CERTIFICATION REPORT
CLOSURE BY REMOVAL
GROUNDWATER

UNIT 6 SCRUBBER BASINS
DTE ELECTRIC COMPANY
ST. CLAIR POWER PLANT
EAST CHINA, MICHIGAN

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Contents

Tables

Figures

Appendix

EXECUTIVE SUMMARY

The Unit 6 Scrubber Basins at the DTE Electric Company (DTE) St. Clair Power Plant (SCPP) were identified as inactive coal combustion residuals (CCR) management units under the United States Environmental Protection Agency (USEPA) CCR rule 40 Code of Federal Regulations (CRF) 257. To address the requirements of the CCR rule, DTE elected to complete closure by removal of the CCR material, thereby eliminating the CCR units. Physical removal of the CCR material is reported in the DTE St. Clair Power Plant Unit 6 Scrubber Basins Closure by Removal Certification Report dated December 2018.

Closure by removal also requires that "…groundwater monitoring concentrations do not exceed the groundwater protection standards pursuant to §257.95(h) for constituents listed in Appendix IV of this part" (the CCR rule). On behalf of DTE, AECOM Technical Services, Inc. (AECOM) established a groundwater monitoring system, conducted eight (8) baseline monitoring events, and evaluated the groundwater monitoring concentrations to determine whether this criterion was met.

The groundwater protection standards (GWPS) values are the greater of site-specific background concentrations, the drinking water maximum contaminant levels (MCLs), or the tap water regional screening levels (RSLs). All values met either the MCL or RSL as applicable, except for a limited number of lithium concentrations. These lithium concentrations then required an evaluation of site-specific background. AECOM evaluated background and identified multiple lines of evidence that lead to the conclusion that the observed lithium concentrations are representative of regional background lithium concentrations and are therefore equivalent to the GWPS.

Accordingly, the criteria for closure are met, the unit qualifies as removed (via clean closure), and no further action (including groundwater monitoring) is required to comply with the closure requirements of the CCR rule under 40 CFR §257.102(c).

1.0 INTRODUCTION

At the request of DTE, AECOM prepared the following certification report to document achievement of the groundwater requirements of closure by removal for the Unit 6 Scrubber Basins site at the DTE SCPP, located in East China, Michigan (**Figure 1**). Closure by removal was conducted as directed by the USEPA's CCR rule 40 CFR §257.102(c), which specifies that:

> *…CCR removal and decontamination of the CCR unit are complete when… groundwater monitoring concentrations do not exceed the groundwater protection standard established pursuant to §257.95(h) for constituents listed in appendix IV to this part.*

Completion of closure by removal (of the unit and groundwater) eliminates the CCR unit and removes the obligation to conduct long-term monitoring of groundwater. This document presents summary details of the site background, groundwater conditions on site, and the lines of evidence supporting the determination of clean closure for groundwater, followed by a certification statement.

1.1 Site Location

The SCPP is located in St. Clair County Michigan approximately 1 mile north of the city of East China, Michigan. The SCPP is a coal-fired and oil-fired electricity generating plant built in the 1950s. The SCPP facility is bounded to the east by the St. Clair River. Topography in the vicinity of the facility is relatively flat with an irregular grade from western "upland" areas ranging in elevation from 600 to 620 feet mean sea level (ft., msl), eastward toward the St. Clair River through elevations on the order of 580 to 595 ft., msl.

1.2 Description of the CCR Unit

The SCPP Unit 6 Scrubber Basins are located approximately 2,600 feet west of the main plant and encompass an area approximately 15 acres in size (**Figure 1**). The two (2) Scrubber Basins were built in 1973 to handle flue gas desulfurization (FGD) scrubber material generated through the FGD process to remove sulfur compounds from the flue gas. Filling of the basins ceased in the mid-1970s. The basins are located adjacent to each other with their long axis oriented northeast to southwest. The eastern basin is approximately 1,300 feet in length with a maximum width of approximately 280 feet. The western basin is also approximately 1,300 feet in length and is approximately 190-feet wide. An earthen berm approximately 50-feet wide separates the two (2) basins. For purposes of the CCR groundwater evaluation, the two (2) basins were considered a combined CCR multiunit.

1.3 Unit Closure

Removal of the CCR material from the unit is documented in the DTE SCPP Unit 6 Scrubber Basins Closure by Removal Certification Report dated December 2018. In order to complete closure by removal, the groundwater was tested to evaluate whether "groundwater monitoring concentrations do not exceed" (GWPS). GWPS values are the greater of site-specific background concentrations, the drinking water MCLs, or the tap water RSLs. Details of the characterization of groundwater conditions and the development of GWPS values are presented below.

2.0 GROUNDWATER EVALUATION

As described in the Well Installation Report posted to the facility Operating Record April 17, 2019, seven (7) monitoring wells (BKG-1, BKG-2 and MW-1 through MW-5) were installed around the Unit 6 Scrubber Basins (**Figure 2**) to characterize groundwater conditions. All seven (7) wells encountered the first water-bearing zone in weathered bedrock/coarse till at the top of bedrock after drilling through over 125 feet of glacially compacted clay-rich till. All seven wells are hydraulically confined, with water levels rising to within 3.5 to 11 feet below ground surface (bgs). The water-bearing zone does not yield much water to

any of the seven (7) wells, but the wells were retained for testing, except for BKG-2 where the yield was insufficient for low-flow sampling criteria. Additional details regarding the monitoring well network are included in the Well Installation Report dated April 2019.

Boring logs for the monitoring wells are presented in **Appendix A**. As noted above, the CCR unit is underlain by a thick sequence of clay-rich glacial till overlying a weathered bedrock/coarse till zone in which limited amounts of groundwater are found under highly confined conditions. The clay-rich till is described as variously stiff-to-soft from the surface to a depth of over 125 feet. No desiccation cracks or other secondary porosity features were encountered in any of the drilled boreholes. These observations indicate that the clay unit immediately beneath the Unit 6 Scrubber Basins CCR unit provides a natural geologic barrier to infiltration of water from the surface. Water level data collected from these wells are presented herein on **Table 1**.

Between July 24, 2018 and February 21, 2019, eight (8) groundwater monitoring events were conducted to characterize groundwater quality in support of the closure by removal. The monitoring wells were tested for the analytes specified in Appendix III and Appendix IV of the CCR rule, as well as some additional ionic constituents. The results of these analyses are reported herein on **Table 2**.

3.0 GWPS EVALUATION

As noted in Section 1.3, GWPS values are the greater of three potential values:

- The drinking water MCLs per 40 CFR §141.62/66,
- The tap water RSLs for:
    - Cobalt 0.006 milligrams per liter (mg/L)
    - Lead 0.015 mg/L
    - Lithium 0.040 mg/L
    - Molybdenum 0.100 mg/L, or
- Site-specific background concentrations.

Over the course of eight events at the selected six (6) monitoring wells (48 samples in total), all Appendix IV constituent concentrations were less than their respective MCL or RSL except for lithium, for which there were nine (9) detections above the RSL of 0.040 mg/L. Lithium concentrations for the entire data set averaged 0.032 mg/L and ranged to a maximum of 0.055 mg/L. For comparison, the Michigan Part 201 Residential Drinking Water Criteria for lithium is 0.170 mg/L.

To evaluate whether these lithium values qualify as background concentrations, multiple lines of evidence were examined. Those lines of evidence include details of the geologic/hydrogeologic setting, the general chemistry of the groundwater (as it reflects the character of groundwater movement), and the regional evidence of lithium levels in groundwater.

3.1 Geologic/Hydrogeologic Setting

The geologic and hydrogeologic setting of the site is described in Section 2 above. As noted, the dominant characteristic of the setting is the presence of over 125 feet of clayey till overlying the uppermost aquifer. The hydraulic characteristics of the till were not directly measured at the site for this evaluation. However, testing of the same till unit at the nearby Bottom Ash Basins on site indicated a vertical hydraulic conductivity on the order of 2 to 3 x 10^{-8} centimeters per second (cm/s) (TRC, 2017). This low order of magnitude hydraulic conductivity indicates that the roughly 125 feet of clayey till represents a barrier that effectively prevents vertical movement of water. Therefore, this line of evidence strongly supports the position that the detected lithium concentrations represent a background condition.

As a second line of geologic evidence, the local bedrock is known from monitoring well logs and geologic maps of the area to consist of a gray marine shale[1,2]. Such bedrock materials are prone to yield brackish water when not effectively flushed by fresh water. The relatively stagnant groundwater becomes enriched in the ionic and metals constituents of the host rock. This is supported by field data presented on **Table 3**, which indicate that the oxygen reduction potential (ORP) of the sampled groundwater is dominated by negative values in all wells over the monitored period. This uniformly low ORP condition indicates the strong potential for metals to be reduced from a fixed/oxygenated state to a more mobile/reduced state, resulting in transfer from bedrock to groundwater.

3.2 Groundwater Chemistry

The CCR rule requires the monitoring of Appendix III constituents as indicators of CCR influence on groundwater quality. Inspection of these concentrations on **Table 2** provides two lines of evidence regarding the character of background groundwater.

First, the groundwater chemistry is consistent across the site, with the relative proportions of the basic ionic constituents varying only moderately between wells and between monitoring events. Second, the groundwater chemistry is salty, meaning that it is dominated by high concentrations of sodium and chloride with relatively low calcium, magnesium, and sulfate concentrations. The total dissolved solids (TDS) of the groundwater ranges from 2,520 to 4,000 mg/L, which qualifies as slightly brackish to moderately brackish[3]. In contrast, fresh groundwater resources (TDS less than 1,000 mg/L) tend toward an ionic chemistry dominated by calcium and bicarbonate, and CCR units tend to be dominated by calcium and sulfate with potential for magnesium and chloride components in some cases.

These general chemistry signatures can be visualized using an illustration referred to as a Piper diagram. In the Piper diagram, the relative dominance of each ion (represented in milliequivalents as opposed to weight/volume) in each sample can be illustrated graphically. Each sample occupies coordinates on separate ternary diagrams for cations and anions, and one quaternary plot combining both. The chemical signature evaluation relies on the conservation of mass in simple mixing of solutions having high-solubility ionic constituents. On this basis, groundwater that is mixed with CCR unit water will have a chemical signature that is intermediate between that of the unaffected groundwater and that of the unit. The more unit water that is mixed with groundwater, the more the plot of the resultant sample will move toward the plot of the unit water.

A Piper diagram illustrating the general chemistry of the monitoring wells is presented herein as **Figure 3**. The groundwater samples for six monitoring wells over the course of eight (8) monitoring events all plot within an extremely small sector of the diagram illustrating an overwhelming dominance of sodium and chloride over all other ions. The plot indicates that the chemistry of the groundwater is consistent across the site and over time, suggesting that the wells are all affected by the same factors despite their widely spaced locations (including the BKG-1 well located approximately 1,540 feet to the northwest of the unit).

Samples from a groundwater source that might better qualify as potable would show up in the lower left corners (calcium and bicarbonate) of the ternary diagrams as illustrated by the orange oval on **Figure 3** (EPRI, 2012). Samples of water from a CCR unit (no samples were collected because the CCR material was removed from the unit) might typically plot more toward the upper corner of the right ternary diagram (sulfate) and the lower left corner of the left ternary (calcium) as illustrated by the teal oval on **Figure 3** (EPRI, 2012).

[1] Milstein, Randall L. (complier), 1987, Bedrock geology of southern Michigan: Geological Survey Division, Michigan Dept. of Natural Resources, scale: 1:500,000.

[2] https://mrdata.usgs.gov

[3] USGS, 2018. Saline Water Use in the United States (Available at https://www.usgs.gov)

The fact that the monitoring well data do not indicate any mixing with either bicarbonate waters or sulfate waters, is a clear indication that no surface infiltration has affected the monitored groundwater. Therefore, this line of evidence strongly supports the position that the detected lithium concentrations represent a background condition.

3.3 Regional Lithium Concentrations

Three sources of regional groundwater quality data were evaluated to establish the regional distribution of lithium concentrations.

- DTE operates the nearby Range Road Landfill. Table 1 in Appendix C of the Range Road Landfill Groundwater Monitoring Report dated 2018 (TRC, 2019) references a 2007 study of private deep drinking water wells in China Township, Michigan that are believed to represent background groundwater quality. Well depths range from 115 to 130 feet deep and are located 2.20 to 4.10 miles west-northwest of the Unit 6 Scrubber Basins site. No geologic boring logs from these exact addresses are available, but public records of nearby logs indicate dominantly clay, sandstone and shale lithologies[4]. Lithium concentrations in this area ranged from 0.011 to 0.036 mg/L.

- Table 2 in Appendix A (Background Data) of the St. Clair Power Plant Bottom Ash Basins (SCPP BABs) Annual Groundwater Monitoring Report dated January 2018 (TRC, 2018) reports Appendix III and Appendix IV parameters for nine (9) sampling events from four (4) monitoring wells all screened in the uppermost aquifer. Lithium concentrations from four monitoring wells range between 0.033 to 0.130 mg/L. The Bottom Ash Basins are approximately 0.40 miles east of the Unit 6 Scrubber Basins. Similar to the Unit 6 Scrubber Basins, there is a horizontally expansive clay unit with substantial vertical thickness of 120 feet that isolates the uppermost aquifer from the SCPP BABs CCR unit. Low groundwater flow rates have also been observed at the Bottom Ash Basins.

- DTE also monitors groundwater quality at the nearby Belle River Power Plant. Table 2 in Appendix A (Background Data) of the Diversion Basin (BRPP DB) Annual Groundwater Monitoring Report dated January 2018 (TRC, 2018) reports Appendix III and Appendix IV parameters for nine sampling events from six monitoring wells all screened in the uppermost aquifer. Lithium concentrations from these six (6) wells range between 0.033 to 0.130 mg/L. The BRPP DB is approximately 0.90 miles west-northwest of the Unit 6 Scrubber Basins. Similar to the Unit 6 Scrubber Basins, there is a horizontally expansive clay unit with substantial vertical thickness of 130 feet that isolates the uppermost aquifer from the BRPP DB. Low groundwater flow rates have also been observed at the BRPP DB.

4.0 CONCLUSION

Based on the lines of evidence presented above, the lithium values measured in the Unit 6 Scrubber Basins site groundwater monitoring system represent background conditions and therefore are adopted as the GWPS for purposes of evaluating closure in place. Accordingly, the criteria for closure are met, the unit qualifies as removed (via clean closure), and no further action (including groundwater monitoring) is required to comply with the closure requirements of the CCR rule under 40 CFR §257.102(c).

[4] https://www.michigan.gov/deq

5.0 CERTIFICATION STATEMENT

DTE UNIT 6 SCRUBBER BASINS CLOSURE
ST. CLAIR, MICHIGAN

I, Scott G. Hutsell, P.E., being a Registered Professional Engineer in accordance with the Michigan Professional Engineer's Registration do hereby certify to my knowledge, information and belief, that the information contained in the accompanying report related to closure by removal of coal combustion residuals (CCR) from the Unit 6 Scrubber Basins at the St. Clair Power Plant is true and correct and has been prepared in accordance with the current industry standard of practice for the CCR removal.

Scott G. Hutsell
Signature

05/17/2019
Date

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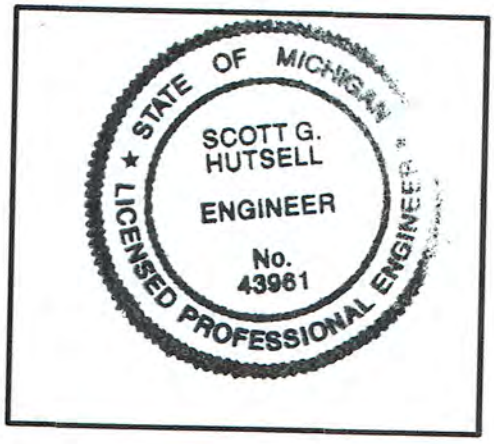

6.0 REFERENCES

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TRC. 2018. Annual Groundwater Monitoring Report - DTE Electric Company St. Clair Power Plant Bottom Ash Basins Coal Combustion Residual Unit, 4901 Pointe Drive, East China Township, Michigan. Prepared for DTE Electric Company. (https://www.newlook.dteenergy.com/wps/wcm/connect/dte-web/home/community-and-news/common/environment/coal-combustion-residual).

TRC. 2018. Annual Groundwater Monitoring Report – DTE Electric Company Belle River Power Plant Diversion Basin, 4505 King Road, China Township, Michigan. Prepared for DTE Electric Company. (https://www.newlook.dteenergy.com/wps/wcm/connect/dte-web/home/community-and-news/common/environment/coal-combustion-residual).

TRC. 2019. 2018 Annual Groundwater Monitoring Report - DTE Electric Company Range Road Coal Combustion Residual Landfill. 3600 Range Road, China Township, Michigan. Prepared for DTE Electric Company. (https://www.newlook.dteenergy.com/wps/wcm/connect/dte-web/home/community-and-news/common/environment/coal-combustion-residual).

TABLES

TABLE 1
DTE ST. CLAIR
INACTIVE SCRUBBER BASINS
GROUNDWATER ELEVATIONS

		Baseling Monitoring							
		Event 1		**Event 2**		**Event 3**		**Event 4**	
	Date	**7/24/2018**		**8/23/2018**		**9/19/2018**		**10/17/2018**	
Well	**TOC Elevation (feet, msl)**	**DTW (feet)**	**Groundwater Elevation (feet, msl)**	**DTW (feet)**	**Groundwater Elevation (feet, msl)**	**DTW (feet)**	**Groundwater Elevation (feet, msl)**	**DTW (feet)**	**Groundwater Elevation (feet, msl)**
BKG-1	590.02	9.56	580.46	9.37	580.65	9.41	580.61	9.01	581.01
MW-1	591.29	6.66	584.63	6.75	584.54	6.98	584.31	6.99	584.30
MW-2	589.94	5.04	584.90	5.31	584.63	5.60	584.34	5.46	584.48
MW-3	589.02	3.98	585.04	4.16	584.86	4.32	584.70	4.48	584.54
MW-4	589.16	4.41	584.75	4.24	584.92	4.50	584.66	4.80	584.36
MW-5	590.06	5.15	584.91	5.43	584.63	5.78	584.28	5.94	584.12

NM = Not measured
NA = Not applicable
TOC = Top of casing
DTW = Depth to water
msl = mean sea level

TABLE 1
DTE ST. CLAIR
INACTIVE SCRUBBER BASINS
GROUNDWATER ELEVATIONS

		Baseling Monitoring							
		Event 5		Event 6		Event 7		Event 8	
	Date	11/13/2018		12/11/2018		1/8/2019		2/20/2019	
Well	TOC Elevation (feet, msl)	DTW (feet)	Groundwater Elevation (feet, msl)	DTW (feet)	Groundwater Elevation (feet, msl)	DTW (feet)	Groundwater Elevation (feet, msl)	DTW (feet)	Groundwater Elevation (feet, msl)
BKG-1	590.02	9.23	580.79	9.21	580.81	9.10	580.92	8.81	581.21
MW-1	591.29	7.28	584.01	7.12	584.17	6.16	585.13	5.38	585.91
MW-2	589.94	5.70	584.24	5.16	584.78	4.15	585.79	3.82	586.12
MW-3	589.02	3.96	585.06	3.63	585.39	2.78	586.24	3.16	585.86
MW-4	589.16	4.92	584.24	3.35	585.81	2.99	586.17	2.84	586.32
MW-5	590.06	6.06	584.00	5.12	584.94	4.68	585.38	4.81	585.25

NM = Not measured
NA = Not applicable
TOC = Top of casing
DTW = Depth to water
msl = mean sea level

TABLE 2
DTE ST. CLAIR
INACTIVE SCRUBBER BASINS
GROUNDWATER ANALYTICAL SUMMARY

				Aquifer	Unconsolidated							
				Well ID	BKG-1							
		U.S. EPA MCL	U.S. EPA Tap Water RSL		BKG-1-072518	BKG-1-082318	BKG-1-091918	BKG-1-101918	BKG-1-111418	BKG-1-121118	BKG-1-010919	BKG-1-022019
Lab Suite	Anayltical Constituent			Date	7/25/2018	8/23/2018	9/19/2018	10/19/2018	11/14/2018	12/11/2018	1/9/2019	2/20/2019
CCR Appendix III	Boron (B)	NE	4.0	mg/L	1.73	1.74	1.74	1.76	1.83	1.85	1.87	1.69
	Calcium	NE	NE	mg/L	83.6	85.1	82.4	86.1	85.2	84.6	72.9	93.6
	Chloride	NE	NE	mg/L	1,950	2,330	2,100	2,100	2,080	2,900	2,090	1,990
	Fluoride (B)	4.0	8.0	mg/L	0.32	0.20	0.14	0.32	0.3	0.61	0.66	1.9
	Sulfate	NE	NE	mg/L	32.4	32.3	24.2	14.8	31.4	27.3	19.8	211
	Total Dissolved Solids (TDS)	NE	NE	mg/L	3,600	3,640	3,690	3,600	3,620	3,650	3,700	3,490
	pH	NE	NE	SU	7.56	7.45	7.39	7.29	7.29	7.48	7.78	7.44
CCR Appendix IV	Antimony	0.006	0.0078	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Arsenic	0.010	5.20E-05	mg/L	0.0062	0.0041	0.0030	0.0022	0.0027	0.0023	0.0021	0.0027
	Barium (B)	2.0	3.8	mg/L	0.392	0.385	0.386	0.336	0.376	0.359	0.339	0.349
	Beryllium	0.004	0.025	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Cadmium (B)	0.005	0.0092	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Chromium (B,H)	0.10	NE	mg/L	0.0054	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0057
	Cobalt	NE	0.006	mg/L	0.0026	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Lead (B)	0.015	0.015	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Lithium (B)	NE	0.040	mg/L	0.0499	0.0400	0.0215	<0.0200	0.0283	0.0319	0.0240	0.0548
	Mercury (B, Z)	0.002	0.00063	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Molybdenum (B)	NE	0.10	mg/L	0.0255	0.0239	0.0206	0.0171	0.0232	0.0231	0.0180	0.0338
	Selenium (B)	0.050	0.10	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Thallium (B)	0.002	0.0002	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
General Chemistry	Magnesium	NE	NE	mg/L	24.5	23.4	22.8	23.0	23.0	22.7	20.2	34.6
	Potassium	NE	NE	mg/L	10.20	9.37	8.63	6.83	8.90	8.42	7.74	15.10
	Sodium	NE	NE	mg/L	1,230	1,150	1,230	1,180	1,260	1,270	1,310	1,190
	Alkalinity (Bicarbonate)	NE	NE	mg/L	178	181	197	197	185	184	186	177
Radium	Ra 226	NE	NE	pCi/L	1.94	1.75	2.28	1.91	2.01	1.50	5.19	1.50
	Ra 228	NE	NE	pCi/L	2.46	1.81	1.88	0.58	1.33	1.27	1.41	0.765
	Ra Total	NE	NE	pCi/L	4.40	3.56	4.16	2.49	3.34	2.77	0.109	2.27

Notes:
mg/L - milligrams per liter (equivalent to parts per million)
pCi/L = picoCuries per liter
RSL - Regional Screening Level
MCL - Maximum Contaminant Limit
NE - Value has not been established
TDS - Total dissolved solids
SU - Standard Units

TABLE 2
DTE ST. CLAIR
INACTIVE SCRUBBER BASINS
GROUNDWATER ANALYTICAL SUMMARY

				Aquifer	Unconsolidated										
				Well ID	MW-1										
Lab Suite	Anayltical Constituent	U.S. EPA MCL	U.S. EPA Tap Water RSL		MW-1-072518	MW-1-082318	MW-1-092018	MW-1-101818	MW-1-111318	MW-1-121118	MW-1-121118-D	MW-1-010819	MW-1-010819-D	MW-1-022119	MW-1-022119-D
				Date	7/25/2018	8/23/2018	9/20/2018	10/18/2018	11/13/2018	12/11/2018	12/11/2018	1/8/2019	1/8/2019	2/21/2019	2/21/2019
CCR Appendix III	Boron (B)	NE	4.0	mg/L	1.86	1.80	1.88	1.78	1.88	1.93	1.93	1.85	1.86	1.93	1.88
	Calcium	NE	NE	mg/L	87.1	88.3	95.3	88.6	94.4	97.3	97.3	90.0	90.5	99.7	95.7
	Chloride	NE	NE	mg/L	2,100	2,600	2,190	2,390	2,270	2,470	2,470	2,030	2,370	2,640	2,320
	Fluoride (B)	4.0	8.0	mg/L	0.35	0.20	<0.10	<0.10	0.51	0.46	0.46	0.70	0.68	0.74	0.74
	Sulfate	NE	NE	mg/L	2.0	2.6	3.1	5.1	5.5	4.0	4.0	3.3	3.3	3.5	3.5
	Total Dissolved Solids (TDS)	NE	NE	mg/L	4,000	3,980	3,270	3,890	3,800	3,960	3,960	3,910	3,950	3,890	3,880
	pH	NE	NE	SU	7.54	7.43	7.42	7.44	7.23	7.31	7.31	7.39	7.39	7.46	7.46
CCR Appendix IV	Antimony	0.006	0.0078	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Arsenic	0.010	5.20E-05	mg/L	0.0017	0.0014	0.0011	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	0.0011
	Barium (B)	2.0	3.8	mg/L	0.512	0.486	0.507	0.462	0.489	0.467	0.458	0.464	0.472	0.495	0.496
	Beryllium	0.004	0.025	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Cadmium (B)	0.005	0.0092	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Chromium (B,H)	0.10	NE	mg/L	0.0028	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0031	<0.0020
	Cobalt	NE	0.006	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Lead (B)	0.015	0.015	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Lithium (B)	NE	0.040	mg/L	0.0435	0.0392	0.0278	0.0286	0.0338	0.0301	0.0291	0.0252	0.0237	<0.0200	0.0214
	Mercury (B, Z)	0.002	0.00063	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Molybdenum (B)	NE	0.10	mg/L	0.0137	0.0126	0.0120	0.0115	0.0125	0.0132	0.0126	0.0125	0.0126	0.0125	0.0126
	Selenium (B)	0.050	0.10	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Thallium (B)	0.002	0.0002	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
General Chemistry	Magnesium	NE	NE	mg/L	26.7	26.5	28.6	26.9	28.3	28.4	29.0	28.2	28.4	29.1	28.6
	Potassium	NE	NE	mg/L	6.94	6.81	7.19	7.08	7.52	6.86	7.07	7.19	7.22	6.87	6.72
	Sodium	NE	NE	mg/L	1,320	1,220	1,300	1,260	1,320	1,340	1,360	1,330	1,330	1,310	1,320
	Alkalinity (Bicarbonate)	NE	NE	mg/L	154	156	162	163	164	161	162	166	159	168	168
Radium	Ra 226	NE	NE	pCi/L	2.47	0.790	1.89	1.03	0.750	1.05	1.62	0.995	0.560	0.836	1.94
	Ra 228	NE	NE	pCi/L	1.75	1.39	1.50	1.18	1.35	1.99	0.844	1.27	2.02	0.495	1.04
	Ra Total	NE	NE	pCi/L	4.22	2.18	3.39	2.21	2.10	3.04	2.46	2.27	2.58	1.33	2.98

Notes:
mg/L - milligrams per liter (equivalent to parts per million)
pCi/L = picoCuries per liter
RSL - Regional Screening Level
MCL - Maximum Contaminant Limit
NE - Value has not been established
TDS - Total dissolved solids
SU - Standard Units

TABLE 2
DTE ST. CLAIR
INACTIVE SCRUBBER BASINS
GROUNDWATER ANALYTICAL SUMMARY

				Aquifer	Unconsolidated								
				Well ID	MW-2								
		U.S. EPA MCL	U.S. EPA Tap Water RSL		MW-2-072418	MW-2-082218	MW-2-092018	MW-2-101918	MW-2-101918-D	MW-2-111318	MW-2-121118	MW-2-010819	MW-2-022019
Lab Suite	**Anayltical Constituent**			**Date**	7/24/2018	8/22/2018	9/20/2018	10/19/2018	10/19/2018	11/13/2018	12/11/2018	1/8/2019	2/20/2019
CCR Appendix III	Boron (B)	NE	4.0	mg/L	2.01	1.97	2.06	2.10	2.10	2.10	2.03	2.10	2.08
	Calcium	NE	NE	mg/L	65.9	59.7	59.5	57.3	58.0	55.0	59.1	51.7	58.1
	Chloride	NE	NE	mg/L	1,860	2,100	1,860	1,960	2,330	2,020	1,940	2,060	2,160
	Fluoride (B)	4.0	8.0	mg/L	0.59	0.47	<0.10	0.64	0.65	0.66	0.60	0.88	0.81
	Sulfate	NE	NE	mg/L	13.7	8.0	7.1	2.9	2.5	1.8	12.5	0.63	16.1
	Total Dissolved Solids (TDS)	NE	NE	mg/L	3,160	3,320	3,970	3,330	3,400	3,310	3,290	3,380	3,310
	pH	NE	NE	SU	7.82	7.72	7.59	7.45	7.45	7.55	7.79	7.73	7.68
CCR Appendix IV	Antimony	0.006	0.0078	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Arsenic	0.010	5.20E-05	mg/L	0.0034	0.0020	0.0018	0.0018	0.0015	0.0013	0.0020	0.0011	0.0021
	Barium (B)	2.0	3.8	mg/L	0.362	0.325	0.313	0.266	0.267	0.278	0.295	0.265	0.299
	Beryllium	0.004	0.025	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Cadmium (B)	0.005	0.0092	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Chromium (B,H)	0.10	NE	mg/L	0.0053	0.0021	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0027
	Cobalt	NE	0.006	mg/L	0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Lead (B)	0.015	0.015	mg/L	0.0015	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Lithium (B)	NE	0.040	mg/L	0.0490	0.0405	0.0378	0.0333	0.0351	0.0385	0.0406	0.0359	0.0440
	Mercury (B, Z)	0.002	0.00063	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Molybdenum (B)	NE	0.10	mg/L	0.0260	0.0216	0.0227	0.0186	0.0185	0.0199	0.0251	0.0195	0.0245
	Selenium (B)	0.050	0.10	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Thallium (B)	0.002	0.0002	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
General Chemistry	Magnesium	NE	NE	mg/L	19.8	17.1	17.7	17.0	16.9	15.8	18.3	15.5	18.8
	Potassium	NE	NE	mg/L	9.42	7.16	7.64	6.96	6.96	6.39	8.17	6.56	8.84
	Sodium	NE	NE	mg/L	1,150	1,160	1,160	1,150	1,140	1,160	1,150	1,210	1,190
	Alkalinity (Bicarbonate)	NE	NE	mg/L	188	193	193	212	207	199	190	202	186
Radium	Ra 226	NE	NE	pCi/L	1.22	1.34	1.36	1.41	0.88	0.963	1.88	1.59	1.83
	Ra 228	NE	NE	pCi/L	2.06	1.03	1.12	0.82	0.36	0.949	1.19	1.00	0.812
	Ra Total	NE	NE	pCi/L	3.28	2.37	2.48	2.23	1.24	1.91	3.07	2.59	2.64

Notes:
mg/L - milligrams per liter (equivalent to parts per million)
pCi/L = picoCuries per liter
RSL - Regional Screening Level
MCL - Maximum Contaminant Limit
NE - Value has not been established
TDS - Total dissolved solids
SU - Standard Units

TABLE 2
DTE ST. CLAIR
INACTIVE SCRUBBER BASINS
GROUNDWATER ANALYTICAL SUMMARY

				Aquifer	Unconsolidated									
				Well ID	MW-3									
Lab Suite	**Anayltical Constituent**	**U.S. EPA MCL**	**U.S. EPA Tap Water RSL**		MW-3-072418	MW-3-072418-D	MW-3-082218	MW-3-092018	MW-3-101918	MW-3-111318	MW-3-111318-D	MW-3-121218	MW-3-010819	MW-3-022019
				Date	7/24/2018	7/24/2018	8/22/2018	9/20/2018	10/19/2018	11/13/2018	11/13/2018	12/12/2018	1/8/2019	2/20/2019
CCR Appendix III	Boron (B)	NE	4.0	mg/L	1.73	1.73	1.58	1.70	1.69	1.76	1.78	1.75	1.80	1.80
	Calcium	NE	NE	mg/L	61.5	61.7	55.8	62.2	62.4	61.9	62.9	60.4	60.2	66.2
	Chloride	NE	NE	mg/L	1,700	1,580	1,670	1,520	1,780	1,750	1,790	1,700	1,560	1,970
	Fluoride (B)	4.0	8.0	mg/L	0.73	0.72	0.67	<1.0	0.59	0.67	0.69	0.76	0.87	0.77
	Sulfate	NE	NE	mg/L	8.4	8.3	8.3	7.1	6.3	1.9	1.9	1.60	0.62	4.40
	Total Dissolved Solids (TDS)	NE	NE	mg/L	2,870	2,840	2,830	2,880	2,900	2,870	2,830	2,920	2,930	2,920
	pH	NE	NE	SU	7.62	7.62	7.59	7.47	7.41	7.42	7.42	7.55	7.65	7.58
CCR Appendix IV	Antimony	0.006	0.0078	mg/L	<0.0010	<0.0010	0.0013	0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Arsenic	0.010	5.20E-05	mg/L	0.0010	<0.0010	0.0038	0.0030	0.0026	0.0024	0.0023	0.0021	0.0019	0.0032
	Barium (B)	2.0	3.8	mg/L	0.058	0.058	0.290	0.289	0.247	0.265	0.263	0.237	0.254	0.270
	Beryllium	0.004	0.025	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.0002
	Cadmium (B)	0.005	0.0092	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Chromium (B,H)	0.10	NE	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0023	0.0033	0.0062
	Cobalt	NE	0.006	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010	<0.0010
	Lead (B)	0.015	0.015	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0021
	Lithium (B)	NE	0.040	mg/L	0.0396	0.0391	0.0313	0.0255	0.0217	0.0233	0.0242	0.0215	0.0214	0.0314
	Mercury (B, Z)	0.002	0.00063	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Molybdenum (B)	NE	0.10	mg/L	0.0060	0.0061	0.0269	0.0270	0.0238	0.0235	0.0243	0.0246	0.0240	0.0257
	Selenium (B)	0.050	0.10	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Thallium (B)	0.002	0.0002	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
General Chemistry	Magnesium	NE	NE	mg/L	17.7	17.7	15.0	16.9	17.2	16.9	17.3	16.7	17.5	19.0
	Potassium	NE	NE	mg/L	6.18	6.22	5.08	5.45	5.44	5.25	5.32	5.24	5.46	6.94
	Sodium	NE	NE	mg/L	999	1,010	932	979	967	1,010	1,060	1,060	1,060	993
	Alkalinity (Bicarbonate)	NE	NE	mg/L	167	168	170	173	182	188	186	195	186	192
Radium	Ra 226	NE	NE	pCi/L	1.21	1.32	1.39	1.39	1.00	0.933	0.845	0.909	1.02	0.372
	Ra 228	NE	NE	pCi/L	1.53	3.07	1.18	1.83	0.34	0.901	1.10	0.866	1.26	0.570
	Ra Total	NE	NE	pCi/L	2.74	4.39	2.57	3.22	1.34	1.83	1.95	1.78	2.28	0.942

Notes:
mg/L - milligrams per liter (equivalent to parts per million)
pCi/L = picoCuries per liter
RSL - Regional Screening Level
MCL - Maximum Contaminant Limit
NE - Value has not been established
TDS - Total dissolved solids
SU - Standard Units

TABLE 2
DTE ST. CLAIR
INACTIVE SCRUBBER BASINS
GROUNDWATER ANALYTICAL SUMMARY

				Aquifer	Unconsolidated								
				Well ID	MW-4								
Lab Suite	**Anayltical Constituent**	**U.S. EPA MCL**	**U.S. EPA Tap Water RSL**		MW-4-072418	MW-4-082218	MW-4-082218-D	MW-4-091918	MW-4-101718	MW-4-111418	MW-4-121218	MW-4-010819	MW-4-022119
				Date	7/24/2018	8/22/2018	8/22/2018	9/19/2018	10/17/2018	11/14/2018	12/12/2018	1/8/2019	2/21/2019
CCR Appendix III	Boron (B)	NE	4.0	mg/L	1.68	1.62	1.54	1.59	1.58	1.53	1.71	1.67	1.78
	Calcium	NE	NE	mg/L	67.0	54.0	51.3	51.2	51.9	54.1	65.3	58.6	67.2
	Chloride	NE	NE	mg/L	1,440	1,540	1,560	1,430	1,520	1,360	1,650	1,670	1,870
	Fluoride (B)	4.0	8.0	mg/L	0.94	0.95	0.92	0.96	0.35	0.86	1.00	1.10	1.20
	Sulfate	NE	NE	mg/L	7.1	7.0	7.1	5.8	8.8	6.5	3.1	6.6	7.9
	Total Dissolved Solids (TDS)	NE	NE	mg/L	2,530	2,550	2,530	2,610	2,520	2,640	2,760	2,730	2,740
	pH	NE	NE	SU	7.87	7.76	7.76	7.79	7.80	7.60	7.83	7.85	7.88
CCR Appendix IV	Antimony	0.006	0.0078	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Arsenic	0.010	5.20E-05	mg/L	<0.0010	0.0019	0.0017	0.0014	0.0014	0.0019	0.0027	0.0018	0.0026
	Barium (B)	2.0	3.8	mg/L	0.060	0.269	0.271	0.262	0.238	0.265	0.278	0.269	0.294
	Beryllium	0.004	0.025	mg/L	<0.0002	0.0003	0.0003	<0.0002	<0.0002	0.0002	0.0004	0.0002	0.0003
	Cadmium (B)	0.005	0.0092	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Chromium (B,H)	0.10	NE	mg/L	0.0032	0.0076	0.0067	0.0038	0.0033	0.0059	0.0094	0.0067	0.0091
	Cobalt	NE	0.006	mg/L	0.0012	0.0022	0.0022	0.0013	0.0012	0.0025	0.0037	0.0021	0.0032
	Lead (B)	0.015	0.015	mg/L	<0.0010	0.0019	0.0018	0.0010	<0.0010	0.0022	0.0037	0.0023	0.0029
	Lithium (B)	NE	0.040	mg/L	0.0477	0.0314	0.0285	0.0232	0.0239	0.0248	0.0340	0.0246	0.0371
	Mercury (B, Z)	0.002	0.00063	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Molybdenum (B)	NE	0.10	mg/L	0.0053	0.0220	0.0223	0.0226	0.0224	0.0231	0.0235	0.0226	0.0218
	Selenium (B)	0.050	0.10	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Thallium (B)	0.002	0.0002	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
General Chemistry	Magnesium	NE	NE	mg/L	23.1	16.6	15.8	16.1	16.7	15.2	22.2	19.7	23.0
	Potassium	NE	NE	mg/L	9.12	6.62	6.18	5.54	5.78	4.93	7.09	6.96	8.59
	Sodium	NE	NE	mg/L	918	902	846	917	830	910	975	942	969
	Alkalinity (Bicarbonate)	NE	NE	mg/L	173	163	162	161	156	183	170	162	188
Radium	Ra 226	NE	NE	pCi/L	1.49	0.441	1.06	0.836	0.386	0.727	0.533	0.848	0.505
	Ra 228	NE	NE	pCi/L	1.63	1.37	1.15	1.50	1.45	1.11	0.618	1.37	0.749
	Ra Total	NE	NE	pCi/L	3.12	1.81	2.21	2.34	1.84	1.84	1.15	2.22	1.25

Notes:
mg/L - milligrams per liter (equivalent to parts per million)
pCi/L = picoCuries per liter
RSL - Regional Screening Level
MCL - Maximum Contaminant Limit
NE - Value has not been established
TDS - Total dissolved solids
SU - Standard Units

TABLE 2
DTE ST. CLAIR
INACTIVE SCRUBBER BASINS
GROUNDWATER ANALYTICAL SUMMARY

				Aquifer	Unconsolidated								
				Well ID	MW-5								
Lab Suite	Anayltical Constituent	U.S. EPA MCL	U.S. EPA Tap Water RSL		MW-5-072418	MW-5-082218	MW-5-091918	MW-5-091918-D	MW-5-102218	MW-5-111318	MW-5-121218	MW-5-010919	MW-5-22119
				Date	7/24/2018	8/22/2018	9/19/2018	9/19/2018	10/22/2018	11/13/2018	12/12/2018	1/9/2019	2/21/2019
CCR Appendix III	Boron (B)	NE	4.0	mg/L	1.74	1.60	1.62	1.64	1.74	1.70	1.83	1.77	1.76
	Calcium	NE	NE	mg/L	76.0	68.7	67.2	68.4	67.8	68.2	64.8	65.3	75.7
	Chloride	NE	NE	mg/L	1,740	2,000	1,880	1,840	2,030	2,000	1,920	2,000	2,030
	Fluoride (B)	4.0	8.0	mg/L	0.44	0.30	0.24	0.25	0.52	0.55	0.72	0.77	0.74
	Sulfate	NE	NE	mg/L	6.7	1.5	3.0	3.7	0.50	3.0	0.31	<0.25	11.00
	Total Dissolved Solids (TDS)	NE	NE	mg/L	3,260	3,330	3,280	3,270	3,270	3,220	3,270	3,300	3,200
	pH	NE	NE	SU	7.50	7.34	7.38	7.38	7.36	7.39	7.54	7.73	7.55
CCR Appendix IV	Antimony	0.006	0.0078	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Arsenic	0.010	5.20E-05	mg/L	<0.0010	<0.0010	0.0010	<0.0010	0.0010	0.0011	<0.0010	<0.0010	0.0010
	Barium (B)	2.0	3.8	mg/L	0.076	0.337	0.318	0.327	0.315	0.323	0.284	0.280	0.335
	Beryllium	0.004	0.025	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Cadmium (B)	0.005	0.0092	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Chromium (B,H)	0.10	NE	mg/L	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0040
	Cobalt	NE	0.006	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Lead (B)	0.015	0.015	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Lithium (B)	NE	0.040	mg/L	0.0437	0.0288	0.0228	0.0233	0.0260	0.0317	0.0291	0.0284	0.0342
	Mercury (B, Z)	0.002	0.00063	mg/L	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
	Molybdenum (B)	NE	0.10	mg/L	0.0038	0.0142	0.0148	0.0148	0.0161	0.0172	0.0168	0.0158	0.0175
	Selenium (B)	0.050	0.10	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Thallium (B)	0.002	0.0002	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
General Chemistry	Magnesium	NE	NE	mg/L	21.7	18.5	19.1	19.6	19.3	19.2	18.5	19.2	20.8
	Potassium	NE	NE	mg/L	7.49	5.86	5.90	6.11	5.77	6.26	5.61	6.06	7.05
	Sodium	NE	NE	mg/L	1,130	1,020	1,100	1,100	1,100	1,110	1,170	1,150	1,120
	Alkalinity (Bicarbonate)	NE	NE	mg/L	160	173	178	174	181	175	185	176	173
Radium	Ra 226	NE	NE	pCi/L	1.03	1.42	0.772	1.05	0.583	0.649	0.722	0.945	0.733
	Ra 228	NE	NE	pCi/L	1.50	1.81	1.92	1.87	0.639	0.702	1.39	1.33	0.852
	Ra Total	NE	NE	pCi/L	2.53	3.23	2.69	2.92	1.22	1.35	2.11	2.28	1.59

Notes:
mg/L - milligrams per liter (equivalent to parts per million)
pCi/L = picoCuries per liter
RSL - Regional Screening Level
MCL - Maximum Contaminant Limit
NE - Value has not been established
TDS - Total dissolved solids
SU - Standard Units

TABLE 3
DTE ST. CLAIR
INACTIVE SCRUBBER BASINS
FIELD PARAMETERS

Well ID	Date	Depth to Water Pre-purge (feet, BTOC)	Final DTW Reading Purge completion (feet, BTOC)	Flow (mL/min)	Temp (Celsius)	Specific Conductivity (uS/cm)	pH (Standard Units)	Oxidation Reduction Potential (ORP) (mv)	Turbidity (NTUs)
MW-1	7/25/2018	6.69	15.35	100	14.3	7370	7.54	-102.7	86
	8/23/2018	6.75	14.93	100	14.1	7363	7.43	-84.1	53
	9/20/2018	7.04	20.25	100	13.1	7087	7.42	19.4	25
	10/18/2018	7.04	13.92	100	11.9	7421	7.44	-121.1	167
	11/13/2018	7.28	7.97	150	10.7	6898	7.23	-94.7	47
	12/11/2018	7.12	9.08	150	10.6	6768	7.31	-38.3	16
	1/8/2019	6.16	12.51	100	10.8	6770	7.39	132.0	9
MW-2	7/24/2018	5.04	12.01	100	16.2	6179	7.82	-103.7	145
	8/22/2018	5.31	15.34	100	14.1	6312	7.72	-112.2	54
	9/20/2018	5.64	15.66	100	13.9	6196	7.59	13.5	25
	10/19/2018	5.55	13.14	200	12.6	6541	7.45	-152.6	94
	11/13/2018	5.70	7.09	100	10.6	6106	7.55	-138.8	41
	12/11/2018	5.16	9.76	150	10.6	5819	7.79	-83.8	20
	1/8/2019	4.15	12.77	150	10.9	6039	7.73	63.7	34
	2/20/2019	3.82	15.36	150	8.9	5805	7.68	-5.2	24
MW-3	7/24/2018	3.98	14.00	100	15.5	5435	7.62	-72.7	110
	8/22/2018	4.16	14.00	100	14.9	5430	7.59	-56.3	71
	9/20/2018	4.36	12.75	100	14.2	5314	7.47	139.5	18
	10/18/2018	4.73	21.50	200	11.9	5591	7.41	-95.5	36
	11/13/2018	3.96	7.96	150	10.6	5283	7.42	-108.7	58
	12/12/2018	3.63	13.09	150	10.2	5674	7.55	-73.1	63
	1/8/2019	2.78	10.92	100	10.4	5215	7.65	45.3	59
	2/20/2019	3.16	29.86	150	10.3	5081	7.58	25.7	287
MW-4	7/24/2018	4.41	7.40	100	16.3	4925	7.87	-109.1	540
	8/22/2018	4.24	6.65	100	15.5	5041	7.76	-100.6	426
	9/19/2018	4.50	6.58	100	15.6	4832	7.79	106.3	285
	10/17/2018	4.80	6.75	100	12.9	5013	7.80	-137.8	153
	11/14/2018	4.92	3.93	200	11.2	4999	7.60	-107.3	163
	12/12/2018	3.35	6.75	100-150	10.7	5322	7.83	-83.3	251
	1/8/2019	2.99	4.79	100	10.6	4785	7.85	42.3	350
	2/21/2019	2.84	6.37	150	10.0	5152	7.88	43.9	241
MW-5	7/24/2018	5.15	16.70	100	13.6	6065	7.50	-85.2	27
	8/22/2018	5.43	15.66	100	14.2	6181	7.34	-64.7	25
	9/19/2018	5.78	13.02	100	14.7	6083	7.38	59.4	22
	10/22/2018	5.94	14.60	150	12.9	6381	7.36	-130.6	34
	11/13/2018	6.06	11.89	100	10.9	5942	7.39	-117.6	25
	12/12/2018	5.12	5.58	100-150	10.4	6315	7.54	-68.5	22
	1/8/2019	4.68	9.60	100	10.0	6501	7.73	142.7	25
	2/21/2019	4.81	14.93	200	10.5	6068	7.55	35.6	9
BKG-1	7/25/2018	9.60	14.71	100	15.7	6721	7.56	-93.1	210
	8/23/2018	9.37	13.42	100	16.8	6775	7.45	-83.6	194
	9/19/2018	9.41	17.82	100	13.7	6591	7.39	125.9	221
	10/19/2018	9.08	14.97	150	12.1	6933	7.29	-111.5	76
	11/14/2018	9.23	9.08	200	10.3	6774	7.29	-91.3	23
	12/11/2018	9.21	10.41	200	9.4	6433	7.48	-42.2	14
	1/9/2019	9.10	16.82	100	8.9	7237	7.78	97.0	19
	2/20/2019	8.81	17.31	150	8.2	5859	7.44	103.1	19

BTOC = Below top of casing
mL/min = milliliters per minute
(uS/cm) = micro Siemens per centimeter
mv = millivolts
NTUs = nephelometric turbidity units

FIGURES

LEGEND:

Approximate Boundary of Unit 6 Scrubber Basins

N

0 500 1,000

Feet

BASE MAP SOURCE: © 2019 Microsoft Corporation © 2019 DigitalGlobe ©CNES (2019) Distribution Airbus DS Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, ©

DTE Energy

DTE ST. CLAIR PLANT

FIGURE 1
UNIT 6 SCRUBBER BASINS
SITE VICINITY MAP

SCALE: 1:2,400

DATE: 3/6/2019

CHECKED BY:

AECOM

Document Path: G:\Cincinnati\DCS\GIS\ArcMap_GeoDB_Projects\D\DTE\DTE-Monroe Plant\Project Management\St Clair RFP\GIS\Figure1_Site_Vicinity_DTE_St_Clair_Plant.mxd

LEGEND:

CCR Monitoring Well

Non-CCR Monitoring Well

N

0 200 400

Feet

BASE MAP SOURCE: © 2019 Microsoft Corporation © 2019 DigitalGlobe ©CNES (2019) Distribution Airbus DS Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, ©

DTE Energy

DTE ST. CLAIR PLANT

FIGURE 2
UNIT 6 SCRUBBER BASINS
WELL LOCATION MAP
2019

SCALE: 1:2,400

DATE: 3/18/2019

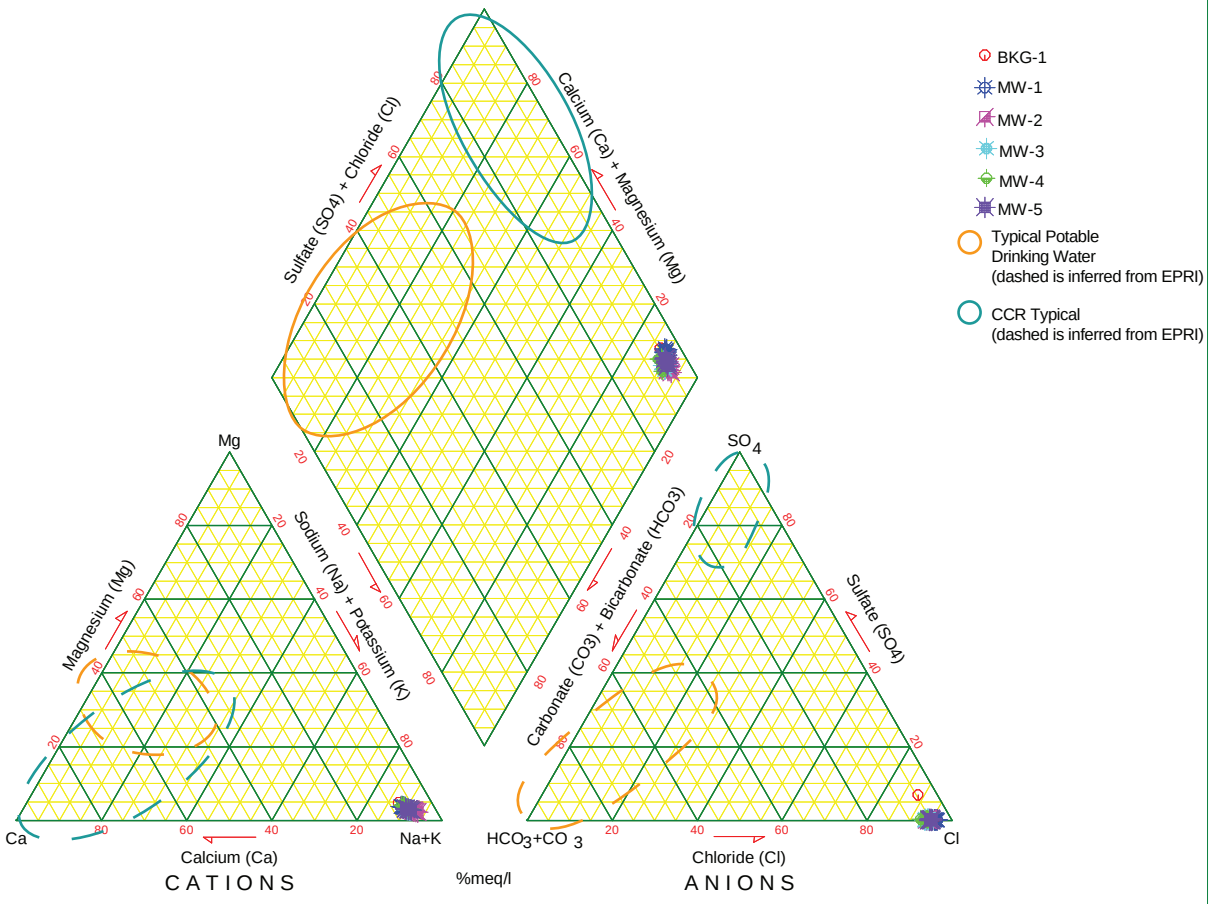
CHECKED BY:

AECOM

Document Path: G:\Cincinnati\DCS\GIS\ArcMap_GeoDB_Projects\DTE\DTE-Monroe Plant\Project Management\St Clair RFP\GIS\Figure2_Well_Location_DTE_St_Clair_Plant.mxd

Figure 3

DTE St. Clair Events 1-8



APPENDIX A

BORING LOGS

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of BKG-1

Sheet 1 of 5

Date(s) Drilled	**5/22/2018 to 5/23/2018**	Logged By	**T. George**	Checked By	**WBL**
Drilling Method	**Sonic**	Drill Bit Size/Type	**6" OD casing**	Total Depth of Borehole	**141 ft**
Drill Rig Type	**ProSonic 600**	Drilling Contractor	**Cascade**	Surface Elevation	**587.48 ft msl**
Borehole Backfill	**Monitoring Well**	Sampling Method(s)	**Sonic**	Top of Casing Elevation	**590.02 ft msl**
Boring Location	**467758.47, 13627846.63**	Groundwater Level(s)	**9.94 ft. measured 06/25/2018**		

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Well Diagram	REMARKS AND OTHER DETAILS
	0					TOPSOIL		Hand Augered to 4.5 feet
		4.5	0	0		Brown and gray lean CLAY (CL), trace sand, trace gravel, trace root fibers, stiff, moist		
585						Becomes brownish-gray with gravel Brown lean CLAY (CL) with gray mottling, trace sand, trace gravel, whiteish-gray calcareous staining, hard, moist		
	5	1.5	1.5	100		Becomes very stiff		
580						Becomes stiff		
	10	10	10	100				
575						Becomes medium stiff		
	15					Brown lean CLAY (CL) with trace coarse sand, no gravel, dark gray mottling, medium stiff, moist		Bentonite Grout
570						Becomes with trace to no sand, no gravel, soft to medium stiff		
	20	10	10	100				
565						Becomes soft		
	25							2" Sch 40 PVC Riser
560		10	10	100		Grayish-brown lean CLAY (CL), without sand and gravel, soft, moist		
	30							

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of BKG-1

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
	30						
555		10	10	100			
	35						2" Sch 40 PVC Riser
550							
	40	10	10	100		Grayish-brown lean CLAY (CL), trace to no sand, no gravel, soft, moist	
545						Becomes with trace bluish-gray	
	45						Bentonite Grout
540							
	50	10	10	100			
535						Brownish-gray lean CLAY (CL), trace sand, trace gravel, medium stiff, moist (glacial till)	
	55						
530							
	60	10	10	100			
525							
	65						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of BKG-1

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
		10	10	100			
520	70	10	10	100		Grayish-brown silty-CLAY (CL-ML) to lean CLAY (CL) with sand, trace gravel, medium stiff to stiff, moist	
515	75					Becomes medium stiff	2" Sch 40 PVC Riser
510	80	10	10	100			
505	85					Grayish-brown lean CLAY (CL) with sand, trace gravel, medium stiff, moist (glacial till)	Bentonite Grout
500	90	10	10	100			
495	95						
490	100	10	10	100			

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of BKG-1

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
485	105	10	10	100			
480	110	10	10	100			2" Sch 40 PVC Riser
475	115					Grayish-brown lean CLAY (CL), trace sand, trace gravel, medium stiff, moist	Bentonite Grout
470	120	10	10	100		Becomes soft	
465	125					Grayish-brown lean CLAY (CL), trace to no sand, no gravel, soft to medium soft, moist	Bentonite Chips (3/8")
460	130	10	10	100		Grayish to brown silty-CLAY (CL-ML) with silt laminae, very soft, wet	No. 40 Red Flint Sand
455	135					Clayey SAND (SC) to sandy silty-CLAY (CL-ML) with gravel, very soft, loose to very loose, wet	0.010" Slotted Screen (sch 40 PVC)
						Brownish-gray sandy silty-CLAY (CL-ML) with gravel, stiff, moist (glacial till)	

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of BKG-1

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
		10	10	100		Dark to medium gray SHALE, residuum to completely weathered, extremely weak, partial horizontal bedding, moist to damp with depth	
450						Becomes highly weathered, very weak, trace horizontal bedding	
		5	5	100			← No. 40 Red Flint Sand
	140						
						Total Boring Depth 141 feet below ground surface	
445							
	145						
440							
	150						
435							
	155						
430							
	160						
425							
	165						
420							
	170						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of BKG-2

Sheet 1 of 5

Date(s) Drilled	**06/05/2018 to 6/5/2018**	Logged By	**T. George**	Checked By	**WBL**
Drilling Method	**Sonic**	Drill Bit Size/Type	**6" OD casing**	Total Depth of Borehole	**145 ft**
Drill Rig Type	**ProSonic 600**	Drilling Contractor	**Cascade**	Surface Elevation	**588.62 ft msl**
Borehole Backfill	**Monitoring Well**	Sampling Method(s)	**Sonic**	Top of Casing Elevation	**591.31 ft msl**
Boring Location	**467523.50, 13627689.14**	Groundwater Level(s)	**10.96 ft. measured 06/25/2018**		

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Well Diagram	REMARKS AND OTHER DETAILS
	0	5	0	0		TOPSOIL Brown lean CLAY (CL) with sand, trace gravel, very stiff, moist (FILL) FILL Dark brown TOPSOIL, medium stiff, moist (FILL) Brown lean CLAY (CL) with gray mottling, with sand, trace gravel, stiff, moist		**Hand augered to 5 feet**
585						Brown gravelly clayey SAND (SC), moist		
	5	2.5	2.5	100		Brown lean CLAY (CL) with gray mottling, trace coarse sand, trace gravel, hard, moist Becomes with light gray calcareous veins		
580								
	10	10	10	100		Becomes stiff Becomes grayish brown and medium brown Becomes medium stiff		**2" Sch 40 PVC Riser** **Bentonite Grout**
575								
	15							
570						Grayish-brown lean CLAY (CL), trace isolated coarse sand, trace isolated gravel, soft, moist		
	20	10	10	100				
565								
	25							
560		10	10	100		Grayish-brown lean CLAY (CL), trace to no isolated coarse sand, no gravel, soft, moist		
	30							

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of BKG-2

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
	30						
555		10	10	100			
	35						2" Sch 40 PVC Riser
550							
	40	10	10	100			
545							
	45						Bentonite Grout
540						Becomes medium stiff, trace isolated coarse sand (glacial till)	
	50	10	10	100			
535							
	55					Brownish-gray clayey SAND (SC) with gravel, loose to medium dense, moist (glacial till)	
530						Brownish-gray lean CLAY (CL) with sand, trace gravel, medium stiff, moist (glacial till)	
	60	10	10	100			
525							
	65						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of BKG-2

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
		10	10	100			
520	70	10	10	100		Brownish-gray lean CLAY (CL) with sand, trace gravel, medium stiff, moist	
515	75						Bentonite Grout
		10	10	100		Becomes with increasing gravel	
510	80						
505	85					5" boulder	2" Sch 40 PVC Riser
		10	10	100			
500	90						
495	95						
		10	10	100			
490	100						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of BKG-2

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
485	105	10	10	100			2" Sch 40 PVC Riser
480	110	10	10	100			Bentonite Grout
475	115					Becomes soft	
470	120	10	10	100		Brownish-gray lean CLAY (CL), trace sand, trace gravel, soft to medium stiff, moist	Bentonite Chips
465	125						No. 40 Red Flint Sand
460	130	10	10	100		Grayish-brown silty-CLAY (CL-ML) with silt laminae, soft, wet Brownish-gray silty-CLAY (CL) with sand, trace gravel, soft, moist Grayish-brown silty-CLAY (CL-ML) with silt laminae, soft, wet	
455	135					Gray clayey SAND (SC) to sandy SILT (ML), very loose, very wet Gray silty-CLAY (CL-ML), soft, moist Becomes with sand, trace gravel, hard, moist Dark gray sandy silty-CLAY (CL-ML), trace gravel, stiff, moist	0.010" Slotted Screen (Sch 40 PVC)

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of BKG-2

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
		10	10	100			
450	140	7.5	7.5	100		Gray SHALE, completely to highly weathered, very weak, damp Becomes highly to moderately weathered	No. 40 Red Flint Sand Natural Collape
445	145					Total Boring Depth 145 feet below ground surface	
440	150						
435	155						
430	160						
425	165						
420	170						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-1

Sheet 1 of 5

Date(s) Drilled	**5/24/2018 to 5/25/2018**	Logged By	**T. George**	Checked By	**WBL**
Drilling Method	**Sonic**	Drill Bit Size/Type	**6" OD casing**	Total Depth of Borehole	**145 ft**
Drill Rig Type	**ProSonic 600 Truck Mount**	Drilling Contractor	**Cascade**	Surface Elevation	**591.41 ft msl**
Borehole Backfill	**Monitoring Well**	Sampling Method(s)	**Sonic**	Top of Casing Elevation	**591.29 ft msl**
Boring Location	**467065.76, 13629714.33**	Groundwater Level(s)	**7.67 ft. measured 06/25/2018**		

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Well Diagram	REMARKS AND OTHER DETAILS
	0					Coarse to fine silty SAND (SM) with gravel (FILL)		Hand augered 2.9 - 5.0 feet
590		2.9	2.9	100		Brown and Gray sandy silty CLAY (CL) with gravel, very stiff, moist (FILL)		
						Silty GRAVEL (GW) with slag (FILL)		
						Brown and gray lean CLAY (CL) with gravel, very stiff, moist		
						Brown lean CLAY (CL) with trace calcareous whitish-gray staining, gray mottling, very stiff, moist		
						No Recovery		
	5	5	0	0		Becomes hard		
585								
						Becomes very stiff		
	10	12	12	100				2" Sch 40 PVC Riser
580						Brown lean CLAY (CL) with trace to no sand, no gravel, gray mottling, stiff to very stIff, moist		
	15							Bentonite Grout
575						Brown lean CLAY (CL) with trace isolated coarse sand, gravel, gray mottling, very stiff becoming medium stiff, moist		
						Trace gravel present		
	20	10	10	100				
570						Brown lean CLAY (CL) with trace to no sand, no gravel, gray mottling, medium stiff, moist (glacial till)		
	25							
565						Brown lean CLAY (CL) with trace isolated gravel, stiff, moist		
		10	10	100				
	30					Brown lean CLAY (CL) with trace to no sand, no gravel, medium stiff, moist (glacial till)		

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-1

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
	30						
560		10	10	100		Becomes grayish-brown	
	35						2" Sch 40 PVC Riser
555						Becomes grayish-brown	
	40					Grayish-brown lean CLAY (CL) with trace to no sand, no gravel, medium stiff, moist	
550		10	10	100			
	45					Becomes soft to medium stiff	Bentonite Grout
545						Becomes soft	
	50						
540		10	10	100			
	55					Grayish-brown lean CLAY (CL) with trace to no sand, no gravel, soft to medium stiff, moist	
535						Becomes soft to medium soft with trace isolated coarse sand	
	60						
530		10	10	100			
	65						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-1

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
525		10	10	100		Brownish-gray lean CLAY (CL) with sand to trace sand, trace gravel, medium stiff, moist (glacial till)	
	70						2" Sch 40 PVC Riser
520		10	10	100			
	75						
515							
	80						Bentonite Grout
510		10	10	100			
	85						
505							
	90						
500		10	10	100			
	95						
495							
	100	10	10	100			

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-1

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
490							
	105	10	10	100			2" Sch 40 PVC Riser
485							
	110						Bentonite Grout
480		10	10	100			
	115						
475							
	120						
470		10	10	100			Bentonite Chips
	125					Becomes grayish-brown with reddish-brown mottles	
465						Grayish-brown lean CLAY (CL) to silty-CLAY (CL-ML), trace isolated coarse sand, soft to medium stiff, moist	No. 40 Red Flint Sand
	130						0.010" Slotted Screen (Sch 40 PVC)
460		10	10	100		Becomes moist to wet	
	135					Grayish-brown sandy silty-CLAY (CL-ML), trace gravel, medium soft to soft, moist to wet	

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-1

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
455		10	10	100		Brownish-gray clayey SAND (SC) with trace gravel, loose to very loose, wet to moist (glacial till)	
						Gray sandy silty-CLAY (CL-ML), trace gravel, hard, moist (glacial till)	
		4.5	4.5	100		Gray SHALE, completely weathered to highly weathered, extremely to very weak, damp	← No. 40 Red Flint Sand
	140					Becomes highly weathered, very weak	
450						Becomes moderately weathered	
						Total Boring Depth 141.5 feet below ground surface	
	145						
445							
	150						
440							
	155						
435							
	160						
430							
	165						
425							
	170						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-2

Sheet 1 of 5

Date(s) Drilled	**6/11/2018 to 6/12/2018**	Logged By	**T. George**	Checked By	**WBL**
Drilling Method	**Sonic**	Drill Bit Size/Type	**6" OD casing**	Total Depth of Borehole	**144 ft**
Drill Rig Type	**ProSonic 600 Truck Mount**	Drilling Contractor	**Cascade**	Surface Elevation	**590.25 ft msl**
Borehole Backfill	**Monitoring Well**	Sampling Method(s)	**Sonic**	Top of Casing Elevation	**589.94 ft msl**
Boring Location	**466770.78, 13629658.84**	Groundwater Level(s)	**5.94 ft. measured 06/25/2018**		

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Well Diagram	REMARKS AND OTHER DETAILS
590	0	5	0	0		Gray silty SAND (SM) with gravel; some sand and bottom ash; medium dense; moist (FILL)		Hand augered to 5 feet
						Brownish-gray silty GRAVEL (GW-GM) with sand, trace bottom ash and brick with slag (FILL)		
						Grayish-brown lean CLAY (CL); trace sand and gravel; very stiff; moist (FILL)		
585	5	2	2	100		Becomes brown with gray mottling Brown lean CLAY (CL); trace sand; gray mottling; very stiff to hard; moist (glacial till)		
580	10	10	10	100				2" sch 40 PVC Riser
575	15							
						Becomes grayish-brown, stiff		
570	20	10	10	100		Grayish-brown lean CLAY (CL); trace sand; no gravel; medium stiff; moist		Bentonite Grout
565	25	10	10	100				
	30							

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Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-2

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
560	30	10	10	100		Trace isolated gravel	
555	35					Becomes soft	
550	40	10	10	100			2" sch 40 PVC Riser
545	45						
540	50	10	10	100		Becomes brownish-gray	Bentonite Grout
535	55					Becomes medium stiff	
530	60	10	10	100		Brownish-gray lean CLAY (CL) with sand; trace gravel; medium stiff; moist (glacial till)	
	65						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-2

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
525		10	10	100			
520	70	10	10	100			
515	75						2" sch 40 PVC Riser
510	80	10	10	100			
505	85						Bentonite Grout
500	90	10	10	100			
495	95	10	10	100			
	100						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-2

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
490							
		10	10	100			
485	105						2" sch 40 PVC Riser
						Becomes medium stiff to soft	
480	110	10	10	100			
						Brownish-gray lean CLAY(CL); trace sand; no gravel; soft; moist (glacial till)	
475	115						Bentonite Grout
		10	10	100			
470	120					Trace gravel	
							Bentonite Chips
						Brownish-gray lean CLAY (CL) with sand; trace gravel; soft, moist	
465	125						No. 40 Red Flint Sand
						Brownish-gray silty CLAY (CL/ML); trace sand; moist to wet	
						Becomes with trace reddish-brown	
460	130	10	10	100		Brownish-gray to reddish-brown silty CLAY (CL/ML); with sand; trace gravel; soft to very soft; moist to wet (glacial till)	
							0.010" Slotted Screen (sch 40 PVC)
	135					Silty CLAY (CL/ML) with no gravel or sand, moist	

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-2

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
455		10	10	100		Brownish-gray sandy SILT (ML) with clayey SAND (SC); loose to very loose; wet	
						Gray sandy-silty CLAY (CL/ML); with gravel; very stiff; moist	
						Gray gravelly, silty CLAY (CL/ML); weather shale present; hard; moist	
						Gray SHALE bedrock; weathered; weak; damp	
						Becomes completely to highly weathered, very weak to extremely weak	
450	140	7	7	100			← No. 40 Red Flint Sand
						Becomes highly to moderately weathered, very weak	
						Total Boring Depth 144 feet below ground surface	
445	145						
440	150						
435	155						
430	160						
425	165						
	170						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-3

Sheet 1 of 5

Date(s) Drilled	**6/7/2018 to 6/7/2018**	Logged By	**T. George**	Checked By	**WBL**
Drilling Method	**Sonic**	Drill Bit Size/Type	**6" OD casing**	Total Depth of Borehole	**140 ft**
Drill Rig Type	**ProSonic 600 Truck Mount**	Drilling Contractor	**Cascade**	Surface Elevation	**589.20 ft msl**
Borehole Backfill	**Monitoring Well**	Sampling Method(s)	**Sonic**	Top of Casing Elevation	**589.02 ft msl**
Boring Location	**466489.65, 13629561.07**	Groundwater Level(s)	**6.21 ft. measured 06/25/2018**		

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Well Diagram	REMARKS AND OTHER DETAILS
	0					Brownish-gray coarse to fine grained SAND (SW/SM); with gravel; some slag and bottom ash (FILL)		Hand augered to 5 feet
		5	0	0		Gray lean CLAY (CL) with peat seams; stiff; moist Becomes without peat seams, bluish-gray Becomes bluish-gray with trace brown, increasing with depth		
585						Brown CLAY (CL); gray mottling; stiff; moist		
	5	2.5	2.5	100		Becomes with light gray calcareous blotches Brown lean CLAY (CL); gray mottling; trace sand; hard; moist (glacial till)		
						Becomes with trace gravel		
580								
	10	10	10	100		Gravelly lean CLAY (CL) with sand layer, very stiff Brown lean CLAY (CL); gray mottling; trace sand; hard; moist (glacial till)		2" sch 40 PVC riser
						Gravelly lean CLAY (CL) with sand layer Brown lean CLAY (CL) with trace sand; gray mottling; stiff; moist		
575								
	15							
						Grayish-brown lean CLAY (CL); trace coarse sand; no gravel; soft; moist		
570								
	20							Bentonite Grout
		10	10	100				
565								
	25							
		10	10	100				
560								
	30							

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Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-3

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
	30						
555		10	10	100			
	35						2" sch 40 PVC riser
550							
	40	10	10	100			
545							
	45						Bentonite Grout
540						Grayish-brown lean CLAY (CL); mottled; trace coarse sand; soft; moist	
	50	10	10	100		Increased coarse sand content	
535							
	55						
530						Brownish-gray CLAY (CL); trace sand and gravel; medium stiff; moist (glacial till)	
	60	10	10	100			
525							
	65						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-3

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
		10	10	100			
520	70	10	10	100			
515	75					Increased sand content	2" sch 40 PVC riser
510	80	10	10	100			
505	85						Bentonite Grout
500	90	10	10	100			
495	95						
490	100	10	10	100			

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-3

Sheet 4 of 5

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
485	105	10	10	100			2" sch 40 PVC riser
480	110	10	10	100		Becomes soft to medium stiff; trace sand and gravel	Bentonite Grout
475	115						
470	120	10	10	100			Bentonite Chips
465	125						No. 40 Red Flint Sand
460	130	10	10	100		Brownish-gray silty CLAY (CL/ML); silt laminae; trace gravel; soft to very soft; wet (glacial till)	0.010" Slotted Screen (sch 40 PVC)
455	135					Brownish-gray clayey SAND (SC); loose to very loose; wet Brownish-gray silty CLAY (CL/ML); with sand; trace gravel soft to very soft; wet (glacial till)	

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-3

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
		10	10	100		Gray sandy, silty CLAY (CL/ML); trace gravel; hard; moist (glacial till)	
						Dark gray gravelly, silty CLAY (CL/ML); weather bedrock fragments (shale); hard; moist	
		2.5	2.5	100		Gray SHALE bedrock; weathered; very weak; damp	← Natural Collapse
450	140					Total Boring Depth 140 feet below ground surface	
445	145						
440	150						
435	155						
430	160						
425	165						
420	170						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-4

Sheet 1 of 5

Date(s) Drilled	**5/29/2018 to 5/30/2018**	Logged By	**T. George**	Checked By	**WBL**
Drilling Method	**Sonic**	Drill Bit Size/Type	**6" OD casing**	Total Depth of Borehole	**142 ft**
Drill Rig Type	**ProSonic 600 Truck Mount**	Drilling Contractor	**Cascade**	Surface Elevation	**589.43 ft msl**
Borehole Backfill	**Monitoring Well**	Sampling Method(s)	**Sonic**	Top of Casing Elevation	**589.16 ft msl**
Boring Location	**466246.85, 13629419.29**	Groundwater Level(s)	**6.31 ft. measured 06/25/2018**		

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Well Diagram	REMARKS AND OTHER DETAILS
	0	3.5	3.5	100		Clay/Sand/Gravel mixture; dense, moist; trace brick fragments (FILL)		Hand augered 3.5 feet to 5 feet below ground surface
						Blue gray CLAY (CL) with decayed organic materials; mottled; trace sand		
585		1.5	0	0		Brown CLAY (CL); trace sand; gray mottling; stiff		
	5	2	2	100			▼	
		10	10	100		Becomes very stiff to hard		
580	10					Becomes stiff		
						Isolated coal seam		
						Grades to grayish brown		
575	15							2" sch 40 PVC Riser
		10	10	100		Grayish Brown CLAY (CL); trace coarse sand; soft; moist		
570	20							Bentonite Grout
565	25							
		10	10	100				
560	30							

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-4

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
	30	10	10	100		Grayish Brown CLAY (CL); trace coarse sand; soft; moist	
555	35						
550	40	10	10	100			2" sch 40 PVC Riser
545	45						
540	50	10	10	100			Bentonite Grout
535	55					Becomes trace gravel, medium stiff	
530	60	10	10	100			
525	65						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-4

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
		10	10	100			
520	70	10	10	100		Brownish gray CLAY(CL); trace to some sand; trace gravel; stiff; moist (glacial till)	
515	75						2" sch 40 PVC Riser
		10	10	100		Brownish gray CLAY(CL) with sand; trace gravel; medium stiff; moist (glacial till)	
510	80						
505	85						Bentonite Grout
		10	10	100			
500	90						
495	95	10	10	100			
		10	10	100			
490	100						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-4

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
485	105	10	10	100			2" sch 40 PVC Riser
480	110	10	10	100		Brownish gray CLAY(CL); trace sand; trace gravel; medium stiff; moist (glacial till)	Bentonite Grout
475	115						
470	120	10	10	100		Becomes soft to medium stiff	Bentonite Chips
465	125						No. 40 Red Flint Sand
460	130	10	10	100		Grayish brown CLAY (CL) and silty CLAY (CL/ML); trace sand; silt laminae; soft; moist Reddish-brown silty CLAY (CL/ML) with sand; trace gravel; soft; wet	0.010" Slotted Screen (sch 40 PVC)
455	135					Gray clayey SAND (SC); trace gravel; loose to very loose; wet Gray silty CLAY (CL/ML); trave gravel; stiff to very stiff; moist (glacial till)	

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-4

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
		10	10	100			No. 40 Red Flint Sand
450	140	5	7	100		Gray CLAY (CL); with sand; hard; moist; shale fragments Gray SHALE bedrock; highly weathered; damp Gray SHALE bedrock; moderately weathered; weathering increase with depth; damp	
						Total Boring Depth 142 feet below ground surface	
445	145						
440	150						
435	155						
430	160						
425	165						
420	170						

Project: DTE-CCR Groundwater Investigation	Log of MW-5
Project Location: DTE St. Clair	
Project Number: 6056402.3	Sheet 1 of 5

Date(s) Drilled	5/31/2018 to 5/31/2018	Logged By	T. George	Checked By	WBL
Drilling Method	Sonic	Drill Bit Size/Type	6" OD casing	Total Depth of Borehole	143.5 ft
Drill Rig Type	ProSonic 600 Truck Mount	Drilling Contractor	Cascade	Surface Elevation	590.31 ft msl
Borehole Backfill	Monitoring Well	Sampling Method(s)	Sonic	Top of Casing Elevation	590.06 ft msl
Boring Location	465857.83, 13629265.70	Groundwater Level(s)	50.15 ft. measured 06/25/2018		

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Well Diagram	REMARKS AND OTHER DETAILS
590	0	5.5	5.5	100		Brownish-gray coarse to fine grained SAND (SW/SM); with gravel; some slag and bottom ash (FILL)		Hand augered to 5.5 feet
						Brownish-gray clayey GRAVEL (GM); with sand (FILL)		
585	5					Greenish-gray fat CLAY (CH); mottled; trace fine sand laminae; medium stiff; some decayed oranics (peat)		
		11.5	11.5	100		Brown lean CLAY (CL); gray mottling; trace to no sand; very stiff; moist (glacial till) Some calcareous zones		
580	10							2" sch 40 PVC Riser
575	15					Becomes medium stiff		
		10	10	100		Grayish-brown CLAY (CL); trace coarse sand; soft; moist		
570	20							Bentonite Grout
565	25					Grayish-brown lean CLAY (CL); trace to no sand; trace to no gravel; soft; moist		
		10	10	100				
	30							

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Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-5

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
560	30						
		10	10	100			
555	35						
		10	10	100			
550	40						2" sch 40 PVC Riser
		10	10	100			
545	45						
		10	10	100			
540	50						Bentonite Grout
		10	10	100			
535	55						
						Increasing coarse sand and gravel	
530	60	10	10	100			
	65						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-5

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
525		10	10	100			
	70					Grayish-brown lean CLAY (CL); trace isolated coarse sand; trace isolated gravel; medium stiff; moist (glacial till)	
520		10	10	100			
	75						2" sch 40 PVC Riser
515							
						Brownish-gray lean CLAY (CL) with sand; trace gravel; medium stiff; moist (glacial till)	
	80						
510		10	10	100			
	85						Bentonite Grout
505							
	90						
500		10	10	100			
	95						
495							
		10	10	100			
	100						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-5

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
490							
		10	10	100			
485	105						2" sch 40 PVC Riser
480	110	10	10	100			
475	115					Brownish CLAY (CL); trace coarse sand; trace gravel (glacial till)	Bentonite Grout
		10	10	100			
470	120					Becomes medium-stiff to soft	
465	125						Bentonite Chips
		10	10	100			
460	130						No. 40 Red Flint Sand
		10	10	100			
						Brownish-gray silty CLAY (CL/ML); silt interbeds; fine sand laminae; moist to wet (glacial till)	
	135						

Project: DTE-CCR Groundwater Investigation
Project Location: DTE St. Clair
Project Number: 6056402.3

Log of MW-5

Elevation, feet	Depth, feet	SAMPLES: Run Length (ft)	SAMPLES: Recovery (ft)	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	REMARKS AND OTHER DETAILS
455		10	10	100		Becomes interbedded with soft brownish-gray with reddish-brown mottles	0.010" Slotted Screen (sch 40 PVC)
						Grayish-brown silty CLAY (CL/ML); with sand; trace gravel; mottled; very soft; wet	
450	140	6.5	6.5	100		Gray sandy CLAY (CL/ML) with silt and gravel; medium to very stiff moist	No. 40 Red Flint Sand
						Gray SHALE bedrock; highly weathered; very weak; damp	
						Total Boring Depth 143.5 feet below ground surface	
445	145						
440	150						
435	155						
430	160						
425	165						
	170						