

DRAFT

Site-Wide Groundwater Monitoring Report for 2008

General Motors Corporation Facilities:

Former Delphi Harrison Thermal Systems Moraine Plant
Former General Motors Powertrain Group, Moraine Engine Plant
Former General Motors Truck Group, Moraine Assembly Plant

Moraine, Ohio

February 27, 2009

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1. Introduction

This Site-Wide Groundwater Monitoring Report presents the groundwater monitoring activities completed in 2008 at the following General Motors Corporation (GM) facilities located in Moraine, Ohio (Figure 1): former Delphi Harrison Thermal Systems Moraine Plant (former Delphi Thermal Moraine [leased to Delphi Corporation between January 1999 and September 2003]), former General Motors Powertrain Group, Moraine Engine Plant (former Moraine Engine), and former General Motors Truck Group, Moraine Assembly Plant (former Moraine Assembly). A multi-phased Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) was completed for these facilities and approved by the United States Environmental Protection Agency (U.S. EPA) in June 2000 (ARCADIS Geraghty & Miller, Inc. 2000a and b, ENVIRON 2000a and b). The RFI identified that the primary source area of volatile organic compounds (VOCs) in shallow groundwater at the three facilities is located at the Area of Interest (AOI) 7 - Former Oil House Area, in the northern portion of the former Moraine Engine facility (Figure 2). The Baseline Risk Assessment (BRA) concluded that, under current conditions, there was no unacceptable risk associated with constituents detected in soil/waste at the AOIs and Solid Waste Management Units (SWMUs) investigated in the RFI. However, the BRA also concluded that constituents detected in groundwater at the Former Oil House Area may migrate to the extent that reasonably expected future uses of groundwater might be affected.

The focus of the Interim Measures/Corrective Measures (IM/CM) Report (ARCADIS Geraghty & Miller, Inc. 2001) was a site-wide remedy that addressed the source of the VOCs in groundwater and the downgradient plume based on the conceptual site model at that time. Subsequent to submittal of the IM/CM Report, implementation of the corrective measures proposed in the IM/CM Report has been conducted on an ongoing basis by GM. The corrective measures proposed in the IM/CM Report incorporated the Former Oil House Area corrective measures (in-situ remediation of groundwater in the Oil House Area and downgradient of the Oil House Area, Figure 2); the capture zone corrective measures (hydraulic control with a pump and treat system for the upper aquifer and hydraulic control for the lower aquifer, Figure 2); institutional actions (the site will remain industrial and groundwater use will be restricted to non-potable purposes); and a site-wide groundwater monitoring program.

The conceptual site model previously developed for the Site was revised using the additional data collected during the supplemental investigations since submittal of the IM/CM Report. The revised conceptual site model was presented in the draft Corrective Measures Proposal (CMP) (ARCADIS, Inc. 2008a) and was used to support

the updated risk analysis and corrective measures evaluation. The proposed final site-wide corrective measures for the Moraine Facilities combines source treatment and containment with downgradient hydraulic control of groundwater and appropriate engineering and institutional controls to prevent potentially significant exposures during the implementation of these corrective measures. The specific elements of the proposed final site-wide corrective measures presented in the CMP are:

- 1). Upper Aquifer Reactive Zone Corrective Measures: operation of in-situ remediation barriers in the upper aquifer downgradient and sidegradient of the Former Oil House Area and downgradient of the Moraine Assembly Process Waste Collection Systems (RZ-1, proposed relocated RZ-2, RZ-3, RZ-4) for treatment.
- 2). Upper Aquifer Capture Zone Corrective Measures: operation of an upper aquifer recovery well at the downgradient property boundary (TW-2) for hydraulic control.
- 3). Lower Aquifer Corrective Measures: operation of two lower aquifer recovery wells, one located downgradient of wells GM-68D/GM-75D for lower aquifer source containment and one downgradient of the Site property boundary (DN-13) for hydraulic control.
- 4). Corrective Measures Groundwater Monitoring: completion of monitoring groundwater quality associated with land-based units, performance monitoring for corrective measures, and the point of compliance wells.
- 5). Engineering/Institutional Controls: implementation of land and groundwater use restrictions via environmental covenants for the entire facility.

This report addresses several components of the proposed final remedy, including the site-wide groundwater monitoring program and the performance of the ongoing corrective measures (Table 1). In addition, analytical results and water level measurements from the Winter/Spring 2008 supplemental groundwater investigation that were presented in the CMP are incorporated by reference in this report. All groundwater monitoring for the facilities was conducted in accordance with the approved Site-Wide Groundwater Monitoring Plan (ARCADIS G&M, Inc. 2002) and as modified in the Site-Wide Groundwater Monitoring Report for 2007 (ARCADIS, Inc. 2008b).

1.1 Site Description

The GM site has been used for industrial purposes since the property was acquired in the mid-1920's. The former Moraine Engine and former Moraine Assembly facilities occupy approximately 300 acres, while the adjacent former Delphi Thermal Moraine facility occupies approximately 165 acres. The facilities are located in the City of Moraine in Montgomery County in southwestern Ohio. A small portion of the Moraine Assembly facility is located in the City of Kettering. Figure 1 presents the location of each facility, property boundaries, and site features.

Frigidaire (a former division of GM) produced appliances from the late 1920's until 1979. GM announced the shut down of all Frigidaire operations in January 1979. During 1980 and 1981, the majority of the former Frigidaire Plant 2 was converted to the former Moraine Engine facility, and the former Frigidaire Plant 3 and the northeast corner of former Frigidaire Plant 2 were converted to the Moraine Assembly facility. Since 1981, former Moraine Engine operations have included the machining, painting (this operation was discontinued in September 1995), and assembly of diesel truck engines. Former Moraine Engine operations ceased in the fall of 2000. The plant building has undergone decommissioning and demolition, and the majority of this site has been covered with an asphalt parking surface. GM operated a regional haulway at the location of the former Moraine Engine plant, which is now referred to as the Vehicle Distribution Center. Operations at the regional haulway ceased in December 2008.

Since 1981, the former Moraine Assembly operations included the manufacture, assembly, and painting of small trucks and mid-size sport utility vehicles. Operations at the former Moraine Assembly ceased in December 2008. The Moraine Assembly building is currently undergoing decommissioning activities.

Former Delphi Thermal Moraine's major operations, which began in 1941, included the machining and assembly of automotive air conditioning compressors, accumulator dehydrators, and miscellaneous air conditioning valves. Delphi Corporation leased the property from GM from January 1999 through October 2003. Operations at the former Delphi Thermal Moraine Building 14 ceased in September 2003 and the building was decommissioned. As of October 1, 2003, management of the property has reverted to GM and GM remains the property owner. Demolition of Building 14 was completed in 2005.

1.2 Groundwater Monitoring Program Objectives

The objectives of groundwater monitoring at the GM Moraine Facilities are as follows:

1. Monitor groundwater quality upgradient and downgradient of the closed North and South Settling Lagoons;
2. Monitor groundwater quality upgradient and downgradient of Landfills L1, L2, and L3;
3. Monitor the effectiveness of and the need for current groundwater capture systems in the upper and lower aquifers at the southern, downgradient property boundary;
4. Monitor the effectiveness of corrective measures activities in In-Situ Reactive Zones (RZ) RZ-1, RZ-3, and RZ-4, to address VOCs related to the Former Oil House Area; and
5. Monitor an appropriate list of wells once corrective measures objectives have been met, as defined in the CMP (ARCADIS, Inc. 2008a), to verify that these objectives continue to be met without the active measures.

1.3 Baseline Groundwater Monitoring Program Sampling Event

To provide a basis for evaluating the performance of the Corrective Measures, a comprehensive site-wide groundwater sampling event for VOCs was conducted in September 1999 to establish a baseline data set. The next site-wide groundwater sampling event was completed between September and October 2000. During the 2000 sampling event, at the request of U.S. EPA, groundwater samples were analyzed for Appendix IX VOCs by Method 8260 and cis-1,2-dichloroethene (cis-1,2-DCE), semi-volatile organic compounds (SVOCs) and metals to verify that current groundwater conditions were consistent with previous site conditions. The results of this one-time sampling event confirmed that VOCs were the only constituents of potential concern in groundwater at the site. SVOCs were not detected and metals were not detected above levels of concern during the 2000 sampling event. The analytical results from the 1999 baseline event and the 2000 site-wide event are presented in the Draft Interim Measures/Corrective Measures Report (ARCADIS Geraghty & Miller, Inc. 2001).

2. Groundwater Monitoring Summary

In accordance with the Site-Wide Groundwater Monitoring Plan (ARCADIS G&M, Inc. 2002), annual groundwater sampling was conducted in 2001 through 2007. The analytical results from these sampling events are presented in the Site-Wide Groundwater Monitoring Report for 2007 (ARCADIS, Inc. 2008b). The 1999 baseline through 2007 groundwater quality data for the site-specific VOC parameter list are reproduced in tables in Appendix A of this report to support the evaluation of the on-going remedial activities.

The latest groundwater monitoring was conducted in fall 2008 (September, October, and November). Additional events were conducted in 2008 in support of the CMP development. These events occurred in February, March and April 2008 and included newly installed wells, water level measurements, upper aquifer potentiometric surface mapping, lower aquifer potentiometric surface mapping, and groundwater gradient calculations. The data from these events are presented in the draft CMP (ARCADIS, Inc. 2008a).

All data generated as part of the monitoring events in 2008 are used to evaluate groundwater quality upgradient and downgradient of the closed lagoons, performance of the IRZs and the performance of the capture zones (as discussed in Sections 3.2 and 4.0). A summary of the activities and methodologies that were completed in September through November are presented in Section 2.1 and the groundwater monitoring results are presented in Section 2.2.

2.1 Groundwater Monitoring Activities/Methodologies

In order to meet the objectives of the groundwater monitoring program, the scope of work presented in Section 3.0 of the Site-Wide Groundwater Monitoring Plan and Section 5.0 of the Site-Wide Groundwater Monitoring Report for 2007, was implemented during 2008. The following sections summarize the collection of the annual groundwater elevation measurements, the monthly groundwater monitoring, and the annual site-wide groundwater monitoring.

2.1.1 Groundwater Elevation Monitoring

Groundwater levels were measured on November 17 and 18, 2008. The measured wells included all on-site and off-site monitoring wells at the three facilities as shown on Figure 3 (upper aquifer wells) and Figure 4 (lower aquifer wells). Groundwater levels

were also measured in Moraine Assembly production wells (where accessible), Moraine Assembly fire wells, two lower aquifer wells (MT596M and MT576M) located east of the Moraine Assembly and the former Moraine Engine plants, four City of Moraine upper aquifer wells located west of the Great Miami River, and four stream gauges along the Great Miami River and two stream gauges along Holes Creek. One lower aquifer well (MT-69) located south of the Dryden Road North Wellfield that is normally measured was not due to well damage. Based on field observations including sounded total depths, the well screen for MT-69 has collapsed and can no longer provide an accurate groundwater level. This Montgomery County well was installed with a red brass screen, which is susceptible to deterioration. Groundwater levels were measured in accordance with procedures defined in the RFI Sampling and Analysis Plan, Standard Operating Procedure (SOP) #4 (Geraghty & Miller, Inc. 1997a) and recorded on a field data sheet.

2.1.2 Monthly Groundwater Recovery System Monitoring

The National Pollution Discharge Elimination System (NPDES) Permit issued to GM for the groundwater recovery and treatment system requires periodic monitoring and reporting of water quality in the effluent stream and pumping flow rates. Samples of groundwater being pumped through the air stripping treatment tower were collected and analyzed monthly for the parameters required in the permit. GM's air permit for the air stripper tower expired on June 20, 2003 and the Regional Air Pollution Control Agency (RAPCA) approved renewal of this permit through June 20, 2008 as a registration status permit due to the negligible organic compound emissions from the tower. GM submitted a request on June 19, 2008 to RAPCA for recognition of P001 as a de minimis source of air emissions and the removal of the TW-2 Recovery Well Air Stripping Tower (P001) permit from RAPCA's records. In a letter received by GM on June 27, 2008, RAPCA approved the stripper tower to be listed as de minimis air contaminant source and exempt from air permitting requirements. RAPCA stated in the approval letter that RAPCA will not process the submitted PTO application and will request to the Ohio EPA to withdraw P001 and Permit-To-Install 08-3161 issued on October 26, 1994. Table 2 summarizes the VOC results for the monthly air stripper tower influent stream during 2008. The monthly air stripper influent data are also presented in Figure 5, for the period from the initial start-up in January 1996 through December 2008. Table 3 summarizes the VOC results for the monthly air stripper tower effluent stream during 2008. Table 4 summarizes the VOC results for the monthly DN-13 sampling during 2008. All analyses were conducted in accordance with methods specified in the Final Interim Measures Design Plans (Geraghty & Miller, Inc. 1995).

2.1.3 Site-Wide Groundwater Monitoring

In accordance with the Site-Wide Groundwater Monitoring Plan (ARCADIS G&M, Inc. 2002), monitoring wells were sampled in September and October 2008. A summary of the 2008 sampling events, including number of wells and analytical parameters are presented on Table 1. Well construction and survey data for the wells used in the site-wide program are presented in Table 5.

Groundwater samples were collected from specified wells using low-flow or bailing sampling procedures. Field parameters including pH, specific conductance, temperature, oxidation/reduction potential, and dissolved oxygen were measured during purging of each well using a multi-parameter flow-through cell. SOP #21 was followed when sampling monitoring wells (ARCADIS G&M, Inc., 2002). One groundwater sample from well DN-13 was collected through the sampling valve according to SOP #28 (ARCADIS G&M, Inc., 2002).

All groundwater samples were collected and managed under standard chain-of-custody procedures, and validated in accordance with the approved Supplemental RFI Work Plan and the RFI Quality Assurance Project Plan (Geraghty & Miller, Inc., 1997a). The Supplemental RFI Quality Assurance Project Plan will be followed until the Draft Quality Assurance Project Plan for RCRA Corrective Action is approved by the U.S. EPA (draft report was submitted to the U.S. EPA on December 23, 2003). All pertinent field data were recorded electronically. A field parameter data table is presented in Appendix B. Analytical results are presented and discussed in Section 2.2.3.

2.1.4 Laboratory Analytical Methods

Groundwater samples were analyzed for the site-specific VOC parameter list using SW 846 Method 8260. This parameter list was developed after evaluating data from the September 1999 baseline groundwater sampling event and the one-time sampling event conducted in September/October 2000 (which included analysis of Appendix IX VOCs and cis-1,2-DCE, SVOCs, and metals), conducted as part of the Former Oil House Area corrective measures. The site-specific VOC parameter list is: benzene, 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), cis-1,2-DCE, trans-1,2-dichloroethene (trans-1,2-DCE), ethylbenzene, tetrachloroethene (PCE), toluene, 1,1,1-trichloroethane (1,1,1-TCA), trichloroethene (TCE), vinyl chloride, and xylenes. Select groundwater samples from upper aquifer monitoring wells were also analyzed for the following biogeochemical indicator parameters: manganese (total and

dissolved), iron (total and dissolved), sulfate, sulfide, total organic carbon (TOC), chlorides, light hydrocarbons (ethane and ethene), and methane. Table 1 lists specific field, laboratory, biogeochemical indicator parameters, and field and laboratory analytical methods. All samples were submitted to TestAmerica in North Canton, Ohio or Microseeps in Pittsburgh, Pennsylvania. Only ethene, ethane, and methane samples were submitted to and analyzed by Microseeps. For the 2008 groundwater event additional parameters were added to specific wells to support the CMP supplemental risk assessment for Landfill L2 and the Waste Pile Staging Area. HR-3 were sampled and analyzed for site-specific VOCs and both GM-19S and GM-35 were sampled and analyzed in addition to the site-wide program list (Table 1) for benzo(a)anthracene, benzo(b)fluoranthene, antimony, cadmium, chromium, and total PCBs. The methods are presented in Appendix C for these additional parameters along with the complete set of groundwater results, including quality assurance/quality control (QA/QC) samples for the entire event.

2.2 Groundwater Monitoring Program Results

2.2.1 Groundwater Elevation Monitoring

As part of the site-wide assessment of current groundwater conditions, groundwater levels were measured to determine groundwater flow directions in the upper and lower aquifers and to determine vertical gradients between the two aquifers. Three groundwater elevation monitoring events were completed in 2008, two were completed to support the CMP on March 5-6 and April 24-25, 2008 (ARCADIS, Inc. 2008a) and one was completed on November 17-18, 2008 as part of the site-wide groundwater monitoring. The March and April 2008 groundwater level measurement data is presented on Tables 2 and 3, respectively, of the CMP (ARCADIS, Inc. 2008a) and the November 2008 groundwater level measurement event data is presented on Table 6.

2.2.1.1 Upper Aquifer

The groundwater level data collected during preparation of the CMP (ARCADIS, Inc. 2008a) resulted in an improved resolution of the groundwater flow conditions near the Great Miami River. The upper aquifer potentiometric surface for March 2008 and April 2008 are shown on Figures 6 and 7, respectively, of the CMP (ARCADIS, Inc. 2008a). A comparison between the March and April 2008 water levels indicate a significant difference in upper aquifer groundwater flow. Precipitation levels were higher than normal before and during the March water level measurement event (ARCADIS, Inc. 2008a). Groundwater level data for this event indicates flow is away from the Great

Miami River southwest of the Site and stream levels at high stage. Therefore it was determined that this section of the Great Miami River was a losing stream during the March 2008 event. The upper aquifer potentiometric surface on April 24-25 (Figure 7 of the CMP) indicates that flow in the upper aquifer is generally from the northeast to southwest on- and off-site and corresponds to long term trends. As stated in the CMP, upstream of the confluence of the Great Miami River and Holes Creek, the updated groundwater flow model predicts an east/southeasterly component of flow from the Great Miami River towards the Site (i.e., immediately adjacent to the Great Miami River), indicating that the upper aquifer is gaining water from the Great Miami River (ARCADIS, Inc. 2008a). Further discussion of the March and April 2008 events, including hydraulic gradients are located in the CMP (ARCADIS, Inc. 2008a).

The upper aquifer potentiometric surface on November 17-18, 2008 (Figure 6) show that flow in the upper aquifer is generally from northeast to southwest. TW-2 was measured during the November event and was operational. The November measurements show that the TW-2 water level was lower than the water levels in nearby wells (GM-16, GM-17, 4S, and WSU-24) indicating capture in the vicinity of recovery well. A comparison of the November 2008 groundwater flow conditions to the October 2007 groundwater flow map for the upper aquifer (ARCADIS, Inc. 2008b) indicates a similar gradient and flow direction across the site in 2008 and 2007. The 2008 upper aquifer flow patterns are generally consistent with groundwater flow conditions since TW-2 operation was initiated in January 1996.

Table 7 presents the 2008 monthly precipitation totals, recorded by the National Weather Service, and the deviation from calculated average amounts. The 2008 annual total precipitation recorded at the Dayton, Ohio monitoring station was 45.25 inches, which was 6.90 inches above average. Precipitation for the months of February, March, May, June, July, and December was above normal, while precipitation for all other months was below normal.

The average hydraulic gradient of the upper aquifer, calculated from site-wide groundwater level measurements in November 2008 was 0.0005 foot/foot (ft/ft). The groundwater flow velocity for the upper aquifer was calculated using the following equation:

$$V_w = Ki/N_e$$

where

$$V_w = \text{groundwater flow velocity (feet per day [ft/day])}$$

K = hydraulic conductivity (ft/day)

i = hydraulic gradient (ft/ft)

N_e = effective porosity

Hydraulic characteristics of the upper aquifer were determined by evaluation of data from pumping tests conducted in 1985 and in 1989. The median hydraulic conductivity value estimated from pumping test data was 1,650 ft/day, and effective porosity was assumed to be 0.3 to 0.5. Using hydraulic gradients for November 2008, groundwater flow velocities in the upper aquifer ranged from 1.76 ft/day to 2.93 ft/day. Assuming the most extreme condition (i.e., no retardation or retardation factor [R_d] equal to 0), the rate of VOC migration could equal the rate of groundwater flow. However, soil-VOC interaction does occur, and, therefore, the actual VOC migration rates are slower than that of groundwater flow. Most of the VOCs detected in the upper aquifer at the GM facilities are likely to have a R_d ranging from 2 to 10 (Walton 1985), so the rate of migration of the VOCs in the upper aquifer in November 2008 could be as low as 0.18 ft/day.

During the Supplemental RFI, conducted in August 1998 at the Former Oil House Area, slug tests were conducted on three monitor wells (GM-23, GM-27 and GM-28) to assess aquifer characteristics in this area of the site. These slug tests determined that hydraulic conductivity in the upper aquifer in this area is lower than the hydraulic conductivity calculated on a site-wide basis. Hydraulic conductivity of the portion of the aquifer above the upper clay till at the Former Oil House Area was determined to be approximately 43 ft/day. Below the upper clay till, the hydraulic conductivity was determined to be 54 ft/day. Using hydraulic gradients from November 2008, the groundwater flow velocities in the upper aquifer above the Former Oil House Area ranged from 0.043 ft/day to 0.072 ft/day.

2.2.1.2 Lower Aquifer

The lower aquifer potentiometric surface for November 2008 (Figure 7) shows groundwater flow in the lower aquifer to be generally from northeast to southwest. County Well DN-13, located south of the former Delphi Thermal facility in the Dryden Road North Wellfield, was in operation during groundwater level measurements and had approximately 61 feet of drawdown. This localized cone of depression around DN-13 is shown on Figure 7; however, individual contours are not shown. Production

Wells 11B and 12A were not operating during the November water level measurement event.

No significant change in the overall flow conditions across the northern to central portion of the site were noted during the April and November 2008 lower aquifer groundwater elevation data in comparison with the October 2007 groundwater flow map. However, during the March 2008 groundwater level measurement event production well 12A was operating. A cone of depression centered around 12A was evident during this event and groundwater flow in general was more from the north to the south than was evident in the April and November events (ARCADIS, Inc. 2008a). Potentiometric surface for the lower aquifer during the March and April 2008 events are on Figures 8 and 9, respectively of the CMP (ARCADIS, Inc. 2008a). Further discussion of the March and April 2008 events, including hydraulic gradients is located in the CMP (ARCADIS, Inc. 2008a).

The average hydraulic gradients of the potentiometric surface in the lower aquifer, calculated from groundwater level measurements November 2008 were 0.0007 ft/ft. Using a hydraulic conductivity of 400 ft/day, assuming a porosity of 0.3 to 0.5, and using the equation presented earlier ($V_w = Ki/N_e$), groundwater flow velocity in the lower aquifer for November 2008 ranged between 0.58 ft/day and 0.97 ft/day. As discussed above, most of the VOCs detected in the lower aquifer groundwater at the GM facilities are likely to have an R_d ranging from 2 to 10 (Walton 1985), so the rate of migration of the VOCs in the lower aquifer in November could be as low as 0.06 ft/day.

2.2.2 Vertical Gradients

The groundwater level measurements collected on November 17 and 18, 2008 were used to determine the direction and magnitude of vertical gradients between the upper and lower aquifers (Table 8). The vertical gradients were calculated using the following equation:

$$i = \frac{h_2 - h_1}{d}$$

where

h_2 = hydraulic head of lower well A (ft)

h_1 = hydraulic head of upper well B (ft)

d = distance between midpoint of screen for well A and B (ft)

i = vertical gradient

The magnitude and direction of vertical gradients indicate whether the potential exists for groundwater to move from one aquifer to another through a confining unit, and which direction it may move (positive for an upward gradient and negative for a downward gradient). Calculated vertical gradients ranged from 0.0050 ft/ft upward (GM-8/GM-7R) to 0.0267 ft/ft downward (GM-16/GM-15).

At the northern (upgradient) end of the site, a slight downward vertical gradient was present in upper/lower monitoring well pair HR- 9/HR-10 and no vertical gradient was present in upper/lower monitoring well pair HR-11/HR-12.

The well pairs immediately downgradient (south) of the closed North Settling Lagoon (W-3-N/HR-15 and W-4-N/HR-14) had downward vertical gradients. The vertical gradient at well pair HR-3/HR-13 (side gradient to the closed North Settling Lagoon) was upward. Well pairs in the vicinity of Landfill L1 (GM-16/GM-15, GM-2/GM-1, GM-18/GM-13, GM-17/GM-11, GM-6/GM-3, 4S/GM-5) all had downward vertical gradients, with the exception of well pair GM-8/GM-7R which had an upward gradient (since June 1995 the vertical gradient in this well pair was upward 50 percent of the time and downward 50 percent of the time). The downward vertical gradient at the other five well pairs near Landfill L1 was likely due to the proximity of these well pairs to lower aquifer extraction well DN-13. Downgradient of the site, the vertical gradient was downward for well pair GM-10/GM-9. A vertical gradient was not calculated at well pair GM-26/MT-69 due to MT-69 well damage.

At the Former Oil House Area, groundwater level measurements in upper aquifer well pair GM-23/GM-27 (above the upper clay till/beneath the upper clay till) were used to evaluate the vertical gradient in the upper aquifer. A downward vertical gradient was present in the upper aquifer across the upper clay till present at the Former Oil House Area. Well pair GM-23/GM-39 was used to evaluate the vertical gradient in the lower aquifer compared to the upper aquifer. A downward vertical gradient was present across both the upper clay till and regional clay till.

Downgradient of the Site near Holes Creek, till is not present; and upon evaluation of vertical gradients in this area in well pairs GM-65S/GM-65D and GM-55/GM-56 show a downward vertical gradient.

2.2.3 Groundwater Monitoring Analytical Results

As described in Section 2.1.4, groundwater was evaluated on a site-wide basis for the presence of the site-specific list of VOCs. Tables 9 through 12 present the VOC results upgradient and downgradient of the RZs. Tables 13 through 16 present the bioattenuation parameter results upgradient and downgradient of the RZs. These results are discussed in Section 3.2.1 as they pertain to the performance of the RZ corrective measures. Table 17 presents the VOC results for the site-wide groundwater sampling event completed in September-October 2008 for the upper and lower aquifer wells. Data for 1999 through 2008 groundwater sampling events are presented on Figures 8 and 9 for the upper and lower aquifer wells respectively. The groundwater results are presented in this section and evaluated based on groundwater quality upgradient of the site, on site, and downgradient of the site. The complete set of groundwater results, including QA/QC samples, is presented in Appendix C. The additional parameter results (SVOCs, metals, PCBs) selected for the 2008 sampling are also presented in Appendix C. The 1999 baseline sampling data, used as a point of comparison for the September-October 2008 groundwater results, are presented in Appendix A.

2.2.3.1 Upper Aquifer Groundwater Quality

The following sections include a discussion of the groundwater quality in upper aquifer monitoring wells shown on Figure 3 that are part of the site-wide program.

2.2.3.1.1 Upgradient Groundwater Quality

In 2008, two upgradient upper aquifer monitoring wells exhibited the presence of VOCs:

- § HR-9, total VOCs were 114.19 micrograms per liter (ug/L) in 2008, compared to a 1999 baseline total VOC concentration of 116 ug/L.
- § HR-11, total VOCs were 5.2 ug/L in 2008, compared to a 1999 baseline total VOC concentration of 17.3 ug/L.

Two key observations can be made relative to upgradient groundwater quality. First, the detected VOCs are consistent with historical values for upgradient groundwater quality as indicated in the Description of Current Conditions (DOCC) (Geraghty & Miller, Inc. 1991 and 1997b) and RFI Reports (ARCADIS Geraghty & Miller, Inc. 2000a

and 2000b) for the GM Moraine facilities (including the 1999 baseline sampling results). This confirms that upgradient sources of VOCs not related to GM operations continue to exist in the local area. The highest VOC concentrations upgradient to the site are 1,1,1-TCA, TCE and the breakdown products 1,1-DCA, cis-1,2-DCE, and trans-1,2-DCE, suggesting that the upgradient releases have been migrating long enough to allow for degradation of the chlorinated VOCs 1,1,1-TCA and PCE and/or TCE to occur. Second, the types of VOCs detected upgradient are similar to those detected further downgradient beneath the site, indicating that total VOC concentrations detected beneath the site include both upgradient (off-site) and on-site contributions.

2.2.3.1.2 On-Site Groundwater Quality

To evaluate the primary source area of VOCs at the site (Former Oil House Area), five upper aquifer monitoring wells (GM-23, GM-27, GM-28, GM-29, and GM-30) were sampled in 2008. With the exception of GM-27, all of these wells are screened above the upper clay till present at the Former Oil House Area.

- § GM-30 (northern most Former Oil House Area well, located next to the former tank farm) - total VOC concentrations decreased from 37,350 ug/L in the 1999 baseline to 981 ug/L in 2008. This well predominantly contained ethylbenzene, xylenes, and 1,1-DCA.
- § GM-23 (located next to the Former Oil House building) - total VOC concentrations decreased from 17,853.3 ug/L in the 1999 baseline sampling to 4,229 ug/L in 2008. TCE and PCE concentrations have decreased while concentrations for daughter products cis-1,2-DCE and vinyl chloride have increased. This well predominantly contained cis-1,2-DCE and vinyl chloride. This well is upgradient to the original RZ-1 barrier and is within the zone of influence of carbon introductions conducted in the Former Oil House Area which results in solubilizing previously adsorbed VOCs to be treated by RZ-1.
- § GM-27 (paired with GM-23 and screened below the upper clay till) - exhibited a decrease of total VOCs between the 1999 baseline (145.7 ug/L) and 2008 (71.85 ug/L). GM-27 predominantly contains TCE, cis-1,2-DCE, and 1,1-DCA. This well is upgradient to RZ-1.
- § GM-29 (serves as an upgradient well for RZ-1) - total VOC concentrations increased from 1,256.3 ug/L in the 1999 baseline to 1,406 ug/L in 2008 primarily

due to an increase in daughter products (cis-1,2-DCE and vinyl chloride); however, TCE concentrations have decreased since the baseline sampling event. This well is upgradient to the original RZ-1 barrier and is within the zone of influence of carbon introductions conducted in the Former Oil House Area after RZ-1 was expanded in 2002, which results in solubilizing previously adsorbed VOCs to be treated by RZ-1.

- § GM-28 (serves as the downgradient well for RZ-1; the VOC and bioattenuation parameter results for this well are discussed in greater detail in Section 3.3) - total VOC concentrations decreased from 1,292.4 ug/L in 1999 to 16.9 ug/L in 2008.

Additional wells installed southeast of the Former Oil House Area during the supplemental groundwater investigation (GM-59, GM-60, GM-75S), also contain PCE, TCE, and cis-1,2-DCE. Wells GM-59/GM-60, located in the Vehicle Distribution Center, are paired where GM-59 is screened at a shallow depth in the upper aquifer and GM-60 is screened deeper at the regional clay till. Well GM-75S is located in the southwest corner of the former Moraine Assembly and is screened at the regional clay till. In 2008, PCE was detected in wells GM-59, GM-60, GM-75S at concentrations of 750 ug/L, 900 ug/L, and 690 ug/L, respectively. In 2008, TCE was detected in wells GM-59, GM-60, GM-75S at concentrations of 750 ug/L, 920 ug/L, and 250 ug/L, respectively. This area of the site is currently not addressed by corrective measures but the proposed final corrective measures discussed in the 2008 draft CMP do include a remedy to address these concentrations.

Of the wells identified as downgradient from the Former Oil House Area in the southwestern and southerly directions toward the property boundary, the total VOC concentrations have decreased over time, as discussed below.

- √ ME-6, total VOCs were 944.9 ug/L in the 1999 baseline sampling event, decreasing to 37.55 ug/L in 2008.
- √ ME-3, total VOCs were 159.7 ug/L in the 1999 baseline sampling event, decreasing to 19 ug/L in 2008.
- √ GM-33, total VOCs were 292.1 ug/L in 2001 (this well was installed after the 1999 baseline sampling event), decreasing to 89.98 ug/L in 2008.
- √ GM-35, total VOCs were 732.8 ug/L in 2001 (this well was installed after the 1999 baseline sampling event), decreasing to 241.9 ug/L in 2008.

- √ GM-8, total VOCs were 150.3 ug/L in the 1999 baseline sampling event, decreasing to 21.75 ug/L in 2008.
- √ GM-6, total VOCs were 275.1 ug/L in the 1999 baseline sampling event, decreasing to 11.3 ug/L in 2008.
- √ GM-2, total VOCs were 82.9 ug/L in the 1999 baseline sampling event, decreasing to 10.59 ug/L in 2008.

These data indicate that VOC concentrations in monitoring wells hydraulically downgradient of the Former Oil House Area and RZ-1 decreased from the 1999 baseline to 2008. Wells GM-21 and GM-22, located south of and sidegradient to the Former Oil House Area, exhibited a decrease and slight increase in total VOC concentrations, respectively. In well GM-22, total VOCs were 7.6 ug/L in 1999 baseline and slightly increased to 12.13 ug/L in 2008. In well GM-21, total VOCs were 168.9 ug/L in the 1999 baseline and decreased to 104.29 ug/L in 2008. The significance of these concentrations is further discussed in Section 4.0.

The following total VOC concentrations are noted in monitor wells hydraulically downgradient of the Former Oil House Area to the southwest and upgradient of the closed South Settling Lagoon:

- √ HR-1, total VOCs were 114 ug/L in the 1999 baseline event, decreasing to 106.57 ug/L in 2008.
- √ HR-17, total VOCs were 29.1 ug/L in the 1999 baseline event, increasing to 155.8 ug/L in 2008.

The following total VOC concentrations are noted in monitor wells hydraulically side-gradient of the Former Oil House Area to the west and east of the closed North Settling Lagoon:

- § HR-2, total VOC concentrations were 15 ug/L in the 1999 baseline event and 8.83 ug/L in 2008.
- § HR-4, total VOC concentrations were 2.6 ug/L in the 1999 baseline event and 5.08 ug/L in 2008.

Wells downgradient of the closed North (W-2-N, W-3-N, W-4-N) and South (W-2-S, W-3-S, W-4-S) Settling Lagoons (closed through in-situ solidification and installation of a cover system in 2001, after the 1999 baseline sampling event) were sampled for both the site-wide groundwater monitoring and post-closure monitoring programs. Total VOC concentrations in wells downgradient of the closed North Settling Lagoon, ranged from 3.3 ug/L to 308.9 ug/L in the 1999 baseline event and ranged from 2.17 ug/L to 103.2 ug/L in 2008. The detected VOCs included 1,1-DCA, cis-1,2-DCE, trans-1,2-DCE, 1,1,1-TCA, TCE, PCE, and vinyl chloride. Total VOC concentrations in wells downgradient of the closed South Settling Lagoon, ranged from 6.5 ug/L to 52.9 ug/L in the 1999 baseline event and 5.33 ug/L to 57.66 ug/L in 2008. The detected VOCs included 1,1-DCA, cis-1,2-DCE, trans-1,2-DCE, 1,1,1-TCA, TCE, and PCE. The significance of these concentrations is further discussed in Section 4.0.

2.2.3.1.3 Downgradient Groundwater Quality

On-site downgradient wells (GM-6, TW-2, GM-2) and off-site downgradient wells (GM-47, GM-50, GM-51, GM-52, GM-16, GM-17, GM-18, WSU-24, GM-10) in the upper aquifer exhibited concentrations of PCE, TCE, 1,1,1-TCA and their associated daughter products. In the 1999 baseline event, total VOC concentrations in these wells ranged from 16.5 ug/L to 266.3 ug/L (excluding wells GM-47, GM-50, GM-51, GM-52 which were installed in 2006). In 2008, total VOC concentrations in these downgradient wells ranged from 7.28 ug/L to 291.2 ug/L (including wells GM-47, GM-50, GM-51, GM-52 which were installed in 2006). At the off-site downgradient well GM-26, which was defined for the site-wide groundwater monitoring program as the point of compliance (POC) well for the upper aquifer, no VOCs were detected in the 1999 baseline event, while PCE was detected below the MCL at 1.4 ug/L in 2008. The decreasing concentrations in the wells downgradient of the site (GM-6, TW-2, GM-2, GM-17, GM-18, GM-10, and WSU-24) compared to the RFI data (ARCADIS Geraghty & Miller, Inc. 2000a) and the 1999 baseline conditions, is likely attributable to the effects of corrective measures pumping at TW-2 which began in January 1996, pumping at DN-13, the effects of the RZs and on-going natural attenuation of the VOCs. PCE and TCE concentrations in GM-16 in 2008 are greater than the 1999 baseline concentrations. RZ-4 was installed in July 2006 to address the increased concentrations observed at GM-16. Additional off-site wells installed during the supplemental groundwater investigation further delineated downgradient concentrations including well installation west of the Great Miami River. Concentrations in these wells (GM-55, GM-65S, GM-78, GM-79, GM-80) in 2008 ranged from 2.45 ug/L to 12.5 ug/L.

2.2.3.2 Lower Aquifer Groundwater Quality

This section includes a discussion of the groundwater quality in lower aquifer monitoring wells shown on Figure 4 that are part of the site-wide program. In 1999 and 2008, the upgradient lower aquifer monitor well HR-12 exhibited the presence of VOCs (total VOCs of 7.4 ug/L and 6.79 ug/L, respectively). The detected VOCs included 1,1,1-TCA, PCE, and TCE, suggesting that upgradient releases of chlorinated VOCs has occurred. The detected VOCs in HR-12 are consistent with historical values for upgradient groundwater quality as indicated in the DOCC (Geraghty & Miller, Inc. 1991 and 1997b) and RFI Reports (ARCADIS Geraghty & Miller, Inc. 2000a and 2000b) for the GM Moraine facilities. This confirms that upgradient sources of VOCs, not related to GM operations, continue to exist in the lower aquifer in the local area. Additionally, the types of VOCs detected upgradient are similar to those detected further downgradient beneath the site, indicating that total VOC concentrations detected beneath the site include both upgradient (off-site) and on-site contributions. VOCs were not detected in upgradient lower aquifer well HR-10 in 2008.

On-site lower-aquifer monitor wells that were part of the site-wide monitoring program in September-October 2008 included HR-15, GM-39, GM-40, GM-61, GM-75D, GM-68D, GM-82, GM-41, GM-58, GM-54, GM-42, GM-19D. Wells GM-39, GM-40, GM-41, and GM-42 were installed in 2003 and wells GM-54, GM-58, GM-61, GM-68D, GM-75D, and GM-82 were installed in 2006 to 2008 after the 1999 baseline sampling event. Detected VOCs included PCE, TCE, 1,1,1-TCA and their associated daughter products. In 1999 (baseline conditions) the total VOC concentrations in these wells ranged from 13.5 ug/L to 70.3 ug/L. In 2008, total VOC concentrations in these wells ranged from 3.6 ug/L to 1,090 ug/L. The increase in the concentration range for this area in 2008 compared to the baseline conditions is due to the sampling data from GM-68D and GM-75D, which were installed after the baseline sampling event. The area of the site monitored by these wells is currently not addressed by corrective measures but the proposed final corrective measures discussed in the 2008 draft CMP do include an approach to address these concentrations.

Additional monitor wells were installed during the supplemental groundwater investigation off-site to the west (GM-83D) and to the east (GM-84) of the site. In 2008, total VOCs in GM-83D were 1.6 ug/L and in GM-84 were 6.6 ug/L.

On-site downgradient wells (GM-3, GM-1) and off-site downgradient wells (GM-15, GM-11, GM-20D, DN-13, GM-9) contained similar VOCs when compared to the on-site groundwater quality. In 1999 (baseline conditions) the total VOC concentrations in

these wells ranged from non-detect to 115 ug/L. In 2008, total VOC concentrations in these wells decreased (total VOCs ranged from non-detect to 33.49 ug/L). VOCs were not detected in off-site, downgradient well MT-69 in 1999 and 2007. Well MT-69 was not sampled in 2008 due to well damage. The off-site downgradient wells GM-15, GM-11, and GM-20D were defined for the site-wide groundwater monitoring program as the POC wells for the lower aquifer. The MCL for TCE was exceeded in wells GM-15, GM-11, and GM-20D in 2008. However, groundwater downgradient of these wells is captured in the lower aquifer capture zone well, DN-13. All other detected VOCs in these POC wells were below MCLs.

3. Corrective Measures Implementation and Performance

To address the source of VOCs in groundwater (Former Oil House Area Source Area) and the associated downgradient plume, GM continued to operate the corrective measures systems in 2008. This involved operation of the RZs and capture zones, as presented in Section 3.1. To meet the objectives defined in Section 4.0 of the Site-Wide Groundwater Monitoring Plan, the data collected in 2008 (described in Section 2.0 of this report) are evaluated in Sections 3.2 and 4.0 to assess the ongoing effectiveness of and the need for continuation of these corrective measures. The corrective measures performance is summarized in Section 3.2 and presented in more detail in Appendix D.

3.1 Corrective Measures Implementation

3.1.1 In-Situ Reactive Zones

The reductive dechlorination of chlorinated VOCs can be enhanced by the introduction of a carbon source that stimulates activity of indigenous microorganisms. The high carbon loading triggers a succession of microbial species. Initially, aerobic electron acceptors such as oxygen and nitrate are consumed. Then, the microbial succession leads to a consortium of species that survive by sulfate reduction, methanogenesis and other similar metabolic pathways, supporting the highly reducing conditions necessary for the dechlorination of PCE, TCE, cis-1,2-DCE, and vinyl chloride. This enhanced reductive dechlorination process (ERD) has been developed at the GM Moraine site through the use of RZs for introduction of a degradable carbon source necessary to develop the desired reducing conditions.

Enhanced reductive dechlorination was implemented in 1999 as a component of the Former Oil House Area corrective measures at three zones: 1) at the southern boundary of the Former Oil House Area (RZ-1); 2) at an intermediate downgradient location south of the Former Oil House Area in the ME well series area (RZ-2 which was operated from 1999 to 2002); and 3) at a downgradient location south of former Delphi Thermal Moraine (RZ-3 West) and the former Moraine Engine plant (RZ-3 East). Using the data obtained from the Supplemental Groundwater Investigation conducted in 2006, RZ-4 was designed and installed to address VOC impacts identified west of RZ-3 West (GM-16). The RZ locations are shown on Figure 2. The actual layouts of each RZ are shown on Figures 10 and 11, and discussed below:

- § At RZ-1, molasses solution was introduced into the upper aquifer, above the upper clay till. The carbon injection wells are screened across the lower 10 ft of the upper aquifer, which is 4 ft to 12 ft thick. RZ-1 consists of 21 introduction wells, of which 12 wells (RZ-1J through RZ-1U) were added in 2002, to expand RZ-1.
- § Former RZ-2 consisted of four monitoring wells (ME-1 [abandoned], ME-2, ME-4, ME-5 [abandoned]), located along the western edge of the former Moraine Engine Plant 3 building. The RZ-2 wells were screened within the upper 3 ft of the upper aquifer. RZ-2 was operated from 1999 to 2002. Relocation of in situ reactive zone RZ-2 has been evaluated as part of the CMP.
- § RZ-3 consists of 46 introduction wells, 30 wells in RZ-3 West (RZ-3A through RZ-3DD) and 16 wells in RZ-3 East (RZ-3FF through RZ-3KK, and RZ-3MM through RZ-3VV). At RZ-3, the carbon injection wells were screened from approximately the aquifer surface to a depth of 46 ft to 68 ft bls, allowing carbon introduction through the lower 20 to 30 feet of the upper aquifer. Introduction wells RZ-3RR through RZ-3VV were installed in April 2005 in order to establish a reactive zone further down-gradient and closer to the property boundary. The additional introduction wells were screened from 34 ft to 54 ft bls. Wells RZ-3MM through RZ-3QQ have not been operated since the installation of RZ-3RR through RZ-3VV in 2005, therefore, of the 16 existing introduction wells in RZ-3 East, only 11 are active.
- § RZ-4 consists of 15 introduction wells, 7 wells in RZ-4 West (RZ-4I through RZ-4O) and 8 wells in RZ-4 East (RZ-4A through RZ-4H). These wells were installed in July 2006. The RZ-4 West wells are located in the southeast corner of the closed South Settling Lagoon and the RZ-4 East wells are located north of Landfill L1 and west of the Waste Pile/Staging Area. At RZ-4, the carbon injection wells were screened from approximately the aquifer surface to a depth of 57 ft to 62 ft bls, allowing carbon introduction through the lower 30 feet of the upper aquifer. Only RZ-4 East remains active.

To establish conditions conducive to ERD within reactive zones RZ-1, RZ-2, and RZ-3, a readily degradable carbon source (a dilute solution of molasses and potable water) was periodically delivered into the reactive zone introduction wells during a 6-month period from December 1999 to May 2000. The molasses solution consisted of either a 10-to-1 or 20-to-1 ratio of potable water to feed-grade molasses that was pumped into each RZ well. The initial event, conducted in December 1999, consisted of two consecutive rounds of carbon source introductions in each RZ well. After the initial

introduction event, the carbon source solution introductions were scheduled twice per month through May 2000. Due to the success during the first six months of implementing this technology, carbon source introduction activities continued in October, November, and December 2000, and subsequently from June 2001 through December 2008.

Introductions in RZ-1 were modified in the fall of 2003 after review of the previous site-wide groundwater analytical results. Due to the success of RZ-1, GM implemented a reduced carbon loading frequency of one introduction event every other month, and periodically monitored GM-28 to ensure that the necessary reducing conditions were being sustained to promote the dechlorination process. In May 2005, the introduction routine was changed to two injections every quarter to ensure reducing conditions are maintained and sufficient carbon is available to allow for complete degradation of the VOCs. This injection schedule of two per quarter was followed in 2008 with the exception of the fourth quarter when RZ-1 was not skipped in order to address an increase in VOC concentrations (cis-1,2-dichloroethene and vinyl chloride) noted during the third quarter performance monitoring.

Introductions continued throughout 2008 on a monthly introduction schedule in Reactive Zone RZ-3. Wells GM-21, GM-6, and GM-8 serve as the downgradient performance monitoring wells for RZ-3. Monthly carbon introductions in RZ-4 East continued through December 2008. Monitoring Well GM-19S serves as the downgradient performance monitoring well for RZ-4 East. The molasses is stored on-site and mixed with potable water prior to injections. Details regarding the frequency and strength of carbon source introductions are provided in Table 18 for 2008. Additional discussion is presented in Appendix D.

3.1.2 Capture Zones

The capture zone corrective measure for the upper aquifer consists of groundwater extraction at the property boundary using well TW-2; treatment through an air stripper tower; and discharge through GM's NPDES permitted outfall to the Great Miami River. Groundwater recovery from TW-2 began on January 31, 1996. During the 13 years of operation (January 31, 1996 through December 31, 2008), the system has recovered and treated a total of 853,513,983 gallons of groundwater at an average flow rate of 143.4 gallons per minute (gpm). Annual total gallons recovered and average flow rate during 2008 were 61,858,963 gallons and approximately 129.7 gpm, respectively. The location of recovery well TW-2 is shown on Figure 2.

From November 1996 through the end of this reporting period, GM has monitored the water level in TW-2 and adjusted the TW-2 flow rate as recommended in the October 1996 Monthly Technical Progress Report (Geraghty & Miller, Inc. 1996) and approved by U.S. EPA (Personal Communication, 1996). This procedure was implemented to avoid excessive drawdown within the well, which could cause damage to the well screen and/or the pump. The flow rate from TW-2 is adjusted as necessary to maintain the water level in TW-2 at least 0.5 feet above the top of the well screen. As documented in the 2008 Monthly Technical Progress Reports, the treatment system is periodically shut down for short periods of time for operation and maintenance activities.

Well DN-13 is a lower aquifer well that Montgomery County has been using in a Pump-to-Waste Program since March 1990. The capture zone corrective measure for the lower aquifer consists of continued pumping of DN-13 in 2008 at an approximate range of 1,000 to 1,100 gpm. Well DN-13 was operational throughout 2008 except for the periodic shutdowns for operation and maintenance activities that are documented in the 2008 Monthly Technical Progress Reports. As further discussed in Section 3.2.2, these temporary shut downs did not have long-term effects on the capture zone around well DN-13. The location of well DN-13 is shown on Figure 2.

3.2 Corrective Measures Performance

3.2.1 In-Situ Reactive Zone Performance Results

As described earlier in Section 3.1.1, the carbon solution delivery network consisted of RZ-1, RZ-3 (West and East), and RZ-4 East. Molasses was introduced in 2008 into the groundwater through introduction points shown on Figures 10 and 11. Operation of the RZs was monitored through the collection of field parameter measurements, and laboratory analyses of biogeochemical indicator parameters and VOCs, according to the Site-Wide Groundwater Monitoring Plan (ARCADIS G&M, Inc. 2002). A detailed assessment of the effectiveness of the In-situ Reactive Zones and the results of this monitoring are presented in Appendix D and summarized below:

§ Existing aquifer conditions have been converted to more reducing conditions within and downgradient of the reactive zones through the introduction of a carbon source, as evidenced by the changes in field and bioattenuation parameters;

- § The target compounds (PCE and TCE) have been effectively reduced to daughter products (cis-1,2-DCE and vinyl chloride) and ultimately to end products (ethene and ethane) based on a review of the VOC results; and
- § Levels of vinyl chloride were consistently low to non-detect in all downgradient wells, indicating degradation of cis-1,2-DCE to ethene and ethane.

In general, the process of enhanced reductive dechlorination at this site has been successful in achieving the desired reduction of VOC concentrations. In 2009, GM will continue to evaluate if modifications to the RZs are needed based on water quality and performance monitoring data.

3.2.2 Capture Zone Performance Results

Figures 6 and 7 indicate the location of the capture zone corrective measures at the southern end of the former Delphi Thermal Moraine site for both the upper and lower aquifers, respectively. Additionally, it should be noted that these flow maps are consistent with the flow conditions predicted by the capture zone modeling, presented on Figures 2 and 3 of the Final Interim Measures Design Plans (Geraghty & Miller, Inc. 1995). Seasonal weather conditions vary throughout the year and this variation will have an impact on the groundwater elevations observed at the site (Table 7). The observed elevation differences in 2008 are consistent with the above average precipitation in 2008. Although precipitation was higher than normal (6.31 inches above normal) during 2008 and 5 inches higher than 2007, the above average precipitation occurred early in the year. The November 2008 event closely matches the October 2007 potentiometric surface across the site. Water-level elevations in TW-2 are regularly monitored to ensure the water level does not fall below the well screen. If the water level approaches the well screen, the pumping rate is reduced for protection of the pump. Pumping rate adjustments were not necessary in 2008 as discussed previously in Section 3.1. The pumping rate for DN-13 was not adjusted; therefore, only seasonal variations influence water level elevations at DN-13. Effective capture has been maintained in spite of seasonal variations in both the upper and lower aquifers.

Figure 5 presents a graph of the influent concentration of total chlorinated VOCs and benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds in TW-2 since start up of the recovery and treatment system in January 1996. The data shows a steady decline in total chlorinated VOCs and a significant decrease in VOC concentrations.

The data indicates that the remediation at the site is continuing to provide VOC mass reduction downgradient of RZ-3 West.

4. Corrective Action Completion Strategy

4.1 Effectiveness of Corrective Measures Activities

4.1.1 Background and Objectives

The goal of the corrective measures for groundwater at the Site is to reduce existing site-related groundwater concentrations to levels that are protective of reasonably expected future uses of groundwater. GM's approach for achieving this goal is through a combination of the corrective measures that achieve plume migration control, reduce existing plume concentrations, and monitor performance of these measures. Once on-site groundwater concentrations are reduced sufficiently by active corrective measures (pumping and in-situ treatment) to ensure continued protection of reasonably expected groundwater uses, some, or all, of the active measures will be terminated.

Groundwater monitoring as described in the Site-Wide Groundwater Monitoring Plan (ARCADIS G&M, Inc. 2002) or as will be described in the forthcoming corrective measures design plan (to be developed following U.S. EPA approval of the CMP) will continue to verify that groundwater conditions remain acceptable, and that ultimately, groundwater concentrations at the POC defined for the upper and lower aquifers, decline below the appropriate protective levels (i.e., appropriate for the protection of the groundwater resource and its reasonably expected future uses). Data have been and will continue to be acquired during the implementation of the site-wide groundwater monitoring program to evaluate progress towards achieving this goal.

The need for continued operation of the remedial measures described in Section 2 will be determined based on achieving and maintaining the following conditions:

1. Upper aquifer: consistent with the criterion stated in the approved RCRA Corrective Action Environmental Indicator Determination – Migration of Contaminated Groundwater Under Control (CA 750), the condition to be met in the upper aquifer is no migration of VOCs at concentrations exceeding appropriately protective levels (i.e., appropriate for the protection of the groundwater resource and its reasonably expected future uses as characterized in the RFI) beyond the existing area of contaminated groundwater. Based on the groundwater conditions established during the September 1999 baseline sampling event, the existing well GM-26 was identified as the POC monitoring point for ensuring that this condition is maintained.

2. Lower aquifer: consistent with the goal to maintain a usable aquifer, including off-site drinking water use, the condition to be met in the lower aquifer is no VOC concentrations exceeding appropriate protective levels (i.e., appropriate for the protection of the groundwater resource and its reasonably expected future uses as characterized in the RFI) beyond the existing area of contaminated groundwater. Based on the groundwater conditions established during the September 1999 baseline sampling event, the existing wells GM-15, GM-11, and GM-20D were identified as the POC monitoring points for ensuring that this condition is maintained.

Once on-site groundwater concentrations are reduced sufficiently by active measures to be protective of reasonably expected future uses, some or all of these active measures will be terminated. Following termination of any active measures, GM will continue its groundwater monitoring program to confirm that the conditions in the upper and lower aquifer continue to be met without these active measures.

4.1.2 Methodology

In accordance with the Site-Wide Groundwater Monitoring Plan (ARCADIS G&M, Inc. 2002), groundwater data are compared to remediation target levels (RTLs) developed to ensure compliance with the above-stated conditions without active corrective measures. As defined in the Site-Wide Groundwater Monitoring Plan, these RTLs have been calculated using the groundwater assessment methods developed in the Baseline and Supplemental Baseline Risk Assessments (ENVIRON 2000a, b) taking into consideration the current pumping conditions at and in the vicinity of the facility. Specifically, the MODFLOW groundwater flow model (Geraghty & Miller, Inc. 1994) developed for Delphi Thermal Moraine and the surrounding region (including former Moraine Engine and Moraine Assembly) is used to support estimation of RTLs which are concentrations in on-site groundwater at locations downgradient of the Former Oil House Area that would not be expected to result in exceedances of the MCL at the designated monitoring points.

As discussed in the 2008 CMP (ARCADIS, Inc. 2008a), the MODFLOW groundwater flow model developed for the site was updated to reflect changes in on-site pumping conditions and the refined hydrogeologic conceptual site model. In particular, due to the cessation of operations at the former Moraine Assembly facility in December 2008, GM production wells 11B and 12A are currently operating at a greatly diminished level and will cease to operate at some point in the near future. Therefore, the MODFLOW model was updated to project the flow conditions with wells 11B, and 12A no longer

operating (model scenario "1A" as defined in the CMP [ARCADIS, Inc. 2008a]). Additional details regarding the refinements made to the groundwater flow model can be found in Appendix D of the 2008 CMP (ARCADIS, Inc. 2008a).

Using this approach and considering the scope of the annual groundwater monitoring program, GM developed RTLs for the following remediation monitoring zones in both the upper and lower aquifer at and downgradient of the Former Oil House Area:

§ Upper Aquifer

- Former Oil House Area, (AOI 7 Shallow): the Former Oil House Area source area (wells GM-23, GM-29 and GM-30),
- Zone S1: the monitoring zone immediately downgradient of RZ-1 (well GM-28),
- Zone S1 to Zone S2: the monitoring zone between RZ-1 and RZ-2 (wells GM-28, and ME-6),
- Zone S2: the monitoring zone immediately downgradient of RZ-2 (wells ME-6, ME-3, GM-31),
- Zone S2 to Zone S3: the monitoring zone between RZ-2 and RZ-3 (wells ME-6, ME-3, GM-31, GM-22, GM-19S, EAST, GM-33, GM-35),
- Zone S3: the monitoring zone immediately downgradient of RZ-3 (wells GM-32, GM-21, W-4-S, GM-63, and GM-64),
- Zone S3 to GM-10: the monitoring zone between RZ-3 and GM-10 (wells 4S, GM-32, GM-21, GM-8, GM-6, W-4-S, GM-2, GM-16, GM-18, WSU-24, GM-47, GM-50, GM-51, GM-63, GM-64 and GM-10),
- GM-10/GM-52: the monitoring zone downgradient of RZ-3 (wells GM-10 and GM-52), and
- POC Shallow: monitoring at well GM-26.

§ Lower Aquifer

- Former Oil House Area, (AOI 7 Deep): the Former Oil House Area source area (wells GM-23, GM-29, and GM-30),
- Zone GM-40/41/54: the monitoring zone encompassing GM-40, GM-41 and GM-54,
- Zone GM-42: the monitoring zone encompassing GM-42,
- Zone D1: the monitoring zone encompassing GM-19D,
- Zone D2: the monitoring zone encompassing wells GM-1 and GM-3, and
- POC Deep: monitoring at wells GM-11, GM-15 and GM-20D.

The following steps were conducted to assess the site-wide monitoring data for the purpose of determining the extent to which each remedial measure is contributing to achievement of the conditions outlined above for the upper and lower aquifers:

- § As discussed above, the groundwater flow model was updated in 2008 to reflect current pumping conditions. The pumping conditions are summarized on Table E-1 in Appendix E. Table E-1 also provides the source reduction factors calculated from the groundwater flow model that are used to assess hypothetical concentrations at receptor wells that are attributable to the land-based units (i.e., North and South Settling Lagoons, and Landfills L1, L2 and L3). The RTLs, updated to reflect these current pumping conditions at and in the vicinity of the site (ARCADIS, Inc. 2008a), are presented on Table E-4 in Appendix E.
- § Minimum, mean and maximum constituent concentrations in each remediation monitoring zone were calculated based on data collected during the 2008 monitoring period. One-half sample quantitation limits were used for non-detect results.
- § Minimum, mean and maximum constituent concentrations were compared against the RTLs developed for each remediation monitoring zone.

4.1.3 Results

The results for groundwater quality data collected in all groundwater monitoring events in 2008 in each remediation monitoring zone wells are discussed in Section 2.2.3. A comparison of the minimum, mean and maximum concentrations for each parameter in each remediation monitoring zone to the RTLs is presented on Table 19. These results and relative change in these results in comparison with the 2007 monitoring period are discussed below and presented on Table 19. For reference, Table 19 also presents a comparison with the results from the 1999 baseline sampling event.

The comparison of the 2008 shallow zone (upper aquifer) monitoring data with the RTLs indicates the following:

AOI 7, Shallow (wells GM-23, GM-29 and GM-30):

- § Consistent with 2007, concentrations of 1,1-DCE, cis-1,2,-DCE, PCE and TCE remained below the RTLs.

§ As compared with 2007, the concentrations of vinyl chloride have decreased but still remain above the RTL.

Zone S1 (well GM-28):

§ Consistent with 2007, all concentrations remain below the RTLs.

Zone S1 to S2 (wells GM-28, ME-6):

§ Consistent with 2007, all concentrations remain below the RTLs.

Zone S2 (wells ME-6, ME-3, GM-31):

§ Consistent with 2007, the concentrations of 1,1-DCE, cis-1,2,-DCE, PCE and vinyl chloride remain below RTLs.

§ As compared to 2007, the maximum concentration of TCE has decreased but still remains above the RTL.

Zone S2 to S3 (wells ME-6, ME-3, GM-31, GM-22, GM-19S, EAST, GM-33, GM-35):

§ Consistent with 2007, the concentrations of 1,1-DCE, cis-1,2,-DCE, PCE and vinyl chloride remain below RTLs.

§ As compared with 2007, the maximum concentration of TCE has decreased but still remains above the RTL.

Zone S3 (wells W-4-S, GM-32, GM-21, GM-63, and GM-64):

§ Consistent with 2007, the concentrations of 1,1-DCE remain below the RTL.

§ As compared with 2007, the maximum concentration of cis-1,2-DCE has decreased to a level below the RTL. The maximum concentrations of PCE and TCE have increased slightly and remain above the RTLs. The maximum concentration of vinyl chloride has decreased but remains above RTL.

Zone S3 to GM-10 (wells 4S, GM-32, GM-21, GM-8, GM-6, W-4-S, 4S, GM-2, GM-16, GM-18, WSU-24, GM-47, GM-50, GM-51, GM-63, GM-64 and GM-10):

- § Consistent with 2007, the concentrations of 1,1-DCE remain below the RTL.
- § As compared with 2007, the maximum concentration of cis-1,2-DCE has decreased to a level below the RTL.
- § As compared with 2007, the maximum concentrations of TCE and PCE have slightly increased and remain above the RTLs. The maximum concentration of vinyl chloride has decreased but still remains above the RTL.
- § As compared with 2007, the average concentration of PCE has remained stable above the RTL.

GM-10/GM-52:

- § Consistent with 2007, the concentrations of 1,1-DCE, cis-1,2-DCE and vinyl chloride remain below RTLs.
- § Consistent with 2007, the maximum and average concentrations of PCE have remained relatively stable above the RTL. The maximum and average concentrations of TCE have decreased but still remain above the RTL.

POC Shallow (well GM-26):

- § Consistent with 2007, all concentrations remain below the RTLs.

The comparison of the 2008 deep zone monitoring data with the RTLs indicates the following:

AOI 7, Deep (wells GM-23, GM-29, and GM-30):

- § Consistent with 2007, the concentrations of 1,1-DCE remain below the RTL.
- § As compared with 2007, the maximum concentrations of cis-1,2-DCE and PCE have decreased to levels below the RTLs.
- § Consistent with 2007, the maximum concentration of vinyl chloride has decreased but still remains above the RTL. The maximum and average concentrations of TCE have remained relatively stable above the RTL. The average concentration of vinyl chloride has decreased but remains above the RTL.

Zone GM-40/41/54:

- § Consistent with 2007, the concentrations of 1,1-DCE, cis-1,2-DCE, and vinyl chloride remain below the RTLs.
- § As compared with 2007, the maximum and average concentrations of PCE have increased slightly and remain above the RTL. The maximum and average TCE concentrations have decreased but also remain above the RTL.

GM-42:

- § Consistent with 2007, all concentrations remain below the RTLs.

Zone D1 (well GM-19D):

- § Consistent with 2007, concentrations of 1,1-DCE, cis-1,2-DCE, PCE, and TCE remain below the RTLs.
- § Consistent with 2007, the detected concentration of vinyl chloride has decreased but remains above the RTL.

Zone D2 (wells GM-1 and GM-3):

- § Consistent with 2007, concentrations of 1,1-DCE, cis-1,2-DCE, PCE, and vinyl chloride remain below the RTLs.
- § As compared with 2007, the concentrations of TCE have decreased but remain above the RTL.

POC Deep (wells GM-11, GM-15 and GM-20D):

- § Consistent with 2007, concentrations of 1,1-DCE, cis-1,2-DCE, PCE and vinyl chloride remain below RTLs.
- § As compared to 2007, the minimum concentration of TCE has increased above the RTL. The maximum and average concentrations of TCE have decreased slightly but remain above the RTL.

As indicated by the comparison of groundwater monitoring data with the RTLs presented on Table 19, concentrations at the upper aquifer POC well remain below RTLs. Concentrations in the monitoring zone immediately upgradient of the upper aquifer POC remain stable and above RTLs since 2006. Concentrations in the monitoring zones further upgradient of the upper aquifer POC, as well as concentrations at the lower aquifer POC wells remain above the RTLs for one or more constituents. Therefore, active corrective measures are still required to maintain the short-term objective in the upper aquifer, and to achieve the short-term corrective action objective in the lower aquifer.

Concentrations in the AOI-7 area remain above levels necessary to achieve the RTLs at the downgradient upper and lower aquifer POCs. However, concentrations immediately downgradient of RZ-1 remain below the RTLs, thus indicating that RZ-1 has been effective at remediating groundwater impacts from AOI-7 in the upper aquifer. Continued corrective measures downgradient of RZ-1 (i.e., at RZ-3 and RZ-4) will be continued to address residual impacts in the downgradient upper aquifer plume area. In addition, the CMP submitted in August 2008 included a review of the appropriateness of the monitoring wells selected as POC wells (ARCADIS Inc. 2008a), and provided proposed modifications to the monitoring program, specifically the POC wells for the upper and lower aquifer. These changes including additional modifications to the monitoring program will be proposed in the corrective measures design plan which will be developed following approval of the 2008 CMP (ARCADIS Inc. 2008a).

4.2 Monitoring of Land-Based Waste Management Units

4.2.1 Background and Objectives

One additional component of the site-wide groundwater monitoring program is monitoring of other specific units (i.e., the closed lagoons). Although the RFI,

Supplemental RFI and CMP, determined that the wastes at these units do not contribute constituents to groundwater at levels that would have a significant effect on current and reasonably expected future groundwater uses, the monitoring program includes monitoring wells that are used to confirm these findings. In addition, the Site-Wide Groundwater Monitoring Plan was developed to meet the objectives of Ohio EPA's post-closure monitoring for the closed North and South Settling Lagoons.

4.2.2 Methodology

As indicated above, this site-wide monitoring program was developed to meet the objectives of RCRA corrective action and the post-closure groundwater monitoring requirements for the closed lagoons. The site-wide program monitors potentially significant contributions of hazardous waste constituents to existing groundwater quality from the closed lagoons. To determine if the closed lagoons may be significant contributors of hazardous waste constituents to existing groundwater concentrations, monitoring data collected from the designated post-closure monitoring wells located downgradient of each of the closed lagoons are evaluated for temporal trends. The approach proposed in the Site-Wide Groundwater Monitoring Plan for this assessment includes, as an initial approach, the application of straight line regression to determine if the data suggests a strong positive correlation.

In addition, in accordance with the Site-Wide Groundwater Monitoring Plan, the monitoring wells located immediately downgradient of the in-place waste management units are evaluated to determine whether these units are significantly affecting groundwater quality. Specifically, the potential health significance of constituents detected in monitoring wells immediately downgradient of these units to current and reasonably expected groundwater uses on-site and off-site are evaluated using the groundwater assessment methods developed in the Supplemental RFI Baseline Risk Assessment (ENVIRON 2000b) and CMP (ARCADIS, Inc. 2008a). If this evaluation identifies detected concentrations that indicate one or more of these units may be having a potentially significant impact on downgradient groundwater quality, then a review of groundwater quality from monitoring wells upgradient and downgradient of the particular unit would be conducted to identify whether the unit is affecting groundwater quality. The monitoring wells identified in the Site-Wide Groundwater Monitoring Plan for monitoring each of the waste management units are:

§ Closed North Settling Lagoon: HR-4 (upgradient), W-2-N, W-3-N, W-4-N.

§ Closed South Settling Lagoon: HR-17 (upgradient), W-2-S, W-3-S, W-4-S.

§ Landfill L1: GM-2, GM-6, 4S.

§ Landfill L2: W-4-N, HR-2, HR-3.

§ Landfill L3: W-4-N, HR-2, HR-4.

Consistent with the groundwater exposure evaluation conducted for the Supplemental Baseline Risk Assessment (ENVIRON 2000b) and CMP (ARCADIS, Inc. 2008a), groundwater concentrations reported for each set of downgradient monitoring wells are assumed to represent source concentrations associated with each unit. These source concentrations are combined with source reduction factors developed for the base case exposure scenario (i.e., current groundwater use conditions without corrective measures pumping – “Scenario 1a”) to estimate exposure concentrations at the points of groundwater use (e.g., downgradient municipal well fields). For the current evaluation, the maximum concentrations detected during the 2008 sampling events in each set of monitoring wells are used as the source concentration and combined with the updated source reduction factors presented on Table E-1 (as described in Section 4.1.2). The estimated exposure concentrations are then compared with MCLs or risk-based equivalent drinking water levels (EDWLs) (“drinking water criteria”).

4.2.3 Results

As proposed in the Site-Wide Groundwater Monitoring Plan (ARCADIS G&M, Inc. 2002), post-closure monitoring data collected from those wells assigned to the closed North and South Settling Lagoons were reviewed for temporal trends (see Section 2.2.3.1.2). Data considered in the evaluation included results through the September 2008 monitoring event and data ranging back to the initial post-closure monitoring event conducted in November 2001. Currently, the data set collected since the lagoons were closed includes seven data points for any monitoring well/constituent pair; the data plots for key constituents are provided on Figure E-1 for the closed North Settling Lagoon (NSL) and Figure E-2 for the closed South Settling Lagoon (SSL). In general, the linear regression analysis for the NSL, using the available data, indicates either declining concentrations or little significant changes over time. Similarly for the SSL, changes in concentrations in the wells immediately downgradient of this unit appear to correspond to changes in concentrations in the upgradient well (HR-17). While a slight increase in cis-1,2-DCE concentrations has been observed in well W-4-S, this increase does not represent a significant change. Between 2002 and 2008, cis-1,2-DCE concentrations in this well have only increased from about 3 ug/L to about 6 ug/L. The drinking water criterion for cis-1,2-DCE is 70 ug/L. These concentration

trend lines do not indicate that any significant increases in groundwater concentrations that would be attributable to these land based units.

Using the methodology developed in the Supplemental RFI baseline risk assessment (ENVIRON 2000b) and CMP (ARCADIS Inc. 2008a) for assessing potential impacts to groundwater receptors from releases at the Moraine facilities, GM determined that the data from the wells downgradient of the closed North and South Settling Lagoons do not indicate that these units are significantly affecting groundwater quality. The potential significance of concentrations detected during the 2008 sampling events in each set of downgradient monitoring wells for the lagoons and landfills were assessed. Based on the maximum concentrations detected during the 2008 sampling events at each of these units, exposure concentrations at water supply wells representing current pumping conditions were estimated. The estimated combined groundwater concentrations at each of the receptor wells are presented on Table 20 in comparison with drinking water criteria. As shown on Table 20, the maximum concentrations detected downgradient of each of the land-based waste disposal units do not contribute significantly to concentrations at these points of potential exposure. Therefore, the data from the wells downgradient of the waste management units indicate that these units are not significantly affecting groundwater quality. Supporting calculations for this assessment are provided in Appendix E.

5. Conclusions and Recommendations

This summary report presents the groundwater monitoring activities completed in 2008 at the GM Moraine Facilities located in Moraine, Ohio. This sampling was conducted to meet the five objectives presented in Section 1.2. Compliance with these objectives is presented for the waste management units, corrective measures, and on-going site-wide groundwater monitoring in the following sections.

5.1 Land-Based Waste Management Units

As proposed in the Site-Wide Groundwater Monitoring Plan (ARCADIS G&M, Inc. 2002), monitoring data collected immediately downgradient of the closed North and South Settling Lagoons, and Landfills L1, L2 and L3 were evaluated to determine if these units may be contributing constituents to groundwater at levels that would have a significant effect on current and reasonably expected future groundwater uses. Using the methodology developed in the Supplemental RFI baseline risk assessment (ENVIRON 2000b) and CMP (ARCADIS, Inc. 2008a) for assessing potential impacts to groundwater receptors from releases at the Moraine facilities, the potential significance of observed groundwater concentrations downgradient of these units was evaluated.

This evaluation determined that data from the wells downgradient of the in-place waste management units indicate that these units are not significantly affecting groundwater quality. Based on the results from the 2008 monitoring, no changes in the monitoring program for the waste management units are proposed.

5.2 Corrective Measures Performance

GM's approach for achieving its corrective action goals for the Moraine facilities is based on a combination of corrective measures (in-situ treatment and hydraulic control) designed to reduce existing plume concentrations thereby achieving plume reduction and migration control.

5.2.1 In-Situ Treatment

Groundwater quality monitoring at and downgradient of the reductive dechlorination treatment zones indicates that this in-situ treatment program has been effective at reducing VOC concentrations in groundwater. As observed during the 2008 monitoring, the upper aquifer conditions in the areas downgradient of the in-situ reactive zones have been converted to more reducing conditions through the

introduction of a carbon source, as evidenced by the changes in field and bioattenuation indicator parameters. Further, the VOC results indicate that the target compounds (PCE and TCE) have been effectively reduced to daughter products (cis-1,2-DCE and vinyl chloride) and ultimately to ethene and ethane.

In general, the process of enhanced reductive dechlorination at this site has been successful in achieving a reduction of VOC concentrations. Based on the data collected in 2008 as part of the site-wide groundwater monitoring program, GM does not believe that additional modifications to the RZs will be necessary at this time; however, GM will evaluate if modifications to the current RZs are needed based on water quality and performance monitoring data.

5.2.2 Hydraulic Control

Groundwater elevation monitoring indicates that the capture zone corrective measures continue to be effective at maintaining hydraulic control in both the upper and lower aquifers in the southern area of the former Delphi Thermal Moraine. Additionally, the observed flow conditions are consistent with the conditions predicted by the capture zone modeling performed in developing the corrective measures pumping plan, which confirms the continued utility of the groundwater flow model as a predictive tool.

Based on the effective performance of the pumping program during the 2008 monitoring and exceedences of RTLs at the Former Oil House Area and in Zones S1 to S2, S2, S2 to S3, S3, S3 to GM-10/-52, GM-10/-52, Zone GM-40/-41/-54, GM-42, Zone D1, Zone D2, and POC monitoring points in the deep aquifer (GM-11, GM-15, GM-20D), no changes to the hydraulic control component of the ongoing corrective measures are proposed at this time.

GM's ongoing groundwater monitoring program includes the assessment of changes in site-specific VOCs in both the upper and lower aquifers at locations upgradient of the GM Moraine facilities, as well as on-site and downgradient of the facilities. Data collected from upper and lower aquifer wells located upgradient of the facilities confirms that upgradient sources of VOCs, not related to GM operations, continue to exist in the local area. Notwithstanding these upgradient contributions of VOCs to on-site groundwater, the monitoring data indicate a site-wide decrease in VOC concentrations since the baseline sampling event conducted in 1999, other than areas to be addressed as proposed in the CMP. In addition, VOC concentrations at the current off-site downgradient upper aquifer POC well GM-26 remained below drinking water criteria. Concentrations of TCE remained above the drinking water criterion in

downgradient lower aquifer wells GM-11, GM-15 and GM-20D, however, groundwater downgradient of these wells is contained by the lower aquifer capture zone well DN-13.

The overall decreasing concentrations in the wells downgradient of the site since the corrective measures were first implemented is likely attributable to the combined effects of corrective measures pumping at TW-2 which began in January 1996, pumping at DN-13, and on-going enhanced natural attenuation of the VOCs. However, concentrations in the monitoring zones immediately upgradient of the upper aquifer POC (GM-26), as well as concentrations at the lower aquifer POC wells remain above the RTLs. Therefore, active corrective measures are still required to achieve the corrective action objectives presented in the CMP.

Based on the evaluation of the site-wide groundwater quality, both the in-situ treatment and hydraulic control components of the corrective action program will be continued.

5.3 Reassessment of Site-Wide Groundwater Monitoring Program

In accordance with the Site-Wide Groundwater Monitoring Plan (ARCADIS G&M, Inc. 2002), groundwater monitoring was conducted in 2008 to evaluate groundwater quality upgradient and downgradient of the closed lagoons and landfills, performance of the in-situ reactive zones, and performance of the capture zones. Based on the data collected during the 2008 monitoring period, GM believes that the monitoring program has provided sufficient data for a comprehensive evaluation of the current corrective action objectives. To reassess the monitoring program in support of the proposed final corrective measures, GM recommends the following:

- § A proposed revised site-wide groundwater monitoring program for 2009 is presented in Table 21. Table 21 reflects a reduced list of wells based on an evaluation of data trends observed at each monitor well since 1999. The rationale for reducing the list is presented on Table 21. The groundwater monitoring for 2009 will focus primarily on the required wells needed to support evaluation of the land-based waste management units, IRZ performance monitoring, capture zone monitoring, and POC monitoring. For those wells that are not retained in 2009, they will be sampled every 5 years or until the time the groundwater monitoring program is revised for the final site-wide corrective measures when the CMP is finalized.
- § As part of the corrective measures design plan, GM will use the updated groundwater flow model to develop new RTLs, as appropriate at the time the

corrective measure design plan is prepared. These updated RTLs will serve to evaluate groundwater data collected as part of final corrective measures performance monitoring.

- § GM will present future revisions to the site-wide groundwater monitoring program in support of the final site-wide corrective measures when the CMP is finalized.

6. References

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Table 1. Site-Wide Groundwater Monitoring Events in 2008, General Motors Corporation, Moraine, Ohio.

November 2008 Site-Wide Groundwater and Surface Water Elevations

Groundwater and surface water elevations were measured on November 17-18, 2008.

September-October 2008 Site-Wide Annual Groundwater Sampling

Site-specific list of VOCs⁽¹⁾ and field parameters⁽²⁾ were analyzed during September 22 to October 23, 2008 from the following upper aquifer monitoring wells. Biogeochemical parameters⁽³⁾ and additional parameters⁽⁴⁾ were analyzed at select wells identified below:

W-2-N	W-2-S	GM-10	GM-28 ⁽³⁾	GM-52
W-3-N	W-3-S	GM-16	GM-29 ⁽³⁾	GM-55
W-4-N	W-4-S ⁽³⁾	GM-17	GM-30 ⁽³⁾	GM-59 ⁽³⁾
HR-1	TW-2	GM-18	GM-31 ⁽³⁾	GM-60 ⁽³⁾
HR-2	ME-3 ⁽³⁾	GM-19S ^(3,4)	GM-32 ⁽³⁾	GM-63 ⁽³⁾
HR-3	ME-6 ⁽³⁾	GM-21 ⁽³⁾	GM-33	GM-64 ⁽³⁾
HR-4	WSU-24	GM-22 ⁽³⁾	GM-35 ⁽⁴⁾	GM-65S
HR-5	GM-2	GM-23 ⁽³⁾	GM-47 ⁽³⁾	GM-75S ⁽³⁾
HR-9	GM-6 ⁽³⁾	GM-26	GM-50 ⁽³⁾	GM-78
HR-11	GM-8 ⁽³⁾	GM-27	GM-51	GM-79
HR-17				GM-80

Site-specific list of VOCs⁽¹⁾ were analyzed during September 22 to October 23, 2008 from the following list of lower aquifer monitoring wells:

HR-10	GM-3	GM-20D	GM-54	GM-82
HR-12	GM-9	GM-39	GM-58	GM-83D
HR-15	GM-11	GM-40	GM-61	GM-84
DN-13	GM-15	GM-41	GM-68D	
GM-1	GM-19D	GM-42	GM-75D	

1. Site-specific list of VOCs includes: benzene, 1,1-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, ethylbenzene, tetrachloroethene, toluene, 1,1,1-trichloroethane, trichloroethene, vinyl chloride, and xylenes.
2. Field parameters include: pH, specific conductivity, dissolved oxygen, oxidation reduction potential, and temperature.
3. Biogeochemical parameters include: manganese (total and dissolved), iron (total and dissolved), sulfate, sulfide, total organic carbon, chlorides, ethane, ethene, and methane.
4. Additional parameters include: metals (antimony, cadmium, chromium), semi-volatile organic compounds (benzo(a)anthracene, benzo(b)fluoranthene) and, polychlorinated biphenyls.

DN-13 Monthly Groundwater Sampling

Appendix IX VOCs and cis-1,2-DCE were analyzed during these monthly sampling events from DN-13.

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Table 1. Site-Wide Groundwater Monitoring Events in 2008, General Motors Corporation, Moraine, Ohio.

Air Stripper Tower Influent and Effluent Monthly Groundwater Sampling

Benzene, chloroethane, 1,1-dichloroethane, cis-1,2-dichloroethene, trans-1,2-dichloroethene, ethylbenzene, tetrachloroethene, toluene, 1,1,1-trichloroethane, trichloroethene, vinyl chloride, and xylenes were analyzed during the influent sampling events from the air stripper tower by EPA Method 8260B. The stripping tower effluent sample was analyzed for oil and grease and the following list of VOCs: benzene, chloroethane, 1,1-dichloroethane, cis-1,2-dichloroethene, trans-1,2-dichloroethene, ethylbenzene, tetrachloroethene, toluene, 1,1,1-trichloroethane, trichloroethene, vinyl chloride, and xylenes. The effluent sample was analyzed by EPA Methods 8260B and 624 (drinking water standard).

RZ Performance Sampling

The following events were performed in 2008:

The following wells were sampled on March 4 and 6, 2008 for site-specific list of VOCs⁽¹⁾, TOC, ethane, ethene, methane, and field parameters⁽²⁾: GM-8, GM-19S, GM-21, GM-28, GM-29, GM-32, GM-63, GM-64 and W-4-S;

The following wells were sampled on June 2-3, 2008 for site-specific list of VOCs⁽¹⁾, TOC, ethane, ethene, methane, and field parameters⁽²⁾: GM-8, GM-19S, GM-21, GM-28, GM-29, GM-32, GM-63, and GM-64.

The following wells were sampled on September 3-4, 2008 for site-specific list of VOCs⁽¹⁾, TOC, ethane, ethene, methane, and field parameters⁽²⁾: GM-8, GM-19S, GM-21, GM-28, GM-29, GM-32, GM-63, and GM-64.

<u>Parameter</u>	<u>Analytical Method</u>
Site-specific list of VOCs	EPA Method 8260B/EPA Method 624
Manganese, total and dissolved	EPA Method 6010B
Iron, total and dissolved	EPA Method 6010B
Sulfate	SM 375.4
Sulfide	SM 376.1
Total Organic Carbon	SM 415.1
Chlorides	SM 325.2
Ethane, Ethene, Methane	Method AM18G
Metals	EPA Method 6010B
SVOCs	EPA Method 8270
PCBs	EPA Method 8082

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Table 2. Influent Monitoring of the Air Stripper Tower for 2008, General Motors Corporation, Moraine, Ohio.

Constituent	Units	1/7/08	2/13/08	3/3/08	4/3/08	5/9/08	6/5/08	7/9/08	8/11/08	9/12/08	10/7/08	11/7/08	12/1/08
Oil & Grease ¹	mg/L	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	2.1 B	< 5 U	1.3 B	< 5 U	< 5 U	< 5 U
VOCs²													
Benzene	ug/L	< 5 U	1.2	1.5	1.3	1.6	1.4	1.2	1.4	1.5	1.5	1.7	1.5
Chloroethane	ug/L	8.3	6.1	9.9	6.6	8.6	13	7.7	11	8.8	8.6	8.7	6.6
1,1-Dichloroethane	ug/L	8.4	11	8.2	5.4	2.9	3.6	2	1.9	1.8	2	2.5	3.7
cis-1,2-Dichloroethene	ug/L	11	11	11	27	13	9.9	8.1	7	5.2	4.9	4.3	4.8
trans-1,2-Dichloroethene	ug/L	< 5 U	0.64 J	0.7 J	0.62 J	0.48 J	0.52 J	0.38 J	0.34 J	0.32 J	0.34 J	0.38 J	0.53 J
Ethylbenzene	ug/L	< 5 U	< 1 U	< 1 U	< 1 U	< 1 U	0.64 J	1.4	1.1	0.76 J	0.57 J	0.46 J	0.46 J
Tetrachloroethene	ug/L	3.8 J	2.8	3.1	2.9	2.2	2.2	1.6	1.6	1.5	1.4	1.4	1.6
Toluene	ug/L	< 5 U	< 1 U	< 1 U	< 1 U	< 1 U	0.29 J	0.51 J B	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,1-Trichloroethane	ug/L	< 5 U	< 1 U	< 1 U	0.26 J	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	ug/L	11	7.3	10	14	7.5	9.4	8.4	8.3	7.4	7.4	5.7	6.8
Vinyl chloride	ug/L	2.5 J	2.7	2.7	3.1	2.6	2.5	1.4	1.5	0.99 J	1	1.2	1.3
Xylenes	ug/L	< 10 U	< 2 U	< 2 U	< 2 U	< 2 U	0.33 J	1.7 J B	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Total VOCs	ug/L	45.0	42.74	47.1	61.18	38.88	43.78	34.39	34.14	28.27	27.71	26.34	27.29

1 Analytical method for oil & grease is EPA 1664A.

2 Analytical method for VOC analysis is SW-846 Method 8260B.

VOC concentrations in micrograms per liter (ug/L) and Oil & Grease concentrations in milligrams per liter (mg/L) as reported by the laboratory.

J Estimated result. Result is less than reporting limit.

B Method blank contamination.

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Table 3. NPDES Permit Effluent Monitoring of the Air Stripper Tower for 2008, General Motors Corporation, Moraine, Ohio.

Constituent	Units	Permit Limit	1/7/08	2/13/08	3/3/08	4/3/08	5/9/08	6/5/08	7/9/08	8/11/08	9/12/08	10/7/08	11/7/08	12/1/08
Oil & Grease ¹	mg/L	10	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	2 B	< 5 U	< 5 U	1.4 B J	1.7 B	< 5 U
VOCs³														
Benzene	ug/L	10	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	0.29 J
Chloroethane	ug/L	10	< 1 U	< 1 U	0.78 J	< 1 U	0.71 J	0.91 J	0.76 J	< 1 U	0.42 J	0.53 J	0.94 J	0.77 J
1,1-Dichloroethane	ug/L	10	< 1 U	0.43 J	0.44 J	0.24 J	0.35 J	0.36 J	0.34 J	< 1 U	< 1 U	< 1 U	0.40 J	0.68 J
cis-1,2-Dichloroethene	ug/L	10	0.26 J	0.58 J	0.75 J	1.3	1.7	1.1	1.5	0.49 J	0.46 J	0.59 J	0.83 J	1.0
trans-1,2-Dichloroethene	ug/L	10	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	ug/L	10	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/L	10	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Toluene	ug/L	10	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	0.46 J B	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,1-Trichloroethane	ug/L	10	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	ug/L	10	< 1 U	< 1 U	0.44 J	0.54 J	0.77 J	0.78 J	1.1	0.43 J	0.46 J	0.54 J	0.78 J	0.91 J
Vinyl Chloride	ug/L	10	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Xylenes	ug/L	10	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	0.98 J B	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U

mg/L Milligrams per Liter.

ug/L Micrograms per Liter.

1 Analytical method for oil & grease is EPA 1664A.

2 Analytical method for pH is EPA 150.1.

3 Analytical method for volatile organic compounds (VOCs) is SW-846 Method 8260B.

VOC concentrations in micrograms per liter (ug/L) and Oil & Grease concentrations in milligrams per liter (mg/L) as reported by the laboratory

J Estimated result. Result is less than reporting limit.

B Method blank contamination.

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Table 4. DN-13 Monthly Monitoring for 2008, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound ¹	Units	1/7/08	2/13/08	3/3/08	4/3/08	5/9/08	6/5/08	7/9/08	8/11/08	9/12/08	10/7/08	11/7/08	12/1/08
1,1,1,2-Tetrachloroethane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,1-Trichloroethane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	0.57 J	0.68 J	< 1 U
1,1,2,2-Tetrachloroethane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,2-Trichloroethane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	ug/L	1.9	2.1	2.3	2	2	2	1.8	1.7	1.7	1.6	2.0	2.0
1,1-Dichloroethene	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2,3-Trichloropropane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dibromo-3-chloropropane	ug/L	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
1,2-Dibromoethane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloroethane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,2-Dichloropropane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,4-Dioxane	ug/L	< 200 U	< 200 U	< 200 U	< 200 U	< 200 U	< 200 U	< 200 U	< 200 U	< 200 U	< 200 U	< 200 U	< 200 U
2-Butanone	ug/L	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U
2-Hexanone	ug/L	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U
4-Methyl-2-Pentanone	ug/L	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U
Acetone	ug/L	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U
Acetonitrile	ug/L	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U
Acrolein	ug/L	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U
Acrylonitrile	ug/L	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U	< 20 U
Allyl chloride	ug/L	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Benzene	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Bromodichloromethane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Bromoform	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Bromomethane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Carbon disulfide	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Carbon tetrachloride	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chlorobenzene	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloroethane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloroform	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Chloromethane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U

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Table 4. DN-13 Monthly Monitoring for 2008, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound ¹	Units	1/7/08	2/13/08	3/3/08	4/3/08	5/9/08	6/5/08	7/9/08	8/11/08	9/12/08	10/7/08	11/7/08	12/1/08
Chloroprene	ug/L	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
cis-1,2-Dichloroethene	ug/L	7	7	7.3	6.6	6.9	6.8	6.7	6	6.4	6.6	7.0	7.5
cis-1,3-Dichloropropene	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Dibromochloromethane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Dibromomethane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Dichlorodifluoromethane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Ethyl methacrylate	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Iodomethane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Isobutyl alcohol	ug/L	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U
Methyl acrylonitrile	ug/L	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Methyl methacrylate	ug/L	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Methylene chloride	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Propionitrile	ug/L	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U	< 4 U
Styrene	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Toluene	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	0.40 J	0.50 J	< 1 U
trans-1,3-Dichloropropene	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,4-Dichloro-2-butene	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	ug/L	4.1	3.6	4.3	4.2	4.3	4.5	4.7	4.7	5	4.7	4.7	5.6
Trichlorofluoromethane	ug/L	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Vinyl acetate	ug/L	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Vinyl chloride	ug/L	2.2	1.9	2.4	1.5	1.9	1.6	1.4	1.4	1.4	1.5	2.0	1.8
Xylene (total)	ug/L	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Total VOCs	ug/L	15.2	14.6	16.3	14.3	15.1	14.9	14.6	13.8	14.5	15.37	16.88	16.9

1 Analytical method for VOC analysis is SW-846 Method 8260B.

All concentrations in micrograms per liter (ug/L) as reported by the laboratory.

< - Value below laboratory reporting limits.

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Table 5. Monitoring Well Construction Details, General Motors Corporation, Moraine, Ohio.

Well	Surface Elevation	TOC Elevation	Well Diameter	Screened Interval				Borehole Depth	Site Coordinates		State Plane Coordinates		Geologic Modifiers
	ft msl	ft msl		inches	ft bls	ft bls	ft msl		ft msl	ft bls	Northing, y	Easting, x	
Upper Aquifer Wells													
W-1-N	737.61	739.02	4	35	70	703	668	70	6618	5037	625116.2043	1483946.9943	UA:TT
W-2-N	729.68	731.68	4	35	60	695	670	60	5264	4744	623865.9104	1483351.6742	UA
W-3-N	731.98	733.66	4	32	57	700	675	57	5157	5032	623695.8796	1483607.3111	UA
W-4-N	729.88	731.63	4	40	65	690	665	65	5157	5224	623651.9134	1483795.0108	UA:TT
HR-1	730.10	732.71	2	47	57	683	673	57	3420	5205	621967.7490	1483378.1275	UA:TT
HR-2	732.62	734.75	2	47	57	686	676	58	5209	5455	623649.3090	1484030.9226	UA:TT
HR-3	734.31	736.75	2	50	60	684	674	61	5211	5648	623612.1403	1484238.0984	UA:TT
HR-4	740.61	742.60	2	55	65	686	676	67	6111	5214	624582.0074	1484003.5860	UA:TT
HR-5	730.95	734.27	2	44	54	687	677	59	4760	4985	623354.8172	1483478.6541	UA:TT
HR-6	730.18	732.66	2	43	53	687	677	59	4009	4985	622588.6622	1483298.8965	UA:TT
HR-7	731.00	731.73	2	47	57	684	674	58	4743	4678	623373.8266	1483168.5266	UA:TT
HR-8	740.84	743.42	2	54	64	687	677	76	6819	5626	625177.0505	1484566.7534	UA
HR-9	741.00	743.51	2	58	68	683	673	75	7669	5508	626071.2019	1484648.1158	UA
HR-11	740.90	743.33	2	60	70	681	671	75	7313	6207	625682.4858	1485262.9762	UA
HR-16	724.60	727.01	4	42	62	683	663	70	2354	4198	621167.6648	1482171.8435	UA:TT
HR-17	725.40	726.43	4	27	47	698	678	56	2457	4776	621128.4488	1482780.5158	UA:TT
W-1-S	728.23	729.29	4	25	60	703	668	60	2777	4958	621396.0291	1482990.4046	UA:TT
W-2-S	725.01	726.64	4	30	65	695	660	65	1786	4207	620618.7813	1482078.7622	UA:TT
W-3-S	NM	729.17	4	36	76	NA	NA	76	1678	4386	620466.6686	1482207.4451	UA
W-4-S	726.66	727.92	4	30	70	697	657	70	1671	4785	620394.9579	1482564.2035	UA
GM-2	NM	735.81	2	45	55	NA	NA	55	1102	5803	619586.2208	1483427.9998	UA
4S	NM	731.36	4	30	65	NA	NA	65	1071	5564	619578.3226	1483129.6378	UA
GM-6	NM	730.27	2	35	45	NA	NA	45	1042	5306	619627.6172	1482930.9571	UA:TT
GM-8	735.17	735.17	2	40	50	695	685	50	1283	5285	619866.4552	1482965.5535	UA:TT
GM-10	NM	723.90	2	40	50	NA	NA	50	162	5258	618762.6410	1482667.7306	UA:TT
GM-16	NM	725.30	2	48	58	NA	NA	58	652	4566	619420.5576	1482149.1466	UA
GM-17	NM	723.84	2	40	50	NA	NA	50	672	5174	619311.8761	1482697.0210	UA:TT
GM-18	NM	723.80	2	45	55	NA	NA	55	583	4993	619229.5883	1482505.4542	UA
GM-19S	NM	730.92	2	47	57	NA	NA	57	1767	5274	620339.5683	1483017.2551	UA:TT
GM-21	725.36	725.00	2	45	55	680	670	55	1519	6052	619920.5937	1483764.5951	UA:TT
GM-22	731.84	731.63	2	44	54	688	678	54	2531	6285	620840.4209	1484226.5683	UA:TT
GM-23	NM	731.07	2	24	34	NA	NA	34	5393	6018	623699.2336	1484619.9213	UA:TUT
GM-24	747.61	747.29	2	58	68	690	680	70	8122	7812	625945.0802	1486991.6971	UA

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Table 5. Monitoring Well Construction Details, General Motors Corporation, Moraine, Ohio.

Well	Surface Elevation	TOC Elevation	Well Diameter	Screened Interval				Borehole Depth	Site Coordinates		State Plane Coordinates		Geologic Modifiers
	ft msl	ft msl		inches	ft bls	ft bls	ft msl		ft msl	ft bls	Northing, y	Easting, x	
Upper Aquifer Wells													
GM-25	747.05	746.17	2	48	58	699	689	58	4930	8170	622786.2705	1486599.6865	UA:TT
GM-26	722.29	722.29	2	50	60	672	662	60	-988	4961	617729.9788	1482129.0695	UA
GM-27	731.03	730.57	2	40	50	691	681	58	5393	6029	623696.6136	1484630.7659	UA:TT
GM-28	NM	736.46	2	22	32	NA	NA	32	5041	5916	623392.3799	1484436.8617	UA:TUT
GM-29	731.31	731.37	2	28	38	703	693	38	5209	5974	623534.4471	1484535.0727	UA:TUT
GM-30 ⁽¹⁾	NM	734.79	2	28	38	NA	NA	38	5559	5970	623876.3465	1484609.5933	UA:TUT
GM-31 ⁽¹⁾	732.05	732.13	2	51	61	681	671	62	2939	5914	621336.9337	1483965.1322	UA:TT
GM-32	732.47	732.08	2	51	61	681	671	61	3486	6070	620114.2493	1483379.9656	UA:TT
GM-33	730.30	729.77	2	48	58	682	672	58	2278	5762	620761.9955	1483714.2282	UA:TT
GM-34	731.06	730.56	2	26	36	705	695	36	2278	5770	620753.8480	1483727.5719	UA:WT
GM-35	731.56	731.27	2	57	67	675	665	70	1750	5510	620389.3810	1483279.5201	UA:TT
GM-36	731.44	731.11	2	25	35	706	696	35	1755	5551	620383.2312	1483300.8386	UA:WT
GM-37	730.36	730.05	2	46	56	684	674	56	1857	5696	620407.3595	1483456.0282	UA:TT
GM-38	730.31	729.88	2	24	34	706	696	34	1858	5686	620403.1387	1483471.6479	UA:WT
GM-43	729.41	729.00	2	40	50	NA	NA	54	3655	5211	622192.2046	1483441.3723	UA:TT
GM-44	729.30	728.77	2	51	61	NA	NA	62	3137	5217	621686.3425	1483331.5124	UA:TT
GM-45	730.03	729.75	2	50	60	NA	NA	60	2853	5217	621409.1769	1483266.9285	UA:TT
GM-46	728.13	727.79	2	19.8	29.8	708	698	29.8	5130	6257	623393.7601	1484777.0271	UA:TUT
GM-47	727.03	726.75	2	49.4	59.4	678	668	59.4	1312	4776	620060.6143	1482479.3608	UA:TT
GM-48	728.98	728.67	2	63.2	73.2	666	656	73.2	610	4200	619488.4287	1481740.8154	UA:TT
GM-49	728.28	727.88	2	66.9	76.9	661	651	76.9	-222	4383	618643.7266	1481742.8231	UA:TT
GM-50	727.03	726.56	2	29.7	39.7	697	687	39.7	1312	4773	620065.0482	1482445.8840	UA:WT
GM-51	728.82	728.30	2	34.3	44.3	695	685	44.3	614	4198	619465.2399	1481753.1472	UA:WT
GM-52	728.16	727.62	2	34	44	694	684	44	-226	4383	618604.5296	1481740.7235	UA:WT
GM-53	730.53	730.35	2	23	33	708	698	33	2999	6824	621184.8324	1484855.6876	UA:TT
GM-55	719.90	719.86	2	25	35	695	685	35	-646	5202	618008.2839	1482441.5719	UA:WT
GM-57	719.41	721.74	2	25	35	694	684	35	-993	4966	617724.0851	1482132.1351	UA:WT
GM-59	732.46	732.25	2	25	35	707	697	35	4501	6323	622761.5281	1484712.7729	UA:WT
GM-60	732.46	732.24	2	42	52	690	680	52	4501	6324	622761.3002	1484712.7809	UA:TT
GM-62	722.17	722.11	2	50	60	672	662	60	-189	5443	618397.3774	1482818.1330	UA
GM-63	726.21	725.79	2	30	40	696	686	40	1625	4919	620283.7218	1482686.3290	UA:WT
GM-64	726.38	725.95	2	50	60	676	666	60	1625	4914	620284.6106	1482681.2885	UA:TT

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Table 5. Monitoring Well Construction Details, General Motors Corporation, Moraine, Ohio.

Well	Surface Elevation	TOC Elevation	Well Diameter inches	Screened Interval				Borehole Depth ft bls	Site Coordinates		State Plane Coordinates		Geologic Modifiers
	ft msl	ft msl		ft bls	ft bls	ft msl	ft msl		Northing, y	Easting, x	Northing, y	Easting, x	
Upper Aquifer Wells													
GM-65S	723.94	723.58	2	42	52	682	672	52	-1488	4312	617392.2259	1481382.4271	UA
GM-66	733.50	733.22	2	45	55	688	678	57	4377	5714	622780.3860	1484091.5572	UA:TT
GM-67S	732.54	732.06	2	44	54	689	679	54	4744	6096	623050.0533	1484547.2174	UA:TT
GM-68S	732.48	732.18	2	39.5	49.5	693	683	49.5	4064	6358	622326.2125	1484652.8528	UA:TT
GM-71	737.19	736.82	2	21	31	716	706	37	4494	6849	622633.7567	1485222.9070	UA:TUT
GM-72	737.05	736.78	2	52	62	685	675	67	4496	6861	622633.7567	1485233.9320	UA:TT
GM-74S	732.52	732.17	2	40	50	693	683	50	4198	6417	622444.5430	1484733.8601	UA:TT
GM-75S	738.26	737.69	2	42	52	696	686	52	4605	6635	622790.6745	1485039.3503	UA:TT
GM-76S	739.49	739.00	2	27	37	712	702	37	5396	6730	623538.7809	1485313.4176	UA:TT
GM-77S	741.49	741.14	2	33	43	708	698	43	3618	7743	621576.9342	1485892.0315	UA:TT
GM-78	721.58	721.18	2	40	50	682	672	70	-267	5723	618257.5787	1483035.5947	UA
GM-79	718.54	717.91	2	45	55	674	664	60	-29	3623	618970.9862	1481045.8893	UA:TT
GM-80	716.23	715.82	2	15	25	701	691	25	-1046	3753	617951.2997	1480939.3277	UA:WT
GM-81	715.8	715.31	2	50	60	666	656	90	-1063	3752	617934.8895	1480934.7439	UA
GM-83S	726.44	725.84	2	44	54	682	672	54	3718	3837	622568.7465	1482112.9569	UA:TT
EAST	NM	730.98	2	NA	NA	NA	NA	71	2120	5818	620545.6947	1483674.2190	UA:TT
WEST	NM	731.08	2	NA	NA	NA	NA	52	2004	5463	620509.6228	1483299.0985	UA:TT
WSU-17	726.93	726.18	2	11.69	66.9	715.2	659.3	67	970	5279	619558.2279	1482898.5384	UA:TT
WSU-18	734.18	733.52	2	29.2	69.2	705.0	664.3	69	1004	5458	619554.9290	1483096.6469	UA:TT
WSU-19	727.28	726.62	2	33.4	63.4	693.9	663.2	63	1182	5212	619736.8872	1482880.3995	UA:TT
WSU-22	726.21	726.49	2	NA	NA	NA	NA	52	1625	4917	620311.4363	1482687.2293	UA:TT
WSU-23	724.65	724.90	2	NA	NA	NA	NA	58	1535	4204	620381.0854	1481978.6336	UA:TT
WSU-24	725.10	724.82	2	NA	NA	NA	NA	66	574	5663	619124.1425	1483169.1107	UA:TT
TW-2	NM	733.38	10	35	45	NA	NA	45	1027	5337	619568.4036	1482942.6663	UA:TT
ME-2 ⁽¹⁾	732.38	732.08	2	27	37	705	695	37	2945	5973	621327.2669	1484014.6258	UA:WT
ME-3 ⁽¹⁾	732.23	731.73	2	29	39	703	693	39	2897	5938	621288.3532	1483969.5620	UA:WT
ME-4 ⁽¹⁾	732.05	732.24	2	26	36	706	696	36	2925	5914	621321.4422	1483952.3693	UA:WT
ME-6 ⁽¹⁾	733.09	732.68	2	29	39	704	694	39	3325	5927	621706.9517	1484057.0461	UA:WT
MW-1 ⁽²⁾	713.60	715.53	2	61.2	71.2	652	642	71.7	2164	2247	621420.6144	1480209.1127	UA:TT
MW-4 ⁽²⁾	707.45	707.19	2	19.6	39.6	688	668	40	-653	692	619035.3250	1478050.0733	UA
MW-5 ⁽²⁾	709.59	709.34	2	22.5	42.5	687	667	43	-682	1646	618787.9839	1478971.6197	UA
MW-9 ⁽²⁾	713.16	712.85	2	63	73	650	640	73.5	-2309	1798	617169.4849	1478747.1452	UA
Lower Aquifer Wells													
GM-1	NM	735.74	2	90	100	NA	NA	100	1087	5803	619570.7118	1483421.8130	LA
GM-3	NM	730.44	2	90	100	NA	NA	100	1023	5309	619621.9727	1482926.3542	LA
GM-4	NM	731.46	2	140	150	NA	NA	150	1010	5322	619602.7099	1482922.7333	LA
GM-5	NM	731.29	2	90	100	NA	NA	100	1037	5512	619588.6213	1483126.6107	LA

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Table 5. Monitoring Well Construction Details, General Motors Corporation, Moraine, Ohio.

Well	Surface Elevation	TOC Elevation	Well Diameter	Screened Interval				Borehole Depth	Site Coordinates		State Plane Coordinates		Geologic Modifiers
	ft msl	ft msl		ft bls	ft bls	ft msl	ft msl		ft bls	Northing, y	Easting, x	Northing, y	
Lower Aquifer Wells													
GM-7R	NM	735.61	2	80	90	NA	NA	91	1247	5295	619863.8298	1482962.1340	LA
GM-9	NM	724.07	2	90	100	NA	NA	100	146	5247	618771.8670	1482674.1902	LA
GM-11	NM	723.71	2	90	100	NA	NA	100	679	5164	619318.6270	1482694.0524	LA
GM-13	NM	723.82	2	90	100	NA	NA	100	566	4990	619239.1943	1482501.6168	LA
GM-14	NM	723.50	2	140	150	NA	NA	150	611	5030	619244.0886	1482515.5184	LA
GM-15	NM	725.23	2	90	100	NA	NA	100	664	4581	619427.7004	1482156.5128	LA
GM-19D	NM	730.73	4	145	150	NA	NA	150	1775	5298	620339.8625	1483063.5273	LA
GM-20D	NM	727.26	4	87	92	NA	NA	92	619	5699	619177.7271	1483236.8889	LA
GM-39	731.15	730.95	2	106	116	625	615	116	5396	6006	623705.5364	1484609.0626	LA
GM-40	727.28	727.04	2	140	150	587	577	150	3089	4984	621693.8055	1483084.8121	LA
GM-41	731.22	733.65	2	104	114	627	617	114	3430	6684	621635.7801	1484818.4021	LA
GM-42	729.48	729.16	2	140	150	589	579	150	2338	5651	620810.1968	1483562.5296	LA
GM-54	730.51	730.29	2	70	80	661	651	80	2995	6818	621182.1891	1484848.6752	LA
GM-56	719.75	719.52	2	75	85	645	635	85	-646	5209	618006.1752	1482448.5647	LA:NTP
GM-58	735.59	735.46	2	72	82	664	654	82	3451	7183	621541.9882	1485308.7468	LA:BT
GM-61	732.48	732.23	2	70	80	662	652	80	4501	6318	622762.6947	1484707.4691	LA:BT
GM-65D	723.83	723.54	2	85	95	639	629	108	-1491	4311	617389.5183	1481380.4746	LA:NTP
GM-67D	732.64	732.19	2	70	80	663	653	121	4744	6082	623053.5624	1484533.4779	LA:BT
GM-68D	732.46	732.27	2	64	74	668	658	150	4064	6358	622327.5383	1484645.8862	LA:BT
GM-69	732.42	732.08	2	90	100	642	632	140	3022	6352	621314.8199	1484401.6371	LA
GM-70	737.47	737.19	2	72	82	665	655	120	3887	7283	621944.0370	1485505.8829	LA
GM-73	737.34	736.97	2	85	95	652	642	120	4495	6843	622635.9765	1485216.5022	LA
GM-74D	732.49	732.04	2	69	79	663	653	120	4203	6417	622450.0123	1484735.6502	LA:BT
GM-75D	738.13	737.68	2	85	95	653	643	120	4604	6623	622793.2406	1485027.5873	LA
GM-76D	739.48	738.94	2	70	80	669	659	120	5392	6730	623535.2043	1485312.4245	LA:BT
GM-77D	741.52	740.93	2	75	85	667	657	100	3615	7741	621574.4283	1485889.3662	LA:BT
GM-82	732.55	732.14	2	85	95	648	638	119.5	3640	6107	621972.7146	1484304.7894	LA
GM-83D	726.41	725.77	2	110	120	616	606	120	3719	3844	622568.1953	1482120.4685	LA
GM-84	740.44	739.92	2	96.5	106.5	644	634	120	2580	7606	620619.4561	1485522.1487	LA:BT
HR-10	740.90	742.81	4	115	125	626	616	125	7686	5492	626078.4125	1484653.5358	LA:NTP
HR-12	741.00	742.64	4	120	130	621	611	130	7333	6194	625702.3993	1485250.0490	LA
HR-13	733.20	735.03	4	75	85	658	648	85	5221	5665	623616.8315	1484215.3411	LA:BT
HR-14	729.90	731.63	4	78	88	652	642	88	5178	5209	623675.4267	1483782.2839	LA
HR-15	732.10	733.74	4	88	98	644	634	98	5161	5020	623712.7941	1483595.9072	LA
M73C	NM	716.55	NA	NA	NA	NA	NA	NA	180	4539	618973.2537	1482114.3309	LA
MT69	719.84	722.71	8	NA	NA	NA	NA	158	-988	5020	617749.1907	1482121.3945	LA
MT576M	750.00	751.46	5	NA	NA	NA	NA	114	4804	9620	622940.2909	1487799.4686	LA

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Table 5. Monitoring Well Construction Details, General Motors Corporation, Moraine, Ohio.

Well	Surface Elevation	TOC Elevation	Well Diameter inches	Screened Interval				Borehole Depth ft bls	Site Coordinates		State Plane Coordinates		Geologic Modifiers
	ft msl	ft msl		ft bls	ft bls	ft msl	ft msl		Northing, y	Easting, x	Northing, y	Easting, x	
Lower Aquifer Wells													
MT596M*	759.18	757.73	5	NA	NA	NA	NA	89	6438	10644	624057.1091	1488849.1418	LA
DN-13	724.09	727.54	20	110	170	614	554	170	470	4760	619196.1959	1482267.5426	LA
11B	744.5	742.56	NA	NA	NA	NA	NA	158	4501	7456	622501.4801	1485799.6814	LA
12A	740.86	742.39	18	104	144	637	597	154	4787	7510	622804.0361	1485951.2100	LA
A	NM	739	20	155	205	NA	NA	205	6045	6056	624325.4108	1484805.7949	LA
31	NM	734.05	20	90	122	NA	NA	122	5521	6422	623727.4107	1485049.2752	LA
34	NM	733.46	20	107	140	NA	NA	140	4004	6754	622178.4664	1485017.7925	LA
39	NM	732.07	20	117	142	NA	NA	145	5263	6435	623442.4628	1484987.5777	LA
FW-1A	NM	739.89	24	105	166	NA	NA	169	7344	7069	625357.5160	1486090.3366	LA
FW-2	NM	737.48	20	NA	150	NA	NA	160	4470	7259	622516.4369	1485616.6642	LA
FW-3	NM	739.26	20	NA	141	NA	NA	200	4476	6593	622675.0394	1484968.9430	LA
FW-4	NM	731.62	14	NA	136	NA	NA	160	2316	6453	620605.0473	1484338.1137	LA

TOC - Top of Casing.

NA - Not Available.

ft msl - Feet Above Mean Sea Level.

NM - Not Measured.

ft bls - Feet Below Land Surface.

(1) - Depth of screened interval and total well depth have been modified from the well log due to site construction.

(2) - City of Moraine Monitoring Wells.

* Measuring point is top of cement housing.

Site coordinates based on site-specific benchmarks.

State plane coordinates in NAD 83 Ohio South.

UA - Upper Aquifer.

LA - Lower Aquifer.

TT - Top of Till (regional clay till).

TUT - Top of Upper Till (upper clay till).

BT - Below Till (regional clay till).

WT - Water Table (screened across the watertable interface).

NTP - No Till Present.

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Table 6. Groundwater Level Measurements Collected During November 17-18, 2008, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Groundwater Elevation (AMSL)
<u>Upper Aquifer Wells</u>			
W-1-N	739.02	30.90	708.12
W-2-N	731.68	24.08	707.60
W-3-N	733.66	26.13	707.53
W-4-N	731.63	24.06	707.57
HR-1	732.71	26.48	706.23
HR-2	734.75	27.09	707.66
HR-3	736.75	29.12	707.63
HR-4	742.60	35.52	707.08
HR-5	734.27	27.06	707.21
HR-6	732.66	26.06	706.60
HR-7	731.73	25.51	706.22
HR-8	743.42	35.10	708.32
HR-9	743.51	34.80	708.71
HR-11	743.33	34.54	708.79
HR-16	727.01	21.32	705.69
HR-17	726.43	20.50	705.93
W-1-S	729.29	23.07	706.22
W-2-S	726.64	21.58	705.06
W-3-S	729.17	24.80	704.37
W-4-S	727.92	22.58	705.34
GM-2	735.81	30.58	705.23
4S	731.36	26.48	704.88
GM-6	730.27	25.70	704.57
GM-8	735.17	30.42	704.75
GM-10	723.90	19.61	704.29
GM-16	725.30	20.85	704.45
GM-17	723.84	19.31	704.53
GM-18	723.80	19.37	704.43
GM-19S	730.92	25.34	705.58
GM-21	725.00	19.50	705.50
GM-22	731.63	25.21	706.42
GM-23	731.07	23.20	707.87
GM-24	747.29	37.83	709.46
GM-25	746.17	37.88	708.29
GM-26	722.29	18.57	703.72
GM-27	730.57	22.76	707.81
GM-28	736.46	28.95	707.51
GM-29	731.37	23.62	707.75
GM-30	734.79	27.00	707.79
GM-31	732.13	25.91	706.22
GM-32	732.08	26.60	705.48
GM-33	729.77	23.80	705.97
GM-34	730.56	24.60	705.96
GM-35	731.27	25.87	705.40
GM-36	731.11	25.58	705.53

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Table 6. Groundwater Level Measurements Collected During November 17-18, 2008, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Groundwater Elevation (AMSL)
<u>Upper Aquifer Wells</u>			
GM-37	730.05	24.22	705.83
GM-38	729.88	24.38	705.50
GM-43	729.00	NM	NA
GM-44	728.77	22.40	706.37
GM-45	729.75	23.00	706.75
GM-46	727.79	19.21	708.58
GM-47	726.75	21.98	704.77
GM-48	728.67	24.39	704.28
GM-49	727.88	24.21	703.67
GM-50	726.56	21.83	704.73
GM-51	728.30	24.27	704.03
GM-52	727.62	23.15	704.47
GM-53	730.35	23.75	706.60
GM-55	719.86	16.03	703.83
GM-57	721.74	18.46	703.28
GM-59	732.25	25.00	707.25
GM-60	732.24	25.00	707.24
GM-62	722.11	17.89	704.22
GM-63	725.79	20.72	705.07
GM-64	725.95	20.88	705.07
GM-65S	723.58	20.71	702.87
GM-66	733.22	26.18	707.04
GM-67S	732.06	24.71	707.35
GM-68S	732.18	25.08	707.10
GM-71	736.82	29.45	707.37
GM-72	736.78	29.40	707.38
GM-74S	732.17	24.95	707.22
GM-75S	737.69	30.35	707.34
GM-76S	739.00	30.81	708.19
GM-77S	741.14	33.63	707.51
GM-78	721.18	16.75	704.43
GM-79	717.91	14.27	703.64
GM-80	715.82	12.92	702.90
GM-81	715.31	12.30	703.01
GM-83S	725.84	19.32	706.52
EAST	730.98	25.05	705.93
WEST	731.08	29.25	701.83
WSU-17	726.18	21.53	704.65
WSU-18	733.52	28.71	704.81
WSU-19	726.62	23.36	703.26
WSU-22	NA	NM	NA
WSU-23	724.90	20.07	704.83
WSU-24	724.82	19.95	704.87
TW-2 (ON)	733.38	31.55	701.83
ME-2	732.08	NM	NA
ME-3	731.73	25.51	706.22
ME-4	732.24	26.08	706.16
ME-6	732.68	26.50	706.18

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Table 6. Groundwater Level Measurements Collected During November 17-18, 2008, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Groundwater Elevation (AMSL)
<u>Lower Aquifer Wells</u>			
GM-1	735.74	30.77	704.97
GM-3	730.44	26.95	703.49
GM-4	731.46	27.00	704.46
GM-5	731.29	26.62	704.67
GM-7R	735.61	30.66	704.95
GM-9	724.07	20.07	704.00
GM-11	723.71	19.69	704.02
GM-13	723.82	20.24	703.58
GM-14	723.50	20.09	703.41
GM-15	725.23	21.90	703.33
GM-19D	730.73	25.24	705.49
GM-20D	727.26	22.22	705.04
GM-39	730.95	23.16	707.79
GM-40	727.04	21.35	705.69
GM-41	733.65	26.97	706.68
GM-42	729.16	23.75	705.41
GM-54	730.29	23.63	706.66
GM-56	719.52	15.73	703.79
GM-58	735.46	28.53	706.93
GM-61	732.23	25.03	707.20
GM-65D	723.54	20.68	702.86
GM-67D	732.19	24.85	707.34
GM-68D	732.27	25.35	706.92
GM-69	732.08	25.77	706.31
GM-70	737.19	30.18	707.01
GM-73	736.97	29.68	707.29
GM-74D	732.04	24.97	707.07
GM-75D	737.68	30.28	707.40
GM-76D	738.94	31.16	707.78
GM-77D	740.93	33.74	707.19
GM-82	732.14	25.56	706.58
GM-83D	725.77	18.97	706.80
GM-84	739.92	33.44	706.48
HR-10	742.81	34.11	708.70
HR-12	742.64	33.85	708.79
HR-13	735.03	27.34	707.69
HR-14	731.63	24.09	707.54
HR-15	733.74	26.34	707.40
M73C	716.55	13.09	703.46
MT69	722.71	NM	NA
MT576M	751.46	42.43	709.03
MT596M	757.73	42.37	715.36

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Table 6. Groundwater Level Measurements Collected During November 17-18, 2008, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Groundwater Elevation (AMSL)
<u>Production and Fire Wells</u>			
DN-13 (County Well)	727.78	86.28	641.50
11B	NS	35.03	707.53
12A	NS	36.96	705.43
31	734.05	25.96	708.09
34	733.46	26.33	707.13
39	732.07	24.36	707.71
A	739.00	29.41	709.59
FW-1A	739.89	31.97	707.92
FW-2	737.48	30.27	707.21
FW-3	739.26	31.93	707.33
FW-4	731.62	25.78	705.84
<u>Stream Gauge*</u>			
SG1	747.64	NM	NA
SG2	709.95	0.27	709.68
SG3	718.45	6.71	711.74
SG4	714.78	6.03	708.75
SG5	711.10	NM	NA
SG6	723.21	15.82	707.39
SG7	731.55	0.00	731.55
<u>IRZ Wells</u>			
RZ-1D	731.20	22.63	708.57
RZ-1H	730.32	22.60	707.72
RZ-1K	729.85	NM	NA
RZ-1N	731.66	23.12	708.54
RZ-1U	735.13	NM	NA
OW-4	735.02	NM	NA
RZ-3A	726.74	21.93	704.81
RZ-3D	728.64	23.21	705.43
RZ-3F	728.54	NM	NA
RZ-3I	729.36	22.79	706.57
RZ-3L	730.65	NM	NA
RZ-3N	729.99	18.17	711.82
RZ-3U	730.37	NM	NA
RZ-3Y	731.03	25.55	705.48
RZ-3CC	729.39	24.07	705.32
RZ-3GG	725.77	20.21	705.56
RZ-3II	726.08	NM	NA
RZ-3MM	726.92	21.50	705.42
RZ-4A	725.71	20.23	705.48
RZ-4D	727.07	20.23	706.84
RZ-4G	728.16	22.67	705.49
RZ-4I	728.55	NM	NA
RZ-4L	727.54	22.40	705.14
RZ-4O	726.46	NM	NA

ARCADIS**Table 6. Groundwater Level Measurements Collected During November 17-18, 2008, General Motors Corporation, Moraine, Ohio.**

Well	Measuring Point Elevation	Depth-to-Water (feet)	Groundwater Elevation (AMSL)
<u>Moraine City</u>			
MW-1	715.53	11.13	704.40
MW-4	707.19	7.47	699.72
MW-5	709.34	7.92	701.42
MW-9	712.85	12.94	699.91

Measuring point is to top of the well casing or surveyed measuring point.
Groundwater elevations are reported in feet above mean sea level (AMSL).
Groundwater levels were measured on November 17-18, 2008 using an electronic water level indicator (more than one meter was used and WL elevations reflect a calibration factor).

Groundwater level measurements are reported in feet below the measuring point.

NS - Not Surveyed.

NM - Not measured.

NA - Not applicable.

*Surface water measurement

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Table 7. Summary of Precipitation Measurements Recorded by the National Weather Service, During 2008 - Dayton, Ohio.

Date	Actual Precipitation	Average Precipitation	Departure from Average
January	2.04	2.59	0.55 below average
February	4.14	2.15	1.99 above average
March	6.98	3.24	3.74 above average
April	2.21	3.86	1.65 below average
May	4.38	4.25	0.13 above average
June	6.63	4.05	2.58 above average
July	5.89	3.79	2.10 above average
August	1.65	3.14	1.49 below average
September	2.69	2.82	0.13 below average
October	1.24	2.52	1.28 below average
November	2.28	3.07	0.79 below average
December	5.12	2.87	2.25 above average
2008 Total	45.25	38.35	6.90 above average

All precipitation measurements are reported in inches.

Information obtained from the NOAA Website (<http://www7.ncdc.noaa.gov/IPS/lcd/lcd.html>)

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Table 8. Vertical Gradients For Shallow/Deep Well Pairs During 2008, General Motors Corporation, Moraine, Ohio.

Vertical Gradients November 17 and 18, 2008		
Upper/Lower Wells	Direction	Gradient (ft/ft)
<u>Upgradient</u>		
HR-9/HR-10	D	-0.0002
HR-11/HR-12	NA	0.0000
<u>On-Site</u>		
W-3-N/HR-15	D	-0.0027
W-4-N/HR-14	D	-0.0010
HR-3/HR-13	U	0.0024
GM-8/GM-7R	U	0.0050
GM-2/GM-1	D	-0.0058
GM-6/GM-3	D	-0.0196
4S/GM-5	D	-0.0044
GM-68S/GM-68D	D	-0.0004
GM-75S/GM-75D	U	0.0014
<u>Former Oil House Area</u>		
GM-23/GM-27	D	-0.0037
GM-23/GM-39	D	-0.0010
<u>Off-Site/Downgradient</u>		
GM-10/GM-9	D	-0.0058
GM-16/GM-15	D	-0.0267
GM-18/GM-13	D	-0.0189
GM-17/GM-11	D	-0.0102
GM-55/GM-56	D	-0.0009
GM-65S/GM-65D	D	-0.0002

D - Downward gradient (-). NA - Not applicable.
 U - Upward gradient (+).

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Table 9. Summary of Groundwater Analytical Results from Reactive Zone 1 Wells, General Motors Corporation, Moraine, Ohio.

RZ-1 Constituents	Units	Sidegradient Well GM-29																
		9/1/99	2/22/00	5/26/00	9/21/00	3/20/01	6/26/01	11/13/01	12/12/01	6/13/02	9/25/02	5/22/03	9/24/03	9/15/04	10/17/05	9/28/06	9/26/07	10/6/08
Volatile Organic Compounds																		
1,1,1-Trichloroethane	ug/L	37.8	36.0	32.5	24.5	27.0	23.8J	<50	19J	17	16J	< 50	18J	21 J	19 J	17 J	15 J	12 J
1,1-Dichloroethane	ug/L	4.3	4.1	6.3	16.6	10.8	6.3J	<50	<50	<50	<40	< 50	<33	< 50 U	18 J	15 J	15 J	11 J
1,1-Dichloroethene	ug/L	1.3	1.1	1.6	3.1	3.5	3.0J	<50	<50	<50	<40	< 50	<33	< 50 U	< 50 U	< 33 U	< 50 U	< 33 U
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0UJ	<50	<50	<50	<40	< 50	<33	< 50 U	< 50 U	< 33 U	< 50 U	< 33 U
cis-1,2-Dichloroethene	ug/L	320	223	1,190J	2,871	2,170	2050J	1,800	1,800	1600	1300	950	1200	1200	1600	1300	1200	900
Ethylbenzene	ug/L	<1.0	1.4	<1.0	<1.0	<1.0	<1.0UJ	21J	<50	<50	<40	< 50	<33	< 50 U	< 50 U	< 33 U	< 50 U	< 33 U
Tetrachloroethene	ug/L	<20	38.7	24.6	20.0	24.4	24.8J	17J	22J	22	18J	47J	18J	20 J	15 J	15 J	18 J	17 J
Toluene	ug/L	<1.0	<1.0	<1.0	2.2	<1.0	<1.0UJ	<50	<50	<50	<40	< 50	<33	< 50 U	< 50 U	< 33 U	< 50 U	< 33 U
trans-1,2-Dichloroethene	ug/L	11.1	9.1	8.9	14.4	20.4	25.6J	26	24J	21	21	< 25	20	21 J	27 J	20 J	19 J	16 J
Trichloroethene	ug/L	878	758	649J	289	354	437J	270	320	380	310	280	390	440	390	310	350	300
Vinyl chloride	ug/L	3.8	1.0	1.7	788	362	276J	230	280	140	140	99	150	230	490	210	290	150
Xylenes	ug/L	<1.0	6.0	<1.0	<1.0	<1.0	<1.0UJ	52	<50	<50	<40	< 50	<33	< 50 U	< 100 U	< 67 U	< 100 U	< 67 U
Total VOCs	ug/L	1,256.3	1,078.4	1,914.6	4,028.8	2,972.1	2,846.5	2,416	2,465	2,180	1,805	1,376	1,796	1,932	2,559	1,887	1,907	1,406

ug/L - Micrograms per liter.

J - Value is estimated.

UJ - Constituent not detected above laboratory reporting limit. Reporting limit estimated.

< - Constituent not detected above laboratory reporting limit shown.

U - Constituent not detected.

Samples collected in September and October 1999 represent baseline conditions.

Carbon source introductions began in December 1999.

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Table 9. Summary of Groundwater Analytical Results from Reactive Zone 1 Wells, General Motors Corporation, Moraine, Ohio.

RZ-1 Constituents	Units	Upgradient Well GM-23																
		9/2/99	2/21/00	5/31/00	9/20/00	3/20/01	6/26/01	11/12/01	12/12/01	6/13/02	9/26/02	5/22/03	9/23/03	9/14/04	10/17/05	9/28/06	9/27/07	10/23/08
Volatile Organic Compounds																		
1,1,1-Trichloroethane	ug/L	7.2	< 50	< 20	2.0	3.1	1.5	< 420	< 500	< 330	< 400	< 620 U	< 500 U	< 500 U	< 560 U	< 330 U	< 200 U	< 62 U
1,1-Dichloroethane	ug/L	32.5	< 50	12.8 J	16.3	17.9	3.7	< 420	< 500	< 330	< 400	< 620 U	< 500 U	< 500 U	< 560 U	< 330 U	< 200 U	< 62 U
1,1-Dichloroethene	ug/L	17.2	<50	6.6 J	5.1	15.9	16.3	< 420	< 500	< 330	< 400	< 620 U	< 500 U	< 500 U	< 560 U	< 330 U	< 200 U	< 62 U
Benzene	ug/L	1.9	< 50	< 20	< 1.0	1.4	< 1.0	< 420	< 500	< 330	< 400	< 620 U	< 500 U	< 500 U	< 560 U	< 330 U	< 200 U	< 62 U
cis-1,2-Dichloroethene	ug/L	7530	10400 D	4080 J	5620	9640	11000	8400	7200	9900	7700	6800	5800	4600	19000	11000	4700	2000
Ethylbenzene	ug/L	< 1.0	<50	< 20	< 1.0	<1.0	< 1.0	< 420	< 500	< 330	< 400	< 620 U	< 500 U	< 500 U	< 560 U	< 330 U	< 200 U	< 62 U
Tetrachloroethene	ug/L	6250	7280 J	6200 J	3470	2910	8600	15000	14000	8400	10000	12000	12000	6700	2300	370	280	71
Toluene	ug/L	<1.0	< 50	< 20	< 1.0	< 1.0	2.3	< 420	< 500	< 330	< 400	< 620 U	< 500 U	< 500 U	< 560 U	< 330 U	< 200 U	< 62 U
trans-1,2-Dichloroethene	ug/L	54.5	118 J	39.8 J	33.2	85.5	60.8	<210	< 250	<170	< 200	< 310 U	< 250 U	< 250 U	< 560 U	270 J	130 J	58 J
Trichloroethene	ug/L	1460	1350 D	1480 J	609	745	1780J	2200	2100	1900	1700	1500	1600	1100	490 J	95 J	82 J	< 62 U
Vinyl chloride	ug/L	2500	2420 J	140 J	801	765	68	1200	< 500	810	540	1700	690	870	2800	4100	2600	2100
Xylenes	ug/L	< 1.0	< 50	< 20	< 1.0	< 1.0	1.4	< 420	< 500	< 330	< 400	< 620 U	< 500 U	< 500 U	< 1100 U	< 670 U	< 400 U	< 120 U
Total VOCs	ug/L	17,853.3	21,568	11,959.2	10,556.6	14,183.8	21,533.8	26,800	23,300	21,010	19,940	22,000	20,090	13,270	24,590	15,835	7,792	4,229

ug/L - Micrograms per liter.

J - Value is estimated.

UJ - Constituent not detected above laboratory reporting limit. Reporting limit estimated.

< - Constituent not detected above laboratory reporting limit shown.

U - Constituent not detected.

Samples collected in September and October 1999 represent baseline conditions.

Carbon source introductions began in December 1999.

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Table 9. Summary of Groundwater Analytical Results from Reactive Zone 1 Wells, General Motors Corporation, Moraine, Ohio.

RZ-1 Constituents	Units	Downgradient Well GM-28																	
		9/1/99	2/23/00	5/26/00	9/21/00	3/20/01	6/26/01	11/15/01	12/12/01	7/21/02	9/24/02	5/23/03	10/1/03	4/30/04	9/15/04	10/18/05	9/27/06	9/20/07	10/22/08
Volatile Organic Compounds																			
1,1,1-Trichloroethane	ug/L	17.7	23.2	18.1	5.0	<1.0	<1.0	<10	<5.0UJ	<4.0	<1	<1	<1.0	<1	<1 U	<1.0 U	<1 U	<1 U	<5 U
1,1-Dichloroethane	ug/L	3.3	4.2	11.8	9.9	<1.0	<1.0	<10	<5.0UJ	<4.0	2.7	4.2	3.3	3.5	3.3	4.0	4.2	4.6	2.2 J
1,1-Dichloroethene	ug/L	<1.0	<1.0	3.8	<1.0	<1.0	<1.0	<10	<5.0UJ	<4.0	<1	<1	<1.0	<1	<1 U	<1.0 U	<1 U	<1 U	<5 U
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<5.0UJ	<4.0	<1	<1	<1.0	<1	<1 U	<1.0 U	<1 U	<1 U	<5 U
cis-1,2-Dichloroethene	ug/L	175	503	2,700	37.0	7.7	352	<5.0	2.2UJ	<2.0	1.1	0.66	0.58	0.45 J	0.41 J	0.32 J	0.26 J	0.72 J	6.9
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<5.0UJ	<4.0	<1	<1	0.28J	<1	<1 U	<1.0 U	<1 U	<1 U	<5 U
Tetrachloroethene	ug/L	316	88.4	30.2	2.3	2.8	<1.0	<10	<5.0UJ	<4.0	<1	0.95J	<1.0	<1	0.88 J	<1.0 U	<1 U	<1 U	<5 U
Toluene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<1.8UJ	<4.0	<1.3	1	1.0	<1	<1 U	<1.0 U	<1 U	<1 U	<5 U
trans-1,2-Dichloroethene	ug/L	9.2	9.7	36.5	22.3	17.6	<1.0	11	11J	8.6	11	9.2	4.0	2.2	1.2	0.63 J	0.66 J	0.58 J	1.3 J
Trichloroethene	ug/L	768	833	14.8	1.6	1.8	<1.0	<10	<5.0UJ	<4.0	0.86J	3.1	1.6	1.6	1.4	0.66 J	0.43 J	0.51 J	<5 U
Vinyl chloride	ug/L	3.2	<1.0	1.9	12.4	2.6	<1.0	<10	<5.0UJ	<4.0	<1	<1	0.53J	<1	0.44 J	1.1	0.42 J	1.2	6.5
Xylenes	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<5.0UJ	<4.0	<1.2	0.87J	1.6	<1	<1 U	<2.0 U	<2 U	<2 U	<10 U
Total VOCs	ug/L	1,292.4	1,461.5	2,817.1	90.5	32.5	352	11	11	8.6	15.66	19.98	12.89	7.75	7.63	6.71	5.97	7.61	16.9

ug/L - Micrograms per liter.

J - Value is estimated.

UJ - Constituent not detected above laboratory reporting limit. Reporting limit estimated.

< - Constituent not detected above laboratory reporting limit shown.

U - Constituent not detected.

Samples collected in September and October 1999 represent baseline conditions.

Carbon source introductions began in December 1999.

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Table 10. Summary of Groundwater Analytical Results from Reactive Zone 3 West Wells, General Motors Corporation, Moraine, Ohio.

RZ-3 West Constituents	Units	Upgradient Well EAST														
		9/21/99	2/23/00	5/25/00	9/22/00	3/19/01	6/25/01	11/12/01	12/11/01	6/12/02	9/23/02	5/21/03	9/25/03	9/13/04	10/18/05	9/21/06
Volatile Organic Compounds																
1,1,1-Trichloroethane	ug/L	21.0	20.6	20.5	22.2	19.3	16.7	13	12	14	10	6.2	7.1	5.7	5.9	10
1,1-Dichloroethane	ug/L	5.4	7.3	7.7	7.7	5.9	5.5	6.2	5.3	6.0	3.9	1.9	2.3	0.72 J	3.0	3.2
1,1-Dichloroethene	ug/L	<1.0	<1.0	1.02J	1.2	1.2	<1.0	0.90J	<3.3	1.3	0.73J	< 1.4	<2.0	0.34 J	< 1.0 U	0.59 J
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	<2.5	<2	< 1.4	<2.0	< 1 U	< 1.0 U	< 1.4 U
cis-1,2-Dichloroethene	ug/L	9.1	24.0	32.0	77.3	117	80.1	51	51	33	8.8	4.5	4.3	1.6	3.1	4.1
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	<2.5	<2	< 1.4	<2.0	< 1	< 1.0 U	< 1.4 U
Tetrachloroethene	ug/L	61.0	77.1	54.6	55.8	49.9	59.3	56	49	37	49	42	47	40	47	41
Toluene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	<2.5	<2	< 1.4	<2.0	< 1 U	< 1.0 U	< 1.4 U
trans-1,2-Dichloroethene	ug/L	<1.0	2.0	1.5	1.8	5.8	3.3	2.7	2.4	1.3	<1	< 0.72	<1.0	< 0.5 U	< 1.0 U	< 1.4 U
Trichloroethene	ug/L	56.1	90.1	81.3	97.2	105	117	92	94	75	46	29	35	23	23	29
Vinyl chloride	ug/L	<1.0	5.3	1.2	3.0	4.8	<1.0	1.5J	0.66J	0.48	<2	< 1.4	<2.0	< 1 U	1.2	< 1.4 U
Xylenes	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	<2.5	<2	< 1.4	<2.0	< 1 U	< 2.0 U	< 2.9 U
Total VOCs	ug/L	152.6	226.4	199.82	266.2	308.9	281.9	223.3	214.36	168.08	118.43	83.6	95.7	71.36	83.2	87.89

ug/L - Micrograms per liter.

J - Value is estimated.

UJ - Constituent not detected above laboratory reporting limit. Reporting limit estimated.

< - Constituent not detected above laboratory reporting limit shown.

U - Constituent not detected.

Samples collected in September and October 1999 represent baseline conditions.

Carbon source introductions began in December 1999.

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Table 10. Summary of Groundwater Analytical Results from Reactive Zone 3 West Wells, General Motors Corporation, Moraine, Ohio.

RZ-3 West Constituents	Units	Downgradient Well GM-32																
		9/22/99	2/28/00	5/30/00	9/25/00	3/19/01	6/25/01	11/12/01	12/11/01	6/12/02	9/20/02	5/23/03	10/1/03	9/14/04	10/19/05	9/19/06	9/18/07	9/23/08
Volatile Organic Compounds																		
1,1,1-Trichloroethane	ug/L	<1.0	<10	<100	<1.0	<50	9.2	<5.0	<100	<20	<10	< 1 U	<2.0	< 10 U	< 10 U	< 10 U	< 5 U	< 10 U
1,1-Dichloroethane	ug/L	3.3	101	46.0J	35.9	<50	3.1	6.2	<100	12	9.7J	5.5	5.5	3 J	4.9 J	3.7 J	4.3 J	4 J
1,1-Dichloroethene	ug/L	<1.0	<10	<100	<1.0	<50	<1.0	<5.0	<100	<20	<10	< 1 U	<2.0	< 10 U	< 10 U	< 10 U	< 5 U	< 10 U
Benzene	ug/L	<1.0	<10	<100	<1.0	<50	<1.0	4.3J	<100	4.0	<10	1.6	1.5J	< 10 U	< 10 U	< 10 U	1.6 J	< 10 U
cis-1,2-Dichloroethene	ug/L	2.6	<10	<100	<1.0	<50	32.0	<2.5	<50	<10	<5	0.66	<1.0	< 5 U	< 10 U	< 10 U	< 5 U	< 10 U
Ethylbenzene	ug/L	<1.0	<10	<100	<1.0	<50	<1.0	0.79J	<100	<20	<10	0.65J	0.73J	< 10 U	< 10 U	< 10 U	< 5 U	< 10 U
Tetrachloroethene	ug/L	1.2	<10	<100	<1.0	<50	37.6	<5.0	<100	<20	<10	< 1 U	<2.0	< 10 U	< 10 U	< 10 U	< 5 U	< 10 U
Toluene	ug/L	1.0	20.6	<100	10.4	<50	<1.0	12	<100	4.9	<10	2.2	2.3	< 10 U	< 10 U	< 10 U	< 5 U	< 10 U
trans-1,2-Dichloroethene	ug/L	4.2	111	41.0J	20.3	<50	2.5	2.9	<50	3.0	<5	1.6	1.0	< 5 U	< 10 U	< 10 U	1 J	< 10 U
Trichloroethene	ug/L	3.2	<10	<100	<1.0	<50	107	<5.0	<100	<20	<10	< 1 U	<2.0	< 10 U	< 10 U	< 10 U	< 5 U	< 10 U
Vinyl chloride	ug/L	3.0	<10	<100	<1.0	<50	<1.0	1.1J	<100	3.0	<10	< 1 U	<2.0	< 10 U	< 10 U	< 10 U	< 5 U	< 10 U
Xylenes	ug/L	<1.0	<10	<100	<1.0	<50	<1.0	3.0J	<100	<20	<10	2.1	3.6	< 10 U	< 20 U	< 20 U	3.4 J	< 20 U
Total VOCs	ug/L	18.5	232.6	87	66.6	0	191.4	30.29	0	26.9	9.7	14.31	14.63	3	4.9	3.7	10.3	4

ug/L - Micrograms per liter.

J - Value is estimated.

UJ - Constituent not detected above laboratory reporting limit. Reporting limit estimated.

< - Constituent not detected above laboratory reporting limit shown.

U - Constituent not detected.

Samples collected in September and October 1999 represent baseline conditions.

Carbon source introductions began in December 1999.

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Table 10. Summary of Groundwater Analytical Results from Reactive Zone 3 West Wells, General Motors Corporation, Moraine, Ohio.

RZ-3 West Constituents	Units	Downgradient Well GM-8											Downgradient Well GM-6										
		3/6/98	9/20/99	9/26/00	11/9/01	9/20/02	10/1/03	9/14/04	10/19/05	9/19/06	9/18/07	9/23/08	3/6/98	9/20/99	9/26/00	11/9/01	9/20/02	10/2/03	9/14/04	10/19/05	9/19/06	9/18/07	9/24/08
Volatile Organic Compounds																							
1,1,1-Trichloroethane	ug/L	6.7	1.9	<1.0	0.40J	<2.0	<2.0	< 1 U	< 1.0 U	< 5 U	< 2 U	< 1 U	36.2	24.6	12.1	3.9	1.4J	0.19J	< 1 U	< 1.0 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	ug/L	49.3	30.2	36.5	40	63	48	15	16	18	9.1	1.7	35.3	33.2	13.0	14	60	20	18	21	16	26	< 8.4 U
1,1-Dichloroethene	ug/L	1.0	<1.0	<1.0	< 1.0	<2.0	<2.0	< 1 U	< 1.0 U	< 5 U	< 2 U	< 1 U	<1.0	1.2	<1.0	< 2.0	<2.0	<1.0	< 1 U	< 1.0 U	< 1 U	< 1 U	< 1 U
Benzene	ug/L	2.3	3.4	1.1	0.78J	5.5	5.4	4.2	3.5	2.1 J	2.4	6.8	<1.0	<1.0	<1.0	< 2.0	2.2	1.0	1.7	0.49 J	< 1 U	0.42 J	1.2
cis-1,2-Dichloroethene	ug/L	56.1	26.2	1.5	2.0	5.5	<1.0	< 0.5	0.24 J	2.1 J	< 2 U	< 1 U	82.4	52.9	41.0	8.2	43	13	10	20	18	16	6.7
Ethylbenzene	ug/L	28.9	20.7	12.5	0.40J	7.5	11	19	29	< 5 U	1.7 J	8.6	<1.0	<10.0	<1.0	< 2.0	<2.0	0.22J	< 1 U	< 1.0 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/L	20.0	14.8	<1.0	< 1.0	<2.0	<2.0	< 1 U	< 1.0 U	< 5 U	< 2 U	< 1 U	94.0	81.4	51.5	14	14	11	2.6	0.34 J	< 1 U	< 1 U	< 1 U
Toluene	ug/L	<1.0	<1.0	<1.0	< 1.0	1.8J	1.2J	< 1 U	0.39 J	< 5 U	< 2 U	< 1 U	<1.0	<1.0	<1.0	< 2.0	<2.0	0.83J	< 1 U	< 1.0 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	ug/L	10.1	12.0	5.4	3.6	9	4.4	1.1	0.99 J	1 J	0.9 J	0.27 J	2.4	2.0	2.2	1.8	8.6	2.5	1.9	2.1	1.6	2.6	1.3
Trichloroethene	ug/L	95.2	30.4	6.6	4.4	<2.0	<2.0	< 1 U	< 1.0 U	< 5 U	< 2 U	< 1 U	119	78.2	56.6	48	33	23	5.7	1.4	0.35 J	0.34 J	< 1 U
Vinyl chloride	ug/L	10.1	8.4	2.4	1.9	5.8	<2.0	0.48 J	0.73 J	3.2 J	< 2 U	0.48 J	2.3	1.6	3.7	1.9J	12	3.3	3	11	7.3	6.7	2.1
Xylenes	ug/L	10.3	2.3	1.9	0.39J	1.5J	2.0	1.1	< 2.0 U	< 10 U	0.9 J	3.9	<1.0	<10	<1.0	< 2.0	< 2.0	1.0	< 1 U	< 2.0 U	< 2 U	< 2 U	< 2 U
Total VOCs	ug/L	290	150.3	67.9	53.87	99.6	72	40.88	50.85	26.4	15	21.75	371.6	275.1	180.1	91.8	174.2	76.04	42.9	56.33	43.25	52.06	11.3

ug/L - Micrograms per liter.

J - Value is estimated.

UJ - Constituent not detected above laboratory reporting limit. Reporting limit estimated.

< - Constituent not detected above laboratory reporting limit shown.

U - Constituent not detected.

Samples collected in September and October 1999 represent baseline conditions.

Carbon source introductions began in December 1999.

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Table 11. Summary of Groundwater Analytical Results from Reactive Zone 3 East Wells, General Motors Corporation, Moraine, Ohio.

RZ-3 East Constituents	Units	Upgradient Well GM-22																
		9/1/99	2/23/00	5/25/00	9/21/00	3/20/01	6/26/01	11/13/01	12/12/01	6/13/02	9/25/02	5/22/03	9/24/03	9/14/04	10/17/05	9/20/06	9/26/07	10/3/08
Volatile Organic Compounds																		
1,1,1-Trichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4.4	0.63J	0.47	0.93J	0.61J	1.2	1.7	0.96 J	0.47 J	0.66 J	0.73 J
1,1-Dichloroethane	ug/L	<1.0	2.2	2.8	2.4	3.8	4.7	6.8	6.6	4.1	<2	1.2	1.0	2.1	1.0	1.1	0.72 J	< 1 U
1,1-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.58J	0.32J	<1.0	<2	< 1	<1.0	< 1 U	< 1.0 U	< 1 U	< 1 U	< 1 U
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2	< 1	<1.0	< 1 U	< 1.0 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/L	<1.0	3.1	4.0	1.9	3.5	5.1	8.5	7.8	3.6	<1	0.46J	0.45J	0.9	0.36 J	0.28 J	0.24 J	< 1 U
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2	< 1	<1.0	< 1 U	< 1.0 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/L	3.6	2.8	3.0	1.6	2.2	3.2	4.9	2.9	1.9	2.3	2.5	2.9	2.9	3.6	3.2	3.3	5.7
Toluene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	0.32J	<1.0	<2	0.49J	<1.0	< 1 U	< 1.0 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.17J	<0.50	<0.50	<1	< 0.5	<0.50	< 0.5 U	< 1.0 U	< 1 U	< 1 U	< 1 U
Trichloroethene	ug/L	4.0	2.5	3.6	<1.0	1.6	2.8	7.5	2.3	2.1	7.6	6	7.6	10	4.7	3	3.3	5.7
Vinyl chloride	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.60J	0.85J	0.38	<2	< 1	<1.0	< 1 U	< 1.0 U	< 1 U	< 1 U	< 1 U
Xylenes	ug/L	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2	< 1	<1.0	< 1 U	< 2.0 U	< 2 U	< 2 U	< 2 U
Total VOCs	ug/L	7.6	11.8	13.4	5.9	11.1	16.9	33.45	21.72	12.55	10.83	11.26	13.15	17.6	10.62	8.05	8.22	12.13

ug/L - Micrograms per liter.

J - Value is estimated.

UJ - Constituent not detected above laboratory reporting limit. Reporting limit estimated.

< - Constituent not detected above laboratory reporting limit shown.

U - Constituent not detected.

Samples collected in September and October 1999 represent baseline conditions.

Carbon source introductions began in December 1999.

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Table 11. Summary of Groundwater Analytical Results from Reactive Zone 3 East Wells, General Motors Corporation, Moraine, Ohio.

RZ-3 East Constituents	Units	Downgradient Well GM-21																	
		9/22/99	2/23/00	5/26/00	9/22/00	3/19/01	6/25/01	11/13/01	12/11/01	6/12/02	9/25/02	5/22/03	9/24/03	9/14/04	10/17/05	9/20/06	12/1/06	9/26/07	10/3/08
Volatile Organic Compounds																			
1,1,1-Trichloroethane	ug/L	53.1	15.4	27.9	15.7	7.0	7.7	6.9	1.2	23	31	18	31	26	4.3	12	4.7	8.5	8.7
1,1-Dichloroethane	ug/L	9.0	5.8	6.8	5.6	5.1	4.1	3.8J	0.71J	5.4	5J	4.1J	6.9J	4.2 J	3.4	8.6	6.4	18	15
1,1-Dichloroethene	ug/L	3.9	1.6	2.4	1.6	1.2	<1.0	<5.0	<1.0	3.6	2.6J	< 6.7	2.0J	3.1 J	< 1.0 U	0.19 J	0.2 J	< 1.4 U	0.33 J
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<6.0	<6.7	< 6.7	<8.0	< 9.1 U	< 1.0 U	< 1 U	< 1 U	< 1.4 U	< 1.4 U
cis-1,2-Dichloroethene	ug/L	66.4	35.9	47.8	38.7	39.5	37.8	39	6.5	48	43	130	100	56	20	14	8.2	26	38
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<6.0	<6.7	< 6.7	<8.0	< 9.1 U	< 1.0 U	< 1 U	< 1 U	< 1.4 U	< 1.4 U
Tetrachloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<6.0	<6.7	< 6.7	<8.0	< 9.1 U	< 1.0 U	< 1 U	< 1 U	< 1.4 U	0.56 J
Toluene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<6.0	<6.7	< 6.7	<8.0	< 9.1 U	< 1.0 U	< 1 U	< 1 U	< 1.4 U	< 1.4 U
trans-1,2-Dichloroethene	ug/L	7.8	9.3	7.4	12.9	16.4	15.7	15	2.8	8.3	5.1	2.2J	2.9J	7.9	22	4.3	4.8	2.5	4.7
Trichloroethene	ug/L	28.7	283	311	189	169	158	160	28	210	230	79	200	180	1.8	5.9	0.8 J	2.8	18
Vinyl chloride	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<6.0	<6.7	< 6.7	<8.0	< 9.1 U	13	9.3	4.7	12	19
Xylenes	ug/L	<1.0	2.3	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<6.0	<6.7	< 6.7	<8.0	< 9.1 U	< 2.0 U	< 2 U	< 2 U	< 2.9 U	< 2.9 U
Total VOCs	ug/L	168.9	353.3	403.3	263.5	238.2	223.3	224.7	39.21	298.3	316.7	233.3	342.8	277.2	64.5	54.29	29.8	69.8	104.29

ug/L - Micrograms per liter.

J - Value is estimated.

UJ - Constituent not detected above laboratory reporting limit. Reporting limit estimated.

< - Constituent not detected above laboratory reporting limit shown.

U - Constituent not detected.

Samples collected in September and October 1999 represent baseline conditions.

Carbon source introductions began in December 1999.

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Table 12. Summary of Groundwater Analytical Results from Reactive Zone 4 East Wells, General Motors Corporation, Moraine, Ohio.

RZ-4 East Constituents	Units	Upgradient Well WEST			Downgradient Well GM-19S														
		9/21/99	2/23/00	5/25/00	9/20/99	5/24/00	9/22/00	3/19/01	6/25/01	11/12/01	6/12/02	9/26/02	5/21/03	9/25/03	9/13/04	10/18/05	9/21/06	9/17/07	9/23/08
Volatile Organic Compounds																			
1,1,1-Trichloroethane	ug/L	24.8	25.1	27.4	16.0	17.9	14.5	11.9	9.6	7.6	7.2	6.3	12	13	14	13	9.7 J	0.59 J	< 1 U
1,1-Dichloroethane	ug/L	25.6	24.5	32.5	7.7	7.0	4.4	4.1	2.9	2.9J	3.7	6.3	8.4	8.3	8.1	9.0	7 J	10	13
1,1-Dichloroethene	ug/L	<1.0	<1.0	<1.0	1.0	1.1	<1.0	<1.0	<1.0	<3.3	0.98	<4	< 4	1.6J	1.9 J	1.2 J	< 22 U	< 1 U	< 1 U
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	0.62	<4	< 4	<5.0	< 4 U	< 1.7 U	< 22 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/L	125	34.5	29.0	34.6	42.9	37.6	38.2	31.5	26	28	39	81	89	61	29	660	0.3 J	0.68 J
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	<4	< 4	<5.0	< 4 U	< 1.7 U	< 22 U	< 1 U	< 1 U
Tetrachloroethene	ug/L	41.3	53.9	37.7	46.0	57.1	68.0	67.6	71.7	64	60	52	62	62	71	95	9.1 J	1.5	0.94 J
Toluene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	<4	< 4	<5.0	< 4 U	< 1.7 U	< 22 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	ug/L	<1.0	1.7	1.3	2.3	2.7	2.6	3.0	2.4	2.0	2.3	2.7	2.5	2.9	2.4	1.0 J	10 J	0.29 J	0.52 J
Trichloroethene	ug/L	37.3	108	103.0	71.1	104	104	107	121	97	110	110	120	140	120	140	11 J	0.46 J	3
Vinyl chloride	ug/L	<1.0	<1.0	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	<3.3	0.70	5.2	< 4	<5.0	< 4 U	1.8	< 22 U	< 1 U	9.3
Xylenes	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	<4	< 4	<5.0	< 4 U	< 3.3 U	< 44 U	< 2 U	< 2 U
Total VOCs	ug/L	254	247.7	230.9	178.7	234.1	231.1	231.8	239.1	199.5	213.5	221.5	285.9	316.8	278.4	290	706.8	13.14	27.44

ug/L - Micrograms per liter.

J - Value is estimated.

UJ - Constituent not detected above laboratory reporting limit. Reporting limit estimated.

< - Constituent not detected above laboratory reporting limit shown.

U - Constituent not detected.

Samples collected in September and October 1999 represent baseline conditions.

Carbon source introductions began in August 2006.

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Table 13. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 1, General Motors Corporation, Moraine, Ohio.

RZ-1 Constituents	Units	Sidegradient Well GM-29																
		9/1/99	2/22/00	5/26/00	9/21/00	3/20/01	6/26/01	11/13/01	12/12/01	6/13/02	9/25/02	5/22/03	9/24/03	9/15/04	10/17/05	9/28/06	9/26/07	10/6/08
<u>Inorganics & TOC</u>																		
Nitrate	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	mg/l	<0.30	<0.30	<0.30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese (Total)	mg/l	0.552	0.136	0.35	0.248	0.203	0.136	0.17B	0.17	1.5B	0.18B	0.67J	0.20J	0.17	0.18	1.3	0.3 J	< 0.19 U
Manganese (Dissolved)	mg/l	0.13	0.101	0.177	0.125	0.116	0.128	0.17B	0.15	0.13B	0.16B	0.15J	0.21J	0.15	0.14	0.12	0.16 J	< 0.16 U
Iron (Total)	mg/l	18	1.43	10.1	8.48	5.84	2.52	3.4	3.8	47.8B	3.8	28.6	4.9	3.2	4.6	< 0.1 U	8.9	< 5.4 U
Iron (Dissolved)	mg/l	0.24	0.13	2.78	3.09	<0.10	2.03	3.3	2.9	2.2B	2.8	2.4	3.6	2.7	3.7	2.9	3.4	< 3.9 U
Iron (Ferrous)	mg/l	0.02	0	2.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	90	126	31	29	31	37	65	48	63	76	91J	52	14 J	51	70	65	< 5 UJ
Sulfide	mg/l	<4	<1	<1	<1	<1	<1	1.3	<1	<1	<1	0.54B	1.6	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Total Organic Carbon	mg/l	18	11	22	<1	7.57	7.3	10	10	8	8	7	9	9	11	13	15 J	16
Chloride	mg/l	254	426	508	373	337	262	600B	460	490	490	490	560J	540	370	380	360 J	< 1 U
<u>Permanent Gases</u>																		
Carbon Dioxide	mg/l	46.52	49.87	44.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oxygen	mg/l	1.02	0.66	1.41	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen	mg/l	20.29	18.7	15.61	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	mg/l	0.01152	0.007699	0.00017	1.62	1.30	1.5	0.610	1.2	0.56	1.1	0.6	1.5	3.8	13	10	NA	16
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<u>Light Hydrocarbon Scan</u>																		
Ethane	ng/l	5641	1861	751	639	460	17000	20000	28000	14000	16000	7400	9900	13000	170000	350000	NA	370000
Ethene	ng/l	9769	1275	12098	441796	160000	130000	230000	180000	48000	140000	150000	200000	1700000	1600000 J	750000	NA	420000
<u>Field Parameters</u>																		
pH	S.U.	6.99	7.02	6.86	7.24	7.31	7.20	7.47	7.57	7.14	7.22	6.32	6.88	6.85	6.80	6.94	6.63	7.1
Specific Conductivity	umhos/cm	1502	3044	2388	1942	1733	1291	2703	2860	1977	2354	2303	2278	2580	2200	2170	2350	1870
Dissolved Oxygen	mg/l	0.35	0.51	0.45	3.44	8.20	0.40	0.22	0.01	3.57	1.40	1.38	0.13	0.04	0	0.29	0.4	0.11
Redox Potential	mV	-526.6	19.6	-105.4	-35.0	-158.2	-166.4	-129.7	-168	-122.9	-91.3	-157.8	-118.6	-134	-153	-168	-139	-54
Temperature	°C	17.8	16.9	17.97	17.64	20.04	20.47	16.42	17.13	19.33	17.63	18.23	16.81	16.4	16.8	16.69	18	16.78

mg/l - milligrams per liter.

S.U. - Standard Units.

mV - Millivolts.

°C - Degrees Celsius.

J - Value is estimated.

B - Blank contamination.

NA - Not Analyzed.

umhos/cm - Micromohs/centimeter.

ng/l - nanograms per liter.

Samples collected in September 1999 represent baseline conditions.

Carbon source introductions began in December 1999.

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Table 13. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 1, General Motors Corporation, Moraine, Ohio.

RZ-1 Constituents	Units	Upgradient Well GM-23												
		9/2/99	2/21/00	5/31/00	3/20/01	6/13/02	9/26/02	5/22/03	9/23/03	9/14/04	10/17/05	9/28/06	9/27/07	10/23/08
<u>Inorganics & TOC</u>														
Nitrate	mg/l	0.08	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	mg/l	3.83	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	mg/l	<0.30	0.94	2.84	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese (Total)	mg/l	4.71	0.887	0.121	0.469	1.5 J	1.0 J	1.5 J	1.6 J	1.3 J	0.79	1.5	1.4 J	0.89
Manganese (Dissolved)	mg/l	0.346	0.841	0.101	0.311	1.3 J	0.68 J	1.5 J	1.7 J	1.2 J	0.81	1.5	1.3 J	0.9
Iron (Total)	mg/l	13.6	0.53	0.18	0.48	0.16 J	0.63	0.50	0.14	0.11	30.7	13.6	10.8	10.1
Iron (Dissolved)	mg/l	<0.10	<0.10	<0.10	< 1.0	<0.10	<0.10	<0.10	<0.10	<0.10	34.2	13.2	10	10
Iron (Ferrous)	mg/l	4	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	72	650	8040	1440	920	810	310 J	650	430 J	120	850	590	490
Sulfide	mg/l	<4	<1	<1	<1	<1	<1	<1 U	0.67 B	<1	<1	<1 U	< 1 U	< 1 U
Total Organic Carbon	mg/l	19	25	19	10.8	15 J	15	15	13	10 J	360	11	9	9
Chloride	mg/l	118	143	85	232	180	190	220	140 J	220	260	220	210	220
<u>Permanent Gases</u>														
Carbon Dioxide	mg/l	88.47	264.8	323.79	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oxygen	mg/l	0.96	1.56	17.78	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen	mg/l	20.22	13.75	3.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	mg/l	0.1248	0.72	0.02083	0.780	1.6	2.1	2.7	1.8	1.5	1.3	0.91	0.64	1.9
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<u>Light Hydrocarbon Scan</u>														
Ethane	ng/l	6,878	14644	1037	11000	25000	32000	44000	23000	17000	16000	12000	7100	21000
Ethene	ng/l	580916	439458	569	260000	230000	230000	1200000	270000	260000	500000	900000	370000 J	960000
<u>Field Parameters</u>														
pH	S.U.	6.80	6.62	6.31	6.64	6.81	6.76	5.59	6.73	7.04	5.66	6.69	6.34	7.74
Specific Conductivity	umhos/cm	1160	2856	6720	3448	2290	2390	1683	2258	2130	2570	2740	2470	1465
Dissolved Oxygen	mg/l	0.65	0.78	10.48	8.38	4.23	0.42	1.76	0.85	0	0	0.4	0.44	0.11
Redox Potential	mV	122.2	158.7	194.2	160.4	346.5	215.6	247.9	198.8	57	-108	-108	-91	189
Temperature	°C	17.89	17.6	26.45	19.08	16.40	19.06	17.91	17.38	16.30	16.5	16.78	17.5	17.12

mg/l - milligrams per liter.

S.U. - Standard Units.

mV - Millivolts.

°C - Degrees Celsius.

J - Value is estimated.

B - Blank contamination.

NA - Not Analyzed.

umhos/cm - Micromohs/centimeter.

ng/l - nanograms per liter.

Samples collected in September 1999 represent baseline conditions.

Carbon source introductions began in December 1999.

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Table 13. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 1, General Motors Corporation, Moraine, Ohio.

RZ-1 Constituents	Units	Downgradient Well GM-28																		
		9/1/99	2/23/00	5/26/00	9/21/00	3/20/01	6/26/01	11/15/01	12/12/01	7/21/02	9/24/02	5/23/03	10/1/03	4/30/04	9/15/04	10/18/05	9/27/06	9/20/07	10/22/08	
Inorganics & TOC																				
Nitrate	mg/l	0.08	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Nitrite	mg/l	0.06	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Nitrogen, Ammonia	mg/l	<0.30	<0.30	0.68	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Manganese (Total)	mg/l	3.2	1.15	6.26	4.1	0.594	2.24	0.58	0.47	1.1	0.48B	0.69J	0.42J	0.34	0.37	0.45	0.46	0.44 J	1.4	
Manganese (Dissolved)	mg/l	0.068	0.449	6.71	3.94	0.477	1.76	0.61	0.49	1.1	0.41B	0.29J	0.40J	0.32	0.36	0.45	0.43	0.43 J	1.5	
Iron (Total)	mg/l	106	25.3	22.7	58.9	29.6	59	23.6	23.5	36.2	28.7	47.9	23.4J	17.6	15.7	16.1	14.5	11.7	23.4	
Iron (Dissolved)	mg/l	<0.10	0.59	23.3	48.3	2.65	49.8	23.3	23.7	34.7	23.4	16.7	22.4J	16.4	15.1	15.2	13.1	10.7	23.7	
Iron (Ferrous)	mg/l	0	0.03	2.6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Sulfate	mg/l	89	43	<5	<5	9	106	<5	<5	<5	18	65J	31J	89	93 J	91	75	77	33	
Sulfide	mg/l	<4	<1	<1	<1	<1	<1	1.5	<1.0	2.0	4.3	2.5	<1.0	< 1 U	< 1 U	< 1.0 U	< 1 U	< 1 U	< 1 U	
Total Organic Carbon	mg/l	15	24	742	571	90.0	360	74	68B	140	23	15	17	15 J	8	10	7	8 J	310	
Chloride	mg/l	208	664	805	782	1030	508	730B	560	370	450	350	270J	320	340	320	320	300 J	260	
Permanent Gases																				
Carbon Dioxide	mg/l	41.52	63.57	16.51	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Oxygen	mg/l	2.32	0.59	0.64	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Nitrogen	mg/l	19.42	16.39	19.82	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Methane	mg/l	0.002487	0.001832	0.21	1.70	13.0	13.0	13	20	19	14	8.9	11	7.9	6.6	2.8	2.5	2.3	2.9	
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Light Hydrocarbon Scan																				
Ethane	ng/l	750	493	865	1198	42000	39000	91000	98000	420000	300000	310000	230000	160000	150000	81000	73000	72000	52000	
Ethene	ng/l	48	98	646	1794606	57000	5000	1100	1400	8800	12000	74000	430	160	54	< 210 U	< 25 U	62	9300	
Field Parameters																				
pH	S.U.	7.02	6.92	7.01	7.18	7.10	6.64	6.50	7.45	6.84	7.24	6.86	6.80	NA	6.85	5.47	7.08	6.72	6.49	
Specific Conductivity	umhos/cm	1359	3124	4402	4538	3724	3216	3136	3700	2187	2195	2132	1501	NA	2030	2230	1880	1.95	1428	
Dissolved Oxygen	mg/l	0.95	1.45	2.52	6.78	4.36	0.41	0.83	0.20	0.68	0.35	1.41	0.34	NA	0	0	0.29	0.64	0.13	
Redox Potential	mV	90.5	56.0	-93.7	-200.1	-70.6	-177.8	-148.2	-203	-153.3	-135.3	-93.1	-146.9	NA	-165	-166	-183	-152	27	
Temperature	°C	16.4	18.48	19.24	20.21	18.93	19.04	19.24	18.92	20.44	18.68	16.88	17.97	NA	16.2	15.9	16.33	17.1	16.38	

mg/l - milligrams per liter.

S.U. - Standard Units.

mV - Millivolts.

°C - Degrees Celsius.

J - Value is estimated.

B - Blank contamination.

NA - Not Analyzed.

umhos/cm - Micromohs/centimeter.

ng/l - nanograms per liter.

Samples collected in September 1999 represent baseline conditions.

Carbon source introductions began in December 1999.

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Table 14. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 3 West, General Motors Corporation, Moraine, Ohio.

RZ-3 West	Units	Upgradient Well EAST													
		9/21/99	2/23/00	5/25/00	9/22/00	3/19/01	11/12/01	12/11/01	6/12/02	9/23/02	5/21/03	9/25/03	9/13/04	10/18/05	9/21/06
<u>Inorganics & TOC</u>															
Nitrate	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	mg/l	<0.30	<0.30	<0.30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese (Total)	mg/l	0.627	0.474	0.361	0.227	0.182	0.20B	0.21B	0.56B	0.28B	0.12J	0.23J	0.19	1.4	0.92
Manganese (Dissolved)	mg/l	0.098	0.157	0.116	0.136	0.129	0.18B	0.17B	0.20B	0.16B	0.041J	0.096	0.047	0.10	0.12
Iron (Total)	mg/l	4.82	5.55	5.3	2.26	1.17	0.21	0.29	7.9	0.89	0.16	0.64	0.4	5.1	14
Iron (Dissolved)	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<1.0	<0.10	< 0.1 U	< 0.10 U	< 0.1 U
Iron (Ferrous)	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	75	130	117	96	101	130	120	170	95	63J	110	54 J	130	71
Sulfide	mg/l	<1	<1	<1	<1	<1.0	1.2	1.6	<1.0	<1.0	<1	2.1	< 1 U	< 1.0 U	< 1 U
Total Organic Carbon	mg/l	3	10	4	<1	<1.0	3B	2	4	2	<1	1	0.5 B	4	2
Chloride	mg/l	283	254	194	196	198	190B	180	270	310	250	310J	290	370	430
<u>Permanent Gases</u>															
Carbon Dioxide	mg/l	34.69	58.08	52.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oxygen	mg/l	1.88	0.97	1.26	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen	mg/l	17.88	17.50	19.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	mg/l	0.000571	0.003269	0.01158	1.08	1.100	0.310	0.15	0.0042	0.0027	0.00055	0.0013	0.0012	< 0.0058 U	0.0018
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<u>Light Hydrocarbon Scan</u>															
Ethane	ng/l	32	39	118	126	2600	2000	1800	440	50	13	14	20	< 76 U	28
Ethene	ng/l	18	107	57	73	190	150	56	170	37	34	21	20	< 210 U	43
<u>Field Parameters</u>															
pH	S.U.	6.99	7.04	7.00	7.11	7.34	7.15	7.32	7.02	7.18	6.69	6.94	7.18	6.17	6.88
Specific Conductivity	umhos/cm	1777	1955	1503	1133	1189	1363	1480	1439	1467	1506	1548	1700	2190	2120
Dissolved Oxygen	mg/l	0.30	0.37	2.76	1.68	1.00	1.73	0.05	1.05	1.82	1.79	1.04	0.94	0	0.52
Redox Potential	mV	14.9	122.9	144.5	143.7	468.4	177.1	86	306.5	215.6	201	147.6	195	189	104
Temperature	°C	21.21	19.38	19.32	20.30	19.60	18.68	18.69	19.61	19.62	19.45	18.47	17.4	17.5	18.03

mg/l - milligrams per liter.

S.U. - Standard Units.

mV - Millivolts.

°C - Degrees Celsius.

J - Value is estimated.

B - Blank contamination.

NA - Not Analyzed.

umhos/cm - Micromohs/centimeter.

ng/l - nanograms per liter.

Samples collected in September 1999 represent baseline conditions.

Carbon source introductions began in December 1999.

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Table 14. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 3 West, General Motors Corporation, Moraine, Ohio.

RZ-3 West Constituents	Units	Downgradient Well GM-32															
		9/22/99	2/28/00	5/30/00	9/25/00	3/19/01	11/12/01	12/11/01	6/12/02	9/20/02	5/23/03	10/1/03	9/14/04	10/19/05	9/19/06	9/18/07	9/23/08
<u>Inorganics & TOC</u>																	
Nitrate	mg/l	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	mg/l	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	mg/l	2.29	2.00	19.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese (Total)	mg/l	0.147	0.516	0.051	0.30	0.17	0.16B	0.087B	0.043B	0.053B	0.1J	0.13J	0.13 J	0.076	0.088	0.077 J	0.051
Manganese (Dissolved)	mg/l	0.052	0.061	0.048	0.31	<0.050	0.020B	0.024B	0.042B	0.028B	0.077J	0.11J	0.13 J	0.067	0.078	0.072 J	0.056
Iron (Total)	mg/l	8.14	42.4	18.4	81.0	13.0	16.5	10.5	7.5	8.4B	21.3	31.4J	33.9	22.0	24.7	20	14
Iron (Dissolved)	mg/l	3.53	0.59	17.1	81.6	3.17	5.2	6.5	8.1	6.8B	18.7	30.5J	34.5	19.8	24.5	19.5	13.6
Iron (Ferrous)	mg/l	1.8	2.2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	30	<5	<10	<10	<20	5	4J	1J	<5	<5	<5	< 5 U	< 5 U	< 5 U	< 5 U	24
Sulfide	mg/l	<1	<10	<1	<1	1.60	<1	<1.0	0.50J	1.3	0.86B	7.3	16	4.1	1	14	7.7
Total Organic Carbon	mg/l	68	1200	2020	2720	1120	320B	250	240	160	150	170	240 J	300	260	290 J	95
Chloride	mg/l	317	638	740	740	798	700B	630	470	510	390	510J	530	550	560	560 J	400
<u>Permanent Gases</u>																	
Carbon Dioxide	mg/l	39.79	8.94	24.32	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oxygen	mg/l	1.67	0.85	<0.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen	mg/l	14.93	15.23	2.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	mg/l	2.73	7.06	14.91	16.84	29	29	38	24	32	24	19	25	30 J	26	26	25
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<u>Light Hydrocarbon Scan</u>																	
Ethane	ng/l	1649	9965	1029	189	7900	42000	72000	84000	94000	74000	46000	57000	85000 J	76000	73000	58000
Ethene	ng/l	86509	163855	472312	510593	150000	130000	90000	93000	49000	9900	3400	2000	1900 J	2400	1200	940
<u>Field Parameters</u>																	
pH	S.U.	7.54	8.59	7.64	7.73	8.36	8.42	8.13	8.55	8.13	6.41	6.81	6.86	6.3	6.84	7	7.13
Specific Conductivity	umhos/cm	2750	9030	9195	9225	7483	6874	6200	5432	4289	3908	3192	4210	4810	4510	4240	3220
Dissolved Oxygen	mg/l	0.09	0.23	10.82	2.55	0.36	0.07	0.03	1.14	0.22	1.93	0.31	0	0	0.21	0.45	1.79
Redox Potential	mV	-226.4	-279.1	-213.6	-353.8	-152.5	-222.8	-279	-220.5	-227.1	-204.6	-154.4	-160	-191	-193	-161	-200
Temperature	°C	19.27	19.72	23.48	19.27	19.30	18.84	18.62	20.83	19.81	19.31	18.47	17.2	17.0	17.7	16.7	18.71

mg/l - milligrams per liter.

S.U. - Standard Units.

mV - Millivolts.

°C - Degrees Celsius.

J - Value is estimated.

B - Blank contamination.

NA - Not Analyzed.

umhos/cm - Micromohs/centimeter.

ng/l - nanograms per liter.

Samples collected in September 1999 represent baseline conditions.

Carbon source introductions began in December 1999.

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Table 14. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 3 West, General Motors Corporation, Moraine, Ohio.

RZ-3 West	Constituents	Units	Downgradient Well GM-8								Downgradient Well GM-6									
			3/6/98	9/20/99	9/20/02	12/9/03	9/14/04	10/19/05	9/19/06	9/18/07	9/23/08	3/6/98	9/20/99	9/20/02	12/9/03	9/14/04	10/19/05	9/19/06	9/18/07	9/24/08
<u>Inorganics & TOC</u>																				
	Nitrate	mg/l	<4.4	0	NA	NA	NA	NA	NA	NA	<4.4	0	NA	NA	NA	NA	NA	NA	NA	
	Nitrite	mg/l	<0.033	0	NA	NA	NA	NA	NA	NA	<0.033	0	NA	NA	NA	NA	NA	NA	NA	
	Nitrogen, Ammonia	mg/l	1.69	1.95	NA	NA	NA	NA	NA	NA	<0.300	<0.30	NA	NA	NA	NA	NA	NA	NA	
	Manganese (Total)	mg/l	0.204	0.125	0.085B	0.21	0.13	0.17	0.16	0.12 J	1.07	1.11	0.27B	0.57	0.43	0.50	0.54	0.4 J	0.14	
	Manganese (Dissolved)	mg/l	0.229	0.125	0.084B	0.21	0.14	0.15	0.15	0.11 J	1	0.958	0.24B	0.53	0.47	0.49	0.54	0.39 J	0.13	
	Iron (Total)	mg/l	1.01	0.27	0.55B	1.9	1.8	3.2	3.4	3.3	1.32	0.27	0.40B	5.7	3.2	5.4	5.7	6.7	2.9	
	Iron (Dissolved)	mg/l	1.22	0.26	0.52B	1.9	1.8	2.8	3.1	3	<0.1	<0.10	0.30B	1.9	3.1	4.8	5.6	6.3	2.6	
	Iron (Ferrous)	mg/l	<0.2	0	NA	NA	NA	NA	NA	NA	<0.2	NA	NA	NA	NA	NA	NA	NA	NA	
	Sulfate	mg/l	59	54	59	<5	13 J	27	24	49	93	83	43	27	26 J	52	55	66	26	
	Sulfide	mg/l	<1	<1	<1.0	<1.0	2	< 1.0 U	1.8	0.86 J	<1	<1	<1.0	<1.0	3.4	< 1.0 U	< 1 U	< 1 U	6.5	
	Total Organic Carbon	mg/l	7	8	16	20	19 J	19	16	16 J	3	4	17	12	16 J	6	7	8 J	14 J	
	Chloride	mg/l	248	216	180	180J	190	260	320	360 J	227	247	170	190J	230	290	340	400 J	250	
<u>Permanent Gases</u>																				
	Carbon Dioxide	mg/l	15.8	9.91	NA	NA	NA	NA	NA	NA	47.4	48.44	NA	NA	NA	NA	NA	NA	NA	
	Oxygen	mg/l	1.1	0.92	NA	NA	NA	NA	NA	NA	1.57	2.23	NA	NA	NA	NA	NA	NA	NA	
	Nitrogen	mg/l	19.7	25.42	NA	NA	NA	NA	NA	NA	20.5	21.77	NA	NA	NA	NA	NA	NA	NA	
	Methane	mg/l	1.48	2.47	8.5	14	9	8.1 J	7.2	9.1	0.008337	0.006916	7.8	7.8	7.2	4.4 J	3.5	5.3	5.2	
	Carbon Monoxide	mg/l	<0.4	<0.40	NA	NA	NA	NA	NA	NA	<0.4	<0.40	NA	NA	NA	NA	NA	NA	NA	
<u>Light Hydrocarbon Scan</u>																				
	Ethane	ng/l	370	1134	13000	12000	18000	17000 J	7200	10000	47	67	10000	2400	5000	870 J	520	660	13000	
	Ethene	ng/l	12233	39617	3700	440	56	< 76 U J	1200	32	91	97	4900	750	2000	3600 J	1700	1800	680	
<u>Field Parameters</u>																				
	pH	S.U.	7.7	7.98	8.18	7.2	7.76	6.45	7.31	7.21	7	7.05	7.46	7.76	7.16	6.06	6.8	6.84	7.17	
	Specific Conductivity	umhos/cm	1539	1584	1734	1870	1900	2080	2120	2300	1422	1493	1658	2080	1830	1880	1920	2130	2160	
	Dissolved Oxygen	mg/l	0.16	0.28	0.37	0.04	0	0	0.53	0.70	0.88	0.48	0.34	0.03	0	0	0.24	0.51	1.43	
	Redox Potential	mV	-145	-49.8	-150.6	-137	-186	-162	-160	-125	57.6	26.5	-27.7	-223	-111	-107	-111	-86	-159	
	Temperature	°C	17.53	19.09	19.20	18.17	16.6	16.3	18.1	17	18.49	21.07	19.07	17.71	16.8	16.8	17.3	17.5	16.51	

mg/l - milligrams per liter.

S.U. - Standard Units.

mV - Millivolts.

°C - Degrees Celsius.

J - Value is estimated.

B - Blank contamination.

NA - Not Analyzed.

umhos/cm - Micromohs/centimeter.

ng/l - nanograms per liter.

Samples collected in September 1999 represent baseline conditions.

Carbon source introductions began in December 1999.

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Table 15. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 3 East, General Motors Corporation, Moraine, Ohio.

RZ-3 East	Units	Upgradient Well GM-22															
		9/1/99	2/23/00	5/25/00	9/21/00	3/20/01	11/13/01	12/12/01	6/13/02	9/25/02	5/22/03	9/24/03	9/14/04	10/17/05	9/20/06	9/26/07	10/3/08
<u>Inorganics & TOC</u>																	
Nitrate	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	mg/l	<0.30	<0.30	<0.30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese (Total)	mg/l	0.089	0.273	0.355	0.422	0.458	0.74B	0.63	0.38B	0.029B	0.031J	0.027J	0.1 J	0.040	0.26	0.071 J	0.033
Manganese (Dissolved)	mg/l	0.096	0.263	0.328	0.403	0.413	0.73B	0.62	0.40B	0.093B	0.023J	0.020J	0.035 J	0.026	0.18	0.015 J	< 0.015 U
Iron (Total)	mg/l	<0.10	0.16	0.96	0.94	0.28	<0.10	<0.10	0.11B	0.18	0.22	0.23	1.6	0.19	2.1	1	0.68
Iron (Dissolved)	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	< 0.1 U	< 0.10 U	< 0.1 U	< 0.1 U	< 0.1 U
Iron (Ferrous)	mg/l	0.6	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	49	125	120	117	99	300	150	120	70	72J	77	49 J	52	48	66	42
Sulfide	mg/l	<1	<1	<1	<1	<1.0	<1	<1.0	<1.0	0.40J	0.54B	1.6	< 1 U	< 1.0 U	< 1 U	< 1U	1.5
Total Organic Carbon	mg/l	6	4	4	<1	<1.0	16B	6B	3	2	<1	1	1 J	2	2	< 2 U	1
Chloride	mg/l	246	270	279	248	326	220B	280	290	370	350	350J	370	330	420	390 J	240
<u>Permanent Gases</u>																	
Carbon Dioxide	mg/l	40.15	43.99	40.20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oxygen	mg/l	1.05	0.86	1.28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen	mg/l	23.38	19.43	21.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	mg/l	0.05818	0.23	0.18	0.000967	0.280	0.067	0.16	0.039	0.014	0.00039	1.2	0.02	< 0.012 U	< 0.0047 U	0.0016	0.0043
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<u>Light Hydrocarbon Scan</u>																	
Ethane	ng/l	42	91	69	29	83	130	120	140	270	13	8.4	340	< 810 U	< 83 U	22 J	13 J
Ethene	ng/l	67	32	64	111	39	210	12	54	62	27	11	12	< 810 U	< 59 U	11 J	< 25 U
<u>Field Parameters</u>																	
pH	S.U.	7.12	7.15	7.08	7.17	7.00	7.33	7.39	7.21	7.02	6.89	7.04	7.10	6.88	6.97	6.78	6.76
Specific Conductivity	umhos/cm	1373	1975	1671	1684	1610	1753	2020	1415	1720	1730	1597	1760	1930	2080	2170	1280
Dissolved Oxygen	mg/l	0.32	0.46	0.49	1.73	0.82	0.01	0.15	0.94	2.14	1.04	1.2	0	0	0.27	1.18	3.15
Redox Potential	mV	62.2	70.2	26.1	-80.8	175.1	54.8	-110	105.2	181.2	116.6	74.6	62	68	51	79	174
Temperature	°C	19.41	18.87	20.87	22.28	20.79	19.45	18.99	20.29	19.49	18.62	18.45	17.2	16.9	17.46	18.1	16.79

mg/l - milligrams per liter.
 S.U. - Standard Units.
 mV - Millivolts.
 °C - Degrees Celsius.
 J - Value is estimated.
 B - Blank contamination.
 NA - Not Analyzed.
 umhos/cm - Micromohs/centimeter.

ng/l - nanograms per liter.
 Samples collected in September 1999 represent baseline conditions.
 Carbon source introductions began in December 1999.

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Table 15. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 3 East, General Motors Corporation, Moraine, Ohio.

RZ-3 East	Units	Downgradient Well															
		GM-21															
Constituents		9/22/99	2/23/00	5/26/00	9/22/00	3/19/01	11/13/01	12/11/01	6/12/02	9/25/02	5/22/03	9/24/03	9/14/04	10/17/05	9/20/06	9/26/07	10/3/08
<u>Inorganics & TOC</u>																	
Nitrate	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	mg/l	<0.30	<0.3	<0.30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese (Total)	mg/l	0.321	0.233	0.215	0.336	0.298	0.30B	0.30B	0.31B	0.29B	0.32J	0.37J	0.35 J	0.17	0.19	0.27 J	0.78
Manganese (Dissolved)	mg/l	0.273	0.225	0.212	0.312	0.291	0.32B	0.29B	0.29B	0.25B	0.26J	0.38J	0.33 J	0.16	0.19	0.27 J	0.77
Iron (Total)	mg/l	2.58	0.30	0.83	0.63	0.11	<0.10	0.16	0.65	0.56	12.6	0.27	2.3	26.9	10.7	9.2	17.9
Iron (Dissolved)	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.11	<0.10	<0.10	1.4	0.47	< 0.1 U	25.5	10.7	8.9	16.7
Iron (Ferrous)	mg/l	0.4	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	103	102	80	102	118	120	100	76	76	55J	82	79 J	< 5 U	35	17	38
Sulfide	mg/l	<1	<1	<1	<1	<1	<1	1.9	0.50J	0.40J	0.54B	1.5	2.9	< 1.0 U	< 1 U	< 1 U	1.5
Total Organic Carbon	mg/l	1	3	2	<1	<1	2B	1	0.9J	2	2	2 J	2 J	92	7	14 J	18
Chloride	mg/l	136	145	126	129	165	140	150	170	180	160	190J	190	190	240	260 J	240
<u>Permanent Gases</u>																	
Carbon Dioxide	mg/l	37.04	37.40	18.70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oxygen	mg/l	1.41	0.99	1.89	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen	mg/l	23.40	21.67	23.64	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	mg/l	0.03744	0.01769	0.01370	0.04218	0.048	0.049	0.035	0.022	0.03	0.031	1.5	0.077	17	4.9	30	28
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<u>Light Hydrocarbon Scan</u>																	
Ethane	ng/l	72	67	84	72	82	76	120	150	120	130	30	140	9800	27000	290000 J	77000
Ethene	ng/l	169	38	70	69	46	46	100	120	64	570	520	250	330000	63000	80000	13000
<u>Field Parameters</u>																	
pH	S.U.	6.99	7.22	7.06	7.21	7.85	7.50	7.45	7.22	7.09	6.76	7.05	7.19	6.73	6.9	6.64	6.05
Specific Conductivity	umhos/cm	1188	1299	1048	1096	1067	1190	1360	1045	1245	968	1181	1180	1640	1580	1870	1405
Dissolved Oxygen	mg/l	0.66	0.60	0.40	0.99	0.57	0.04	0.04	0.63	0.41	0.83	0.75	0	0	0.25	0.46	0.12
Redox Potential	mV	-26.9	113.3	167.1	153.9	218.5	168.8	-25	373.8	238.1	77.1	-26.7	-7	-140	-137	-126	68
Temperature	°C	20.43	18.43	17.92	19.03	17.59	16.73	15.82	18.67	18.67	17.54	18.39	17.1	16.4	16.94	17.2	16.5

mg/l - milligrams per liter.
 S.U. - Standard Units.
 mV - Millivolts.
 °C - Degrees Celsius.
 J - Value is estimated.
 B - Blank contamination.
 NA - Not Analyzed.
 umhos/cm - Micromohs/centimeter.

ng/l - nanograms per liter.
 Samples collected in September 1999 represent baseline conditions.
 Carbon source introductions began in December 1999.

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Table 16. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 4 East, General Motors Corporation, Moraine, Ohio.

RZ-4 East	Units	Upgradient Well WEST			Upgradient Well GM-19S															
		9/21/99	2/23/00	5/25/00	9/20/99	2/23/00	5/24/00	9/22/00	3/19/01	11/20/01	12/11/01	6/12/02	9/26/02	5/21/03	9/25/03	9/13/04	10/18/05	9/21/06	9/17/07	9/23/08
<u>Inorganics & TOC</u>																				
Nitrate	mg/l	0	0	0	11	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Nitrite	mg/l	17.6	0	0	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Nitrogen, Ammonia	mg/l	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
Manganese (Total)	mg/l	0.391	0.038	0.029	0.726	1.09	0.247	0.238	0.191	0.20	0.21B	0.25B	0.39B	0.3J	0.23J	0.25	0.24	0.99	0.28 J	0.16
Manganese (Dissolved)	mg/l	0.383	<0.010	<0.010	0.185	0.205	0.200	0.187	0.155	0.19	0.18B	0.18B	0.19B	0.2J	0.21J	0.16	0.20	0.94	0.15 J	0.16
Iron (Total)	mg/l	0.27	0.40	0.37	16.9	39.4	1.19	0.40	0.90	0.091	0.18	0.26	0.44	0.17	0.96	3	0.38	1.6	12.7	7.4
Iron (Dissolved)	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.1	<0.10	< 0.1 U	< 0.10 U	1.4	9.4	7.3
Iron (Ferrous)	mg/l	0	0	0	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	73	129	155	127	131	131	118	113	100	90	110	110	150J	150	110 J	83	95	63	68
Sulfide	mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.96J	<1.0	<1.0	<1	1.3	1.6	< 1.0 U	< 1 U	< 1 U	< 1 U
Total Organic Carbon	mg/l	2	7	3	2	7	5	<1	<1	2B	1	1	3	2	2	1	3	22	6 J	3
Chloride	mg/l	260	166	164	247	197	168	165	158	130B	150	140	210	270	300J	310	320	350	400 J	390
<u>Permanent Gases</u>																				
Carbon Dioxide	mg/l	50.41	67.57	61.09	41.85	57.12	50.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oxygen	mg/l	1.30	1.50	2.20	4.43	1.01	1.24	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen	mg/l	13.24	13.74	17.1	20.87	17.07	17.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	mg/l	0.001409	0.000217	0.002179	0.00986	0.002712	0.003325	0.003706	0.039	0.005	0.0088	0.002	0.46	0.0021	0.0022	0.0014	< 0.0065 U	0.025	7.5	0.79
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
<u>Light Hydrocarbon Scan</u>																				
Ethane	ng/l	37	33	57	71	104	139	184	210	300	350	410	730	170	80	48	< 250 U	730	7800	550
Ethene	ng/l	100	17	47	55	45	43	36	61	34	27	130	770	78	45	51	< 220 U	550	22000	30000
<u>Field Parameters</u>																				
pH	S.U.	6.89	6.97	6.97	7.05	7.05	7.00	7.19	7.14	7.28	7.31	7.09	7.02	6.71	6.93	7.13	5.97	6.84	7.03	7.1
Specific Conductivity	umhos/cm	1759	1640	1547	1500	1784	1548	1235	1097	1190	1350	1052	1474	1706	1726	1970	1940	2150	2010	2290
Dissolved Oxygen	mg/l	0.41	1.73	1.50	0.92	0.30	1.94	1.36	0.96	1.75	0.06	0.90	0.47	2.01	1.87	0	0	0.3	0.43	1.87
Redox Potential	mV	106.2	139.1	198.3	31.3	149.6	200.1	187.7	320.8	195.6	13	446.3	259.6	178.3	135	160	122	-82	-145	-153
Temperature	°C	21.44	19.90	19.75	20.85	18.69	20.80	20.09	20.14	19.24	19.10	20.39	20.36	20.22	19.57	18.6	17.6	17.9	17.5	16.9

mg/l - milligrams per liter.

S.U. - Standard Units.

mV - Millivolts.

°C - Degrees Celsius.

J - Value is estimated.

B - Blank contamination.

NA - Not Analyzed.

umhos/cm - Micromohs/centimeter.

ng/l - nanograms per liter.

Samples collected in September 1999 represent baseline conditions.

Carbon source introductions began in August 2006.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	Upgradient of the Site		On-Site				
		HR-9 9/30/2008 Upper Aquifer	HR-11 9/25/2008 Upper Aquifer	HR-4 9/30/2008 Upper Aquifer	W-2-N 9/29/2008 Upper Aquifer	W-3-N 9/29/2008 Upper Aquifer	W-4-N 9/29/2008 Upper Aquifer	HR-2 10/1/2008 Upper Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	8.2	< 1 U	< 1 U	< 1 U	< 3.3 U	0.39 J	< 1 U
1,1-Dichloroethane	ug/l	58	5.2	4.1	< 1 U	< 3.3 U	1.9	4.6
1,1-Dichloroethene	ug/l	0.49 J	< 1 U	< 1 U	< 1 U	< 3.3 U	< 1 U	< 1 U
Benzene	ug/l	< 2.5 U	< 1 U	< 1 U	< 1 U	< 3.3 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	32	< 1 U	0.23 J	1.7	98	11	3.4
Ethylbenzene	ug/l	< 2.5 U	< 1 U	< 1 U	< 1 U	< 3.3 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	< 2.5 U	< 1 U	0.44 J	< 1 U	< 3.3 U	0.38 J	< 1 U
Toluene	ug/l	< 2.5 U	< 1 U	< 1 U	< 1 U	< 3.3 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	ug/l	4.5	< 1 U	< 1 U	< 1 U	1.4 J	0.92 J	0.47 J
Trichloroethene	ug/l	11	< 1 U	0.31 J	0.47 J	< 3.3 U	8.4	0.36 J
Vinyl chloride	ug/l	< 2.5 U	< 1 U	< 1 U	< 1 U	3.8	0.34 J	< 1 U
Xylene (total)	ug/l	< 5 U	< 2 U	< 2 U	< 2 U	< 6.7 U	< 2 U	< 2 U
Total VOCs	ug/l	114.19	5.2	5.08	2.17	103.2	23.33	8.83

ug/l - Micrograms per liter.

All QA/QC results for 2008 data are shown in Appendix C.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

U - Constituent not detected above laboratory reporting limit shown.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	HR-3	HR-5	HR-1	On-Site	GM-23	GM-27	GM-29
		10/2/2008	9/29/2008	9/29/2008	GM-30 10/6/2008	10/23/2008	10/23/2008	10/6/2008
		Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	0.84 J	< 1 U	0.77 J	< 10 U	< 62 U	< 1.4 U	12 J
1,1-Dichloroethane	ug/l	16	0.48 J	1.8 J	11	< 62 U	2	11 J
1,1-Dichloroethene	ug/l	0.27 J	< 1 U	< 2.5 U	< 10 U	< 62 U	< 1.4 U	< 33 U
Benzene	ug/l	< 1 UJ	< 1 U	< 2.5 U	< 10 U	< 62 U	< 1.4 U	< 33 U
cis-1,2-Dichloroethene	ug/l	17	5.4	5	< 10 U	2000	11	900
Ethylbenzene	ug/l	< 1 U	< 1 U	< 2.5 U	300	< 62 U	< 1.4 U	< 33 U
Tetrachloroethene	ug/l	< 1 U	< 1 U	27	< 10 U	71	0.9 J	17 J
Toluene	ug/l	< 1 U	< 1 U	< 2.5 U	< 10 U	< 62 U	< 1.4 U	< 33 U
trans-1,2-Dichloroethene	ug/l	1.6	0.59 J	2 J	< 10 U	58 J	0.51 J	16 J
Trichloroethene	ug/l	32	13	70	< 10 U	< 62 U	57	300
Vinyl chloride	ug/l	2.2	< 1 U	< 2.5 U	< 10 U	2100	0.44 J	150
Xylene (total)	ug/l	< 2 U	< 2 U	< 5 U	670	< 120 U	< 2.9 U	< 67 U
Total VOCs	ug/l	69.91	19.47	106.57	981	4,229	71.85	1,406

ug/l - Micrograms per liter.

All QA/QC results for 2008 data are shown in Appendix C.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

U - Constituent not detected above laboratory reporting limit shown.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	GM-28	GM-59	GM-60	On-Site	ME-6	GM-31	ME-3
		10/22/2008	10/3/2008	10/3/2008	GM-75S	10/22/2008	10/23/2008	10/22/2008
		Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	< 5 U	< 33 U	< 25 U	< 20 U	2.7	2.9	2.1
1,1-Dichloroethane	ug/l	2.2 J	< 33 U	< 25 U	< 20 U	11	3.2	1.8
1,1-Dichloroethene	ug/l	< 5 U	< 33 U	< 25 U	< 20 U	< 1 U	< 2.5 U	< 1 U
Benzene	ug/l	< 5 U	< 33 U	< 25 U	< 20 U	< 1 U	< 2.5 U	< 1 U
cis-1,2-Dichloroethene	ug/l	6.9	41	360	< 20 U	5.2	76	1.4
Ethylbenzene	ug/l	< 5 U	< 33 U	< 25 U	< 20 U	< 1 U	< 2.5 U	< 1 U
Tetrachloroethene	ug/l	< 5 U	750	900	690	7.7	< 2.5 U	8.1
Toluene	ug/l	< 5 U	< 33 U	< 25 U	< 20 U	< 1 U	< 2.5 U	< 1 U
trans-1,2-Dichloroethene	ug/l	1.3 J	< 33 U	< 25 U	< 20 U	0.25 J	3	< 1 U
Trichloroethene	ug/l	< 5 U	750	920	250	9	78	4.9
Vinyl chloride	ug/l	6.5	< 33 U	< 25 U	< 20 U	1.7	0.9 J	0.7 J
Xylene (total)	ug/l	< 10 U	< 67 U	< 50 U	< 40 U	< 2 U	< 5 U	< 2 U
Total VOCs	ug/l	16.9	1,541	2,180	940	37.55	164	19

ug/l - Micrograms per liter.

All QA/QC results for 2008 data are shown in Appendix C.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

U - Constituent not detected above laboratory reporting limit shown.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	GM-22	GM-19S	GM-33	On-Site	GM-32	GM-21	HR-17
		10/3/2008	9/23/2008	10/23/2008	GM-35	9/23/2008	10/3/2008	9/26/2008
		Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	0.73 J	< 1 U	8.4	4.6 J	< 10 U	8.7	< 4 U
1,1-Dichloroethane	ug/l	< 1 U	13	2.9	20	4 J	15	1.1 J
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	0.58 J	< 10 U	< 10 U	0.33 J	< 4 U
Benzene	ug/l	< 1 U	< 1 U	< 1.4 U	< 10 U	< 10 U	< 1.4 U	< 4 U
cis-1,2-Dichloroethene	ug/l	< 1 U	0.68 J	4.1	92	< 10 U	38	2.7 J
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1.4 U	< 10 U	< 10 U	< 1.4 U	< 4 U
Tetrachloroethene	ug/l	5.7	0.94 J	38	20	< 10 U	0.56 J	120
Toluene	ug/l	< 1 U	< 1 U	< 1.4 U	< 10 U	< 10 U	< 1.4 U	< 4 U
trans-1,2-Dichloroethene	ug/l	< 1 U	0.52 J	< 1.4 U	9.4 J	< 10 U	4.7	1 J
Trichloroethene	ug/l	5.7	3	36	88	< 10 U	18	31
Vinyl chloride	ug/l	< 1 U	9.3	< 1.4 U	7.9 J	< 10 U	19	< 4 U
Xylene (total)	ug/l	< 2 U	< 2 U	< 2.9 U	< 20 U	< 20 U	< 2.9 U	< 8 U
Total VOCs	ug/l	12.13	27.44	89.98	241.9	4	104.29	155.8

ug/l - Micrograms per liter.

All QA/QC results for 2008 data are shown in Appendix C.

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J - Value is estimated.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	On-Site			Downgradient of the Site			
		W-2-S 9/25/2008 Upper Aquifer	W-3-S 9/26/2008 Upper Aquifer	W-4-S 9/26/2008 Upper Aquifer	GM-63 10/1/2008 Upper Aquifer	GM-64 10/1/2008 Upper Aquifer	GM-47 10/1/2008 Upper Aquifer	GM-50 10/1/2008 Upper Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	1.4	1.2	0.95 J	4 J	0.55 J	1.4 J	1.6 J
1,1-Dichloroethane	ug/l	0.92 J	0.21 J	1.3	2.2 J	2.7	2 J	1.7 J
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	0.21 J	< 5 U	< 1 U	< 5 U	< 2.5 U
Benzene	ug/l	< 1 U	< 1 U	< 1 U	< 5 U	< 1 U	< 5 U	< 2.5 U
cis-1,2-Dichloroethene	ug/l	0.78 J	0.52 J	6	4.9 J	15	160	13
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 5 U	< 1 U	< 5 U	< 2.5 U
Tetrachloroethene	ug/l	< 1 U	1.3	32	140	31	86	82
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 5 U	< 1 U	< 5 U	< 2.5 U
trans-1,2-Dichloroethene	ug/l	< 1 U	< 1 U	1.2	< 5 U	2.3	3.9 J	0.68 J
Trichloroethene	ug/l	5.2	2.1	16	92	14	36	54
Vinyl chloride	ug/l	< 1 U	< 1 U	< 1 U	< 5 U	2.3	1.9 J	< 2.5 U
Xylene (total)	ug/l	< 2 U	< 2 U	< 2 U	< 10 U	< 2 U	< 10 U	< 5 U
Total VOCs	ug/l	8.3	5.33	57.66	243.1	67.85	291.2	152.98

ug/l - Micrograms per liter.

All QA/QC results for 2008 data are shown in Appendix C.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	Downgradient of the Site						
		GM-8 9/23/2008 Upper Aquifer	GM-6 9/24/2008 Upper Aquifer	TW-2 9/24/2008 Upper Aquifer	GM-2 9/24/2008 Upper Aquifer	GM-51 9/30/2008 Upper Aquifer	GM-16 9/30/2008 Upper Aquifer	GM-17 9/24/2008 Upper Aquifer
Volatile Organic Compounds								
1,1,1-Trichloroethane	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	0.6 J	1.8 J	0.29 J
1,1-Dichloroethane	ug/l	1.7	< 8.4 U	< 1.9 U	< 1.1 U	0.78 J	3.8	< 1 U
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 3.3 U	< 1 U
Benzene	ug/l	6.8	1.2	1.4	< 1 U	< 1 U	< 3.3 U	< 1 U
cis-1,2-Dichloroethene	ug/l	< 1 U	6.7	< 5.2 U	6.7	2	20	< 1.9 U
Ethylbenzene	ug/l	8.6	< 1 U	0.76 J	< 1 U	< 1 U	< 3.3 U	< 1 U
Tetrachloroethene	ug/l	< 1 U	< 1 U	1.4	1.3	9.3	100	4.8
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 3.3 U	< 1 U
trans-1,2-Dichloroethene	ug/l	0.27 J	1.3	0.36 J	0.19 J	0.7 J	1.1 J	< 1 U
Trichloroethene	ug/l	< 1 U	< 1 U	7.5	2.4	7.7	48	10
Vinyl chloride	ug/l	0.48 J	2.1	1	< 1 U	< 1 U	< 3.3 U	< 1 U
Xylene (total)	ug/l	3.9	< 2 U	< 2 U	< 2 U	< 2 U	< 6.7 U	< 2 U
Total VOCs	ug/l	21.75	11.3	12.42	10.59	21.08	174.7	15.09

ug/l - Micrograms per liter.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	Downgradient of the Site						
		GM-18 9/24/2008 Upper Aquifer	WSU-24 9/25/2008 Upper Aquifer	GM-52 9/30/2008 Upper Aquifer	GM-10 9/24/2008 Upper Aquifer	GM-79 10/2/2008 Upper Aquifer	GM-55 10/2/2008 Upper Aquifer	GM-78 10/2/2008 Upper Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	2.3	0.62 J	1.9 J	0.53 J	0.65 J	< 1 U	< 1 U
1,1-Dichloroethane	ug/l	< 6.1 U	0.85 J	3	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethene	ug/l	< 1.4 U	< 1 U	< 2.5 U	< 1 U	< 1 U	< 1 U	< 1 U
Benzene	ug/l	< 1.4 U	< 1 U	< 2.5 U	< 1 U	< 1 UJ	< 1 UJ	< 1 UJ
cis-1,2-Dichloroethene	ug/l	13	2.4 J	14	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	ug/l	< 1.4 U	< 1 U	< 2.5 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	16	1.7	88	0.85 J	< 1 U	7.2	11
Toluene	ug/l	< 1.4 U	< 1 U	< 2.5 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	ug/l	0.79 J	0.35 J	< 2.5 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	ug/l	38	12 J	43	5.9	1.8	< 1 U	< 1 U
Vinyl chloride	ug/l	< 1.4 U	< 1 U	< 2.5 U	< 1 U	< 1 U	< 1 U	< 1 U
Xylene (total)	ug/l	< 2.9 U	< 2 U	< 5 U	< 2 U	< 2 U	< 2 U	< 2 U
Total VOCs	ug/l	70.09	17.92	149.9	7.28	2.45	7.2	11

ug/l - Micrograms per liter.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	Downgradient of the Site			Upgradient of the Site		On-Site	
		GM-80 9/22/2008 Upper Aquifer	GM-26 10/1/2008 Upper Aquifer	GM-65S 10/6/2008 Upper Aquifer	HR-10 9/30/2008 Lower Aquifer	HR-12 9/25/2008 Lower Aquifer	HR-15 9/29/2008 Lower Aquifer	GM-39 10/1/2008 Lower Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	0.39 J	< 1 U	< 1 U
1,1-Dichloroethane	ug/l	0.39 J	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Benzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	3.6	< 1 U	< 1 U	< 1 U	< 1 U	3.6	0.67 J
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	0.93 J	1.4	8.7	< 1 U	1.3	< 1 U	< 1 U
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	ug/l	0.19 J	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	ug/l	5.4	< 1 U	3.8	< 1 U	5.1	0.47 J	< 1 U
Vinyl chloride	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	9.7	3.2
Xylene (total)	ug/l	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Total VOCs	ug/l	10.51	1.4	12.5	0	6.79	13.77	3.87

ug/l - Micrograms per liter.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	GM-83D	GM-40	GM-61	On-Site	GM-68D	GM-82	GM-41
		10/2/2008	9/30/2008	10/1/2008	GM-75D 10/6/2008	10/3/2008	10/2/2008	9/26/2008
		Lower Aquifer	Lower Aquifer	Lower Aquifer	Lower Aquifer	Lower Aquifer	Lower Aquifer	Lower Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	< 1 U	< 1 U	< 1 U	< 33 U	< 5 U	1 J	< 7.1 U
1,1-Dichloroethane	ug/l	< 1 U	< 1 U	0.94 J	< 33 U	< 5 U	2.4 J	< 7.1 U
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	0.19 J	< 33 U	< 5 U	0.64 J	< 7.1 U
Benzene	ug/l	< 1 UJ	< 1 U	< 1 U	< 33 U	< 5 U	< 3.3 U	< 7.1 U
cis-1,2-Dichloroethene	ug/l	0.3 J	< 1 U	20	120	14	46	11
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 33 U	< 5 U	< 3.3 U	< 7.1 U
Tetrachloroethene	ug/l	< 1 U	< 1 U	13	220	190	51	< 7.1 U
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 33 U	< 5 U	< 3.3 U	< 7.1 U
trans-1,2-Dichloroethene	ug/l	< 1 U	< 1 U	0.92 J	< 33 U	< 5 U	2 J	< 7.1 U
Trichloroethene	ug/l	< 1 U	< 1 U	23	750	46	100	180
Vinyl chloride	ug/l	1.3	3.6	0.75 J	< 33 U	< 5 U	< 3.3 U	< 7.1 U
Xylene (total)	ug/l	< 2 U	< 2 U	< 2 U	< 67 U	< 10 U	< 6.7 U	< 14 U
Total VOCs	ug/l	1.6	3.6	58.8	1,090	250	203.04	191

ug/l - Micrograms per liter.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	GM-58	GM-54	On-Site	GM-84	GM-19D	Downgradient of the Site	
		9/26/2008	9/30/2008	GM-42 9/30/2008	10/2/2008	9/23/2008	GM-3 9/24/2008	GM-1 9/24/2008
		Lower Aquifer	Lower Aquifer	Lower Aquifer	Lower Aquifer	Lower Aquifer	Lower Aquifer	Lower Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	< 2.5 U	< 5.7 U	< 1 U	< 1 U	< 1 U	< 1 U	0.69 J
1,1-Dichloroethane	ug/l	< 2.5 U	< 5.7 U	0.66 J	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethene	ug/l	< 2.5 U	< 5.7 U	0.53 J	< 1 U	< 1 U	< 1 U	< 1 U
Benzene	ug/l	< 2.5 U	< 5.7 U	< 1 U	< 1 UJ	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	< 2.5 U	< 5.7 U	20	< 1 U	2.4	< 1 U	< 1 U
Ethylbenzene	ug/l	< 2.5 U	< 5.7 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	80	190	< 1 U	< 1 U	< 1 U	< 1 UJ	1.8
Toluene	ug/l	< 2.5 U	< 5.7 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	ug/l	< 2.5 U	< 5.7 U	0.89 J	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	ug/l	< 2.5 U	2.5 J	9.9	6.6	< 1 U	< 1 UJ	31
Vinyl chloride	ug/l	< 2.5 U	< 5.7 U	0.31 J	< 1 U	9.8	< 1 U	< 1 U
Xylene (total)	ug/l	< 5 U	< 11 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Total VOCs	ug/l	80	192.5	32.29	6.6	12.2	0	33.49

ug/l - Micrograms per liter.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	Downgradient of the Site				
		GM-15	GM-11	GM-20D	DN-13	GM-9
		9/30/2008	9/24/2008	9/25/2008	9/24/2008	9/24/2008
		Lower Aquifer	Lower Aquifer	Lower Aquifer	Lower Aquifer	Lower Aquifer
Volatile Organic Compounds						
1,1,1-Trichloroethane	ug/l	< 1 U	0.47 J	0.45 J	0.63 J	1.2
1,1-Dichloroethane	ug/l	1.1	< 1 U	< 1 U	< 1.7 U	< 1 U
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Benzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	0.79 J	< 1 U	< 1 U	6.2	< 1 U
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	< 1 U	1.7	2.6	< 1 U	< 1 U
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	0.44 J	< 1 U
Trichloroethene	ug/l	6.2	31	6.6	4.5	18
Vinyl chloride	ug/l	< 1 U	< 1 U	< 1 U	1.4	< 1 U
Xylene (total)	ug/l	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U
Total VOCs	ug/l	8.09	33.17	9.65	13.17	19.2

ug/l - Micrograms per liter.

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Table 18. Carbon Source Solution Introduction Volumes for 2008, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	January		February		March		April	
		Injection Event #93 ⁽¹⁾		Injection Event #94 ⁽²⁾		Injection Event #95 ⁽³⁾		Injection Event #96 ⁽⁴⁾	
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)
Reactive Zone 1	RZ-1C	800	33.33	---	NA	800	33.33	800	33.33
	RZ-1D	800	23.53	---	NA	800	29.63	800	30.77
	RZ-1E	800	26.67	---	NA	800	25.81	800	27.59
	RZ-1F	800	26.67	---	NA	800	34.78	800	25.81
	RZ-1G	800	27.58	---	NA	800	25.81	800	22.22
	RZ-1H	800	20.00	---	NA	800	20.00	800	32.00
	RZ-1I	800	29.63	---	NA	800	40.00	800	33.33
	RZ-1J	800	34.78	---	NA	800	30.77	800	34.78
	RZ-1K	800	34.78	---	NA	800	30.77	800	33.33
	RZ-1L	800	33.33	---	NA	800	36.36	800	33.33
	RZ-1M	800	30.77	---	NA	800	28.57	800	33.33
	RZ-1N	800	26.67	---	NA	800	19.05	800	30.77
	RZ-1O	800	27.58	---	NA	800	32.00	800	28.57
	RZ-1P	800	26.67	---	NA	400	14.29	800	32.00
	RZ-1Q	800	36.36	---	NA	400	8.00	800	30.77
	RZ-1R	800	32.00	---	NA	800	34.78	800	32.00
	RZ-1S	---	NA	---	NA	400	10.53	800	32.00
	RZ-1T	---	NA	---	NA	800	32.00	800	17.39
	RZ-1U	800	29.63	---	NA	800	30.77	800	16.33

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Table 18. Carbon Source Solution Introduction Volumes for 2008, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	January		February		March		April	
		Injection Event #93 ⁽¹⁾		Injection Event #94 ⁽²⁾		Injection Event #95 ⁽³⁾		Injection Event #96 ⁽⁴⁾	
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)
Reactive Zone 3	RZ-3A	1600	23.34	1600	29.62	1600	32.78	1600	35.57
	RZ-3B	1600	26.79	1600	28.08	1600	30.82	1600	33.57
	RZ-3C	1600	31.39	1600	24.77	1600	33.00	1600	31.39
	RZ-3D	1600	22.45	1600	23.94	1600	34.18	1600	28.08
	RZ-3E	1600	22.46	1600	32.78	1600	30.29	1600	30.95
	RZ-3F	1600	30.95	1600	30.29	---(13)	NA	1600	29.18
	RZ-3G	1600	27.51	1600	32.05	---(13)	NA	1600	28.72
	RZ-3H	1600	32.21	1600	32.05	1600	34.43	1600	32.21
	RZ-3I	1600	32.05	1600	29.18	1600	30.20	1600	28.79
	RZ-3J	1600	29.67	1600	32.20	1600	30.73	1600	35.57
	RZ-3K	1600	23.36	1600	30.20	1600	27.48	1600	23.72
	RZ-3L	1600	20.65	1600	27.62	1600	30.77	1600	24.17
	RZ-3M	1600	37.23	1600	33.39	1600	33.33	1600	25.21
	RZ-3N	1600	26.05	1600	25.39	1600	28.15	1600	30.46
	RZ-3O	1600	27.43	1600	26.53	1600	47.32	1600	20.10
	RZ-3P	1600	30.95	1600	28.61	1600	30.73	1600	20.95
	RZ-3Q	1600	28.90	1600	28.91	1600	20.39	1600	17.25
	RZ-3R	1600	29.79	1600	25.56	1600	21.62	1600	20.00
	RZ-3S	1600	31.39	1600	30.29	1600	25.76	1600	12.88
	RZ-3T	1600	29.79	1600	33.39	1600	33.33	1600	12.35
	RZ-3U	1600	32.00	1600	32.78	1600	23.72	1600	16.47
	RZ-3V	1600	30.82	1600	31.52	1600	33.33	1600	10.37
	RZ-3W	1600	32.00	1600	33.39	1600	24.50	1600	10.04
	RZ-3X	1600	32.05	1600	30.81	1600	33.80	1600	14.30
	RZ-3Y	800	34.78	800	27.62	1600	34.78	1600	15.25
	RZ-3Z	1600	31.39	1600	30.20	1600	29.63	1600	23.22
	RZ-3AA	1600	30.20	1600	30.29	1600	31.19	1600	27.32
	RZ-3BB	1600	28.15	1600	30.46	1600	30.20	1600	27.89

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Table 18. Carbon Source Solution Introduction Volumes for 2008, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	January		February		March		April	
		Injection Event #93 ⁽¹⁾		Injection Event #94 ⁽²⁾		Injection Event #95 ⁽³⁾		Injection Event #96 ⁽⁴⁾	
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)
Reactive Zone 3	RZ-3CC	1600	32.67	1600	29.62	1600	23.93	1600	32.67
	RZ-3DD	1600	31.39	1600	26.24	1600	15.72	1600	31.39
	RZ-3FF	--- ⁽¹³⁾	NA	--- ⁽¹³⁾	NA	--- ⁽¹³⁾	NA	--- ⁽¹³⁾	NA
	RZ-3GG	1600	30.73	1600	19.81	--- ⁽¹³⁾	NA	--- ⁽¹⁴⁾	NA
	RZ-3HH	1600	31.39	1600	28.10	1600	30.46	1600	25.03
	RZ-3II	1600	30.00	1600	30.20	1600	30.29	1600	22.03
	RZ-3JJ	1600	33.57	--- ⁽¹³⁾	NA	1600	30.82	1600	31.39
	RZ-3KK	1600	23.94	--- ⁽¹³⁾	NA	1600	28.50	1600	20.05
	RZ-3RR	800 ⁽¹⁴⁾	36.36	1600	26.92	1600	58.34	800 ⁽¹⁴⁾	16.67
	RZ-3SS	800 ⁽¹⁴⁾	20.51	800 ⁽¹⁴⁾	13.56	1600	45.43	800 ⁽¹⁴⁾	19.52
	RZ-3TT	1000 ⁽¹⁴⁾	11.15	--- ⁽¹⁴⁾	NA	1600	3.95	500 ⁽¹⁵⁾	5.71
	RZ-3UU	800 ⁽¹⁴⁾	33.33	1600	28.90	1600	17.76	--- ⁽¹⁴⁾	NA
	RZ-3VV	800 ⁽¹⁴⁾	32.00	1600	30.00	1600	13.09	--- ⁽¹⁴⁾	NA
Reactive Zone 4	RZ-4A	3000	30.97	3000	25.66	3000	26.81	3000	26.59
	RZ-4B	3000	37.07	3200	28.14	3000	33.43	3000	22.48
	RZ-4C	3000	22.19	3000	26.09	3000	24.23	3000	24.27
	RZ-4D	3000	39.63	3200	29.06	3000	20.86	3000	26.16
	RZ-4E	3000	40.46	3000	31.08	3000	23.67	3000	19.99
	RZ-4F	3000	33.33	3000	29.69	3000	28.49	3000	17.54
	RZ-4G	3000	41.40	--- ⁽¹⁴⁾	NA	3000	22.17	3000	20.61
	RZ-4H	3000	39.67	3000	28.51	3000	27.84	3000	26.95
Site-Wide Total		97,000		79,000		97,200		95,700	

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Table 18. Carbon Source Solution Introduction Volumes for 2008, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	May		June		July		August	
		Injection Event #97 ⁽⁵⁾		Injection Event #98 ⁽⁶⁾		Injection Event #99 ⁽⁷⁾		Injection Event #100 ⁽⁸⁾	
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)
Reactive Zone 1	RZ-1C	800	26.66	---	NA	--- ⁽¹⁴⁾	NA	800	32.00
	RZ-1D	800	17.77	---	NA	800	33.33	800	30.77
	RZ-1E	800	32.00	---	NA	800	32.00	800	32.00
	RZ-1F	800	36.36	---	NA	800	32.00	800	28.57
	RZ-1G	800	13.11	---	NA	800	28.57	800	27.59
	RZ-1H	800	32.00	---	NA	800	30.77	800	23.53
	RZ-1I	800	20.51	---	NA	800	32.00	800	29.63
	RZ-1J	800	36.36	---	NA	800	30.77	800	15.69
	RZ-1K	800	25.00	---	NA	800	38.09	800	15.69
	RZ-1L	800	30.77	---	NA	800	32.00	800	30.77
	RZ-1M	800	33.33	---	NA	800	28.57	800	20.00
	RZ-1N	800	30.77	---	NA	800	33.33	800	20.00
	RZ-1O	800	33.33	---	NA	800	33.33	800	25.00
	RZ-1P	800	29.63	---	NA	800	30.77	800	36.36
	RZ-1Q	800	29.63	---	NA	800	33.33	800	22.86
	RZ-1R	800	33.33	---	NA	800	32.00	800	22.86
	RZ-1S	--- ⁽¹³⁾	NA	---	NA	800	25.81	800	12.91
	RZ-1T	800	34.78	---	NA	800	22.86	800	21.62
	RZ-1U	800	26.66	---	NA	800	15.38	800	18.18

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Table 18. Carbon Source Solution Introduction Volumes for 2008, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	May		June		July		August	
		Injection Event #97 ⁽⁵⁾		Injection Event #98 ⁽⁶⁾		Injection Event #99 ⁽⁷⁾		Injection Event #100 ⁽⁸⁾	
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)
Reactive Zone 3	RZ-3A	1600	25.15	1600	27.43	1600	32.67	1600	32.00
	RZ-3B	1600	40.66	1600	30.86	1600	27.13	1600	35.05
	RZ-3C	1600	47.73	1600	28.12	1600	34.06	1600	26.24
	RZ-3D	1600	18.57	1600	30.68	1600	32.38	1600	28.91
	RZ-3E	1600	18.14	1600	27.72	1600	34.18	1600	31.48
	RZ-3F	1600	20.87	1600	25.39	1600	19.90	1600	30.72
	RZ-3G	1600	32.00	1600	27.62	1600	29.10	1600	24.12
	RZ-3H	1600	23.91	1600	19.55	1600	30.46	1600	22.42
	RZ-3I	1600	28.13	1600	27.89	1600	28.08	1600	8.64
	RZ-3J	1600	26.13	1600	27.19	1600	38.22	1600	18.33
	RZ-3K	1600	25.42	1600	35.57	1600	20.52	1600	27.13
	RZ-3L	1600	30.63	1600	26.79	1600	22.80	1600	27.89
	RZ-3M	1600	29.33	1600	24.28	1600	28.71	1600	23.03
	RZ-3N	1600	16.16	1600	21.88	1600	26.20	1600	22.64
	RZ-3O	1600	22.86	1600	32.00	1600	30.00	1600	27.32
	RZ-3P	1600	29.33	1600	21.03	1600	29.34	1600	27.00
	RZ-3Q	1600	26.66	1600	23.93	1600	25.00	1600	25.92
	RZ-3R	1600	29.33	1600	24.70	1600	30.81	1600	12.66
	RZ-3S	1600	27.62	1600	28.15	1600	19.25	1600	13.97
	RZ-3T	1600	18.65	1600	17.06	1600	19.87	1600	9.05
	RZ-3U	1600	20.27	1600	24.52	1600	8.60	1600	13.63
	RZ-3V	1600	20.61	1600	28.08	1600	11.94	1600	21.54
	RZ-3W	1600	17.85	1600	28.72	1600	29.79	1600	19.41
	RZ-3X	1600	34.18	1600	30.82	1600	21.84	1600	19.99
	RZ-3Y	1600	29.80	1600	32.21	1600	21.07	1600	21.59
	RZ-3Z	1600	36.44	1600	31.39	1600	21.47	1600	24.61
RZ-3AA	1600	18.00	1600	23.45	1600	18.70	1600	13.68	
RZ-3BB	1600	27.11	1600	18.37	1600	23.69	1600	20.81	

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Table 18. Carbon Source Solution Introduction Volumes for 2008, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	May		June		July		August	
		Injection Event #97 ⁽⁵⁾		Injection Event #98 ⁽⁶⁾		Injection Event #99 ⁽⁷⁾		Injection Event #100 ⁽⁸⁾	
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)
Reactive Zone 3	RZ-3CC	1600	20.26	1600	20.19	1600	15.68	1600	21.19
	RZ-3DD	1600	21.67	1600	17.77	1600	32.20	1600	17.25
	RZ-3FF	--- ⁽¹³⁾	NA	--- ⁽¹³⁾	NA	--- ⁽¹³⁾	NA	--- ⁽¹³⁾	NA
	RZ-3GG	--- ⁽¹³⁾	NA	1600	23.55	1600	25.10	1600	29.80
	RZ-3HH	1600	24.14	1600	27.15	1600	31.39	1600	21.48
	RZ-3II	1600	26.24	1600	30.82	1600	26.48	1600	31.51
	RZ-3JJ	1600	31.39	1600	31.19	1600	25.91	1600	32.67
	RZ-3KK	1600	33.57	1600	27.15	1600	34.85	1600	29.33
	RZ-3RR	1600	31.39	1600	26.24	1600	28.72	1600	21.01
	RZ-3SS	1600	14.13	1600	29.63	1600	19.12	1600	21.84
	RZ-3TT	--- ⁽¹³⁾	NA	1600	8.30	1600	9.30	1600	13.33
	RZ-3UU	1600	19.84	1600	25.41	1600	24.34	1600	19.16
RZ-3VV	1600	12.42	1600	24.61	1600	17.08	1600	16.41	
Reactive Zone 4	RZ-4A	3000	38.79	3000	36.88	3000	19.94	3000	15.04
	RZ-4B	3000	36.41	3000	37.50	3000	15.29	3000	20.83
	RZ-4C	3000	38.31	3000	31.07	3000	31.12	3000	29.87
	RZ-4D	3000	40.93	3000	42.07	3000	23.34	3000	16.61
	RZ-4E	3000	36.83	3000	37.17	3000	19.45	3000	20.60
	RZ-4F	3000	26.11	3000	28.04	3000	18.46	3000	9.36
	RZ-4G	3000	37.90	3000	37.90	3000	23.83	3000	13.97
	RZ-4H	3000	32.82	3000	24.37	3000	30.35	3000	20.47
Site-Wide Total		99,200		88,000		102,400		103,200	

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Table 18. Carbon Source Solution Introduction Volumes for 2008, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	September		October		November		December	
		Injection Event #101 ⁽⁹⁾		Injection Event #102 ⁽¹⁰⁾		Injection Event #103 ⁽¹¹⁾		Injection Event #104 ⁽¹²⁾	
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)
Reactive Zone 1	RZ-1C	800	38.09	1600	18.09	800	11.26	800	19.05
	RZ-1D	800	32.00	1600	22.58	800	21.05	800	21.05
	RZ-1E	800	33.33	1600	23.23	800	26.67	800	28.57
	RZ-1F	800	32.00	1600	21.19	800	22.22	800	23.53
	RZ-1G	800	28.57	1600	18.53	800	14.29	800	33.33
	RZ-1H	800	22.86	1600	17.79	800	20.00	800	13.79
	RZ-1I	800	29.63	1600	20.78	800	19.05	800	21.62
	RZ-1J	800	27.58	1600	19.90	800	18.60	800	16.33
	RZ-1K	800	28.57	1600	16.89	200 ⁽¹⁴⁾	8.33	--- ⁽¹³⁾	NA
	RZ-1L	800	38.09	1600	19.30	600 ⁽¹⁴⁾	24.00	800	14.81
	RZ-1M	800	32.00	800	18.60	800	14.04	800	19.51
	RZ-1N	800	27.58	---	NA	800	16.33	400 ⁽¹³⁾	12.50
	RZ-1O	800	32.00	800	24.24	800	19.05	400 ⁽¹⁴⁾	16.66
	RZ-1P	800	32.00	800	14.81	800	25.00	800	15.09
	RZ-1Q	800	32.00	800	19.51	800	20.51	800	32.00
	RZ-1R	800	26.66	800	29.63	800	16.00	800	27.59
	RZ-1S	800	38.09	800	22.86	50 ⁽¹³⁾	5.56	--- ⁽¹³⁾	NA
	RZ-1T	800	32.00	800	17.39	800	22.85	800	18.60
	RZ-1U	800	34.78	800	34.78	800	17.78	--- ⁽¹³⁾	NA

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Table 18. Carbon Source Solution Introduction Volumes for 2008, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	September		October		November		December	
		Injection Event #101 ⁽⁹⁾		Injection Event #102 ⁽¹⁰⁾		Injection Event #103 ⁽¹¹⁾		Injection Event #104 ⁽¹²⁾	
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)
Reactive Zone 3	RZ-3A	1600	30.00	1600	25.84	1600	20.96	1600	28.09
	RZ-3B	1600	28.82	1600	21.50	1600	14.72	1600	35.57
	RZ-3C	1600	28.12	1600	26.00	1600	38.35	1600	15.91
	RZ-3D	1600	34.06	1600	28.82	1600	19.90	1600	20.46
	RZ-3E	1600	28.82	1600	25.46	1600	23.59	1600	25.09
	RZ-3F	1600	35.57	1600	27.77	1600	30.29	1600	15.38
	RZ-3G	1600	34.06	1600	32.67	1600	20.74	1600	28.82
	RZ-3H	1600	32.00	1600	21.23	1600	22.54	1600	24.02
	RZ-3I	1600	35.05	1600	24.61	1600	19.45	1600	24.27
	RZ-3J	1600	24.76	1600	24.89	1600	21.07	1600	28.57
	RZ-3K	1600	16.42	1600	32.00	1600	19.05	1600	20.52
	RZ-3L	1600	35.57	1600	22.24	1600	23.20	1600	15.78
	RZ-3M	1600	32.77	1600	26.69	1600	22.45	1600	31.16
	RZ-3N	1600	31.68	1600	22.43	1600	20.64	1600	14.97
	RZ-3O	1600	36.36	1600	19.75	1600	22.88	1600	24.34
	RZ-3P	1600	25.10	1600	29.33	1600	31.98	1600	13.78
	RZ-3Q	1600	29.50	1600	19.55	1600	28.43	1600	16.78
	RZ-3R	1600	32.00	1600	21.88	1600	30.95	1600	17.02
	RZ-3S	1600	27.62	1600	30.29	1600	15.55	1600	17.50
	RZ-3T	1600	32.50	1600	26.28	1600	24.57	1600	22.00
	RZ-3U	1600	21.41	1600	20.95	1600	16.00	1600	43.53
	RZ-3V	1600	23.12	1600	24.76	1600	32.05	1600	42.11
	RZ-3W	1600	20.05	1600	21.11	1600	23.34	1600	44.59
	RZ-3X	1600	30.82	1600	27.19	1600	32.50	1600	47.72
	RZ-3Y	1600	16.16	1600	24.02	1600	26.59	1600	31.78
	RZ-3Z	1600	14.13	1600	25.72	1600	25.00	1600	44.44
	RZ-3AA	1600	13.40	1600	16.86	1600	31.48	1600	48.53
RZ-3BB	1600	32.21	1600	18.12	1600	11.51	1600	47.06	

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Table 18. Carbon Source Solution Introduction Volumes for 2008, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	September		October		November		December	
		Injection Event #101 ⁽⁹⁾		Injection Event #102 ⁽¹⁰⁾		Injection Event #103 ⁽¹¹⁾		Injection Event #104 ⁽¹²⁾	
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)
Reactive Zone 3	RZ-3CC	1600	18.78	1600	14.29	1600	27.62	---	NA
	RZ-3DD	1600	9.20	1600	19.81	1600	23.14	---	NA
	RZ-3FF	--- ⁽¹³⁾	NA	--- ⁽¹³⁾	NA	--- ⁽¹³⁾	NA	--- ⁽¹³⁾	NA
	RZ-3GG	1600	30.29	1600	25.09	1600	21.07	1600	34.85
	RZ-3HH	1600	28.10	1600	26.30	1600	22.54	1600	30.20
	RZ-3II	1600	30.29	1600	32.78	1600	22.88	1600	42.39
	RZ-3JJ	1600	32.05	1600	18.09	1600	20.81	1600	32.67
	RZ-3KK	1600	28.10	1600	19.80	1600	27.62	1600	32.00
	RZ-3RR	--- ⁽¹⁴⁾	NA	1600	17.85	1600	29.34	1600	26.30
	RZ-3SS	--- ⁽¹⁴⁾	NA	1600	14.74	1600	18.39	1600	18.17
	RZ-3TT	1600	30.29	800 ⁽¹⁴⁾	5.03	1600	20.81	1600	14.06
	RZ-3UU	--- ⁽¹⁴⁾	NA	1600	22.89	1600	26.70	1600	36.00
	RZ-3VV	--- ⁽¹⁴⁾	NA	1600	10.13	1600	24.67	1600	22.02
Reactive Zone 4	RZ-4A	3000	13.93	3000	17.31	3000	32.58	3000	41.11
	RZ-4B	3000	28.80	3000	26.69	3000	14.49	3000	37.37
	RZ-4C	3000	36.22	3000	17.74	3000	20.21	3000	30.52
	RZ-4D	3000	30.24	3000	28.95	3000	30.32	3000	40.45
	RZ-4E	3000	27.88	3000	18.73	3000	24.92	3000	37.66
	RZ-4F	3000	22.30	3000	18.39	3000	21.37	3000	35.65
	RZ-4G	3000	24.01	3000	24.13	3000	29.60	3000	37.68
	RZ-4H	3000	19.84	3000	29.00	3000	27.76	3000	44.69
Site-Wide Total		96,800		109,600		101,650		96,800	

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Table 18. Carbon Source Solution Introduction Volumes for 2008, General Motors Corporation, Moraine, Ohio.

Notes:

From January 2008 through August 2008 Carbon source introduced into each well was a 20:1 solution (potable water to molasses) for RZ-1C through RZ-3KK, 33:1 for RZ-3RR through RZ-3VV, and 50:1 solution for RZ-4.

From September 2008 through December 2008 Carbon source introduced into each well was a 20:1 solution (potable water to molasses) for RZ-1 and 50:1 for RZ-3 and RZ-4.

NA Not Applicable

-- Introduction well was not selected for introduction during this event.

- (1) Injection Event #93 was completed January 2nd through 4th, 7th through 10th, 14th through 18th, and the 21st.
- (2) Injection Event #94 was completed February 5th, 11th through 14th, 19th through 21st, and 25th through 28th, 2008.
- (3) Injection Event #95 was completed March 3rd through 6th, 11th through 13th, 17th through 20th, and 24th through 27th, 2008.
- (4) Injection Event #96 was completed April 2nd, 7th through 10th, 14th through 17th, 21st through 23rd, and 28th through 30th, 2008.
- (5) Injection Event #97 was completed May 15th and 16th, 19th through 23rd, 27th through 29th, and June 2nd through 4th, 2008.
- (6) Injection Event #98 was completed June 2nd through 5th, 10th through 12th, 19th, 20th, and 23rd through 25th, 2008.
- (7) Injection Event #99 was completed July 1st through 3rd, 10th and 11th, 14th through 17th, 21st through 24th, and 28th through 31st, 2008.
- (8) Injection Event #100 was completed August 4th through 7th, 11th through 14th, 18th through 21st, and 25th through 28th, 2008.
- (9) Injection Event #101 was completed September 2nd through 4th, 8th through 11th, 15th through 18th, and 22nd through 25th, 2008.
- (10) Injection Event #102 was completed October 6th through 9th, 13th through 17th, 20th through 24th, and 27th through 31st, 2008.
- (11) Injection Event #103 was completed November 3rd through 7th, 10th through 14th, 17th through 20th, and 24th through 26th, 2008.
- (12) Injection Event #104 was completed December 1st through 3rd, 8th through 11th, 15th through 19th, and 23rd and 24th, and 29th, and 30th, 2008.
- (13) Introduction not completed or introduction volume reduced due to accessibility.
- (14) Introduction not completed or introduction volume reduced because well would not accept solution and/or due to high pressure.
- (15) Indicates flow rate for pressurized injections only. A portion of this well was gravity fed and rate is not included in rate calculation.

**Table 19: Corrective Action Monitoring Results for Comparison to Remediation Target Levels (RTLs)
General Motors Corporation - Moraine, Ohio**

Aquifer	Remediation Zone	Chemical	2008			2007			1999			RTL ¹ (mg/L)	Ratio: Min 2008 Value to RTL	Ratio: Mean 2008 Value to RTL	Ratio: Max 2008 Value to RTL	Ratio: Min 2007 Value to RTL	Ratio: Mean 2007 Value to RTL	Ratio: Max 2007 Value to RTL	Ratio: Min 1999 Value to RTL	Ratio: Mean 1999 Value to RTL	Ratio: Max 1999 Value to RTL		
			Num of Analyses	Num of Detects	Min Value (mg/l)	Mean Value (mg/L)	Max Value (mg/l)	Min Value (mg/l)	Mean Value (mg/L)	Max Value (mg/l)	Min Value (mg/l)											Mean Value (mg/L)	Max Value (mg/l)
Shallow	AOI 7 Shallow	1,1-Dichloroethene	6		9.5E-04	3.6E-03	6.0E-03	1.8E-03	6.9E-03	1.9E-02	1.3E-03	6.5E-01	5.1E+00	7.0E-01	1.4E-03	5.1E-03	8.6E-03	2.5E-03	9.9E-03	2.7E-02	1.9E-03	9.3E-01	7.2E+00
Shallow	AOI 7 Shallow	cis-1,2-Dichloroethene	6	5	8.5E-04	1.0E+00	2.0E+00	1.6E-03	1.6E+00	4.7E+00	2.5E-03	5.2E+00	9.7E+00	7.0E+00	1.2E-04	1.5E-01	2.9E-01	2.2E-04	2.3E-01	6.7E-01	3.6E-04	7.4E-01	1.4E+00
Shallow	AOI 7 Shallow	Tetrachloroethene	6	5	1.5E-03	2.2E-02	7.1E-02	2.7E-03	6.6E-02	2.8E-01	9.5E-03	4.0E+00	7.1E+00	5.0E-01	2.9E-03	4.5E-02	1.4E-01	5.3E-03	1.3E-01	5.6E-01	1.9E-02	8.0E+00	1.4E+01
Shallow	AOI 7 Shallow	Trichloroethene	6	4	8.5E-04	2.1E-01	3.6E-01	1.6E-03	2.1E-01	3.5E-01	2.5E-03	1.4E+00	5.1E+00	5.0E-01	1.7E-03	4.3E-01	7.2E-01	3.1E-03	4.3E-01	7.0E-01	5.0E-03	2.8E+00	1.0E+01
Shallow	AOI 7 Shallow	Vinyl Chloride	6	5	1.1E-03	4.7E-01	2.1E+00	2.0E-03	6.9E-01	2.6E+00	1.0E-03	1.5E+00	2.6E+00	2.0E-01	5.5E-03	2.4E+00	1.1E+01	1.0E-02	3.4E+00	1.3E+01	5.0E-03	7.4E+00	1.3E+01
Shallow	Zone S1	1,1-Dichloroethene	4		9.5E-05	1.9E-04	4.8E-04	9.0E-05	9.3E-05	9.5E-05	5.0E-04	5.0E-04	5.0E-04	6.3E-01	1.5E-04	3.0E-04	7.5E-04	1.4E-04	1.5E-04	1.5E-04	7.9E-04	7.9E-04	7.9E-04
Shallow	Zone S1	cis-1,2-Dichloroethene	4	4	5.5E-03	1.4E-02	3.3E-02	7.4E-04	1.1E-02	3.0E-02	1.8E-01	1.8E-01	1.8E-01	6.3E+00	8.7E-04	2.2E-03	5.2E-03	1.2E-04	1.8E-03	4.8E-03	2.8E-02	2.8E-02	2.8E-02
Shallow	Zone S1	Tetrachloroethene	4		1.5E-04	2.8E-04	7.0E-04	9.5E-05	1.3E-04	1.5E-04	3.2E-01	3.2E-01	3.2E-01	4.5E-01	3.2E-04	6.3E-04	1.6E-03	2.1E-04	2.9E-04	3.2E-04	7.0E-01	7.0E-01	7.0E-01
Shallow	Zone S1	Trichloroethene	4	3	4.3E-04	8.3E-04	1.9E-03	5.4E-04	6.3E-04	7.8E-04	7.7E-01	7.7E-01	7.7E-01	4.5E-01	9.4E-04	1.9E-03	4.2E-03	1.2E-03	1.4E-03	1.7E-03	1.7E+00	1.7E+00	1.7E+00
Shallow	Zone S1	Vinyl Chloride	4	4	3.7E-03	1.0E-02	2.2E-02	1.1E-03	8.6E-03	2.2E-02	3.2E-03	3.2E-03	3.2E-03	1.8E-01	2.1E-02	5.7E-02	1.2E-01	1.6E-03	4.8E-02	1.2E-01	1.8E-02	1.8E-02	1.8E-02
Shallow	Zone S1 to S2	1,1-Dichloroethene	5		9.5E-05	1.7E-04	4.8E-04	9.0E-05	9.4E-05	9.5E-05	5.0E-04	5.0E-04	5.0E-04	1.3E-01	7.1E-04	1.3E-03	3.6E-03	6.8E-04	7.0E-04	7.1E-04	3.8E-03	3.8E-03	3.8E-03
Shallow	Zone S1 to S2	cis-1,2-Dichloroethene	5	5	5.2E-03	1.2E-02	3.3E-02	7.4E-04	1.1E-02	3.0E-02	1.8E-01	2.2E-01	2.6E-01	1.3E+00	3.9E-03	9.1E-03	2.5E-02	5.6E-04	8.1E-03	2.3E-02	1.3E-01	1.6E-01	1.9E-01
Shallow	Zone S1 to S2	Tetrachloroethene	5	1	1.5E-04	1.8E-03	7.7E-03	9.5E-05	1.2E-03	4.5E-03	2.1E-01	2.6E-01	3.2E-01	9.5E-02	1.5E-03	1.9E-02	8.1E-02	1.0E-03	1.3E-02	4.7E-02	2.2E+00	2.8E+00	3.3E+00
Shallow	Zone S1 to S2	Trichloroethene	5	4	4.3E-04	2.5E-03	9.0E-03	5.4E-04	3.5E-03	1.2E-02	4.7E-01	6.2E-01	7.7E-01	9.5E-02	4.5E-03	2.6E-02	9.5E-02	5.6E-03	3.7E-02	1.3E-01	5.0E+00	6.5E+00	8.1E+00
Shallow	Zone S1 to S2	Vinyl Chloride	5	5	1.7E-03	8.6E-03	2.2E-02	1.1E-03	7.6E-03	2.2E-02	5.0E-04	1.9E-03	3.2E-03	3.8E-02	4.5E-02	2.3E-01	5.8E-01	2.9E-02	2.0E-01	5.8E-01	1.3E-02	4.9E-02	8.4E-02
Shallow	Zone S2	1,1-Dichloroethene	3		9.5E-05	1.4E-04	2.4E-04	9.5E-05	1.7E-04	3.2E-04	5.0E-04	1.0E-03	2.5E-03	7.0E-02	1.4E-03	2.0E-03	3.4E-03	1.4E-03	2.4E-03	4.5E-03	7.1E-03	1.4E-02	3.6E-02
Shallow	Zone S2	cis-1,2-Dichloroethene	3	3	1.4E-03	2.8E-02	7.9E-02	1.2E-03	3.7E-02	1.0E-01	2.5E-03	6.8E-02	2.6E-01	7.0E-01	2.0E-03	4.1E-02	1.1E-01	1.7E-03	5.3E-02	1.4E-01	3.6E-03	9.7E-02	3.6E-01
Shallow	Zone S2	Tetrachloroethene	3	2	3.6E-04	5.4E-03	8.1E-03	4.9E-04	3.4E-03	5.2E-03	1.3E-03	6.9E-02	2.1E-01	5.0E-02	7.2E-03	1.1E-01	1.6E-01	9.7E-03	6.8E-02	1.0E-01	2.6E-02	1.4E+00	4.3E+00
Shallow	Zone S2	Trichloroethene	3	3	4.9E-03	3.2E-02	8.1E-02	3.6E-03	3.5E-02	9.0E-02	2.5E-03	1.4E-01	4.7E-01	5.0E-02	9.8E-02	6.3E-01	1.6E+00	7.2E-02	7.0E-01	1.8E+00	5.0E-02	2.7E+00	9.5E+00
Shallow	Zone S2	Vinyl Chloride	3	3	7.0E-04	1.1E-03	1.7E-03	8.2E-04	2.1E-03	4.5E-03	5.0E-04	6.3E-04	1.0E-03	2.0E-02	3.5E-02	5.4E-02	8.5E-02	4.1E-02	1.1E-01	2.3E-01	2.5E-02	3.1E-02	5.0E-02
Shallow	Zone S2 to S3	1,1-Dichloroethene	8	2	9.5E-05	2.9E-04	9.5E-04	9.5E-05	3.0E-04	9.5E-04	5.0E-04	7.9E-04	2.5E-03	6.3E-02	1.5E-03	4.7E-03	1.5E-02	1.5E-03	4.8E-03	1.5E-02	7.9E-03	1.2E-02	4.0E-02
Shallow	Zone S2 to S3	cis-1,2-Dichloroethene	8	7	8.5E-05	2.4E-02	9.2E-02	2.4E-04	3.3E-02	1.4E-01	5.0E-04	4.1E-02	2.6E-01	6.3E-01	1.3E-04	3.8E-02	1.5E-01	3.8E-04	5.3E-02	2.2E-01	7.9E-04	6.5E-02	4.0E-01
Shallow	Zone S2 to S3	Tetrachloroethene	8	7	3.6E-04	1.8E-02	3.9E-02	4.9E-04	1.4E-02	3.2E-02	1.3E-03	5.3E-02	2.1E-01	4.5E-02	8.0E-03	4.1E-01	8.7E-01	1.1E-02	3.2E-01	7.1E-01	2.9E-02	1.2E+00	4.7E+00
Shallow	Zone S2 to S3	Trichloroethene	8	8	4.9E-03	3.2E-02	8.8E-02	3.3E-03	3.7E-02	1.1E-01	2.5E-03	8.9E-02	4.7E-01	4.5E-02	1.1E-01	7.2E-01	2.0E+00	7.3E-02	8.2E-01	2.4E+00	5.6E-02	2.0E+00	1.1E+01
Shallow	Zone S2 to S3	Vinyl Chloride	8	4	1.1E-04	1.5E-03	7.9E-03	1.1E-04	2.4E-03	1.2E-02	5.0E-04	5.7E-04	1.0E-03	1.8E-02	6.1E-03	8.1E-02	4.4E-01	6.1E-03	1.3E-01	6.7E-01	2.8E-02	3.2E-02	5.6E-02
Shallow	Zone S3	1,1-Dichloroethene	16	1	9.5E-05	4.8E-04	1.9E-03	9.0E-05	5.7E-04	2.4E-03	5.0E-04	2.3E-03	3.9E-03	4.9E-02	1.9E-03	9.8E-03	3.9E-02	1.8E-03	1.2E-02	4.9E-02	1.0E-02	4.7E-02	8.0E-02
Shallow	Zone S3	cis-1,2-Dichloroethene	16	13	3.9E-04	1.5E-02	4.4E-02	4.3E-04	1.0E-01	5.3E-01	2.6E-03	4.4E-02	6.6E-02	4.9E-01	8.0E-04	3.0E-02	9.0E-02	8.7E-04	2.1E-01	1.1E+00	5.3E-03	9.1E-02	1.4E-01
Shallow	Zone S3	Tetrachloroethene	16	9	1.5E-04	4.0E-02	1.7E-01	9.5E-05	4.0E-02	1.3E-01	5.0E-04	1.4E-03	2.5E-03	3.5E-02	4.1E-03	1.1E+00	4.7E+00	2.7E-03	1.2E+00	3.7E+00	1.4E-02	4.0E-02	7.1E-02
Shallow	Zone S3	Trichloroethene	16	12	8.5E-05	3.2E-02	1.3E-01	4.3E-04	3.6E-02	1.2E-01	3.2E-03	1.6E-01	4.6E-01	3.5E-02	2.4E-03	9.1E-01	3.7E+00	1.2E-02	1.0E+00	3.4E+00	9.1E-02	4.6E+00	1.3E+01
Shallow	Zone S3	Vinyl Chloride	16	9	3.7E-04	5.9E-03	2.5E-02	2.1E-04	1.0E-02	5.3E-02	5.0E-04	1.5E-03	3.0E-03	1.4E-02	2.6E-02	4.2E-01	1.8E+00	1.5E-02	7.2E-01	3.8E+00	3.6E-02	1.1E-01	2.1E-01
Shallow	Zone S3 to GM-10/GM-52	1,1-Dichloroethene	28	1	9.5E-05	3.4E-04	1.9E-03	9.0E-05	4.1E-04	2.4E-03	5.0E-04	1.3E-03	3.9E-03	3.5E-02	2.7E-03	9.8E-03	5.4E-02	2.6E-03	1.2E-02	6.9E-02	1.4E-02	3.6E-02	1.1E-01
Shallow	Zone S3 to GM-10/GM-52	cis-1,2-Dichloroethene	28	23	8.5E-05	1.6E-02	1.6E-01	8.5E-05	7.0E-02	5.3E-01	5.0E-04	2.8E-02	6.6E-02	3.5E-01	2.4E-04	4.7E-02	4.6E-01	2.4E-04	2.0E-01	1.5E+00	1.4E-03	8.0E-02	1.9E-01
Shallow	Zone S3 to GM-10/GM-52	Tetrachloroethene	28	16	1.5E-04	3.3E-02	1.7E-01	9.5E-05	3.3E-02	1.3E-01	5.0E-04	1.7E-02	8.1E-02	2.5E-02	5.8E-03	1.3E+00	6.6E+00	3.8E-03	1.3E+00	5.2E+00	2.0E-02	6.7E-01	3.3E+00
Shallow	Zone S3 to GM-10/GM-52	Trichloroethene	28	19	8.5E-05	2.5E-02	1.3E-01	8.5E-05	2.8E-02	1.2E-01	5.0E-04	8.4E-02	4.6E-01	2.5E-02	3.4E-03	1.0E+00	5.2E+00	3.4E-03	1.1E+00	4.8E+00	2.0E-02	3.3E+00	1.8E+01
Shallow	Zone S3 to GM-10/GM-52	Vinyl Chloride	28	15	1.1E-04	3.7E-03	2.5E-02	1.1E-04	5.9E-03	5.3E-02	5.0E-04	1.8E-03	8.4E-03	1.0E-02	1.1E-02	3.7E-01	2.5E+00	1.1E-02	5.9E-01	5.3E+00	5.0E-02	1.8E-01	8.4E-01
Shallow	GM-10/GM-52	1,1-Dichloroethene	2		9.5E-05	1.7E-04	2.4E-04	9.5E-05	1.7E-04	2.4E-04	5.0E-04	5.0E-04	5.0E-04	2.8E-02	3.4E-03	6.0E-03	8.6E-03	3.4E-03	6.0E-03	8.6E-03	1.8E-02	1.8E-02	1.8E-02
Shallow	GM-10/GM-52	cis-1,2-Dichloroethene	2	1	8.5E-05	7.0E-03	1.4E-02	3.5E-04	9.2E-03	1.8E-02	5.0E-04	5.0E-04	5.0E-04	2.8E-01	3.0E-04	2.5E-02	5.0E-02	1.2E-03	3.3E-02	6.4E-02	1.8E-03	1.8E-03	1.8E-03
Shallow	GM-10/GM-52	Tetrachloroethene	2	2	8.5E-04	4.4E-02	8.8E-02	9.7E-04	4.4E-02	8.8E-02	5.0E-04	5.0E-04	5.0E-04	2.0E-02	4.3E-02	2.2E+00	4.4E+00	4.8E-02	2.2E+00	4.4E+00	2.5E-02	2.5E-02	2.5E-02
Shallow	GM-10/GM-52	Trichloroethene	2	2	5.9E-03	2.4E-02	4.3E-02	8.6E-03	2.8E-02	4.7E-02	1.4E-02	1.4E-02	1.4E-02	2.0E-02	3.0E-01	1.2E+00	2.2E+00	4.3E-01	1.4E+00	2.4E+00	7.2E-01	7.2E-01	7.2E-01
Shallow	GM-10/GM-52	Vinyl Chloride	2	</																			

**Table 19: Corrective Action Monitoring Results for Comparison to Remediation Target Levels (RTLs)
General Motors Corporation - Moraine, Ohio**

Aquifer	Remediation Zone	Chemical	2008			2007			1999			RTL ¹ (mg/L)	Ratio: Min 2008 Value to RTL	Ratio: Mean 2008 Value to RTL	Ratio: Max 2008 Value to RTL	Ratio: Min 2007 Value to RTL	Ratio: Mean 2007 Value to RTL	Ratio: Max 2007 Value to RTL	Ratio: Min 1999 Value to RTL	Ratio: Mean 1999 Value to RTL	Ratio: Max 1999 Value to RTL		
			Num of Analyses	Num of Detects	Min Value (mg/l)	Mean Value (mg/L)	Max Value (mg/l)	Min Value (mg/l)	Mean Value (mg/L)	Max Value (mg/l)	Min Value (mg/l)											Mean Value (mg/L)	Max Value (mg/l)
Deep	AOI 7 Deep	1,1-Dichloroethene	6		9.5E-04	3.6E-03	6.0E-03	1.8E-03	6.9E-03	1.9E-02	1.3E-03	6.5E-01	5.1E+00	2.3E-01	4.1E-03	1.5E-02	2.6E-02	7.5E-03	3.0E-02	8.1E-02	5.6E-03	2.8E+00	2.2E+01
Deep	AOI 7 Deep	cis-1,2-Dichloroethene	6	5	8.5E-04	1.0E+00	2.0E+00	1.6E-03	1.6E+00	4.7E+00	2.5E-03	5.2E+00	9.7E+00	2.3E+00	3.6E-04	4.4E-01	8.6E-01	6.6E-04	7.0E-01	2.0E+00	1.1E-03	2.2E+00	4.2E+00
Deep	AOI 7 Deep	Tetrachloroethene	6	5	1.5E-03	2.2E-02	7.1E-02	2.7E-03	6.6E-02	2.8E-01	9.5E-03	4.0E+00	7.1E+00	1.7E-01	8.7E-03	1.3E-01	4.3E-01	1.6E-02	4.0E-01	1.7E+00	5.7E-02	2.4E+01	4.3E+01
Deep	AOI 7 Deep	Trichloroethene	6	4	8.5E-04	2.1E-01	3.6E-01	1.6E-03	2.1E-01	3.5E-01	2.5E-03	1.4E+00	5.1E+00	1.7E-01	5.1E-03	1.3E+00	2.2E+00	9.3E-03	1.3E+00	2.1E+00	1.5E-02	8.4E+00	3.0E+01
Deep	AOI 7 Deep	Vinyl Chloride	6	5	1.1E-03	4.7E-01	2.1E+00	2.0E-03	6.9E-01	2.6E+00	1.0E-03	1.5E+00	2.6E+00	6.7E-02	1.7E-02	7.1E+00	3.2E+01	3.0E-02	1.0E+01	3.9E+01	1.5E-02	2.2E+01	3.9E+01
Deep	GM-40/41/54	1,1-Dichloroethene	3		9.5E-05	4.5E-04	7.0E-04	9.5E-05	4.5E-04	6.5E-04				6.1E-02	1.6E-03	7.4E-03	1.2E-02	1.6E-03	7.5E-03	1.1E-02			
Deep	GM-40/41/54	cis-1,2-Dichloroethene	3	1	8.5E-05	3.9E-03	1.1E-02	8.5E-05	6.6E-03	1.7E-02				6.1E-01	1.4E-04	6.4E-03	1.8E-02	1.4E-04	1.1E-02	2.8E-02			
Deep	GM-40/41/54	Tetrachloroethene	3	1	1.5E-04	6.4E-02	1.9E-01	1.5E-04	6.2E-02	1.6E-01				4.3E-02	3.3E-03	1.5E+00	4.4E+00	3.3E-03	1.4E+00	3.7E+00			
Deep	GM-40/41/54	Trichloroethene	3	2	8.5E-05	6.1E-02	1.8E-01	8.5E-05	8.1E-02	2.3E-01				4.3E-02	2.0E-03	1.4E+00	4.2E+00	2.0E-03	1.9E+00	5.3E+00			
Deep	GM-40/41/54	Vinyl Chloride	3	1	6.5E-04	1.7E-03	3.6E-03	5.0E-04	1.9E-03	4.0E-03				1.7E-02	3.8E-02	9.7E-02	2.1E-01	2.9E-02	1.1E-01	2.3E-01			
Deep	GM-42	1,1-Dichloroethene	1	1	5.3E-04	5.3E-04	5.3E-04	1.5E-04	1.5E-04	1.5E-04				3.3E-02	1.6E-02	1.6E-02	1.6E-02	4.5E-03	4.5E-03	4.5E-03			
Deep	GM-42	cis-1,2-Dichloroethene	1	1	2.0E-02	2.0E-02	2.0E-02	1.8E-02	1.8E-02	1.8E-02				3.3E-01	6.1E-02	6.1E-02	6.1E-02	5.4E-02	5.4E-02	5.4E-02			
Deep	GM-42	Tetrachloroethene	1		1.5E-04	1.5E-04	1.5E-04	1.5E-04	1.5E-04	1.5E-04				2.3E-02	6.2E-03	6.2E-03	6.2E-03	6.2E-03	6.2E-03	6.2E-03			
Deep	GM-42	Trichloroethene	1	1	9.9E-03	9.9E-03	9.9E-03	2.2E-03	2.2E-03	2.2E-03				2.3E-02	4.2E-01	4.2E-01	4.2E-01	9.2E-02	9.2E-02	9.2E-02			
Deep	GM-42	Vinyl Chloride	1	1	3.1E-04	3.1E-04	3.1E-04	4.7E-04	4.7E-04	4.7E-04				9.3E-03	3.3E-02	3.3E-02	3.3E-02	5.0E-02	5.0E-02	5.0E-02			
Deep	Zone D1	1,1-Dichloroethene	1		9.5E-05	9.5E-05	9.5E-05	9.5E-05	9.5E-05	9.5E-05	5.0E-04	5.0E-04	5.0E-04	7.0E-03	1.4E-02	1.4E-02	1.4E-02	1.4E-02	1.4E-02	1.4E-02	7.1E-02	7.1E-02	7.1E-02
Deep	Zone D1	cis-1,2-Dichloroethene	1	1	2.4E-03	2.4E-03	2.4E-03	1.4E-03	1.4E-03	1.4E-03	1.2E-03	1.2E-03	1.2E-03	7.0E-02	3.4E-02	3.4E-02	3.4E-02	2.0E-02	2.0E-02	2.0E-02	1.7E-02	1.7E-02	1.7E-02
Deep	Zone D1	Tetrachloroethene	1		1.5E-04	1.5E-04	1.5E-04	1.5E-04	1.5E-04	1.5E-04	5.0E-04	5.0E-04	5.0E-04	5.0E-03	2.9E-02	2.9E-02	2.9E-02	2.9E-02	2.9E-02	2.9E-02	1.0E-01	1.0E-01	1.0E-01
Deep	Zone D1	Trichloroethene	1		8.5E-05	8.5E-05	8.5E-05	3.2E-03	3.2E-03	3.2E-03	1.4E-02	1.4E-02	1.4E-02	5.0E-03	1.7E-02	1.7E-02	1.7E-02	6.4E-01	6.4E-01	6.4E-01	2.7E+00	2.7E+00	2.7E+00
Deep	Zone D1	Vinyl Chloride	1	1	9.8E-03	9.8E-03	9.8E-03	1.6E-02	1.6E-02	1.6E-02	1.5E-03	1.5E-03	1.5E-03	2.0E-03	4.9E+00	4.9E+00	4.9E+00	8.0E+00	8.0E+00	8.0E+00	7.5E-01	7.5E-01	7.5E-01
Deep	Zone D2	1,1-Dichloroethene	2		9.5E-05	9.5E-05	9.5E-05	9.5E-05	9.5E-05	9.5E-05	5.0E-04	5.0E-04	5.0E-04	1.3E-02	7.4E-03	7.4E-03	7.4E-03	7.4E-03	7.4E-03	7.4E-03	3.9E-02	3.9E-02	3.9E-02
Deep	Zone D2	cis-1,2-Dichloroethene	2		8.5E-05	8.5E-05	8.5E-05	8.5E-05	1.9E-03	3.8E-03	5.0E-04	8.0E-04	1.1E-03	1.3E-01	6.6E-04	6.6E-04	6.6E-04	6.6E-04	1.5E-02	3.0E-02	3.9E-03	6.2E-03	8.6E-03
Deep	Zone D2	Tetrachloroethene	2	2	1.1E-03	1.4E-03	1.8E-03	1.8E-03	1.9E-03	1.9E-03	1.2E-03	1.6E-03	2.0E-03	9.2E-03	1.2E-01	1.6E-01	2.0E-01	2.0E-01	2.0E-01	2.1E-01	1.3E-01	1.7E-01	2.2E-01
Deep	Zone D2	Trichloroethene	2	2	6.5E-03	1.9E-02	3.1E-02	1.4E-02	2.3E-02	3.2E-02	7.5E-03	1.9E-02	3.1E-02	9.2E-03	7.1E-01	2.0E+00	3.4E+00	1.5E+00	2.5E+00	3.5E+00	8.2E-01	2.1E+00	3.3E+00
Deep	Zone D2	Vinyl Chloride	2		1.1E-04	1.1E-04	1.1E-04	1.1E-04	1.1E-04	1.1E-04	5.0E-04	5.0E-04	5.0E-04	3.7E-03	3.0E-02	3.0E-02	3.0E-02	3.0E-02	3.0E-02	3.0E-02	1.4E-01	1.4E-01	1.4E-01
Deep	POC Deep	1,1-Dichloroethene	3		9.5E-05	9.5E-05	9.5E-05	9.5E-05	9.5E-05	9.5E-05	5.0E-04	5.0E-04	5.0E-04	7.0E-03	1.4E-02	1.4E-02	1.4E-02	1.4E-02	1.4E-02	1.4E-02	7.1E-02	7.1E-02	7.1E-02
Deep	POC Deep	cis-1,2-Dichloroethene	3	1	8.5E-05	3.2E-04	7.9E-04	8.5E-05	4.2E-04	1.1E-03	5.0E-04	1.8E-03	4.3E-03	7.0E-02	1.2E-03	4.6E-03	1.1E-02	1.2E-03	6.0E-03	1.6E-02	7.1E-03	2.5E-02	6.1E-02
Deep	POC Deep	Tetrachloroethene	3	2	1.5E-04	1.5E-03	2.6E-03	1.5E-04	1.2E-03	2.1E-03	5.0E-04	8.3E-04	1.5E-03	5.0E-03	2.9E-02	3.0E-01	5.2E-01	2.9E-02	2.5E-01	4.2E-01	1.0E-01	1.7E-01	3.0E-01
Deep	POC Deep	Trichloroethene	3	3	6.2E-03	1.5E-02	3.1E-02	5.1E-03	1.6E-02	3.5E-02	5.0E-04	6.4E-03	1.5E-02	5.0E-03	1.2E+00	2.9E+00	6.2E+00	1.0E+00	3.3E+00	7.0E+00	1.0E-01	1.3E+00	2.9E+00
Deep	POC Deep	Vinyl Chloride	3		1.1E-04	1.1E-04	1.1E-04	1.1E-04	1.1E-04	1.1E-04	5.0E-04	5.0E-04	5.0E-04	2.0E-03	5.5E-02	5.5E-02	5.5E-02	5.5E-02	5.5E-02	5.5E-02	2.5E-01	2.5E-01	2.5E-01

NOTES
1. RTL reflect groundwater modeling conducted in 2008 to reflect current pumping conditions without interim measures pumping (see CMP, ARCADIS 2008a)

Table 20: In-Place Waste Mangement Unit Assessment
Summary of Downgradient Groundwater Concentrations (mg/L) for Current Groundwater Use¹
GM Moraine, Moraine, Ohio

TCL/TAL Group	Constituent	CASRN	West Carrollton	Criteria	Flag
VOC	1,1,1-Trichloroethane	71-55-6	0.0001	0.2	
VOC	1,1-Dichloroethane	75-34-3	0.0002	3.65	
VOC	1,1-Dichloroethene	75-35-4	0.	0.007	
VOC	1,2-Dichloroethene (total)	540-59-0	0.	0.07	
VOC	2-Butanone	78-93-3	0.0001	21.9	
VOC	Acetone	67-64-1	0.	32.85	
VOC	Benzene	71-43-2	0.	0.005	
VOC	Carbon Disulfide	75-15-0	0.	3.65	
VOC	Chlorobenzene	108-90-7	0.	0.1	
VOC	Chloroethane	75-00-3	0.	14.6	
VOC	Chloroform	67-66-3	0.	0.08	
VOC	cis-1,2-Dichloroethene	156-59-2	0.003	0.07	
VOC	Ethyl Benzene	100-41-4	0.	0.7	
VOC	Styrene	100-42-5	0.	0.1	
VOC	Tetrachloroethene	127-18-4	0.0002	0.005	
VOC	Toluene	108-88-3	0.	1.	
VOC	trans-1,2-Dichloroethene	156-60-5	0.0001	0.1	
VOC	Trichloroethene	79-01-6	0.0007	0.005	
VOC	Trichlorofluoromethane	75-69-4	0.0001	10.95	
VOC	Vinyl Chloride	75-01-4	0.0002	0.002	
VOC	Xylenes (total)	1330-20-7	0.	10.	
SVOC	1,2-Dichlorobenzene	95-50-1	0.	0.6	
SVOC	2-Methylnaphthalene	91-57-6	0.	0.73	
SVOC	Benzo(a)anthracene	56-55-3	0.	0.0009	
SVOC	Benzo(a)pyrene	50-32-8	0.	0.0002	
SVOC	Benzo(b)fluoranthene	205-99-2	0.	0.0009	
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.	0.006	
SVOC	Butylbenzylphthalate	85-68-7	0.	7.3	
SVOC	Chrysene	218-01-9	0.	0.0921	
SVOC	Di-n-butylphthalate	84-74-2	0.	3.7	
SVOC	Fluoranthene	206-44-0	0.0001	1.46	
SVOC	Fluorene	86-73-7	0.0001	1.46	
SVOC	Naphthalene	91-20-3	0.0002	0.73	
SVOC	Phenanthrene	85-01-8	0.0007	1.095	
SVOC	Pyrene	129-00-0	0.	1.095	
P/PCB	Aroclor-1242	53469-21-9	0.	0.0005	
P/PCB	Aroclor-1254	11097-69-1	0.	0.0005	
P/PCB	Aroclor-1260	11096-82-5	0.	0.0005	
INORG	Antimony	7440-36-0	0.0001	0.006	
INORG	Arsenic	7440-38-2	0.0002	0.01	
INORG	Barium	7440-39-3	0.0073	2.	
INORG	Beryllium	7440-41-7	0.	0.004	
INORG	Cadmium	7440-43-9	0.	0.005	
INORG	Chromium (total)	7440-47-3	0.0004	0.1	
INORG	Cobalt	7440-48-4	0.0005	0.73	
INORG	Copper	7440-50-8	0.0001	1.3	
INORG	Cyanide (total)	57-12-5	0.	0.2	
INORG	Lead	7439-92-1	0.0001	0.015	
INORG	Manganese	7439-96-5	0.0147	0.876	
INORG	Mercury	7439-97-6	0.	0.002	
INORG	Nickel	7440-02-0	0.0007	0.73	
INORG	Selenium	7782-49-2	0.0001	0.05	
INORG	Silver	7440-22-4	0.0001	0.1825	
INORG	Thallium	7440-28-0	0.	0.002	
INORG	Vanadium	7440-62-2	0.	0.0365	
INORG	Zinc	7440-66-6	0.0024	10.95	
Notes:					
	1 Draft Corrective Measures Proposal (ARCADIS 2008a) Groundwater Exposure Scenario 1A - Baseline The only wells currently pumping are those in the West Carrollton municipal well field.				

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Table 21. Summary of Site-Wide Groundwater Monitoring Plan for 2009, General Motors Corporation, Moraine, Ohio.

Monitor Wells	Reason for Monitoring in 2008	Monitoring Frequency	Parameter List	Revised Reason for Monitoring in 2009	Revised Monitoring Frequency	Revised Parameter List
<u>Upper Aquifer Wells</u>						
HR-9	Monitoring groundwater quality upgradient of the site.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Well contains stable chlorinated VOC concentrations for 10 years. Well retained to monitor upgradient groundwater quality.	Annual	VOCs ⁽¹⁾
HR-11	Monitoring groundwater quality upgradient of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. VOCs have been stable for the past 6 years and well is redundant with HR-9.	Every 5 years	VOCs ⁽¹⁾
HR-4	Monitoring of groundwater quality upgradient of the closed North Settling Lagoon and downgradient of Landfill L3.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Well required for long-term lagoon and landfill monitoring.	Annual	VOCs ⁽¹⁾
W-2-N	Monitoring of groundwater quality downgradient of the closed North Settling Lagoon.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Well required for long-term lagoon monitoring.	Annual	VOCs ⁽¹⁾
W-3-N	Monitoring of groundwater quality downgradient of the closed North Settling Lagoon.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Well required for long-term lagoon monitoring.	Annual	VOCs ⁽¹⁾
W-4-N	Monitoring of groundwater quality downgradient of the closed North Settling Lagoon and Landfills L2 and L3.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Well required for long-term lagoon monitoring.	Annual	VOCs ⁽¹⁾
HR-2	Monitoring groundwater quality downgradient of Landfills L2 and L3.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Well required for long-term landfill monitoring.	Annual	VOCs ⁽¹⁾

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Table 21. Summary of Site-Wide Groundwater Monitoring Plan for 2009, General Motors Corporation, Moraine, Ohio.

Monitor Wells	Reason for Monitoring in 2008	Monitoring Frequency	Parameter List	Revised Reason for Monitoring in 2009	Revised Monitoring Frequency	Revised Parameter List
HR-5	Monitoring of groundwater quality downgradient of the North Settling Lagoon.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Groundwater quality downgradient of the lagoon will be monitored using W-2-N, W-3-N, and W-4-N.	Every 5 years	VOCs ⁽¹⁾
HR-1	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Groundwater quality on the western side of the plume to be monitored using well GM-43.	Every 5 years	VOCs ⁽¹⁾
GM-43	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. This well location better represents Building 14 groundwater quality.	Annual	VOCs ⁽¹⁾
GM-30	Monitoring effectiveness of corrective measures at AOI 7.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Remove well from annual monitoring. Analysis indicates well primarily contains ethylbenzene and xylene with decreasing trend. No other well in the Former Oil House Area contains these VOCs therefore, it is local to the former tank farm area.	Every 5 years	VOCs ⁽¹⁾
GM-23	Monitoring effectiveness of corrective measures at RZ-1.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Retain well for annual monitoring. Well represents groundwater quality within the Former Oil House Area.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
GM-27	Monitoring effectiveness of corrective measures at RZ-1 in lower portion of the upper aquifer.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Stable VOC concentration data trend has been observed over 10 years along with reduction in TCE concentrations.	Every 5 years	VOCs ⁽¹⁾

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Table 21. Summary of Site-Wide Groundwater Monitoring Plan for 2009, General Motors Corporation, Moraine, Ohio.

Monitor Wells	Reason for Monitoring in 2008	Monitoring Frequency	Parameter List	Revised Reason for Monitoring in 2009	Revised Monitoring Frequency	Revised Parameter List
GM-29	Monitoring effectiveness of corrective measures sidegradient to RZ-1.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Retain well for annual monitoring of RZ-1 performance.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
GM-28	Monitoring effectiveness of corrective measures downgradient of RZ-1.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Retain well for annual monitoring of RZ-1 performance.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
ME-6	Monitoring effectiveness of corrective measures at the upgradient boundary of RZ-2.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Remove well from annual monitoring. Stable VOC concentration data trend has been observed since former RZ-2 operations ceased.	Every 5 years	VOCs ⁽¹⁾
GM-31	Monitoring effectiveness of corrective measures beneath the introduction zone within RZ-2.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Remove well from annual monitoring. Other wells will be retained to monitor groundwater quality in the central portion of the site (GM-59, GM-60, GM-75S).	Every 5 years	VOCs ⁽¹⁾
ME-3	Monitoring effectiveness of corrective measures at the downgradient boundary of RZ-2.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Remove well from annual monitoring. Stable VOC concentration data trend has been observed since former RZ-2 operations ceased.	Every 5 years	VOCs ⁽¹⁾
GM-22	Monitoring effectiveness of corrective measures upgradient of RZ-3 East.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Remove well from annual monitoring. Low level stable VOC concentrations have been observed for 10 years. Other wells will be retained to monitor groundwater quality in the central portion of the site (GM-59, GM-60, GM-75S).	Every 5 years	VOCs ⁽¹⁾

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Table 21. Summary of Site-Wide Groundwater Monitoring Plan for 2009, General Motors Corporation, Moraine, Ohio.

Monitor Wells	Reason for Monitoring in 2008	Monitoring Frequency	Parameter List	Revised Reason for Monitoring in 2009	Revised Monitoring Frequency	Revised Parameter List
GM-19S	Monitoring effectiveness of corrective measures downgradient of RZ-4 East and groundwater quality upgradient of Landfill L1.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾ SVOCs, Metals, PCBs ⁽³⁾	Retain well for annual monitoring of RZ-4 performance.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
GM-33	Monitoring effectiveness of corrective measures upgradient of RZ-3 West and groundwater quality upgradient of Landfill L1.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. The WPSA and upgradient groundwater quality for RZ-3 and Landfill L1 will be monitored using GM-35.	Every 5 years	VOCs ⁽¹⁾
GM-35	Monitoring effectiveness of corrective measures upgradient of RZ-3 West and groundwater quality upgradient of Landfill L1.	Annual	VOCs ⁽¹⁾ SVOCs, Metals, PCBs ⁽³⁾	Retain well for annual monitoring of the WPSA and upgradient groundwater quality for RZ-3 and Landfill L1.	Annual	VOCs ⁽¹⁾
GM-32	Monitoring effectiveness of corrective measures downgradient of RZ-3 West and groundwater quality upgradient of Landfill L1.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Retain well for TOC analysis only. Low VOC concentrations trends are stable.	Annual	TOC
GM-21	Monitoring effectiveness of corrective measures downgradient of RZ-3 West.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Retain well for annual monitoring of RZ-3 performance.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
HR-17	Monitoring of groundwater quality upgradient of the closed South Settling Lagoon.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Well required for long-term lagoon monitoring.	Annual	VOCs ⁽¹⁾
W-2-S	Monitoring of groundwater quality downgradient of the closed South Settling Lagoon.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Well required for long-term lagoon monitoring.	Annual	VOCs ⁽¹⁾
W-3-S	Monitoring of groundwater quality downgradient of the closed South Settling Lagoon.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Well required for long-term lagoon monitoring.	Annual	VOCs ⁽¹⁾

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Table 21. Summary of Site-Wide Groundwater Monitoring Plan for 2009, General Motors Corporation, Moraine, Ohio.

Monitor Wells	Reason for Monitoring in 2008	Monitoring Frequency	Parameter List	Revised Reason for Monitoring in 2009	Revised Monitoring Frequency	Revised Parameter List
W-4-S	Monitoring of groundwater quality downgradient of the closed South Settling Lagoon and sidegradient to RZ-4 West.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Retain well for annual monitoring. Well required for long-term lagoon monitoring.	Annual	VOCs ⁽¹⁾
GM-8	Monitoring groundwater quality downgradient of RZ-3 West and within Landfill L1.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Retain well for annual monitoring of RZ-3 performance and for long-term landfill monitoring.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
GM-6	Monitoring groundwater quality downgradient of RZ-3 West and within Landfill L1.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Retain well for annual long-term landfill monitoring.	Annual	VOCs ⁽¹⁾
GM-47	Monitoring effectiveness of corrective measures downgradient of RZ-4 West.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Retain well for annual monitoring of offsite groundwater quality in the residential area.	Annual	VOCs ⁽¹⁾
GM-50	Monitoring effectiveness of corrective measures downgradient of RZ-4 West.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Retain well for annual monitoring of offsite groundwater quality in the residential area.	Annual	VOCs ⁽¹⁾
GM-51	Monitoring effectiveness of corrective measures downgradient of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Other offsite downgradient wells selected for POC.	Every 5 years	VOCs ⁽¹⁾
GM-52	Monitoring effectiveness of corrective measures downgradient of the site.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring of VOC concentrations on the eastern side of the river.	Annual	VOCs ⁽¹⁾
GM-63	Monitoring effectiveness of corrective measures downgradient of RZ-4 West.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Remove from annual monitoring. Groundwater quality in this area to be monitored using GM-47/GM-50.	Every 5 years	VOCs ⁽¹⁾

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Table 21. Summary of Site-Wide Groundwater Monitoring Plan for 2009, General Motors Corporation, Moraine, Ohio.

Monitor Wells	Reason for Monitoring in 2008	Monitoring Frequency	Parameter List	Revised Reason for Monitoring in 2009	Revised Monitoring Frequency	Revised Parameter List
GM-64	Monitoring effectiveness of corrective measures downgradient of RZ-4 West.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Remove from annual monitoring. Groundwater quality in this area to be monitored using GM-47/GM-50.	Every 5 years	VOCs ⁽¹⁾
TW-2	Monitoring groundwater quality downgradient of the site and Landfill L1.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Capture zone well.	Annual	VOCs ⁽¹⁾
GM-2	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾	Retain well for annual long-term landfill monitoring.	Annual	VOCs ⁽¹⁾
GM-16	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring of offsite PCE and TCE concentration trends.	Annual	VOCs ⁽¹⁾
GM-17	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Other offsite downgradient wells selected for POC.	Every 5 years	VOCs ⁽¹⁾
GM-18	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Other offsite downgradient wells selected for POC.	Every 5 years	VOCs ⁽¹⁾
WSU-24	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Other offsite downgradient wells selected for POC.	Every 5 years	VOCs ⁽¹⁾
GM-10	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Other offsite downgradient wells selected for POC.	Every 5 years	VOCs ⁽¹⁾
GM-26	Monitoring groundwater quality downgradient of the site. Point of compliance well.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring as POC.	Annual	VOCs ⁽¹⁾

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Table 21. Summary of Site-Wide Groundwater Monitoring Plan for 2009, General Motors Corporation, Moraine, Ohio.

Monitor Wells	Reason for Monitoring in 2008	Monitoring Frequency	Parameter List	Revised Reason for Monitoring in 2009	Revised Monitoring Frequency	Revised Parameter List
GM-59	Monitoring groundwater quality for the proposed corrective measures.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Retain well for annual monitoring. Data from this well will be used to support the future CMP design and establish a data trend.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
GM-60	Monitoring groundwater quality for the proposed corrective measures.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Retain well for annual monitoring. Data from this well will be used to support the future CMP design and establish a data trend.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
GM-75S	Monitoring groundwater quality for the proposed corrective measures.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾	Retain well for annual monitoring. Data from this well will be used to support the future CMP design and establish a data trend.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
GM-55	Monitoring groundwater quality for the proposed point of compliance well.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring as proposed POC in the CMP and to establish a data trend.	Annual	VOCs ⁽¹⁾
GM-65S	Monitoring groundwater quality for the proposed point of compliance well.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring as proposed POC in the CMP and to establish a data trend.	Annual	VOCs ⁽¹⁾
GM-78	Monitoring groundwater quality for the proposed point of compliance well.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring as proposed POC in the CMP and to establish a data trend.	Annual	VOCs ⁽¹⁾
GM-79	Monitoring groundwater quality for the proposed point of compliance well.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring as proposed POC in the CMP and to establish a data trend.	Annual	VOCs ⁽¹⁾

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Table 21. Summary of Site-Wide Groundwater Monitoring Plan for 2009, General Motors Corporation, Moraine, Ohio.

Monitor Wells	Reason for Monitoring in 2008	Monitoring Frequency	Parameter List	Revised Reason for Monitoring in 2009	Revised Monitoring Frequency	Revised Parameter List
GM-80	Monitoring groundwater quality for the proposed point of compliance well.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring as proposed POC in the CMP and to establish a data trend.	Annual	VOCs ⁽¹⁾
HR-3	Monitoring groundwater quality downgradient of Landfill L2.	Annual	VOCs ⁽¹⁾	Remove well for annual long-term landfill monitoring. Other wells retained to monitor groundwater quality in this area.	Every 5 years	VOCs ⁽¹⁾
<u>Lower Aquifer Wells</u>						
HR-10	Monitoring groundwater quality upgradient of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. VOCs have been nondetect for 10 years and well is redundant with HR-12.	Every 5 years	VOCs ⁽¹⁾
HR-12	Monitoring groundwater quality upgradient of the site.	Annual	VOCs ⁽¹⁾	Retain for annual monitoring. Well contains low level chlorinated VOC concentrations. Well retained to monitor upgradient groundwater quality.	Annual	VOCs ⁽¹⁾
HR-15	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Well contains vinyl chloride and will be retained to monitor groundwater quality on the western plume boundary.	Annual	VOCs ⁽¹⁾
GM-39	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Low level stable VOC concentrations have been observed for 6 years. Other wells will be retained to monitor groundwater quality in the central portion of the site (GM-68D, GM-75D).	Every 5 years	VOCs ⁽¹⁾

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Table 21. Summary of Site-Wide Groundwater Monitoring Plan for 2009, General Motors Corporation, Moraine, Ohio.

Monitor Wells	Reason for Monitoring in 2008	Monitoring Frequency	Parameter List	Revised Reason for Monitoring in 2009	Revised Monitoring Frequency	Revised Parameter List
GM-40	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Low level stable VOC concentrations have been observed for 6 years. Other wells will be retained to monitor groundwater quality on the western plume boundary (GM-19D).	Every 5 years	VOCs ⁽¹⁾
GM-41	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Well contains TCE that can be monitored by downgradient onsite well GM-69.	Every 5 years	VOCs ⁽¹⁾
GM-42	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Low level stable VOC concentrations have been observed for 6 years. Other wells will be retained to monitor groundwater quality on the western plume boundary (GM-19D).	Every 5 years	VOCs ⁽¹⁾
GM-54	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Well contains PCE and will be retained to monitor groundwater quality on the eastern plume boundary.	Annual	VOCs ⁽¹⁾
GM-58	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Well contains PCE that can be monitored by downgradient onsite well GM-54.	Every 5 years	VOCs ⁽¹⁾

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Table 21. Summary of Site-Wide Groundwater Monitoring Plan for 2009, General Motors Corporation, Moraine, Ohio.

Monitor Wells	Reason for Monitoring in 2008	Monitoring Frequency	Parameter List	Revised Reason for Monitoring in 2009	Revised Monitoring Frequency	Revised Parameter List
GM-61	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Other wells will be retained to monitor groundwater quality in the central portion of the site (GM-68D, GM-75D). This well may be added in the future to support the CMP design.	Every 5 years	VOCs ⁽¹⁾
GM-19D	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Well contains vinyl chloride and will be retained to monitor groundwater quality on the western plume boundary.	Annual	VOCs ⁽¹⁾
GM-3	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Stable VOC concentrations have been observed for 10 years. Groundwater in this area will be monitored by POC wells.	Every 5 years	VOCs ⁽¹⁾
GM-1	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Stable VOC concentrations have been observed for 10 years. Groundwater in this area will be monitored by POC wells.	Every 5 years	VOCs ⁽¹⁾
GM-15	Monitoring groundwater quality downgradient of the site. Point of compliance well.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring as POC.	Annual	VOCs ⁽¹⁾
GM-11	Monitoring groundwater quality downgradient of the site. Point of compliance well.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring as POC.	Annual	VOCs ⁽¹⁾
GM-20D	Monitoring groundwater quality downgradient of the site. Point of compliance well.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring as POC.	Annual	VOCs ⁽¹⁾

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Table 21. Summary of Site-Wide Groundwater Monitoring Plan for 2009, General Motors Corporation, Moraine, Ohio.

Monitor Wells	Reason for Monitoring in 2008	Monitoring Frequency	Parameter List	Revised Reason for Monitoring in 2009	Revised Monitoring Frequency	Revised Parameter List
DN-13	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Capture zone well.	Annual	VOCs ⁽¹⁾
GM-9	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Stable VOC concentrations have been observed for 10 years. Groundwater in this area will be monitored by POC wells.	Every 5 years	VOCs ⁽¹⁾
MT-69	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Well screen is damaged, groundwater quality in this area can be monitored using GM-56.	NA	NA
GM-68D	Monitoring groundwater quality for the proposed corrective measures.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Data from this well will be used to support the future CMP design and establish a data trend.	Annual	VOCs ⁽¹⁾
GM-75D	Monitoring groundwater quality for the proposed corrective measures.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring. Data from this well will be used to support the future CMP design and establish a data trend.	Annual	VOCs ⁽¹⁾
GM-82	Monitoring groundwater quality for the proposed corrective measures.	Annual	VOCs ⁽¹⁾	Remove well from annual monitoring. Other wells will be retained to monitor groundwater quality in the central portion of the site (GM-68D, GM-75D). This well will be added in the future to support the CMP design.	Every 5 years	VOCs ⁽¹⁾
GM-83D	Monitoring groundwater quality for the proposed point of compliance well.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring as proposed POC in the CMP and to establish a data trend.	Annual	VOCs ⁽¹⁾

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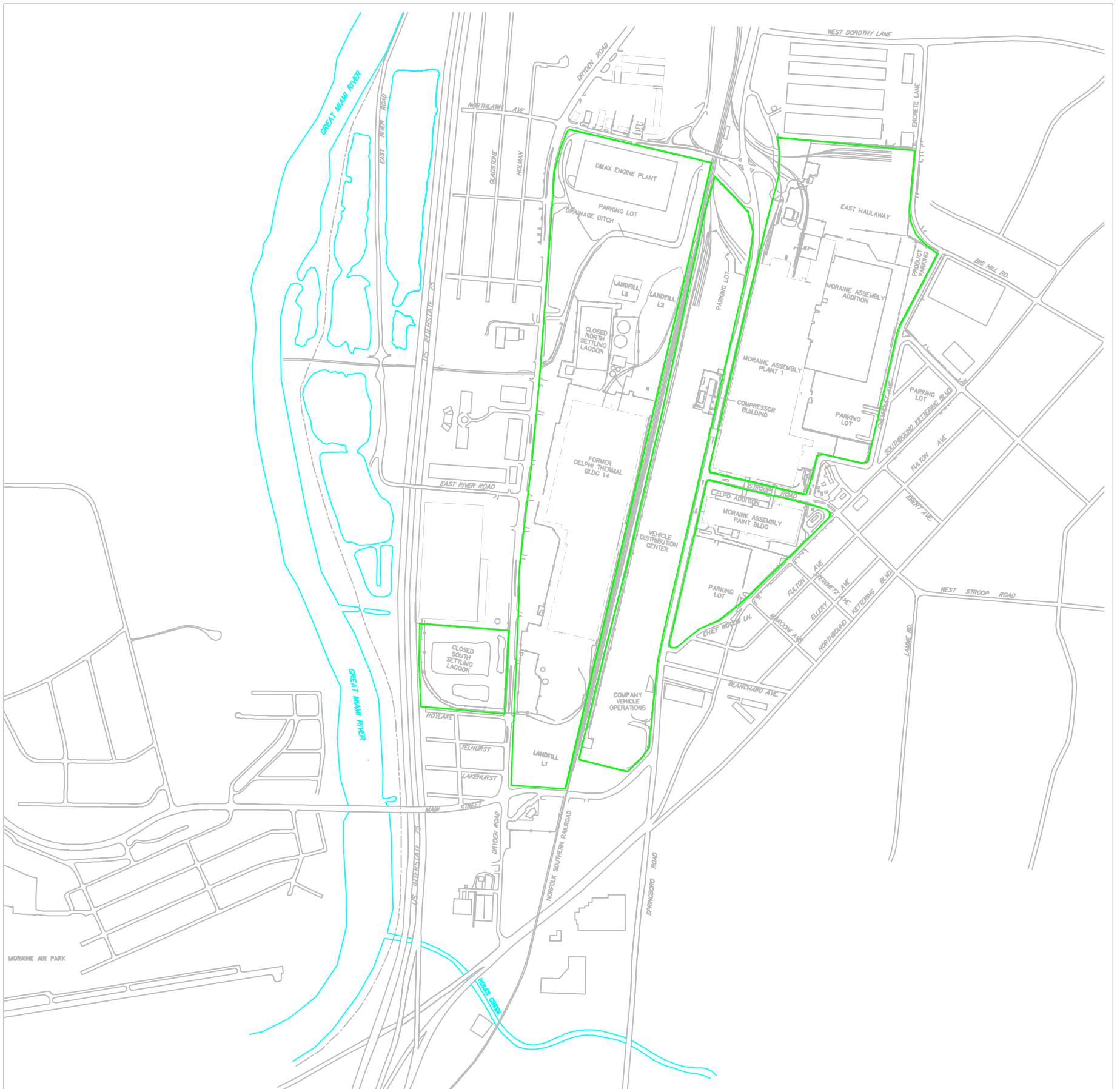
Table 21. Summary of Site-Wide Groundwater Monitoring Plan for 2009, General Motors Corporation, Moraine, Ohio.

Monitor Wells	Reason for Monitoring in 2008	Monitoring Frequency	Parameter List	Revised Reason for Monitoring in 2009	Revised Monitoring Frequency	Revised Parameter List
GM-84	Monitoring groundwater quality for the proposed point of compliance well.	Annual	VOCs ⁽¹⁾	Retain well for annual monitoring as proposed POC in the CMP and to establish a data trend.	Annual	VOCs ⁽¹⁾

(1) The parameters for the remaining annual sampling events will include the site-specific list of VOCs: benzene, 1,1,-dichloroethane, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, ethylbenzene, tetrachloroethene, toluene, 1,1,1-trichloroethane, trichloroethene, vinyl chloride, and xylenes.

(2) The biogeochemical list includes the following field and laboratory parameters: Field parameter - pH, specific conductivity, dissolved oxygen, oxidation reduction potential, and temperature, and Laboratory parameters - manganese (total and dissolved), iron (total and dissolved), sulfate, sulfide, total organic carbon, chlorides, ethane, ethene, and methane.

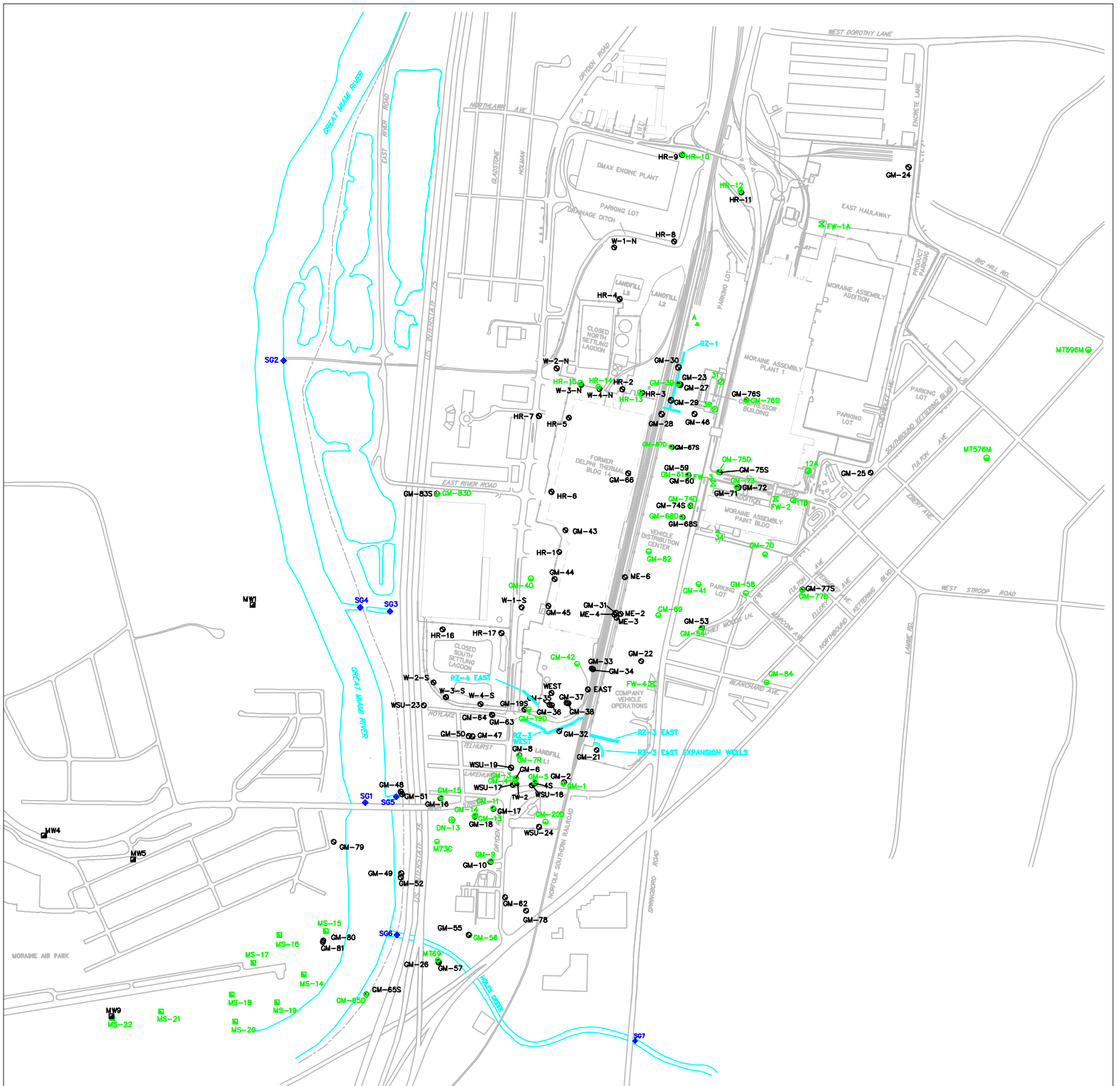
(3) Additional parameters include benzo(a)anthracene, benzo(b)fluoranthene, antimony (total), cadmium (total), chromium (total), and PCBs.



LEGEND
 ——— PROPERTY BOUNDARY
 - - - RIVER LEVEL

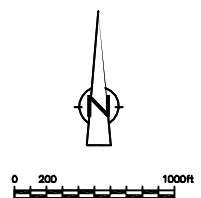
GENERAL MOTORS CORPORATION
 MORaine, OHIO
 OH000294.0012

SITE LAYOUT



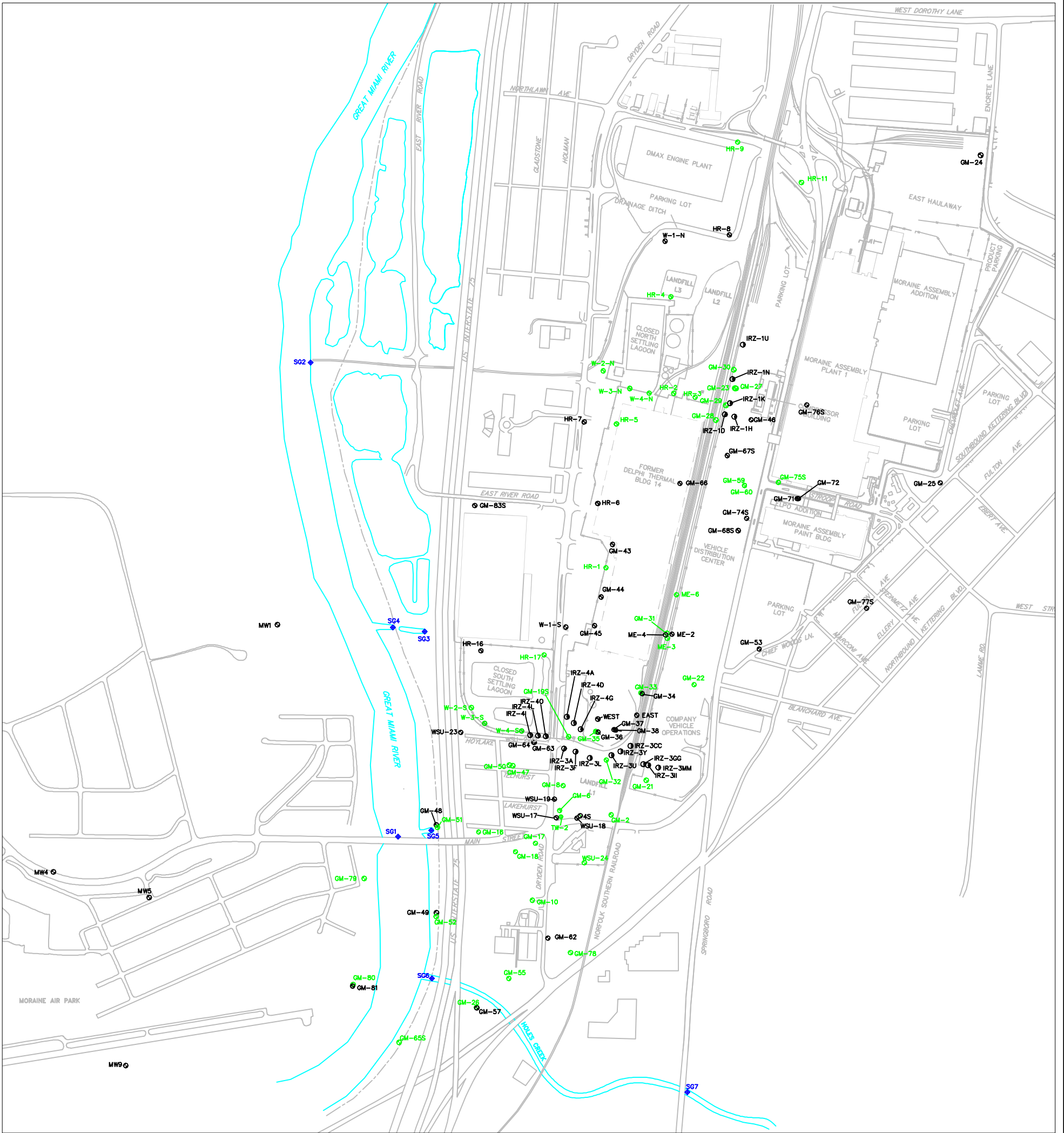
- LEGEND**
- MONITORING WELL (UPPER AQUIFER)
 - RECOVERY WELL (TW-2)
 - MONITORING WELL (LOWER AQUIFER)
 - CARBON SOURCE INTRODUCTION WELLS, REACTIVE ZONES (RZ-1, RZ-3, AND RZ-4)
 - ⊗ FIRE WELL
 - ▲ PRODUCTION WELL CONVERTED TO MONITORING WELL (31, 39)
 - INACTIVE PRODUCTION WELL (31, 39)
 - ACTIVE PRODUCTION WELL (11B, 12A)
 - ⊕ MONTGOMERY COUNTY WELL (USED BY GM FOR PUMP TO WASTE PROGRAM)
 - MONTGOMERY COUNTY WELL (INACTIVE MIAMI SHORES DAYTON PRIMARY PUBLIC SUPPLY BACKUP)
 - ◆ STREAM GAUGE
 - RIVER LEVEL
 - CITY OF MORAINES MONITORING WELL

NOTES:
 1. GREEN INDICATES LOWER AQUIFER WELLS.
 2. BLACK INDICATES UPPER AQUIFER WELLS.

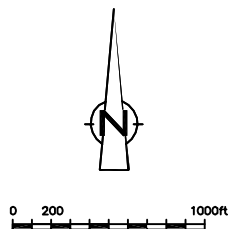


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 OH000294.0012

SITE-WIDE CORRECTIVE MEASURES



LEGEND	
	MONITORING WELL (UPPER AQUIFER)
	RECOVERY WELL (USED FOR SITE-WIDE MONITORING)
	STREAM GAUGE
	CARBON INTRODUCTION WELL
	MONITORING WELL USED FOR SITE-WIDE MONITORING (UPPER AQUIFER)
	FORMER BUILDING 14 FOOTPRINT
	RIVER LEVEE

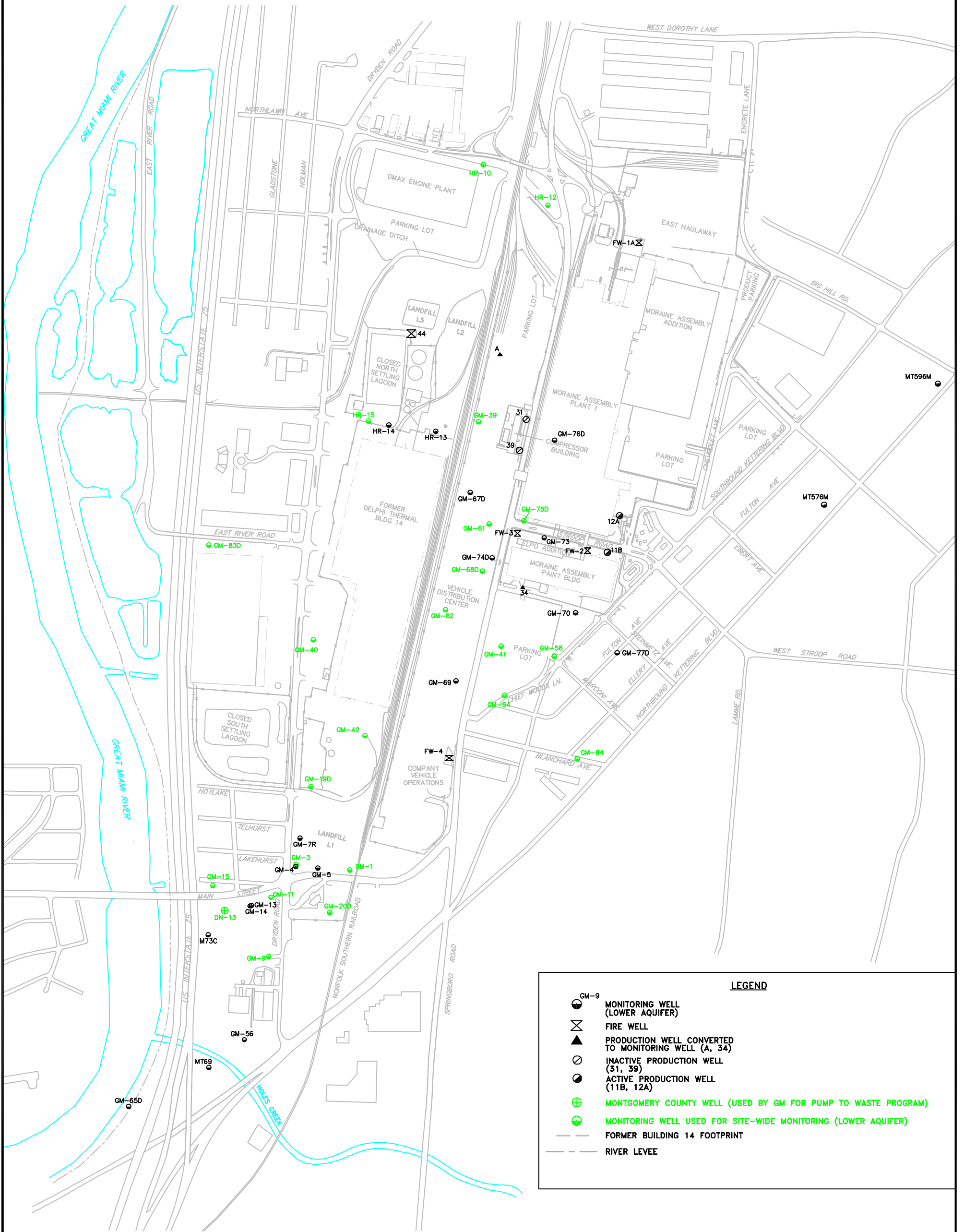


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**UPPER AQUIFER MONITORING WELLS
 FOR SITE-WIDE GROUNDWATER
 MONITORING**

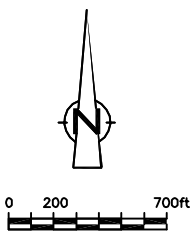
FIGURE
3

XREFS: — PROJECTNAME: —
 OH284BASE MAP 2008



LEGEND

- GM-9 MONITORING WELL (LOWER AQUIFER)
- FIRE WELL
- PRODUCTION WELL CONVERTED TO MONITORING WELL (A, 34)
- INACTIVE PRODUCTION WELL (31, 39)
- ACTIVE PRODUCTION WELL (11B, 12A)
- MONTGOMERY COUNTY WELL (USED BY GM FOR PUMP TO WASTE PROGRAM)
- MONITORING WELL USED FOR SITE-WIDE MONITORING (LOWER AQUIFER)
- FORMER BUILDING 14 FOOTPRINT
- RIVER LEVEE



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 OH000294.0012

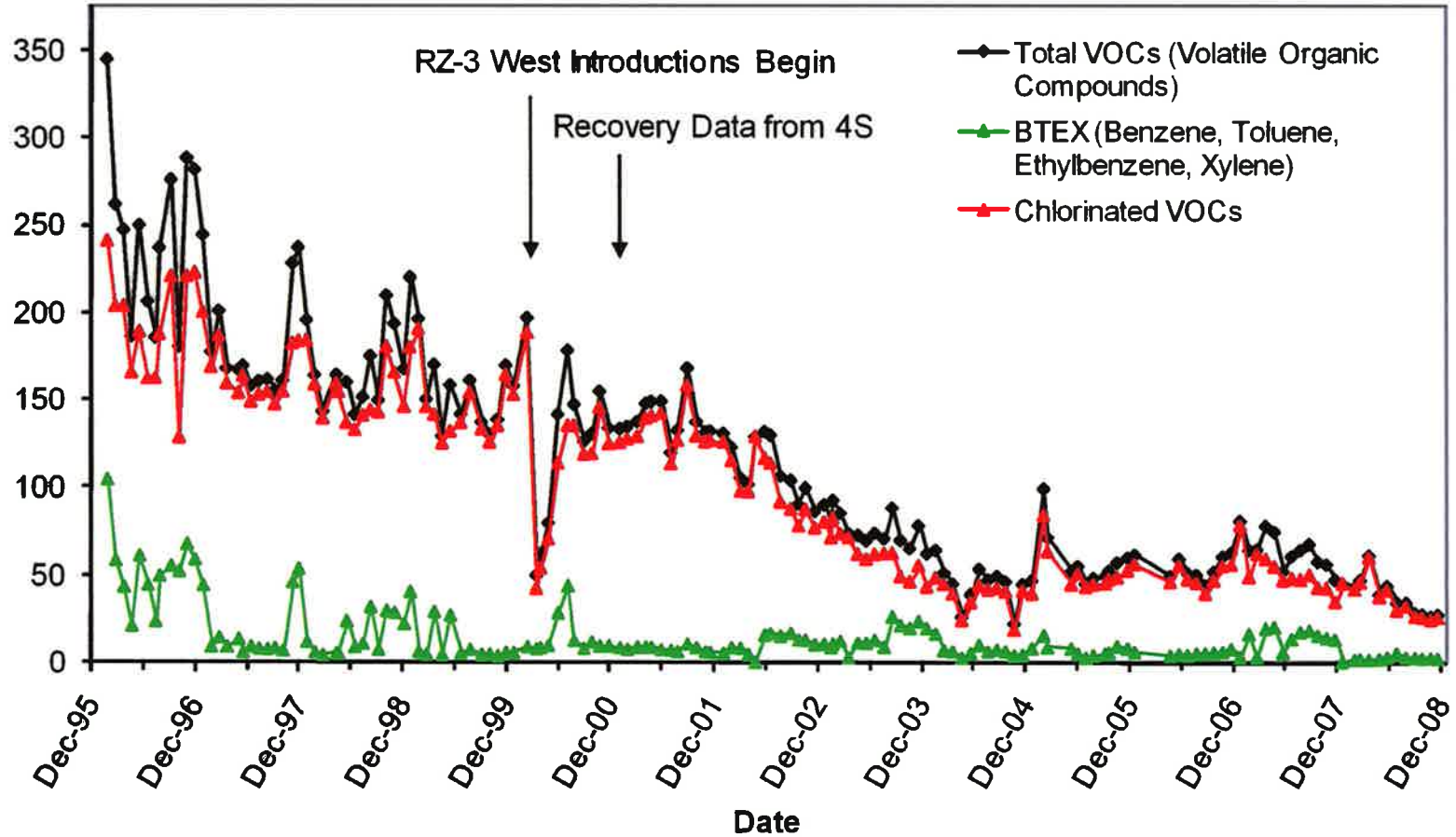
**LOWER AQUIFER MONITORING WELLS
 FOR SITE-WIDE GROUNDWATER
 MONITORING**

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FIGURE
4

PROJECTNAME: ---

Concentration of Chlorinated VOCs, Total VOCs, and BTEX
Micrograms per Liter (ug/L)



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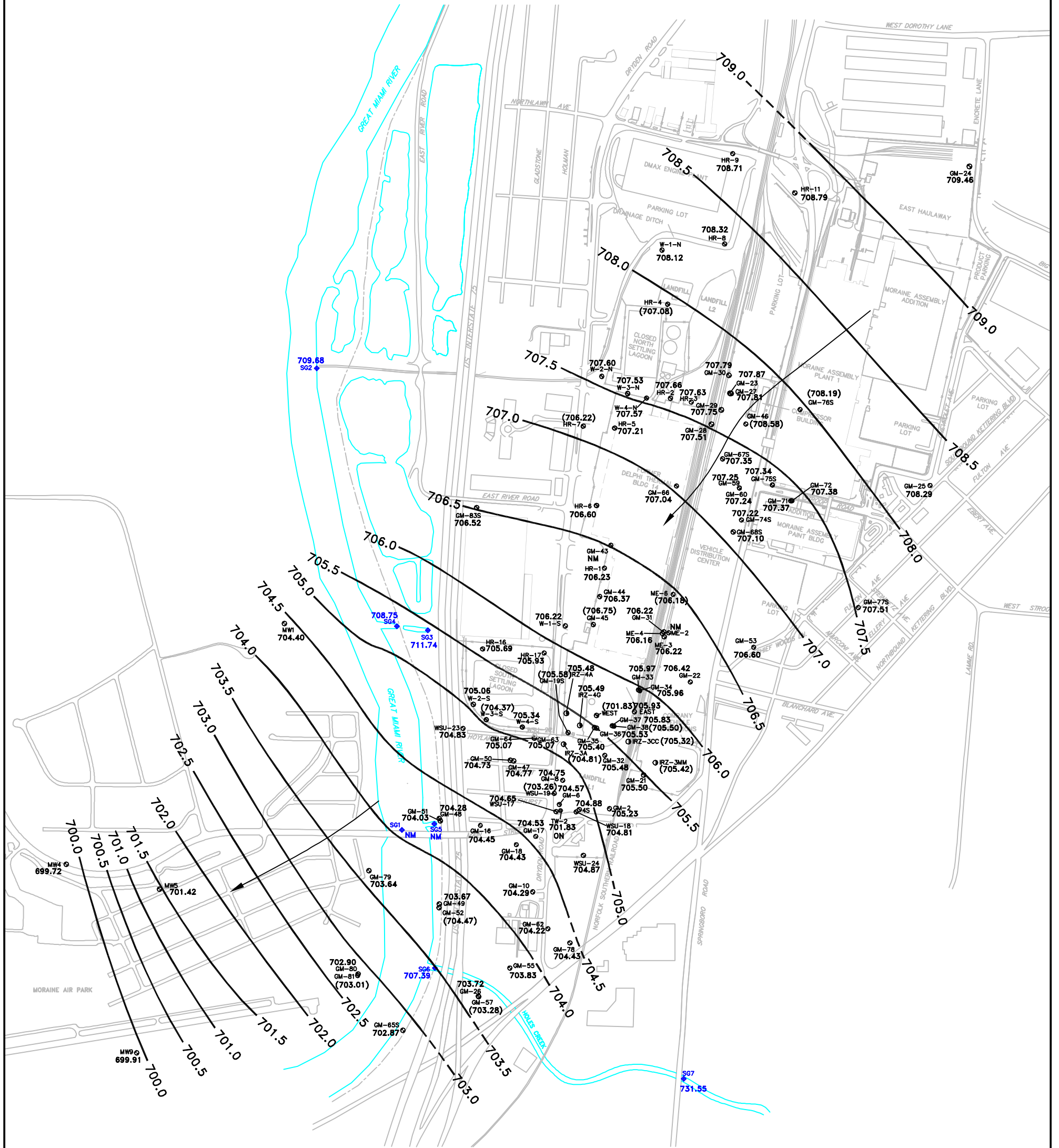
**INFLUENT VOCs SINCE START-UP,
GROUNDWATER RECOVERY AND
TREATMENT SYSTEM**



FIGURE

5

XREFS: PROJECTNAME: ----
 OH294BASE MAP 2008



LEGEND

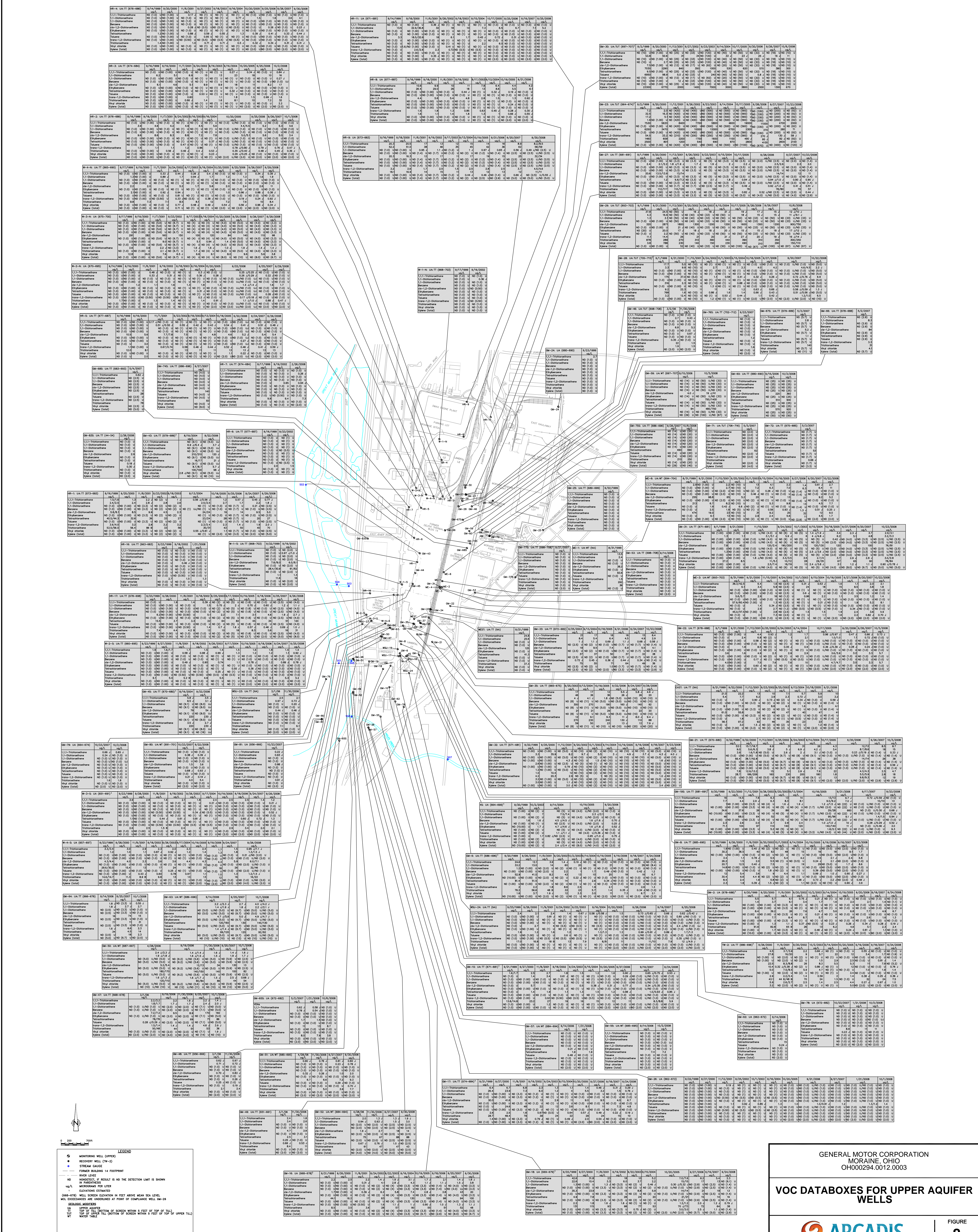
- ⊙ MONITORING WELL (UPPER AQUIFER)
- RECOVERY WELL (TW-2)
- ◆ 707.94 STREAM GAUGE AND STREAM GAUGE MEASUREMENT; NOT USED FOR CONTOURING
- ⊕ CARBON INTRODUCTION WELL
- RIVER LEVEL
- 706.23 GROUNDWATER ELEVATION (FEET MSL)
- 706.0 — GROUNDWATER CONTOUR (FEET MSL) (DASHED WHERE INFERRED)
- () NOT USED FOR CONTOURING
- NM NOT MEASURED; DUE TO FLOODING OR DAMAGED WELL
- FLOW DIRECTION
- ON/OFF INDICATES WHETHER RECOVERY WELL IS IN OPERATION
- CONTOUR INTERVAL = 0.5 FOOT



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POTENTIOMETRIC SURFACE (UPPER AQUIFER) ON NOVEMBER 17-18, 2008





LEGEND

- MONITORING WELL (UPPER)
- STREAM GAUGE
- RECOVERY WELL (W-2)
- FOUNDER BASIN 14 FOOTPRINT
- RIVER LEVEL
- BOUNDARY OF RESULT IS NO DETECTION LIMIT IS SHOWN IN PARENTHESES
- ELEVATIONS ARE UNLESS NOTED AS FEET ABOVE MEAN SEA LEVEL
- (000-00) HAS BEEN ESTIMATED IN FEET ABOVE MEAN SEA LEVEL
- NO EXCEEDANCES ARE UNLESS NOTED AS FEET ABOVE MEAN SEA LEVEL

SOLOGE: LOGS

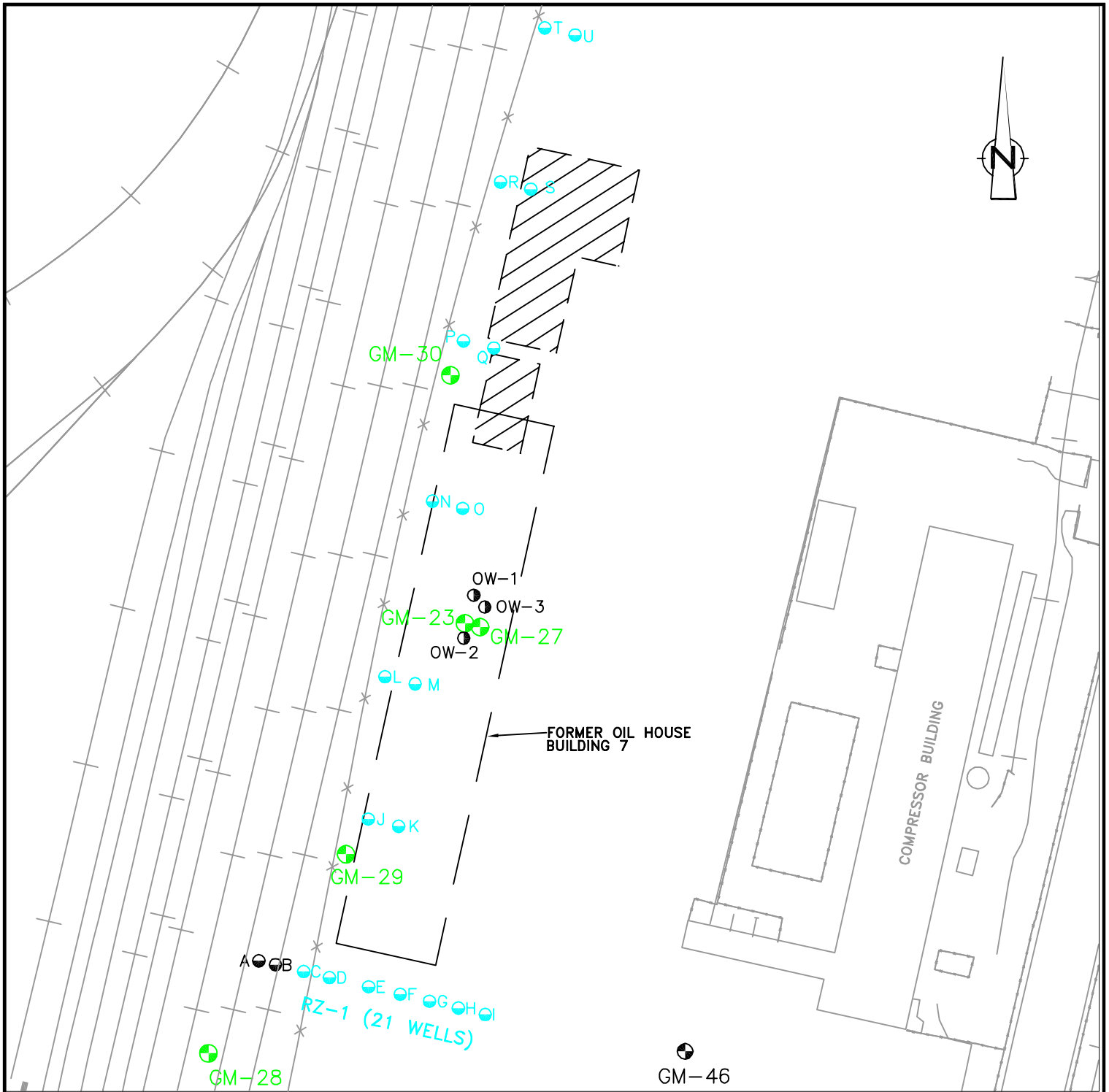
- TP TOP OF THE TRENCH OF SPORE WITHIN 5 FEET OF TOP OF TELL
- BT BOTTOM OF THE TRENCH OF SPORE WITHIN 5 FEET OF TOP OF TELL
- WT WATER TABLE

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OHIO00294.0012.0003

VOC DATABOXES FOR UPPER AQUIFER WELLS

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FIGURE 8

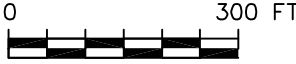
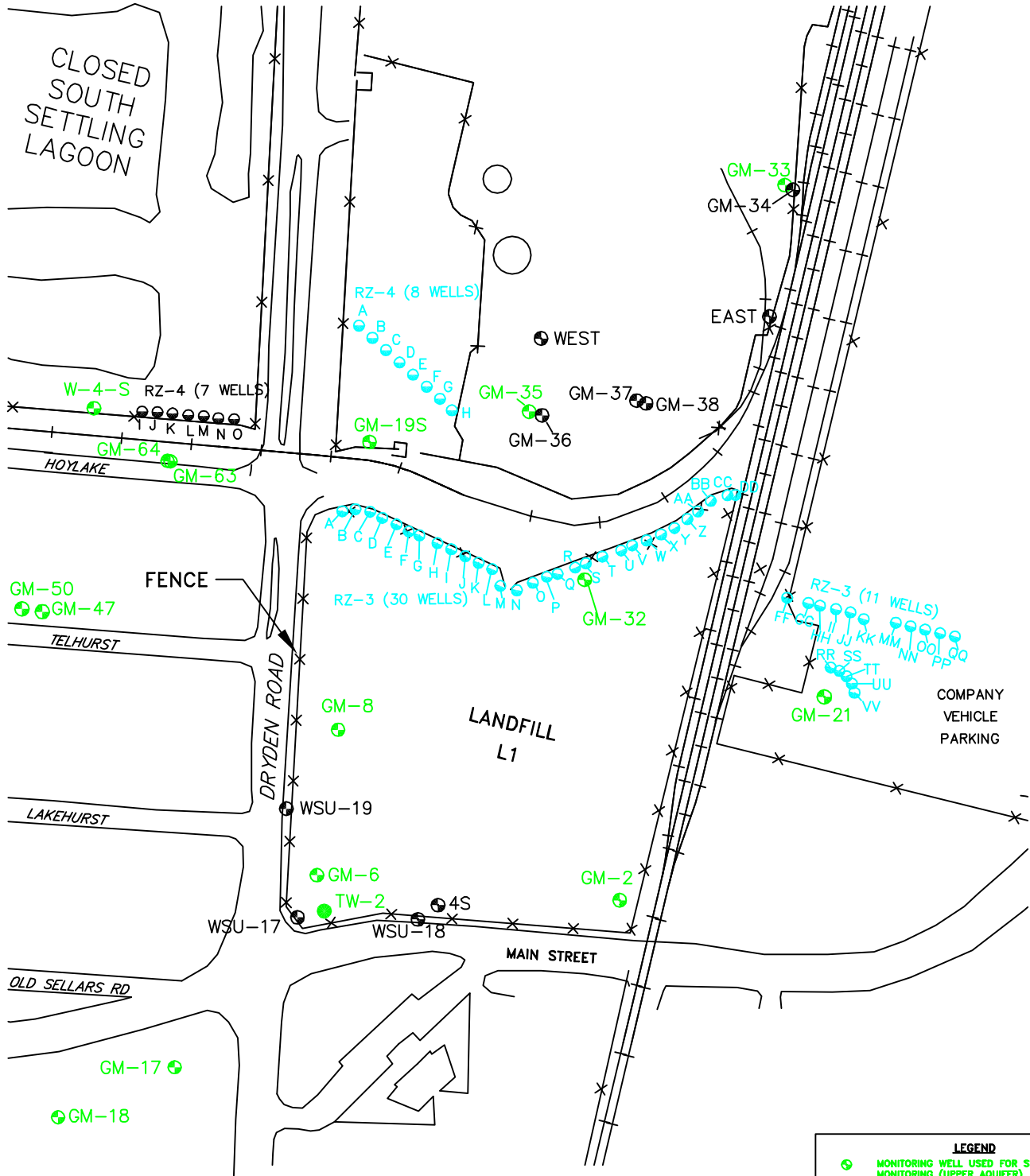


LEGEND

- MONITORING WELL (UPPER AQUIFER)
- OXIDATION WELLS USED AS CARBON SOURCE INTRODUCTION WELLS (INACTIVE)
- MONITORING WELL USED FOR SITE-WIDE (UPPER AQUIFER)
- CARBON SOURCE INTRODUCTION WELL
- INACTIVE CARBON SOURCE INTRODUCTION WELL
- APPROXIMATE LOCATION OF FORMER MORaine ENGINE TANK FARM



DATE 2/16/2009	PROJECT MANAGER N. GILLOTTI	DRAWING NAME C:\07\ANN\ANN08-07
DRAWN R. SMITH	LEAD DESIGN PROF. J. HUNT	CHECKED T. FORTNER
PROJECT NUMBER OH000294.0012.0002		FIGURE NUMBER 10



NOTE: INTRODUCTION WELL RZ-3LL WAS NOT INSTALLED DUE TO PRESENCE OF UNDERGROUND UTILITIES.

LEGEND	
	MONITORING WELL USED FOR SITE-WIDE MONITORING (UPPER AQUIFER)
	CARBON SOURCE INTRODUCTION WELLS
	INACTIVE CARBON SOURCE INTRODUCTION WELLS
	RECOVERY WELL (USED FOR SITE-WIDE MONITORING)
	MONITORING WELL (UPPER AQUIFER)

DATE 2/16/2009	PROJECT MANAGER N. GILLOTTI	DRAWING NAME C\07\ANN\ANN08-09
DRAWN R. SMITH	LEAD DESIGN PROF. J. HUNT	CHECKED N. GILLOTTI
PROJECT NUMBER OH000294.0012.0002		FIGURE NUMBER 11

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Appendix A

Site-Wide Groundwater VOC
Analytical Results from 1999 to 2007

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Table A-1. Groundwater Analytical Results for the Upper Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethyl-benzene	PCE	Toluene	trans-1,2-DCE	TCE	Vinyl Chloride	Xylenes
Upgradient of the Site													
HR-9	9/16/1999	20.3	52.2	<1.0	<1.0	20.3	<1.0	<1.0	<1.0	3.2	18.1	<1.0	<1.0
HR-9	9/18/2000	20.5	51.0	<1.0	<1.0	16.3	<1.0	<1.0	<1.0	2.6	16.9	<1.0	<1.0
HR-9	11/6/2001	17	38	0.95J	< 1.4	12	< 1.4	< 1.4	< 1.4	1.7	14	< 1.4	< 1.4
HR-9	9/19/2002	13	46	1.1J	< 1.7	17	< 1.7	< 1.7	< 1.7	2.5	15	< 1.7	< 1.7
HR-9	9/17/2003	12	35	< 1.2 U	< 1.2 U	11	< 1.2 U	< 1.2 U	< 1.2 U	1.5	11	< 1.2 U	< 1.2 U
HR-9	9/13/2004	15	45	1 J	< 2 U	17	< 2 U	< 2 U	< 2 U	2.5	13	0.44 J	< 2 U
HR-9	10/19/2005	14	42	0.97 J	< 1.2 U	19	< 1.2 U	< 1.2 U	< 1.2 U	2.8	12	0.46 J	< 2.5 U
HR-9	9/21/2006	16	36	0.65 J	< 1.4 U	15	< 1.4 U	< 1.4 U	< 1.4 U	2.5	13	< 1.4 U	< 2.9 U
HR-9	9/25/2007	8.9	62	0.56J	< 2.5 U	25	< 2.5 U	< 2.5 U	< 2.5 U	3.7	12	0.66J	<5 U
HR-11	9/14/1999	<1.0	13.5	<1.0	<1.0	3.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
HR-11	9/18/2000	<1.0	32.9	<1.0	<1.0	18.5	<1.0	<1.0	<1.0	2.6	<1.0	<1.0	<1.0
HR-11	11/6/2001	0.30J	33	<1.0	< 1.0	18	< 1.0	< 1.0	< 1.0	2.3	< 1.0	< 1.0	< 1.0
HR-11	9/26/2002	< 1	18	< 1	< 1	6.1	< 1	< 1	< 1	0.72	< 1	< 1	< 1
HR-11	9/18/2003	< 1 U	10	< 1 U	< 1 U	1.7	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	< 1 U	< 1 U
HR-11	9/15/2004	< 1 U	7.3	< 1 U	< 1 U	0.45 J	< 1 U	2.2	< 1 U	< 0.5 U	< 1 U	< 1 U	< 1 U
HR-11	10/17/2005	< 1.0 U	6.5	< 1.0 U	< 1.0 U	0.72 J	< 1.0 U	6.0	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 2.0 U
HR-11	9/25/2006	< 1 U	6.7	< 1 U	< 1 U	0.31 J	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 2 U
HR-11	9/19/2007	< 1 U	7.1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 2 U
GM-24	9/23/1999	2.7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
On-Site													
HR-8	9/16/1999	10.6	26.4	<1.0	<1.0	4.4	<1.0	<1.0	<1.0	1.5	1.6	<1.0	<1.0
HR-8	9/18/2000	9.9	29.0	<1.0	<1.0	5.6	<1.0	<1.0	<1.0	1.8	1.1	<1.0	<1.0
HR-8	11/6/2001	10	26	< 1.0	< 1.0	5.4	< 1.0	< 1.0	< 1.0	1.3	1.4	< 1.0	< 1.0
HR-8	9/19/2002	11	18	0.44J	< 1.0	4.8	< 1.0	< 1.0	< 1.0	0.85	1.8	< 1.0	< 1.0
HR-8	9/17/2003	7.8	13	< 1 U	< 1 U	2.8	< 1 U	< 1 U	< 1 U	0.63	1.3	< 1 U	< 1 U
HR-8	9/13/2004	6.4	8.6	0.32 J	< 1 U	1.5	< 1 U	< 1 U	< 1 U	0.45 J	1	< 1 U	< 1 U
HR-8	10/19/2005	4.4	5.5	0.19 J	< 1.0 U	1.3	< 1.0 U	0.24 J	< 1.0 U	0.28 J	0.66 J	< 1.0 U	< 2.0 U
HR-8	9/21/2006	4.2	6.1	< 1 U	< 1 U	0.92 J	< 1 U	< 1 U	< 1 U	0.3 J	0.55 J	< 1 U	< 2 U
W-1-N	9/17/1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
W-1-N	9/19/2002	< 1.0	0.36J	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0
HR-4	9/14/1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	1.4	<1.0	<1.0
HR-4	9/20/2000	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
HR-4	11/6/2001	0.17J	< 1.0	< 1.0	< 1.0	0.28J	< 1.0	0.88J	< 1.0	< 0.50	1.0	< 1.0	< 1.0
HR-4	9/27/2002	< 1	< 1	< 1	< 1	< 0.5	< 1	0.59J	< 1	< 0.5	0.71J	< 1	< 1
HR-4	9/18/2003	< 1 U	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	0.55 J	< 1 U	< 0.5 U	0.71 J	< 1 U	< 1 U
HR-4	9/16/2004	< 1 U	0.77 J	< 1 U	< 1 U	< 0.5 U	< 1 U	1.3	< 1 U	< 0.5 U	0.5 J	< 1 U	< 1 U

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Table A-1. Groundwater Analytical Results for the Upper Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethyl-benzene	PCE	Toluene	trans-1,2-DCE	TCE	Vinyl Chloride	Xylenes
HR-4	10/20/2005	< 1.0 U	1.5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	0.39 J	< 1.0 U	< 1.0 U	0.32 J	< 1.0 U	< 2.0 U
HR-4	9/25/2006	< 1 U	1.6	< 1 U	< 1 U	0.26 J	< 1 U	0.41 J	< 1 U	< 1 U	0.34 J	< 1 U	< 2 U
HR-4	9/26/2007	< 1 U	3.6	< 1 U	< 1 U	< 1 U	< 1 U	0.33 J	< 1 U	< 1 U	0.31 J	< 1 U	< 2 U
W-2-N	9/14/1999	<1.0	<1.0	<1.0	<1.0	1.6	<1.0	<1.0	<1.0	<1.0	1.7	<1.0	<1.0
W-2-N	9/19/2000	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
W-2-N	11/6/2001	0.48J	0.33J	< 1.0	< 1.0	1.1	< 1.0	< 1.0	< 1.0	< 0.50	1.3	< 1.0	< 1.0
W-2-N	9/19/2002	< 1.0	0.31J	< 1.0	< 1.0	1.6	< 1.0	< 1.0	< 1.0	< 0.50	1.4	< 1.0	< 1.0
W-2-N	9/18/2003	< 1 U	< 1 U	< 1 U	< 1 U	1.3	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	< 1 U	< 1 U
W-2-N	9/16/2004	0.3 J	0.36 J	< 1 U	< 1 U	1.8	< 1 U	0.31 J	< 1 U	0.2 J	1.4	< 1 U	< 1 U
W-2-N	10/20/2005	< 1.0 U	0.28 J	< 1.0 U	< 1.0 U	1.3	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	0.91 J	< 1.0 U	< 2.0 U
W-2-N	9/22/2006	0.25 J	0.29 J	< 1 UJ	< 1 UJ	1.4 J	< 1 UJ	< 1 UJ	< 1 UJ	0.18 J	1 J	< 1 UJ	< 2 UJ
W-2-N	9/25/2007	< 1 U	0.22 J	< 1 U	< 1 U	1.6	< 1 U	< 1 U	0.28J	< 1 U	0.88J	< 1 U	< 2 U
W-3-N	9/17/1999	<1.0	<1.0	<1.0	<1.0	291	<1.0	2.5	<1.0	2.6	<1.0	12.8	<1.0
W-3-N	9/19/2000	<1.0	<1.0	<1.0	<1.0	282	<1.0	<1.0	<1.0	3.9	<1.0	24.0	<1.0
W-3-N	11/7/2001	< 5.6	< 5.6	< 5.6	< 5.6	160	< 5.6	9.0	< 5.6	2.2J	2.1J	7.6	< 5.6
W-3-N	9/23/2002	< 6.7	< 6.7	< 6.7	< 6.7	150	< 6.7	< 6.7	< 6.7	< 3.3	< 6.7	6.5J	< 6.7
W-3-N	9/17/2003	< 4 U	< 4 U	< 4 U	< 4 U	100	< 4 U	5.1	< 4 U	1.6 J	1.7 J	6.6	< 4 U
W-3-N	9/16/2004	< 4 U	< 4 U	< 4 U	< 4 U	120	< 4 U	0.94 J	< 4 U	1.6 J	< 4 U	6.1	< 4 U
W-3-N	10/20/2005	< 4.0 U	< 4.0 U	< 4.0 U	< 4.0 U	84	< 4.0 U	1.4 J	< 4.0 U	1.0 J	< 4.0 U	8.0	< 8.0 U
W-3-N	9/25/2006	< 5 U	< 5 U	< 5 U	< 5 U	140	< 5 U	< 5 U	< 5 U	1.9 J	< 5 U	9.6	< 10 U
W-3-N	9/26/2007	< 4 U	< 4 U	< 4 U	< 4 U	110	< 4 U	< 4 U	< 4 U	1.4 J	< 4 U	5.6	< 8 U
W-4-N	9/17/1999	<1.0	1.3	<1.0	<1.0	2.2	<1.0	2.1	<1.0	<1.0	9.8	<1.0	<1.0
W-4-N	9/19/2000	<1.0	<1.0	<1.0	<1.0	2.0	<1.0	<1.0	<1.0	<1.0	7.3	<1.0	<1.0
W-4-N	11/7/2001	0.33J	0.89J	< 1.0	< 1.0	1.6	< 1.0	0.92J	< 1.0	< 0.50	7.1	< 1.0	< 1.0
W-4-N	9/24/2002	0.44J	1.7	< 1	< 1	5.2	< 1	0.94J	< 1	0.33J	8.5	0.77J	< 1
W-4-N	9/17/2003	0.26 J	0.94 J	< 1 U	< 1 U	1.7	< 1 U	1.1	< 1 U	< 0.5 U	8.1	0.48 J	< 1 U
W-4-N	9/16/2004	0.4 J	1.7	< 1 U	< 1 U	5.8	< 1 U	1.7	< 1 U	0.38 J	12	0.49 J	< 1 U
W-4-N	10/20/2005	< 1.0 U	1.2	< 1.0 U	< 1.0 U	2.0	< 1.0 U	1.0	< 1.0 U	< 1.0 U	7.2	0.54 J	< 2.0 U
W-4-N	9/25/2006	< 1 U	1.3	< 1 U	< 1 U	2.4	< 1 U	0.96 J	< 1 U	0.19 J	7.6	0.56 J	< 2 U
W-4-N	9/26/2007	0.34J	1.6	< 1 U	< 1 U	2.6	< 1 U	0.88 J	< 1 U	0.24 J	10	0.96 J	< 2 U
HR-2	9/16/1999	<1.0	3.9	<1.0	<1.0	9.6	<1.0	<1.0	<1.0	1.5	<1.0	<1.0	<1.0
HR-2	9/19/2000	<1.0	4.6	<1.0	<1.0	8.6	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0
HR-2	11/7/2001	< 1.0	4.2	< 1.0	< 1.0	8.3	< 1.0	< 1.0	< 1.0	1.1	0.56J	< 1.0	< 1.0
HR-2	9/24/2002	< 1	4.9	< 1	< 1	8.8	< 1	< 1	< 1	1.2	0.46J	< 1	< 1
HR-2	9/16/2003	< 1 U	4.5	< 1 U	< 1 U	7.2	< 1 U	< 1 U	< 1 U	0.96	0.4 J	< 1 U	< 1 U
HR-2	9/16/2004	< 1 U	5.6	< 1 U	< 1 U	7.8	< 1 U	0.37 J	< 1 U	1.1	0.53 J	0.23 J	< 1 U
HR-2	10/20/2005	< 1.0 U	4.4	< 1.0 U	< 1.0 U	5.0	< 1.0 U	< 1.0 U	< 1.0 U	0.78 J	0.35 J	0.29 J	< 2.0 U

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Table A-1. Groundwater Analytical Results for the Upper Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethyl-benzene	PCE	Toluene	trans-1,2-DCE	TCE	Vinyl Chloride	Xylenes
HR-2	9/25/2006	< 1 U	5.2	< 1 U	< 1 U	5.6	< 1 U	< 1 U	< 1 U	0.79 J	0.48 J	< 1 U	< 2 U
HR-2	9/26/2007	< 1 U	5.3	< 1 U	< 1 U	5.0	< 1 U	< 1 U	< 1 U	0.76J	0.45J	< 1 U	< 2 U
HR-3	9/16/1999	<1.0	6.2	<1.0	<1.0	6.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
HR-3	9/19/2000	<1.0	5.1	<1.0	<1.0	4.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
HR-3	11/7/2001	< 1.0	6.9	< 1.0	< 1.0	5.1	< 1.0	< 1.0	< 1.0	0.60	0.66J	< 1.0	< 1.0
HR-3	9/24/2002	< 1	15	< 1	< 1	9.9	< 1	< 1	< 1	1	1.4	< 1	< 1
HR-3	9/16/2003	< 1 U	13	< 1 U	< 1 U	9.9	< 1 U	< 1 U	< 1 U	1.1	1.6	< 1 U	< 1 U
HR-3	9/16/2004	0.27 J	23	< 1 U	< 1 U	18	< 1 U	0.32 J	< 1 U	1.8	8.1	< 1 U	< 1 U
HR-3	10/20/2005	0.34 J	18	< 1.0 U	< 1.0 U	11	< 1.0 U	< 1.0 U	< 1.0 U	1.5	10	< 1.0 U	< 2.0 U
HR-3	9/25/2006	< 1 U	10	< 1 U	< 1 U	8.2	< 1 U	< 1 U	< 1 U	0.99 J	7.2	< 1 U	< 2 U
GM-30	9/2/1999	<10	53.8J	<10	<10	7.5J	7030J	9.5J	6950J	<10	<10	<10	23300J
GM-30	9/20/2000	<1.0	50.6	<1.0	2.7	<1.0	2290	<1.0	98.9	<1.0	<1.0	<1.0	6770
GM-30	11/13/2001	< 25	31	< 25	< 25	< 12	840	< 25	5.0J	< 12	12J	< 25	2000
GM-30	9/27/2002	< 33	34	< 33	< 33	< 17	350	< 33	< 33	< 17	< 33	< 33	1400
GM-30	9/23/2003	< 120 U	< 120 U	< 120 U	< 120 U	< 62 U	1000	< 120 U	240	< 62 U	< 120 U	< 120 U	7000
GM-30	9/14/2004	< 40 U	33 J	< 40 U	< 40 U	< 20 U	530	< 40 U	< 40 U	< 20 U	< 40 U	< 40 U	3000
GM-30	10/17/2005	< 50 U	23 J	< 50 U	< 50 U	< 50 U	620	< 50 U	< 50 U	< 50 U	< 50 U	< 50 U	3800
GM-30	9/20/2006	< 33 U	25 J	< 33 U	< 33 U	< 33 U	570	< 33 U	5.8 J	< 33 U	< 33 U	< 33 U	2500
GM-30	9/26/2007	< 18 U	16 J	< 18 U	< 18 U	< 18 U	380	< 18 U	< 18 U	< 18 U	< 18 U	< 18 U	1300
GM-23	9/2/1999	7.2	32.5	17.2	1.9	7530	<1.0	6250	<1.0	54.5	1460	2500	7.0
GM-23	9/20/2000	2.0	16.3	5.1	<1.0	5620	<1.0	3470	<1.0	33.2	609	801	<1.0
GM-23	11/12/2001	< 420	< 420	< 420	< 420	8400	< 420	15000	< 420	< 210	2200	1200	< 420
GM-23	9/26/2002	< 400	< 400	< 400	< 400	7700	< 400	10000	< 400	< 200	1700	540	< 400
GM-23	9/23/2003	< 500 U	< 500 U	< 500 U	< 500 U	5800	< 500 U	12000	< 500 U	< 250 U	1600	690	< 500 U
GM-23	9/14/2004	< 500 U	< 500 U	< 500 U	< 500 U	4600	< 500 U	6700	< 500 U	< 250 U	1100	870	< 500 U
GM-23	10/17/2005	< 560 U	< 560 U	< 560 U	< 560 U	19000	< 560 U	2300	< 560 U	< 560 U	490 J	2800	< 1100 U
GM-23	9/28/2006	< 330 U	< 330 U	< 330 U	< 330 U	11000	< 330 U	370	< 330 U	270 J	95 J	4100	< 670 U
GM-23	9/27/2007	< 200 U	< 200 U	< 200 U	< 200 U	4700	< 200 U	280	< 200 U	130 J	82 J	2600	< 400 U
GM-27	9/1/1999	<1.0	2.4	<1.0	<1.0	20.6	<1.0	1.7	<1.0	<1.0	121	<1.0	<1.0
GM-27	9/20/2000	<1.0	2.2	<1.0	<1.0	13.9	<1.0	1.2	<1.0	<1.0	112	<1.0	<1.0
GM-27	11/13/2001	< 3.3	1.8J	< 3.3	< 3.3	13	< 3.3	6.8	< 3.3	< 1.7	110	< 3.3	< 3.3
GM-27	9/26/2002	< 3.3	1.7J	< 3.3	< 3.3	14	< 3.3	< 3.3	< 3.3	< 1.7	100	< 3.3	< 3.3
GM-27	9/23/2003	< 5 U	1.9 J	< 5 U	< 5 U	12	< 5 U	2.1 J	< 5 U	< 2.5 U	100	< 5 U	< 5 U
GM-27	9/15/2004	< 3.3 U	2 J	< 3.3 U	< 3.3 U	13	< 3.3 U	1.8 J	< 3.3 U	< 1.7 U	81	< 3.3 U	< 3.3 U
GM-27	10/17/2005	< 2.5 U	2.2 J	< 2.5 U	< 2.5 U	14	< 2.5 U	0.94 J	< 2.5 U	0.49 J	76	0.82 J	< 5.0 U
GM-27	9/28/2006	< 2.5 U	2.6	< 2.5 U	< 2.5 U	14	< 2.5 U	1 J	< 2.5 U	1 J	80	< 2.5 U	< 5 U
GM-27	9/27/2007	< 2 U	2.3	< 2 U	< 2 U	12	< 2 U	0.9 J	< 2 U	0.41 J	70	< 2 U	< 4 U

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Table A-1. Groundwater Analytical Results for the Upper Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethyl-benzene	PCE	Toluene	trans-1,2-DCE	TCE	Vinyl Chloride	Xylenes
GM-29	9/1/1999	37.8	4.3	1.3	<1.0	320	<1.0	<20	<1.0	11.1	878	3.8	<1.0
GM-29	9/21/2000	24.5	16.6	3.1	<1.0	2871	<1.0	20.0	2.2	14.4	289	788	<1.0
GM-29	11/13/2001	< 50	< 50	< 50	< 50	1800	21J	17J	< 50	26	270	230	52
GM-29	9/25/2002	16J	< 40	< 40	< 40	1300	< 40	18J	< 40	21	310	140	< 40
GM-29	9/24/2003	18 J	< 33 U	< 33 U	< 33 U	1200	< 33 U	18 J	< 33 U	20	390	150	< 33 U
GM-29	9/15/2004	21 J	< 50 U	< 50 U	< 50 U	1200	< 50 U	20 J	< 50 U	21 J	440	230	< 50 U
GM-29	10/17/2005	19 J	18 J	< 50 U	< 50 U	1600	< 50 U	15 J	< 50 U	27 J	390	490	< 100 U
GM-29	9/28/2006	17 J	15 J	< 33 U	< 33 U	1300	< 33 U	15 J	< 33 U	20 J	310	210	< 67 U
GM-29	9/26/2007	15 J	15 J	< 50 U	< 50 U	1200	< 50 U	18 J	< 50 U	19 J	350	290	< 100 U
GM-28	9/1/1999	17.7	3.3	<1.0	<1.0	175	<1.0	316	<1.0	9.2	768	3.2	<1.0
GM-28	9/21/2000	5.0	9.9	<1.0	<1.0	37.0	<1.0	2.3	<1.0	22.3	1.6	12.4	<1.0
GM-28	11/15/2001	< 10	< 10	< 10	< 10	< 5.0	< 10	< 10	< 10	11	< 10	< 10	< 10
GM-28	9/24/2002	< 1	2.7	< 1	< 1	1.1	< 1	< 1	< 1.3 U	11	0.86J	< 1	< 1.2 U
GM-28	10/1/2003	< 1 U	3.3	< 1 U	< 1 U	0.58	< 1 U	< 1 U	< 1 U	4	1.6	0.53 J	< 1 U
GM-28	9/15/2004	< 1 U	3.3	< 1 U	< 1 U	0.41 J	< 1 U	0.88 J	< 1 U	1.2	1.4	0.44 J	< 1 U
GM-28	10/18/2005	< 1.0 U	4.0	< 1.0 U	< 1.0 U	0.32 J	< 1.0 U	< 1.0 U	< 1.0 U	0.63 J	0.66 J	1.1	< 2.0 U
GM-28	9/27/2006	< 1 U	4.2	< 1 U	< 1 U	0.26 J	< 1 U	< 1 U	< 1 U	0.66 J	0.43 J	0.42 J	< 2 U
GM-28	9/20/2007	< 1 U	4.6	< 1 U	< 1 U	0.72 J	< 1 U	< 1 U	< 1 U	0.58 J	0.51 J	1.2	< 2 U
GM-25	9/22/1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
GM-25	9/22/1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
HR-7	9/17/1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	9.8	<1.0	<1.0
HR-7	9/19/2002	< 1.0	< 1.0	< 1.0	< 1.0	0.65	< 1.0	< 1.0	< 1.0	< 0.50	9.4	< 1.0	< 1.0
HR-7	9/19/2002	< 1.0	< 1.0	< 1.0	< 1.0	0.65	< 1.0	< 1.0	< 1.0	< 0.50	9.4	< 1.0	< 1.0
HR-5	9/16/1999	<1.0	<1.0	<1.0	<1.0	10.5	<1.0	<1.0	<1.0	1.1	12.0	<1.0	<1.0
HR-5	9/19/2000	<1.0	<1.0	<1.0	<1.0	5.6	<1.0	<1.0	3.0	<1.0	8.1	<1.0	2.0
HR-5	11/7/2001	0.17J	0.55J	< 1.0	< 1.0	7.8	< 1.0	< 1.0	< 1.0	0.74	11	< 1.0	< 1.0
HR-5	9/23/2002	< 1	0.55J	< 1	< 1	7.5	< 1	< 1	< 1	0.58	13	< 1	< 1
HR-5	9/18/2003	< 1 U	0.42 J	< 1 U	< 1 U	5	< 1 U	< 1 U	< 1 U	0.46 J	11	< 1 U	< 1 U
HR-5	9/13/2004	< 1 U	0.43 J	< 1 U	< 1 U	4.8	< 1 U	< 1 U	< 1 U	0.44 J	11	< 1 U	< 1 U
HR-5	10/18/2005	< 1.0 U	0.54 J	< 1.0 U	< 1.0 U	4.6	< 1.0 U	< 1.0 U	< 1.0 U	0.52 J	13	1.1	< 2.0 U
HR-5	9/22/2006	< 1 UJ	0.41 J	< 1 UJ	< 1 UJ	5.2 J	< 1 UJ	0.27 J	< 1 UJ	0.46 J	13 J	0.22 J	< 2 UJ
HR-5	9/24/2007	< 1 U	0.51J	< 1 U	< 1 U	5.4	< 1 U	< 1 U	< 1 U	0.41J	13	< 1 U	< 2 U
HR-6	9/16/1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.0	<1.0	<1.0
HR-6	9/23/2002	< 1	< 1	< 1	< 1	< 0.5	< 1	< 1	< 1	< 0.5	1.5	< 1	< 1
HR-1	9/16/1999	1.6	2.4	<1.0	<1.0	5.8	<1.0	44.3	<1.0	3.9	56.0	<1.0	<1.0
HR-1	9/25/2000	1.3	2.4	<1.0	<1.0	8.5	<1.0	32.6	<1.0	3.2	56.4	<1.0	<1.0
HR-1	11/8/2001	2.2J	2.8J	< 3.3	< 3.3	9.9	< 3.3	36	< 3.3	2.8	86B	< 3.3	< 3.3

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Table A-1. Groundwater Analytical Results for the Upper Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethyl-benzene	PCE	Toluene	trans-1,2-DCE	TCE	Vinyl Chloride	Xylenes
HR-1	9/23/2002	< 2	2.8	< 2	< 2	4.5	< 2	33	< 2	3.2	33	< 2	< 2
HR-1	9/18/2003	1 J	2.6	< 2 U	< 2 U	2.3	< 2 U	27	< 2 U	3.2	56	< 2 U	< 2 U
HR-1	9/13/2004	0.56 J	2.5	< 1 U	< 1 UJ	24	< 1 U	23	< 1 U	2.3	30	0.55 J	< 1 U
HR-1	10/18/2005	1.2	2.7	< 1.0 U	< 1.0 U	19	< 1.0 U	28	< 1.0 U	2.3	43	1.1	< 2.0 U
HR-1	9/25/2006	0.57 J	1.7	< 1.7 U	< 1.7 U	14	< 1.7 U	< 1.7 U	< 1.7 U	1.4 J	50	< 1.7 U	< 3.3 U
HR-1	9/24/2007	0.45J	2.2	0.21J	< 1 U	9.5	< 1 U	20	< 1 U	1.9	40	< 1 U	< 2 U
W-1-S	9/22/1999	<1.0	<1.0	<1.0	<1.0	8.0	<1.0	30.9	<1.0	1.1	11.6	<1.0	<1.0
W-1-S	9/19/2002	< 2.0	0.97J	< 2.0	< 2.0	6.0	< 2.0	62	< 2.0	1.3	16	< 2.0	< 2.0
W-1-S	9/19/2002	< 2.0	0.97J	< 2.0	< 2.0	6.0	< 2.0	62	< 2.0	1.3	16	< 2.0	< 2.0
ME-6	8/31/1999	2.9	<1.0	<1.0	<1.0	255	<1.0	213	<1.0	<1.0	474	<1.0	<1.0
ME-6	9/21/2000	<1.0	<1.0	<1.0	<1.0	98.8	<1.0	6.7	1.9	2.5	19.0	6.1	<1.0
ME-6	11/15/2001	2.2	2.7	< 2.0	< 2.0	65	< 2.0	8.2	0.42J	1.8	23	13	< 2.0
ME-6	9/25/2002	< 10	< 10	< 10	< 10	5.2	< 10	< 10	6.6J	< 5	< 10	< 10	< 10
ME-6	10/1/2003	13	7.2	< 2 U	0.46 J	20	< 2 U	12	< 2 U	< 1 U	31	2.9	< 2 U
ME-6	9/15/2004	4.1	6.3	0.26 J	< 1 U	14	< 1 U	5.3	< 1 U	0.56	9.2	2.4	< 1 U
ME-6	10/18/2005	2.2	7.0	< 1.0 U	< 1.0 U	13	< 1.0 U	9.8	< 1.0 U	0.93 J	25	5.6	< 2.0 U
ME-6	9/27/2006	1.4	6.3	< 1.4 U	< 1.4 U	27	< 1.4 U	13	< 1.4 U	1.3 J	32	11	< 2.9 U
ME-6	9/20/2007	0.61 J	6.4	< 1 U	< 1 U	9.2	< 1 U	4.5	< 1 U	0.51 J	12	4.5	< 2 U
ME-1	8/31/1999	13.5	2.4	<1.0	<1.0	38.2	<1.0	83.6	<1.0	1.5	292	36	<1.0
GM-31	9/1/1999	<1.0	1.3	<1.0	<1.0	7.8	<1.0	1.3	<1.0	<1.0	27.2	<1.0	<1.0
GM-31	9/21/2000	<1.0	1.1	<1.0	<1.0	40.2	<1.0	<1.0	<1.0	<1.0	8.5	<1.0	<1.0
GM-31	11/15/2001	< 4.0	3.1J	< 4.0	< 4.0	120	< 4.0	< 4.0	< 4.0	1.8J	11	7.4	< 4.0
GM-31	9/24/2002	< 6	5.9J	< 6	< 6	200	< 6	< 6	< 6	3.5	10	19	< 6
GM-31	10/1/2003	< 5 U	6	< 5 U	< 5 U	170	< 5 U	< 5 U	< 5 U	3.5	28	10	< 5 U
GM-31	9/15/2004	1.4 J	4 J	< 5 U	< 5 U	120	< 5 U	2.5 J	< 5 U	2.7	29	2.4 J	< 5 U
GM-31	10/18/2005	3.4	6.2	0.42 J	< 2.0 U	120	< 2.0 U	< 2.0 U	< 2.0 U	3.7	67	3.1	< 4.0 U
GM-31	9/27/2006	2.3 J	5.1	< 4 U	< 4 U	110	< 4 U	< 4 U	< 4 U	2.9 J	65	1.2 J	< 8 U
GM-31	9/20/2007	3.7	4.8	< 3.3 U	< 3.3 U	100	< 3.3 U	< 3.3 U	< 3.3 U	2.8 J	90	1.1 J	6.7 U
ME-3	8/31/1999	42.5	6.1	<1.0	<1.0	5.7	<1.0	57.9	<1.0	<1.0	47.5	<1.0	<1.0
ME-3	9/21/2000	6.4	3.4	<1.0	<1.0	2.9	<1.0	<1.0	1.4	2.9	<1.0	2.1	<1.0
ME-3	11/15/2001	1.6	5.9	< 1.0	< 1.0	16	< 1.0	1.3	0.34J	2.7	3.8	7.3	< 1.0
ME-3	9/24/2002	< 2.5	< 2.5	< 2.5	< 2.5	< 1.2	< 2.5	< 2.5	< 2.5	< 1.2	< 2.5	< 2.5	< 2.5
ME-3	10/1/2003	0.31 J	24	< 1 U	0.6 J	0.96	< 1 U	< 1 U	< 1 U	< 0.5 U	1.5	< 1 U	< 1 U
ME-3	9/15/2004	0.53 J	18	< 1 U	< 1 U	2.2	< 1 U	0.21 J	< 1 U	< 0.5 U	1.5	1.1	< 1 U
ME-3	10/18/2005	1.6	15	< 1.0 U	< 1.0 U	1.1	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	1.9	1.6	< 2.0 U
ME-3	9/27/2006	1.1	8.5	< 1 U	< 1 U	3.5	< 1 U	1.9	< 1 U	0.34 J	2.4	2.2	< 2 U
ME-3	9/20/2007	2	3.8	< 1 U	< 1 U	1.2	< 1 U	5.2	< 1 U	< 1 U	3.6	0.82 J	< 2 U

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Table A-1. Groundwater Analytical Results for the Upper Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											Vinyl Chloride	Xylenes
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethylbenzene	PCE	Toluene	trans-1,2-DCE	TCE			
GM-43	9/22/2006	< 5 UJ	3.7 J	< 5 UJ	< 5 UJ	120 J	< 5 UJ	21 J	< 5 UJ	5.7 J	98 J	< 5 UJ	< 10 UJ	
GM-45	9/22/2006	3.5 J	3.1 J	< 8 UJ	< 8 UJ	54 J	< 8 UJ	230 J	< 8 UJ	2.7 J	230 J	< 8 UJ	< 16 UJ	
HR-16	9/23/1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.7	<1.0	<1.0	
HR-16	9/18/2002	< 1.0	< 1.0	< 1.0	< 1.0	0.46J	< 1.0	< 1.0	< 1.0	< 0.50	1.5	< 1.0	< 1.0	
HR-17	9/23/1999	<1.0	<1.0	<1.0	<1.0	6.2	<1.0	15.5	<1.0	<1.0	7.4	<1.0	<1.0	
HR-17	9/28/2000	1.9	<1.0	<1.0	<1.0	<1.0	<1.0	3.7	<1.0	<1.0	4.4	<1.0	<1.0	
HR-17	11/8/2001	1.4	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	3.3	< 1.0	< 0.50	4.2B	< 1.0	< 1.0	
HR-17	9/18/2002	0.39J	1.5	< 1.0	< 1.0	5.1	< 1.0	22	< 1.0	1.4	12	< 1.0	< 1.0	
HR-17	9/25/2003	< 2 U	0.75 J	< 2 U	< 2 U	2.2	< 2 U	64	< 2 U	0.7 J	10	< 2 U	< 2 U	
HR-17	9/17/2004	< 5 U	2 J	< 5 U	< 5 U	7.1	< 5 U	82	< 5 U	1.6 J	18	< 5 U	< 5 U	
HR-17	10/19/2005	< 1.8 U	0.70 J	< 1.8 U	< 1.8 U	3.1	< 1.8 U	45	< 1.8 U	0.57 J	8.3	< 1.8 U	< 3.7 U	
HR-17	9/18/2006	< 1 U	0.6 J	< 1 U	< 1 U	4.6	< 1 U	34	< 1 U	0.46 J	5.6	< 1 U	< 2 U	
HR-17	9/25/2007	< 2.5 U	1.2 J	< 2.5 U	< 2.5 U	1.9 J	< 2.5 U	51	< 2.5 U	0.69 J	16	< 2.5 U	< 5 U	
W-2-S	9/23/1999	1.9J	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	6.1	<1.0	<1.0	
W-2-S	9/27/2000	1.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5.0	<1.0	<1.0	
W-2-S	11/8/2001	1.7	0.58J	< 1.0	< 1.0	0.49J	< 1.0	< 1.0	< 1.0	< 0.50	5.2B	< 1.0	< 1.0	
W-2-S	9/18/2002	1.5	0.98J	< 1.0	< 1.0	0.90	< 1.0	< 1.0	< 1.0	< 0.50	4.9	< 1.0	< 1.0	
W-2-S	9/26/2003	1.4	0.99 J	< 1 U	< 1 U	0.74	< 1 U	< 1 U	0.25 J	< 0.5 U	5.5	< 1 U	< 1 U	
W-2-S	9/17/2004	1.5	1.3	< 1 U	< 1 U	1.1	< 1 U	0.55 J	< 1 U	< 0.5 U	6	< 1 U	< 1 U	
W-2-S	10/19/2005	1.6	1.2	< 1.0 U	< 1.0 U	0.78 J	< 1.0 U	0.36 J	< 1.0 U	< 1.0 U	5.4	< 1.0 U	< 2.0 U	
W-2-S	9/18/2006	1.8	1.2	< 1 U	< 1 U	1.2	< 1 U	< 1 U	< 1 U	< 1 U	5.1	< 1 U	< 2 U	
W-2-S	9/24/2007	1.4	1.1	< 1 U	< 1 U	0.89 J	< 1 U	< 1 U	< 1 U	< 1 U	5.3	< 1 U	< 2 U	
W-3-S	9/23/1999	3.9	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	2.6	<1.0	<1.0	
W-3-S	9/28/2000	2.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.5	<1.0	<1.0	
W-3-S	11/8/2001	1.6	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	0.44J	< 1.0	< 0.50	1.5B	< 1.0	< 1.0	
W-3-S	9/18/2002	2.1	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	0.61J	< 1.0	< 0.50	2.4	< 1.0	< 1.0	
W-3-S	9/26/2003	1.8	< 1 U	< 1 U	< 1 U	0.34 J	< 1 U	0.81 J	< 1 U	< 0.5 U	2	< 1 U	< 1 U	
W-3-S	9/17/2004	2.4	0.21 J	< 1 U	< 1 U	< 0.5 U	< 1 U	1.2	< 1 U	< 0.5 U	2.9	< 1 U	< 1 U	
W-3-S	10/19/2005	2.5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	1.0	< 1.0 U	< 1.0 U	2.9	< 1.0 U	< 2.0 U	
W-3-S	9/18/2006	2.5	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	0.6 J	< 1 U	< 1 U	3.4	< 1 U	< 2 U	
W-3-S	9/24/2007	1.4	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	0.72 J	< 1 U	< 1 U	2	< 1 U	< 2 U	
W-4-S	9/23/1999	3.3	1.2	<1.0	<1.0	4.4	<1.0	30.5J	<1.0	<1.0	14.7J	<1.0	<1.0	
W-4-S	9/28/2000	3.0	1.0	<1.0	<1.0	4.0	<1.0	15.4	<1.0	<1.0	11.3	<1.0	<1.0	
W-4-S	11/8/2001	2.9	1.1	< 1.0	< 1.0	3.3	< 1.0	13	< 1.0	0.43J	8.9B	< 1.0	< 1.0	
W-4-S	9/18/2002	2.3	0.87J	< 1.0	< 1.0	3.6	< 1.0	17	< 1.0	0.60	9.8	< 1.0	< 1.0	
W-4-S	9/26/2003	2	0.92 J	< 1 U	< 1 U	3.6	< 1 U	24	0.25 J	0.78	13	< 1 U	< 1 U	
W-4-S	9/17/2004	2.3	1.2	< 1 U	< 1 U	4.4	< 1 U	18	< 1 U	0.97	13	< 1 U	< 1 U	

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Table A-1. Groundwater Analytical Results for the Upper Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethyl-benzene	PCE	Toluene	trans-1,2-DCE	TCE	Vinyl Chloride	Xylenes
W-4-S	10/19/2005	2.4	1.4	< 1.0 U	< 1.0 U	4.3	< 1.0 U	20	< 1.0 U	1.1	13	< 1.0 U	< 2.0 U
W-4-S	9/19/2006	1.7	1.3	< 1 U	< 1 U	4.3	< 1 U	18	< 1 U	1	12	< 1 U	< 2 U
W-4-S	9/24/2007	1.5	1.8	< 1 U	< 1 U	5.9	< 1 U	26	< 1 U	1.3	16	< 1 U	< 2 U
GM-19S	9/20/1999	16.0	7.7	1.0	<1.0	34.6	<10	46.0	<1.0	2.3	71.1	<1.0	<10
GM-19S	9/22/2000	14.5	4.4	<1.0	<1.0	37.6	<1.0	68.0	<1.0	2.6	104	<1.0	<1.0
GM-19S	11/12/2001	7.6	2.9J	< 3.3	< 3.3	26	< 3.3	64	< 3.3	2.0	97	< 3.3	< 3.3
GM-19S	9/26/2002	6.3	6.3	< 4	< 4	39	< 4	52	< 4	2.7	110	5.2	< 4
GM-19S	9/25/2003	13	8.3	1.6 J	< 5 U	89	< 5 U	62	< 5 U	2.9	140	< 5 U	< 5 U
GM-19S	9/13/2004	14	8.1	1.9 J	< 4 U	61	< 4 U	71	< 4 U	2.4	120	< 4 U	< 4 U
GM-19S	10/18/2005	13	9.0	1.2 J	< 1.7 U	29	< 1.7 U	95	< 1.7 U	1.0 J	140	1.8	< 3.3 U
GM-19S	9/21/2006	9.7 J	7 J	< 22 U	< 22 U	660	< 22 U	9.1 J	< 22 U	10 J	11 J	< 22 U	< 44 U
GM-19S	9/17/2007	0.59 J	10	< 1 U	< 1 U	0.3 J	< 1 U	1.5	< 1 U	0.29 J	0.46 J	< 1 U	< 2 U
EAST	9/21/1999	21.0	5.4	<1.0	<1.0	9.1	<1.0	61.0	<1.0	<1.0	56.1	<1.0	<1.0
EAST	9/22/2000	22.2	7.7	1.2	<1.0	77.3	<1.0	55.8	<1.0	1.8	97.2	3.0	<1.0
EAST	11/12/2001	13	6.2	0.90J	< 3.3	51	< 3.3	56	< 3.3	2.7	92	1.5J	< 3.3
EAST	9/23/2002	10	3.9	0.73J	< 2	8.8	< 2	49	< 2	< 1	46	< 2	< 2
EAST	9/25/2003	7.1	2.3	< 2 U	< 2 U	4.3	< 2 U	47	< 2 U	< 1 U	35	< 2 U	< 2 U
EAST	9/13/2004	5.7	0.72 J	0.34 J	< 1 U	1.6	< 1 U	40	< 1 U	< 0.5 U	23	< 1 U	< 1 U
EAST	10/18/2005	5.9	3.0	< 1.0 U	< 1.0 U	3.1	< 1.0 U	47	< 1.0 U	< 1.0 U	23	1.2	< 2.0 U
EAST	9/21/2006	10	3.2	0.59 J	< 1.4 U	4.1	< 1.4 U	41	< 1.4 U	< 1.4 U	29	< 1.4 U	< 2.9 U
WEST	9/21/1999	24.8	25.6	<1.0	<1.0	125	<1.0	41.3	<1.0	<1.0	37.3	<1.0	<1.0
GM-33	9/25/2003	21	8.4	1 J	< 2.5 U	19	< 2.5 U	37	< 2.5 U	0.72 J	75	< 2.5 U	< 2.5 U
GM-33	9/13/2004	17	5.4	1.1 J	< 2 U	9.5	< 2 U	37	< 2 U	0.45 J	55	< 2 U	< 2 U
GM-33	10/18/2005	18	6.4	0.69 J	< 1.0 U	7.4	< 1.0 U	50	< 1.0 U	0.36 J	71	1.0	< 2.0 U
GM-33	9/21/2006	18	4.5	1.1 J	< 1.7 U	6.9	< 1.7 U	37	< 1.7 U	0.44 J	64	< 1.7 U	< 3.3 U
GM-33	9/24/2007	15	4.9	0.68 J	< 1.7 U	5.5	< 1.7 U	32	< 1.7 U	0.34 J	49	< 1.7 U	< 3.3 U
GM-35	9/25/2003	17	46	4 J	< 8 U	300	< 8 U	21	< 8 U	12	270	59	< 8 U
GM-35	9/13/2004	17	36	4.1 J	< 11 U	270	< 11 U	21	< 11 U	9.1	230	50	< 11 U
GM-35	10/18/2005	12	36	1.8 J	< 5.0 U	190	< 5.0 U	29	< 5.0 U	9.3	240	23	< 10 U
GM-35	9/22/2006	5.5 J	26 J	< 5 UJ	< 5 UJ	160 J	< 5 UJ	14 J	< 5 UJ	11 J	130 J	13 J	< 10 UJ
GM-35	9/24/2007	5.8 J	26	< 10 U	< 10 U	140	< 10 U	22	< 10 U	8 J	110	12	< 20 U
GM-32	9/22/1999	<1.0	3.3	<1.0	<1.0	2.6	<1.0	1.2	1.0	4.2	3.2	3.0	<1.0
GM-32	9/25/2000	<1.0	35.9	<1.0	<1.0	<1.0	<1.0	<1.0	10.4	20.3	<1.0	<1.0	<1.0
GM-32	11/12/2001	< 5.0	6.2	< 5.0	4.3J	< 2.5	0.79J	< 5.0	12	2.9	< 5.0	1.1J	3.0J
GM-32	9/20/2002	< 10	9.7J	< 10	< 10	< 5	< 10	< 10	< 10	< 5	< 10	< 10	< 10
GM-32	10/1/2003	< 2 U	5.5	< 2 U	1.5 J	< 1 U	< 2 U	< 2 U	< 2 U	1	< 2 U	< 2 U	< 2 U
GM-32	9/14/2004	< 10 U	3 J	< 10 U	< 10 U	< 5 U	< 10 U	< 10 U	< 10 U	< 5 U	< 10 U	< 10 U	< 10 U

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Table A-1. Groundwater Analytical Results for the Upper Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											Vinyl Chloride	Xylenes
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethylbenzene	PCE	Toluene	trans-1,2-DCE	TCE			
GM-32	10/19/2005	< 10 U	4.9 J	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 20 U
GM-32	9/19/2006	< 10 U	3.7 J	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 10 U	< 20 U
GM-32	9/18/2007	< 5 U	4.3 J	< 5 U	1.6 J	< 5 U	< 5 U	< 5 U	< 5 U	1 J	< 5 U	< 5 U	< 5 U	3.4 J
GM-22	9/1/1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.6	<1.0	<1.0	4.0	<1.0	<1.0	<1.0
GM-22	9/21/2000	<1.0	2.4	<1.0	<1.0	1.9	<1.0	1.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
GM-22	11/13/2001	4.4	6.8	0.58J	< 1.0	8.5	< 1.0	4.9	< 1.0	0.17J	7.5	0.60J	< 1.0	< 1.0
GM-22	9/25/2002	0.93J	< 2	< 2	< 2	< 1	< 2	2.3	< 2	< 1	7.6	< 2	< 2	< 2
GM-22	9/24/2003	1.2	1	< 1 U	< 1 U	0.45 J	< 1 U	2.9	< 1 U	< 0.5 U	7.6	< 1 U	< 1 U	< 1 U
GM-22	9/14/2004	1.7	2.1	< 1 U	< 1 U	0.9	< 1 U	2.9	< 1 U	< 0.5 U	10	< 1 U	< 1 U	< 1 U
GM-22	10/17/2005	0.96 J	1.0	< 1.0 U	< 1.0 U	0.36 J	< 1.0 U	3.6	< 1.0 U	< 1.0 U	4.7	< 1.0 U	< 2.0 U	< 2.0 U
GM-22	9/20/2006	0.47 J	1.1	< 1 U	< 1 U	0.28 J	< 1 U	3.2	< 1 U	< 1 U	3	< 1 U	< 2 U	< 2 U
GM-22	9/26/2007	0.66 J	0.72 J	< 1 U	< 1 U	0.24 J	< 1 U	3.3	< 1 U	< 1 U	3.3	< 1 U	< 2 U	< 2 U
GM-21	9/22/1999	53.1	9.0	3.9	<1.0	66.4	<1.0	<1.0	<1.0	7.8	28.7	<1.0	<1.0	<1.0
GM-21	9/22/2000	15.7	5.6	1.6	<1.0	38.7	<1.0	<1.0	<1.0	12.9	189	<1.0	<1.0	<1.0
GM-21	11/13/2001	6.9	3.8J	< 5.0	< 5.0	39	< 5.0	< 5.0	< 5.0	15	160	< 5.0	< 5.0	< 5.0
GM-21	9/25/2002	31	5J	2.6J	< 6.7	43	< 6.7	< 6.7	< 6.7	5.1	230	< 6.7	< 6.7	< 6.7
GM-21	9/24/2003	31	6.9 J	2 J	< 8 U	100	< 8 U	< 8 U	< 8 U	2.9 J	200	< 8 U	< 8 U	< 8 U
GM-21	9/14/2004	26	4.2 J	3.1 J	< 9.1 U	56	< 9.1 U	< 9.1 U	< 9.1 U	7.9	180	< 9.1 U	< 9.1 U	< 9.1 U
GM-21	10/17/2005	4.3	3.4	< 1.0 U	< 1.0 U	20	< 1.0 U	< 1.0 U	< 1.0 U	22	1.8	13	< 2.0 U	< 2.0 U
GM-21	9/20/2006	12	8.6	0.19 J	< 1 U	14	< 1 U	< 1 U	< 1 U	4.3	5.9	9.3	< 2 U	< 2 U
GM-21	9/26/2007	8.5	18	<1.4 U	<1.4 U	26	<1.4 U	<1.4 U	<1.4 U	2.5	2.8	12	< 2.9 U	< 2.9 U
GM-8	9/20/1999	1.9	30.2	<1.0	3.4	26.2	20.7	14.8	<1.0	12.0	30.4	8.4	2.3	2.3
GM-8	9/26/2000	<1.0	36.5	<1.0	1.1	1.5	12.5	<1.0	<1.0	5.4	6.6	2.4	1.9	1.9
GM-8	11/9/2001	0.40J	40	< 1.0	0.78J	2.0	0.40J	< 1.0	< 1.0	3.6	4.4	1.9	0.39J	0.39J
GM-8	9/20/2002	< 2	63	< 2	5.5	5.5	7.5	< 2	1.8J	9	< 2	5.8	1.5J	1.5J
GM-8	10/1/2003	< 2 U	48	< 2 U	5.4	< 1 U	11	< 2 U	< 2 U	4.4	< 2 U	< 2 U	< 2 U	< 2 U
GM-8	9/14/2004	< 1 U	15	< 1 U	4.2	< 0.5 U	19	< 1 U	< 1 U	1.1	< 1 U	0.48 J	1.1	1.1
GM-8	10/19/2005	< 1.0 U	16	< 1.0 U	3.5	0.24 J	29	< 1.0 U	0.39 J	0.99 J	< 1.0 U	0.73 J	< 2.0 U	< 2.0 U
GM-8	9/19/2006	< 5 U	18	< 5 U	2.1 J	2.1 J	< 5 U	< 5 U	< 5 U	1 J	< 5 U	3.2 J	< 10 U	< 10 U
GM-8	9/18/2007	< 2 U	9.1	< 2 U	2.4	< 2 U	1.7 J	< 2 U	< 2 U	0.9 J	< 2 U	< 2 U	0.9 J	0.9 J

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Table A-1. Groundwater Analytical Results for the Upper Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											Vinyl Chloride	Xylenes
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethylbenzene	PCE	Toluene	trans-1,2-DCE	TCE			
GM-6	9/20/1999	24.6	33.2	1.2	<1.0	52.9	<10	81.4	<1.0	2.0	78.2	1.6	<10	
GM-6	9/26/2000	12.1	13.0	<1.0	<1.0	41.0	<1.0	51.5	<1.0	2.2	56.6	3.7	<1.0	
GM-6	11/9/2001	3.9	14	< 2.0	< 2.0	8.2	< 2.0	14	< 2.0	1.8	48	1.9J	< 2.0	
GM-6	9/20/2002	1.4J	60	< 2	2.2	43	< 2	14	< 2	8.6	33	12	< 2	
GM-6	10/2/2003	0.19 J	20	< 1 U	1	13	0.22 J	11	< 1 U	2.5	23	3.3	< 1 U	
GM-6	9/14/2004	< 1 U	18	< 1 U	1.7	10	< 1 U	2.6	< 1 U	1.9	5.7	3	< 1 U	
GM-6	10/19/2005	< 1.0 U	21	< 1.0 U	0.49 J	20	< 1.0 U	0.34 J	< 1.0 U	2.1	1.4	11	< 2.0 U	
GM-6	9/19/2006	< 1 U	16	< 1 U	< 1 U	18	< 1 U	< 1 U	< 1 U	1.6	0.35 J	7.3	< 2 U	
GM-6	9/18/2007	< 1 U	26	< 1 U	0.42 J	16	< 1 U	< 1 U	< 1 U	2.6	0.34 J	6.7	< 2 U	
Downgradient of the Site														
TW-2	9/26/2000	4.5	27.8	<1.0	<1.0	22.5	10.4	5.0	<1.0	2.9	43.1	5.9	3.2	
TW-2	11/9/2001	3.9	20	< 2.0	< 2.0	8.8	0.38J	8.5	< 2.0	2.4	48	2.7	< 2.0	
TW-2	9/20/2002	2.2	9	< 2	< 2	26	< 2	5.9	< 2	1.4	70	2.5	< 2	
TW-2	10/2/2003	0.66 J	5.7	< 1 U	1.5	8.3	0.86 J	4.7	< 1 U	0.59	24	1.4	< 1 U	
TW-2	9/14/2004	< 1 U	22	< 1 U	2.9	5.5	< 1 U	< 1 U	< 1 U	2	1.5	2.5	< 1 U	
TW-2	10/20/2005	< 1.0 U	12	< 1.0 U	2.5	5.3	12	< 1.0 U	3.4	1.4	< 1.0 U	4.4	5.0	
TW-2	9/19/2006	0.55 J	3.4	< 1 U	< 1 U	11	< 1 U	7	< 1 U	0.38 J	32	0.27 J	< 2 U	
TW-2	9/18/2007	< 1 U	1.7	< 1 U	0.81 J	7.9	< 1 U	1.9	< 1 U	0.25 J	24	0.97 J	< 2 U	
4S	9/20/1999	<1.0	1.6	<1.0	1.6	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<10	
4S	10/2/2003	< 2 U	7	< 2 U	1.6 J	< 1 U	1.7 J	< 2 U	< 2 U	1.7	< 2 U	< 2 U	< 2 U	
4S	9/14/2004	< 5 U	7.5	< 5 U	4.5 J	< 2.5 U	4.7 J	< 5 U	1.1 J	< 2.5 U	< 5 U	< 5 U	2.4 J	
4S	10/19/2005	< 4.0 U	2.3 J	< 4.0 U	1.6 J	< 4.0 U	1.6 J	< 4.0 U	< 4.0 U	0.95 J	< 4.0 U	< 4.0 U	< 8.0 U	
4S	9/20/2006	< 1 U	5.6	< 1 U	0.7 J	0.25 J	0.52 J	< 1 U	< 1 U	0.75 J	< 1 U	< 1 U	< 2 U	
GM-2	9/20/1999	5.5	1.4	<1.0	<1.0	8.4	<10	6.0	<1.0	<1.0	61.6	<1.0	<10	
GM-2	9/25/2000	5.7	3.7	<1.0	<1.0	39.2	<1.0	7.7	<1.0	1.3	82.8	1.7	<1.0	
GM-2	11/9/2001	6.1	6.1	< 3.3	< 3.3	26	< 3.3	8.4	< 3.3	1.1J	65	< 3.3	< 3.3	
GM-2	9/20/2002	0.75J	3.4	< 1	< 1	7.6	< 1	8.7	< 1	0.37J	26	< 1	< 1	
GM-2	10/2/2003	0.21 J	1.7	< 1 U	< 1 U	4.7	0.21 J	5.7	< 1 U	< 0.5 U	13	0.46 J	< 1 U	
GM-2	9/14/2004	< 1 U	1.6	< 1 U	< 1 U	5.6	< 1 U	4	< 1 U	0.23 J	6.2	< 1 U	< 1 U	
GM-2	10/19/2005	< 1.0 U	2.0	< 1.0 U	< 1.0 U	6.8	< 1.0 U	3.6	< 1.0 U	0.26 J	4.6	0.24 J	< 2.0 U	
GM-2	9/20/2006	< 1 U	2.1	< 1 U	< 1 U	7.7	< 1 U	2.6	< 1 U	0.34 J	5.1	0.61 J	< 2 U	
GM-2	9/18/2007	< 1 U	1.4	< 1 U	< 1 U	4.9	< 1 U	1.6	< 1 U	0.28 J	2.3	1.1	< 2 U	
GM-16	9/21/1999	2.2	<1.0	<1.0	<1.0	1.7	<1.0	44.1	<1.0	<1.0	8.5	<1.0	<1.0	
GM-16	9/26/2000	2.5	<1.0	<1.0	<1.0	<1.0	<1.0	16.2	<1.0	<1.0	3.5	<1.0	<1.0	
GM-16	11/8/2001	2.2	0.31J	< 1.0	< 1.0	0.39J	< 1.0	17	< 1.0	< 0.50	3.6	< 1.0	< 1.0	
GM-16	9/24/2002	1.4J	4.1	< 2	< 2	6.2	< 2	63	< 2	1.6	28	< 2	< 2	
GM-16	9/22/2003	1.9 J	2.8 J	< 4 U	< 4 U	5.8	< 4 U	110	< 4 U	1.1 J	57	< 4 U	< 4 U	

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Table A-1. Groundwater Analytical Results for the Upper Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											Vinyl Chloride	Xylenes
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethyl-benzene	PCE	Toluene	trans-1,2-DCE	TCE			
GM-16	9/16/2004	3.1 J	4.3	< 3.3 U	< 3.3 U	7.4	< 3.3 U	130	< 3.3 U	1 J	90	< 3.3 U	< 3.3 U	
GM-16	10/19/2005	1.7 J	1.1 J	< 3.3 U	< 3.3 U	2.8 J	< 3.3 U	100	< 3.3 U	0.90 J	55	< 3.3 U	< 6.7 U	
GM-16	9/18/2006	2.1	1.1 J	< 1.4 U	< 1.4 U	3.8	< 1.4 U	98	< 1.4 U	1 J	51	< 1.4 U	< 2.9 U	
GM-16	9/25/2007	1.4 J	1.5 J	< 4 U	< 4 UJ	43	< 4 U	94	< 4 U	1.3 J	52	< 4 U	< 8 U	
GM-17	9/21/1999	6.4	26.4	<1.0	<1.0	30.0	<1.0	<1.0	<1.0	2.6	28.7	1.4	<1.0	
GM-17	9/27/2000	6.7	23.9	<1.0	<1.0	41.6	<1.0	24.6	<1.0	2.5	48.4	<1.0	<1.0	
GM-17	11/8/2001	6.8	7.3	< 3.3	< 3.3	16	< 3.3	48	< 3.3	1.8	79	< 3.3	< 3.3	
GM-17	9/19/2002	2.3	6.0	< 1.2	< 1.2	13	< 1.2	22	< 1.2	0.67	39	0.79J	< 1.2	
GM-17	9/24/2003	1.3	1.2	< 1 U	< 1 U	2.9	< 1 U	12	< 1 U	< 0.5 U	24	< 1 U	< 1 U	
GM-17	9/15/2004	1.1	4	< 1 U	< 1 U	11	< 1 U	3.6	< 1 U	0.64	22	0.49 J	< 1 U	
GM-17	10/20/2005	1.4	5.5	< 1.0 U	< 1.0 U	9.0	< 1.0 U	8.1	< 1.0 U	0.57 J	29	2.0	< 2.0 U	
GM-17	9/27/2006	0.46 J	3.2	< 1 U	< 1 U	9.5	< 1 U	11	< 1 U	0.49 J	24	0.54 J	< 2 U	
GM-17	9/18/2007	0.31 J	1.5	< 1 U	< 1 U	4	< 1 U	7.3	< 1 U	0.22 J	15	< 1 U	< 2 U	
GM-18	9/22/1999	42.6	22.6	1.3	<1.0	35.3	<1.0	4.9	<1.0	2.2	131	<1.0	<1.0	
GM-18	9/27/2000	31.8	10.4	<1.0	<1.0	23.9	<1.0	7.8	<1.0	1.8	115	<1.0	<1.0	
GM-18	11/8/2001	23	3.3	1.3J	< 3.3	14	< 3.3	12	< 3.3	1.6J	93	< 3.3	< 3.3	
GM-18	9/19/2002	18	6.0	< 3.3	< 3.3	15	< 3.3	28	< 3.3	1.6J	98	< 3.3	< 3.3	
GM-18	9/22/2003	10	3.7	< 2 U	< 2 U	8.8	< 2 U	24	< 2 U	< 1 U	77	0.75 J	< 2 U	
GM-18	9/15/2004	5.2	2.2	0.46 J	< 2 U	5.9	< 2 U	20	< 2 U	< 1 U	53	< 2 U	< 2 U	
GM-18	10/20/2005	7.0	15	0.30 J	< 1.0 U	14	< 1.0 U	21	< 1.0 U	1.2	70 J	3.0	< 2.0 U	
GM-18	9/27/2006	6.2	17	< 2.9 U	< 2.9 U	21	< 2.9 U	15	< 2.9 U	2 J	72	2.5 J	< 5.7 U	
GM-18	9/19/2007	5.4	13	< 2.5 U	< 2.5 U	19	< 2.5 U	14	< 2.5 U	1.2 J	64	1.1 J	< 5 U	
WSU-24	9/23/1999	2.4	<1.0	<1.0	<1.0	<1.0	<1.0	1.9	<1.0	<1.0	17.0	<1.0	<1.0	
WSU-24	9/26/2000	2.1	<1.0	<1.0	<1.0	2.7	<1.0	1.2	<1.0	<1.0	16.8	<1.0	<1.0	
WSU-24	11/9/2001	2.4	0.81J	< 1.0	< 1.0	4.0	< 1.0	1.6	< 1.0	< 0.50	18	< 1.0	< 1.0	
WSU-24	9/24/2002	1.4	< 1	< 1	< 1	< 0.5	< 1	1.2	< 1	< 0.5	13	< 1	< 1	
WSU-24	9/22/2003	0.67 J	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	1	< 1 U	< 0.5 U	7.9	< 1 U	< 1 U	
WSU-24	9/16/2004	0.58 J	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	1.3	< 1 U	< 0.5 U	8	< 1 U	< 1 U	
WSU-24	10/20/2005	1.5	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	1.2	< 1.0 U	< 1.0 U	11	< 1.0 U	< 2.0 U	
WSU-24	9/26/2006	0.65 J	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	0.81 J	< 1 U	< 1 U	10	< 1 U	< 2 U	
WSU-24	9/19/2007	0.66 J	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	0.89 J	< 1 U	< 1 U	7.9	< 1 U	< 2 U	
GM-10	9/21/1999	1.7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	14.8	<1.0	<1.0	
GM-10	9/27/2000	2.5	1.4	<1.0	<1.0	5.7	<1.0	1.4	<1.0	<1.0	23.2	<1.0	<1.0	
GM-10	11/8/2001	2.7	3.4	< 1.0	< 1.0	16	< 1.0	1.9	< 1.0	0.93	27	1.2	< 1.0	
GM-10	9/18/2002	1.8	0.61J	< 1.0	< 1.0	2.3	< 1.0	1.1	< 1.0	< 0.50	19	< 1.0	< 1.0	
GM-10	9/24/2003	0.96 J	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	2.2	< 1 U	< 0.5 U	33	< 1 U	< 1 U	
GM-10	9/14/2004	1.2	< 1 U	< 1 U	< 1 U	0.38 J	< 1 U	1.5	< 1 U	< 0.5 U	15	< 1 U	< 1 U	

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Table A-1. Groundwater Analytical Results for the Upper Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											Vinyl Chloride	Xylenes
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethyl-benzene	PCE	Toluene	trans-1,2-DCE	TCE			
GM-10	10/20/2005	1.6	<1.0 U	<1.0 U	<1.0 U	0.31 J	<1.0 U	1.2	<1.0 U	<1.0 U	12	<1.0 U	<2.0 U	
GM-10	9/27/2006	0.9 J	0.29 J	<1 U	<1 U	0.77 J	<1 U	0.98 J	<1 U	<1 U	11	<1 U	<2 U	
GM-10	9/19/2007	0.75 J	<1 U	<1 U	<1 U	0.35 J	<1 U	0.93 J	<1 U	<1 U	8.8	<1 U	<2 U	
GM-26	9/22/1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
GM-26	9/27/2000	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
GM-26	11/12/2001	0.19J	<1.0	<1.0	<1.0	<0.50	<1.0	1.1	<1.0	<0.50	<1.0	<1.0	<1.0	
GM-26	9/25/2002	<1	<1	<1	<1	<0.5	<1	0.92J	<1	<0.5	<1	<1	<1	
GM-26	10/1/2003	<1 U	<1 U	<1 U	<1 U	<0.5 U	<1 U	0.85 J	<1 U	<0.5 U	<1 U	<1 U	<1 U	
GM-26	9/16/2004	<1 U	<1 U	<1 U	<1 U	<0.5 U	<1 U	1.3	<1 U	<0.5 U	<1 U	<1 U	<1 U	
GM-26	10/20/2005	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	1.0	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<2.0 U	
GM-26	9/21/2006	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	0.91 J	<1 U	<1 U	<1 U	<1 U	<2 U	
GM-26	9/27/2007	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	1.2	<1 U	<1 U	<1 U	<1 U	<2 U	
GM-47	9/25/2007	2.2 J	2.4 J	<7.1 U	<7.1 U	170	<7.1 U	71	<7.1 U	4.6 J	53	<7.1 U	<14 U	
GM-50	9/25/2007	1.4 J	1.9 J	<5.9 U	<5.9 U	130	<5.9 U	100	<5.9 U	2.5 J	44	<5.9 U	<12 U	
GM-51	9/27/2007	0.61 J	0.23 J	<1 U	<1 U	1	<1 U	7.2	0.29 J	<1 U	3.9	<1 U	<2 U	
GM-52	9/26/2007	1.3 J	1.5 J	<2.5 U	<2.5 U	18	<2.5 U	88	<2.5 U	1 J	47	<2.5 U	<5 U	
GM-63	9/25/2007	2.7 J	1.8 J	<6.7 U	<6.7 U	5 J	<6.7 U	130	<6.7 U	<6.7 U	120	<6.7 U	<13 U	
GM-64	9/25/2007	<3.3 U	2.7 J	<3.3 U	<3.3 U	74	<3.3 U	11	<3.3 U	6.6	4.5	18	<6.7 U	

All concentrations presented in ug/l.

1,1-DCA - 1,1-Dichloroethane.

1,1-DCE - 1,1-Dichloroethene.

cis-1,2-DCE - cis-1,1-Dichloroethene.

trans-1,2-DCE - trans-1,2-Dichloroethene.

PCE - Tetrachloroethene.

1,1,1-TCA - 1,1,1-Trichloroethane.

TCE - Trichloroethene.

VOCs - Volatile Organic Compounds.

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Table A-2. Groundwater Analytical Results for the Lower Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											Vinyl Chloride	Xylenes
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethylbenzene	PCE	Toluene	trans-1,2-DCE	TCE			
Upgradient of the Site														
HR-10	9/15/1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
HR-10	9/29/2000	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
HR-10	11/14/2001	<1.0	<1.0	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<1.0
HR-10	9/27/2002	<1	<1	<1	<1	<0.5	<1	<1	<1	<0.5	<1	<1	<1	<1
HR-10	9/17/2003	<1 U	<1 U	<1 U	<1 U	<0.5 U	<1 U	<1 U	<1 U	<0.5 U	<1 U	<1 U	<1 U	<1 U
HR-10	9/20/2004	<1 U	<1 U	<1 U	<1 U	<0.5 U	<1 U	<1 U	<1 U	<0.5 U	<1 U	<1 U	<1 U	<1 U
HR-10	10/24/2005	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<2.0 U	<2.0 U
HR-10	9/26/2006	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<2 U
HR-10	9/25/2007	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<2 U
HR-12	9/14/1999	<1.0UJ	2.7	<1.0	1.2	1.8	<1.0	<1.0	<1.0	<1.0	<1.0	1.7	<1.0	<1.0
HR-12	9/28/2000	<1.0	2.2	<1.0	<1.0	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.5	<1.0	<1.0
HR-12	11/14/2001	<1.0	3.6	<1.0	<1.0	2.7	<1.0	<1.0	<1.0	0.23	<1.0	3.8	<1.0	<1.0
HR-12	9/26/2002	<1	2.4	<1	<1	2.1	<1	<1	<1	<0.5	<1	1.7	<1	<1
HR-12	9/18/2003	<1 U	1.7	<1 U	<1 U	1.4	<1 U	<1 U	<1 U	<0.5 U	<1 U	1.6	<1 U	<1 U
HR-12	9/21/2004	<1 U	1.8	<1 U	<1 U	1.2	<1 U	<1 U	<1 U	<0.5 U	<1 U	1.1	<1 U	<1 U
HR-12	10/24/2005	<1.0 U	2.1	<1.0 U	<1.0 U	1.5	<1.0 U	<1.0 U	<1.0 U	<1.0 U	<1.0 U	0.36 J	<2.0 U	<2.0 U
HR-12	9/26/2006	<1 U	2.1	<1 U	<1 U	1.3	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<2 U
HR-12	9/19/2007	<1 U	2.2	<1 U	<1 U	1.3	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<1 U	<2 U
On-Site														
HR-14	9/15/1999	<1.0	<1.0	<1.0	<1.0	7.9	<1.0	<1.0	<1.0	<1.0	3.4	11.5	<1.0	<1.0
HR-14	9/30/2002	<1	<1	<1	<1	3.6	<1	<1	<1	<0.5	1.2	<1	<1	<1
HR-15	9/15/1999	<1.0	<1.0	<1.0	<1.0	2.5	<1.0	<1.0	<1.0	<1.0	<1.0	11.0	<1.0	<1.0
HR-15	9/29/2000	<1.0	<1.0	<1.0	<1.0	2.8	<1.0	<1.0	<1.0	<1.0	<1.0	11.2	<1.0	<1.0
HR-15	11/14/2001	<1.0	<1.0	<1.0	<1.0	0.86	<1.0	<1.0	<1.0	<0.50	<1.0	<1.0	<1.0	<1.0
HR-15	9/30/2002	<1	<1UJ	<1	<1	1	<1	<1	<1	<0.5	<1	<1	<1	<1
HR-15	9/17/2003	<1 U	<1 U	<1 U	<1 U	2.2	<1 U	<1 U	<1 U	<0.5 U	0.29 J	14	<1 U	<1 U
HR-15	9/21/2004	<1 U	<1 U	<1 U	<1 U	2.5	<1 U	<1 U	<1 U	<0.5 U	0.38 J	19	<1 U	<1 U
HR-15	10/25/2005	<1.0 U	<1.0 U	<1.0 U	<1.0 U	2.2	<1.0 U	<1.0 U	<1.0 U	<1.0 U	0.40 J	14	<2.0 U	<2.0 U
HR-15	9/25/2006	<1 U	<1 U	<1 U	<1 U	2.2	<1 U	<1 U	<1 U	<1 U	0.5 J	13	<2 U	<2 U
HR-15	9/26/2007	<1 U	<1 U	<1 U	<1 U	2.5	<1 U	<1 U	<1 U	<1 U	0.37 J	15	<2 U	<2 U
HR-13	9/15/1999	1.6	41.4	<1.0	<1.0	20.8	<1.0	<1.0	<1.0	3.1	3.4	<1.0	<1.0	<1.0
HR-13	9/29/2000	1.7	39.5	<1.0	<1.0	14.1	<1.0	<1.0	<1.0	2.5	2.0	<1.0	<1.0	<1.0
HR-13	11/14/2001	0.74J	15	<1.0	0.18J	6.5	<1.0	<1.0	<1.0	0.65	1.2	<1.0	<1.0	<1.0
HR-13	9/30/2002	1.4	25	<1	<1	11	<1	<1	<1	1.4	3.6	<1	<1	<1
HR-13	9/16/2003	2.2	33	<1 U	<1 U	12	<1 U	<1 U	<1 U	1.8	5.7	<1 U	<1 U	<1 U
HR-13	9/21/2004	2.6	30	0.27 J	<1 U	12	<1 U	<1 U	<1 U	1.5	21	0.43 J	<1 U	<1 U
HR-13	10/25/2005	2.3	25	0.25 J	<1.0 U	11	<1.0 U	0.20 J	<1.0 U	1.5	20	<1.0 U	<2.0 U	<2.0 U
HR-13	9/25/2006	2	22	0.18 J	<1 U	9	<1 U	0.2 J	<1 U	1.4	15	<1 U	<2 U	<2 U

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Table A-2. Groundwater Analytical Results for the Lower Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											Vinyl Chloride	Xylenes
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethylbenzene	PCE	Toluene	trans-1,2-DCE	TCE			
HR-13	9/25/2007	< 1 U	1.5	< 1 U	< 1 U	1.1	< 1 U	< 1 U	< 1 U	< 1 U	5.1	< 1 U	< 2 U	
31	9/29/2000	<1.0	7.4	<1.0	<1.0	8.4	<1.0	<1.0	<1.0	<1.0	12.9	4.4	<1.0	
31	11/15/2001	< 1.0	3.1	< 1.0	< 1.0	2.4	< 1.0	< 1.0	< 1.0	< 0.50	5.1	2.5	< 1.0	
39	9/27/2002	< 1	1.6	< 1	< 1	1.3	< 1	< 1	< 1	< 0.5	3.8	0.51J	< 1	
39	9/24/2003	< 1 U	0.58 J	< 1 U	< 1 U	0.71	< 1 U	< 1 U	< 1 U	< 0.5 U	0.89 J	< 1 U	< 1 U	
GM-39	12/10/2003	< 1 U	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	< 1 U	0.18 J	< 0.5 U	< 1 U	1.3	< 1 U	
GM-39	9/20/2004	< 1 U	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	1.8	< 1 U	
GM-39	10/24/2005	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	0.77 J	< 2.0 U	
GM-39	9/27/2006	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	1.7	< 2 U	
GM-39	9/26/2007	< 1 U	< 1 U	< 1 U	< 1 U	19 J	< 1 U	< 1 U	< 1 U	0.23 J	< 1 U	1.6	< 2 U	
GM-40	12/10/2003	< 1 U	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	3.1	< 1 U	
GM-40	9/20/2004	< 1 U	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	3.2	< 1 U	
GM-40	10/25/2005	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	2.9	< 2.0 U	
GM-40	9/26/2006	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	3.9	< 2 U	
GM-40	9/25/2007	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	4	< 2 U	
GM-61	9/26/2007	0.59 J	1.6 J	< 1.7 U	< 1.7 U	3.9	< 1.7 U	28	< 1.7 U	< 1.7 U	56	< 1.7 U	< 3.3 U	
GM-41	12/10/2003	< 11 U	< 11 U	< 11 U	< 1 U	10	< 11 U	< 11 U	< 11 U	< 5.6 U	320	< 11 U	< 11 U	
GM-41	9/21/2004	< 6.2 U	< 6.2 U	< 6.2 U	< 6.2 U	24	< 6.2 U	< 6.2 U	< 6.2 U	< 3.1 U	180	< 6.2 U	< 6.2 U	
GM-41	10/24/2005	< 10 U	< 10 U	< 10 U	< 10 U	16	< 10 U	< 10 U	< 10 U	< 10 U	250	< 10 U	< 20 U	
GM-41	9/18/2006	< 4 U	< 4 U	< 4 U	< 4 U	11	< 4 U	< 4 U	< 4 U	< 4 U	210	< 4 U	< 8 U	
GM-41	9/20/2007	< 6.7 U	< 6.7 U	< 6.7 U	< 6.7 U	17	< 6.7 U	< 6.7 U	< 6.7 U	1.4 J	230	1.9 J	< 13 U	
GM-58	9/20/2007	< 3.3 U	< 3.3 U	< 3.3 U	< 3.3 U	< 3.3 U	< 3.3 U	69	< 3.3 U	< 3.3 U	< 3.3 U	< 3.3 U	< 6.7 U	
GM-54	9/20/2007	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	< 5 U	150	< 5 U	< 5 U	2.4 J	< 5 U	< 10 U	
GM-42	12/9/2003	< 1 U	0.46 J	< 1 U	< 1 U	11	< 1 U	0.27 J	< 1 U	0.34 J	0.37 J	1	< 1 U	
GM-42	9/20/2004	< 1 U	0.7 J	0.25 J	< 1 U	16	< 1 U	< 1 U	< 1 U	0.44 J	0.43 J	0.92 J	< 1 U	
GM-42	10/25/2005	< 1.0 U	0.64 J	0.21 J	< 1.0 U	17	< 1.0 U	0.19 J	< 1.0 U	0.59 J	0.85 J	0.56 J	< 2.0 U	
GM-42	9/26/2006	< 1 U	0.5 J	< 1 U	< 1 U	14	< 1 U	< 1 U	< 1 U	0.44 J	0.64 J	0.45 J	< 2 U	
GM-42	9/25/2007	< 1 U	0.67 J	< 1 U	< 1 U	18	< 1 U	< 1 U	0.18 J	0.69 J	2.2	0.44 J	< 2 U	
GM-19D	9/28/1999	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	13.5	1.5	<1.0	
GM-19D	10/2/2000	<1.0	<1.0	<1.0	<1.0	3.5	<1.0	<1.0	<1.0	<1.0	2.9	15.7	<1.0	
GM-19D	11/14/2001	0.18J	< 1.0	< 1.0	< 1.0	0.92	< 1.0	< 1.0	0.38J	< 0.50	3.7	13	< 1.0	
GM-19D	9/26/2002	< 1	< 1	< 1	< 1	0.81	< 1	< 1	< 1	< 0.5	3.1	0.36J	< 1	
GM-19D	9/25/2003	< 1 U	< 1 U	< 1 U	< 1 U	1.8	< 1 U	< 1 U	< 1 U	< 0.5 U	0.24 J	17	< 1 U	
GM-19D	9/20/2004	0.31 J	< 1 U	< 1 U	< 1 U	2	< 1 U	< 1 U	< 1 U	< 0.5 U	3.5	18	< 1 U	
GM-19D	10/25/2005	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	2.7	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	1.2	15	< 2.0 U	
GM-19D	9/26/2006	< 1 U	< 1 U	< 1 U	< 1 U	2	< 1 U	< 1 U	< 1 U	< 1 U	1.4	18	< 2 U	
GM-19D	9/17/2007	0.25 J	< 1 U	< 1 U	< 1 U	1.4	< 1 U	< 1 U	< 1 U	< 1 U	3.2	16	< 2 U	
GM-7R	9/28/1999	4.2	<1.0	<1.0	<1.0	2.1	<1.0	<1.0	<1.0	<1.0	76.1	<1.0	<1.0	

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Table A-2. Groundwater Analytical Results for the Lower Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethylbenzene	PCE	Toluene	trans-1,2-DCE	TCE	Vinyl Chloride	Xylenes
Downgradient of the Site													
GM-3	9/28/1999	1.7	<1.0	<1.0	<1.0	1.1	<1.0	1.2	<1.0	<1.0	7.5	<1.0	<1.0
GM-3	10/2/2000	1.0	2.1	<1.0	<1.0	8.3	<1.0	1.5	<1.0	1.1	9.4	<1.0	<1.0
GM-3	11/14/2001	0.16J	0.95J	< 1.0	< 1.0	2.6	< 1.0	0.48J	< 1.0	0.25J	2.9	< 1.0	< 1.0
GM-3	10/1/2002	0.74J	1.8	< 1	< 1	8.9	< 1	1.4	< 1	1.2	9.5	0.63J	< 1
GM-3	10/2/2003	0.96 J	1.6	< 1 U	< 1 U	5.5	0.26 J	1.7	< 1 U	0.77	12	< 1 U	< 1 U
GM-3	9/21/2004	1	1.8	< 1 U	< 1 U	4.9	< 1 U	2	< 1 U	0.75	13	< 1 U	< 1 U
GM-3	10/25/2005	0.83 J	1.6	< 1.0 U	< 1.0 U	4.7	< 1.0 U	2.0	< 1.0 U	0.66 J	14	< 1.0 U	< 2.0 U
GM-3	9/22/2006	0.59 J	2 J	< 1 UJ	< 1 UJ	6.1 J	< 1 UJ	2.1 J	< 1 UJ	1 J	13 J	0.27 J	< 2 UJ
GM-3	9/18/2007	0.67 J	1.5	< 1 U	< 1 U	3.8	< 1 U	1.9	< 1 U	0.77 J	14	< 1 U	< 2 U
GM-4	9/28/1999	<1.0	<1.0	<1.0	<1.0	2.3	<1.0	<1.0	<1.0	<1.0	13.4	<1.0	<1.0
GM-5	9/28/1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.9	<1.0	1.3	<1.0	<1.0
GM-1	9/28/1999	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	2.0	5.2	<1.0	30.6	<1.0	<1.0
GM-1	10/2/2000	2.2	<1.0	<1.0	<1.0	<1.0	<1.0	2.8	<1.0	<1.0	37.2	<1.0	<1.0
GM-1	11/14/2001	0.80J	0.29J	< 1.0	< 1.0	< 0.50	< 1.0	1.3	< 1.0	< 0.50	19	< 1.0	< 1.0
GM-1	10/1/2002	1.3 J	0.48 J	< 1.4 U	< 1.4 U	0.95	< 1.4 U	2.3	< 1.4 U	< 0.72 U	39	< 1.4 U	< 1.4 U
GM-1	10/2/2003	1.2	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	2	< 1 U	< 0.5 U	34	< 1 U	< 1 U
GM-1	9/21/2004	1.2	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	2.1	< 1 U	< 0.5 U	35	< 1 U	< 1 U
GM-1	10/25/2005	0.95 J	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	2.1	< 1.0 U	< 1.0 U	34	< 1.0 U	< 2.0 U
GM-1	9/20/2006	0.76 J	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	2.1	< 1 U	< 1 U	34	< 1 U	< 2 U
GM-1	9/18/2007	0.74 J	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	1.8	< 1 U	< 1 U	32	< 1 U	< 2 U
GM-15	9/24/1999	<1.0	2.4	<1.0	<1.0	4.3	<1.0	<1.0	<1.0	<1.0	4.1	<1.0	<1.0
GM-15	10/2/2000	<1.0	2.3	<1.0	<1.0	2.6	<1.0	<1.0	<1.0	<1.0	4.7	<1.0	<1.0
GM-15	11/14/2001	< 1.0	1.4	< 1.0	< 1.0	1.2	< 1.0	< 1.0	< 1.0	< 0.50	4.9	< 1.0	< 1.0
GM-15	9/27/2002	< 1	1.6	< 1	< 1	1.8	< 1	< 1	< 1	< 0.5	4.7	< 1	< 1
GM-15	9/22/2003	< 1 U	1.7	< 1 U	< 1 U	1.6	< 1 U	< 1 U	< 1 U	< 0.5 U	5.9	< 1 U	< 1 U
GM-15	9/20/2004	< 1 U	1.8	< 1 U	< 1 U	1.4	< 1 U	< 1 U	< 1 U	< 0.5 U	5.8	< 1 U	< 1 U
GM-15	10/26/2005	< 1.0 U	1.7	< 1.0 U	< 1.0 U	1.7	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	5.9	< 1.0 U	< 2.0 U
GM-15	9/18/2006	< 1 U	1.6	< 1 U	< 1 U	1.2	< 1 U	< 1 U	< 1 U	< 1 U	6.3	< 1 U	< 2 U
GM-15	9/25/2007	< 1 U	1.5	< 1 U	< 1 U	1.1	< 1 U	< 1 U	< 1 U	< 1 U	5.1	< 1 U	< 2 U
GM-14	9/24/1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
GM-13	9/24/1999	1.9	<1.0	<1.0	<1.0	<1.0	<1.0	3.6	<1.0	<1.0	31.0	<1.0	<1.0
GM-11	9/24/1999	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.5	<1.0	<1.0	14.5	<1.0	<1.0
GM-11	10/2/2000	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	3.0	<1.0	<1.0	41.3	<1.0	<1.0
GM-11	11/14/2001	0.33J	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	1.0	< 1.0	< 0.50	12	< 1.0	< 1.0
GM-11	10/1/2002	1	0.34J	< 1	< 1	0.62	< 1	2.2	< 1	< 0.5	35	< 1	< 1
GM-11	9/24/2003	0.96 J	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	2.2	< 1 U	< 0.5 U	33	< 1 U	< 1 U
GM-11	9/21/2004	0.89 J	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	2.1	< 1 U	< 0.5 U	33	< 1 U	< 1 U

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Table A-2. Groundwater Analytical Results for the Lower Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethylbenzene	PCE	Toluene	trans-1,2-DCE	TCE	Vinyl Chloride	Xylenes
GM-11	10/26/2005	0.75 J	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	1.7	< 1.0 U	< 1.0 U	32	< 1.0 U	< 2.0 U
GM-11	9/25/2006	0.75 J	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	2	< 1 U	< 1 U	34	< 1 U	< 2 U
GM-11	9/18/2007	0.6 J	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	1.5	< 1 U	< 1 U	35	< 1 U	< 2 U
GM-20D	9/24/1999	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
GM-20D	10/3/2000	1.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	4.2	< 1.0	< 1.0	14.3	< 1.0	< 1.0
GM-20D	11/14/2001	0.64J	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	2.0	< 1.0	< 0.50	5.9	< 1.0	< 1.0
GM-20D	9/30/2002	< 1	< 1	< 1	< 1	< 0.5	< 1	1.3	< 1	< 0.5	3.8	< 1	< 1
GM-20D	9/22/2003	0.89 J	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	3.6	< 1 U	< 0.5 U	12	< 1 U	< 1 U
GM-20D	9/21/2004	0.96 J	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	2.9	< 1 U	< 0.5 U	11	< 1 U	< 1 U
GM-20D	10/26/2005	0.73 J	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	2.7	< 1.0 U	< 1.0 U	11	< 1.0 U	< 2.0 U
GM-20D	9/26/2006	0.51 J	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	2.1	< 1 U	< 1 U	11	< 1 U	< 2 U
GM-20D	9/19/2007	0.5 J	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	2.1	< 1 U	< 1 U	9.2	< 1 U	< 2 U
DN-13	11/14/2001	1.1	2.5	< 1.0	< 1.0	6.2	< 1.0	< 1.0	< 1.0	0.37J	5.0	1.2	< 1.0
DN-13	9/27/2002	1.1	2.5	< 1	< 1	7.3	< 1	< 1	< 1	0.48J	6.1	1.3	< 1
DN-13	9/22/2003	1.1	2.4	< 1 U	< 1 U	6.8	< 1 U	0.31 J	< 1 U	0.4 J	6.4	1.1	< 1 U
DN-13	9/16/2004	0.84 J	2.2	< 1 U	< 1 U	6.7	< 1 U	0.44 J	< 1 U	0.49 J	6.8	2.1	< 1 U
DN-13	10/20/2005	1.5	2.0	< 1.0 U	< 1.0 U	5.5	< 1.0 U	0.38 J	< 1.0 U	< 1.0 U	7.2	2.6	< 2.0 U
DN-13	9/27/2006	0.51 J	1.5	< 1 U	< 1 U	6.1	< 1 U	0.33 J	< 1 U	0.41 J	5.7	2.3	< 2 U
DN-13	9/19/2007	0.48 J	2	< 1 U	< 1 U	6.4	< 1 U	< 1 U	< 1 U	0.4 J	3.3	2.6	< 2 U
GM-9	9/24/1999	1.0	< 1.0	< 1.0	< 1.0	1.0	< 1.0	< 1.0	< 1.0	< 1.0	13.8	< 1.0	< 1.0
GM-9	10/3/2000	1.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	17.2	< 1.0	< 1.0
GM-9	11/14/2001	0.48J	0.58J	< 1.0	< 1.0	1.1	< 1.0	0.38J	< 1.0	< 0.50	8.6	< 1.0	< 1.0
GM-9	9/30/2002	0.99J	0.48J	< 1	< 1	0.66	< 1	< 1	< 1	< 0.5	16	< 1	< 1
GM-9	9/24/2003	1.3	0.45 J	< 1 U	< 1 U	0.56	< 1 U	< 1 U	< 1 U	< 0.5 U	20	< 1 U	< 1 U
GM-9	9/21/2004	1.1	0.6 J	< 1 U	< 1 U	0.97	< 1 U	< 1 U	< 1 U	< 0.5 U	16	< 1 U	< 1 U
GM-9	10/26/2005	0.85 J	0.59 J	< 1.0 U	< 1.0 U	0.99 J	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	15	< 1.0 U	< 2.0 U
GM-9	9/25/2006	0.44 J	0.48 J	< 1 U	< 1 U	0.85 J	< 1 U	< 1 U	< 1 U	< 1 U	6.6	< 1 U	< 2 U
GM-9	9/19/2007	1.2	0.48 J	< 1 U	< 1 U	0.71 J	< 1 U	< 1 U	< 1 U	< 1 U	18	< 1 U	< 2 U
MT-69	9/24/1999	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MT-69	10/3/2000	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MT-69	11/15/2001	< 1.0	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0	< 0.50	< 1.0	< 1.0	< 1.0
MT-69	9/30/2002	< 1	< 1	< 1	< 1	< 0.5	< 1	< 1	< 1	< 0.5	< 1	< 1	< 1
MT-69	10/1/2003	< 1 U	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	< 1 U	< 1 U
MT-69	9/27/2004	< 1 U	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	< 1 U	< 1 U	< 0.5 U	< 1 U	< 1 U	< 1 U

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Table A-2. Groundwater Analytical Results for the Lower Aquifer Wells from 1999-2007, General Motors Corporation, Moraine, Ohio.

Well	Date	VOCs											
		1,1,1-TCA	1,1-DCA	1,1-DCE	Benzene	cis-1,2-DCE	Ethylbenzene	PCE	Toluene	trans-1,2-DCE	TCE	Vinyl Chloride	Xylenes
MT-69	10/24/2005	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 1.0 U	< 2.0 U
MT-69	9/26/2006	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 2 U
MT-69	9/27/2007	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 2 U

All concentrations presented in ug/l.

1,1-DCA - 1,1-Dichloroethane.

1,1-DCE - 1,1-Dichloroethene.

cis-1,2-DCE - cis-1,1-Dichloroethene.

trans-1,2-DCE - trans-1,2-Dichloroethene.

PCE - Tetrachloroethene.

1,1,1-TCA - 1,1,1-Trichloroethane.

TCE - Trichloroethene.

VOCs - Volatile Organic Compounds.

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Appendix B

Groundwater Sampling Data for 2008

Table B-1. Annual Groundwater Sampling Event Field Parameter Data Sheet for 2008, General Motors Corporation, Moraine, Ohio.

Well ID	Sample ID	pH (s.u.)	Temp (°C)	ORP (mV)	Conductivity (mS/cm)	DO (mg/L)	Purge Rate (mL/min)	Time - Start Purge	Time - End Purge	Volume Purged (gal)	Sample Date	Time - Sample	Total Depth (ft)	Sampler
Upper Aquifer Wells														
W-2-N	WG-092908-MB-035	6.93	16.17	-88.4	0.935	0.15	500	15:07	15:42	4.5	9/29/2008	15:50	63.00	MB
W-3-N	WG-092908-MB-030	6.84	16.39	-91.4	0.887	0.15	500	11:28	12:20	7.5	9/29/2008	12:30	58.90	MB
W-4-N	WG-092908-NZ-031	7.3	16.4	184	1.05	0.21	400	11:20	12:20	6	9/29/2008	12:25	67.15	NZ
W-2-S	WG-092508-MB-023	6.99	16.03	145	1.28	3.06	500	13:50	14:20	3.75	9/25/2008	14:30	68.40	MB
W-3-S	WG-092608-MB-024	6.81	14.5	169	1.13	2.41	500	7:50	8:15	3.5	9/26/2008	8:20	75.00	MB
W-4-S	WG-092608-MB-025	6.71	16.18	161	1.43	0	500	9:38	10:13	4.5	9/26/2008	10:20	71.20	MB
HR-1	WG-092908-MB-032	6.73	16.32	0.22	1.138	0.22	500	13:30	14:10	5	9/29/2008	14:20	59.40	MB
HR-2	WG-100108-NZ-052	6.8	13.9	279	0.999	0.23	400	10:20	10:55	3.75	10/1/2008	11:00	58.90	NZ
HR-3	WG-100208-NZ-064	6.9	14.6	161	1.17	0.27	400	15:55	16:35	4.5	10/2/2008	16:40	57.20	NZ
HR-4	WG-093008-NZ-041	7.26	15.9	219	0.996	0.35	400	14:10	14:55	4.75	9/30/2008	15:00	67.90	NZ
HR-5	WG-092908-NZ-033	7.29	17.25	191	1.008	0.23	400	12:55	13:45	5.5	9/29/2008	13:50	58.00	NZ
HR-9	WG-093008-MB-042	6.61	16.39	48	0.932	0.14	500	15:30	16:10	5.5	9/30/2008	16:15	69.76	MB
HR-11	WG-092508-MB-022	6.74	15.7	52	1.35	2.68	500	11:05	11:50	6.25	9/25/2008	11:55	68.90	MB
HR-17	WG-092608-NZ-027	7	15.79	326	1.106	0.3	400	9:45	10:10	3.5	9/26/2008	10:25	49.00	NZ
GM-2	WG-092408-MB-011	7.1	17.38	16	1.47	1.64	500	13:30	14:00	3.75	9/24/2008	14:10	56.90	MB
GM-6	WG-092408-MB-008	7.17	16.51	-159	2.16	1.43	500	9:57	10:22	3.125	9/24/2008	10:30	46.30	MB
GM-8	WG-092308-NZ-004	8.1	17.6	-262	2.06	0	400	14:30	14:55	2.5	9/23/2008	15:00	51.50	NZ
GM-10	WG-092408-MB-015	7.03	15.52	116	1.17	5.58	500	15:50	16:10	2.5	9/24/2008	15:20	49.48	MB
GM-16	WG-093008-NZ-046	7.1	15.89	196	1.361	0.17	400	16:50	17:30	5.5	9/30/2008	17:35	56.80	NZ
GM-17	WG-092408-NZ-012	6.81	16.57	20	1.71	0.36	300	13:40	14:20	3	9/24/2008	14:25	49.50	NZ
GM-18	WG-092408-NZ-016	6.86	16.74	22	1.61	0	300	15:40	16:20	3	9/24/2008	16:25	54.04	NZ
GM-19S	WG-092308-MB-002	7.1	16.9	-153	2.29	1.87	500	11:18	11:42	3	9/23/2008	11:50	56.20	MB
GM-21	WG-100308-NZ-068	6.05	16.5	68	1.405	0.12	400	10:15	11:10	6	10/3/2008	11:15	53.30	NZ
GM-22	WG-100308-NZ-069	6.76	16.79	174	1.28	3.15	400	11:50	12:45	6	10/3/2008	12:50	56.19	NZ
GM-23	WG-102308-NZ-083	7.74	17.12	189	1.465	0.11	400	14:25	15:00	NA	10/23/2008	15:00	31.96	NZ
GM-26	WG-100108-NZ-051	6.83	13.56	284	0.905	4.56	500	8:30	9:15	5	10/1/2008	9:20	58.34	NZ
GM-27	WG-102308-NZ-082	7.85	16.02	214	1.266	0.12	400	13:35	14:15	NA	10/23/2008	14:20	46.63	NZ
GM-28	WG-102208-NZ-078	6.49	16.38	27	1.428	0.13	400	15:55	16:55	NA	10/22/2008	17:00	36.34	nz
GM-29	WG-100608-NZ-074	7.1	16.78	-54	1.87	0.11	400	14:45	16:10	11	10/6/2008	16:15	32.61	NZ
GM-30	WG-100608-JC-073	6.53	18.13	129	2.62	0.17	400	14:38	16:40	13	10/6/2008	16:45	36.05	JC
GM-31	WG-102308-NZ-079	7.92	16.91	156	2.48	0.12	400	9:25	10:55	NA	10/23/2008	11:00	63.15	NZ
GM-32	WG-092308-MB-005	7.13	18.71	-200	3.22	1.79	400	14:38	15:03	2	9/23/2008	15:10	57.20	MB
GM-33	WG-102308-NZ-081	7.76	17.04	178	2.06	0.14	400	12:10	12:55	NA	10/23/2008	13:00	54.33	NZ
GM-35	WG-092908-NZ-034	8.77	18.07	146	6.09	0.13	400	14:05	14:55	5.5	9/29/2008	15:00	65.75	NZ
GM-47	WG-100108-MB-053	6.94	16.85	33.1	1.203	0.09	500	13:53	14:43	6.5	10/1/2008	14:50	59.40	MB
GM-50	WG-100108-MB-054	6.95	16.5	63.9	1.527	0.09	500	15:42	16:37	6.5	10/1/2008	16:45	39.75	MB
GM-51	WG-093008-NZ-038	6.99	16.23	91	1.181	0.65	400	9:40	10:45	6	9/30/2008	10:50	43.99	NZ
GM-52	WG-093008-NZ-040	7.02	15.54	0.19	1.345	0.19	400	10:55	11:35	4.5	9/30/2008	11:40	43.83	NZ
GM-55	WG-100108-MB-059	7.1	13.93	75.7	0.784	3.59	500	11:00	12:30	12	10/2/2008	12:35	35.03	MB
GM-59	WG-100308-MB-065	6.92	18.7	76.1	1.192	0.79	500	8:16	9:06	6	10/3/2008	9:15	34.26	MB
GM-60	WG-100308-MB-067	6.93	17.38	64	1.256	0.1	500	9:40	10:35	6	10/3/2008	10:40	50.28	MB

Table B-1. Annual Groundwater Sampling Event Field Parameter Data Sheet for 2008, General Motors Corporation, Moraine, Ohio.

Well ID	Sample ID	pH (s.u.)	Temp (°C)	ORP (mV)	Conductivity (mS/cm)	DO (mg/L)	Purge Rate (mL/min)	Time - Start Purge	Time - End Purge	Volume Purged (gal)	Sample Date	Time - Sample	Total Depth (ft)	Sampler
Upper Aquifer Wells														
GM-63	WG-100108-MB-048	6.96	16.85	77.1	1.669	0.2	500	8:45	9:24	5.5	10/1/2008	9:30	39.70	MB
GM-64	WG-100108-MB-050	6.93	17.2	-105.3	1.256	0.06	500	10:25	11:45	10.5	10/1/2008	11:45	58.40	MB
GM-65S	WG-100608-JC-071	7.14	14.37	226	1.074	1.42	400	11:20	12:35	6.5	10/6/2008	12:40	51.90	JC
GM-75S	WG-100608-NZ-072	6.9	19	204	1.299	1.05	400	11:55	12:40	5.5	10/6/2008	12:45	51.38	NZ
GM-78	WG-100208-MB-060	7.15	14.99	81.1	0.938	4.56	500	13:35	14:30	8	10/2/2008	14:35	49.25	MB
GM-79	WG-100208-MB-057	7.1	16.53	47.4	0.968	0.11	500	9:30	10:20	6.5	10/2/2008	10:30	54.10	MB
GM-80	WG-092208-NZ-001	6.86	14.99	40	1.08	1.18	400	16:25	17:10	5	9/22/2008	17:15	24.42	NZ
WSU-24	WG-092508-MB-019	6.81	15.25	120	1.39	6.33	500	9:22	10:02	5	9/25/2008	10:10	65.33	MB
TW-2	WG-092408-NZ-009	7.03	16:45	-180	1.74	0	600	11:15	11:35	3	9/24/2008	11:40	N/A	NZ
ME-3	WG-102208-NZ-077	7	17.23	179	2.34	1.06	400	14:35	15:15		10/22/2008	15:20	36.58	NZ
ME-6	WG-102208-NZ-076	6.68	17.2	206	2.23	1.31		13:45	14:10	7.5	10/22/2008	14:15	35.45	NZ
Lower Aquifer Wells														
GM-1	WG-092408-MB-010	6.97	15.25	106	1.31	3.03	500	11:37	12:02	5	9/24/2008	0:10	102.80	MB
GM-3	WG-092408-NZ-007	6.68	16.38	71	1.23	0.04	400	9:55	10:45	5	9/24/2008	10:55	102.10	NZ
GM-9	WG-092408-MB-014	7.08	15.5	65	1.38	1.8	500	14:50	15:20	4	9/24/2008	15:30	99.45	MB
GM-11	WG-092408-NZ-013	6.81	16.47	64	1.2	1.39	400	14:35	15:15	4	9/24/2008	15:20	98.95	NZ
GM-15	WG-093008-NZ-045	7.1	16.24	190	0.995	0.2	400	16:00	16:40	5.5	9/30/2008	16:45	98.70	NZ
GM-19D	WG-092308-NZ-003	6.9	17.07	-136	1.48	0	400	11:40	12:20	5	9/23/2008	12:25	148.05	NZ
GM-20D	WG-092508-NZ-018	7.02	14.86	260	1.001	0.32	400	9:25	10:20	5.5	9/25/2008	10:25	99.87	NZ
GM-39	WG-100108-NZ-055	6.94	15.29	102	1.134	0.17	400	14:18	15:13	5.5	10/1/2008	15:15	116.76	NZ
GM-40	WG-093008-MB-039	6.88	16.08	-120.8	1.082	0.22	500	10:40	11:10	4	9/30/2008	11:15	161.00	MB
GM-41	WG-092608-NZ-028	6.94	16.97	238	1.141	0.18	400	11:05	12:05	6	9/26/2008	12:10	116.07	NZ
GM-42	WG-093008-MB-037	6.83	16.49	-39.1	1.058	0.15	500	9:05	9:55	6	9/30/2008	10:05	151.03	MB
GM-54	WG-093008-MB-047	6.88	16.52	64.9	1.043	4.18	500	18:36	19:21	6	9/30/2008	19:35	79.27	MB
GM-58	WG-092608-MB-029	6.79	16.12	162	1.37	0	500	11:40	12:35	7	9/26/2008	12:45	81.50	MB
GM-61	WG-100108-NZ-056	6.72	16.72	127	1.151	0.17	400	15:55	16:55	6.5	10/1/2008	17:00	78.37	NZ
GM-68D	WG-100308-NZ-066	6.27	17.18	126	1.35	0.13	400	8:40	9:40	6.5	10/3/2008	9:45	74.21	NZ
GM-75D	WG-100608-NZ-070	6.6	17.81	178	1.222	0.22	400	10:55	11:50	6	10/6/2008	11:55	94.15	NZ
GM-82	WG-100208-MB-063	6.8	17.26	-8	1.198	0.08	500	15:51	17:06	6	10/2/2008	NA	95.26	MB
GM-83D	WG-100208-NZ-061	7.21	14.86	81	0.889	0.26	400	14:15	15:15	6	10/2/2008	15:20	119.14	NZ
GM-84	WG-100208-NZ-058	6.89	14.49	63	0.946	0.34	400	10:40	11:40	6.5	10/2/2008	11:45	106.87	NZ
HR-10	WG-093008-MB-044	6.83	15.43	-99.5	1.005	0.28	500	16:38	17:18	5.5	9/30/2008	NA	128.30	MB
HR-12	WG-092508-NZ-021	7.22	15.86	131	0.995	0.16	400	11:00	11:40	4	9/25/2008	11:45	131.10	NZ
HR-15	WG-092908-NZ-036	7.37	16.32	116	1.061	0.26	400	15:35	16:25	4.5	9/29/2008	16:30	105.40	NZ
DN-13	WG-092408-NZ-017	NM	NM	NM	NM	NM	NM	16:20	16:40	NA	9/24/2008	16:40	N/A	NZ

Notes:

pH - negative logarithm of the concentration (mol/L) of the H₂O⁺[H⁺] ion; scale is commonly used over a range 0 to 14 standard units (s.u.)

Temp - temperature

ORP - oxidation reduction potential

DO - dissolved oxygen

°C - degrees Celsius

mV - millivolts

mg/L - milligrams per liter

mS/cm - millisiemens per centimeter

gal - gallons

mL/min - milliliters per minute

ft - feet

mL - milliliters

VOCs - volatile organic compounds

NM - not measured

NA - not available

WG - groundwater

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Appendix C

Groundwater Analytical Database for
2008

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Table C-1. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	Upgradient of the Site			On-Site			
		HR-9 9/30/2008 Upper Aquifer	Duplicate 9/30/2008 QA/QC	HR-11 9/25/2008 Upper Aquifer	HR-4 9/30/2008 Upper Aquifer	W-2-N 9/29/2008 Upper Aquifer	W-3-N 9/29/2008 Upper Aquifer	W-4-N 9/29/2008 Upper Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	8.2	8.5	< 1 U	< 1 U	< 1 U	< 3.3 U	0.39 J
1,1-Dichloroethane	ug/l	58	59	5.2	4.1	< 1 U	< 3.3 U	1.9
1,1-Dichloroethene	ug/l	0.49 J	< 2.5 U	< 1 U	< 1 U	< 1 U	< 3.3 U	< 1 U
Benzene	ug/l	< 2.5 U	< 2.5 U	< 1 U	< 1 U	< 1 U	< 3.3 U	< 1 U
cis-1,2-Dichloroethene	ug/l	32	34	< 1 U	0.23 J	1.7	98	11
Ethylbenzene	ug/l	< 2.5 U	< 2.5 U	< 1 U	< 1 U	< 1 U	< 3.3 U	< 1 U
Tetrachloroethene	ug/l	< 2.5 U	< 2.5 U	< 1 U	0.44 J	< 1 U	< 3.3 U	0.38 J
Toluene	ug/l	< 2.5 U	< 2.5 U	< 1 U	< 1 U	< 1 U	< 3.3 U	< 1 U
trans-1,2-Dichloroethene	ug/l	4.5	4.6	< 1 U	< 1 U	< 1 U	1.4 J	0.92 J
Trichloroethene	ug/l	11	11	< 1 U	0.31 J	0.47 J	< 3.3 U	8.4
Vinyl chloride	ug/l	< 2.5 U	0.55 J	< 1 U	< 1 U	< 1 U	3.8	0.34 J
Xylene (total)	ug/l	< 5 U	< 5 U	< 2 U	< 2 U	< 2 U	< 6.7 U	< 2 U

ug/l - Micrograms per liter.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

U - Constituent not detected above laboratory reporting limit shown.

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Table C-1. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	HR-2	HR-3	HR-5	On-Site HR-1	GM-30	GM-23	GM-27
		10/1/2008	10/2/2008	9/29/2008	9/29/2008	10/6/2008	10/23/2008	10/23/2008
		Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	< 1 U	0.84 J	< 1 U	0.77 J	< 10 U	< 62 U	< 1.4 U
1,1-Dichloroethane	ug/l	4.6	16	0.48 J	1.8 J	11	< 62 U	2
1,1-Dichloroethene	ug/l	< 1 U	0.27 J	< 1 U	< 2.5 U	< 10 U	< 62 U	< 1.4 U
Benzene	ug/l	< 1 U	< 1 UJ	< 1 U	< 2.5 U	< 10 U	< 62 U	< 1.4 U
cis-1,2-Dichloroethene	ug/l	3.4	17	5.4	5	< 10 U	2000	11
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 2.5 U	300	< 62 U	< 1.4 U
Tetrachloroethene	ug/l	< 1 U	< 1 U	< 1 U	27	< 10 U	71	0.9 J
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 2.5 U	< 10 U	< 62 U	< 1.4 U
trans-1,2-Dichloroethene	ug/l	0.47 J	1.6	0.59 J	2 J	< 10 U	58 J	0.51 J
Trichloroethene	ug/l	0.36 J	32	13	70	< 10 U	< 62 U	57
Vinyl chloride	ug/l	< 1 U	2.2	< 1 U	< 2.5 U	< 10 U	2100	0.44 J
Xylene (total)	ug/l	< 2 U	< 2 U	< 2 U	< 5 U	670	< 120 U	< 2.9 U

ug/l - Micrograms per liter.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

U - Constituent not detected above laboratory reporting limit shown.

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Table C-1. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	GM-29	Duplicate	GM-28	On-Site	GM-60	GM-75S	ME-6
		10/6/2008 Upper Aquifer	10/6/2008 QA/QC	10/22/2008 Upper Aquifer	GM-59 10/3/2008 Upper Aquifer	10/3/2008 Upper Aquifer	10/6/2008 Upper Aquifer	10/22/2008 Upper Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	12 J	10 J	< 5 U	< 33 U	< 25 U	< 20 U	2.7
1,1-Dichloroethane	ug/l	11 J	9.1 J	2.2 J	< 33 U	< 25 U	< 20 U	11
1,1-Dichloroethene	ug/l	< 33 U	< 33 U	< 5 U	< 33 U	< 25 U	< 20 U	< 1 U
Benzene	ug/l	< 33 U	< 33 U	< 5 U	< 33 U	< 25 U	< 20 U	< 1 U
cis-1,2-Dichloroethene	ug/l	900	750	6.9	41	360	< 20 U	5.2
Ethylbenzene	ug/l	< 33 U	< 33 U	< 5 U	< 33 U	< 25 U	< 20 U	< 1 U
Tetrachloroethene	ug/l	17 J	12 J	< 5 U	750	900	690	7.7
Toluene	ug/l	< 33 U	< 33 U	< 5 U	< 33 U	< 25 U	< 20 U	< 1 U
trans-1,2-Dichloroethene	ug/l	16 J	14 J	1.3 J	< 33 U	< 25 U	< 20 U	0.25 J
Trichloroethene	ug/l	300	250	< 5 U	750	920	250	9
Vinyl chloride	ug/l	150	110	6.5	< 33 U	< 25 U	< 20 U	1.7
Xylene (total)	ug/l	< 67 U	< 67 U	< 10 U	< 67 U	< 50 U	< 40 U	< 2 U

ug/l - Micrograms per liter.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

U - Constituent not detected above laboratory reporting limit shown.

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Table C-1. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	GM-31	Duplicate	ME-3	On-Site	GM-19S	GM-33	GM-35
		10/23/2008	10/23/2008	10/22/2008	GM-22	9/23/2008	10/23/2008	9/29/2008
		Upper Aquifer	QA/QC	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	2.9	3.1	2.1	0.73 J	< 1 U	8.4	4.6 J
1,1-Dichloroethane	ug/l	3.2	3.3	1.8	< 1 U	13	2.9	20
1,1-Dichloroethene	ug/l	< 2.5 U	< 2.5 U	< 1 U	< 1 U	< 1 U	0.58 J	< 10 U
Benzene	ug/l	< 2.5 U	< 2.5 U	< 1 U	< 1 U	< 1 U	< 1.4 U	< 10 U
cis-1,2-Dichloroethene	ug/l	76	81	1.4	< 1 U	0.68 J	4.1	92
Ethylbenzene	ug/l	< 2.5 U	< 2.5 U	< 1 U	< 1 U	< 1 U	< 1.4 U	< 10 U
Tetrachloroethene	ug/l	< 2.5 U	< 2.5 U	8.1	5.7	0.94 J	38	20
Toluene	ug/l	< 2.5 U	< 2.5 U	< 1 U	< 1 U	< 1 U	< 1.4 U	< 10 U
trans-1,2-Dichloroethene	ug/l	3	2.8	< 1 U	< 1 U	0.52 J	< 1.4 U	9.4 J
Trichloroethene	ug/l	78	84	4.9	5.7	3	36	88
Vinyl chloride	ug/l	0.9 J	0.78 J	0.7 J	< 1 U	9.3	< 1.4 U	7.9 J
Xylene (total)	ug/l	< 5 U	< 5 U	< 2 U	< 2 U	< 2 U	< 2.9 U	< 20 U

ug/l - Micrograms per liter.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

U - Constituent not detected above laboratory reporting limit shown.

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Table C-1. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	GM-32	GM-21	HR-17	On-Site	W-3-S	W-4-S	Duplicate
		9/23/2008	10/3/2008	9/26/2008	W-2-S	9/26/2008	9/26/2008	9/26/2008
		Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	QA/QC
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	< 10 U	8.7	< 4 U	1.4	1.2	0.95 J	1.1 J
1,1-Dichloroethane	ug/l	4 J	15	1.1 J	0.92 J	0.21 J	1.3	1.5 J
1,1-Dichloroethene	ug/l	< 10 U	0.33 J	< 4 U	< 1 U	< 1 U	0.21 J	< 2 U
Benzene	ug/l	< 10 U	< 1.4 U	< 4 U	< 1 U	< 1 U	< 1 U	< 2 U
cis-1,2-Dichloroethene	ug/l	< 10 U	38	2.7 J	0.78 J	0.52 J	6	7.1
Ethylbenzene	ug/l	< 10 U	< 1.4 U	< 4 U	< 1 U	< 1 U	< 1 U	< 2 U
Tetrachloroethene	ug/l	< 10 U	0.56 J	120	< 1 U	1.3	32	46
Toluene	ug/l	< 10 U	< 1.4 U	< 4 U	< 1 U	< 1 U	< 1 U	< 2 U
trans-1,2-Dichloroethene	ug/l	< 10 U	4.7	1 J	< 1 U	< 1 U	1.2	1.5 J
Trichloroethene	ug/l	< 10 U	18	31	5.2	2.1	16	22
Vinyl chloride	ug/l	< 10 U	19	< 4 U	< 1 U	< 1 U	< 1 U	< 2 U
Xylene (total)	ug/l	< 20 U	< 2.9 U	< 8 U	< 2 U	< 2 U	< 2 U	< 4 U

ug/l - Micrograms per liter.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

U - Constituent not detected above laboratory reporting limit shown.

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Table C-1. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	Downgradient of the Site						
		GM-63 10/1/2008 Upper Aquifer	Duplicate 10/1/2008 QA/QC	GM-64 10/1/2008 Upper Aquifer	GM-47 10/1/2008 Upper Aquifer	GM-50 10/1/2008 Upper Aquifer	GM-8 9/23/2008 Upper Aquifer	GM-6 9/24/2008 Upper Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	4 J	4.2 J	0.55 J	1.4 J	1.6 J	< 1 U	< 1 U
1,1-Dichloroethane	ug/l	2.2 J	2.1 J	2.7	2 J	1.7 J	1.7	< 8.4 U
1,1-Dichloroethene	ug/l	< 5 U	< 5 U	< 1 U	< 5 U	< 2.5 U	< 1 U	< 1 U
Benzene	ug/l	< 5 U	< 5 U	< 1 U	< 5 U	< 2.5 U	6.8	1.2
cis-1,2-Dichloroethene	ug/l	4.9 J	4.7 J	15	160	13	< 1 U	6.7
Ethylbenzene	ug/l	< 5 U	< 5 U	< 1 U	< 5 U	< 2.5 U	8.6	< 1 U
Tetrachloroethene	ug/l	140	130	31	86	82	< 1 U	< 1 U
Toluene	ug/l	< 5 U	< 5 U	< 1 U	< 5 U	< 2.5 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	ug/l	< 5 U	< 5 U	2.3	3.9 J	0.68 J	0.27 J	1.3
Trichloroethene	ug/l	92	92	14	36	54	< 1 U	< 1 U
Vinyl chloride	ug/l	< 5 U	< 5 U	2.3	1.9 J	< 2.5 U	0.48 J	2.1
Xylene (total)	ug/l	< 10 U	< 10 U	< 2 U	< 10 U	< 5 U	3.9	< 2 U

ug/l - Micrograms per liter.

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J - Value is estimated.

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Table C-1. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	Downgradient of the Site					
		TW-2 9/24/2008 Upper Aquifer	GM-2 9/24/2008 Upper Aquifer	GM-51 9/30/2008 Upper Aquifer	GM-16 9/30/2008 Upper Aquifer	GM-17 9/24/2008 Upper Aquifer	GM-18 9/24/2008 Upper Aquifer
<u>Volatile Organic Compounds</u>							
1,1,1-Trichloroethane	ug/l	< 1 U	< 1 U	0.6 J	1.8 J	0.29 J	2.3
1,1-Dichloroethane	ug/l	< 1.9 U	< 1.1 U	0.78 J	3.8	< 1 U	< 6.1 U
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 3.3 U	< 1 U	< 1.4 U
Benzene	ug/l	1.4	< 1 U	< 1 U	< 3.3 U	< 1 U	< 1.4 U
cis-1,2-Dichloroethene	ug/l	< 5.2 U	6.7	2	20	< 1.9 U	13
Ethylbenzene	ug/l	0.76 J	< 1 U	< 1 U	< 3.3 U	< 1 U	< 1.4 U
Tetrachloroethene	ug/l	1.4	1.3	9.3	100	4.8	16
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 3.3 U	< 1 U	< 1.4 U
trans-1,2-Dichloroethene	ug/l	0.36 J	0.19 J	0.7 J	1.1 J	< 1 U	0.79 J
Trichloroethene	ug/l	7.5	2.4	7.7	48	10	38
Vinyl chloride	ug/l	1	< 1 U	< 1 U	< 3.3 U	< 1 U	< 1.4 U
Xylene (total)	ug/l	< 2 U	< 2 U	< 2 U	< 6.7 U	< 2 U	< 2.9 U

ug/l - Micrograms per liter.

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J - Value is estimated.

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Table C-1. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	Downgradient of the Site						
		WSU-24 9/25/2008 Upper Aquifer	Duplicate 9/25/2008 QA/QC	GM-52 9/30/2008 Upper Aquifer	GM-10 9/24/2008 Upper Aquifer	GM-79 10/2/2008 Upper Aquifer	GM-55 10/2/2008 Upper Aquifer	GM-78 10/2/2008 Upper Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	0.62 J	0.42 J	1.9 J	0.53 J	0.65 J	< 1 U	< 1 U
1,1-Dichloroethane	ug/l	0.85 J	< 1 U	3	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 2.5 U	< 1 U	< 1 U	< 1 U	< 1 U
Benzene	ug/l	< 1 U	< 1 U	< 2.5 U	< 1 U	< 1 UJ	< 1 UJ	< 1 UJ
cis-1,2-Dichloroethene	ug/l	2.4 J	< 1 UJ	14	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	ug/l	< 1 U	< 1 U	< 2.5 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	1.7	1.3	88	0.85 J	< 1 U	7.2	11
Toluene	ug/l	< 1 U	< 1 U	< 2.5 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	ug/l	0.35 J	< 1 U	< 2.5 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	ug/l	12 J	4.9 J	43	5.9	1.8	< 1 U	< 1 U
Vinyl chloride	ug/l	< 1 U	< 1 U	< 2.5 U	< 1 U	< 1 U	< 1 U	< 1 U
Xylene (total)	ug/l	< 2 U	< 2 U	< 5 U	< 2 U	< 2 U	< 2 U	< 2 U

ug/l - Micrograms per liter.

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J - Value is estimated.

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Table C-1. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	Downgradient of the Site			Upgradient of the Site		On-Site	
		GM-80 9/22/2008 Upper Aquifer	GM-26 10/1/2008 Upper Aquifer	GM-65S 10/6/2008 Upper Aquifer	HR-10 9/30/2008 Lower Aquifer	HR-12 9/25/2008 Lower Aquifer	HR-15 9/29/2008 Lower Aquifer	GM-39 10/1/2008 Lower Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	0.39 J	< 1 U	< 1 U
1,1-Dichloroethane	ug/l	0.39 J	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Benzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	3.6	< 1 U	< 1 U	< 1 U	< 1 U	3.6	0.67 J
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	0.93 J	1.4	8.7	< 1 U	1.3	< 1 U	< 1 U
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	ug/l	0.19 J	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	ug/l	5.4	< 1 U	3.8	< 1 U	5.1	0.47 J	< 1 U
Vinyl chloride	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	9.7	3.2
Xylene (total)	ug/l	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U

ug/l - Micrograms per liter.

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J - Value is estimated.

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Table C-1. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	GM-83D	Duplicate	GM-40	On-Site	GM-75D	GM-68D	GM-82
		10/2/2008	10/2/2008	9/30/2008	GM-61	10/6/2008	10/3/2008	10/2/2008
		Lower Aquifer	QA/QC	Lower Aquifer	Lower Aquifer	Lower Aquifer	Lower Aquifer	Lower Aquifer
<u>Volatile Organic Compounds</u>								
1,1,1-Trichloroethane	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 33 U	< 5 U	1 J
1,1-Dichloroethane	ug/l	< 1 U	< 1 U	< 1 U	0.94 J	< 33 U	< 5 U	2.4 J
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	0.19 J	< 33 U	< 5 U	0.64 J
Benzene	ug/l	< 1 UJ	< 1 UJ	< 1 U	< 1 U	< 33 U	< 5 U	< 3.3 U
cis-1,2-Dichloroethene	ug/l	0.3 J	0.27 J	< 1 U	20	120	14	46
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 33 U	< 5 U	< 3.3 U
Tetrachloroethene	ug/l	< 1 U	< 1 U	< 1 U	13	220	190	51
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 33 U	< 5 U	< 3.3 U
trans-1,2-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	0.92 J	< 33 U	< 5 U	2 J
Trichloroethene	ug/l	< 1 U	< 1 U	< 1 U	23	750	46	100
Vinyl chloride	ug/l	1.3	1.4	3.6	0.75 J	< 33 U	< 5 U	< 3.3 U
Xylene (total)	ug/l	< 2 U	< 2 U	< 2 U	< 2 U	< 67 U	< 10 U	< 6.7 U

ug/l - Micrograms per liter.

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J - Value is estimated.

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Table C-1. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	On-Site						Downgradient of the Site	
		GM-41 9/26/2008 Lower Aquifer	GM-58 9/26/2008 Lower Aquifer	GM-54 9/30/2008 Lower Aquifer	GM-42 9/30/2008 Lower Aquifer	GM-84 10/2/2008 Lower Aquifer	GM-19D 9/23/2008 Lower Aquifer	GM-3 9/24/2008 Lower Aquifer	Duplicate 9/24/2008 QA/QC
<u>Volatile Organic Compounds</u>									
1,1,1-Trichloroethane	ug/l	< 7.1 U	< 2.5 U	< 5.7 U	< 1 U	< 1 U	< 1 U	< 1 U	0.67 J
1,1-Dichloroethane	ug/l	< 7.1 U	< 2.5 U	< 5.7 U	0.66 J	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethene	ug/l	< 7.1 U	< 2.5 U	< 5.7 U	0.53 J	< 1 U	< 1 U	< 1 U	< 1 U
Benzene	ug/l	< 7.1 U	< 2.5 U	< 5.7 U	< 1 U	< 1 UJ	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	11	< 2.5 U	< 5.7 U	20	< 1 U	2.4	< 1 U	< 2.5 U
Ethylbenzene	ug/l	< 7.1 U	< 2.5 U	< 5.7 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	< 7.1 U	80	190	< 1 U	< 1 U	< 1 U	< 1 UJ	2 J
Toluene	ug/l	< 7.1 U	< 2.5 U	< 5.7 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	ug/l	< 7.1 U	< 2.5 U	< 5.7 U	0.89 J	< 1 U	< 1 U	< 1 U	0.41 J
Trichloroethene	ug/l	180	< 2.5 U	2.5 J	9.9	6.6	< 1 U	< 1 UJ	13 J
Vinyl chloride	ug/l	< 7.1 U	< 2.5 U	< 5.7 U	0.31 J	< 1 U	9.8	< 1 U	< 1 U
Xylene (total)	ug/l	< 14 U	< 5 U	< 11 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U

ug/l - Micrograms per liter.

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Table C-1. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	Downgradient of the Site					
		GM-1 9/24/2008 Lower Aquifer	GM-15 9/30/2008 Lower Aquifer	GM-11 9/24/2008 Lower Aquifer	GM-20D 9/25/2008 Lower Aquifer	DN-13 9/24/2008 Lower Aquifer	GM-9 9/24/2008 Lower Aquifer
<u>Volatile Organic Compounds</u>							
1,1,1-Trichloroethane	ug/l	0.69 J	< 1 U	0.47 J	0.45 J	0.63 J	1.2
1,1-Dichloroethane	ug/l	< 1 U	1.1	< 1 U	< 1 U	< 1.7 U	< 1 U
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Benzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	< 1 U	0.79 J	< 1 U	< 1 U	6.2	< 1 U
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	1.8	< 1 U	1.7	2.6	< 1 U	< 1 U
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	0.44 J	< 1 U
Trichloroethene	ug/l	31	6.2	31	6.6	4.5	18
Vinyl chloride	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	1.4	< 1 U
Xylene (total)	ug/l	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U

ug/l - Micrograms per liter.

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J - Value is estimated.

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Table C-1. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	Rinse Blanks							
		9/24/2008 QA/QC	9/25/2008 QA/QC	9/29/2008 QA/QC	9/30/2008 QA/QC	10/1/2008 QA/QC	10/2/2008 QA/QC	10/6/2008 QA/QC	10/23/2008 QA/QC
<u>Volatile Organic Compounds</u>									
1,1,1-Trichloroethane	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	ug/l	1.7	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Benzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	1.1	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	1.5	< 1 U
Toluene	ug/l	< 1 U	< 1 U	0.36 J	0.28 J	0.22 J	0.21 J	0.42 J	< 1 U
trans-1,2-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Vinyl chloride	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Xylene (total)	ug/l	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U

ug/l - Micrograms per liter.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

U - Constituent not detected above laboratory reporting limit shown.

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Table C-1. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	Trip Blanks									
		9/23/2008 QA/QC	9/24/2008 QA/QC	9/25/2008 QA/QC	9/26/2008 QA/QC	9/29/2008 QA/QC	9/30/2008 QA/QC	10/1/2008 QA/QC	10/2/2008 QA/QC	10/6/2008 QA/QC	10/23/2008 QA/QC
<u>Volatile Organic Compounds</u>											
1,1,1-Trichloroethane	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Benzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
trans-1,2-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Vinyl chloride	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Xylene (total)	ug/l	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U	< 2 U

ug/l - Micrograms per liter.

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J - Value is estimated.

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Table C-2. Summary of Additional Groundwater Analytical Results from Upper Aquifer Monitoring Wells in September-October 2008, General Motors Corporation, Moraine, Ohio.

	Units	On-Site	
		GM-19S 9/23/2008 Upper Aquifer	GM-35 9/29/2008 Upper Aquifer
<u>Semi-Volatile Organic Compounds</u>			
Benzo(a)anthracene	ug/l	< 10 U	< 40 U
Benzo(b)fluoranthene	ug/l	< 10 U	< 40 U
<u>Metals</u>			
Antimony	mg/l	< 0.06 U	< 0.06 U
Cadmium	mg/l	< 0.005 U	< 0.005 U
Chromium	mg/l	0.0026 J	0.0071 J
<u>Polychlorinated Biphenyls</u>			
Aroclor-1016	ug/l	< 1 U	< 1 U
Aroclor-1221	ug/l	< 1 U	< 1 U
Aroclor-1232	ug/l	< 1 U	< 1 U
Aroclor-1242	ug/l	< 1 U	< 1 U
Aroclor-1248	ug/l	< 1 U	< 1 U
Aroclor-1254	ug/l	< 1 U	< 1 U
Aroclor-1260	ug/l	< 1 U	< 1 U

ug/l - Micrograms per liter.

mg/l - Milligrams per liter.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

U - Constituent not detected above laboratory reporting limit shown.

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Appendix D

In-Situ Reactive Zones Performance
Results for 2008

In-Situ Reactive Zones Performance Results

As described in Section 3.1.1 of the Site-Wide Groundwater Monitoring Report for 2008 (Monitoring Report), the carbon solution delivery network consisted of three reactive zones, RZ-1, RZ-3 (East and West) and RZ-4 (East). During 2008, a carbon solution was introduced into the groundwater through introduction points at RZ-1, RZ-3 (East and West), and RZ-4 (East) shown on Figures 10, and 11 of the Monitoring Report, respectively. RZ-1 was originally installed in 1999 as a nine well barrier downgradient of the Former Oil House Area source area, and then based on the performance of the ERD technology, RZ-1 was expanded into portions of the Former Oil House Area source area by the addition of 12 introduction points in 2002. RZ-3 was originally installed in 1999 and has been operated as a cut-off barrier (30 wells in RZ-3 East and 11 wells in RZ-3 West) to mitigate further downgradient VOC migration. In 2005, RZ-3 East was modified by the addition of 5 introduction wells (RZ-3RR through RZ-3VV) and cessation of introduction in 5 existing wells (RZ-3MM through RZ-3QQ) to improve performance at the far eastern edge of the plume. Using data obtained from the Supplemental Groundwater Investigation conducted in 2006, RZ-4 was designed and installed to address VOC concentrations present on the western side of the plume. RZ-4 consists of 15 introduction wells, 7 wells in RZ-4 West and 8 wells in RZ-4 East. The RZ-4 West wells are located in the southeast corner of the closed South Settling Lagoon and the RZ-4 East wells are located north of Landfill L1 and west of the Waste Pile/Staging Area. Introductions to RZ-4 began in August 2006. RZ-4 West was not in operation in 2008. The following sections discuss the monitoring completed to assess the effectiveness of the in-situ reactive zones and the results of this monitoring.

Reactive Zone Monitoring

Operation of the reactive zones was monitored through the collection of field parameter measurements, and laboratory analyses of biogeochemical indicator parameters and volatile organic compounds (VOCs), according to the Site-Wide Groundwater Monitoring Plan (ARCADIS G&M, Inc. 2002). Field parameter measurements included: pH, specific conductivity, dissolved oxygen (DO), oxidation-reduction potential (ORP), and temperature. Biogeochemical parameters included manganese (total and dissolved), iron (total and dissolved), sulfate, sulfide, total organic carbon (TOC), chlorides, light hydrocarbons (ethane and ethene), and methane. The monitored VOCs included: benzene, toluene, ethylbenzene, xylenes, tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), vinyl chloride, 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), and trans-1,2-dichloroethene (trans-1,2-DCE). The VOC data collected are presented in Tables 9 through 12 of the Monitoring Report. The bioattenuation parameter data is presented on Tables 13 through 16. An evaluation of pertinent monitoring data is presented in the following sections.

The operational monitoring data collected, as indicated above, can be broadly categorized as: (i) "primary" operational monitoring data, which tracks the actual operation of the remediation system and determines whether the operation is proceeding as planned, and (ii) "secondary" operational monitoring data, which assists in the occasional troubleshooting of the system. The

secondary data becomes important in the event that degradation of the VOCs is not proceeding as expected, and the cause cannot be determined from the primary operational monitoring data. The primary operational monitoring data includes pH, TOC, VOCs, ethene, ethane, and methane. Secondary operational monitoring data includes dissolved manganese, dissolved iron, sulfate, and ORP. The primary operational data for select monitoring wells is discussed below and presented graphically on Figures D-1 through D-8.

The purpose of upgradient and downgradient monitor wells, separate from the introduction points within the reactive zones, is to collect and compare data before and after biodegradation by the stimulated microbial population. Locations of these wells are shown on Figures 10 and 11 of the Monitoring Report.

- § At RZ-1, GM-29 is designated as the upgradient monitoring well, while GM-28 is designated as the downgradient monitor well. These wells are ideally positioned, relative to estimated groundwater travel time, approximately 100 days upgradient and 100 days downgradient from the original introduction wells installed to create the RZ-1 introduction zone (line of nine introduction wells, RZ-1A through 1I, placed in an East-West direction). GM-29 is located within the area of the RZ-1 expansion wells (twelve introduction wells placed in two rows north of the original nine wells, RZ-1J through 1U). Therefore, GM-23 is also used as an upgradient monitoring point because this well is located within the source area.
- § For RZ-3 West, monitor well GM-19S is used as the upgradient well. It should be noted that as of August 2006 GM-19S is now the downgradient monitoring well for RZ-4 East. At RZ-3 West, GM-32, which is within the introduction zone due to its location being constrained by the proximity of Landfill L1, is designated as the downgradient monitor well. Results at GM-32 are analyzed with caution, as this well is located in the early stages of the reactive zone due to its proximity to the introduction points. Annual data collected from GM-8 and GM-6, which are further downgradient from the introduction zone and located along the west side of Landfill L1, have also been evaluated with respect to monitoring the performance of RZ-3 West. At RZ-3 West, carbon solution is introduced in thirty wells, RZ-3A through RZ-3DD.
- § For RZ-3 East, GM-22 is designated as the upgradient monitor well and GM-21 is designated as the downgradient monitor well. At RZ-3 East, carbon solution is introduced in the original wells, RZ-3FF through RZ-3KK, and five additional wells, RZ-3RR through RZ-3VV.
- § For RZ-4 East monitoring well GM-19S is used as the downgradient monitoring well. For RZ-4 West monitoring well pair GM-63 and GM-64 are used as the downgradient monitoring wells. This well pair has screened intervals in the intermediate and deep portions of the upper aquifer.

In 2008, in general, a target volume of 800 gallons of 5 percent molasses solution (approximately 17,400 milligrams per liter [mg/L] TOC) was injected into the introduction wells of RZ-1 during January, March, April, May, July, August, September, October, November, and December. The

introduction wells at RZ-3 West and RZ-3 East introduction wells RZ-3FF through RZ-3KK received a target volume of approximately 1,600 gallons of 2 percent molasses solution (approximately 17,400 mg/L TOC) monthly in general from January through December 2008. The RZ-3 East replacement wells (RZ-3RR through RZ-3VV) received a target volume of approximately 1,600 gallons of 2.7 percent molasses solution (approximately 9,405 mg/L TOC) in 2008. A target volume of 3,000 gallons of 2 percent molasses solution (approximately 6,960 mg/L TOC) was injected into the RZ-4 East wells from January through December 2008. Table 18 in the Monitoring Report presents the carbon solution introduction volumes for different introduction wells in 2008.

Analysis of Primary Operational Monitoring Data

The primary operational data is comprised of a limited number of variables that are monitored at a frequency necessary to supply the information required for the operation of the remediation system. The entire data set is presented in Tables 9 through 16 of the Monitoring Report. These tables are organized such that upgradient and downgradient changes can be easily identified for each reactive zone from 1999 to 2008. Figures D-1 through D-8 present the primary operational data (pH, TOC, methane, VOCs, ethane, and ethene) graphically for monitoring wells used for monitoring the effectiveness of each of the IRZs (GM-23, GM-29, GM-28, GM-32, GM-8, GM-6, GM-21, and GM-19S). The graphs are organized to allow a simple comparison of the trends in each monitoring well for pH, TOC, methane, VOCs, ethene, ethane, and total parent-daughter compound molarity. A discussion of the primary operational data is provided below.

pH

The preferred pH range for reductive dechlorination is between 6 and 8, and the acceptable pH range extends from 5 to 9. All pH measurements collected in 2008 from upgradient and downgradient monitoring wells were within the acceptable pH range.

Total Organic Carbon/Methane

At RZ-1, the reductive dechlorination process is continuing effectively even though the TOC levels at the designated downgradient well, GM-28, is only 5 to 6 mg/L which is at background levels. Considering the differences in the VOC concentrations at the upgradient wells GM-29 and GM-23, and the VOC concentrations at GM-28, the RZ is performing as an effective barrier, reducing the total target VOC concentrations from 1,406 micrograms per liter ($\mu\text{g/L}$) in GM-29 and 4,229 $\mu\text{g/L}$ in GM-23 (September-October 2008) to 16.9 $\mu\text{g/L}$ at GM-28 (September-October 2008). Based on the TOC values in the RZ-1 injectate, the carbon was consumed rapidly by an active soil microbial community. Methane concentrations in GM-28 continue to be sustained above background concentrations, which provides evidence that methanogenesis is occurring and that the desired reducing conditions are being sustained in the reactive zone. TOC concentrations at GM-29 have increased since introductions began at the RZ-1 expansion wells

and methane concentrations in GM-29 remain above the background levels observed in this monitoring well in the 1999 sampling before the start of carbon introductions.

TOC and methane concentrations at RZ-3 West downgradient well GM-32 were sustained above background levels through 2008. TOC and methane concentrations observed at further downgradient wells decreased in GM-8 and remained the same in GM-6 from 2007 to 2008. Due to the distance/travel-time from RZ-3 West to downgradient well GM-6, TOC concentrations above background levels would not be expected in this well. TOC concentrations observed in groundwater samples collected from GM-21, which is the downgradient well for RZ-3 East, were at background levels. However, dissolved methane concentrations were well above background indicating that the aquifer is anaerobic at GM-21.

Analytical results from GM-19S, the downgradient monitoring well for RZ-4 East, exhibit a common ERD signature. An initial spike in TOC (September 2006 sampling event) above background concentrations followed by a spike in total parent-daughter ethene molarity (indicating that target compounds may have been de-sorbed from the aquifer soil-matrix), and increasing methane concentrations indicating that the carbon substrate loading is adequate to support methanogenesis and reductive dechlorination. TOC and methane concentrations in 2008 were sustained at similar levels observed in 2007.

VOC Analytical Results

The groundwater analytical data for the site-specific list of VOCs are presented in Table 9 for RZ-1, Table 10 for RZ-3 West, Table 11 for RZ-3 East, and Table 12 for RZ-4 East in the Monitoring Report. Additionally, the degradation of PCE and TCE (parent compounds) to cis-1,2-DCE, vinyl chloride (daughter products), and ethene and ethane (end products) are provided with the pH, TOC, and methane data for the upgradient monitor wells at RZ-1 (GM-29 and GM-23) and downgradient monitor wells in RZ-1, RZ-3 West, RZ-3 East, and RZ-4 East on Figures D-1 through D-8, respectively.

The following bullets summarize the observations and trends evident among the reactive zones at the GM Moraine Facilities which indicate that enhanced reduction of the targeted chlorinated VOCs is progressing as a result of the carbon introduction process:

- § Comparing the 2008 profiles of chlorinated compounds in the upgradient and downgradient wells in RZ-1 (Figures D-1 and D-3, respectively), it was observed that degradation of the chlorinated VOCs was sustained throughout 2008. The total chlorinated VOC concentrations in GM-29 have decreased in 2008 as compared to 2007 (1,907 µg/L in 2007 and 1,406 µg/L in 2008). Total chlorinated VOC concentrations in GM-23 decreased from 15,835 µg/L in 2006 to 7,792 µg/L in 2007 and to 4,229 µg/L in 2008. This well is upgradient to the original RZ-1 barrier and is within the zone of influence of carbon introductions conducted in the Former Oil House Area in wells OW-1 through OW-3.

- § Data from monitoring wells GM-8 and GM-6, which are located downgradient of RZ-3 West along the west side of Landfill L1, were considered to evaluate the effect of carbon introductions at RZ-3 West. Concentrations of total chlorinated VOCs at GM-8 remained steady in 2008 (21.75 µg/L) compared to 2007 (15 µg/L). Though GM-6 is located further downgradient, concentrations of PCE and TCE have consistently decreased since 1998. It is expected that consistent carbon introduction at RZ-3 West will eventually reduce the concentrations of all chlorinated VOCs at GM-6.
- § Total chlorinated VOC concentrations in monitoring well GM-21, which is the downgradient monitor well for RZ-3 East, have remained significantly lower compared to baseline conditions since the installation of Reactive Zone introduction wells RZ-3RR through RZ-3VV.
- § Data from monitoring well GM-19S, downgradient of RZ-4 East has exhibited a strong decreasing trend in total chlorinated VOC concentrations falling from 607 µg/L in December 2006 to 27.44 µg/L in September-October 2008.
- § The concentrations of VOCs at the influent to the air-stripper tower are being monitored on a monthly basis since the startup of the air stripper unit on January 31, 1996 (Figure 5 of the Monitoring Report). The first monitoring event was in February 1996, and the introduction of carbon in RZ-3 commenced in December 1999. On reviewing the data presented in Figure 5, it can be observed that the concentrations of VOCs in 2008 remained consistent with the 2007 monitoring data.

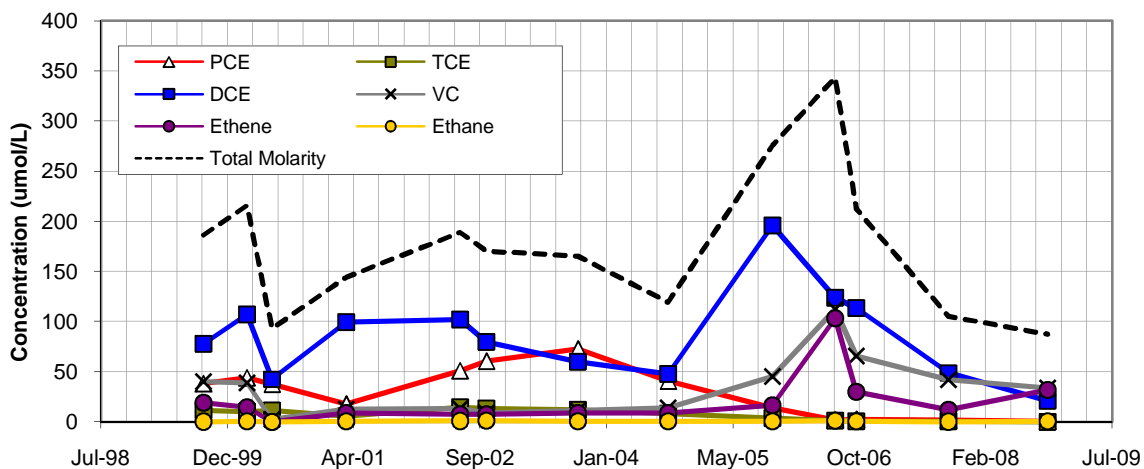
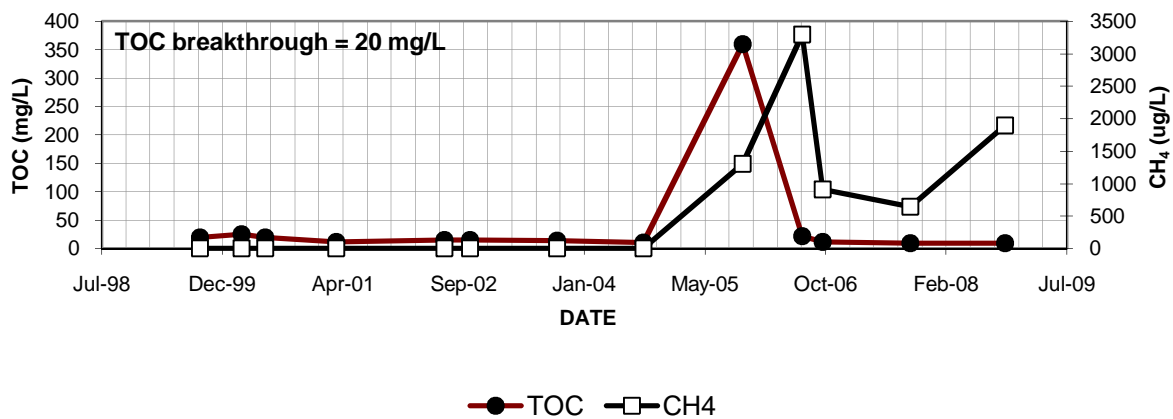
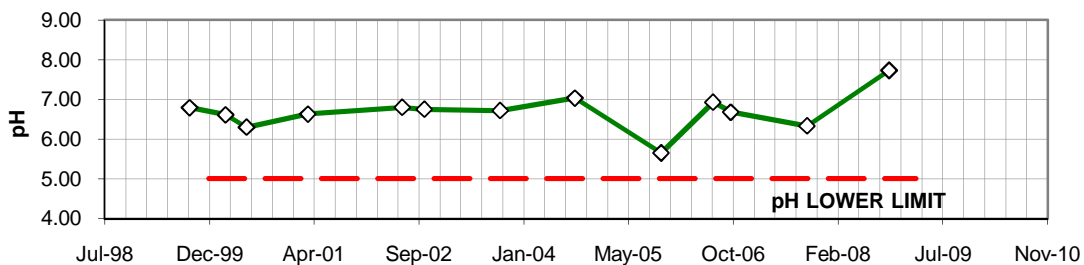
Conclusions

The following observations and conclusions can be made:

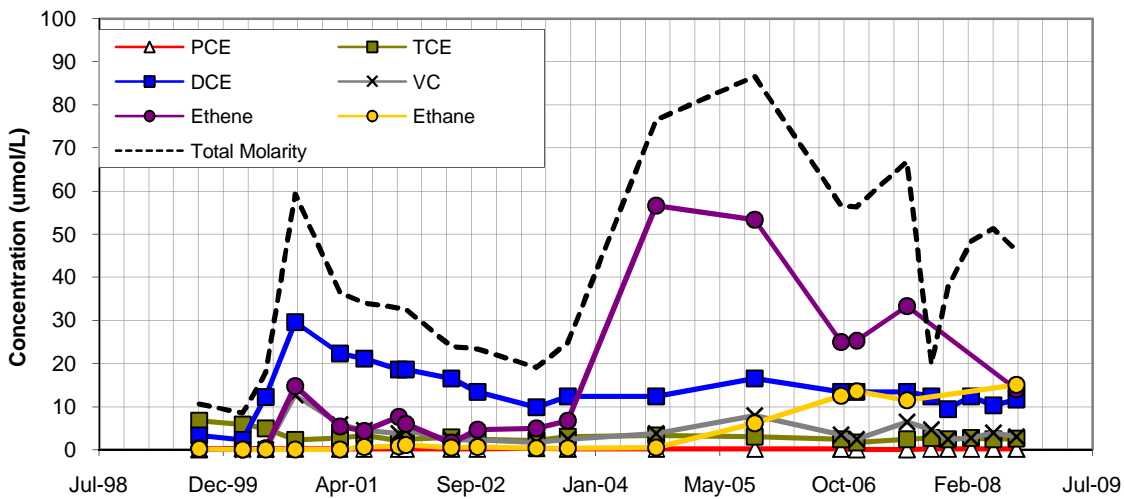
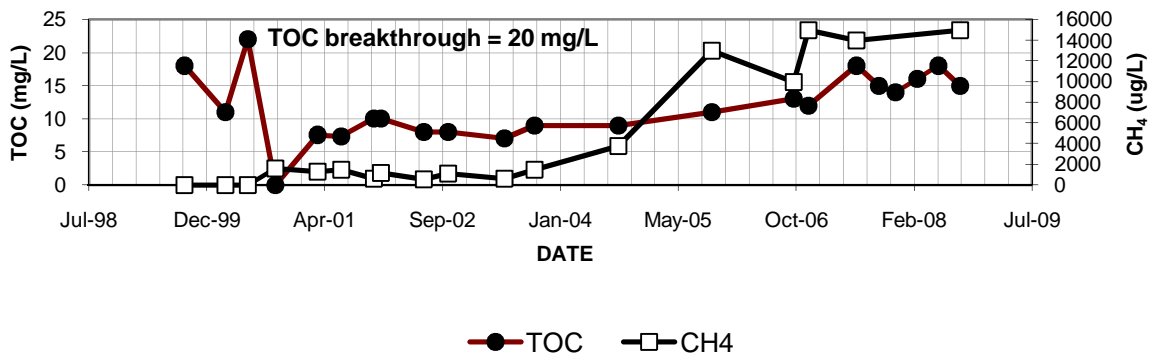
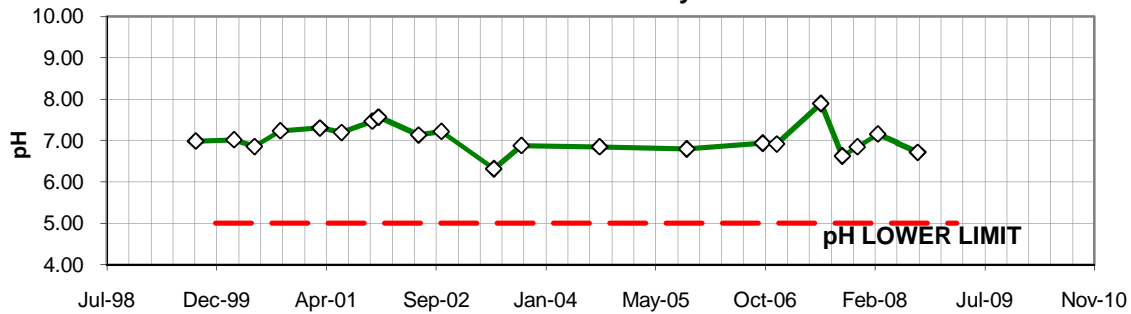
- § Existing aquifer conditions have been converted to more reducing conditions within and downgradient of the reactive zones through the introduction of a carbon source, as evidenced by the changes in field and bioattenuation parameters;
- § The target compounds (PCE and TCE) have been effectively reduced to daughter products (cis-1,2-DCE and vinyl chloride) and ultimately to end products (ethene and ethane) based on a review of the VOC results; and
- § Levels of vinyl chloride were consistently low to non-detect in all downgradient wells, indicating degradation of cis-1,2-DCE to ethene and ethane.

Overall, the process of enhanced reductive dechlorination at this site has been successful in achieving the desired reduction of VOC concentrations. In 2009, GM will continue to evaluate if modifications to the RZs are needed based on water quality and performance monitoring data.

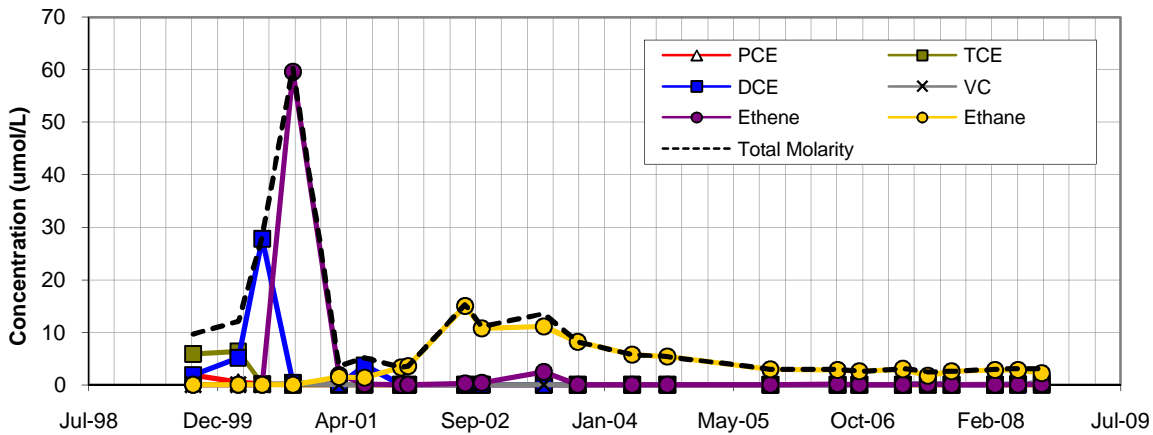
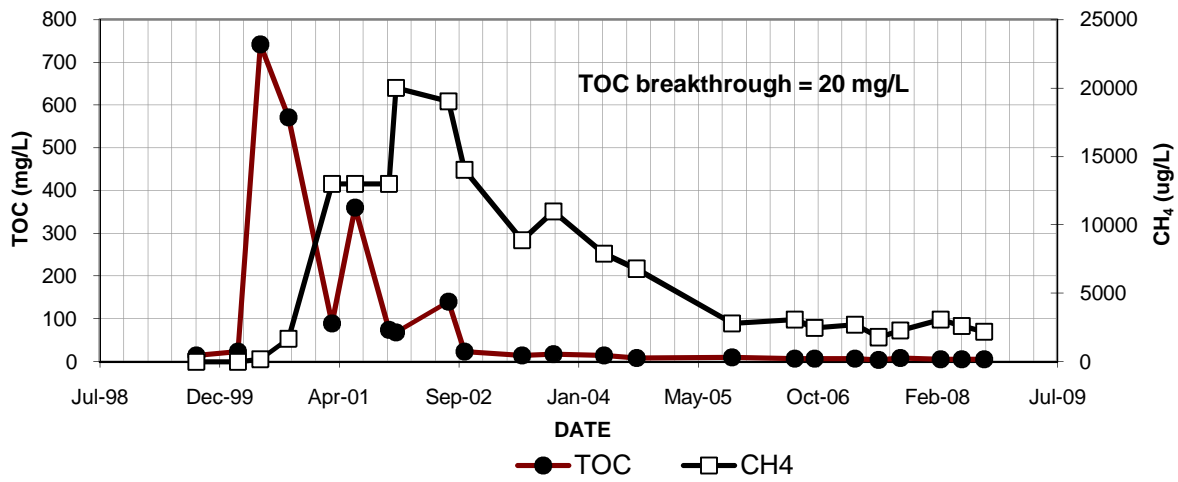
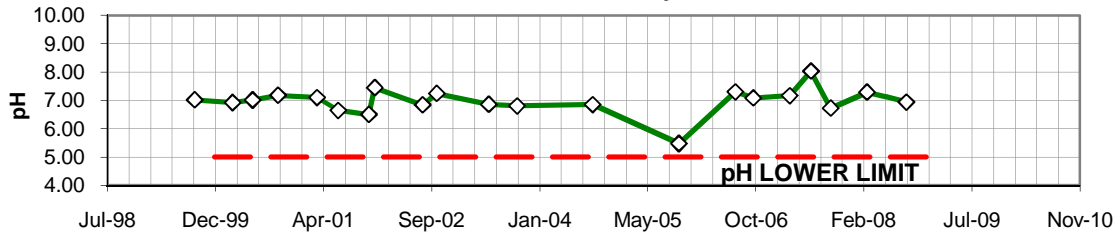
**Figure D-1
GM-23 ERD Analysis**



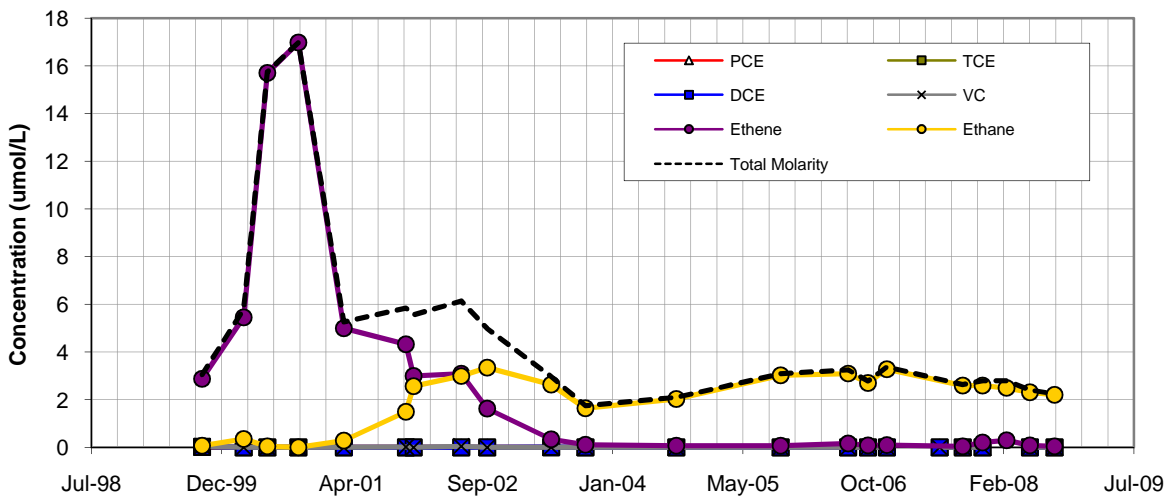
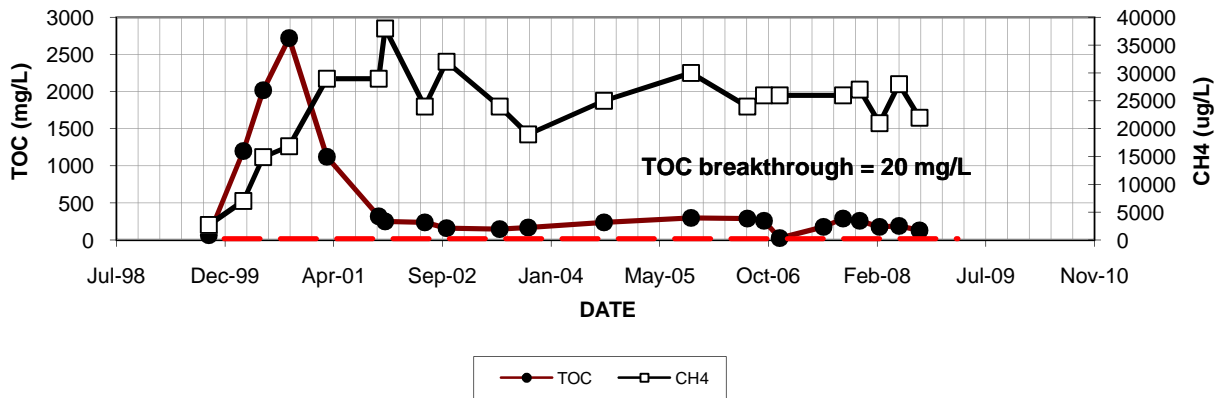
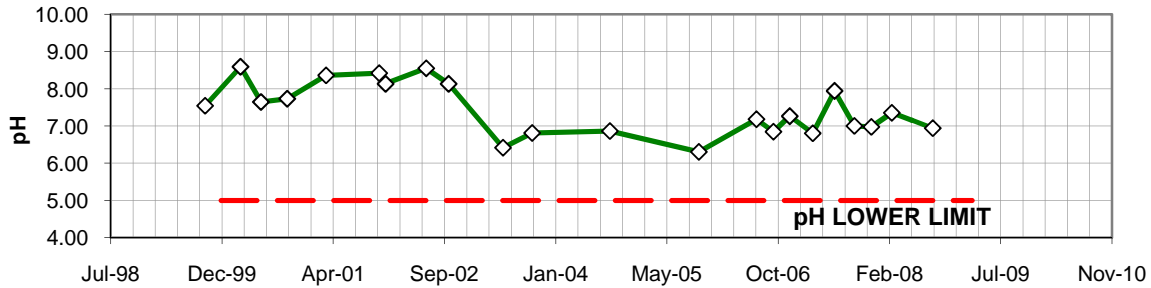
**Figure D-2
GM-29 ERD Analysis**



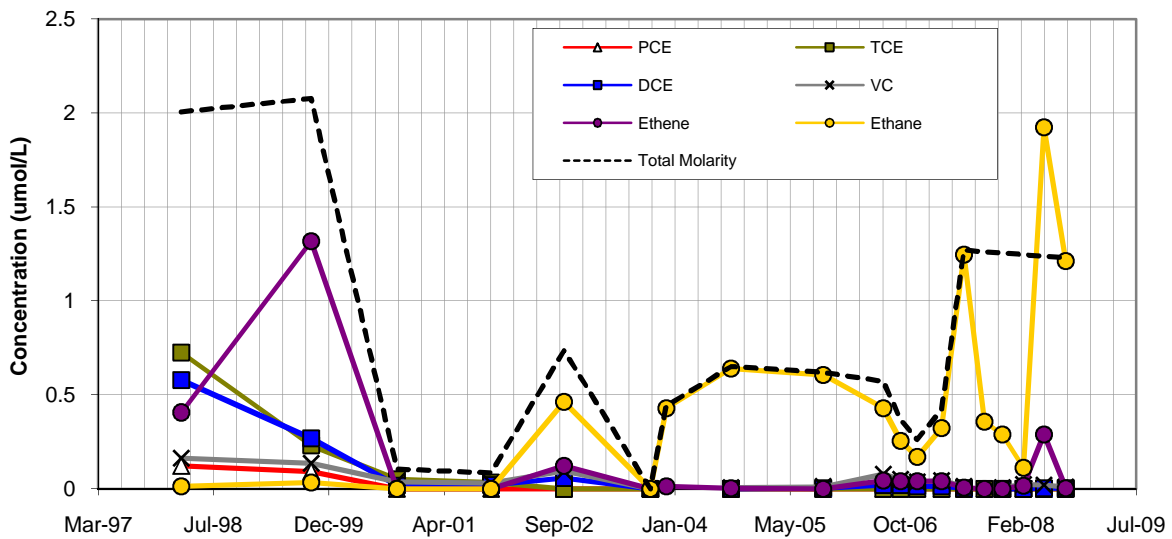
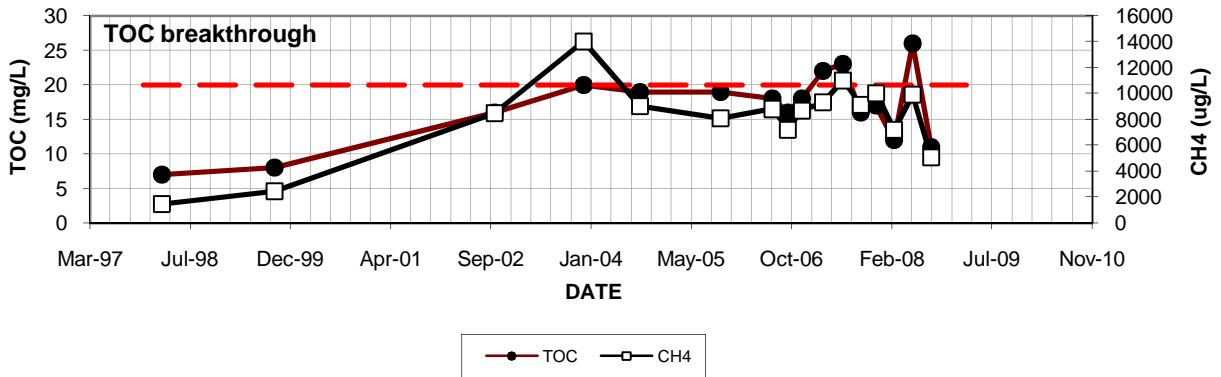
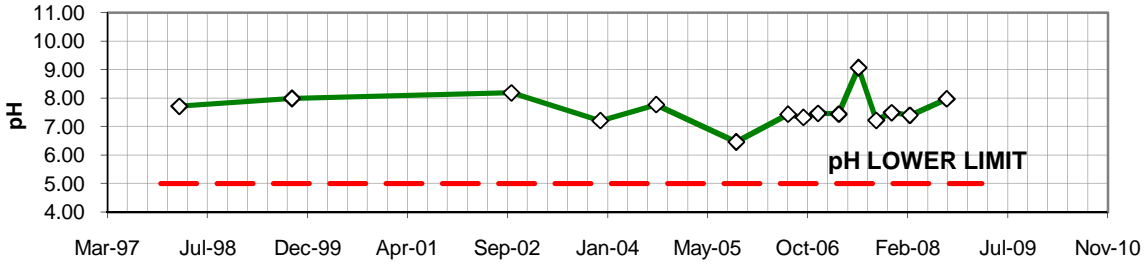
**Figure D-3
GM-28 ERD Analysis**



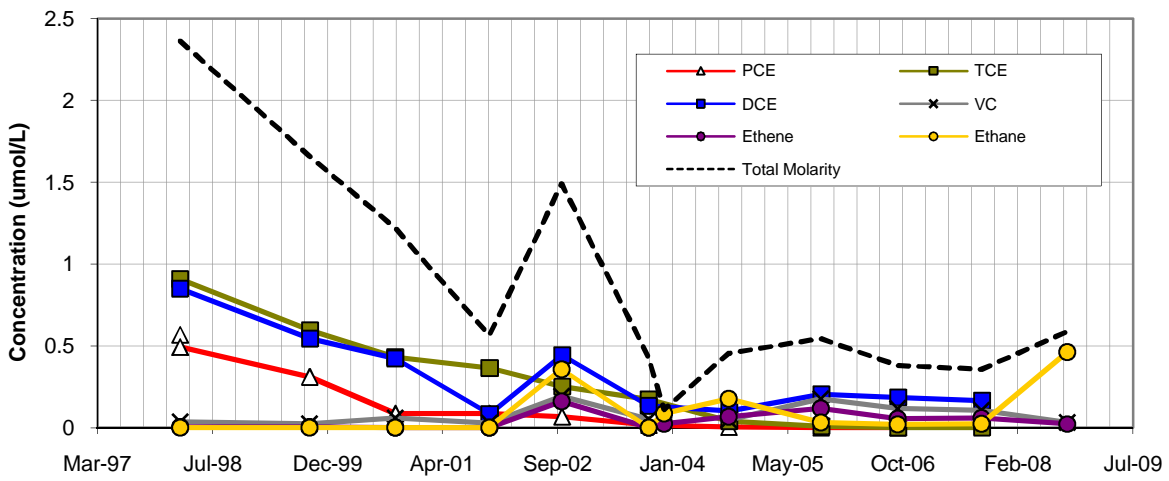
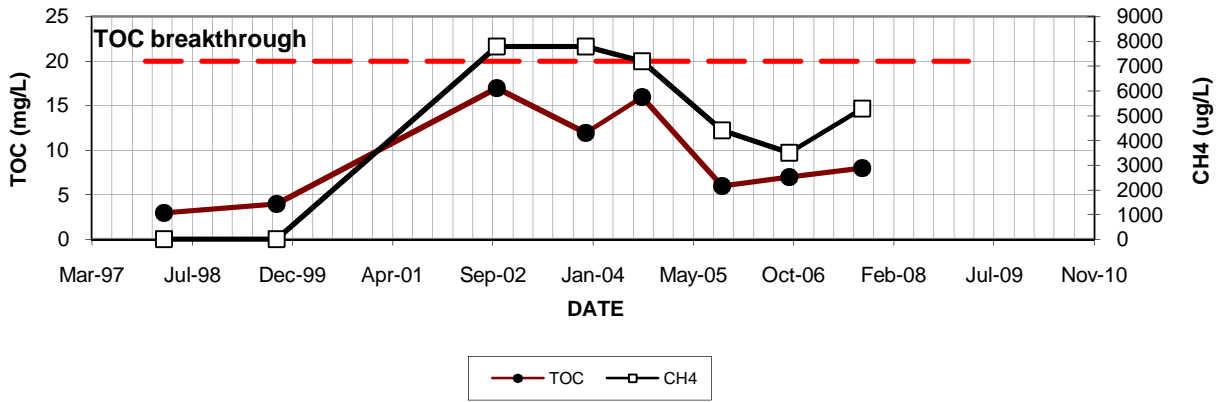
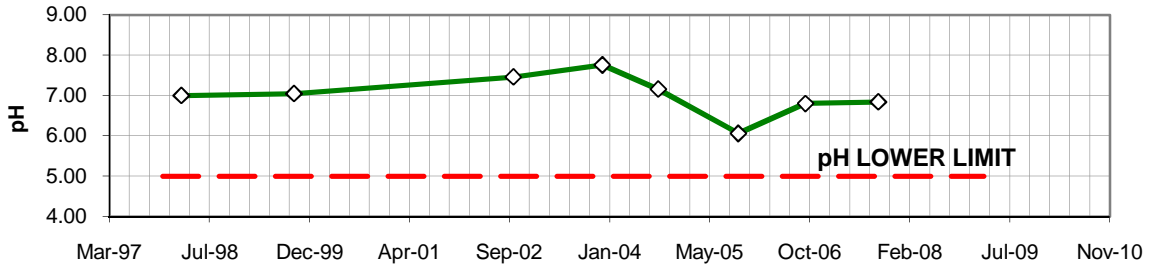
**Figure D-4
GM-32 ERD Analysis**



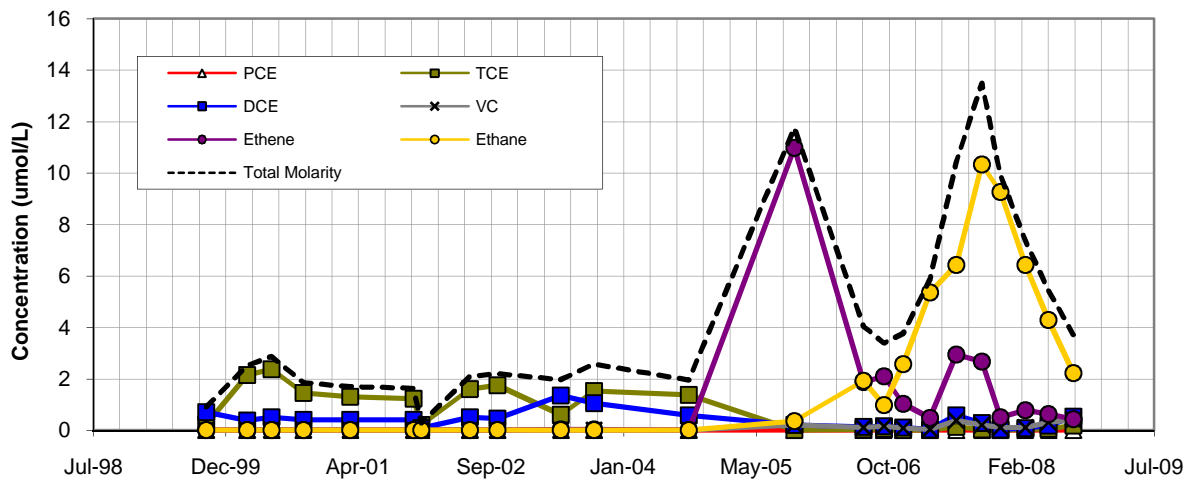
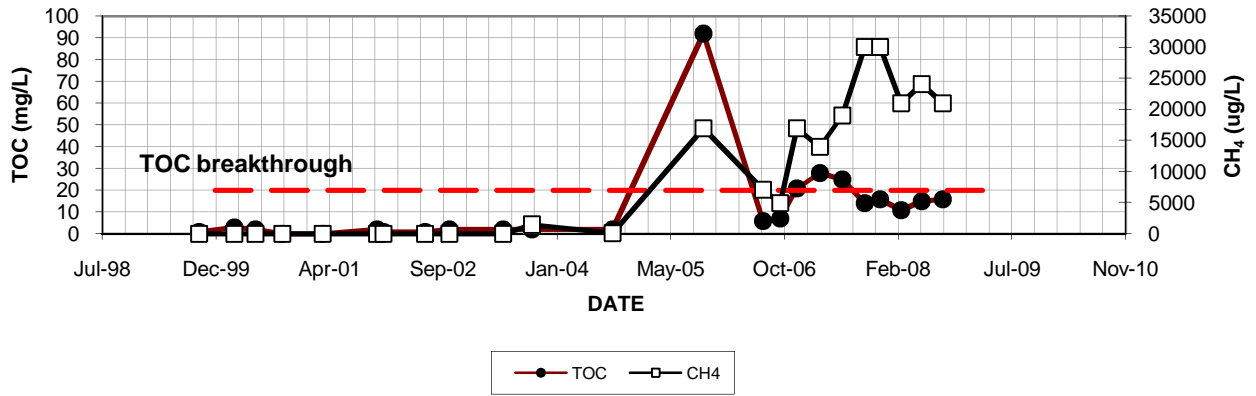
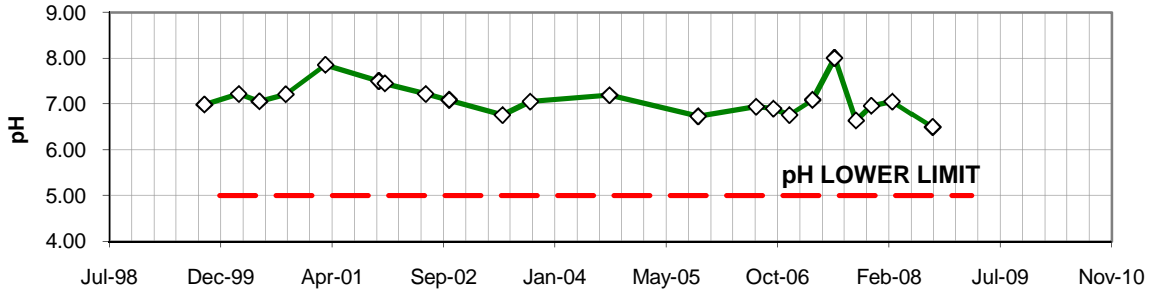
**Figure D-5
GM-8 ERD Analysis**



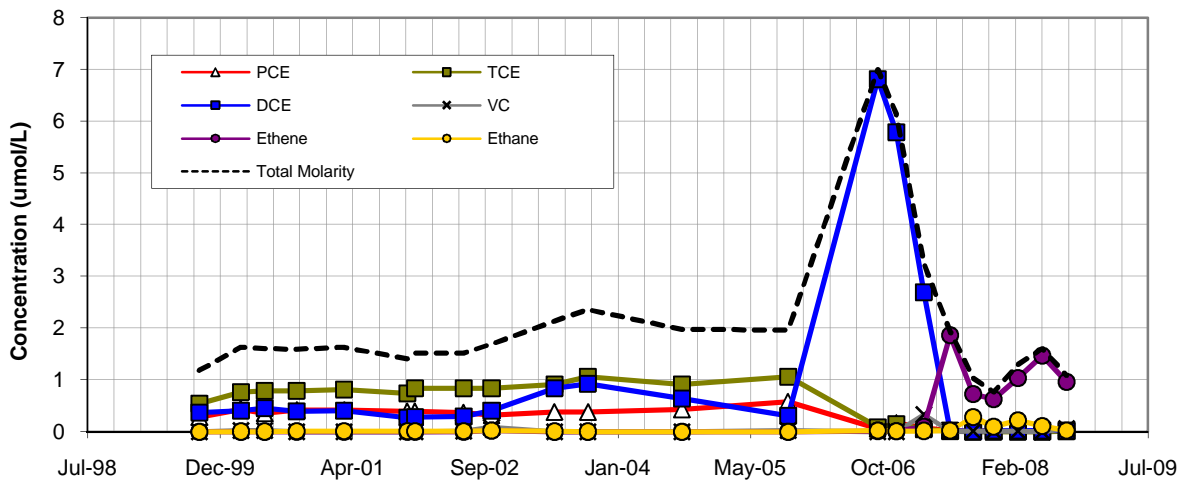
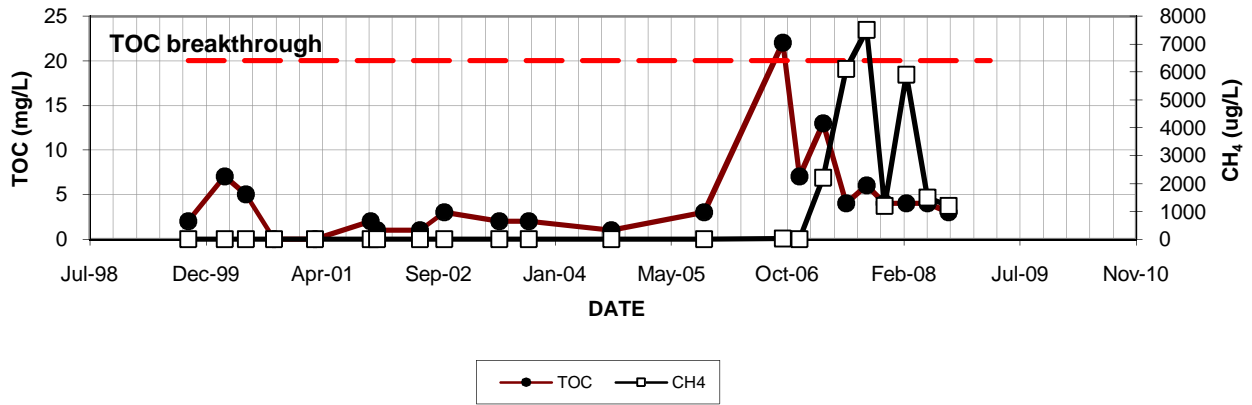
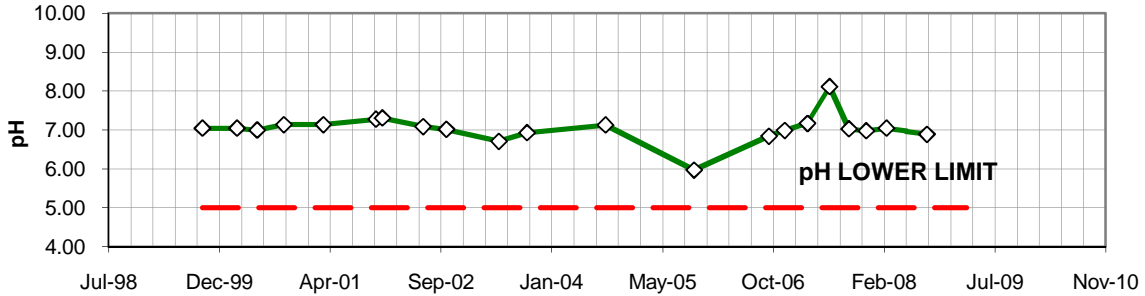
**Figure D-6
GM-6 ERD Analysis**



**Figure D-7
GM-21 ERD Analysis**



**Figure D-8
GM-19S ERD Analysis**



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Appendix E

Supporting Documentation for
Corrective Action Completion
Evaluation for 2008

Supporting Calculations
Table E-1: Source Reduction Factors

Potential Receptors Points	Well ID	Model Location (row, column, layer)	Pumping Rates	Potential Source Areas				
				Landfill 1	Landfill 2	Landfill 3	North Settling Lagoon	South Settling Lagoon
Shallow Treatment Well	TW-2	(215,144,1)	0	1.00E+00	1.47E-03	2.36E-05	4.50E-06	0.00E+00
Dryden North Well	DN-13	(225,117,3-4)	0	1.80E-01	8.24E-02	7.35E-03	8.23E-03	1.80E-02
Dryden South Well	DS-7	(249,118,3)	0	6.73E-01	4.04E-03	1.71E-04	1.29E-04	7.56E-05
Miami Shores Well Field	MS-14	(252,75,3-5)	0	2.02E-01	1.39E-01	3.94E-02	5.77E-02	1.87E-01
	MS-15	(245,79,3-5)						
	MS-16	(246,70,3-5)	0	6.02E-02	1.51E-01	7.61E-02	1.19E-01	3.05E-01
	MS-17	(250,66,3-5)						
	MS-18	(254,62,3-5)	0	1.79E-01	1.17E-01	5.70E-02	8.83E-02	2.15E-01
	MS-19	(255,70,3-5)						
	MS-20	(257,63,3-5)						
Moraine Assembly Production Wells	11B	(116,224,3)	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	12A	(108,226,3)	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Moraine Engine Well 28	28	(58,80,3)	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Moraine Engine Plant	31	(86,210,3)	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	39	(40,81,3)	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Harrison Production Wells	44	(29,70,3)	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	42	(54,59,3)	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	45	(74,56,3)	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
West Carrollton Well Field	WC-1	(282,27,3-5)	259	8.44E-06	2.65E-03	7.60E-03	1.14E-02	5.51E-03
	WC-3	(280,31,3-5)	259	1.51E-04	1.00E-02	2.19E-02	3.44E-02	4.00E-02
	WC-4	(281,29,3-5)	259	5.12E-05	6.01E-03	1.45E-02	1.03E-02	1.90E-02
Miami River ¹	--	--	--	6.76E-07	2.74E-04	1.02E-03	1.47E-03	4.25E-04

Notes:

1. Source reduction factors reflect updated groundwater model results generated using current site pumping conditions without interim measures pumping (Pumping Scenario 1a, ARCADIS 2008a)
2. Shaded cells indicate those potential receptor wells which are not pumping in pumping Scenario 1a (i.e., current conditions without interim measures pumping).
3. Dilution factors reported for the Miami River are mass loading factors to the river [^{lb/day}/_{mg/L}]

Supporting Calculations
Table E-2: Source Concentrations for In-Place Waste Management Units
(Based on all 2008 sampling data)

SWMU	TCL/TAL Group	Constituent	CASRN	Maximum Downgradient Ground Water Concentration (mg/L)
Landfill L1	VOC	1,1,1-Trichloroethane	71-55-6	0.
Landfill L1	VOC	1,1-Dichloroethane	75-34-3	0.0056
Landfill L1	VOC	1,1-Dichloroethene	75-35-4	0.
Landfill L1	VOC	1,2-Dichloroethene (total)	540-59-0	0.
Landfill L1	VOC	2-Butanone	78-93-3	0.
Landfill L1	VOC	Acetone	67-64-1	0.
Landfill L1	VOC	Benzene	71-43-2	0.0012
Landfill L1	VOC	Carbon Disulfide	75-15-0	0.
Landfill L1	VOC	Chlorobenzene	108-90-7	0.
Landfill L1	VOC	Chloroethane	75-00-3	0.0542
Landfill L1	VOC	Chloroform	67-66-3	0.
Landfill L1	VOC	cis-1,2-Dichloroethene	156-59-2	0.0067
Landfill L1	VOC	Ethyl Benzene	100-41-4	0.0005
Landfill L1	VOC	Styrene	100-42-5	0.
Landfill L1	VOC	Tetrachloroethene	127-18-4	0.0013
Landfill L1	VOC	Toluene	108-88-3	0.
Landfill L1	VOC	trans-1,2-Dichloroethene	156-60-5	0.0013
Landfill L1	VOC	Trichloroethene	79-01-6	0.0024
Landfill L1	VOC	Trichlorofluoromethane	75-69-4	0.
Landfill L1	VOC	Vinyl Chloride	75-01-4	0.0021
Landfill L1	VOC	Xylenes (total)	1330-20-7	0.
Landfill L1	SVOC	1,2-Dichlorobenzene	95-50-1	0.
Landfill L1	SVOC	2-Methylnaphthalene	91-57-6	0.
Landfill L1	SVOC	Benzo(a)anthracene	56-55-3	0.
Landfill L1	SVOC	Benzo(a)pyrene	50-32-8	0.
Landfill L1	SVOC	Benzo(b)fluoranthene	205-99-2	0.
Landfill L1	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.
Landfill L1	SVOC	Butylbenzylphthalate	85-68-7	0.
Landfill L1	SVOC	Chrysene	218-01-9	0.
Landfill L1	SVOC	Di-n-butylphthalate	84-74-2	0.
Landfill L1	SVOC	Fluoranthene	206-44-0	0.
Landfill L1	SVOC	Fluorene	86-73-7	0.
Landfill L1	SVOC	Naphthalene	91-20-3	0.
Landfill L1	SVOC	Phenanthrene	85-01-8	0.
Landfill L1	SVOC	Pyrene	129-00-0	0.
Landfill L1	P/PCB	Aroclor-1242	53469-21-9	0.
Landfill L1	P/PCB	Aroclor-1254	11097-69-1	0.
Landfill L1	P/PCB	Aroclor-1260	11096-82-5	0.
Landfill L1	INORG	Antimony	7440-36-0	0.
Landfill L1	INORG	Arsenic	7440-38-2	0.022
Landfill L1	INORG	Barium	7440-39-3	0.49
Landfill L1	INORG	Beryllium	7440-41-7	0.
Landfill L1	INORG	Cadmium	7440-43-9	0.
Landfill L1	INORG	Chromium (total)	7440-47-3	0.0025
Landfill L1	INORG	Cobalt	7440-48-4	0.
Landfill L1	INORG	Copper	7440-50-8	0.
Landfill L1	INORG	Cyanide (total)	57-12-5	0.
Landfill L1	INORG	Lead	7439-92-1	0.
Landfill L1	INORG	Manganese	7439-96-5	0.7
Landfill L1	INORG	Mercury	7439-97-6	0.
Landfill L1	INORG	Nickel	7440-02-0	0.0117
Landfill L1	INORG	Selenium	7782-49-2	0.
Landfill L1	INORG	Silver	7440-22-4	0.
Landfill L1	INORG	Thallium	7440-28-0	0.
Landfill L1	INORG	Vanadium	7440-62-2	0.
Landfill L1	INORG	Zinc	7440-66-6	0.
Notes:				
Downgradient wells: GM-02, GM-06, 4S				

Supporting Calculations
Table E-2: Source Concentrations for In-Place Waste Management Units
(Based on all 2008 sampling data)

SWMU	TCL/TAL Group	Constituent	CASRN	Maximum Downgradient Ground Water Concentration (mg/L)
Landfill L2	VOC	1,1,1-Trichloroethane	71-55-6	0.0008
Landfill L2	VOC	1,1-Dichloroethane	75-34-3	0.016
Landfill L2	VOC	1,1-Dichloroethene	75-35-4	0.0003
Landfill L2	VOC	1,2-Dichloroethene (total)	540-59-0	0.
Landfill L2	VOC	2-Butanone	78-93-3	0.
Landfill L2	VOC	Acetone	67-64-1	0.
Landfill L2	VOC	Benzene	71-43-2	0.
Landfill L2	VOC	Carbon Disulfide	75-15-0	0.
Landfill L2	VOC	Chlorobenzene	108-90-7	0.
Landfill L2	VOC	Chloroethane	75-00-3	0.
Landfill L2	VOC	Chloroform	67-66-3	0.
Landfill L2	VOC	cis-1,2-Dichloroethene	156-59-2	0.017
Landfill L2	VOC	Ethyl Benzene	100-41-4	0.
Landfill L2	VOC	Styrene	100-42-5	0.
Landfill L2	VOC	Tetrachloroethene	127-18-4	0.0004
Landfill L2	VOC	Toluene	108-88-3	0.
Landfill L2	VOC	trans-1,2-Dichloroethene	156-60-5	0.0016
Landfill L2	VOC	Trichloroethene	79-01-6	0.032
Landfill L2	VOC	Trichlorofluoromethane	75-69-4	0.
Landfill L2	VOC	Vinyl Chloride	75-01-4	0.0022
Landfill L2	VOC	Xylenes (total)	1330-20-7	0.
Landfill L2	SVOC	1,2-Dichlorobenzene	95-50-1	0.
Landfill L2	SVOC	2-Methylnaphthalene	91-57-6	0.
Landfill L2	SVOC	Benzo(a)anthracene	56-55-3	0.
Landfill L2	SVOC	Benzo(a)pyrene	50-32-8	0.
Landfill L2	SVOC	Benzo(b)fluoranthene	205-99-2	0.
Landfill L2	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.
Landfill L2	SVOC	Butylbenzylphthalate	85-68-7	0.
Landfill L2	SVOC	Chrysene	218-01-9	0.
Landfill L2	SVOC	Di-n-butylphthalate	84-74-2	0.
Landfill L2	SVOC	Fluoranthene	206-44-0	0.
Landfill L2	SVOC	Fluorene	86-73-7	0.
Landfill L2	SVOC	Naphthalene	91-20-3	0.
Landfill L2	SVOC	Phenanthrene	85-01-8	0.
Landfill L2	SVOC	Pyrene	129-00-0	0.
Landfill L2	P/PCB	Aroclor-1242	53469-21-9	0.
Landfill L2	P/PCB	Aroclor-1254	11097-69-1	0.
Landfill L2	P/PCB	Aroclor-1260	11096-82-5	0.
Landfill L2	INORG	Antimony	7440-36-0	0.
Landfill L2	INORG	Arsenic	7440-38-2	0.
Landfill L2	INORG	Barium	7440-39-3	0.0795
Landfill L2	INORG	Beryllium	7440-41-7	0.
Landfill L2	INORG	Cadmium	7440-43-9	0.
Landfill L2	INORG	Chromium (total)	7440-47-3	0.
Landfill L2	INORG	Cobalt	7440-48-4	0.
Landfill L2	INORG	Copper	7440-50-8	0.
Landfill L2	INORG	Cyanide (total)	57-12-5	0.
Landfill L2	INORG	Lead	7439-92-1	0.
Landfill L2	INORG	Manganese	7439-96-5	0.211
Landfill L2	INORG	Mercury	7439-97-6	0.
Landfill L2	INORG	Nickel	7440-02-0	0.0116
Landfill L2	INORG	Selenium	7782-49-2	0.
Landfill L2	INORG	Silver	7440-22-4	0.
Landfill L2	INORG	Thallium	7440-28-0	0.
Landfill L2	INORG	Vanadium	7440-62-2	0.
Landfill L2	INORG	Zinc	7440-66-6	0.
Notes:				
Downgradient wells: W-4-N, HR-2, HR-3				

Supporting Calculations
Table E-2: Source Concentrations for In-Place Waste Management Units
(Based on all 2008 sampling data)

SWMU	TCL/TAL Group	Constituent	CASRN	Maximum Downgradient Ground Water Concentration (mg/L)
Landfill L3	VOC	1,1,1-Trichloroethane	71-55-6	0.0004
Landfill L3	VOC	1,1-Dichloroethane	75-34-3	0.0046
Landfill L3	VOC	1,1-Dichloroethene	75-35-4	0.
Landfill L3	VOC	1,2-Dichloroethene (total)	540-59-0	0.
Landfill L3	VOC	2-Butanone	78-93-3	0.
Landfill L3	VOC	Acetone	67-64-1	0.
Landfill L3	VOC	Benzene	71-43-2	0.
Landfill L3	VOC	Carbon Disulfide	75-15-0	0.
Landfill L3	VOC	Chlorobenzene	108-90-7	0.
Landfill L3	VOC	Chloroethane	75-00-3	0.
Landfill L3	VOC	Chloroform	67-66-3	0.
Landfill L3	VOC	cis-1,2-Dichloroethene	156-59-2	0.011
Landfill L3	VOC	Ethyl Benzene	100-41-4	0.
Landfill L3	VOC	Styrene	100-42-5	0.
Landfill L3	VOC	Tetrachloroethene	127-18-4	0.0004
Landfill L3	VOC	Toluene	108-88-3	0.
Landfill L3	VOC	trans-1,2-Dichloroethene	156-60-5	0.0009
Landfill L3	VOC	Trichloroethene	79-01-6	0.0084
Landfill L3	VOC	Trichlorofluoromethane	75-69-4	0.
Landfill L3	VOC	Vinyl Chloride	75-01-4	0.0003
Landfill L3	VOC	Xylenes (total)	1330-20-7	0.
Landfill L3	SVOC	1,2-Dichlorobenzene	95-50-1	0.
Landfill L3	SVOC	2-Methylnaphthalene	91-57-6	0.
Landfill L3	SVOC	Benzo(a)anthracene	56-55-3	0.
Landfill L3	SVOC	Benzo(a)pyrene	50-32-8	0.
Landfill L3	SVOC	Benzo(b)fluoranthene	205-99-2	0.
Landfill L3	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.
Landfill L3	SVOC	Butylbenzylphthalate	85-68-7	0.
Landfill L3	SVOC	Chrysene	218-01-9	0.
Landfill L3	SVOC	Di-n-butylphthalate	84-74-2	0.
Landfill L3	SVOC	Fluoranthene	206-44-0	0.
Landfill L3	SVOC	Fluorene	86-73-7	0.
Landfill L3	SVOC	Naphthalene	91-20-3	0.
Landfill L3	SVOC	Phenanthrene	85-01-8	0.
Landfill L3	SVOC	Pyrene	129-00-0	0.
Landfill L3	P/PCB	Aroclor-1242	53469-21-9	0.
Landfill L3	P/PCB	Aroclor-1254	11097-69-1	0.
Landfill L3	P/PCB	Aroclor-1260	11096-82-5	0.
Landfill L3	INORG	Antimony	7440-36-0	0.
Landfill L3	INORG	Arsenic	7440-38-2	0.
Landfill L3	INORG	Barium	7440-39-3	0.0675
Landfill L3	INORG	Beryllium	7440-41-7	0.
Landfill L3	INORG	Cadmium	7440-43-9	0.
Landfill L3	INORG	Chromium (total)	7440-47-3	0.
Landfill L3	INORG	Cobalt	7440-48-4	0.
Landfill L3	INORG	Copper	7440-50-8	0.
Landfill L3	INORG	Cyanide (total)	57-12-5	0.
Landfill L3	INORG	Lead	7439-92-1	0.
Landfill L3	INORG	Manganese	7439-96-5	0.
Landfill L3	INORG	Mercury	7439-97-6	0.
Landfill L3	INORG	Nickel	7440-02-0	0.0116
Landfill L3	INORG	Selenium	7782-49-2	0.
Landfill L3	INORG	Silver	7440-22-4	0.
Landfill L3	INORG	Thallium	7440-28-0	0.
Landfill L3	INORG	Vanadium	7440-62-2	0.
Landfill L3	INORG	Zinc	7440-66-6	0.
Notes:				
Downgradient wells: W-4-N, HR-2, HR-4				

Supporting Calculations
Table E-2: Source Concentrations for In-Place Waste Management Units
(Based on all 2008 sampling data)

SWMU	TCL/TAL Group	Constituent	CASRN	Maximum Downgradient Ground Water Concentration (mg/L)
North Settling Lagoon	VOC	1,1,1-Trichloroethane	71-55-6	0.
North Settling Lagoon	VOC	1,1-Dichloroethane	75-34-3	0.
North Settling Lagoon	VOC	1,1-Dichloroethene	75-35-4	0.
North Settling Lagoon	VOC	1,2-Dichloroethene (total)	540-59-0	0.
North Settling Lagoon	VOC	2-Butanone	78-93-3	0.
North Settling Lagoon	VOC	Acetone	67-64-1	0.
North Settling Lagoon	VOC	Benzene	71-43-2	0.
North Settling Lagoon	VOC	Carbon Disulfide	75-15-0	0.
North Settling Lagoon	VOC	Chlorobenzene	108-90-7	0.
North Settling Lagoon	VOC	Chloroethane	75-00-3	0.
North Settling Lagoon	VOC	Chloroform	67-66-3	0.
North Settling Lagoon	VOC	cis-1,2-Dichloroethene	156-59-2	0.098
North Settling Lagoon	VOC	Ethyl Benzene	100-41-4	0.
North Settling Lagoon	VOC	Styrene	100-42-5	0.
North Settling Lagoon	VOC	Tetrachloroethene	127-18-4	0.0004
North Settling Lagoon	VOC	Toluene	108-88-3	0.
North Settling Lagoon	VOC	trans-1,2-Dichloroethene	156-60-5	0.0014
North Settling Lagoon	VOC	Trichloroethene	79-01-6	0.0084
North Settling Lagoon	VOC	Trichlorofluoromethane	75-69-4	0.
North Settling Lagoon	VOC	Vinyl Chloride	75-01-4	0.0038
North Settling Lagoon	VOC	Xylenes (total)	1330-20-7	0.
North Settling Lagoon	SVOC	1,2-Dichlorobenzene	95-50-1	0.
North Settling Lagoon	SVOC	2-Methylnaphthalene	91-57-6	0.
North Settling Lagoon	SVOC	Benzo(a)anthracene	56-55-3	0.
North Settling Lagoon	SVOC	Benzo(a)pyrene	50-32-8	0.
North Settling Lagoon	SVOC	Benzo(b)fluoranthene	205-99-2	0.
North Settling Lagoon	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.
North Settling Lagoon	SVOC	Butylbenzylphthalate	85-68-7	0.
North Settling Lagoon	SVOC	Chrysene	218-01-9	0.
North Settling Lagoon	SVOC	Di-n-butylphthalate	84-74-2	0.
North Settling Lagoon	SVOC	Fluoranthene	206-44-0	0.
North Settling Lagoon	SVOC	Fluorene	86-73-7	0.
North Settling Lagoon	SVOC	Naphthalene	91-20-3	0.
North Settling Lagoon	SVOC	Phenanthrene	85-01-8	0.
North Settling Lagoon	SVOC	Pyrene	129-00-0	0.
North Settling Lagoon	P/PCB	Aroclor-1242	53469-21-9	0.
North Settling Lagoon	P/PCB	Aroclor-1254	11097-69-1	0.
North Settling Lagoon	P/PCB	Aroclor-1260	11096-82-5	0.
North Settling Lagoon	INORG	Antimony	7440-36-0	0.
North Settling Lagoon	INORG	Arsenic	7440-38-2	0.0074
North Settling Lagoon	INORG	Barium	7440-39-3	0.0986
North Settling Lagoon	INORG	Beryllium	7440-41-7	0.
North Settling Lagoon	INORG	Cadmium	7440-43-9	0.
North Settling Lagoon	INORG	Chromium (total)	7440-47-3	0.
North Settling Lagoon	INORG	Cobalt	7440-48-4	0.
North Settling Lagoon	INORG	Copper	7440-50-8	0.0055
North Settling Lagoon	INORG	Cyanide (total)	57-12-5	0.
North Settling Lagoon	INORG	Lead	7439-92-1	0.001
North Settling Lagoon	INORG	Manganese	7439-96-5	0.
North Settling Lagoon	INORG	Mercury	7439-97-6	0.
North Settling Lagoon	INORG	Nickel	7440-02-0	0.0116
North Settling Lagoon	INORG	Selenium	7782-49-2	0.
North Settling Lagoon	INORG	Silver	7440-22-4	0.
North Settling Lagoon	INORG	Thallium	7440-28-0	0.
North Settling Lagoon	INORG	Vanadium	7440-62-2	0.
North Settling Lagoon	INORG	Zinc	7440-66-6	0.
Notes:				
Downgradient wells: W-2-N, W-3-N, W-4-N				

Supporting Calculations
Table E-2: Source Concentrations for In-Place Waste Management Units
(Based on all 2008 sampling data)

SWMU	TCL/TAL Group	Constituent	CASRN	Maximum Downgradient Ground Water Concentration (mg/L)
South Settling Lagoon	VOC	1,1,1-Trichloroethane	71-55-6	0.
South Settling Lagoon	VOC	1,1-Dichloroethane	75-34-3	0.
South Settling Lagoon	VOC	1,1-Dichloroethene	75-35-4	0.
South Settling Lagoon	VOC	1,2-Dichloroethene (total)	540-59-0	0.
South Settling Lagoon	VOC	2-Butanone	78-93-3	0.
South Settling Lagoon	VOC	Acetone	67-64-1	0.
South Settling Lagoon	VOC	Benzene	71-43-2	0.
South Settling Lagoon	VOC	Carbon Disulfide	75-15-0	0.
South Settling Lagoon	VOC	Chlorobenzene	108-90-7	0.
South Settling Lagoon	VOC	Chloroethane	75-00-3	0.
South Settling Lagoon	VOC	Chloroform	67-66-3	0.
South Settling Lagoon	VOC	cis-1,2-Dichloroethene	156-59-2	0.0066
South Settling Lagoon	VOC	Ethyl Benzene	100-41-4	0.
South Settling Lagoon	VOC	Styrene	100-42-5	0.
South Settling Lagoon	VOC	Tetrachloroethene	127-18-4	0.
South Settling Lagoon	VOC	Toluene	108-88-3	0.
South Settling Lagoon	VOC	trans-1,2-Dichloroethene	156-60-5	0.
South Settling Lagoon	VOC	Trichloroethene	79-01-6	0.
South Settling Lagoon	VOC	Trichlorofluoromethane	75-69-4	0.0031
South Settling Lagoon	VOC	Vinyl Chloride	75-01-4	0.
South Settling Lagoon	VOC	Xylenes (total)	1330-20-7	0.
South Settling Lagoon	SVOC	1,2-Dichlorobenzene	95-50-1	0.
South Settling Lagoon	SVOC	2-Methylnaphthalene	91-57-6	0.
South Settling Lagoon	SVOC	Benzo(a)anthracene	56-55-3	0.
South Settling Lagoon	SVOC	Benzo(a)pyrene	50-32-8	0.
South Settling Lagoon	SVOC	Benzo(b)fluoranthene	205-99-2	0.
South Settling Lagoon	SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.
South Settling Lagoon	SVOC	Butylbenzylphthalate	85-68-7	0.
South Settling Lagoon	SVOC	Chrysene	218-01-9	0.
South Settling Lagoon	SVOC	Di-n-butylphthalate	84-74-2	0.
South Settling Lagoon	SVOC	Fluoranthene	206-44-0	0.
South Settling Lagoon	SVOC	Fluorene	86-73-7	0.
South Settling Lagoon	SVOC	Naphthalene	91-20-3	0.
South Settling Lagoon	SVOC	Phenanthrene	85-01-8	0.
South Settling Lagoon	SVOC	Pyrene	129-00-0	0.
South Settling Lagoon	P/PCB	Aroclor-1242	53469-21-9	0.
South Settling Lagoon	P/PCB	Aroclor-1254	11097-69-1	0.
South Settling Lagoon	P/PCB	Aroclor-1260	11096-82-5	0.
South Settling Lagoon	INORG	Antimony	7440-36-0	0.
South Settling Lagoon	INORG	Arsenic	7440-38-2	0.
South Settling Lagoon	INORG	Barium	7440-39-3	0.176
South Settling Lagoon	INORG	Beryllium	7440-41-7	0.
South Settling Lagoon	INORG	Cadmium	7440-43-9	0.
South Settling Lagoon	INORG	Chromium (total)	7440-47-3	0.0035
South Settling Lagoon	INORG	Cobalt	7440-48-4	0.0144
South Settling Lagoon	INORG	Copper	7440-50-8	0.
South Settling Lagoon	INORG	Cyanide (total)	57-12-5	0.
South Settling Lagoon	INORG	Lead	7439-92-1	0.
South Settling Lagoon	INORG	Manganese	7439-96-5	0.115
South Settling Lagoon	INORG	Mercury	7439-97-6	0.
South Settling Lagoon	INORG	Nickel	7440-02-0	0.0067
South Settling Lagoon	INORG	Selenium	7782-49-2	0.
South Settling Lagoon	INORG	Silver	7440-22-4	0.
South Settling Lagoon	INORG	Thallium	7440-28-0	0.
South Settling Lagoon	INORG	Vanadium	7440-62-2	0.
South Settling Lagoon	INORG	Zinc	7440-66-6	0.
Notes:				
Downgradient wells: W-2-S, W-3-S, W-4-S				

Supporting Calculations
Table E-3a: Estimated Contributions to Ground Water Concentrations (mg/L) at West Carrollton Receptor Point
(Pumping Scenario 1a)

TCL/TAL Group	Constituent	CASRN	Landfill L1	Landfill L2	Landfill L3	N Settling Lagoon	S Settling Lagoon	Total	Criteria	Flag
VOC	1,1,1-Trichloroethane	71-55-6		5.22E-06	5.72E-06			0.0001	0.2	
VOC	1,1-Dichloroethane	75-34-3	3.93E-07	9.95E-05	6.75E-05			0.0002	3.65	
VOC	1,1-Dichloroethene	75-35-4		1.68E-06				0.	0.007	
VOC	1,2-Dichloroethene (total)	540-59-0						0.	0.07	
VOC	2-Butanone	78-93-3						0.0001	21.9	
VOC	Acetone	67-64-1						0.	32.85	
VOC	Benzene	71-43-2	8.43E-08					0.	0.005	
VOC	Carbon Disulfide	75-15-0						0.	3.65	
VOC	Chlorobenzene	108-90-7						0.	0.1	
VOC	Chloroethane	75-00-3	3.81E-06					0.	14.6	
VOC	Chloroform	67-66-3						0.	0.08	
VOC	cis-1,2-Dichloroethene	156-59-2	4.70E-07	1.06E-04	1.61E-04	1.83E-03	1.41E-04	0.003	0.07	
VOC	Ethyl Benzene	100-41-4	3.65E-08					0.	0.7	
VOC	Styrene	100-42-5						0.	0.1	
VOC	Tetrachloroethene	127-18-4	9.13E-08	2.36E-06	6.45E-06	7.11E-06		0.0002	0.005	
VOC	Toluene	108-88-3						0.	1.	
VOC	trans-1,2-Dichloroethene	156-60-5	9.13E-08	9.95E-06	1.35E-05	2.62E-05		0.0001	0.1	
VOC	Trichloroethene	79-01-6	1.69E-07	1.99E-04	1.23E-04	1.57E-04		0.0007	0.005	
VOC	Trichlorofluoromethane	75-69-4					6.67E-05	0.0001	10.95	
VOC	Vinyl Chloride	75-01-4	1.47E-07	1.37E-05	4.99E-06	7.11E-05		0.0002	0.002	
VOC	Xylenes (total)	1330-20-7						0.	10.	
SVOC	1,2-Dichlorobenzene	95-50-1						0.	0.6	
SVOC	2-Methylnaphthalene	91-57-6						0.	0.73	
SVOC	Benzo(a)anthracene	56-55-3						0.	0.0009	
SVOC	Benzo(a)pyrene	50-32-8						0.	0.0002	
SVOC	Benzo(b)fluoranthene	205-99-2						0.	0.0009	
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7						0.	0.006	
SVOC	Butylbenzylphthalate	85-68-7						0.	7.3	
SVOC	Chrysene	218-01-9						0.	0.0921	
SVOC	Di-n-butylphthalate	84-74-2						0.	3.7	
SVOC	Fluoranthene	206-44-0						0.0001	1.46	
SVOC	Fluorene	86-73-7						0.0001	1.46	
SVOC	Naphthalene	91-20-3						0.0002	0.73	
SVOC	Phenanthrene	85-01-8						0.0007	1.095	
SVOC	Pyrene	129-00-0						0.	1.095	
P/PCB	Aroclor-1242	53469-21-9						0.	0.0005	
P/PCB	Aroclor-1254	11097-69-1						0.	0.0005	
P/PCB	Aroclor-1260	11096-82-5						0.	0.0005	
INORG	Antimony	7440-36-0						0.0001	0.006	
INORG	Arsenic	7440-38-2	1.54E-06			1.38E-04		0.0002	0.01	
INORG	Barium	7440-39-3	3.44E-05	4.94E-04	9.90E-04	1.84E-03	3.78E-03	0.0073	2.	
INORG	Beryllium	7440-41-7						0.	0.004	
INORG	Cadmium	7440-43-9						0.	0.005	
INORG	Chromium (total)	7440-47-3	1.76E-07				7.53E-05	0.0004	0.1	
INORG	Cobalt	7440-48-4					3.10E-04	0.0005	0.73	
INORG	Copper	7440-50-8				1.03E-04		0.0001	1.3	
INORG	Cyanide (total)	57-12-5						0.	0.2	
INORG	Lead	7439-92-1				1.87E-05		0.0001	0.015	
INORG	Manganese	7439-96-5	4.91E-05	1.31E-03			2.47E-03	0.0147	0.876	
INORG	Mercury	7439-97-6						0.	0.002	
INORG	Nickel	7440-02-0	8.21E-07	7.22E-05	1.70E-04	2.17E-04	1.44E-04	0.0007	0.73	
INORG	Selenium	7782-49-2						0.0001	0.05	
INORG	Silver	7440-22-4						0.0001	0.1825	
INORG	Thallium	7440-28-0						0.	0.002	
INORG	Vanadium	7440-62-2						0.	0.0365	
INORG	Zinc	7440-66-6						0.0024	10.95	

Supporting Calculations

Table E-3b: Estimated Contributions to Ground Water Concentrations (mg/L) at Great Miami River Receptor Point (Pumping Scenario 1a)

TCL/TAL Group	Constituent	CASRN	Landfill L1	Landfill L2	Landfill L3	N Settling Lagoon	S Settling Lagoon	Total	Criteria	Flag
VOC	1,1,1-Trichloroethane	71-55-6		1.74E-11	3.01E-11			0.	0.2	
VOC	1,1-Dichloroethane	75-34-3	2.86E-13	3.31E-10	3.54E-10			0.	3.65	
VOC	1,1-Dichloroethene	75-35-4		5.59E-12				0.	0.007	
VOC	1,2-Dichloroethene (total)	540-59-0						0.	0.07	
VOC	2-Butanone	78-93-3						0.	21.9	
VOC	Acetone	67-64-1						0.	32.85	
VOC	Benzene	71-43-2	6.13E-14					0.	0.005	
VOC	Carbon Disulfide	75-15-0						0.	3.65	
VOC	Chlorobenzene	108-90-7						0.	0.1	
VOC	Chloroethane	75-00-3	2.77E-12					0.	14.6	
VOC	Chloroform	67-66-3						0.	0.08	
VOC	cis-1,2-Dichloroethene	156-59-2	3.42E-13	3.52E-10	8.48E-10	1.09E-08	2.10E-10	0.	0.07	
VOC	Ethyl Benzene	100-41-4	2.66E-14					0.	0.7	
VOC	Styrene	100-42-5						0.	0.1	
VOC	Tetrachloroethene	127-18-4	6.64E-14	7.87E-12	3.39E-11	4.22E-11		0.	0.005	
VOC	Toluene	108-88-3						0.	1.	
VOC	trans-1,2-Dichloroethene	156-60-5	6.64E-14	3.31E-11	7.09E-11	1.55E-10		0.	0.1	
VOC	Trichloroethene	79-01-6	1.23E-13	6.62E-10	6.47E-10	9.33E-10		0.	0.005	
VOC	Trichlorofluoromethane	75-69-4					9.95E-11	0.	10.95	
VOC	Vinyl Chloride	75-01-4	1.07E-13	4.55E-11	2.62E-11	4.22E-10		0.	0.002	
VOC	Xylenes (total)	1330-20-7						0.	10.	
SVOC	1,2-Dichlorobenzene	95-50-1						0.	0.6	
SVOC	2-Methylnaphthalene	91-57-6						0.	0.73	
SVOC	Benzo(a)anthracene	56-55-3						0.	0.0009	
SVOC	Benzo(a)pyrene	50-32-8						0.	0.0002	
SVOC	Benzo(b)fluoranthene	205-99-2						0.	0.0009	
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7						0.	0.006	
SVOC	Butylbenzylphthalate	85-68-7						0.	7.3	
SVOC	Chrysene	218-01-9						0.	0.0921	
SVOC	Di-n-butylphthalate	84-74-2						0.	3.7	
SVOC	Fluoranthene	206-44-0						0.	1.46	
SVOC	Fluorene	86-73-7						0.	1.46	
SVOC	Naphthalene	91-20-3						0.	0.73	
SVOC	Phenanthrene	85-01-8						0.	1.095	
SVOC	Pyrene	129-00-0						0.	1.095	
P/PCB	Aroclor-1242	53469-21-9						0.	0.0005	
P/PCB	Aroclor-1254	11097-69-1						0.	0.0005	
P/PCB	Aroclor-1260	11096-82-5						0.	0.0005	
INORG	Antimony	7440-36-0						0.	0.006	
INORG	Arsenic	7440-38-2	1.12E-12			8.22E-10		0.	0.01	
INORG	Barium	7440-39-3	2.50E-11	1.65E-09	5.20E-09	1.10E-08	5.65E-09	0.	2.	
INORG	Beryllium	7440-41-7						0.	0.004	
INORG	Cadmium	7440-43-9						0.	0.005	
INORG	Chromium (total)	7440-47-3	1.28E-13				1.12E-10	0.	0.1	
INORG	Cobalt	7440-48-4					4.62E-10	0.	0.73	
INORG	Copper	7440-50-8				6.11E-10		0.	1.3	
INORG	Cyanide (total)	57-12-5						0.	0.2	
INORG	Lead	7439-92-1				1.11E-10		0.	0.015	
INORG	Manganese	7439-96-5	3.58E-11	4.37E-09			3.69E-09	0.	0.876	
INORG	Mercury	7439-97-6						0.	0.002	
INORG	Nickel	7440-02-0	5.98E-13	2.40E-10	8.94E-10	1.29E-09	2.15E-10	0.	0.73	
INORG	Selenium	7782-49-2						0.	0.05	
INORG	Silver	7440-22-4						0.	0.1825	
INORG	Thallium	7440-28-0						0.	0.002	
INORG	Vanadium	7440-62-2						0.	0.0365	
INORG	Zinc	7440-66-6						0.	10.95	

TABLE E-4: Preliminary Remediation Target Levels (Updated February 2009)

Remediation Target Levels (mg/L) - Upper Aquifer									
Point of Compliance			Constituent of Concern					monitoring wells	
GM-26			PCE	TCE	1,1-DCE	cis-1,2-DCE	Vinyl Chloride		
Allowable POC Concentration (mg/L):			0.005	0.005	0.007	0.070	0.002		
Estimated Remediation Target Level at AOI 7 (mg/L):			0.500	0.500	0.700	7.000	0.200	GM-23, GM-29 and GM-30	
Distance from AOI 7 (monitoring zone)	Source Reduction Factor¹	Normalized Remediation Target	Remediation Target (mg/L)	Remediation Target (mg/L)	Remediation Target (mg/L)	Remediation Target (mg/L)	Remediation Target (mg/L)	Remediation Target (mg/L)	
140 ft (Zone S1)	0.90	90	0.450	0.450	0.630	6.300	0.180	GM-28	
1190 ft (Zone S1 to Zone S2)	0.19	19	0.095	0.095	0.133	1.330	0.038	GM-28, ME-6	
2240 ft (Zone S2)	0.10	10	0.050	0.050	0.070	0.700	0.020	ME-6, ME-3, GM-31	
2940 ft (Zone S2 to Zone S3)	0.09	9	0.045	0.045	0.063	0.630	0.018	ME-6, ME-3, GM-31, GM-22, GM-19S, and EAST	
3640 ft (Zone S3)	0.07	7	0.035	0.035	0.049	0.490	0.014	GM-32, GM-21, W-4-S, GM-63, and GM-64	
4430 ft (Zone S3 to GM-10)	0.05	5	0.025	0.025	0.035	0.350	0.010	GM-47, GM-50, GM-51, GM-63, GM-64, GM-32, GM-21, GM-8, GM-6, 4S, GM-2, GM-16, GM-17, GM-18, WSU-24, W-4-S, and GM-10	
5215 ft (GM-10/GM-52)	0.04	4	0.020	0.020	0.028	0.280	0.008	GM-10 and GM-52	
6370 ft (POC)	0.01	1	0.005	0.005	0.007	0.070	0.002	GM-26	
Remediation Target Level (mg/L) - Lower Aquifer									
Point of Compliance			Constituent of Concern					monitoring wells	
GM-11, GM-15 and GM-20D			PCE	TCE	1,1-DCE	cis-1,2-DCE	Vinyl Chloride		
Allowable POC Concentration (mg/L):			0.005	0.005	0.007	0.070	0.002		
Estimated Remediation Target Level at AOI 7 (mg/L):			0.167	0.167	0.233	2.333	0.067	GM-23, GM-29 and GM-30	
Distance from AOI 7 (monitoring zone)	Source Reduction Factor¹	Normalized Remediation Target	Remediation Target (mg/L)	Remediation Target (mg/L)	Remediation Target (mg/L)	Remediation Target (mg/L)	Remediation Target (mg/L)	Remediation Target (mg/L)	
2000 ft (GM-40/41/54)	0.26	8.7	0.043	0.043	0.061	0.607	0.017	GM-40, GM-41, and GM-52	
2900 ft (Well GM-42)	0.14	4.7	0.023	0.023	0.033	0.327	0.009	GM-42 (replaces Well 32)	
3600 ft (Well GM-19D)	0.09	3.0	0.015	0.015	0.021	0.210	0.006	GM-19D	
4250 ft (Zone D2)	0.055	1.8	0.009	0.009	0.013	0.128	0.004	GM-1 and GM-3	
4900 ft (POC)	0.03	1.0	0.005	0.005	0.007	0.070	0.002	GM-11, GM-15 and GM-20D	
Note									
1. Source Reduction Factors reflect updated groundwater model results generated using current site conditions without interim measures pumping (ARCADIS 2008a)									

Figure E-1: North Settling Lagoon

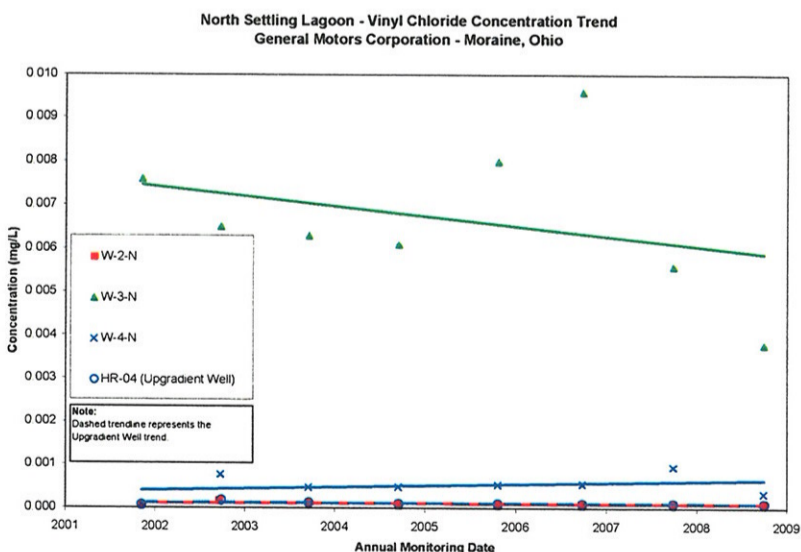
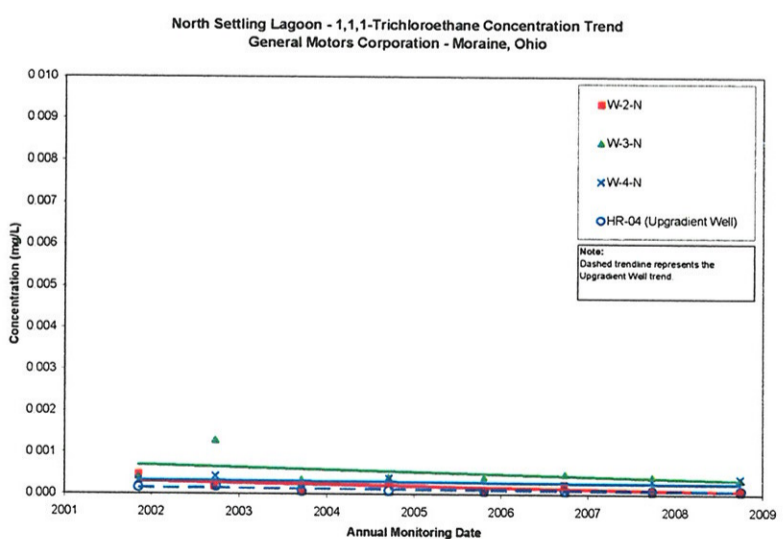
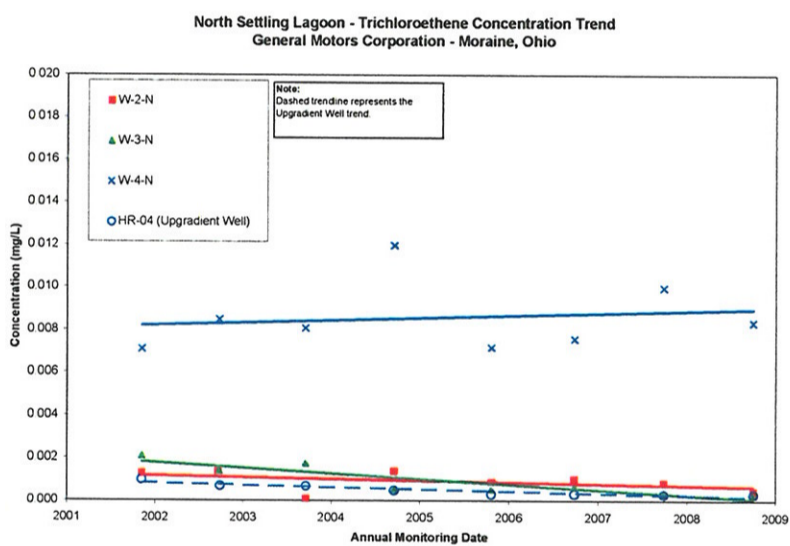
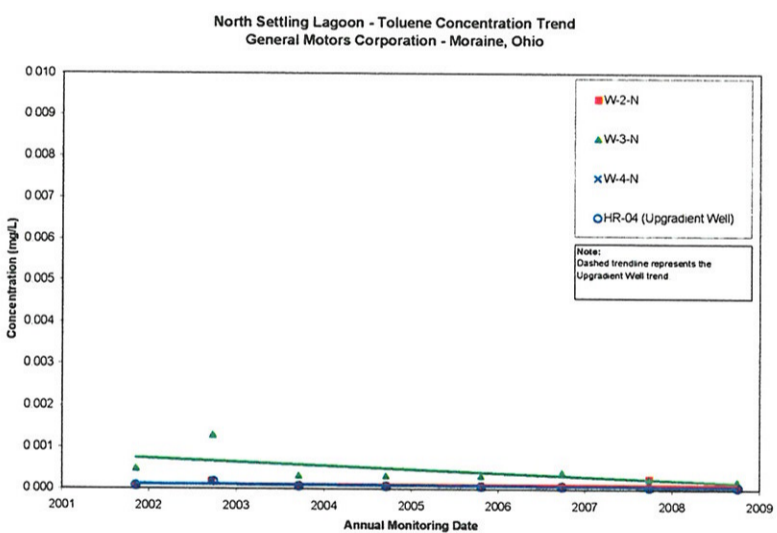
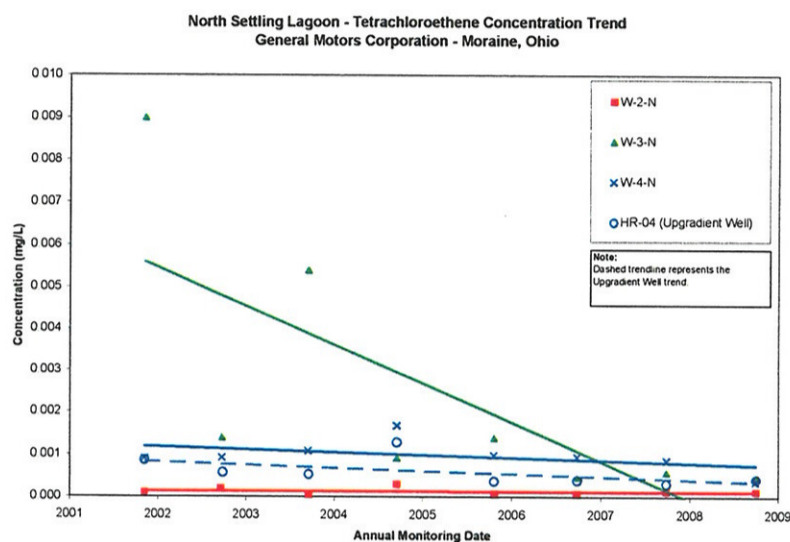
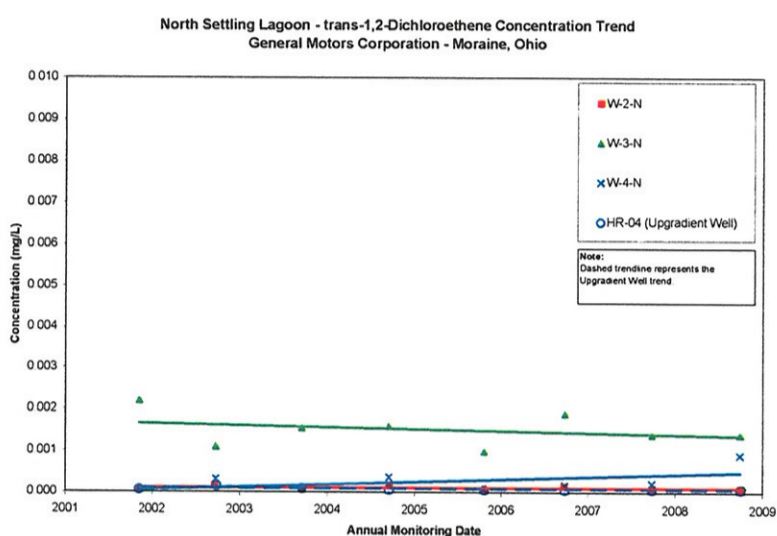
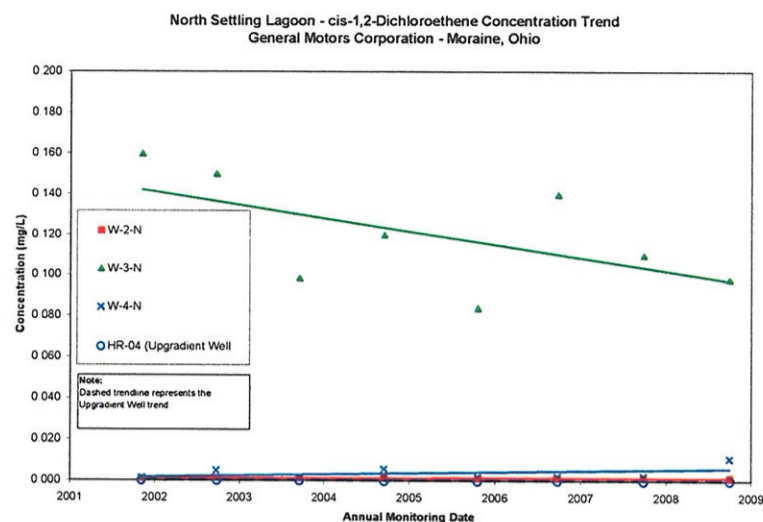
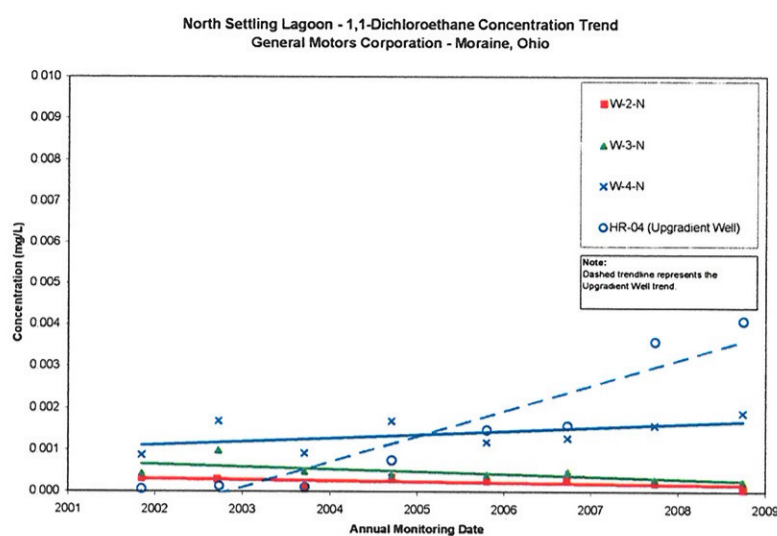


Figure E-2: South Settling Lagoon

