



January 21, 2019

Reference No. 012607

Distributed via E mail

Mr. Greg Rudloff
U.S. Environmental Protection Agency, Region 5
Land and Chemicals Division
77 West Jackson Blvd., LU 9J
Chicago, Illinois 60604 3590

Dear Mr. Rudloff:

**Re: 2nd 2018 Semi Annual Progress Report
Performance Based Administrative Order on Consent
Docket Number RCRA 05 2011 0025
13000 Eckles Road Site, Livonia, Michigan
USEPA ID No. MID 005 356 621**

In accordance with the Performance Based Administrative Order on Consent between the U.S. Environmental Protection Agency Region 5 (USEPA) and Revitalizing Auto Communities Environmental Response Trust (RACER), please find the attached progress report for the 2nd half of 2018 (July 1, 2018 through December 31, 2018).

Please contact Grant Trigger or Jeff Crum (regarding AOI 31 vapor intrusion pathway monitoring matters), or Dave Favero or myself (regarding system operation and Area 1 groundwater matters) if you would like to discuss further. Thank you.

Sincerely,

GHD

A handwritten signature in blue ink, appearing to read "CJM", followed by a horizontal line.

Christopher J. Meincke, P.E.

CJM/25/ds/Det.

Attachment A: 2nd Semi Annual 2018 Progress Report

cc: Grant Trigger, RACER
Dave Favero, RACER
Richard Conforti, MDEQ
Jeff Crum, Hamp, Mathews & Associates
Livonia Civic Center Library



ATTACHMENT A
2nd SEMI-ANNUAL 2018 PROGRESS REPORT
PERFORMANCE-BASED ADMINISTRATIVE ORDER ON CONSENT
13000 ECKLES ROAD SITE, LIVONIA, MICHIGAN
July 1, 2018 to December 31, 2018

1. Description of Work Completed

- Continued operation of the Area 1 French Drain Collection Trench and Groundwater Treatment system (GWTP). The Groundwater Treatment System was shut down for approximately 1 week at the beginning of July for the July 4th holiday and 1 week at the end of December for the Christmas holiday. The Great Lakes Water Authority (GLWA) has been updated on shutdowns. During the second half of 2018 the system has collected and treated 3,842,508 gallons of groundwater. Monthly discharge totals are presented in Table 1.
- Submitted the 1st Semi-Annual 2018 Progress Report dated July 25, 2018 to USEPA.
- Installed and evaluated soil boring physical parameter data and collected soil and groundwater samples from temporary wells July 2018 at AOI 31 Home 6 property (37800 Grantland) to support design elements of Pilot Study for potential remediation of TCE-impacted groundwater at off-site locations.
- Refined conceptual site model (CSM) through development of several geological cross-sections during August and September 2018 to facilitate design of a Pilot Study for TCE groundwater remediation off-site.
- Submitted a Response to Comments on the Area 1 PRG Work Plan on September 21, 2018.
- Submitted GWTP influent and effluent perfluorinated compounds (PFAS) results to GLWA in a Semi-Annual Report dated September 28, 2018 and met with GLWA to discuss the status of the GWTP and Site activities on October 9, 2018.
- Submitted a request to GLWA dated October 18, 2018 to modify the treatment processes in the GWTP based on influent concentrations of nickel and chromium below GLWA Special Discharge Permit effluent limits. Received approval from GLWA to modify the GWTP processes in a letter dated October 22, 2018. A clarification letter was submitted to GLWA on October 25, 2018. Modified operation of the GWTP (eliminated chemical use/pH adjustment) on December 3, 2018.
- Submitted a draft summary of potential treatment alternatives to address PFAS-impacted groundwater to USEPA on October 28, 2018.
- Collected groundwater samples from Area 1 monitoring wells October 29 and 30, 2018 as part of the approved GMP activities.



- Installed Pilot Study pumping test monitor wells and performed pumping testing of wells October 2018 at Home 6 property (37800 Grantland). Evaluated pumping test results and further refined the subsurface CSM November 2018 to support designing a Pilot Study for in-situ TCE groundwater remediation.
- Conducted a meeting with USEPA to discuss Corrective Action O&M activities, Area 1 Remediation activities, AOI 31 Vapor Intrusion (VI) Pathway sampling strategy, and the 2019 scope and budget request on November 1, 2018. An additional meeting was conducted on November 1, 2018 to update USEPA Region V on PFAS-related investigations at RACER Michigan Sites.
- Submitted a Proposed Scope of Work for an Additional Permeable Reactive Gate Treatability Study date November 14, 2018 to USEPA to evaluate treatment alternatives for PFAS-impacted groundwater. USEPA provided approval to initiate the Treatability Study via email on November 26, 2018.
- Collected groundwater samples from AOI 31 Groundwater Monitoring Plan (GMP) monitoring wells and four newly installed monitoring wells October 2018 and November 2018.
- Collected soil vapor and subslab Vapor Pin® samples from AOI 31 properties/homes in November and December 2018. Completed evaluation of soil vapor results.
- Submitted 2019 Annual Environmental Budget Request to USEPA on December 4, 2018 and received USEPA approval on December 6, 2018.
- Attended a meeting hosted by GLWA on December 5, 2018 to discuss industrial contributions of PFAS to the sanitary sewer system.
- New property owner installed a liner in the 72" storm sewer line present immediately south of the southern alignment of the Area 1 barrier wall during October and November 2018.
- Continued development of a scope of work for installing and operating a Pilot Groundwater In-Situ Remediation of TCE at off-site locations.
- Continued evaluation of potential cost savings to decrease OM&M costs associated with the Area 1 Groundwater Collection and Treatment System, including monitoring the influent for reductions in chromium and nickel concentrations as a result of the targeted or full scale ISCR injections.
- Submitted a Request to Temporarily Cease Operations of the GWTP and evaluate groundwater elevation dated December 18, 2018 to USEPA. USEPA provided approval to temporarily cease operations via email on December 18, 2018. Groundwater elevation monitoring devices were installed in select monitoring wells and GWTP operations were temporarily ceased on December 20, 2018.



2. Data Collected

- Groundwater sample results associated with the Area 1 GMP sampling event from Area 1 monitoring wells are included on Figure 1 and in Table 2. Groundwater sample results associated with the AOI 31 GMP sampling event from the AOI 31 monitoring wells are included on Figure 2 and in Table 3.
- AOI 31 long-term soil vapor and Vapor Pin® monitoring results will be submitted under separate cover. (Results do not indicate a need for additional VI risk mitigation at this time)
- AOI 31 Pilot Study soil physical parameters, and soil and groundwater sample results will be submitted under separate cover.

3. Problems Encountered

- Off-site Area 1 monitoring well MW-OS-6D was not able to be located during the annual GMP Sampling Event in December 2018 and appears to have been destroyed.
- Off-site AOI 31 soil vapor monitoring well SG-1 was not able to be located during the annual long-term soil vapor monitoring event performed during November and December 2018.

4. Estimated Percent Complete and Information Summary for Selected Activities

- O&M of the Groundwater Pump & Treat System (GWTP, Barrier Wall, Cover) 33%
Continued operation of the Area 1 French Drain Collection Trench and Groundwater Treatment system. Submitted appropriate discharge reports as per the Special Discharge Permit. (Percent complete estimated as 9 years complete of 27 years estimated in the May 2010 RCES.)
- Long-Term Groundwater Monitoring On-going 75%
Long-Term Groundwater Monitoring Plan proposed 5 years of monitoring to verify continued stability/reduction in off-Site/boundary concentrations (anticipated completion 2006 through 2010). Sampling activities are currently planned to continue pending USEPA approval to cease monitoring.
- Maintenance of the AOI 39 Dust Control Plan 100%
- Restrictive Covenants 100%
Prepared a revised Declaration of Restrictive Covenant (DRC) and Termination Agreement for the existing 2007 DRC and submitted to USEPA on June 25, 2015. Recorded final DRC and Termination Agreement on August 26, 2015.



- Vapor Intrusion Investigation 100%

Vapor Intrusion Investigation has been completed and subsequent mitigation has been implemented at one residence, and a VI pathway sampling plan downgradient of previously investigated homes has been approved and is being implemented. See AOI 31 below for additional activities.

- Installation of Vapor Mitigation System (Home 8: 37780 Grantland St.) 100%

Installation completed and system operational at Home 7 since September 2012.

Installation completed January 2018 and system operational at Home 8, 37750 Grantland St.

- O&M and Performance Monitoring of Vapor Mitigation System On-going

System performance monitoring is being implemented at pre-scheduled time periods, though some delay in the schedule occurred due to home foreclosure and achieving contact with new homeowners. Latest system performance monitoring completed December 2017.

- Pilot Tests - Alternative Chemicals & Target In-Situ Treatment Injection 100%

Objective was to design, implement, and evaluate a pilot test to use alternative chemicals in the wastewater treatment process that could reduce treatment system operating time and/or operating costs. Also, design and implement an in-situ stabilization treatment in Area 1 that could also reduce treatment system operating time and long-term monitoring duration.

The Area 1 field pilot test was conducted in November and December 2010. Based on an evaluation of the pilot test results, additional pilot study injection and monitoring activities were recommended to determine if full-scale on-site implementation would significantly reduce dissolved concentrations of chromium and nickel and allow for the groundwater treatment plant activities to be reduced or eliminated.

The groundwater treatment plant optimization activities have not been conducted due to health and safety concerns associated with handling, storing, and mixing the proposed replacement chemicals.

Additional cost and remedial alternative evaluations were performed in 2013. Additional Area 1 Characterization activities have been implemented. A laboratory treatability study was performed using site groundwater to evaluate the effectiveness of utilizing a permeable reactive barrier wall (PRB) with zero valent iron (ZVI) to treat Area 1 groundwater if the existing groundwater collection and treatment system operations are ceased. Groundwater modeling activities were also performed to evaluate the optimal location and number of PRBs and the effects on groundwater flow inside and outside of the Area 1 Barrier Wall.

An additional field pilot test injection was completed in November 2013 and monitoring activities were completed through October 2014 with an additional Pilot Injections in the



northern portion of the Area 1 chromium and nickel-impacted groundwater plume proposed in the 2015 Annual EA Budget Request.

Additional expanded pilot study injections were completed in May through June of 2015 including the injection of sodium sulfide, sodium dithionite, or a combination of the two in 83 injections points in the northern portion of the Area 1 chromium and nickel-impacted groundwater plume. Groundwater monitoring concluded in December 2015. An Area 1 ISCR Pilot Study Summary Report was submitted in January 2016.

- Groundwater Treatment System Decommissioning & Removal 0%
Anticipated to be completed in 2037 per May 2010 RCES but could be completed in 2018 or 2019 if the implemented ISCR and proposed Permeable Reactive Gate remedies are successful.
- Completion Report & Well Abandonment 0%
Anticipated to be completed in 2037 per May 2010 RCES.
- AOI 31 40%

A Long-Term VI Pathway Monitoring Work Plan was approved which included a minimum two years of semi-annual/annual soil vapor and groundwater sample collection to evaluate groundwater plume stability, downgradient extent of the groundwater and soil vapor TCE plume, and spatial and temporal variability in TCE soil vapor concentrations. The first semi-annual event was conducted in June 2016. Based on the results of the first event, additional groundwater delineation activities (Phase I Geoprobe®) were completed during the 1st Quarter of 2017 to further delineate TCE and TCA groundwater plumes and concentrations to determine if modifications are needed to the VI pathway monitoring plan, or if response actions are needed to mitigate potential unacceptable VI risk. Additional permanent monitoring wells and soil vapor probes were installed in June 2017 and were sampled in July 2017. Home 1 and Home 8 subslab soil vapor probes were resampled in December 2017. Soil vapor and Vapor Pin samples were collected November/December 2018. Preparation of a Long-Term VI pathway risk summary report of the VI sampling results from 2016 through 2018 will continue during the first half of 2019.

Groundwater and soil diagnostic sample data were collected June and October 2018 to assist design of a Pilot In-Situ Groundwater Remediation of the TCE plume to lessen vapor intrusion pathway risk assessment activities in the future at homes downgradient of the current plume's extent. A scope of work for the Pilot In-Situ Remediation of TCE at AOI 31 is being prepared.

- Area 1 Remedial Implementation 50%
A request to perform Targeted Area 1 ISCR Injections was submitted to USEPA in April 2016 and approved by USEPA on May 18, 2016. Targeted injections were implemented in August 2016. An Area 1 Full Scale ISCR Work Plan was submitted to USEPA in April 2016



and approved by USEPA on May 18, 2016. Implementation of the work plan activities began September 2016. ISCR injections were completed in November 2016. Performance groundwater monitoring following the ISCR injections was completed in January 2017 and April/May 2017.

An Area 1 Permeable Reactive Gate Evaluation report was submitted to USEPA in September 2017 proposing to install a permeable reactive gate (PRG) along a portion of the eastern alignment of the Area 1 Barrier Wall, to allow groundwater to exit the area surrounded by the barrier wall while being passively treated. An Area 1 Permeable Reactive Gate Work Plan was submitted to USEPA in April 2018. Comments received from USEPA were addressed and the presence of PFAS-impacted groundwater is currently being evaluated.

Follow-up targeted injections were conducted in December 2017 along the south and southern eastern alignments of the Area 1 Barrier Wall (in the vicinity of French drain collection trench and proposed PRG location, where injections had not previously been conducted. Follow-up groundwater monitoring activities were completed in January 2018 and May 2018.

- PFAS Site Characterization 75%
Initial groundwater samples were collected during 2017/2018 to evaluate the potential presence of PFAS-impacted groundwater at the Site. PFAS has been detected in groundwater samples within the former Plating Area and GWTP influent/effluent samples at concentrations greater than the USEPA's 2016 Lifetime Health Advisory of 70 ng/L for PFOA and PFOS. Additional characterization is proposed in 2019 to delineate horizontal and vertical extents of PFAS-impacted groundwater within Area 1, and how it may impact the proposed installation of the Area 1 PRG.
- PFAS Remedy/Interim Measure Evaluation 25%
Potential remedial alternatives to address PFAS-impacted groundwater within Area 1 have been reviewed, summarized and continue to be evaluated.
- PFAS Pilot Tests 5%
A USEPA Proposed Scope of Work for a laboratory treatability study has been initiated to evaluate several media to determine their effectiveness treating PFAS-impacted groundwater.
- PFAS Remedy/Interim Measure Design 0%
Anticipated to be completed following the conclusion of the Laboratory Treatability Study, if applicable.
- PFAS Remedy/Interim Measure Implementation 0%
Anticipated to be completed following the conclusion of the PFAS Remedy/Interim Measure Design task, if applicable.



5. Summary of Contacts with Interested Parties

- Coordination with redevelopment activities continues as necessary.
- Residents are updated on a one-on-one basis to maintain privacy of VI pathway risk evaluations at their homes.

6. Changes in Personnel

- None

7. Projected Work for Next Reporting Period (January 2019 through June 2019)

- Conduct a semi-annual soil vapor and groundwater sampling event according to USEPA approved Long-Term Vapor Intrusion Pathway Monitoring Work Plan or as otherwise approved by USEPA.
- Prepare a 2016-2018 summary report of the Long-Term Vapor Intrusion Pathway investigations for submittal to USEPA.
- Continue to monitoring groundwater elevations and operation of the Area 1 French Drain Collection Trench and Groundwater Treatment system, as required.
- Install additional monitoring wells and collect groundwater samples from select Area 1 monitoring wells to evaluate the presence of PFAS and evaluate impacts of PFAS concentrations on the French Drain Collection Trench, Groundwater Treatment system, and proposed Permeable Reactive Gate.
- Continue evaluation of potential cost savings to decrease OM&M costs associated with the Area 1 Groundwater Collection and Treatment System including evaluating results of the full scale and targeted ISCR injections.
- Meet individually with AOI 31 off-site residents to update them on the VI pathway risk conditions and basis for performing a Pilot Study of In-Situ Groundwater Remediation of the TCE plume.
- Continue to work toward installation and operation of Pilot In-Situ Groundwater Remediation system for the TCE plume to mitigate future VI pathway monitoring for off-site AOI 31 receptors.
- Conduct a vapor mitigation system performance evaluation at 37780 Grantland Street (Home 7) and 37750 Grantland Street (Home 8).
- Continue support of redevelopment activities.



- Prepare summaries of meetings, data reviews, or conference calls with USEPA, as appropriate.
- Prepare the 2nd 2018 Semi-Annual Progress Report.

Attachments: Figure 1 – Area 1 GMP Groundwater Sample Results
Figure 2 – AOI 31 GMP Groundwater Sample Results
Table 1 – Summary of Monthly Groundwater Treatment Plant Discharge Volume
Table 2 – Area 1 GMP Groundwater Sample Results
Table 3 – AOI 31 GMP Groundwater Sample Results

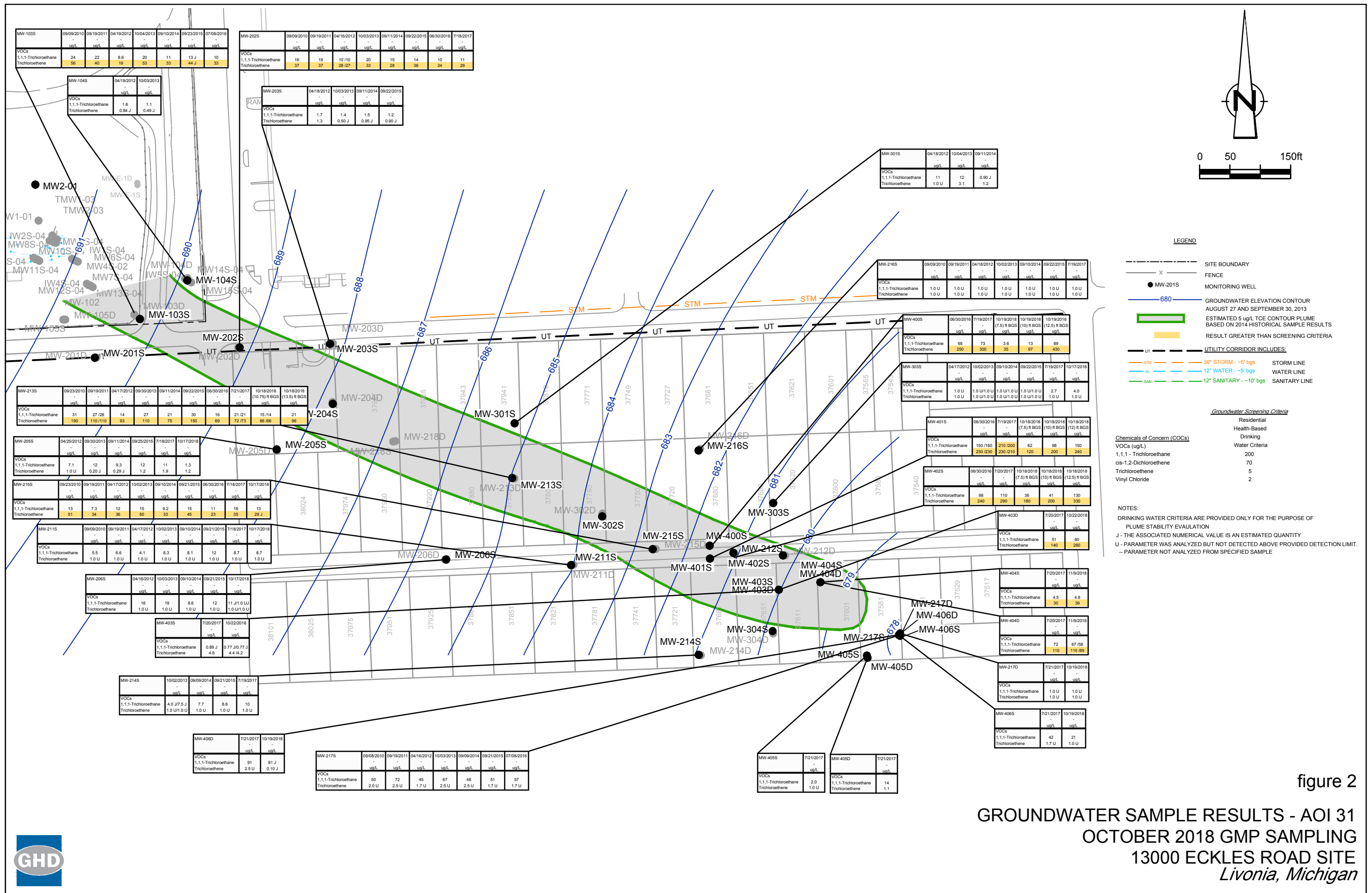


figure 2
GROUNDWATER SAMPLE RESULTS - AOI 31
OCTOBER 2018 GMP SAMPLING
13000 ECKLES ROAD SITE
Livonia, Michigan



TABLE 1

January 2019

Page 1 of 1

**SUMMARY OF MONTHLY GROUNDWATER TREATMENT PLANT DISCHARGE
AREA 1 - FORMER PLATING AREA
ECKLES ROAD SITE
LIVONIA, MICHIGAN**

Monthly GWTP Discharge Volume (Gallons)	
Month	
July 2018	732,406
August 2018	655,810
September 2018	651,176
October 2018	636,826
November 2018	710,292
December 2018	455,998
Total July 2018 to December 2018 Discharge	3,842,508

Table 2

Analytical Results of Groundwater Samples
2018 Groundwater Monitoring Plan Sampling - Area 1
Eckles Road Site
Livonia, Michigan

Area:		MDEQ Generic	Area 01	Area 01	Area 01	Area 01	Area 01	Area 01
Sample Location:		Groundwater Cleanup Criteria	HA-14	HA-14	HA-16	MW-OS-4D	MW-OS-4S	MW-OS-5D
Sample Identification:		Residential	GW-12607-102918-SK-002	GW-12607-102918-SK-003	GW-12607-102918-SK-004	GW-12607-102918-SK-005	GW-12607-102918-SK-006	GW-12607-103018-SK-008
Sample Date:		Drinking Water	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/29/2018	10/30/2018
Sample Type:				Duplicate				
Units								
Metals								
Chromium	mg/L	0.1	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0015 J
Chromium III (trivalent)	mg/L	0.1	0.0029 J	0.0021 J	--	--	--	--
Chromium VI (hexavalent)	mg/L	0.1	0.010 U	0.010 U	--	--	--	--
Nickel	mg/L	0.1	0.97	0.9	190	37	5.3	0.012 J
Field Parameters								
Conductivity, field	mS/cm		0.956	0.956	4.09	3.83	3.15	4.93
Dissolved oxygen (DO), field	mg/L		0.96	0.96	1.59	1.05	0.91	0.43
Oxidation reduction potential (ORP), field	millivolts		-197	-197	-66	-56	-30	-50
pH, field	s.u.	6.5 - 8.5	7.65	7.65	6.68	7	7.26	6.91
Temperature, field	Deg C		14.76	14.76	14.49	17.8	18.76	15.59
Turbidity, field	NTU		2.03	2.03	4.58	4.3	4.71	3.95

Notes:

U - Not detected at the associated reporting limit.

J - Estimated concentration.

(1) Groundwater - MDEQ Generic cleanup criteria for residential and nonresidential category,
administrative rule R 299.44 effective December 30, 2013, pursuant to Part 201 of 1994 PA 451 as amended

Table 2

Analytical Results of Groundwater Samples
 2018 Groundwater Monitoring Plan Sampling - Area 1
 Eckles Road Site
 Livonia, Michigan

Area:		Area 01	Area 01
Sample Location:		MW-OS-8D	OW-24
Sample Identification:		GW-12607-103018-SK-007	GW-12607-102918-SK-001
Sample Date:		10/30/2018	10/29/2018
Sample Type:			
	Units		
Metals			
Chromium	mg/L	0.0018 J	0.025
Chromium III (trivalent)	mg/L	--	0.025
Chromium VI (hexavalent)	mg/L	--	0.010 U
Nickel	mg/L	0.0085 J	0.042
Field Parameters			
Conductivity, field	mS/cm	3.17	12.56
Dissolved oxygen (DO), field	mg/L	0.59	0.44
Oxidation reduction potential (ORP), field	millivolts	-42	-292
pH, field	s.u.	7.13	8.83
Temperature, field	Deg C	12.8	15.34
Turbidity, field	NTU	8.76	1.3

Table 3
Analytical Results of Groundwater Samples
AOI 31 - Fire Training Area
Eckles Road Site
Livonia, Michigan

Sample Location:	MDEQ Generic	MW-205S	MW-206S	MW-206S	MW-211S	MW-213S	MW-213S	MW-213S	MW-215S	MW-217D
Sample Identification:	Groundwater Cleanup Criteria	GW-12607-101718-DA-001	GW-12607-101718-DA-003	GW-12607-101718-DA-004	GW-12607-101718-DA-002	GW-12607-101818-DA-013	GW-12607-101818-DA-014	GW-12607-101818-DA-015	GW-12607-101718-DA-005	GW-12607-101918-DA-019
Sample Date:	Residential	10/17/2018	10/17/2018	10/17/2018	10/17/2018	10/18/2018	10/18/2018	10/18/2018	10/17/2018	10/19/2018
Sample Type:	Drinking Water			Duplicate			Duplicate			
Sample Depth:		-	-	-	-	(10.75) ft BGS	(10.75) ft BGS	(13.5) ft BGS	-	-
Parameters	Units									
Volatile Organic Compounds (VOCs)										
1,1,1-Trichloroethane	ug/L	200	1.3	11 J	1.0 UJ	8.7	15	14	21	13
1,1,2,2-Tetrachloroethane	ug/L	8.5	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
1,1,2-Trichloroethane	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
1,1-Dichloroethane	ug/L	880	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
1,1-Dichloroethene	ug/L	7	1.0 U	1.1	1.0 U	0.89 J	0.77 J	0.70 J	1.0 J	1.3
1,2,4-Trichlorobenzene	ug/L	70	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	0.2	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	0.05	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
1,2-Dichlorobenzene	ug/L	600	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
1,2-Dichloroethane	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
1,2-Dichloropropane	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
1,3-Dichlorobenzene	ug/L	6.6	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
1,4-Dichlorobenzene	ug/L	75	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	13000	10 U	10 U	10 U	10 U	25 U	25 U	33 U	10 U
2-Hexanone	ug/L	1000	10 U	10 U	10 U	10 U	25 U	25 U	33 U	10 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	1800	10 U	10 U	10 U	10 U	25 U	25 U	33 U	10 U
Acetone	ug/L	730	10 U	10 U	10 U	10 U	25 U	25 U	33 U	10 U
Benzene	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Bromodichloromethane	ug/L	80	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Bromoform	ug/L	80	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Bromomethane (Methyl bromide)	ug/L	10	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Carbon disulfide	ug/L	800	5.0 U	5.0 U	5.0 U	5.0 U	13 U	13 U	17 U	5.0 U
Carbon tetrachloride	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Chlorobenzene	ug/L	100	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Chloroethane	ug/L	430	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Chloroform (Trichloromethane)	ug/L	80	1.0 U	1.0 U	1.0 U	1.0 U	0.59 J	0.55 J	0.75 J	0.61 J
Chloromethane (Methyl chloride)	ug/L	260	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
cis-1,2-Dichloroethene	ug/L	70	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
cis-1,3-Dichloropropene	ug/L		1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Cyclohexane	ug/L		1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Dibromochloromethane	ug/L	80	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Dichlorodifluoromethane (CFC-12)	ug/L	1700	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Ethylbenzene	ug/L	74	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Isopropyl benzene	ug/L	800	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Methyl acetate	ug/L		10 U	10 U	10 U	10 U	25 U	25 U	33 U	10 U
Methyl cyclohexane	ug/L		1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Methyl tert butyl ether (MTBE)	ug/L	40	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Methylene chloride	ug/L	5	5.0 U	5.0 U	5.0 U	5.0 U	13 U	13 U	17 U	5.0 U
Styrene	ug/L	100	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Tetrachloroethene	ug/L	5	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Toluene	ug/L	790	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
trans-1,2-Dichloroethene	ug/L	100	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
trans-1,3-Dichloropropene	ug/L		1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Trichloroethene	ug/L	5	1.2	1.0 U	1.0 U	1.0 U	66	66	96	28 J
Trichlorofluoromethane (CFC-11)	ug/L	2600	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Trifluorotrichloroethane (CFC-113)	ug/L	170000	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Vinyl chloride	ug/L	2	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	2.5 U	3.3 U	1.0 U
Xylenes (total)	ug/L	280	2.0 U	2.0 U	2.0 U	2.0 U	5.0 U	5.0 U	6.7 U	2.0 U

Notes:
U - Not detected at the associated reporting limit.
J - Estimated concentration.
UJ - Not detected; associated reporting limit is estimated.

(1) Groundwater - MDEQ Generic cleanup criteria for residential and nonresidential category, administrative rule R 299.44 effective December 30, 2013, pursuant to Part 201 of 1994 PA 451 as amended

Table 3
Analytical Results of Groundwater Samples
AOI 31 - Fire Training Area
Eckles Road Site
Livonia, Michigan

Sample Location:	MW-303S	MW-400S	MW-400S	MW-400S	MW-401S	MW-401S	MW-401S	MW-402S	MW-402S	MW-402S
Sample Identification:	GW-12607-101718-DA-006	GW-12607-101918-DA-016	GW-12607-101918-DA-017	GW-12607-101918-DA-018	GW-12607-101818-DA-010	GW-12607-101818-DA-011	GW-12607-101818-DA-012	GW-12607-101818-DA-007	GW-12607-101818-DA-008	GW-12607-101818-DA-009
Sample Date:	10/17/2018	10/19/2018	10/19/2018	10/19/2018	10/18/2018	10/18/2018	10/18/2018	10/18/2018	10/18/2018	10/18/2018
Sample Type:										
Sample Depth:	-	(7.5) ft BGS	(10) ft BGS	(12.5) ft BGS	(7.5) ft BGS	(10) ft BGS	(12) ft BGS	(7.5) ft BGS	(10) ft BGS	(12.5) ft BGS
Parameters	Units									
Volatile Organic Compounds (VOCs)										
1,1,1-Trichloroethane	ug/L	4.0	3.6	13	89	62	98	150	36	130
1,1,2,2-Tetrachloroethane	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
1,1,2-Trichloroethane	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
1,1-Dichloroethane	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	1.8 J	6.3 U	10 U
1,1-Dichloroethene	ug/L	0.19 J	1.0 U	0.96 J	5.9 J	4.3 J	6.6 J	11	2.3 J	9.4 J
1,2,4-Trichlorobenzene	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
1,2-Dichlorobenzene	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
1,2-Dichloroethane	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
1,2-Dichloropropane	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
1,3-Dichlorobenzene	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
1,4-Dichlorobenzene	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	10 U	10 U	25 U	130 U	50 U	100 U	100 U	63 U	100 U
2-Hexanone	ug/L	10 U	10 U	25 U	130 U	50 U	100 U	100 U	63 U	100 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	10 U	10 U	25 U	130 U	50 U	100 U	100 U	63 U	100 U
Acetone	ug/L	10 U	10 U	25 U	130 U	50 U	100 U	100 U	63 U	100 U
Benzene	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Bromodichloromethane	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Bromoform	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Bromomethane (Methyl bromide)	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Carbon disulfide	ug/L	5.0 U	5.0 U	13 U	63 U	25 U	50 U	50 U	31 U	50 U
Carbon tetrachloride	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Chlorobenzene	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Chloroethane	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Chloroform (Trichloromethane)	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Chloromethane (Methyl chloride)	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
cis-1,2-Dichloroethene	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
cis-1,3-Dichloropropene	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Cyclohexane	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Dibromochloromethane	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Dichlorodifluoromethane (CFC-12)	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Ethylbenzene	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Isopropyl benzene	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Methyl acetate	ug/L	10 U	10 U	25 U	130 U	50 U	100 U	100 U	63 U	100 U
Methyl cyclohexane	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Methyl tert butyl ether (MTBE)	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Methylene chloride	ug/L	5.0 U	5.0 U	13 U	63 U	25 U	50 U	50 U	31 U	50 U
Styrene	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Tetrachloroethene	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Toluene	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
trans-1,2-Dichloroethene	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
trans-1,3-Dichloropropene	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Trichloroethene	ug/L	1.0 U	35	97	430	120	200	240	180	330
Trichlorofluoromethane (CFC-11)	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Trifluorotrichloroethane (CFC-113)	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Vinyl chloride	ug/L	1.0 U	1.0 U	2.5 U	13 U	5.0 U	10 U	10 U	6.3 U	10 U
Xylenes (total)	ug/L	2.0 U	2.0 U	5.0 U	25 U	10 U	20 U	20 U	13 U	20 U

Table 3
Analytical Results of Groundwater Samples
AOI 31 - Fire Training Area
Eckles Road Site
Livonia, Michigan

Sample Location:	MW-403D	MW-403S	MW-403S	MW-404D	MW-404D	MW-404S	MW-406D	MW-406S	Trip Blank	Trip Blank	Trip Blank
Sample Identification:	GW-12607-102218-DA-024	GW-12607-102218-DA-022	GW-12607-102218-DA-023	GW-012607-110918-KT-002	GW-012607-110918-KT-003	GW-012607-110918-KT-001	GW-12607-101918-DA-020	GW-12607-101918-DA-021	TB-12607-101718	TB-12607-102218	TRIP BLANK
Sample Date:	10/22/2018	10/22/2018	10/22/2018	11/9/2018	11/9/2018	11/9/2018	10/19/2018	10/19/2018	10/17/2018	10/22/2018	11/9/2018
Sample Type:			Duplicate		Duplicate						
Sample Depth:	-	-	-	-	-	-	-	-	-	-	-
Parameters	Units										
Volatile Organic Compounds (VOCs)											
1,1,1-Trichloroethane	ug/L	60	0.77 J	0.77 J	67	58	4.8	81 J	21	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	0.29 J	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	ug/L	20 U	1.0 U	1.0 U	5.0 U	1.8 J	2.0 U	0.70 J	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	ug/L	8.4 J	1.0 U	1.0 U	4.5 J	5.6	2.0 U	6.2	1.1	1.0 U	1.0 U
1,2,4-Trichlorobenzene	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromo-3-chloropropane (DBCP)	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane (Ethylene dibromide)	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone (Methyl ethyl ketone) (MEK)	ug/L	200 U	10 U	10 U	50 U	20 U	20 U	10 U	10 U	10 U	10 U
2-Hexanone	ug/L	200 U	10 U	10 U	50 U	20 U	20 U	10 U	10 U	10 U	10 U
4-Methyl-2-pentanone (Methyl isobutyl ketone) (MIBK)	ug/L	200 U	10 U	10 U	50 U	20 U	20 U	10 U	10 U	10 U	10 U
Acetone	ug/L	200 U	10 U	10 U	50 U	20 U	20 U	10 U	10 U	10 U	10 U
Benzene	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane (Methyl bromide)	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	ug/L	100 U	5.0 U	5.0 U	25 U	10 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U
Carbon tetrachloride	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform (Trichloromethane)	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.4	0.41 J	1.0 U	1.0 U
Chloromethane (Methyl chloride)	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	ug/L	20 U	1.0 U	1.0 U	5.0 U	0.91 J	2.0 U	0.37 J	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dichlorodifluoromethane (CFC-12)	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Isopropyl benzene	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl acetate	ug/L	200 U	10 U	10 U	50 U	20 U	20 U	10 U	10 U	10 U	10 U
Methyl cyclohexane	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methyl tert butyl ether (MTBE)	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	ug/L	100 U	5.0 U	5.0 U	25 U	10 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U
Styrene	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Toluene	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	ug/L	260	4.4	4.2	110	89	39	0.10 J	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane (CFC-11)	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trifluorotrichloroethane (CFC-113)	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	ug/L	20 U	1.0 U	1.0 U	5.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes (total)	ug/L	40 U	2.0 U	2.0 U	10 U	4.0 U	4.0 U	2.0 U	2.0 U	2.0 U	2.0 U