when the lower confidence level exceeds the upper GWPS or the upper confidence level is below the lower GWPS.

## **Technical Memorandum**

methodologies built into the CCR Rule, and numerous other federal rules, are key in determining whether or not individually measured data points represent a concentration increase over the baseline or a fixed standard (such as a GWPS in an assessment monitoring program).

For each detected constituent, the concentrations from each well were 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 for Appendix III and Appendix IV (April 2019 to April 2021 for JHC-MW-15006 and JHC-MW-15011, August 2017 to October 2020 for JHC-MW-15007 and JHC-MW-15009, August 2019 to April 2021 for JHC-MW-15008/R, and September 2017 to October 2020 for JHC-MW-15010) and the past seven events for the additional Section 11511a(3) constituents (iron) and Section 11519b(2) (copper, nickel, silver, vanadium, and zinc) (October 2019 through April 2021) 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-15007<sup>3</sup>;
- 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, arsenic, selenium, and vanadium in JHC-MW-15011.

Groundwater data were then evaluated utilizing Sanitas<sup>TM</sup> statistical software. Sanitas<sup>TM</sup> is a software tool that is commercially available for performing statistical evaluations consistent with procedures outlined in the Unified Guidance. Within the Sanitas<sup>TM</sup> 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 ( $\alpha$ ) of 0.01. The following narrative describes the methods employed, the results obtained and the Sanitas<sup>TM</sup> 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

<sup>&</sup>lt;sup>3</sup> JHC-MW-15007 was not sampled in October 2019, October 2020, and February and April 2021 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.

• Calculation of the confidence intervals for each cumulative dataset.

The results of these evaluations are presented and discussed below.

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. A potential increasing trend was noted for boron in JHC-MW-15011 and a potential decreasing trend was noted for arsenic 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 Sanitas<sup>TM</sup> 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 conditions. For the Section 11511a(3) constituents (iron) and Section 11519b(2) (copper, nickel, silver, vanadium, and zinc), the most recent seven 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.

Distribution	Constituent-Well Combinations		
	Boron in JHC-MW-15008R and JHC-MW-15011		
	TDS in JHC-MW-15011		
Normal	Arsenic in JHC-MW-15011		
	Selenium in JHC-MW-15010 and JHC-MW-15011		
	Vanadium in JHC-MW-15006 and JHC-MW-15011		
Lognormal	Iron in JHC-MW-15006 and JHC-MW-15010 (Aitchison's adjustment)		
	Boron in JHC-MW-15010 (3 <sup>rd</sup> power)		
Normalized by exponential	Sulfate in JHC-MW-15006 (2 <sup>nd</sup> power)		
transformation	TDS in JHC-MW-15006 (5 <sup>th</sup> power) and JHC-MW-15008R (6 <sup>th</sup> power)		

The Sanitas<sup>™</sup> 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
Normalized by square root transformation	Boron in JHC-MW-15009 Selenium in JHC-MW-15009
Non-Parametric (not able to be normalized)	Chromium in JHC-MW-15010 Selenium in JHC-MW-15008R Nickel in JHC-MW-15010 Vanadium in JHC-MW-15010

The confidence interval test compares the lower confidence limit to the GWPS. The results of the assessment monitoring statistical evaluation for the downgradient wells are consistent with the results of the previous assessment monitoring data statistical evaluations, indicating arsenic, boron, and vanadium are present at statistically significant concentrations above the GWPS. 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. Boron at JHC-MW-15011 was not previously observed at statistically significant levels above the GWPS; however, concentrations have been trending upward since 2019 and have been consistently above the GWPS since October 2019. 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 §257.95(g).

### Attachments

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

Attachment 1 Sanitas<sup>™</sup> Output

# Table

							Sar	mple Location:					JHC-MW-1500	6			
								Sample Date:	4/24/2019	10/10/2019	2/12/2020	4/14/2020	7/16/2020	10/22/2020	10/22/2020	2/23/2021	4/13/2021
Constituent	Unit	EPA MCL	EPA RSL	MI Residential*	MI Non- Residential*	MI GSI^	UTL	GWPS					Downgradient				
Appendix III <sup>(1)</sup>															Field Dup		
Boron	ug/L	NC	NA	500	500	7,200	54	500	240	230	247	284	242	272	331	301	288
Calcium	mg/L	NC	NA	NC	NC	500 <sup>EE</sup>	40	500	41	35	101	102	91.4	87.2	84.3	89.0	82.0
Chloride	mg/L	250**	NA	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	70	250	21	22	21.0	24.9	27.7	22.0	22.2	21.2	22.9
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
Sulfate	mg/L	250**	NA	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	13	250	75	55	217	260	195	253	251	276	257
Total Dissolved Solids	mg/L	500**	NA	500 <sup>E</sup>	500 <sup>E</sup>	500	240	500	240	190	542	562	521	515	511	556	497
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.6	7.8	7.6	7.2	7.4	7.5		7.7	7.7
Appendix IV <sup>(1)</sup>																	
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	< 1.0	< 1.0	< 1	1	< 1	1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	10	10	10	1	10	5.1	4.3	6	5	5	9	6	4	3
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	230	180	326	353	291	382	194	227	188
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	5.0	5.0	3.5	0.2	5	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	100	100	11	2	100	4.1	< 1.0	2	1	18	5	1	< 1	3
Cobalt	ug/L	NC	6	40	100	100	15	15	< 6.0	< 6.0	< 6	< 15	< 6	< 6	< 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
Lead	ug/L	NC	15	4.0	4.0	39	1	15	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	170	350	440	10	40	< 10	< 10	13	13	13	15	14	13	12
Mercury	ug/L	2	NA	2.0	2.0	0.20#	0.2	2	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	73	210	3,200	5	100	10	9.1	13	16	22	38	37	37	54
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA	0.234	0.310		0.426		0.289	< 0.345		0.241
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.343	< 0.524		0.518		< 0.274	< 0.399		0.432
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5	0.488	< 0.524		0.944		0.318	0.453		0.673
Selenium	ug/L	50	NA	50	50	5.0	5	50	< 1.0	1.3	8	9	5	2	1	1	< 1
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameter	s <sup>(2)</sup>																
Iron	ug/L	300**	NA	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	870	870		43	189	26	128	929	213	43	41
Copper	ug/L	1,000**	NA	1,000 <sup>E</sup>	1,000 <sup>E</sup>	15	2.1	1,000		< 1.0	2	1	11	4	4	1	4
Nickel	ug/L	NC	NA	100	100	86	2	100		< 2.0	14	1	13	5	< 2	< 2	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	< 0.2	< 0.2
Vanadium	ug/L	NC	NA	4.5	62	27	2	4.5		8	16	10	15	19	9	7	7
Zinc	ug/L	5,000**	NA	2,400	5,000 <sup>E</sup>	190	18	2,400		< 10	< 10	< 10	< 30	11	23	< 10	< 10

### Notes:

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

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

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 and MI Part 115 Parameter 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.

 $^{\mathsf{E}}$  - Criterion is the aesthetic drinking water value per footnote {E}.

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

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

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

(3) JHC-MW-15008 was decommissioned on June 24, 2019. Replacement well JHC-MW-15008R was installed on June 25, 2019.

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

							Sa	mple Location:						,	JHC-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 <sup>(4)</sup>	2/12/2020	4/14/2020	7/16/2020	10/22/2020(4)	2/23/2021(4)	4/13/2021 <sup>(4)</sup>
Constituent	Unit	EPA MCL	EPA RSL	MI Residential*	MI Non- Residential*	MI GSIA	UTL	GWPS							Downgradient						
Appendix III <sup>(1)</sup>																					
Boron	ua/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 <sup>EE</sup>	40	500	32.1	32.2		38.7	42.6	79		55.2	62.1	52.8			
Chloride	mg/L	250**	NA	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	13	250	31.6	32.3		26.2	19.2	54		31.9	83.0	68.3			
Total Dissolved Solids	mg/L	500**	NA	500 <sup>E</sup>	500 <sup>E</sup>	500	240	500	170	188		298	166	360		312	336	357			
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.4	7.3	8.4 <sup>(5)</sup>	7.4	7.6	7.4		7.4	7.0	7.1			
Appendix IV <sup>(1)</sup>																					
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 Parameters	s <sup>(2)</sup>																				
Iron	ug/L	300**	NA	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	870	870								71	< 20	< 20			
Copper	ug/L	1,000**	NA	1,000 <sup>E</sup>	1,000 <sup>E</sup>	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 <sup>E</sup>	190	18	2,400								10	< 10	< 30			

#### Notes:

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

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

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 and MI Part 115 Parameter 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.
- $^{\mathsf{E}}$  Criterion is the aesthetic drinking water value per footnote {E}.
- EE Criterion is based on the total dissolved solids GSI value per footnote {EE}.

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

(2) Per Michigan Part 115 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection

monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

(3) JHC-MW-15008 was decommissioned on June 24, 2019. Replacement well JHC-MW-15008R was installed on June 25, 2019.

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

							Sa	mple Location:					JHC-MW	-15008R <sup>(3)</sup>				
								Sample Date:	8/13/2019	10/9/2019	10/9/2019	2/12/2020	4/14/2020	7/16/2020	10/22/2020	2/23/2021	4/13/2021	4/13/2021
				MI	MI Non-								Downo	radient				
Constituent	Unit	EPA MCL	EPA RSL	Residential*	Residential*	MI GSI^	UTL	GWPS			-		Downg	Jiadient	_		-	
Appendix III <sup>(1)</sup>											Field Dup							Field Dup
Boron	ug/L	NC	NA	500	500	7,200	54	500	93	130	130	423	505	384	285	326	352	360
Calcium	mg/L	NC	NA	NC	NC	500 <sup>EE</sup>	40	500	33	100	100	94.7	99.9	79.8	109	105	85.4	87.0
Chloride	mg/L	250**	NA	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	70	250	2.2	16	16	22.4	25.0	25.4	18.8	17.2	17.2	17.1
Fluoride	ug/L	4,000	NA	NC	NC	NC	1,000	4,000	170	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250**	NA	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	13	250	20	220	220	219	235	183	215	197	185	186
Total Dissolved Solids	mg/L	500**	NA	500 <sup>E</sup>	500 <sup>E</sup>	500	240	500	150	< 50	430	556	566	536	577	548	517	512
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.4	7.3		7.3	6.9	7.1	7.0	7.0	7.1	
Appendix IV <sup>(1)</sup>																		
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	1.2	< 1.0	< 1.0	< 1	1	< 1	1	< 1	1	< 1
Arsenic	ug/L	10	NA	10	10	10	1	10	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	110	340	320	291	252	219	216	250	200	195
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1.0	< 1.0	< 1.0	< 1	< 1	< 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	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	NA	100	100	11	2	100	3.8	4.5	4.5	7	< 1	< 1	< 1	2	41	56
Cobalt	ug/L	NC	6	40	100	100	15	15	< 6.0	< 6.0	< 6.0	< 6	< 15	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NA	NC	NC	NC	1,000	4,000	170	< 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	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	170	350	440	10	40	10	15	15	18	19	17	19	20	20	21
Mercury	ug/L	2	NA	2.0	2.0	0.20#	0.2	2	< 0.20	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	73	210	3,200	5	100	6.8	< 5.0	< 5.0	< 5	< 5	< 5	5	9	17	19
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA	0.183	0.449	0.751		0.180		0.553		0.272	0.351
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA	0.468	0.817	0.744		< 0.429		0.330		< 0.491	< 0.512
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5	0.651	1.27	1.49		0.549		0.883		0.496	0.780
Selenium	ug/L	50	NA	50	50	5.0	5	50	12	110	110	11	6	13	68	16	6	6
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2	< 2.0	< 2.0	< 2.0	< 2	< 2	2	< 2	2	2	< 2
MI Part 115 Parameters	s <sup>(2)</sup>																	
Iron	ug/L	300**	NA	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	870	870		99	150	164	134	48	56	41	347	419
Copper	ug/L	1,000**	NA	1,000 <sup>E</sup>	1,000 <sup>E</sup>	15	2.1	1,000		< 1.0	1.1	2	2	2	2	2	5	5
Nickel	ug/L	NC	NA	100	100	86	2	100		2.7	2.6	8	< 1	< 2	< 2	3	38	48
Silver	ug/L	100**	NA	34	98	0.20	0.2	34		< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 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	< 2	< 2	< 2
Zinc	ug/L	5,000**	NA	2,400	5,000 <sup>E</sup>	190	18	2,400		< 10	< 10	< 10	< 10	< 30	< 10	< 10	< 10	< 10

#### Notes:

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

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

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 and MI Part 115 Parameter GWPS is the most restrictive of the MCL/Part 201 criteria, or the UTL

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

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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.

- $^{\mathsf{E}}$  Criterion is the aesthetic drinking water value per footnote {E}.

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

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

(2) Per Michigan Part 115 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection

monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

(3) JHC-MW-15008 was decommissioned on June 24, 2019. Replacement well JHC-MW-15008R was installed on June 25, 2019.

(4) 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

							San	nple Location:									JHC-MW-1500	9							
								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 <sup>(4)</sup>	2/12/2020	4/14/2020	4/14/2020	7/16/2020	10/22/2020(4)	2/23/2021 <sup>(4)</sup>	4/13/2021(4)
				MI	MI Non-												Downgradiant								
Constituent	Unit	EPA MCL	EPA RSL	Residential*	Residential*	MI GSI^	UTL	GWPS									Downgradient								
Appendix III <sup>(1)</sup>												Field Dup			Field Dup		Field Dup				Field Dup				
Boron	ug/L	NC	NA	500	500	7,200	54	500	156	144			91.4	188	187	200	190		468	874	881	401			
Calcium	mg/L	NC	NA	NC	NC	500 <sup>EE</sup>	40	500	41.2	34.3			41.2	46.2	46.4	92	89		74.5	78.7	79.9	84.2			
Chloride	mg/L	250**	NA	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	70	250	20.1	17.7			22.9	17.7	17.7	17	16		10.7	6.95	6.78	6.18			
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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	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/L	500**	NA	500 <sup>E</sup>	500 <sup>E</sup>	500	240	500	208	178			214	234	202	430	440		332	354	341	397			
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.5	7.4	8.4 <sup>(5)</sup>		7.7	7.6		7.4			7.5	7.2		7.2			
Appendix IV <sup>(1)</sup>																									
Antimony	ug/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/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/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/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/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/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/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/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	< 1	< 1	< 1			
Lithium	ug/L	NC	40	170	350	440	10	40	11		< 10	< 10	< 10	14	14	11	11		14	14	14	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	< 0.20	< 0.20	< 0.20		< 0.2	< 0.2	< 0.2	< 0.2			
Molybdenum	ug/L	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			
Radium-226	pCi/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				
Radium-228	pCi/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				
Radium-226/228	pCi/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/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/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 Parameter	s <sup>(2)</sup>																								
Iron	ug/L	300**	NA	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	870	870											420	< 20	< 20	34			
Copper	ug/L	1,000**	NA	1,000 <sup>E</sup>	1,000 <sup>E</sup>	15	2.1	1,000											4	1	2	3			
Nickel	ug/L	NC	NA	100	100	86	2	100											41	< 1	1	< 2			
Silver	ug/L	100**	NA	34	98	0.20	0.2	34											< 0.2	< 0.2	< 0.2	< 0.2			
Vanadium	ug/L	NC	NA	4.5	62	27	2	4.5											3	< 2	< 2	< 2			
Zinc	ug/L	5,000**	NA	2,400	5,000 <sup>E</sup>	190	18	2,400											< 10	< 10	< 10	< 30			

### Notes:

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

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if the UTL exceeds the 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.

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

							Sa	mple Location:							JHC-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(4)	2/23/2021(4)	4/13/2021 <sup>(4)</sup>
Constituent	Unit	EPA MCL	EPA RSL	MI Residential*	MI Non- Residential*	MI GSI^	UTL	GWPS							Downgradient	t					
Appendix III <sup>(1)</sup>																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 <sup>EE</sup>	40	500	33.0		40.9	59.6	58	84	82.9	88.0	82.7	78.1			
Chloride	mg/L	250**	NA	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	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 <sup>E</sup>	500 <sup>E</sup>	500	240	500	220		294	262	270	330	280	319	333	361			
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.2	8.0 <sup>(5)</sup>	7.3	7.5	6.6	6.9	7.0		6.6	6.6			
Appendix IV <sup>(1)</sup>																					
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	rs <sup>(2)</sup>																				
Iron	ug/L	300**	NA	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	870	870						2,100	25	31	< 20	27			
Copper	ug/L	1,000**	NA	1,000 <sup>E</sup>	1,000 <sup>E</sup>	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 <sup>E</sup>	190	18	2,400						<10	11	12	< 10	< 30			

#### Notes:

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

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

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 and MI Part 115 Parameter 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.
- $^{\mathsf{E}}$  Criterion is the aesthetic drinking water value per footnote {E}.
- EE Criterion is based on the total dissolved solids GSI value per footnote {EE}.

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

(2) Per Michigan Part 115 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection

monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported. (3) JHC-MW-15008 was decommissioned on June 24, 2019. Replacement well JHC-MW-15008R was installed on June 25, 2019.

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

							Sar	mple Location:					JHC-MW-1501	1			
								Sample Date:	4/23/2019	10/10/2019	2/12/2020	4/15/2020	7/16/2020	10/22/2020	2/23/2021	2/23/2021	4/13/2021
Constituent	Unit			MI Residential*	MI Non- Residential*	MLCSIA		GWPS					Downgradient				
• • •• ••(1)	Onit		LIAROL	Residential	Residential		OIL	0010								<b></b>	
Appendix III		NC	NIA	500	500	7 000	E A	500	440	600	1.010	2.070	0 700	4.400	4 700	Field Dup	5 070
Boron	ug/L	NC	NA	500	500	7,200	54	500	440	690	1,910	2,870	2,720	4,120	4,720	4,530	5,070
	mg/L	NC 050##	NA	NC.	NC	500	40	500	43	110	122	112	86.7	122	93.5	92.1	/8./
	mg/L	250**	NA	250-	250 <sup>L</sup>	500	70	250	18	9.4	5.71	4.16	10.4	3.79	1.78	1.80	2.65
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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	13	250	86	180	192	183	136	141	119	121	113
Total Dissolved Solids	mg/L	500**	NA	500 <sup>⊧</sup>	500 <sup>E</sup>	500	240	500	280	550	654	542	499	546	429	421	359
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5 <sup>⊧</sup>	6.5 - 8.5 <sup>⊧</sup>	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	8.8	8.4	8.0	7.6	7.7	7.6	7.3		7.2
Appendix IV <sup>(1)</sup>																	
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	< 1.0	< 1.0	2	4	2	2	< 1	< 1	< 1
Arsenic	ug/L	10	NA	10	10	10	1	10	36	44	31	25	22	22	14	13	13
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	170	360	563	514	419	430	455	434	399
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	5.0	5.0	3.5	0.2	5	< 0.20	< 0.20	< 0.2	0.2	< 0.2	0.5	0.7	0.8	0.8
Chromium	ug/L	100	NA	100	100	11	2	100	9.0	1.4	1	< 1	< 1	< 1	< 1	< 1	5
Cobalt	ug/L	NC	6	40	100	100	15	15	< 6.0	< 6.0	< 6	< 6	< 6	< 6	< 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
Lead	ug/L	NC	15	4.0	4.0	39	1	15	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	170	350	440	10	40	< 10	14	22	21	20	17	17	16	14
Mercury	ug/L	2	NA	2.0	2.0	0.20#	0.2	2	< 0.20	< 0.20	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	73	210	3,200	5	100	21	11	12	7	28	< 5	6	6	8
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA	0.0720	0.2980		0.242		0.344			0.165
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.343	0.665		0.606		< 0.264			0.758
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5	< 0.343	0.963		0.848		0.497			0.923
Selenium	ug/L	50	NA	50	50	5.0	5	50	13	76	104	29	20	308	166	161	143
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2	< 2.0	< 2.0	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameters	(2)																
Iron	ug/L	300**	NA	300 <sup>E</sup>	300 <sup>E</sup>	500.000 <sup>EE</sup>	870	870		120	178	145	115	< 20	< 20	< 20	57
Copper	ug/L	1,000**	NA	1,000 <sup>E</sup>	1,000 <sup>E</sup>	15	2.1	1,000		< 1.0	1	1	2	1	2	3	2
Nickel	ug/L	NC	NA	100	100	86	2	100		< 2.0	4	< 2	< 2	< 2	< 2	< 2	8
Silver	ug/L	100**	NA	34	98	0.20	0.2	34		< 0.20	< 0.2	< 0.4	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	NA	4.5	62	27	2	4.5		14	42	40	30	49	35	34	34
Zinc	ug/L	5,000**	NA	2,400	5,000 <sup>E</sup>	190	18	2,400		< 10	< 10	< 10	< 30	< 10	< 10	< 10	< 10

### Notes:

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

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

NA - not applicable.

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

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if the UTL exceeds the 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.

 $^{\mathsf{E}}$  - Criterion is the aesthetic drinking water value per footnote {E}.

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

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

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

(3) JHC-MW-15008 was decommissioned on June 24, 2019. Replacement well JHC-MW-15008R was installed on June 25, 2019.

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

# Attachment 1 Sanitas<sup>™</sup> Output

# Boron Comparison to GWPS





# Sulfate Comparison to GWPS



Time Series Analysis Run 6/11/2021 9:15 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

mg/L

Total Dissolved Solids Comparison to GWPS





mg/L

# Arsenic Comparison to GWPS





# Chromium Comparison to GWPS





# Selenium Comparison to GWPS





# Iron Comparison to GWPS





# Nickel Comparison to GWPS





# Vanadium Comparison to GWPS





Constituent: Boron, Total Analysis Run 6/11/2021 9:26 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

For observations made between 8/15/2017 and 4/13/2021, a summary of the selected data set:

Observations = 48 ND/Trace = 0 Wells = 6 Minimum Value = 91.4 Maximum Value = 5070 Mean Value = 909.9 Median Value = 286.5 Standard Deviation = 1294 Coefficient of Variation = 1.423 Skewness = 1.792

Well	<u>#Obs.</u>	ND/Trace	<u>Min</u>	Max	Mean	<u>Median</u>	Std.Dev.	<u>CV</u>	Skewness
JHC-MW-15006	8	0	230	301.5	266.7	265.5	29.76	0.1116	0.03705
JHC-MW-15007	8	0	98	242	159.9	152	41.98	0.2626	0.6808
JHC-MW-15008R	8	0	93	505	312.8	341	140.8	0.4501	-0.4296
JHC-MW-15009	8	0	91.4	877.5	315.1	191.3	262.5	0.8332	1.335
JHC-MW-15010	8	0	98.4	2800	1600	2240	1254	0.7842	-0.4187
JHC-MW-15011	8	0	440	5070	2806	2795	1734	0.6181	-0.1032

Constituent: Sulfate Analysis Run 6/11/2021 9:27 AM

Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

For observations made between 8/15/2017 and 4/13/2021, a summary of the selected data set:

Observations = 48 ND/Trace = 0 Wells = 6 Minimum Value = 18.2 Maximum Value = 276 Mean Value = 108.8 Median Value = 71.65 Standard Deviation = 84.52 Coefficient of Variation = 0.777 Skewness = 0.5366

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	<u>CV</u>	Skewness
JHC-MW-15006	8	0	55	276	198.4	234.5	86.41	0.4356	-0.8902
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	184.3	206	68.82	0.3734	-1.962
JHC-MW-15009	8	0	18.2	130	49.24	36.6	35.6	0.723	1.62
JHC-MW-15010	8	0	24	39.9	33.56	32.95	5.158	0.1537	-0.4268
JHC-MW-15011	8	0	86	192	143.9	138.5	37.98	0.2639	-0.05274

Constituent: Total Dissolved Solids Analysis Run 6/11/2021 9:27 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

For observations made between 8/15/2017 and 4/13/2021, a summary of the selected data set:

Observations = 48 ND/Trace = 0 Wells = 6 Minimum Value = 150 Maximum Value = 654 Mean Value = 376 Median Value = 352.3 Standard Deviation = 143.7 Coefficient of Variation = 0.3822 Skewness = 0.1261

Well	<u>#Obs.</u>	ND/Trace	<u>Min</u>	Max	Mean	<u>Median</u>	Std.Dev.	<u>CV</u>	Skewness
JHC-MW-15006	8	0	190	562	452.6	517	148.9	0.3289	-1.11
JHC-MW-15007	8	0	166	360	273.4	305	84.53	0.3092	-0.357
JHC-MW-15008R	8	0	150	577	460.9	542	167	0.3622	-1.182
JHC-MW-15009	8	0	178	435	291.2	275	98.39	0.3379	0.245
JHC-MW-15010	8	0	220	361	296.2	296.8	45.31	0.153	-0.2287
JHC-MW-15011	8	0	280	654	481.9	520.5	120.3	0.2497	-0.3825

Constituent: Arsenic, Total Analysis Run 6/11/2021 9:28 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

For observations made between 8/15/2017 and 4/13/2021, a summary of the selected data set:

Observations = 48 ND/Trace = 24 Wells = 6 Minimum Value = 1 Maximum Value = 44 Mean Value = 6.2 Median Value = 1.95 Standard Deviation = 9.917 Coefficient of Variation = 1.599 Skewness = 2.367

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	0	3	7.5	4.988	5	1.35	0.2706	0.4822
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	13	44	25.81	23.5	10.74	0.416	0.3864

Constituent: Chromium, Total Analysis Run 6/11/2021 9:29 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

For observations made between 8/15/2017 and 4/13/2021, a summary of the selected data set:

Observations = 48 ND/Trace = 11 Wells = 6 Minimum Value = 1 Maximum Value = 370 Mean Value = 13.56 Median Value = 1.45 Standard Deviation = 53.53 Coefficient of Variation = 3.947 Skewness = 6.349

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	<u>CV</u>	Skewness
JHC-MW-15006	8	2	1	18	4.138	2.5	5.718	1.382	2.09
JHC-MW-15007	8	1	1	35	9.575	2	14.6	1.525	1.164
JHC-MW-15008R	8	3	1	48.5	8.6	2.9	16.26	1.891	2.192
JHC-MW-15009	8	1	1	31	8.794	3.95	10.68	1.215	1.187
JHC-MW-15010	8	0	1	370	47.71	1.3	130.2	2.729	2.267
JHC-MW-15011	8	4	1	9	2.55	1	2.951	1.157	1.563

Constituent: Selenium, Total Analysis Run 6/11/2021 9:29 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

For observations made between 8/15/2017 and 4/13/2021, a summary of the selected data set:

Observations = 48 ND/Trace = 5 Wells = 6 Minimum Value = 0.5 Maximum Value = 308 Mean Value = 46.11 Median Value = 13 Standard Deviation = 67.29 Coefficient of Variation = 1.459 Skewness = 1.964

Well	<u>#Obs.</u>	ND/Trace	<u>Min</u>	Max	Mean	Median	Std.Dev.	<u>CV</u>	Skewness
JHC-MW-15006	8	2	0.5	9	3.35	1.4	3.498	1.044	0.7534
JHC-MW-15007	8	2	0.5	23	9.313	2.7	10.85	1.165	0.4872
JHC-MW-15008R	8	0	6	110	30.25	12.5	38.11	1.26	1.411
JHC-MW-15009	8	1	0.5	78	32.55	16.3	33.58	1.032	0.4686
JHC-MW-15010	8	0	3	210	94.14	80.05	83.15	0.8833	0.1783
JHC-MW-15011	8	0	13	308	107.1	90	98.81	0.9229	1.004

Constituent: Iron, Total Analysis Run 6/11/2021 9:31 AM

Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

For observations made between 10/9/2019 and 4/13/2021, a summary of the selected data set:

Observations = 31 ND/Trace = 6 Wells = 6 Minimum Value = 20 Maximum Value = 2100 Mean Value = 174.4 Median Value = 56 Standard Deviation = 380.2 Coefficient of Variation = 2.18 Skewness = 4.425

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	7	0	26	571	148.7	43	195.5	1.315	1.683
JHC-MW-15007	3	2	20	71	37	20	29.44	0.7958	0.7071
JHC-MW-15008R	7	0	41	383	135.8	124.5	119.1	0.8771	1.395
JHC-MW-15009	3	1	20	420	158	34	227	1.437	0.7041
JHC-MW-15010	4	1	20	2100	543.8	27.5	1038	1.908	1.155
JHC-MW-15011	7	2	20	178	93.57	115	62.04	0.663	-0.05972

Constituent: Nickel, Total Analysis Run 6/11/2021 9:31 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

For observations made between 10/9/2019 and 4/13/2021, a summary of the selected data set:

Observations = 31 ND/Trace = 15 Wells = 6 Minimum Value = 1 Maximum Value = 200 Mean Value = 12.26 Median Value = 2 Standard Deviation = 36.29 Coefficient of Variation = 2.96 Skewness = 4.709

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	<u>Median</u>	Std.Dev.	<u>CV</u>	<u>Skewness</u>
JHC-MW-15006	7	2	1	14	5.357	2	5.618	1.049	0.9031
JHC-MW-15007	3	2	1	7	3.333	2	3.215	0.9644	0.6309
JHC-MW-15008R	7	3	1	43	8.807	2.65	15.25	1.731	1.952
JHC-MW-15009	3	1	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	7	5	2	8	3.143	2	2.268	0.7216	1.663

Constituent: Vanadium, Total Analysis Run 6/11/2021 9:31 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

For observations made between 10/9/2019 and 4/13/2021, a summary of the selected data set:

Observations = 31 ND/Trace = 9 Wells = 6 Minimum Value = 2 Maximum Value = 49 Mean Value = 13.03 Median Value = 7 Standard Deviation = 13.76 Coefficient of Variation = 1.056 Skewness = 1.277

Well	<u>#Obs.</u>	ND/Trace	<u>Min</u>	Max	Mean	Median	Std.Dev.	<u>CV</u>	<u>Skewness</u>
JHC-MW-15006	7	0	7	16	11	10	3.916	0.356	0.1799
JHC-MW-15007	3	0	14	16	15	15	1	0.06667	0
JHC-MW-15008R	7	7	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	7	0	14	49	34.79	34.5	11.08	0.3186	-0.754









ng/L

# Parametric Confidence Interval





Constituent: Boron, Total Analysis Run 6/11/2021 9:40 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

# **Confidence Interval**

Constituent: Boron, Total (ug/L) Analysis Run 6/11/2021 9:41 AM

Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

	JHC-MW-15008R	JHC-MW-15009	JHC-MW-15010	JHC-MW-15011
8/15/2017		156		
9/26/2017		144	109	
6/20/2018		91.4	98.4	
11/14/2018			120	
11/15/2018		187.5 (D)		
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
7/16/2020	384	401	2130	2720
10/22/2020	285			4120
2/23/2021	326			4625 (D)
4/13/2021	356 (D)			5070
Mean	312.8	315.1	1600	2806
Std. Dev.	140.8	262.5	1254	1734
Upper Lim.	461.9	560.4	2710	4644
Lower Lim.	163.6	91.66	528.2	967.5

mg/L

# Parametric Confidence Interval

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





# **Confidence Interval**

Constituent: Sulfate (mg/L) Analysis Run 6/11/2021 9:40 AM

Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

	JHC-MW-15006		
4/24/2019	75		
10/10/2019	55		
2/12/2020	217		
4/14/2020	260		
7/16/2020	195		
10/22/2020	252 (D)		
2/23/2021	276		
4/13/2021	257		
Mean	198.4		
Std. Dev.	86.41		
Upper Lim.	275.6		
Lower Lim.	125.8		

mg/L

# Parametric Confidence Interval

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



Constituent: Total Dissolved Solids Analysis Run 6/11/2021 9:39 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

# **Confidence Interval**

Constituent: Total Dissolved Solids (mg/L) Analysis Run 6/11/2021 9:40 AM

Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

		JHC-MW-15006	JHC-MW-15008R	JHC-MW-15011
4	/23/2019			280
4	/24/2019	240		
8	/13/2019		150	
1	0/9/2019		240 (D)	
1	0/10/2019	190		550
2	/12/2020	542	556	654
4	/14/2020	562	566	
4	/15/2020			542
7	/16/2020	521	536	499
1	0/22/2020	513 (D)	577	546
2	/23/2021	556	548	425 (D)
4	/13/2021	497	514.5 (D)	359
Ν	lean	452.6	460.9	481.9
S	td. Dev.	148.9	167	120.3
U	lpper Lim.	561.1	574.8	609.4
Ŀ	ower Lim.	395.8	428.2	354.3

ng/L

# Parametric Confidence Interval

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




Constituent: Arsenic, Total (ug/L) Analysis Run 6/11/2021 9:40 AM

	JHC-MW-15011
4/23/2019	36
10/10/2019	44
2/12/2020	31
4/15/2020	25
7/16/2020	22
10/22/2020	22
2/23/2021	13.5 (D)
4/13/2021	13
Mean	25.81
Std. Dev.	10.74
Upper Lim.	37.19
Lower Lim.	14.43

## Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Chromium, Total Analysis Run 6/11/2021 9:38 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

Constituent: Chromium, Total (ug/L) Analysis Run 6/11/2021 9:39 AM

	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	4.5 (D)
4/14/2020	1
7/16/2020	1
Mean	47.71
Std. Dev.	130.2
Upper Lim.	370
Lower Lim.	1

## 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 6/11/2021 9:41 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

Constituent: Selenium, Total (ug/L) Analysis Run 6/11/2021 9:42 AM

	JHC-MW-15008R	JHC-MW-15009	JHC-MW-15010	JHC-MW-15011
8/15/2017		<1		
4/26/2018		1 (D)	3	
6/20/2018		10.3	11	
11/14/2018			34.1	
11/15/2018		12.6 (D)		
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
7/16/2020	13	76	179	20
10/22/2020	68			308
2/23/2021	16			163.5 (D)
4/13/2021	6 (D)			143
Mean	30.25	32.55	94.14	107.1
Std. Dev.	38.11	33.58	83.15	98.81
Upper Lim.	110	68.86	182.3	211.8
Lower Lim.	6	1.67	5.999	2.327

## Parametric Confidence Interval



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



Constituent: Iron, Total (ug/L) Analysis Run 6/11/2021 9:43 AM

	JHC-MW-15006	JHC-MW-15010
10/9/2019		2100
10/10/2019	43	
2/11/2020		28 (D)
2/12/2020	189	
4/14/2020	26	<20
7/16/2020	128	27
10/22/2020	571 (D)	
2/23/2021	43	
4/13/2021	41	
Mean	148.7	541.3
Std. Dev.	195.5	1039
Upper Lim.	307.6	43972
Lower Lim.	22.41	0.02865

## Non-Parametric Confidence Interval

Compliance Limit is not exceeded.



Constituent: Nickel, Total Analysis Run 6/11/2021 9:43 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

Constituent: Nickel, Total (ug/L) Analysis Run 6/11/2021 9:43 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

## 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 6/11/2021 9:43 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21

Constituent: Vanadium, Total (ug/L) Analysis Run 6/11/2021 9:43 AM

	JHC-MW-15006	JHC-MW-15010	JHC-MW-15011
10/9/2019		5.5	
10/10/2019	8		14
2/11/2020		4 (D)	
2/12/2020	16		42
4/14/2020	10	4	
4/15/2020			40
7/16/2020	15	4	30
10/22/2020	14 (D)		49
2/23/2021	7		34.5 (D)
4/13/2021	7		34
Mean	11	4.375	34.79
Std. Dev.	3.916	0.75	11.08
Upper Lim.	15.65	5.5	47.95
Lower Lim.	6.349	4	21.62



# Appendix C GSI Time Series Charts

Sanitas<sup>™</sup> v.9.6.28 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 antimony result collected in accordance with the JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP).

Sanitas™ v.9.6.28 Sanitas software licensed to Consumers Energy. UG





Time Series Analysis Run 6/11/2021 11:00 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21 Sanitas<sup>™</sup> v.9.6.28 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 result is dissolved arsenic result collected in accordance with the JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP).

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



Lithium, Total

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

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





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

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

#### Molybdenum, Total



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

#### **Total Dissolved Solids**



Time Series Analysis Run 6/11/2021 11:00 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_1SA21 Sanitas<sup>™</sup> v.9.6.28 Sanitas software licensed to Consumers Energy. UG Hollow symbols indicate censored values.



Vanadium, Total

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

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



























# Appendix D April 2021 Laboratory Reports



135 W. Trail St. Jackson, MI 49201

- To: CDBatts, JH Campbell Complex
- From: EBlaj, T-258
- Date: May 03, 2021
- *Subject:* JH CAMPBELL SOLID WASTE DISPOSAL AREA GROUNDWATER MONITORING 2<sup>nd</sup> Quarter, 2021 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: 21-0446

CE Laboratory Services conducted groundwater monitoring on 04/12/2021 through 04/15/2021 at the JH Campbell Solid Waste Disposal Area, for the 2<sup>nd</sup> Quarter monitoring requirements. The samples were received for analysis by the Chemistry department on 04/15/2021.

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, 22<sup>nd</sup> 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:Q2-2021 Background WellsDate Received:4/15/2021Chemistry Project:21-0446

Sample #	Field Sample ID	<u>Matrix</u>	Sample Date	<u>Site</u>	
21-0446-01	JHC-MW-15023	Groundwater	04/12/2021 07:08 PM	JHC RCRA GW Monitoring	- Background Wells
21-0446-02	JHC-MW-15024	Groundwater	04/13/2021 12:04 PM	JHC RCRA GW Monitoring	- Background Wells
21-0446-03	JHC-MW-15025	Groundwater	04/13/2021 11:11 AM	JHC RCRA GW Monitoring	- Background Wells
21-0446-04	JHC-MW-15026	Groundwater	04/13/2021 09:43 AM	JHC RCRA GW Monitoring	- Background Wells
21-0446-05	JHC-MW-15027	Groundwater	04/13/2021 08:55 AM	JHC RCRA GW Monitoring	- Background Wells
21-0446-06	JHC-MW-15028	Groundwater	04/12/2021 06:06 PM	JHC RCRA GW Monitoring	- Background Wells
21-0446-07	DUP-02	Groundwater	04/12/2021 12:00 AM	JHC RCRA GW Monitoring	- Background Wells
21-0446-08	FB-02	Water	04/13/2021 11:00 AM	JHC RCRA GW Monitoring	- Background Wells
21-0446-09	EB-02	Water	04/13/2021 12:16 PM	JHC RCRA GW Monitoring	- Background Wells
21-0446-10	JHC-MW-15025 Field MS	Groundwater	04/13/2021 11:11 AM	JHC RCRA GW Monitoring	- Background Wells
21-0446-11	JHC-MW-15025 Field MSD	Groundwater	04/13/2021 11:11 AM	JHC RCRA GW Monitoring	- Background Wells



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-0446
Field Sample ID:	JHC-MW-15023	Collect Date:	04/12/2021
Lab Sample ID:	21-0446-01	Collect Time:	07:08 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous					21-0446-01-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP/	AMP Detection & Assess	sment Mo	nitoring	Aliquot:	21-0446-01-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	17		ug/L	5	04/27/2021	AB21-0427-17
Beryllium	ND		ug/L	1	04/27/2021	AB21-0427-17
Boron	50		ug/L	20	04/27/2021	AB21-0427-17
Cadmium	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Calcium	11100		ug/L	1000	04/27/2021	AB21-0427-17
Chromium	ND		ug/L	1	04/27/2021	AB21-0427-17
Cobalt	ND		ug/L	6	04/27/2021	AB21-0427-17
Copper	1		ug/L	1	04/27/2021	AB21-0427-17
Iron	ND		ug/L	20	04/27/2021	AB21-0427-17
Lead	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	ND		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	ND		ug/L	5	04/27/2021	AB21-0427-17
Nickel	ND		ug/L	2	04/27/2021	AB21-0427-17
Selenium	ND		ug/L	1	04/27/2021	AB21-0427-17
Silver	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Thallium	ND		ug/L	2	04/27/2021	AB21-0427-17
Vanadium	ND		ug/L	2	04/27/2021	AB21-0427-17
Zinc	ND		ug/L	10	04/27/2021	AB21-0427-17

Anions by EPA 300.0 CCR Rule Ana	lyte List, Cl, F,	<u>rte List, CI, F, SO4, Aque</u>		Aliquot: 21-0446-01-C03-A01		Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	2640		ug/L	1000	04/22/2021	AB21-0422-06
Fluoride	ND		ug/L	1000	04/22/2021	AB21-0422-06
Sulfate	12200		ug/L	1000	04/22/2021	AB21-0422-06
Total Dissolved Solids by SM 25400	;			Aliquot:	21-0446-01-C04-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	66		mg/L	10	04/16/2021	AB21-0416-04



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-0446
Field Sample ID:	JHC-MW-15024	Collect Date:	04/13/2021
Lab Sample ID:	21-0446-02	Collect Time:	12:04 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, To	otal, Aqueous			Aliquot:	21-0446-02-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP/	AMP Detection & Asses	sment Mo	nitoring	Aliquot:	21-0446-02-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	17		ug/L	5	04/27/2021	AB21-0427-17
Beryllium	ND		ug/L	1	04/27/2021	AB21-0427-17
Boron	21		ug/L	20	04/27/2021	AB21-0427-17
Cadmium	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Calcium	36800		ug/L	1000	04/27/2021	AB21-0427-17
Chromium	ND		ug/L	1	04/27/2021	AB21-0427-17
Cobalt	ND		ug/L	6	04/27/2021	AB21-0427-17
Copper	ND		ug/L	1	04/27/2021	AB21-0427-17
Iron	67		ug/L	20	04/27/2021	AB21-0427-17
Lead	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	ND		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	ND		ug/L	5	04/27/2021	AB21-0427-17
Nickel	ND		ug/L	2	04/27/2021	AB21-0427-17
Selenium	ND		ug/L	1	04/27/2021	AB21-0427-17
Silver	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Thallium	ND		ug/L	2	04/27/2021	AB21-0427-17
Vanadium	ND		ug/L	2	04/27/2021	AB21-0427-17
Zinc	ND		ug/L	10	04/30/2021	AB21-0427-17

Anions by EPA 300.0 CCR Rule Ana	lyte List, CI, F,	SO4, Aqu	eous	Aliquot:	21-0446-02-C03-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	21500		ug/L	1000	04/22/2021	AB21-0422-06
Fluoride	ND		ug/L	1000	04/22/2021	AB21-0422-06
Sulfate	8140		ug/L	1000	04/22/2021	AB21-0422-06
Total Dissolved Solids by SM 2540C	;			Aliquot:	21-0446-02-C04-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	175		mg/L	10	04/16/2021	AB21-0416-04



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-0446
Field Sample ID:	JHC-MW-15025	Collect Date:	04/13/2021
Lab Sample ID:	21-0446-03	Collect Time:	11:11 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, To	otal, Aqueous			Aliquot:	21-0446-03-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP/	AMP Detection & Assess	ment Mo	nitoring	Aliquot:	21-0446-03-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	6		ug/L	5	04/27/2021	AB21-0427-17
Beryllium	ND		ug/L	1	04/27/2021	AB21-0427-17
Boron	20		ug/L	20	04/27/2021	AB21-0427-17
Cadmium	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Calcium	19800		ug/L	1000	04/27/2021	AB21-0427-17
Chromium	ND		ug/L	1	04/27/2021	AB21-0427-17
Cobalt	ND		ug/L	6	04/27/2021	AB21-0427-17
Copper	ND		ug/L	1	04/27/2021	AB21-0427-17
Iron	ND		ug/L	20	04/27/2021	AB21-0427-17
Lead	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	ND		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	ND		ug/L	5	04/27/2021	AB21-0427-17
Nickel	ND		ug/L	2	04/27/2021	AB21-0427-17
Selenium	ND		ug/L	1	04/27/2021	AB21-0427-17
Silver	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Thallium	ND		ug/L	2	04/27/2021	AB21-0427-17
Vanadium	ND		ug/L	2	04/27/2021	AB21-0427-17
Zinc	ND		ug/L	10	04/30/2021	AB21-0427-17

Anions by EPA 300.0 CCR Rule An	alyte List, Cl, F,	SO4, Aqu	eous	Aliquot:	21-0446-03-C03-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	19500		ug/L	1000	04/22/2021	AB21-0422-06
Fluoride	ND		ug/L	1000	04/22/2021	AB21-0422-06
Sulfate	9020		ug/L	1000	04/22/2021	AB21-0422-06
Total Dissolved Solids by SM 2540	с			Aliquot:	21-0446-03-C04-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	135		mg/L	10	04/16/2021	AB21-0416-04



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-0446
Field Sample ID:	JHC-MW-15026	Collect Date:	04/13/2021
Lab Sample ID:	21-0446-04	Collect Time:	09:43 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, To	otal, Aqueous			Aliquot:	21-0446-04-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP/	AMP Detection & Assess	sment Mo	nitoring	Aliquot:	21-0446-04-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	10		ug/L	5	04/27/2021	AB21-0427-17
Beryllium	ND		ug/L	1	04/27/2021	AB21-0427-17
Boron	ND		ug/L	20	04/27/2021	AB21-0427-17
Cadmium	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Calcium	9230		ug/L	1000	04/27/2021	AB21-0427-17
Chromium	ND		ug/L	1	04/27/2021	AB21-0427-17
Cobalt	ND		ug/L	6	04/27/2021	AB21-0427-17
Copper	ND		ug/L	1	04/27/2021	AB21-0427-17
Iron	ND		ug/L	20	04/27/2021	AB21-0427-17
Lead	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	ND		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	ND		ug/L	5	04/27/2021	AB21-0427-17
Nickel	ND		ug/L	2	04/27/2021	AB21-0427-17
Selenium	ND		ug/L	1	04/27/2021	AB21-0427-17
Silver	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Thallium	ND		ug/L	2	04/27/2021	AB21-0427-17
Vanadium	ND		ug/L	2	04/27/2021	AB21-0427-17
Zinc	ND		ug/L	10	04/27/2021	AB21-0427-17

Anions by EPA 300.0 CCR Rule Analyt	te List, Cl, F,	SO4, Aqu	eous	Aliquot:	21-0446-04-C03-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	4050		ug/L	1000	04/22/2021	AB21-0422-06
Fluoride	ND		ug/L	1000	04/22/2021	AB21-0422-06
Sulfate	6880		ug/L	1000	04/22/2021	AB21-0422-06
Total Dissolved Solids by SM 2540C				Aliquot:	21-0446-04-C04-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	51		mg/L	10	04/16/2021	AB21-0416-04



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-0446
Field Sample ID:	JHC-MW-15027	Collect Date:	04/13/2021
Lab Sample ID:	21-0446-05	Collect Time:	08:55 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, To	otal, Aqueous			Aliquot:	21-0446-05-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP/	AMP Detection & Assess	ment Mo	nitoring	Aliquot:	21-0446-05-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	8		ug/L	5	04/27/2021	AB21-0427-17
Beryllium	ND		ug/L	1	04/27/2021	AB21-0427-17
Boron	ND		ug/L	20	04/27/2021	AB21-0427-17
Cadmium	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Calcium	10900		ug/L	1000	04/27/2021	AB21-0427-17
Chromium	ND		ug/L	1	04/27/2021	AB21-0427-17
Cobalt	ND		ug/L	6	04/27/2021	AB21-0427-17
Copper	ND		ug/L	1	04/27/2021	AB21-0427-17
Iron	343		ug/L	20	04/27/2021	AB21-0427-17
Lead	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	ND		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	ND		ug/L	5	04/27/2021	AB21-0427-17
Nickel	ND		ug/L	2	04/27/2021	AB21-0427-17
Selenium	ND		ug/L	1	04/27/2021	AB21-0427-17
Silver	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Thallium	ND		ug/L	2	04/27/2021	AB21-0427-17
Vanadium	ND		ug/L	2	04/27/2021	AB21-0427-17
Zinc	ND		ug/L	10	04/30/2021	AB21-0427-17

Anions by EPA 300.0 CCR Rule Ana	alyte List, Cl, F,	SO4, Aqu	eous	Aliquot:	21-0446-05-C03-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	04/22/2021	AB21-0422-06
Fluoride	ND		ug/L	1000	04/22/2021	AB21-0422-06
Sulfate	7090		ug/L	1000	04/22/2021	AB21-0422-06
Total Dissolved Solids by SM 25400	;			Aliquot:	21-0446-05-C04-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	56		mg/L	10	04/16/2021	AB21-0416-04



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-0446
Field Sample ID:	JHC-MW-15028	Collect Date:	04/12/2021
Lab Sample ID:	21-0446-06	Collect Time:	06:06 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous				Aliquot:	Aliquot: 21-0446-06-C02-A01	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP/	AMP Detection & Assess	sment Mo	nitoring	Aliquot:	21-0446-06-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	5		ug/L	5	04/27/2021	AB21-0427-17
Beryllium	ND		ug/L	1	04/27/2021	AB21-0427-17
Boron	ND		ug/L	20	04/27/2021	AB21-0427-17
Cadmium	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Calcium	14000		ug/L	1000	04/27/2021	AB21-0427-17
Chromium	ND		ug/L	1	04/27/2021	AB21-0427-17
Cobalt	ND		ug/L	6	04/27/2021	AB21-0427-17
Copper	ND		ug/L	1	04/27/2021	AB21-0427-17
Iron	ND		ug/L	20	04/27/2021	AB21-0427-17
Lead	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	ND		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	ND		ug/L	5	04/27/2021	AB21-0427-17
Nickel	ND		ug/L	2	04/27/2021	AB21-0427-17
Selenium	ND		ug/L	1	04/27/2021	AB21-0427-17
Silver	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Thallium	ND		ug/L	2	04/27/2021	AB21-0427-17
Vanadium	ND		ug/L	2	04/27/2021	AB21-0427-17
Zinc	ND		ug/L	10	04/27/2021	AB21-0427-17

Anions by EPA 300.0 CCR Rule Analyt	te List, Cl, F	SO4, Aqueous Aliquot: 21-0446-06-C03-A01		Analyst: DMW		
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	04/22/2021	AB21-0422-06
Fluoride	ND		ug/L	1000	04/22/2021	AB21-0422-06
Sulfate	5990		ug/L	1000	04/22/2021	AB21-0422-06
Total Dissolved Solids by SM 2540C				Aliquot:	21-0446-06-C04-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	65		mg/L	10	04/16/2021	AB21-0416-04



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-0446
Field Sample ID:	DUP-02	Collect Date:	04/12/2021
Lab Sample ID:	21-0446-07	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous					21-0446-07-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP//	AMP Detection & Asses	sment Mo	nitoring	Aliquot:	21-0446-07-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	5		ug/L	5	04/27/2021	AB21-0427-17
Beryllium	ND		ug/L	1	04/27/2021	AB21-0427-17
Boron	ND		ug/L	20	04/27/2021	AB21-0427-17
Cadmium	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Calcium	14700		ug/L	1000	04/27/2021	AB21-0427-17
Chromium	ND		ug/L	1	04/27/2021	AB21-0427-17
Cobalt	ND		ug/L	6	04/27/2021	AB21-0427-17
Copper	ND		ug/L	1	04/27/2021	AB21-0427-17
Iron	ND		ug/L	20	04/27/2021	AB21-0427-17
Lead	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	ND		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	ND		ug/L	5	04/27/2021	AB21-0427-17
Nickel	ND		ug/L	2	04/27/2021	AB21-0427-17
Selenium	ND		ug/L	1	04/27/2021	AB21-0427-17
Silver	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Thallium	ND		ug/L	2	04/27/2021	AB21-0427-17
Vanadium	ND		ug/L	2	04/27/2021	AB21-0427-17
Zinc	ND		ug/L	10	04/27/2021	AB21-0427-17
	Dula Analyta List CL E	CO4 4				

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous		Aliquot: 21-0446-07-C03-A01		Analyst: DMW		
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	04/22/2021	AB21-0422-06
Fluoride	ND		ug/L	1000	04/22/2021	AB21-0422-06
Sulfate	6530		ug/L	1000	04/22/2021	AB21-0422-06
Total Dissolved Solids by SM 25400	<b>)</b>			Aliquot:	21-0446-07-C04-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	64		mg/L	10	04/16/2021	AB21-0416-04



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-0446
Field Sample ID:	FB-02	Collect Date:	04/13/2021
Lab Sample ID:	21-0446-08	Collect Time:	11:00 AM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous				Aliquot:	21-0446-08-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP	AMP Detection & Assess	sment Mo	nitoring	Aliquot:	21-0446-08-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	ND		ug/L	5	04/27/2021	AB21-0427-17
Beryllium	ND		ug/L	1	04/27/2021	AB21-0427-17
Boron	ND		ug/L	20	04/27/2021	AB21-0427-17
Cadmium	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Calcium	ND		ug/L	1000	04/27/2021	AB21-0427-17
Chromium	ND		ug/L	1	04/27/2021	AB21-0427-17
Cobalt	ND		ug/L	6	04/27/2021	AB21-0427-17
Copper	ND		ug/L	1	04/27/2021	AB21-0427-17
Iron	ND		ug/L	20	04/27/2021	AB21-0427-17
Lead	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	ND		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	ND		ug/L	5	04/27/2021	AB21-0427-17
Nickel	ND		ug/L	2	04/27/2021	AB21-0427-17
Selenium	ND		ug/L	1	04/27/2021	AB21-0427-17
Silver	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Thallium	ND		ug/L	2	04/27/2021	AB21-0427-17
Vanadium	ND		ug/L	2	04/27/2021	AB21-0427-17
Zinc	ND		ug/L	10	04/27/2021	AB21-0427-17

Anions by EPA 300.0 CCR Rule Anal	yte List, CI, F	, SO4, Aqu	eous	Aliquot: 21-0446-08-C03-A01		Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	04/22/2021	AB21-0422-06
Fluoride	ND		ug/L	1000	04/22/2021	AB21-0422-06
Sulfate	ND		ug/L	1000	04/22/2021	AB21-0422-06
Total Dissolved Solids by SM 2540C				Aliquot:	21-0446-08-C04-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	ND		mg/L	10	04/16/2021	AB21-0416-04



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-0446
Field Sample ID:	EB-02	Collect Date:	04/13/2021
Lab Sample ID:	21-0446-09	Collect Time:	12:16 PM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous				Aliquot:	21-0446-09-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP/	AMP Detection & Assess	sment Mo	nitoring	Aliquot:	21-0446-09-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	ND		ug/L	5	04/27/2021	AB21-0427-17
Beryllium	ND		ug/L	1	04/27/2021	AB21-0427-17
Boron	ND		ug/L	20	04/27/2021	AB21-0427-17
Cadmium	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Calcium	ND		ug/L	1000	04/27/2021	AB21-0427-17
Chromium	ND		ug/L	1	04/27/2021	AB21-0427-17
Cobalt	ND		ug/L	6	04/27/2021	AB21-0427-17
Copper	ND		ug/L	1	04/27/2021	AB21-0427-17
Iron	ND		ug/L	20	04/27/2021	AB21-0427-17
Lead	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	ND		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	ND		ug/L	5	04/27/2021	AB21-0427-17
Nickel	ND		ug/L	2	04/27/2021	AB21-0427-17
Selenium	ND		ug/L	1	04/27/2021	AB21-0427-17
Silver	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Thallium	ND		ug/L	2	04/27/2021	AB21-0427-17
Vanadium	ND		ug/L	2	04/27/2021	AB21-0427-17
Zinc	ND		ug/L	10	04/27/2021	AB21-0427-17

Anions by EPA 300.0 CCR Rule An	alyte List, CI, F,	SO4, Aqu	eous	Aliquot: 21-0446-09-C03-A01		Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	ND		ug/L	1000	04/22/2021	AB21-0422-06
Fluoride	ND		ug/L	1000	04/22/2021	AB21-0422-06
Sulfate	ND		ug/L	1000	04/22/2021	AB21-0422-06
Total Dissolved Solids by SM 2540	C			Aliquot:	21-0446-09-C04-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	ND		mg/L	10	04/16/2021	AB21-0416-04



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-0446
Field Sample ID:	JHC-MW-15025 Field MS	Collect Date:	04/13/2021
Lab Sample ID:	21-0446-10	Collect Time:	11:11 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous					Aliquot: 21-0446-10-C02-A01	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	97.6		%	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP/AMP Detection & Assessment Monitoring					21-0446-10-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	103		%	1	04/27/2021	AB21-0427-17
Arsenic	106		%	1	04/27/2021	AB21-0427-17
Barium	103		%	5	04/27/2021	AB21-0427-17
Beryllium	102		%	1	04/27/2021	AB21-0427-17
Boron	101		%	20	04/27/2021	AB21-0427-17
Cadmium	103		%	0.2	04/27/2021	AB21-0427-17
Calcium	113		%	1000	04/27/2021	AB21-0427-17
Chromium	94		%	1	04/27/2021	AB21-0427-17
Cobalt	96		%	6	04/27/2021	AB21-0427-17
Copper	95		%	1	04/27/2021	AB21-0427-17
Iron	100		%	20	04/27/2021	AB21-0427-17
Lead	100		%	1	04/27/2021	AB21-0427-17
Lithium	98		%	10	04/27/2021	AB21-0427-17
Molybdenum	103		%	5	04/27/2021	AB21-0427-17
Nickel	95		%	2	04/27/2021	AB21-0427-17
Selenium	105		%	1	04/27/2021	AB21-0427-17
Silver	99.3		%	0.2	04/27/2021	AB21-0427-17
Thallium	100		%	2	04/27/2021	AB21-0427-17
Vanadium	96		%	2	04/27/2021	AB21-0427-17
Zinc	95		%	10	04/27/2021	AB21-0427-17

Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous					Aliquot: 21-0446-10-C03-A01	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	98		%	1000	04/22/2021	AB21-0422-06
Fluoride	94		%	1000	04/22/2021	AB21-0422-06
Sulfate	95		%	1000	04/22/2021	AB21-0422-06


Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-0446
Field Sample ID:	JHC-MW-15025 Field MSD	Collect Date:	04/13/2021
Lab Sample ID:	21-0446-11	Collect Time:	11:11 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, To	tal, Aqueous			Aliquot:	21-0446-11-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	85.3		%	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP/	AMP Detection & Asses	sment Mo	nitoring	Aliquot:	21-0446-11-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	103		%	1	04/27/2021	AB21-0427-17
Arsenic	104		%	1	04/27/2021	AB21-0427-17
Barium	103		%	5	04/27/2021	AB21-0427-17
Beryllium	101		%	1	04/27/2021	AB21-0427-17
Boron	101		%	20	04/27/2021	AB21-0427-17
Cadmium	101		%	0.2	04/27/2021	AB21-0427-17
Calcium	110		%	1000	04/27/2021	AB21-0427-17
Chromium	95		%	1	04/27/2021	AB21-0427-17
Cobalt	96		%	6	04/27/2021	AB21-0427-17
Copper	94		%	1	04/27/2021	AB21-0427-17
Iron	97		%	20	04/27/2021	AB21-0427-17
Lead	98		%	1	04/27/2021	AB21-0427-17
Lithium	98		%	10	04/27/2021	AB21-0427-17
Molybdenum	104		%	5	04/27/2021	AB21-0427-17
Nickel	95		%	2	04/27/2021	AB21-0427-17
Selenium	107		%	1	04/27/2021	AB21-0427-17
Silver	98.1		%	0.2	04/27/2021	AB21-0427-17
Thallium	100		%	2	04/27/2021	AB21-0427-17
Vanadium	95		%	2	04/27/2021	AB21-0427-17
Zinc	100		%	10	04/27/2021	AB21-0427-17

Anions by EPA 300.0 CCR R	Rule Analyte List, Cl, F,	SO4, Aqu	eous	Aliquot:	21-0446-11-C03-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	98		%	1000	04/22/2021	AB21-0422-06
Fluoride	94		%	1000	04/22/2021	AB21-0422-06
Sulfate	95		%	1000	04/22/2021	AB21-0422-06



Data Qualifiers

Exception Summary

No exceptions occured.

CONSUMERS	
ENERGY	

Chemistry Department

General Standard Operating Procedure

# TITLE: SAMPLE LOG-IN - SHIPMENT INSPECTION FORM

handler Det. 04/1	15/21		Insuration Des CLUH		
Inspection Date:	1117	01.10	Inspection By: UVI	1	
Sample Origin/Project Nan	1e:140	QL-LD.	4 Bacigroun	- C	
Shipment Delivered By: En	nter the type of	f shipment car	rrier.		
Pony	FedEx	UP	S USPS	Airt	orne
Other/Hand Carry (v	whom) Dr	NW-C	onsumers		
Tracking Number:			_ Shipping Form Att	ached: Yes	No
Shipping Containers: Enter	the type and	number of shi	ipping containers received.		
Cooler (2)	Cardboard B	lox	Custom Case	Envelop	e/Mailer
Loose/Unpackaged	Containers		Other	and a start of the	
Condition of Shipments Br	ter the as-rece	ived condition	n of the shipment container		
Dames J Okiasant	Observed. M		Dented	Taal	king
Damaged Shipment	Observed: IN	one <u>v</u>	Dented	- Leal	king
CoC W Temperature of Containers As-Received Tempe	York Request _ : Measure the rature Range_	temperature o 0 · U · 2 · 2	Air Data Sheet of several sample containers C Samples Received on	Other . Ice: Yes∳ N	īo
M&TE # and Expira Number and Type of Conta	tion 0154 10. iners: Enter	tBY 1.2.1 the total numb	per of sample containers rec	eived.	
Container Type	Water	Soil	Other	Broken	Leaking
VOA (40mL or 60mL	)			·	-
Quart/Liter (gp)	18		· · · · · · · · · · · · · · · · · · ·		
9-oz (amber glass jan	r)				
2-oz (amber glass)			·		
125 mL (plastic)	LL				
24 mL vial (glass)	6	$\longrightarrow$			
250500 mL (plastic)	4			1	
Other			( <del></del>	the second se	

21-044 tone 12 gb not needed

# **CHAIN OF CUSTODY**

# **CONSUMERS ENERGY COMPANY – LABORATORY SERVICES**

# **Consumers Energy**

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

JHC Q	1TE:	: 2021 RCRA	A GW Monito	oring	PROJECT NUMBER:			!		AN	ALY	SIS RI	EQUESTED	PAGE 1_OF 1 SEND REPORT TO:
SAMPLING TE	EAN	Backgrour M: CLH	nd Wells		DATE SHIPPED	-0446 SITE	SKETCHED CIRCLE NC	ATTACHED? ONE: )	als, Total	SUG		mn		Caleb BattsBeth Swanberg, TRC PHONE:
CE CONTROL #		SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCA	TION	DEPTH	# OF CONTAINERS	Meta	Anic	TDS	Radi		REMARKS
21-0446-01		412.21	1908	GW	JHC-MW-15023			5	x	х	х	x		omus
-02	2	4.13.21	1204	GW	JHC-MW-15024			5	x	x	x	x		Ombo
-03	3	T	1111	GW	JHC-MW-15025		64	5	x	x	x	x		Omo
-04	4		0943	GW	JHC-MW-15026			5	x	x	x	x		Omes
-05	5	1	0855	GW	JHC-MW-15027		-	5	x	x	x	x		ama
-06	5	412.21	1806	GW	JHC-MW-15028			5	x	x	х	x		GUMIQ
-07	7	Ţ	-	GW	DUP-02			5	x	x	х	x		Omis
-08	3 1	1.13.21	1100	W	FB-02			5	x	x	x	x		Omus
-09		T	1216	W	EB-02		10 <del>1</del>	5	x	x	x	x		DIMIO
-10			1111	GW	JHC-MW-15025 Field M	IS		2	x	x				Omus
-11		1	T	GW	JHC-MW-15025 Field M	ISD	) e <del>11</del> 9	2	x	x				DMW
RELINQUISHE		BY: (SIGNA' BY: (SIGNA'	TURE) Ullawa TURE)	DATE/T	IME RECE 21 10450M IME: RECE	EIVED BY: (S	SIGNATURE)			T	CM		COMM (6.2.( 0) Cloy 0) Cloy 0) Cloy 10 LAB	ENTS O\540Y 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: 160-41801-1

Laboratory Sample Delivery Group: 21-0446 Client Project/Site: JH Campbell Background Wells

# For:

Consumers Energy 135 W Trail Street Jackson, Michigan 49201

Attn: Emil Blaj

Authorized for release by: 5/24/2021 2:34:19 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.

Visit us at: www.eurofinsus.com/Env

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The

Expert

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# Job ID: 160-41801-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

# **CASE NARRATIVE**

# **Client: Consumers Energy**

# Project: JH Campbell Background Wells

# Report Number: 160-41801-1

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 04/22/2021; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 14.6 C.

# RADIUM-226 (GFPC)

Samples JHC-MW-15023 (160-41801-1), JHC-MW-15024 (160-41801-2), JHC-MW-15025 (160-41801-3), JHC-MW-15026 (160-41801-4), JHC-MW-15027 (160-41801-5), JHC-MW-15028 (160-41801-6), DUP-02 (160-41801-7), FB-02 (160-41801-8) and EB-02 (160-41801-9)

# Job ID: 160-41801-1 (Continued)

# Laboratory: Eurofins TestAmerica, St. Louis (Continued)

were analyzed for Radium-226 (GFPC) in accordance with EPA Method 903.0. The samples were prepared on 04/28/2021 and 04/29/2021 and analyzed on 05/20/2021 and 05/21/2021.

Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: JHC-MW-15023 (160-41801-1), JHC-MW-15024 (160-41801-2), JHC-MW-15025 (160-41801-3), JHC-MW-15026 (160-41801-4), JHC-MW-15027 (160-41801-5) and JHC-MW-15028 (160-41801-6). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) was prepared to demonstrate batch precision.

Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: DUP-02 (160-41801-7), FB-02 (160-41801-8) and EB-02 (160-41801-9). 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.

# RADIUM-228 (GFPC)

Samples JHC-MW-15023 (160-41801-1), JHC-MW-15024 (160-41801-2), JHC-MW-15025 (160-41801-3), JHC-MW-15026 (160-41801-4), JHC-MW-15027 (160-41801-5), JHC-MW-15028 (160-41801-6), DUP-02 (160-41801-7), FB-02 (160-41801-8) and EB-02 (160-41801-9) were analyzed for Radium-228 (GFPC) in accordance with EPA 904. The samples were prepared on 04/28/2021 and 04/29/2021 and analyzed on 05/13/2021.

Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: JHC-MW-15023 (160-41801-1), JHC-MW-15024 (160-41801-2), JHC-MW-15025 (160-41801-3), JHC-MW-15026 (160-41801-4), JHC-MW-15027 (160-41801-5) and JHC-MW-15028 (160-41801-6). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) was prepared to demonstrate batch precision.

Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: DUP-02 (160-41801-7), FB-02 (160-41801-8) and EB-02 (160-41801-9). 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-15023 (160-41801-1), JHC-MW-15024 (160-41801-2), JHC-MW-15025 (160-41801-3), JHC-MW-15026 (160-41801-4), JHC-MW-15027 (160-41801-5), JHC-MW-15028 (160-41801-6), DUP-02 (160-41801-7), FB-02 (160-41801-8) and EB-02 (160-41801-9) 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 05/21/2021.

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

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Euro	3715

# **Chain of Custody Record**

Contropine Environment Testing TestAmerica

Earth City. MO 63045-1205

	Project Manage	er: Emil B	aj							
Client Contact	Email: Emil.Blaj	Dcmsenerg	y.com		Site	Contact:	Bethany Swanbero	Date:		COC No:
Consumers Energy, Laboratory Services	Tel/Fax: 517-78	8-5888			Lab	Contact:	Emil Blai	Carrier.		1 of 1
135 W. Trail Street	Anal	ysis Turna	round Tir	ne	F					
Jackson, MI 49201	CALENDAR D	AYS	WORKI	NG DAYS						For 1 ah 1 lea Only.
517-788-5888	TAT if dif	ferent from Be	elow							Walk-in Client-
(xxx) xxx-xxxx FAX		2 weeks			/ λ	(1.8 (0.1				l ab Sampling:
Project Name: JH Campbell Background Wells		1 week			() (	06 06				
Project #: 21-0446		2 days			asv	A9 A9				
PO# 21046494		1 day			av 9v	3) 8 3) 9				1 201 200:
Sample Identification	Sample Sa Date 7	ime le Si ime le	ample Type =Comp. Grab) N	latrix Co	Preservati Preservati	Radium 22 Radium 22				Sample Specific Notes
JHC-MW-15023	4/12/21	908	υ	GW	2 V	× ×				
JHC-MW-15024	4/13/21 1	204	ъ	GW	N N	××				
JHC-MW-15025	4/13/21	111	U	GW	2 7	××				
JHC-MW-15026	4/13/21 0	1943	b	GW	2 2	× ×				
JHC-MW-15027	4/13/21 0	855	U	GW	N	××				
JHC-MW-15028	4/12/21 1	806	IJ	GW	N N	××				
DUP-02	1	1	9	GW	2 N	××				
FB-02	4/13/21	100	υ	ō	2 7	××				
EB-02	4/13/21	216	IJ	ī	2 N	× ×				
									160-41	301 Chain of Custody
Preservation Used: 1= Ice, 2= HCI; 3= H2SO4; 4=HNO.	3; 5=NaOH; 6= Oth	ler								
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Ple Comments Section if the lab is to dispose of the sample.	ase List any EPA W	/aste Code	s for the s	ample in	ре К	ample Dis	sposal ( A fee may l	oe assessed if s	amples are reta	ned longer than 1 month)
Von-Hazard        Flammable        Skin Irritant	Poison B		Unknowr		Π	Return	to Client	Disposal by Lab		Months
Special Instructions/QC Requirements & Comments:										MORTHS
Custody Seals Intact:	Custody Seal No	.:					Cooler Temp. (°C): C	bs'd:	Corr'd:	Therm ID No.:
Relinquished by: <b>CAADUAHAMAUN</b>	Company: CE - Trail IS	+.606	<u> </u>	ate/Time	Å.	sceived by	X INPS .	Comp	any:	Date/Time:
Relinquished by: NPS	Company:		ă	ate/Time:	Å	talved W	NOUDVIS	JA IN Comp	STUT : AND	Date/Time:
Relinquished by:	Company:		ă	ate/Time:	Ĩæ	sceived in	Laboratory by:	Comp	any:	Date/Time:
									Form No.	CA-C-WI-002, Rev. 4.23, dated 4/

4

# Login Sample Receipt Checklist

Client: Consumers Energy

# Login Number: 41801 List Number: 1 Creator: Korrinhizer, Micha L

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: 160-41801-1 SDG Number: 21-0446

List Source: Eurofins TestAmerica, St. Louis

# **Definitions/Glossary**

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

# Qualifiers

# Rad

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	 U
%R	Percent Recovery	
CFL	Contains Free Liquid	
CFU	Colony Forming Unit	
CNF	Contains No Free Liquid	ð
DER	Duplicate Error Ratio (normalized absolute difference)	
Dil Fac	Dilution Factor	9
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_0	Preparation, Precipitate Separation	None	TAL SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	TAL SL

## Protocol References:

EPA = US Environmental Protection Agency

None = None

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

# Laboratory References:

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

# Sample Summary

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

Job	ID:	160-	-41	801	-1
	S	DG:	21	-044	16

Sample Summary									
Client: Consur Project/Site: J	ners Energy H Campbell Background Wells				Job ID: 160-41801-1 SDG: 21-0446	2			
Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID				
160-41801-1		Water	04/12/21 19:08	04/22/21 13:00					
160-41801-2	JHC-MW-15024	Water	04/13/21 12:04	04/22/21 13:00					
160-41801-3	JHC-MW-15025	Water	04/13/21 11:11	04/22/21 13:00		E			
160-41801-4	JHC-MW-15026	Water	04/13/21 09:43	04/22/21 13:00		J			
160-41801-5	JHC-MW-15027	Water	04/13/21 08:55	04/22/21 13:00					
160-41801-6	JHC-MW-15028	Water	04/12/21 18:06	04/22/21 13:00					
160-41801-7	DUP-02	Water	04/19/21 00:00	04/22/21 13:00					
160-41801-8	FB-02	Water	04/13/21 11:00	04/22/21 13:00					
160-41801-9	EB-02	Water	04/13/21 12:16	04/22/21 13:00		8			
						9			

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

Job ID: 160-41801-1 SDG: 21-0446

**Matrix: Water** 

5

9

Lab Sample ID: 160-41801-1

Lab Sample ID: 160-41801-2

**Matrix: Water** 

# Client Sample ID: JHC-MW-15023 Date Collected: 04/12/21 19:08 Date Received: 04/22/21 13:00

Method: 903.0 - F	Radium-226	(GFPC)								
			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0230	U	0.0632	0.0633	1.00	0.120	pCi/L	04/28/21 13:36	05/20/21 06:58	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	82.4		40 - 110					04/28/21 13:36	05/20/21 06:58	1

# Method: 904.0 - Radium-228 (GFPC)

	Booult	•	Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.478		0.283	0.286	1.00	0.427	pCi/L	04/28/21 14:41	05/13/21 13:39	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	82.4		40 - 110					04/28/21 14:41	05/13/21 13:39	1
Y Carrier	85.6		40 - 110					04/28/21 14:41	05/13/21 13:39	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	0.501		0.290	0.293	5.00	0.427	pCi/L		05/21/21 21:06	1

# Client Sample ID: JHC-MW-15024 Date Collected: 04/13/21 12:04

Date Received: 04/22/21 13:00

# Method: 903.0 - Radium-226 (GFPC)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2 <b>σ+/-</b> )	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0592	U	0.0859	0.0861	1.00	0.146	pCi/L	04/28/21 13:36	05/20/21 06:58	1
<b>Carrier</b> Ba Carrier	% <b>Yield</b> 77.9	Qualifier	Limits 40 - 110					<b>Prepared</b> 04/28/21 13:36	Analyzed 05/20/21 06:58	Dil Fac

# Method: 904.0 - Radium-228 (GFPC)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.00788	U	0.264	0.264	1.00	0.472	pCi/L	04/28/21 14:41	05/13/21 13:39	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	77.9		40 - 110					04/28/21 14:41	05/13/21 13:39	1
Y Carrier	86.7		40 - 110					04/28/21 14:41	05/13/21 13:39	1

Job ID: 160-41801-1 SDG: 21-0446

Client Sample ID: Date Collected: 04/13 Date Received: 04/22	JHC-M /21 12:04 /21 13:00	W-15024	ŀ					Lab Sample	D: 160-41	801-2 Water
Method: Ra226 Ra2	28 - Com	bined Ra	dium-226 a	nd Radium	-228					
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.0670	U	0.278	0.278	5.00	0.472	pCi/L		05/21/21 21:06	1
<b>Client Sample ID:</b>	JHC-M	W-15025	5					Lab Sample	D: 160-41	801-3
Date Collected: 04/13 Date Received: 04/22	3/21 11:11 /21 13:00	)							Matrix	Water
Method: 903.0 - Rad	lium-226	(GEPC)								
		(	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0496	U	0.0682	0.0683	1.00	0.115	pCi/L	04/28/21 13:36	05/20/21 06:58	1
Carrier	%Yield	Qualifier	l imits					Prepared	Analyzed	Dil Fac
Ba Carrier	88.5	quanton	40 - 110					04/28/21 13:36	05/20/21 06:58	1
wethod: 904.0 - Rad	1um-228	(GFPC)	Count	Total						
			Uncort	Incort						
Analyta	Pocult	Qualifier	(2g+/)	(2gt/)	ы	MDC	Unit	Proparad	Analyzod	Dil Eac
Radium-228	0.0685		(20+/-)	0.237	1.00			<u>Prepareu</u>	05/13/21 13:30	
Nadiam-220	0.0000	0	0.201	0.201	1.00	0.414	poi/L	04/20/21 14.41	00/10/21 10:00	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	88.5		40 - 110					04/28/21 14:41	05/13/21 13:39	1
Y Carrier	87.5		40 - 110					04/28/21 14:41	05/13/21 13:39	1
Method: Ra226 Ra2	28 - Com	bined Ra	dium-226 a	nd Radium	-228					
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.118	U	0.247	0.247	5.00	0.414	pCi/L		05/21/21 21:06	1
<b>Client Sample ID:</b>	JHC-M	W-15026	;					Lab Sample	D: 160-41	801-4
Date Collected: 04/13	/21 09:43	3						-	Matrix	: Water
Date Received: 04/22	/21 13:00	)								
Method: 903.0 - Rad	ium-226	(GFPC)								
		(- /	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(2 <b>σ+/-</b> )	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0872	U	0.0816	0.0819	1.00	0.125	pCi/L	04/28/21 13:36	05/20/21 06:58	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac

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

Job ID: 160-41801-1 SDG: 21-0446

**Matrix: Water** 

Matrix: Water

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Lab Sample ID: 160-41801-4

Lab Sample ID: 160-41801-5

# Client Sample ID: JHC-MW-15026 Date Collected: 04/13/21 09:43 Date Received: 04/22/21 13:00

Method: 904.0 - Ra	adium-228	(GFPC)								
			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.361	U	0.276	0.278	1.00	0.434	pCi/L	04/28/21 14:41	05/13/21 13:39	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	82.4		40 - 110					04/28/21 14:41	05/13/21 13:39	1
Y Carrier	86.7		40 - 110					04/28/21 14:41	05/13/21 13:39	1

# Method: Ra226\_Ra228 - Combined Radium-226 and Radium-228

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(2 <b>σ+/-</b> )	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium	0.449		0.288	0.290	5.00	0.434	pCi/L		05/21/21 21:06	1
226 + 228										

# Client Sample ID: JHC-MW-15027 Date Collected: 04/13/21 08:55 Date Received: 04/22/21 13:00

### Method: 903.0 - Radium-226 (GFPC) Count Total Uncert. Uncert. Analyte **Result Qualifier** (2**σ**+/-) (2**σ**+/-) RL MDC Unit Prepared Analyzed Dil Fac Radium-226 0.0345 U 0.0716 0.0717 1.00 0.129 pCi/L 04/28/21 13:36 05/20/21 06:58 1 Carrier %Yield Qualifier Limits Prepared Analyzed Dil Fac 40 - 110 04/28/21 13:36 05/20/21 06:58 Ba Carrier 85.2 1

# Method: 904.0 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.231	U	0.215	0.216	1.00	0.434	pCi/L	04/28/21 14:41	05/13/21 13:39	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	85.2		40 - 110					04/28/21 14:41	05/13/21 13:39	1
Y Carrier	83.0		40 - 110					04/28/21 14:41	05/13/21 13:39	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	-0.197	U	0.227	0.228	5.00	0.434	pCi/L		05/21/21 21:06	1

# Eurofins TestAmerica, St. Louis

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

Job ID: 160-41801-1 SDG: 21-0446

**Matrix: Water** 

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Lab Sample ID: 160-41801-6

Lab Sample ID: 160-41801-7

Matrix: Water

# Client Sample ID: JHC-MW-15028 Date Collected: 04/12/21 18:06 Date Received: 04/22/21 13:00

Method: 903.0 - Ra	adium-226	(GFPC)								
			Count	Total Uncert						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0863	U	0.0770	0.0774	1.00	0.115	pCi/L	04/28/21 13:36	05/20/21 06:58	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	86.1		40 - 110					04/28/21 13:36	05/20/21 06:58	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	-0.175	U	0.224	0.225	1.00	0.435	pCi/L	04/28/21 14:41	05/13/21 13:39	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	86.1		40 - 110					04/28/21 14:41	05/13/21 13:39	1
Y Carrier	84.5		40 - 110					04/28/21 14:41	05/13/21 13:39	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	-0.0892	U	0.237	0.238	5.00	0.435	pCi/L		05/21/21 21:06	1

# Client Sample ID: DUP-02

# Date Collected: 04/19/21 00:00

# Date Received: 04/22/21 13:00

# Method: 903.0 - Radium-226 (GFPC)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.00716	U	0.0580	0.0580	1.00	0.114	pCi/L	04/29/21 09:25	05/21/21 09:19	1
<b>Carrier</b> Ba Carrier	%Yield 92.4	Qualifier	Limits 40 - 110					<b>Prepared</b> 04/29/21 09:25	Analyzed 05/21/21 09:19	Dil Fac

# Method: 904.0 - Radium-228 (GFPC)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(2 <b>σ+/-</b> )	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0880	U	0.192	0.192	1.00	0.332	pCi/L	04/29/21 10:28	05/13/21 13:41	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	92.4		40 - 110					04/29/21 10:28	05/13/21 13:41	1
Y Carrier	87.1		40 - 110					04/29/21 10:28	05/13/21 13:41	1

Client: Consumers Energy Project/Site: JH Campbell Background Wells Job ID: 160-41801-1 SDG: 21-0446

### Client Sample ID: DUP-02 Lab Sample ID: 160-41801-7 Date Collected: 04/19/21 00:00 Matrix: Water Date Received: 04/22/21 13:00 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 0.0952 U 0.201 0.201 5.00 0.332 pCi/L 05/21/21 21:05 + 228 **Client Sample ID: FB-02** Lab Sample ID: 160-41801-8 Date Collected: 04/13/21 11:00 Matrix: Water Date Received: 04/22/21 13:00 Method: 903.0 - Radium-226 (GFPC) Count Total Uncert. Uncert. Analyte Result Qualifier (2**σ**+/-) (2**σ**+/-) RL MDC Unit Prepared Analyzed Dil Fac Radium-226 -0.00798 U 0.0611 0.0611 1.00 0.125 pCi/L 04/29/21 09:25 05/21/21 09:19 Limits Carrier %Yield Qualifier Prepared Analyzed Dil Fac Ba Carrier 93.0 40 - 110 04/29/21 09:25 05/21/21 09:19 Method: 904.0 - Radium-228 (GFPC) Count Total Uncert. Uncert. (2**σ**+/-) Analyte Result Qualifier (2<del>σ+/-</del>) RL MDC Unit Prepared Analyzed Dil Fac Radium-228 0.0150 U 04/29/21 10:28 05/13/21 13:41 0.212 0.212 1.00 0.378 pCi/L 1 Carrier %Yield Qualifier Limits Prepared Analyzed Dil Fac Ba Carrier 93.0 40 - 110 04/29/21 10:28 05/13/21 13:41 1 Y Carrier 88.6 40 - 110 04/29/21 10:28 05/13/21 13:41 1 Method: Ra226 Ra228 - Combined Radium-226 and Radium-228 Total Count Uncert. Uncert. Analyte **Result Qualifier** (2σ+/-) (2σ+/-) RL MDC Unit Prepared Analyzed Dil Fac Combined Radium 226 0.00699 U 0.221 0.221 5.00 0.378 pCi/L 05/21/21 21:05 1 + 228 Client Sample ID: EB-02 Lab Sample ID: 160-41801-9 Date Collected: 04/13/21 12:16 Matrix: Water Date Received: 04/22/21 13:00 Method: 903.0 - Radium-226 (GFPC) Total Count Uncert. Uncert. (2**σ**+/-) Analyte **Result Qualifier** (2**σ**+/-) MDC Unit RL Prepared Analyzed Dil Fac Radium-226 0.0191 U 04/29/21 09:25 05/21/21 09:19 0.0684 0.0684 1.00 0.128 pCi/L 1 Carrier %Yield Qualifier Limits Prepared Analyzed Dil Fac Ba Carrier 93.0 40 - 110 04/29/21 09:25 05/21/21 09:19 1

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

Job ID: 160-41801-1 SDG: 21-0446

# **Client Sample ID: EB-02** Date Collected: 04/13/21 12:16 Date Received: 04/22/21 13:00

 Method: 904.0 - Rad	dium-228	(GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0113	U	0.222	0.222	1.00	0.397	pCi/L	04/29/21 10:28	05/13/21 13:41	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	93.0		40 - 110					04/29/21 10:28	05/13/21 13:41	1
Y Carrier	86.4		40 - 110					04/29/21 10:28	05/13/21 13:41	1
_ Method: Ra226_Ra	228 - Com	bined Ra	dium-226 a	nd Radium	1-228					
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226	0.0304	U	0.232	0.232	5.00	0.397	pCi/L		05/21/21 21:05	1

+ 228

Matrix: Water

# Method: 903.0 - Radium-226 (GFPC)

Lab Sample II	D: MB 1	60-5075	12/23-A						Cli	ent Samp	le ID: Metho	d Blank
Analysis Pete	b. 5100	50									Prep Type: I	OTAI/NA
Analysis Dalo	11. 5100	000		Count	Total						Ртер Басси.	507512
		MB	MB	Uncert	Uncert							
Analyte		Result	Qualifier	(2σ+/-)	(2σ+/-)	RI	MDC	Unit		Prenared	Analyzed	Dil Fac
Radium-226		0.003416		0.0860	0.0860	1.00	0.174	pCi/L	04/	28/21 13:36	05/20/21 06:58	1
		0.0001.0	•	010000	0.0000			p 0., 1	•		00/20/21 00100	·
		MB	МВ									
Carrier		%Yield	Qualifier	Limits						Prepared	Analyzed	Dil Fac
Ba Carrier		79.7		40 - 110					04/	28/21 13:36	05/20/21 06:58	1
Lab Sample II Matrix: Water	D: LCS	1 <mark>60-507</mark>	512/1-A					Cli	ent Sa	mple ID:	Lab Control Prep Type: T	Sample otal/NA
Analysis Batc	h: 5106	61									Prep Batch:	507512
						Total						
			Spike	LCS	LCS	Uncert.					%Rec.	
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Radium-226			15.1	16.09		1.69	1.00	0.173	pCi/L	106	75 - 125	
	LCS	LCS										
Carrier	%Yield	Qualifier	Limits									
Ba Carrier	83.9		40 - 110	-								
Lab Sample I	D: LCSI	D 160-50	)7512/2-A					Client S	Sample	e ID: Lab (	Control Sam	ole Dup
Matrix: Water											Prep Type: T	otal/NA
Analysis Batc	h: 5106	61									Prep Batch:	507512
						Total						
			Spike	LCSD	LCSD	Uncert.					%Rec.	RER
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits RE	R Limit
Radium-226			15.1	15.77		1.67	1.00	0.181	pCı/L	104	75-125 0.	1 1
	LCSD	LCSD										
Carrier	%Yield	Qualifier	Limits									
Ba Carrier	83.6		40 - 110	-								
Lab Sample I	D: MB 1	60-5076	75/23-A						Cli	ent Samp	ole ID: Metho	d Blank
Matrix: Water											Prep Type: T	otal/NA
Analysis Batc	h: 5110	16									Prep Batch:	507675
				Count	Total							
		MB	MB	Uncert.	Uncert.							
Analyte		Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit		Prepared	Analyzed	Dil Fac
Radium-226		0.02967	U	0.0559	0.0560	1.00	0.101	pCı/L	04/	29/21 09:25	05/21/21 09:25	1
		МВ	МВ									
Carrier		%Yield	Qualifier	Limits					1	Prepared	Analyzed	Dil Fac
Ba Carrier		89.4		40 - 110					04/	29/21 09:25	05/21/21 09:25	1
 [												_
Lab Sample I	D: LCS	160-507	675/1-A					Cli	ent Sa	imple ID:	Lab Control	Sample
Matrix: Water											Prep Type: T	otal/NA
Analysis Batc	n: 5110	15				<b>.</b>					Prep Batch:	507675
			<b>.</b>			Total						
			Spike	LCS	LCS	Uncert.				a/ <del>-</del>	%Rec.	
Analyte			Added	Result	Qual	<u>(2σ+/-)</u>	RL	MDC	Unit	%Rec		
Radium-226			11.3	11.16		1.16	1.00	0.124	pCI/L	98	/5-125	

# **QC Sample Results**

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Method: 903.0 - Radium-226 (GFPC) (Continued)

Lab Sample Matrix: Wate	ID: LCS er	160-507 015	′675/1-A					Cli	ent Sa	mple ID:	Lab Con Prep Typ	trol Sa be: To	ample tal/NA
Analysis Da		/15									гтер Ба	ten. 5	0/0/5
	LCS	LCS											
Carrier	%Yield	Qualifier	Limits	_									
Ba Carrier	90.6		40 - 110										
Lab Sample	ID: LCSI	D 160-50	07675/2-A					Client S	ample	D: Lab	Control S	Sampl	e Dup
Matrix: Wate	er										Prep Typ	be: To	tal/NA
Analysis Ba	tch: 5110	)15									Prep Ba	tch: 5	07675
-						Total							
			Spike	LCSD	LCSD	Uncert.					%Rec.		RER
Analyte			Added	Result	Qual	(2 <b>σ+/-</b> )	RL	MDC	Unit	%Rec	Limits	RER	Limit
Radium-226			11.3	10.87		1.13	1.00	0.120	pCi/L	96	75 - 125	0.13	1
	LCSD	LCSD											
Carrier	%Yield	Qualifier	- Limits										
Ba Carrier	85.5		40 - 110	_									
Method: 90	94.0 - Ra	idium-	228 (GFPC	ン)									
Lab Sampla		60 5075	47/02 4						CI	ont Some		thod	Blook
Lab Sample		60-5075	017/23-A						Cli	ent Samp		enou	
	tch: 5094	17									Pron Ba	tch: 5	07517
Analysis Da	IICH. 3030	,,,		Count	Total						гтер Ба	ten. 5	0/51/
		мв	МВ	Uncert.	Uncert.								
Analvte		Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	F	Prepared	Analyz	ed	Dil Fac
Radium-228		0.3832	<u>U</u>	0.378	0.379	1.00	0.612	pCi/L	04/2	28/21 14:41	05/13/21 1	13:39	1
0		MB	MB										
Carrier Ro Corrier		% rieia	Qualifier							-repared	Analyz	<b>ea</b> 12:20 -	DII Fac
V Carrier		79.7 84.0		40 - 110					04/	20/21 14.41 28/21 14·41	05/13/21	13.39	1
		04.9		40 - 110					04/2	20/21 14.41	00/10/21	15.55	,
Lab Sample	ID: LCS	160-507	′517/1-A					Cli	ent Sa	mple ID:	Lab Con	trol S	ample
Matrix: Wate	er										Prep Typ	be: To	tal/NA
Analysis Ba	tch: 5095	526									Prep Ba	tch: 5	07517
-						Total							
			Spike	LCS	LCS	Uncert.					%Rec.		
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits		
Radium-228			9.62	9.964		1.26	1.00	0.605	pCi/L	104	75 - 125		
	LCS	LCS											
Carrier	%Yield	Qualifier	- Limits										
Ba Carrier	83.9		40 - 110	_									
Y Carrier	88.2		40 - 110										
Lab Sample	ID: LCSI	D 160-50	07517/2-A					Client S	Sample	ID: Lab	Control S	Sampl	e Dup
Matrix: Wate	er										Prep Typ	e: To	tal/NA
Analysis Ba	itch: 5095	526				_					Prep Ba	tch: 5	07517
			<b>-</b>			Total							
• • /			Spike	LCSD	LCSD	Uncert.				a/ <del>-</del>	%Rec.		RER
Analyte				Result	Qual	<u>(2σ+/-)</u>	RL	MDC	Unit		Limits	RER	Limit
Radium-228			9.62	10.04		1.26	1.00	U 581	DCI/L	104	/5-125	0.03	1

# **QC Sample Results**

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

Lab Samplo		160-50	17517/2-4					Client S	amnlo I	D· Lab (	Control S	amnl	
Matrix: Wate	iD. 2031 er	5 100-50	J/ J///2-A					chefit 3	ampie		Prep Tvp	e: Tof	tal/NA
Analvsis Ba	tch: 5095	526									Prep Bat	ch: 5	07517
,,													
<b>.</b> .	LCSD	LCSD											
Carrier	%Yield	Qualifier	$\frac{Limits}{10,110}$										
Ba Carrier	83.0		40 - 110										
r Carrier	00.2		40 - 110										
_ab Sample	ID: MB 1	60-5076	679/23-A						Clie	nt Samp	ole ID: Me	thod	Blank
Matrix: Wate	r										Prep Typ	e: Tot	al/NA
Analysis Ba	tch: 5094	82									Prep Bat	ch: 5	07679
				Count	Total								
		MB	МВ	Uncert.	Uncert.								
Analyte		Result	Qualifier	(2 <b>σ+/-</b> )	(2 <b>σ+/-</b> )	RL	MDC	Unit	Pre	epared	Analyze	d	Dil Fac
Radium-228		0.2507	U	0.248	0.249	1.00	0.402	pCi/L	04/29	0/21 10:28	05/13/21 1	3:46	1
		MR	MR										
Carrior		%Vield	Qualifier	l imite					Pr	onarod	Analyza	d	Dil Fac
Ba Carrier		89.4		40_110					04/29	0/21 10·28	05/13/21 1	3.46	1
Y Carrier		86.0		40 - 110					04/29	)/21 10:28	05/13/21 1	3:46	1
Lab Sample	ID: LCS	1 <mark>60-50</mark> 7	'679/1-A					Cli	ent San	ple ID:	Lab Cont	rol Sa	ample
Matrix: Wate	er										Prep Typ	e: Tot	tal/NA
Analysis Ba	tch: 5095	517									Prep Bat	ch: 5	07679
						Total							
			Spike	LCS	LCS	Uncert.					%Rec.		
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits		
≀adium-228			7.21	7.610		0.936	1.00	0.374	pCi/L	105	75 - 125		
	LCS	LCS											
Carrier	%Yield	Qualifier	r Limits										
Ba Carrier	90.6		40 - 110	-									
Y Carrier	86.7		40 - 110										
													_
Lab Sample	ID: LCSI	J 160-50	J7679/2-A					Client S	ample I	D: Lab	Control S	ample	e Dup
Matrix: wate	er tobe 5005	47									Prep Typ	e: 101	al/NA
Analysis Ba	tcn: 5095	017				Total					Ргер Ват	cn: 5	0/6/9
			Spike	1.090		lotal					% Poc		DED
Analyto			Shike	LCOD Booult	Oual	$(2\alpha + 1)$	ы	MDC	Unit	%Paa	%Rec.	DED	Limit
Radium-228			7 21	7 865	Quai	0 973	1 00			100	75 125	0.13	1
			1.21	7.005		0.975	1.00	0.570	POI/L	109	15-125	0.15	1
	LCSD	LCSD											
Carrier	%Yield	Qualifier	Limits	_									
Ra Carrier	05 E		10 110										

Y Carrier 86.7 40 - 110

# **QC Association Summary**

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

Job ID: 160-41801-1 SDG: 21-0446

# Rad

# Prep Batch: 507512

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-41801-1	JHC-MW-15023	Total/NA	Water	PrecSep-21	
160-41801-2	JHC-MW-15024	Total/NA	Water	PrecSep-21	
160-41801-3	JHC-MW-15025	Total/NA	Water	PrecSep-21	
160-41801-4	JHC-MW-15026	Total/NA	Water	PrecSep-21	
160-41801-5	JHC-MW-15027	Total/NA	Water	PrecSep-21	
160-41801-6	JHC-MW-15028	Total/NA	Water	PrecSep-21	
MB 160-507512/23-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-507512/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
LCSD 160-507512/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep-21	

# Prep Batch: 507517

Rad						
Prep Batch: 507512						
Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch	
160-41801-1	JHC-MW-15023	Total/NA	Water	PrecSep-21		
160-41801-2	JHC-MW-15024	Total/NA	Water	PrecSep-21		5
160-41801-3	JHC-MW-15025	Total/NA	Water	PrecSep-21		
160-41801-4	JHC-MW-15026	Total/NA	Water	PrecSep-21		
160-41801-5	JHC-MW-15027	Total/NA	Water	PrecSep-21		
160-41801-6	JHC-MW-15028	Total/NA	Water	PrecSep-21		
MB 160-507512/23-A	Method Blank	Total/NA	Water	PrecSep-21		
LCS 160-507512/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21		8
LCSD 160-507512/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep-21		
Prep Batch: 507517						9
Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch	
160-41801-1	JHC-MW-15023	Total/NA	Water	PrecSep_0		
160-41801-2	JHC-MW-15024	Total/NA	Water	PrecSep_0		11
160-41801-3	JHC-MW-15025	Total/NA	Water	PrecSep_0		
160-41801-4	JHC-MW-15026	Total/NA	Water	PrecSep_0		
160-41801-5	JHC-MW-15027	Total/NA	Water	PrecSep_0		
160-41801-6	JHC-MW-15028	Total/NA	Water	PrecSep_0		
MB 160-507517/23-A	Method Blank	Total/NA	Water	PrecSep_0		
LCS 160-507517/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0		
LCSD 160-507517/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0		

# Prep Batch: 507675

Lab Sample ID	Client Sample ID	Ргер Туре	Matrix	Method	Prep Batch
160-41801-7	DUP-02	Total/NA	Water	PrecSep-21	
160-41801-8	FB-02	Total/NA	Water	PrecSep-21	
160-41801-9	EB-02	Total/NA	Water	PrecSep-21	
MB 160-507675/23-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-507675/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
LCSD 160-507675/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep-21	

# Prep Batch: 507679

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-41801-7	DUP-02	Total/NA	Water	PrecSep_0	
160-41801-8	FB-02	Total/NA	Water	PrecSep_0	
160-41801-9	EB-02	Total/NA	Water	PrecSep_0	
MB 160-507679/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-507679/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-507679/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

# **Tracer/Carrier Summary**

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

			Percent Yield (Acceptance Limits)	
		Ва		
Lab Sample ID	Client Sample ID	(40-110)		5
160-41801-1	JHC-MW-15023	82.4		
160-41801-2	JHC-MW-15024	77.9		
160-41801-3	JHC-MW-15025	88.5		
160-41801-4	JHC-MW-15026	82.4		
160-41801-5	JHC-MW-15027	85.2		
160-41801-6	JHC-MW-15028	86.1		8
160-41801-7	DUP-02	92.4		0
160-41801-8	FB-02	93.0		0
160-41801-9	EB-02	93.0		3
LCS 160-507512/1-A	Lab Control Sample	83.9		
LCS 160-507675/1-A	Lab Control Sample	90.6		
LCSD 160-507512/2-A	Lab Control Sample Dup	83.6		
LCSD 160-507675/2-A	Lab Control Sample Dup	85.5		
MB 160-507512/23-A	Method Blank	79.7		
MB 160-507675/23-A	Method Blank	89.4		12
Tracer/Carrier Legend	ł			

Ba = Ba Carrier

# Method: 904.0 - Radium-228 (GFPC) **Matrix: Water**

Percent Yield (Acceptance Limits) Ва Υ Lab Sample ID **Client Sample ID** (40-110) (40-110) 160-41801-1 JHC-MW-15023 82.4 85.6 160-41801-2 JHC-MW-15024 77.9 86.7 160-41801-3 JHC-MW-15025 88.5 87.5 160-41801-4 JHC-MW-15026 82.4 86.7 160-41801-5 JHC-MW-15027 85.2 83.0 JHC-MW-15028 160-41801-6 86.1 84.5 **DUP-02** 160-41801-7 92.4 87.1 160-41801-8 FB-02 93.0 88.6 EB-02 160-41801-9 93.0 86.4 LCS 160-507517/1-A Lab Control Sample 88.2 83.9 LCS 160-507679/1-A Lab Control Sample 90.6 86.7 LCSD 160-507517/2-A Lab Control Sample Dup 88.2 83.6 LCSD 160-507679/2-A Lab Control Sample Dup 85.5 86.7 MB 160-507517/23-A Method Blank 79.7 84.9 Method Blank MB 160-507679/23-A 89.4 86.0

**Tracer/Carrier Legend** 

Ba = Ba Carrier

Y = Y Carrier

Prep Type: Total/NA

Prep Type: Total/NA



135 W. Trail St. Jackson, MI 49201

- To: CDBatts, JH Campbell Complex
- From: EBlaj, T-258
- Date: May 03, 2021
- Subject: JH CAMPBELL SOLID WASTE DISPOSAL AREA GROUNDWATER MONITORING 2<sup>nd</sup> Quarter, 2021 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: 21-0445

CE Laboratory Services conducted groundwater monitoring on 04/12/2021 through 04/15/2021 at the JH Campbell Solid Waste Disposal Area, for the 2<sup>nd</sup> Quarter monitoring requirements. Samples were not collected from MW-15007, MW-15009, and MW-15010, the wells were dry. All other samples were received for analysis by the Chemistry department on 04/15/2021.

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, 22<sup>nd</sup> 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:Q2-2021 Pond A WellsDate Received:4/15/2021Chemistry Project:21-0445

Sample #	Field Sample ID	<u>Matrix</u>	Sample Date	Site
21-0445-01	JHC-MW-15006	Groundwater	04/13/2021 06:37 PM	JHC RCRA GW Monitoring - Pond A Unit
21-0445-02	JHC-MW-15007	Not Collected, we	ell was dry	JHC RCRA GW Monitoring - Pond A Unit
21-0445-03	JHC-MW-15008R	Groundwater	04/13/2021 09:21 AM	JHC RCRA GW Monitoring - Pond A Unit
21-0445-04	JHC-MW-15009	Not Collected, we	ell was dry	JHC RCRA GW Monitoring - Pond A Unit
21-0445-05	JHC-MW-15010	Not Collected, we	ell was dry	JHC RCRA GW Monitoring - Pond A Unit
21-0445-06	JHC-MW-15011	Groundwater	04/13/2021 07:23 PM	JHC RCRA GW Monitoring - Pond A Unit
21-0445-07	DUP-01	Groundwater	04/13/2021 12:00 AM	JHC RCRA GW Monitoring - Pond A Unit
21-0445-08	EB-01	Water	04/13/2021 09:29 AM	JHC RCRA GW Monitoring - Pond A Unit
21-0445-09	FB-01	Water	04/13/2021 08:10 AM	JHC RCRA GW Monitoring - Pond A Unit
21-0445-10	JHC-MW-15006 Field MS	Groundwater	04/13/2021 06:37 PM	JHC RCRA GW Monitoring - Pond A Unit
21-0445-11	JHC-MW-15006 Field MSD	Groundwater	04/13/2021 06:37 PM	JHC RCRA GW Monitoring - Pond A Unit



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-0445
Field Sample ID:	JHC-MW-15006	Collect Date:	04/13/2021
Lab Sample ID:	21-0445-01	Collect Time:	06:37 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous				Aliquot: 21-0445-01-C02-A01		Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP/	AMP Detection & Assess	sment Mo	nitoring	Aliquot:	21-0445-01-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	3		ug/L	1	04/27/2021	AB21-0427-17
Barium	188		ug/L	5	04/27/2021	AB21-0427-17
Beryllium	ND		ug/L	1	04/27/2021	AB21-0427-17
Boron	288		ug/L	20	04/27/2021	AB21-0427-17
Cadmium	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Calcium	82000		ug/L	1000	04/27/2021	AB21-0427-17
Chromium	3		ug/L	1	04/27/2021	AB21-0427-17
Cobalt	ND		ug/L	6	04/27/2021	AB21-0427-17
Copper	4		ug/L	1	04/27/2021	AB21-0427-17
Iron	41		ug/L	20	04/27/2021	AB21-0427-17
Lead	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	12		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	54		ug/L	5	04/27/2021	AB21-0427-17
Nickel	2		ug/L	2	04/27/2021	AB21-0427-17
Selenium	ND		ug/L	1	04/27/2021	AB21-0427-17
Silver	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Thallium	ND		ug/L	2	04/27/2021	AB21-0427-17
Vanadium	7		ug/L	2	04/27/2021	AB21-0427-17
Zinc	ND		ug/L	10	04/30/2021	AB21-0427-17

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous				Aliquot: 21-0445-01-C03-A01		Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #	
Chloride	22900		ug/L	1000	04/21/2021	AB21-0421-02	
Fluoride	ND		ug/L	1000	04/21/2021	AB21-0421-02	
Sulfate	257000		ug/L	1000	04/27/2021	AB21-0421-02	
Total Dissolved Solids by SM 2540C				Aliquot:	21-0445-01-C04-A01	Analyst: CET	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #	
Total Dissolved Solids	497		mg/L	10	04/19/2021	AB21-0419-04	



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-0445
Field Sample ID:	JHC-MW-15008R	Collect Date:	04/13/2021
Lab Sample ID:	21-0445-03	Collect Time:	09:21 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous				Aliquot: 21-0445-03-C02-A01		Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP/	AMP Detection & Assess	sment Mo	nitoring	Aliquot:	21-0445-03-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	1		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	200		ug/L	5	04/27/2021	AB21-0427-17
Beryllium	ND		ug/L	1	04/27/2021	AB21-0427-17
Boron	352		ug/L	20	04/27/2021	AB21-0427-17
Cadmium	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Calcium	85400		ug/L	1000	04/27/2021	AB21-0427-17
Chromium	41		ug/L	1	04/27/2021	AB21-0427-17
Cobalt	ND		ug/L	6	04/27/2021	AB21-0427-17
Copper	5		ug/L	1	04/27/2021	AB21-0427-17
Iron	347		ug/L	20	04/27/2021	AB21-0427-17
Lead	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	20		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	17		ug/L	5	04/27/2021	AB21-0427-17
Nickel	38		ug/L	2	04/27/2021	AB21-0427-17
Selenium	6		ug/L	1	04/27/2021	AB21-0427-17
Silver	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Thallium	2		ug/L	2	04/27/2021	AB21-0427-17
Vanadium	ND		ug/L	2	04/27/2021	AB21-0427-17
Zinc	ND		ug/L	10	04/27/2021	AB21-0427-17

Anions by EPA 300.0 CCR Rule Analyte List, CI, F, SO4, Aqueous			Aliquot: 21-0445-03-C03-A01		Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	17200		ug/L	1000	04/21/2021	AB21-0421-02
Fluoride	ND		ug/L	1000	04/21/2021	AB21-0421-02
Sulfate	185000		ug/L	1000	04/21/2021	AB21-0421-02
Total Dissolved Solids by SM 2540C				Aliquot:	21-0445-03-C04-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	517		mg/L	10	04/19/2021	AB21-0419-04



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-0445
Field Sample ID:	JHC-MW-15011	Collect Date:	04/13/2021
Lab Sample ID:	21-0445-06	Collect Time:	07:23 PM
Matrix:	Groundwater		

# Metals by EPA 6020; HMP/AMP Detection & Assessment Monitoring

metals by EFA 6020, HMF/AMF Detection & Assessment Monitoring				Aliquot:	Analyst: EB	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	13		ug/L	1	04/27/2021	AB21-0427-17
Barium	399		ug/L	5	04/27/2021	AB21-0427-17
Beryllium	ND		ug/L	1	04/27/2021	AB21-0427-17
Boron	5070		ug/L	20	04/27/2021	AB21-0427-17
Cadmium	0.8		ug/L	0.2	04/27/2021	AB21-0427-17
Calcium	78700		ug/L	1000	04/27/2021	AB21-0427-17
Chromium	5		ug/L	1	04/27/2021	AB21-0427-17
Cobalt	ND		ug/L	6	04/27/2021	AB21-0427-17
Copper	2		ug/L	1	04/27/2021	AB21-0427-17
Iron	57		ug/L	20	04/27/2021	AB21-0427-17
Lead	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	14		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	8		ug/L	5	04/27/2021	AB21-0427-17
Nickel	8		ug/L	2	04/27/2021	AB21-0427-17
Selenium	143		ug/L	1	04/27/2021	AB21-0427-17
Silver	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Thallium	ND		ug/L	2	04/27/2021	AB21-0427-17
Vanadium	34		ug/L	2	04/27/2021	AB21-0427-17
Zinc	ND		ug/L	10	04/30/2021	AB21-0427-17
Mercury by EPA 7470A, Total, Ac	lueous			Aliquot:	21-0445-06-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/22/2021	AB21-0422-10
Anions by EPA 300.0 CCR Rule A	Analyte List, CI, F,	SO4, Aqu	eous	Aliquot:	21-0445-06-C03-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	2650		ug/L	1000	04/21/2021	AB21-0421-02
Fluoride	ND		ug/L	1000	04/21/2021	AB21-0421-02
Sulfate	113000		ug/L	1000	04/21/2021	AB21-0421-02
Total Dissolved Solids by SM 254	40C			Aliquot:	21-0445-06-C04-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	359		mg/L	10	04/19/2021	AB21-0419-04



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-0445
Field Sample ID:	DUP-01	Collect Date:	04/13/2021
Lab Sample ID:	21-0445-07	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous					21-0445-07-C02-A01	Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP/	AMP Detection & Assess	ment Mo	nitoring	Aliquot:	21-0445-07-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	195		ug/L	5	04/27/2021	AB21-0427-17
Beryllium	ND		ug/L	1	04/27/2021	AB21-0427-17
Boron	360		ug/L	20	04/27/2021	AB21-0427-17
Cadmium	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Calcium	87000		ug/L	1000	04/27/2021	AB21-0427-17
Chromium	56		ug/L	1	04/27/2021	AB21-0427-17
Cobalt	ND		ug/L	6	04/27/2021	AB21-0427-17
Copper	5		ug/L	1	04/27/2021	AB21-0427-17
Iron	419		ug/L	20	04/27/2021	AB21-0427-17
Lead	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	21		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	19		ug/L	5	04/27/2021	AB21-0427-17
Nickel	48		ug/L	2	04/27/2021	AB21-0427-17
Selenium	6		ug/L	1	04/27/2021	AB21-0427-17
Silver	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Thallium	ND		ug/L	2	04/27/2021	AB21-0427-17
Vanadium	ND		ug/L	2	04/27/2021	AB21-0427-17
Zinc	ND		ug/L	10	04/30/2021	AB21-0427-17
Anions by EPA 300.0 CCR	Rule Analyte List, Cl, F,	SO4, Aqu	eous	Aliquot:	21-0445-07-C03-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	17100		ug/L	1000	04/21/2021	AB21-0421-02
Fluoride	ND		ug/L	1000	04/21/2021	AB21-0421-02
Sulfate	186000		ug/L	1000	04/21/2021	AB21-0421-02

Total Dissolved Solids by SM 2540C				Aliquot:	21-0445-07-C04-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	512		mg/L	10	04/19/2021	AB21-0419-04



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-0445
Field Sample ID:	EB-01	Collect Date:	04/13/2021
Lab Sample ID:	21-0445-08	Collect Time:	09:29 AM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous					Aliquot: 21-0445-08-C02-A01	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP/	AMP Detection & Assess	sment Mo	nitoring	Aliquot:	21-0445-08-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	ND		ug/L	5	04/27/2021	AB21-0427-17
Beryllium	ND		ug/L	1	04/27/2021	AB21-0427-17
Boron	ND		ug/L	20	04/27/2021	AB21-0427-17
Cadmium	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Calcium	ND		ug/L	1000	04/27/2021	AB21-0427-17
Chromium	ND		ug/L	1	04/27/2021	AB21-0427-17
Cobalt	ND		ug/L	6	04/27/2021	AB21-0427-17
Copper	ND		ug/L	1	04/27/2021	AB21-0427-17
Iron	ND		ug/L	20	04/27/2021	AB21-0427-17
Lead	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	ND		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	ND		ug/L	5	04/27/2021	AB21-0427-17
Nickel	ND		ug/L	2	04/27/2021	AB21-0427-17
Selenium	ND		ug/L	1	04/27/2021	AB21-0427-17
Silver	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Thallium	ND		ug/L	2	04/27/2021	AB21-0427-17
Vanadium	ND		ug/L	2	04/27/2021	AB21-0427-17
Zinc	ND		ug/L	10	04/30/2021	AB21-0427-17
Anions by EPA 300.0 CCR	Rule Analyte List, CI, F,	SO4, Aqu	eous	Aliquot:	21-0445-08-C03-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	04/21/2021	AB21-0421-02
Fluoride	ND		ug/L	1000	04/21/2021	AB21-0421-02
Sulfate	ND		ug/L	1000	04/21/2021	AB21-0421-02
Total Dissolved Solids by SM 2540C				Aliquot: 2	21-0445-08-C04-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	ND		mg/L	10	04/19/2021	AB21-0419-04



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-0445
Field Sample ID:	FB-01	Collect Date:	04/13/2021
Lab Sample ID:	21-0445-09	Collect Time:	08:10 AM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous					Aliquot: 21-0445-09-C02-A01	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	ND		ug/L	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP//	AMP Detection & Assess	sment Mo	nitoring	Aliquot:	21-0445-09-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	ND		ug/L	5	04/27/2021	AB21-0427-17
Beryllium	ND		ug/L	1	04/27/2021	AB21-0427-17
Boron	ND		ug/L	20	04/27/2021	AB21-0427-17
Cadmium	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Calcium	ND		ug/L	1000	04/27/2021	AB21-0427-17
Chromium	ND		ug/L	1	04/27/2021	AB21-0427-17
Cobalt	ND		ug/L	6	04/27/2021	AB21-0427-17
Copper	ND		ug/L	1	04/27/2021	AB21-0427-17
Iron	ND		ug/L	20	04/27/2021	AB21-0427-17
Lead	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	ND		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	ND		ug/L	5	04/27/2021	AB21-0427-17
Nickel	ND		ug/L	2	04/27/2021	AB21-0427-17
Selenium	ND		ug/L	1	04/27/2021	AB21-0427-17
Silver	ND		ug/L	0.2	04/27/2021	AB21-0427-17
Thallium	ND		ug/L	2	04/27/2021	AB21-0427-17
Vanadium	ND		ug/L	2	04/27/2021	AB21-0427-17
Zinc	ND		ug/L	10	04/27/2021	AB21-0427-17
Anions by EPA 300.0 CCR	Rule Analyte List, Cl, F, S	SO4, Aqu	eous	Aliquot:	21-0445-09-C03-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #

i arameter(3)	Result	i lag	Units		Analysis Date	fracking #
Chloride	ND		ug/L	1000	04/21/2021	AB21-0421-02
Fluoride	ND		ug/L	1000	04/21/2021	AB21-0421-02
Sulfate	ND		ug/L	1000	04/21/2021	AB21-0421-02
Total Dissolved Solids by SM 2540C				Aliquot:	21-0445-09-C04-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	ND		mg/L	10	04/19/2021	AB21-0419-04



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-0445
Field Sample ID:	JHC-MW-15006 Field MS	Collect Date:	04/13/2021
Lab Sample ID:	21-0445-10	Collect Time:	06:37 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous					Aliquot: 21-0445-10-C02-A01	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	108		%	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP/	AMP Detection & Assess	sment Mo	nitoring	Aliquot:	21-0445-10-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	104		%	1	04/27/2021	AB21-0427-17
Arsenic	106		%	1	04/27/2021	AB21-0427-17
Barium	103		%	5	04/27/2021	AB21-0427-17
Beryllium	103		%	1	04/27/2021	AB21-0427-17
Boron	102		%	20	04/27/2021	AB21-0427-17
Cadmium	103		%	0.2	04/27/2021	AB21-0427-17
Calcium	113		%	1000	04/27/2021	AB21-0427-17
Chromium	95		%	1	04/27/2021	AB21-0427-17
Cobalt	97		%	6	04/27/2021	AB21-0427-17
Copper	95		%	1	04/27/2021	AB21-0427-17
Iron	95		%	20	04/27/2021	AB21-0427-17
Lead	96		%	1	04/27/2021	AB21-0427-17
Lithium	101		%	10	04/27/2021	AB21-0427-17
Molybdenum	104		%	5	04/27/2021	AB21-0427-17
Nickel	98		%	2	04/27/2021	AB21-0427-17
Selenium	107		%	1	04/27/2021	AB21-0427-17
Silver	98.0		%	0.2	04/27/2021	AB21-0427-17
Thallium	98		%	2	04/27/2021	AB21-0427-17
Vanadium	98		%	2	04/27/2021	AB21-0427-17
Zinc	97		%	10	04/27/2021	AB21-0427-17

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous			Aliquot: 21-0445-10-C03-A01		Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	99		%	1000	04/21/2021	AB21-0421-02
Fluoride	93		%	1000	04/21/2021	AB21-0421-02
Sulfate	101		%	1000	04/27/2021	AB21-0421-02



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-0445
Field Sample ID:	JHC-MW-15006 Field MSD	Collect Date:	04/13/2021
Lab Sample ID:	21-0445-11	Collect Time:	06:37 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous				Aliquot: 21-0445-11-C02-A01		Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Mercury	92.2		%	0.2	04/22/2021	AB21-0422-10
Metals by EPA 6020; HMP/AMP Detection & Assessment Monitoring					21-0445-11-C02-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	106		%	1	04/27/2021	AB21-0427-17
Arsenic	106		%	1	04/27/2021	AB21-0427-17
Barium	104		%	5	04/27/2021	AB21-0427-17
Beryllium	103		%	1	04/27/2021	AB21-0427-17
Boron	104		%	20	04/27/2021	AB21-0427-17
Cadmium	105		%	0.2	04/27/2021	AB21-0427-17
Calcium	111		%	1000	04/27/2021	AB21-0427-17
Chromium	95		%	1	04/27/2021	AB21-0427-17
Cobalt	99		%	6	04/27/2021	AB21-0427-17
Copper	94		%	1	04/27/2021	AB21-0427-17
Iron	95		%	20	04/27/2021	AB21-0427-17
Lead	96		%	1	04/27/2021	AB21-0427-17
Lithium	101		%	10	04/27/2021	AB21-0427-17
Molybdenum	105		%	5	04/27/2021	AB21-0427-17
Nickel	98		%	2	04/27/2021	AB21-0427-17
Selenium	107		%	1	04/27/2021	AB21-0427-17
Silver	100		%	0.2	04/27/2021	AB21-0427-17
Thallium	98		%	2	04/27/2021	AB21-0427-17
Vanadium	98		%	2	04/27/2021	AB21-0427-17
Zinc	101		%	10	04/27/2021	AB21-0427-17

Anions by EPA 300.0 CCR Rule Analyte List, Cl, F, SO4, Aqueous			Aliquot: 21-0445-11-C03-A01		Analyst: DMW	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Chloride	97		%	1000	04/21/2021	AB21-0421-02
Fluoride	91		%	1000	04/21/2021	AB21-0421-02
Sulfate	97		%	1000	04/27/2021	AB21-0421-02


Data Qualifiers

Exception Summary

No exceptions occured.

Chemistry Department

General Standard Operating Procedure

#### TITLE: SAMPLE LOG-IN - SHIPMENT INSPECTION FORM

Project Log-In Number:	21-044	15				
Inspection Date: 04	.15.21	_	Inspection By:	WH		
- Sample Origin/Project Name	: <u>] +(</u>	C Q2-2	OZI PONT	5 A		
Shipment Delivered By: Ente	er the type of sl	hipment carr	ler.			
Pony Hony Hony Hony Hony Hong Hong Yang Yang Hong Yang Yang Yang Yang Yang Yang Yang Ya	FedEx nom) <u>CUt  </u>	UPS CET-C	onsvmers	USPS	_ Airbo	orne
Tracking Number:			Shipping F	orm Attache	ed: Yes	No
Shipping Containers: Enter the	he type and nu	mber of ship	ping containers re	ceived.		
Cooler <u>2</u> Loose/Unpackaged Co	Cardboard Box	< <u></u>	Custom Case Other	;	Envelope	/Mailer
Condition of Shipment: Enter	r the as-receive	ed condition	of the shipment co	ontainer.		
Damaged Shipment O Other	bserved: None	e	Dented		Leak	ing
Shipment Security: Enter if a	ny of the shipp	oing containe	rs were opened be	efore receipt.		
Shipping Containers R	teceived: Open	ned	Sealed			
Enclosed Documents: Enter th	he type of doci	uments enclo	sed with the shipr	nent		
CoC Wor	rk Request		Air Data Shee	t	Other	
Temperature of Containers: N	Measure the ter	mperature of	several sample co	ontainers.		
As-Received Tempera	ture Range 3.	1-5.6°C	Samples Rec	eived on Ice:	Yes <u>No</u>	0
M&TE # and Expiration	on 016403	2				
Number and Type of Contain	ers: Enter the	total numbe	r of sample contai	ners receive	d.	
<u>Container Type</u>	<u>Water</u>	<u>Soil</u>	Other		<u>Broken</u>	<u>Leaking</u>
VOA (40mL or 60mL)					i	
Quart/Liter (g/p)	12		·			
9-oz (amber glass jar)						
2-oz (amber glass)						
125 mL (plastic)	16	<u> </u>				
24 mL vial (glass)	·	<u> </u>	. <u></u>			i
<b>260-50</b> 0 mL (plastic)	6	·				
Other						

21-0445 Page 14 of 15 PG. 28 2 not needed

## **CHAIN OF CUSTODY**

### **CONSUMERS ENERGY COMPANY – LABORATORY SERVICES**

#### **Consumers Energy**

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

SAMPLING SITE					PROJECT NUMBER										1	
	JHC O2	-2021 RCRA	GW Monito	nng		21_0//5				<u>AN</u>	ALY	<u>sis r</u> 	EQUE	STED	<b>—</b>	PAGE <u>1</u> OF <u>1</u> SEND REPORT TO
		Pond A	Wells			21-0443										Caleb Batts
SAMF	PLING TE	AM			DATE SHIPPED	SITE	SKETCHED	ATTACHED?								Beth Swanberg, TRC
CET	/ DMW	/ CLH					CIRCLE	UNE	Tota		ĺ	Í				PHONE
							NO	)	tals,	ons	s	lium				
CON	CE (TROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / L	LOCATION	DEPTH	# OF CONTAINERS	Me	Ani	TD	Rac				REMARKS
21-	-0445-01	4.13.21	1837	GW	JHC-MW-15006			5	x	x	x	x				
	-02	·		GW	JHC-MW-15007			5	x	x	x	x				<b>⊅</b> NJ
	-03	4.13.21	0921	GW	JHC-MW-15008R			5	x	x	x	x				
	-04			GW	JHC-MW-15009			5	X	х	x	x				pry
	-05			GW	JHC-MW-15010			5	x	x	x	x				Dry
	-06	4.13.21	1923	GW	JHC-MW-15011			5	x	x	x	x				•
	-07	4.13.21	1200	GW	DUP-01			5	X	х	x	х				
	-08	4.13.21	0929	W	FB-01			5	x	x	x	x				
	-09	4.13.21	0810	W	EB-01			5	x	x	x	x				
	-10	4.13.21	1837	GW	JHC-MW-15007 Fiel	ld MS		2	x	x						
<b>,</b>	✓ -11	4.13.21	1837	GW	JHC-MW-15007 Fiel	ld MSD		2	X	х						
RELINQUISHED BY (SIGNATURE) DATE/I		IME RECEIVED BY (SIGNATURE)			COMMENTS 3.1-5.6°C											
	cas	UDH!	msen	<u> </u>	15.21 0800	¥										
RELI	NQUISHE	D BY (SIGNAT	ГURE)	DATE/1		RECEIVED BY	IGNATURE)									
											OF	NGIN	IAL TC	LAB	СС	<b>JPY TO CUSTOMER</b>

# 🔅 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: 160-41804-1

Laboratory Sample Delivery Group: 21-0445 Client Project/Site: JH Campbell Pond A Walls

#### For:

Consumers Energy 135 W Trail Street Jackson, Michigan 49201

Attn: Emil Blaj

Authorized for release by: 5/24/2021 5:24:23 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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#### Job ID: 160-41804-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

#### **CASE NARRATIVE**

**Case Narrative** 

#### **Client: Consumers Energy**

#### **Project: JH Campbell Pond A Walls**

#### Report Number: 160-41804-1

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 04/22/2021; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 7.7 C.

#### RADIUM-226 (GFPC)

Samples JHC-MW-15006 (160-41804-1), JHC-MW-15008R (160-41804-2), JHC-MW-15011 (160-41804-3), DUP-01 (160-41804-4), FB-01 (160-41804-5) and EB-01 (160-41804-6) were analyzed for Radium-226 (GFPC) in accordance with EPA Method 903.0. The samples were

#### Job ID: 160-41804-1 (Continued)

#### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

prepared on 04/29/2021 and analyzed on 05/21/2021.

Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: JHC-MW-15006 (160-41804-1), JHC-MW-15008R (160-41804-2), JHC-MW-15011 (160-41804-3), FB-01 (160-41804-5) and EB-01 (160-41804-6). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared to demonstrate batch precision.

The following sample was prepared at a reduced aliquot due to Matrix: DUP-01 (160-41804-4). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared to demonstrate batch precision.

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

#### RADIUM-228 (GFPC)

Samples JHC-MW-15006 (160-41804-1), JHC-MW-15008R (160-41804-2), JHC-MW-15011 (160-41804-3), DUP-01 (160-41804-4), FB-01 (160-41804-5) and EB-01 (160-41804-6) were analyzed for Radium-228 (GFPC) in accordance with EPA 904. The samples were prepared on 04/29/2021 and analyzed on 05/13/2021.

Insufficient sample volume was available to perform a sample duplicate (DUP) for the following samples: JHC-MW-15006 (160-41804-1), JHC-MW-15008R (160-41804-2), JHC-MW-15011 (160-41804-3), FB-01 (160-41804-5) and EB-01 (160-41804-6). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared to demonstrate batch precision.

The following sample was prepared at a reduced aliquot due to Matrix: DUP-01 (160-41804-4). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were 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 (160-41804-1), JHC-MW-15008R (160-41804-2), JHC-MW-15011 (160-41804-3), DUP-01 (160-41804-4), FB-01 (160-41804-5) and EB-01 (160-41804-6) 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 05/21/2021.

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

St. Louis	
TestAmerica,	Trail North
Eurofins <sup>-</sup>	13715 Rider

# **Chain of Custody Record**

Courofins Environment Testing

Earth City, MO 63045-1205 phone 314.298.8566 fax 314.298.8757	Regula	tory Prog	ram:		PDES	RCRA Other:			TestAme	ica Laboratories, Inc. d/	b/a Eurofins TestAmeric:
	Project Mana	ger: Emil	Blaj		Г						
Client Contact	Email: Emil.Bla	aj@cmsene	rgy.com		Site	Contact: Bethan	y Swanberg	Date:		COC No:	
Consumers Energy, Laboratory Services	Tel/Fax: 517-	788-5888			Lab	Contact: Emil Bl	ai	Carrier:		10	1 COCs
135 W. Trail Street	An	alysis Turr	laround Til	ne	F					Camolor: CI	
Jackson, MI 49201	CALENDAR	DAYS		NG DAYS							
517-788-5888	TAT IF	different from	Below								
(xxx) xxx-xxxx FAX		2 wee	sk	ł		(1.4					
Project Name: JH Campbell Pond A Wells	5	1 wee	¥			706 703					
Project.#: 21-0445		2 day	S		1.21	Aq Aq					
PO#JD4049 L		1 day			ə/ ə/	3) 8 3) 8				ON SING / dor	
	Sample	Sample	Sample Type C=Comp,	*	eservati Horm M	SS muib SS muib					
Sample Identification	Date	Time	G=Grab)	latrix C	년 년 년	ଅ ଅ				Sampl	e Specific Notes:
JHC-MW-15006	4/13/2021	1837	U	GW	2	××					
JHC-MW-15008R	4/13/21	0921	ს	GW	2 7	×××					
JHC-MW-15011	4/13/21	1923	U	GW	2	× ×					
DUP-01	1	1	υ	GW	2	×××					
FB-01	4/13/21	0929	U	ā	2	××					
EB-01	4/13/21	0810	υ	ō	~	×					
				+	+						
				+	+				- - -	-	÷
		_			+	_					
				_	_						
					-				160-418	04 Chain of Custody	
Preservation Used: 1= Ice, 2= HCI; 3= H2SO4; 4=HNO3;	5=NaOH; 6= 0	ther			-						
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Plea Comments Section if the lab is to dispose of the sample.	se List any EPA	Waste Coc	les for the s	ample in	s the	ample Disposal (	A fee may t	e assessed	if samples are	retained longer than 1	month)
Von-Hazard [ Flammable ] Skin Irritant	Poison B				Τ	Detrum to Cliant	[				
Special Instructions/QC Requirements & Comments:					1			DISDOSAL DV. LAT	L AR	hive for Months	
Custody Seals Intact:	Custody Seal I	40.:				Cooler Te	emp. (°C): O	bs'd	Corr'd-	Therm ID No	
Relinquished by:	Company:	1.451	<u> </u>	ate/Time:	2 -	sceived by:	Z	Ŭ	mpany:	Date/Time:	
Relinquished by:	Company:		ă	ate/Time:		YONAY A V	DILIN	1111000	mpany: En	CA Date/Time:	17.21 144 u
Relinquished by:	Company:		ă_	ate/Time:	<u>&gt;</u> ~	sceived in Laborat	tory by:	Š	mpany:	Date/Time:	12. 12. VL
21									Form	No. CA-C-WI-002, Rev	. 4.23, dated 4/16/2019

4

5

#### Login Sample Receipt Checklist

Client: Consumers Energy

#### Login Number: 41804 List Number: 1 Creator: Korrinhizer, Micha L

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: 160-41804-1 SDG Number: 21-0445

List Source: Eurofins TestAmerica, St. Louis

## Client: Consumers Energy Project/Site: JH Campbell Pond A Walls

#### Qualifiers

#### Rad

Qualifiers		3
<mark>Rad</mark> Qualifier	Qualifier Description	
U	Result is less than the sample detection limit.	_
Glossary		— <b>5</b>
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	0
%R	Percent Recovery	
CFL	Contains Free Liquid	
CFU	Colony Forming Unit	
CNF	Contains No Free Liquid	ŏ
DER	Duplicate Error Ratio (normalized absolute difference)	
Dil Fac	Dilution Factor	9
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 Pond A Walls

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_0	Preparation, Precipitate Separation	None	TAL SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	TAL SL

#### **Protocol References:**

EPA = US Environmental Protection Agency

None = None

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

#### Laboratory References:

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

#### Sample Summary

## Client: Consumers Energy Project/Site: JH Campbell Pond A Walls

Project/Site: J	H Campbell Pond A Walls				SDG: 21-0445	
I ah Sample ID	Client Sample ID	Matrix	Collected	Received	Assat ID	
160-41804-1	JHC-MW-15006	Water	04/13/21 18:37	04/22/21 13:00		
160-41804-2	JHC-MW-15008R	Water	04/13/21 09:21	04/22/21 13:00		
160-41804-3	JHC-MW-15011	Water	04/13/21 19:23	04/22/21 13:00		E
160-41804-4	DUP-01	Water	04/19/21 00:00	04/22/21 13:00		Ð
160-41804-5	FB-01	Water	04/13/21 09:29	04/22/21 13:00		
160-41804-6	EB-01	Water	04/13/21 08:10	04/22/21 13:00		
						8
						9

Total

Uncert.

(2**σ**+/-)

0.0993

RL

1.00

MDC Unit

0.102 pCi/L

Count Uncert.

(2<del>0</del>+/-)

0.0969

Date Collected: 04/13/21 18:37

Date Received: 04/22/21 13:00

Analyte

Radium-226

Client Sample ID: JHC-MW-15006

Method: 903.0 - Radium-226 (GFPC)

## Lab Sample ID: 160-41804-1

04/29/21 09:25 05/21/21 09:20

04/29/21 09:25 05/21/21 09:20

Lab Sample ID: 160-41804-2

Matrix: Water

Analyzed

Analyzed

Prepared

Prepared

**Matrix: Water** 

Dil Fac 1 Dil Fac 1 9

<b>Carrier</b> Ba Carrier	90.3	Qualifier	Limits 40 - 110	
Method: 904.0 - R	adium-228	(GFPC)	Count	Total

0.241

**Result Qualifier** 

Analyto	Posult	Qualifier	Uncert.	Uncert.	DI	MDC	Unit	Propared	Analyzod	Dil Eac
Radium-228	0.432		0.277	0.280	1.00	0.426	pCi/L	04/29/21 10:28	05/13/21 13:41	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	90.3		40 - 110					04/29/21 10:28	05/13/21 13:41	1
Y Carrier	85.6		40 - 110					04/29/21 10:28	05/13/21 13:41	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	0.673		0.293	0.297	5.00	0.426	pCi/L		05/21/21 21:05	1

#### Client Sample ID: JHC-MW-15008R Date Collected: 04/13/21 09:21

Date Received: 04/22/21 13:00

#### Method: 903.0 - Radium-226 (GFPC)

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(2 <b>σ+/-</b> )	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.272		0.104	0.107	1.00	0.106	pCi/L	04/29/21 09:25	05/21/21 09:20	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	87.9		40 - 110					04/29/21 09:25	05/21/21 09:20	1

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

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2 <b>σ+/-</b> )	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.224	U	0.295	0.296	1.00	0.491	pCi/L	04/29/21 10:28	05/13/21 13:41	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	87.9		40 - 110					04/29/21 10:28	05/13/21 13:41	1
Y Carrier	84.9		40 - 110					04/29/21 10:28	05/13/21 13:41	1

#### **Client Sample Results**

Client: Consumers Energy Project/Site: JH Campbell Pond A Walls Job ID: 160-41804-1 SDG: 21-0445

Client Sample ID Date Collected: 04/1 Date Received: 04/2	): JHC-M 13/21 09:21 22/21 13:00	W-15008	BR					Lab Sample	e ID: 160-41 Matrix:	804-2 Water
Method: Ra226_Ra	a228 - Com	bined Ra	dium-226 a Count Uncert.	nd Radium Total Uncert.	-228					
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.496		0.313	0.315	5.00	0.491	pCi/L		05/21/21 21:05	1
<b>Client Sample ID</b>	): JHC-M	W-15011						Lab Sample	e ID: 160-41	804-3
Date Collected: 04/1 Date Received: 04/2	13/21 19:23 2/21 13:00	3							Matrix	Water
Method: 903.0 - Ra	adium-226	(GFPC)								
			Count	Total						
Analyta	D!!	Qualifier	Uncert.	Uncert.		MDO	l lmit	Due 10 e 10 e 1		
Analyte	Result	Qualifier	(2 <del>0+/-)</del>	<u>(2σ+/-)</u>				Prepared		
Radium-226	0.165 %Viold	Qualifior	U.U889	0.0901	1.00	0.112	pCI/L	04/29/21 09:25	05/21/21 09:20	Dil Eac
Ba Carrier	88.8	quanner	40 110					04/29/21 09·25	05/21/21 09·20	1
Metnod: 904.0 - Ra Analyte	Result	(GFPC) Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.758		0.308	0.316	1.00	0.435	pCi/L	04/29/21 10:28	05/13/21 13:42	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	88.8		40 - 110					04/29/21 10:28	05/13/21 13:42	1
Method: Ra226_Ra	a228 - Com	bined Ra	40 - 110 dium-226 a	nd Radium	-228			04/29/21 10.26	05/13/21 13.42	,
			Uncert	Uncert						
Analvte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analvzed	Dil Fac
Combined Radium 226 + 228	0.923		0.321	0.329	5.00	0.435	pCi/L		05/21/21 21:05	1
Client Sample ID	): DUP-01							Lab Sample	e ID: 160-41	804-4
Date Collected: 04/1 Date Received: 04/2	2/21 13:00								watrix	vvater
Method: 903.0 - Ra	adium-226	(GFPC)	<b>a</b>							
			Count	iotai						
Analyto	Pocult	Qualifier	(2c+/)	$(2\alpha \pm 1)$	ы	MDC	Unit	Bronarad	Analyzod	
Radium-226		Quaimer	0 132	0 136	1 00	0 130	nCi/l		05/21/21 00·20	
Corrier	0/ Vial-1	Qualifier	U. 102	0.100	1.00	0.100		Dressed	Analyzad	
	%Yield	Qualifier						Prepared	Analyzed	
Da Garrier	92.4		40 - 110					04/29/21 09:25	03/21/21 09:20	1

Eurofins TestAmerica, St. Louis

#### **Client Sample Results**

Total

Uncert.

(2σ+/-)

0.329

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

Method: 904.0 - Radium-228 (GFPC)

#### Client Sample ID: DUP-01 Date Collected: 04/19/21 00:00 Date Received: 04/22/21 13:00

Analyte

Carrier

Ba Carrier

Y Carrier

Radium-228

Jol	o ID: 160-41804-1
	SDG: 21-0445

Analyzed

Analyzed

04/29/21 10:28 05/13/21 13:42

04/29/21 10:28 05/13/21 13:42

04/29/21 10:28 05/13/21 13:42

Lab Sample ID: 160-41804-5

Prepared

Prepared

Dil Fac

Dil Fac

Matrix: Water

1

1

1

#### Method: Ra226\_Ra228 - Combined Radium-226 and Radium-228

**Result Qualifier** 

%Yield Qualifier

0.429 U

92.4

86.7

Count

Uncert.

(2<del>0</del>+/-)

Limits

40 - 110

40 - 110

0.326

			Count	Total					
			Uncert.	Uncert.					
Analyte	Result	Qualifier	(2σ+/-)	(2 <del>σ+</del> /-)	RL	MDC Unit	t Prepared	Analyzed	Dil Fac
Combined Radium	0.780		0.352	0.356	5.00	0.512 pCi/L	/L	05/21/21 21:05	1
226 + 228									

RL

1.00

MDC Unit

0.512 pCi/L

#### Client Sample ID: FB-01 Date Collected: 04/13/21 09:29 Date Received: 04/22/21 13:00

#### Method: 903.0 - Radium-226 (GFPC) Count Total Uncert. Uncert. Dil Fac Analyte **Result Qualifier** (2σ+/-) (2**σ**+/-) RL MDC Unit Prepared Analyzed Radium-226 -0.0322 U 0.0418 0.0419 1.00 0.105 pCi/L 04/29/21 09:25 05/21/21 09:21 1 Carrier %Yield Qualifier Limits Prepared Analyzed Dil Fac Ba Carrier 90.9 40 - 110 04/29/21 09:25 05/21/21 09:21 1

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

			Count Uncert.	lotal Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.118	U	0.209	0.209	1.00	0.400	pCi/L	04/29/21 10:28	05/13/21 13:42	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	90.9		40 - 110					04/29/21 10:28	05/13/21 13:42	1
Y Carrier	84.9		40 - 110					04/29/21 10:28	05/13/21 13:42	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	-0.151	U	0.213	0.213	5.00	0.400	pCi/L		05/21/21 21:05	1

Eurofins TestAmerica, St. Louis

Total

Uncert.

(2**σ**+/-)

0.0560

Count Uncert.

(2**σ**+/-)

0.0560

Limits

40 - 110

Method: 903.0 - Radium-226 (GFPC)

#### **Client Sample ID: EB-01** Date Collected: 04/13/21 08:10 Date Received: 04/22/21 13:00

Lab	Sample	ID:	160-41	804-6

04/29/21 09:25 05/21/21 09:21

04/29/21 09:25 05/21/21 09:21

Analyzed

Analyzed

Prepared

Prepared

**Matrix: Water** 

Dil Fac

Dil Fac

1

1

9

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2 <b>σ</b> +/-)	(2 <b>σ</b> +/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.0642	U	0.232	0.232	1.00	0.430	pCi/L	04/29/21 10:28	05/13/21 13:45	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	85.8		40 - 110					04/29/21 10:28	05/13/21 13:45	1
Y Carrier	83.7		40 - 110					04/29/21 10:28	05/13/21 13:45	1

RL

1.00

MDC Unit

0.111 pCi/L

#### Method: Ra226\_Ra228 - Combined Radium-226 and Radium-228

**Result Qualifier** 

%Yield Qualifier

0.00929 U

85.8

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	-0.0549	U	0.239	0.239	5.00	0.430	pCi/L		05/21/21 21:05	1

Analyte

Carrier

Ba Carrier

Radium-226

Eurofins TestAmerica, St. Louis

#### **QC Sample Results**

#### Method: 903.0 - Radium-226 (GFPC)

Lab Sample	ID: MB 1	60-5076	675/23-A						Clie	ent Samp	ole ID: Met	thod	Blank
Matrix: wate	r 1011 - 5440	140									Prep Type	8:10	tal/NA
Analysis Bat	icn: 5110	10		Count	Total						Ргер Ват	cn: 5	0/6/5
		MD	MD	Uncort	IDiai								
Analyta		Booult	WID Qualifiar		(2a+/)	ы	MDC	Unit	Б	ropored	Analyza	d	
Analyte Rodium 226		0.02067		0.0550	0.0560						05/01/01 00	<u>u</u> 0.25	
Raululli-220		0.02907	0	0.0559	0.0500	1.00	0.101	poi/L	04/2	9/21 09.25	03/21/2108	9.20	1
		MB	МВ										
Carrier		%Yield	Qualifier	Limits					P	repared	Analyze	d	Dil Fac
Ba Carrier		89.4		40 - 110					04/2	29/21 09:25	05/21/21 09	9:25	1
_													
Lab Sample	ID: LCS	160-507	675/1-A					Cli	ent Sa	mple ID:	Lab Cont	rol S	ample
Matrix: Wate	r										Prep Type	e: To	tal/NA
Analysis Bat	tch: 5110	015									Prep Bate	ch: 5	607675
						Total							
			Spike	LCS	LCS	Uncert.					%Rec.		
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits		
Radium-226			11.3	11.16		1.16	1.00	0.124	pCi/L	98	75 - 125		
	LCS	LCS											
Carrier	%Yield	Qualifier	· Limits										
Ba Carrier	90.6		40 - 110	-									
Analysis Bat	tch: 5110	)15				Total					Prep Bat	ch: 5	507675
			Spike	LCSD	LCSD	Uncert.					%Rec.		RER
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit
Radium-226			11.3	10.87		1.13	1.00	0.120	pCi/L	96	75 - 125	0.13	1
	1000	1000											
Corrior	Viald	Cualifian	. Limito										
Ba Carrier	% field	Quaimer		-									
	00.0		40 - 110										
Method: 904	4.0 - Ra	dium-	228 (GFPC	<b>C)</b>									
Lab Sample	ID: MB 1	60-5076	679/23-A						Clie	ent Samp	ole ID: Me	thod	Blank
Matrix: Wate	r										Prep Type	e: To	tal/NA
Analysis Bat	tch: 5094	182									Prep Bate	ch: 5	<b>607679</b>
				Count	Total								
		MB	МВ	Uncert.	Uncert.								
Analyte		Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	P	repared	Analyze	d	Dil Fac
Radium-228		0.2507	U	0.248	0.249	1.00	0.402	pCi/L	04/2	29/21 10:28	05/13/21 13	3:46	1
		МВ	МВ										
Carrier		%Yield	Qualifier	Limits					P	repared	Analyze	d	Dil Fac
Ba Carrier		89.4		40 - 110					04/2	29/21 10:28	05/13/21 1:	3:46	1
Y Carrier		86.0		40 - 110					04/2	29/21 10:28	05/13/21 13	3:46	1

#### **QC Sample Results**

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

Method: 90	04.0 - Radium-22	8 (GFPC	) (Cont	tinued	)								
Lab Sample Matrix: Wat	e ID: LCS 160-50767 er	'9/1-A					Cli	ent Sa	mple ID:	Lab Cont Prep Typ	trol Sa e: Tot	ample al/NA	
Analysis Ba	atcn: 509517				Total					Ргер Ва	icn: 50	0/0/9	5
		Spike	LCS	LCS	Uncert.					%Rec.			
Analyte		Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits			
Radium-228		7.21	7.610		0.936	1.00	0.374	pCi/L	105	75 - 125			
	LCS LCS												
Carrier	%Yield Qualifier	Limits											
Ba Carrier	90.6	40 - 110											8
Y Carrier	86.7	40 - 110											0
Lab Sample	e ID: LCSD 160-5076	679/2-A					Client S	ample	ID: Lab	Control S	ample	e Dup	3
Matrix: Wat	er									Prep Typ	e: Tot	al/NA	10
Analysis Ba	atch: 509517									Prep Ba	tch: 50	07679	
					Total								
		Spike	LCSD	LCSD	Uncert.					%Rec.		RER	
Analyte		Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit	
Radium-228		7.21	7.865		0.973	1.00	0.376	pCi/L	109	75 - 125	0.13	1	
	LCSD LCSD												
Carrier	%Yield Qualifier	Limits											
Ba Carrier	85.5	40 - 110											

40 - 110 Y Carrier 86.7

#### **QC Association Summary**

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

#### Rad

#### Prep Batch: 507675

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-41804-1	JHC-MW-15006	Total/NA	Water	PrecSep-21	
160-41804-2	JHC-MW-15008R	Total/NA	Water	PrecSep-21	
160-41804-3	JHC-MW-15011	Total/NA	Water	PrecSep-21	
160-41804-4	DUP-01	Total/NA	Water	PrecSep-21	
160-41804-5	FB-01	Total/NA	Water	PrecSep-21	
160-41804-6	EB-01	Total/NA	Water	PrecSep-21	
MB 160-507675/23-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-507675/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
LCSD 160-507675/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep-21	
Prep Batch: 507679					
Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-41804-1	JHC-MW-15006	Total/NA	Water	PrecSep_0	
160-41804-2	JHC-MW-15008R	Total/NA	Water	PrecSep_0	
160-41804-3	JHC-MW-15011	Total/NA	Water	PrecSep_0	
160-41804-4	DUP-01	Total/NA	Water	PrecSep_0	
160-41804-5	FB-01	Total/NA	Water	PrecSep_0	
160-41804-6	EB-01	Total/NA	Water	PrecSep_0	
MB 160-507679/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-507679/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-507679/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

#### **Tracer/Carrier Summary**

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

#### Percent Yield (Acceptance Limits) Ва (40-110) Lab Sample ID **Client Sample ID** 160-41804-1 JHC-MW-15006 90.3 160-41804-2 JHC-MW-15008R 87.9 160-41804-3 JHC-MW-15011 88.8 160-41804-4 **DUP-01** 92.4 160-41804-5 FB-01 90.9 160-41804-6 EB-01 85.8 LCS 160-507675/1-A Lab Control Sample 90.6 LCSD 160-507675/2-A Lab Control Sample Dup 85.5

89.4

#### **Tracer/Carrier Legend**

Ba = Ba Carrier

MB 160-507675/23-A

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

Method Blank

**Matrix: Water** 

-			
		Ва	Y
Lab Sample ID	Client Sample ID	(40-110)	(40-110)
160-41804-1	JHC-MW-15006	90.3	85.6
160-41804-2	JHC-MW-15008R	87.9	84.9
160-41804-3	JHC-MW-15011	88.8	85.2
160-41804-4	DUP-01	92.4	86.7
160-41804-5	FB-01	90.9	84.9
160-41804-6	EB-01	85.8	83.7
LCS 160-507679/1-A	Lab Control Sample	90.6	86.7
LCSD 160-507679/2-A	Lab Control Sample Dup	85.5	86.7
MB 160-507679/23-A	Method Blank	89.4	86.0

#### **Tracer/Carrier Legend**

Ba = Ba Carrier

Y = Y Carrier

5

12

Prep Type: Total/NA



135 W. Trail St. Jackson, MI 49201

- To: CDBatts, JH Campbell Complex
- From: EBlaj, T-258
- Date: July 14, 2021
- Subject: JH CAMPBELL SOLID WASTE DISPOSAL AREA GROUNDWATER MONITORING 2<sup>nd</sup> Quarter, 2021 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: 21-0454

CE Laboratory Services conducted groundwater monitoring on 04/12/2021 through 04/15/2021 at the JH Campbell Solid Waste Disposal Area, for the 2<sup>nd</sup> Quarter monitoring requirements. Samples were not collected from MW-10AR; the well was dry. All other samples were received for analysis by the Chemistry department on 04/15/2021.

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

Reviewed and approved by:

Emil Blaj Sr. Technical Analyst Project Lead



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, 22<sup>nd</sup> 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

#### 21-0454 GSI Page 2 of 11

- 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 Complex Work Order ID: Q2-2021 RCRA GW Monitoring N&E / HMP / GSI / Supplemental Date Received: 4/15/2021 Chemistry Project: 21-0454

Sample #	Field Sample ID	Matrix	Sample Date	<u>Site</u>
21-0454-01	MW-14S	Groundwater	04/14/2021 11:31 AM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-02	PZ-24S	Groundwater	04/14/2021 06:59 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-03	PZ-40S	Groundwater	04/14/2021 08:59 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-04	TW-19-04A	Groundwater	04/14/2021 02:18 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-05	TW-19-05	Groundwater	04/14/2021 03:54 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-06	TW-19-06A	Groundwater	04/14/2021 04:51 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-07	DUP-08	Groundwater	04/14/2021 12:00 AM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-08	FB-08	Water	04/14/2021 07:10 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-09	EB-08	Water	04/14/2021 08:30 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-10	TW-19-04A Field MS	Groundwater	04/14/2021 02:18 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-11	TW-19-04A Field MSD	Groundwater	04/14/2021 02:18 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-12	PZ-23S	Groundwater	04/14/2021 06:16 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-13	PZ-24	Groundwater	04/14/2021 06:07 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-14	PZ-40	Groundwater	04/14/2021 08:17 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-15	DUP-09	Groundwater	04/14/2021 12:00 AM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-16	MW-9AR	Groundwater	04/14/2021 10:06 AM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-17	MW-10AR	Not Collected, we	ell was dry	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-18	TW-19-01A	Groundwater	04/14/2021 12:21 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-19	TW-19-02A	Groundwater	04/14/2021 01:06 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells
21-0454-20	TW-19-03A	Groundwater	04/14/2021 01:41 PM	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells



Sample Site:	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells (395496	Laboratory Project:	21-0454
Field Sample ID:	MW-14S	Collect Date:	04/14/2021
Lab Sample ID:	21-0454-01	Collect Time:	11:31 AM
Matrix:	Groundwater		

#### Metals by EPA 6020; HMP/AMP Detection & Assessment Monitoring

	Delection & Asses		Intoring	Aliquot:	21-0454-01-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	10		ug/L	5	04/27/2021	AB21-0427-17
Chromium	ND		ug/L	1	04/27/2021	AB21-0427-17
Lithium	ND		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	ND		ug/L	5	04/27/2021	AB21-0427-17
Selenium	ND		ug/L	1	04/27/2021	AB21-0427-17
Vanadium	ND		ug/L	2	04/27/2021	AB21-0427-17
Total Dissolved Solids by SM 2	540C			Aliquot:	21-0454-01-C03-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	35		mg/L	10	04/19/2021	AB21-0419-05



Sample Site:	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells (395496	Laboratory Project:	21-0454
Field Sample ID:	PZ-24S	Collect Date:	04/14/2021
Lab Sample ID:	21-0454-02	Collect Time:	06:59 PM
Matrix:	Groundwater		

#### Metals by EPA 6020; HMP/AMP Detection & Assessment Monitoring

Metals by EFA 0020, HMF/AMF De	lection & Asses		Intoring	Aliquot:	21-0454-02-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	23		ug/L	5	04/27/2021	AB21-0427-17
Chromium	1		ug/L	1	04/27/2021	AB21-0427-17
Lithium	ND		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	ND		ug/L	5	04/27/2021	AB21-0427-17
Selenium	ND		ug/L	1	04/27/2021	AB21-0427-17
Vanadium	2		ug/L	2	04/27/2021	AB21-0427-17
Total Dissolved Solids by SM 2540	C			Aliquot:	21-0454-02-C03-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	40		mg/L	10	04/19/2021	AB21-0419-05



Sample Site:	JHC RCRA GW Monitoring - N&E/AMP/GSI/Supp Wells (395496	Laboratory Project:	21-0454
Field Sample ID:	PZ-40S	Collect Date:	04/14/2021
Lab Sample ID:	21-0454-03	Collect Time:	08:59 PM
Matrix:	Groundwater		

#### Metals by EPA 6020; HMP/AMP Detection & Assessment Monitoring

	Delection & Asses		Intoring	Aliquot:	21-0454-03-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Antimony	ND		ug/L	1	04/27/2021	AB21-0427-17
Arsenic	ND		ug/L	1	04/27/2021	AB21-0427-17
Barium	16		ug/L	5	04/27/2021	AB21-0427-17
Chromium	1		ug/L	1	04/27/2021	AB21-0427-17
Lithium	ND		ug/L	10	04/27/2021	AB21-0427-17
Molybdenum	ND		ug/L	5	04/27/2021	AB21-0427-17
Selenium	ND		ug/L	1	04/27/2021	AB21-0427-17
Vanadium	ND		ug/L	2	04/27/2021	AB21-0427-17
Total Dissolved Solids by SM 2	540C			Aliquot	21-0454-03-C03-A01	Analyst: CET
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking #
Total Dissolved Solids	45		mg/L	10	04/19/2021	AB21-0419-05



Data Qualifiers

Exception Summary

No exceptions occured.

CONSUMERS ENERGY	Genera	Chemistry I al Standard O	PROC C PAGE 1 REVISIO ATTAC	HEM-1.2.0 OF 2 ON 3 HMENT A	
TITLE: SAMPLE LO	DG-IN – SI	HPMENT	INSPECTION FOR	М	
Project Log-In Number: _ Inspection Date:0띡 -	21-04	154	Inspection By: <u></u>	ł	
Sample Origin/Project Nan	ne:	, QL-20	21 Supplement	ntal	
Shipment Delivered By: Er Pony Other/Hand Carry (1	nter the type o FedEx whom)	$\frac{1}{5} + \frac{1}{5} + \frac{1}$	rier. SUSPS_ VUH	Airt	oome
Tracking Number:			Shipping Form A	ttached: Yes	No
Shipping Containers: Enter Cooler <u></u> Loose/Unpackaged	the type and Cardboard E Containers	number of shi Box	pping containers received Custom Case Other	I. Envelope	e/Mailer
Condition of Shipment: En Damaged Shipment Other	ter the as-rece Observed: N	eived condition	n of the shipment containe Dented	er. Leal	king
Shipment Security: Enter if Shipping Containers	any of the sh Received: C	ipping contain pened	ers were opened before ro Sealed	eceipt.	
CoC V W	ork Request	oounions ono	Air Data Sheet	Other	
<b>Femperature of Containers</b> As-Received Tempe M&TE # and Expira	Measure the rature Range tion $0164$	temperature o 0.6-2.2 1.84 21	f several sample containe C Samples Received of	ors. on Ice: Yes 🗸 N	lo
Number and Type of Conta <u>Container Type</u> VOA (40mL or 60mL	Mater	the total numb <u>Soil</u>	er of sample containers re Other	Broken	Leakin
Quart/Liter (gp) 9-oz (amber glass jar 2-oz (amber glass)	)			=	
125 mL (plastic) 24 mL vial (glass) محتوع (plastic)	12			_	

21-0454 GSI Page 9 of 11

Other\_

PG. 282 not nucled

1

# **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:	CW Marite	atura.	PROJECT NUMBER:				ANALYSIS REQUESTED				REQUESTE	D	PAGE I OF 2	
JHC Q2 No SAMPLING TEA	-2021 RCRA &E / AMP / AM: / CLH	GSI Wells	oring	DATE SHIPPED	21-045	4 SITE SKETCHED CIRCLE NC	ATTACHED? ONE: )	als, Total	Suc		mm	olved Metals	-	_Caleb Batts	
CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION	N/LOCATION	DEPTH	# OF CONTAINERS	Meta	Anic	TDS	Radi	Diss		REMARKS	
21-0454-01	4.14.21	1131	GW	MW-14S			5	x	X	х	x	x		cut	
-02	T	1859	GW	PZ-24S			5	X	X	X	x	x	1111	CET	
-03		2059	GW	PZ-40S			5	x	х	x	x	X		CET	
-04		1418	GW	TW-19-04A			5	x	х	х	x			Dmus	
-05		1554	GW	TW-19-05			5	x	x	x	x			bmus	
-06		1651	GW	TW-19-06A			5	x	x	x	x			omu	
-07		1	GW	DUP-08			5	x	x	x	x			CLH	
-08		1910	GW	FB-08			5	x	x	x	x			CET	
-09		2030	GW	EB-08			5	x	x	x	x			CET	
-10		1418	GW	TW-19-04A Field	MS		2	x	x		1			Dmu	
<ul><li>✓ -11</li></ul>	1	T	AQ	TW-19-04A Field	MSD		2	x	x					DMW	
	D BY: (SIGNA L LULL D BY: (SIGNA	ture) ture) ture)	DATE/	TIME 5.21 1045 am TIME:	RECEIVED	BY: (SIGNATURE)			Ter	νp.	( RIGT	0(5%) 0.6-2	COMMENT	Y 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:			ANALYSIS REQUESTED				REQUEST	ED	PAGE 2 OF 2	
JHC Q2- N&	-2021 RCR/ E / AMP / S	GW Monito upplemental	ring	21-04	454		ed						SEND REPORT TO: Caleb Batts	
SAMPLING TEA	am: / CLH			DATE SHIPPED	SITE SKETCHED CIRCLE	ATTACHED? ONE: )	als, Total	suo		ium	als, Dissolve		Beth Swanberg, TRC PHONE:	
CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / LOCATIO	DN DEPTH	# OF CONTAINERS	Met	Anio	TDS	Rad	Met		REMARKS	
21-0454-12	4.14.21	1816	GW	PZ-23S	1.000	6	X	х	х	х	Х		DMW	
-13	T	1807	GW	PZ-24		5	x	x	x	x			CET	
-14		2017	GW	PZ-40		5	x	x	х	x			CET	
-15			GW	DUP-09		2	x				х		omus	
-16		1006	GW	MW-9AR		2	x			1Ē	x		cut	
-17		-	GW	MW-10AR		2	x				x		cut	
-18		1221	GW	TW-19-01A		2	x				X		DMW	
-19		1306	GW	TW-19-02A	1122	2	x				X		Omus	
-20		1341	GW	TW-19-03A		2	x				X		Omw	
													1-1-	
										11				
RELINQUISHEI	D BY: (SIGNA	TURE) TURE)	DATE/	S. 21 1045am TIME: RECEIV	ED BY: (SIGNATURE) ED FY: (SIGNATURE)	)			0	RIGP	VAL TO I	COMMI	ENTS COPY TO CUSTOMER	



## Appendix E April 2021 Field Notes

Well ID       Stress				y sheet	ergy Compan Impling Work	Consumers En toring Well Sa	Moni		ervices ettenoe	Laboratory Se
Purge Method:	el	446-02 Galv. St	Der <u>21 - 0</u> 4 Iron	vell ID JHC MW.15024 Deation JH Campbell						
Depint to water Tape:       Dot No. 1       S/N. 5       DUP-       Sonde ID:       11M       15H       19M         QC SAMPLE:       MS/MSD       DUP-       Sonde ID:       11M       15H       19M         Depth-to-water T/PVC (ft)       2.9.44       Depth-To-Bottom T/PVC (ft)       Completed by $MDA$ Time       pH       Temp       Sp Cond       DO       DO       ORP       Pump Rate       Water level         min       units       'C       us/em       %sat.       ppm       mV       mL/min       Drawdown ft         3-5min       +/0.1       NA       +/3%       +/10%       +/10%       +/10%       <0.33		Bailer		Fultz		Submersible		Peristaltic		Purge Metho
Depth-to-water T/PVC (ft)       12.94       Depth-To-Bottom T/PVC (ft)       Completed by $\Lambda m_{A}$ Time       pH       Temp       Sp Cond       DO       DO       ORP       Pump Rate       Water level         min       units       'C       us/em       % sat.       ppm       mV       mL/min       Drawdown ft         3-5 min       +/-0.1       NA       +/-3%       +/-10%       +/-10%       +/-10%       +/-20% <td< td=""><td>20G</td><td>19M</td><td>15H</td><td> 11M</td><td>Sonde ID:</td><td>51905</td><td>DUP-</td><td>IS/MSD</td><td>er Tape:</td><td>QC SAMPLE:</td></td<>	20G	19M	15H	11M	Sonde ID:	51905	DUP-	IS/MSD	er Tape:	QC SAMPLE:
Time         pH         Temp         Sp Cond         DO         DO         ORP         Pump Rate         Water level           min         units         'C         uS/cm         % sat.         ppm         mV         mt/min         Drawdown ft           3.5 min $4/0.3$ $1/0\%$ $4/10\%$ <td< td=""><td></td><td>y Amw</td><td>Completed by</td><td></td><td>(ft)</td><td>ottom T/PVC</td><td>Depth-To-B</td><td>12.94</td><td>er T/PVC (ft)</td><td>Depth-to-wat</td></td<>		y Amw	Completed by		(ft)	ottom T/PVC	Depth-To-B	12.94	er T/PVC (ft)	Depth-to-wat
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Turbidity	Water level	Pump Rate	ORP	DO	DO	Sp Cond	Temp	рН	Time
Stablization parameters for the last three readings         11 21       12.94         1128       6.85       9.2       353.1       42.2       402       + 219.5       2.00       12.94         1133       7.13       9.1       358.7       6.1       0.69       + 204.5       2.00       12.94         1138       7.11       9.2       354.4       4.6       0.52       + 198.0       2.00       12.94         1138       7.11       9.2       354.4       4.6       0.52       + 198.0       2.00       12.94         1148       6.92       9.2       334.6       3.9       0.44       + 191.1       206       12.94         1148       6.84       9.1       325.0       3.8       0.43       + 196.9       2.00       12.94         1153       6.79       9.3       323.2       4.0       6.45       +178.8       260       12.94         1158       6.716       9.2       319.4       3.9       0.44       +173.3       200       12.94         1203       6.716       9.3       321.5       3.9       0.43       +171.4       2.00       12.94         1204       9       9 <td>NTU +/- 10%</td> <td>Drawdown ft &lt; 0.33</td> <td>mL/min *</td> <td>mV +/- 10mV</td> <td>ppm +/- 10%</td> <td>% sat. +/- 10%</td> <td>uS/cm +/- 3%</td> <td>°C NA</td> <td>units +/- 0.1</td> <td>min 3-5 min</td>	NTU +/- 10%	Drawdown ft < 0.33	mL/min *	mV +/- 10mV	ppm +/- 10%	% sat. +/- 10%	uS/cm +/- 3%	°C NA	units +/- 0.1	min 3-5 min
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		12 01		e readings	or the last three	on parameters f	Stablizatio	1		1122
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	1203	12.99	200	+ 219.5	462	422	253.1	9.2	6.85	1128
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	3.90	12.94	200	+204.5	0.69	6.1	358.7	9.1	7.13	1133
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	3.11	12.94	200	+ 198.0	0.52	4.6	354.4	9.2	7.11	1138
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	3.23	12.94	200	+191.1	0.44	3.9	334.6	9.2	6.92	1143
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	3.18	12.94	200	+186.9	0.43	3.8	325.0	9.1	6.84	1148
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	3.41	1294	200	+178.8	0.45	4.D	323.2	9.3	6.79	1153
1203       6.76       9.3       321.5       3.9       0.43       +171.4       2.00       12.94       1         1204       1	3.33	12.94	200	+173.3	0.44	3.9	319.4	9.2	6.76	1158
Total Pump Time (min):     37     Total Purge Volume (gal):     0.0     Reviewed by:     04-3       Weather:     SUNNY', 46°F     04-3	3.37	12.94	200	+171.4	0.43	3.9	321.5	9,3	6.76	1203 1204
Fotal Pump Time (min):     37     Total Purge Volume (gal):     2.0     Reviewed by:     7       Weather:     SUNNY',     46°F     104-2       Comments:										
Weather: <u>SUNNY</u> , 46°F Comments:	_	A	Reviewed by:		2.0	olume (gal) :	Total Purge V	37	me (min):	Fotal Pump Ti
	14-21	04-						, 46°F	Sunny	Weather: Comments:
Bottles Filled Preservative Codes: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCI F			- HCI F	04 D-NaOH E	INO3 C-H2SC	A-NONE B-H	ive Codes:	Preservat	Filled	Bottles
Quantity         Size         Type         Preservative         Pre	iltered Y/N	Preservative Code	Туре	Size	Quantity	Filtered Y/N	Preservative Code	Туре	Size	Quantity
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$						2222	8 A A	HDPE	12 125m1 250m1	2

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Laboratory Se	nta ervices accernat		Mon	Consumers En itoring Well S	nergy Compar ampling Worl	ny ksheet			
Well ID     JHC     MW-15023     Date     4.12.21     Control Number     21.044b       Location     JH     Cumpbell     Well Material:     PVC     SS     Iron								(4 - 0) Galv. S	teel
Purge Metho	d: 🔀	Peristaltic		Submersible		Fultz		Bailer	
Depth to Wat	ter Tape: 🗧	solinst	S/N	3798	51				_
QC SAMPLE:	r	VIS/MSD	DUP-		Sonde ID:	11M	<b>15</b> H	<b>1</b> 9M	20G
Depth-to-wat	ter T/PVC (ft)	17.62	Depth-To-E	ottom T/PVC	(ft)	-	Completed b	ame	-
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%
1841		1	Stubilizati					17.62	
1942	674	111	au 3	231	7. 29	+219 6	2 00	17.62	2 214
1847	5.34	10.9	au )	18	0.85	12363	200	1762	360
1857	525	109	966	6.8	674	17471	200	1762	347
1957	C 21	10.9	104.8	60	010	+243.5	200	1762	241
1902	E18	10.8	106.8	6.5	071	12436	200	17.62	3(7)
1907	5.21	10.5	1081	66	0.11	12429	200	17.62	201
1908	~ ~	10.4	100.	0.0		121	200	11.0-	2.11
		20						0/-	
Total Pump Ti	me (min):	of I	Total Purge V	olume (gal) :	1.4		Reviewed by:	T	
Comments:	Sunnh	520				***		Jorg	-24-21
		1							
Bottles	s Filled	Preserva	tive Codes:	A-NONE B-	HNO3 C-H2S	04 D-NaOH E	- HCI F		
Quantity	Size	Type	Preservative Code	Filtered Y/N	Quantity	Size	Type	Preservative Code	Filtered Y/N
2	IL	HOPE	B	N	quantity	Unit	1160		
/ 1	125ml	T	B	N					
	25001		A	N					
Pump rate shou	ild be <500 mL/m	nin for low-flow a	nd <1 aal/min for	hiah Volume.					t

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Laboratory S	orts ervices occlence		Moni	Consumers En itoring Well Sa	ergy Compar ampling Worl	ny ksheet					
WellID Location	1W-15025 JH Car	npbell	Date         4.13.21         Control Number         2(-0446.03-10)         -11           Well Material:         PVC         SS         Iron         Galv. Steel								
Purge Metho	d: X	Peristaltic		Submersible		] Fultz Bailer					
Depth to Wa	ter Tape:	olinst	S/N	31985	51			_			
QC SAMPLE:	X	vis/MSD	DUP-		Sonde ID:	11M	15H	19M	20G		
Depth-to-wa	h-to-water T/PVC (ft) 12.12 Depth-To-Bottom T/PVC (ft) Completed by anw										
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%		
1024				n purumeters j	or the lust thre			12.12			
1025	609	77	2799	247	2.22	+7467	2.00	1212	242		
1030	1.98	79	2012	1051-	200	1229 8	200	12.12	2.45		
1035	7.70	76	2773	5.0	D13	12207	200	12.12	2.91		
1000	1.25	75	210.0	75	0.00	+230, (	200	12.12	341		
1045	6.80	1.7	2580	80	1.00	7220.0	200	12.12	241		
1010	626	1.5	250.0	151	1.21	12100	2.00	12.12	252		
INCE	6.10	15	255.5	10.9	129	+ 213.1	200	12.12	2.50		
1000	6.12	1.5	251.0	12 1	146	+215.	200	12 12	246		
1100	6.12	10	2011	12.7	1.70	1211.6	200	12.10	2.90		
1105	677	75	251.9	120	1.50	+210.0	200	12.14	1.51		
111	4.12	(. 5	654.5	15.0	1.20	+ 409.0	200	12.12	2.20		
Total Pump T	ime (min):	47	Total Purge Vo	olume (gal) :	2.5		Reviewed by:	A			
Weather: Comments:	Sunny	j, 46°r	2					Jou.	-24-21		
Bottle	s Filled	Preservat	tive Codes:	A-NONE B-H	1NO3 C - H2S	04 D-NaOH E	- HCl F				
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N		
~~~~	125ml	HOPE	BA	NN							
3	250 100,127										
* Pump rate sho	uld be <500 mL/m	nin for low-flow a	nd <1 gal/min for l	high Volume.							

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Laboratory Se	PILS Prvices		( Moni	Consumers En itoring Well Sa	ergy Compan ampling Worl	y «sheet					
Well ID Location	tc MW- )H (ampb	15026	Date <u>4.(</u>	3.21 Well Material		Control Num	umber <u>21-0446-04</u> Iron Galv. Steel				
Purge Method	d: 🔀	Peristaltic		Submersible		Fultz		Bailer			
Depth to Wat	er Tape: 🖇	olinst	S/N	: 37985							
QC SAMPLE:	N	ns/msd	DUP-		Sonde ID:	11M	15H	X 19M	20G		
Depth-to-wat	er T/PVC (ft)	13.85	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% Stablizatic	+/- 10% on parameters f	+/- 10% or the last thre	+/- 10mV e readings	*	< 0.33	+/- 10%		
0916								13.85			
0917	5.79	8.7	96.7	51.6	5.43	+165.3	200	13.85	5.34		
0922	5.68	8.6	88.9	28.5	3.26	1187.0	200	12.85	4.59		
0927	5.62	8.5	82.6	27.1	3.11	+205.7	2.00	13.85	4.27		
0932	5.60	8.5	83.2	26.9	3.10	1215.1	2.00	13.85	5.21		
0937	561	8.5	839	27.0	3.11	+ 220.8	2.00	13.85	4.87		
0942	5.62	8.5	84.1	27.1	3.12	+224.3	200	13.85	5.01		
0943											
Total Pump Ti	me (min):	2	Total Purge V	olume (gal) :	1.4		Reviewed by:	F			
Weather:	Sunna'	440F	2					104-	24-21		
Comments:								V			
Bottles	; Filled	Preserva	tive Codes:	A-NONE B-H	1NO3 C - H2SC	04 D-NaOH I	E-HCIF				
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N		
2	16	HOPE	B	N							
	125MI		6 A	N							
	1,000			N	/						

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Laboratory Se A CENTURY OF EAC	ervices		Moni	Consumers En itoring Well S	ergy Compan ampling Work	y ksheet					
Well ID	HC MW-	15027	Date 4,1	3.21		Control Num	ber 21-04	46-05			
Location	JH Camp	bell		Well Materia	I: PVC	SS	Iron	Galv. S	teel		
Purge Metho	d: 🗶	Peristaltic		Submersible		Fultz		Bailer			
Depth to Wat	ter Tape: 5	olinst	S/N	37985	1 +		_				
QC SAMPLE:		ns/msd	DUP-		Sonde ID:	11M	15H	19M	20G		
Depth-to-wat	ter T/PVC (ft)	14.22	Depth-To-B	ottom T/PVC	(ft)	t) Completed by					
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%		
OP13			Stubilzuti	n parameters j	or the last three			1422			
6814	4.91	8.0	21.2	41.1	4.73	1188.2	2.00	14.22	69.10		
0819	4.67	80	235	23.2	269	+210.5	200	14.22	28.14		
0824	5.27	8.0	47.5	18.3	2.13	A170.1	200	14.22	8.04		
0829	5.35	8.0	51.8	17.6	2.05	411058	200	14.22	784		
0834	5.51	8.6	62.3	16.3	1.89	149.3	200	14.22	5.32		
6839	5.61	8.D	68.5	15.7	182	+140.7	200	14.22	5.64		
0844	5.68	8.0	74.1	15.2	1.79	+132.4	200	14.22	5.17		
0849	572	8.D	75.0	15.1	1.76	+132.6	200	14.22	5.66		
0054	5.74	7.9	75.7	15.1	1.75	+130.7	200	14.22	571		
0855											
Total Pump T	ime (min):	37	Total Purge V	olume (gal) :	20		Reviewed by:	F			
Weather:	SUNNU	1 430	F	(0-7)	0.0			04-	24-21		
Comments:		3) 02						J			
Bottle	s Filled	Preservat	ive Codes:	A-NONE B-I	HNO3 C - H2SC	D4 D-NaOH E	- HCI F				
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N		
2	1L	HOPE	B	N							
1	162MI		X	N							
i	250m1	1	A	N		ž					
* Pump rate shou	uld be <500 mL/m	in for low-flow a	nd <1 gal/min for i	high Volume.							

Laboratory Services Consumers Energy Company A CENTURY OF EXCELLENCE Monitoring Well Sampling Worksheet										
Well ID	HC-MW I	5028	Date 4.	2.21		Control Num	ber 21.04	46.06 -0	7	
Location	SH Camp	bell		Well Materia	I: X PVC	SS	Iron	Galv. S	teel	
Purge Metho	d: 🔀	Peristaltic		Submersible		] Fultz		Bailer		
Depth to Wat	ter Tape: 🔰	olinst	S/N	: 3798	51		_		1.000	
QC SAMPLE:	N	ns/msd [	X DUP-	02	Sonde ID:	Sonde ID: 11M 15H 19M [				
Depth-to-wat	er T/PVC (ft)	14.02	Depth-To-B	ottom T/PVC	(ft)	Completed by 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%	+/- 10%	+/- 10mV	*	< 0.33	+/- 10%	
1110			Stablizati	on parameters f	or the last thre	e readings		14.02		
(110	8.60	9.9	137.6	441	485	+211.0	200	1402	8.12	
1725	872	95	122 6	29.6	441	1198.5	200	dmw 4.122	639	
1730	8.16	9.4	121.0	40.3	4.50	1185.3	200	14.02	4.97	
1735	810	9.3	127.9	417	4.61	+181.4	200	14.02	4.76	
1740	7.92	9.3	122.5	42.9	4.80	+176.7	2.00	14.02	4.90	
1745	7.73	9.4	118.3	44.5	4.98	+11.3	200	1402	5.1b	
1750	7.64	9.3	116.7	45.2	5.06	+170.3	200	14.07	5.22	
1755	7.61	9.4	115.3	46.5	5.19	+167.7	200	14.02	5.31	
0001	7.56	9.2	114.4	46.0	5.16	+166.8	200	14.02	5.29	
1861										
1										
		112			- 0					
Total Pump Ti	me (min):	41	Total Purge V	olume (gal) :	2.0		Reviewed by:	-Y-		
Weather:	Sunny	1 .71.4						1 09-3	24-21	
comments:										
Bottles	s Filled	Preserva	tive Codes:	A-NONE B-H	1NO3 C - H2S	04 D - NaOH J	F-HCLE-			
Dottie	Tineu	T COCT VU	Preservative					Preservative		
Quantity	Size	HDPC.	Code	Filtered Y/N	Quantity	Size	Туре	Code	Filtered Y/N	
2	125 m)	I	B	N						
2	Ţ		A	N						
2	250 ml	Y	A	N		1				

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Laboratory Se	Prices		Mon	Consumers En itoring Well Sa	ergy Compan ampling Work	y sheet				
Well ID Location	ield B	BLANK	Date     4.13.21     Control Number     21.0446.08       Well Material:     PVC     SS     Iron     Galv. Steel							
Purge Metho	d:	Peristaltic		Submersible		Fultz		Bailer		
Depth to Wat	ter Tape:		S/N	:	+					
QC SAMPLE:		MS/MSD [	DUP-		Sonde ID:	11M	<b>15H</b>	19M	20G	
Depth-to-wat	ter T/PVC (ft)		Depth-To-B	ottom T/PVC	(ft)	_	Completed b	y amos		
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	I NA	+/- 3% Stablizati	on parameters j	for the last three	e readings	*	< 0.33	+/- 10%	
1100										
								0		
Total Pump T	ime (min):	-	Total Purge V	olume (gal) :	-		Reviewed by:	×		
Weather:								104.	24-21	
Comments:								U		
Bottle	s Filled	Preserva	tive Codes:	A-NONE B-	HNO3 C - H2SC	04 D - NaOH	E - HCI F			
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N	
2	16	HOPE	B	N						
	125ml		LS A	N						
	250 ml		A	N		*				
* Pump rate show	uld be <500 mL/n	nin for low-flow a	and <1 gal/min for	high Volume.						

Laboratory S	GELLENGE		Mon	Consumers En itoring Well S	ergy Compan ampling Worl	iy ksheet			
Well ID Location Purge Metho	SH Cur	Peristaltic	Date <u>4.</u>	3.2 Well Materia Submersible	I: PVC	Control Num	ber <u>21-04</u> Iron	K46-09       Galv. S       Bailer	teel
Depth to Wa	ter Tane:		S/N						
QC SAMPLE:		ws/msd	DUP-		Sonde ID:	11M	15H	19M	20G
Depth-to-wa	iter T/PVC (ft)		Depth-To-B	ottom T/PVC	(ft)	÷	Completed b	y_dmw	
Time	pH	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 +/- 10%	mV +/- 10mV	mL/min *	Drawdown ft < 0.33	NTU +/- 10%
1216									
Total Pump 1 Weather: Comments:	rime (min):	-	Total Purge V	'olume (gal) :	-		Reviewed by:	04	- -24_24
Bottle	es Filled	Preserva	tive Codes:	A - NONE B -	HNO3 C - H250	D4 D - NaOH	E - HCI F		
Quantity 2 1	Size 1L 125 Ml 125 Ml	Type Htbpe	Preservative Code B B A	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
* Pump rate sho	ould be <500 mL/m	nin for low-flow d	and <1 gal/min for	high Volume.				1	

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Laboratory S	anita ervices		Mon	Consumers En itoring Well Sa	ergy Compan Impling Worl	y (sheet			
Well ID M	W . 15006		Date 4-13-	1C.		Control Num	ber 21-044	5-01	
Location	HC.			Well Material	: VPVC	SS	Iron	Galv. S	teel
		Deviateltia		Cubmonible		Eules .	_	Pailor	
Purge Metho		Peristantic	S/N		1.1	Fullz		Daller	
QC SAMPLE:		VIS/MSD	DUP-	. 1220(11)4	Sonde ID:	11M	15H	19M	V 20G
Depth-to-wa	ter T/PVC (ft)	35.21	Depth-To-B	ottom T/PVC	(ft)	_	Completed b	y_CET	
Time	pH	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity
			-					Duraudaum fr	AITL
3-5 min	+/- 0.1	NA	uS/cm +/- 3%	% sat. +/- 10%	ppm +/- 10%	mV +/- 10mV	mt/min *	< 0.33	+/- 10%
			Stablizati	on parameters f	or the last thre	e readings		14, 2% L	
1744							200	335.21	
1746	7.55	15.1	784	13.6	1.37	64.0	200	35.21	125.50
1751	7.58	15.3	783	12.3	1.22	52.6	200	35.21	110.36
1756	1.56	19.0	784	11.2	1.04	43.4	200	35.21	59.88
1801	7.57	23.5	.140	5.6	0.73	56.0	200	35.21	26.52
1406	2.60	22.8	780	7.2	0.62	58.0	200	35.21	14.57
1411	7.59	13.7	717	61	0.52	60 · C	200	35.21	10.69
1816	7.60	23.9	777	5.5	0.46	59.5	202	35.21	8.84
1821	7.61	24.3	785	4.2	0 35	46.3	200	35.21	8.03
1826	7.64	21.4	792	33	6.29	04	200	35.21	5.66
1431	2.65	18.4	790	2.8	0.25	-0.2	200	35.21	4.69
1536	1.66	18.0	793	2.9	0.27	- 6.9	200	35.21	4.29
1437				1					1
1346									
Fotal Pump T	ime (min): C	2	Total Purge V	olume (gal) : ř	22.75991		Reviewed by	Y	
Weather:								104-2	14-21
comments:		6						V	
					_				
Bottle	s Filled	Preserva	tive Codes:	A-NONE B-I	1NO3 C - H25	04 D - NaOH	E - HCI F		
Quantity	Size	Type	Preservative Code	Filtered Y/N	Quantity	Size	Type	Preservative Code	Filtered Y/N
2	10ant	HOPE	E	N					
1	SUCIL		1						
3	125ml		6						
3	1	1	K	L .		1000 miles			

Laboratory S	Services		Mon	Consumers En itoring Well Sa	ergy Compan ampling Worl	iy ksheet			
Well ID Location Purge Methe	DHC-MW JHC P	- 15007 INP A Peristaltic	Date <u>4.13-21</u> Control Number <u>21-0445.02</u> Well Material:     PVC     SS     Iron     Galv. Steel       Submersible     Fultz     Bailer						
Depth to Wa	iter Tape:		S/N	:					
QC SAMPLE	N	/IS/MSD	DUP-		Sonde ID:	11M	<b>15H</b>	19M	20G
Depth-to-wa	iter T/PVC (ft)	Dry	Depth-To-B	ottom T/PVC	(ft)	-	Completed b	у	
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% Stablizati	% sat. +/- 10% on parameters f	ppm +/- 10% for the last thre	mV +/- 10mV e readings	mL/min *	Drawdown ft <0.33	NTU +/- 10%
	NOSO	imple							
	well	Dry							
							÷		
Total Pump	Time (min):	-	Total Purge V	olume (gal) :	-		Reviewed by:	×	
Weather: Comments:								104-	24-21
Bottle	es Filled	Preservat	ve Codes:	A - NONE B - H	INO3 C - H2SC	D4 D - NaOH I	- HCI F		
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
* Pump rate sho	uld be <500 mL/m	in for low-flow ar	d <1 gal/min for	high Volume.		1			)

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Laboratory Se	ervices ervices		Mon	Consumers En itoring Well Sa	ergy Compan ampling Worl	iy ksheet			
Well ID <u>140</u> Location <u>1</u>	C-MW-1 HC-Por	BOOR	Date <u>4</u>	13 · 2021 Well Material	PVC	Control Numl	per <u>21-04</u> ] Iron	<u>45-0</u> 3 Galv. S	teel
Purge Methoo	d:	Peristaltic	V	Submersible		Fultz		Bailer	
Depth to Wat	er Tape: 6	as/msp	S/N	DI 1003	Sonde ID:	11M	15H	[]19M	20G
Depth-to-wat	er T/PVC (ft)	43.23	Depth-To-B	ottom T/PVC	(ft) 47.6	0_	Completed by	V_CUH	
Time	pH	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 +/- 10%	mV +/- 10mV	mL/min *	Drawdown ft < 0.33	NTU +/- 10%
			Stablizatio	on parameters f	or the last thre	e readings			
0820		S					120	43.23	
0830	7.00	14.6	798	10.8	1.10	-22.5	120	43.23	60.43
0835	TOLP	14.2	797	11.4	1.17	+7.3	120	43.23	37.14
0840	7.04	15.6	793	12.0	1.19	+17.7	120	43.23	29.63
0845	7.06	15.4	790	12.2	1-21	+23.9	120	43.23	21.400
0850	7.05	16.6	800	11.9	1.14	+45.8	120	43.23	18.63
0855	7.05	15.3	804	11.5	1.14	4416.9	120	43.23	18.95
0900	Þom	D Sto	paed	PUMP	ing		120	43.23	16.41
0910	7.06	18.5	401	10.3	0.59	450.10	120	43.73	9.41
Dais	7.06	18.6	801	10.0	052	+53.1	170	43.23	8.63
70920	collec	tel Sa	molo	C.	6.00				
60921	7.06	18.7	800	5.9	0.50	+55.Lp	120	43.23	7.41
Total Pump Ti	me (min):	19	Total Purge V	olume (gal) :	2.0		Reviewed by:	¥	
Weather:	40°F. 5	unal u	indu		-			104	-24-21
Comments:	Sil	ity purg	e water DUP-01	-		Pur	np @ mak	speed (	255)
Bottles	s Filled	Preservati	ve Codes:	A-NONE B-H	HNO3 C-H2S	O4 D - NaOH	- HCI F-		
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
2	125mL	HPDE	B	N					
2	V	1	A						
2	250mL		AR						
* Pump rate shou	Id be <500 mL/m	nin for low-flow an	nd <1 gal/min for	high Volume.					-

Laboratory S			Consumers Energy Company Monitoring Well Sampling Worksheet							
Well ID M	HC- 16004		Date 4.13	.21		Control Num	her 21-04	45-04		
Location	she pon	DA	Date <u>1 10</u>	Well Material	: PVC		lron	Galv. S	teel	
Purge Metho	od:	Peristaltic		Submersible		Fultz		Bailer		
Depth to Wa	ter Tape: G	eotech	S/N	:1003	-					
QC SAMPLE:		ws/msd	DUP-		Sonde ID:	11M	<b>15H</b>	19M	20G	
Depth-to-wa	ter T/PVC (ft)	Dru	Depth-To-B	ottom T/PVC	(ft)	-	Completed b	by		
Time	pН	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%	
		[	Stablizatio	on parameters f	or the last thre	e readings				
	WIII	Dry								
	NO	sampu								
							10000			
						1				
	-									
							1.20			
-										
		-					-			
1		1				1.60				
Total Pump T	ime (min):	-	Total Purge V	olume (gal) :	-		Reviewed by:	4		
Weather:								104	-24-21	
Comments:								0		
		-				-			1000	
Bottle	s Filled	Preservat	ive Codes:	A-NONE B-H	INO3 C-H2S	04 D - NaOH I	E - HCI F			
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N	
-										
			1 10 10 10 10 10 10 10 10 10 10 10 10 10							
Pump rate sho	uld be <500 mL/n	nin for low-flow ar	nd <1 gal/min for	high Volume.						

Description         Consumers Energy Company           Account of Exercision         Monitoring Well Sampling Worksheet											
Well ID <u>) 위(</u> Location <u>기</u> 년 Purge Metho	C-MW-15 HC POND	Peristaltic	Date <u>4.17</u>	Well Material Submersible	:PVC	Control Number 21-0445-05 SS Iron Galv. Steel					
OC SAMPLE:		AS/MSD	DUP-	: 1002	Sonde ID:	11M	<b>15H</b>	19M	206		
Depth-to-wa	ter T/PVC (ft)	DM	Depth-To-B	ottom T/PVC	(ft)		Completed by	/			
Time		Tomm	Sn Cond			000	Dump Pata	Water loval	Turbidieu		
min 3-5 min	рн units +/- 0.1	°C NA	uS/cm +/- 3%	% sat. +/- 10%	ppm +/- 10%	mV +/- 10mV	mL/min *	Drawdown ft	NTU +/- 10%		
	INCRIL .		Stablizati	on parameters f	or the last thre	e readings					
	NO S	ampre									
							-				
						1					
									_		
Tatal Duma T	line o (unin).		Tatal Dunce M	aluma (asl) :			Deviewed ku	10			
Weather: Comments:		-	Total Purge v	olume (gal) :		-	Reviewed by:	10	(-24-21		
Bottle	s 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/N		
* Pump rate sho	uld be <500 mL/m	hin for low-flow a	nd <1 gal/min for	high Volume.		-					

rs Energy

Laboratory S	Services		Consumers Energy Company Monitoring Well Sampling Worksheet								
Well ID M	N 15011		Date A-13	-31		Control Num	iber 21 - 044	s-ple			
Location 🖄	<i>к</i> С.			Well Material	PVC	SS	Iron	Galv. S	teel		
Purge Metho	od:	Peristaltic	$\checkmark$	Submersible		Fultz		Bailer			
Depth to Wa	ater Tape: Sol	ten	S/N	1: 12202454	17-1						
QC SAMPLE:	· 🗌 I	MS/MSD	DUP-		Sonde ID:	11M	15H	19M	V 20G		
Depth-to-wa	ater T/PVC (ft)	38.87	Depth-To-E	Bottom T/PVC	(ft) Completed			DY 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%		
1000			Stablizati	on parameters f	or the last thre	ee readings	1100	1000			
1101			1	120			400	31.81	2120		
1902	7.65	15.8	577	16.0	1.48	36.1	900	31.71	24.59		
1901	3118	14,1	577	4.3	0,44	62.1	400	39.97	5.15		
1912	7,18	14.1	572	4.0	0.43	52.7	400	38.87	4.90		
1917	1.18	14.1	568	4.0	0.41	48,1	400	38.87	5.18		
1922	1.17	14.1	563	4.1	6.42	43.0	406	38.97	500		
1423											
1928											
									· · · · · · · · · · · · · · · · · · ·		
						-					
_											
					_	1		-			
College Dave S	1										
otal Pump	Time (min): )	.7	Total Purge V	′olume (gal) : ≍	~2.2.5gal		Reviewed by:	X			
Neather:								104-	24-21		
Comments:								v			
								-			
Bottle	es Filled	Preserva	ative Codes:	A-NONE B-H	INO3 C - H2S	04 D - NaOH	E - HCI F				
			Preservative		and the second			Preservative			
Quantity	Size	HD16	Code	Filtered Y/N	Quantity	Size	Туре	Code	Filtered Y/N		
1	[4]	1	A	7							
1	socal		1						-		
2	loceme		E	1							

Continuent East Can Laboratory S	ionthe Services		Moni	Consumers En itoring Well Sa	ergy Company ampling Works	/ sheet			
Well ID	FB-01	1.	Date 4.1	3.21		Control Num	ber 21.0	445.08	
Location	JHC PO	nd A		Well Material	: PVC	SS	Iron	Galv. S	iteel
Purge Meth	od:	Peristaltic		Submersible		Fultz		Bailer	
Depth to Wa	ater Tape:		S/N						
QC SAMPLE:	: 🚺 N	is/MSD	DUP-		Sonde ID:	11M	15H	19M	20G
Depth-to-wa	ater T/PVC (ft)		Depth-To-B	ottom T/PVC	(ft)	-	Completed b	Y	
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%	+/- 10%	+/- 10mV	*	< 0.33	+/- 10%
nara	Colled	Led	FILD	RIANK	»	Teadings			
VICI		4 000	6 TUP	Oluri					
			-						
			-						
1									
	-								
									-
	1								
Total Pump	Time (min):	-	Total Purge V	olume (gal) :	-		Reviewed by	×	
Weather:								loy.	24-21
Comments:	Al.							V	
Bottle	es Filled	Preserva	tive Codes:	A - NONE B - H	INO3 C - H2SO	4 D-NaOH I	E-HCIF		
Quantity	Size	Type	Preservative Code	Filtered Y/N	Quantity	Size	Type	Preservative Code	Filtered Y/N
1	125mL	HDDE	B	N	quantity	ULC	1162		1
I	125mL	T	A	T	1				
1	250ml		A						
1 -	-L	V for low flow	15						

Laboratory Se	ervices		Consumers Energy Company Monitoring Well Sampling Worksheet							
F	B-DI		4-1	3-21		o	21-041	16.09		
Well ID Location	JHC PC	ind A	Date _	Well Material	: PVC		Iron	Galv. S	teel	
Purge Metho	d:	Peristaltic	$\checkmark$	Submersible		Fultz		Bailer		
Depth to Wat	er Tape:		S/N	:					-	
QC SAMPLE:	M	s/msd	DUP-		Sonde ID:	11M	<b>15</b> H	19M	20G	
Depth-to-wat	er T/PVC (ft) _		Depth-To-B	ottom T/PVC	(ft)	-	Completed b	у		
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 +/- 10%	mV +/- 10mV	mL/min *	Drawdown ft < 0.33	NTU +/- 10%	
			Stablizati	on parameters f	or the last thre	e readings				
0610	collec	ited E	B-01	on su	ib pri	mp				
				_				-		
						-				
						-				
									-	
Total Pump Ti	ime (min):	-	Total Purge V	olume (gal) :	-		Reviewed by	×		
Weather:								1 04	1-24-21	
Comments:								V		
Bottle	s Filled	Preservat	ive Codes:	A-NONE B-I	HNO3 C - H250	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	HDPE	В	N						
1	125 mL	1	A	1						
1	250mL		A							
2	1-1	V	B	V		2				
Pump rate shou	uld be <500 mL/mi	in for low-flow a	nd <1 gal/min for	high Volume.						

Page 1 of 1

Laboratory S	ervices etterde		Consumers Energy Company Monitoring Well Sampling Worksheet								
Well ID <u>m</u> Location	w-14s	ntal	Date <u> </u>	<u>154 – 01</u> Galv. S	teel						
Purge Metho	od:	Peristaltic		Submersible		] Fultz		Bailer			
QC SAMPLE:	ter Tape: 🧲	AS/MSD	DUP-	: 1003 08	Sonde ID:	11M	15H	19M	20G		
Depth-to-wa	ter T/PVC (ft)	9.05	Depth-To-B	ottom T/PVC	(ft) <u>13.25</u>		Completed b	y lit			
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 +/- 10%	mV +/- 10mV	mL/min *	Drawdown ft < 0.33	NTU +/- 10%		
INTH			Stablizati	on parameters	for the last thre	e readings	120	a			
1050	1.00	01.	29.2	1.7	1 - 1 - 0		120	9.73	370		
1100	6.09	0.4	21.2		0,18	T122.1	120	9.15	2.20		
1110	5.64	8.4	26.9	5.9	0.69	+120.5	12.0	972	2109		
MIC	559	9.1	25,3	5.9	0.107	+137.6	120	9.73	2.45		
1120	5.50	8-1	24.9	59	0.109	+144.9	120	9.73	2:22		
1125	5.50	8.10	24.9	50	0.49	+145.1	120	9.73	2.32		
1130	5.48	8.4	24.8	5,9	610	11414.7	120	9.73	2.34		
113	contect	ed Sa	mples								
Total Pump T	ime (min):	40	Total Purge V	olume (gal) :	~1.3		Reviewed by:	¥			
Weather: Comments:	Collec	ted Fi	eup Duf	)				09,	24-21		
Bottle	s Filled	Preserva	tive Codes:	A - NONE B -	HNO3 C-H2S	O4 D-NaOH E	- HCI F				
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N		
1+1=2	125mL	HDPE	B	N	1-+1=2	1-1-	HOPE	B	N		
17122	125mL	1	A	N	L	P.C.	HOVE	13	N		
1-11=2	250mc	L	A	N		1 1					
' Pump rate sho	uld be <500 mL/m	in for low-flow a	nd <1 gal/min for	high Volume.							

Laboratory :	Services		Mor	Consumers Er nitoring Well S	ergy Compan ampling Wor	ny ksheet			
Well ID <u>92</u> Location <u></u>	-245 HC		Date <u>4-14</u>	Well Materia		Control Num	ber <u>21-64 (</u> Iron	Galv. S	iteel
Purge Meth Depth to W	od:	Peristaltic	Submersible Fultz Bailer						
QC SAMPLE	:	MS/MSD	DUP-	1000	Sonde ID:	11M	15H	19M	V 20G
Depth-to-wa	ater T/PVC (ft)	7.34	Depth-To-	Bottom T/PVC	(ft)	-	Completed b	Y_(65	
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 +/- 10%	mV +/- 10mV	mL/min *	Drawdown ft < 0.33	NTU +/- 10%
1876	1		Stablizati	ion parameters f	or the last thre	e readings	140	7.41	
1828	7.03	7.7	38.6	27.0	3.23	-19.3	240	7.41	2.53
is33	5.86	7.6	32.5	32.4	3.86	107.7	240	7,41	2.24
1838	5.56	7.5	20.4	26.8	3.21	132.5	240	7.41	2.60
1843	5.54	7.6	20.9	26.2	3.14	131.3	\$ 20240	7.41	3.74
1448	5.04	1.5	31.2	25.7	3.08	126.9	240	7.41	3,74
1853	5.55	7.6	21.8	25.1	3.01	119.6	240	7.41	3.33
1858	5.56	7.5	22.0	25.3	3.03	117.3	240	7.41	4.70
1859			1						
1910									
otal Pump	Time (min): U		Total Purge V	(olume (gal) •	~ 1 () m		Reviewed by:	X	
Veather: Comments:		1			a ie ga			000	1-24-21
Bottle	es Filled	Preserva	tive Codes:	A-NONE B-H	INO3 C - H2S0	D4 D-NaOH E	- HCI F -		
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N
1	125mL	HDPE	E	У	2	1000ml	MPPE	E	N
1	-1		± A	N					
	-		A						

			Mor	hitoring Well S	Sampling Wor	ksheet					
Well ID P2	1-40s		Date <u>4-14</u>	Date <u>4-14-20</u> Control Number <u>21-0454-93</u>							
Location	THC		Well Material: VPVC SS Galv. Steel								
Purge Meth	od: 🗸	Peristaltic		Submersible Fultz Bailer							
Depth to W	ater Tape: So	linst	S/M	1: 122009	547-1	_		_			
QC SAMPLE	:	MS/MSD	DUP-		Sonde ID:	11M	15H	19M	20G		
Depth-to-wa	ater T/PVC (ft)	10.70	Depth-To-E	Bottom T/PVC	: (ft)	_	Completed b	by <u>CE T</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%	+/- 10%	+/- 10mV	*	< 0.33	+/- 10%		
	1	1	Stablizat	ion parameters	for the last thre	ee readings	1 21/0				
3031				1.000	0.00	12.9.11	240	10171			
2000	5.58	7.0	29.0	24.8	2.88	152.9	240	10.71	9.20		
2038	5.2.2	7.1	22.4	4.8	0.58	174.1	240	10.71	6.71		
2043	5.22	1.0	21.7	4.3	0.55	176.1	240	10.71	5.17		
2044	5.21	6.9	20.4	4.3	0.52	178.2	240	10.71	4.63		
2053	5.22	6.9	201	4.1	0.48	179.3	240	10.71	4.78		
1055	5.21	6.9	19.6	4.1	0.49	180.4	240	10 71	457		
1059		0						1	11.52		
2112					-						
2110				1							
						-					
	-					-					
_									_		
-											
								0			
otal Pump	۲ime (min): 식	1	Total Purge V	olume (gal) : :	= 2.0 nal		Reviewed by:	×			
Weather:	100				J			04-2	4-21		
Comments								V			
Bottle	as Filled	Prosonus	tive Codes:	A NONE R		DA D NOON					
botti		rieserva	Preservative	A-NONE D.	105 6-123			Preservative			
Quantity	Size	Туре	Code	Filtered Y/N	Quantity	Size	Туре	Code	Filtered Y/N		
2	100ml	HOPE	E	N ,							
	1251		4								
	1 Jan		A			-					



## Appendix D Second Semiannual Monitoring Report



2021 Semiannual Groundwater Monitoring Report and Fourth Quarter 2021 Hydrogeological Monitoring Report

JH Campbell Power Plant Pond A CCR Unit

West Olive, Michigan

January 2022

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

**Prepared For:** Consumers Energy

Prepared By: TRC 1540 Eisenhower Place Ann Arbor, Michigan 48108

Kristin Lowery, E.I.T. Project Engineer



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Table 7	Summary of Groundwater Exceedances – Fourth Quarter 2021

#### **FIGURES**

Figure 1	Site Location Map
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- Figure 2 Figure 3 Site Plan with CCR Monitoring Well Locations Groundwater Contour Map – October 2021



#### **APPENDICES**

- Appendix A Data Quality Review
- Appendix B October 2021 Assessment Monitoring Statistical Evaluation
- Appendix C GSI Time Series Charts
- Appendix D October 2021 Laboratory Reports
- Appendix E October 2021 Field Notes



### **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 Michigan Department of Environment, Great Lakes, and Energy (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 2021 Semiannual Groundwater Monitoring Report and Fourth Quarter 2021 Hydrogeological Monitoring Report for the JH Campbell Pond A CCR Unit (Semiannual Report) to cover the semiannual groundwater monitoring conducted in October 2021 to comply with the CCR Rule and the Pond A HMP and AMP. 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. Pond A remains in assessment monitoring.

#### 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 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 14, 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 submitted a site-wide remedial action plan (RAP) for the JH Campbell site on September 30, 2021, 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 since fourth quarter 2019. 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 fourth quarter 2021 Pond A HMP and AMP event, which also serves as the second semiannual assessment monitoring event for 2021 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 at elevations ranging from 604 feet near the background wells to 590 feet along the southeast corner of the Dry Ash Landfill and south of the former Ponds 1-2 and Pond A CCR surface impoundments and generally flows to the south-southeast toward the Pigeon River. The subsurface materials encountered at the JH Campbell site generally consist of approximately 40 to 60 feet of poorly graded, fine-grained lacustrine sand. A laterally extensive clay-rich till is generally encountered within approximately 40 to 60 ft bgs across the site that according to deep drilling logs conducted at the JH Campbell Power Plant (just west of the CCR units) is on the order of 80 feet thick and extends to the top of shale bedrock approximately 140 ft bgs.



## 2.0 Groundwater Monitoring

#### 2.1 Monitoring Well Network

The established groundwater monitoring network for Pond A currently consists of 11 monitoring wells (six background monitoring wells and five downgradient monitoring wells) 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 five downgradient wells (JHC-MW-15006, JHC-MW-15007R, JHC-MW-15008R, JHC-MW-15009R, and JHC-MW-15011R) 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 2021 Assessment Monitoring

Consumers Energy personnel performed gauging and sampling of monitoring wells associated with Pond A from October 19 through 22, 2021. Groundwater monitoring was performed in accordance with the approved Pond A HMP and AMP and the *Sample and Analysis Plan* for JH Campbell Power Plant Pond A (SAP) (TRC, January 2021). Groundwater samples collected during the October 2021 event were submitted to Consumers Energy Laboratory Services in Jackson, Michigan, for analysis of the total metals and inorganic indicator constituents. Radium analysis was performed by Eurofins TestAmerica in St Louis, Missouri. Semiannual monitoring constituents include:

Section 11511a(3)(c) – Detection Monitoring Constituents	Section 11519b(2) – Assessment Monitoring Constituents
Boron	Antimony
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 226/228
	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 the October 2021 sampling event.

Consumers Energy collected quality assurance/quality control (QA/QC) samples during the October 2021 groundwater sampling event. The QA/QC samples consisted of one field blank, one equipment blank, two field duplicates (JHC-MW-15028 and JHC-MW-15007R), and two field matrix spike/matrix spike duplicate (MS/MSD) samples collected from JHC-MW-15008R and JHC-MW-15025.

#### 2.2.1 Analytical Data and Relevant Screening Criteria

Analytical results from the fourth quarter 2021 monitoring event are included in the attached laboratory reports (Appendix D). Fourth quarter 2021 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 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 2021 event using several wells throughout the RCRA CCR well network are provided on Table 1. October 2021 groundwater elevations were used to construct the groundwater contour map provided on Figure 3. The average hydraulic gradient of 0.0036 ft/ft was calculated using the following well pairs: JHC-MW-15026/PZ-23S, JHC-MW-15017/PZ-24S, and JHC-MW-15024/JHC-MW-15031 (Figure 2). Using the mean hydraulic conductivity of 62 ft/day (ARCADIS, 2016) and an assumed effective porosity of 0.4, the estimated average seepage velocity is approximately 0.56 ft/day or 200 ft/year for the October 2021 event.

The general groundwater flow direction is similar to that identified in previous monitoring rounds and continues to demonstrate that the downgradient wells are appropriately positioned to detect the presence of 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 2021 groundwater data in accordance with the assessment monitoring program. The statistical evaluation details are provided in Appendix B (*Statistical Evaluation of October 2021 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.

For the fourth quarter monitoring event, the replacement monitoring well data was pooled with the existing data set from each of the original respective monitoring wells for the purpose of statistical evaluation. Reference to the pooled data sets are denoted with the original well name followed by "/R" (e.g. JHC-MW-15011/R) to indicate that data from both the original and replacement well were used in the evaluation.

In general, the fourth quarter groundwater concentrations at the Pond A monitoring wells were generally consistent with or lower compared to previous quarters, in wells that were replaced and ones that were not. The following statistical evaluation is based on the confidence interval



analysis using a "rolling" data set collected over the past most recent eight events.

The fourth quarter 2021 statistical evaluation indicates that the statistically evaluated Part 115 constituents boron at JHC-MW-15011/R and vanadium at JHC-MW-15006 and JHC-MW-15011/R 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. Arsenic at JHC-MW-15011/R continued to be present at statistically significant levels at or above the GWPS through second quarter 2021. As shown in the data tables and trend tests included in Appendix B, arsenic concentrations at JHC-MW-15011/R have begun to decline in 2020 and 2021 such that the arsenic concentration at JHC-MW-15011R decreased to below the GWPS in third and fourth quarter 2021 and the lower confidence limit for JHC-MW-15011/R was below the GWPS in third and fourth quarter 2021.
- 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 vanadium concentration at replacement well JHC-MW-15011R decreased to below the GWPS in third and fourth quarter 2021; however, the lower confidence limit for the JHC-MW-15011/R dataset remained above the GWPS.
- Boron at JHC-MW-15011 was a new exceedance of the GWPS identified in second quarter 2021 and was confirmed in third quarter 2021 with the JHC-MW-15011/R dataset. Boron concentrations at monitoring well JHC-MW-15011 showed an initial increase in 2019, around the timing of the completion of Pond A capping activities and have remained generally stable in 2019 through 2021. A similar increasing boron concentration and statistically significant level above the GWPS was previously identified at JHC-MW-15010 following the Pond A cap installation. In June 2021, EGLE approval was obtained to remove JHC-MW-15010 from the Pond A monitoring program since it is no longer positioned hydraulically downgradient from Pond A. Both of these wells are located on the ends of Pond A and are most susceptible to influence from other potential upgradient CCR sources.

No other constituents were observed at statistically significant levels exceeding the GWPSs in downgradient monitoring wells at Pond A during the fourth quarter 2021. A summary of the confidence intervals for October 2021 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 the 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 as geochemistry changes occur and groundwater from other potential upgradient CCR sources reaches the Pond A well network, and many Appendix III and Appendix IV, and Part 115-specific constituents may be affected by this change, which, as discussed above, was observed with boron at JHC-MW-15010. 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 are 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 criteria in one or more of the Pond A wells (Table 4). Given that TDS and vanadium data at the Pond A monitoring wells are above the generic GSI criteria for several consecutive quarterly events, vanadium and TDS have been added to the list of constituents evaluated at the GSI compliance wells associated with the Pond A AMP. A summary of the GSI monitoring data are provided in Table 5.

Time-series plots for the GSI monitoring wells MW-13, MW-14S, PZ-24S, and PZ-40S, including assessment monitoring data collected from February 2020 through October 2021<sup>1</sup> 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 ( $\alpha$ ) of 0.01 per tail for each constituent/sampling point dataset to assess trends over the past 8 monitoring events (February 2020 through October 2021). 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. Trends were not calculated for TDS and vanadium because less than 8 monitoring events have been performed since these parameters were added to the GSI parameter list in second quarter 2021. Trend analysis will be performed accordingly once at least 5 more GSI sampling events have been conducted (8 monitoring events total).

All of the constituent concentrations at the GSI monitoring wells are below their respective Part 201 generic GSI criteria in October 2021 (Table 5) and there are no statistically significant trends based on the trend analysis (Appendix C).

<sup>&</sup>lt;sup>1</sup> 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 and arsenic concentrations continue to show improvement post-closure. In addition, boron and vanadium are present at statistically significant levels above 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.

As part of the development of the Remedial Action Plan under Agreement No. 115-01-2018, wetlands between Pond A and the Pigeon River were field delineated in May 2021. Water quality monitoring for the wetlands as GSI receptors will be incorporated into the monitoring program for the site-wide RAP. 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. The cessation of hydraulic loading and recharge of the aquifer are expected to have an influence on groundwater conditions as geochemistry changes occur and groundwater from other potential upgradient CCR sources reaches the Pond A well network, and many Appendix III and Appendix IV, and Part 115-specific constituents may be affected by this change. Groundwater monitoring will continue to 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.

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 2022. The next semiannual assessment monitoring event in accordance with §257.95 is scheduled for the second calendar quarter of 2022.



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# Tables

## Table 1 Summary of Groundwater Elevation Data – Fourth Quarter 2021 JH Campbell – Assessment Monitoring Program West Olive, Michigan

Well	Ground	тос	Geologic Unit	Scree	n In	iterval	October 19, 2021		
Location	Elevation	Elevation	of Screen	Ele	vat	ion	Depth to	Groundwater	
	(ft)	(ft)	Interval		(ft)		Water	Elevation	
	( )						(ft BTOC)	(ft)	
	617.01	610.00	Cond	602.0	to	502.0	10.00	600.08	
JHC-IMW-15023	613 70	619.98	Sand	606.8	to	593.0	19.00	600.98	
JHC-MW-15024	614 14	617 17	Sand	607.1	to	597.1	13.36	603.81	
JHC-MW-15026	615.09	618.04	Sand	607.1	to	597.1	15.11	602.93	
JHC-MW-15027	614.77	617.30	Sand	604.8	to	594.8	15.47	601.83	
JHC-MW-15028	611.02	613.80	Sand	603.0	to	593.0	15.06	598.74	
JHC-MW-15029	608.08	610.95	Sand	600.1	to	590.1	12.11	598.84	
JHC-MW-15030	604.05	607.17	Sand	600.1	to	590.1	10.32	596.85	
Pond 1N, 1S, 2N, 2S	3		<b>a</b> .						
JHC-MW-15001	607.02	609.53	Sand	603.5	to	598.5	D	ry	
JHC-MW-15002	618.18	621.27	Sand	590.2	to	580.2	25.35	595.92	
JHC-MW-15003	623.16	627.20	Sand	595.2	to	585.2	33.47	593.73	
JHC-MW-15005	606.22	609.99	Sand	579.2	to	569.2	18.50	591.49	
JHC-MW-18004	602.92	605.72	Sand	596.9	to	586.9	12.69	593.03	
JHC-MW-18005	600.30	603.16	Sand	595.3	to	585.3	11.90	591.26	
Pond 3N, 3S			<b>a</b> .				0 <b>-</b> 0 <i>1</i>		
JHC-MW-15013	632.40	635.25	Sand	604.4	to	594.4	35.91	599.34	
JHC-MW-15015	632.46	635.20	Sand	604.5	to	594.5	35.30	599.90	
JHC-MW-15016	631.81	632.52	Sand	603.8	to	593.8	33.71	598.81 <sup>(3)</sup>	
JHC-MW-18001	609.09	611.98	Sand	603.1	to	593.1	12.85	599.13	
JHC-MW-18002	605.53	608.93	Sand	602.0	to	592.0	9.67	599.26	
JHC-MW-18003	605.36	608.78	Sand	601.9	to	591.9	9.61	599.17	
Landfill			<b>a</b> .				10.10		
JHC-MW-15017	613.69	616.61	Sand	603.7	to	593.7	16.40	600.21	
JHC-MW-15018	614.26	617.02	Sand	604.3	to	594.3	17.05	599.97	
JHC-MW-15019	609.81	612.86	Sand	603.8	to	593.8	Decomm	issioned	
JHC-MW-15022	620.92	623.79	Sand	597.9	to	587.9	29.53	594.26	
JHC-MW-15031	632.94	635.87	Sand	599.9	to	589.9	43.65	592.22	
JHC-MW-15032	611.32	614.29	Sand	598.3	to	588.3	17.99	596.30	
JHC-MW-15033	618.08	620.99	Sand	602.1	to	592.1	23.03	597.96	
JHC-MW-15034	612.90	615.97	Sand	601.9	to	591.9	16.97	599.00	
JHC-MW-15035	632.53	634.28	Sand	599.5	to	589.5	41.11	593.17	
JHC-MW-15036	617.94	618.34	Sand	597.9	to	587.9	27.13	591.21	
JHC-MW-15037	614.28	616.06	Sand	591.3	to	586.3	25.55	590.51	
	604 74	607.50	Cond	500 7	40	E 0 0 7	25.01	501.67	
JHC-IMW-15000	624.74	627.30	Sand	599.7 602.8	to	502.9	JJ.91	091.07	
JHC-IMW-15007	625.72	629.26	Sand	505.7	to	592.0	27.00	501.2C	
JHC-IMW-15007R <sup>(1)</sup>	620.73	624.67	Sand	595.7	to	505.7	37.00	500.62	
JHC-IMW-15008R*/	622.32	625.22	Sand	602.2	to	507.3	44.04 Docomm	090.05	
JHC-IMW-15009	622.33	635.05	Sand	505.2	to	592.3	12 97	501 19	
JHC-MW-15009R*/	622.15	625.00	Sand	595.Z	to	502.6	43.07 Docomm	091.10	
JHC-IMW-15010	607.71	620.92	Sand	600.7	to	592.0	Decomm	hissioned	
	627.73	620.70	Sand	504.7	to	590.7	28.20	501 50	
JHC-IMW-15011R	021.13	029.79	Sanu	594.7	10	564.7	30.29	591.50	
MW/_13	503 10	505 37	Clavey Silt	587.0	to	585 /	ח	rv	
MW-13	587 26	500.01	Sand	582.0	to	577 0	10.02	580.06	
P7-239	602.84	604.07	Sand	502.9	to	586.9	15.02	580.30	
P7-24S	586 56	500 15	Sand	584.6	to	570.6	8 50	581 56	
P7-40S	580 51	503.15	Sand	585 5	to	575.5	11 00	581.26	
TW-19-044	608 15	611 //	Sand	501.0	to	586.2	23.00	588 11	
TW-19-05	603.44	606 36	Sand	592.8	to	587.8	17 09	580.77	
TW-19-06A	599 61	602.50	Sand	592.0	to	587 3	14 13	588 41	
	000.01	002.04	Janu	002.0	10	001.0	17.13	17.000	

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

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

TOC: Top of well casing. ft BTOC: Feet below top of well casing.

--: Not measured (1) JHC-MW-15008R installed in June 2019.

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

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

# Table 2 Summary of Field Parameters: Fourth Quarter 2021 JH Campbell Pond A - Assessment Monitoring Program West Olive, Michigan

Sample Location	Sample Date	Dissolved         Oxidation           mple Date         Oxygen         Potential		Specific Conductivity	Temperature	Turbidity	
		(mg/L)	(mV)	(SU)	(umhos/cm)	(°C)	(NTU)
Background							
JHC-MW-15023	10/20/2021	0.93	208.3	5.8	91	13.8	2.1
JHC-MW-15024	10/20/2021	0.79	124.8	7.0	422	12.4	4.5
JHC-MW-15025	10/19/2021	0.74	144.5	7.8	340	13.1	4.5
JHC-MW-15026	10/19/2021	0.50	181.6	5.7	45	14.5	2.3
JHC-MW-15027	10/19/2021	0.63	69.4	5.9	107	16.0	8.3
JHC-MW-15028	10/19/2021	2.32	52.6	8.3	159	14.8	4.9
Pond A							
JHC-MW-15006	10/21/2021	0.57	-4.7	7.8	783	22.6	5.7
JHC-MW-15007R	10/21/2021	0.47	-107.4	8.0	684	20.7	4.0
JHC-MW-15008R	10/21/2021	0.98	74.0	7.2	719	14.6	0.0
JHC-MW-15009R	10/21/2021	3.79	-42.5	7.1	498	13.5	0.5
JHC-MW-15011R	10/21/2021	0.70	-138.9	8.0	503	20.1	8.1
Pond A GSI							
MW-13	10/19/2021 <sup>(1)</sup>						
MW-14S	10/21/2021	0.47	145.5	5.5	26	14.7	2.7
PZ-24S	10/20/2021	1.14	81.6	5.6	34	15.0	2.9
PZ-40S	10/20/2021	0.27	188.1	5.1	24	12.8	3.6

#### Notes:

mg/L - Milligrams per Liter.

mV - Millivolts.

SU - Standard Units.

umhos/cm - Micromhos per centimeter.

°C - Degrees Celsius.

NTU - Nephelometric 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 2021 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:	10/20/2021	10/20/2021	10/19/2021	10/19/2021	10/19/2021	10/19/2021
				MI Non-				Backa	round		
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^			Васку	iouna		
Appendix III <sup>(1)</sup>											
Boron	ug/L	NC	500	500	7,200	41	< 20	< 20	< 20	< 20	< 20
Calcium	mg/L	NC	NC	NC	500 <sup>EE</sup>	10.7	40.2	24.2	4.01	13.4	20.0
Chloride	mg/L	250**	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	3.60	47.1	23.3	1.09	< 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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	11.8	7.53	8.98	5.81	7.89	5.90
Total Dissolved Solids	mg/L	500**	500 <sup>E</sup>	500 <sup>E</sup>	500	77	242	259	34	71	203
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>⊑</sup>	6.5 - 9.0	5.8	7.0	7.8	5.7	5.9	8.3
Appendix IV <sup>(1)</sup>											
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	25	6	8	15	8
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	< 0.148	< 0.144	< 0.155	< 0.154	< 0.131	< 0.127
Radium-228	pCi/L	NC	NC	NC	NC	< 0.407	< 0.349	< 0.434	0.449	< 0.380	< 0.393
Radium-226/228	pCi/L	5	NC	NC	NC	< 0.407	0.364	< 0.434	0.573	< 0.380	< 0.393
Selenium	ug/L	50	50	50	5.0	< 1	2	< 1	< 1	< 1	< 1
Thallium	ug/L	2	2.0	2.0	3.7	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115	(2)										
Iron	ug/L	300**	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	86	119	47	28	1,430	41
Copper	ug/L	1,000**	1,000 <sup>E</sup>	1,000 <sup>E</sup>	15	< 1	1	< 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 <sup>E</sup>	190	< 10	< 10	< 10	< 10	< 10	< 10

#### Notes:

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

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

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

NC - no criteria.

\* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020.

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

- ^ Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using site-specific hardness of 180 mg CaCO3/L as measured at surface water sample SW-01 collected on April 9, 2018 from the Pigeon River. Chromium GSI criterion based on hexavalent chromium per footnote {H}.
- # If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway
- per Michigan Part 201 and MDEQ policy and procedure 09-014 dated June 20, 2012.
- E Criterion is the aesthetic drinking water value per footnote {E}.
- EE Criterion is based on the total dissolved solids GSI value per footnote {EE}.
- (1) 40 CFR Part 257 Appendix III Detection Monitoring Constituents and Appendix IV Assessment Monitoring Constituents.
- (2) Per Michigan Part 115 Amendments Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection

monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported. BOLD value indicates an exceedance of one or more of the listed criteria.

**RED** value indicates an exceedance of the MCL.

All metals were analyzed as total unless otherwise specified.

# Table 4 Summary of Groundwater Sampling Results (Analytical): Fourth Quarter 2021 JH Campbell Pond A – Assessment Monitoring Program West Olive, Michigan

					Sample Location:	JHC-MW-15006	JHC-MW-15007R	JHC-MW-15008R	JHC-MW-15009R	JHC-MW-15011R
					Sample Date:	10/21/2021	10/21/2021	10/21/2021	10/21/2021	10/21/2021
Constituent	Unit	EPA MCL	MI Residential*	MI Non- Residential*	MI GSI^			downgradient		
Appendix III <sup>(1)</sup>										
Boron	ug/L	NC	500	500	7,200	371	956	786	1,680	2,150
Calcium	mg/L	NC	NC	NC	500 <sup>EE</sup>	84.5	68.5	77.2	58.7	51.0
Chloride	mg/L	250**	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	19.6	13.9	15.7	12.1	13.5
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250**	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	217	101	112	25.7	45.0
Total Dissolved Solids	mg/L	500**	500 <sup>E</sup>	500 <sup>E</sup>	500	485	418	443	301	195
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>⊑</sup>	6.5 - 9.0	7.8	8.0	7.2	7.1	8.0
Appendix IV <sup>(1)</sup>										
Antimony	ug/L	6	6.0	6.0	130	< 1	< 1	1	< 1	< 1
Arsenic	ug/L	10	10	10	10	6	7	< 1	1	3
Barium	ug/L	2,000	2,000	2,000	820	211	219	167	286	131
Beryllium	ug/L	4	4.0	4.0	18	< 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
Chromium	ug/L	100	100	100	11	2	1	< 1	< 1	< 1
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	39	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	13	13	19	15	< 10
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	3,200	48	16	26	5	13
Radium-226	pCi/L	NC	NC	NC	NC	0.277	0.309	0.281	0.374	0.157
Radium-228	pCi/L	NC	NC	NC	NC	< 0.387	< 0.394	< 0.397	< 0.376	0.428
Radium-226/228	pCi/L	5	NC	NC	NC	0.634	0.583	0.661	0.728	0.585
Selenium	ug/L	50	50	50	5.0	1	4	20	62	4
Thallium	ug/L	2	2.0	2.0	3.7	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115 <sup>(2</sup>	2)									
Iron	ug/L	300**	300 <sup>E</sup>	300E	500,000EE	185	151	150	1,090	264
Copper	ug/L	1,000**	1,000 <sup>E</sup>	1,000 <sup>E</sup>	15	3	4	1	< 1	1
Nickel	ug/L	NC	100	100	86	5	< 2	< 2	< 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	12	8	< 2	3	< 2
Zinc	ug/L	5,000**	2,400	5,000 <sup>E</sup>	190	53	21	< 10	< 10	< 10

#### Notes:

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

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

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

NC - no criteria.

\* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020.

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

- ^ Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using site-specific hardness of 180 mg CaCO3/L as measured at surface water sample SW-01 collected on April 9, 2018 from the Pigeon River. Chromium GSI criterion based on hexavalent chromium per footnote {H}.
- # If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway per Michigan Part 201 and MDEQ policy and procedure 09-014 dated June 20, 2012.
- E Criterion is the aesthetic drinking water value per footnote {E}.
- EE Criterion is based on the total dissolved solids GSI value per footnote {EE}.

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

(2) Per Michigan Part 115 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection

monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

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

**RED** value indicates an exceedance of the MCL.

All metals were analyzed as total unless otherwise specified.
# Table 5 Summary of Groundwater Sampling Results (Analytical): Fourth Quarter 2021 JH Campbell Pond A GSI – Assessment Monitoring Program West Olive, Michigan

					Sample Location:	MW-13	MW-14S	PZ-24S	PZ-40S
					Sample Date:	10/19/2021 <sup>(3)</sup>	10/21/2021	10/20/2021	10/20/2021
				MI Non-					
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^				
Appendix III <sup>(1)</sup>									
Total Dissolved Solids	mg/L	500**	500 <sup>E</sup>	500 <sup>E</sup>	500		57	46	37
Appendix IV <sup>(1)</sup>									
Antimony	ug/L	6	6.0	6.0	130		< 1	< 1	< 1
Arsenic	ug/L	10	10	10	10		< 1	2	< 1
Barium	ug/L	2,000	2,000	2,000	820		11	20	27
Chromium	ug/L	100	100	100	11		< 1	2	1
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
Additional MI Part 115	2)								
Vanadium	ug/L	NC	4.5	62	27		< 2	5	< 2

#### Notes:

ug/L - micrograms per liter; mg/L - milligrams 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 21, 2020.

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

^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using site-specific hardness of 180 mg CaCO3/L as measured at surface water sample SW-01 collected on April 9, 2018

from the Pigeon River. Chromium GSI criterion based on hexavalent chromium per footnote {H}.

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

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

(2) Per Michigan Part 115 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection

monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

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

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

**RED** value indicates an exceedance of the MCL.

All metals were analyzed as total unless otherwise specified.

# Table 6 Summary of Groundwater Protection Standard Exceedances – Fourth Quarter 2021 JH Campbell Pond A – Assessment Monitoring Program West Olive, Michigan

Constituent	Llpite	CWPS	JHC-M\	N-15006	JHC-MW	/-15007/R	JHC-MW	/-15008R	JHC-MW	/-15009/R	JHC-MW	-15011/R
Constituent	Units	GWF3	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL	LCL	UCL
Appendix IV												
Arsenic	ug/L	10									5.4	27
Selenium	ug/L	50					3.5	34	15	75	-14	210
Additional Mic	chigan Part	115 Param	eters									
Boron*	ug/L	500			140	980	290	580	26	1,300	2,200	4,900
Sulfate*	mg/L	250	200	270								
TDS*	mg/L	500	490	550	240	460	440	580			320	660
Iron*	ug/L	870	27	320					-240	1,100	16	560
Vanadium*	ug/L	4.5	7.7	15	1.9	20					17	44

#### 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 ( $\alpha = 0.01$ ) of the downgradient data set.

LCL - Lower Confidence Limit ( $\alpha = 0.01$ ) 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 7 Summary of Groundwater Exceedances Fourth Quarter 2021 JH 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 unless otherwise stated

Facility: JH Campbell – WDS# 395496

Well #	Location	Parameter	Part 201 GRCC	Statistical Limit (or 'CC' for Control Charts)	4 Qtr. 2021 ( <b>bold</b> >201)	3 Qtr. 2021 ( <b>bold</b> >201)	2 Qtr. 2021 ( <b>bold</b> >201)	1 Qtr. 2021 ( <b>bold</b> >201)
JHC-MW-15011/R	Downgradient	Boron	500	LCL	2,150	4,860	5,070	4,720 <sup>(1)</sup>
JHC-MW-15011/R	Downgradient	Arsenic	10	LCL	3	2	13	14
JHC-MW-15006	Downgradient	Vanadium	4.5	LCL	12	10	7	7
JHC-MW-15011/R	Downgradient	Vanadium	4.5	LCL	< 2	< 2	34	35

#### 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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- BACKGROUND MONITORING WELL DOWNGRADIENT BOTTOM ASH POND
- 1/2 N/S MONITORING WELL DOWNGRADIENT BOTTOM ASH POND
- **3 N/S MONITORING WELL**
- DOWNGRADIENT LANDFILL MONITORING WELL
- PIEZOMETER 2021
- DOWNGRADIENT POND A MONITORING WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL

NEW DOWNGRADIENT BOTTOM ASH POND 1/2 N/S MONITORING WELL (2018) NEW DOWNGRADIENT BOTTOM ASH POND 3 N/S MONITORING WELL (2018)

- + DOWNGRADIENT MONITORING WELLS
- STAFF GAUGE
- TEMPORARY WELL

**\** 

HMP WELL

#### <u>NOTES</u>

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

0 1 " = 700 '	700		1,400 Feet	L.
1:8,400				Ę
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CHECKED BY:	B. YELEN			
APPROVED BY:	S. HOLMSTROM		FIGI	IRE 2
DATE:	JANUARY 2022			
$\diamond$	RC		A	1540 Eisenhower Place nn Arbor, MI 48108-3284 Phone: 734.971.7080 www.trccompanies.com
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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
- PIEZOMETER 2021
- DOWNGRADIENT POND A MONITORING WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL

NEW DOWNGRADIENT BOTTOM ASH POND 1/2 N/S MONITORING WELL (2018) NEW DOWNGRADIENT BOTTOM ASH POND 3 N/S MONITORING WELL (2018)

- + DOWNGRADIENT MONITORING WELLS
- STAFF GAUGE
- TEMPORARY WELL



(591.25) GROUNDWATER ELEVATION (FEET ABOVE MSL)

#### **NOTES**

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

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CHECKED BY:	B. YELEN		
APPROVED BY:	S. HOLMSTROM	FI	GURE 3
DATE:	JANUARY 2022		
<b>?</b> T	RC		1540 Eisenhower Place Ann Arbor, MI 48108-3284 Phone: 734.971.7080 www.trccompanies.com
FILE NO.:			418422-003-002_af.mxd



# Appendix A Data Quality Review

### Laboratory Data Quality Review Groundwater Monitoring Event October 2021 CEC JH Campbell Pond A

Groundwater samples were collected by Consumers Energy (CE) Laboratory Services for the October 2021 sampling event. Samples were analyzed for total metals, anions, alkalinity, and total dissolved solids (TDS) by CE Laboratory Services in Jackson, Michigan. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 21-1280R.

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

- JHC-MW-15006 JHC-MW-15007R
- JHC-MW-15008R

JHC-MW-15009R

■ JHC-MW-15011R

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

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

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

## **Data Usability Review Procedure**

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

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

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

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

This data usability report addresses the following items:

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

#### **Review Summary**

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

- 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**

- MS and MSD analyses were performed on sample JHC-MW-15008R for total 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-05/JHC-MW-15007R. All criteria were met with the following exception.
  - The RPD for chromium (66.7%) was above the acceptance criteria. Therefore, potential uncertainty exists for the positive results for chromium in groundwater samples, as summarized in the attached table, Attachment A. However, results are consistent with historical results; therefore, data usability is not affected.

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

Samples	Collection Date	Analyte	Non-Conformance/Issue
JHC-MW-15006	10/21/2021		Field duplicate vericibility, potential upcortainty evicts. However, regults are consistent with
JHC-MW-15007R	10/21/2021	Chromium	historical results: therefore, deta uncertainty exists. However, results are consistent with
DUP-05	10/21/2021		

### Laboratory Data Quality Review Groundwater Monitoring Event October 2021 CEC JH Campbell Pond A

Groundwater samples were collected by Consumers Energy (CE) Laboratory Services for the October 2021 sampling event. Samples were analyzed for radium by Eurofins-TestAmerica laboratory in St. Louis, Missouri. The laboratory analytical results were reported in laboratory sample delivery group (SDG) 160-43809-1.

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

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

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

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

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

## **Data Usability Review Procedure**

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

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

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

This data usability report addresses the following items:

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

### **Review Summary**

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

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

### **QA/QC Sample Summary**

- Target analytes were not detected in the method blanks.
- Field and equipment blanks were not submitted with this sample set.
- LCS/LCSD recoveries and relative percent differences were within laboratory control limits.
- MS/MSD and laboratory duplicate analyses were not performed on a sample from this SDG.
- The field duplicate pair samples were DUP-05/JHC-MW-15007R. All criteria were met.
- Carrier recoveries were within 40-110%.

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

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

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

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

Each sample was analyzed for the following constituents:

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

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

## **Data Usability Review Procedure**

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

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

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

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

This data usability report addresses the following items:

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

#### **Review Summary**

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

- The reviewed Appendix III and IV constituents as well as iron, copper, nickel, silver, vanadium, and zinc will be utilized for the purposes of an assessment monitoring program.
- Data are usable for the purposes of the assessment monitoring program.
- When the data are evaluated through an assessment monitoring statistical program, findings below may be used to support the removal of outliers.

#### **QA/QC Sample Summary**

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

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

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

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

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

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

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

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

Each sample was analyzed for the following constituents:

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

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

# **Data Usability Review Procedure**

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

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

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

This data usability report addresses the following items:

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

#### **Review Summary**

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

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

#### **QA/QC Sample Summary**

- Target analytes were not detected in the method blanks.
- One equipment blank (EB-01) and one field blank (FB-01) were collected. Target analytes were not detected in the equipment and field blanks.
- LCS/LCSD recoveries and relative percent differences were within laboratory control limits.
- MS/MSD and laboratory duplicate analyses were not performed on a sample from this SDG.
- The field duplicate pair samples were DUP-01/JHC-MW-15028. All criteria were met.
- Carrier recoveries were within 40-110%.



# Appendix B October 2021 Assessment Monitoring Statistical Evaluation



Date:	January 28, 2022
То:	Bethany Swanberg, Consumers Energy
From:	Sarah Holmstrom, TRC Kristin Lowery, TRC
Project No.:	418422.0000.0000 Phase 1 Task 3
Subject:	Statistical Evaluation of October 2021 Assessment Monitoring Sampling Event, JH Campbell 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 *Sample and Analysis Plan* for JH Campbell Power Plant Pond A (SAP) (TRC, January 2021). The fourth quarter 2021 monitoring event was conducted on October 19 through 22, 2021. 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 October 27, 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<sup>™</sup> output files are included as an attachment.

The statistical evaluation of the fourth quarter 2021 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
Boron	500 ug/L	1 of 5
Vanadium	4.5 ug/L	2 of 5

The results of the assessment monitoring statistical evaluation for the downgradient wells are consistent with the results of the previous assessment monitoring data statistical evaluations, indicating boron and vanadium are present at statistically significant concentrations above the GWPS and arsenic concentrations continue to show improvement.

#### Assessment Monitoring Statistical Evaluation

The downgradient compliance well network at the JHC Pond A consists of five wells (JHC-MW-15006 through JHC-MW-15009/R and JHC-MW-150011/R) located south and east of Pond A. As discussed in the October 7, 2021 *Summary of Pond A Monitoring Well Decommissioning and Replacement* letter, monitoring wells JHC-MW-15007, JHC-MW-15009, and JHC-MW-15011 were decommissioned and replacement monitoring wells JHC-MW-15007R, JHC-MW-15009R, and JHC-MW-15011R were installed in July 2021. For the purposes of statistical evaluation, the data sets from the replacement monitoring wells have been pooled with the former monitoring wells given that the wells were replaced to reset the screens at a lower elevation and data integrity was maintained before and after replacement. However, the monitoring wells are in a different screened interval and a slightly different location adjacent to the original well location. As such, as additional data are collected from the replacement monitoring wells, the datasets will be evaluated to determine if groundwater concentrations at the replacement wells are significantly different from the former wells and if shortening the datasets for statistical evaluation is appropriate.

Following the fourth quarter 2021 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 Guidance<sup>1</sup>, the preferred method for comparisons to a fixed standard is confidence limits. Based on the number of historical observations in the representative sample population, the sample mean, the sample standard deviation, and a selected confidence level (i.e., 99 percent), 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

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

the GWPS<sup>2</sup>. 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 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 (February 2020 through October 2021 for JHC-MW-15006, JHC-MW-15008R, and JHC-MW-15011/R, and June 2018 through October 2021 for JHC-MW-15007/R and JHC-MW-15009/R) and the past five (JHC-MW-15007/R and JHC-MW-15009/R) or eight events (JHC-MW-15006, JHC-MW-15008R, and JHC-MW-15008R, and JHC-MW-150011/R), as data are available, for the additional Section 11511a(3) constituents (iron) and Section 11519b(2) (copper, nickel, silver, vanadium, and zinc) (February 2020 through October 2021) 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;
- Boron, TDS, and vanadium in JHC-MW-15007/R;
- Boron, TDS, and selenium in JHC-MW-15008R;
- Boron, selenium, and iron in JHC-MW-15009/R; and
- Boron, TDS, arsenic, selenium, iron, and vanadium in JHC-MW-15011/R.

Groundwater data were then evaluated utilizing Sanitas<sup>TM</sup> statistical software. Sanitas<sup>TM</sup> is a software tool that is commercially available for performing statistical evaluations consistent with procedures outlined in the Unified Guidance. Within the Sanitas<sup>TM</sup> 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 ( $\alpha$ ) of 0.01. The following narrative describes the methods employed, the results obtained and the Sanitas<sup>TM</sup> 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;

<sup>&</sup>lt;sup>2</sup> For pH, an exceedance occurs when the lower confidence level exceeds the upper GWPS or the upper confidence level is below the lower GWPS.

- 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, results for the past eight events were observed visually for potential trends and outliers (timeseries plots in Attachment 1). A decreasing trend was noted for arsenic in JHC-MW-15011/R (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 Sanitas<sup>TM</sup> 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 conditions. For the Section 11511a(3) constituents (iron) and Section 11519b(2) (copper, nickel, silver, vanadium, and zinc) at JHC-MW-15007/R and JHC-MW-15009/R, 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<sup>™</sup> 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 at JHC-MW-15009/R and JHC-MW-15011/R Sulfate at JHC-MW-15006 TDS at JHC-MW-15006 JHC-MW-15007/R and JHC-MW-
Normal	15011/R Arsenic at JHC-MW-15011/R
	Selenium at JHC-MW-15009/R and JHC-MW-15011/R
	Vanadium at JHC-MW-15009/R (Kapian-Meler)

Distribution	Constituent-Well Combinations
Normalized by power transformation	Boron at JHC-MW-15008R (1/3 power) TDS at JHC-MW-15008R (2 <sup>nd</sup> power) Selenium at JHC-MW-15008R (1/3 power) Iron at JHC-MW-15011/R (1/3 power, Kaplan-Meier) Vanadium at JHC-MW-15011/R (2 <sup>nd</sup> power, Kaplan-Meier)
Normalized by square root transformation	Iron at JHC-MW-15006
Non-Parametric (not able to be normalized)	Boron at JHC-MW-15007/R

The confidence interval test compares the lower confidence limit to the GWPS. The results of the assessment monitoring statistical evaluation for the downgradient wells are consistent with the results of the previous assessment monitoring data statistical evaluations, indicating boron and vanadium are present at statistically significant concentrations above the GWPS. 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 declined in 2020 and 2021 and the lower confidence limit was below the GWPS during fourth quarter 2021. Boron at JHC-MW-15011/R was observed at statistically significant levels above the GWPS for the first time in second quarter 2021; however, concentrations have been trending upward since 2019 and have been consistently above the GWPS since October 2019. Vanadium at JHC-MW-15006 and JHC-MW-15011/R 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 §257.95(g).

#### Attachments

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

Attachment 1 Sanitas<sup>™</sup> 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

Sample Location									n: JHC-MW-15006									
								Sample Date:	2/12/2020	4/14/2020	7/16/2020	10/22/2020	10/22/2020	2/23/2021	4/13/2021	8/17/2021	10/21/2021	
				MI	MI Non-													
Constituent	Unit	EPA MCL	EPA RSL	Residential*	Residential*	MI GSI^	UTL	GWPS										
Appendix III <sup>(1)</sup>													Field Dup					
Boron	ug/L	NC	NA	500	500	7,200	54	500	247	284	242	272	331	301	288	358	371	
Calcium	mg/L	NC	NA	NC	NC	500 <sup>EE</sup>	40	500	101	102	91.4	87.2	84.3	89.0	82.0	71.5	84.5	
Chloride	mg/L	250**	NA	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	70	250	21.0	24.9	27.7	22.0	22.2	21.2	22.9	20.1	19.6	
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	
Sulfate	mg/L	250**	NA	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	13	250	217	260	195	253	251	276	257	184	217	
Total Dissolved Solids	mg/L	500**	NA	500 <sup>E</sup>	500 <sup>E</sup>	500	240	500	542	562	521	515	511	556	497	501	485	
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.6	7.2	7.4	7.5		7.7	7.7	7.5	7.8	
Appendix IV <sup>(1)</sup>																		
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	< 1	1	< 1	1	< 1	< 1	< 1	< 1	< 1	
Arsenic	ug/L	10	NA	10	10	10	1	10	6	5	5	9	6	4	3	5	6	
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	326	353	291	382	194	227	188	175	211	
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	
Cadmium	ug/L	5	NA	5.0	5.0	3.5	0.2	5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
Chromium	ug/L	100	NA	100	100	11	2	100	2	1	18	5	1	< 1	3	6	2	
Cobalt	ug/L	NC	6	40	100	100	15	15	< 6	< 15	< 6	< 6	< 6	< 6	< 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	
Lead	ug/L	NC	15	4.0	4.0	39	1	15	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	
Lithium	ug/L	NC	40	170	350	440	10	40	13	13	13	15	14	13	12	12	13	
Mercury	ug/L	2	NA	2.0	2.0	0.20#	0.2	2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
Molybdenum	ug/L	NC	100	73	210	3,200	5	100	13	16	22	38	37	37	54	43	48	
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA		0.426		0.289	< 0.345		0.241		0.277	
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA		0.518		< 0.274	< 0.399		0.432		< 0.387	
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5		0.944		0.318	0.453		0.673		0.634	
Selenium	ug/L	50	NA	50	50	5.0	5	50	8	9	5	2	1	1	< 1	2	1	
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	
MI Part 115 Parameters	s <sup>(2)</sup>																	
Iron	ug/L	300**	NA	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	870	870	189	26	128	929	213	43	41	137	185	
Copper	ug/L	1,000**	NA	1,000 <sup>E</sup>	1,000 <sup>E</sup>	15	2.1	1,000	2	1	11	4	4	1	4	2	3	
Nickel	ug/L	NC	NA	100	100	86	2	100	14	1	13	5	< 2	< 2	2	6	5	
Silver	ug/L	100**	NA	34	98	0.20	0.2	34	< 0.2	< 0.4	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
Vanadium	ug/L	NC	NA	4.5	62	27	2	4.5	16	10	15	19	9	7	7	10	12	
Zinc	ug/L	5,000**	NA	2,400	5,000 <sup>E</sup>	190	18	2,400	< 10	< 10	< 30	11	23	< 10	< 10	< 10	53	

#### Notes:

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

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

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 and MI Part 115 Parameter 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.

 $^{\mathsf{E}}$  - Criterion is the aesthetic drinking water value per footnote {E}.

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

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) 40 CFR Part 257 Appendix III Detection Monitoring Constituents and Appendix IV Assessment Monitoring Constituents. (2) Per Michigan Part 115 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection

monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

(3) JHC-MW-15008 was decommissioned on June 24, 2019. Replacement well JHC-MW-15008R was installed on June 25, 2019.

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

(5) JHCW-MW-15007, JHC-MW-15009, and JHC-MW-15011 were decommissioned in July 2021. Replacement wells

#### Table B1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation JH Campbell Pond A – HMP/AMP West Olive, Michigan

							Sar	nple Location:	JHC-MW-15007 <sup>(5)</sup>										JHC-MW-15007R <sup>(5)</sup>					
								Sample Date:	6/20/2018	11/15/2018	4/24/2019	10/9/2019 <sup>(4)</sup>	2/12/2020	4/14/2020	7/16/2020	10/22/2020 <sup>(4)</sup>	2/23/2021(4)	4/13/2021 <sup>(4)</sup>	8/17/2021	8/17/2021	10/21/2021	10/21/2021		
Constituent	Unit	EPA MCL	EPA RSL	MI Residential*	MI Non- Residential*	MI GSI^	UTL	GWPS																
Appendix III <sup>(1)</sup>																				Field Dup		Field Dup		
Boron	ug/L	NC	NA	500	500	7,200	54	500	157	142	190		147	242	162				373	409	956	1,000		
Calcium	mg/L	NC	NA	NC	NC	500 <sup>EE</sup>	40	500	38.7	42.6	79		55.2	62.1	52.8				76.9	80.4	68.5	72.6		
Chloride	mg/L	250**	NA	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	70	250	17.5	20.6	23		9.10	14.1	9.16				15.8	16.0	13.9	14.2		
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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	13	250	26.2	19.2	54		31.9	83.0	68.3				170	172	101	104		
Total Dissolved Solids	mg/L	500**	NA	500 <sup>E</sup>	500 <sup>E</sup>	500	240	500	298	166	360		312	336	357				530	559	418	419		
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.4	7.6	7.4		7.4	7.0	7.1				7.7		8.0			
Appendix IV <sup>(1)</sup>																								
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	< 1.0	< 1.0	< 1.0		< 1	< 1	< 1				< 1	< 1	< 1	< 1		
Arsenic	ug/L	10	NA	10	10	10	1	10	2.9	4.0	4.0		3	3	3				6	6	7	7		
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	115	177	320		231	266	248				250	265	219	224		
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1.0	< 1.0	< 1.0		< 1	< 1	< 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		< 0.2	< 0.2	< 0.2				< 0.2	< 0.2	< 0.2	< 0.2		
Chromium	ug/L	100	NA	100	100	11	2	100	1.2	31.3	35		3	2	2				< 1	< 1	1	2		
Cobalt	ug/L	NC	6	40	100	100	15	15	< 15.0	< 6.0	< 6.0		< 6	< 15	< 6				< 6	< 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	< 1	< 1				< 1	< 1	< 1	< 1		
Lithium	ug/L	NC	40	170	350	440	10	40	15	16	12		15	14	13				13	14	13	13		
Mercury	ug/L	2	NA	2.0	2.0	0.20#	0.2	2	< 0.20	< 0.20	< 0.20		< 0.2	< 0.2	< 0.2				< 0.2	< 0.2	< 0.2	< 0.2		
Molybdenum	ug/L	NC	100	73	210	3,200	5	100	< 5.0	7.6	7.2		< 5	< 5	< 5				22	23	16	16		
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.736	0.864	0.217			0.197							0.309	0.302		
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 1.12	< 0.688	0.392			< 0.456							< 0.394	<0.381		
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5	< 1.86	1.40	0.609			< 0.456							0.583	0.483		
Selenium	ug/L	50	NA	50	50	5.0	5	50	1.3	< 1.0	4.1		23	22	22				7	7	4	4		
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2	< 2.0	< 2.0	< 2.0		< 2	< 2	< 2				< 2	< 2	< 2	< 2		
MI Part 115 Parameters	s <sup>(2)</sup>																							
Iron	ug/L	300**	NA	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	870	870					71	< 20	< 20				36	33	151	165		
Copper	ug/L	1,000**	NA	1,000 <sup>E</sup>	1,000 <sup>E</sup>	15	2.1	1,000					2	1	< 1				1	1	4	4		
Nickel	ug/L	NC	NA	100	100	86	2	100					7	< 1	< 2				< 2	< 2	< 2	2		
Silver	ug/L	100**	NA	34	98	0.20	0.2	34					< 0.2	< 0.2	< 0.2				< 0.2	< 0.2	< 0.2	< 0.2		
Vanadium	ug/L	NC	NA	4.5	62	27	2	4.5					16	14	15				3	3	8	8		
Zinc	ug/L	5,000**	NA	2,400	5,000 <sup>E</sup>	190	18	2,400					10	< 10	< 30				< 10	< 10	21	20		

#### Notes:

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

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

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 and MI Part 115 Parameter 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.
- $^{\mathsf{E}}$  Criterion is the aesthetic drinking water value per footnote {E}.
- EE Criterion is based on the total dissolved solids GSI value per footnote {EE}.
- 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) 40 CFR Part 257 Appendix III Detection Monitoring Constituents and Appendix IV Assessment Monitoring Constituents.

(2) Per Michigan Part 115 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection

monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported. (3) JHC-MW-15008 was decommissioned on June 24, 2019. Replacement well JHC-MW-15008R was installed on June 25, 2019.

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

(5) JHCW-MW-15007, JHC-MW-15009, and JHC-MW-15011 were decommissioned in July 2021. Replacement wells

#### Table B1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation JH Campbell Pond A – HMP/AMP West Olive, Michigan

Sample Location									ι: JHC-MW-15008R <sup>(3)</sup>									
								Sample Date:	2/12/2020	4/14/2020	7/16/2020	10/22/2020	2/23/2021	4/13/2021	4/13/2021	8/18/2021	10/21/2021	
				MI	MI Non-													
Constituent	Unit	EPA MCL	EPA RSL	Residential*	Residential*	MI GSI^	UTL	GWPS										
Appendix III <sup>(1)</sup>															Field Dup			
Boron	ug/L	NC	NA	500	500	7,200	54	500	423	505	384	285	326	352	360	364	786	
Calcium	mg/L	NC	NA	NC	NC	500 <sup>EE</sup>	40	500	94.7	99.9	79.8	109	105	85.4	87.0	62.3	77.2	
Chloride	mg/L	250**	NA	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	70	250	22.4	25.0	25.4	18.8	17.2	17.2	17.1	13.2	15.7	
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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	13	250	219	235	183	215	197	185	186	90.8	112	
Total Dissolved Solids	mg/L	500**	NA	500 <sup>E</sup>	500 <sup>E</sup>	500	240	500	556	566	536	577	548	517	512	365	443	
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.3	6.9	7.1	7.0	7.0	7.1		7.1	7.2	
Appendix IV <sup>(1)</sup>																		
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	< 1	1	< 1	1	< 1	1	< 1	< 1	1	
Arsenic	ug/L	10	NA	10	10	10	1	10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	291	252	219	216	250	200	195	137	167	
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	
Cadmium	ug/L	5	NA	5.0	5.0	3.5	0.2	5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
Chromium	ug/L	100	NA	100	100	11	2	100	7	< 1	< 1	< 1	2	41	56	< 1	< 1	
Cobalt	ug/L	NC	6	40	100	100	15	15	< 6	< 15	< 6	< 6	< 6	< 6	< 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	
Lead	ug/L	NC	15	4.0	4.0	39	1	15	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	
Lithium	ug/L	NC	40	170	350	440	10	40	18	19	17	19	20	20	21	17	19	
Mercury	ug/L	2	NA	2.0	2.0	0.20#	0.2	2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
Molybdenum	ug/L	NC	100	73	210	3,200	5	100	< 5	< 5	< 5	5	9	17	19	21	26	
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA		0.180		0.553		0.272	0.351		0.281	
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA		< 0.429		0.330		< 0.491	< 0.512		< 0.397	
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5		0.549		0.883		0.496	0.780		0.661	
Selenium	ug/L	50	NA	50	50	5.0	5	50	11	6	13	68	16	6	6	3	20	
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2	< 2	< 2	2	< 2	2	2	< 2	< 2	< 2	
MI Part 115 Parameters	(2)																	
Iron	ug/L	300**	NA	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	870	870	164	134	48	56	41	347	419	24	150	
Copper	ug/L	1,000**	NA	1,000 <sup>E</sup>	1,000 <sup>E</sup>	15	2.1	1,000	2	2	2	2	2	5	5	1	1	
Nickel	ug/L	NC	NA	100	100	86	2	100	8	< 1	< 2	< 2	3	38	48	6	< 2	
Silver	ug/L	100**	NA	34	98	0.20	0.2	34	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	
Vanadium	ug/L	NC	NA	4.5	62	27	2	4.5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	
Zinc	ug/L	5,000**	NA	2,400	5,000 <sup>E</sup>	190	18	2,400	< 10	< 10	< 30	< 10	< 10	< 10	< 10	< 10	< 10	

#### Notes:

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

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

NA - not applicable.

NC - no criteria.

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

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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.

 $^{\mathsf{E}}$  - Criterion is the aesthetic drinking water value per footnote {E}.

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

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) 40 CFR Part 257 Appendix III Detection Monitoring Constituents and Appendix IV Assessment Monitoring Constituents. (2) Per Michigan Part 115 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection

monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.

(3) JHC-MW-15008 was decommissioned on June 24, 2019. Replacement well JHC-MW-15008R was installed on June 25, 2019.

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

(5) JHCW-MW-15007, JHC-MW-15009, and JHC-MW-15011 were decommissioned in July 2021. Replacement wells

# Table B1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation JH Campbell Pond A – HMP/AMP West Olive, Michigan

Sample Locatio							mple Location:						J	HC-MW-15009	(5)						JHC-MW-15009R <sup>(5)</sup>		
								Sample Date:	6/20/2018	11/15/2018	11/15/2018	4/24/2019	4/24/2019	10/9/2019 <sup>(4)</sup>	2/12/2020	4/14/2020	4/14/2020	7/16/2020	10/22/2020(4)	2/23/2021 <sup>(4)</sup>	4/13/2021(4)	8/16/2021	10/21/2021
				MI	MI Non-																	-	
Constituent	Unit	EPA MCL	EPA RSL	Residential*	Residential*	MI GSI^	UTL	GWPS															
Appendix III <sup>(1)</sup>											Field Dup		Field Dup				Field Dup						
Boron	ug/L	NC	NA	500	500	7,200	54	500	91.4	188	187	200	190		468	874	881	401				1440	1,680
Calcium	mg/L	NC	NA	NC	NC	500 <sup>EE</sup>	40	500	41.2	46.2	46.4	92	89		74.5	78.7	79.9	84.2				67.1	58.7
Chloride	mg/L	250**	NA	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	70	250	22.9	17.7	17.7	17	16		10.7	6.95	6.78	6.18				6.73	12.1
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				<1,000	< 1,000
Sulfate	mg/L	250**	NA	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	13	250	18.2	26.9	27.1	130	130		40.5	49.1	49.9	64.4				25.2	25.7
Total Dissolved Solids	mg/L	500**	NA	500 <sup>E</sup>	500 <sup>E</sup>	500	240	500	214	234	202	430	440		332	354	341	397				83	301
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	7.7	7.6		7.4			7.5	7.2		7.2				6.5	7.1
Appendix IV <sup>(1)</sup>																							
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	< 1.0	1.2	< 1.0	< 1.0	< 1.0		< 1	1	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				< 1	1
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	130	178	181	360	360		287	307	298	290				237	286
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	< 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	< 0.2
Chromium	ug/L	100	NA	100	100	11	2	100	< 1.0	14.1	11.8	17	14		31	1	1	1				< 1	< 1
Cobalt	ug/L	NC	6	40	100	100	15	15	< 15.0	< 6.0	< 6.0	< 6.0	< 6.0		< 6	< 15	< 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	< 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	< 1
Lithium	ug/L	NC	40	170	350	440	10	40	< 10	14	14	11	11		14	14	14	14				13	15
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	< 0.2
Molybdenum	ug/L	NC	100	73	210	3,200	5	100	< 5.0	6.1	6.1	5.7	5.6		15	< 5	< 5	6				7	5
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.631	< 0.896	< 0.705	0.351	0.289			0.394	0.307						0.374
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA	< 0.634	0.800	< 0.663	0.674	0.509			0.573	0.459						< 0.376
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5	< 1.27	< 1.47	< 1.37	1.02	0.798			0.967	0.767						0.728
Selenium	ug/L	50	NA	50	50	5.0	5	50	10.3	12.6	12.6	61	63		20	77	79	76				37	62
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	< 2
MI Part 115 Parameters	(2)																						
Iron	ug/L	300**	NA	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	870	870							420	< 20	< 20	34				496	1,090
Copper	ug/L	1,000**	NA	1,000 <sup>E</sup>	1,000 <sup>E</sup>	15	2.1	1,000							4	1	2	3				4	< 1
Nickel	ug/L	NC	NA	100	100	86	2	100							41	< 1	1	< 2				< 2	< 2
Silver	ug/L	100**	NA	34	98	0.20	0.2	34							< 0.2	< 0.2	< 0.2	< 0.2				< 0.2	< 0.2
Vanadium	ug/L	NC	NA	4.5	62	27	2	4.5							3	< 2	< 2	< 2				< 2	3
Zinc	ug/L	5,000**	NA	2,400	5,000 <sup>E</sup>	190	18	2,400							< 10	< 10	< 10	< 30				12	< 10

#### Notes:

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

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

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 and MI Part 115 Parameter 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.

 $^{\mathsf{E}}$  - Criterion is the aesthetic drinking water value per footnote {E}.

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

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

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

(3) JHC-MW-15008 was decommissioned on June 24, 2019. Replacement well JHC-MW-15008R was installed on June 25, 2019.

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

(5) JHCW-MW-15007, JHC-MW-15009, and JHC-MW-15011 were decommissioned in July 2021. Replacement wells

# Table B1 Comparison of Groundwater Sampling Results to Groundwater Protection Standards for Statistical Evaluation JH Campbell Pond A – HMP/AMP West Olive, Michigan

Sample Locati										JHC-MW-15011 <sup>(5)</sup>							
								Sample Date:	2/12/2020	4/15/2020	7/16/2020	10/22/2020	2/23/2021	2/23/2021	4/13/2021	8/17/2021	10/21/2021
				MI	MI Non-												
Constituent	Unit	EPA MCL	EPA RSL	Residential*	Residential*	MI GSI^	UTL	GWPS									
Appendix III <sup>(1)</sup>														Field Dup			
Boron	ug/L	NC	NA	500	500	7,200	54	500	1,910	2,870	2,720	4,120	4,720	4,530	5,070	4,860	2,150
Calcium	mg/L	NC	NA	NC	NC	500 <sup>EE</sup>	40	500	122	112	86.7	122	93.5	92.1	78.7	76.7	51.0
Chloride	mg/L	250**	NA	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	70	250	5.71	4.16	10.4	3.79	1.78	1.80	2.65	6.94	13.5
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 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	13	250	192	183	136	141	119	121	113	82.9	45.0
Total Dissolved Solids	mg/L	500**	NA	500 <sup>E</sup>	500 <sup>E</sup>	500	240	500	654	542	499	546	429	421	359	676	195
pH, Field	SU	6.5 - 8.5**	NA	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>E</sup>	6.5 - 9.0	5.5 - 8.8	5.5 - 8.8	8.0	7.6	7.7	7.6	7.3		7.2	7.3	8.0
Appendix IV <sup>(1)</sup>																	
Antimony	ug/L	6	NA	6.0	6.0	130	2	6	2	4	2	2	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	NA	10	10	10	1	10	31	25	22	22	14	13	13	2	3
Barium	ug/L	2,000	NA	2,000	2,000	820	35	2,000	563	514	419	430	455	434	399	142	131
Beryllium	ug/L	4	NA	4.0	4.0	18	1	4	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	NA	5.0	5.0	3.5	0.2	5	< 0.2	0.2	< 0.2	0.5	0.7	0.8	0.8	< 0.2	< 0.2
Chromium	ug/L	100	NA	100	100	11	2	100	1	< 1	< 1	< 1	< 1	< 1	5	2	< 1
Cobalt	ug/L	NC	6	40	100	100	15	15	< 6	< 6	< 6	< 6	< 6	< 6	< 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
Lead	ug/L	NC	15	4.0	4.0	39	1	15	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	40	170	350	440	10	40	22	21	20	17	17	16	14	17	< 10
Mercury	ug/L	2	NA	2.0	2.0	0.20#	0.2	2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	100	73	210	3,200	5	100	12	7	28	< 5	6	6	8	17	13
Radium-226	pCi/L	NC	NA	NC	NC	NC	NA	NA		0.242		0.344			0.165		0.157
Radium-228	pCi/L	NC	NA	NC	NC	NC	NA	NA		0.606		< 0.264			0.758		0.428
Radium-226/228	pCi/L	5	NA	NC	NC	NC	1.93	5		0.848		0.497			0.923		0.585
Selenium	ug/L	50	NA	50	50	5.0	5	50	104	29	20	308	166	161	143	12	4
Thallium	ug/L	2	NA	2.0	2.0	3.7	2	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
MI Part 115 Parameter	s <sup>(2)</sup>																
Iron	ug/L	300**	NA	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	870	870	178	145	115	< 20	< 20	< 20	57	1,610	264
Copper	ug/L	1,000**	NA	1,000 <sup>E</sup>	1,000 <sup>E</sup>	15	2.1	1,000	1	1	2	1	2	3	2	< 1	1
Nickel	ug/L	NC	NA	100	100	86	2	100	4	< 2	< 2	< 2	< 2	< 2	8	< 2	< 2
Silver	ug/L	100**	NA	34	98	0.20	0.2	34	< 0.2	< 0.4	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Vanadium	ug/L	NC	NA	4.5	62	27	2	4.5	42	40	30	49	35	34	34	< 2	< 2
Zinc	ug/L	5,000**	NA	2,400	5,000 <sup>E</sup>	190	18	2,400	< 10	< 10	< 30	< 10	< 10	< 10	< 10	< 10	< 10

#### Notes:

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

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

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 and MI Part 115 Parameter 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.

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

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

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

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

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

(3) JHC-MW-15008 was decommissioned on June 24, 2019. Replacement well JHC-MW-15008R was installed on June 25, 2019.

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

(5) JHCW-MW-15007, JHC-MW-15009, and JHC-MW-15011 were decommissioned in July 2021. Replacement wells

# Attachment 1 Sanitas<sup>™</sup> Output

# Boron Comparison to GWPS





# Sulfate Comparison to GWPS



Time Series Analysis Run 12/2/2021 4:06 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

mg/L

Total Dissolved Solids Comparison to GWPS





mg/L

Sanitas<sup>™</sup> v.9.6.31 Sanitas software licensed to Consumers Energy. EPA Hollow symbols indicate censored values.

# Arsenic Comparison to GPWS



Time Series Analysis Run 12/2/2021 4:09 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

ng/L
# Selenium Comparison to GWPS



Time Series Analysis Run 12/2/2021 4:10 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

# Iron Comparison to GWPS





# Vanadium Comparison to GWPS





Constituent: Boron, Total Analysis Run 12/2/2021 4:09 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

For observations made between 6/20/2018 and 10/21/2021, a summary of the selected data set:

Observations = 40 ND/Trace = 0 Wells = 5 Minimum Value = 91.4 Maximum Value = 5070 Mean Value = 1047 Median Value = 367.5 Standard Deviation = 1410 Coefficient of Variation = 1.346 Skewness = 1.815

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	0	242	371	299.1	294.5	46.25	0.1547	0.3787
JHC-MW-15007R	8	0	142	978	301.1	176	285.7	0.9487	1.938
JHC-MW-15008R	8	0	285	786	428.6	374	158.6	0.3701	1.58
JHC-MW-15009R	8	0	91.4	1680	667.6	434.5	605	0.9063	0.7404
JHC-MW-15011R	8	0	1910	5070	3541	3495	1271	0.359	-0.03985

Constituent: Sulfate Analysis Run 12/2/2021 4:08 PM

Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

For observations made between 6/20/2018 and 10/21/2021, a summary of the selected data set:

Observations = 40 ND/Trace = 0 Wells = 5 Minimum Value = 18.2 Maximum Value = 276 Mean Value = 131.1 Median Value = 125 Standard Deviation = 81.21 Coefficient of Variation = 0.6193 Skewness = 0.1118

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	<u>Skewness</u>
JHC-MW-15006	8	0	184	276	232.3	234.5	33.53	0.1443	-0.1748
JHC-MW-15007R	8	0	19.2	171	69.51	61.15	50.19	0.722	0.9881
JHC-MW-15008R	8	0	90.8	235	179.7	191.3	51.66	0.2875	-0.8105
JHC-MW-15009R	8	0	18.2	130	47.56	33.75	36.64	0.7703	1.581
JHC-MW-15011R	8	0	45	192	126.6	128	48.62	0.384	-0.2222

Constituent: Total Dissolved Solids Analysis Run 12/2/2021 4:08 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

For observations made between 6/20/2018 and 10/21/2021, a summary of the selected data set:

Observations = 40 ND/Trace = 0 Wells = 5 Minimum Value = 83 Maximum Value = 676 Mean Value = 432.5 Median Value = 464 Standard Deviation = 138.4 Coefficient of Variation = 0.3201 Skewness = -0.5696

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	0	485	562	522.1	517	28.47	0.05452	0.2178
JHC-MW-15007R	8	0	166	544.5	349	346.5	107.5	0.308	0.184
JHC-MW-15008R	8	0	365	577	513.2	542	73.01	0.1423	-1.201
JHC-MW-15009R	8	0	83	435	290.9	316.5	114.3	0.3929	-0.5521
JHC-MW-15011R	8	0	195	676	487	520.5	158.5	0.3254	-0.5931

Constituent: Arsenic, Total Analysis Run 12/2/2021 4:10 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

For observations made between 6/20/2018 and 10/21/2021, a summary of the selected data set:

Observations = 40 ND/Trace = 15 Wells = 5 Minimum Value = 1 Maximum Value = 31 Mean Value = 3 Standard Deviation = 7.31 Coefficient of Variation = 1.318 Skewness = 2.129

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	0	3	7.5	5.188	5	1.361	0.2624	0.07736
JHC-MW-15007R	8	0	2.9	7	4.113	3.5	1.563	0.3801	0.9946
JHC-MW-15008R	8	8	1	1	1	1	0	0	NaN
JHC-MW-15009R	8	7	1	1	1	1	0	0	NaN
JHC-MW-15011R	8	0	2	31	16.44	17.75	10.4	0.6325	-0.1959

Constituent: Selenium, Total Analysis Run 12/2/2021 4:11 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

For observations made between 6/20/2018 and 10/21/2021, a summary of the selected data set:

Observations = 40 ND/Trace = 2 Wells = 5 Minimum Value = 0.5 Maximum Value = 308 Mean Value = 34.91 Median Value = 12.3 Standard Deviation = 58.73 Coefficient of Variation = 1.682 Skewness = 3.039

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	1	0.5	9	3.5	1.75	3.391	0.9689	0.7489
JHC-MW-15007R	8	1	0.5	23	10.49	5.55	10.01	0.9541	0.4059
JHC-MW-15008R	8	0	3	68	17.88	12	21.03	1.176	1.953
JHC-MW-15009R	8	0	10.3	78	44.74	49.5	28.21	0.6305	-0.08158
JHC-MW-15011R	8	0	4	308	97.94	66.5	105.2	1.075	0.9667

Constituent: Iron, Total Analysis Run 12/2/2021 4:12 PM

Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

For observations made between 2/12/2020 and 10/21/2021, a summary of the selected data set:

Observations = 34 ND/Trace = 5 Wells = 5 Minimum Value = 10 Maximum Value = 1610 Mean Value = 207.1 Median Value = 121.5 Standard Deviation = 329 Coefficient of Variation = 1.589 Skewness = 2.976

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	0	26	571	165	132.5	176.3	1.068	1.685
JHC-MW-15007R	5	2	10	158	56.7	34.5	61.89	1.092	0.9761
JHC-MW-15008R	8	0	24	383	125	95	117.6	0.9405	1.395
JHC-MW-15009R	5	1	10	1090	410	420	439.1	1.071	0.6533
JHC-MW-15011R	8	2	10	1610	298.6	130	536.9	1.798	2.153

Constituent: Vanadium, Total Analysis Run 12/2/2021 4:13 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

For observations made between 2/12/2020 and 10/21/2021, a summary of the selected data set:

Observations = 34 ND/Trace = 13 Wells = 5 Minimum Value = 2 Maximum Value = 49 Mean Value = 12.01 Median Value = 7 Standard Deviation = 13.53 Coefficient of Variation = 1.126 Skewness = 1.389

Well	<u>#Obs.</u>	ND/Trace	Min	Max	Mean	Median	Std.Dev.	CV	Skewness
JHC-MW-15006	8	0	7	16	11.38	11	3.462	0.3043	-0.02865
JHC-MW-15007R	5	0	3	16	11.2	14	5.541	0.4947	-0.6519
JHC-MW-15008R	8	8	2	2	2	2	0	0	NaN
JHC-MW-15009R	5	3	2	3	2.4	2	0.5477	0.2282	0.4082
JHC-MW-15011R	8	2	2	49	29.19	34.25	17.74	0.6079	-0.7869









mg/L





mg/L



# Sen's Slope Estimator Analysis Run 12/2/2021 4:19 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

mg/L













ng/L

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# Parametric and Non-Parametric (NP) Confidence Interval

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



Constituent: Boron, Total Analysis Run 12/3/2021 12:42 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

Constituent: Boron, Total (ug/L) Analysis Run 12/3/2021 12:44 PM

Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

	JHC-MW-15007R	JHC-MW-15008R	JHC-MW-15009R	JHC-MW-15011R
6/20/2018	157		91.4	
11/15/2018	142		187.5 (D)	
4/24/2019	190		195 (D)	
2/12/2020	147	423	468	1910
4/14/2020	242	505	877.5 (D)	
4/15/2020				2870
7/16/2020	162	384	401	2720
10/22/2020		285		4120
2/23/2021		326		4625 (D)
4/13/2021		356 (D)		5070
8/16/2021			1440	
8/17/2021	391 (D)			4860
8/18/2021		364		
10/21/2021	978 (D)	786	1680	2150
Mean	301.1	428.6	667.6	3541
Std. Dev.	285.7	158.6	605	1271
Upper Lim.	978	578.4	1309	4888
Lower Lim.	142	285.2	26.26	2193

mg/L

# Parametric Confidence Interval

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



Constituent: Sulfate Analysis Run 12/3/2021 12:42 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

Constituent: Sulfate (mg/L) Analysis Run 12/3/2021 12:44 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

JHC-MW-15006
217
260
195
252 (D)
276
257
184
217
232.3
33.53
267.8

mg/L

# Parametric Confidence Interval

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



# Constituent: Total Dissolved Solids Analysis Run 12/3/2021 12:42 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

Constituent: Total Dissolved Solids (mg/L) Analysis Run 12/3/2021 12:44 PM

Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

	JHC-MW-15006	JHC-MW-15007R	JHC-MW-15008R	JHC-MW-15011R
6/20/2018		298		
11/15/2018		166		
4/24/2019		360		
2/12/2020	542	312	556	654
4/14/2020	562	336	566	
4/15/2020				542
7/16/2020	521	357	536	499
10/22/2020	513 (D)		577	546
2/23/2021	556		548	425 (D)
4/13/2021	497		514.5 (D)	359
8/17/2021	501	544.5 (D)		676
8/18/2021			365	
10/21/2021	485	418.5 (D)	443	195
Mean	522.1	349	513.2	487
Std. Dev.	28.47	107.5	73.01	158.5
Upper Lim.	552.3	462.9	584.1	655
Lower Lim.	492	235.1	441.4	319

ng/L

# Parametric Confidence Interval

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



Constituent: Arsenic, Total Analysis Run 12/3/2021 12:42 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

Constituent: Arsenic, Total (ug/L) Analysis Run 12/3/2021 12:44 PM

Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

	JHC-MW-15011R
2/12/2020	31
4/15/2020	25
7/16/2020	22
10/22/2020	22
2/23/2021	13.5 (D)
4/13/2021	13
8/17/2021	2
10/21/2021	3
Mean	16.44
Std. Dev.	10.4
Upper Lim.	27.46
Lower Lim.	5.417

ng/L

# Parametric Confidence Interval

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



Constituent: Selenium, Total Analysis Run 12/3/2021 12:42 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

Constituent: Selenium, Total (ug/L) Analysis Run 12/3/2021 12:44 PM

Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

	JHC-MW-15008R	JHC-MW-15009R	JHC-MW-15011R
6/20/2018		10.3	
11/15/2018		12.6 (D)	
4/24/2019		62 (D)	
2/12/2020	11	20	104
4/14/2020	6	78 (D)	
4/15/2020			29
7/16/2020	13	76	20
10/22/2020	68		308
2/23/2021	16		163.5 (D)
4/13/2021	6 (D)		143
8/16/2021		37	
8/17/2021			12
8/18/2021	3		
10/21/2021	20	62	4
Mean	17.88	44.74	97.94
Std. Dev.	21.03	28.21	105.2
Upper Lim.	33.6	74.64	209.5
Lower Lim.	3.478	14.84	-13.61

# Parametric Confidence Interval

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



Constituent: Iron, Total Analysis Run 12/3/2021 12:42 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

Constituent: Iron, Total (ug/L) Analysis Run 12/3/2021 12:44 PM

Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

	JHC-MW-15006	JHC-MW-15009R	JHC-MW-15011R
2/12/2020	189	420	178
4/14/2020	26	<20 (D)	
4/15/2020			145
7/16/2020	128	34	115
10/22/2020	571 (D)		<20
2/23/2021	43		<20 (D)
4/13/2021	41		57
8/16/2021		496	
8/17/2021	137		1610
10/21/2021	185	1090	264
Mean	165	410	298.6
Std. Dev.	176.3	439.1	536.9
Upper Lim.	321.6	1067	562
Lower Lim.	26.51	-242.7	16.31

# Parametric Confidence Interval

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



ng/L

Constituent: Vanadium, Total Analysis Run 12/3/2021 12:42 PM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

Constituent: Vanadium, Total (ug/L) Analysis Run 12/3/2021 12:44 PM

Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

	JHC-MW-15006	JHC-MW-15007R	JHC-MW-15011R
2/12/2020	16	16	42
4/14/2020	10	14	
4/15/2020			40
7/16/2020	15	15	30
10/22/2020	14 (D)		49
2/23/2021	7		34.5 (D)
4/13/2021	7		34
8/17/2021	10	3 (D)	<2
10/21/2021	12	8 (D)	<2
Mean	11.38	11.2	28.94
Std. Dev.	3.462	5.541	18.18
Upper Lim.	15.04	20.48	44.17
Lower Lim.	7.706	1.915	17.43



# Appendix C GSI Time Series Charts



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.9.6.32 Sanitas software licensed to Consumers Energy. EPA



Time Series Analysis Run 12/6/2021 10:55 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21 Sanitas<sup>™</sup> v.9.6.32 Sanitas software licensed to Consumers Energy. EPA 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<sup>™</sup> v.9.6.32 Sanitas software licensed to Consumers Energy. EPA 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).

Barium, Total



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

#### Molybdenum, 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 molybdenum result collected in accordance with the JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP).

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



Time Series Analysis Run 12/6/2021 10:55 AM Client: Consumers Energy Data: JHC CCR\_Sanitas Data\_4Q21

#### Sanitas<sup>™</sup> v.9.6.32 Sanitas software licensed to Consumers Energy. EPA Hollow symbols indicate censored values.



#### Total Dissolved Solids



Vanadium, 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 vanadium result collected in accordance with the JH Campbell Dry Ash Landfill Hydrogeological Monitoring Plan (HMP).


























# Appendix D October 2021 Laboratory Reports



135 W. Trail St. Jackson, MI 49201

To: CDBatts, JH Campbell Complex

From: EBlaj, T-258

Date: November 08, 2021

- Subject: JH CAMPBELL SOLID WASTE DISPOSAL AREA GROUNDWATER MONITORING 4<sup>th</sup> Quarter, 2021 Background Wells
  - CC: BLSwanberg, P22-119 HDRegister, P22-521

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

# **Chemistry Project: 21-1276**

CE Laboratory Services conducted groundwater monitoring on 10/19/2021 through 10/22/2021 at the JH Campbell Solid Waste Disposal Area, for the 4<sup>th</sup> Quarter monitoring requirements. The samples were received for analysis by the Chemistry department on 10/22/2021.

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, 22<sup>nd</sup> 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

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- 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 2021 JHC Background WellsDate Received:10/22/2021Chemistry Project:21-1276

Sample #	Field Sample ID	<u>Matrix</u>	Sample Date	<u>Site</u>	
21-1276-01	JHC-MW-15023	Groundwater	10/20/2021 10:57 AM	JHC RCRA GW Monitoring -	Background Wells
21-1276-02	JHC-MW-15024	Groundwater	10/20/2021 09:28 AM	JHC RCRA GW Monitoring -	Background Wells
21-1276-03	JHC-MW-15025	Groundwater	10/19/2021 05:58 PM	JHC RCRA GW Monitoring -	Background Wells
21-1276-04	JHC-MW-15026	Groundwater	10/19/2021 04:51 PM	JHC RCRA GW Monitoring -	Background Wells
21-1276-05	JHC-MW-15027	Groundwater	10/19/2021 03:56 PM	JHC RCRA GW Monitoring -	Background Wells
21-1276-06	JHC-MW-15028	Groundwater	10/19/2021 02:36 PM	JHC RCRA GW Monitoring -	Background Wells
21-1276-07	DUP-01	Groundwater	10/19/2021 12:00 AM	JHC RCRA GW Monitoring -	Background Wells
21-1276-08	FB-01	Water	10/20/2021 09:49 AM	JHC RCRA GW Monitoring -	Background Wells
21-1276-09	EB-01	Water	10/19/2021 06:23 PM	JHC RCRA GW Monitoring -	Background Wells
21-1276-10	JHC-MW-15025 Field MS	Groundwater	10/19/2021 05:58 PM	JHC RCRA GW Monitoring -	Background Wells
21-1276-11	JHC-MW-15025 Field MSD	Groundwater	10/19/2021 05:58 PM	JHC RCRA GW Monitoring -	Background Wells



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	JHC-MW-15023	Collect Date:	10/20/2021
Lab Sample ID:	21-1276-01	Collect Time:	10:57 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous			Aliquot #: 21-1276-01-C01-A01		Analyst: TMR	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/29/2021	AB21-1027-11
Metals by EPA 6020B: CCR I	Rule Appendix III-IV Tot	al Metals	s Ехр	Aliquot #: 21-1	276-01-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Arsenic	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Barium	21		ug/L	5.0	11/04/2021	AB21-1103-10
Beryllium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Boron	41		ug/L	20.0	11/03/2021	AB21-1103-10
Cadmium	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Calcium	10700		ug/L	1000.0	11/03/2021	AB21-1103-10
Chromium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Cobalt	ND		ug/L	6.0	11/04/2021	AB21-1103-10
Copper	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Iron	86		ug/L	20.0	11/03/2021	AB21-1103-10
Lead	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Lithium	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Magnesium	3350		ug/L	1000.0	11/03/2021	AB21-1103-10
Molybdenum	ND		ug/L	5.0	11/04/2021	AB21-1103-10
Nickel	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Potassium	767		ug/L	100.0	11/03/2021	AB21-1103-10
Selenium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Silver	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Sodium	3330		ug/L	1000.0	11/03/2021	AB21-1103-10
Thallium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Vanadium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Zinc	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR R	ule Analyte List, Cl, F, S	604, Aqu	eous	Aliquot #: 21-1	276-01-C02-A01	Analyst: DMW
	De suit		Unite	 	Analysis Data	The shine

Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Chloride	3600	ug/L	1000.0	10/27/2021	AB21-1028-01
Fluoride	ND	ug/L	1000.0	10/27/2021	AB21-1028-01
Sulfate	11800	ug/L	1000.0	10/27/2021	AB21-1028-01
Total Dissolved Solids by SM 2540C			Aliquot #: 21-1	1276-01-C03-A01	Analyst: CLH
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking

**Total Dissolved Solids** 

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mg/L

10/27/2021

10.0

AB21-1027-04

77



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	JHC-MW-15023	Collect Date:	10/20/2021
Lab Sample ID:	21-1276-01	Collect Time:	10:57 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B			Aliquot #: 21-1	276-01-C04-A01 Analyst: DL	
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Alkalinity Total	23000	ug/L	10000.0	10/29/2021	AB21-1029-15
Alkalinity Bicarbonate	23000	ug/L	10000.0	10/29/2021	AB21-1029-15
Alkalinity Carbonate	ND	ug/L	10000.0	10/29/2021	AB21-1029-15

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Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	JHC-MW-15024	Collect Date:	10/20/2021
Lab Sample ID:	21-1276-02	Collect Time:	09:28 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous			Aliquot #: 21-1276-02-C01-A01		Analyst: TMR	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/29/2021	AB21-1027-11
Metals by EPA 6020B: CCR	Rule Appendix III-IV To	tal Metals	Ехр	Aliquot #: 21-1	276-02-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Arsenic	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Barium	25		ug/L	5.0	11/04/2021	AB21-1103-10
Beryllium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Boron	ND		ug/L	20.0	11/03/2021	AB21-1103-10
Cadmium	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Calcium	40200		ug/L	1000.0	11/03/2021	AB21-1103-10
Chromium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Cobalt	ND		ug/L	6.0	11/04/2021	AB21-1103-10
Copper	1		ug/L	1.0	11/04/2021	AB21-1103-10
Iron	119		ug/L	20.0	11/03/2021	AB21-1103-10
Lead	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Lithium	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Magnesium	11600		ug/L	1000.0	11/03/2021	AB21-1103-10
Molybdenum	ND		ug/L	5.0	11/04/2021	AB21-1103-10
Nickel	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Potassium	1060		ug/L	100.0	11/03/2021	AB21-1103-10
Selenium	2		ug/L	1.0	11/04/2021	AB21-1103-10
Silver	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Sodium	15500		ug/L	1000.0	11/03/2021	AB21-1103-10
Thallium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Vanadium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Zinc	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR	Rule Analyte List, CI, F,	SO4, Aqu	eous	Aliquot #: 21-1	276-02-C02-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	47100		ug/L	1000.0	10/27/2021	AB21-1028-01

Fluoride	ND	ug/L	1000.0	10/27/2021	AB21-1028-01
Sulfate	7530	ug/L	1000.0	10/27/2021	AB21-1028-01
Total Dissolved Solids by SM 25	40C	A	liquot #: 21-1	276-02-C03-A01	Analyst: CLH
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Total Dissolved Solids	242	mg/L	10.0	10/27/2021	AB21-1027-04

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Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	JHC-MW-15024	Collect Date:	10/20/2021
Lab Sample ID:	21-1276-02	Collect Time:	09:28 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B			Aliquot #: 21-1276-02-C04-A01		Analyst: DLS
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Alkalinity Total	112000	ug/L	10000.0	10/29/2021	AB21-1029-15
Alkalinity Bicarbonate	112000	ug/L	10000.0	10/29/2021	AB21-1029-15
Alkalinity Carbonate	ND	ug/L	10000.0	10/29/2021	AB21-1029-15

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Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	JHC-MW-15025	Collect Date:	10/19/2021
Lab Sample ID:	21-1276-03	Collect Time:	05:58 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous			Aliquot #: 21-	Aliquot #: 21-1276-03-C01-A01	
Parameter(s)	Result	Flag Uni	ts RL	Analysis Date	Tracking
Mercury	ND	ug/L	0.2	10/29/2021	AB21-1027-11
Metals by EPA 6020B: CCF	R Rule Appendix III-IV Tot	al Metals Exp	Aliquot #: 21-	1276-03-C01-A02	Analyst: EB
Parameter(s)	Result	Flag Uni	ts RL	Analysis Date	Tracking
Antimony	ND	ug/L	1.0	11/04/2021	AB21-1103-10
Arsenic	ND	ug/L	1.0	11/04/2021	AB21-1103-10
Barium	6	ug/L	5.0	11/04/2021	AB21-1103-10
Beryllium	ND	ug/L	1.0	11/04/2021	AB21-1103-10
Boron	ND	ug/L	20.0	11/03/2021	AB21-1103-10
Cadmium	ND	ug/L	0.2	11/04/2021	AB21-1103-10
Calcium	24200	ug/L	1000.0	11/03/2021	AB21-1103-10
Chromium	ND	ug/L	1.0	11/04/2021	AB21-1103-10
Cobalt	ND	ug/L	6.0	11/04/2021	AB21-1103-10
Copper	ND	ug/L	1.0	11/04/2021	AB21-1103-10
Iron	47	ug/L	20.0	11/03/2021	AB21-1103-10
Lead	ND	ug/L	1.0	11/04/2021	AB21-1103-10
Lithium	ND	ug/L	10.0	11/04/2021	AB21-1103-10
Magnesium	7070	ug/L	1000.0	11/03/2021	AB21-1103-10
Molybdenum	ND	ug/L	5.0	11/04/2021	AB21-1103-10
Nickel	ND	ug/L	2.0	11/04/2021	AB21-1103-10
Potassium	1050	ug/L	100.0	11/03/2021	AB21-1103-10
Selenium	ND	ug/L	1.0	11/04/2021	AB21-1103-10
Silver	ND	ug/L	0.2	11/04/2021	AB21-1103-10
Sodium	23000	ug/L	1000.0	11/03/2021	AB21-1103-10
Thallium	ND	ug/L	2.0	11/04/2021	AB21-1103-10
Vanadium	ND	ug/L	2.0	11/04/2021	AB21-1103-10
Zinc	ND	ug/L	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR	Rule Analyte List, CI, F, S	04. Aqueous	Aliquot #: 21-	1276-03-C02-A01	Analvst: DMW
Parameter(s)	Result	Flag Uni	ts RL	Analysis Date	- Tracking
Chloride	23300	ug/L	1000.0	10/27/2021	AB21-1028-01
Fluoride	ND	ua/L	1000.0	10/27/2021	AB21-1028-01
Sulfate	8980	ug/L	1000.0	10/27/2021	AB21-1028-01

Total Dissolved Solids by SM 2540C			Aliquot #: 21-1276-03-C03-A01			#Error
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	259		mg/L	10.0	10/26/2021	

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Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	JHC-MW-15025	Collect Date:	10/19/2021
Lab Sample ID:	21-1276-03	Collect Time:	05:58 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B			Aliquot #: 21-1276-03-C04-A01		Analyst: DLS
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Alkalinity Total	100000	ug/L	10000.0	10/29/2021	AB21-1029-15
Alkalinity Bicarbonate	100000	ug/L	10000.0	10/29/2021	AB21-1029-15
Alkalinity Carbonate	ND	ug/L	10000.0	10/29/2021	AB21-1029-15

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Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	JHC-MW-15026	Collect Date:	10/19/2021
Lab Sample ID:	21-1276-04	Collect Time:	04:51 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous		Aliquot #: 21-1276-04-C01-A01		Analyst: TMR		
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/29/2021	AB21-1027-11
Metals by EPA 6020B: CCF	Rule Appendix III-IV Tot	al Metals	: Exp	Aliquot #: 21-1	276-04-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Arsenic	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Barium	8		ug/L	5.0	11/04/2021	AB21-1103-10
Beryllium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Boron	ND		ug/L	20.0	11/03/2021	AB21-1103-10
Cadmium	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Calcium	4010		ug/L	1000.0	11/03/2021	AB21-1103-10
Chromium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Cobalt	ND		ug/L	6.0	11/04/2021	AB21-1103-10
Copper	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Iron	28		ug/L	20.0	11/03/2021	AB21-1103-10
Lead	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Lithium	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Magnesium	ND		ug/L	1000.0	11/03/2021	AB21-1103-10
Molybdenum	ND		ug/L	5.0	11/04/2021	AB21-1103-10
Nickel	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Potassium	669		ug/L	100.0	11/03/2021	AB21-1103-10
Selenium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Silver	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Sodium	2310		ug/L	1000.0	11/03/2021	AB21-1103-10
Thallium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Vanadium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Zinc	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR	Rule Analyte List, CI, F,	SO4, Aqu	eous	Aliquot #: 21-1	276-04-C02-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	1090		ua/l	1000.0	10/27/2021	AB21-1028-01

NDug/L1000.010/27/2021AB21-1028-015810ug/L1000.010/27/2021AB21-1028-01
5810 ua/L 1000.0 10/27/2021 AB21-1028-01
Aliquot #: 21-1276-04-C03-A01 Analyst: DMW
Result Flag Units RL Analysis Date Tracking
Aliquot #: 21-1276-04-C03-A01 Ana

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Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	JHC-MW-15026	Collect Date:	10/19/2021
Lab Sample ID:	21-1276-04	Collect Time:	04:51 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B			Aliquot #: 21-1276-04-C04-A01		Analyst: DLS
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Alkalinity Total	15300	ug/L	10000.0	10/29/2021	AB21-1029-15
Alkalinity Bicarbonate	15300	ug/L	10000.0	10/29/2021	AB21-1029-15
Alkalinity Carbonate	ND	ug/L	10000.0	10/29/2021	AB21-1029-15

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Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	JHC-MW-15027	Collect Date:	10/19/2021
Lab Sample ID:	21-1276-05	Collect Time:	03:56 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous		Aliquot #: 21-1276-05-C01-A01		Analyst: TMR		
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/29/2021	AB21-1027-11
Metals by EPA 6020B: CCR Rule Appendix III-IV Total Metals Exp		: Exp	Aliquot #: 21-1	276-05-C01-A02	Analyst: EB	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Arsenic	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Barium	15		ug/L	5.0	11/04/2021	AB21-1103-10
Beryllium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Boron	ND		ug/L	20.0	11/03/2021	AB21-1103-10
Cadmium	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Calcium	13400		ug/L	1000.0	11/03/2021	AB21-1103-10
Chromium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Cobalt	ND		ug/L	6.0	11/04/2021	AB21-1103-10
Copper	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Iron	1430		ug/L	20.0	11/03/2021	AB21-1103-10
Lead	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Lithium	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Magnesium	2890		ug/L	1000.0	11/03/2021	AB21-1103-10
Molybdenum	ND		ug/L	5.0	11/04/2021	AB21-1103-10
Nickel	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Potassium	237		ug/L	100.0	11/03/2021	AB21-1103-10
Selenium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Silver	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Sodium	1900		ug/L	1000.0	11/03/2021	AB21-1103-10
Thallium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Vanadium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Zinc	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR	Rule Analyte List, CI, F,	SO4, Aqu	eous	Aliquot #: 21-1	276-05-C02-A01	Analyst: DMW

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Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Chloride	ND	ug/L	1000.0	10/27/2021	AB21-1028-01
Fluoride	ND	ug/L	1000.0	10/27/2021	AB21-1028-01
Sulfate	7890	ug/L	1000.0	10/27/2021	AB21-1028-01
Total Dissolved Solids by SM 254	.0C		Aliquot #: 21-1	276-05-C03-A01	Analyst: DMW

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Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Total Dissolved Solids	71	mg/L	10.0	10/26/2021	AB21-1026-12



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	JHC-MW-15027	Collect Date:	10/19/2021
Lab Sample ID:	21-1276-05	Collect Time:	03:56 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B			Aliquot #: 21-1	Analyst: DLS	
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Alkalinity Total	42900	ug/L	10000.0	10/29/2021	AB21-1029-15
Alkalinity Bicarbonate	42900	ug/L	10000.0	10/29/2021	AB21-1029-15
Alkalinity Carbonate	ND	ug/L	10000.0	10/29/2021	AB21-1029-15

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Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	JHC-MW-15028	Collect Date:	10/19/2021
Lab Sample ID:	21-1276-06	Collect Time:	02:36 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous			Aliquot #: 21-1276-06-C01-A01		Analyst: TMR	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/29/2021	AB21-1027-11
Metals by EPA 6020B: CCR R	ule Appendix III-IV To	tal Metals	s Exp	Aliquot #: 21-1	276-06-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Arsenic	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Barium	8		ug/L	5.0	11/04/2021	AB21-1103-10
Beryllium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Boron	ND		ug/L	20.0	11/03/2021	AB21-1103-10
Cadmium	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Calcium	20000		ug/L	1000.0	11/03/2021	AB21-1103-10
Chromium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Cobalt	ND		ug/L	6.0	11/04/2021	AB21-1103-10
Copper	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Iron	41		ug/L	20.0	11/03/2021	AB21-1103-10
Lead	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Lithium	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Magnesium	4380		ug/L	1000.0	11/03/2021	AB21-1103-10
Molybdenum	ND		ug/L	5.0	11/04/2021	AB21-1103-10
Nickel	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Potassium	320		ug/L	100.0	11/03/2021	AB21-1103-10
Selenium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Silver	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Sodium	1350		ug/L	1000.0	11/03/2021	AB21-1103-10
Thallium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Vanadium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Zinc	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR Ru	le Analyte List, CI, F,	SO4, Aqı	ieous	Aliquot #: 21-1	276-06-C02-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	ND		ug/L	1000.0	10/27/2021	AB21-1028-01

Fluoride	ND	ug/L	1000.0	10/27/2021	AB21-1028-01
Sulfate	5900	ug/L	1000.0	10/27/2021	AB21-1028-01
Total Dissolved Solids by SM 25400	;		Aliquot #: 21-1	276-06-C03-A01	Analyst: DMW
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Total Dissolved Solids	203	mg/L	10.0	10/26/2021	AB21-1026-12

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Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	JHC-MW-15028	Collect Date:	10/19/2021
Lab Sample ID:	21-1276-06	Collect Time:	02:36 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B			Aliquot #: 21-1	Analyst: DLS	
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Alkalinity Total	72000	ug/L	10000.0	10/29/2021	AB21-1029-15
Alkalinity Bicarbonate	72000	ug/L	10000.0	10/29/2021	AB21-1029-15
Alkalinity Carbonate	ND	ug/L	10000.0	10/29/2021	AB21-1029-15

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Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	DUP-01	Collect Date:	10/19/2021
Lab Sample ID:	21-1276-07	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous		Aliquot #: 21-1276-07-C01-A01		Analyst: TMR		
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/29/2021	AB21-1027-11
Metals by EPA 6020B: CCR	Rule Appendix III-IV Tot	al Metals	s Exp	Aliquot #: 21-1	276-07-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Arsenic	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Barium	8		ug/L	5.0	11/04/2021	AB21-1103-10
Beryllium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Boron	ND		ug/L	20.0	11/03/2021	AB21-1103-10
Cadmium	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Calcium	20600		ug/L	1000.0	11/03/2021	AB21-1103-10
Chromium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Cobalt	ND		ug/L	6.0	11/04/2021	AB21-1103-10
Copper	1		ug/L	1.0	11/04/2021	AB21-1103-10
Iron	35		ug/L	20.0	11/03/2021	AB21-1103-10
Lead	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Lithium	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Magnesium	4580		ug/L	1000.0	11/03/2021	AB21-1103-10
Molybdenum	ND		ug/L	5.0	11/04/2021	AB21-1103-10
Nickel	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Potassium	362		ug/L	100.0	11/03/2021	AB21-1103-10
Selenium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Silver	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Sodium	1420		ug/L	1000.0	11/03/2021	AB21-1103-10
Thallium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Vanadium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Zinc	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR I	Rule Analyte List, Cl, F, S	604, Aqu	ieous	Aliquot #: 21-1	276-07-C02-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RI	Analysis Date	Tracking

Farameter(S)	Result	Flag Units	KL.	Analysis Date	Паскіну
Chloride	ND	ug/L	1000.0	10/27/2021	AB21-1028-01
Fluoride	ND	ug/L	1000.0	10/27/2021	AB21-1028-01
Sulfate	5230	ug/L	1000.0	10/27/2021	AB21-1028-01
Total Dissolved Solids by SM 2540C			Aliquot #: 21-1	276-07-C03-A01	Analyst: DMW

Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Total Dissolved Solids	108	mg/L	10.0	10/26/2021	AB21-1026-12



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	DUP-01	Collect Date:	10/19/2021
Lab Sample ID:	21-1276-07	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B			Aliquot #: 21-1	Analyst: DLS	
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Alkalinity Total	73500	ug/L	10000.0	10/29/2021	AB21-1029-15
Alkalinity Bicarbonate	73500	ug/L	10000.0	10/29/2021	AB21-1029-15
Alkalinity Carbonate	ND	ug/L	10000.0	10/29/2021	AB21-1029-15

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Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	FB-01	Collect Date:	10/20/2021
Lab Sample ID:	21-1276-08	Collect Time:	09:49 AM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous				Aliquot #: 21-1276-08-C01-A01		Analyst: TMR	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking	
Mercury	ND	u	ıg/L	0.2	10/29/2021	AB21-1027-11	
Metals by EPA 6020B: CCF	R Rule Appendix III-IV Tot	al Metals E	Ехр	Aliquot #: 21-1	276-08-C01-A02	Analyst: EB	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking	
Antimony	ND	u	ıg/L	1.0	11/04/2021	AB21-1103-10	
Arsenic	ND	u	ıg/L	1.0	11/04/2021	AB21-1103-10	
Barium	ND	u	ıg/L	5.0	11/04/2021	AB21-1103-10	
Beryllium	ND	u	ıg/L	1.0	11/04/2021	AB21-1103-10	
Boron	ND	u	ıg/L	20.0	11/03/2021	AB21-1103-10	
Cadmium	ND	u	ıg/L	0.2	11/04/2021	AB21-1103-10	
Calcium	ND	u	ıg/L	1000.0	11/03/2021	AB21-1103-10	
Chromium	ND	u	ıg/L	1.0	11/04/2021	AB21-1103-10	
Cobalt	ND	u	ıg/L	6.0	11/04/2021	AB21-1103-10	
Copper	ND	u	ıg/L	1.0	11/04/2021	AB21-1103-10	
Iron	ND	u	ıg/L	20.0	11/03/2021	AB21-1103-10	
Lead	ND	u	ıg/L	1.0	11/04/2021	AB21-1103-10	
Lithium	ND	u	ıg/L	10.0	11/04/2021	AB21-1103-10	
Magnesium	ND	u	ıg/L	1000.0	11/03/2021	AB21-1103-10	
Molybdenum	ND	u	ig/L	5.0	11/04/2021	AB21-1103-10	
Nickel	ND	u	ıg/L	2.0	11/04/2021	AB21-1103-10	
Potassium	ND	u	ig/L	100.0	11/03/2021	AB21-1103-10	
Selenium	ND	u	ig/L	1.0	11/04/2021	AB21-1103-10	
Silver	ND	u	ig/L	0.2	11/04/2021	AB21-1103-10	
Sodium	ND	u	ig/L	1000.0	11/03/2021	AB21-1103-10	
Thallium	ND	u	ıg/L	2.0	11/04/2021	AB21-1103-10	
Vanadium	ND	u	ig/L	2.0	11/04/2021	AB21-1103-10	
Zinc	ND	u	ig/L	10.0	11/04/2021	AB21-1103-10	
Anions by EPA 300.0 CCR	Rule Analyte List, Cl, F, S	SO4, Aque	ous	Aliquot #: 21-1	276-08-C02-A01	Analyst: DMW	

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Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Chloride	ND	ug/L	1000.0	10/27/2021	AB21-1028-01
Fluoride	ND	ug/L	1000.0	10/27/2021	AB21-1028-01
Sulfate	ND	ug/L	1000.0	10/27/2021	AB21-1028-01



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	EB-01	Collect Date:	10/19/2021
Lab Sample ID:	21-1276-09	Collect Time:	06:23 PM
Matrix:	Water		

Mercury by EPA 7470A, Total, Aqueous				Aliquot #: 21-1276-09-C01-A01		Analyst: TMR
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/29/2021	AB21-1027-11
Metals by EPA 6020B: CCR	Rule Appendix III-IV Tot	al Metals	Ехр	Aliquot #: 21-1	276-09-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Arsenic	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Barium	ND		ug/L	5.0	11/04/2021	AB21-1103-10
Beryllium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Boron	ND		ug/L	20.0	11/03/2021	AB21-1103-10
Cadmium	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Calcium	ND		ug/L	1000.0	11/03/2021	AB21-1103-10
Chromium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Cobalt	ND		ug/L	6.0	11/04/2021	AB21-1103-10
Copper	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Iron	ND		ug/L	20.0	11/03/2021	AB21-1103-10
Lead	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Lithium	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Magnesium	ND		ug/L	1000.0	11/03/2021	AB21-1103-10
Molybdenum	ND		ug/L	5.0	11/04/2021	AB21-1103-10
Nickel	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Potassium	ND		ug/L	100.0	11/03/2021	AB21-1103-10
Selenium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Silver	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Sodium	ND		ug/L	1000.0	11/03/2021	AB21-1103-10
Thallium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Vanadium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Zinc	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR I	Rule Analyte List, Cl, F, S	SO4, Aqu	eous	Aliquot #: 21-1	276-09-C02-A01	Analyst: DMW

	<u> </u>	- ,, , , , , , , , , , , , , , , , , ,			
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Chloride	ND	ug/L	1000.0	10/27/2021	AB21-1028-01
Fluoride	ND	ug/L	1000.0	10/27/2021	AB21-1028-01
Sulfate	ND	ug/L	1000.0	10/27/2021	AB21-1028-01



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	JHC-MW-15025 Field MS	Collect Date:	10/19/2021
Lab Sample ID:	21-1276-10	Collect Time:	05:58 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous			Aliquot #: 21-	Aliquot #: 21-1276-10-C01-A01	
Parameter(s)	Result	Flag Unit	s RL	Analysis Date	Tracking
Mercury	84.8	%	0.2	10/29/2021	AB21-1027-11
Metals by EPA 6020B: CCR	Rule Appendix III-IV Tot	al Metals Exp	Aliquot #: 21-	1276-10-C01-A02	Analyst: EB
Parameter(s)	Result	Flag Unit	s RL	Analysis Date	Tracking
Antimony	108	%	1.0	11/04/2021	AB21-1103-10
Arsenic	102	%	1.0	11/04/2021	AB21-1103-10
Barium	108	%	5.0	11/04/2021	AB21-1103-10
Beryllium	105	%	1.0	11/04/2021	AB21-1103-10
Boron	96	%	20.0	11/03/2021	AB21-1103-10
Cadmium	106	%	0.2	11/04/2021	AB21-1103-10
Calcium	99.7	%	1000.0	11/03/2021	AB21-1103-10
Chromium	103	%	1.0	11/04/2021	AB21-1103-10
Cobalt	103	%	6.0	11/04/2021	AB21-1103-10
Copper	102	%	1.0	11/04/2021	AB21-1103-10
Iron	98	%	20.0	11/03/2021	AB21-1103-10
Lead	96	%	1.0	11/04/2021	AB21-1103-10
Lithium	97	%	10.0	11/04/2021	AB21-1103-10
Magnesium	108	%	1000.0	11/03/2021	AB21-1103-10
Molybdenum	107	%	5.0	11/04/2021	AB21-1103-10
Nickel	101	%	2.0	11/04/2021	AB21-1103-10
Potassium	109	%	100.0	11/03/2021	AB21-1103-10
Selenium	104	%	1.0	11/04/2021	AB21-1103-10
Silver	102	%	0.2	11/04/2021	AB21-1103-10
Sodium	107	%	1000.0	11/03/2021	AB21-1103-10
Thallium	97	%	2.0	11/04/2021	AB21-1103-10
Vanadium	104	%	2.0	11/04/2021	AB21-1103-10
Zinc	99	%	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR R	ule Analyte List, CI, F, S	SO4, Aqueous	Aliguot #: 21-	1276-10-C02-A01	Analyst: DMW

······································	<u> </u>				7
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Chloride	94	%	1000.0	10/27/2021	AB21-1028-01
Fluoride	88	%	1000.0	10/27/2021	AB21-1028-01
Sulfate	94	%	1000.0	10/27/2021	AB21-1028-01



Sample Site:	JHC RCRA GW Monitoring - Background Wells (395496)	Laboratory Project:	21-1276
Field Sample ID:	JHC-MW-15025 Field MSD	Collect Date:	10/19/2021
Lab Sample ID:	21-1276-11	Collect Time:	05:58 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, To	tal, Aqueous		Aliquo	t #: 21-′	1276-11-C01-A01	Analyst: TMR
Parameter(s)	Result	Flag U	nits	RL	Analysis Date	Tracking
Mercury	110	%		0.2	10/29/2021	AB21-1027-11
Metals by EPA 6020B: CCR	Rule Appendix III-IV Tot	al Metals Ex	<sup>(p</sup> Aliquo	t #: 21-′	1276-11-C01-A02	Analyst: EB
Parameter(s)	Result	Flag U	nits	RL	Analysis Date	Tracking
Antimony	105	%		1.0	11/04/2021	AB21-1103-10
Arsenic	100	%		1.0	11/04/2021	AB21-1103-10
Barium	105	%		5.0	11/04/2021	AB21-1103-10
Beryllium	106	%		1.0	11/04/2021	AB21-1103-10
Boron	101	%		20.0	11/03/2021	AB21-1103-10
Cadmium	104	%		0.2	11/04/2021	AB21-1103-10
Calcium	101	%		1000.0	11/03/2021	AB21-1103-10
Chromium	103	%		1.0	11/04/2021	AB21-1103-10
Cobalt	102	%		6.0	11/04/2021	AB21-1103-10
Copper	98	%		1.0	11/04/2021	AB21-1103-10
Iron	106	%		20.0	11/03/2021	AB21-1103-10
Lead	96	%		1.0	11/04/2021	AB21-1103-10
Lithium	100	%		10.0	11/04/2021	AB21-1103-10
Magnesium	111	%		1000.0	11/03/2021	AB21-1103-10
Molybdenum	105	%		5.0	11/04/2021	AB21-1103-10
Nickel	100	%		2.0	11/04/2021	AB21-1103-10
Potassium	117	%		100.0	11/03/2021	AB21-1103-10
Selenium	102	%		1.0	11/04/2021	AB21-1103-10
Silver	100	%		0.2	11/04/2021	AB21-1103-10
Sodium	116	%		1000.0	11/03/2021	AB21-1103-10
Thallium	97	%		2.0	11/04/2021	AB21-1103-10
Vanadium	104	%		2.0	11/04/2021	AB21-1103-10
Zinc	97	%		10.0	11/04/2021	AB21-1103-10
Anions by FPA 300 0 CCR	Rule Analyte List, CL F	SO4. Aqueo	IS Aliquo	t #• 21_"	1276-11-C02-A01	Analyst: DMW

				210-11-002-A01	Analyst. Divite
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Chloride	93	%	1000.0	10/27/2021	AB21-1028-01
Fluoride	87	%	1000.0	10/27/2021	AB21-1028-01
Sulfate	93	%	1000.0	10/27/2021	AB21-1028-01



Data Qualifiers

Exception Summary

No exceptions occured.

Chemistiy Department

General Standard Operating Procedure

# TITLE: SAMPLE LOG-IN – SHIPMENT INSPECTION FORM

Project Log-In Number: <u>21·127</u>		
Inspection Date: 10 25 21	Inspection By:	
Sample Origin/Project Name:	Background  Pm	1d-1
Shipment Delivered By: Enter the type of shipment carry	ler.	
Pony FedEx UPS	USPS	Airborne
Other Hand Carry (whom) GH - CMS		
Tracking Number	Shipping Form Attached	l Yes No
Shipping Containers: Enter the type and number of ship	ping containers received.	
Cooler (2) Cardboard Box	Custom Case	Envelope/Mailer
Loose/Unpackaged Containers	Other	
Condition of Shipmonts. Entor the as received condition	of the chinmont container	
Condition of Simplifient: Enter the as-received condition		
Damaged Shipment Observed. None	Dented	Leaking
Other		
Shipment Security: Enter if any of the shipping containe	rs were opened before receipt	
Shipping Containers Received. Opened	Sealed	
Enclosed Documents: Enter the type of documents enclo	sed with the shipment	
CoC Work Request	Aur Data Sheet	Other
Temperature of Containers: Measure the temperature of	several sample containers	
As-Received Temperature Range 12 - 4.00	Samples Received on Ice.	Yes <u>¥_</u> No
M&TE # and Expiration()164.02 0154-02		
Number and Type of Containers: Enter the fotal number	r of cample containers received	
<u>Container Type</u> <u>Water</u> <u>Soil</u>	Other	<u>Broken</u> <u>Leaking</u>
Overtill ster (c/		
QuarViller (g)		
2-02 (amber glass)		
125  mL (nlastic) $27$ .		······································
24 mL vial (plass)		
<b>25a</b> 590 mL (plastic) 9		·
Other		······································

21-1276 Page of 25 2 not needed

# **CHAIN OF CUSTODY**

# **CONSUMERS ENERGY COMPANY – LABORATORY SERVICES**

# **Consumers Energy**

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

SAMPL	ING SITI	E	_			PROJECT NUMBER					4.51	A T 37	מזמ ח	EOU	morr	20	
J	HC Q4-	-2021 Back	RCRA	GW Monito d Wells	rıng		21-1276					ALY	<u>212 k</u>				SEND REPORT TO Caleb Batts
SAMPI	ING TEA	M				DATE SHIPPED	SITE	SKETCHED	ATTACHED?								Beth Swanberg, TRC
CET	DMW	CLH						CIRCLE	ONE	Tota			Ity	~		Į	PHONE
			(DT D )					Yes	No	etals,	nons	S	kalın	dum			
CONT	E ROL#	DA	TE	TIME	MATRIX	SAMPLE DESCRIPTION / LC	OCATION	DEPTH	# OF CONTAINERS	M	An	E	Ν	Ra			REMARKS
21-1	27 <u>6-01</u>	10.7	20.21	1057	GW	ЛНС-MW-15023			7	x	x	x	x	x			
	-02			0928	GW	JHC-MW-15024			7	x	x	x	x	x			
	03	10.19	7.2)	1758	GW	JHC-MW-15025			7	x	x	x	x	x			
	04	1		1651	GW	JHC-MW-15026			7	x	x	x	x	х			
	05			1556	GW	JHC-MW-15027			7	x	x	x	x	x			
	-06			1436	GW	JHC-MW-15028			7	x	x	х	x	х		_	
	-07				GW	DUP-01			7	x	x	x	x	x			
	-08	10.7	4.21	0949	w	FB-01			5	x	x	x		x			
	09	10.1	9.21	1823	w	EB-01			5	x	x	x		x			
	10	10.10	.21	1758	GW	JHC-MW-15025 Field N	MS		2	x	x						
	11	J		1758	GW	JHC-MW-15025 Field N	MSD		2	x	x						
													1				
RELIN	QUISHE ACM QUISHE	DBY ( ЛЦ DBY (	SIGNAT	TURE)	DATE/	TIME 1736 12 2021 + 180 TIME 102221 R	RECEIVED BY (	SIGNATURE)			<u>.</u>					COM	1.2-4.0°L 0.5402
L		;										0	RIGI	NAL'	TOL	AB	 OPY 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: 160-43807-1

Client Project/Site: JH Campbell CCR Groundwater Testing

# For:

Consumers Energy 135 W Trail Street Jackson, Michigan 49201

Attn: Emil Blaj

Authorized for release by: 11/30/2021 5:26:10 PM

Jayna Awalt, Project Manager II (314)298-8566 Jayna.Awalt@Eurofinset.com

LINKS Review your project results through Total Access



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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# Job ID: 160-43807-1

# Laboratory: Eurofins TestAmerica, St. Louis

### Narrative

Job Narrative 160-43807-1

### Receipt

The samples were received on 10/28/2021 8:45 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved. The temperature of the cooler at receipt was 17.6° C.

## RAD

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.

# Radium-228 Prep Batch 160-535028/Radium-226 Prep Batch 160-535027

Insufficient sample volume was available to perform a sample duplicate for the following samples: JHC-MW-15023 (160-43807-1), JHC-MW-15024 (160-43807-2), JHC-MW-15025 (160-43807-3), JHC-MW-15026 (160-43807-4), JHC-MW-15027 (160-43807-5), JHC-MW-15028 (160-43807-6), DUP-01 (160-43807-7), FB-01 (160-43807-8) and EB-01 (160-43807-9). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

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

Louis	
St.	
TestAmerica,	Trail North
urofins	3715 Rider
ш.	-

# **Chain of Custody Record**

Control Environment Testing TestAmerica

Earth City, MO 63045-1205 phone 314.298.8566 fax 314.298.8757

Othe J RCRA Regulatory Program: Dw NPDES

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	Project Mai	nader: Em	il Blai		NLDL3		> ]	tner:			Ξ	stAmerica	Laborator	es, Inc. d/b/a	Eurofins To	estAmerica
Client Contact	Email: Emil.	Blaj@cmser	lergy.com		<u>si</u>	te Cont	act: Bet	Janv Sw	anberg	Date.			CO	C No.		
Consumers Energy, Laboratory Services	Tel/Fax: 51	7-788-5888				b Cont	act: Emi	l Blai	5	Carrier.				- -	ر ۲	J.
135 W. Trail Street		Analysis Tu	rnaround 7	emi i									-	5		\$2
Jackson, MI 49201	CALEND.	AR DAYS	NOR	KING DAYS	Τ	-							le N	npier: CLH/D	MW/CET	
517-788-5888	TAT	if different fro	m Below		Τ	( •	_									
(xxx) xxx-xxx FAX			in below			۲) ۱۱)	(0						PV3	IK-IN Client:		
Project Name: JH Campbell Background Wells	] 🖸		reek			к) к)	706						Lat	:Sampling:		
Project #: 21-1276		2 d	SVE		_	ası A9	٨q		_							
P.O#		10	ay		9/	9 (EI	I3) 8					_		/ SDG No.:		
			Sample		(ite)	22 u	22 1			_			<u> </u>			
Sample Identification	Sample Date	Sample Time	Type (C≃Comp. G=Grab)	Matrix	Presen ont.	Perforn Radium	muibeЯ							Sample S	pecific Not	.sə
JHC-MW-15023	10/20/2021	1057	ს	GW	2 2	× Z	×									
JHC-MW-15024	10/20/21	0928	IJ	GW	2 2	× z	×							-		
JHC-MW-15025	10/19/21	1758	თ	GW	2 2	×	×							160		11881
JHC-MW-15026	10/19/21	1651	U	ß	2 2	×	×	-						-4380		n na tana t
0 JHC-MW-15027	10/19/21	1556	თ	З	2 2	×	×									T T T T T T T T T T T T T T T T T T T
4 JHC-MW-15028	10/19/21	1436	σ	GW	2 2	× z	×						-	nain c		e Generation
ф DUP-01	1	1	U	GW	2 2	× z	×							of Cus		 
FB-01	10/20/2021	0949	ს	⊡	2 2	×	×		-					stody		
EB-01	10/19/2021	1823	υ	õ	2 2	× z	×									lit <b>Da</b> lit
																1001 1000
								-			-					
														-		
Preservation Used: 1= Ice, 2= HCI; 3= H2SO4; 4=HNO3;	5=NaOH; 6=	Other												Constant Constant		
Possible Hazard Identification: Are any samples from a listed EPA Hazardous Waste? Pleas Comments Section if the lab is to dispose of the sample.	se List any EP	A Waste C	odes for the	sample	n the	Sample	e Dispos	al (Afe	e may be	assesse	d if samp	les are ret	ained ton	ger than 1 m	onth)	
Skin Irritant	Poison B			цŅ			eturn to Cli	ent		sposal by L	d	Archive	for	Months		
Special Instructions/QC Requirements & Comments:																
Custody Seals Intact: Custody Seals Integration	Custody Sea	al No.:					Cool	er Temp.	(°C): Ob:	;p,s	Corr	;p	The	m ID No.:		
Reingquished by H annew	Conpany:	NG GN	NAU	Pate/Tim	121	Receive	ed by:	Å			company:		Dat	e/Time:		
	Company:		-	Date∕Tirff	0 c	mic	that t	( B K)	NN	5	ompany:	the second secon	Jat Dat	OCT 2 8	2021	08:44
keiniquished by:	Company:			Date/Tim		Receive	ed in Lab	oratory t	Š.		ompany:		Dat	e/Time:		
21												Form No.	CA-C-W	-002, Rev. 4.	23, dated	4/16/2019

4



Laboratory Services

135 W. Trail Street Jackson, MI 49201

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

### PROCUREMENT #: 21101165

QA Code: NQ

(Item 1) - Part Number: N/A - Quantity : 1 JHC CCR Rule GW Q4-2021 Samples

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

Standard TAT Request.

Reference Quote #16009576-0

(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: 43807 List Number: 1 Creator: Korrinhizer, Micha L

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: 160-43807-1

List Source: Eurofins TestAmerica, St. Louis

## **Definitions/Glossary**

# Client: Consumers Energy Project/Site: JH Campbell CCR Groundwater Testing

Job ID: 160-43807-1

## Qualifiers

Project/Site:	JH Campbell CCR Groundwater Testing	
Qualifiers		
<mark>Rad</mark> Qualifier	Qualifier Description	
U	Result is less than the sample detection limit.	
Glossarv		5
Abbreviation	These commonly used abbreviations may or may not be present in this report	C
	Listed under the "D" column to designate that the result is reported on a dry weight basis	O
%R	Percent Recovery	
CEI	Contains Free Liquid	
CFU	Colony Forming Unit	
CNF	Contains No Free Liquid	8
DER	Duplicate Error Ratio (normalized absolute difference)	
Dil Fac	Dilution Factor	9
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 CCR Groundwater Testing

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_0	Preparation, Precipitate Separation	None	TAL SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	TAL SL

#### **Protocol References:**

EPA = US Environmental Protection Agency

None = None

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

#### Laboratory References:

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

## Sample Summary

## Client: Consumers Energy Project/Site: JH Campbell CCR Groundwater Testing

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-43807-1	JHC-MW-15023	Water	10/20/21 10:57	10/28/21 08:45
160-43807-2	JHC-MW-15024	Water	10/20/21 09:28	10/28/21 08:45
160-43807-3	JHC-MW-15025	Water	10/19/21 17:58	10/28/21 08:45
160-43807-4	JHC-MW-15026	Water	10/19/21 16:51	10/28/21 08:45
160-43807-5	JHC-MW-15027	Water	10/19/21 15:56	10/28/21 08:45
160-43807-6	JHC-MW-15028	Water	10/19/21 14:36	10/28/21 08:45
160-43807-7	DUP-01	Water	10/19/21 00:00	10/28/21 08:45
160-43807-8	FB-01	Water	10/20/21 09:49	10/28/21 08:45
160-43807-9	EB-01	Water	10/19/21 18:23	10/28/21 08:45

Job ID: 160-43807-1

Total

Uncert.

(2**σ**+/-)

RL

MDC Unit

0.148 pCi/L

#### **Client: Consumers Energy** Project/Site: JH Campbell CCR Groundwater Testing

Client Sample ID: JHC-MW-15023

Method: 903.0 - Radium-226 (GFPC)

Date Collected: 10/20/21 10:57

Date Received: 10/28/21 08:45

Analyte

Job ID: 160-43807-1

Lab Sample ID: 160-43807-1 Matrix: Water							
			5				
Prepared	Analyzed	Dil Fac					
Prepared	Analyzed	Dil Fac					
11/04/21 08:46	11/29/21 13:31	1	8				
			9				

Radium-226 0.0915 U 0.0932 0.0935 1.00 Carrier %Yield Qualifier Limits 40 - 110 Ba Carrier 97.0 Method: 904.0 - Radium-228 (GFPC) Count Total Uncert Uncert

**Result Qualifier** 

Count

Uncert.

(2<del>0</del>+/-)

			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.0693	U	0.233	0.233	1.00	0.407	pCi/L	11/04/21 09:20	11/23/21 12:52	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	97.0		40 - 110					11/04/21 09:20	11/23/21 12:52	1
Y Carrier	77 0		40 - 110					11/04/21 09:20	11/23/21 12:52	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	0.161	U	0.251	0.251	5.00	0.407	pCi/L		11/30/21 15:36	1

## Client Sample ID: JHC-MW-15024 Date Collected: 10/20/21 09:28

Date Received: 10/28/21 08:45

### Method: 903.0 - Radium-226 (GFPC)

			Count	Total						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RI	MDC	Unit	Prenared	Analyzed	Dil Fac
Radium-226	0.0470	U	0.0826	0.0827	1.00	0.144	pCi/L	11/04/21 08:46	11/29/21 13:31	1
<b>Carrier</b> Ba Carrier	% <b>Yield</b> 103	Qualifier	Limits 40 - 110					<b>Prepared</b> 11/04/21 08:46	Analyzed	Dil Fac

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

			Count Uncert.	Total Uncert.					Analyzed	
Analyte	Result	Qualifier	(2σ+/-)	(2 <b>σ+/-</b> )	RL	MDC	Unit	Prepared		Dil Fac
Radium-228	0.317	U	0.226	0.227	1.00	0.349	pCi/L	11/04/21 09:20	11/23/21 12:52	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	103		40 - 110					11/04/21 09:20	11/23/21 12:52	1
Y Carrier	79.6		40 - 110					11/04/21 09:20	11/23/21 12:52	1

## Lab Sample ID: 160-43807-2

Matrix: Water

Client: Consumers Energy Project/Site: JH Campbell CCR Groundwater Testing Job ID: 160-43807-1

Client Sample ID Date Collected: 10/2 Date Received: 10/2	: JHC-M 0/21 09:28 8/21 08:45	W-15024						Lab Sample	e ID: 160-43 Matrix:	8807-2 : Water
Method: Ra226 Ra	228 - Con	bined Rad	dium-226 a	nd Radium	1-228					
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.364		0.241	0.242	5.00	0.349	pCi/L		11/30/21 15:36	1
Client Sample ID	: JHC-M	W-15025						Lab Sample	D: 160-43	807-3
Date Collected: 10/1 Date Received: 10/2	9/21 17:58 8/21 08:45	3							Matrix	: Water
Method: 903.0 - Ra	dium-226	(GFPC)								
			Count	Total						
			Uncert.	Uncert.				_	-	
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.0104	U	0.0772	0.0772	1.00	0.155	pCi/L	11/04/21 08:46	11/29/21 13:32	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	100		40 - 110					11/04/21 08:46	11/29/21 13:32	1
 Method: 904.0 - Ra	dium-228	(GFPC)								
		. ,	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.131	U	0.255	0.255	1.00	0.434	pCi/L	11/04/21 09:20	11/23/21 12:52	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	100		40 - 110					11/04/21 09:20	11/23/21 12:52	1
Y Carrier	76.6		40 - 110					11/04/21 09:20	11/23/21 12:52	1
Method: Ra226_Ra	228 - Con	bined Rad	dium-226 a	nd Radium	1-228					
			Count	Total						
Amelia	Desert	0	Uncert.	Uncert.				Deserved	A	D'I 5
Analyte	Result		(2σ+/-)	(2σ+/-)	<b>RL</b>	MDC		Prepared	Analyzed	
+ 228	0.121	0	0.200	0.200	5.00	0.434	poi/L		11/30/21 13.30	I
Client Sample ID Date Collected: 10/1	: JHC-M 9/21 16:51	W-15026						Lab Sample	e ID: 160-43 Matrix	807-4 : Water
Date Received: 10/2	8/21 08:45	5								
Method: 903.0 - Ra	dium-226	(GFPC)	<b>a</b> .	<b>-</b>						
			Count	Iotal						
Analyta	Popult	Qualifier	(2 m ± / )	(2g+/ )	ы	MDC	Unit	Broparad	Analyzod	Dil Eac
Radium-226	0.124	U	0.101	0.102	1.00	0.154	pCi/L	11/04/21 08:46	11/29/21 13:32	1
Carrier	0/ 1/	Qualifier	l incida					Dramarad	Analized	
Garrier	76 ¥ IEIA	Quantier	LIINITS					Prepared	Anaiyzea	ин нас

Total

Uncert.

(2**σ+/-**)

0.282

Count

Uncert.

(2**σ**+/-)

0.279

Limits 40 - 110

40 - 110

#### Client: Consumers Energy Project/Site: JH Campbell CCR Groundwater Testing

Client Sample ID: JHC-MW-15026

Method: 904.0 - Radium-228 (GFPC)

Date Collected: 10/19/21 16:51 Date Received: 10/28/21 08:45

Analyte

Carrier

Ba Carrier

Y Carrier

Radium-228

Job ID: 160-43807-1

	807-4 Water	D: 160-43 (Matrix:	Lab Sample			
Ę						
	Dil Fac	Analyzed	Prepared	Unit	MDC	RL
	1	11/23/21 12:52	11/04/21 09:20	pCi/L	0.428	1.00
	Dil Fac	Analyzed	Prepared			
G	1	11/23/21 12:52	11/04/21 09:20			
	1	11/23/21 12:52	11/04/21 09:20			
Ş						28
	Dil Eac	Applyzod	Propared	Unit	MDC	ы
		11/30/21 15:36		nCi/l	0 428	5 00
	·	11/00/21 10:00		p0#2	0.120	0.00
	807-5	D: 160-43	Lab Sample			
	: Water	Matrix:				

## Method: Ra226\_Ra228 - Combined Radium-226 and Radium-228

**Result Qualifier** 

%Yield Qualifier

0.449

102

78.5

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium	0.573		0.297	0.300	5.00	0.428	pCi/L		11/30/21 15:36	1

#### Client Sample ID: JHC-MW-15027 Date Collected: 10/19/21 15:56 Date Received: 10/28/21 08:45

Method: 903.0 -	Radium-226	(GFPC)								
			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.0186	U	0.0695	0.0695	1.00	0.131	pCi/L	11/04/21 08:46	11/29/21 13:32	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	98.5		40 - 110					11/04/21 08:46	11/29/21 13:32	1

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

			Count Uncert.	lotal Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.344	U	0.245	0.247	1.00	0.380	pCi/L	11/04/21 09:20	11/23/21 12:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	98.5		40 - 110					11/04/21 09:20	11/23/21 12:53	1
Y Carrier	78.9		40 - 110					11/04/21 09:20	11/23/21 12:53	1

## Method: Ra226\_Ra228 - Combined Radium-226 and Radium-228

			Count	Total						
			Uncert.	Uncert. Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.363	U	0.255	0.257	5.00	0.380	pCi/L		11/30/21 15:36	1

Eurofins TestAmerica, St. Louis

Total

Uncert.

(2**σ**+/-)

0.0829

Total

Uncert.

(2**σ**+/-)

0.237

RL

1.00

RL

1.00

MDC Unit

0.127 pCi/L

MDC Unit

0.393 pCi/L

Count Uncert.

(2<del>0</del>+/-)

0.0826

Limits

40 - 110

Count

Uncert.

(2**σ**+/-)

Limits

40 - 110

40 - 110

0.237

#### **Client: Consumers Energy** Project/Site: JH Campbell CCR Groundwater Testing

Client Sample ID: JHC-MW-15028

Method: 903.0 - Radium-226 (GFPC)

Method: 904.0 - Radium-228 (GFPC)

Date Collected: 10/19/21 14:36

Date Received: 10/28/21 08:45

Analyte

Carrier

Analyte

Carrier

Ba Carrier

Y Carrier

Radium-228

Ba Carrier

Radium-226

Job ID: 160-43807-1

Matrix: Water

Dil Fac

Dil Fac

1

1

1

11/04/21 08:46 11/29/21 13:32 Prepared Analyzed Dil Fac 11/04/21 09:20 11/23/21 12:53

Prepared

11/04/21 08:46

Prepared

Lab Sample ID: 160-43807-6

Analyzed

11/29/21 13:32

Analyzed

Prepared	Analyzed	Dil Fac
11/04/21 09:20	11/23/21 12:53	1
11/04/21 09:20	11/23/21 12:53	1

Lab Sample ID: 160-43807-7

Matrix: Water

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

**Result Qualifier** 

%Yield Qualifier

**Result Qualifier** 

%Yield Qualifier

0.188 U

98.0

79.3

0.0894 U

98.0

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.278	U	0.251	0.251	5.00	0.393	pCi/L		11/30/21 15:36	1

## Client Sample ID: DUP-01 Date Collected: 10/19/21 00:00

#### Date Received: 10/28/21 08:45

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

Analyte Radium-226	Result 0.000	$\frac{\text{Qualifier}}{U}$	<b>(2σ+/-)</b> 0.0666	<b>(2σ+/-)</b> 0.0666	<b>RL</b> 1.00	0.133	Unit pCi/L	Prepared 11/04/21 08:46	Analyzed 11/29/21 13:32	Dil Fac
<b>Carrier</b> Ba Carrier	%Yield	Qualifier	Limits					<b>Prepared</b> 11/04/21 08:46	Analyzed	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	0.0672	U	0.304	0.304	1.00	0.526	pCi/L	11/04/21 09:20	11/23/21 12:53	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	99.5		40 - 110					11/04/21 09:20	11/23/21 12:53	1
Y Carrier	78.1		40 - 110					11/04/21 09:20	11/23/21 12:53	1

Job ID: 160-43807-1

Client: Consumers Energy	
Project/Site: JH Campbell CCR Groundwater	Testing

## Client Sample ID: DUP-01 Date Collected: 10/19/21 00:00

Date Collected: 10/19 Date Received: 10/28	9/21 00:00 8/21 08:45								Matrix	: Water
 Mothod: Po226, Po2	228 Com	binod Po	dium 226 a	nd Padium						
	220 - 0011		Count		1-220					
			Uncort	Uncort						
Analuta	Desult	Qualifian			ы	MDC	11	Drevered	Analyzad	
	Result	Qualifier	(20+/-)	(20+/-)			Unit	Prepared		DIIFac
-+ 228	0.0672	U	0.311	0.311	5.00	0.526	pCI/L		11/30/21 15:36	
Client Sample ID:	FB-01							Lab Sample	D: 160-43	8807-8
Date Collected: 10/20	)/21 09:49							-	Matrix	: Wate
Date Received: 10/28	8/21 08:45									
 Method: 903.0 - Rac	dium-226	(GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(2 <b>σ+/-</b> )	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.00317	U	0.0664	0.0664	1.00	0.132	pCi/L	11/04/21 08:46	11/29/21 13:32	
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fa
Ba Carrier	101		40 - 110					11/04/21 08:46	11/29/21 13:32	
Method: 904.0 - Rac	dium-228	(GFPC)	Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	-0.0774	U	0.277	0.277	1.00	0.502	pCi/L	11/04/21 09:20	11/23/21 12:56	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	101		40 - 110					11/04/21 09:20	11/23/21 12:56	1
Y Carrier	72.9		40 - 110					11/04/21 09:20	11/23/21 12:56	1
Method: Ra226_Ra2	228 - Com	ibined Rad	dium-226 a Count	nd Radium Total	1-228					
Analyta	Result	Qualifier	(2g+/-)	(2g+/-)	RI	MDC	Unit	Propared	Analyzod	Dil Fac
Combined Radium 226	-0 0742		0.285	0.285	5 00	0.502	pCi/l		11/30/21 15:36	1
+ 228	0.07 12	0	0.200	0.200	0.00	0.002	p0#2		11/00/21 10:00	
Client Sample ID:	EB-01							Lab Sample	D: 160-43	807-9
Date Collected: 10/19	9/21 18:23	}							Matrix	: Wate
Date Received: 10/28	8/21 08:45									
	dium-226	(GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.0212	U	0.0642	0.0642	1 00	0.137	pCi/l	11/04/21 08:46	11/29/21 13:32	

Radium-226	-0.0212	U	0.0642	0.0642	1.00	0.137 pCi/L	11/04/21 08:46	11/29/21 13:32	1
Carrier	%Yield	Qualifier	Limits				Prepared	Analyzed	Dil Fac
Ba Carrier	98.0		40 - 110				11/04/21 08:46	11/29/21 13:32	1

Eurofins TestAmerica, St. Louis

#### Client: Consumers Energy Project/Site: JH Campbell CCR Groundwater Testing

Job ID: 160-43807-1

Matrix: Water

Lab Sample ID: 160-43807-9

## Client Sample ID: EB-01 Date Collected: 10/19/21 18:23 Date Received: 10/28/21 08:45

- Mothod: 904.0 - Badium 228 (GEBC)										
Method: 504.0 - Rad	num-220	(GFFC)	Count	Total						
Analista	Desult	Ovellfier	Uncert.	Uncert.	ы	MDO	11	Durananad	<b>A</b>	
Analyte	Result	Qualifier	(20+/-)	(20+/-)	RL	MDC	Unit	Prepared	Analyzed	DIIFac
Radium-228	0.0947	U	0.256	0.256	1.00	0.441	pCi/L	11/04/21 09:20	11/23/21 12:57	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	98.0		40 - 110					11/04/21 09:20	11/23/21 12:57	1
Y Carrier	80.7		40 - 110					11/04/21 09:20	11/23/21 12:57	1
_ Method: Ra226_Ra2	28 - Com	bined Ra	dium-226 a	nd Radium	-228					
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.0735	U	0.264	0.264	5.00	0.441	pCi/L		11/30/21 15:36	1

## **QC Sample Results**

#### Client: Consumers Energy Project/Site: JH Campbell CCR Groundwater Testing

Job ID: 160-43807-1

Method: 903.0 - Radium-226 (GFPC)

_												
Lab Sample	ID: MB 1	60-5350	27/23-A						Clie	ent Samp	ole ID: Meth	od Blan
Matrix: Wate	er										Prep Type:	Total/N
Analysis Ba	atch: 5390	)49		•							Prep Batcl	n: 53502
		MD	MD	Count	Iotal							
Analyta		MB Beault		Uncert.	(2a+/)	ы	MDC	Unit	В	ranarad	Applyzod	
Padium 226		0.02402		(20+/-)	0.0710				<u> </u>		Analyzeu 11/20/21 12:	
Raulum-220		0.02492	0	0.0710	0.0710	1.00	0.131	poi/L	11/0	4/21 00.40	11/29/21 13.	59
		MB	МВ									
Carrier		%Yield	Qualifier	Limits					<b>P</b>	repared	Analyzed	Dil Fa
Ba Carrier		96.8		40 - 110					11/0	4/21 08:46	11/29/21 13:	39
- I ab Sample		160-535	027/1-4					Cli	ent Sar	nnle ID <sup>.</sup>	Lab Contro	J Sampl
Matrix: Wate	er	100-000						011	un oui	inpic ib.	Prep Type:	Total/N
Analysis Ba	atch: 5390	)46									Prep Batc	h: 53502
· •		-				Total						
			Spike	LCS	LCS	Uncert.					%Rec.	
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	
Radium-226			11.3	10.20		1.09	1.00	0.146	pCi/L	90	75 - 125	
	LCS	LCS										
Carrier	%Yield	Qualifier	Limits									
Ba Carrier	95.0		40 - 110	_								
-												
Lab Sample	ID: LCS	D 160-53	85027/2-A					Client S	ample	ID: Lab	Control Sa	mple Du
Matrix: Wate	er										Prep Type:	Total/N
Analysis Ba	itch: 5390	)46				<b>T</b> . ( . )					Prep Batcl	n: 53502
			Spike			lotal					% Baa	DE
Analyto			Spike	Posult	Qual	(2α+/-)	DI	MDC	Unit	%Pac	Vicec.	
Radium-226				9 657		1 04	1 00	0 160	nCi/l	- <u>/// 85</u>	$\frac{111113}{75-125}$	
			11.0	0.001		1.01	1.00	0.100	p0#2	00	10-120	
	LCSD	LCSD										
Carrier	%Yield	Qualifier	<u>Limits</u>	_								
Ba Carrier	92.0		40 - 110									
Method: 90	94.0 - Ra	dium-2	228 (GFPC	C)								
									0			
Lab Sample	EID: IVIB 1	60-5350	28/23-A						Clie	ent Samp	Die ID: Meth	od Blan
Analysis Ro	er Mahi 5291	122									Prep Type:	10tal/N
Analysis Da	IICH. 5504	200		Count	Total						Fiep Batch	1. 55502
		MB	MB	Uncert	Uncert							
Analvte		Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	P	repared	Analvzed	Dil F:
Radium-228		0.09522	<u> </u>	0.195	0.195	1.00	0.336	pCi/L	11/0	4/21 09:20	11/23/21 13:	02
Corriger		MB	MB	1 ins :4-					~		A	D:1 F
Carrier		% Yield	Quaimer						<b>P</b>	repared	Analyzed	
Da Carrier		90.8 01 E		40 - 110					11/0	4/21 09:20	11/23/27 73:0	J∠ 02
r Carrier		04.5		40 - 110					11/0	+/21 09.20	11/23/21 13:0	12

10

## **QC Sample Results**

Job ID: 160-43807-1

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

Project/Site: J	H Campb	ell CCR Gr	roundwater	Testing										
Method: 90	94.0 - Ra	dium-22	8 (GFPC	) (Con	tinued	)								
Lab Sample Matrix: Wate	ID: LCS er	160-53502	28/1 <b>-A</b>					Clie	ent Sa	mple ID:	Lab Cont Prep Typ	trol Sa be: Tot	ample al/NA	
Analysis Ba	itch: 5382	216				Total					Prep Bat	tch: 5	35028	5
			Spike	LCS	LCS	Uncert.					%Rec.			
Analyte			Added	Result	Qual	(2 <b>σ+/-</b> )	RL	MDC	Unit	%Rec	Limits			
Radium-228			9.12	9.646		1.14	1.00	0.428	pCi/L	106	75 - 125			
	LCS	LCS												
Carrier	%Yield	Qualifier	Limits											
Ba Carrier	95.0		40 - 110											<b>X</b>
Y Carrier	79.3		40 - 110											
Lab Sample		7 160-5350	<b>128/2-∆</b>					Client S	ample	ID <sup>.</sup> I ab	Control S	ample	e Dun	9
Matrix: Wate	er							onone o	ampio	10. 200	Prep Tvr	e: Tot	al/NA	10
Analysis Ba	tch: 5382	216									Prep Ba	tch: 5	35028	
_						Total								
			Spike	LCSD	LCSD	Uncert.					%Rec.		RER	
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit	
Radium-228			9.12	7.977		0.997	1.00	0.440	pCi/L	87	75 - 125	0.78	1	
	LCSD	LCSD												
Carrier	%Yield	Qualifier	Limits											
Ba Carrier	92.0		40 - 110											

79.6 40 - 110 Y Carrier

## **QC Association Summary**

Prep Type

Total/NA

Matrix

Water

Client: Consumers Energy Project/Site: JH Campbell CCR Groundwater Testing

**Client Sample ID** 

JHC-MW-15023

JHC-MW-15024

JHC-MW-15025

JHC-MW-15026

JHC-MW-15027

JHC-MW-15028

Method Blank

Lab Control Sample

Lab Control Sample Dup

**DUP-01** 

FB-01

EB-01

## Job ID: 160-43807-1

Prep Batch

Method

PrecSep-21

## LCSD 160-535027/2-A Prep Batch: 535028

MB 160-535027/23-A

LCS 160-535027/1-A

Prep Batch: 535027

Lab Sample ID

160-43807-1

160-43807-2

160-43807-3

160-43807-4

160-43807-5

160-43807-6

160-43807-7

160-43807-8

160-43807-9

Rad

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-43807-1	JHC-MW-15023	Total/NA	Water	PrecSep_0	
160-43807-2	JHC-MW-15024	Total/NA	Water	PrecSep_0	
160-43807-3	JHC-MW-15025	Total/NA	Water	PrecSep_0	
160-43807-4	JHC-MW-15026	Total/NA	Water	PrecSep_0	
160-43807-5	JHC-MW-15027	Total/NA	Water	PrecSep_0	
160-43807-6	JHC-MW-15028	Total/NA	Water	PrecSep_0	
160-43807-7	DUP-01	Total/NA	Water	PrecSep_0	
160-43807-8	FB-01	Total/NA	Water	PrecSep_0	
160-43807-9	EB-01	Total/NA	Water	PrecSep_0	
MB 160-535028/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-535028/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-535028/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

## **Tracer/Carrier Summary**

#### Client: Consumers Energy Project/Site: JH Campbell CCR Groundwater Testing

Job ID: 160-43807-1

Prep Type: Total/NA

Prep Type: Total/NA

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

			Percent Yield (Acceptance Limits)	
		Ва		
Lab Sample ID	Client Sample ID	(40-110)		5
160-43807-1	JHC-MW-15023	97.0		
160-43807-2	JHC-MW-15024	103		
160-43807-3	JHC-MW-15025	100		
160-43807-4	JHC-MW-15026	102		
160-43807-5	JHC-MW-15027	98.5		
160-43807-6	JHC-MW-15028	98.0		8
160-43807-7	DUP-01	99.5		U
160-43807-8	FB-01	101		0
160-43807-9	EB-01	98.0		3
LCS 160-535027/1-A	Lab Control Sample	95.0		
LCSD 160-535027/2-A	Lab Control Sample Dup	92.0		
MB 160-535027/23-A	Method Blank	96.8		
Tracer/Carrier Legend	Ł			
Ba = Ba Carrier				12

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

## Matrix: Water

				Percent Yield (Acceptance Limits)
		Ва	Y	
Lab Sample ID	Client Sample ID	(40-110)	(40-110)	
160-43807-1	JHC-MW-15023	97.0	77.0	
160-43807-2	JHC-MW-15024	103	79.6	
160-43807-3	JHC-MW-15025	100	76.6	
160-43807-4	JHC-MW-15026	102	78.5	
160-43807-5	JHC-MW-15027	98.5	78.9	
160-43807-6	JHC-MW-15028	98.0	79.3	
160-43807-7	DUP-01	99.5	78.1	
160-43807-8	FB-01	101	72.9	
160-43807-9	EB-01	98.0	80.7	
LCS 160-535028/1-A	Lab Control Sample	95.0	79.3	
LCSD 160-535028/2-A	Lab Control Sample Dup	92.0	79.6	
MB 160-535028/23-A	Method Blank	96.8	84.5	

#### Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier

Eurofins TestAmerica, St. Louis



135 W. Trail St. Jackson, MI 49201

To: CDBatts, JH Campbell Complex

From: EBlaj, T-258

Date: November 08, 2021

- Subject: JH CAMPBELL SOLID WASTE DISPOSAL AREA GROUNDWATER MONITORING 4<sup>th</sup> Quarter, 2021 Pond A Wells
  - CC: BLSwanberg, P22-119 HDRegister, P22-521

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

### Chemistry Project: 21-1280R

CE Laboratory Services conducted groundwater monitoring on 10/19/2021 through 10/22/2021 at the JH Campbell Solid Waste Disposal Area, for the 4<sup>th</sup> Quarter monitoring requirements. The samples were received for analysis by the Chemistry department on 10/22/2021.

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, 22<sup>nd</sup> 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

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- 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:Q4-2021 Pond A WellsDate Received:10/22/2021Chemistry Project:21-1280

Sample #	Field Sample ID	<u>Matrix</u>	Sample Date	Site
21-1280-01	JHC-MW-15006	Groundwater	10/21/2021 01:49 PM	JHC RCRA GW Monitoring - Pond A Unit
21-1280-02	JHC-MW-15007R	Groundwater	10/21/2021 11:38 AM	JHC RCRA GW Monitoring - Pond A Unit
21-1280-03	JHC-MW-15008R	Groundwater	10/21/2021 04:01 PM	JHC RCRA GW Monitoring - Pond A Unit
21-1280-04	JHC-MW-15009R	Groundwater	10/21/2021 05:11 PM	JHC RCRA GW Monitoring - Pond A Unit
21-1280-05	JHC-MW-15011R	Groundwater	10/21/2021 03:42 PM	JHC RCRA GW Monitoring - Pond A Unit
21-1280-06	DUP-05	Groundwater	10/21/2021 12:00 AM	JHC RCRA GW Monitoring - Pond A Unit
21-1280-07	JHC-MW-15008R Field MS	Groundwater	10/21/2021 04:01 PM	JHC RCRA GW Monitoring - Pond A Unit
21-1280-08	JHC-MW-15008R Field MSD	Groundwater	10/21/2021 04:01 PM	JHC RCRA GW Monitoring - Pond A Unit



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-1280
Field Sample ID:	JHC-MW-15006	Collect Date:	10/21/2021
Lab Sample ID:	21-1280-01	Collect Time:	01:49 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueo	lercury by EPA 7470A, Total, Aqueous					Analyst: CLH
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/28/2021	AB21-1028-03
Metals by EPA 6020B: CCR Rule App	oendix III-IV To	tal Metal	s Exp	Aliquot #: 21-1	280-01-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Arsenic	6		ug/L	1.0	11/04/2021	AB21-1103-10
Barium	211		ug/L	5.0	11/04/2021	AB21-1103-10
Beryllium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Boron	371		ug/L	20.0	11/03/2021	AB21-1103-10
Cadmium	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Calcium	84500		ug/L	1000.0	11/03/2021	AB21-1103-10
Chromium	2		ug/L	1.0	11/04/2021	AB21-1103-10
Cobalt	ND		ug/L	6.0	11/04/2021	AB21-1103-10
Copper	3		ug/L	1.0	11/04/2021	AB21-1103-10
Iron	185		ug/L	20.0	11/03/2021	AB21-1103-10
Lead	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Lithium	13		ug/L	10.0	11/04/2021	AB21-1103-10
Magnesium	21400		ug/L	1000.0	11/03/2021	AB21-1103-10
Molybdenum	48		ug/L	5.0	11/04/2021	AB21-1103-10
Nickel	5		ug/L	2.0	11/04/2021	AB21-1103-10
Potassium	5760		ug/L	100.0	11/03/2021	AB21-1103-10
Selenium	1		ug/L	1.0	11/04/2021	AB21-1103-10
Silver	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Sodium	29800		ug/L	1000.0	11/03/2021	AB21-1103-10
Thallium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Vanadium	12		ug/L	2.0	11/04/2021	AB21-1103-10
Zinc	53		ug/L	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR Rule Anal	yte List, Cl, F,	SO4, Aqı	leous	Aliquot #: 21-1	280-01-C02-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	19600		ug/L	1000.0	10/28/2021	AB21-1029-01
Fluoride	ND		ug/L	1000.0	10/28/2021	AB21-1029-01
Sulfate	217000		ug/L	1000.0	11/01/2021	AB21-1029-01
Total Dissolved Solids by SM 2540C				Aliquot #: 21-1	280-01-C03-A01	Analyst: CLH

			Anguot #: ET	1200 01 000 A01	Analyst. OEII
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Total Dissolved Solids	485	mg/L	10.0	10/27/2021	AB21-1027-07



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-1280
Field Sample ID:	JHC-MW-15006	Collect Date:	10/21/2021
Lab Sample ID:	21-1280-01	Collect Time:	01:49 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B			Aliquot #: 21-1	Analyst: CLH	
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Alkalinity Total	131000	ug/L	10000.0	11/02/2021	AB21-1102-11
Alkalinity Bicarbonate	131000	ug/L	10000.0	11/02/2021	AB21-1102-11
Alkalinity Carbonate	ND	ug/L	10000.0	11/02/2021	AB21-1102-11

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Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-1280
Field Sample ID:	JHC-MW-15007R	Collect Date:	10/21/2021
Lab Sample ID:	21-1280-02	Collect Time:	11:38 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueou	S			Aliquot #: 21-1	280-02-C01-A01	Analyst: CLH
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/28/2021	AB21-1028-03
Metals by EPA 6020B: CCR Rule Appe	ndix III-IV To	tal Metals	в Ехр	Aliquot #: 21-1	280-02-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Arsenic	7		ug/L	1.0	11/04/2021	AB21-1103-10
Barium	219		ug/L	5.0	11/04/2021	AB21-1103-10
Beryllium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Boron	956		ug/L	20.0	11/03/2021	AB21-1103-10
Cadmium	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Calcium	68500		ug/L	1000.0	11/03/2021	AB21-1103-10
Chromium	1		ug/L	1.0	11/04/2021	AB21-1103-10
Cobalt	ND		ug/L	6.0	11/04/2021	AB21-1103-10
Copper	4		ug/L	1.0	11/04/2021	AB21-1103-10
Iron	151		ug/L	20.0	11/03/2021	AB21-1103-10
Lead	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Lithium	13		ug/L	10.0	11/04/2021	AB21-1103-10
Magnesium	30400		ug/L	1000.0	11/03/2021	AB21-1103-10
Molybdenum	16		ug/L	5.0	11/04/2021	AB21-1103-10
Nickel	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Potassium	3640		ug/L	100.0	11/03/2021	AB21-1103-10
Selenium	4		ug/L	1.0	11/04/2021	AB21-1103-10
Silver	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Sodium	15500		ug/L	1000.0	11/03/2021	AB21-1103-10
Thallium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Vanadium	8		ug/L	2.0	11/04/2021	AB21-1103-10
Zinc	21		ug/L	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR Rule Analyt	e List, Cl, F,	SO4, Aqı	ieous	Aliquot #: 21-1	280-02-C02-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	13900		ug/L	1000.0	10/28/2021	AB21-1029-01
Fluoride	ND		ug/L	1000.0	10/28/2021	AB21-1029-01
Sulfate	101000		ug/L	1000.0	10/28/2021	AB21-1029-01
Total Dissolved Solids by SM 2540C				Aliquot #: 21-1	280-02-C03-A01	Analyst: CLH

Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Total Dissolved Solids	418	mg/L	10.0	10/27/2021	AB21-1027-07



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-1280
Field Sample ID:	JHC-MW-15007R	Collect Date:	10/21/2021
Lab Sample ID:	21-1280-02	Collect Time:	11:38 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B			Aliquot #: 21-1	Analyst: CLH	
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Alkalinity Total	228000	ug/L	10000.0	11/02/2021	AB21-1102-11
Alkalinity Bicarbonate	228000	ug/L	10000.0	11/02/2021	AB21-1102-11
Alkalinity Carbonate	ND	ug/L	10000.0	11/02/2021	AB21-1102-11

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Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-1280
Field Sample ID:	JHC-MW-15008R	Collect Date:	10/21/2021
Lab Sample ID:	21-1280-03	Collect Time:	04:01 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous			Aliquot #: 21-1280-03-C01-A01			Analyst: CLH
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/28/2021	AB21-1028-03
Metals by EPA 6020B: CCR Ru	le Appendix III-IV To	tal Metals	в Ехр	Aliquot #: 21-1	280-03-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	1		ug/L	1.0	11/04/2021	AB21-1103-10
Arsenic	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Barium	167		ug/L	5.0	11/04/2021	AB21-1103-10
Beryllium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Boron	786		ug/L	20.0	11/03/2021	AB21-1103-10
Cadmium	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Calcium	77200		ug/L	1000.0	11/03/2021	AB21-1103-10
Chromium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Cobalt	ND		ug/L	6.0	11/04/2021	AB21-1103-10
Copper	1		ug/L	1.0	11/04/2021	AB21-1103-10
Iron	150		ug/L	20.0	11/03/2021	AB21-1103-10
Lead	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Lithium	19		ug/L	10.0	11/04/2021	AB21-1103-10
Magnesium	28700		ug/L	1000.0	11/03/2021	AB21-1103-10
Molybdenum	26		ug/L	5.0	11/04/2021	AB21-1103-10
Nickel	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Potassium	2320		ug/L	100.0	11/03/2021	AB21-1103-10
Selenium	20		ug/L	1.0	11/04/2021	AB21-1103-10
Silver	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Sodium	19000		ug/L	1000.0	11/03/2021	AB21-1103-10
Thallium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Vanadium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Zinc	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR Rule	e Analyte List, Cl, F,	SO4, Aqı	ieous	Aliquot #: 21-1	280-03-C02-A01	Analvst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	15700		ua/L	1000.0	10/28/2021	AB21-1029-01
Fluoride	ND		ua/L	1000.0	10/28/2021	AB21-1029-01
Sulfate	112000		ug/L	1000.0	10/28/2021	AB21-1029-01
Total Dissolved Solids by SM 2	2540C			Aliquot #: 21-1	280-03-C03-A01	Analvst: CLH
Parameter(s)	Result	Flac	Units	RL	Analysis Date	Tracking
Total Dissolved Solids	443	5	mg/L	10.0	- 10/27/2021	AB21-1027-07



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-1280
Field Sample ID:	JHC-MW-15008R	Collect Date:	10/21/2021
Lab Sample ID:	21-1280-03	Collect Time:	04:01 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B			Aliquot #: 21-1	Analyst: CLH	
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Alkalinity Total	245000	ug/L	10000.0	11/02/2021	AB21-1102-11
Alkalinity Bicarbonate	245000	ug/L	10000.0	11/02/2021	AB21-1102-11
Alkalinity Carbonate	ND	ug/L	10000.0	11/02/2021	AB21-1102-11



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-1280
Field Sample ID:	JHC-MW-15009R	Collect Date:	10/21/2021
Lab Sample ID:	21-1280-04	Collect Time:	05:11 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueo	ous			Aliquot #: 21-1	280-04-C01-A01	Analyst: CLH
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/28/2021	AB21-1028-03
Metals by EPA 6020B: CCR Rule App	endix III-IV To	otal Metal	s Exp	Aliquot #: 21-1	280-04-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Arsenic	1		ug/L	1.0	11/04/2021	AB21-1103-10
Barium	286		ug/L	5.0	11/04/2021	AB21-1103-10
Beryllium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Boron	1680		ug/L	20.0	11/03/2021	AB21-1103-10
Cadmium	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Calcium	58700		ug/L	1000.0	11/03/2021	AB21-1103-10
Chromium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Cobalt	ND		ug/L	6.0	11/04/2021	AB21-1103-10
Copper	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Iron	1090		ug/L	20.0	11/03/2021	AB21-1103-10
Lead	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Lithium	15		ug/L	10.0	11/04/2021	AB21-1103-10
Magnesium	14700		ug/L	1000.0	11/03/2021	AB21-1103-10
Molybdenum	5		ug/L	5.0	11/04/2021	AB21-1103-10
Nickel	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Potassium	2940		ug/L	100.0	11/03/2021	AB21-1103-10
Selenium	62		ug/L	1.0	11/04/2021	AB21-1103-10
Silver	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Sodium	10900		ug/L	1000.0	11/03/2021	AB21-1103-10
Thallium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Vanadium	3		ug/L	2.0	11/04/2021	AB21-1103-10
Zinc	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR Rule Anal	yte List, CI, F,	SO4, Aqı	leous	Aliquot #: 21-1	280-04-C02-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	12100		ug/L	1000.0	10/28/2021	AB21-1029-01
Fluoride	ND		ug/L	1000.0	10/28/2021	AB21-1029-01
Sulfate	25700		ug/L	1000.0	10/28/2021	AB21-1029-01
Total Dissolved Solids by SM 2540C				Aliquot #: 21-1	280-04-C03-A01	Analyst: CLH

			Anguot #: 21		Analyst. OEII
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Total Dissolved Solids	301	mg/L	10.0	10/27/2021	AB21-1027-07



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-1280
Field Sample ID:	JHC-MW-15009R	Collect Date:	10/21/2021
Lab Sample ID:	21-1280-04	Collect Time:	05:11 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B			Aliquot #: 21-1	280-04-C04-A01	Analyst: CLH
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Alkalinity Total	214000	ug/L	10000.0	11/02/2021	AB21-1102-11
Alkalinity Bicarbonate	214000	ug/L	10000.0	11/02/2021	AB21-1102-11
Alkalinity Carbonate	ND	ug/L	10000.0	11/02/2021	AB21-1102-11

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AB21-1027-07

10/27/2021

10.0

Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-1280
Field Sample ID:	JHC-MW-15011R	Collect Date:	10/21/2021
Lab Sample ID:	21-1280-05	Collect Time:	03:42 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueou	S			Aliquot #: 21-1	280-05-C01-A01	Analyst: CLH
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/28/2021	AB21-1028-03
Metals by EPA 6020B: CCR Rule Appe	ndix III-IV To	tal Metals	в Ехр	Aliquot #: 21-1	280-05-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Arsenic	3		ug/L	1.0	11/04/2021	AB21-1103-10
Barium	131		ug/L	5.0	11/04/2021	AB21-1103-10
Beryllium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Boron	2150		ug/L	20.0	11/03/2021	AB21-1103-10
Cadmium	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Calcium	51000		ug/L	1000.0	11/03/2021	AB21-1103-10
Chromium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Cobalt	ND		ug/L	6.0	11/04/2021	AB21-1103-10
Copper	1		ug/L	1.0	11/04/2021	AB21-1103-10
Iron	264		ug/L	20.0	11/03/2021	AB21-1103-10
Lead	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Lithium	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Magnesium	18000		ug/L	1000.0	11/03/2021	AB21-1103-10
Molybdenum	13		ug/L	5.0	11/04/2021	AB21-1103-10
Nickel	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Potassium	3420		ug/L	100.0	11/03/2021	AB21-1103-10
Selenium	4		ug/L	1.0	11/04/2021	AB21-1103-10
Silver	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Sodium	10600		ug/L	1000.0	11/03/2021	AB21-1103-10
Thallium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Vanadium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Zinc	ND		ug/L	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR Rule Analyt	te List, CI, F,	SO4, Aqı	ieous	Aliquot #: 21-1	280-05-C02-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	13500		ug/L	1000.0	10/28/2021	AB21-1029-01
Fluoride	ND		ug/L	1000.0	10/28/2021	AB21-1029-01
Sulfate	45000		ug/L	1000.0	10/28/2021	AB21-1029-01
Total Dissolved Solids by SM 2540C				Aliquot #: 21-1	280-05-C03-A01	Analyst: CLH
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking

Total Dissolved Solids

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195

mg/L



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-1280
Field Sample ID:	JHC-MW-15011R	Collect Date:	10/21/2021
Lab Sample ID:	21-1280-05	Collect Time:	03:42 PM
Matrix:	Groundwater		

Alkalinity by SM 2320B			Aliquot #: 21-1	280-05-C04-A01	Analyst: CLH
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Alkalinity Total	172000	ug/L	10000.0	11/02/2021	AB21-1102-11
Alkalinity Bicarbonate	172000	ug/L	10000.0	11/02/2021	AB21-1102-11
Alkalinity Carbonate	ND	ug/L	10000.0	11/02/2021	AB21-1102-11



Sulfate

Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-1280
Field Sample ID:	DUP-05	Collect Date:	10/21/2021
Lab Sample ID:	21-1280-06	Collect Time:	12:00 AM
Matrix:	Groundwater		

Mercury by EPA 7470A, Total, Aqueous			Aliquot #: 21-1280-06-C01-A01		Analyst: CLH	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	ND		ug/L	0.2	10/28/2021	AB21-1028-03
Metals by EPA 6020B: CCF	Rule Appendix III-IV To	tal Metals	Ехр	Aliquot #: 21-1	280-06-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Arsenic	7		ug/L	1.0	11/04/2021	AB21-1103-10
Barium	224		ug/L	5.0	11/04/2021	AB21-1103-10
Beryllium	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Boron	1000		ug/L	20.0	11/03/2021	AB21-1103-10
Cadmium	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Calcium	72600		ug/L	1000.0	11/03/2021	AB21-1103-10
Chromium	2		ug/L	1.0	11/04/2021	AB21-1103-10
Cobalt	ND		ug/L	6.0	11/04/2021	AB21-1103-10
Copper	4		ug/L	1.0	11/04/2021	AB21-1103-10
Iron	165		ug/L	20.0	11/03/2021	AB21-1103-10
Lead	ND		ug/L	1.0	11/04/2021	AB21-1103-10
Lithium	13		ug/L	10.0	11/04/2021	AB21-1103-10
Magnesium	31700		ug/L	1000.0	11/03/2021	AB21-1103-10
Molybdenum	16		ug/L	5.0	11/04/2021	AB21-1103-10
Nickel	2		ug/L	2.0	11/04/2021	AB21-1103-10
Potassium	3580		ug/L	100.0	11/03/2021	AB21-1103-10
Selenium	4		ug/L	1.0	11/04/2021	AB21-1103-10
Silver	ND		ug/L	0.2	11/04/2021	AB21-1103-10
Sodium	16400		ug/L	1000.0	11/03/2021	AB21-1103-10
Thallium	ND		ug/L	2.0	11/04/2021	AB21-1103-10
Vanadium	8		ug/L	2.0	11/04/2021	AB21-1103-10
Zinc	20		ug/L	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR	Rule Analyte List, CI, F,	SO4, Aqu	eous	Aliquot #: 21-1	280-06-C02-A01	Analyst: DMW
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Chloride	14200		ug/L	1000.0	10/28/2021	AB21-1029-01
Fluoride	ND		ug/L	1000.0	10/28/2021	AB21-1029-01

Total Dissolved Solids by SM 2540C				Aliquot #: 2	21-1280-06-C03-A0	1 Analyst: CLH
Parameter(s)	Result	Flag U	nits	RL	Analysis Dat	e Tracking
Total Dissolved Solids	419	mg	/L	10.0	) 10/27/2021	AB21-1027-07

ug/L

1000.0

10/28/2021

AB21-1029-01

104000



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-1280
Field Sample ID:	DUP-05	Collect Date:	10/21/2021
Lab Sample ID:	21-1280-06	Collect Time:	12:00 AM
Matrix:	Groundwater		

Alkalinity by SM 2320B		Aliquot #: 21-1	Analyst: CLH		
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Alkalinity Total	228000	ug/L	10000.0	11/02/2021	AB21-1102-11
Alkalinity Bicarbonate	228000	ug/L	10000.0	11/02/2021	AB21-1102-11
Alkalinity Carbonate	ND	ug/L	10000.0	11/02/2021	AB21-1102-11

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Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-1280
Field Sample ID:	JHC-MW-15008R Field MS	Collect Date:	10/21/2021
Lab Sample ID:	21-1280-07	Collect Time:	04:01 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, Te	Aliquot #: 21-1	Analyst: CLH				
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Mercury	cury 93.8 %		6	0.2	10/28/2021	AB21-1028-03
Metals by EPA 6020B: CC	R Rule Appendix III-IV Tot	al Metals I	Ехр	Aliquot #: 21-1	280-07-C01-A02	Analyst: EB
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking
Antimony	111	9	6	1.0	11/04/2021	AB21-1103-10
Arsenic	95	9	6	1.0	11/04/2021	AB21-1103-10
Barium	110	9	6	5.0	11/04/2021	AB21-1103-10
Beryllium	110	9	6	1.0	11/04/2021	AB21-1103-10
Boron	106	9	6	20.0	11/03/2021	AB21-1103-10
Cadmium	108	9	6	0.2	11/04/2021	AB21-1103-10
Calcium	107	9	6	1000.0	11/03/2021	AB21-1103-10
Chromium	94	9	6	1.0	11/04/2021	AB21-1103-10
Cobalt	94	9	6	6.0	11/04/2021	AB21-1103-10
Copper	89	9	6	1.0	11/04/2021	AB21-1103-10
Iron	99	9	6	20.0	11/03/2021	AB21-1103-10
Lead	96	9	6	1.0	11/04/2021	AB21-1103-10
Lithium	99	9	6	10.0	11/04/2021	AB21-1103-10
Magnesium	113	9	6	1000.0	11/03/2021	AB21-1103-10
Molybdenum	106	9	6	5.0	11/04/2021	AB21-1103-10
Nickel	90	9	6	2.0	11/04/2021	AB21-1103-10
Potassium	108	9	6	100.0	11/03/2021	AB21-1103-10
Selenium	98	9	6	1.0	11/04/2021	AB21-1103-10
Silver	101	9	6	0.2	11/04/2021	AB21-1103-10
Sodium	114	9	6	1000.0	11/03/2021	AB21-1103-10
Thallium	97	9	6	2.0	11/04/2021	AB21-1103-10
Vanadium	96	9	6	2.0	11/04/2021	AB21-1103-10
Zinc	91	9	6	10.0	11/04/2021	AB21-1103-10
Anions by EPA 300.0 CCR	Rule Analyte List, CI. F. S	SO4. Aque	ous	Aliquot #: 21-1	280-07-C02-A01	Analyst: DMW

AIIIOIIS DY EFA 300.0 CCR	Aliquot #: 21-1	Analyst: Diviw			
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Chloride	96	%	1000.0	10/28/2021	AB21-1029-01
Fluoride	87	%	1000.0	10/28/2021	AB21-1029-01
Sulfate	101	%	1000.0	10/28/2021	AB21-1029-01



Sample Site:	JHC RCRA GW Monitoring - Pond A Unit (395496)	Laboratory Project:	21-1280
Field Sample ID:	JHC-MW-15008R Field MSD	Collect Date:	10/21/2021
Lab Sample ID:	21-1280-08	Collect Time:	04:01 PM
Matrix:	Groundwater		

Mercury by EPA 7470A, To	Aliquot #: 21-1	Analyst: CLH					
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking	
Mercury 97.8			%	0.2	10/28/2021	AB21-1028-03	
Metals by EPA 6020B: CCF	R Rule Appendix III-IV To	tal Metals	Ехр	Aliquot #: 21-1	280-08-C01-A02	Analyst: EB	
Parameter(s)	Result	Flag	Units	RL	Analysis Date	Tracking	
Antimony	113		%	1.0	11/04/2021	AB21-1103-10	
Arsenic	95		%	1.0	11/04/2021	AB21-1103-10	
Barium	113		%	5.0	11/04/2021	AB21-1103-10	
Beryllium	108		%	1.0	11/04/2021	AB21-1103-10	
Boron	101		%	20.0	11/03/2021	AB21-1103-10	
Cadmium	109		%	0.2	11/04/2021	AB21-1103-10	
Calcium	107		%	1000.0	11/03/2021	AB21-1103-10	
Chromium	96		%	1.0	11/04/2021	AB21-1103-10	
Cobalt	93		%	6.0	11/04/2021	AB21-1103-10	
Copper	89		%	1.0	11/04/2021	AB21-1103-10	
Iron	100		%	20.0	11/03/2021	AB21-1103-10	
Lead	95		%	1.0	11/04/2021	AB21-1103-10	
Lithium	97		%	10.0	11/04/2021	AB21-1103-10	
Magnesium	112		%	1000.0	11/03/2021	AB21-1103-10	
Molybdenum	107		%	5.0	11/04/2021	AB21-1103-10	
Nickel	88		%	2.0	11/04/2021	AB21-1103-10	
Potassium	106		%	100.0	11/03/2021	AB21-1103-10	
Selenium	95		%	1.0	11/04/2021	AB21-1103-10	
Silver	102		%	0.2	11/04/2021	AB21-1103-10	
Sodium	112		%	1000.0	11/03/2021	AB21-1103-10	
Thallium	98		%	2.0	11/04/2021	AB21-1103-10	
Vanadium	97		%	2.0	11/04/2021	AB21-1103-10	
Zinc	91		%	10.0	11/04/2021	AB21-1103-10	
Anions by EPA 300 0 CCP	Pulo Analyto List CLE	SO4 Agu		Aliguet #: 21.1	290.09 002 401	Analyst. DMM	

			Analyst. Divivi		
Parameter(s)	Result	Flag Units	RL	Analysis Date	Tracking
Chloride	94	%	1000.0	10/28/2021	AB21-1029-01
Fluoride	86	%	1000.0	10/28/2021	AB21-1029-01
Sulfate	100	%	1000.0	10/28/2021	AB21-1029-01



Data Qualifiers

Exception Summary

No exceptions occured.

Chemistry Department

## TITLE: SAMPLE LOG-IN - SHIPMENT INSPECTION FORM

Project Lo	g-In Number:	21-12-80	)				
Inspection	Date: 1029	221		Inspection B	y: <u>WH</u>		
Sample Or	ہ igin/Project Name:	Pond	A J	HC Q2	F-2021		
Shipment I	Delivered By: Enter	r the type of sh	ipment carrie	er			
Po Ot	ny F her/Hand Carry (wh	om) (UH	UPS_		USPS	_ Airbor	me
Tra	acking Number:			Shipping	g Form Attache	ed. Yes	No
Shipping C	Containers: Enter th	e type and num	nber of shipp	ing containers	received		
Co	oler (2)	Cardboard Box		Custom C	ase	Envelope/N	Mailer
Lo	ose/Unpackaged Co	ntainers	- <u> </u>	Other		F	
Condition of	of Shipment: Enter	the as-receive	d condition c	f the shipment	t container.		
Da Ot	maged Shipment Ol	oserved None		Dent	ted	Leakır	ıg
Shipment S	Security: Enter if ar	ny of the shippi	ing container	s were opened	before receipt		
Sh	pping Containers R	eceived: Open	led	Seale	ed V		
Fuelosed D	nonmante: Enter th	e twe of docu	ments enclos	ed with the ch	inment		
Elicioseu D		1 Demost	ments enclos		ipiteitt	Other	
Co	wor	K Request	<u> </u>	Air Data Sr	1eet	Otner	
Temperatu	re of Containers: N	Aeasure the ten	nperature of	several sample	e containers		
As	-Received Temperat	ture Range 2.	1-36°C	Samples R	leceived on Ice.	$Yes \underline{V} No$	
Mð	&TE # and Expiration	n 01540	Z 6.3.2	2			
Number an	d Type of Contain	ers: Enter the	total number	of sample cor	ntainers receive	d	
Co	ontainer Type	Water	Soil	Othe	r	Broken	Leaking
VC	DA (40mL or 60mL)	12					
Qu	art/Liter (gp	12			,,,		
9-c	oz (amber glass jar)		P	<b>.</b>			
2-0	oz (amber glass)			<u> </u>			
12:	5 mL (plastic)	16-	<u> </u>				
24	mL vial (glass)	10	·				
715V 590	0 mL (plastıc) her						

PG:2g2not needed

# **CHAIN OF CUSTODY**

## **CONSUMERS ENERGY COMPANY – LABORATORY SERVICES**

## **Consumers Energy**

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

.

SAMPLING S	ITE		PROJECT NUMBER			ANALVER DECLESTED																			
JHC (	2-2021 RCRA Pond A	GW Momto <b>Wells</b>	ring		21-128	80					ALY	<u>212 R</u>	EQU	ESTE			SEND REPORT TO Caleb Batts								
SAMPLING T	EAM			DATE SHIPPED		SITE	SKETCHED	ATTACHED?				Ì					Beth Swanberg, TRC								
CET / DMV	V/CLH						NO	JNE	als, Tota	Suc		linity	m		Ì		PHONE								
CE CONTROL #	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	SAMPLE DESCRIPTION / 1	LOCATION		DEPTH	# OF CONTAINERS	Meta	Anic	Ant	Anio	Anic	SQT	TDS	I I I	Ê	Ĩ	Ĩ	Alka	Radı				REMARKS
21-1280-0	10.21.21	1349	GW	JHC-MW-15006				7	x	x	x	х	x				CET								
0	2 10.21.21	1138	GW	JHC-MW-15007R				7	x	x	x	x	x				CET								
	3 10.2) 2)	1601	GW	JHC-MW-15008R				7	x	x	x	x	x				CbH								
0	4 10 - 21 - 21	1711	GW	JHC-MW-15009R				7	x	x	x	x	x				CVH								
-0	5 10.21.21	1542	GW	JHC-MW-15011R				7	x	x	x	x	x				Cet								
	6 (D.21.21		GW	DUP-05				7	x	x	x	x	x				CET								
0	7 10-21-21	1601	GW	JHC-MW-15008R Field MS				2	x	х							CLH								
<b>↓</b> 0	8 10.21.21	1601	GW	JHC-MW-15008R Field	ld MSD			2	x	x							CUH								
		[																							
					_																				
CONSUBILIAMIN ) 10.2		IME RECEIVED BY (SIGNATURE)		COMMENTS						TS															
RELINQUISHED BY (SIGNATURE) DATE		DATE/	IME	RECEIVED	BY (SI	IGNATURE)				0	RIGI	VAL.	TO LA	в	çc	DPY 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: 160-43809-1

Client Project/Site: JH Campbell CCR Groundwater Testing

## For:

Consumers Energy 135 W Trail Street Jackson, Michigan 49201

Attn: Emil Blaj

LINKS

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Authorized for release by: 11/30/2021 5:27:57 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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### Job ID: 160-43809-1

#### Laboratory: Eurofins TestAmerica, St. Louis

#### Narrative

Job Narrative 160-43809-1

#### Receipt

The samples were received on 10/28/2021 8:45 AM. Unless otherwise noted below, the samples arrived in good condition, and where required, properly preserved. The temperature of the cooler at receipt was 18.6° C.

#### RAD

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.

#### Radium-228 Prep Batch 160-535028/Radium-226 Prep Batch 160-535027

Insufficient sample volume was available to perform a sample duplicate for the following samples: JHC-MW-15006 (160-43809-1), JHC-MW-15007R (160-43809-2), JHC-MW-15008R (160-43809-3), JHC-15009R (160-43809-4), JHC-MW-15011R (160-43809-5) and DUP-05 (160-43809-6). A laboratory control sample/ laboratory control sample duplicate (LCS/LCSD) were prepared instead to demonstrate batch precision.

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

Louis	
St.	
TestAmerica,	r Trail North
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Inrol	3715
_	-

**Chain of Custody Record** 



Earth City, MO 63045-1205 phone 314.298.8566 fax 314.298.8757

[ Positioton Dr.

	Proiort Ma	atory rio	gram.	M	NPDES	RCRA	Othe	Ľ			lestAmeric:	a Labora	tories, Inc. d/b/a Eurofin	is TestAmerica
Client Contact	Email: Emil.	Blaj@cmser	lergy.com		<u></u>	te Contac	t: Bethar	Jv Swanb	ero Date			Ē	COC No:	
Consumers Energy, Laboratory Services	Tel/Fax: 51	7-788-5888				ab Contac	t: Emil B	lai	Carri	er:			1 of 1	COCe
135 W. Trail Street		nalysis Tu	rnaround 1	ime	┢							-		\$\$\$\$
Jackson, MI 49201	CALEND	AR DAYS	WOR	KING DAYS									For Lah Lise Only.	_
517-788-5888	TAT	if different fro	m Below			( N							Malk-in Client	
(xxx) xxx-xxxx FAX		2 v	reeks			۲ () ۱۳۵) ۱۳۵)							Lab Sampling:	
Project Name: JH Campbell Pond A Wells	5	1 v	reek			06 06						_		
Project #: 21-1280		2 d	ays			A9: A9:						-1	Iob / SDC No -	
PO#		1 d	ay		θΛ	∃)97 ∃)97 1/S							1 200 NO.	
Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	teservati #	M miohe <sup>s</sup> S2 muibes S2 muibes						<b>.</b>		
JHC-MW-15006	10/21/2021	1349	U	S S	5	×								Notes:
JHC-MW-15007R	10/21/21	1138	U	GW	2	× × Z								
JHC-MW-15008R	10/21/21	1601	U	GW	5	× × Z							60-43	
JHC-15009R	10/21/21	1711	U	ъ	2	×						-	3809	
0 JHC-MW-15011R	10/21/21	1542	ß	ā	2	× × Z							Chair	
DUP-05	10/21/21	:	ს	ō	2	× × Z						-	n of C	
<del>17</del>													Custo	
					1								ody	
												-		
					+						-	+	-	
								+					-	
							_							
Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3;	5=NaOH; 6=	Other												
Possible hazard identification: Are any samples from a listed EPA Hazardous Waste? Pleas Comments Section if the lab is to dispose of the sample.	se List any EF	A Waste C	odes for the	sample	in the	Sample I	Disposal	(Afeem;	ay be asse	ssed if sam	ples are re	tained	longer than 1 month)	
Skin Irritant	Poison B			UN LIN		Retu	urn to Client		/ Disposal I	w Lab	Archiv	e for	Months	
Special Instructions/QC Requirements & Comments:														
Custody Seals Intact: Yes No	Custody Sea	al No.:					Cooler	Temp. (°C	): Obs'd:	ĉ	rr'd:		herm ID No.:	
relinquished of Cade with a en	Company: Consurve	ars En	LIAN	Date/Tim 0/2u/2	е: <b>093</b> р	Received	by:	SAN		Company			Date/Time:	
the interview of the second seco	Company:		<b>,</b>	Date/Tim	ë	Received	Cha I	(ma)	hine	Company	E.	ہم	Jaco 8 2021	28:45
terinquished by:	Company:			Date/Tim	ë	Received	in Labor	atory by:	0	Company			Date/Time:	
21														

Page'4 of

Form No. CA-C-WI-002, Rev. 4.23, dated 4/16/2019



10

Laboratory Services

135 W. Trail Street Jackson, MI 49201

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

#### **PROCUREMENT #: 21101165**

QA Code: NQ

(Item 1) - Part Number: N/A - Quantity : 1 JHC CCR Rule GW Q4-2021 Samples

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

Standard TAT Request.

Reference Quote #16009576-0

(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: 43809 List Number: 1 Creator: Korrinhizer, Micha L

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: 160-43809-1

List Source: Eurofins TestAmerica, St. Louis

## **Definitions/Glossary**

# Client: Consumers Energy Project/Site: JH Campbell CCR Groundwater Testing

Job ID: 160-43809-1

## Qualifiers

Project/Site:	JH Campbell CCR Groundwater Testing	
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	U
%R	Percent Recovery	
CFL	Contains Free Liquid	
CFU	Colony Forming Unit	
CNF	Contains No Free Liquid	ð
DER	Duplicate Error Ratio (normalized absolute difference)	
Dil Fac	Dilution Factor	9
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 CCR Groundwater Testing

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_0	Preparation, Precipitate Separation	None	TAL SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	TAL SL

#### **Protocol References:**

EPA = US Environmental Protection Agency

None = None

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

#### Laboratory References:

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

## Sample Summary

#### Client: Consumers Energy Project/Site: JH Campbell CCR Groundwater Testing

Job ID: 160-43809-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-43809-1		Water	10/21/21 13:49	10/28/21 08:45
160-43809-2	JHC-MW-15007R	Water	10/21/21 11:38	10/28/21 08:45
160-43809-3	JHC-MW-15008R	Water	10/21/21 16:01	10/28/21 08:45
160-43809-4	JHC-15009R	Water	10/21/21 17:11	10/28/21 08:45
160-43809-5	JHC-MW-15011R	Water	10/21/21 15:42	10/28/21 08:45
160-43809-6	DUP-05	Water	10/21/21 00:00	10/28/21 08:45

Total

Uncert.

(2**σ+/-**)

0.129

RL

1.00

MDC Unit

0.159 pCi/L

Count Uncert.

(2**σ**+/-)

0.127

Limits

110

#### **Client: Consumers Energy** Project/Site: JH Campbell CCR Groundwater Testing

Client Sample ID: JHC-MW-15006

Method: 903.0 - Radium-226 (GFPC)

Date Collected: 10/21/21 13:49

Date Received: 10/28/21 08:45

Analyte

Carrier

Radium-226

Job ID: 160-43809-1

**Matrix: Water** 

Lab Sample ID: 160-43809-1

Analyzed

Analyzed

11/04/21 08:46 11/29/21 13:32

11/04/21 08:46 11/29/21 13:32

Lab Sample ID: 160-43809-2

Matrix: Water

Prepared

Prepared

# 9

Dil Fac

Dil Fac

1

1

Ba Carrier	102	40 -
Method: 904.0	- Radium-228 (GFPC)	

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.357	U	0.249	0.251	1.00	0.387	pCi/L	11/04/21 09:20	11/23/21 12:57	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	102		40 - 110					11/04/21 09:20	11/23/21 12:57	1
Y Carrier	80.4		40 - 110					11/04/21 09:20	11/23/21 12:57	1

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

**Result Qualifier** 

%Yield Qualifier

0.277

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2 <b>σ+/-</b> )	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.634		0.280	0.282	5.00	0.387	pCi/L		11/30/21 15:36	1

#### Client Sample ID: JHC-MW-15007R Date Collected: 10/21/21 11:38

Date Received: 10/28/21 08:45

## Method: 903.0 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.309		0.118	0.122	1.00	0.129	pCi/L	11/04/21 08:46	11/29/21 13:33	1
<b>Carrier</b> Ba Carrier	98.8	Qualifier	Limits 40 - 110					<b>Prepared</b> 11/04/21 08:46	Analyzed	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	0.273	U	0.245	0.247	1.00	0.394	pCi/L	11/04/21 09:20	11/23/21 12:57	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	98.8		40 - 110					11/04/21 09:20	11/23/21 12:57	1
Y Carrier	81.9		40 - 110					11/04/21 09:20	11/23/21 12:57	1

Job ID: 160-43809-1

Client: Consumers Energy	
Project/Site: JH Campbell CCR Groundwater Te	esting

<b>Client Sample ID</b>	: JHC-M	W-15007	'R					Lab Sample	D: 160-43	3809-2
Date Collected: 10/2	1/21 11:38	3							Matrix	: Water
Date Received: 10/2	8/21 08:45	5								
	000 0									
Method: Ra226_Ra	228 - Con	nbined Ra	dium-226 a		1-228					
			Uncort	Uncort						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RI	MDC	Unit	Prenared	Analyzed	Dil Fac
Combined Radium	0.583		0.272	0.275	5.00	0.394	pCi/L		11/30/21 15:36	1
226 + 228	0.000		0.2.2	0.2.0	0.00	0.000	P 0 1			
<b>Client Sample ID</b>	: JHC-M	W-15008	R					Lab Sample	D: 160-43	3809-3
Date Collected: 10/2	1/21 16:01	1							Matrix	: Water
Date Received: 10/2	8/21 08:45	5								
Method: 903.0 - Ra	dium-226	(GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.281		0.115	0.118	1.00	0.132	pCi/L	11/04/21 08:46	11/29/21 13:33	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	102		40 - 110					11/04/21 08:46	11/29/21 13:33	1
Method: 904.0 - Ra	dium-228	(GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(2 <b>σ+/-</b> )	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.380	U	0.256	0.258	1.00	0.397	pCi/L	11/04/21 09:20	11/23/21 12:57	1
Corrior	% Viold	Qualifiar	Limito					Bronorod	Analyzad	
Ba Carrier	102	Quaimer						11/04/21 00:20	11/23/21 12:57	1
Y Carrier	82.6		40 - 110					11/04/21 09:20	11/23/21 12:57	1
	02.0		40 - 110					11/04/21 03:20	11/25/21 12.57	,
Method: Ra226_Ra	228 - Con	nbined Ra	dium-226 a	nd Radium	1-228					
			Uncort	Uncort						
Analyto	Rosult	Qualifier	(2σ+/-)	$(2\sigma + 1_{-})$	RI	MDC	Unit	Prenared	Analyzod	Dil Fac
	0 661		0.281	0.284	5.00	0.397	pCi/l		11/30/21 15:36	1
226 + 228	0.001		0.201	0.204	0.00	0.007	po#E		11/00/21 10:00	
<b>Client Sample ID</b>	: JHC-15	5009R						Lab Sample	D: 160-43	3809-4
Date Collected: 10/2	1/21 17:11	l							Matrix	: Water
Date Received: 10/2	8/21 08:45	5								
Method: 903.0 - Ra	dium-226	(GFPC)								
			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.374		0.140	0.144	1.00	0.162	pCi/L	11/04/21 08:46	11/29/21 13:33	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	105		40 - 110					11/04/21 08:46	11/29/21 13:33	1

Total

Uncert.

(2σ+/-)

0.245

RL

1.00

MDC Unit

0.376 pCi/L

#### **Client: Consumers Energy** Project/Site: JH Campbell CCR Groundwater Testing

Client Sample ID: JHC-15009R Date Collected: 10/21/21 17:11

Method: 904.0 - Radium-228 (GFPC)

Date Received: 10/28/21 08:45

Analyte

Carrier

Ba Carrier

Y Carrier

Radium-228

Job ID: 160-43809-1

Matrix: Water

Matrix: Water

Lab Sample ID: 160-43809-4

Analyzed

11/23/21 12:57

Analyzed

11/04/21 09:20 11/23/21 12:57

11/04/21 09:20 11/23/21 12:57

Lab Sample ID: 160-43809-5

Prepared

11/04/21 09:20

Prepared

1 Dil Fac 1 1

Dil Fac

#### Method: Ra226\_Ra228 - Combined Radium-226 and Radium-228

**Result Qualifier** 

%Yield Qualifier

0.354 U

105

83.4

Count

Uncert.

(2<del>0</del>+/-)

Limits

40 - 110

40 - 110

**.** .

0.242

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(2 <b>σ</b> +/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium	0.728		0.280	0.284	5.00	0.376	pCi/L		11/30/21 15:36	1
226 + 228										

#### Client Sample ID: JHC-MW-15011R Date Collected: 10/21/21 15:42 Date Received: 10/28/21 08:45

#### 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 0.157 0.102 0.103 1.00 0.145 pCi/L 11/04/21 08:46 11/29/21 13:33 1 Carrier %Yield Qualifier Limits Prepared Analyzed Dil Fac Ba Carrier 107 40 - 110 11/04/21 08:46 11/29/21 13:33 1

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

Analyta	Popult	Qualifiar	Uncert.	Uncert.	ы	MDC	Unit	Bronorod	Analyzad	
Allalyte	Result	Quaimer	(20+/-)	(20+/-)				Flepaleu	Analyzeu	DIFAC
Radium-228	0.428		0.257	0.260	1.00	0.393	pCi/L	11/04/21 09:20	11/23/21 12:57	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	107		40 - 110					11/04/21 09:20	11/23/21 12:57	1
Y Carrier	82.2		40 - 110					11/04/21 09:20	11/23/21 12:57	1

- - -

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

			Count	Total						
			Uncert.	Uncert.						
Analyte	Result	Qualifier	(2 <b>σ+/-</b> )	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	0.585		0.277	0.280	5.00	0.393	pCi/L		11/30/21 15:36	1

#### Client: Consumers Energy Project/Site: JH Campbell CCR Groundwater Testing

Job ID: 160-43809-1

**Matrix: Water** 

5

9

Lab Sample ID: 160-43809-6

#### Client Sample ID: DUP-05 Date Collected: 10/21/21 00:00 Date Received: 10/28/21 08:45

			Count Uncert.	Total Uncert.						
Analyte	Result	Qualifier	(2 <b>σ</b> +/-)	(2 <b>σ+/-</b> )	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.302		0.132	0.134	1.00	0.165	pCi/L	11/04/21 08:46	11/29/21 13:33	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Ba Carrier	103		40 - 110					11/04/21 08:46	11/29/21 13:33	1

#### Uncert. Uncert. **Result Qualifier** Analyte (2**σ**+/-) (2**σ**+/-) RL MDC Unit Prepared Analyzed Dil Fac Radium-228 0.181 U 0.230 0.230 0.381 pCi/L 11/04/21 09:20 11/23/21 12:57 1.00 1 %Yield Qualifier Carrier Limits Prepared Analyzed Dil Fac Ba Carrier 103 40 - 110 11/04/21 09:20 11/23/21 12:57 1 82.6 40 - 110 Y Carrier 11/04/21 09:20 11/23/21 12:57 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	0.483		0.265	0.266	5.00	0.381	pCi/L		11/30/21 15:36	1

Eurofins TestAmerica, St. Louis

## **QC Sample Results**

#### Client: Consumers Energy Project/Site: JH Campbell CCR Groundwater Testing

Job ID: 160-43809-1

10

Method: 903.0 - Radium-226 (GFPC)

Lab Sample I	D: MB 1	60-5350	27/23-A						Client Samp	le ID: Metho	d Blank
Matrix: Water	•									Prep Type: T	otal/NA
Analysis Bate	ch: 5390	)49								Prep Batch:	535027
				Count	Total						
		MB	MB	Uncert.	Uncert.						
Analyte		Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226		0.02492	U	0.0710	0.0710	1.00	0.131	pCi/L	11/04/21 08:46	11/29/21 13:39	1
		MB	MB								
Carrier Ba Carrier		%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
		30.0		40 - 110					11/04/21 00.40	11/29/21 15:59	1
Lab Sample I Matrix: Water	D: LCS	160-535	027/1-A					Clie	ent Sample ID:	Lab Control S Prep Type: T	Sample otal/NA
Analysis Bate	ch: 5390	046								Prep Batch:	535027
-						Total				-	
			Spike	LCS	LCS	Uncert.				%Rec.	
Analyte			Added	Result	Qual	(2 <b>σ+/-</b> )	RL	MDC	Unit %Rec	Limits	
Radium-226			11.3	10.20		1.09	1.00	0.146	pCi/L 90	75 - 125	
	LCS	LCS									
Carrier	%Yield	Qualifier	Limits								
Ba Carrier	95.0		40 - 110	-							
Lab Sample I Matrix: Water Analysis Bate	D: LCSI ch: 5390	D 160-53 )46	5027/2-A			Total		Client S	ample ID: Lab	Control Samp Prep Type: T Prep Batch:	ole Dup otal/NA 535027
			Sniko			Uncort				%Poc	DED
Analyto				Result	Qual	(2σ+/-)	RI	MDC	linit %Rec	Limite RE	R Limit
Radium-226			11.3	9.657	<u></u>	1.04	1.00	0.160	pCi/L 85	75-125 0.2	5 1
	LCSD	LCSD									
Carrier	%Yield	Qualifier	l imits								
Ba Carrier	92.0	quanto	40 - 110	_							
- Method: 904	.0 - Ra	dium-2	228 (GFPC	2)							
				/							
Lab Sample I	D: MB 1	60-5350	28/23-A						Client Samp	Ie ID: Metho	d Blank
Analysis Pet	ob. 5201	122								Prop Potobi	525029
Allalysis Date	UII. 3364	200		Count	Total					Fieh parcu:	535028
		MR	MB	Uncert	Uncert						
Analyte		Result	Qualifier	(2σ+/-)	(2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228		0.09522	<u> </u>	0.195	0.195	1.00	0.336	pCi/L	11/04/21 09:20	11/23/21 13:02	1
		MB	MB								
Carrier		MB %Yield	MB Qualifier	Limits					Prepared	Analvzed	Dil Fac
<b>Carrier</b> Ba Carrier		MB %Yield 96.8	MB Qualifier	Limits 40 - 110					<b>Prepared</b> 11/04/21 09:20	Analyzed 11/23/21 13:02	Dil Fac

## **QC Sample Results**

Job ID: 160-43809-1

Project/Site: JI	H Campb	ell CCR Gr	roundwater	Testing										
Method: 90	4.0 - Ra	dium-22	8 (GFPC	) (Con	tinued	)								
Lab Sample Matrix: Wate	ID: LCS er	160-53502	8/1 <b>-A</b>					Clie	ent Sa	mple ID:	Lab Con Prep Typ	trol Sa be: Tot	ample al/NA	
Analysis Ba	tch: 5382	216				Total					Prep Ba	tch: 5	35028	5
			Spike	LCS	LCS	Uncert.					%Rec.			
Analyte			Added	Result	Qual	(2 <b>σ+/-</b> )	RL	MDC	Unit	%Rec	Limits			
Radium-228			9.12	9.646		1.14	1.00	0.428	pCi/L	106	75 - 125			
	LCS	LCS												
Carrier	%Yield	Qualifier	Limits											
Ba Carrier	95.0		40 - 110											8
Y Carrier	79.3		40 - 110											0
Lab Sample	ID: LCSI	0 160-5350	)28/2-A					Client S	ample	ID: Lab	Control S	ample	e Dup	9
Matrix: Wate	er										Prep Typ	e: Tot	al/NA	10
Analysis Ba	tch: 5382	216									Prep Ba	tch: 53	35028	
						Total								
			Spike	LCSD	LCSD	Uncert.					%Rec.		RER	
Analyte			Added	Result	Qual	(2σ+/-)	RL	MDC	Unit	%Rec	Limits	RER	Limit	
Radium-228			9.12	7.977		0.997	1.00	0.440	pCi/L	87	75 - 125	0.78	1	
	LCSD	LCSD												
Carrier	%Yield	Qualifier	Limits											
Ba Carrier	92.0		40 - 110											

40 - 110 Y Carrier 79.6

## **QC Association Summary**

Client: Consumers Energy Project/Site: JH Campbell CCR Groundwater Testing

#### Job ID: 160-43809-1

0		
Ka	d	

#### Prep Batch: 535027

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-43809-1	JHC-MW-15006	Total/NA	Water	PrecSep-21	
160-43809-2	JHC-MW-15007R	Total/NA	Water	PrecSep-21	
160-43809-3	JHC-MW-15008R	Total/NA	Water	PrecSep-21	
160-43809-4	JHC-15009R	Total/NA	Water	PrecSep-21	
160-43809-5	JHC-MW-15011R	Total/NA	Water	PrecSep-21	
160-43809-6	DUP-05	Total/NA	Water	PrecSep-21	
MB 160-535027/23-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-535027/1-A	Lab Control Sample	Total/NA	Water	PrecSep-21	
LCSD 160-535027/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep-21	
Prep Batch: 535028					
Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-43809-1	JHC-MW-15006	Total/NA	Water	PrecSep_0	
160-43809-2	JHC-MW-15007R	Total/NA	Water	PrecSep_0	
160-43809-3	JHC-MW-15008R	Total/NA	Water	PrecSep_0	
160-43809-4	JHC-15009R	Total/NA	Water	PrecSep_0	
160-43809-5	JHC-MW-15011R	Total/NA	Water	PrecSep_0	
160-43809-6	DUP-05	Total/NA	Water	PrecSep_0	
MB 160-535028/23-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-535028/1-A	Lab Control Sample	Total/NA	Water	PrecSep_0	
LCSD 160-535028/2-A	Lab Control Sample Dup	Total/NA	Water	PrecSep_0	

## **Tracer/Carrier Summary**

#### Client: Consumers Energy Project/Site: JH Campbell CCR Groundwater Testing

Job ID: 160-43809-1

Prep Type: Total/NA

## Method: 903.0 - Radium-226 (GFPC)

Matrix: Water

-		Percent Yield (Acceptance Limits)							
		Ва							
Lab Sample ID	Client Sample ID	(40-110)		5					
160-43809-1	JHC-MW-15006	102							
160-43809-2	JHC-MW-15007R	98.8							
160-43809-3	JHC-MW-15008R	102							
160-43809-4	JHC-15009R	105							
160-43809-5	JHC-MW-15011R	107							
160-43809-6	DUP-05	103		Q					
LCS 160-535027/1-A	Lab Control Sample	95.0		0					
LCSD 160-535027/2-A	Lab Control Sample Dup	92.0		0					
MB 160-535027/23-A	Method Blank	96.8		9					
Tracer/Carrier Legend	1								

Ba = Ba Carrier

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

Matrix: Water

				Percent Yield (Acceptance Limits)
		Ва	Y	
Lab Sample ID	Client Sample ID	(40-110)	(40-110)	
160-43809-1	JHC-MW-15006	102	80.4	
160-43809-2	JHC-MW-15007R	98.8	81.9	
160-43809-3	JHC-MW-15008R	102	82.6	
160-43809-4	JHC-15009R	105	83.4	
160-43809-5	JHC-MW-15011R	107	82.2	
160-43809-6	DUP-05	103	82.6	
LCS 160-535028/1-A	Lab Control Sample	95.0	79.3	
LCSD 160-535028/2-A	Lab Control Sample Dup	92.0	79.6	
MB 160-535028/23-A	Method Blank	96.8	84.5	

#### Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier

12

Prep Type: Total/NA



## Appendix E October 2021 Field Notes

Consumers Energy

A CENTURY OF EXCELLENCE		WAT	ER LEVEL	DATA							
Site:	JH Campbe	ell									
Project No:	21.1274, 1276, 1277, 1278, 1279, 1280, 1281, 1287										
Analyst:	WH, LMO, DMW, CET Reviewed by:										
Date:	10.19	.21	Review Date:	11-05-21							
Method: Tape ID:	Electronic T SOLINISA SOLINISA	ape Geotect	n S/N:	379 851 501491	Geotral = 10	05					
Well ID	Time	DTW (ft)	DTB (ft)	Locked Y or N	Well Condition Good (G) / Poor (P) / Remarks						
JHC-MW-15023	6967	19.00	27.75	X	GOOD	Dmw					
JHC-MW-15024	0914	14.15	19.95	1	T						
JHC-MW-15025	0917	13.36	20.00	1.1							
JHC-MW-15026	0927	15.11	21.01								
JHC-MW-15027	0930	15,47	23.00								
JHC-MW-15028	0936	15.04	23 20.79	1							
JHC-MW-15029	0938	12.11	20.91								
JHC-MW-15030	0940	10.32	16.84	1	4	$\downarrow$					
JHC-MW-15002	1205	25.35	33.25	Y	GOOD	CUH JIMO					
JHC-MW-15003	1208	33.47	36.48		1	Ī					
JHC-MW-15005	1210	18.50	22.60								
JHC-MW-18004	1212	12.69	18.83								
JHC-MW-18005	1214	11.90	17.71								
JHC-MW-15013	1150	35.91	40.92								
JHC-MW-15015	1145	35.30	40.80	1							
JHC-MW-15016	1208	33.71	38.60	NA	iolig.	sing all bay on					
JHC-MW-18001	1220	12.85	19.10	1							
JHC-MW-18002	1157	9.67	16.98								
JHC-MW-18003	1155	9.61	16.90								
JHC-MW-15006	1050	35.91	37.80								
JHC-MW-15007R	1100	37.00	42.95								
JHC-MW-15008R	1104	44.04	47.38								
JHC-MW-15009R	un	43.87	50.65								
JHC-MW-15011R	1030	38.29	45.02								
JHC-MW-15017	1307	16.40	23.75	1	V	1					

NOTES: TOC reference point (top of steel plate for RWs) DTW = Depth to Water DTB = Depth to Bottom

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Laboratory Services

WATER LEVEL DATA

GENTURY OF EXCELLENCE					
Site:	JH Campbe	U			
Project No:	21-1274	1276. 1277	1278 127	9 1280	1281. 1287
Analyst:	CUH.	LMD DAAN	V CFT	1, 100,	Reviewed by:
Date:	10.10	1.2021	1, 11,		Review Date: (1-05-2)
Method:	Electronic T	ape	V		
Tape ID:	Solinist Geotech S/N: 379851				Geoteol 27 2 1005
Well ID	Time	DTW (ft)	DTB (ft)	Locked Y or N	Well Condition Good (G) / Poor (P) / Remarks
JHC-MW-15018	1306	17.05	22.73	YES	GLOOP CUTILINO
JHC-MW-15022	1000	29.53	36.22	1	DNW
JHC-MW-15031	1017	43.45	46.69		
JHC-MW-15032	0859	17.99	25.83	•	
JHC-MW-15033	0962	23.03	28.55	-	
JHC-MW-15034	0905	16.97	23.95	N-1	
JHC-MW-15035 (MW-B5)	1020	41.11	45.32		
JHC-MW-15036 (MW-B6)	1013	27.13	32.61		
JHC-MW-15037 (MW-B7)	1007	25.55	29.94		*
MWA1	0951	12.37	18.11		Replaced when corbiniock
MWA2	0953	12.58	16.68		GOOD
MWB1	1032	Dry	35.01		DM
MWB2	1636	37.06	31.51	-	GUOP
MWB2D	1028	37.33	51.00		
MWB3	1026	38.45	40.30	1	
MWB4	1024	41.41	47,70		1
MWB5 (JHC-MW-15035)	1020	41.11	45.32	1	replaced when comintace
MWB6 (JHC-MW-15036)	1013	27.13	32.61		GIOOD
MWB7 (JHC-MW-15037)	1007	25.55	29.94		
MW1	0933	12.63	16.11	1	
MW3	0921	12.55	16.56	-	
MW4	0911	32.20	32.71		
MW5	1601	12.25	15.78		
MW-8	0849	29.23	33.45		
MW-8C	0848	29.81	63.78	V	+ +

0848 29.31 63.78 NOTES: TOC reference point (top of steel plate for RWs)

DTB = Depth to Bottom

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DTW = Depth to Water

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A DENTURY OF EXCELLENCE		WAT	ER LEVEL	DATA						
Site:	JH Campbe	ell								
Project No:	21-1274, 1274, 1277, 1278, 1279, 1280, 1281, 1297									
Analyst:	CUH, LMD	, DMW, C	ET	., .,	Reviewed by:	T-				
Date:	10-10-2021 Review Date: 0 11-6									
Method: Tape ID:	Electronic T SOLANST SOLAIST	1005								
Well ID	Time	DTW (ft)	DTB (ft)	Locked Y or N	Well ( Good (G) / P	Condition oor (P) / Remarks				
MW-9AR	1430	22.03	23,59	Y	GOOP	CET				
MW-9B	1432	21.99	29.55	1	1					
MW-9C	1434	21.22	41.33							
MW-9D	1436	21.06	54.68	1	1	1				
MW-11A	1519	9.75	16.40	X	GOOD	WH LAND				
MW-15	1501	12.80	14.24	1	I	ī				
MW-16A	1515	11.22	20.45	_						
MW-16B	1514	10.55	50.15							
MW-16C	1513	11.10	84.34							
MW-17	1522	14.99	23.20	( ) ( )						
MW-18A	1408	28.97	36.80							
MW-18B	1409	31.80	73.05		1					
MW-18C	1410	32.20	86.95	4		1				
MW-10AR	1325	Dry	14.28	4	Perchecked 10/20	2100920 CET				
MW-10B	1326	14.65	23.52			- T				
MW-12	1356	9.01	9.77							
MW-13	1321	Dry	10.20		DYY: reckecked in	0/20/21 09.26				
MW-14	1318	9.27	17.46							
MW-14S	1314	10.02	13.21							
MW-14D	1315	9.39	37.40							
PZ-23	6930	14.01	15.47							
PZ-23S	0931	15.41	18,25							
PZ-23D	0933	16.90	37,41							
PZ-24	1010	5.98	13.78		replaced when	corbin lock				
PZ-24S	1013	8,59	11.01	L		Ť				

 1013
 6.721
 11.01

 NOTES: TOC reference point (top of steel plate for RWs)

 DTW = Depth to Water

 DTB = Depth to Bottom

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Page 4 of 6

Laboratory Services		WAT	ER LEVEL	DATA				
Site:	JH Campbe	ell.						
Project No:	21.1274. 1	ETLE, 12TT.	1280, 1278	1279 1281	. 1287			
Analyst:	CVH, LM	), DMW,	(ET	,	Reviewed by	· 7:		
Date:	10/19/2	1			Review Date	: 0 a-	05-21	
Method:	Electronic T SOLINST	ape Great	Tech S/N	379851	Gented	-at lost		
Well ID	Time	DTW (ft)	DTB (ft)	Locked Y or N	Well Condition Good (G) / Poor (P) / Remarks			
PZ-24D	1015	8.50	38.52	V			CET	
PZ-37 (Gated Plant Area)	1519	5.19	20.04	1			1	
PZ-40	0950	9.15	22.44		Replaced m	new rork	in	
PZ-40S	09.47	11.99	17.65	4	- contract of	1.000 0010	1	
P1S	1431	16.05	22.37	lock Diva ca D	1"well G	000	CILLIND	
P2S	1433	14.50	22,50	I	1	1	1	
P3S	1525	14.21	22.55		1			
P5S	1453	13.50	22.30			1		
P6S	1452	13.04	22.40					
P7S	1450	12.69	22,70					
P9S	1447	8.60	19.75		1.1	-		
P10	1505	8.50	10.52			NOCAP		
P11	1520	6.90	9.54	+	V			
PZ-1203	1120	ÞM	37.65	Yes				
PZ-1204	1120	Dry	30.90					
PZ-1205	0912	Dry	35.85					
PZ-1207	0930	Dry	32.73					
PZ-1208	1000	DM	37.14					
PZ-1212	1000	Dry	24.50					
PZ-21-01	LOI2	34.80	38.05		replaced	corbin		
PZ-21-02	1010	37,20	43.40		T			
PZ-21-03	0936	38.04	43.52					
PZ-21-04	(130	38.60	44.10					
PZ-21-05	1124	33.50	42.85					
PZ-21-06	0925	38.54	45.80	1	ł	1	V	

NOTES: TOC reference point (top of steel plate for RWs) DTW = Depth to Water

DTB = Depth to Bottom

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Laboratory Services

WATER LEVEL DATA

I GENTURY OF EXCELLENCE		UA.		DATA						
Site:	JH Campb	ell								
Project No:	21.1274,	1274, 1271	12718, 12	79, 1280	1281,	1287				
Analyst:	CUH, LM	O. DMW.	(ET	, ,	Review	ved by: T	f:			
Date:	-10-1	19.21			Review	v Date:	11-05-21			
Method:	Electronic	Гаре			1.012.5					
Tape ID:	Solinst	Solinst Georech SIN: Solygi Geoted & 105								
Well ID	Time	DTW (ft)	DTB (ft)	Locked Y or N	Well Condition Good (G) / Poor (P) / Remarks					
RW-1	1100	30.51	39.64	NA	Eio	OP	Pmvr) CET			
RW-2	1123	35.25	\$3.00	Ī	Ī	24	T			
RW-3	1154	15.40	23,22							
RW-4	1221	9.29	22.03							
RW-5	1252	9.50	21.42							
RW-6	1205	10.87	21.95							
RW-7	1237	9.82	20.52	$\downarrow$	1					
SG-21-1	1127	0.60	NIA	NIA	-					
SG-21-2	1226	2.00	NIA	NA	-					
SG-21-3	1310	2.08	NIA	NA	-					
TW-17-01	1353	29.91	34.09	N	1"	Cap	CUH (LMD)			
TW-17-07	1445	26.93	31.70	N			CET			
TW-17-08	1342	34.80	39.45			d.				
TW-17-10	1421	DM Dlugg	ed—	N	topol	F casing br	roke lo ground level			
TW-17-12	1438	12.95	14.20	T	10	1 cap	- CJ.			
TW-17-14	1443	7.17	10.95		NO	Cap				
TW-17-16	1444	6.90	9.10		1ª	Icap				
TW-18-01	1323	31.20	33.80	<b>T</b> 1		I				
TW-18-02	1351	29.35	29.55							
TW-18-03	1340	30.29	34.05							
TW-18-04	1327	31.80	34.70							
TW-18-05	1324	30.45	33,71	-						
TW-18-06	1331	31.92	36.96							
TW-18-07	.1330	32.37	35.40							
TW-18-08	1232	33.00								

NOTES: TOC reference point (top of steel plate for RWs)

Form Rev.04-12-20EB

DTW = Depth to Water

DTB = Depth to Bottom

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Laboratory Services

WATER LEVEL DATA

#### A CENTURY OF EXCELLENC Site: JH Campbell Project No: 21-1274, 1276, 1277, 1278, 1229, 1280, 1281, 1287 Analyst: LUH, LMO, DMW, LET **Reviewed by:** 10.19.2021 11-05-21 Date: **Review Date:** Electronic Tape SOLINST SOLINST Method: 379051 Gentech at 1005 Tape ID: S/N: Erectech DTW Well Condition DTB Locked Well ID Time (ft) (ft) Y or N Good (G) / Poor (P) / Remarks 32.90 34.84 N 1335 GOOP TW-18-09 cap CLAI 30.03 TW-18-10 1338 33.85 plugged-can only go to 8.00' bgs TW-18-11 1476 29.91 1401 32.28 TW-18-12S 30.10 1402 42.60 TW-18-121 29.35 1403 50.30 TW-18-12D 29.51 1415 TW-18-13 27.20 32.39 34.23 1321 TW-18-14 111 N GOOD 1448 30.03 32.38 TW-18-15 CET 1" 30.44 28.27 1043 N GOOD TW-18-16 DMW 26.95 1492 29.88 N cet TW-18-17 22,71 25.35 1335 TW-19-01A 1333 19.00 20.97 TW-19-02A 15.68 1.330 17.59 TW-19-03A 23,00 TW-19-04A Ogiy 24.25 17.09 0923 TW-19-05 18.23 14.13 15.30 0920 TW-19-06A

NOTES: TOC reference point (top of steel plate for RWs) DTW = Depth to Water DTB = Depth to Bottom

	sitents Services			Consur Monitoring	ners Energy ( Well Samplin	Company ng Worksheet				
	HC MW.	15023	Date 10-2	0.21		Control Num	ber 21.	276-01		
Location	st (um	vell	Well Material: PVC SS Iron Galv. Steel					Steel		
Purge Meth	nod:	Peristaltic		Submersible		] Fultz		Bailer		
Depth to W	ater Tape:	solinst	S/I	N: 3798	51					
QC SAMPLE	ii 🗌	MS/MSD	DUP-		Sonde ID:	11M	15H	V 19M	20G	21G
Depth-to-w	ater T/PVC (ft)	19.00	Depth-To-E	Bottom T/PVC	(ft)	:) Completed by				
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	Notes
min	units	°C	uS/cm	% sat.	ppm	mV	ml/min	Drawdown	NTU	
3-5 min	+/- 0.1	NA	+/-3%	+/- 10%	+/- 10%	+/- 10mV	*	< 0.33	+/- 10%	
	1	1	St	tablization para	meters for the	last three readin	gs	10 00		
1015	102	100	01	001	2.21			19.00	0.01	
1010	6.10	1301	71.1	12.6	1.26	+135.0	200	19.00	2.84	
1021	3:11	13.5	61.1	9.3	0.95	+191.2	200	19.00	2.39	
1026	5.65	13.7	74,7	9.2	6.94	+205.6	200	19.00	1.91	
1031	5.65	13.8	76.3	9.0	0.92	+206.6	200	19.00	1.92	
1036	5.68	13.8	80.5	8.9	0.90	+209.7	200	19.00	1.98	
1041	5.70	13.8	85.3	9.0	0.91	+210.5	200	19.00	2.01	
1046	5.75	13.8	88.0	9.0	0.92	+210.1	200	19.00	2.14	
1051	5.76	13.8	89.4	9.1	0.92	+209.4	200	19.00	2.17	
1056	511	13.8	90.5	91	6.93	+ 208.3	200	19.00	2.08	
1057		1	10.4					11.00		
1001										
			1							
					1.00			1		
Total Pump	Time (min):	42	Total Purge V	olume (gal) :	2.2		Reviewed by:	V.		
Weather:	Clinnth'	5705	Total Turge V	oranie (Barl) :	-6		neriencu by.	Á ((,	05-21	
Comments		1-21.						0		
Deut	entre l			A NONE A			und a			
Bottle	es Filled	Preserva	Preservative	A-NONE B-I	1103 C-H2S	04 D - NaOH E	- HU F	Preservative	-	
Quantity	Size	Туре	Code	Filtered Y/N	Quantity	Size	Туре	Code	Filtered Y/N	
	125 ml	HOPE	A	N	2	16	HOPE	B	N	
	250-1	1	Å	1						
2.	bow	VOA	A	7				3-3-31	·	
Pump rate sh	auld ha <500 ml /n	ain for low flow o	nd <1 acl/min for	high Volume						

Laboratory S	ervices courren			Consur Monitoring	mers Energy Well Sampli	Company ng Worksheet				
Well ID Location	SHC MY SH Cam	v-15024 vpbell	Date 10.	20.21 Well Materia		Control Num	ber <u>21-1</u> Iron	276-02 Galv. S	Steel	
Purge Metho	od:	Peristaltic		Submersible		Fultz		Bailer		
Depth to Wa	ter Tape:	Solins	t s/r	1: 3798	51			_		
QC SAMPLE:		MS/MSD	DUP-		Sonde ID:	11M	15H	19M	20G	21G
Depth-to-wa	ter T/PVC (ft)	14.15	Depth-To-B	ottom T/PVC	(ft)		Completed b	y dmw		
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	Notes
min	units	°C	uS/cm	% sat.	ppm	mV	ml/min	Drawdown	NTU	
3-5 min	+/- 0.1	NA	+/- 3%	+/- 10%	+/- 10%	+/-10mV	*	< 0.33	+/- 10%	
0.0.11		1	St	ablization para	meters for the	last three readin	gs	11115		
0096	- 11	0.11	Car			aur		19.15	0.1/0	
0041	7:11	12.4	515	16.5	1.68	+134.5	180	14.15	9.40	
0852	7.59	12.3	562	6.6	0.70	+126.8	180	14.15	4.85	
0857	7.41	12.4	513	5.7	0.58	+123.7	180	14.15	4.87	
0902	7.44	12.4	497.6	5.0	0.52	+122.1	180	14.15	4.88	-
0907	7.31	12.3	476.4	5.0	0.53	+ 121.7	180	14.15	4.17	
0912	7.08	12.3	441.0	6.5	0.68	+122.4	180	14.15	4.23	
0917	7.01	124	429.5	7.2	0.75	+123.3	180	1415	4.34	
0922	6.98	12.4	425.5	74	0.78	+1243	180	14.15	4.41	
6927	6.97	12.4	422.2	75	0.79	+1248	180	1415	450	
1928		16.1	1000		0.11	1.01.0	100	19.15	1.70	
0 100										
								-		
			-		(					
Total Pump T	ime (min):	42	Total Purge V	olume (gal) ·	2.0		Reviewed by:	V	~	
Weather:	OACH	u SUINA	a' 540	F			neviewed by.	X	11-05-24	
Comments:	- 400 · 1	4 over	91 21					0		
Bottle	s Filled	Preservat	ive Codes:	A-NONE B-	HNO3 C-H2S	04 D - NaOH I	- HCI F			
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N	
1 1	125 M	HOCE	A	N	2	IL	HOPE	B	N	
1	T	T	B	Ĩ						
1	250 ml	V Ann	A							
* Pump rate shou	uld be <500 ml /m	in for low-flow a	nd <1 aal/min for l	high Volume						

Laboratory S	Services Rock contr			Consur Monitoring	ners Energy ( Well Samplin	Company ng Worksheet				
Well ID <u>J</u> Location	HC MW. JH (aw	15025 1pbell	Date 10.	19-21 Well Materia		Control Num	ber <u>21 - 1</u> 7 Iron	Galv. S	16 - 11 Steel	
Purge Meth	od:	Peristaltic		Submersible		] Fultz		Bailer		
Depth to Wa	ater Tape:	>6linst	S/1	v: 370	1851					
QC SAMPLE		ws/msd	DUP-	_	Sonde ID:	11M	15H	<b>1</b> 9M	20G	
Depth-to-wa	ater T/PVC (ft)	13.36	Depth-To-B	Sottom T/PVC	(ft)	_	Completed b	v dmw		
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	Note
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%	
1-11	1		St	ablization para	meters for the	last three readin	gs			-
1116	0.01	120	5.01					13.36		
1717	1.26	(3.)	363.1	12.6	1.26	+1987	200	13.36	2.01	
1722	7.61	13.3	369.7	6.0	0.62	+ 182.0	200	13.36	339	
1727	7.71	13.2	371.4	5.3	0.54	+173.6	200	13.36	4.01	
1732	7.78	13.1	360.4	5.7	0.59	+164.6	200	13.36	4.24	
1737	7.80	13.1	355.9	6.2	0.64	+159.2	200	13.36	4.15	
1742	7.81	13.1	352.7	69	0.71	+153.7	200	13.36	4.33	
141	1.80	13.1	348.4	7.0	0.72	+149.6	200	13.36	4.56	
4415	1.79	13.1	342.9	11	0.73	+ 146.5	200	13.36	4.61	
1757	178	13.1	340.1	1.3	0.74	+144.5	200)	13.36	4.53	
1758		13.1	- 10-1				200			
	1	110			2.2			L.	_	
Total Pump	Time (min):	TL	Total Purge V	olume (gal) :	2.2		Reviewed by:	Y		
weather: Comments:		ay, or	F					0	(1-0)-24	
Bottle	es Filled	Preservat	ive Codes:	A - NONE B - I	HNO3 C - H2S	04 D - NaOH	- HCl F	Drocomether		-
Quantity	Size	Туре	Code	Filtered Y/N	Quantity	Size	Туре	Code	Filtered Y/N	
3	125ml	HDRE	B	N	2	16	HOPE	B	N	
3	T		A	1						
2	250 ml	Yon	PA	1						
F	0000	VUN	(7)	v						

Well ID       DATC       10.19.21       Control Number       21.1216 * 0.9         Location       JH       CMM00241       Well Material:       PVC       SS       Iron       Galv. Steel         Purge Method:       ✓       Peristatic       Submersible       Fultz       Bailler         Depth to Water Tape:       Soli INST       S/N:       379.861       Comtrol Number       21.12716 * 0.9         Cast MPLE:       Ms/MSD       DUP       Sonde ID:       11M       15H       19M       20G       21G         Depth-to-water T/PVC (ft)       5.00       DO       DO       ORP       Pump Rate       Water level       Turbidity       Notes         min       units       *C       us/cm       % sat.       pm       mV       ml/min       nt       NtU         35 min       of 0.1       MA       vf.305       vf.106       vf.1076       vf.108	Laboratory S	mis ervices sectance			Consu	mers Energy ( Well Sampli	Company ng Worksheet								
Purge Method:         V Peristatic         Submersible         Fulz         Baller           Depth to Water Tape:         Sol(i ASt         5/N:         379.851         Sonde ID:         11M         15H         19M         20G         21G           Depth to Water Tape:         MS/MSD         DUP         Sonde ID:         11M         15H         19M         20G         21G           Depth-to-water T/PVC (ft)         Completed by         Ant         V         MXW           Time         pH         Temp         Sp Cond         DO         DO         ORP         Pump Rate         Water level         Turbidity         Notes           min         units         *C         us/cm         %sat.         ppm         mV         m//min         ft         NTU         33 min         -/-0.08         2.18         Notes           16/24         15.05         1/1.3         G. S         0.60         +1/6.7.2         2.00         15.08         2.27           16/25         5.74         1/4.0         Y6.1         S.9         0.60         +1/6.1         2.00         15.08         2.27           16/35         5.73         14/.6         Y6.3         5.3         0.53         +176.6	Well ID <u>1</u>	HC MW.	15026 1001/	Date	<b>(9.2)</b> Well Materia	al: PVC	Control Num	ber <u>21</u> · Iron	1216 · 0 · Galv. S	Steel					
Depth to Water Tape:         Soli AST         S/N:         379 861           QC SAMPLE:         MS/MSD         DUP         Sonde ID:         11M         15H         /19M         206         216           Depth-to-water T/PVC (ft)         LG_OB         Depth-To-Bottom T/PVC (ft)         Completed by         ANMV           Time         pH         Temp         Sp Cond         DO         DO         ORP         Pump Rate         Water level         Turbidity         Notes           3min         or/co.         NA         +7.8%         -/10%         +7.10%         -/10%         +7.10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%         -/10%	Purge Metho	od: V	Peristaltic		Submersible		Fultz		Bailer						
QC SAMPLE:         MS/MSD         DUP-         Sonde ID:         11M         15H         19M         20G         21G           Depth-to-water T/PVC (ft)         L5.02         Depth-To-Bottom T/PVC (ft)         Completed by         AMWV           Time         pH         Temp         Sp Cond         DO         DO         ORP         Pump Rate         Water level         Turbidity         Notes           min         units         'C         us/cm         %sat.         ppm         mV         M/min         <0.33	Depth to Wa	ter Tape:	solins	t s/	N: 370	1851									
Depth-to-water T/PVC (ft)	QC SAMPLE:		MS/MSD	DUP-		Sonde ID:	11M	15H	<b>1</b> 9M	20G	21G				
Time         PH         Temp         Sp Cond         DO         DO         ORP         Pump Rate         Water level         Turbidity         Notes           min         units         'C         uS/cm         % sat.         ppm         mV         mL/min         ft         NTU           3-3min         +/-0.2         NA         +/-3%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         NTU         NTU           3-3min         +/-0.2         NA         +/-3%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         <	Depth-to-wa	ter T/PVC (ft)	15.08	Depth-To-E	Bottom T/PVC	(ft)		Completed b	v_dmw						
min         units         'C         us/or         % sat. // 3%         ppm         mV         mL/min         Drawdown         NTU           35 min         -// 0.1         MA         -// 3%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%         -// 10%	Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	Notes				
3.5 min       vf. 0.1       NA       47.3%       vf. 10%       vf. 10%       vf. 10%       vf. 10%         Stabilization parameters for the last three readings         16 24       [5.0%         16 24       [5.0%         16 25       6.79       [5.0%         16 25       6.79       [5.0%       [5.0%         16 30       5.0%       [15.0%       [5.0%         16 30       5.0%       [15.0%       [5.0%         16 30       5.0%       [15.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0%       [5.0% <td ]<="" colspan="4" td=""><td>min</td><td>units</td><td>°C</td><td>uS/cm</td><td>% sat</td><td>ppm</td><td>mV</td><td>ml/min</td><td>Drawdown</td><td>NTU</td><td></td></td>	<td>min</td> <td>units</td> <td>°C</td> <td>uS/cm</td> <td>% sat</td> <td>ppm</td> <td>mV</td> <td>ml/min</td> <td>Drawdown</td> <td>NTU</td> <td></td>				min	units	°C	uS/cm	% sat	ppm	mV	ml/min	Drawdown	NTU	
Stabilization parameters for the last three readings         1624       15.0%         1625       6.79       15.1       49.2       19.1       1.90       + 1450       2.00       15.0%       1.89         1630       5.86       14.5       41.3       6.8       0.60       + 162.2       2.00       15.0%       1.89         1635       5.74       14.6       46.1       5.9       0.60       + 167.1       2.00       15.0%       2.37         1640       5.75       14.6       45.5       5.4       0.55       + 173.3       2.00       15.0%       2.41         1650       5.73       14.6       45.3       5.3       0.53       + 176.6       2.00       15.0%       2.41         1650       5.73       14.5       45.0       5.0       0.50       + 101.6       2.00       15.0%       2.33         1651       1651       1651       1650       15.0%       15.0%       15.0%       15.0%       15.0%       15.0%       16.0%       16.0%       15.0%       15.0%       15.0%       16.0%       15.0%       16.0%       16.0%       16.0%       16.0%       16.0%       16.0%       16.0%       16.0%       16.	3-5 min	+/- 0.1	NA	+/- 3%	+/- 10%	+/- 10%	+/- 10mV	*	< 0.33	+/- 10%					
1624       15.0%         1625       6.79       15.1       49.2       19.1       1.90       + 1450       2.00       15.0%       2.18         1630       5.86       14.5       47.3       6.8       0.68       + 162.2       2.00       15.0%       1.89         1655       5.79       14.6       46.1       5.9       0.60       + 167.1       2.00       15.0%       2.37         1640       5.75       14.6       45.5       5.4       0.55       + 113.3       2.00       15.0%       2.25         1645       5.73       14.6       45.3       5.3       0.53       + 176.6       2.00       15.0%       2.44         1650       5.73       14.5       45.0       5.0       0.50       + 181.6       2.00       15.0%       2.33         1651       10.5       10.5       1.0%       2.00       15.0%       2.33       11651         1651       10.5       10.5       1.0%       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10				Si	tablization para	meters for the	last three readin	gs							
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	1624								15.08						
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	162S	6.79	15.1	49.2	19.1	1.90	+1450	200	15.08	2.18					
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	1630	5.86	14.5	47.3	68	0.68	+162.2	200	15.08	1.89					
1050       5:15       14.6       45.5       5.4       0.55       4113:3       200       15:08       2.25         1640       5:13       14.6       45:3       5.3       0.53       4116:6       200       15:08       2.25         1650       5:13       14.6       45:3       5.3       0.53       4116:6       200       15:08       2.41         1650       5:13       14.5       45:0       5:0       0.50       4181.6       200       15:08       2.33         1651       1651       16.5       5:0       0.50       4181.6       200       15:08       2.33         1651       16.5       16.5       10.50       4181.6       200       15:08       2.33         1651       16.5       16.5       10.50       4181.6       200       15:08       2.33         1651       16.5       16.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5         1651       16.5       16.5       16.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5       10.5	1635	5.79	14.6	46.1	5.9	0.60	+167.1	200	1608	221	1				
10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10       10 <td< td=""><td>1640</td><td>5.15</td><td>146</td><td>45.5</td><td>54</td><td>0.55</td><td>+13.3</td><td>200</td><td>ICOR</td><td>275</td><td>-</td></td<>	1640	5.15	146	45.5	54	0.55	+13.3	200	ICOR	275	-				
IO       IO <thio< th="">       IO       IO       <thi< td=""><td>ILLE</td><td>113</td><td>146</td><td>45.3</td><td>5.1</td><td>AE2</td><td>4115.5</td><td>200</td><td>15:00</td><td>2.45</td><td>-</td></thi<></thio<>	ILLE	113	146	45.3	5.1	AE2	4115.5	200	15:00	2.45	-				
1650       5.13       14.5       45.0       5.0       0.50       4101.9       2.00       16.00       2.55         1651       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1	10-15	6.10	19.0	Lit D	2.0	0.53	+1 10.0	200	15.00	6.91					
1651       Ib51       Ib51 <td>1650</td> <td>5.10</td> <td>14.5</td> <td>45.0</td> <td>5.0</td> <td>0.50</td> <td>+101.0</td> <td>200</td> <td>15.00</td> <td>2.55</td> <td></td>	1650	5.10	14.5	45.0	5.0	0.50	+101.0	200	15.00	2.55					
Bottles Filled     Preservative Codes:     A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F -       Quantity     Size     Type       Preservative Codes:     A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F -	1651		-								/				
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       1     1250M     H     A     N     2     L     HDQE     IS     N	1.1.1								1						
Image: State Stilled     Preservative Codes:     A - NONE     B - HNO3     C - H2SO4     D - NaOH     E - HCl     F       Quantity     Size     Type     Preservative     Filtered Y/N     Quantity     Size     Type     Filtered Y/N       1     1250 M     H208C     A     N     2     1     HD0C     IS     N															
Bottles Filled     Preservative Codes:     A - NONE     B - HNO3     C - H2SO4     D - NaOH     E - HCl     F       Quantity     Size     Type     Code     Filtered Y/N     Quantity     Size     Type     Preservative       1     1250M     HONG     A     N     2     1     HONG     HONG															
Bottles Filled     Preservative Codes:     A - NONE     B - HNO3     C - H2SO4     D - NaOH     E - HCl     F       Quantity     Size     Type     Code     Filtered V/N     Quantity     Size     Type     Code     Filtered V/N       1     1     1     1     1     1     1     1     1     1     1															
Bottles Filled     Preservative Codes:     A - NONE     B - HNO3     C - H2SO4     D - NaOH     E - HCl     F       Quantity     Size     Type     Code     Filtered Y/N     Quantity     Size     Type     Code     Filtered Y/N       1     1     1     1     1     1     1     1     1     1															
Bottles Filled     Preservative Codes:     A - NONE     B - HNO3     C - H2SO4     D - NaOH     E - HCl     F       Quantity     Size     Type     Code     Filtered Y/N     Quantity     Size     Type     Code     Filtered Y/N       1     1     1     1     1     1     1     1     1     1				-											
Total Purge Volume (gal):     I.H     Reviewed by:       Meather:     Cloudy:     USS F       Comments:     II-05-2I       Bottles Filled     Preservative Codes:     A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCI F       Quantity     Size     Type     Code       I     Preservative     Filtered Y/N     Quantity       Size     Type     Code     Filtered Y/N       I     I     I     I       I     I     I     I       I     I     I     I       I     I     I     I       I     I     I     I       I     I     I     I       I     I     I       I     I     I       I     I     I       I     I     I       I     I     I       I     I     I       I <thi< th="">     I     I       I     I     I     I       I     I     I     I       I     I     I       I     I     I       I     I     I       I     I     I       I     I     <thi< th="">       I<td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></thi<></thi<>															
Total Purge Volume (gal) : 1.4       Reviewed by:         Weather:       Cloudy:       USO F       U.os.al         Comments:       II.os.al       II.os.al         Bottles Filled       Preservative Codes:       A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F									1						
Meather:     Cloudy:     05° F       Comments:     II-05-2I       Bottles Filled     Preservative Codes:     A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F       Quantity     Size     Type     Preservative Code       I     1250 M     HDPC     A     N       I     250 M     A     N     I	Total Pump T	ime (min):	27	Total Purge V	olume (gal) :	1.4		Reviewed by:	ph-						
Bottles Filled     Preservative Codes:     A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F       Quantity     Size     Type     Preservative Code     Filtered Y/N       1     1250M     HDRC     A     N       2     1     1000     B     N	Weather:	cloud	14. 650	F					1.	1-05-21					
Bottles Filled     Preservative Codes:     A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F       Quantity     Size     Type     Preservative Code     Preservative Filtered Y/N     Quantity     Size     Type     Preservative Code     Filtered Y/N       1     1250M     HDPE     A     N     2     1L     HDPE     IB     N       1     250M     A     N     A     A     A     A     A     A	Comments:		51												
Bottles Filled     Preservative Codes:     A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCI F       Quantity     Size     Type     Preservative Code     Filtered Y/N     Quantity     Size     Type     Code     Filtered Y/N       1     1250M     HDRF     A     N     2     1     HDRF     B     N       1     250M     A     A     N     2     1     HDRF     B     N	-		-		1.000		2 4		and the second						
Quantity     Size     Type     Preservative Code     Filtered Y/N     Quantity     Size     Type     Preservative Code     Filtered Y/N       1     1250M     HDPE     A     N     2     IL     HDPE     B     N       1     1     1     B     N     -     -     -     -       1     250M     V     A     N     -     -     -     -	Bottle	s Filled	Preservat	tive Codes:	A-NONE B-	HNO3 C - H2S	04 D-NaOH E	- HCI F							
1 125MI HORE A N 2 IL HOPE B N 1 250MI L A N	Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N					
1 250ml V A N	1	125M	HORE	A	N	2	IL	HOPE	B	2					
250M V A N	1	T		B	N										
	5	250ml	N.	A	N	-									
	L	60m1	VOM	n	N										

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Constimers Energy
Countonth
Laboratory Services

Laboratory Se	ervices			Consun Monitoring	ners Energy ( Well Samplir	Company ng Worksheet				
Well ID Location Purge Metho	HC MW- SH Camp od:	15027 Pbell Peristaltic	Date <u>10</u> .	19-21 Well Materia Submersible	I: PVC	Control Num	ber 21 · 1 Iron	Galv. S Bailer	iteel	
Depth to Wa	ter Tape:	Solinst	s/n	1: 379	851					
QC SAMPLE:		MS/MSD	DUP-		Sonde ID:	11M	15H	✓19M	20G	21G
Depth-to-wa	ter T/PVC (ft)	15.47	Depth-To-B	ottom T/PVC	(ft)		Completed b	y dmw		
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	Notes
min 3-5 min	units +/- 0.1	°C NA	uS/cm +/- 3%	% sat. +/- 10%	ppm +/- 10%	mV +/- 10mV	mL/min *	Drawdown ft < 0.33	NTU +/- 10%	
ITIU			St	ablization paraı	neters for the	last three readin	igs	1010		-
1519	6.77	16.1	48.2	21.8	2.11	+133.5	200	15.47	31-06	
1620	5.40	15.8	52.9	7.7	0.76	+137.2	200	15.47	24.15	
1530	5.13	16.0	84.7	7.0	0.68	+97.0	200	15.47	8.94	
1535	5.82	15.9	95.6	7.2	0.70	+ 89.4	200	15.47	7.33	
1545	5.88	15.9	105.1	6.5	6.63	+11.8	200	15.47	8.24	
1550	5.88	16.0	105.2	64	0.63	+75.8	200	15.47	8.39	
1556	741	0-01	100-0	0.1	0.00	401.9	200	(3.4/	0.59	
otal Pump T	ime (min):	42	Total Purge V	olume (gal) :	2.2		Reviewed by:	Ŧ.	0.0 01	
Veather: Comments:	ZWW	<u>, 06</u>	7					0 "	-03-24	
Bottle	s Filled	Preservat	tive Codes:	A - NONE B - H	INO3 C - H25	04 D-NaOH I	E - HCI F	Descent		
Quantity	Size	Type	Code	Filtered Y/N	Quantity	Size	Type	Code	Filtered Y/N	
1	165MI	T	B	N I	4		JMW 10-19.21	5	r	
2	60mi	VOA	A	$\checkmark$						

Laboratory Se	nu ervices errende			Consu	mers Energy C Well Samplir	Company ng Worksheet				
Well ID Location Purge Metho	c MW·(1 2H Camp d: V	502.9 bell Peristaltic	Date     10.19.21     Control Number     21 · 1276·06     - 07       Well Material:     VPVC     SS     Iron     Galv. Steel							
Depth to Wat	ter Tape:	Saling	s/n	: 3798	51					
QC SAMPLE:	0	vis/MSD	V DUP-	01	Sonde ID:	11M	15H	V 19M	20G	21G
Depth-to-wat	ter T/PVC (ft)	15.05	Depth-To-B	ottom T/PVC	(ft)		Completed b	y dmw		
Time	pH	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	Notes
								Drawdown		
min 3-5 min	units +/- 0.1	°C NA	uS/cm	% sat.	ppm +/- 10%	mV +/- 10mV	mL/min *	ft < 0.33	NTU +/- 10%	
0 0 11111	.,		St	ablization para	meters for the	ast three readin	gs	. 0105	., 10,0	
1354								15.08		
1355	8.29	15.0	161.9	31.3	3.06	+165.4	200	15.00	5.64	
1400	821	15.2	161.1	24.0	128	+112.1	2.00	15.08	5.13	
1405	8.25	14.9	160.8	13.5	2.33	194.8	200	15.00	5.00	
1410	\$23	15.1	1609	13.7	229	+ 82.2	200	15.08	5.17	
1415	8.27	14.9	1605	12.1	229	173.4	200	15.08	4.99	
14.20	829	149	161.0	221	220	1607	200	15.00	11.79	
1420	8.26	15.4	166.8	227	1 21	LENG	200	1500	5.19	
11120	826	14.9	159.2	222	2.21	+ 50.1 + K1 D	200	15.00	11.99	
1920	0.00	11 2	1500	222	1.5'	101	200	15.00	4.00	
1955	8.65	19.0	150-1	63.6	1.56	+71.0	200	15.00	4.91	
1436										
_										
Total Pump Ti	ime (min):	42	Total Purge V	olume (gal) :	2.2		Reviewed by:	X	_	
Weather:	Sunnu	6800	F					0 (	1-05-21	
Comments:		,								
	_							_		
Bottles	Filled	Preservat	ive Codes:	A - NONE B -	HNO3 C-H2S	04 D - NaOH I	- HCI F -			
			Preservative					Preservative	-	
Quantity	Size	Туре	Code	Filtered Y/N	Quantity	Size	Type	Code	Filtered Y/N	
1	insul	nure	P) 12	N	Amising	2)	TUPE	P	N.	
2	250m1	1	Å		CALLON TO LET.					1
24	100 ml	VOR	A	V						
* Pump rate shou	Id be <500 mL/m	in for low-flow ar	nd <1 gal/min for l	high Volume.						

Amw 10.19.21



#### Consumers Energy Company

Well ID       CML       Date       L0       20.2       Control Number       21.4       121.6-08         Location       JLC (AMDBell       Well Material:       PVC       SS       Iron       Galv. Steel         Purge Method:       Persistatic       Submersible       Fultz       Baller         Depth       MS/MSD       DUP       Sonde ID:       11M       15H       19M       20G       216         Depth-to-water T/PVC (ft)       Depth-To-Bottom T/PVC (ft)       Completed by				_	Monitoring	Well Samplin	g Worksheet				
Location       JH: (AMpbell       Well Material:       PVC       SS       Iron       Galv. Steel         Purge Method:       Peristatic       Submersible       Fultz       Baller         Depth to Water Tape:       S/N:       Sonde ID:       11M       15H       19M       20G       216         Depth to Water Tape:       S/N:       Completed by	Well ID	idd Blan	k	Date 10.2	0.21		Control Num	ber 21-1'	276-08		
Purge Method:       Peristattic       Submersible       Fultz       Bailer         Depth to Water Tape:       5/N:       OC       Sonde ID:       11M       15H       19M       20G       21G         Depth to Water Tape:       S/N:       DuP       Sonde ID:       11M       15H       19M       20G       21G         Depth-to-water T/PVC (ft)       Depth-To-Bottom T/PVC (ft)       Completed by	Location	JH camp	bell		Well Materia	I: PVC	SS	Iron	Galv. S	iteel	
Purge Method:       Peristatic       Submersible       Fultz       Baller         Depth to Water Tape:       S/N:       Sonde ID:       11M       15H       19M       20G       21G         Depth to Water Tape:       S/N:       Sonde ID:       11M       15H       19M       20G       21G         Depth to Water Tape:       Sonde ID:       11M       15H       19M       20G       21G         Depth to water TyPVC (ft)       Depth-To-Bottom T/PVC (ft)       Completed by       Completed by       Turbidity       Notes         Time       pH       Temp       Sp Cond       DO       DO       ORP       Pump Rate       Water Level       Turbidity       Notes         35 min       r/-0.1       MA       +3%       -10%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20%       +20% <td>Same Press</td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Same Press	_									
Depth to Water Tape:       S/N:         QC SAMPLE:       MS/MSD       DUP       Sonde ID:       1 M       1 SH       19M       2 0G       2 1G         Depth-to-water T/PVC (ft)       Depth-To-Bottom T/PVC (ft)       Completed by	Purge Meth	od:	] Peristaltic		Submersible		Fultz		Bailer		
QC SAMPLE:       MS/MSD       DUP-       Sonde ID:       11M       15H       19M       20G       21G         Depth-to-water T/PVC (ft)       Depth-To-Bottom T/PVC (ft)       Completed by:	Depth to W	ater Tape:		S/I	N:						
Depth-to-water T/PVC (ft)         Depth-To-Bottom T/PVC (ft)         Completed by           Time         pH         Temp         Sp Cond         DO         DO         ORP         Pump Rate         Water level         Turbidity         Notes           min         units         'C         uS/cm         % sat.         ppm         mV         mL/min         ft         NTU           35 min         -/-0.1         MA         -/-38         -/-10%         -/-10%         -/-10%         mL/min         ft         NTU           35 min         -/-0.1         MA         -/-38         -/-10%         -/-10%         -/-10%         -/-10%           0949         -         CUNLC/L (2)         F         Al A         Statistion parameters for the last time readings         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         - <td>QC SAMPLE</td> <td>:</td> <td>MS/MSD</td> <td>DUP-</td> <td></td> <td>Sonde ID:</td> <td> 11M</td> <td><b>15H</b></td> <td>19M</td> <td> 20G</td> <td>21G</td>	QC SAMPLE	:	MS/MSD	DUP-		Sonde ID:	11M	<b>15H</b>	19M	20G	21G
Time         pH         Temp         Sp Cond         DO         DO         ORP         Pump Rate         Water level         Turbidity         Notes           33 min         units         "C         uS/cm         % sat.         ppm         mV         mL/min         ft         NTU         Image: construction of the last three readings         Image: construction of the last three readings         Image: construction of the last three readings           09449         -         CONICCT et al.         E. A. & BLOWKL_SOMOLES         Image: construction of the last three readings         Image: construction of the last three readings           09449         -         CONICCT et al.         E. A. & BLOWKL_SOMOLES         Image: construction of the last three readings         Image: construction of the last three readings           09449         -         CONICCT et al.         E. A. & BLOWKL_SOMOLES         Image: construction of the last three readings         Image: construction of the last three readings           09449         -         CONICCT et al.         E. A. & BLOWKL_SOMOLES         Image: construction of the last three readings         Image: construction of the last three readings           09449         -         CONICCT et al.         E. A. BLOWKL_SOMOLES         Image: construction of the last three readings         Image: construction of the last three readings           Image: constru	Depth-to-wa	ater T/PVC (ft	)	Depth-To-E	Bottom T/PVC	(ft)	4,	Completed b	У		
min         units         'C         us/cm         % sat.         ppm         mV         mL/min         ft         NTU           3.3 min         -/-0.1         MA         -//3%         -//1%         +//1%         -         <0.33	Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	Notes
35 min       4/-0.1       NA       4/-3%       4/-10%       4/-10%       <	min	units	°C	uS/cm	% sat.	ppm	mV	mL/min	ft	NTU	
Stabilization parameters for the last three readings       Oquq     - Collicited     F. ald     Bank       Image: Stabilization parameters for the last three readings     Image: Stabilization parameters for the last three readings       Image: Stabilization parameters for the last three readings       Image: Stabilization parameters for the last three readings       Image: Stabilization parameters for the last three readings       Image: Stabilization parameters for the last three readings       Image: Stabilization parameters for the last three readings       Image: Stabilization parameters for the last three readings       Image: Stabilization parameters for the last three readings       Image: Stabilization parameters for the last three readings       Image: Stabilization parameters for the last three readings       Image: Stabilization parameters for the last three readings       Image: Stabilization parameters for the last three readings       Image: Stabilization parameters for the last three readings       Image: Stabilization parameters for the last three       Image: Stabilization parameters for the last three	3-5 min	+/-0.1	NA	+/- 3%	+/- 10%	+/- 10%	+/-10mV	*	< 0.33	+/- 10%	
09449       - CONCCATED       FLAD TSLONK SOMPLES         Image: Some state of the some state of the state state state state of the state state of the state state of the	10.0			SI	tablization parai	meters for the lo	ast three readin	igs			
Image: Size Filled     Preservative Codes:     A - NONE 8 - HNO3 C - H2SO4 D - NaOH E - HCl F	0949	- 0011	ected t	ield B	lank san	nples			-		
Bottles Filled     Preservative Codes:     A - NONE B - HNO3 C - H2SO4 D - NAOH E - HCl F			1200								
Bottles Filled     Preservative Codes:     A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F					1			11			
Bottles Filled     Preservative Codes:     A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCI F											1
Bottles Filled         Preservative Codes:         A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F			1								
Image: State Stilled       Preservative Codes:       A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F											
Bottles Filled       Preservative Codes:       A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F											
Bottles Filled     Preservative Codes:     A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F       Quantity     Size     Type     Preservative Codes:       A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F											
Bottles Filled     Preservative Codes:     A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCI F											
Bottles Filled     Preservative Codes:     A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F	1										1
Bottles Filled     Preservative Codes:     A - NONE     B - HNO3     C - HZSO4     D - NaOH     E - HCl     F											
Bottles Filled     Preservative Codes:     A - NONE     B - HNO3     C - H2SO4     D - NaOH     E - HCl     F											
Bottles Filled     Preservative Codes:     A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F       Quantity     Size     Type     Code       I     I25 mL     Plashic     B       I     I25 mL     A     I       I     I25 mL     A     I       I     I25 mL     I     I											
Interviewed by:     Interviewed by:       Interviewed by:     Interviewed by:       Weather:     Interviewed by:       Weather:     Interviewed by:       Interviewed by:     Interviewed by:											
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     Code     Filtered Y/N       1     125 mL     Plastic     B     N     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I     I <td></td>											
Bottles Filled     Preservative Codes:     A - NONE     B - HNO3     C - H2SO4     D - NaOH     E - HCI     F       Quantity     Size     Type     Preservative     Code     Filtered     Y/N       1     12 SmL     Plastic     B     N     I     I     I       2     1-L     Plastic     B     V     I     I     I				1					1		
Total Pump Time (min):       Total Purge Volume (gal):       Reviewed by:         Weather:	-										
Total Purge Volume (gal) :       Reviewed by:         Weather:       (105-2)         Comments:       Preservative Codes: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F         Quantity       Size       Type       Preservative Codes: Code       A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F         Quantity       Size       Type       Preservative Code       Filtered Y/N       Quantity       Size       Type       Preservative Code         1       125mL       Plastic       B       N       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I								20.2			
Weather:       Image: Comments:         Bottles Filled       Preservative Codes:       A - NONE       B - HNO3       C - H2SO4       D - NaOH       E - HCl       F	Total Pump	Time (min):	~	Total Purge V	olume (gal) :	-		Reviewed by:	X	1.15.11.4	
Bottles Filled     Preservative Codes:     A - NONE     B - HNO3     C - H2SO4     D - NaOH     E - HCI     F       Quantity     Size     Type     Preservative     Filtered Y/N     Quantity     Size     Type     Code     Filtered Y/N       1     125mL     Plastic     B     N     I     I     I       1     125mL     Plastic     B     V     I     I       2     1 - L     Plastic     B     V     I     I	Weather:								- 0	1-05-21	
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     125mL     Plastic     B     N     Image: Size     Type     Code     Filtered Y/N       1     125mL     Plastic     B     N     Image: Size     Image: Size     Type       2     1-L     Plastic     B     V     Image: Size     Image: Size     Image: Size     Image: Size	Comments:										
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     125mL     Plastic     B     N     Image: Size     Type     Code     Filtered Y/N       1     125mL     Plastic     B     N     Image: Size     Type     Image: Size       1     125mL     Plastic     B     N     Image: Size     Type     Image: Size       2     1-L     Plastic     B     V     Image: Size     Image: Size     Image: Size		-									_
Quantity     Size     Type     Preservative       Quantity     Size     Type     Code     Filtered Y/N       1     125mL     Plastic     B     N	Bottle	as Filled	Prosorvati	va Codes:			A D NOOH	HOLE			
Quantity     Size     Type     Code     Filtered Y/N     Quantity     Size     Type     Code     Filtered Y/N       1     125mL     Plastic     B     N     Image: Size     Image: Size     Type     Code     Filtered Y/N       1     125mL     Plastic     B     N     Image: Size     Type     Code     Filtered Y/N       1     125mL     A     Image: Size     Type     Code     Filtered Y/N       1     125mL     A     Image: Size     Type     Code     Filtered Y/N       2     1-L     Plastic     B     Image: Size     Image: Size     Type     Code	Dotti		rieservat	Preservative	A-NONE B-I	1105 C-1250	14 D-NaOH I	- HCI F	Preservative		
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Quantity	Size	Туре	Code	Filtered Y/N	Quantity	Size	Туре	Code	Filtered Y/N	
1     NS mL     A       1     250     A       2     1-L     Plastic       B     V	1	125mL	Plastic	В	N						
1     250     J     A       2     1-L     Plastic     B     V	1	nsmi		A	1					-	
L I-L Plastic B V	1	250	L.	A							
	* Pumo roto she	UI - L	Plastic	B d <1 gal/min for	high Volume						



**Consumers Energy Company** 

Wall ID	GALL HAD	At Plank	D.1. 10.1	Monitoring	Well Samplin	ng Worksheet	21	127/20	119	
Location	14 camo	bell	Date 104	Well Materia	al: PVC	SS SS	Iron	Galv	Steel	
	0. chiq		_							
Purge Meth	od:	Peristaltic		Submersible		Fultz		Bailer		
Depth to Wa	ater Tape:		s/	N:						
QC SAMPLE	:	MS/MSD	DUP-		Sonde ID:	11M	15H	19M	20G	21G
Depth-to-wa	ater T/PVC (ft)		Depth-To-F	Bottom T/PVC	(ft)	1	Completed b	у		
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	Notes
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%	
1000	C 11	Leit	S	tablization para	meters for the l	ast three readin	ngs	1		
1813	- (011	ected	Equipm	icht Bla	nk san	ples				
		1.000	U							
							11			
							1			
					-					
_	-									
				2						
							1			
		1.								
			-							
			_							
					-					
tell report of		_			1					
Total Pump 1	Time (min):	-	Total Purge V	/olume (gal) :	-		Reviewed by:	X'	12-12	
Weather:								1 11-	05-21	
Comments:								V		
-			-							
Bottle	s Filled	Preserva	tive Codes:	A - NONE B - H	INO3 C - H2SC	04 D - NaOH	E - HCI F	_		
Quantity	Size	Type	Preservative Code	Filtered Y/N	Quantity	Size	Type	Preservative Code	Filtered Y/N	
1	125 401	VOPL	A	N	quantity	UILC	Type	couc	. inci cu i/iv	
i	T	T	8	1						
1	250ml		A							
2	IL		B	J						
Pump rate sho	uld be <500 mL/n	nin for low-flow a	nd <1 gal/min for	high Volume.						

Constainment Emergy	
Court on the	
Laboratory Services	

#### Consumers Energy Company Monitoring Well Sampling Worksheet

QC SAMPLE:       MS/MSD       DUP-       Sonde ID:       11M       15H       19M       1/2         Depth-to-water T/PVC (ft) 35.91       Depth-To-Bottom T/PVC (ft) 37.90       Completed by (£7)         Time       pH       Temp       Sp Cond       DO       DO       ORP       Pump Rate       Water level       Turbid         min       units       'C       us/cm       % sat.       ppm       mV       mL/min       ft       NTL         35 min       +/-0.1       NA       +/-3%       +/-10%       +/-10%       +/-10mV       < < < 3.33       +/-10         35 min       +/-0.1       NA       +/-3%       +/-10%       +/-10%       +/-10mV       < < < < 3.33       +/-10         13/0 <sup>+</sup> NA       +/-3%       +/-10%       +/-10%       +/-10MV       < < < < < > < < < > < < < < < <td>&lt; &lt; &lt; &lt; &lt; <td>&lt; &lt; &lt; &lt; <td>&lt; &lt; &lt; &lt; <td>&lt; &lt; &lt; &lt; &lt; <td>&lt; &lt; &lt; </td>       &lt; &lt; </td>       &lt; &lt; </td>       &lt; &lt; </td>       &lt; &lt; &lt; <td>&lt; 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Steel       Submersible     Fultz     Bailer       S/N:     1005							Well ID <u>MW + 1 SOC</u> Location <u>MC</u> Purge Method: Peristaltic Depth to Water Tape: Geolech QC SAMPLE: MS/MSD				
Depth-to-water T/PVC (ft) $35.91$ Depth-to-Bottom T/PVC (ft) $37.50$ Completed by $(£^{9})$ Time         pH         Temp         Sp Cond         DO         DO         ORP         Pump Rate         Water level         Turbic           min         units         'C         us/cm         % sat.         ppm         mV         ml/min         ft         NIT $35 min$ +/-0.1         NA         +/-3%         +/-10%         +/-10%         +/-10mV         *         <0.33         +/-10 $35 min$ +/-0.1         NA         +/-3%         +/-10%         +/-10mV         *         <0.33         +/-10 $100^{1-1}$ NA         +/-3%         +/-10%         +/-10mV         *         <0.33         +/-10 $130^{10}$ NA         +/-3%         +/-10%         +/-10mV         *         <0.33         +/-10 $130^{10}$ NA         +/-3%         +/-10%         +/-10%         +/-10%         <0.35.91 $131^{10}$ $7.15$ $14.6$ $857$ $2.56$ $2.36$ $67.6$ $100$ $35.91$	G 21G	20G	19M	15H	11M	Sonde ID:		DUP-	MS/MSD		QC SAMPLE																																															
Time         рн         Temp         Sp Cond         DO         DO         ORP         Pump Rate         Water level         Turbid           min         units         'C         us/cm         % sat.         ppm         mV         mI//min         ft         NTL           3.5 min         +/-0.1         NA         +/-3%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-10%         +/-1		2	v_ <u>C</u> E9	Completed by	7	(ft) 37.8(	Depth-To-Bottom T/PVC (ft) 37.8			ater T/PVC (ft)	Depth-to-wa																																															
min         units         'C         US/cm         % sat.         ppm         mV         mL/min         ft         NTL           3-5 min         +/-0.1         NA         +/-3%         +/-10%         +/-10%         +/-10W         *         <0.33         +/-10           Stabilization parameters for the last three readings           1VOL         100         35.91         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         - </th <th>y Notes</th> <th>Turbidity</th> <th>Water level</th> <th>Pump Rate</th> <th>ORP</th> <th>DO</th> <th>DO</th> <th>Sp Cond</th> <th>Temp</th> <th>рН</th> <th>Time</th>	y Notes	Turbidity	Water level	Pump Rate	ORP	DO	DO	Sp Cond	Temp	рН	Time																																															
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$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	,	5.98	35.91	160	60.6	1.57	13.6	853	14.6	115	1313																																															
$(32^{5})$ $1.72$ $17.9$ $806$ $8.9$ $0.844$ $28.3$ $100$ $35.91$ $6.86$ $(32^{5})$ $1.75$ $19.8$ $7.7$ $1.56$ $0.711$ $15.71$ $100$ $35.91$ $6.86$ $(32^{5})$ $1.75$ $19.8$ $7.7$ $0.62$ $6.5$ $(00)$ $35.91$ $6.41$ $(35^{5})$ $1.75$ $21.44$ $180$ $7.0$ $0.62$ $6.5$ $(00)$ $35.91$ $6.41$ $(35^{5})$ $1.76$ $21.5$ $100$ $35.91$ $6.41$ $(35^{5})$ $1.76$ $22.5$ $100$ $35.91$ $5.92$ $(35^{5})$ $1.62$ $2.53$ $100$ $35.91$ $5.92$ $1.833$ $1000$ $35.91$ $5.76$ $(35^{5})$ $1.52$ $183$ $6.6$ $0.51$ $-4.7$ $1000$ $35.91$ $5.76$ $(35^{4})$ $1.93$ $6.6$ $0.51$ $-4.7$ $1000$ $35.91$ $5.76$ $(34^{4})$ $1.93$ $1.92$ $77.0$	-	7.04	36.91	100	41.2	0.95	9,6	834	15.7	101	131%																																															
1528 $1.75$ $19.6$ $77L$ $7.6$ $0.71$ $15.7$ $100$ $35.91$ $7.7$ $.757$ $1.75$ $21.4$ $180$ $7.0$ $0.62L$ $6.5$ $100$ $35.91$ $6.44$ $1754$ $1.46$ $2.5$ $140$ $6.7$ $0.554$ $2.5$ $100$ $35.91$ $6.44$ $1754$ $1.46$ $2.5$ $140$ $6.7$ $0.554$ $2.5$ $100$ $35.91$ $6.44$ $1754$ $1.46$ $2.5$ $182$ $6.6$ $0.57$ $2.5$ $100$ $35.91$ $5.83$ $1546$ $1.16$ $183$ $6.6$ $0.51$ $-4.7$ $100$ $35.91$ $5.72$ $1546$ $1.24$ $183$ $6.6$ $0.51$ $-4.7$ $100$ $35.91$ $5.72$ $1347$ $1.42$ $183$ $6.6$ $0.51$ $-4.7$ $100$ $35.91$ $5.72$ $1470$ $1.42$ $1.57$ $1.420$ $1.220$ $1.420$ $1.220$ $1.420$ $1.420$ <		6.89	35.91	160	28.3	0.84	89	806	17.9	1.12	(323)																																															
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		7.79	35.91	100	15.7	0.71	7.8	1972	19.6	1.15	1328																																															
1734       1.16       12.5       100       35.91       599         1154       12.5       182       6.6       0.57       -3.8       100       35.91       5.83         1546       116       12.5       183       6.6       0.57       -3.8       100       35.91       5.83         1546       116       12.5       183       6.6       0.51       -4.7       100       35.91       5.72         1549       193       6.6       0.51       -4.7       100       35.91       5.72         1549       193       6.6       0.51       -4.7       100       35.91       5.72         1549       193       6.6       0.51       -4.7       100       35.91       5.72         1477       193       6.6       0.51       -4.7       100       35.91       5.72         1477       193       193       193       193       193       193       193       193       193         1947       193       193       193       193       193       193       193       193       193       193       193       193       193       193       193       193       193 <td>-</td> <td>6.41</td> <td>35.91</td> <td>(00)</td> <td>13</td> <td>0.62</td> <td>7.0</td> <td>180</td> <td>21.4</td> <td>1.15</td> <td>.355</td>	-	6.41	35.91	(00)	13	0.62	7.0	180	21.4	1.15	.355																																															
1.307       1.16       22-5       182       6.6       0.57       -3.4       100       35.91       5.83         1346       1.06       22.5       183       6.6       0.51       -4.7       100       35.51       5.76         1349       1       183       6.6       0.51       -4.7       100       35.51       5.76         1349       1       1       1       100       35.51       5.76         1471       1       1       1       100       35.51       5.76         1471       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1	-	599	35.91	100	2.3	0.54	62	740	22.5	1.16	1734																																															
1346     1.06     1.2.5     1.83     6.6     0.51     -4.7     100     35.71     5.76       1349     1417     1     1     1     1     1     1     1       1417     1     1     1     1     1     1     1     1       Total Pump Time (min)     15     Total Purge Volume (gal):     77.0     Reviewed by:     1     1	-	6.83	35.91	100	3.4	0.57	6.6	782	22.5	2:16	NYN																																															
13.49       1417       1417       Total Pump Time (min)       75       Total Purge Volume (gal): 77.0       Reviewed by:       14.05.21		5.72	35.71	σύι	-4.7	0.51	6.6	183	22.5	7.76	1346																																															
1417       1417       1417       1417       1417       1417       1417       1417       1417       1417       1417       1417       1417       1417       1417       1417       1417       1417       1417       1417       1417       1417       1417       1417       1417		2.10								1	1349																																															
Total Pump Time (min) Total Purge Volume (gal): 77.0 Reviewed by:	i i ni i i i i i i									1.	1412																																															
Total Pump Time (min) Total Purge Volume (gal): 77.0 Reviewed by:																																																										
Total Pump Time (min) T 5 Total Purge Volume (gal): 77.0 Reviewed by:																																																										
Total Pump Time (min) TS Total Purge Volume (gal): 77.0 Reviewed by:									1.1.1	1600																																																
Weather:			T	Reviewed by:		77.0	olume (gal) :	Total Purge V	575	ime (min)	Total Pump T																																															
Comments:		05-21	0 11-1								Weather: Comments:																																															
Bottles Filled Preservative Codes: A - NONE B - HNO3 C - H2SO4 D - NaOH E - HCl F				- HCI F	04 D - NaOH E	HNO3 C - H250	A-NONE B-I	ive Codes:	Preservat	s Filled	Bottle																																															
Ouantity Size Type Code Filtered Y/N Quantity Size Type Code Filtered Y	'N	Filtered Y/N	Preservative	Type	Size	Quantity	Filtered Y/N	Preservative Code	Type	Size	Quantity																																															
1 125 ML PLASTIC B N 2 2. L PLASTIC B N		N	В	PLASTIC	2.6	2	N	B	PLUSTIC	125 mL	1																																															
	-						-	4		1	1																																															
$\frac{1}{2} \frac{1}{1000} \frac{1}{100} \frac{1}{$								A	VaA	LOML	2																																															

Laboratory	Services		Consumers Energy Company Monitoring Well Sampling Worksheet								
Well ID <u>M</u> Location <u></u>	100 -1500 JHC nod:	Peristaltic	Date 10 - 21 - 21     Control Number 21 - 12.70 - 02       Well Material:     PVC     SS       Iron     Galv. Steel       Submersible     Fultz						Steel		
Depth to W	ater Tape: (·	act. cl.	5/	N: 1005							
QC SAMPLE		MS/MSD	J DUP-	05	Sonde ID: 11M 15H			19M	V 20G	21G	
Depth-to-w	ater T/PVC (ft	37.0	Depth-To-I	Bottom T/PVC	:(ft) <u>42.8</u>	5	Completed b	y CES			
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	Notes	
min 3-5 min	units	°C NA	uS/cm	% sat.	ppm	mV	mL/min	Drawdown ft	NTU		
0.011111	.7 0.1	, na	S	tablization para	meters for the	last three reading	ngs	1 0.55	+/-10/0		
1050							180				
1057	7.34	17.2	715	9.4	0.90	31.0	180	37.16	34.83		
1057	7.52	17.9	8.4 70	10:27	0.77	-50.6	180	37.16	31.42		
1102	7.72	19.4	700	7.4	0.68	-66.8	180	37.16	20.95		
107	1.82	19.6	693	6.7	0.62	-74.3	140	37,16	17.16		
1112	7.85	20.4	690	6.2	0.56	-79.2	180	37.16	12.59		
1117	7.88	20.3	691	5.9	0.54	-84.2	-180	37.16	9.23		
1122	7,91	21.3	689	5.4	0.48	-93.0	180	37.16	6.17		
1127	7.76	20.9	685	5.0	0.45	-100.7	180	37.16	4.88		
1132	1.97	20.7	685	4.9	0.48	-104.7	180	37,16	4.25		
1137	7.97	20.7	684	4.8	0.47	-107.4	180	37.16	4,01		
1138		1.0		1.							
1211											
Total Pump	Time (min): 🖇	31	Total Purge V	olume (gal) :	13.8		Reviewed by:	×			
Weather:								0 11-	.os-21		
Comments											
Bottle	es Filled	Preserva	tive Codes:	A-NONE B-I	HNO3 C-H2S	04 D - NaOH I	E - HCI F				
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Туре	Preservative Code	Filtered Y/N		
_	rismi	PLASHIC	3	N	2	1.L	Plastic	B	N		
1	250ML		A								
2	LEOML	VOA	A	V							
Pump rate sha	ould be <500 mL/r	nin for low-flow a	nd <1 gal/min for l	high Volume.							

Consumers Every
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Laboratory Services

#### Consumers Energy Company Monitoring Well Sampling Worksheet

Depth to Wa	iter Tape:	Solonia	st s/1	N: 501	491	(		<u> </u>	<u> </u>	
QC SAMPLE:		MS/MSD	DUP-		Sonde ID:	11M	15H	19M	20G	<b>X</b> 2
Depth-to-wa	ter T/PVC (ft)	44.04	Depth-To-E	Bottom T/PVC	(ft) 47.7	68	Completed b	y cutt		_
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	Note
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%	-
1520			30				250	44.04		
1525	7.19	14.0	718	8.7	0.88	+82.7	250	44.04	7.40	
1530	7.19	14.6	719	9.1	6.92	+67.7	250	44.04	1.34	
1535	7.19	14.6	718	9.9	1.00	+10.1	250	44.04	0.68	
1540	7.18	14.7	717	11.1	1.13	173,1	250	44.04	-0.29	
1545	7.18	4.7	719	9.0	0.91	+73.0	250	44.04	-0.34	
1550	7.18	14.6	719	9.7	0.98	+73.4	250	44.04	-0.27	
1000	7.13	14.4	719	10.0	1.01	173.8	250	44.04	-0.20	
1555	7,18	14.4	719	9.7	0.99	174.0	250	44.04	-0.23	
1401	colle	chel S	amole	<						
11012	end									
		1	1							
Total Pump T	ime (min):	41	Total Purge V	(olume (gal) ·	3.0		Reviewed by	V		
Weather:	550F	valo	who b ci	aunt (Bai).	0.0		neviewed by	11-	05-21	
Comments:		10000, 1	aller, C	up D-1				- V		
		colle	cted M	s/Mst	2					
Pottlo	e Filled	Dracomunt	lue Codes						-	
Bottle	srilled	Preservat	Preservative	A-NONE B-	HNUS C- H25	04 D-NaOH	- HCI F	Preservative	1	
Quantity	Size	Туре	Code	Filtered Y/N	Quantity	Size	Туре	Code	Filtered Y/N	
3	12SmL	Plastic	B	N		250mL	HEPE	A	N	_
5	145mL	plastic	A	N						
2	1 (Diag)	VAA	A							

Comments Energy
Cosmonth
Laboratory Services

#### Consumers Energy Company Monitoring Well Sampling Worksheet

				womtoring	wen sampn	ng worksneet				
Well ID	HC-MW	-15009R	Date 10 .	21.21		Control Num	ber 21 - 1	280-04	1	
Location	JHC PON	DA .		Well Materia	al: PVC	SS	Iron	Galv. S	Steel	
Purge Meth	od:	Peristaltic	1	Bladdee	-	Fultz		Bailer		
Depth to Wa	ater Tape: <b>S</b> Ø	lonist	s/	N: 50140	a1					
QC SAMPLE	: r	MS/MSD	DUP-		Sonde ID:	11M	<b>15</b> H	19M	20G	✓ 21G
Depth-to-wa	ater T/PVC (ft)	43.80	Depth-To-I	Bottom T/PVC	(ft) <u>50.6</u>	L	Completed b	V CUTT		
Time	pН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	Notes
min	unite	°C	uslom	% sat		mV	ml /min	Drawdown	NITH	
3-5 min	+/-0.1	NA	+/- 3%	+/- 10%	+/- 10%	+/- 10mV	mL/min *	< 0.33	+/- 10%	
1 P			S	tablization para	meters for the	last three readin	ngs			
1435					1		300	43.92		
1445	7.15	13.6	511	25.4	2.65	-70.2	300	43.92	10.41	
1450	1.12	13.4	504	30.4	3.16	- 55.8	300	43.92	6.49	
1655	7.12	13.5	502	32.3	3.34	-50.8	300	43.92	4.99	
1700	1.11	13,5	499.9	34.1	3,54	-40.7	300	43,92	0.82	
1705	7.11	13.6	499.2	35.4	3.67	-44.9	300	43.92	0.70	
1110	7.11	13.5	497.9	35.4	3,79	-42.5	300	43.92	0.51	
1711	rollers	edsan	plos							
1112	ind									
1119	201.00				-					
								1		
Tatal Duman 7	Time's (acta)		Tabal Dunca V	taliana taali	20		D 1 11	1.		
		96 010	Total Purge V	olume (gal) :	3.0		Reviewed by:	Y.	aC 01	
weather:	500	r, cio	DY, WI	raiy				- () ".	-03-4	
Comments:								v		
-	_									
Bottle	es Filled	Preservat	ve Codes:	A-NONE B-I	INO3 C - H25	04 D - NaOH	E-HCLE-			
			Preservative					Preservative		
Quantity	Size	Туре	Code	Filtered Y/N	Quantity	Size	Туре	Code	Filtered Y/N	
1	12SmL	Plastic	B	N	2	1.2	Plastic	B	N	
	126mL		A			1000			1	
2	LSOML	V V	A	-						
L	UVYIL	VUN	N	V					-	

Page \_\_\_\_\_ of \_\_\_\_

Laboratory S	ienvices iervices			Consur Monitoring	mers Energy ( Well Sampli	Company ng Worksheet				
Well ID <u>for</u> Location <u></u> Purge Metho Depth to Wa	N 150 118 JHC od:	Peristaltic	Date <u>10 - 2</u>	<u>ر- کر</u> Well Materia Submersible	ıl: PVC	Control Num	ber <u>21 - I28</u> Iron	0 - 05 Galv. S Bailer	iteel	
OC SAMPLE:	:	MS/MSD	DUP-		Sonde ID:	11M	15H	19M	20G	21G
Depth-to-wa	ater T/PVC (ft)	38.29	Depth-To-B	ottom T/PVC	: (ft) <u>45.07</u>	(ft) <u>45.02</u> Completed b				
Time	pH	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	Notes
min 3-5 min	units +/- 0.1	°C NA	uS/cm +/- 3%	% sat. +/- 10%	ppm +/- 10%	mV +/- 10mV	mL/min *	Drawdown ft < 0.33	NTU +/- 10%	
OPUN		I	St	ablization parai	meters for the	last three readin	loo	1 1 2 2 2		
1446	0 04	I/I	224	101 6	1.90	29.7	100	1.8 29	A1(0	
11.6	4 04	10.1	351	11.0	1.102	19.3	100	3829	31.40	
M 3 4	1.04	10	510	7.7	1.00	2108.5	1/2/1	10.10	1800	
1450	197	100	505	7.1	0.65	1204	100	38.29	26.07	
1506	1.99	20.6	50%	6.9	0.61	-135.8	100	34.79	22.90	
151)	16.00	20.2	510	24	0.67	138.6	100	38,79	21.55	
1516	7.99	20.2	107	13	0.10	137.4	100	38.29	20.46	
1521	799	20.5	Sos	7,3	6.6	-131.4	100	38.29	19.79	
1526	1.91	20.1	508	1.3	0.60	-134.8	100	38.29	14.13	
1531	7.97	19.7	508	7.3	0.69	-1366	100	38.29	917	
1536	7.96	20.0	504	7.1	0.69	-138.4	100	38.29	8.20	
1541	7.97	20.1	503	70	0.76	-138.9	100	38.29	8.13	
1210										
	Time (min): V	(0)	Tetal Durgo V		- 11 0		D-stand hu	V	5	
Weather: Comments:	ime (min): 1	) <	Total Pulke v	Slume (gai) :	24.0		Reviewed by:	<b>(</b> 1)	1-05-21	
Quantity	s Filled Size	Preservat	Preservative Code	A - NONE B - Filtered Y/N	Quantity	O4 D - NaOH E Size	- HCI F Type	Preservative Code	Filtered Y/N	
1	125mL 125mL 250mL	Plastic	B A A	N	2	1-1-	Plastic	B	N	
Laboratory S	Services			Consur Monitoring	mers Energy Well Sampli	Company ng Worksheet				
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Well ID/ Location	JAC JAC		Date <u>16- 2</u> 1	Well Materia	il: 🗹 PVC	Control Num	ber <u>21-12</u> Iron	57-06 Galv. S	Steel	
Purge Meth	od:	Peristaltic		Submersible		Fultz		Bailer		
Depth to W	ater Tape: (つ	noteda	s/	N: 1605					1	
QC SAMPLE	:	MS/MSD	DUP-		Sonde ID:	11M	15H	19M	20G	21G
Depth-to-wa	ater T/PVC (ft)	10.02	Depth-To-E	Bottom T/PVC	(ft) 13.21	_	Completed b	y CET		
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	Notes
min	units	°C	us/cm	% sat	nnm	mV	ml /min	Drawdown ft	NTU	
3-5 min	+/- 0.1	NA	+/- 3%	+/- 10%	+/- 10%	+/- 10mV	*	< 0.33	+/- 10%	
A.11. A	1	1	S	tablization para	meters for the	last three readir	ngs	40.40	bi I	
0802					0.16	- and	200	220010.	0.0	
0804	6.72-	14.9	40.1	8.4	0.88	80.4	200	20010.1	9 3.20	
0809	5.63	14.8	27.6	4.5	0.46	133-1	200	E20010	09 2.47	
0814	5.55	14.8	26.8	4.4	0.44	137.9	200	10.09	2.52	
0811	5:48	14.8	26.9	4.2	0.42	141.6	200	10.09	2.71	
6824	5.47	14.7	26.4	4.4	0.44	143,5	200	10.09	2.99	
6829	5.47	14.8	26.2	4.4	0.44	144,6	200	10.09	2.84	
0.834	5.47	14.8	26.2	5.0	0.50	145.2	200	10.09	2.57	
0839	5.47	14.7	25.9	4.7	6.47	145.7	200	10.01	2.66	1
0844	3.47	14.7	26.4	4.6	0.47	145.5	200	10.09	2.66	·
Orys							100			
6458					1					
					1					
Tatal Duna	Time (min)		T. 1. 1 D					30-		
Mosthor:	Time (min): _	06	Total Purge v	olume (gal) :	~ 2.1		Reviewed by:	1	c 21	
Comments:								0 11.0	2-4	
Bottle	es Filled	Preserva	tive Codes:	A-NONE B-H	1NO3 C - H2S	04 D - NaOH I	E - HCI F			
Ourantitur	Cia-	Ture	Preservative	Filtered V/N	Oursetter	et	There	Preservative	Filtered V (N	
Quantity	17Cml	HOPE	Code	y Y	Quantity	1000ml	HOPE	G		
1	1.2.44	1	1	N	~		IIPIS	P		
1			A							
	250 ml	11	11							
* Pump rate sho	ould be <500 mL/n	nin for low-flow a	nd <1 gal/min for	high Volume.						

Energy Continu

Laboratory S	Services			Consur Monitoring	mers Energy ( Well Samplin	Company ng Worksheet				
Well ID 82	- 245		Date 10-2	0-21		Control Num	ber 21-12	287-67		
Location	DAC			Well Materia	I: PVC	SS	Iron	Galv. S	steel	
Purge Meth	od:	Peristaltic		Submersible		Fultz		Bailer		
Depth to W	ater Tape: 🕒	rotech	S/	N: 1005			_			
QC SAMPLE		MS/MSD	DUP-		Sonde ID:	11M	15H	19M	20G	21G
Depth-to-wa	ater T/PVC (ft)	8.59	Depth-To-E	Bottom T/PVC	(ft) <u>11.01</u>	_	Completed b	y CES		
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	Notes
min	units	°C	uS/cm	% sat	nom	mV	ml /min	Drawdown	NTU	
3-5 min	+/- 0.1	NA	+/- 3%	+/- 10%	+/- 10%	+/- 10mV	*	< 0.33	+/- 10%	
	1		S	tablization para	meters for the .	last three readir	ngs	0.00		
1200						1000	200	8.19		
1851	5.98	14.9	28.5	24.6	2.47	/60.9	200	9.81	3-01	
1486	5.51	14.9	31.6	12-5	1.25	128.5	200	8.81	2.81	
1801	5.50	14.9	32.5	9.8	0.99	115.0	200	8.81	2.84	
1805	5,51	14.9	33.3	8.8	0.89	103.7	200	8.81	2.96	
1811	5.54	14.9	33.7	9.4	0,99	92-0	200	8.81	3.13	
1816	5.55	14.9	53.7	10.6	1.08	89.6	200	8.81	2.97	
1821	5.57	14.9	34.3	10.7	1.09	84.5	200	8.81	2.93	
1826	Susr	15.0	34.4	11.4	1.14	81.6	200	8.81	2.97	
1827						0	1.4.1.1.1			
1840										
					1					
		-								
					11					
		1	1	1						
Total Pump	ر ک :(Time (min	51	Total Purge V	l /olume (gal) :	~ 2.7		Reviewed by:	t.		
Weather:								11-	05.21	
Comments:								V		
1200					-					
Bottle	es Filled	Preservat	tive Codes:	A-NONE B-I	1NO3 C - H2S	04 D - NaOH	E-HCLE-			
			Preservative					Preservative		
Quantity	Size	Туре	Code	Filtered Y/N	Quantity	Size	Type	Code	Filtered Y/N	
1	120mc	I	Ĩ	N	d	1000nd	MULE	15	N	
i	1		A							
F F	Loom	1	L	5						15 ;;
Pump rate sho	ould be <500 mL/n	nin for low-flow a	nd <1 gal/min for	high Volume.						

Laboratory S	SELLEN OF			Consur Monitoring	mers Energy ( Well Samplin	Company ng Worksheet					
Well ID 87	1405	-	Date 10-2	0-21		Control Num	ber 21-128-	1-08			
Location	HC JH			Well Materia	il: 🗹 PVC	SS	Iron	Galv.	Steel		
Purge Meth	od:	Peristaltic		Submersible	Fultz Bailer						
Depth to Wa	ater Tape: G	stup	S/	N: 1065							
QC SAMPLE		MS/MSD	DUP-		Sonde ID:	11M	15H	19M	<b>2</b> 0G	21G	
Depth-to-wa	ater T/PVC (ft)	11.99	Depth-To-	Bottom T/PVC	(ft) 17.65	_	Completed b	y (67	4		
Time	рН	Temp	Sp Cond	DO	DO	ORP	Pump Rate	Water level	Turbidity	Notes	
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%		
heal	1	1	S	tablization para	meters for the	last three readin	gs		- 1		
1001	1.10	12.0	0.0 1	01	046	-111	200	12.06	1 17		
1465	6.96	12-7	30-5	1.6	0.80	16.9	200	12.06	5.61		
1468	2.20	12-8	410-1	040-11	0.41	136.9	2,00	12.06	3.12		
1413	5.24	12-8	25.4	3.6	0.58	149.5	200	12.06	2.2.5		
1418	5.16	18.8	21.4	0.50	0.30	166.0	800	12-06	4.21		
1923	5.19	12.7	24.5	9.6	0.28	174.0	200	12-06	4.3)		
14528	Sila	12.8	24.4	2.5	0.27	178.9	200	12.06	3.95		
1433	5-1	12.8	24.)	2.5	6.27	1855	200	,2.06	3.91		
1938	5.10	12.8	24.4	25	0.27	188.1	200	12.00	3.61		
1451					10000	1.1.1.1					
1504		-					-				
A. A. A.			-								
1.00					1200						
Fotal Pump T	'ime (min): 🏒	5063	Total Purge V	olume (gal)	rd Sgal		Reviewed by:	Y			
Weather:								11	5-21		
Comments:								v			
_	_								-		
Bottle	s Filled	Preserva	tive Codes:	A-NONE B-H	INO3 C - H250	04 D - NaOH E	- HCI F				
Quantity	Size	Туре	Preservative Code	Filtered Y/N	Quantity	Size	Type	Preservative Code	Filtered Y/N		
1	125ml	HAPPE	A	N	2	VOOme	ADPE	B	N		
1			B	2							
	260.1		8	Y,							
Dump rate cha	uld have 500 ml	nin for law flaws	A address for the	N link Volume				-			



# Appendix E Nature and Extent Data Summary



## **Technical Memorandum**

Date:	January 28, 2022
То:	Bethany Swanberg, Consumers Energy
From:	Sarah Holmstrom, TRC Kristin Lowery, TRC
Project No.:	418422.0000.0000
Subject:	2021 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)<sup>1</sup>.

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)<sup>2</sup> monitoring network.

<sup>&</sup>lt;sup>1</sup> TRC. 2019. Statistical Evaluation of Initial Assessment Monitoring Sampling Event, JH Campbell Pond A CCR Unit, Consumers Energy Company, West Olive, Michigan. January 14.

<sup>&</sup>lt;sup>2</sup> 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**

In addition to the existing HMP wells, TRC, on behalf of Consumers 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 2021 included shallow step-out wells in addition to wells and parameters monitored quarterly as part of the Pond A HMP. A summary of the nature and extent groundwater data collected in 2021 are provided on Table 1. 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).

To further delineate the extent of arsenic, Barr Engineering, on behalf of Consumers Energy, completed five soil borings (SB-21-01 to SB-21-05) to the south of Pond A from March 25 to March 26, 2021. A temporary stainless steel well screen (3 feet in length) was set two feet below the observed water table in each soil boring and grab groundwater samples were collected using a peristaltic pump. The results are consistent with other nature and extent data and show that arsenic concentrations are below the GWPS downgradient from Pond A – below the laboratory reporting limit of 1 ug/L at three of the five locations and equal to the reporting limit at the other two locations. The locations of the soil borings are shown in Figure 1. The soil boring logs and well construction diagrams are included in Attachment 1. The groundwater sample results are provided in Table 2.

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. This was further confirmed by the additional 2021 grab groundwater sampling data that shows arsenic is well below the GWPS at all five of the soil boring locations immediately downgradient from Pond A. 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.

# Tables

X:\WPAAM\PJT2\418422\0000\GMR\POND A\APPENDICES\APPX E\APPX E1 - TM418422.0.DOCX

# Table 1 Summary of Groundwater Sampling Results (Analytical): February 2021 - October 2021 JH Campbell Nature and Extent Wells – RCRA CCR Monitoring Program West Olive, Michigan

					Sample Location:	MW-14S				PZ-	23\$		PZ-24		
					Sample Date:	2/23/2021	4/14/2021	8/17/2021	10/21/2021	2/23/2021	4/14/2021	8/17/2021	10/21/2021	4/14/2021	10/20/2021
				MI Non-				•					•		•
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^										
Appendix III <sup>(1)</sup>															
Boron	ug/L	NC	500	500	7,200	< 20	< 20	24	< 20	34	23	44	25	177	181
Calcium	mg/L	NC	NC	NC	500 <sup>EE</sup>	2.39	2.15	2.01	2.16		7.64		6.19	26.8	16.9
Chloride	mg/L	250**	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	< 1.00	< 1.00	1.08	1.03		< 1.00		< 1.00	1.99	1.89
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000		< 1,000		< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250**	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	1.63	1.26	1.47	2.38		2.72		2.61	28.2	11.2
Total Dissolved Solids	mg/L	500**	500 <sup>E</sup>	500 <sup>E</sup>	500	35	35	37	57		43		42	282	126
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>⊨</sup>	6.5 - 9.0	5.4	5.5	5.58	5.47	6.8	6.4	6.86	6.67	6.9	7.23
Appendix IV <sup>(1)</sup>															
Antimony	ug/L	6	6.0	6.0	130	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	10	10	10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	2,000	2,000	820	11	10	11	11		< 5		< 5	20	12
Beryllium	ug/L	4	4.0	4.0	18	< 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
Chromium	ug/L	100	100	100	11	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1	1
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6		< 15		< 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
Lead	ug/L	NC	4.0	4.0	39	< 1	< 1	< 1	< 1		< 1		< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2		< 0.2		< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	3,200	< 5	< 5	< 5	< 5	6	5	7	6	7	14
Radium-226	pCi/L	NC	NC	NC	NC				< 0.158				< 0.186		< 0.254
Radium-228	pCi/L	NC	NC	NC	NC				< 0.402				0.521		0.628
Radium-226/228	pCi/L	5	NC	NC	NC				< 0.402				0.538		0.820
Selenium	ug/L	50	50	50	5.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Thallium	ug/L	2	2.0	2.0	3.7	< 2	< 2	< 2	< 2		< 2		< 2	< 2	< 2
Additional MI Part 115	(2)														
Iron	ug/L	300**	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	124	245	582	478						
Copper	ug/L	1,000**	1,000 <sup>E</sup>	1,000 <sup>E</sup>	15	< 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						
Vanadium	ug/L	NC	4.5	62	27	< 2	< 2	< 2	< 2	< 2		< 2			
Zinc	ug/L	5,000**	2,400	5,000 <sup>E</sup>	190	< 10	< 10	< 10	< 10						

#### Notes:

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

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

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

NC - no criteria; -- - not analyzed.

\* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020.

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

- ^ Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using site-specific hardness of 180 mg CaCO3/L as measured at surface water sample SW-01 collected on April 9, 2018 from the Pigeon River. Chromium GSI criterion based on hexavalent chromium per footnote {H}.
- # If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway per Michigan Part 201 and MDEQ policy and procedure 09-014 dated June 20, 2012.

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

40 CFR Part 257 Appendix III Detection Monitoring Constituents and Appendix IV Assessment Monitoring Constituents.
 Per Michigan Part 115 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.
 BOLD value indicates an exceedance of one or more of the listed criteria.

RED value indicates an exceedance of the MCL.

# Table 1 Summary of Groundwater Sampling Results (Analytical): February 2021 - October 2021 JH Campbell Nature and Extent Wells – RCRA CCR Monitoring Program West Olive, Michigan

					Sample Location:	PZ-24S			PZ	-40		PZ-40S			
					Sample Date:	2/23/2021	4/14/2021	8/17/2021	10/20/2021	4/14/2021	10/20/2021	2/23/2021	4/14/2021	8/17/2021	10/20/2021
				MI Non-								-			
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^										
Appendix III <sup>(1)</sup>															
Boron	ug/L	NC	500	500	7,200	< 20	< 20	25	< 20	211	245	< 20	< 20	< 20	< 20
Calcium	mg/L	NC	NC	NC	500 <sup>EE</sup>	2.65	2.11	2.70	3.61	10.6	7.58	1.67	1.35	1.73	1.75
Chloride	mg/L	250**	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	< 1.00	< 1.00	1.05	< 1.00	7.33	4.37	< 1.00	< 1.00	1.11	1.64
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250**	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	2.22	2.14	3.09	3.85	13.5	9.63	1.70	2.17	1.92	2.05
Total Dissolved Solids	mg/L	500**	500E	500 <sup>E</sup>	500	51	40	37	46	90	60	45	45	46	37
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>⊑</sup>	6.5 - 9.0	5.4	5.6	5.27	5.58	6.3	6.23	4.9	5.2	4.97	5.1
Appendix IV <sup>(1)</sup>															
Antimony	ug/L	6	6.0	6.0	130	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Arsenic	ug/L	10	10	10	10	< 1	< 1	1	2	< 1	< 1	< 1	< 1	< 1	< 1
Barium	ug/L	2,000	2,000	2,000	820	27	23	32	20	16	12	16	16	26	27
Beryllium	ug/L	4	4.0	4.0	18	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cadmium	ug/L	5	5.0	5.0	3.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	0.2	< 0.2	< 0.2	< 0.2
Chromium	ug/L	100	100	100	11	2	1	2	2	< 1	< 1	2	1	1	1
Cobalt	ug/L	NC	40	100	100	< 6	< 6	< 6	< 6	< 15	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Lead	ug/L	NC	4.0	4.0	39	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Lithium	ug/L	NC	170	350	440	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Mercury	ug/L	2	2.0	2.0	0.20#	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Molybdenum	ug/L	NC	73	210	3,200	< 5	< 5	< 5	< 5	< 5	6	< 5	< 5	< 5	< 5
Radium-226	pCi/L	NC	NC	NC	NC				0.340		< 0.159				< 0.219
Radium-228	pCi/L	NC	NC	NC	NC				< 0.653		< 0.441				< 0.495
Radium-226/228	pCi/L	5	NC	NC	NC				< 0.653		0.541				< 0.495
Selenium	ug/L	50	50	50	5.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	<1	< 1
Ihallium	ug/L	2	2.0	2.0	3.7	<2	<2	<2	< 2	<2	< 2	< 2	<2	<2	<2
Additional MI Part 115	5 <sup>(2)</sup>														
Iron	ug/L	300**	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	451	359	768	1,170			710	959	1,390	476
Copper	ug/L	1,000**	1,000 <sup>E</sup>	1,000 <sup>E</sup>	15	1	< 1	1	< 1			3	4	1	< 1
Nickel	ug/L	NC	100	100	86	< 2	< 2	< 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	< 0.2	< 0.2
Vanadium	ug/L	NC	4.5	62	27	2	2	3	5			< 2	< 2	< 2	< 2
Zinc	ug/L	5,000**	2,400	5,000 <sup>E</sup>	190	< 10	< 10	< 10	< 10			< 10	< 10	< 10	< 10

#### Notes:

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

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

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

NC - no criteria; -- - not analyzed.

\* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020.

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

- ^ Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using site-specific hardness of 180 mg CaCO3/L as measured at surface water sample SW-01 collected on April 9, 2018 from the Pigeon River. Chromium GSI criterion based on hexavalent chromium per footnote {H}.
- # If detected above 0.20 ug/L, further evaluation of low-level mercury may be necessary to evaluate the GSI pathway per Michigan Part 201 and MDEQ policy and procedure 09-014 dated June 20, 2012.

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

40 CFR Part 257 Appendix III Detection Monitoring Constituents and Appendix IV Assessment Monitoring Constituents.
 Per Michigan Part 115 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported.
 BOLD value indicates an exceedance of one or more of the listed criteria.

RED value indicates an exceedance of the MCL.

# Table 1 Summary of Groundwater Sampling Results (Analytical): February 2021 - October 2021 JH Campbell Nature and Extent Wells – RCRA CCR Monitoring Program West Olive, Michigan

					Sample Location:		TW-19-04A			TW-19-05		TW-19-06A		
					Sample Date:	4/14/2021	8/17/2021	10/20/2021	4/14/2021	8/17/2021	10/20/2021	4/14/2021	8/18/2021	10/20/2021
				MI Non-			·	•	-					
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^									
Appendix III <sup>(1)</sup>														
Boron	ug/L	NC	500	500	7,200	1,780	2,000	1,830	107	122	186	138	185	174
Calcium	mg/L	NC	NC	NC	500 <sup>EE</sup>	63.8	67.7	74.3	57.9	54.8	66.8	22.1	25.6	27.6
Chloride	mg/L	250**	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	2.42	8.49	2.93	4.77	2.21	8.39	< 1.00	< 1.00	< 1.00
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
Sulfate	mg/L	250**	250 <sup>E</sup>	250 <sup>E</sup>	500 <sup>EE</sup>	27.6	26.5	50.3	25.8	19.9	42.9	13.8	11.7	11.5
Total Dissolved Solids	mg/L	500**	500E	500 <sup>E</sup>	500	276	322	352	264	219	320	106	128	125
pH, Field	SU	6.5 - 8.5**	6.5 - 8.5 <sup>E</sup>	6.5 - 8.5 <sup>⊾</sup>	6.5 - 9.0	6.7	7.27	6.96	6.9	7.19	7.32	6.9	7.64	7.3
Appendix IV <sup>(1)</sup>														
Antimony	ug/L	6	6.0	6.0	130	2	3	3	2	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	91	110	136	18	19	28	6	7	7
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	0.3	< 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	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Fluoride	ug/L	4,000	NC	NC	NC	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000	< 1,000
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	15	20	20	20	24	23	< 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	96	86	72	< 5	< 5	6	30	24	16
Radium-226	pCi/L	NC	NC	NC	NC			0.338			< 0.177			< 0.188
Radium-228	pCi/L	NC	NC	NC	NC			< 0.435			< 0.399			< 0.456
Radium-226/228	pCi/L	5	NC	NC	NC			0.684			< 0.399			0.477
Selenium	ug/L	50	50	50	5.0	210	146	293	18	16	26	16	12	< 1
Thallium	ug/L	2	2.0	2.0	3.7	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Additional MI Part 115	(2)													
Iron	ug/L	300**	300 <sup>E</sup>	300 <sup>E</sup>	500,000 <sup>EE</sup>	< 20	< 20	130	< 20	29	123	125	332	245
Copper	ug/L	1,000**	1,000E	1,000 <sup>E</sup>	15	< 1	< 1	< 1	2	2	2	< 1	< 1	< 1
Nickel	ug/L	NC	100	100	86	< 2	< 2	< 2	< 2	3	< 2	< 2	< 2	< 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 <sup>E</sup>	190	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10

### Notes:

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

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

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

NC - no criteria; -- - not analyzed.

\* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020.

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

^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using site-specific hardness of 180 mg CaCO3/L as measured at surface water sample SW-01 collected on April 9, 2018 from the Pigeon River. Chromium GSI criterion based on hexavalent chromium per footnote {H}.

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

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

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

(2) Per Michigan Part 115 Amendments - Public Act No. 640 of 2018 Section 11511a(3)(c) and 11519b(2) additional detection

monitoring constituents (iron) and assessment monitoring constituents (copper, nickel, silver, vanadium, and zinc) are reported. **BOLD** value indicates an exceedance of one or more of the listed criteria.

RED value indicates an exceedance of the MCL.

# Table 2Summary of Groundwater Sampling Results (Analytical): March 2021JH Campbell Nature and Extent Grab Groundwater Samples – RCRA CCR Monitoring Program<br/>West Olive, Michigan

					Sample Location:	SB-21-01	SB-21-02	SB-21-03	SB-21-04	SB-21-05
					Sample Date:	3/26/2021	3/25/2021	3/25/2021	3/25/2021	3/25/2021
				MI Non-						·
Constituent	Unit	EPA MCL	MI Residential*	Residential*	MI GSI^					
Arsenic	ug/L	10	10	10	10	1	< 1	< 1	< 1	1
Boron	ug/L	NC	500	500	7,200	103	513	590	294	313
Calcium	ug/L	NC	NC	NC	5.0E+05 <sup>EE</sup>	134,000	41,200	33,300	44,100	73,800
Chloride	ug/L	2.50E+05**	2.50E+05	2.50E+05	5.0E+05 <sup>EE</sup>	5,980	8,540	13,500	16,200	17,600
Chromium	ug/L	100	100	100	11	1	< 1	1	1	1
Iron	ug/L	300**	300 <sup>E</sup>	300 <sup>E</sup>	5.0E+05 <sup>EE</sup>	765	292	210	241	418
Lithium	ug/L	NC	170	350	440	19	< 10	< 10	< 10	11
Molybdenum	ug/L	NC	73	210	3,200	20	16	19	12	9
Selenium	ug/L	50	50	50	5.0	24	21	2	8	76
Sulfate	ug/L	2.50E+05**	2.50E+05	2.50E+05	5.0E+05 <sup>EE</sup>	295,000	105,000	69,900	96,300	129,000
Total Dissolved Solids	mg/L	500**	500	500	500	776	241	224	271	421
Vanadium	ug/L	NC	4.5	62	27	< 2	< 2	< 2	< 2	12

#### Notes:

ug/L - micrograms per liter.

mg/L - milligrams per liter.

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

NC - no criteria.

\* - Michigan Part 201 Generic Drinking Water Cleanup Criteria, December 21, 2020.

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

^ - Michigan Part 201 Groundwater Surface Water Interface (GSI) Criteria. Hardness-dependent criteria calculated using site-specific hardness of 180 mg CaCO3/L as measured at surface water sample SW-01 collected on April 9, 2018 from the Pigeon River. Chromium GSI criterion based on hexavalent chromium per footnote {H}.

<sup>E</sup> - Criterion is the aesthetic drinking water value per footnote {E}.

 $^{\mbox{\scriptsize EE}}$  - Criterion is based on the total dissolved solids GSI value per footnote {EE}.

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

**RED** value indicates an exceedance of the MCL.

# Figure



Coordinate System: NAD 1983 StatePlane Michigan South FIPS 2113 Feet Map Rotation:

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- 1/2 N/S MONITORING WELL
- DOWNGRADIENT BOTTOM ASH POND 3 N/S MONITORING WELL
- DOWNGRADIENT LANDFILL MONITORING WELL
- PIEZOMETER 2021
- DOWNGRADIENT POND A MONITORING WELL
- MONITORING WELL (STATIC WATER LEVEL ONLY)
- DECOMMISSIONED MONITORING WELL

NEW DOWNGRADIENT BOTTOM ASH POND 1/2 N/S MONITORING WELL (2018) NEW DOWNGRADIENT BOTTOM ASH POND 3 N/S MONITORING WELL (2018)

- + DOWNGRADIENT MONITORING WELLS
- STAFF GAUGE
- TEMPORARY WELL



2021 GRAB GROUNDWATER SAMPLE

#### . ♦ ♦

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

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APPROVED BY:	S. HOLMSTROM		FIGU	RF 1
DATE:	JANUARY 2022			
<b>۲ (</b>	RC		An	1540 Eisenhower Place n Arbor, MI 48108-3284 Phone: 734.971.7080 www.trccompanies.com
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# Appendix F Semiannual Progress Report



January 30, 2022

Subject: Semiannual Progress Report - Selection of Remedy JH Campbell Ponds 1-2 North and 1-2 South 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: Ponds 1-2 and Pond A. Based on the schedule of selfimplementation 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 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
Ponds 1-2	Arsenic	2 of 5

Subsequently, the Assessment of Corrective Measures Report (TRC, September 2019) was completed on September 11, 2019 for Ponds 1-2 and Pond A.

Semi-annual progress reports have been made available on the CE public-facing website. This is the fifth semi-annual update.

**Environmental Services** 



# **Assessment Activities**

## Ponds 1-2

Consumers Energy has performed CCR removal at 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 Ponds 1-2 based on multiple lines of evidence described in the approved closure work plan.

Consumers Energy continues to monitor Ponds 1-2 semiannually for Appendix III and IV constituents. Since the cessation of hydraulic loading and removal of CCR at the unit, groundwater flow direction has changed significantly and JHC-MW-15002 and JHC-MW-15003 are no longer downgradient of the former CCR unit. They will continue to be sampled as part of the assessment monitoring program to evaluate groundwater quality post-CCR removal while the use of these wells in the groundwater monitoring system is re-evaluated.

Consumers Energy conducted the first semiannual assessment monitoring event of 2021 at Ponds 1-2 on April 12 through 14, 2021 in accordance with the Sample Analysis Plan for JH Campbell Bottom Ash Ponds 1-2 and Pond 3 (SAP) (TRC, January 2021). As discussed in the Statistical Evaluation of April 2021 Assessment Monitoring Sampling Event technical memorandum (TRC, July 30, 2021) the results indicated a new statistically significant level (SSL) above the GWPS for selenium at JHC-MW-15005. The new SSL above the GWPS for selenium at JHC-MW-15005 resulted from increases in concentrations observed after the cessation of hydraulic loading at Ponds 1-2 in 2018 and an associated change in local groundwater flow. TRC developed an Alternate Source Demonstration (ASD) for the new SSL in accordance with §257.95(g)(3)(ii). The multiple lines of evidence presented in the ASD show that the SSL is from a source other than Ponds 1-2. The alternate source was determined to be a system of closed, pre-existing units licensed under Michigan solid waste rules which are adjacent to Ponds 1-2. The closed, pre-existing units are not regulated under the CCR Rule, but remedial action is being taken under Consent Agreement WMRPD No. 115-01-2018. A remedial action plan (RAP) was submitted to EGLE on September 30, 2021.

### 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, six 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.

The arsenic exceedance at JHC-MW-15011 which initially triggered corrective action continues to attenuate after reaching an apparent local maximum in late 2019, immediately following the completion of the final cover for Pond A. The arsenic concentration at JHC-MW-15011R decreased to below the GWPS in third and fourth quarter 2021 and the lower confidence limit for JHC-MW-15011/R was below the GWPS in third and fourth quarter 2021.

Nature and extent near Pond A was further characterized in March 2021 by collecting soil borings and grab groundwater samples immediately downgradient of Pond A. Details of the data collected are included in Appendix E of the *2021 Annual Groundwater Monitoring and Corrective Action Report* (TRC, January 2022) to which this progress report is also appended. Arsenic was below the GWPS (10 ug/L) at all five locations and was not detectable at a reporting limit of 1 ug/L at three of the five locations.

Increases in Appendix III constituents (e.g. boron) and direct exceedances of the selenium GWPS in JHC-MW-15011, JHC-MW-15010, JHC-MW-15009, and JHC-MW-15008R that have not yet resulted in a statistically significant exceedance suggest a detectable influence from the immediately adjacent, upgradient, closed, pre-existing CCR units on-site. The closed, pre-existing units are not regulated under the RCRA CCR Rule, but remedial action is being taken under Consent Agreement WMRPD No. 115-01-2018. A RAP for these units was submitted to EGLE on September 30, 2021.

## Conclusions

### Ponds 1-2

Changing constituent concentrations indicate that the system is establishing a new equilibrium following source removal. Nature and extent sampling results suggest that the GWPS exceedances do not pose an immediate threat to human health or the environment.



The ASD performed for JHC-MW-15005 demonstrates the influence of immediately adjacent, closed, pre-existing units not regulated by the CCR Rule on at least one well in the downgradient groundwater monitoring network developed for Ponds 1-2. Consumers Energy is re-evaluating the well network for Ponds 1-2 to account for the influence from the closed, pre-existing units. Continued monitoring at Ponds 1-2 is appropriate to understand the new geochemical equilibrium being established at the former unit and the influence from the adjacent alternate source.

### Pond A

Arsenic at JHC-MW-15011/R continues to attenuate. The last two quarters of sampling at JHC-MW-15011R were below the GWPS. Nature and extent sampling data indicate that arsenic is not detected above the GWPS immediately downgradient from Pond A.

Groundwater monitoring data since the installation of the final cover indicate an observable influence from immediately adjacent, upgradient, closed, pre-existing units. Remedial action for the upgradient units is being taken under Consent Agreement WMRPD No. 115-01-2018.

## **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.

At Ponds 1-2, continued monitoring and a re-evaluation of the well network is appropriate to account for the changed groundwater flow and equilibrium established following the primary corrective action and to evaluate the influence of the alternate source on constituent concentrations in the Ponds 1-2 well network.

Arsenic continues to attenuate at Pond A following dewatering and the installation of the final cover. Groundwater monitoring data since the implementation of the primary corrective actions indicate an observable influence from immediately adjacent, upgradient, closed, pre-existing units. A formal demonstration of this influence is being developed in 2022.

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 14, 2019. Notification of Appendix IV Constituent Exceeding Groundwater Protection Standard per §257.95(g), 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.

Golder Associates. October 2016. JH Campbell Generating Facility Pond A Closure Plan, West Olive, Michigan. Prepared for Consumers Energy Company.

Golder Associates. January 2018. JH Campbell Generating Facility Bottom Ash Ponds 1-2 Closure Plan, West Olive, Michigan. Prepared for Consumers Energy Company.

TRC Environmental Corporation. January 2022. 2021 Annual Groundwater Monitoring and Corrective Action Report, JH Campbell Power Plant, Pond A CCR Unit. Prepared for Consumers Energy Company.

TRC Environmental Corporation. January 2021. Sample Analysis Plan for JH Campbell Bottom Ash Ponds 1-2 and Pond 3. Prepared for Consumers Energy Company.

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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