



# **2014 Annual Groundwater Monitoring Report**

**Pontiac North Campus**

December 19, 2014



A handwritten signature in black ink, appearing to read "Theresa Olechiw".

---

Theresa Olechiw  
Associate Project Manager

A handwritten signature in black ink, appearing to read "Christi Kiker".

---

Christi Kiker, P.E.  
Principal Engineer, CPM

**Annual Groundwater  
Monitoring Report**

Pontiac North Campus

Prepared for:  
RACER Trust

Prepared by:  
ARCADIS of Michigan, LLC  
28550 Cabot Drive  
Suite 500  
Novi  
Michigan 48377  
Tel 248 994 2240  
Fax 248 994 2241

Our Ref.:  
B0064607.2014

Date:  
December 19, 2014

<b>List of Acronyms and Abbreviations</b>	<b>ii</b>
<b>1. Introduction</b>	<b>1</b>
<b>2. Groundwater Sampling Procedures</b>	<b>3</b>
2.1 Water Level Measurements	3
2.2 Groundwater Sample Collection	3
<b>3. Groundwater Sampling Results</b>	<b>4</b>
3.1 Groundwater Elevation	4
3.2 Analytical Results	4
<b>4. Conclusions</b>	<b>6</b>
<b>5. References</b>	<b>7</b>
<b>Tables</b>	
1 Groundwater Elevation Summary September 2014	
2 Groundwater Analytical Results Data Summary September 2014	
<b>Figures</b>	
1 Site Location	
2 Groundwater Contour Map September 2014	
3 Groundwater Analytical Summary September 2014	
<b>Appendices</b>	
A Letter to USEPA	
B Email Approval from USEPA	
C Historical Semi-Annual Sampling Event Groundwater Analytical Data Summary (on CD)	
D Chemical Concentration Graphs	

**List of Acronyms and Abbreviations**

cis-1,2-DCE	cis-1,2-dichloroethene
DO	dissolved oxygen
EEC	Encore Environmental Consortium, LLC
EI	Environmental Indicators
FSP	Field Sampling Plan
GM	General Motors LLC
GMP	Groundwater Monitoring Program
GSI	groundwater/surface water interface
LNAPL	light non-aqueous phase liquid
MLC	Motors Liquidation Company
mg/L	milligrams per liter
NRDWC	Non-residential Drinking Water Criteria
NTU	Nephelometric turbidity units
ORP	oxidation reduction potential
PCBs	polychlorinated biphenyls
PCE	tetrachloroethene
QAPP	Quality Assurance Project Plan
RACER	Revitalizing Auto Communities Environmental Response
RCRA	Resource Conservation and Recovery Act
RDWC	Residential Drinking Water Criteria
RFI	RCRA Facility Investigation
Site	Pontiac North Campus
SSPL	Site-specific parameter list
TCL	target compound list
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

**1. Introduction**

On July 10, 2009, Motors Liquidation Company (MLC; formerly known as General Motors Corporation), who filed for Chapter 11 protection under the Bankruptcy Code in federal court, sold certain assets to General Motors Company (now known as General Motors LLC [GM LLC]), including a portion of Pontiac North Campus. Effective March 31, 2011, the Revitalizing Auto Communities Environmental Response Trust (RACER) was created through a Bankruptcy Settlement Agreement among MLC, the federal government, 14 states, and the St. Regis Mohawk Tribe.

On October 30, 2009, MLC and GM jointly submitted a request to the U.S. Environmental Protection Agency (USEPA) to modify the Groundwater Monitoring Program (GMP; Appendix A) for the RACER Pontiac North Campus (hereafter referred to as the “Site”) in Pontiac, Michigan (Figure 1). The USEPA responded via email granting the request for modification to the plan (Appendix B).

The 2014 annual groundwater sampling event was conducted September 18 through 24, 2014 at the Site in accordance with the Resource Conservation and Recovery Act (RCRA) Environmental Indicators (EI) Report (CA725 [Current Human Exposures Under Control] and CA750 [Migration of Contaminated Groundwater Under Control]) (ENVIRON 2002) as amended by the 2009 Pontiac North Campus (PNC) GMP Modification Proposal approved November 23, 2009 by USEPA.

Groundwater and light non-aqueous phase liquid (LNAPL; if present) elevation measurements were recorded in 71 monitoring wells, and groundwater samples were collected from a sub-set of monitoring wells as presented in the EI Report (ENVIRON 2002) and approved by the USEPA (Appendices A and B). Beginning with the annual event in 2009, the focused set of monitoring wells located on and immediately downgradient from RACER-owned property is listed below.

<b>Shallow Saturated Zone</b>	
MW-40-99	MWM16-21
MWF1R	MWM16-43
MWF7-01	MWW1-04
MWF12-01	MWW10-03

The monitoring well locations are shown on Figures 2 and 3.

During the 2013 annual groundwater sampling event, it was discovered that monitoring well MW16-43 is damaged and no longer suitable for sampling. Monitoring well MW16-43 is located south of Columbia Ave near the former Plant 15. The well is assumed to have been damaged by activities performed by a demolition contractor and is now filled with gravel. Due to continuing construction activities by the current property owner, the monitoring well was not replaced in 2014. The monitoring well will be properly abandoned, and a replacement will be attempted in 2015.

The following sections of this report summarize the procedures used to complete the groundwater sampling and the analytical results for the groundwater samples collected during this event.

## **2. Groundwater Sampling Procedures**

### **2.1 Water Level Measurements**

Groundwater and LNAPL level measurements were recorded from accessible monitoring wells on September 18 through 24, 2014 in accordance with procedures outlined in the Field Sampling Plan (FSP) of the RCRA Facility Investigation (RFI) Work Plan (EEC 2001a) and Quality Assurance Project Plan (QAPP; EEC 2001b). Groundwater and LNAPL levels were measured to the nearest 0.01 foot with either a static water level meter or an oil/water interface probe. Groundwater elevations were calculated using surveyed top-of-well casing elevations. Equivalent groundwater elevations were calculated for wells where LNAPL was present. A summary of water levels and groundwater elevations is shown in Table 1.

### **2.2 Groundwater Sample Collection**

Groundwater samples were collected using low-flow sampling procedures, as presented in the FSP and QAPP. The procedures presented in the FSP are taken from the Low-Stress (or Low-Flow) Purging and Sampling Procedure (USEPA 1996), which is the USEPA Region V standard method for collecting low-stress/low-flow groundwater samples from monitoring wells.

During sampling, purge water was monitored for dissolved oxygen (DO), temperature, specific conductivity, turbidity, oxygen reduction potential (ORP), and pH. These water quality measurements were used to determine groundwater sample stability prior to collection of the groundwater samples submitted for laboratory analysis.

Groundwater samples were collected and submitted for laboratory analysis for target compound list (TCL) volatile organic compounds (VOCs) using USEPA Method 8260B, polychlorinated biphenyls (PCBs) using USEPA Method 8082, and select Site-specific parameter list (SSPL) metals using USEPA Method 6020 and 7470A. Groundwater samples were analyzed by TestAmerica in North Canton, Ohio in accordance with methods described in the RFI Work Plan.

### **3. Groundwater Sampling Results**

#### **3.1 Groundwater Elevation**

Groundwater elevations from shallow monitoring wells (screened across the water table) were used to create a shallow groundwater potentiometric surface map (Figure 2). Apparent shallow groundwater flow across the Site and the GM property is generally to the southwest; however, subsurface features (e.g., sewer lines, other man-made features, and re-worked native and fill material) may create localized effects (groundwater mounds or depressions), as shown on Figure 2. Groundwater elevation data will continue to be evaluated as part of the groundwater monitoring program to monitor potential changes in groundwater flow direction.

#### **3.2 Analytical Results**

The groundwater data were compared to select criteria from Michigan Department of Environmental Quality Operational Memorandum #1, Attachment #1, dated December 30, 2013. The select criteria used to evaluate groundwater quality at the Site include residential and non-residential drinking water criteria (RDWC and NRDWC), and volatilization to indoor air inhalation criteria. These criteria are presented in Table 2. A summary of the September 2014 annual sampling groundwater analytical data is included in Table 2 and presented on Figure 3. A summary of groundwater analytical data dating back to 2001 is included in Appendix C.

It should be noted that the criteria used for comparison include those designed to be protective of potential exposures via drinking water use and are conservative for evaluating the groundwater data from the shallow and intermediate saturated zones at the Site. The Site and the immediate vicinity obtain potable water from the City of Detroit and do not rely on local groundwater as a drinking water supply. Therefore, groundwater with constituent concentrations higher than these generic screening criteria does not necessarily indicate that the groundwater poses unacceptable risks; it only suggests that the potential for the groundwater to pose unacceptable risks should be evaluated considering Site-specific factors.

The RFI Supplemental Report No. 1 (EEC 2003) concluded that residential drinking water use was not a current or reasonably expected future use of the shallow and intermediate groundwater at the Site. However, groundwater at the Site does have the potential to migrate off site based on the calculated southwesterly groundwater flow direction. Due to the potential for off-site migration, RDWC are used for screening data

near the downgradient property boundary. The September 2014 groundwater data, presented in Table 2 and on Figure 3, have been compared to RDWC to assist the evaluation of groundwater quality near the downgradient property boundary.

The following is a summary of the September 2014 groundwater sample analytes and concentrations that exceeded selected screening criteria:

### **VOCs**

- No VOC exceedances of RDWC or NRDWC were detected in groundwater samples collected during the September 2014 sampling event.

### **PCBs**

- No PCB exceedances of RDWC or NRDWC were detected in groundwater samples collected during the September 2014 sampling event. An exceedance of the Groundwater Surface Water Interface (GSI) was detected in the groundwater sample collected at monitoring well MWW1-04 during the September 2014 sampling event. The GSI criteria for Aroclor-1248 (PCB-1248) is 0.0002 milligram per liter (mg/L), and the PCB sample result for monitoring well MWW1-04 was 0.000348 mg/L.

### **Inorganics**

- The concentration of total manganese detected at monitoring well MWF12-01 (2.4 mg/L) exceeds the aesthetic RDWC and NRDWC of 0.05 mg/L, but is lower than the Non-residential Health-Based Drinking Water criteria of 2.5 mg/L. The turbidity of the sample from monitoring well MWF12-01 was 7.10 Nephelometric turbidity units (NTU).
- The concentration of vanadium detected at monitoring well MWW1-04 was 0.013 mg/L (duplicate was 0.014 mg/L), which is higher than the RDWC of 0.0045 mg/L but lower than the NRDWC of 0.062 mg/L.

### **pH**

- Monitoring well MWW1-04 exhibited an elevated pH reading of 11.84. The pH readings from the remaining wells sampled in September 2014 were within the RDWC and NRDWC pH range of 6.5 to 8.5.

#### 4. Conclusions

Overall, groundwater analytical results are similar to previous sampling results at the majority of locations. Select key constituents detected in numerous events were graphed to show trends in concentration over time. These graphs are presented in Appendix D. The conclusions are as follows:

- The concentrations of 1,1-dichloroethene in monitoring well MWF7-01 indicate that they are decreasing and are stable in monitoring well MWF12-01 (downgradient of MWF7-01), both concentrations of which are lower than the NRDWC of 0.007 mg/L. This may indicate that degradation of 1, 1-dichloroethene is naturally occurring at the Site.
- Concentrations of both cis-1,2-dichloroethene (cis-1,2-DCE) and tetrachloroethene (PCE) have decreased since 2009 at monitoring well MWF7-01. Both constituents are lower than the NRDWC of 0.07 mg/L for cis-1,2-DCE and 0.005 mg/L for PCE. This may indicate that degradation is naturally occurring at the Site.
- The concentration of manganese in monitoring well MWW10-03 indicates that it is decreasing and stable. The concentration of manganese in MWF12-01 appears to have an increasing trend but is lower the health-based NRDWC of 2.5 mg/L in the 2014 sampling event.
- The concentrations of total PCBs in monitoring well MWW1-04 have fluctuated over time. The 2014 groundwater result of 0.000348 mg/L was a decrease from last year; continuing the overall downward trend.
- The concentration of vanadium in monitoring well MWW1-04 is stable and has been decreasing since 2009. The concentrations of vanadium in MWW1-04 have remained lower than the NRDWC of 0.062 mg/L.

Overall these results indicate that impacted groundwater on site is exhibiting a decreasing and stable footprint.

A revised groundwater monitoring program is in development and will continue to monitor these trends; in particular, manganese. Upon approval of the Corrective Measures Proposal, the groundwater monitoring program will be finalized. It will include monitoring points, parameters, duration, and monitoring objectives to maintain groundwater compliance and move toward Site closure.

## 5. References

Encore Environmental Consortium, LLC (EEC). 2011a. RCRA Facility Investigation (RFI) Work Plan, General Motors Corporation, Pontiac North Campus, Pontiac, Michigan. May, 2011.

EEC. 2011b. Quality Assurance Project Plan (QAPP), General Motors Corporation, Pontiac North Campus, Pontiac, Michigan. May, 2011.

EEC. 2013. RCRA Facility Investigation (RFI) Supplemental Report No. 1, General Motors Corporation, Pontiac North Campus, Pontiac, Michigan. November, 2013.

ENVIRON International Corporation (ENVIRON). 2002. Resource Conservation and Recovery Act Environmental Indicators Report, General Motors Corporation, Pontiac North Campus Facility, Pontiac, Michigan. July, 2002.

Michigan Department of Environmental Quality. 2013. Operational Memorandum #1, Attachment #1, Cleanup Criteria Requirements for Response Activity. December 30.

U.S. Environmental Protection Agency (USEPA; Region I). 1996. Low-Stress (or Low-Flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells – Revision 2. July 30, 1996.



**Tables**

**Table 1  
Groundwater Elevation Summary, September 2014**

**2014 Annual Groundwater Monitoring Report  
RACER Trust Pontiac North Campus**

Well ID	Well Elevation <sup>1</sup>	Depth to Water (ft)	Depth to LNAPL (ft)	Groundwater Elevation	LNAPL Thickness (ft)	Equivalent Groundwater Elevation <sup>2</sup>
<b>SITEWIDE</b>						
MWP1R	982.67	18.42	--	964.25	--	--
MWF1R	971.74	25.67	--	946.07	--	--
MWP4	977.31	13.46	--	963.85	--	--
<b>OFFSITE</b>						
MWOS-01	943.74	7.55	--	936.19	--	--
MWOS-02	943.46	7.21	---	936.25	---	---
MWOS-04	942.52	4.12	---	938.40	---	---
MWOS-06	944.01	1.57	---	942.44	---	---
MW ROW 03	942.38	0.90	---	941.48	---	---
<b>FIERO</b>						
<b>F-7</b>						
MWF7-01	970.30	20.35	--	949.95	--	--
<b>F-8</b>						
MWF8-01	972.94	18.91	--	954.03	--	--
<b>F-12</b>						
MWF12-01	965.39	17.85	--	947.54	--	--
MWF12-02	966.81	18.72	--	948.09	--	--
<b>PONTIAC SCHOOL BOARD PROPERTY</b>						
MWPS-02	942.30	4.60	--	937.70	--	--
<b>DEMOLITION AREA</b>						
<b>W-1</b>						
MWW1-04	944.20	4.69	--	939.51	--	--
MWW1-06	943.63	7.46	--	936.17	--	--
MW-40-99	952.32	9.79	--	942.53	--	--
TW-01-01	972.95	DRY		NA		
TW-01-02	973.38	21.25	---	952.13	---	---
TW-01-03	969.06	16.45	---	952.61	---	---
<b>W-8</b>						
MWW8-34	966.55	15.02	TRACE	951.53	--	--
MWW8-36	968.62	17.21	16.6	951.41	0.61	951.53
MWW8-45	968.40	17.79	---	950.61	---	---
MWW8-48	971.08	22.92	19.98	948.16	2.94	948.75
RWW8-119	969.36	18.55	--	950.81	--	--
RWW8-124	967.77	17.00	--	950.77	--	--
RWW8-125	967.64	16.96	--	950.68	--	--
RWW8-129	966.71	17.31	15.94	949.40	1.37	949.67
RWW8-130	966.44	15.81	--	950.63	--	--
RWW8-131	966.01	15.39	--	950.62	--	--
RWW8-132	965.47	14.95	--	950.52	--	--
RWW8-133	966.34	17.25	15.71	949.09	1.54	949.40
TW-11-01	969.28	7.85	7.81	961.43	0.04	961.44
TW-11-02	970.38	5.03	5.02	965.35	0.01	965.35
TW-09-01	970.01	18.29	18.27	951.72	0.02	951.72
TW-10-01	971.91	20.56	---	951.35	---	---
TW-10-02	971.83	19.55	---	952.28	---	---
TWW8-01	969.37	DRY	---	NA	---	---

**Table 1**  
**Groundwater Elevation Summary, September 2014**

**2014 Annual Groundwater Monitoring Report**  
**RACER Trust Pontiac North Campus**

Well ID	Well Elevation <sup>1</sup>	Depth to Water (ft)	Depth to LNAPL (ft)	Groundwater Elevation	LNAPL Thickness (ft)	Equivalent Groundwater Elevation <sup>2</sup>
<b>W-10</b>						
MWW10-07	967.11	5.67	---	961.44	---	---
MWW10-09	966.81	7.21	---	959.60	---	---
MWW10-SEN01	967.31	18.73	---	948.58	---	---
MWW10-SEN02	967.68	25.19	---	942.49	---	---
MWW10-SEN03	981.67	38.24	---	943.43	---	---
MWW10-SEN04	971.12	27.99	---	943.13	---	---
MWW10-SEN05	970.78	15.93	---	954.85	---	---
<b>MFD</b>						
<b>M-2</b>						
MWM2-04	967.68	14.36	---	953.32	---	---
MWM2-06	967.72	14.50	---	953.22	---	---
MWM2-07	967.60	AT SURFACE	---	NA	---	---
MWM2-08	967.56	14.91	---	952.65	---	---
MWM2-18	967.59	14.31	---	953.28	---	---
MWM2-19	967.75	14.50	---	953.25	---	---
MWM2-20	967.30	14.10	---	953.20	---	---
MWM2-22	967.56	14.08	---	953.48	---	---
MWM2-23	967.61	14.20	---	953.41	---	---
MWM2-24	967.36	13.90	---	953.46	---	---
MWM2-28	967.70	13.81	---	953.89	---	---
MWM2-29	967.63	22.90	21.75	944.73	1.15	944.96
MWM2-33R	967.55	46.05	---	921.50	---	---
MWM2-35	967.55	46.06	---	921.49	---	---
TWM2-01	967.23	6.11	---	961.12	---	---
TWM2-02	967.52	1.18	---	966.34	---	---
TWM2-03	967.76	DRY	---	NA	---	---
TWM2-04	967.64	2.48	---	965.16	---	---
TWM2-05	967.69	7.70	7.30	959.99	0.40	960.07
TWM2-06	967.53	8.22	---	959.31	---	---
TWM2-07	967.59	15.21	13.48	952.38	1.73	952.73
<b>M-4</b>						
MWM4-05	985.70	7.49	--	978.21	--	--
<b>M-5</b>						
MWM5-02	977.07	19.41	---	957.66	---	---
MWM5-03	978.78	20.98	---	957.80	---	---
MWM5-04	979.55	21.73	---	957.82	---	---
<b>M-16</b>						
MWM16-37	980.37	22.86	---	957.51	---	---
<b>M-1</b>						
MWM1-02	964.27	13.48	---	950.79	---	---

NA = not applicable

CNL = Could not locate

LNAPL = light non-aqueous phase liquid

**Footnotes:**

1 - Top of Casing Elevation is in feet National Vertical Geodetic Datum (1988).

2 - The equivalent groundwater (GW) elevation is calculated where LNAPL is present using the LNAPL surface elevation, the thickness of LNAPL and the approximate specific density of the LNAPL (0.8). The calculation is as follows:

$$\text{Equivalent GW elevation} = \text{LNAPL surface elevation} - ([1 - \text{specific density of the LNAPL}] \times \text{LNAPL thickness})$$

Table 2  
Groundwater Analytical Results Data Summary, September 2014

2014 Annual Groundwater Monitoring Report  
RACER Trust Pontiac North Campus

Location ID: Sample Depth(): Date Collected:	Groundwater Surface Water Interface	Non-Residential Drinking Water	Non-Residential Health Based Drinking Water Value	Non-Res GW Volatilization to Indoor Air Inhalation	Residential Drinking Water	Res GW Volatilization to Indoor Air Inhalation	Units	MW-40-99 09/18/14	MWF1R 09/19/14	MWF7-01 09/19/14	MWF7-01 DUPLICATE 09/19/14
<b>PCBs</b>											
Aroclor-1016	0.0002	0.0005	--	0.045	0.0005	0.045	mg/L	NA	NA	NA	NA
Aroclor-1221	0.0002	0.0005	--	0.045	0.0005	0.045	mg/L	NA	NA	NA	NA
Aroclor-1232	0.0002	0.0005	--	0.045	0.0005	0.045	mg/L	NA	NA	NA	NA
Aroclor-1242	0.0002	0.0005	--	0.045	0.0005	0.045	mg/L	NA	NA	NA	NA
Aroclor-1248	0.0002	0.0005	--	0.045	0.0005	0.045	mg/L	NA	NA	NA	NA
Aroclor-1254	0.0002	0.0005	--	0.045	0.0005	0.045	mg/L	NA	NA	NA	NA
Aroclor-1260	0.0002	0.0005	--	0.045	0.0005	0.045	mg/L	NA	NA	NA	NA
<b>Volatile Organics</b>											
Acetone	1.7	2.1	--	1,000,000	0.73	1,000,000	mg/L	0.031	<0.025	<0.025	<0.025
Benzene	0.2	0.005	--	35	0.005	5.6	mg/L	<0.001	<0.001	<0.001	<0.001
Bromodichloromethane	--	0.08	--	37	0.08	4.8	mg/L	<0.001	<0.001	<0.001	<0.001
Bromoform	--	0.08	--	3,100	0.08	470	mg/L	<0.001	<0.001	<0.001	<0.001
Bromomethane	0.035	0.029	--	9	0.01	4	mg/L	<0.001	<0.001	<0.001	<0.001
2-Butanone	2.2	38	--	240,000	13	240,000	mg/L	<0.025	<0.025	<0.025	<0.025
Carbon Disulfide	--	2.3	--	550	0.8	250	mg/L	<0.005	<0.005	<0.005	<0.005
Carbon Tetrachloride	0.045	0.005	--	2.4	0.005	0.37	mg/L	<0.001	<0.001	<0.001	<0.001
CFC-11	--	7.3	--	1,100	2.6	1,100	mg/L	<0.001	<0.001	<0.001	<0.001
CFC-12	--	4.8	--	300	1.7	220	mg/L	<0.001	<0.001	<0.001	<0.001
Chlorobenzene	0.025	0.1	--	470	0.1	210	mg/L	<0.001	<0.001	<0.001	<0.001
Chlorodibromomethane	--	0.08	--	110	0.08	14	mg/L	<0.001	<0.001	<0.001	<0.001
Chloroethane	1.1	1.7	--	5,700	0.43	5,700	mg/L	<0.001	<0.001	<0.001	<0.001
Chloroform	0.35	0.08	--	180	0.08	28	mg/L	<0.001	<0.001	<0.001	<0.001
Chloromethane	--	1.1	--	45	0.26	8.6	mg/L	<0.001	<0.001	<0.001	<0.001
Cyclohexane	--	--	--	--	--	--	mg/L	<0.001	<0.001	<0.001	<0.001
1,2-Dibromo-3-chloropropane	--	0.0002	--	1.2	0.0002	0.22	mg/L	<0.001	<0.001	<0.001	<0.001
1,2-Dibromoethane	0.0057	0.00005	--	15	0.00005	2.4	mg/L	<0.001	<0.001	<0.001	<0.001
1,2-Dichlorobenzene	0.013	0.6	--	160	0.6	160	mg/L	<0.001	<0.001	<0.001	<0.001
1,3-Dichlorobenzene	0.028	0.019	--	41	0.0066	18	mg/L	<0.001	<0.001	<0.001	<0.001
1,4-Dichlorobenzene	0.017	0.075	--	74	0.075	16	mg/L	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethane	0.74	2.5	--	2,300	0.88	1,000	mg/L	<0.001	0.00028 J	0.0049 J	0.0072 J
1,2-Dichloroethane	0.36	0.005	--	59	0.005	9.6	mg/L	<0.001	<0.001	<0.001	<0.001
1,1-Dichloroethene	0.13	0.007	--	1.3	0.007	0.2	mg/L	<0.001	<0.001	0.0013	0.0017
cis-1,2-Dichloroethene	0.62	0.07	--	210	0.07	93	mg/L	<0.001	<0.001	0.00045 J	0.00081 J
trans-1,2-Dichloroethene	1.5	0.1	--	200	0.1	85	mg/L	<0.001	<0.001	<0.001	<0.001
Dichloromethane	1.5	0.005	--	1,400	0.005	220	mg/L	<0.005	<0.005	<0.005	<0.005
1,2-Dichloropropane	0.23	0.005	--	36	0.005	16	mg/L	<0.001	<0.001	<0.001	<0.001
cis-1,3-Dichloropropene	0.009	--	--	--	--	--	mg/L	<0.001	<0.001	<0.001	<0.001
trans-1,3-Dichloropropene	--	--	--	--	--	--	mg/L	<0.001	<0.001	<0.001	<0.001
Ethylbenzene	0.018	0.074	0.7	170	0.074	110	mg/L	<0.001	<0.001	<0.001	<0.001
Isopropylbenzene	0.028	2.3	--	56	0.8	56	mg/L	<0.005	<0.005	<0.005	<0.005
Methyl acetate	--	--	--	--	--	--	mg/L	<0.01	<0.01	<0.01	<0.01
Methyl N-Butyl Ketone	--	2.9	--	8,700	1	4,200	mg/L	<0.05	<0.05	<0.05	<0.05
Methylcyclohexane	--	--	--	--	--	--	mg/L	<0.001	<0.001	<0.001	<0.001
4-Methyl-2-pentanone	--	5.2	--	20,000	1.8	20,000	mg/L	<0.05	<0.05	<0.05	<0.05
Methyl tert-butyl ether	7.1	0.04	0.69	47,000	0.04	47,000	mg/L	<0.005	<0.005	<0.005	<0.005

Table 2  
Groundwater Analytical Results Data Summary, September 2014

2014 Annual Groundwater Monitoring Report  
RACER Trust Pontiac North Campus

Location ID: Sample Depth(): Date Collected:	Groundwater Surface Water Interface	Non-Residential Drinking Water	Non-Residential Health Based Drinking Water Value	Non-Res GW Volatilization to Indoor Air Inhalation	Residential Drinking Water	Res GW Volatilization to Indoor Air Inhalation	Units	MW-40-99 09/18/14	MWF1R 09/19/14	MWF7-01 09/19/14	MWF7-01 DUPLICATE 09/19/14
Styrene	0.08	0.1	--	310	0.1	170	mg/L	<0.001	<0.001	<0.001	<0.001
1,1,2,2-Tetrachloroethane	0.078	0.035	--	77	0.0085	12	mg/L	<0.001	<0.001	<0.001	<0.001
Tetrachloroethene	0.06	0.005	--	170	0.005	25	mg/L	<0.001	<0.001	0.00091 J	0.00099 J
Toluene	0.27	0.79	1	530	0.79	530	mg/L	<0.001	<0.001	<0.001	<0.001
1,2,4-Trichlorobenzene	0.099	0.07	--	300	0.07	300	mg/L	<0.001	<0.001	<0.001	<0.001
1,1,1-Trichloroethane	0.089	0.2	--	1,300	0.2	660	mg/L	<0.001	<0.001	0.014	0.014
1,1,2-Trichloroethane	0.33	0.005	--	110	0.005	17	mg/L	<0.001	<0.001	<0.001	<0.001
Trichloroethene	0.2	0.005	--	4.9	0.005	2.2	mg/L	<0.001	<0.001	0.00016 J	0.0002 J
1,1,2-trichloro-1,2,2-trifluoroethane	0.032	170	--	170	170	170	mg/L	<0.001	<0.001	<0.001	<0.001
Vinyl Chloride	0.013	0.002	--	13	0.002	1.1	mg/L	<0.001	<0.001	<0.001	<0.001
Total Xylenes	0.041	0.28	10	190	0.28	190	mg/L	<0.002	<0.002	<0.002	<0.002
<b>Inorganics</b>											
Antimony	0.13	0.006	--	--	0.006	--	mg/L	NA	NA	NA	NA
Lead	--	0.004	--	--	0.004	--	mg/L	NA	NA	NA	NA
Manganese	--	0.05	2.5	--	0.05	--	mg/L	NA	NA	NA	NA
Vanadium	0.027	0.062	--	--	0.0045	--	mg/L	NA	NA	NA	NA
<b>Field Parameters</b>											
pH	pH units	--	--	--	--	--	--	7.25	7.22	7.08	7.08
Turbidity	NTU	--	--	--	--	--	--	11.90	1.53	2.85	2.85

Table 2  
Groundwater Analytical Results Data Summary, September 2014

2014 Annual Groundwater Monitoring Report  
RACER Trust Pontiac North Campus

Location ID: Sample Depth(): Date Collected:	Groundwater Surface Water Interface	Non-Residential Drinking Water	Non-Residential Health Based Drinking Water Value	Non-Res GW Volatilization to Indoor Air Inhalation	Residential Drinking Water	Res GW Volatilization to Indoor Air Inhalation	Units	MWF12-01 09/19/14	MWM16-21 09/19/14	MWW1-04 09/23/14	MWW1-04 DUPLICATE 09/23/14	MWW10-03 09/18/14
<b>PCBs</b>												
Aroclor-1016	0.0002	0.0005	--	0.045	0.0005	0.045	mg/L	NA	NA	<0.000098	<0.0001	<0.000095
Aroclor-1221	0.0002	0.0005	--	0.045	0.0005	0.045	mg/L	NA	NA	<0.000098	<0.0001	<0.000095
Aroclor-1232	0.0002	0.0005	--	0.045	0.0005	0.045	mg/L	NA	NA	<0.000098	<0.0001	<0.000095
Aroclor-1242	0.0002	0.0005	--	0.045	0.0005	0.045	mg/L	NA	NA	<0.000098	<0.0001	<0.000095
Aroclor-1248	0.0002	0.0005	--	0.045	0.0005	0.045	mg/L	NA	NA	0.00027	<0.0001	<0.000095
Aroclor-1254	0.0002	0.0005	--	0.045	0.0005	0.045	mg/L	NA	NA	0.000078 J	<0.0001	<0.000095
Aroclor-1260	0.0002	0.0005	--	0.045	0.0005	0.045	mg/L	NA	NA	<0.000098	<0.0001	<0.000095
<b>Volatile Organics</b>												
Acetone	1.7	2.1	--	1,000,000	0.73	1,000,000	mg/L	<0.025	<0.025	NA	NA	<0.025
Benzene	0.2	0.005	--	35	0.005	5.6	mg/L	<0.001	<0.001	NA	NA	<0.001
Bromodichloromethane	--	0.08	--	37	0.08	4.8	mg/L	<0.001	<0.001	NA	NA	<0.001
Bromoform	--	0.08	--	3,100	0.08	470	mg/L	<0.001	<0.001	NA	NA	<0.001
Bromomethane	0.035	0.029	--	9	0.01	4	mg/L	<0.001	<0.001	NA	NA	<0.001
2-Butanone	2.2	38	--	240,000	13	240,000	mg/L	<0.025	<0.025	NA	NA	<0.025
Carbon Disulfide	--	2.3	--	550	0.8	250	mg/L	<0.005	<0.005	NA	NA	<0.005
Carbon Tetrachloride	0.045	0.005	--	2.4	0.005	0.37	mg/L	<0.001	<0.001	NA	NA	<0.001
CFC-11	--	7.3	--	1,100	2.6	1,100	mg/L	<0.001	<0.001	NA	NA	<0.001
CFC-12	--	4.8	--	300	1.7	220	mg/L	<0.001	<0.001	NA	NA	<0.001
Chlorobenzene	0.025	0.1	--	470	0.1	210	mg/L	<0.001	<0.001	NA	NA	<0.001
Chlorodibromomethane	--	0.08	--	110	0.08	14	mg/L	<0.001	<0.001	NA	NA	<0.001
Chloroethane	1.1	1.7	--	5,700	0.43	5,700	mg/L	<0.001	<0.001	NA	NA	<0.001
Chloroform	0.35	0.08	--	180	0.08	28	mg/L	<0.001	<0.001	NA	NA	<0.001
Chloromethane	--	1.1	--	45	0.26	8.6	mg/L	<0.001	<0.001	NA	NA	<0.001
Cyclohexane	--	--	--	--	--	--	mg/L	<0.001	<0.001	NA	NA	<0.001
1,2-Dibromo-3-chloropropane	--	0.0002	--	1.2	0.0002	0.22	mg/L	<0.001	<0.001	NA	NA	<0.001
1,2-Dibromoethane	0.0057	0.00005	--	15	0.00005	2.4	mg/L	<0.001	<0.001	NA	NA	<0.001
1,2-Dichlorobenzene	0.013	0.6	--	160	0.6	160	mg/L	<0.001	<0.001	NA	NA	<0.001
1,3-Dichlorobenzene	0.028	0.019	--	41	0.0066	18	mg/L	<0.001	<0.001	NA	NA	<0.001
1,4-Dichlorobenzene	0.017	0.075	--	74	0.075	16	mg/L	<0.001	<0.001	NA	NA	<0.001
1,1-Dichloroethane	0.74	2.5	--	2,300	0.88	1,000	mg/L	0.0046	<0.001	NA	NA	<0.001
1,2-Dichloroethane	0.36	0.005	--	59	0.005	9.6	mg/L	<0.001	<0.001	NA	NA	<0.001
1,1-Dichloroethene	0.13	0.007	--	1.3	0.007	0.2	mg/L	0.0022	<0.001	NA	NA	<0.001
cis-1,2-Dichloroethene	0.62	0.07	--	210	0.07	93	mg/L	0.0002 J	<0.001	NA	NA	<0.001
trans-1,2-Dichloroethene	1.5	0.1	--	200	0.1	85	mg/L	<0.001	<0.001	NA	NA	<0.001
Dichloromethane	1.5	0.005	--	1,400	0.005	220	mg/L	<0.005	<0.005	NA	NA	<0.005
1,2-Dichloropropane	0.23	0.005	--	36	0.005	16	mg/L	<0.001	<0.001	NA	NA	<0.001
cis-1,3-Dichloropropene	0.009	--	--	--	--	--	mg/L	<0.001	<0.001	NA	NA	<0.001
trans-1,3-Dichloropropene	--	--	--	--	--	--	mg/L	<0.001	<0.001	NA	NA	<0.001
Ethylbenzene	0.018	0.074	0.7	170	0.074	110	mg/L	<0.001	<0.001	NA	NA	<0.001
Isopropylbenzene	0.028	2.3	--	56	0.8	56	mg/L	<0.005	<0.005	NA	NA	<0.005
Methyl acetate	--	--	--	--	--	--	mg/L	<0.01	<0.01	NA	NA	<0.01
Methyl N-Butyl Ketone	--	2.9	--	8,700	1	4,200	mg/L	<0.05	<0.05	NA	NA	<0.05
Methylcyclohexane	--	--	--	--	--	--	mg/L	<0.001	<0.001	NA	NA	<0.001
4-Methyl-2-pentanone	--	5.2	--	20,000	1.8	20,000	mg/L	<0.05	<0.05	NA	NA	<0.05
Methyl tert-butyl ether	7.1	0.04	0.69	47,000	0.04	47,000	mg/L	<0.005	<0.005	NA	NA	<0.005

Table 2  
Groundwater Analytical Results Data Summary, September 2014

2014 Annual Groundwater Monitoring Report  
RACER Trust Pontiac North Campus

Location ID: Sample Depth(): Date Collected:	Groundwater Surface Water Interface	Non-Residential Drinking Water	Non-Residential Health Based Drinking Water Value	Non-Res GW Volatilization to Indoor Air Inhalation	Residential Drinking Water	Res GW Volatilization to Indoor Air Inhalation	Units	MWF12-01 09/19/14	MWM16-21 09/19/14	MWW1-04 09/23/14	MWW1-04 DUPLICATE 09/23/14	MWW10-03 09/18/14
Styrene	0.08	0.1	--	310	0.1	170	mg/L	<0.001	<0.001	NA	NA	<0.001
1,1,2,2-Tetrachloroethane	0.078	0.035	--	77	0.0085	12	mg/L	<0.001	<0.001	NA	NA	<0.001
Tetrachloroethene	0.06	0.005	--	170	0.005	25	mg/L	<0.001	<0.001	NA	NA	<0.001
Toluene	0.27	0.79	1	530	0.79	530	mg/L	<0.001	<0.001	NA	NA	<0.001
1,2,4-Trichlorobenzene	0.099	0.07	--	300	0.07	300	mg/L	<0.001	<0.001	NA	NA	<0.001
1,1,1-Trichloroethane	0.089	0.2	--	1,300	0.2	660	mg/L	0.025	<0.001	NA	NA	<0.001
1,1,2-Trichloroethane	0.33	0.005	--	110	0.005	17	mg/L	<0.001	<0.001	NA	NA	<0.001
Trichloroethene	0.2	0.005	--	4.9	0.005	2.2	mg/L	<0.001	<0.001	NA	NA	<0.001
1,1,2-trichloro-1,2,2-trifluoroethane	0.032	170	--	170	170	170	mg/L	<0.001	<0.001	NA	NA	<0.001
Vinyl Chloride	0.013	0.002	--	13	0.002	1.1	mg/L	<0.001	0.00034 J	NA	NA	<0.001
Total Xylenes	0.041	0.28	10	190	0.28	190	mg/L	<0.002	<0.002	NA	NA	<0.002
<b>Inorganics</b>												
Antimony	0.13	0.006	--	--	0.006	--	mg/L	NA	NA	0.003	0.0031	NA
Lead	--	0.004	--	--	0.004	--	mg/L	NA	NA	NA	NA	<0.001 B
Manganese	--	0.05	2.5	--	0.05	--	mg/L	2.4	NA	NA	NA	0.03
Vanadium	0.027	0.062	--	--	0.0045	--	mg/L	NA	NA	0.013	0.014	NA
<b>Field Parameters</b>												
pH	pH units	--	--	--	--	--	--	7.10	7.10	11.84	11.84	7.11
Turbidity	NTU	--	--	--	--	--	--	1.51	7.08	3.50	3.50	1.01

2014 Annual Groundwater Monitoring Report  
RACER Trust Pontiac North Campus**Notes:**

All criteria listed are from Michigan Department of Environmental Quality Operational Memorandum #1, Attachment #1, dated December 30, 2013.

Bold values exceed Michigan Non-residential drinking water criteria

Shaded values exceed Michigan residential drinking water criteria

Red values exceed Michigan Groundwater Surface Water Interface Criteria

"<" indicates the analyte not detected greater than the reporting limit listed.

"J" indicates the result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.

"B" indicates a result that exceeds the Method Detection Limit and/or Reporting Limit in the Method Blank.

GW = Groundwater

mg/L = milligrams per liter

NA = not available

NTU = Nephelometric turbidity units

PCB = polychlorinated biphenyl

1. The criteria listed is for Total PCBs.

2. Groundwater Surface Water Interface Criteria listed is calculated based on a hardness of 150 mg/L-CaCO<sub>3</sub> for southern Lower Peninsula Waters protected as a drinking water source.

**Criteria footnotes:**

"A" Criterion is the state of Michigan drinking water standard established pursuant to Section 5 of 1976 PA 399, MCL 325.1005.

"D" Calculated criterion exceeds 100 percent, hence it is reduced to 100 percent or 1.0E+9 parts per billion (ppb).

"E" Criterion is the aesthetic drinking water value, as required by Section 20120a(5) of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

"G" Groundwater surface water interface (GSI) criterion depends on the pH or water hardness, or both, of the receiving surface water.

"M" Calculated criterion is below the analytical target detection limit, therefore, the criterion defaults to the target detection limit.

"NLV" Hazardous substance is not likely to volatilize under most conditions.

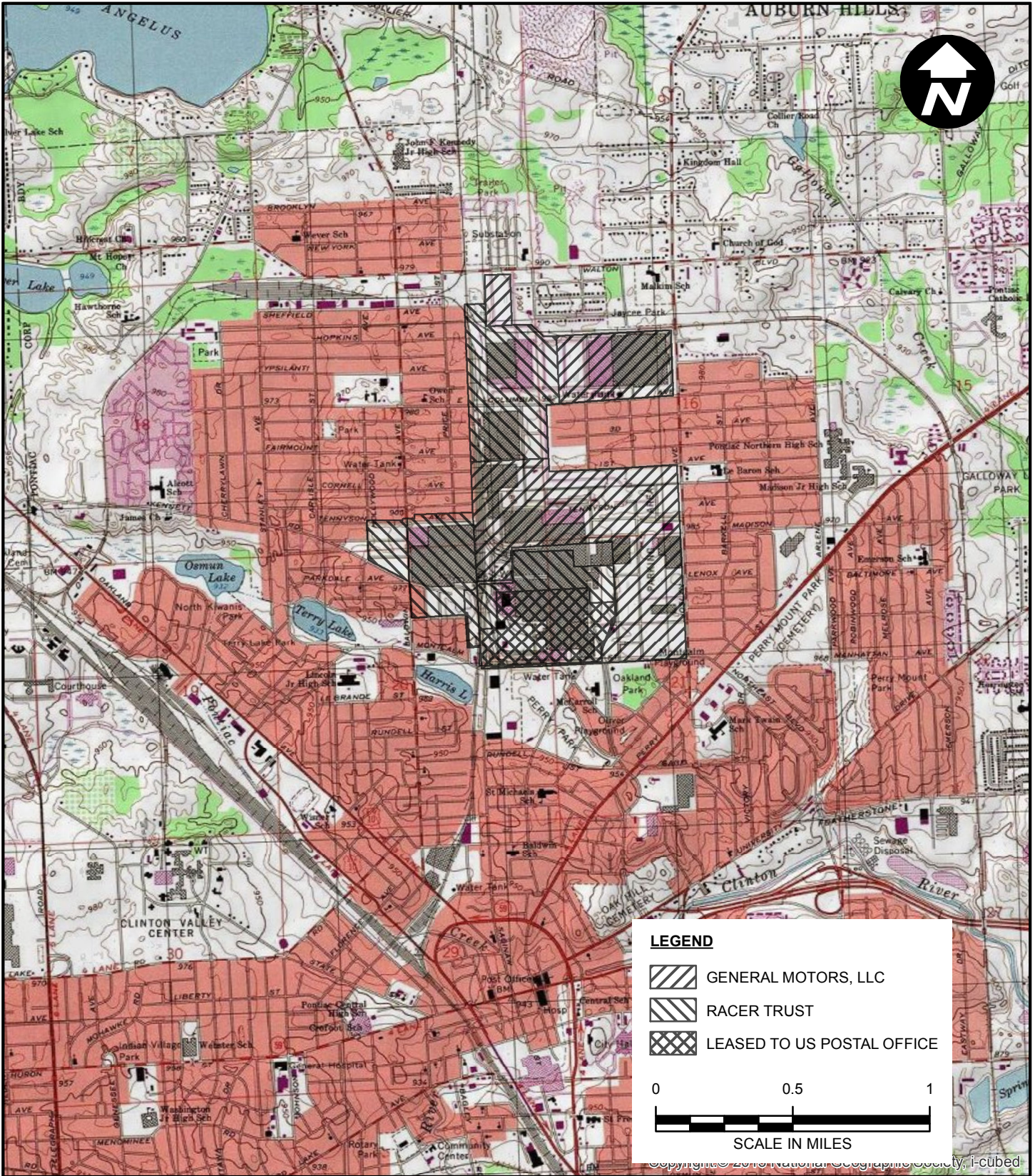
"S" Criterion defaults to the hazardous substance-specific water solubility limit.

"W" Concentrations of trihalomethanes in groundwater shall be added together to determine compliance with the Michigan drinking water standard of 80 µg/L.

"X" The GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source.

When two numbers are present in the cell, the first number is the criterion and the second number is the risk-based or solubility value.

## Figures



RACER TRUST  
 PONTIAC NORTH CAMPUS  
 PONTIAC, MICHIGAN

**SITE LOCATION**

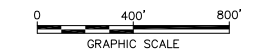
FIGURE  
**1**



**LEGEND:**

- ⊕ GROUNDWATER MONITORING WELL LOCATION
- (968.51) GROUNDWATER ELEVATION (DASHED WHERE INFERRED)
- ⊕ WELL NOT USED FOR GROUNDWATER CONTOURING
- 957.00 — GROUNDWATER CONTOUR (CONTOUR INTERVAL 5.0 FEET)
- ← APPROXIMATE GROUNDWATER FLOW DIRECTION
- NA — NOT AVAILABLE

- NOTES:**
1. ALL SAMPLE LOCATIONS ARE APPROXIMATE.
  2. GROUNDWATER ELEVATIONS CALCULATED FROM WATER LEVELS COLLECTED ON SEPTEMBER 18-24, 2014.
  3. ALL ELEVATIONS ARE REFERENCED TO A MEAN SEE LEVEL DATUM AND ARE IN UNITS OF FEET ABOVE MEAN SEE LEVEL.
  4. ONLY WELLS WHICH WERE GAUGED ON THIS EVENT ARE PRESENTED.



RACER TRUST  
 PONTIAC, MICHIGAN  
 PONTIAC NORTH CAMPUS

**GROUNDWATER CONTOUR MAP  
 SEPTEMBER 2014**




FIGURE  
**2**

CITY: SYRACUSE DIV/GROUP: IMDV DB: A.FOX.G.STOWELL PM:(Redd) LVR:(OH)ONL=OFF=REF: G:\ENVCAD\SYRACUSE\ACT\0664607\01\40\0006\SITE\WIDE\64607C01.DWG LAYOUT: 3 SAVED: 12/18/2014 12:43 PM ACADVER: 19.1 S (LMS TECH) PAGES: 19 LOTS: 12/18/2014 12:44 PM BY: STOWELL, GARY

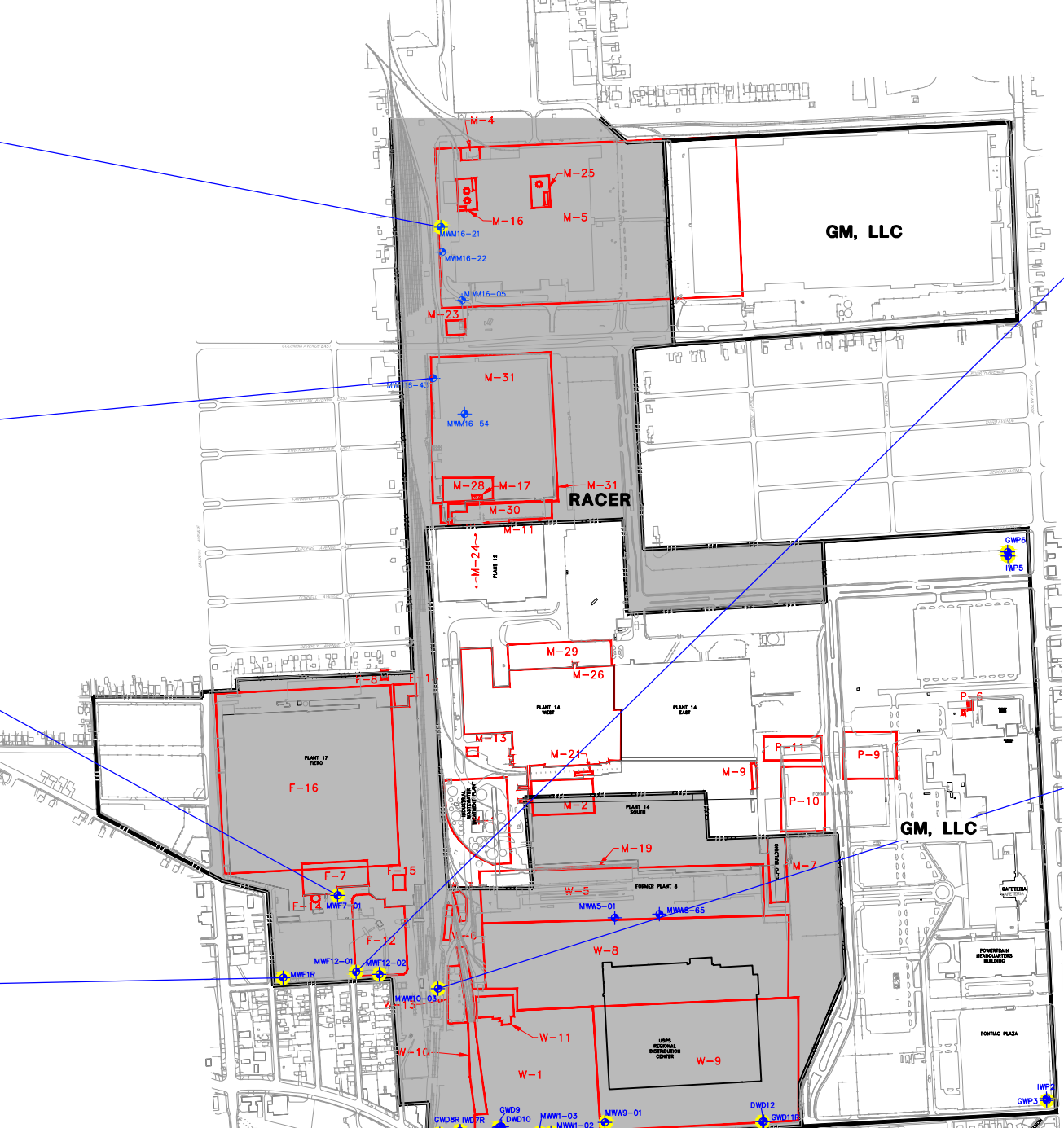
MWM16-21					
Date	11/5/2010	9/23/2011	10/2/2012	12/5/2013	9/19/2014
Field Parameters					
pH Field	NA	7.16	6.99	7.77	7.10
VOCs					
1,1,1-Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
1,1,2-Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
1,1-Dichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
1,2-Dichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Acetone	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)
Benzene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
cis-1,2-Dichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Ethylbenzene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Methylene chloride	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)
Tetrachloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Toluene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Vinyl Chloride	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	.00034 J

MWM16-43				
Date	11/5/2010	9/23/2011	10/2/2012	
Field Parameters				
pH Field	NA	6.96	6.83	
VOCs				
1,1,1-Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	
1,1,2-Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	
1,1-Dichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	
1,2-Dichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	
Acetone	ND(0.025)	ND(0.025)	ND(0.025)	
Benzene	ND(0.001)	ND(0.001)	ND(0.001)	
cis-1,2-Dichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	
Ethylbenzene	ND(0.001)	ND(0.001)	ND(0.001)	
Methylene chloride	ND(0.005)	ND(0.005)	ND(0.005)	
Tetrachloroethane	ND(0.001)	ND(0.001)	ND(0.001)	
Toluene	ND(0.001)	ND(0.001)	ND(0.001)	
Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	
Vinyl Chloride	ND(0.001)	ND(0.001)	ND(0.001)	

MWF7-01				
Date	11/4/2010	10/3/2012	12/4/2013	9/19/2014
Field Parameters				
pH Field	6.91	6.99	7.64	7.08
VOCs				
1,1,1-Trichloroethane	0.014	0.0075	0.0073	0.014 [0.014]
1,1,2-Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
1,1-Dichloroethane	0.0048	0.0032	0.0019	0.0049 J [0.0072 J]
1,2-Dichloroethane	0.0019	0.00073	0.00041 J	0.0013 [0.0017]
Acetone	0.0016 J	ND(0.025)	ND(0.025)	ND(0.025) [ND(0.025) J]
Benzene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
cis-1,2-Dichloroethane	0.0009 J	0.0004	ND(0.001)	0.00045 J [0.00081 J]
Ethylbenzene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Methylene chloride	ND(0.005)	ND(0.005)	ND(0.005) J	ND(0.005) [ND(0.005) J]
Tetrachloroethane	0.0016	0.00057	0.00074 J	0.00091 J [0.00099 J]
Toluene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Vinyl Chloride	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)

MWF1R					
Date	11/4/2010	9/22/2011	10/2/2012	12/4/2013	9/19/2014
Field Parameters					
pH Field	6.82	6.83	7.19	7.66	7.22
VOCs					
1,1,1-Trichloroethane	ND(0.001)	0.00053 J	ND(0.001)	ND(0.001)	ND(0.001)
1,1,2-Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
1,1-Dichloroethane	0.00022 J	0.00095 J	ND(0.001)	ND(0.001)	.00028 J
1,2-Dichloroethane	ND(0.001)	0.00022 J	ND(0.001)	ND(0.001)	ND(0.001)
Acetone	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)	ND(0.025)
Benzene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
cis-1,2-Dichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Ethylbenzene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Methylene chloride	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005)
Tetrachloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Toluene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Vinyl Chloride	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)

MWW1-04				
Date	9/25/2011	10/3/2012	12/4/2013	9/23/2014
Field Parameters				
pH Field	11.77	11.27	9.78	11.84
Inorganics				
Antimony	0.0046	0.0042	< 0.0031 B	0.003 [0.0031]
Arsenic	NA	NA	NA	NA
Barium	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA
Chromium (Total)	NA	NA	NA	NA
Chromium III (Trivalent)	NA	NA	NA	NA
Chromium VI (Hexavalent)	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA
Copper	NA	NA	NA	NA
Cyanide (Total)	NA	NA	NA	NA
Iron	NA	NA	NA	NA
Lead	NA	NA	NA	NA
Manganese	NA	NA	NA	NA
Nickel	NA	NA	NA	NA
Selenium	NA	NA	NA	NA
Thallium	NA	NA	NA	NA
Vanadium	0.025(RDW)	0.014	0.02(RDW)	0.013 (RDW) [0.014 (RDW)]
Pests/PCBs				
Total PCBs	0.0003	0.00043	0.00052(RDW.NRDW)	0.000348 [ND(0.00010)]



MWF12-01					
Date	11/4/2010	9/22/2011	10/3/2012	12/4/2013	9/19/2014
Field Parameters					
pH Field	7.05	6.93	7.21	7.51	7.10
Inorganics					
Antimony	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA
Chromium (Total)	NA	NA	NA	NA	NA
Chromium III (Trivalent)	NA	NA	NA	NA	NA
Chromium VI (Hexavalent)	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA
Cyanide (Total)	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA
Manganese	2.5 (RDW)	0.9	3.2(RDW.NRDW)	5.2 (RDW.NRDW)	2.4 (RDW.NRDW)
Nickel	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA
VOCs					
1,1,1-Trichloroethane	0.0091	0.015	0.009	0.026	0.025
1,1,2-Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
1,1-Dichloroethane	0.0016	0.0024	0.0011	0.0041	0.0046
1,2-Dichloroethane	0.00066 J	0.001	0.00045	0.0014	0.0022
Acetone	0.0012 J	ND(0.025)	ND(0.025)	0.0024 J	ND(0.025)
Benzene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
cis-1,2-Dichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	0.0002 J
Ethylbenzene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Methylene chloride	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005) J	ND(0.005)
Tetrachloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Toluene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Vinyl Chloride	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)

MWW10-03					
Date	11/4/2010	9/23/2011	10/2/2012	12/5/2013	9/18/2014
Field Parameters					
pH Field	NA	6.92	6.88	6.83	7.11
Inorganics					
Antimony	NA	NA	NA	NA [NA]	NA
Arsenic	NA	NA	NA	NA [NA]	NA
Barium	NA	NA	NA	NA [NA]	NA
Cadmium	NA	NA	NA	NA [NA]	NA
Chromium (Total)	NA	NA	NA	NA [NA]	NA
Lead	0.0005 B	ND(0.001)	ND(0.001)	ND(0.001) [ND(0.001)]	ND(0.001)
Manganese	NA	NA	0.12	0.047 [0.062 RDW.NRDW]	0.030
Mercury	NA	NA	NA	NA [NA]	NA
Selenium	NA	NA	NA	NA [NA]	NA
Silver	NA	NA	NA	NA [NA]	NA
Vanadium	NA	NA	NA	NA [NA]	NA
Pests/PCBs					
Total PCBs	ND(0.0014)	ND(0.0014)	ND(0.00095)	< 0.000098 (<0.00011)	ND(0.000095)
VOCs					
1,1,1-Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001) [ND(0.001)]	ND(0.001)
1,1,2-Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001) [ND(0.001)]	ND(0.001)
1,1-Dichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001) [ND(0.001)]	ND(0.001)
1,2-Dichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001) [ND(0.001)]	ND(0.001)
Acetone	0.0025 J	ND(0.025)	ND(0.025)	ND(0.025) [ND(0.0250)]	ND(0.025)
Benzene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001) [ND(0.001)]	ND(0.001)
cis-1,2-Dichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001) [ND(0.001)]	ND(0.001)
Ethylbenzene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001) [ND(0.001)]	ND(0.001)
Methylene chloride	ND(0.005)	ND(0.005)	ND(0.005)	ND(0.005) [ND(0.005)]	ND(0.005)
Tetrachloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001) [ND(0.001)]	ND(0.001)
Toluene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001) [ND(0.001)]	ND(0.001)
Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001) [ND(0.001)]	ND(0.001)
Vinyl Chloride	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001) [ND(0.001)]	ND(0.001)

MWW40-99					
Date	11/3/2010	9/25/2011	10/3/2012	12/3/2013	9/18/2014
Field Parameters					
pH Field	6.87	7.19	7.23	7.15	7.25
VOCs					
1,1,1-Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
1,1,2-Trichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
1,1-Dichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
1,2-Dichloroethane	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)
Acetone	0.0014 J	0.0063 J	0.0016 J	ND(0.025) B	0.031
Benzene	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)	ND(0.001)



## **Appendix A**

Letter to USEPA

*Transmitted Via Email*

October 30, 2009

Mr. Nate Nemani  
United States Environmental Protection Agency  
Region V, LU-9J  
77 West Jackson Street  
Chicago, IL 60604-3590  
LU-9J

Re: GM Pontiac North Campus – Semi-Annual Groundwater Monitoring Program Proposed Modifications

Dear Mr. Nemani:

The purpose of this letter is to request approval from the United States Environmental Protection Agency (U.S. EPA) to modify the Groundwater Monitoring Program (GMP) for the General Motors Pontiac North Campus Facility (Facility) located in Pontiac, Michigan.

GM Corporation filed for Chapter 11 protection on June 1, 2009 under the Bankruptcy Code. On July 10, 2009, GM Company (since renamed GM LLC) was created through the sale of certain GM Corporation assets pursuant to Section 363 of the Bankruptcy Code. General Motors Corporation (renamed MLC) remains in Chapter 11 bankruptcy protection and is managing the assets that were not sold to GM Company (now GM LLC). A portion of the Pontiac North Campus is part of GM LLC and a portion remains with MLC. GM LLC and MLC are jointly submitting this request until the facility separation discussions (e.g., utility splits) are completed and we have an agreement with U.S. EPA on managing the Corrective Action in the future.

Attachment A details the proposed changes to the GMP and provides supporting information. These include the elimination of select monitoring wells and parameters, a change in monitoring frequency and terminating the program after 2 additional years of sampling.

We are requesting U.S. EPA approval of the proposed modifications to the GMP provided in Attachment A, including termination of the program after an additional 2 years (ending in November 2011) if concentrations remain stable or decline. MLC and GM LLC feel that a 2 year timeframe is appropriate given the quantity of groundwater data that has been generated since 2001. Based on the extensive database of analytical data, and the observed stability of groundwater conditions at the Facility, the proposed modifications present a modest reduction in monitoring that will continue to demonstrate that the conditions at the Facility are adequately assessed.

The next semi-annual groundwater sampling event is scheduled for early December 2009. We would appreciate your expeditious review of these modifications so we can eliminate unnecessary sampling during the December monitoring event. To facilitate your review, GM LLC and MLC propose a conference call on Thursday November 5<sup>th</sup> or Friday November 6<sup>th</sup>, 2009 to discuss these proposed modifications to the Groundwater Monitoring Program. In the meantime, if you have any questions please feel free to contact the undersigned.

Sincerely,

Robert Hare  
MLC Project Manager  
248-225-3277

Jean Caufield  
GM LLC Project Manager  
313-506-9468

cc: John McKenna, ARCADIS  
Gavin O'Neill, CRA  
Francis Ramacciotti, ENVIRON

**Attachment A**  
**Proposed Modifications**  
**Semi-Annual Groundwater Monitoring Program**

On October 10, 2000, GM Corporation (now MLC) and the U.S. EPA entered into a Performance Based Corrective Action Agreement for the Pontiac North Campus Site. The Site encompasses approximately 595 acres in the northwest quadrant of the City of Pontiac. Groundwater samples have been collected from select monitoring wells on a semi-annual basis since 2002 as part of the GMP to demonstrate that constituent concentrations in groundwater are stable and that migration of contaminated groundwater is not occurring. The Groundwater Monitoring Program (GMP) was presented as part of the Environmental Indicators (EI) CA750 determination (ENVIRON, 2002). Since 2002, GM Corporation added several additional monitoring wells to the GMP at the request of the U.S. EPA. Following each monitoring event a report summarizing the results was prepared and submitted to U.S. EPA. Following the semi-annual sampling events of 2008, the groundwater monitoring program was evaluated to determine if modifications to the plan are warranted.

Two initial rounds of sampling were completed at each monitoring well that was installed as part of the RFI Work Plan (ENCORE, 2001). Monitoring wells included in the GMP have been sampled on a semi-annual basis since 2002. Additional wells were added to the GMP as additional RFI activities were completed or additional groundwater monitoring was required as a provision for completed Interim Measures (IM). When the analytical data from the semi-annual sampling appeared to be anomalous an additional groundwater sample was immediately collected from that individual well to verify the results for individual constituent(s). These confirmation samples are identified as a Partial Sample Event.

A comprehensive database of these analytical results has been developed over the past eight years. Even though groundwater at the Facility is not used as a drinking water source, analytical results were compared against both Michigan Department of Environmental Quality (MDEQ) Part 201 Residential Drinking Water criteria (RDW) and Industrial Drinking Water (IDW) criteria. Stable or reducing conditions have been observed in at least four sampling events in the analytical results at several locations included in the GMP.

This submittal proposes the following:

- 1) Elimination of select monitoring wells and parameters from the GMP,
- 2) Change the frequency of monitoring from semi-annual to annual; and
- 3) Implement the GMP for 2 more years and terminate it after that provided the data continue to show stable or decreasing trends.

The attached Table 1 provides an evaluation of each monitoring well in the semi-annual sampling program, and indicates modifications being proposed to the sample collection frequency and associated groundwater analysis.

## **SEMI-VOLATILE ORGANIC COMPOUNDS**

Semi-volatile organic compounds (SVOCs) were analyzed for at the majority of the monitoring wells in the GMP. Two SVOCs were only detected above drinking water criteria in three monitoring wells, IWD7, MWW1-02 and MWW1-04. Bis (2-Ethylhexyl)phthalate was detected above the screening criteria once (January 2002) out of 16 sampling events at monitoring well IWD7 and once (October 2004) out of 14 sampling events at well MWW1-02. Bis (2-Ethylhexyl)phthalate is a common laboratory contaminant. Pentachlorophenol was detected above the screening criteria in monitoring well MWW1-04 four (November 2005, February 2006, May 2006, and November 2007) out of 15 samples collected. Based on this evaluation, it is proposed that SVOCs be removed from the analytical parameter list for the GMP.

## **SHALLOW MONITORING WELLS**

For shallow monitoring wells (designated MW) at the Facility, 8 monitoring wells are proposed for elimination from the sampling program. Sample frequency for the remaining monitoring wells is proposed to be reduced from semi-annual to annual for two more years, ending in November 2011 (see Table 1A). The eight monitoring wells (MWD6, MWW1-02, MWW1-03, MWW1-06, MWF12-02, MWM16-05, MWM16-22, and MWM16-54) are proposed to be removed from the GMP because the analytical results have either not exceeded drinking water criteria, were non-detect, or if constituents were detected above criteria the concentrations have stabilized.

Monitoring wells located downgradient of light non-aqueous phase liquid (LNAPL) Area Nos. 1, 2, 3, and 9/10 will continue to be sampled to monitor the upgradient LNAPL areas. Monitoring wells MW40-99 and MWW9-01 are all located downgradient of LNAPL areas. These monitoring locations have not exhibited elevated concentrations of volatile organic compounds (VOCs), PCBs, or site specific parameter list (SSPL) metals and detected concentrations have stabilized. However, they will continue to be sampled to monitor the upgradient LNAPL areas. We propose that these wells be sampled annually instead of the current semi-annual monitoring.

For shallow monitoring wells that have a limited number of sample events (MWW5-01, MWM16-21, MWM16-43, and MWW8-65) the sample frequency will be reduced to annually. Some of these wells have only been sampled three to five times, thus precluding observation of contaminant concentration trends.

Five shallow monitoring wells have been sampled for total dioxins (MWW1-02, MWW1-03, MWW1-04, MWW1-06, and MW40-99). Exceedances of the screening criteria were observed at MWW1-03, MWW1-04 and MW40-99. Dioxins have been reported exceeding criteria three times (15 total samples collected) in monitoring well MWW1-03 and have not been detected above criteria since May 2008. Following the detection of dioxins exceeding criteria in May 2008 a confirmatory sample was collected and the results were non-detect. Dioxins have been reported exceeding criteria once (15 total samples) in monitoring well MWW1-04 and have not been reported exceeding criteria since May 2006. Dioxins have been reported exceeding criteria twice (14 total samples) in monitoring well MW40-99 and have not been reported exceeding criteria since May 2007. We are proposing that dioxins be removed from the sampling program due to the low levels observed and stability of the analytical results.

## **INTERMEDIATE MONITORING WELLS**

We are proposing that intermediate monitoring wells (designated IW) at the Facility be removed from the groundwater sampling program, as shown on Table 1B. Groundwater samples have been collected from monitoring well IWP5 a total of 15 times. Thallium (dissolved) was detected in this well above screening criteria in January 2001 and has not exceeded the screening criteria since (15 sample events). Acetone has also been detected above the screening criteria; however it was reported in the RFI Report (ENCORE 2002) that it has been documented that bentonite pellets, which were used in the well construction, have been known to contain acetone. Acetone is also a common laboratory contaminant Acetone has not been detected above criteria since November 2002 (12 sample events). Groundwater samples have also been collected 15 times from monitoring well IWD7. Bis (2-Ethylhexyl)phthalate, lead, and vanadium were detected above the screening criteria once in January 2002. Since that time these three constituents have not been detected above screening criteria (13 sample events). Arsenic was detected twice above screening criteria (May and November 2007 sampling events) in this well. In both subsequent sampling events (October 2007 and November 2008) arsenic did not exceed the screening criteria.

Groundwater samples have never been collected from monitoring well IWP2, due to insufficient water in the well to collect a sample. For this reason, this well should be removed from the GMP and abandoned.

## **DEEP MONITORING WELLS**

We are proposing that deep monitoring wells (designated GW and DW) be removed from the groundwater sampling program (Table 1C). As part of the original RFI activities, groundwater monitoring wells were installed into two deeper groundwater bearing units (outwash deposits) at the Facility. Deep monitoring wells designated as GW (e.g. GWD8) were installed between 878 and 893 feet above mean sea level (AMSL) in a sand zone (upper outwash deposits). The depth of the GW wells range from 55 to 107 feet below ground surface. Monitoring wells were also installed in a deeper groundwater bearing zone (lower outwash deposits) to determine if a downward vertical hydraulic gradient existed at the Facility and if constituents detected in the shallower water bearing units had migrated to the lower water bearing units. These monitoring wells installed in the lower outwash deposits were designated as DW (e.g. DWD10) and were installed between 808 and 858 AMSL in a sand and gravel zone. The depth of the DW wells range from 115 to 150 feet below ground surface.

Chromium has been detected twice and vanadium once exceeding criteria in monitoring well GWP6. Neither has been detected above criteria since November 2007. Lead and vanadium have been detected once each exceeding criteria in monitoring well GWP3; neither has been detected above criteria since May 2005. The only other two constituents detected above criteria were methylene chloride in monitoring well DWD12 in (May 2003) and acetone in monitoring wells GWD8 (September 2001), GWD9 (May and December 2003), GWP3 (September 2001, and GWP6 (September 2001 and January 2002). Both of these constituents are common laboratory contaminants and acetone has also been documented to be contained in bentonite pellets.

Arsenic is the only other constituent observed above screening criteria in the lower outwash deposits at the Facility. The concentrations of arsenic in the monitoring wells installed in both the upper (GW) and

lower (DW) outwash deposits have been consistent over time. Elevated arsenic concentrations in groundwater in southeastern Michigan are well documented and it is believed that the concentrations detected in these deep monitoring wells are associated with regional background levels. In addition, for monitoring wells where arsenic has been detected above criteria the concentrations have stabilized.

Due to the lack of reported exceedances of VOCs, SVOCs, and PCBs in the deep saturated groundwater zone, it is proposed that the deep monitoring wells be removed from the groundwater monitoring program.

Tables 1A through 1C provide a detailed summary of the proposed changes to the groundwater monitoring program. Appendix A provides the complete set of the semi-annual groundwater sampling analytical tables.



## **Appendix B**

Email Approval from USEPA

**Subject:** FW: GM Pontiac North Campus - Semi-Annual Groundwater Monitoring Program Proposed Modifications  
**Attachments:** PNC GMP Modification Proposal 10-30-09.pdf

-----Original Message-----

From: Nemani.Nate@epamail.epa.gov [mailto:Nemani.Nate@epamail.epa.gov]  
Sent: Monday, November 23, 2009 2:59 PM  
To: Hare, Robert  
Cc: Landale, Beth; jean.e.caufield@gm.com; McKenna, John; O'Neill, Gavin  
Subject: Re: GM Pontiac North Campus - Semi-Annual Groundwater Monitoring Program Proposed Modifications

Bob:

The proposal modifications to the semi-annual Groundwater Monitoring Program (GMP) outlined in the October 30, 2009 e-mail w/ attachments for the subject facility have been reviewed.

The submittal requested approval for the following provisions.

- a) Elimination of select monitoring wells and parameters from the GMP .
- b) Change of frequency of monitoring from semi-annual to annual for certain wells.
- c) Implement the GMP for two (2) more years and terminate it after that provided the data continue to show stable or decreasing trends.

Based on the review and the justifications offered for the changes, the above provisions a) and b) are hereby approved.

Regarding the provision c), to terminate the GW monitoring after 2 years, a separate request , will need to be submitted at the of the 2-year period with pertinent documentation.

If you have any questions, please contact me.

Nate

NATE NEMANI, P.E.  
RCRA CORRECTIVE ACTION PROJECT MANAGER  
LAND AND CHEMICALS DIVISION  
REMEDIATION AND REUSE BRANCH,  
U. S.EPA, REGION 5 ,  
77 W JACKSON Blvd, CHICAGO, ILLINOIS, 60604, Mail Code: LU-9J  
(312) 886-3224 (PHONE)  
(312) 692-2176 (FAX)  
[nemani.nate@epa.gov](mailto:nemani.nate@epa.gov) (e-mail address)

From: "O'Neill, Gavin" <goneill@croworld.com>  
To: Nate Nemani/R5/USEPA/US@EPA  
Cc: "Hare, Robert" <[rhare@alixpartners.com](mailto:rhare@alixpartners.com)>, <[jean.e.caufield@gm.com](mailto:jean.e.caufield@gm.com)>, "Landale, Beth" <[blandale@croworld.com](mailto:blandale@croworld.com)>, "McKenna, John" <[John.McKenna@arcadis-us.com](mailto:John.McKenna@arcadis-us.com)>  
Date: 10/30/2009 01:02 PM  
Subject: GM Pontiac North Campus - Semi-Annual Groundwater Monitoring Program Proposed Modifications

Mr. Nemani

Please find attached a joint request from GM LLC and MLC to modify the Semi-Annual Groundwater Monitoring Program for the GM Pontiac North Campus. As presented in the attached letter, we are proposing a conference call next week on either November 5 or 6, 2009 to discuss the proposed modifications. Please let us know at your earliest convenience your availability for those dates.

Should you have any questions or require additional information, please contact our office.

-----  
Gavin O'Neill  
Conestoga-Rovers & Associates (CRA)

1880 Assumption St., Unit 200  
Windsor, Ontario, N8Y 1C4

Phone: 519.996.9886  
Fax: 519.996.3894  
Cell: 519.965.9000  
Email: [goneill@CRAworld.com](mailto:goneill@CRAworld.com)  
[www.CRAworld.com](http://www.CRAworld.com)

Think before you print P  
Perform every task the safe way, the right way, every time!

This communication and any accompanying document(s) are confidential and are intended for the sole use of the addressee. If you are not the intended recipient, please notify me at the telephone number shown above or by return e-mail and delete this e-mail and any copies. You are advised that any disclosure, copying, distribution, or the taking of any action in reliance upon the communication without consent is strictly prohibited. Thank you.

[attachment "PNC Proposed Modifications to GMP.pdf" deleted by Nate Nemani/R5/USEPA/US]



## **Appendix C**

Historical Semi-Annual Sampling  
Event Groundwater Analytical Data  
Summary (CD)



## **Appendix D**

Chemical Concentration Graphs

APPENDIX D  
 RACER TRUST PONTIAC NORTH CAMPUS  
 2014 ANNUAL GROUNDWATER MONITORING REPORT  
 CHEMICAL CONCENTRATION GRAPHS

