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**Site-Wide Groundwater
Monitoring Report for 2004**

General Motors Corporation
Moraine, Ohio

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Executive Summary	1
1. Introduction	1
1.1 Site Description	2
1.2 Groundwater Monitoring Program Objectives	3
2. Groundwater Monitoring Summary	4
2.1 Groundwater Monitoring Activities/Methodologies	4
2.1.1 Water-Level Measurements	5
2.1.2 Monthly Groundwater Recovery System Monitoring	5
2.1.3 Site-Wide Groundwater Monitoring	5
2.1.4 Laboratory Analytical Methods	6
2.2 Groundwater Monitoring Program Results	7
2.2.1 Groundwater Elevation Monitoring	7
2.2.2 Vertical Gradients	9
2.2.3 Groundwater Monitoring Analytical Results	10
3. Corrective Measures Implementation and Performance	17
3.1 Corrective Measures Implementation	17
3.1.1 In-Situ Reactive Zones	17
3.1.2 Capture Zones	19
3.2 Corrective Measures Performance	20
3.2.1 In-Situ Reactive Zones Performance Results	20
3.2.2 Capture Zone Performance Results	21
4. Corrective Action Completion Strategy	23
4.1 Effectiveness of Corrective Measures Activities	23
4.1.1 Background and Objectives	23
4.1.2 Methodology	24
4.1.3 Results	26

4.2	Monitoring of Land-Based Waste Management Units	29
4.2.1	Background and Objectives	29
4.2.2	Methodology	30
4.2.3	Results	31
5.	Conclusions and Recommendations	33
5.1	Land-Based Waste Management Units	33
5.2	Corrective Measures Performance	33
5.2.1	In-Situ Treatment	33
5.2.2	Hydraulic Control	34
5.3	Reassessment of Site-Wide Groundwater Monitoring Program	35
6.	References	37

Tables

1	Site-Wide Groundwater Monitoring Events in 2004.
2	Influent Monitoring of the Air Stripper Tower for 2004.
3	NPDES Permit Effluent Monitoring of the Air Stripper Tower for 2004.
4	DN-13 Monthly Monitoring for 2004.
5	Monitoring Well Construction Details.
6	Water-Level Measurements Collected During September 2004.
7	Summary of Precipitation Measurements Recorded by the National Weather Service, During 2004 – Dayton, Ohio.
8	Vertical Gradients for Shallow/Deep Well Pairs During September 2004.
9	Summary of Groundwater VOC Analytical Results from Reactive Zone 1 Wells.
10	Summary of Groundwater VOC Analytical Results from Reactive Zone 2 Wells.
11	Summary of Groundwater VOC Analytical Results from Reactive Zone 3 West Wells.
12	Summary of Groundwater VOC Analytical Results from Reactive Zone 3 East Wells.

13	Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 1.
14	Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 2.
15	Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 3 West.
16	Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 3 East.
17	Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2004.
18	Summary of Arsenic and Barium Analytical Results from Upper Aquifer Monitoring Wells in 2004.
19	Carbon Source Solution Introduction Volumes for 2004.
20	Corrective Action Monitoring Results for Comparison to Remediation Target Levels (RTLs).
21	In-Place Waste Management Unit Assessment.
22	Summary of Site-Wide Groundwater Monitoring Plan.

Figures

1	Site Layout.
2	Site-Wide Corrective Measures.
3	Upper Aquifer Wells for Site-Wide Groundwater Monitoring.
4	Lower Aquifer Wells For Site-Wide Groundwater Monitoring.
5	VOC Concentrations at the Influent to Air Stripper Tower Since System Start-Up, Groundwater Recovery and Treatment System.
6	Water Table Surface (Upper Aquifer) on September 7 and 8, 2004.
7	Potentiometric Surface (Lower Aquifer) on September 7 and 8, 2004.
8	VOC Databoxes for Upper Aquifer Wells.
9	VOC Databoxes for Lower Aquifer Wells.
10	Reactive Zone #1.
11	Reactive Zone #2.
12	Reactive Zones #3 West and #3 East.

Appendices

- A Site-Wide Groundwater VOC Analytical Results from 1999 to 2003 Sampling Events
- B Groundwater Sampling Logs for 2004
- C Groundwater Analytical Database for 2004
- D In-Situ Reactive Zones Performance Results for 2004
- E Supporting Documentation for Risk Evaluation

Executive Summary

This Site-Wide Groundwater Monitoring Report presents the groundwater monitoring activities completed in 2004 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 1999 and September 2003]), former General Motors Powertrain Group, Moraine Engine Plant (former Moraine Engine), and General Motors Truck Group, Moraine Assembly Plant (Moraine Assembly). These monitoring activities were completed as part of the on-going Resource Conservation and Recovery Act (RCRA) Corrective Action being implemented at the facilities. The U.S. EPA approved the Site-Wide Groundwater Monitoring Plan in a letter dated June 16, 2000. The site-wide groundwater monitoring is also designed to meet the objectives of Ohio EPA's RCRA post-closure monitoring at the two closed lagoons located at the Delphi Thermal Moraine facility. Ohio EPA approved the Site-Wide Groundwater Monitoring Plan in a letter dated December 24, 2003. 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 remediation activities in Reactive Zones (RZ) RZ-1, RZ-2 and RZ-3, to address volatile organic compounds (VOCs) related to the Former Oil House Area; and
5. Monitor an appropriate list of wells once corrective measures objectives (defined in the Draft Interim Measures/Corrective Measures Report [ARCADIS Geraghty & Miller, Inc. 2001]) have been met to verify that these objectives continue to be met without active measures

The groundwater monitoring conducted in 2004 met these objectives, with the following results:

- § Using the methodology developed in the RCRA Facility Investigation (RFI) baseline risk assessment 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. Therefore, no changes in the monitoring program for these closed lagoons are proposed.
- § Data collected from upper and lower aquifer wells located upgradient of the facilities confirms that upgradient sources of VOCs, not related to GM operations, do exist in the local area. Notwithstanding these upgradient contributions of VOCs to on-site groundwater, the monitoring data indicate a site-wide decrease in total VOC concentrations since the baseline sampling event conducted in 1999. Landfills L1, L2, and L3 are not significantly affecting groundwater quality. In addition, VOC concentrations at the off-site downgradient upper aquifer well GM-26 (the short-/intermediate-term goal point of compliance well for the upper aquifer) have remained below Safe Drinking Water Act, Maximum Contaminant Levels (MCLs). However, concentrations of certain VOCs remained above MCLs in downgradient lower aquifer wells GM-11, GM-15 and GM-20D (the short-/intermediate-term goal point of compliance wells for the lower aquifer).
- § 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 at the southern end of the former Delphi Thermal Moraine. Further, the decreasing concentrations in the wells downgradient of the site, compared to the RFI data and 1999 baseline groundwater sampling data, is likely attributable to the effects of corrective measures pumping at TW-2, pumping at DN-13, the effects of the in-situ reactive zones and on-going natural attenuation of the VOCs. Based on the effective performance of the pumping program during the 2004 monitoring period, no changes to the hydraulic control component of the ongoing corrective measures are proposed.
- § Groundwater quality monitoring at and downgradient of the reductive dechlorination treatment zones (RZ-1, RZ-2 and RZ-3) indicates that this in-situ treatment program has generally been effective at developing reducing conditions in the upper aquifer that have led to reductions in the VOC concentrations in groundwater and this in-situ component of the corrective measures will be continued. GM will implement modifications to RZ-3 East in 2005 in order to achieve the desired reduction in VOCs downgradient of this area.



Site-Wide Groundwater Monitoring Report for 2004

General Motors Corporation
Moraine, Ohio

- § Based on the data collected during the 2004 monitoring period, GM believes that the monitoring program defined for the site, in terms of the monitoring locations, the constituents monitored and the frequency of monitoring, provide sufficient data for a comprehensive evaluation of the corrective action goals and the downgradient point of compliance performance goals.

1. Introduction

This Site-Wide Groundwater Monitoring Report presents the groundwater monitoring activities completed in 2004 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 General Motors Truck Group, Moraine Assembly Plant (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 concluded that under current site 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, 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. Therefore, the focus of the Interim Measures/Corrective Measures Report (ARCADIS Geraghty & Miller, Inc. 2001) was a site-wide remedy that addressed the source of the VOCs in groundwater and the downgradient plume. The final remedy incorporates:

- § The Former Oil House Area corrective measures (in-situ remediation technologies downgradient of the source 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) until no longer required;
- § Institutional actions (the site will remain industrial and groundwater use will be restricted to nonpotable purposes); and
- § A site-wide groundwater monitoring program.

This report addresses several components of the final remedy, including the site-wide groundwater monitoring program (Table 1) and the performance of the corrective

measures. All groundwater monitoring for the facilities was conducted in accordance with the approved Site-Wide Groundwater Monitoring Plan (ARCADIS G&M, Inc. 2002).

1.1 Site Description

The former Moraine Engine and 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.

The GM site has been used for industrial purposes since the property was acquired in the mid-1920's. Frigidaire (a 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 a parking surface. GM operates a regional haulaway at the location of the former Moraine Engine plant, which is now referred to as the Vehicle Distribution Center. Since 1981, Moraine Assembly operations included the manufacture, assembly, and painting of small trucks. Currently Chevrolet TrailBlazers, GM Envoys, Buick Rainiers, and Isuzu Ascenders are produced at this facility. 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 building has reverted to GM and GM remains the property owner. Demolition of Building 14 began in August 2004 and is scheduled to be 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 remediation activities in In-Situ Reactive Zones (RZ) RZ-1, RZ-2 and RZ-3, to address VOCs related to the Former Oil House Area; and
5. Monitor an appropriate list of wells once corrective measures objectives (defined in the Draft Interim Measures/Corrective Measures Report [ARCADIS Geraghty & Miller, Inc. 2001]) have been met to verify that these objectives continue to be met without active measures.

2. Groundwater Monitoring Summary

In accordance with the Site-Wide Groundwater Monitoring Plan (ARCADIS G&M, Inc. 2002), groundwater monitoring was conducted in 2004 to evaluate groundwater quality upgradient and downgradient of the closed lagoons, performance of the RZs and the performance of the capture zones (as discussed in Section 3.2). A summary of the activities and methodologies that were completed in 2004 are presented in Section 2.1 and the groundwater monitoring results are presented in Section 2.2.

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). As presented in the Site-Wide Groundwater Monitoring Plan, rounds of groundwater sampling were also completed in 2001, 2002, and 2003. The analytical results from these sampling events are presented in the Site-Wide Groundwater Monitoring Report for 2003 (ARCADIS, Inc. 2004). The 1999 baseline through 2003 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.

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 2003, was implemented during 2004. The following sections summarize the collection of water-level measurements, the monthly groundwater monitoring, and the annual site-wide groundwater monitoring.

2.1.1 Water-Level Measurements

Water-level elevations were measured on September 7 and 8, 2004, in upper aquifer monitoring wells shown on Figure 3 and lower aquifer wells shown on Figure 4. The measured wells included all on-site and off-site monitoring wells at the three facilities. Water-level elevations were also measured in former Delphi Thermal Moraine 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, and one lower aquifer well (MT69) located south of the Dryden Road North Wellfield. Water-level measurements were collected 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 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 continued to collect influent tower samples during the 2004 sampling events to evaluate the tower performance. Table 2 summarizes the VOC results for the monthly air stripper tower influent stream during 2004. The monthly air stripper influent data is also presented in Figure 5, for the period from the initial start-up in January 1996 through December 2004. Table 3 summarizes the VOC results for the monthly air stripper tower effluent stream during 2004. Table 4 summarizes the VOC results for the monthly DN-13 sampling during 2004. 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 2004. Additionally, the monitoring well downgradient of RZ-1 (GM-28) and lower aquifer monitoring well

GM-41 were sampled in April. A summary of the 2004 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 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 a production well 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 on groundwater sampling logs. The sampling logs for 2004 are 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 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 parameter list includes: 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 biogeochemical indicator parameters nitrate, nitrite, nitrogen (ammonia), manganese (total and dissolved), iron (total and dissolved), sulfate, sulfide, total organic carbon (TOC), chlorides, light hydrocarbons (ethane and ethene), and methane. Groundwater samples from select upper aquifer wells were analyzed for arsenic and barium in both 2003 and 2004 to demonstrate that the isolated detection of these two

metals does not pose a concern at the site. Table 1 lists specific field, laboratory, and biogeochemical indicator parameters, and field and laboratory analytical methods. All samples were submitted to Severn Trent Laboratory in North Canton, Ohio (STL North Canton) or Microseeps in Pittsburgh, Pennsylvania for ethene, ethane, methane analysis only. The complete set of groundwater results, including quality assurance/quality control (QA/QC) samples, is presented in Appendix C.

2.2 Groundwater Monitoring Program Results

2.2.1 Groundwater Elevation Monitoring

As part of the site-wide assessment of current groundwater conditions, water-level elevations were measured to determine groundwater flow directions in the upper and lower aquifers and to determine vertical gradients between the two aquifers. Water-level measurements from 2004 are presented on Table 6.

2.2.1.1 Upper Aquifer

The water-table surface on September 7 and 8, 2004 (Figure 6) shows that flow in the upper aquifer is generally from northeast to southwest. A southwestern deflection in groundwater flow occurs north of Landfill L1 and trends towards capture well TW-2, located near the southwest corner of Landfill L1. A groundwater capture zone, centered on well TW-2, encompassed the southwest corner of Landfill L1. TW-2 was in operation during water-level elevation measurement collection in 2004. Water-level measurements show the water level in TW-2 is lower than the water levels to the west in monitoring well GM-16, to the southwest in monitoring well GM-17, and to the south in monitoring well WSU-24, indicating a reversal of groundwater flow (i.e., to the north) south and southwest of well TW-2. A comparison of these groundwater flow conditions to the 2003 groundwater flow map for the upper aquifer (ARCADIS, Inc. 2004) indicates that the high groundwater table in 2003 led to a decrease in overall head loss along the length of the site, though the 2004 upper aquifer flow patterns are generally consistent with groundwater flow conditions since TW-2 operation was initiated.

Table 7 presents the 2004 monthly precipitation totals, recorded by the National Weather Service, and the deviation from calculated average amounts. The 2004 annual total precipitation recorded at the Dayton, Ohio monitoring station was 41.74 inches, which was 2.16 inches above average. Precipitation for the months of January, May,

June, and August 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 elevation measurements in September 2004 was 0.0006 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 = 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 September 2004, groundwater flow velocities in the upper aquifer ranged from 1.92 ft/day to 3.2 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, some soil-VOC interaction is occurring, 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 September 2004 could be as low as 0.19 ft/day.

During the Supplemental RFI, as part of the August 1998 investigation at the Former Oil House Area, slug tests were conducted on three monitor wells (GM-23, GM-27 and GM-28) to assess groundwater flow conditions 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 September 2004, groundwater flow velocities in the upper aquifer above the upper clay till ranged from 0.1 ft/day to 0.17 ft/day.

2.2.1.2 Lower Aquifer

The potentiometric surface (lower aquifer) on September 7 and 8, 2004 (Figure 7) shows groundwater flow in the lower aquifer to be generally from northeast to southwest, with a groundwater capture zone centered around well DN-13. County Well DN-13, located south of the former Delphi Thermal facility in the Dryden Road North Wellfield, was in operation during water-level elevation measurement collection in 2004. While GM ceased pumping from production wells 31 and 39 in February and September 2003, respectively, no significant change in the overall flow conditions across the northern to central portion of the site were noted in the 2004 lower aquifer groundwater elevation data. It should be noted that GM was using production wells for the Moraine Assembly Plant in 2004 (production wells 11B and 12A). At the time of the September 2004 sampling event, production well 11B was in operation and a localized cone-of-depression associated with this well was likely present.

The average hydraulic gradient of the potentiometric surface in the lower aquifer, calculated from groundwater elevation measurements in September 2004 was 0.0007 ft/ft. Assuming a porosity of 0.3 to 0.5 and using the equation presented earlier ($V_w = K_i/N_e$), groundwater flow velocity in the lower aquifer ranged between 0.59 ft/day and 0.98 ft/day. As discussed above, most of the VOCs detected in the upper aquifer groundwater 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 lower aquifer in September 2004 could be as low as 0.06 ft/day.

2.2.2 Vertical Gradients

The water-level measurements collected on September 7 and 8, 2004 were used to determine the direction and magnitude of vertical gradients between the upper and lower aquifers (Table 8). 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 will move.

At the northern (upgradient) end of the site, vertical gradients were downward in shallow/deep monitoring well pairs HR- 9/HR-10 and HR-11/HR-12 in September

2004. The vertical gradient in these monitoring well pairs have always fluctuated from upward to no vertical gradient to downward, with the predominant direction being upward.

In September 2004, well pairs immediately downgradient (south) of the closed North Settling Lagoon (W-3-N/HR-15 and W-4-N/HR-14) showed downward vertical gradients (consistent with historical data). 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-10/GM-9) all showed downward vertical gradients, with the exception of well pair GM-8/GM-7R which showed an upward gradient (since June 1995 the vertical gradient was upward 50 percent of the time and downward 50 percent of the time) and well pair GM-6/GM-3 which also showed an upward gradient. Since the 1999 baseline sampling, the vertical gradient at well pair GM-6/GM-3 has always been downward; therefore, this upward gradient is unexpected and may be due to a measurement error. The downward vertical gradient at the other five well pairs near Landfill L1 is likely also due to the proximity of these well pairs to lower aquifer extraction well DN-13. Downgradient of the site, the vertical gradient was downward in well pair GM-26/MT69 in September 2004.

At the Former Oil House Area, water-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. An upward vertical gradient was present in the upper aquifer across the upper clay till in September 2004.

2.2.3 Groundwater Monitoring Analytical Results

As described in Section 2.1.4, groundwater at the site was evaluated 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 2004 for the upper and lower aquifer wells. Table 18 presents the 2004 arsenic and barium results from select upper aquifer wells (GM-28, ME-3, GM-32, GM-21, GM-6, TW-2, 4S, GM-2). Data for 1999 through 2004 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 1999 baseline sampling data used as a point of comparison for the 2004 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 2004, two upgradient upper aquifer monitoring wells exhibited the presence of VOCs:

- § HR-9, total VOCs were 93.94 micrograms per liter (ug/L) in 2004, compared to a 1999 baseline total VOC concentration of 116 ug/L.
- § HR-11, total VOCs were 9.95 ug/L in 2004, 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 do exist in the local area. The highest concentrations of upgradient VOCs are 1,1,1-TCA, TCE and the breakdown products DCA and cis-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 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 may be affected by 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, GM-30) were

sampled in 2004. 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 3,563 ug/L in 2004. This well predominantly contained ethylbenzene, xylenes, and 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 13,270 ug/L in 2004. This well predominantly contained PCE, TCE, cis-1,2-DCE, and vinyl chloride. This well is upgradient to 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 2004 (97.8 ug/L). 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 1,932 ug/L in 2004 primarily due to an increase in daughter products; however, TCE concentrations have decreased since the baseline sampling event. This well is also upgradient of 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 7.63 ug/L in 2004.

Based on historical and current groundwater flow directions, on-site wells located south of the Former Oil House Area, including wells ME-6, ME-3, GM-22, EAST, GM-21 and GM-2, are potentially hydraulically downgradient of GM-23. In addition, historical flow could have had a southwesterly trend under the influence of County pumping (i.e., at Miami Shores), which may make impacts to HR-1, W-1-S and HR-17 from the Former Oil House Area possible. Of the wells identified as downgradient from the Former Oil House Area in the southerly direction toward the property boundary, the total VOC concentrations have decreased, as discussed below.

- ME-6, total VOCs were 944.9 ug/L in the 1999 baseline sampling event, then decreasing to 42.12 ug/L in 2004.

- n ME-3, total VOCs were 159.7 ug/L in the 1999 baseline sampling event, then decreasing to 23.54 ug/L in 2004.
- n EAST, total VOCs were 152.6 ug/L in the 1999 baseline sampling event, then decreasing to 71.36 ug/L in 2004.
- n GM-33, total VOCs were 292.1 ug/L in 2001 (this well was installed after the 1999 baseline sampling event), decreasing to 125.45 ug/L in 2004.
- n GM-35, total VOCs were 732.8 ug/L in 2001 (this well was installed after the 1999 baseline sampling event), decreasing to 637.2 ug/L in 2004.
- n GM-8, total VOCs were 150.3 ug/L in the 1999 baseline sampling event, then decreasing to 40.88 ug/L in 2004.
- n GM-2, total VOCs were 82.9 ug/L in the 1999 baseline sampling event, then decreasing to 17.63 ug/L in 2004.

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 2004. Wells GM-21 and GM-22, located south of and sidegradient to the Former Oil House Area, exhibited increases in total VOC concentrations. In well GM-22, total VOCs were 7.6 ug/L in 1999 baseline and increased to 17.6 ug/L in 2004. In well GM-21, total VOCs were 168.9 ug/L in 1999 baseline and increased to 277.2 ug/L in 2004 (primarily due to TCE). The significance of these concentrations is further discussed in Section 4.0 and Appendix D.

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:

- n HR-1, total VOCs were 114 ug/L in the 1999 baseline event, decreasing to 82.91 ug/L in 2004.
- n HR-17, total VOCs were 29.1 ug/L in the 1999 baseline event, increasing to 110.7 ug/L in 2004.

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 15.63 ug/L in 2004.
- § HR-3, total VOC concentrations were 12.3 ug/L in the 1999 baseline event and 51.49 ug/L in 2004.
- § HR-4, total VOC concentrations were 2.6 ug/L in the 1999 baseline event and 2.57 ug/L in 2004.

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 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 4.37 ug/L to 128.64 ug/L in 2004. The detected VOCs included DCA, DCE compounds, TCE, PCE, 1,1,1-TCA, 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 6.71 ug/L to 39.87 ug/L in 2004. The detected VOCs included DCA, DCE compounds, TCE, PCE, and 1,1,1-TCA. The significance of these concentrations is further discussed in Section 4.0.

As discussed in the Draft Site-Wide Groundwater Monitoring Report for 2003 (ARCADIS G&M, Inc. 2004), select upper aquifer, on-site wells were sampled for arsenic and barium to confirm previous sampling data and evaluate groundwater quality downgradient of the RZs. During the September 2004 sampling, wells downgradient of the RZs (GM-28, ME-3, GM-32, GM-21) and wells at the property boundary (GM-6, TW-2, 4S, GM-2) were sampled for arsenic and barium. These results are presented on Table 18. The 2004 arsenic and barium concentrations have a limited spatial extent which is consistent with the discussion presented in the Site-Wide Groundwater Monitoring Report for 2003. Arsenic was detected at GM-28 and GM-32 and barium was detected at GM-32, which are located downgradient of RZ-1 and RZ-3 West respectively, at concentrations above MCLs; however, MCL exceedences for arsenic and barium did not occur at any of the downgradient wells located at the property boundary. This data is further evaluated in Appendix D.

2.2.3.1.3 Downgradient Groundwater Quality

On-site downgradient wells (GM-6, TW-2, 4S, GM-2) and off-site downgradient wells (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. In 2004, total VOC concentrations in these wells ranged from 9.88 ug/L to 235.8 ug/L. The off-site downgradient well GM-26, serves as the short-/intermediate-term goal, point of compliance well for the upper aquifer. In 1999 no VOCs were detected, while in 2004, PCE (1.3 ug/L) was detected in GM-26. The decreasing concentrations in the wells downgradient of the site (GM-6, TW-2, GM-2, GM-18, and GM-10) 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. Concentrations in wells 4S, GM-17, and WSU-24 showed slight but not significant increases above the 2003 results. PCE and TCE concentrations in GM-16 increased in 2004.

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 2004, the upgradient lower aquifer monitor well HR-12 exhibited the presence of VOCs (total VOCs of 7.4 ug/L and 4.1 ug/L, respectively). The detected VOCs included DCA, cis-1,2-DCE, and vinyl chloride, suggesting that degradation of the chlorinated VOCs from upgradient releases 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, do 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 may be affected by both upgradient (off-site) and on-site contributions. VOCs were not detected in upgradient lower aquifer well HR-10 in 2004.

On-site lower-aquifer monitor wells that were part of the site-wide evaluation in September 2004 included HR-15, HR-13, GM-39, GM-40, GM-41, GM-42 and GM-19D. 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 2004, total VOC concentrations in these wells ranged from 1.8 ug/L to 204 ug/L. Wells GM-39, GM-40, GM-41, and GM-42 were installed in November 2003, after the 1999 baseline sampling event. The increase in the concentration range in 2004 compared to baseline is due to the sampling data from the new wells.

On-site downgradient wells (GM-3, GM-1) and off-site downgradient wells (GM-15, GM-11, GM-20D, DN-13, GM-9) exhibited similar concentrations of total 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 2004, total VOC concentrations in these wells decreased (total VOCs ranged from 9 ug/L to 38.3 ug/L). VOCs were not detected in off-site, downgradient well MT-69 in 1999 and 2004. The off-site downgradient wells GM-15, GM-11, and GM-20D, serve as the short-/intermediate-term goal, point of compliance wells for the lower aquifer. The MCL for TCE was exceeded in wells GM-15, GM-11, and GM-20D in 2004. All other detected VOCs in these point of compliance 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 2004. 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 2004 (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 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 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); and 3) at a downgradient location south of former Delphi Thermal Moraine (RZ-3 West) and the former Moraine Engine plant (RZ-3 East). The RZ locations are shown on Figure 2. The actual layouts of each RZ are shown on Figures 10, 11, and 12, and discussed below:

§ At RZ-1, the molasses solution was introduced into the upper aquifer, above the upper clay till. The carbon injection level was set by screening the injection wells in the lower 10 ft of the upper aquifer, which is 4 ft to 12 ft thick. RZ-1 has 21

introduction wells, of which 12 wells were added in 2002 to the original 9 wells, to expand RZ-1.

- § RZ-2 consists of four existing monitoring wells, 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-3 consists of 41 introduction wells, 30 wells in RZ-3 West and 11 in RZ-3 East. At RZ-3, the upper clay till is not present, and the carbon injection wells were screened from the aquifer surface to a depth of 46 ft to 68 ft, allowing carbon introduction through the entire thickness of the upper aquifer.

To sustain dechlorinating conditions within the RZs, a readily degradable carbon source solution (molasses) was periodically introduced 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 mixture 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 (using a 10 to 1 mixture) continued in October, November, and December 2000, and subsequently from June 2001 through December 2001, from June 2002 through January 2003, from May 2003 through December 2003, and from January 2004 through December 2004. Introductions in RZ-1 were modified in the fall of 2003 after review of the site-wide groundwater results. Due to the success of RZ-1, GM implemented an every other month introduction routine and periodically monitored GM-28 (April 2004 and September 2004) to ensure reducing conditions are sustaining the dechlorination process. Carbon source introductions in RZ-2 were not completed in 2004 based on the operational data that was collected in 2003. Carbon introductions in RZ-3 East were resumed in July 2004 in order to collect operational data when the system was active. This data will be used to make future modifications to RZ-3 East. Additional discussion is presented in Appendix D.

The carbon introduction contractor, Monarch Water Systems, Inc. of Xenia, Ohio, maintained dedicated mix tanks at their Xenia facility and transported the pre-mixed solution in a dedicated tanker truck to the GM site from January to March 2004. ARCADIS completed the carbon introductions from April through December 2004. The molasses is now stored on-site and mixed with potable water prior to injections.

ARCADIS also uses a dedicated tanker truck for the carbon solution. Details regarding the frequency and strength of carbon source introductions are provided in Table 19 for 2004.

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 nine years of operation (January 31, 1996 through December 31, 2004), the system has recovered and treated a total of 630,804,769 gallons of groundwater at an average flow rate of approximately 143.2 gallons per minute (gpm). Annual total gallons recovered and average flow rate during 2004 were 53,163,578 gallons and approximately 143.5 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. Due to higher water level elevations noted in 2004, adjustments to the flow rate were not necessary (discussed further in Section 3.2.2).

Between January 1, 2004 and December 31, 2004, the TW-2 component of the remediation system was in operation except for brief shutdowns due to a power outage in February; the tower was shutdown on March 2nd to clean the distribution tray and replace the TW-2 pump; the tower was shutdown on April 22nd and 23rd to clean the tower and the packing was replaced on April 29th and 30th because the cleaning did not sufficiently remove the fouling on the packing; in May the tower was operational for only 3 days while the operation and maintenance history was reviewed and adjustments made to the future operation and maintenance plan; in June the tower was operational for approximately 8 days while repairs to the flow meter, computer, and electrical system were completed; the tower was shut down on October 13th while the distribution tray was cleaned and on October 26th when gaskets were replaced to prevent the tower manways from leaking; the tower was shut down the entire month of November except for the sampling event and on November 10th to 11th the packing was

replaced; and in December the tower was in operation for 14 days, during the downtime in December the influent line was cleaned, cleanouts to the influent line were installed, repairs were made to the flow meter, and after Ohio EPA approval, the pretreatment chemical was switched to ChemTreat.

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 at a rate of 2.7 million gallons per day. Well DN-13 was operational throughout 2004 except for a temporary shut down in July when the system was down for 18 hours. Additionally in August the system was down all month to replace the pump motor, with the exception of August 18th and 31st when the system was operational. 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 Zones Performance Results

As described earlier in Section 3.1.1, the carbon solution delivery network consists of three reactive zones, RZ-1, RZ-2, and RZ-3 (West and East). Molasses was introduced in 2004 into the groundwater through introduction points shown on Figures 10 and 12 for RZ-1 and RZ-3, respectively. 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 ethene and ethane based on a review of the VOC results;

- n 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, without production of significant vinyl chloride peaks;
- n The primary and secondary operational monitoring data from RZ-2 will continue to be evaluated to determine if the carbon source introduction schedule should be resumed; and
- n VOC concentrations at RZ-3 East have not decreased in response to molasses introductions, in contrast to the other three reaction zone segments. TOC levels, as well as other primary and secondary operational monitoring data, indicate that the effects of molasses introductions are not reaching the GM-21 downgradient monitoring location. GM is proceeding with a plan to enhance the design of the introduction system in RZ-3 East to improve performance in this area. This plan will be submitted to the U.S. EPA under separate cover.

Overall, the process of enhanced reductive dechlorination at this site has been successful in achieving the desired reduction of VOC concentrations. GM will complete additional enhancements so that suitable corrective actions can be undertaken in RZ-3 East to achieve the desired reduction in VOCs.

3.2.2 Capture Zone Performance Results

Figures 6 and 7 indicate that the capture zone corrective measures continue to be effective at maintaining hydraulic control at the southern end of the former Delphi Thermal Moraine site. 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). A comparison of the actual groundwater flow contours in the upper and lower aquifers to the predicted flow lines from the particle tracking analysis in the upper aquifer and the predicted zones of capture for DN-13 in the upper and lower aquifers indicates that the predicted influence within each aquifer at the southern end of the former Delphi Thermal Moraine site is being achieved by the corrective measures pumping.

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 2004 are a result of the above average precipitation in 2004. 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. Due to higher groundwater elevation in 2004, pumping rate adjustments were not necessary 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 xylene (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 BTEX 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 at this 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 being met 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 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 will continue to verify that groundwater conditions remain acceptable, and that ultimately, groundwater concentrations at the downgradient property boundary decline below appropriately protective levels (i.e., appropriate for the protection of the groundwater resource and its reasonably expected future uses). Data have been 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 short-/intermediate-term goal is to use existing well GM-26 as the monitoring point or point of compliance (POC) 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 MCLs or equivalent risk-based drinking water

concentrations in the lower aquifer beyond the existing area of contaminated groundwater. Based on the groundwater conditions established during the September 1999 baseline sampling event, the short-/intermediate-term goal is to use existing wells GM-15, GM-11, and GM-20D as the monitoring points or POCs 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. GM's long-term goal is to reduce the off-site groundwater concentrations to below appropriately protective levels so that the monitoring points can be shifted to the downgradient facility boundary.

4.1.2 Methodology

In accordance with the Site-Wide Groundwater Monitoring Plan, 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. 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, 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, 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),
- Zone S3 to GM-10: the monitoring zone between RZ-3 and GM-10 (wells GM-32, GM-21, GM-8, GM-6, 4S, GM-2, GM-16, GM-18, WSU-24, and GM-10),
- GM-10: the monitoring zone downgradient of RZ-3 (well GM-10), and
- POC Shallow: monitoring at well GM-26.

§ Lower Aquifer

- Former Oil House Area, Deep: the Former Oil House Area source area (wells GM-23, GM-29, and GM-30),
- Zone D1: the monitoring zone encompassing GM-19D,
- Zone GM-40/41: the monitoring zone encompassing GM-40 and GM-41,
- Zone GM-42: the monitoring zone encompassing GM-42,
- 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:

§ Groundwater pumping conditions at the facility and surrounding area were reviewed to confirm that the basis for the RTLs remain valid. As discussed in Section 2, groundwater flow patterns remain the same as those evaluated during the 1999 baseline sampling, thus indicating that RTLs developed based on the RFI flow conditions remain valid.

- § Mean constituent concentrations in each remediation monitoring zone were calculated based on data collected during the 2004 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 2004 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 20. These results and relative change in these results in comparison with the 2003 monitoring period are discussed below and presented on Table 20. For reference, Table 20 also presents a comparison with the results from the 1999 baseline sampling event.

4.1.3.1 Shallow Wells

The comparison of the 2004 shallow zone monitoring data with the RTLs indicates the following:

Former Oil House Area, Shallow (wells GM-23, GM-29 and GM-30):

- § As compared to 2003, the maximum concentrations of PCE and vinyl chloride in the source area have decreased but remain above the RTLs.
- § As compared to 2003, the average concentration of PCE remains higher than the RTL.
- § As compared to 2003, the maximum and average concentrations of TCE have decreased and remain below the RTL.

Zone S1 (well GM-28):

- § As compared to 2003, all concentrations remain below the RTLs.

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

§ As compared to 2003, all concentrations remain below RTLs.

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

§ As compared to 2003, all concentrations remain below the RTLs.

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

§ As compared to 2003, the maximum concentration of PCE has increased and now is greater than the RTL.

§ As compared to 2003, the maximum concentrations of TCE and vinyl chloride have decreased but still remain above the RTL.

§ The average concentrations of PCE, TCE and vinyl chloride remain below the RTLs.

Zone S3 (wells GM-32, GM-21):

§ As compared to 2003, the maximum concentration of TCE did not significantly increase and remains above the RTL.

§ As compared to 2003, the average concentration of TCE in this zone has increased and remains greater than the RTL.

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

§ As compared to 2003, the maximum concentration of PCE has not significantly increased and remains at a level greater than the RTL.

§ As compared to 2003, the maximum and average concentrations of TCE have not significantly increased and remain at levels greater than the RTL.

GM-10:

§ As compared to 2003, the detected concentration of TCE has not decreased significantly and remains at a level above the RTL.

POC Shallow (GM-26):

§ Consistent with 2003, all concentrations remain below the RTLs.

4.1.3.2 Deep Wells

The comparison of the 2004 deep zone monitoring data with the RTLs indicates the following:

Former Oil House Area, Deep (wells GM-23, GM-29, and GM-30):

§ As compared to 2003, the maximum concentrations of PCE, TCE and vinyl chloride have decreased but remain at levels above the RTLs.

§ As compared to 2003, the average concentrations of PCE, TCE and vinyl chloride have decreased but only TCE exhibits an average concentration below the RTL.

Zone GM-40/41:

§ As compared to 2003, the maximum and average concentrations for TCE have decreased but remain at levels greater than the RTL.

GM-42:

§ Consistent with 2003, all concentrations remained below RTLs.

GM-19D:

§ As compared to 2003, the concentration of vinyl chloride did not increase significantly and remains at a level greater than the RTL.

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

§ As compared to 2003, the concentrations of TCE have not changed significantly and remain at levels above the RTL.

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

§ As compared to 2003, the concentrations of TCE have not changed significantly and remain at levels exceeding the RTL.

As indicated by the comparison of groundwater monitoring data with RTLs, concentrations at the upper aquifer POC well remain below RTLs. However, concentrations in the monitoring zone immediately upgradient of the upper aquifer POC, as well as concentrations at the lower aquifer POC wells are above the RTLs. 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 Former Oil House Area remain above levels necessary to achieve the RTLs at the downgradient upper and lower aquifer POCs. However, concentrations downgradient of RZ-1 are below the RTLs, thus indicating that RZ-1 has been effective at remediating groundwater impacts from the Former Oil House Area in the upper aquifer. Continued corrective measures are also required downgradient of RZ-1 (i.e., at RZ-2 and RZ-3) to expedite treatment of residual impacts in the downgradient upper aquifer plume area.

4.2 Monitoring of Land-Based Waste Management Units

4.2.1 Background and Objectives

One component of the site-wide groundwater monitoring program is monitoring of other specific units (i.e., the closed lagoons). Although the RFI and Supplemental RFI 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). If this evaluation identifies detected concentrations that indicate one 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-5, W-2-N, W-3-N, and W-4-N.

§ Closed South Settling Lagoon: W-2-S, W-3-S, and W-4-S.

§ Landfill L1: TW-2, GM-6, and 4S.

§ Landfill L2: W-4-N and HR-2.

§ Landfill L3: W-4-N, HR-2, and HR-4.

Consistent with the groundwater exposure evaluation conducted for the Supplemental Baseline Risk Assessment, 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) to estimate exposure concentrations at the points of groundwater use (e.g., downgradient municipal well fields and on-site industrial wells). For the current evaluation, the maximum concentrations detected during the 2004 sampling events in each set of monitoring wells are used as the source concentration. The estimated exposure concentrations are then compared with MCLs or risk-based equivalent drinking water levels (EDWLs).

4.2.3 Results

As specified in the Site-Wide Groundwater Monitoring Plan, post-closure monitoring data collected from those wells assigned to the closed North and South Settling Lagoons were evaluated for temporal trends. Data considered in the evaluation included results from the September 2004 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 only four data points for any monitoring well/constituent pair, and therefore, no regression analysis was performed. Using the methodology developed in the RFI baseline risk assessment 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 2004 sampling events in each set of downgradient monitoring wells for the lagoons and landfills were assessed. Based on the maximum concentrations detected during the 2004 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 21 in comparison with MCLs or EDWLs. As shown on Table 21, 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 2004 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 RFI baseline risk assessment 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 2004 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 2004 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.

Overall, the process of enhanced reductive dechlorination at this site has been successful in achieving the desired reduction of VOC concentrations. However, GM will make enhancements to RZ-3 East to achieve the desired reduction in VOCs downgradient of this area.

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 at the southern end 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 previously developed groundwater flow model as a predictive tool.

Based on the effective performance of the pumping program during the 2004 monitoring and exceedences of RTLs at the Former Oil House Area and in Zones S2 to S3, S3 to GM-10, D1, D2, and 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. In addition, VOC concentrations at the off-site downgradient upper aquifer well GM-26 (the short-/intermediate-term goal point of compliance well for the upper aquifer) remained below MCLs. Concentrations of TCE remained above the MCL in downgradient lower aquifer wells GM-11, GM-15 and GM-20D (the short/intermediate-term goal point of compliance wells for the lower aquifer).

The decreasing concentrations in the wells downgradient of the site, compared to the RFI data, 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 zone immediately upgradient of the upper aquifer POC, as well as concentrations at the lower aquifer POC wells remain above the RTLs. 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.

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 2004 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 2004 monitoring period, GM believes that the monitoring program has provided sufficient data for a comprehensive evaluation of these corrective action goals. The site-wide groundwater monitoring program summary is presented in Table 22. To reassess the monitoring program in support of the final remedy, GM recommends the following:

- § In 2005, GM will reevaluate if a downgradient vertical gradient is present at well pair GM-6/GM-3;
- § As discussed on the Site-Wide Groundwater Monitoring Reports for 2001/2002 and 2003, GM evaluated the presence of arsenic and barium downgradient of the reactive zones (upper aquifer wells GM-28, ME-3, GM-32, and GM-21) and at the property boundary wells (upper aquifer wells GM-6, TW-2, 4S, and GM-2) in 2003 and 2004. Based on the results, GM has demonstrated that the localized detection of arsenic and barium in the upper aquifer do not pose a concern at the site and that MCLs for these metals have not been exceeded at the property boundary wells. GM recommends that arsenic and barium not be included in the site-wide monitoring program for the 2005 sampling event;

- § GM will continue to assess the need for additional monitoring wells in the lower aquifer in support of the final remedy and to ultimately terminate active measures; and
- § In 2005, GM will also review the groundwater flow patterns and groundwater pumping conditions using the previously developed groundwater flow model to confirm that the basis for the RTLs remain valid.

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Table 1. Site-Wide Groundwater Monitoring Events in 2004, General Motors Corporation, Moraine, Ohio.

April 2004 Site-Wide Groundwater Sampling

Site-specific list of VOCs⁽¹⁾, field parameters⁽²⁾, and biogeochemical parameters⁽³⁾ (well GM-28 only) were analyzed during this sampling event from the following upper aquifer monitoring wells:

GM-28 GM-41

September 2004 Site-Wide Annual Groundwater Sampling

Site-specific list of VOCs⁽¹⁾ and field parameters⁽²⁾ were analyzed during these sampling events from the following upper aquifer monitoring wells. Biogeochemical parameters⁽³⁾ were analyzed at wells denoted with an asterisk(*):

W-2-N	HR-11	GM-16	GM-22*	GM-33
W-3-N	HR-17	GM-17	GM-23*	GM-35
W-4-N	W-2-S	GM-18	GM-26	
HR-1	W-3-S	GM-19S*	GM-27	
HR-2	W-4-S	EAST*	GM-28*	
HR-3	GM-2	WSU-24	GM-29*	
HR-4	TW-2	ME-3*	GM-30*	
HR-5	GM-6*	ME-6*	GM-31	
HR-8	GM-8*	4S	GM-32*	
HR-9	GM-10	GM-21*		

Note:

Samples from wells GM-28, ME-3, GM-21, GM-32, GM-6, TW-2, 4S, and GM-2 were also analyzed for arsenic and barium.

Site-specific list of VOCs⁽¹⁾ were analyzed during this sampling event from the following list of lower aquifer monitoring wells:

HR-10	GM-19D	GM-11	MT69	GM-42
HR-12	GM-3	GM-20D	GM-39	
HR-13	GM-1	DN-13	GM-40	
HR-15	GM-15	GM-9	GM-41	

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.

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Table 1. Site-Wide Groundwater Monitoring Events in 2004, General Motors Corporation, Moraine, Ohio.

DN-13 Monthly Groundwater Sampling

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

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. 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.

<u>Parameter</u>	<u>Analytical Method</u>
Site-specific list of VOCs	EPA Method 8260B
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

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Table 2. Influent Monitoring of the Air Stripper Tower for 2004, General Motors Corporation, Moraine, Ohio.

Constituent	Units	1/02/04	2/06/04	3/02/04	4/02/04	5/7/04	6/25/04	7/06/04	8/03/04	9/16/04	10/04/04	11/11/04	12/21/04
Oil & Grease ¹	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
<u>VOCS²</u>													
Benzene	ug/L	1.3	1.4	1.5	1.2	1.3	1.9	1.7	1.4	1.6	1.3	1.2	2.1
Chloroethane	ug/L	6.2	9.6	6.2	5.9	10.0	15	8.9	7.1	8.0	8.9	9.6	17
1,1-Dichloroethane	ug/L	11	9.40	7.8	7.2	3.3	3.1	7.2	8.4	8.6	8.5	1.3	5.6
cis-1,2-Dichloroethene	ug/L	--	--	8.5	7.4	2.6	8.4	12	8.6	8.0	6.9	1.8	6.4
trans-1,2-Dichloroethene	ug/L	0.89	0.84	0.75	0.72	0.68	0.52	0.81	0.74	0.79	0.81	<0.50	0.68
Ethylbenzene	ug/L	2.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.3	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/L	7.4	6.6	6.3	5.0	3.2	2.7	3.8	4.4	5.4	4.5	2.4	4.1
Toluene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	ug/L	16	20	15	12	4.2	4.5	8.8	11	10	9.1	3.4	5.3
Vinyl chloride	ug/L	1.6	1.7	<1.0	1.0	<1.0	<1.0	2.3	1.2	1.6	1.6	<1.0	1.6
Xylenes	ug/L	1.4	<1.0	1.4	<1.0	<1.0	<1.0	2.0	3.1	<1.0	<1.0	<1.0	<1.0
Total VOCs	ug/L	47.9	49.5	47.5	40.4	25.3	36.1	48.9	47.2	44.0	41.6	19.7	42.8

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

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

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

-- Not analyzed.

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Table 3. NPDES Permit Effluent Monitoring of the Air Stripper Tower for 2004, General Motors Corporation, Moraine, Ohio.

Constituent	Units	Permit Limit	1/02/04	2/02/04	3/02/04	4/02/04 ⁴	5/07/04	6/25/04	7/06/04	8/03/04	9/16/04	10/04/04	11/11/04	12/21/04
Oil & Grease ¹	mg/L	10	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	21.1/<5.0 ⁵	<5.0
pH ²	S.U.	6.5 - 9.0 S.U.	7.24	8.23	6.99 ⁶	7.60	6.69	7.01	6.68	6.87	6.86 ⁷	6.79	6.58	7.08
<u>VOCs³</u>														
Benzene	ug/L	10	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	ug/L	10	<1.0	<1.0	1.7	6.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/L	10	<1.0	<1.0	1.3	7.6	<1.0	<1.0	<1.0	<1.0	<1.0	1.4	<1.0	<1.0
cis-1,2-Dichloroethene	ug/L	10	<0.50	0.90	1.8	7.5	<0.50	<0.50	0.73	<0.50	0.96	1.2	<0.50	<0.50
trans-1,2-Dichloroethene	ug/L	10	<0.50	<0.50	<0.50	0.7	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	ug/L	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/L	10	<1.0	<1.0	<1.0	5.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	ug/L	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/L	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	ug/L	10	<1.0	1.0	1.5	12.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0
Vinyl Chloride	ug/L	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes	ug/L	10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

mg/L Milligrams per Liter.

S.U. Standard Units.

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.

4 The effluent was resampled on April 23 and 30, 2004. For the data collected on April 23, 2004, all analytical results for VOCs were below the permit limit of 10 ug/L. For the data collected on April 30, 2004, all analytical results for VOCs were below laboratory reporting limits.

5 The effluent sample collected on November 11, 2004 had an oil and grease value of 21.1 mg/L. The same water sample was re-analyzed on December 7, 2004 and the result was <5.0 mg/L for oil and grease.

6 The pH was measured on March 16, 2004 because of an equipment malfunction on March 2, 2004.

7 The pH was measured on September 7, 2004.

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Table 4. DN-13 Monthly Monitoring for 2004, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound ¹	Units	1/02/04	2/02/04	3/02/04	4/02/04	5/07/04	6/25/04	7/06/04	8/25/04	9/16/04	10/04/04	11/11/04	12/21/04
Acetone	ug/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Acetonitrile	ug/L	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Acrolein	ug/L	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Acrylonitrile	ug/L	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Allyl chloride	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromoform	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone	ug/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Carbon disulfide	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon tetrachloride	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroprene	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Dibromochloromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dibromomethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromo-3-chloropropane	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
1,2-Dibromoethane (EDB)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,4-Dichloro-2-butene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/L	2.2	2.3	1.8	1.9	2.3	2.2	2.1	1.8	2.1	2.3	2.4	2.2
1,2-Dichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/L	6.3	6.5	6.0	5.5	6.5	6.5	6.5	5.7	6.6	6.0	7.2	7.1
trans-1,2-Dichloroethene	ug/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.52	<0.5
1,2-Dichloropropane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,3-Dichloropropene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

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Table 4. DN-13 Monthly Monitoring for 2004, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound ¹	Units	1/02/04	2/02/04	3/02/04	4/02/04	5/07/04	6/25/04	7/06/04	8/25/04	9/16/04	10/04/04	11/11/04	12/21/04
trans-1,3-Dichloropropene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dioxane	ug/L	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200	<200
Ethyl methacrylate	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
2-Hexanone	ug/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Iodomethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Isobutyl alcohol	ug/L	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50
Methacrylonitrile	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Methylene chloride	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
4-Methyl-2-pentanone	ug/L	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methyl methacrylate	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Propionitrile	ug/L	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Styrene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1,2-Tetrachloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2,2-Tetrachloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	ug/L	5.7	5.8	5.8	5.3	6.4	6.0	6.2	5.7	5.9	5.4	6.9	6.0
Trichlorofluoromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,3-Trichloropropane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl acetate	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Vinyl chloride	ug/L	1.6	1.3	<1.0	1.1	1.3	1.2	1.7	2.1	2.4	2.2	2.1	2.5
Xylenes (total)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total VOCs	ug/L	15.8	15.9	13.6	13.8	17.6	15.9	16.5	15.3	17.0	15.9	19.1	17.8

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	Total Well Depth	Northing	Easting
ID #	ft msl	ft msl	Inches	ft bls	ft bls	y	x
<u>Shallow Aquifer Wells</u>							
W-1-N	737.61	739.02	4	36-71	71	6618	5037
W-2-N	729.68	731.68	4	35-60	60	5264	4744
W-3-N	731.98	733.66	4	34-58	58	5157	5032
W-4-N	729.88	731.63	4	41-66	66	5157	5224
HR-1	730.10	732.71	2	49-59	59	3420	5205
HR-2	732.62	734.75	2	47-57	58	5209	5455
HR-3	734.31	736.75	2	51-61	61	5211	5648
HR-4	740.61	742.60	2	55-65	67	6111	5214
HR-5	730.95	734.27	2	52-57	58	4760	4985
HR-6	730.18	732.66	2	45-55	55	4009	4985
HR-7	731.00	731.73	2	47-57	57	4743	4678
HR-8	740.84	743.42	2	56-66	66	6819	5626
HR-9	741.00	743.51	2	60-70	70	7669	5508
HR-11	740.90	743.33	2	59-69	69	7313	6207
HR-16	724.60	727.01	4	42-62	65	2354	4198
HR-17	725.40	726.43	4	27-47	48	2457	4776
W-1-S	728.23	729.29	4	25-60	60	2777	4958
W-2-S	725.01	726.64	4	30-65	67	1786	4207
W-3-S	731.47	733.42	4	36-76	78	1678	4386
W-4-S	726.66	727.68	4	30-70	71	1671	4783
GM-2	NM	735.81	2	47-57	57	1102	5803
4S	NM	731.36	4	30-65	65	1071	5564
GM-6	NM	730.27	2	37-47	47	1042	5306
GM-8	NM	735.17	2	42-52	52	1283	5285
GM-10	NM	723.90	2	40-50	50	162	5258
GM-16	NM	725.30	2	48-58	58	652	4566
GM-17	NM	723.84	2	40-50	50	672	5174
GM-18	NM	723.80	2	45-55	55	583	4993
GM-19S	NM	730.85	2	49-59	59	1767	5274
EAST	NM	730.98	2	NA	71	2120	5818
WEST	NM	731.08	2	NA	52	2004	5463
WSU-24	NM	725.10	2	NA	66	574	5663
WS-17	NM	726.18	2	NA	66	970	5279

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

Well	Surface Elevation	TOC Elevation	Well Diameter	Screened Interval	Total Well Depth	Northing	Easting
ID #	ft msl	ft msl	Inches	ft bls	ft bls	y	x
<u>Shallow Aquifer Wells</u>							
WS-18	NM	733.52	2	NA	61	1004	5458
WS-19	NM	726.62	2	NA	62	1182	5212
TW-2	NM	733.38	10	35-45	45	1027	5337
RW-10	729.29	728.53	4	22-32	35	2147	5751
RW-11	730.02	729.74	4	22-32	37	2121	5773
GM-21	723.79	723.50	2	44-54	54	1449	6079
GM-22	731.84	731.63	2	47-57	60	2531	6285
GM-23	NM	731.00	2	24-34	35	5393	6018
GM-24	747.61	747.29	2	58-68	70	8122	7812
GM-25	747.05	746.17	2	48-58	58	4930	8170
GM-26	722.29	722.29	2	50-60	60	-988	4961
GM-27	731.03	730.57	2	40-50	58	5393	6029
GM-28	NM	738.02	2	31-41	41	5041	5916
GM-29	731.31	730.78	2	28-38	38	5209	5974
GM-30	NM	734.73	2	30-40	40	5559	5970
GM-31	NM	735.23	2	58-68	68	2939	5913
GM-32	732.47	732.08	2	51-61	61	3486	6070
GM-33	730.30	729.77	2	48-58	58	2278	5762
GM-34	731.06	730.56	2	26-36	36	2278	5770
GM-35	731.56	731.27	2	57-67	67	1750	5510
GM-36	731.44	731.11	2	25-35	35	1755	5551
GM-37	730.36	730.05	2	46-56	56	1857	5696
GM-38	730.31	729.88	2	24-34	34	1858	5686
GM-43	NM	729.00	2	40-50	50	3655	5211
GM-44	NM	728.77	2	51-61	61	3137	5217
GM-45	NM	729.75	2	50-60	60	2853	5217
ME-2	732.38	732.08	2	23-33	33	2945	5973
ME-3	NM	732.59	2	25-35	35	2897	5938
ME-4	NM	732.74	2	22-32	34	2925	5913
ME-6	NM	735.91	2	22-32	35	3325	5927

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

Well	Surface Elevation	TOC Elevation	Well Diameter	Screened Interval	Total Well Depth	Northing	Easting
ID #	ft msl	ft msl	Inches	ft bls	ft bls	y	x
<u>Deep Aquifer Wells</u>							
GM-1	NM	735.74	2	92-102	103	1087	5803
GM-3	NM	730.44	2	91-101	101	1023	5309
GM-4	NM	731.46	2	140-150	150	1010	5322
GM-5	NM	731.29	2	92-101	102	1037	5512
GM-7R	NM	735.61	2	80-90	91	1247	5295
GM-9	NM	724.07	2	90-100	100	146	5247
GM-11	NM	723.71	2	90-100	100	679	5164
GM-13	NM	723.82	2	90-100	100	566	4990
GM-14	NM	723.50	2	140-150	150	611	5030
GM-15	NM	725.23	2	90-100	101	664	4581
GM-19D	NM	730.25	4	145-150	150	1775	5298
GM-20D	NM	727.26	4	90-95	100	619	5699
GM-39	731.15	730.95	2	106-116	116	5396	6006
GM-40	727.28	727.04	2	140-150	150	3089	4984
GM-41	731.22	733.65	2	104-114	114	3430	6684
GM-42	729.48	729.16	2	140-150	150	2338	5651
HR-10	740.90	742.81	4	118-128	131	7686	5492
HR-12	741.00	742.64	4	122-132	132	7333	6194
HR-13	733.20	735.03	4	76-86	86	5221	5665
HR-14	729.90	731.63	4	78-88	89	5178	5209
HR-15	732.10	733.74	4	88-98	102	5161	5020
M73C	NM	716.55	NA	NA	NA	180	4539
MT68	743.68	746.45	5	NA	135	2163	8847
MT69	719.84	722.71	8	NA	158	-988	5020
MT576M	750.00	751.46	5	NA	114	4804	9620
MT596M*	759.18	757.73	5	NA	89	6438	10644
DN-13	NM	NM	NA	NA	NA	NM	NM
28	NM	733.67	14	150-161,177-207	214	NM	NM
31	NM	734.05	20	90-120	120	NM	NM
32	NM	732.10	20	94-109,139-149	149	2394	5791
42	NM	731.62	20	135-185	193	3710	5070

ft bls - Feet Below Land Surface.

ft msl - Feet Above Mean Sea Level.

TOC - Top of Casing.

*Measuring point is top of cement housing.

NM - Not Measured.

NA - Not Available.

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Table 6. Water-Level Measurements Collected During September 2004, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Water-Level Elevation
<u>Shallow Aquifer Wells</u>			
W-1-N	739.02	30.70	708.32
W-2-N	731.68	23.91	707.77
W-3-N	733.66	25.95	707.71
W-4-N	731.63	23.81	707.82
HR-1	732.71	26.33	706.38
HR-2	734.75	26.89	707.86
HR-3	736.75	28.90	707.85
HR-4	742.60	34.29	708.31
HR-5	734.27	26.89	707.38
HR-6	732.66	25.95	706.71
HR-7	731.73	24.37	707.36
HR-8	743.42	35.81	707.61
HR-9	743.51	34.51	709
HR-11	743.33	34.20	709.13
HR-16	727.01	21.30	705.71
HR-17	726.43	20.41	706.02
W-1-S	729.29	23.14	706.15
W-2-S	726.64	21.51	705.13
W-3-S	733.42	24.01	709.41
W-4-S	727.68	22.46	705.22
GM-2	735.81	30.31	705.5
4S	731.36	26.80	704.56
GM-6	730.27	26.51	703.76
GM-8	735.17	30.25	704.92
GM-10	723.90	19.29	704.61
GM-16	725.30	20.66	704.64
GM-17	723.84	19.13	704.71
GM-18	723.80	19.13	704.67
GM-19S	730.85	25.19	705.66
EAST	730.98	24.77	706.21
WEST	731.08	25.09	705.99
WSU-24	725.10	19.65	705.45
WS-17	726.18	NM	NM
WS-18	733.52	28.47	705.05
WS-19	726.62	21.72	704.9
TW-2	733.38	34.70	698.68
RW-10	728.53	NM	NM
RW-11	729.74	NM	NM
GM-21	723.50	19.15	704.35
GM-22	731.63	25.14	706.49

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Table 6. Water-Level Measurements Collected During September 2004, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Water-Level Elevation
GM-23	731.07	23.51	707.56
GM-24	747.29	37.40	709.89
GM-25	746.17	37.96	708.21
GM-26	722.29	18.32	703.97
GM-27	730.57	NM	NM
GM-28	736.46	28.72	707.74
GM-29	731.37	23.31	708.06
GM-30	734.79	27.00	707.79
GM-31	735.23	25.70	709.53
GM-32	732.08	26.34	705.74
GM-33	729.77	23.52	706.25
GM-34	730.56	24.33	706.23
GM-35	731.27	25.62	705.65
GM-36	731.11	25.33	705.78
GM-37	730.05	24.10	705.95
GM-38	729.88	23.96	705.92
GM-43	729	22.37	706.63
GM-44	728.77	22.47	706.3
GM-45	729.75	22.87	706.88
ME-2	732.08	25.47	706.61
ME-3	732.59	25.27	707.32
ME-4	732.74	25.85	706.89
ME-6	735.91	26.27	709.64
<u>Deep Aquifer Wells</u>			
GM-1	735.74	30.40	705.34
GM-3	730.44	25.52	704.92
GM-4	731.46	26.56	704.9
GM-5	731.29	26.22	705.07
GM-7R	735.61	30.28	705.33
GM-9	724.07	19.62	704.45
GM-11	723.71	19.20	704.51
GM-13	723.82	19.68	704.14
GM-14	723.50	19.40	704.1
GM-15	725.23	21.22	704.01
GM-19D	730.25	24.95	705.3
GM-20D	727.26	21.83	705.43
GM-39	730.95	22.90	708.05
GM-40	727.04	21.11	705.93
GM-41	733.65	26.69	706.96
GM-42	729.16	23.48	705.68
HR-10	742.81	33.82	708.99
HR-12	742.64	33.53	709.11
HR-13	735.03	27.12	707.91

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Table 6. Water-Level Measurements Collected During September 2004, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Water-Level Elevation
HR-14	731.63	23.92	707.71
HR-15	733.74	26.17	707.57
M73C	716.55	12.56	703.99
MT69	722.71	18.93	703.78
MT576M	751.46	42.10	709.36
MT596M*	757.73	47.10	710.63
<u>Production and Fire Wells</u>			
11B	NS	ON	NM
12A	742.35	OFF	NM
31	734.05	25.78	708.27
32	732.10	26	706.1
37	731.24	NM	NM
39	732.07	NM	NM
42	731.62	25.27	706.35
44	734.62	NM	NM
45	731.03	25.75	705.28
46	733.34	27.91	705.43
A	739.00	NM	NM
FW-1A	739.89	31.66	708.23
FW-2	737.48	29.72	707.76
FW-3	739.26	31.65	707.61
FW-4	731.62	25.57	706.05

Measuring point is to top of the PVC Casing.

Water-level elevations are reported in feet above mean sea level (msl).

Depth-to-water elevations were measured on September 7-8, 2004 using an electronic water level indicator.

Depth-to-water measurements are reported in feet below the measuring point.

NS - Not Surveyed.

NM - Not measured.

*Measuring point is top of cement housing.

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Table 7. Summary of Precipitation Measurements Recorded by the National Weather Service, During 2004 - Dayton, Ohio.

Date	Actual Precipitation	Average Precipitation	Departure from Average
January 2004	4.62	2.60	2.02 above average
February 2004	1.31	2.29	0.98 below average
March 2004	2.48	3.29	0.81 below average
April 2004	3.39	4.03	0.64 below average
May 2004	8.62	4.17	4.45 above average
June 2004	5.13	4.21	0.92 above average
July 2004	3.25	3.75	0.50 below average
August 2004	5.15	3.49	1.66 above average
September 2004	0.61	2.65	2.04 below average
October 2004	2.38	2.72	0.34 below average
November 2004	3.18	3.30	0.12 below average
December 2004	1.62	3.08	1.46 below average
2004 Total	41.74	39.58	2.16 above average

All precipitation measurements are reported in inches.
Information obtained from the NOAA Website (www.erh.noaa.gov on 01/17/05)

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Table 8. Vertical Gradients For Shallow/Deep Well Pairs During 2004, General Motors Corporation, Moraine, Ohio.

Shallow/Deep Wells	Vertical Gradient in September 2004 ⁽¹⁾	
	Direction	Difference (feet)
<u>Ugradient</u>		
HR-9/HR-10	D	-0.01
HR-11/HR-12	D	-0.02
<u>On-Site</u>		
W-3-N/HR-15	D	-0.14
W-4-N/HR-14	D	-0.11
HR-3/HR-13	U	0.06
GM-8/GM-7R	U	0.41
GM-16/GM-15	D	-0.63
GM-2/GM-1	D	-0.16
GM-18/GM-13	D	-0.53
GM-17/GM-11	D	-0.2
GM-6/GM-3	U	1.16
4S/GM-5	U	0.51
<u>AOL7</u>		
GM-23/GM-27 ⁽²⁾	U	0.43
<u>Downgradient</u>		
GM-10/GM-9	D	-0.16
GM-26/MT-69	D	-0.19

D - Downward gradient (-).

U - Upward gradient (+).

⁽¹⁾ - Water-level measurements collected on September 7-8, 2004.

⁽²⁾ - Water-level measurements collected on September 14-15, 2004.

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

RZ-1		Upgradient Well GM-29												
Constituents	Units	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
<u>Volatile Organic Compounds</u>														
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0UJ	<50	<50	<50	<40	< 50	<33	< 50 U
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
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
cis-1,2-Dichloroethene	ug/L	320	223	1,190J	2,871	2,170	2050J	1,800	1,800	1600	1300	950	1200	1200
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
Ethylbenzene	ug/L	<1.0	1.4	<1.0	<1.0	<1.0	<1.0UJ	21J	<50	<50	<40	< 50	<33	< 50 U
Tetrachloroethene	ug/L	<20	38.7	24.6	20.0	24.4	24.8J	17J	22J	22	18J	47J	18J	20 J
Toluene	ug/L	<1.0	<1.0	<1.0	2.2	<1.0	<1.0UJ	<50	<50	<50	<40	< 50	<33	< 50 U
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
Trichloroethene	ug/L	878	758	649J	289	354	437J	270	320	380	310	280	390	440
Vinyl chloride	ug/L	3.8	1.0	1.7	788	362	276J	230	280	140	140	99	150	230
Xylenes	ug/L	<1.0	6.0	<1.0	<1.0	<1.0	<1.0UJ	52	<50	<50	<40	< 50	<33	< 50 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

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		Downgradient Well													
		GM-28													
Constituents	Units	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	9/14/04
<u>Volatile Organic Compounds</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
1,1-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
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
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
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
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
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
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
1,1,1-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
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
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
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
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

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 2 Wells, General Motors Corporation, Moraine, Ohio.

RZ-2		Introduction Well												Introduction Well		
		ME-6												ME-1		
Constituents	Units	8/31/99	2/22/00	5/25/00	9/21/00	03/20/01	6/26/01	11/15/01	12/12/01	9/25/02	5/22/03	10/1/03	9/15/04	8/31/99	2/22/00	5/25/00
<u>Volatile Organic Compounds</u>																
Benzene	ug/L	<1.0	<10	<5.0	<1.0	<1.0	<1.0	<2.0	<3.3	<10	< 1	0.46J	< 1 U	<1.0	<10	<5.0
1,1-Dichloroethane	ug/L	<1.0	<10	1.4J	<1.0	1.6	1.8	2.7	4.8	<10	1.7	7.2	6.3	2.4	<10	<5.0
1,1-Dichloroethene	ug/L	<1.0	<10	<5.0	<1.0	<1.0	<1.0	<2.0	<3.3	<10	< 1	<2.0	0.26 J	<1.0	<10	<5.0
cis-1,2-Dichloroethene	ug/L	255	541	712	98.8	171	67.0	65	86	5.2	3.3	20	14	38.2	459	537
trans-1,2-Dichloroethene	ug/L	<1.0	<10	6.1	2.5	4.3	1.8	1.8	2.0	<5	< 0.5	<1.0	0.56	1.5	<10	4.2J
Ethylbenzene	ug/L	<1.0	<10	<5.0	<1.0	<1.0	<1.0	<2.0	<3.3	<10	< 1	0.54J	< 1 U	<1.0	<10	1.5J
Tetrachloroethene	ug/L	213	18.3	16.2	6.7	34.0	<1.0	8.2	6.1	<10	< 1	12	5.3	83.6	<10	1.8J
Toluene	ug/L	<1.0	<10	<5.0	1.9	<1.0	2.1	0.42J	1.5J	6.6J	1.8	3.4	< 1 U	<1.0	<10	1.4J
1,1,1-Trichloroethane	ug/L	2.9	<10	<5.0	<1.0	1.3	1.2	2.2	2.9J	<10	0.83J	13	4.1	13.5	<10	<5.0
Trichloroethene	ug/L	474	39.0	28.0	19.0	66.0	4.8	23	19	<10	0.69J	31	9.2	292	<10	5.8
Vinyl chloride	ug/L	<1.0	<10	10.8	6.1	27.7	13.3	13	22	<10	1.8	2.9	2.4	36	<10	9.1
Xylenes	ug/L	<1.0	<10	<5.0	<1.0	<1.0	2.9	<2.0	<3.3	<10	0.93J	3.2	< 1 U	<1.0	<10	<5.0
Total VOCs	ug/L	944.9	598.3	774.5	135	305.9	94.9	116.32	144.3	11.8	11.05	93.7	42.12	467.2	459	560.8

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 2 Wells, General Motors Corporation, Moraine, Ohio.

RZ-2		Introduction Well											Introduction Well
Constituents	Units	ME-3											ME-5
		8/31/99	2/22/00	5/25/00	9/21/00	11/15/01	12/12/01	7/21/02	9/24/02	5/21/03	10/1/03	9/15/04	6/26/01
<u>Volatile Organic Compounds</u>													
Benzene	ug/L	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<40	<2.5	< 1	0.60J	< 1 U	<1.0
1,1-Dichloroethane	ug/L	6.1	12.4	4.7	3.4	5.9	5.6	<40	<2.5	19	24	18	<1.0
1,1-Dichloroethene	ug/L	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<40	<2.5	< 1	<1.0	< 1 U	<1.0
cis-1,2-Dichloroethene	ug/L	5.7	105	100	2.9	16	22	<20	<1.2	1.3	0.96	2.2	1.8
trans-1,2-Dichloroethene	ug/L	<1.0	<10	7.5	2.9	2.7	2.8	<20	<1.2	< 0.5	<0.50	< 0.5 U	<1.0
Ethylbenzene	ug/L	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<40	<2.5	< 1	0.52J	< 1 U	<1.0
Tetrachloroethene	ug/L	57.9	<10	<1.0	<1.0	1.3	3.4	<40	<2.5	< 1	<1.0	0.21 J	<1.0
Toluene	ug/L	<1.0	<10	<1.0	1.4	0.34J	0.19J	<40	<2.5	< 1	2.8	< 1 U	3.8
1,1,1-Trichloroethane	ug/L	42.5	16.0	4.8	6.4	1.6	1.9	<40	<2.5	< 1	0.31J	0.53 J	<1.0
Trichloroethene	ug/L	47.5	<10	4.3	<1.0	3.8	9.7	<40	<2.5	1.2	1.5	1.5	<1.0
Vinyl chloride	ug/L	<1.0	<10	54.7	2.1	7.3	11	<40	<2.5	0.36J	<1.0	1.1	<1.0
Xylenes	ug/L	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<40	<2.5	< 1	2.8	< 1 U	4.3
Total VOCs	ug/L	159.7	133.4	176	19.1	38.94	56.59	0	0	21.86	33.49	23.54	9.9

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 2 Wells, General Motors Corporation, Moraine, Ohio.

RZ-2		Below Introduction Zone							
		GM-31							
Constituents	Units	9/1/99	2/23/00	5/31/00	9/21/00	11/15/01	9/24/02	10/1/03	9/15/04
Volatile Organic Compounds									
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<4.0	<6	<5.0	< 5 U
1,1-Dichloroethane	ug/L	1.3	1.4	1.8	1.1	3.1J	5.9J	6.0	4 J
1,1-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<4.0	<6	<5.0	< 5 U
cis-1,2-Dichloroethene	ug/L	7.80	27.8	48.1	40.2	120	200	170	120
trans-1,2-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	1.8J	3.5	3.5	2.7
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<4.0	<6	<5.0	< 5 U
Tetrachloroethene	ug/L	1.3	<1.0	<1.0	<1.0	<4.0	<6	<5.0	2.5 J
Toluene	ug/L	<1.0	<1.0	1.5	<1.0	<4.0	<6	1.3J	< 5 U
1,1,1-Trichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<4.0	<6	<5.0	1.4 J
Trichloroethene	ug/L	27.2	13.6	8.4	8.5	11	10	28	29
Vinyl chloride	ug/L	<1.0	<1.0	<1.0	<1.0	7.4	19	10	2.4 J
Xylenes	ug/L	<1.0	1.1	1.6	<1.0	<4.0	<6	<5.0	< 5 U
Total VOCs	ug/L	37.6	43.9	61.4	49.8	143.3	238.4	218.8	162

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 West Wells, General Motors Corporation, Moraine, Ohio.

RZ-3 West		Upgradient Well													Upgradient Well		
Constituents	Units	EAST													WEST		
		09/21/99	02/23/00	05/25/00	09/22/00	03/19/01	6/25/01	11/12/01	12/11/01	6/12/02	9/23/02	5/21/03	9/25/03	9/13/04	09/21/99	02/23/00	05/25/00
<u>Volatile Organic Compounds</u>																	
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	<1.0	<1.0
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	25.6	24.5	32.5
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	<1.0	<1.0
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	125	34.5	29.0
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	1.7	1.3
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	<1.0	<1.0
Tetrachloroethene	ug/L	61.0	77.1	54.6	55.8	49.9	59.3	56	49	37	49	42	47	40	41.3	53.9	37.7
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	<1.0	<1.0
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	24.8	25.1	27.4
Trichloroethene	ug/L	56.1	90.1	81.3	97.2	105	117	92	94	75	46	29	35	23	37.3	108	103.0
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	<1.0	<1.0	<1.0
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	<1.0	<1.0	<1.0
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	254	247.7	230.9

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

RZ-3 West		Upgradient Well												
		GM-19S												
Constituents	Units	09/20/99	02/23/00	05/24/00	09/22/00	03/19/01	06/25/01	11/12/01	12/11/01	06/12/02	09/26/02	05/21/03	09/25/03	09/13/04
<u>Volatile Organic Compounds</u>														
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	0.62	<4	< 4	<5.0	< 4 U
1,1-Dichloroethane	ug/L	7.7	7.3	7.0	4.4	4.1	2.9	2.9J	2.8J	3.7	6.3	8.4	8.3	8.1
1,1-Dichloroethene	ug/L	1.0	1.0	1.1	<1.0	<1.0	<1.0	<3.3	<3.3	0.98	<4	< 4	1.6J	1.9 J
cis-1,2-Dichloroethene	ug/L	34.6	38.8	42.9	37.6	38.2	31.5	26	27	28	39	81	89	61
trans-1,2-Dichloroethene	ug/L	2.3	2.3	2.7	2.6	3.0	2.4	2.0	2.0	2.3	2.7	2.5	2.9	2.4
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	<3.3	<4	< 4	<5.0	< 4 U
Tetrachloroethene	ug/L	46.0	71.3	57.1	68.0	67.6	71.7	64	64	60	52	62	62	71
Toluene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	<3.3	<4	< 4	<5.0	< 4 U
1,1,1-Trichloroethane	ug/L	16.0	16.9	17.9	14.5	11.9	9.6	7.6	7.5	7.2	6.3	12	13	14
Trichloroethene	ug/L	71.1	101	104	104	107	121	97	110	110	110	120	140	120
Vinyl chloride	ug/L	<1.0	1.7	1.4	<1.0	<1.0	<1.0	<3.3	0.66J	0.70	5.2	< 4	<5.0	< 4 U
Xylenes	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	<3.3	<4	< 4	<5.0	< 4 U
Total VOCs	ug/L	178.7	240.3	234.1	231.1	231.8	239.1	199.5	213.96	213.5	221.5	285.9	316.8	278.4

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

RZ-3 West		Downgradient Well GM-32													Downgradient Well GM-8						
Constituents	Units	09/22/99	02/28/00	05/30/00	09/25/00	03/19/01	06/25/01	11/12/01	12/11/01	6/12/02	9/20/02	5/23/03	10/1/03	9/14/04	3/6/98	9/20/99	9/26/00	11/9/01	9/20/02	10/1/03	9/14/04
<u>Volatile Organic Compounds</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	2.3	3.4	1.1	0.78J	5.5	5.4	4.2
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	49.3	30.2	36.5	40	63	48	15
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	1.0	<1.0	<1.0	< 1.0	<2.0	<2.0	< 1 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	56.1	26.2	1.5	2.0	5.5	<1.0	< 0.5
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	10.1	12.0	5.4	3.6	9	4.4	1.1
Ethylbenzene	ug/L	<1.0	<10	<100	<1.0	<50	<1.0	0.79J	<100	<20	<10	0.65J	0.73J	< 10 U	28.9	20.7	12.5	0.40J	7.5	11	19
Tetrachloroethene	ug/L	1.2	<10	<100	<1.0	<50	37.6	<5.0	<100	<20	<10	< 1 U	<2.0	< 10 U	20.0	14.8	<1.0	< 1.0	<2.0	<2.0	< 1 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	<1.0	<1.0	<1.0	< 1.0	1.8J	1.2J	< 1 U
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	6.7	1.9	<1.0	0.40J	<2.0	<2.0	< 1 U
Trichloroethene	ug/L	3.2	<10	<100	<1.0	<50	107	<5.0	<100	<20	<10	< 1 U	<2.0	< 10 U	95.2	30.4	6.6	4.4	<2.0	<2.0	< 1 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	10.1	8.4	2.4	1.9	5.8	<2.0	0.48 J
Xylenes	ug/L	<1.0	<10	<100	<1.0	<50	<1.0	3.0J	<100	<20	<10	2.1	3.6	< 10 U	10.3	2.3	1.9	0.39J	1.5J	2.0	1.1
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	290	150.3	67.9	53.87	99.6	72	40.88

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 West Wells, General Motors Corporation, Moraine, Ohio.

RZ-3 West		Downgradient Well						
		GM-6						
Constituents	Units	3/6/98	9/20/99	9/26/00	11/9/01	9/20/02	10/2/03	9/14/04
<u>Volatile Organic Compounds</u>								
Benzene	ug/L	<1.0	<1.0	<1.0	< 2.0	2.2	1.0	1.7
1,1-Dichloroethane	ug/L	35.3	33.2	13.0	14	60	20	18
1,1-Dichloroethene	ug/L	<1.0	1.2	<1.0	< 2.0	<2.0	<1.0	< 1 U
cis-1,2-Dichloroethene	ug/L	82.4	52.9	41.0	8.2	43	13	10
trans-1,2-Dichloroethene	ug/L	2.4	2.0	2.2	1.8	8.6	2.5	1.9
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	< 2.0	<2.0	0.22J	< 1 U
Tetrachloroethene	ug/L	94.0	81.4	51.5	14	14	11	2.6
Toluene	ug/L	<1.0	<1.0	<1.0	< 2.0	<2.0	0.83J	< 1 U
1,1,1-Trichloroethane	ug/L	36.2	24.6	12.1	3.9	1.4J	0.19J	< 1 U
Trichloroethene	ug/L	119	78.2	56.6	48	33	23	5.7
Vinyl chloride	ug/L	2.3	1.6	3.7	1.9J	12	3.3	3
Xylenes	ug/L	<1.0	<10	<1.0	< 2.0	< 2.0	1.0	< 1 U
Total VOCs	ug/L	371.6	275.1	180.1	91.8	174.2	76.04	42.9

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

RZ-3 East		Upgradient Well												
		GM-22												
Constituents	Units	09/01/99	02/23/00	05/25/00	09/21/00	03/20/01	06/26/01	11/13/01	12/12/01	6/13/02	9/25/02	5/22/03	9/24/03	9/14/04
Volatile Organic Compounds														
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
1,1-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
1,1-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
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
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
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
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
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
1,1,1-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
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
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
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
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

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 3 East Wells, General Motors Corporation, Moraine, Ohio.

RZ-3 East		Downgradient Well												
		GM-21												
Constituents	Units	09/22/99	02/23/00	05/26/00	09/22/00	03/19/01	06/25/01	11/13/01	12/11/01	6/12/02	9/25/02	5/22/03	9/24/03	9/14/04
Volatile Organic Compounds														
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
1,1-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
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
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
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
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
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
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
1,1,1-Trichloroethane	ug/L	53.1	15.4	27.9	15.7	7.0	7.7	6.9	1.2	23	31	18	31	26
Trichloroethene	ug/L	28.7	283	311	189	169	158	160	28	210	230	79	200	180
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
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
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

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

RZ-1		Upgradient Well GM-29												
Constituents	Units	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
<u>Inorganics & TOC</u>														
Nitrate	mg/l	0	0	0	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
Nitrogen, Ammonia	mg/l	<0.30	<0.30	<0.30	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
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
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
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
Iron (Ferrous)	mg/l	0.02	0	2.2	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
Sulfide	mg/l	<4	<1	<1	<1	<1.0	<1	1.3	<1.0	<1.0	<1.0	0.54B	1.6	< 1 U
Total Organic Carbon	mg/l	18	11	22	<1	7.57	7.3	10	10	8	8	7	9	9
Chloride	mg/l	254	426	508	373	337	262	600B	460	490	490	490	560J	540
<u>Permanent Gases</u>														
Carbon Dioxide	mg/l	46.52	49.87	44.05	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
Nitrogen	mg/l	20.29	18.7	15.61	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
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	5641	1861	751	639	460	17000	20000	28000	14000	16000	7400	9900	13000
Ethene	ng/l	9769	1275	12098	441796	160000	130000	230000	180000	48000	140000	150000	200000	1700000
<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
Specific Conductivity	umhos/cm	1502	3044	2388	1942	1733	1291	2703	2860	1977	2354	2303	2278	2580
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
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
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

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		Downgradient Well GM-28													
Constituents	Units	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
<u>Inorganics & TOC</u>															
Nitrate	mg/l	0.08	0	0	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
Nitrogen, Ammonia	mg/l	<0.30	<0.30	0.68	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
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
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
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
Iron (Ferrous)	mg/l	0	0.03	2.6	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
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
Total Organic Carbon	mg/l	15	24	742	571	90.0	360	74	68B	140	23	15	17	15 J	8
Chloride	mg/l	208	664	805	782	1030	508	730B	560	370	450	350	270J	320	340
<u>Permanent Gases</u>															
Carbon Dioxide	mg/l	41.52	63.57	16.51	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
Nitrogen	mg/l	19.42	16.39	19.82	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
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	750	493	865	1198	42000	39000	91000	98000	420000	300000	310000	230000	160000	150000
Ethene	ng/l	48	98	646	1794606	57000	5000	1100	1400	8800	12000	74000	430	160	54
<u>Field Parameters</u>															
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
Specific Conductivity	umhos/cm	1359	3124	4402	4538	3724	3216	3136	3700	2187	2195	2132	1501	NA	2030
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
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
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

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 2, General Motors Corporation, Moraine, Ohio.

RZ-2		Introduction Well ME-6												Introduction Well ME-1		
Constituents	Units	8/31/99	2/22/00	5/25/00	9/21/00	3/20/01	6/26/01	11/15/01	12/12/01	9/25/02	5/22/03	10/1/03	9/15/04	8/31/99	2/22/00	5/25/00
<u>Inorganics & TOC</u>																
Nitrate	mg/l	0.08	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	13.2	NA	NA
Nitrite	mg/l	0.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.333	NA	NA
Nitrogen, Ammonia	mg/l	<0.30	10.9	23.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.62	3.70	27.8
Manganese (Total)	mg/l	0.502	4.19	1.44	0.46	0.276	0.245	0.33	0.34	1.9B	0.77J	0.42J	0.28	0.5	2.40	2.23
Manganese (Dissolved)	mg/l	<0.010	3.60	1.34	0.456	0.277	0.222	0.30	0.32	1.6B	0.63J	0.40J	0.33	0.493	1.93	1.06
Iron (Total)	mg/l	8.17	67.1	46.3	6.4	1.25	3.52	5.5	4.6	37.2	30.3	6.7J	9.6	<0.10	96.6	134
Iron (Dissolved)	mg/l	<0.10	46.5	42.8	6.66	0.63	1.74	3.9	2.8	7.3	6.5	6.1J	2.9	<0.10	63.4	20.4
Iron (Ferrous)	mg/l	0.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	NA	NA
Sulfate	mg/l	139	111	34	91	128	165	400	220	<5	<5	91J	64 J	143	41	16
Sulfide	mg/l	<2	2.00	1.11	1.58	<1.0	<1	<1.0	<1.0	1.7	0.86B	6.7	3.7 U	<1	<1	1.52
Total Organic Carbon	mg/l	9	1,560	374	35	21.5	38	41	34	1500	250	56	11	2	985	219
Chloride	mg/l	182	350	302	196	261	289	390B	320	430	370	220J	290	177	467	324
<u>Permanent Gases</u>																
Carbon Dioxide	mg/l	51.08	173.39	156.4	NA	NA	NA	NA	NA	NA	NA	NA	NA	49.95	350.8	247.8
Oxygen	mg/l	0.84	0.45	0.52	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.27	0.40	0.41
Nitrogen	mg/l	18.57	12.44	9.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	19.14	10.6	5.32
Methane	mg/l	0.002063	0.56	12.2	0.33	8.30	0.25	0.160	0.65	1.6	12	5.1	2.9	0.000627	1.11	15.6
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.40	<0.40	<0.40
<u>Light Hydrocarbon Scan</u>																
Ethane	ng/l	134	97	<5	134	4900	3600	4600	16000	26	2600	2000	4300	32	164	<5
Ethene	ng/l	134	164	3508	3316	7600	1900	4000	20000	340	810	1400	1700	40	293	129
<u>Field Parameters</u>																
pH	S.U.	7.02	6.64	6.58	7.00	7.06	6.82	6.92	7.50	6.78	6.73	6.90	6.49	7.03	6.19	6.49
Specific Conductivity	umhos/cm	1424	4645	3118	1864	1922	2630	3004	3000	6309	3428	1735	1710	1385	5030	2580
Dissolved Oxygen	mg/l	0.66	7.12	0.84	1.19	4.83	0.33	0.67	0.48	0.59	2.49	0.35	2.51	0.52	7.00	4.78
Redox Potential	mV	109.1	-85.8	-133.8	-200.6	-294.0	43.5	-80.4	-129	-107.2	-101.4	-133.4	-4	108.4	-81.7	-157.8
Temperature	°C	27.51	18.59	22.60	18.98	21.68	19.42	20.01	19.74	22.17	19.1	17.58	17.4	25.46	19.25	21.27

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 2, General Motors Corporation, Moraine, Ohio.

RZ-2		Introduction Well											Introduction Well
Constituents	Units	8/31/99	2/22/00	5/25/00	9/21/00	11/15/01	12/12/01	7/21/02	9/24/02	5/21/03	10/1/03	9/15/04	ME-5 6/26/01
ME-3													
<u>Inorganics & TOC</u>													
Nitrate	mg/l	22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	mg/l	0.1665	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	mg/l	<0.30	3.10	12.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese (Total)	mg/l	0.016	0.870	1.16	0.556	0.580	0.60	3.0	0.67B	0.21J	0.28J	0.47	0.258
Manganese (Dissolved)	mg/l	<0.010	0.702	0.436	0.543	0.620	0.610	3.4	0.69B	0.23J	0.28J	0.47	0.225
Iron (Total)	mg/l	<0.10	20.5	38.2	4.9	3.9	3.6	162	41.1	5.9	1.9J	3.2	8.98
Iron (Dissolved)	mg/l	<0.10	15.3	10.3	4.45	4.10	3.40	133	36.2	4.7	1.7J	2.8	7.57
Iron (Ferrous)	mg/l	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	152	60	34	87	160	150	71B	<5	45J	79J	71 J	219
Sulfide	mg/l	<1	1.39	1.32	<1	<1	<1.0	0.32J	<1.0	1.70	0.98B	3.4 U	<1
Total Organic Carbon	mg/l	1	162	69	4	<1	6	1100	340	15	9	4	65
Chloride	mg/l	336	208	235	184	260B	330	370	380	290	340J	440	297
<u>Permanent Gases</u>													
Carbon Dioxide	mg/l	57.26	183.76	85.52	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oxygen	mg/l	1.72	0.47	0.78	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen	mg/l	16.44	13.39	13.0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	mg/l	0.000129	0.01088	9.68	0.001226	0.0430	0.0160	1.6	7	1.8	1.2	0.81	0.15
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA
<u>Light Hydrocarbon Scan</u>													
Ethane	ng/l	10	73	138	47	520	470	370	210	830	540	170	560
Ethene	ng/l	<5	109	96276	218	23000	38000	1500	200	120	73	270	620
<u>Field Parameters</u>													
pH	S.U.	6.96	6.75	6.89	7.15	6.52	7.40	5.77	6.96	6.70	6.97	6.88	6.87
Specific Conductivity	umhos/cm	1889	2305	1752	1509	1477	2280	4081	3454	1662	1413	2130	2679
Dissolved Oxygen	mg/l	2.01	4.06	0.59	1.11	1.70	0.19	1.60	2.41	2.92	2.93	3.12	0.49
Redox Potential	mV	80.9	-96.8	-136.7	-193.2	-36.1	-127.0	-103.4	-59.7	-30.6	-89.7	-6.2	167.5
Temperature	°C	22.86	19.28	20.00	21.09	18.63	20.05	20.82	21.65	17.18	17.74	17.4	23.07

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 2, General Motors Corporation, Moraine, Ohio.

RZ-2		Below Introduction Zone							
		GM-31							
Constituents	Units	9/1/99	2/23/00	5/31/00	9/21/00	11/15/01	9/24/02	10/1/03	9/15/04
<u>Inorganics & TOC</u>									
Nitrate	mg/l	0	0	0	NA	NA	NA	NA	NA
Nitrite	mg/l	0	0	0	NA	NA	NA	NA	NA
Nitrogen, Ammonia	mg/l	0.41	<0.3	<0.30	NA	NA	NA	NA	NA
Manganese (Total)	mg/l	7.45	0.53	0.899	0.605	0.470	0.97B	1.6J	0.38
Manganese (Dissolved)	mg/l	0.293	0.208	0.189	0.163	0.19	0.27B	0.24J	0.29
Iron (Total)	mg/l	288	17.4	34.9	18.7	16.3	33.4	35.9J	4.6 J
Iron (Dissolved)	mg/l	0.27	1.87	2.37	2.51	3.2	2.8	0.79J	1.4
Iron (Ferrous)	mg/l	0	1.6	1.6	NA	NA	NA	NA	NA
Sulfate	mg/l	118	105	131	105	120	130	140J	98 J
Sulfide	mg/l	<4	<1	1.06	<1	<1	<1.0	7.5	< 1 U
Total Organic Carbon	mg/l	176	4	12	<1	3B	3	2	< 1 U
Chloride	mg/l	240	249	259	221	190B	240	290J	300
<u>Permanent Gases</u>									
Carbon Dioxide	mg/l	32.12	49.58	38.89	NA	NA	NA	NA	NA
Oxygen	mg/l	0.60	0.61	0.66	NA	NA	NA	NA	NA
Nitrogen	mg/l	16.05	19.79	23.03	NA	NA	NA	NA	NA
Methane	mg/l	0.0124	0.03339	0.08616	0.04758	0.034	0.11	0.075	0.059
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA
<u>Light Hydrocarbon Scan</u>									
Ethane	ng/l	2472	4550	9895	2507	1900	1300	740	430
Ethene	ng/l	2295	1283	2439	413	500	2000	260	190
<u>Field Parameters</u>									
pH	S.U.	7.25	7.19	7.03	7.30	6.70	6.80	6.99	7.04
Specific Conductivity	umhos/cm	1514	1786	1538	1580	1275	1635	1321	1790
Dissolved Oxygen	mg/l	1.61	0.39	0.81	1.71	ME	0.31	0.25	0.41
Redox Potential	mV	-328.2	-61.9	-73.7	-188.5	-82.1	-66.2	-69.7	-86
Temperature	°C	28.93	20.75	21.91	21.11	19.45	20.87	18.74	18.3

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 West, General Motors Corporation, Moraine, Ohio.

RZ-3 West		Upgradient Well EAST												Upgradient Well WEST		
Constituents	Units	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	9/21/99	2/23/00	5/25/00
<u>Inorganics & TOC</u>																
Nitrate	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0	0
Nitrite	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	17.6	0	0
Nitrogen, Ammonia	mg/l	<0.30	<0.30	<0.30	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.30	<0.30	<0.30
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	0.391	0.038	0.029
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	0.383	<0.010	<0.010
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	0.27	0.40	0.37
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	<0.10	<0.10
Iron (Ferrous)	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	0	0	0
Sulfate	mg/l	75	130	117	96	101	130	120	170	95	63J	110	54 J	73	129	155
Sulfide	mg/l	<1	<1	<1	<1	<1.0	1.2	1.6	<1.0	<1.0	<1	2.1	< 1 U	<1	<1	<1
Total Organic Carbon	mg/l	3	10	4	<1	<1.0	3B	2	4	2	<1	1	0.5 B	2	7	3
Chloride	mg/l	283	254	194	196	198	190B	180	270	310	250	310J	290	260	166	164
<u>Permanent Gases</u>																
Carbon Dioxide	mg/l	34.69	58.08	52.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	50.41	67.57	61.09
Oxygen	mg/l	1.88	0.97	1.26	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.30	1.50	2.20
Nitrogen	mg/l	17.88	17.50	19.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	13.24	13.74	17.1
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	0.001409	0.000217	0.002179
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	<0.40	<0.40	<0.40
<u>Light Hydrocarbon Scan</u>																
Ethane	ng/l	32	39	118	126	2600	2000	1800	440	50	13	14	20	37	33	57
Ethene	ng/l	18	107	57	73	190	150	56	170	37	34	21	20	100	17	47
<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	6.89	6.97	6.97
Specific Conductivity	umhos/cm	1777	1955	1503	1133	1189	1363	1480	1439	1467	1506	1548	1700	1759	1640	1547
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	0.41	1.73	1.50
Redox Potential	mV	14.9	122.9	144.5	143.7	468.4	177.1	86	306.5	215.6	201	147.6	195	106.2	139.1	198.3
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	21.44	19.90	19.75

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 West, General Motors Corporation, Moraine, Ohio.

RZ-3 West		Upgradient Well GM-19S											
Constituents	Units	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
<u>Inorganics & TOC</u>													
Nitrate	mg/l	11	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	mg/l	0	0	0	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
Manganese (Total)	mg/l	0.726	1.09	0.247	0.238	0.191	0.20	0.21B	0.25B	0.39B	0.3J	0.23J	0.25
Manganese (Dissolved)	mg/l	0.185	0.205	0.200	0.187	0.155	0.19	0.18B	0.18B	0.19B	0.2J	0.21J	0.16
Iron (Total)	mg/l	16.9	39.4	1.19	0.40	0.90	0.091	0.18	0.26	0.44	0.17	0.96	3
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
Iron (Ferrous)	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	127	131	131	118	113	100	90	110	110	150J	150	110 J
Sulfide	mg/l	<1	<1	<1	<1	<1	<1	0.96J	<1.0	<1.0	<1	1.3	1.6
Total Organic Carbon	mg/l	2	7	5	<1	<1	2B	1	1	3	2	2	1
Chloride	mg/l	247	197	168	165	158	130B	150	140	210	270	300J	310
<u>Permanent Gases</u>													
Carbon Dioxide	mg/l	41.85	57.12	50.12	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oxygen	mg/l	4.43	1.01	1.24	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen	mg/l	20.87	17.07	17.13	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methane	mg/l	0.009863	0.002712	0.003325	0.003706	0.039	0.005	0.0088	0.002	0.46	0.0021	0.0022	0.0014
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	NA
<u>Light Hydrocarbon Scan</u>													
Ethane	ng/l	71	104	139	184	210	300	350	410	730	170	80	48
Ethene	ng/l	55	45	43	36	61	34	27	130	770	78	45	51
<u>Field Parameters</u>													
pH	S.U.	7.05	7.05	7.00	7.19	7.14	7.28	7.31	7.09	7.02	6.71	6.93	7.13
Specific Conductivity	umhos/cm	1500	1784	1548	1235	1097	1190	1350	1052	1474	1706	1726	1970
Dissolved Oxygen	mg/l	0.92	0.30	1.94	1.36	0.96	1.75	0.06	0.90	0.47	2.01	1.87	0
Redox Potential	mV	31.3	149.6	200.1	187.7	320.8	195.6	13	446.3	259.6	178.3	135	160
Temperature	°C	20.85	18.69	20.80	20.09	20.14	19.24	19.10	20.39	20.36	20.22	19.57	18.6

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 West, General Motors Corporation, Moraine, Ohio.

RZ-3 West		Downgradient Well GM-32											
Constituents	Units	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
<u>Inorganics & TOC</u>													
Nitrate	mg/l	0	0	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
Nitrogen, Ammonia	mg/l	2.29	2.00	19.3	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
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
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
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
Iron (Ferrous)	mg/l	1.8	2.2	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
Sulfide	mg/l	<1	<10	<1	<1	1.60	<1	<1.0	0.50J	1.3	0.86B	7.3	16
Total Organic Carbon	mg/l	68	1200	2020	2720	1120	320B	250	240	160	150	170	240 J
Chloride	mg/l	317	638	740	740	798	700B	630	470	510	390	510J	530
<u>Permanent Gases</u>													
Carbon Dioxide	mg/l	39.79	8.94	24.32	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
Nitrogen	mg/l	14.93	15.23	2.40	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
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	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
Ethene	ng/l	86509	163855	472312	510593	150000	130000	90000	93000	49000	9900	3400	2000
<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
Specific Conductivity	umhos/cm	2750	9030	9195	9225	7483	6874	6200	5432	4289	3908	3192	4210
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
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
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

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 West, General Motors Corporation, Moraine, Ohio.

RZ-3 West		Downgradient Well					Downgradient Well				
		GM-8					GM-6				
Constituents	Units	3/6/98	9/20/99	9/20/02	12/9/03	9/14/04	3/6/98	9/20/99	9/20/02	12/9/03	9/14/04
<u>Inorganics & TOC</u>											
Nitrate	mg/l	<4.4	0	NA	NA	NA	<4.4	0	NA	NA	NA
Nitrite	mg/l	<0.033	0	NA	NA	NA	<0.033	0	NA	NA	NA
Nitrogen, Ammonia	mg/l	1.69	1.95	NA	NA	NA	<0.300	<0.30	NA	NA	NA
Manganese (Total)	mg/l	0.204	0.125	0.085B	0.21	0.13	1.07	1.11	0.27B	0.57	0.43
Manganese (Dissolved)	mg/l	0.229	0.125	0.084B	0.21	0.14	1	0.958	0.24B	0.53	0.47
Iron (Total)	mg/l	1.01	0.27	0.55B	1.9	1.8	1.32	0.27	0.40B	5.7	3.2
Iron (Dissolved)	mg/l	1.22	0.26	0.52B	1.9	1.8	<0.1	<0.10	0.30B	1.9	3.1
Iron (Ferrous)	mg/l	<0.2	0	NA	NA	NA	<0.2	NA	NA	NA	NA
Sulfate	mg/l	59	54	59	<5	13 J	93	83	43	27	26 J
Sulfide	mg/l	<1	<1	<1.0	<1.0	2	<1	<1	<1.0	<1.0	3.4
Total Organic Carbon	mg/l	7	8	16	20	19 J	3	4	17	12	16 J
Chloride	mg/l	248	216	180	180J	190	227	247	170	190J	230
<u>Permanent Gases</u>											
Carbon Dioxide	mg/l	15.8	9.91	NA	NA	NA	47.4	48.44	NA	NA	NA
Oxygen	mg/l	1.1	0.92	NA	NA	NA	1.57	2.23	NA	NA	NA
Nitrogen	mg/l	19.7	25.42	NA	NA	NA	20.5	21.77	NA	NA	NA
Methane	mg/l	1.48	2.47	8.5	14	9	0.008337	0.006916	7.8	7.8	7.2
Carbon Monoxide	mg/l	<0.4	<0.40	NA	NA	NA	<0.4	<0.40	NA	NA	NA
<u>Light Hydrocarbon Scan</u>											
Ethane	ng/l	370	1134	13000	12000	18000	47	67	10000	2400	5000
Ethene	ng/l	12233	39617	3700	440	56	91	97	4900	750	2000
<u>Field Parameters</u>											
pH	S.U.	7.7	7.98	8.18	7.2	7.76	7	7.05	7.46	7.76	7.16
Specific Conductivity	umhos/cm	1539	1584	1734	1870	1900	1422	1493	1658	2080	1830
Dissolved Oxygen	mg/l	0.16	0.28	0.37	0.04	0.00	0.88	0.48	0.34	0.03	0
Redox Potential	mV	-145	-49.8	-150.6	-137	-186	57.6	26.5	-27.7	-223	-111
Temperature	°C	17.53	19.09	19.20	18.17	16.6	18.49	21.07	19.07	17.71	16.8

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 3 East, General Motors Corporation, Moraine, Ohio.

RZ-3 East		Upgradient Well GM-22											
Constituents	Units	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
<u>Inorganics & TOC</u>													
Nitrate	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	mg/l	0	0	0	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
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
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
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
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
Iron (Ferrous)	mg/l	0.6	0	0	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
Sulfide	mg/l	<1	<1	<1	<1	<1.0	<1	<1.0	<1.0	0.40J	0.54B	1.6	< 1 U
Total Organic Carbon	mg/l	6	4	4	<1	<1.0	16B	6B	3	2	<1	1	1 J
Chloride	mg/l	246	270	279	248	326	220B	280	290	370	350	350J	370
<u>Permanent Gases</u>													
Carbon Dioxide	mg/l	40.15	43.99	40.20	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
Nitrogen	mg/l	23.38	19.43	21.3	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
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	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
Ethene	ng/l	67	32	64	111	39	210	12	54	62	27	11	12
<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
Specific Conductivity	umhos/cm	1373	1975	1671	1684	1610	1753	2020	1415	1720	1730	1597	1760
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
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
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

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 3 East, General Motors Corporation, Moraine, Ohio.

RZ-3 East		Downgradient Well											
		GM-21											
Constituents	Units	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
<u>Inorganics & TOC</u>													
Nitrate	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	mg/l	0	0	0	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
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
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
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
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
Iron (Ferrous)	mg/l	0.4	0	0	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
Sulfide	mg/l	<1	<1	<1	<1	<1	<1	1.9	0.50J	0.40J	0.54B	1.5	2.9
Total Organic Carbon	mg/l	1	3	2	<1	<1	2B	1	0.9J	2	2	2	2 J
Chloride	mg/l	136	145	126	129	165	140	150	170	180	160	190J	190
<u>Permanent Gases</u>													
Carbon Dioxide	mg/l	37.04	37.40	18.70	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
Nitrogen	mg/l	23.40	21.67	23.64	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
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	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
Ethene	ng/l	169	38	70	69	46	46	100	120	64	570	520	250
<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
Specific Conductivity	umhos/cm	1188	1299	1048	1096	1067	1190	1360	1045	1245	968	1181	1180
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
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
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

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 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2004, General Motors Corporation, Moraine, Ohio.

		Upgradient of the Site		On-Site			
		HR-9 9/13/04 Upper Aquifer	HR-11 9/15/04 Upper Aquifer	HR-8 9/13/04 Upper Aquifer	HR-4 9/16/04 Upper Aquifer	W-2-N 9/16/04 Upper Aquifer	W-3-N 9/16/04 Upper Aquifer
	Units						
<u>Volatile Organic Compounds</u>							
Benzene	ug/l	< 2 U	< 1 U	< 1 U	< 1 U	< 1 U	< 4 U
1,1-Dichloroethane	ug/l	45	7.3	8.6	0.77 J	0.36 J	< 4 U
1,1-Dichloroethene	ug/l	1 J	< 1 U	0.32 J	< 1 U	< 1 U	< 4 U
cis-1,2-Dichloroethene	ug/l	17	0.45 J	1.5	< 0.5 U	1.8	120
trans-1,2-Dichloroethene	ug/l	2.5	< 0.5 U	0.45 J	< 0.5 U	0.2 J	1.6 J
Ethylbenzene	ug/l	< 2 U	< 1 U	< 1 U	< 1 U	< 1 U	< 4 U
Tetrachloroethene	ug/l	< 2 U	2.2	< 1 U	1.3	0.31 J	0.94 J
Toluene	ug/l	< 2 U	< 1 U	< 1 U	< 1 U	< 1 U	< 4 U
1,1,1-Trichloroethane	ug/l	15	< 1 U	6.4	< 1 U	0.3 J	< 4 U
Trichloroethene	ug/l	13	< 1 U	1	0.5 J	1.4	< 4 U
Vinyl chloride	ug/l	0.44 J	< 1 U	< 1 U	< 1 U	< 1 U	6.1
Xylene (total)	ug/l	< 2 U	< 1 U	< 1 U	< 1 U	< 1 U	< 4 U
Total VOCs	ug/l	93.94	9.95	18.27	2.57	4.37	128.64

ug/l - Micrograms per liter.

All QA/QC results for 2004 data are shown in Appendix C.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2004, General Motors Corporation, Moraine, Ohio.

		On-Site					
		W-4-N 9/16/04 Upper Aquifer	HR-2 9/16/04 Upper Aquifer	HR-5 9/13/04 Upper Aquifer	HR-3 9/16/04 Upper Aquifer	HR-1 9/13/04 Upper Aquifer	GM-30 9/14/04 Upper Aquifer
	Units						
<u>Volatile Organic Compounds</u>							
Benzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 UJ	< 40 U
1,1-Dichloroethane	ug/l	1.7	5.6	0.43 J	23	2.5	33 J
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 40 U
cis-1,2-Dichloroethene	ug/l	5.8	7.8	4.8	18	24	< 20 U
trans-1,2-Dichloroethene	ug/l	0.38 J	1.1	0.44 J	1.8	2.3	< 20 U
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	530
Tetrachloroethene	ug/l	1.7	0.37 J	< 1 U	0.32 J	23	< 40 U
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 40 U
1,1,1-Trichloroethane	ug/l	0.4 J	< 1 U	< 1 U	0.27 J	0.56 J	< 40 U
Trichloroethene	ug/l	12	0.53 J	11	8.1	30	< 40 U
Vinyl chloride	ug/l	0.49 J	0.23 J	< 1 U	< 1 U	0.55 J	< 40 U
Xylene (total)	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	3000
Total VOCs	ug/l	22.47	15.63	16.67	51.49	82.91	3,563

ug/l - Micrograms per liter.

All QA/QC results for 2004 data are shown in Appendix C.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2004, General Motors Corporation, Moraine, Ohio.

		On-Site					
		GM-23 9/14/04	GM-27 9/15/04	GM-29 9/15/04	GM-28 9/15/04	ME-6 9/15/04	GM-31 9/15/04
	Units	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer
<u>Volatile Organic Compounds</u>							
Benzene	ug/l	< 500 U	< 3.3 U	< 50 U	< 1 U	< 1 U	< 5 U
1,1-Dichloroethane	ug/l	< 500 U	2 J	< 50 U	3.3	6.3	4 J
1,1-Dichloroethene	ug/l	< 500 U	< 3.3 U	< 50 U	< 1 U	0.26 J	< 5 U
cis-1,2-Dichloroethene	ug/l	4600	13	1200	0.41 J	14	120
trans-1,2-Dichloroethene	ug/l	< 250 U	< 1.7 U	21 J	1.2	0.56	2.7
Ethylbenzene	ug/l	< 500 U	< 3.3 U	< 50 U	< 1 U	< 1 U	< 5 U
Tetrachloroethene	ug/l	6700	1.8 J	20 J	0.88 J	5.3	2.5 J
Toluene	ug/l	< 500 U	< 3.3 U	< 50 U	< 1 U	< 1 U	< 5 U
1,1,1-Trichloroethane	ug/l	< 500 U	< 3.3 U	21 J	< 1 U	4.1	1.4 J
Trichloroethene	ug/l	1100	81	440	1.4	9.2	29
Vinyl chloride	ug/l	870	< 3.3 U	230	0.44 J	2.4	2.4 J
Xylene (total)	ug/l	< 500 U	< 3.3 U	< 50 U	< 1 U	< 1 U	< 5 U
Total VOCs	ug/l	13,270	97.8	1,932	7.63	42.12	162

ug/l - Micrograms per liter.

All QA/QC results for 2004 data are shown in Appendix C.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2004, General Motors Corporation, Moraine, Ohio.

		On-Site					
		ME-3 9/15/04 Upper Aquifer	GM-22 9/14/04 Upper Aquifer	GM-19S 9/13/04 Upper Aquifer	EAST 09/13/04 Upper Aquifer	GM-33 09/13/04 Upper Aquifer	GM-35 09/13/04 Upper Aquifer
Units							
<u>Volatile Organic Compounds</u>							
Benzene	ug/l	< 1 U	< 1 U	< 4 U	< 1 U	< 2 U	< 11 U
1,1-Dichloroethane	ug/l	18	2.1	8.1	0.72 J	5.4	36
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	1.9 J	0.34 J	1.1 J	4.1 J
cis-1,2-Dichloroethene	ug/l	2.2	0.9	61	1.6	9.5	270
trans-1,2-Dichloroethene	ug/l	< 0.5 U	< 0.5 U	2.4	< 0.5 U	0.45 J	9.1
Ethylbenzene	ug/l	< 1 U	< 1 U	< 4 U	< 1 U	< 2 U	< 11 U
Tetrachloroethene	ug/l	0.21 J	2.9	71	40	37	21
Toluene	ug/l	< 1 U	< 1 U	< 4 U	< 1 U	< 2 U	< 11 U
1,1,1-Trichloroethane	ug/l	0.53 J	1.7	14	5.7	17	17
Trichloroethene	ug/l	1.5	10	120	23	55	230
Vinyl chloride	ug/l	1.1	< 1 U	< 4 U	< 1 U	< 2 U	50
Xylene (total)	ug/l	< 1 U	< 1 U	< 4 U	< 1 U	< 2 U	< 11 U
Total VOCs	ug/l	23.54	17.6	278.4	71.36	125.45	637.2

ug/l - Micrograms per liter.

All QA/QC results for 2004 data are shown in Appendix C.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2004, General Motors Corporation, Moraine, Ohio.

		On-Site					
		GM-32 9/14/04 Upper Aquifer	GM-21 9/14/04 Upper Aquifer	HR-17 9/17/04 Upper Aquifer	W-2-S 9/17/04 Upper Aquifer	W-3-S 9/17/04 Upper Aquifer	W-4-S 9/17/04 Upper Aquifer
	Units						
<u>Volatile Organic Compounds</u>							
Benzene	ug/l	< 10 U	< 9.1 U	< 5 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	ug/l	3 J	4.2 J	2 J	1.3	0.21 J	1.2
1,1-Dichloroethene	ug/l	< 10 U	3.1 J	< 5 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	< 5 U	56	7.1	1.1	< 0.5 U	4.4
trans-1,2-Dichloroethene	ug/l	< 5 U	7.9	1.6 J	< 0.5 U	< 0.5 U	0.97
Ethylbenzene	ug/l	< 10 U	< 9.1 U	< 5 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	< 10 U	< 9.1 U	82	0.55 J	1.2	18
Toluene	ug/l	< 10 U	< 9.1 U	< 5 U	< 1 U	< 1 U	< 1 U
1,1,1-Trichloroethane	ug/l	< 10 U	26	< 5 U	1.5	2.4	2.3
Trichloroethene	ug/l	< 10 U	180	18	6	2.9	13
Vinyl chloride	ug/l	< 10 U	< 9.1 U	< 5 U	< 1 U	< 1 U	< 1 U
Xylene (total)	ug/l	< 10 U	< 9.1 U	< 5 U	< 1 U	< 1 U	< 1 U
Total VOCs	ug/l	3	277.2	110.7	10.45	6.71	39.87

ug/l - Micrograms per liter.

All QA/QC results for 2004 data are shown in Appendix C.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2004, General Motors Corporation, Moraine, Ohio.

		Downgradient of the Site					
		GM-8 9/14/04 Upper Aquifer	GM-6 9/14/04 Upper Aquifer	TW-2 9/14/04 Upper Aquifer	4S 9/14/04 Upper Aquifer	GM-2 9/14/04 Upper Aquifer	GM-16 9/16/04 Upper Aquifer
	Units						
<u>Volatile Organic Compounds</u>							
Benzene	ug/l	4.2	1.7	2.9	4.5 J	< 1 U	< 3.3 U
1,1-Dichloroethane	ug/l	15	18	22	7.5	1.6	4.3
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 5 U	< 1 U	< 3.3 U
cis-1,2-Dichloroethene	ug/l	< 0.5 U	10	5.5	< 2.5 U	5.6	7.4
trans-1,2-Dichloroethene	ug/l	1.1	1.9	2	< 2.5 U	0.23 J	1 J
Ethylbenzene	ug/l	19	< 1 U	< 1 U	4.7 J	< 1 U	< 3.3 U
Tetrachloroethene	ug/l	< 1 U	2.6	< 1 U	< 5 U	4	130
Toluene	ug/l	< 1 U	< 1 U	< 1 U	1.1 J	< 1 U	< 3.3 U
1,1,1-Trichloroethane	ug/l	< 1 U	< 1 U	< 1 U	< 5 U	< 1 U	3.1 J
Trichloroethene	ug/l	< 1 U	5.7	1.5	< 5 U	6.2	90
Vinyl chloride	ug/l	0.48 J	3	2.5	< 5 U	< 1 U	< 3.3 U
Xylene (total)	ug/l	1.1	< 1 U	< 1 U	2.4 J	< 1 U	< 3.3 U
Total VOCs	ug/l	40.88	42.9	36.4	20.2	17.63	235.8

ug/l - Micrograms per liter.

All QA/QC results for 2004 data are shown in Appendix C.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2004, General Motors Corporation, Moraine, Ohio.

		Downgradient of the Site				
		GM-17 9/15/04 Upper Aquifer	GM-18 9/15/04 Upper Aquifer	WSU-24 9/16/04 Upper Aquifer	GM-10 9/14/04 Upper Aquifer	GM-26 9/16/04 Upper Aquifer
	Units					
<u>Volatile Organic Compounds</u>						
Benzene	ug/l	< 1 U	< 2 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	ug/l	4	2.2	< 1 U	< 1 U	< 1 U
1,1-Dichloroethene	ug/l	< 1 U	0.46 J	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	11	5.9	< 0.5 U	0.38 J	< 0.5 U
trans-1,2-Dichloroethene	ug/l	0.64	< 1 U	< 0.5 U	< 0.5 U	< 0.5 U
Ethylbenzene	ug/l	< 1 U	< 2 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	3.6	20	1.3	1.5	1.3
Toluene	ug/l	< 1 U	< 2 U	< 1 U	< 1 U	< 1 U
1,1,1-Trichloroethane	ug/l	1.1	5.2	0.58 J	1.2	< 1 U
Trichloroethene	ug/l	22	53	8	15	< 1 U
Vinyl chloride	ug/l	0.49 J	< 2 U	< 1 U	< 1 U	< 1 U
Xylene (total)	ug/l	< 1 U	< 2 U	< 1 U	< 1 U	< 1 U
Total VOCs	ug/l	42.83	86.76	9.88	18.08	1.3

ug/l - Micrograms per liter.

All QA/QC results for 2004 data are shown in Appendix C.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2004, General Motors Corporation, Moraine, Ohio.

	Units	Upgradient of the Site		On-Site			
		HR-10	HR-12	HR-15	HR-13	GM-39	GM-40
		9/20/04	9/21/04	9/21/04	9/21/04	9/20/04	9/20/04
		Lower Aquifer	Lower Aquifer	Lower Aquifer	Lower Aquifer	Lower Aquifer	Lower Aquifer
<u>Volatile Organic Compounds</u>							
Benzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	ug/l	< 1 U	1.8	< 1 U	30	< 1 U	< 1 U
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	0.27 J	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	< 0.5 U	1.2	2.5	12	< 0.5 U	< 0.5 U
trans-1,2-Dichloroethene	ug/l	< 0.5 U	< 0.5 U	< 0.5 U	1.5	< 0.5 U	< 0.5 U
Ethylbenzene	ug/l	< 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
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,1-Trichloroethane	ug/l	< 1 U	< 1 U	< 1 U	2.6	< 1 U	< 1 U
Trichloroethene	ug/l	< 1 U	< 1 U	0.38 J	21	< 1 U	< 1 U
Vinyl chloride	ug/l	< 1 U	1.1	19	0.43 J	1.8	3.2
Xylene (total)	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Total VOCs	ug/l	ND	4.1	21.88	67.8	1.8	3.2

ug/l - Micrograms per liter.

All QA/QC results for 2004 data are shown in Appendix C.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2004,
General Motors Corporation, Moraine, Ohio.

		On-Site			Downgradient of the Site		
		GM-41 9/21/04 Lower Aquifer	GM-42 9/20/04 Lower Aquifer	GM-19D 9/20/04 Lower Aquifer	GM-3 9/21/04 Lower Aquifer	GM-1 9/21/04 Lower Aquifer	GM-15 9/20/04 Lower Aquifer
	Units						
<u>Volatile Organic Compounds</u>							
Benzene	ug/l	< 6.2 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	ug/l	< 6.2 U	0.7 J	< 1 U	1.8	< 1 U	1.8
1,1-Dichloroethene	ug/l	< 6.2 U	0.25 J	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	24	16	2	4.9	< 0.5 U	1.4
trans-1,2-Dichloroethene	ug/l	< 3.1 U	0.44 J	< 0.5 U	0.75	< 0.5 U	< 0.5 U
Ethylbenzene	ug/l	< 6.2 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	< 6.2 U	< 1 U	< 1 U	2	2.1	< 1 U
Toluene	ug/l	< 6.2 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,1-Trichloroethane	ug/l	< 6.2 U	< 1 U	0.31 J	1	1.2	< 1 U
Trichloroethene	ug/l	180	0.43 J	3.5	13	35	5.8
Vinyl chloride	ug/l	< 6.2 U	0.92 J	18	< 1 U	< 1 U	< 1 U
Xylene (total)	ug/l	< 6.2 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Total VOCs	ug/l	204	18.74	23.81	23.45	38.3	9

ug/l - Micrograms per liter.

All QA/QC results for 2004 data are shown
in Appendix C.

< - Constituent not detected above
laboratory reporting limit shown.

J - Value is estimated.

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Table 17. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2004, General Motors Corporation, Moraine, Ohio.

		Downgradient of the Site				
		GM-11 9/21/04 Lower Aquifer	GM-20D 9/21/04 Lower Aquifer	DN-13 9/16/04 Lower Aquifer	GM-9 9/21/04 Lower Aquifer	MT-69 9/27/04 Lower Aquifer
	Units					
<u>Volatile Organic Compounds</u>						
Benzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	ug/l	< 1 U	< 1 U	2.2	0.6 J	< 1 U
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	< 0.5 U	< 0.5 U	6.7	0.97	< 0.5 U
trans-1,2-Dichloroethene	ug/l	< 0.5 U	< 0.5 U	0.49 J	< 0.5 U	< 0.5 U
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	2.1	2.9	0.44 J	< 1 U	< 1 U
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,1-Trichloroethane	ug/l	0.89 J	0.96 J	0.84 J	1.1	< 1 U
Trichloroethene	ug/l	33	11	6.8	16	< 1 U
Vinyl chloride	ug/l	< 1 U	< 1 U	2.1	< 1 U	< 1 U
Xylene (total)	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Total VOCs	ug/l	35.99	14.86	19.57	18.67	ND

ug/l - Micrograms per liter.

All QA/QC results for 2004 data are shown in Appendix C.

< - Constituent not detected above laboratory reporting limit shown.

J - Value is estimated.

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Table 18. Summary of Arsenic and Barium Analytical Results from Upper Aquifer Monitoring Wells in September 2004,
General Motors Corporation, Moraine, Ohio.

		GM-28 9/15/04	ME-3 9/15/04	GM-32 9/14/04	GM-21 9/14/04	GM-6 9/14/04	TW-2 9/14/04	4S 9/14/04	GM-2 9/14/04
	Units	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer
<u>Metals</u>									
Arsenic	mg/l	0.089	0.013	0.12	< 0.01 U	0.016	0.021	0.023	< 0.01 U
Arsenic, dissolved	mg/l	0.086	0.0089 B	0.13	< 0.01 U	0.014	0.016	0.02	< 0.01 U
Barium	mg/l	1	0.11 B	2.7	0.19 B	0.49	0.51	0.3	0.14 B
Barium, dissolved	mg/l	1	0.11 B	2.8	0.19 B	0.53	0.47	0.3	0.13 B

mg/l - Milligrams per liter.

All QA/QC results for 2004 data are shown
in Appendix C.

< - Constituent not detected above laboratory
reporting limit shown.

B - Value is estimated.

J - Method blank contamination.

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Table 19. Carbon Source Solution Introduction Volumes for 2004, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	January Injection Event #45 ⁽¹⁾		February Injection Event #46 ⁽²⁾		March Injection Event #47 ⁽³⁾		April Injection Event #48 ⁽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-1A	500	37	--	--	--	--	450	22.5
	RZ-1B	500	37	--	--	--	--	450	26.5
	RZ-1C	--	--	--	--	--	--	500	17.9
	RZ-1D	500	36	--	--	500	12.5	--	--
	RZ-1E	500	38	--	--	500	16.7	--	--
	RZ-1F	500	37	--	--	500	20.0	--	--
	RZ-1G	500	36	--	--	500	25.0	--	--
	RZ-1H	500	36	--	--	500	12.5	--	--
	RZ-1I	500	36	--	--	500	16.7	--	--
	RZ-1J	500	37	--	--	500	25.0	--	--
	RZ-1K	500	35	--	--	500	16.7	--	--
	RZ-1L	500	36	--	--	500	20.0	--	--
	RZ-1M	500	32	--	--	500	25.0	--	--
	RZ-1N	500	36	--	--	500	62.5	--	--
	RZ-1O	500	35	--	--	500	20.0	--	--
	RZ-1P	500	33	--	--	500	25.0	--	--
	RZ-1Q	500	33	--	--	500	33.3	--	--
	RZ-1R	500	36	--	--	500	20.0	--	--
	RZ-1S	500	32	--	--	--	--	500	18.5
	RZ-1T	500	38	--	--	--	--	500	22.7
	RZ-1U	500	36	--	--	--	--	500	20.0
Reactive Zone 2	ME-2	--	--	--	--	--	--	--	--
	ME-4	--	--	--	--	--	--	--	--

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Table 19. Carbon Source Solution Introduction Volumes for 2004, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	January Injection Event #45 ⁽¹⁾		February Injection Event #46 ⁽²⁾		March Injection Event #47 ⁽³⁾		April Injection Event #48 ⁽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	750	35	750	36	750	30.0	750	15.0
	RZ-3B	750	34	750	39	750	25.0	750	25.0
	RZ-3C	750	31	750	37	750	37.5	750	30.0
	RZ-3D	750	34	750	34	750	37.5	750	34.1
	RZ-3E	700	35	750	35	750	37.5	750	27.8
	RZ-3F	750	35	750	34	750	25.0	750	21.4
	RZ-3G	750	39	750	37	750	25.0	750	25.0
	RZ-3H	750	36	750	35	750	30.0	750	27.8
	RZ-3I	750	37	750	35	750	17.4	750	11.9
	RZ-3J	750	37	750	35	750	37.5	750	25.9
	RZ-3K	750	35	750	33	750	25.0	750	15.0
	RZ-3L	750	38	750	37	750	37.5	750	21.4
	RZ-3M	750	37	750	36	750	25.0	750	25.0
	RZ-3N	750	39	750	37	750	21.4	750	27.8
	RZ-3O	750	36	750	35	750	25.0	750	14.2
	RZ-3P	750	38	750	36	750	37.5	750	21.4
	RZ-3Q	750	36	750	36	750	21.4	750	24.2
	RZ-3R	750	38	750	36	750	30.0	750	27.8
	RZ-3S	750	38	750	37	750	21.4	750	26.8
	RZ-3T	750	38	750	36	750	21.4	750	22.7
	RZ-3U	750	36	750	36	750	21.4	750	20.8
	RZ-3V	750	36	750	36	750	21.4	750	25.9
	RZ-3W	750	36	750	36	750	26.8	750	20.3
	RZ-3X	750	37	750	36	750	22.7	750	25.0
	RZ-3Y	750	34	750	36	750	24.2	750	25.0
	RZ-3Z	750	36	750	35	750	25.0	750	18.8
	RZ-3AA	750	38	750	35	750	24.2	--	--
	RZ-3BB	750	37	750	34	750	30.0	750	21.4

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Table 19. Carbon Source Solution Introduction Volumes for 2004, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	January Injection Event #45 ⁽¹⁾		February Injection Event #46 ⁽²⁾		March Injection Event #47 ⁽³⁾		April Injection Event #48 ⁽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	750	37	750	36	750	37.5	750	34.1
	RZ-3DD	750	37	750	36	750	21.4	750	18.8
	RZ-3FF	--	--	--	--	--	--	--	--
	RZ-3GG	--	--	--	--	--	--	--	--
	RZ-3HH	--	--	--	--	--	--	--	--
	RZ-3II	--	--	--	--	--	--	--	--
	RZ-3JJ	--	--	--	--	--	--	--	--
	RZ-3KK	--	--	--	--	--	--	--	--
	RZ-3MM	--	--	--	--	--	--	--	--
	RZ-3NN	--	--	--	--	--	--	--	--
	RZ-3OO	--	--	--	--	--	--	--	--
	RZ-3PP	--	--	--	--	--	--	--	--
	RZ-3QQ	--	--	--	--	--	--	--	--
Site-Wide Total		32,450		22,500		30,000		24,650	

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Table 19. Carbon Source Solution Introduction Volumes for 2004, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	May Injection Event #49 ⁽⁵⁾		June Injection Event #50 ⁽⁶⁾		July Injection Event #51 ⁽⁷⁾		August Injection Event #52 ⁽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-1A	--	--	--	--	--	--	--	--
	RZ-1B	--	--	--	--	--	--	--	--
	RZ-1C	500	13.2	--	--	750	17.9	--	--
	RZ-1D	500	9.1	--	--	750	18.5	--	--
	RZ-1E	500	50.0	--	--	750	17.9	--	--
	RZ-1F	500	33.3	--	--	750	21.7	--	--
	RZ-1G	500	25.0	--	--	750	31.3	--	--
	RZ-1H	500	41.7	--	--	750	33.3	--	--
	RZ-1I	500	22.7	--	--	750	27.8	--	--
	RZ-1J	500	45.5	--	--	750	25.0	--	--
	RZ-1K	500	22.7	--	--	750	17.9	--	--
	RZ-1L	500	16.7	--	--	--	--	--	--
	RZ-1M	500	20.0	--	--	--	--	500	17.9
	RZ-1N	500	27.8	--	--	--	--	500	20.0
	RZ-1O	500	21.7	--	--	--	--	500	27.8
	RZ-1P	500	17.2	--	--	--	--	500	20.0
	RZ-1Q	300	21.4	--	--	--	--	500	20.0
	RZ-1R	500	20.0	--	--	--	--	500	25.0
	RZ-1S	300	17.6	--	--	--	--	500	20.0
	RZ-1T	500	20.0	--	--	--	--	500	25.0
	RZ-1U	300	17.6	--	--	--	--	500	41.7
Reactive Zone 2	ME-2	--	--	--	--	--	--	--	--
	ME-4	--	--	--	--	--	--	--	--

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Table 19. Carbon Source Solution Introduction Volumes for 2004, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	May Injection Event #49 ⁽⁵⁾		June Injection Event #50 ⁽⁶⁾		July Injection Event #51 ⁽⁷⁾		August Injection Event #52 ⁽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	750	16.7	750	18.8	750	18.8	750	16.7
	RZ-3B	750	22.1	750	25.9	750	25.9	750	32.6
	RZ-3C	750	25.0	750	27.8	750	27.8	750	23.4
	RZ-3D	750	21.4	750	22.1	750	22.1	750	30.0
	RZ-3E	750	11.5	750	22.1	750	22.1	750	28.8
	RZ-3F	750	21.4	750	23.4	750	23.4	750	31.3
	RZ-3G	750	30.0	750	22.7	750	22.7	750	37.7
	RZ-3H	750	30.0	750	20.3	750	20.3	750	30.0
	RZ-3I	750	18.3	750	22.7	750	22.7	750	18.3
	RZ-3J	750	18.3	750	30.0	750	20.3	750	18.8
	RZ-3K	750	13.6	750	17.9	750	34.1	750	37.5
	RZ-3L	750	24.2	750	23.4	750	30.0	750	32.6
	RZ-3M	750	20.8	750	21.4	750	22.7	750	30.0
	RZ-3N	750	23.4	750	17.0	750	34.1	750	31.3
	RZ-3O	750	25.0	750	22.7	750	30.0	750	27.8
	RZ-3P	750	27.8	750	21.4	750	25.0	750	25.0
	RZ-3Q	750	25.0	750	21.4	750	30.0	750	21.4
	RZ-3R	750	9.7	750	25.0	750	35.7	750	25.0
	RZ-3S	750	21.4	750	21.4	750	16.3	750	23.4
	RZ-3T	750	20.8	750	19.7	750	28.8	750	27.8
	RZ-3U	750	22.1	750	21.4	750	24.2	750	27.8
	RZ-3V	750	21.4	750	18.8	750	32.6	750	35.7
	RZ-3W	750	22.1	750	25.0	750	37.5	750	27.8
	RZ-3X	750	23.4	750	25.0	750	39.5	750	34.1
	RZ-3Y	750	22.1	750	50.0	750	21.4	750	31.3
	RZ-3Z	750	22.7	25.5	5.1	750	30.0	750	28.8
	RZ-3AA	750	28.8	750	30.0	750	35.7	750	31.3
	RZ-3BB	750	20.8	750	18.8	750	37.5	750	31.3

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Table 19. Carbon Source Solution Introduction Volumes for 2004, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	May Injection Event #49 ⁽⁵⁾		June Injection Event #50 ⁽⁶⁾		July Injection Event #51 ⁽⁷⁾		August Injection Event #52 ⁽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	750	30.0	750	21.4	750	27.8	750	34.1
	RZ-3DD	750	21.4	750	22.7	750	25.0	750	37.5
	RZ-3FF	--	--	--	--	--	--	--	--
	RZ-3GG	--	--	--	--	750	23.4	750	37.5
	RZ-3HH	--	--	--	--	750	18.8	750	28.8
	RZ-3II	--	--	--	--	750	26.8	750	30.0
	RZ-3JJ	--	--	--	--	750	22.7	750	25.0
	RZ-3KK	--	--	--	--	750	22.7	750	37.5
	RZ-3MM	--	--	--	--	750	26.8	750	25.9
	RZ-3NN	--	--	--	--	750	16.0	750	34.1
	RZ-3OO	--	--	--	--	750	22.1	--	--
	RZ-3PP	--	--	--	--	750	23.4	750	37.5
	RZ-3QQ	--	--	--	--	750	30.0	--	--
Site-Wide Total		31,400		21,776		36,750		33,000	

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Table 19. Carbon Source Solution Introduction Volumes for 2004, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	September Injection Event #53 ⁽⁹⁾		October Injection Event #54 ⁽¹⁰⁾		November Injection Event #55 ⁽¹¹⁾		December Injection Event #56 ⁽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-1A	--	--	--	--	450	23.7	--	--
	RZ-1B	--	--	--	--	450	20.5	--	--
	RZ-1C	500	16.7	--	--	500	13.9	--	--
	RZ-1D	500	29.4	--	--	500	27.3	--	--
	RZ-1E	500	29.4	--	--	500	23.8	--	--
	RZ-1F	500	21.4	--	--	500	27.8	--	--
	RZ-1G	500	26.3	--	--	500	26.3	--	--
	RZ-1H	500	29.4	--	--	500	17.2	--	--
	RZ-1I	500	17.6	--	--	500	18.5	--	--
	RZ-1J	500	20.0	--	--	500	23.8	--	--
	RZ-1K	500	12.5	--	--	500	16.7	--	--
	RZ-1L	500	14.3	--	--	500	25.0	--	--
	RZ-1M	500	21.7	--	--	500	31.3	--	--
	RZ-1N	500	16.7	--	--	500	27.8	--	--
	RZ-1O	500	23.1	--	--	500	27.8	--	--
	RZ-1P	500	16.7	--	--	500	31.3	--	--
	RZ-1Q	500	16.7	--	--	500	29.4	--	--
	RZ-1R	500	27.8	--	--	500	31.3	--	--
	RZ-1S	500	11.6	--	--	500	22.7	--	--
	RZ-1T	500	23.1	--	--	500	33.3	--	--
	RZ-1U	500	26.3	--	--	500	33.3	--	--
Reactive Zone 2	ME-2	--	--	--	--	--	--	--	--
	ME-4	--	--	--	--	--	--	--	--

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Table 19. Carbon Source Solution Introduction Volumes for 2004, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	September Injection Event #53 ⁽⁹⁾		October Injection Event #54 ⁽¹⁰⁾		November Injection Event #55 ⁽¹¹⁾		December Injection Event #56 ⁽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	950	31.7	950	27.1	950	32.8	950	32.3
	RZ-3B	950	29.7	950	29.7	950	41.3	950	31.7
	RZ-3C	950	33.9	950	23.8	950	38.0	950	29.7
	RZ-3D	950	28.8	950	38.0	950	30.6	950	39.6
	RZ-3E	950	31.7	950	20.2	950	24.4	950	31.7
	RZ-3F	950	29.7	950	41.3	950	27.9	950	39.6
	RZ-3G	950	27.1	950	35.2	950	31.7	950	38.0
	RZ-3H	950	25.0	950	41.3	950	79.2	950	19.0
	RZ-3I	950	22.6	950	41.3	950	31.7	950	31.7
	RZ-3J	950	30.6	950	43.2	950	28.0	950	33.9
	RZ-3K	950	27.1	950	38.0	950	31.7	950	27.9
	RZ-3L	950	27.1	950	36.5	950	38.0	950	38.0
	RZ-3M	950	21.1	950	35.2	950	35.2	950	36.5
	RZ-3N	950	23.8	950	47.5	950	47.5	--	--
	RZ-3O	950	30.6	950	41.3	950	33.9	950	30.7
	RZ-3P	950	29.7	950	38.0	950	31.7	950	24.4
	RZ-3Q	950	29.7	950	31.7	950	25.7	950	36.5
	RZ-3R	950	37.8	950	33.9	950	33.9	950	38.0
	RZ-3S	950	25.0	950	29.7	950	47.5	950	27.1
	RZ-3T	950	36.5	950	33.9	950	41.3	950	30.7
	RZ-3U	950	23.8	950	41.3	950	47.5	950	31.7
	RZ-3V	950	33.9	950	45.2	950	33.9	950	36.5
	RZ-3W	950	30.7	950	33.9	950	23.8	950	22.1
	RZ-3X	950	38.0	950	34.6	950	36.5	950	41.3
	RZ-3Y	950	30.6	950	35.2	950	21.1	950	29.7
	RZ-3Z	950	28.8	950	47.5	950	43.2	950	33.9
	RZ-3AA	950	32.8	950	41.3	950	45.2	950	41.3
	RZ-3BB	950	24.4	950	39.6	950	35.2	950	43.2

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Table 19. Carbon Source Solution Introduction Volumes for 2004, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	September Injection Event #53 ⁽⁹⁾		October Injection Event #54 ⁽¹⁰⁾		November Injection Event #55 ⁽¹¹⁾		December Injection Event #56 ⁽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	950	30.6	950	35.2	950	43.2	950	28.8
	RZ-3DD	950	26.4	950	31.7	950	47.5	950	27.9
	RZ-3FF	--	--	--	--	950	50.0	--	--
	RZ-3GG	950	23.2	--	--	--	--	--	--
	RZ-3HH	950	38.0	--	--	950	29.7	950	43.2
	RZ-3II	950	25.7	950	38.0	950	31.7	950	29.0
	RZ-3JJ	950	27.1	950	35.2	950	47.5	950	33.0
	RZ-3KK	950	31.7	950	43.2	950	43.2	950	31.7
	RZ-3MM	950	22.1	950	43.2	950	43.2	950	26.4
	RZ-3NN	950	43.2	950	47.5	950	47.5	950	39.6
	RZ-3OO	950	31.7	950	43.2	950	39.6	950	39.6
	RZ-3PP	950	39.6	950	31.7	950	31.7	950	38.0
	RZ-3QQ	950	50.0	950	28.0	950	38.0	950	32.8
Site-Wide Total		47,500		36,100		48,400		36,100	

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Table 19. Carbon Source Solution Introduction Volumes for 2004, General Motors Corporation, Moraine, Ohio.

Notes:

Carbon source introduced into each well is a 10 to 1 solution (potable water to molasses).

NA - Not accessible.

-- - Not injected.

(1) Injection Event #45 was completed from January 5, 2004 to January 15, 2004.

(2) Injection Event #46 was completed from February 2, 2004 to February 9, 2004.

(3) Injection Event #47 was completed from March 18-19, 2004 to March 22-25, 2004.

(4) Injection Event #48 was completed from April 19, 2004 to April 22, 2004.

(5) Injection Event #49 was completed from May 25, 2004 to May 27, 2004.

(6) Injection Event #50 was completed from June 21, 2004 to June 24, 2004.

(7) Injection Event #51 was completed from July 19-22, 2004 to July 27-29, 2004.

(8) Injection Event #52 was completed from August 12-13, 2004 to August 16-20, 2004.

(9) Injection Event #53 was completed from September 13-17, 2004 to September 20-22, 2004.

(10) Injection Event #54 was completed from October 7, 2004 to October 15, 2004.

(11) Injection Event #55 was completed from November 3, 2004 to November 8, 2004.

(12) Injection Event #56 was completed from December 8, 2004 to December 15, 2004.

Table 20: Corrective Action Monitoring Results for Comparison to Remediation Target Levels (RTLs)
General Motors Corporation - Moraine, Ohio

Aquifer	Remediation Zone	Chemical	Num of Analyses	Num of Detects	Min of 2004 Value ¹ (mg/l)	Mean 2004 Value ¹ (mg/L)	Max of 2004 Value ¹ (mg/l)	Min of 2003 Value ¹ (mg/l)	Mean 2003 Value ¹ (mg/L)	Max of 2003 Value ¹ (mg/l)	Min of 1999 Value ¹ (mg/l)	Mean of 1999 Value ¹ (mg/l)	Max of 1999 Value ¹ (mg/l)	RTL (mg/L)	Ratio: Min 2004 Value to RTL	Ratio: Mean 2004 Value to RTL	Ratio: Max 2004 Value to RTL	Ratio: Min 2003 Value to RTL	Ratio: Mean 2003 Value to RTL	Ratio: Max 2003 Value to RTL	Ratio: Min 1999 Value to RTL	Ratio: Mean 1999 Value to RTL	Ratio: Max 1999 Value to RTL
SHALLOW	AOI 7 SHALLOW	1,1-Dichloroethene	3		3.60E-03	1.77E-02	4.50E-02	3.65E-03	3.06E-02	9.50E-02	1.30E-03	2.37E-02	5.00E-02	2.33E+00	1.5E-03	7.6E-03	1.9E-02	1.6E-03	1.3E-02	4.1E-02	5.6E-04	1.0E-02	2.1E-02
SHALLOW	AOI 7 SHALLOW	cis-1,2-Dichloroethene	3	2	4.20E-03	1.93E+00	4.60E+00	9.00E-03	2.46E+00	6.80E+00	7.50E-03	6.04E+00	9.73E+00	2.33E+01	1.8E-04	8.3E-02	2.0E-01	3.9E-04	1.1E-01	2.9E-01	3.2E-04	2.6E-01	4.2E-01
SHALLOW	AOI 7 SHALLOW	Tetrachloroethene	3	2	3.80E-03	2.24E+00	6.70E+00	7.50E-03	4.01E+00	1.20E+01	9.50E-03	4.52E+00	7.12E+00	1.67E+00	2.3E-03	1.3E+00	4.0E+00	4.5E-03	2.4E+00	7.2E+00	5.7E-03	2.7E+00	4.3E+00
SHALLOW	AOI 7 SHALLOW	Trichloroethene	3	2	5.50E-03	5.15E-01	1.10E+00	1.05E-02	6.32E-01	1.60E+00	5.00E-03	1.03E+00	1.46E+00	1.67E+00	3.3E-03	3.1E-01	6.6E-01	6.3E-03	3.8E-01	9.6E-01	3.0E-03	6.2E-01	8.8E-01
SHALLOW	AOI 7 SHALLOW	Vinyl Chloride	3	2	4.20E-03	3.68E-01	8.70E-01	9.00E-03	4.44E-01	1.70E+00	3.80E-03	1.65E+00	2.60E+00	6.67E-01	6.3E-03	5.5E-01	1.3E+00	1.3E-02	6.7E-01	2.5E+00	5.7E-03	2.5E+00	3.9E+00
SHALLOW	ZONE S1	1,1-Dichloroethene	2		9.00E-05	1.00E-04	1.10E-04	1.10E-04	1.33E-04	1.55E-04	5.00E-04	5.00E-04	5.00E-04	2.10E+00	4.3E-05	4.8E-05	5.2E-05	5.2E-05	6.3E-05	7.4E-05	2.4E-04	2.4E-04	2.4E-04
SHALLOW	ZONE S1	cis-1,2-Dichloroethene	2	2	4.10E-04	4.20E-04	4.30E-04	3.53E-04	5.06E-04	6.60E-04	1.75E-01	1.75E-01	1.75E-01	2.10E+01	2.0E-05	2.0E-05	2.0E-05	1.7E-05	2.4E-05	3.1E-05	8.3E-03	8.3E-03	8.3E-03
SHALLOW	ZONE S1	Tetrachloroethene	2	1	6.00E-05	4.70E-04	8.80E-04	3.95E-04	6.73E-04	9.50E-04	3.16E-01	3.16E-01	3.16E-01	1.50E+00	4.0E-05	3.1E-04	5.9E-04	2.6E-04	4.5E-04	6.3E-04	2.1E-01	2.1E-01	2.1E-01
SHALLOW	ZONE S1	Trichloroethene	2	2	1.40E-03	1.53E-03	1.65E-03	8.55E-04	1.98E-03	3.10E-03	7.68E-01	7.68E-01	7.68E-01	1.50E+00	9.3E-04	1.0E-03	1.1E-03	5.7E-04	1.3E-03	2.1E-03	5.1E-01	5.1E-01	5.1E-01
SHALLOW	ZONE S1	Vinyl Chloride	2	1	1.30E-04	2.85E-04	4.40E-04	1.80E-04	2.55E-04	3.30E-04	3.20E-03	3.20E-03	3.20E-03	6.00E-01	2.2E-04	4.8E-04	7.3E-04	3.0E-04	4.3E-04	5.5E-04	5.3E-03	5.3E-03	5.3E-03
SHALLOW	ZONE S1 TO ZONE S2	1,1-Dichloroethene	3	1	9.00E-05	1.53E-04	2.60E-04	1.10E-04	1.60E-04	2.20E-04	5.00E-04	5.00E-04	5.00E-04	1.63E+00	5.5E-05	9.4E-05	1.6E-04	6.7E-05	9.8E-05	1.3E-04	3.1E-04	3.1E-04	3.1E-04
SHALLOW	ZONE S1 TO ZONE S2	cis-1,2-Dichloroethene	3	3	4.10E-04	4.95E-03	1.40E-02	3.53E-04	6.08E-03	2.00E-02	1.75E-01	2.15E-01	2.55E-01	1.63E+01	2.5E-05	3.0E-04	8.6E-04	2.2E-05	3.7E-04	1.2E-03	1.1E-02	1.3E-02	1.6E-02
SHALLOW	ZONE S1 TO ZONE S2	Tetrachloroethene	3	2	6.00E-05	2.08E-03	5.30E-03	2.10E-04	3.39E-03	1.20E-02	2.13E-01	2.65E-01	3.16E-01	1.17E+00	5.1E-05	1.8E-03	4.5E-03	1.8E-04	2.9E-03	1.0E-02	1.8E-01	2.3E-01	2.7E-01
SHALLOW	ZONE S1 TO ZONE S2	Trichloroethene	3	3	1.40E-03	4.08E-03	9.20E-03	6.90E-04	8.91E-03	3.10E-02	4.74E-01	6.21E-01	7.68E-01	1.17E+00	1.2E-03	3.5E-03	7.9E-03	5.9E-04	7.6E-03	2.7E-02	4.1E-01	5.3E-01	6.6E-01
SHALLOW	ZONE S1 TO ZONE S2	Vinyl Chloride	3	2	1.30E-04	9.90E-04	2.40E-03	1.80E-04	1.30E-03	2.90E-03	5.00E-04	1.85E-03	3.20E-03	4.67E-01	2.8E-04	2.1E-03	5.1E-03	3.9E-04	2.8E-03	6.2E-03	1.1E-03	4.0E-03	6.9E-03
SHALLOW	ZONE S2	1,1-Dichloroethene	3	1	9.00E-05	2.67E-04	4.50E-04	1.10E-04	2.38E-04	5.50E-04	5.00E-04	5.00E-04	5.00E-04	2.33E-01	3.9E-04	1.1E-03	1.9E-03	4.7E-04	1.0E-03	2.4E-03	2.1E-03	2.1E-03	2.1E-03
SHALLOW	ZONE S2	cis-1,2-Dichloroethene	3	3	2.20E-03	4.71E-02	1.25E-01	9.60E-04	3.91E-02	1.70E-01	5.65E-03	8.95E-02	2.55E-01	2.33E+00	9.4E-04	2.0E-02	5.4E-02	4.1E-04	1.7E-02	7.3E-02	2.4E-03	3.8E-02	1.1E-01
SHALLOW	ZONE S2	Tetrachloroethene	3	3	2.10E-04	2.85E-03	5.30E-03	6.00E-05	2.56E-03	1.20E-02	1.30E-03	9.12E-02	2.13E-01	1.67E-01	1.3E-03	1.7E-02	3.2E-02	3.6E-04	1.5E-02	7.2E-02	7.8E-03	5.5E-01	1.3E+00
SHALLOW	ZONE S2	Trichloroethene	3	3	1.50E-03	1.42E-02	3.20E-02	6.90E-04	1.25E-02	3.10E-02	2.72E-02	1.82E-01	4.74E-01	1.67E-01	9.0E-03	8.5E-02	1.9E-01	4.1E-03	7.5E-02	1.9E-01	1.6E-01	1.1E+00	2.8E+00
SHALLOW	ZONE S2	Vinyl Chloride	3	3	1.10E-03	2.20E-03	3.10E-03	1.30E-04	3.04E-03	1.00E-02	5.00E-04	5.00E-04	5.00E-04	6.70E-02	1.6E-02	3.3E-02	4.6E-02	1.9E-03	4.5E-02	1.5E-01	7.5E-03	7.5E-03	7.5E-03
SHALLOW	ZONE S2 TO ZONE S3	1,1-Dichloroethene	8	5	9.00E-05	1.04E-03	4.10E-03	1.10E-04	7.00E-04	4.00E-03	5.00E-04	5.83E-04	1.00E-03	9.30E-02	9.7E-04	1.1E-02	4.4E-02	1.2E-03	7.5E-03	4.3E-02	5.4E-03	6.3E-03	1.1E-02
SHALLOW	ZONE S2 TO ZONE S3	cis-1,2-Dichloroethene	8	8	9.00E-04	6.05E-02	2.70E-01	4.55E-04	5.34E-02	3.00E-01	5.00E-04	5.21E-02	2.55E-01	9.33E-01	9.6E-04	6.5E-02	2.9E-01	4.9E-04	5.7E-02	3.2E-01	5.4E-04	5.6E-02	2.7E-01
SHALLOW	ZONE S2 TO ZONE S3	Tetrachloroethene	8	8	2.10E-04	2.26E-02	7.10E-02	6.00E-05	2.22E-02	6.20E-02	1.30E-03	6.40E-02	2.13E-01	6.70E-02	3.1E-03	3.4E-01	1.1E+00	9.0E-04	3.3E-01	9.3E-01	1.9E-02	9.6E-01	3.2E+00
SHALLOW	ZONE S2 TO ZONE S3	Trichloroethene	8	8	1.50E-03	6.01E-02	2.30E-01	6.90E-04	5.73E-02	2.70E-01	4.00E-03	1.13E-01	4.74E-01	6.70E-02	2.2E-02	9.0E-01	3.4E+00	1.0E-02	8.6E-01	4.0E+00	6.0E-02	1.7E+00	7.1E+00
SHALLOW	ZONE S2 TO ZONE S3	Vinyl Chloride	8	4	1.05E-04	7.18E-03	5.00E-02	1.30E-04	5.90E-03	5.90E-02	5.00E-04	5.00E-04	5.00E-04	2.70E-02	3.9E-03	2.7E-01	1.9E+00	4.8E-03	2.2E-01	2.2E+00	1.9E-02	1.9E-02	1.9E-02
SHALLOW	ZONE S3	1,1-Dichloroethene	2	1	9.00E-04	2.00E-03	3.10E-03	1.55E-04	8.56E-04	2.00E-03	5.00E-04	2.20E-03	3.90E-03	7.00E-02	1.3E-02	2.9E-02	4.4E-02	2.2E-03	1.2E-02	2.9E-02	7.1E-03	3.1E-02	5.6E-02
SHALLOW	ZONE S3	cis-1,2-Dichloroethene	2	1	1.05E-03	2.85E-02	5.60E-02	2.50E-04	5.77E-02	1.30E-01	2.60E-03	3.45E-02	6.64E-02	7.00E-01	1.5E-03	4.1E-02	8.0E-02	3.6E-04	8.2E-02	1.9E-01	3.7E-03	4.9E-02	9.5E-02
SHALLOW	ZONE S3	Tetrachloroethene	2		8.50E-04	9.00E-04	9.50E-04	1.20E-04	5.53E-04	1.40E-03	5.00E-04	8.50E-04	1.20E-03	5.00E-02	1.7E-02	1.8E-02	1.9E-02	2.4E-03	1.1E-02	2.8E-02	1.0E-02	1.7E-02	2.4E-02
SHALLOW	ZONE S3	Trichloroethene	2	1	1.40E-03	9.07E-02	1.80E-01	2.10E-04	6.99E-02	2.00E-01	3.20E-03	1.60E-02	2.87E-02	5.00E-02	2.8E-02	1.8E+00	3.6E+00	4.2E-03	1.4E+00	4.0E+00	6.4E-02	3.2E-01	5.7E-01
SHALLOW	ZONE S3	Vinyl Chloride	2		9.50E-04	1.00E-03	1.05E-03	1.80E-04	6.73E-0														

Table 20: Corrective Action Monitoring Results for Comparison to Remediation Target Levels (RTLs)
General Motors Corporation - Moraine, Ohio

Aquifer	Remediation Zone	Chemical	Num of Analyses	Num of Detects	Min of 2004 Value ¹ (mg/l)	Mean 2004 Value ¹ (mg/L)	Max of 2004 Value ¹ (mg/l)	Min of 2003 Value ¹ (mg/l)	Mean 2003 Value ¹ (mg/L)	Max of 2003 Value ¹ (mg/l)	Min of 1999 Value ¹ (mg/l)	Mean of 1999 Value ¹ (mg/l)	Max of 1999 Value ¹ (mg/l)	RTL (mg/L)	Ratio: Min 2004 Value to RTL	Ratio: Mean 2004 Value to RTL	Ratio: Max 2004 Value to RTL	Ratio: Min 2003 Value to RTL	Ratio: Mean 2003 Value to RTL	Ratio: Max 2003 Value to RTL	Ratio: Min 1999 Value to RTL	Ratio: Mean 1999 Value to RTL	Ratio: Max 1999 Value to RTL
DEEP	AOI 7 DEEP	1,1-Dichloroethene	3		3.60E-03	1.77E-02	4.50E-02	3.65E-03	3.06E-02	9.50E-02	1.30E-03	2.37E-02	5.00E-02	7.78E-01	4.6E-03	2.3E-02	5.8E-02	4.7E-03	3.9E-02	1.2E-01	1.7E-03	3.0E-02	6.4E-02
DEEP	AOI 7 DEEP	cis-1,2-Dichloroethene	3	2	4.20E-03	1.93E+00	4.60E+00	9.00E-03	2.46E+00	6.80E+00	7.50E-03	6.04E+00	9.73E+00	7.78E+00	5.4E-04	2.5E-01	5.9E-01	1.2E-03	3.2E-01	8.7E-01	9.6E-04	7.8E-01	1.3E+00
DEEP	AOI 7 DEEP	Tetrachloroethene	3	2	3.80E-03	2.24E+00	6.70E+00	7.50E-03	4.01E+00	1.20E+01	9.50E-03	4.52E+00	7.12E+00	5.56E-01	6.8E-03	4.0E+00	1.2E+01	1.3E-02	7.2E+00	2.2E+01	1.7E-02	8.1E+00	1.3E+01
DEEP	AOI 7 DEEP	Trichloroethene	3	2	5.50E-03	5.15E-01	1.10E+00	1.05E-02	6.32E-01	1.60E+00	5.00E-03	1.03E+00	1.46E+00	5.56E-01	9.9E-03	9.3E-01	2.0E+00	1.9E-02	1.1E+00	2.9E+00	9.0E-03	1.9E+00	2.6E+00
DEEP	AOI 7 DEEP	Vinyl Chloride	3	2	4.20E-03	3.68E-01	8.70E-01	9.00E-03	4.44E-01	1.70E+00	3.80E-03	1.65E+00	2.60E+00	2.22E-01	1.9E-02	1.7E+00	3.9E+00	4.1E-02	2.0E+00	7.7E+00	1.7E-02	7.4E+00	1.2E+01
DEEP	GM-40/41	1,1-Dichloroethene	3		9.00E-05	5.13E-04	9.00E-04	1.10E-04	6.55E-04	1.20E-03				6.20E-02	1.5E-03	8.3E-03	1.5E-02	1.8E-03	1.1E-02	1.9E-02			
DEEP	GM-40/41	cis-1,2-Dichloroethene	3	2	1.05E-04	1.34E-02	2.40E-02	1.25E-04	5.06E-03	1.00E-02				6.22E-01	1.7E-04	2.1E-02	3.9E-02	2.0E-04	8.1E-03	1.6E-02			
DEEP	GM-40/41	Tetrachloroethene	3		9.50E-05	3.92E-04	6.00E-04	6.00E-05	3.55E-04	6.50E-04				4.40E-02	2.2E-03	8.9E-03	1.4E-02	1.4E-03	8.1E-03	1.5E-02			
DEEP	GM-40/41	Trichloroethene	3	2	1.40E-04	1.43E-01	2.50E-01	1.10E-04	1.60E-01	3.20E-01				4.40E-02	3.2E-03	3.3E+00	5.7E+00	2.5E-03	3.6E+00	7.3E+00			
DEEP	GM-40/41	Vinyl Chloride	3	1	6.50E-04	1.63E-03	3.20E-03	1.45E-03	2.28E-03	3.10E-03				1.80E-02	3.6E-02	9.1E-02	1.8E-01	8.1E-02	1.3E-01	1.7E-01			
DEEP	GM-42	1,1-Dichloroethene	1	1	2.50E-04	2.50E-04	2.50E-04	1.10E-04	1.10E-04	1.10E-04				3.10E-02	8.1E-03	8.1E-03	8.1E-03	3.5E-03	3.5E-03	3.5E-03			
DEEP	GM-42	cis-1,2-Dichloroethene	1	1	1.60E-02	1.60E-02	1.60E-02	1.10E-02	1.10E-02	1.10E-02				3.11E-01	5.1E-02	5.1E-02	5.1E-02	3.5E-02	3.5E-02	3.5E-02			
DEEP	GM-42	Tetrachloroethene	1		9.50E-05	9.50E-05	9.50E-05	2.55E-04	2.55E-04	2.55E-04				2.20E-02	4.3E-03	4.3E-03	4.3E-03	1.2E-02	1.2E-02	1.2E-02			
DEEP	GM-42	Trichloroethene	1	1	4.30E-04	4.30E-04	4.30E-04	3.80E-04	3.80E-04	3.80E-04				2.20E-02	2.0E-02	2.0E-02	2.0E-02	1.7E-02	1.7E-02	1.7E-02			
DEEP	GM-42	Vinyl Chloride	1	1	9.20E-04	9.20E-04	9.20E-04	1.00E-03	1.00E-03	1.00E-03				9.00E-03	1.0E-01	1.0E-01	1.0E-01	1.1E-01	1.1E-01	1.1E-01			
DEEP	GM-19D	1,1-Dichloroethene	1		9.00E-05	9.00E-05	9.00E-05	1.10E-04	1.10E-04	1.10E-04	5.00E-04	5.00E-04	5.00E-04	2.30E-02	3.9E-03	3.9E-03	3.9E-03	4.8E-03	4.8E-03	4.8E-03	2.2E-02	2.2E-02	2.2E-02
DEEP	GM-19D	cis-1,2-Dichloroethene	1	1	2.00E-03	2.00E-03	2.00E-03	1.70E-03	1.70E-03	1.70E-03	1.20E-03	1.20E-03	1.20E-03	2.33E-01	8.6E-03	8.6E-03	8.6E-03	7.3E-03	7.3E-03	7.3E-03	5.2E-03	5.2E-03	5.2E-03
DEEP	GM-19D	Tetrachloroethene	1		9.50E-05	9.50E-05	9.50E-05	6.00E-05	6.00E-05	6.00E-05	5.00E-04	5.00E-04	5.00E-04	1.70E-02	5.6E-03	5.6E-03	5.6E-03	3.5E-03	3.5E-03	3.5E-03	2.9E-02	2.9E-02	2.9E-02
DEEP	GM-19D	Trichloroethene	1	1	3.50E-03	3.50E-03	3.50E-03	2.90E-04	2.90E-04	2.90E-04	1.35E-02	1.35E-02	1.35E-02	1.70E-02	2.1E-01	2.1E-01	2.1E-01	1.7E-02	1.7E-02	1.7E-02	7.9E-01	7.9E-01	7.9E-01
DEEP	GM-19D	Vinyl Chloride	1	1	1.80E-02	1.80E-02	1.80E-02	1.60E-02	1.60E-02	1.60E-02	1.50E-03	1.50E-03	1.50E-03	7.00E-03	2.6E+00	2.6E+00	2.6E+00	2.3E+00	2.3E+00	2.3E+00	2.1E-01	2.1E-01	2.1E-01
DEEP	ZONE D2	1,1-Dichloroethene	2		9.00E-05	9.00E-05	9.00E-05	1.10E-04	1.10E-04	1.10E-04	5.00E-04	5.00E-04	5.00E-04	1.60E-02	5.6E-03	5.6E-03	5.6E-03	6.9E-03	6.9E-03	6.9E-03	3.1E-02	3.1E-02	3.1E-02
DEEP	ZONE D2	cis-1,2-Dichloroethene	2	1	1.05E-04	2.50E-03	4.90E-03	1.25E-04	2.81E-03	5.50E-03	5.00E-04	8.00E-04	1.10E-03	1.56E-01	6.7E-04	1.6E-02	3.1E-02	8.0E-04	1.8E-02	3.5E-02	3.2E-03	5.1E-03	7.1E-03
DEEP	ZONE D2	Tetrachloroethene	2	2	2.00E-03	2.05E-03	2.10E-03	1.70E-03	1.88E-03	2.05E-03	1.20E-03	1.60E-03	2.00E-03	1.10E-02	1.8E-01	1.9E-01	1.9E-01	1.5E-01	1.7E-01	1.9E-01	1.1E-01	1.5E-01	1.8E-01
DEEP	ZONE D2	Trichloroethene	2	2	1.30E-02	2.40E-02	3.50E-02	1.20E-02	2.33E-02	3.45E-02	7.50E-03	1.91E-02	3.06E-02	1.10E-02	1.2E+00	2.2E+00	3.2E+00	1.1E+00	2.1E+00	3.1E+00	6.8E-01	1.7E+00	2.8E+00
DEEP	ZONE D2	Vinyl Chloride	2		1.05E-04	1.05E-04	1.05E-04	1.30E-04	1.30E-04	1.30E-04	5.00E-04	5.00E-04	5.00E-04	4.00E-03	2.6E-02	2.6E-02	2.6E-02	3.3E-02	3.3E-02	3.3E-02	1.3E-01	1.3E-01	1.3E-01
DEEP	POC DEEP	1,1-Dichloroethene	3		9.00E-05	9.00E-05	9.00E-05	1.10E-04	1.10E-04	1.10E-04	5.00E-04	5.00E-04	5.00E-04	7.00E-03	1.3E-02	1.3E-02	1.3E-02	1.6E-02	1.6E-02	1.6E-02	7.1E-02	7.1E-02	7.1E-02
DEEP	POC DEEP	cis-1,2-Dichloroethene	3	1	1.05E-04	5.37E-04	1.40E-03	1.25E-04	6.17E-04	1.60E-03	5.00E-04	1.77E-03	4.30E-03	7.00E-02	1.5E-03	7.7E-03	2.0E-02	1.8E-03	8.8E-03	2.3E-02	7.1E-03	2.5E-02	6.1E-02
DEEP	POC DEEP	Tetrachloroethene	3	2	9.50E-05	1.70E-03	2.90E-03	6.00E-05	1.95E-03	3.60E-03	5.00E-04	8.33E-04	1.50E-03	5.00E-03	1.9E-02	3.4E-01	5.8E-01	1.2E-02	3.9E-01	7.2E-01	1.0E-01	1.7E-01	3.0E-01
DEEP	POC DEEP	Trichloroethene	3	3	5.80E-03	1.66E-02	3.30E-02	5.90E-03	1.70E-02	3.30E-02	5.00E-04	6.37E-03	1.45E-02	5.00E-03	1.2E+00	3.3E+00	6.6E+00	1.2E+00	3.4E+00	6.6E+00	1.0E-01	1.3E+00	2.9E+00
DEEP	POC DEEP	Vinyl Chloride	3		1.05E-04	1.05E-04	1.05E-04	1.30E-04	1.30E-04	1.30E-04	5.00E-04	5.00E-04	5.00E-04	2.00E-03	5.3E-02	5.3E-02	5.3E-02	6.5E-02	6.5E-02	6.5E-02	2.5E-01	2.5E-01	2.5E-01

Notes:

1 - Value is calculated either from detected concentrations or 1/2 the sample quantitation limit for non-detects.

Table 21: In-Place Waste Management Unit Assessment							
Summary of Downgradient Ground Water Concentrations (mg/L) for Current Ground Water Use ¹ Delphi Thermal, Moraine Engine and Moraine Assembly Plants - GMC, Moraine, Ohio							
TCL/TAL Group	Constituent	CASRN	Moraine Assembly	Moraine Engine	West Carrollton	Criteria	Flag
VOC	1,1,1-Trichloroethane	71-55-6	0.	0.	0.	0.2	
VOC	1,1-Dichloroethane	75-34-3	0.	0.	0.	3.65	
VOC	1,1-Dichloroethene	75-35-4	0.	0.	0.	0.007	
VOC	1,2-Dichloroethene (total)	540-59-0	0.	0.	0.	0.07	
VOC	2-Butanone	78-93-3	0.	0.	0.	21.9	
VOC	Acetone	67-64-1	0.	0.	0.	3.65	
VOC	Benzene	71-43-2	0.	0.	0.	0.005	
VOC	Carbon Disulfide	75-15-0	0.	0.	0.	3.65	
VOC	Chlorobenzene	108-90-7	0.	0.	0.	0.1	
VOC	Chloroethane	75-00-3	0.	0.	0.	0.01	
VOC	Chloroform	67-66-3	0.	0.	0.	0.1	
VOC	cis-1,2-Dichloroethene	156-59-2	0.0001	0.0001	0.	0.07	
VOC	Ethyl Benzene	100-41-4	0.	0.	0.	0.7	
VOC	Styrene	100-42-5	0.	0.	0.	0.1	
VOC	Tetrachloroethene	127-18-4	0.	0.	0.0001	0.005	
VOC	Toluene	108-88-3	0.	0.	0.	1.	
VOC	trans-1,2-Dichloroethene	156-60-5	0.	0.	0.	0.1	
VOC	Trichloroethene	79-01-6	0.0001	0.0001	0.	0.005	
VOC	Trichlorofluoromethane	75-69-4	0.	0.	0.	10.95	
VOC	Vinyl Chloride	75-01-4	0.	0.	0.	0.002	
VOC	Xylenes (total)	1330-20-7	0.	0.	0.	10.	
SVOC	1,2-Dichlorobenzene	95-50-1	0.	0.	0.	0.6	
SVOC	2-Methylnaphthalene	91-57-6	0.	0.	0.	0.73	
SVOC	Benzo(a)anthracene	56-55-3	0.	0.	0.	0.01	
SVOC	Benzo(a)pyrene	50-32-8	0.	0.	0.	0.0002	
SVOC	Benzo(b)fluoranthene	205-99-2	0.	0.	0.	0.01	
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.	0.	0.	0.006	
SVOC	Butylbenzylphthalate	85-68-7	0.	0.	0.	7.3	
SVOC	Chrysene	218-01-9	0.	0.	0.	0.0117	
SVOC	Di-n-butylphthalate	84-74-2	0.	0.	0.	3.65	
SVOC	Fluoranthene	206-44-0	0.	0.	0.	1.46	
SVOC	Fluorene	86-73-7	0.	0.	0.	1.46	
SVOC	Naphthalene	91-20-3	0.	0.	0.	0.73	
SVOC	Phenanthrene	85-01-8	0.	0.	0.	1.095	
SVOC	Pyrene	129-00-0	0.	0.	0.	1.095	
P/PCB	Aroclor-1242	53469-21-9	0.	0.	0.	0.0005	
P/PCB	Aroclor-1254	11097-69-1	0.	0.	0.	0.0005	
P/PCB	Aroclor-1260	11096-82-5	0.	0.	0.	0.0005	
INORG	Antimony	7440-36-0	0.	0.	0.	0.006	
INORG	Arsenic	7440-38-2	0.	0.	0.	0.05	
INORG	Barium	7440-39-3	0.	0.	0.0002	2.	
INORG	Beryllium	7440-41-7	0.	0.	0.	0.004	
INORG	Cadmium	7440-43-9	0.	0.	0.	0.005	
INORG	Chromium (total)	7440-47-3	0.	0.	0.	0.1	
INORG	Cobalt	7440-48-4	0.	0.	0.	2.19	
INORG	Copper	7440-50-8	0.	0.	0.	1.3	
INORG	Cyanide (total)	57-12-5	0.	0.	0.	0.2	
INORG	Lead	7439-92-1	0.	0.	0.	0.015	
INORG	Manganese	7439-96-5	0.	0.	0.	5.11	
INORG	Mercury	7439-97-6	0.	0.	0.	0.002	
INORG	Nickel	7440-02-0	0.	0.	0.	0.1	
INORG	Selenium	7782-49-2	0.	0.	0.	0.05	
INORG	Silver	7440-22-4	0.	0.	0.	0.1825	
INORG	Thallium	7440-28-0	0.	0.	0.	0.002	
INORG	Vanadium	7440-62-2	0.	0.	0.	0.2555	
INORG	Zinc	7440-66-6	0.	0.	0.	10.95	
Note:							
1 Supplemental Baseline Risk Assessment (ENVIRON 2001b). Groundwater Exposure Scenario 1 - Baseline wells (West Carrollton municipal well field, Moraine Assembly industrial wells (11A, 12A) and Moraine Engine industrial wells (31, 39).							

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Table 22. Summary of Site-Wide Groundwater Monitoring Plan, General Motors Corporation, Moraine, Ohio.

Monitoring Wells	Reason for Monitoring	Monitoring Frequency	Parameter List
<u>Upper Aquifer Wells</u>			
HR-9	Monitoring groundwater quality upgradient of the site.	Annual	VOCs ⁽¹⁾
HR-11	Monitoring groundwater quality upgradient of the site.	Annual	VOCs ⁽¹⁾
HR-8	Monitoring of groundwater quality upgradient of the North Settling Lagoon and Landfills L2 and L3.	Annual	VOCs ⁽¹⁾
HR-4	Monitoring of groundwater quality upgradient of the North Settling Lagoon and downgradient of Landfill L3.	Annual	VOCs ⁽¹⁾
W-2-N	Monitoring of groundwater quality downgradient of the North Settling Lagoon.	Annual	VOCs ⁽¹⁾
W-3-N	Monitoring of groundwater quality downgradient of the North Settling Lagoon.	Annual	VOCs ⁽¹⁾
W-4-N	Monitoring of groundwater quality downgradient of the North Settling Lagoon and Landfills L2 and L3.	Annual	VOCs ⁽¹⁾
HR-2	Monitoring groundwater quality downgradient of Landfills L2 and L3.	Annual	VOCs ⁽¹⁾
HR-5	Monitoring of groundwater quality downgradient of the North Settling Lagoon.	Annual	VOCs ⁽¹⁾
HR-3	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾
HR-1	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾
GM-30	Monitoring effectiveness of interim measures at AOI 7.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
GM-23	Monitoring effectiveness of interim measures at AOI 7.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾

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Table 22. Summary of Site-Wide Groundwater Monitoring Plan, General Motors Corporation, Moraine, Ohio.

Monitoring Wells	Reason for Monitoring	Monitoring Frequency	Parameter List
<u>Upper Aquifer Wells</u>			
GM-27	Monitoring effectiveness of interim measures at AOI 7 in lower portion of the upper aquifer.	Annual	VOCs ⁽¹⁾
GM-29	Monitoring effectiveness of interim measures upgradient of RZ-1.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
GM-28	Monitoring effectiveness of interim measures downgradient of RZ-1.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
ME-6	Monitoring effectiveness of interim measures at the upgradient boundary of RZ-2.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
GM-31	Monitoring effectiveness of interim measures within RZ-2.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
ME-3	Monitoring effectiveness of interim measures at the downgradient boundary of RZ-2.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
GM-22	Monitoring effectiveness of interim measures upgradient of RZ-3.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
GM-19S	Monitoring effectiveness of interim measures upgradient of RZ-3 and groundwater quality upgradient of Landfill L1.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
EAST	Monitoring effectiveness of interim measures upgradient of RZ-3 and groundwater quality upgradient of Landfill L1.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾

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Table 22. Summary of Site-Wide Groundwater Monitoring Plan, General Motors Corporation, Moraine, Ohio.

Monitoring Wells	Reason for Monitoring	Monitoring Frequency	Parameter List
<u>Upper Aquifer Wells</u>			
GM-33	Monitoring effectiveness of interim measures upgradient of RZ-3 and groundwater quality upgradient of Landfill L1.	Annual	VOCs ⁽¹⁾
GM-35	Monitoring effectiveness of interim measures upgradient of RZ-3 and groundwater quality upgradient of Landfill L1.	Annual	VOCs ⁽¹⁾
GM-32	Monitoring effectiveness of interim measures downgradient of RZ-3 and groundwater quality upgradient of Landfill L1.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
GM-21	Monitoring effectiveness of interim measures downgradient of RZ-3.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
HR-17	Monitoring of groundwater quality upgradient of the South Settling Lagoon.	Annual	VOCs ⁽¹⁾
W-2-S	Monitoring of groundwater quality downgradient of the South Settling Lagoon.	Annual	VOCs ⁽¹⁾
W-3-S	Monitoring of groundwater quality downgradient of the South Settling Lagoon.	Annual	VOCs ⁽¹⁾
W-4-S	Monitoring of groundwater quality downgradient of the South Settling Lagoon.	Annual	VOCs ⁽¹⁾
GM-8	Monitoring groundwater quality downgradient of the site and within Landfill L1.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾
GM-6	Monitoring groundwater quality downgradient of the site and Landfill L1.	Annual	VOCs ⁽¹⁾ Biogeochemical ⁽²⁾

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Table 22. Summary of Site-Wide Groundwater Monitoring Plan, General Motors Corporation, Moraine, Ohio.

Monitoring Wells	Reason for Monitoring	Monitoring Frequency	Parameter List
<u>Upper Aquifer Wells</u>			
TW-2	Monitoring groundwater quality downgradient of the site and Landfill L1.	Annual	VOCs ⁽¹⁾
4S	Monitoring groundwater quality downgradient of the site and Landfill L1.	Annual	VOCs ⁽¹⁾
GM-2	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾
GM-16	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾
GM-17	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾
GM-18	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾
WSU-24	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾
GM-10	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾
GM-26	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾
<u>Lower Aquifer Wells</u>			
HR-10	Monitoring groundwater quality upgradient of the site.	Annual	VOCs ⁽¹⁾
HR-12	Monitoring groundwater quality upgradient of the site.	Annual	VOCs ⁽¹⁾
HR-15	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾
HR-13	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾

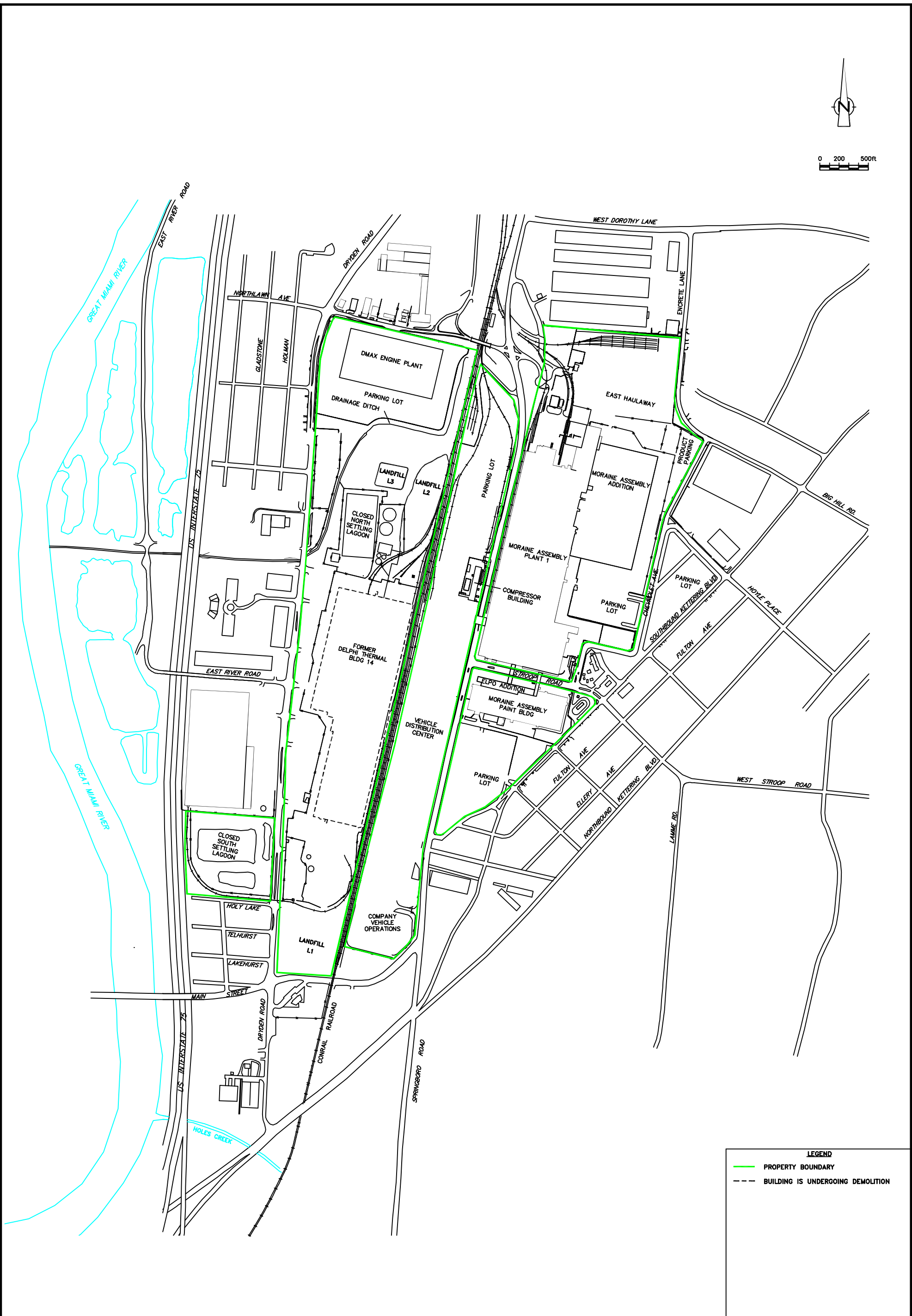
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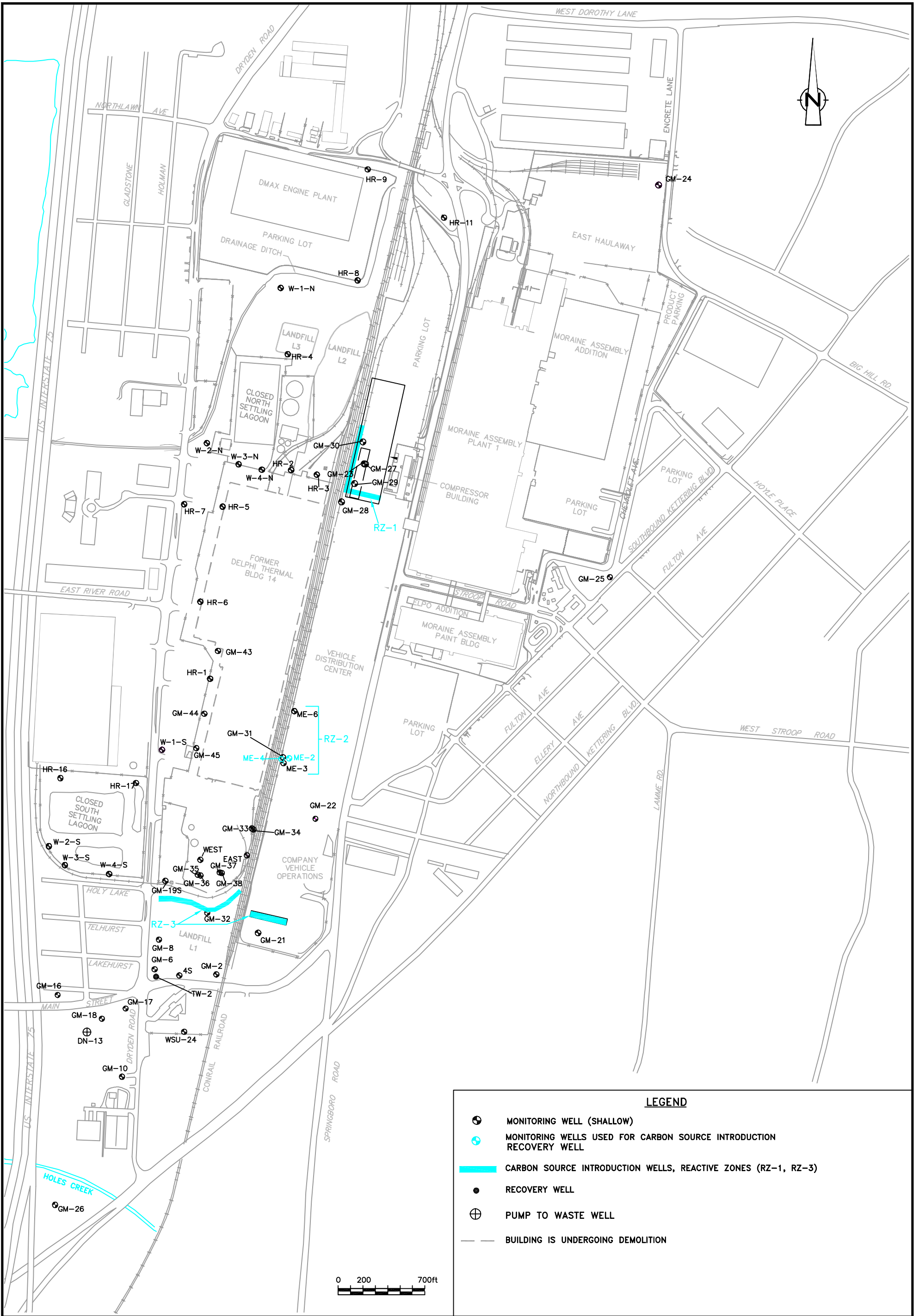
Table 22. Summary of Site-Wide Groundwater Monitoring Plan, General Motors Corporation, Moraine, Ohio.

Monitoring Wells	Reason for Monitoring	Monitoring Frequency	Parameter List
<u>Lower Aquifer Wells</u>			
GM-39	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾
GM-40	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾
GM-41	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾
GM-42	Monitoring groundwater quality in the central portion of the site.	Annual	VOCs ⁽¹⁾
GM-19D	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾
GM-3	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾
GM-1	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾
GM-15	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾
GM-11	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾
GM-20D	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾
DN-13	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾
GM-9	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾
MT-69	Monitoring groundwater quality downgradient of the site.	Annual	VOCs ⁽¹⁾

VOCs - Volatile organic compounds.

- (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 field and laboratory parameters presented on Table 1.





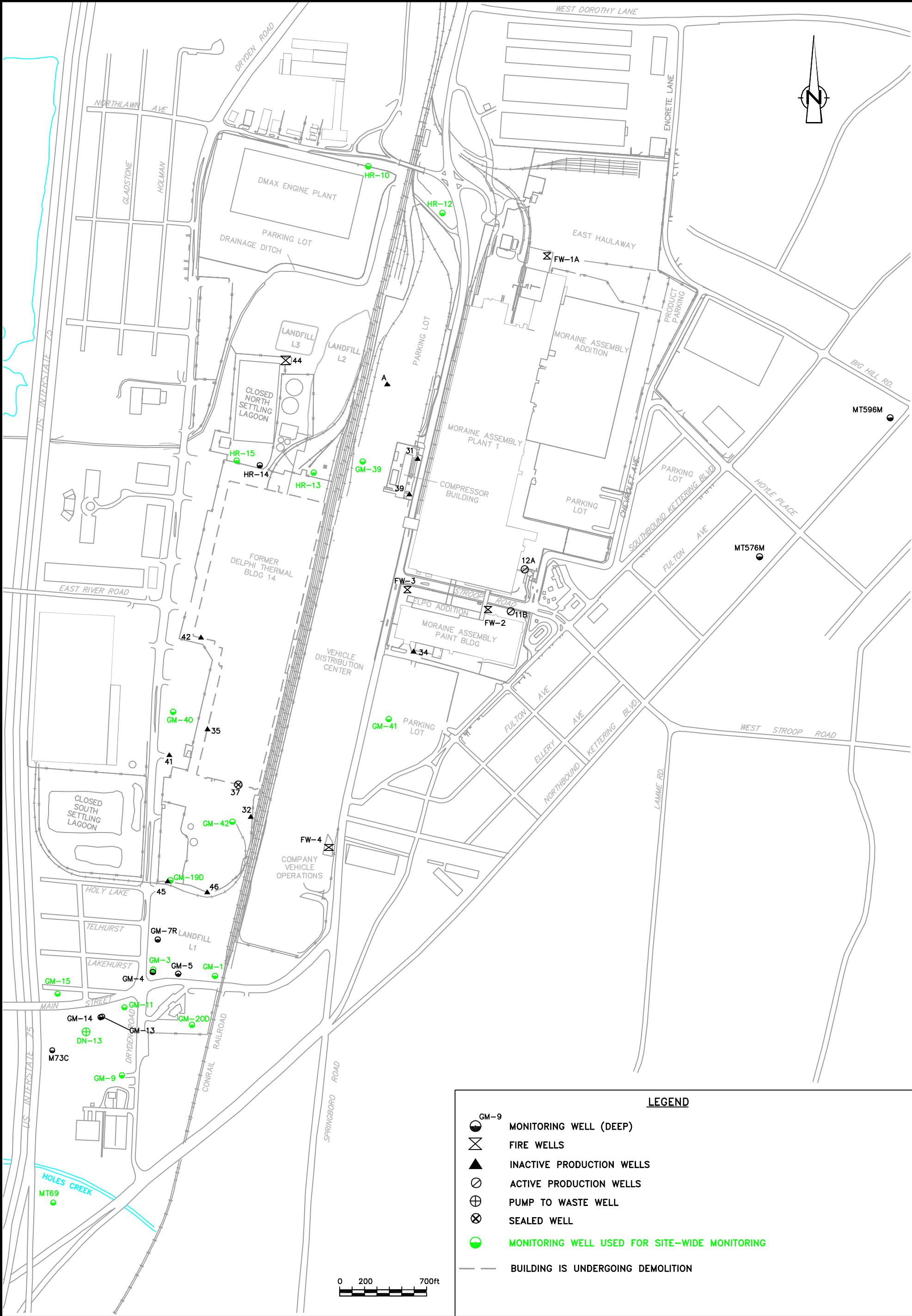
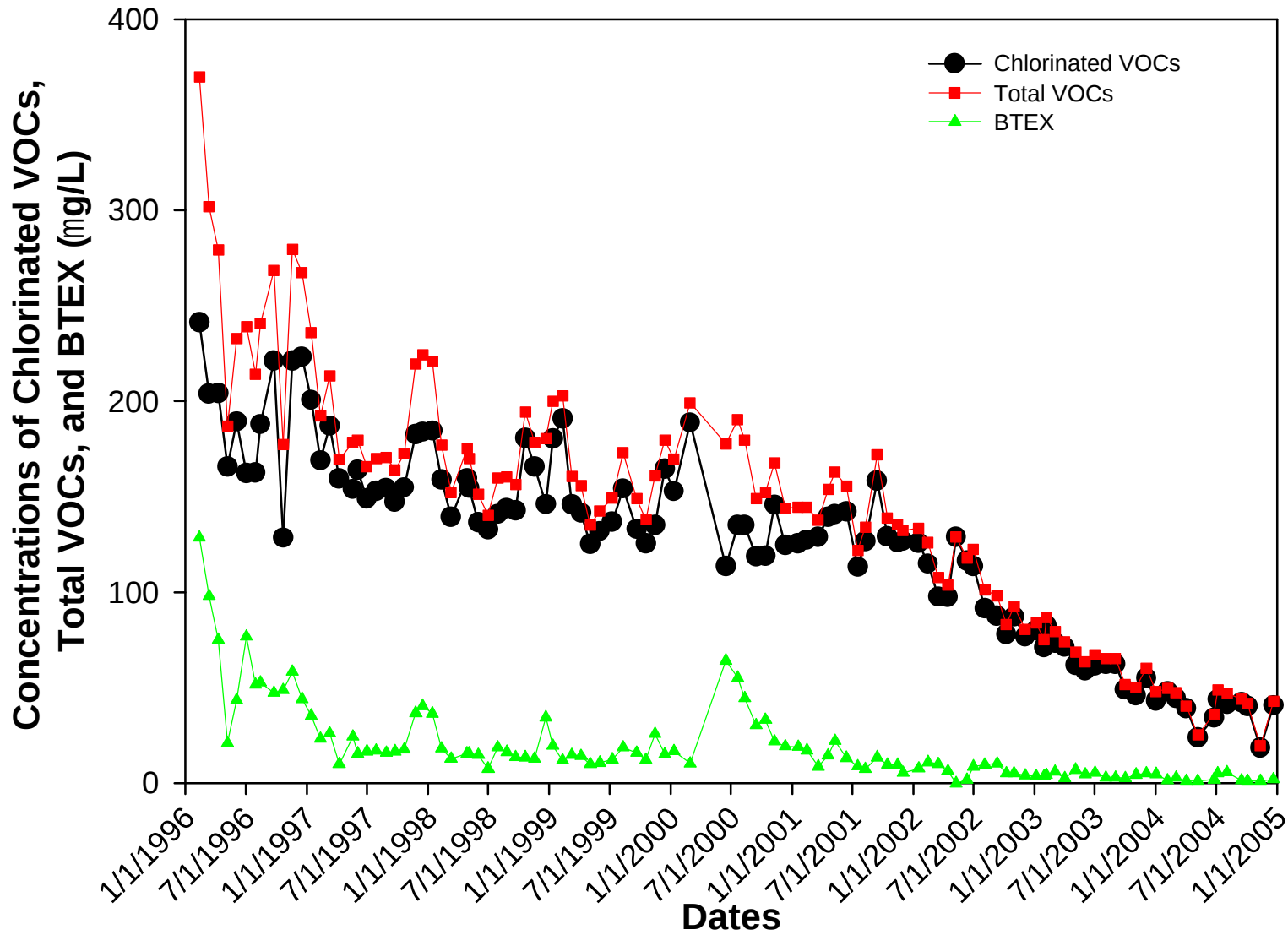
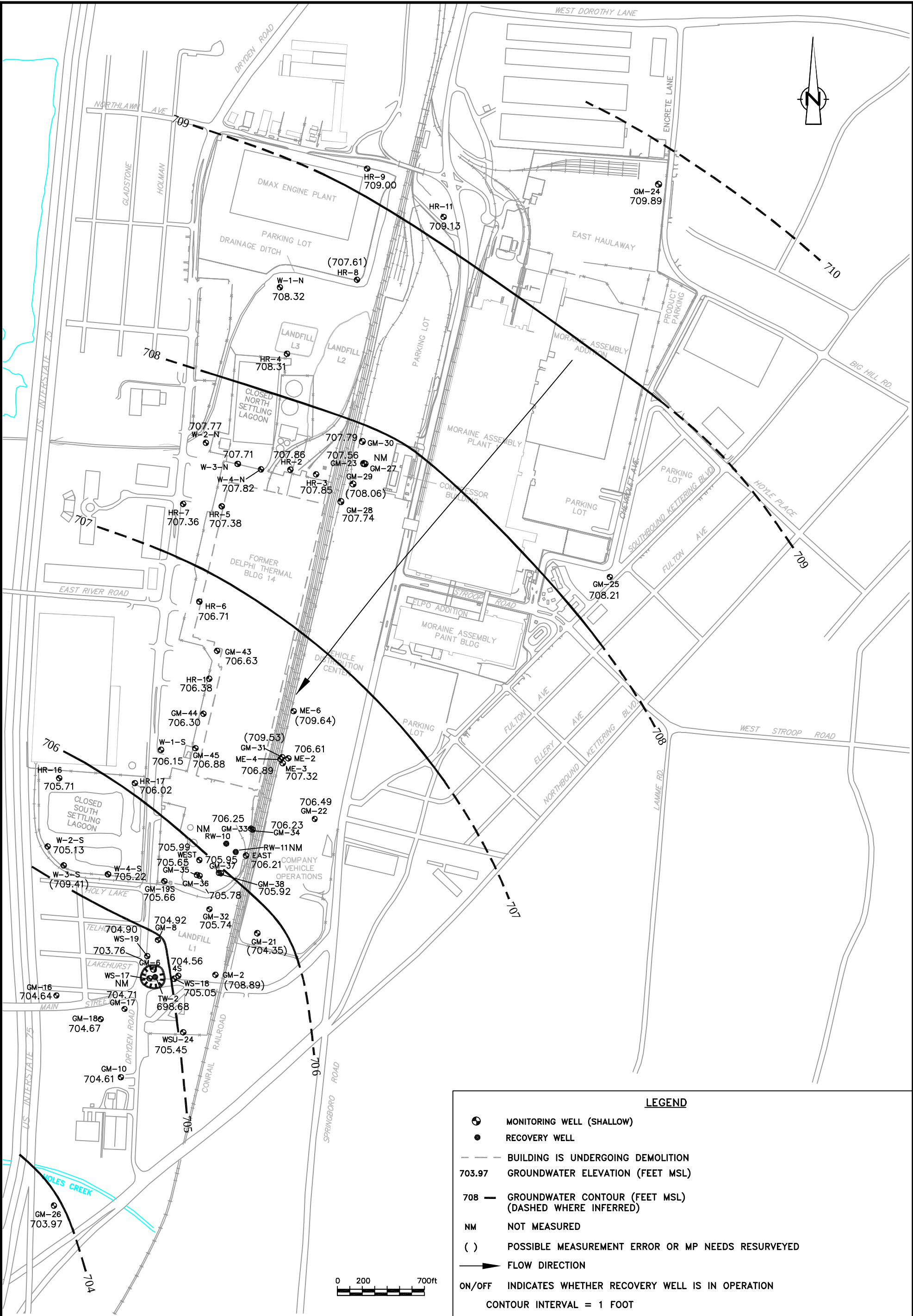


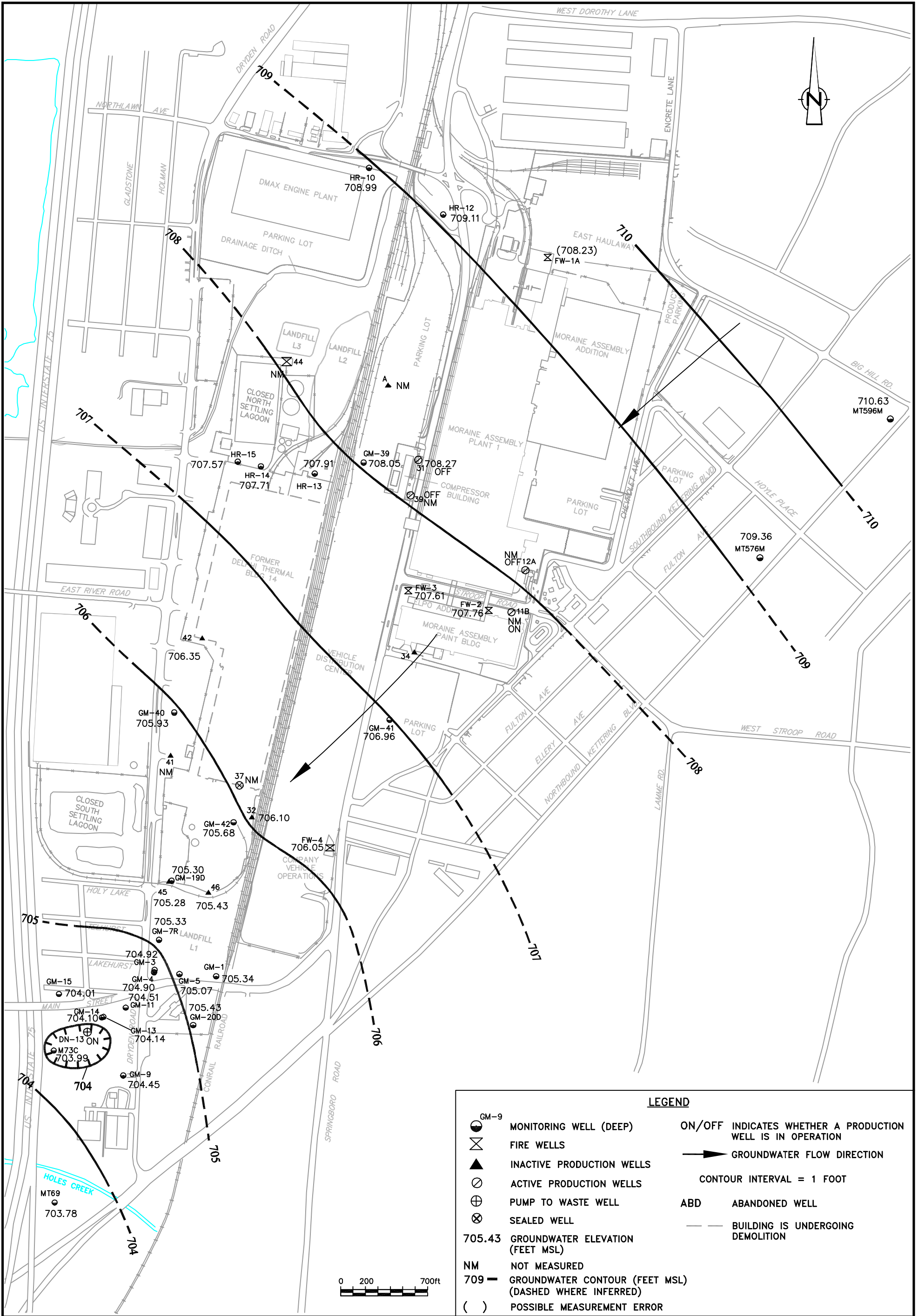
Figure 5. VOC Concentrations at the Influent to Air Stripper Tower Since System Start-up, Groundwater Recovery, and Treatment System





WATER TABLE SURFACE (UPPER AQUIFER)
ON SEPTEMBER 7 AND 8, 2004
GENERAL MOTORS CORPORATION
MORaine, OHIO

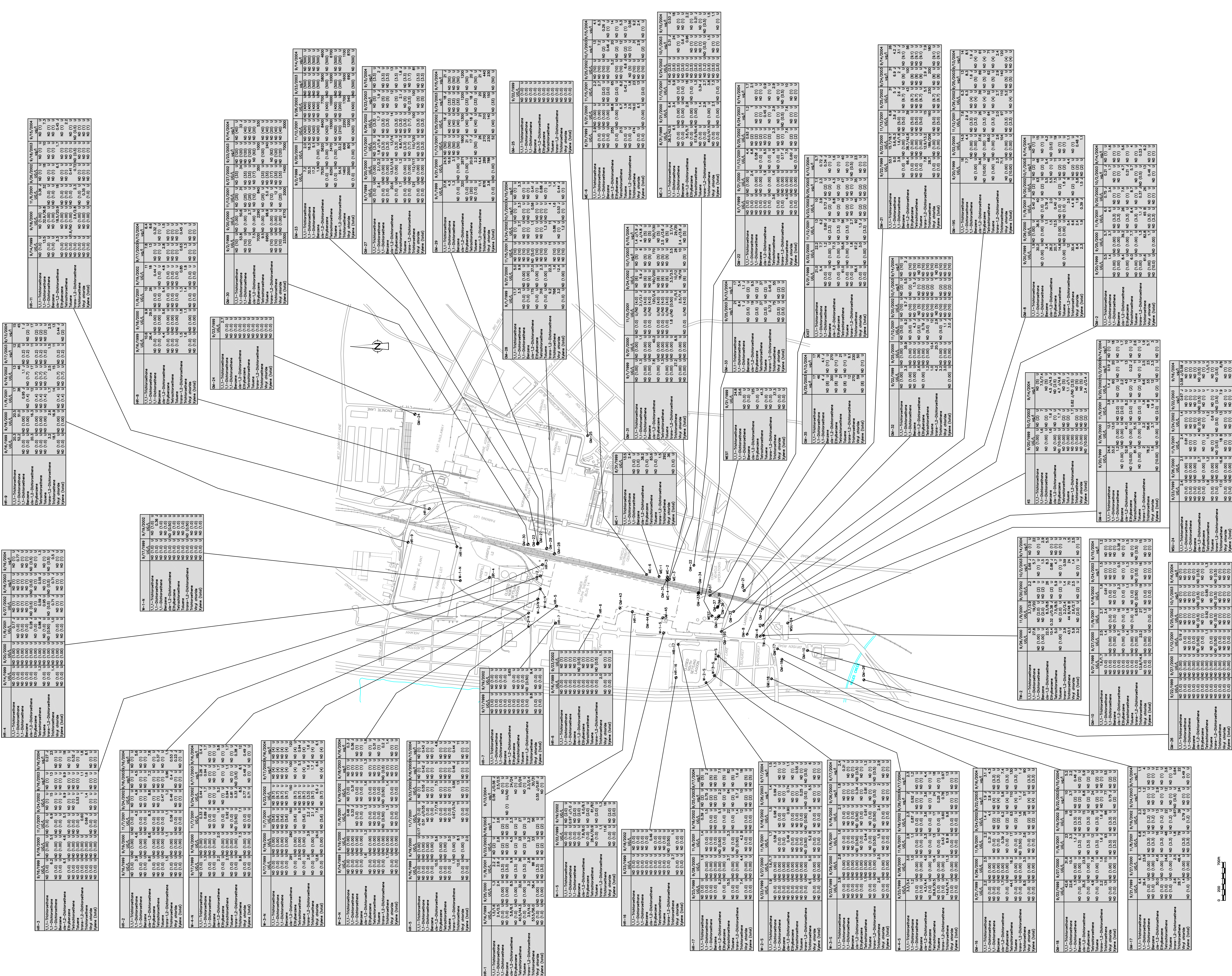
DATE 2/7/2005	PROJECT MANAGER N. GILLOTTI	DRAWING NAME CRA\ANN04\ANN04-06
DRAWN R. SMITH	LEAD DESIGN PROF. J. REID	CHECKED N. GILLOTTI
PROJECT NUMBER OH000294.0007.0003		DRAWING NUMBER 6

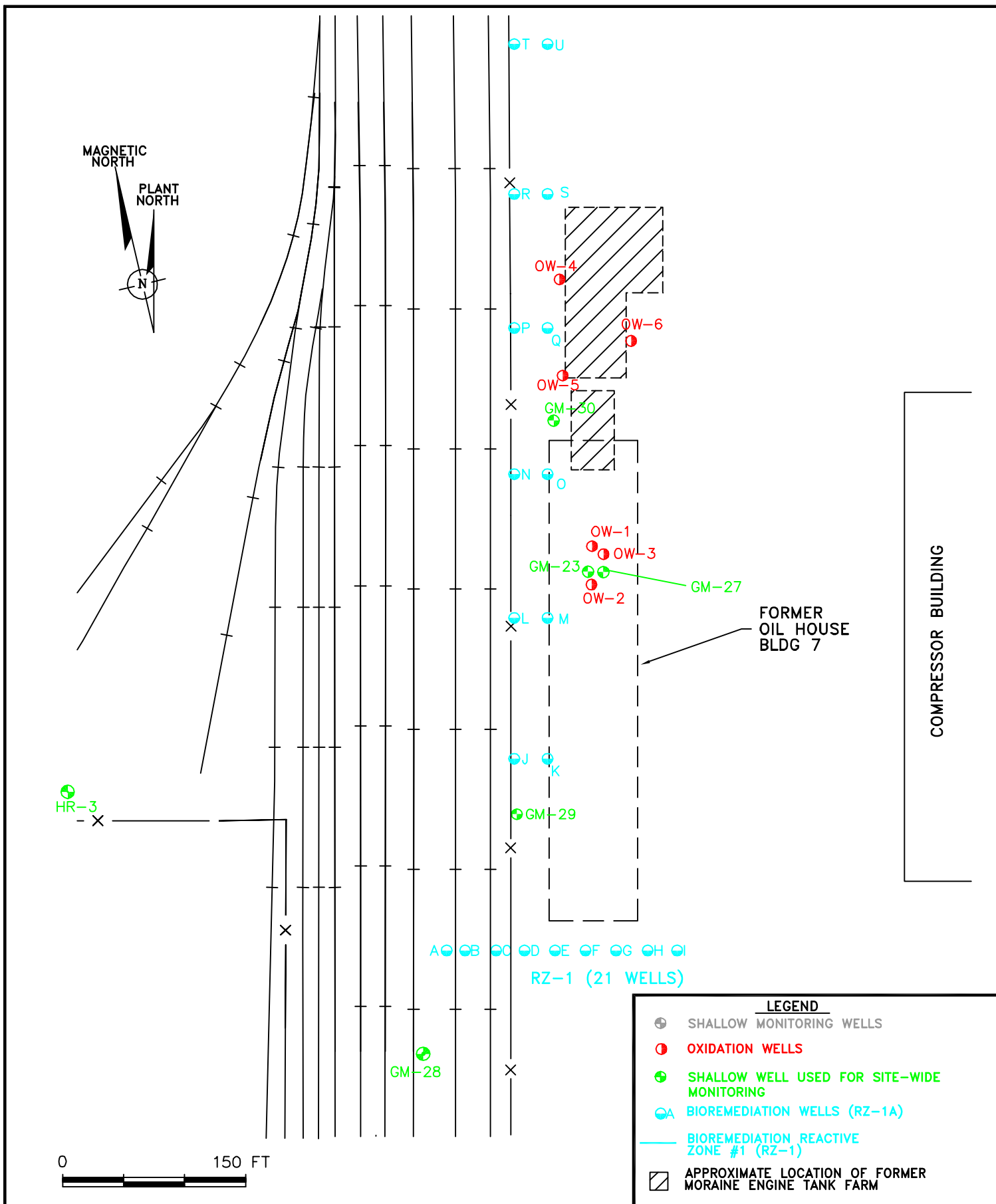


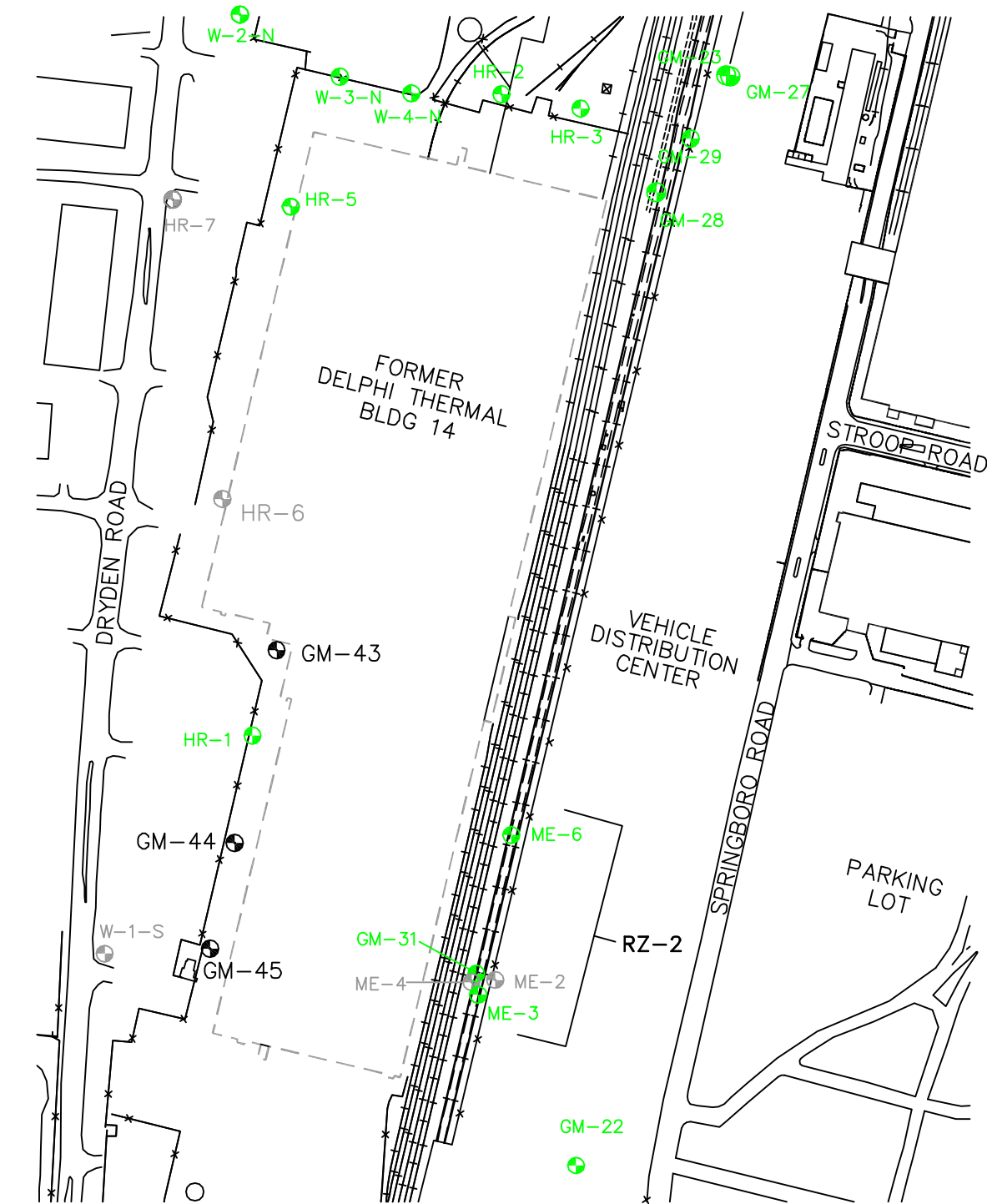
VOC DATABASES FOR UPPER AQUIFER WELLS
GENERAL MOTORS CORPORATION
MORaine, OHIO

- LEGEND
- MONITORING WELL (SHAOWN)
 - RECOVERY WELL
 - BUILDING IS UNDERGOING DEMOLITION
 - NO - NO DETECTION, IF RESULT IS NO THE DETECTION LIMIT IS SHOWN
 - u/L - MICROGRAMS PER LITER
 - u/L EXCEEDANCES ARE UNDERLINE AT POINT OF COMPLIANCE WELL 04-26

1"=50'







LEGEND

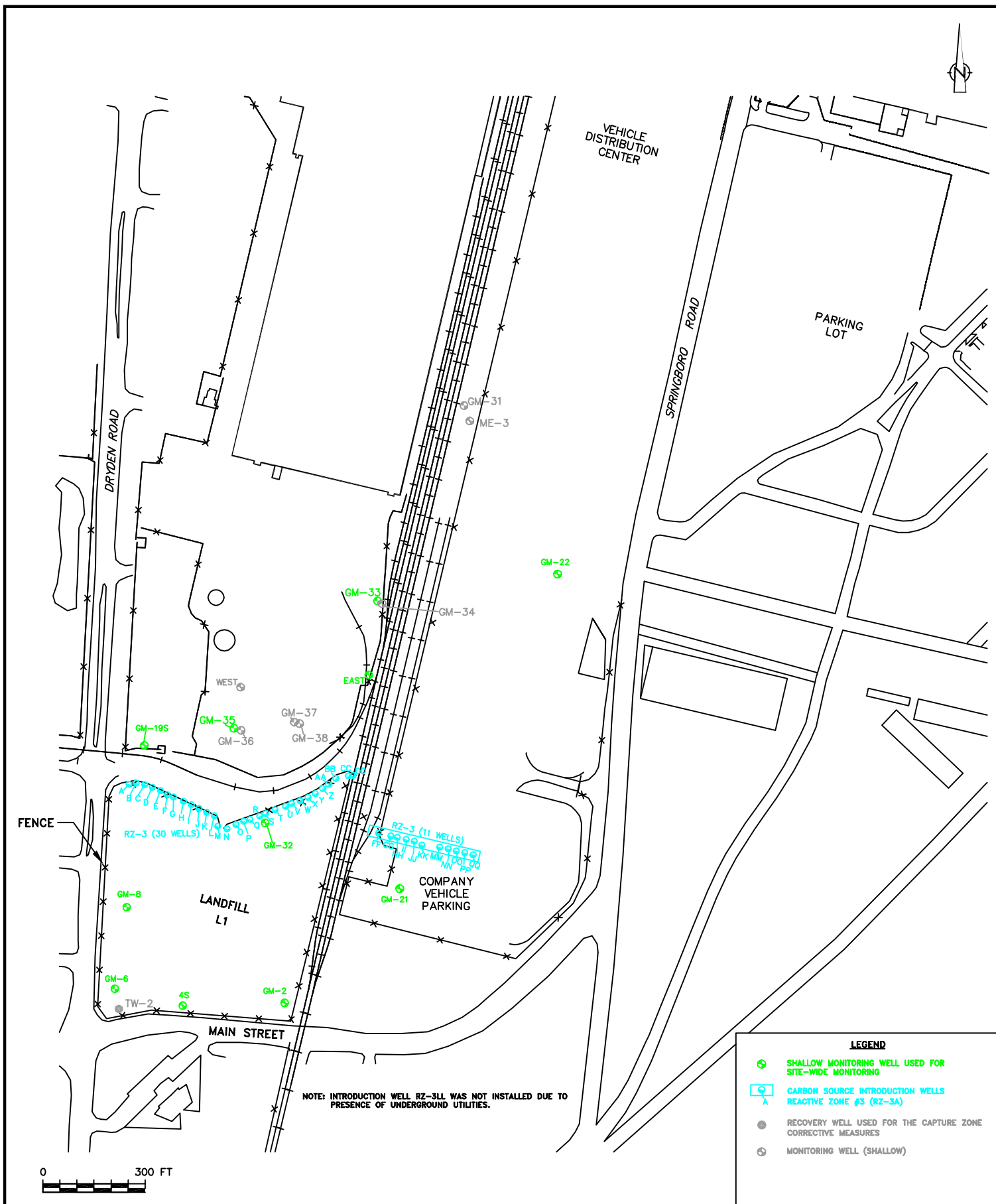
- MONITORING WELL (SHALLOW)
- MONITORING WELL USED FOR SITE-WIDE MONITORING
- BUILDING IS UNDERGOING DEMOLITION



284 Cramer Creek Court
Dublin, OH 43017
Tel: 614/764-2310 Fax: 614/764-1270

**REACTIVE ZONE #2
GENERAL MOTORS CORPORATION
MORAINES, OHIO**

DATE 2/7/2005	PROJECT MANAGER N. GILLOTTI	DRAWING NAME CRA\ANNO4\ANNO4-11
DRAWN R. SMITH	LEAD DESIGN PROF. J. REID	CHECKED N. GILLOTTI
PROJECT NUMBER OH000294.0007.0003		FIGURE NUMBER 11



284 Cramer Creek Court
Dublin, OH 43017
Tel: 614/764-2310 Fax: 614/764-1270

REACTIVE ZONES #3 WEST AND #3 EAST GENERAL MOTORS CORPORATION MORAIN, OHIO

DATE 2/7/2005	PROJECT MANAGER N. GILLOTTI	DRAWING NAME CRA\ANN04\ANN04-12
DRAWN R. SMITH	LEAD DESIGN PROF. J. REID	CHECKED N. GILLOTTI
PROJECT NUMBER OH000294.0007.0003	FIGURE NUMBER 12	

Appendix A

Site-Wide Groundwater VOC
Analytical Results from 1999 to 2003
Sampling Events

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

COMPOUND	UNITS	HR-9 09/16/99	HR-11 09/14/99	GM-24 09/23/99	HR-8 09/16/99	W-1-N 09/17/99	HR-4 09/14/99	W-2-N 09/14/99	W-3-N 09/17/99	W-4-N 09/17/99	HR-2 09/16/99	HR-3 09/16/99
<u>Volatile Organic Compounds</u>												
Benzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/l	52.2	13.5	<1.0	26.4	<1.0	<1.0	<1.0	<1.0	1.3	3.9	6.2
1,1-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	20.3	3.3	<1.0	4.4	<1.0	<1.0	1.6	291	2.2	9.6	6.1
trans-1,2-Dichloroethene	ug/l	3.2	<1.0	<1.0	1.5	<1.0	<1.0	<1.0	2.6	<1.0	1.5	<1.0
Ethylbenzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	2.5	2.1	<1.0	<1.0
Toluene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/l	20.3	<1.0	2.7	10.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	ug/l	18.1	<1.0	<1.0	1.6	<1.0	1.4	1.7	<1.0	9.8	<1.0	<1.0
Vinyl Chloride	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	12.8	<1.0	<1.0	<1.0
Xylenes	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

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

COMPOUND	UNITS	GM-30 09/02/99	GM-23 09/02/99	GM-27 09/01/99	GM-29 09/01/99	GM-28 09/01/99	GM-25 09/22/99	HR-7 09/17/99	HR-5 09/16/99	HR-6 09/16/99	HR-1 09/16/99	DUP-75 09/16/99
<u>Volatile Organic Compounds</u>												
Benzene	ug/l	<10	1.9	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/l	53.8J	32.5	2.4	4.3	3.3	<1.0	<1.0	<1.0	<1.0	2.4	2.5
1,1-Dichloroethene	ug/l	<10	17.2	<1.0	1.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	7.5J	7530	20.6	320	175	<1.0	<1.0	10.5	<1.0	5.8	6.1
trans-1,2-Dichloroethene	ug/l	<10	54.5	<1.0	11.1	9.2	<1.0	<1.0	1.1	<1.0	3.9	4.0
Ethylbenzene	ug/l	7030J	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/l	9.5J	6250	1.7	<20	316	<1.0	<1.0	<1.0	<1.0	44.3	40.5
Toluene	ug/l	6950J	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/l	<10	7.2	<1.0	37.8	17.7	<1.0	<1.0	<1.0	<1.0	1.6	1.5
Trichloroethene	ug/l	<10	1460	121	878	768	<1.0	9.8	12.0	2.0	56.0	53.5
Vinyl Chloride	ug/l	<10	2500	<1.0	3.8	3.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes	ug/l	23300J	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

ARCADIS

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

COMPOUND	UNITS	W-1-S 09/22/99	DUP-77 09/22/99	ME-6 08/31/99	ME-1 08/31/99	GM-31 09/01/99	ME-3 08/31/99	DUP-72 08/31/99	HR-16 09/23/99	HR-17 09/23/99	W-2-S 09/23/99	W-3-S 09/23/99
<u>Volatile Organic Compounds</u>												
Benzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/l	<1.0	<1.0	<1.0	2.4	1.3	6.1	6.1	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	8.0	7.8	255	38.2	7.8	5.7	5.6	<1.0	6.2	<1.0	<1.0
trans-1,2-Dichloroethene	ug/l	1.1	1.1	<1.0	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/l	30.9	28.4	213	83.6	1.3	57.9	60.4	<1.0	15.5	<1.0	1.1
Toluene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/l	<1.0	<1.0	2.9	13.5	<1.0	42.5	38.3	<1.0	<1.0	1.9J	3.9
Trichloroethene	ug/l	11.6	11.6	474	292	27.2	47.5	45.0	2.7	7.4	6.1	2.6
Vinyl Chloride	ug/l	<1.0	<1.0	<1.0	36	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

ARCADIS

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

COMPOUND	UNITS	W-4-S 09/23/99	DUP-78 09/23/99	GM-19S 09/20/99	EAST 09/21/99	WEST 09/21/99	GM-32 09/22/99	GM-22 09/01/99	GM-21 09/22/99	GM-8 09/20/99	GM-6 09/20/99
<u>Volatile Organic Compounds</u>											
Benzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.4	<1.0
1,1-Dichloroethane	ug/l	1.2	1.2	7.7	5.4	25.6	3.3	<1.0	9.0	30.2	33.2
1,1-Dichloroethene	ug/l	<1.0	<1.0	1.0	<1.0	<1.0	<1.0	<1.0	3.9	<1.0	1.2
cis-1,2-Dichloroethene	ug/l	4.4	4.3	34.6	9.1	125	2.6	<1.0	66.4	26.2	52.9
trans-1,2-Dichloroethene	ug/l	<1.0	<1.0	2.3	<1.0	<1.0	4.2	<1.0	7.8	12.0	2.0
Ethylbenzene	ug/l	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	20.7	<10
Tetrachloroethene	ug/l	30.5J	29.6	46.0	61.0	41.3	1.2	3.6	<1.0	14.8	81.4
Toluene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/l	3.3	3.4	16.0	21.0	24.8	<1.0	<1.0	53.1	1.9	24.6
Trichloroethene	ug/l	14.7J	14.6	71.1	56.1	37.3	3.2	4.0	28.7	30.4	78.2
Vinyl Chloride	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	3.0	<1.0	<1.0	8.4	1.6
Xylenes	ug/l	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	2.3	<10

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

COMPOUND	UNITS	4S 09/20/99	GM-2 09/20/99	GM-16 09/21/99	GM-17 09/21/99	GM-18 09/22/99	GM-10 09/21/99	DUP-76 09/21/99	WSU-24 09/23/99	GM-26 09/22/99
<u>Volatile Organic Compounds</u>										
Benzene	ug/l	1.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/l	1.6	1.4	<1.0	26.4	22.6	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	1.3	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	<1.0	8.4	1.7	30.0	35.3	<1.0	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	ug/l	<1.0	<1.0	<1.0	2.6	2.2	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	<10	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/l	<1.0	6.0	44.1	<1.0	4.9	<1.0	<1.0	1.9	<1.0
Toluene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/l	<1.0	5.5	2.2	6.4	42.6	1.7	1.6	2.4	<1.0
Trichloroethene	ug/l	<1.0	61.6	8.5	28.7	131	14.8	13.8	17.0	<1.0
Vinyl Chloride	ug/l	<1.0	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes	ug/l	<10	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

ug/l - Micrograms per liter.

DUP-72 - Duplicate of ME-3.

DUP-75 - Duplicate of HR-1.

DUP-76 - Duplicate of GM-10.

DUP-77 - Duplicate of W-1-S.

DUP-78 - Duplicate of W-4-S.

R - Value is unusable.

UJ - Constituent not detected above the reporting limit. Detection limit estimated.

< - Constituent not detected above laboratory detection limit shown.

J - Value is estimated.

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

COMPOUND	UNITS	HR-10 09/15/99	HR-12 09/14/99	HR-15 09/15/99	HR-14 09/15/99	HR-13 09/15/99	DUP-74 09/15/99	GM-19D 09/28/99	GM-7R 09/28/99
<u>Volatile Organic Compounds</u>									
Benzene	ug/l	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/l	<1.0	2.7	<1.0	<1.0	41.4	42.8	<1.0	<1.0
1,1-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	<1.0	1.8	2.5	7.9	20.8	21.2	1.2	2.1
trans-1,2-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	3.1	3.3	<1.0	<1.0
Ethylbenzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/l	<1.0	<1.0UJ	<1.0	<1.0	1.6	1.6	<1.0	4.2
Trichloroethene	ug/l	<1.0	<1.0	<1.0	3.4	3.4	3.3	13.5	76.1
Vinyl Chloride	ug/l	<1.0	1.7	11.0	11.5	<1.0	<1.0	1.5	<1.0
Xylenes	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

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

COMPOUND	UNITS	DUP-79 09/28/99	GM-3 09/28/99	GM-4 09/28/99	GM-5 09/28/99	GM-1 09/28/99	GM-15 09/24/99	GM-14 09/24/99	GM-13 09/24/99
<u>Volatile Organic Compounds</u>									
Benzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/l	1.1	<1.0	<1.0	<1.0	<1.0	2.4	<1.0	<1.0
1,1-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	2.3	1.1	2.3	<1.0	<1.0	4.3	<1.0	<1.0
trans-1,2-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/l	<1.0	1.2	<1.0	<1.0	2.0	<1.0	<1.0	3.6
Toluene	ug/l	<1.0	<1.0	<1.0	3.9	5.2	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/l	4.8	1.7	<1.0	<1.0	1.1	<1.0	<1.0	1.9
Trichloroethene	ug/l	76.8	7.5	13.4	1.3	30.6	4.1	<1.0	31.0
Vinyl Chloride	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

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

COMPOUND	UNITS	GM-11 09/24/99	GM-20D 09/24/99	GM-9 09/24/99	MT-69 09/24/99
<u>Volatile Organic Compounds</u>					
Benzene	ug/l	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/l	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	<1.0	<1.0	1.0	<1.0
trans-1,2-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/l	1.5	<1.0	<1.0	<1.0
Toluene	ug/l	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/l	<1.0	<1.0	1.0	<1.0
Trichloroethene	ug/l	14.5	<1.0	13.8	<1.0
Vinyl Chloride	ug/l	<1.0	<1.0	<1.0	<1.0
Xylenes	ug/l	<1.0	<1.0	<1.0	<1.0

ug/l - Micrograms per liter.

DUP-74 - Duplicate of HR-13.

DUP-79 - Duplicate of GM-7R.

R - Value is unusable.

UJ - Constituent not detected above the reporting limit. Detection limit estimated.

< - Constituent not detected above laboratory detection limit shown.

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Table A-3. Groundwater Analytical Results for Upper Aquifer Wells in 2000, General Motors Corporation, Moraine, Ohio.

COMPOUND	UNITS	HR-9 9/18/2000	HR-11 9/18/2000	DUP-89 9/18/2000	HR-8 9/18/2000	HR-4 9/20/2000	W-2-N 9/19/2000	W-3-N 9/19/2000	W-4-N 9/19/2000	HR-2 9/19/2000
<u>Volatile Organic Compounds</u>										
Benzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/l	51.0	32.9	36.8	29.0	<1.0	<1.0	<1.0	<1.0	4.6
1,1-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	16.3	18.5	20.9	5.6	<1.0	1.2	282	2.0	8.6
trans-1,2-Dichloroethene	ug/l	2.6	2.6	2.8	1.8	<1.0	<1.0	3.9	<1.0	1.1
Ethylbenzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	ug/l	<1.0	<1.0	1.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/l	20.5	<1.0	<1.0	9.9	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	ug/l	16.9	<1.0	<1.0	1.1	<1.0	<1.0	<1.0	7.3	<1.0
Vinyl Chloride	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	24.0	<1.0	<1.0
Xylenes	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

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Table A-3. Groundwater Analytical Results for Upper Aquifer Wells in 2000, General Motors Corporation, Moraine, Ohio.

COMPOUND	UNITS	HR-3 9/19/2000	GM-30 9/20/2000	GM-23 9/20/2000	GM-27 9/20/2000	DUP-90 9/20/2000	GM-29 9/21/2000	GM-28 9/21/2000	HR-5 9/19/2000	HR-1 9/25/2000
<u>Volatile Organic Compounds</u>										
Benzene	ug/l	<1.0	2.7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/l	5.1	50.6	16.3	2.2	2.1	16.6	9.9	<1.0	2.4
1,1-Dichloroethene	ug/l	<1.0	<1.0	5.1	<1.0	<1.0	3.1	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	4.6	<1.0	5620	13.9	13.5	2871	37.0	5.6	8.5
trans-1,2-Dichloroethene	ug/l	<1.0	<1.0	33.2	<1.0	<1.0	14.4	22.3	<1.0	3.2
Ethylbenzene	ug/l	<1.0	2290	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/l	<1.0	<1.0	3470	1.2	1.2	20.0	2.3	<1.0	32.6
Toluene	ug/l	<1.0	98.9	<1.0	<1.0	<1.0	2.2	<1.0	3.0	<1.0
1,1,1-Trichloroethane	ug/l	<1.0	<1.0	2.0	<1.0	<1.0	24.5	5.0	<1.0	1.3
Trichloroethene	ug/l	<1.0	<1.0	609	112	117	289	1.6	8.1	56.4
Vinyl Chloride	ug/l	<1.0	<1.0	801	<1.0	<1.0	788	12.4	<1.0	<1.0
Xylenes	ug/l	<1.0	6770	<1.0	<1.0	<1.0	<1.0	<1.0	2.0	<1.0

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Table A-3. Groundwater Analytical Results for Upper Aquifer Wells in 2000, General Motors Corporation, Moraine, Ohio.

COMPOUND	UNITS	ME-6 9/21/2000	GM-31 9/21/2000	ME-3 9/21/2000	HR-17 9/28/2000	W-2-S 9/27/2000	DUP-92 9/27/2000	W-3-S 9/28/2000	W-4-S 9/28/2000
<u>Volatile Organic Compounds</u>									
Benzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/l	<1.0	1.1	3.4	<1.0	<1.0	<1.0	<1.0	1.0
1,1-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	98.8	40.2	2.9	<1.0	<1.0	<1.0	<1.0	4.0
trans-1,2-Dichloroethene	ug/l	2.5	<1.0	2.9	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/l	6.7	<1.0	<1.0	3.7	<1.0	<1.0	<1.0	15.4
Toluene	ug/l	1.9	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/l	<1.0	<1.0	6.4	1.9	1.6	1.7	2.8	3.0
Trichloroethene	ug/l	19.0	8.5	<1.0	4.4	5.0	5.0	2.5	11.3
Vinyl Chloride	ug/l	6.1	<1.0	2.1	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

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Table A-3. Groundwater Analytical Results for Upper Aquifer Wells in 2000, General Motors Corporation, Moraine, Ohio.

COMPOUND	UNITS	GM-19S 9/22/2000	EAST 9/22/2000	GM-32 9/25/2000	GM-22 9/21/2000	GM-21 9/22/2000	DUP-91 9/22/2000	GM-8 9/26/2000	GM-6 9/26/2000
<u>Volatile Organic Compounds</u>									
Benzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0
1,1-Dichloroethane	ug/l	4.4	7.7	35.9	2.4	5.6	6.3	36.5	13.0
1,1-Dichloroethene	ug/l	<1.0	1.2	<1.0	<1.0	1.6	1.8	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	37.6	77.3	<1.0	1.9	38.7	42.8	1.5	41.0
trans-1,2-Dichloroethene	ug/l	2.6	1.8	20.3	<1.0	12.9	13.2	5.4	2.2
Ethylbenzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	12.5	<1.0
Tetrachloroethene	ug/l	68.0	55.8	<1.0	1.6	<1.0	<1.0	<1.0	51.5
Toluene	ug/l	<1.0	<1.0	10.4	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/l	14.5	22.2	<1.0	<1.0	15.7	18.7	<1.0	12.1
Trichloroethene	ug/l	104	97.2	<1.0	<1.0	189	206	6.6	56.6
Vinyl Chloride	ug/l	<1.0	3.0	<1.0	<1.0	<1.0	<1.0	2.4	3.7
Xylenes	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.9	<1.0

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Table A-3. Groundwater Analytical Results for Upper Aquifer Wells in 2000, General Motors Corporation, Moraine, Ohio.

COMPOUND	UNITS	TW-2 9/26/2000	GM-2 9/25/2000	GM-16 9/26/2000	GM-17 9/27/2000	GM-18 9/27/2000	WSU-24 9/26/2000	GM-10 9/27/2000	GM-26 9/27/2000
<u>Volatile Organic Compounds</u>									
Benzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/l	27.8	3.7	<1.0	23.9	10.4	<1.0	1.4	<1.0
1,1-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	22.5	39.2	<1.0	41.6	23.9	2.7	5.7	<1.0
trans-1,2-Dichloroethene	ug/l	2.9	1.3	<1.0	2.5	1.8	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	10.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/l	5.0	7.7	16.2	24.6	7.8	1.2.	1.4	<1.0
Toluene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/l	4.5	5.7	2.5	6.7	31.8	2.1	2.5	<1.0
Trichloroethene	ug/l	43.1	82.8	3.5	48.4	115	16.8	23.2	<1.0
Vinyl Chloride	ug/l	5.9	1.7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes	ug/l	3.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

ug/l - Micrograms per liter.

DUP-89 - Duplicate of HR-11.

DUP-90 - Duplicate of GM-27.

DUP-91 - Duplicate of GM-21.

DUP-92 - Duplicate of W-2-S.

< - Constituent not detected above laboratory detection limit shown.

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Table A-4. Groundwater Analytical Results for Lower Aquifer Wells in 2000, General Motors Corporation, Moraine, Ohio.

COMPOUND	UNITS	HR-10 9/29/2000	HR-12 9/28/2000	DUP-93 9/28/2000	HR-13 9/29/2000	HR-15 9/29/2000	31 9/29/2000	GM-19D 10/2/2000	GM-1 10/2/2000	GM-3 10/2/2000	GM-11 10/2/2000
<u>Volatile Organic Compounds</u>											
Benzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/l	<1.0	2.2	2.0	39.5	<1.0	7.4	<1.0	<1.0	2.1	<1.0
1,1-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	<1.0	2.0	1.8	14.1	2.8	8.4	3.5	<1.0	8.3	<1.0
trans-1,2-Dichloroethene	ug/l	<1.0	<1.0	<1.0	2.5	<1.0	<1.0	<1.0	<1.0	1.1	<1.0
Ethylbenzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.8	1.5	3.0
Toluene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/l	<1.0	<1.0	<1.0	1.7	<1.0	<1.0	<1.0	2.2	1.0	1.4
Trichloroethene	ug/l	<1.0	<1.0	<1.0	2.0	<1.0	12.9	2.9	37.2	9.4	41.3
Vinyl Chloride	ug/l	<1.0	2.5	2.6	<1.0	11.2	4.4	15.7	<1.0	<1.0	<1.0
Xylenes	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

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Table A-4. Groundwater Analytical Results for Lower Aquifer Wells in 2000, General Motors Corporation, Moraine, Ohio.

		GM-15	DUP-94	GM-20D	GM-9	MT69
COMPOUND	UNITS	10/2/2000	10/2/2000	10/3/2000	10/3/2000	10/3/2000
<u>Volatile Organic Compounds</u>						
Benzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/l	2.3	2.2	<1.0	<1.0	<1.0
1,1-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	2.6	3.8	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	ug/l	<1.0	<1.0	4.2	<1.0	<1.0
Toluene	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/l	<1.0	<1.0	1.6	1.2	<1.0
Trichloroethene	ug/l	4.7	4.5	14.3	17.2	<1.0
Vinyl Chloride	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes	ug/l	<1.0	<1.0	<1.0	<1.0	<1.0

ug/l - Micrograms per liter.

DUP-89 - Duplicate of HR-11.

DUP-90 - Duplicate of GM-27.

DUP-91 - Duplicate of GM-21.

DUP-92 - Duplicate of W-2-S.

DUP-93 - Duplicate of HR-12.

DUP-94 - Duplicate of GM-15.

< - Constituent not detected above laboratory detection limit shown.

Appendix B

Groundwater Sampling Logs for 2004

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Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/16/2004		
Site/Well No.	DN-13	Replicate No.	N/A	Code No.	N/A		
Weather	Clear, 70°	Sampling Time:	Begin 1655	End	1700		

Evacuation Data

Measuring Point	N/A
MP Elevation (ft)	N/A
Land Surface Elevation (ft)	N/A
Sounded Well Depth (ft bmp)	N/A
Depth to Water (ft bmp)	N/A
Water-Level Elevation (ft)	N/A
Water Column in Well (ft)	N/A
Casing Diameter/Type	N/A
Gallons in Well	N/A
Gallons Pumped/Bailed Prior to Sampling	N/A
Sample Pump Intake Setting (ft bmp)	N/A
Purge Time	begin N/A end N/A
Pumping Rate	NM
Evacuation Method	Submersible pump/port

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	NR
Conductivity (mS/cm)	NR
(µS/cm)	NR
Turbidity (NTU)	NR
Temperature (°C)	NR
Dissolved Oxygen (mg/L)	NR
ORP (mV)	NR
Sampling Method	Grab
Remarks	Sample time @ 1655

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl

Sampling Personnel K. Dombrauckas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/21/2004
Site/Well No.	GM-1	Replicate No.	N/A	Code No.	N/A
Weather	Sunny, 85°	Sampling Time:	Begin 1334	End	1400

Evacuation Data		Field Parameters	
Measuring Point	Top of Casing	Color	Colorless
MP Elevation (ft)	735.74	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	102.00	pH (s.u.)	7.14
Depth to Water (ft bmp)	31.71	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	704.03	(µS/cm)	928
Water Column in Well (ft)	70.29	Turbidity (NTU)	NR
Casing Diameter/Type	2"	Temperature (°C)	17.00
Gallons in Well	11.25	Dissolved Oxygen (mg/L)	1.07
Gallons Pumped/Bailed Prior to Sampling	5 Pumped	ORP (mV)	129
Sample Pump Intake Setting (ft bmp)	94'	Sampling Method	Low Flow
Purge Time	begin 1334 end 1353	Remarks	Sample time @ 1354
Pumping Rate	800 mL/min		DTW Final = 31.71
Evacuation Method	Submersible Pump		

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nepheometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-1 Time Pump Started 1334

Depth of Sampling 94' Date 9/21/04

Parameters	Time									
	1335	1338	1341	1344	1347	1350	1353			
Redox Potential (millivolts)	174.0	168.0	157.0	150.0	140.0	133.0	129.0			
Dissolved Oxygen (mg/L)	5.95	2.29	1.60	1.38	1.19	1.10	1.07			
pH (s.u.)	7.19	7.07	7.01	7.00	7.04	7.10	7.14			
Specific Conductance (uS/cm)	961	957	947	933	922	930	928			
Temperature (C)	16.20	16.60	16.80	16.80	16.90	16.90	17.00			

Flow Rate 800 mL/min Total Depth of Well: 102.00

Time Sampled 1354 Depth to Water Before Purging: 31.71

Total Water Pumped 5 gallons Depth to Water After Purging: 31.71

Comments _____

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Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio	Date	9/14/2004		
Site/Well No.	GM-2	Replicate No.	N/A	Code No.	N/A
Weather	Cloudy, 75°	Sampling Time:	Begin 12:24	End	12:55

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	735.81	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	56.50	pH (s.u.)	7.02
Depth to Water (ft bmp)	30.40	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	705.41	(µS/cm)	1140
Water Column in Well (ft)	26.10	Turbidity (NTU)	NR
Casing Diameter/Type	2"	Temperature (°C)	16.50
Gallons in Well	4.18	Dissolved Oxygen (mg/L)	0.0
Gallons Pumped/Bailed Prior to Sampling	5 Pumped	ORP (mV)	58
Sample Pump Intake Setting (ft bmp)	50'	Sampling Method	Low flow
Purge Time	begin 12:24 end 12:45	Remarks	Sample time @ 12:46
Pumping Rate	500 mL/min		DTW final = 30.40
Evacuation Method	Submersible pump		

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl
As and Ba, Total	500 ml plastic	1	Cool, HN03
As and Ba, Dissolved	500 ml plastic	1	Cool, HN03

Sampling Personnel K. Dombrauckas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-2 Time Pump Started 12:24

Depth of Sampling 50' Date 9/14/04

Parameters	Time									
	12:27	12:30	12:33	12:36	12:39	12:42	12:45			
Redox Potential (millivolts)	125.0	110.0	96.0	85.0	75.0	66.0	58.0			
Dissolved Oxygen (mg/L)	1.22	0.44	0.19	0.05	0.00	0.00	0.00			
pH (s.u.)	7.10	7.02	7.00	7.00	7.00	7.01	7.02			
Specific Conductance (uS/cm)	1,170	1,160	1,160	1,150	1,150	1,140	1,140			
Temperature (C)	16.50	16.60	16.60	16.50	16.50	16.50	16.50			

Flow Rate 500 mL/min Total Depth of Well: 56.50

Time Sampled 12:46 Depth to Water Before Purging: 30.40

Total Water Pumped 5 gallons Depth to Water After Purging: 30.40

Comments _____

ARCADIS

Water Sampling Log

Project GM Annual Site-Wide GWS 2004 Project No. OH000294.07.02 Page 1 of 1
 Site Location Moraine, Ohio Date 9/21/2004
 Site/Well No. GM-3 Replicate No. N/A Code No. N/A
 Weather Sunny, 70° Sampling Time: Begin 10:20 End 10:45

Evacuation Data

Measuring Point Top of Casing
 MP Elevation (ft) 730.44
 Land Surface Elevation (ft) NM
 Sounded Well Depth (ft bmp) 101.20
 Depth to Water (ft bmp) 25.84
 Water-Level Elevation (ft) 704.60
 Water Column in Well (ft) 75.36
 Casing Diameter/Type 2"
 Gallons in Well 12.05
 Gallons Pumped/Bailed
 Prior to Sampling 7 Pumped
 Sample Pump Intake
 Setting (ft bmp) 95'
 Purge Time begin 10:20 end 10:39
 Pumping Rate 800 mL/min
 Evacuation Method Submersible Pump

Field Parameters

Color Colorless
 Odor No
 Appearance Clear
 pH (s.u.) 7.07
 Conductivity (mS/cm) N/A
 (µS/cm) 1110
 Turbidity (NTU) NR
 Temperature (°C) 16.9
 Dissolved Oxygen (mg/L) 0.14
 ORP (mV) 58
 Sampling Method Low Flow

Remarks Sample time @ 10:40
DTW final = 25.85

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl

Sampling Personnel K. Dombrauckas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp below measuring point ml milliliter NTU Nephelometric Turbidity Units
 °C Degrees Celsius mS/cm Millisiemens per centimeter PVC Polyvinyl chloride
 ft feet msl mean sea-level s.u. Standard units
 NM Not Measured N/A Not Applicable µS/cm Microsiemens per centimeter
 mg/L Milligrams per liter NR Not Recorded VOC Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-3 Time Pump Started 10:20

Depth of Sampling 95' Date 9/21/04

Parameters	Time									
	10:21	10:24	10:27	10:30	10:33	10:36	10:39			
Redox Potential (millivolts)	176.0	130.0	70.0	65.0	62.0	59.0	58.0			
Dissolved Oxygen (mg/L)	9.60	1.13	0.42	0.33	0.22	0.17	0.14			
pH (s.u.)	7.22	7.09	7.08	7.08	7.08	7.07	7.07			
Specific Conductance (uS/cm)	1,110	1,110	1,110	1,110	1,110	1,110	1,110			
Temperature (C)	16.10	16.40	16.70	16.80	16.90	16.90	16.90			

Flow Rate 800 mL/min Total Depth of Well: 101.20

Time Sampled 10:40 Depth to Water Before Purging: 25.84

Total Water Pumped 7 gallons Depth to Water After Purging: 25.85

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/14/2003		
Site/Well No.	GM-6	Replicate No.	N/A	Code No.	N/A		
Weather	Cloudy, 70°	Sampling Time:	Begin 9:09	End	9:37		

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	730.27	Odor	Slight organic
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	46.33	pH (s.u.)	7.16
Depth to Water (ft bmp)	25.61	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	704.66	(µS/cm)	1,830
Water Column in Well (ft)	20.72	Turbidity (NTU)	NR
Casing Diameter/Type	2"	Temperature (°C)	16.80
Gallons in Well	3.32	Dissolved Oxygen (mg/L)	0.0
Gallons Pumped/Bailed Prior to Sampling	5 Pumped	ORP (mV)	-111
Sample Pump Intake Setting (ft bmp)	40'	Sampling Method	Low flow
Purge Time	begin 9:09 end 9:24	Remarks	Sample time @ 9:24
Pumping Rate	500 mL/min		DTW final = 25.63
Evacuation Method	Submersible pump		

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl
Fe, Mn, As and Ba Total	500 mL plastic	1	Cool, HNO ₃
Fe, Mn, As and Ba Dissolved	500 mL plastic	1	Cool, HNO ₃
Chlorides (SM325.2)/Sulfate	250 ml plastic	1	Cool
Sulfide (SM376.1)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM415.1)	40 ml glass vials	2	Cool, H ₂ SO ₄
Light Hydrocarbons (AM18G)	40 ml glass vials	2	Cool, BAK

Sampling Personnel	K. Dombrauckas/J. Manzo			
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-6 Time Pump Started 9:09

Depth of Sampling 40' Date 9/14/04

Parameters	Time									
	9:12	9:15	9:18	9:21	9:24					
Redox Potential (millivolts)	-89.0	-97.0	-105.0	-108.0	-111.0					
Dissolved Oxygen (mg/L)	0.92	0.22	0.02	0.00	0.00					
pH (s.u.)	7.16	7.16	7.15	7.16	7.16					
Specific Conductance (uS/cm)	1,830	1,830	1,830	1,830	1,830					
Temperature (C)	16.80	16.80	16.80	16.80	16.80					

Flow Rate 500 mL/min Total Depth of Well: 46.33

Time Sampled 9:24 Depth to Water Before Purging: 25.61

Total Water Pumped 5 gallons Depth to Water After Purging: 25.63

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/14/2004
Site/Well No.	GM-8	Replicate No.	N/A	Code No.	N/A
Weather	Clear, 70s	Sampling Time:	Begin 8:10	End	8:55

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	735.17	Odor	None
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	51.58	pH (s.u.)	7.76
Depth to Water (ft bmp)	30.35	Conductivity (mS/cm)	NR
Water-Level Elevation (ft)	704.82	(µS/cm)	1,900
Water Column in Well (ft)	21.23	Turbidity (NTU)	NR
Casing Diameter/Type	2" PVC	Temperature (°C)	16.60
Gallons in Well	3.40	Dissolved Oxygen (mg/L)	0.0
Gallons Pumped/Bailed Prior to Sampling	6 Pumped	ORP (mV)	-186
Sample Pump Intake Setting (ft bmp)	45.44'	Sampling Method	Low flow
Purge Time	begin 8:24 end 8:39	Remarks	Sample time @ 8:40
Pumping Rate	1000 mL/min		DTW final = 30.35
Evacuation Method	Submersible pump		

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl
Iron & Manganese Tot. (6010A)	500 mL plastic	1	Cool, HNO ₃
Iron & Manganese Diss. (6010A)	500 mL plastic	1	Cool, HNO ₃
Chlorides (SM325.2)/Sulfate	250 ml plastic	1	Cool
Sulfide (SM376.1)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM415.1)	40 ml glass vials	2	Cool, H ₂ SO ₄
Light Hydrocarbons (AM18G)	40 ml glass vials	2	Cool, Na ₃ PO ₄

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-8 Time Pump Started 8:24

Depth of Sampling 45.5' Date 9/14/04

Parameters	Time									
	8:27	8:30	8:33	8:36	8:39					
Redox Potential (millivolts)	-140.0	-166.0	-177.0	-184.0	-186.0					
Dissolved Oxygen (mg/L)	1.05	0.08	0.00	0.00	0.00					
pH (s.u.)	7.69	7.71	7.74	7.75	7.76					
Specific Conductance (uS/cm)	1,890	1,910	1,910	1,900	1,900					
Temperature (C)	16.60	16.60	16.60	16.60	16.60					

Flow Rate 1000 mL/min Total Depth of Well: 51.58

Time Sampled 8:40 Depth to Water Before Purging: 30.35

Total Water Pumped 6 gallons Depth to Water After Purging: 30.35

Comments _____

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Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/21/2004
Site/Well No.	GM-9	Replicate No.	DUP-143	Code No.	N/A
Weather	Sunny, 85°	Sampling Time:	Begin 1415	End	1445

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	724.07
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	99.70
Depth to Water (ft bmp)	19.94
Water-Level Elevation (ft)	704.13
Water Column in Well (ft)	79.76
Casing Diameter/Type	2"
Gallons in Well	12.76
Gallons Pumped/Bailed Prior to Sampling	7 Pumped
Sample Pump Intake Setting (ft bmp)	94'
Purge Time	begin 1415 end 1437
Pumping Rate	1000 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	7.33
Conductivity (mS/cm)	N/A
(µS/cm)	933
Turbidity (NTU)	NR
Temperature (°C)	16.20
Dissolved Oxygen (mg/L)	0.08
ORP (mV)	29
Sampling Method	Low Flow

Remarks	Sample time @ 1438
	DTW final = 19.94

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3 (3)	Cool, HCl

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-9 Time Pump Started 1415

Depth of Sampling 94' Date 9/21/04

Parameters	Time									
	1416	1419	1422	1425	1428	1431	1434	1437		
Redox Potential (millivolts)	174.0	135.0	77.0	49.0	35.0	29.0	29.0	29.0		
Dissolved Oxygen (mg/L)	4.35	1.33	0.62	0.38	0.22	0.11	0.10	0.08		
pH (s.u.)	7.41	7.34	7.35	7.37	7.40	7.33	7.33	7.33		
Specific Conductance (uS/cm)	932	936	937	937	936	935	934	933		
Temperature (C)	15.80	16.00	16.10	16.20	16.20	16.20	16.20	16.20		

Flow Rate 1000 mL/min Total Depth of Well: 99.70

Time Sampled 1438 Depth to Water Before Purging: 19.94

Total Water Pumped 7 gallons Depth to Water After Purging: 19.94

Comments _____

ARCADIS

Water Sampling Log

Project	<u>GM Annual Site-Wide GWS 2004</u>	Project No.	<u>OH000294.07.02</u>	Page	<u>1</u> of <u>1</u>
Site Location	<u>Moraine, Ohio</u>	Date	<u>9/15/2004</u>		
Site/Well No.	<u>GM-10</u>	Replicate No.	<u>N/A</u>	Code No.	<u>N/A</u>
Weather	<u>Sunny, 85°</u>	Sampling Time:	Begin <u>1502</u>	End	<u>1525</u>

Evacuation Data

Measuring Point	<u>Top of PVC Casing</u>
MP Elevation (ft)	<u>723.46</u>
Land Surface Elevation (ft)	<u>NM</u>
Sounded Well Depth (ft bmp)	<u>49.75</u>
Depth to Water (ft bmp)	<u>19.46</u>
Water-Level Elevation (ft)	<u>NM</u>
Water Column in Well (ft)	<u>30.29</u>
Casing Diameter/Type	<u>2"</u>
Gallons in Well	<u>4.85</u>
Gallons Pumped/Bailed Prior to Sampling	<u>7 Pumped</u>
Sample Pump Intake Setting (ft bmp)	<u>43'</u>
Purge Time	begin <u>1502</u> end <u>1517</u>
Pumping Rate	<u>1200 mL/min</u>
Evacuation Method	<u>Submersible pump</u>

Field Parameters

Color	<u>Colorless</u>
Odor	<u>No</u>
Appearance	<u>Clear</u>
pH (s.u.)	<u>7.00</u>
Conductivity (mS/cm)	<u>N/A</u>
(µSs/cm)	<u>1100</u>
Turbidity (NTU)	<u>NR</u>
Temperature (°C)	<u>15.40</u>
Dissolved Oxygen (mg/L)	<u>3.80</u>
ORP (mV)	<u>182</u>
Sampling Method	<u>Low flow</u>
Remarks	<u>Sample time @ 1518</u>

DTW final = 19.46

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-10 Time Pump Started 1502

Depth of Sampling 43' Date 9/15/04

Parameters	Time									
	1505	1508	1511	1514	1517					
Redox Potential (millivolts)	187.0	185.0	183.0	182.0	182.0					
Dissolved Oxygen (mg/L)	6.50	4.51	4.00	4.07	3.80					
pH (s.u.)	7.04	7.02	7.02	7.02	7.00					
Specific Conductance (uS/cm)	1,110	1,110	1,090	1,090	1,100					
Temperature (C)	15.50	15.50	15.40	15.50	15.40					

Flow Rate 1200 mL/min Total Depth of Well: 49.75

Time Sampled 1518 Depth to Water Before Purging: 19.46

Total Water Pumped 7 gallons Depth to Water After Purging: 19.46

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/21/2004
Site/Well No.	GM-11	Replicate No.	N/A	Code No.	N/A
Weather	Sunny, 85°	Sampling Time:	Begin 1459	End	1520

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	723.71
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	99.50
Depth to Water (ft bmp)	19.50
Water-Level Elevation (ft)	704.21
Water Column in Well (ft)	80.00
Casing Diameter/Type	2"
Gallons in Well	12.80
Gallons Pumped/Bailed Prior to Sampling	7 Pumped
Sample Pump Intake Setting (ft bmp)	93'
Purge Time	begin 1459 end 1515
Pumping Rate	800 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	7.09
Conductivity (mS/cm)	N/A
(µS/cm)	941
Turbidity (NTU)	NR
Temperature (°C)	16.5
Dissolved Oxygen (mg/L)	0.53
ORP (mV)	34
Sampling Method	Low Flow
Remarks	Sample time @ 1516
	DTW final = 19.50

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-11 Time Pump Started 1459

Depth of Sampling 93' Date 9/21/04

Parameters	Time									
	1500	1503	1506	1509	1512	1515				
Redox Potential (millivolts)	17.0	21.0	28.0	31.0	32.0	34.0				
Dissolved Oxygen (mg/L)	6.39	1.58	0.97	0.65	0.59	0.53				
pH (s.u.)	7.22	7.13	7.09	7.08	7.09	7.09				
Specific Conductance (uS/cm)	650	920	939	946	942	941				
Temperature (C)	16.30	16.20	16.40	16.50	16.50	16.50				

Flow Rate 800 mL/min Total Depth of Well: 99.50

Time Sampled 1516 Depth to Water Before Purging: 19.50

Total Water Pumped 7 gallons Depth to Water After Purging: 19.50

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/20/2004		
Site/Well No.	GM-15	Replicate No.	N/A	Code No.	N/A		
Weather	Sunny, 80°	Sampling Time:	Begin 1530	End	1600		

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	725.23
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	98.90
Depth to Water (ft bmp)	21.45
Water-Level Elevation (ft)	703.78
Water Column in Well (ft)	77.45
Casing Diameter/Type	2"
Gallons in Well	12.39
Gallons Pumped/Bailed Prior to Sampling	8 Pumped
Sample Pump Intake Setting (ft bmp)	95'
Purge Time	begin 1530 end 1554
Pumping Rate	1000 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	6.95
Conductivity (mS/cm)	N/A
(µS/cm)	1,530
Turbidity (NTU)	NR
Temperature (°C)	18.60
Dissolved Oxygen (mg/L)	0.03
ORP (mV)	-67
Sampling Method	Low flow

Remarks	Sample time @ 1555
	DTW final = 21.46

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	HCl, Cool

Sampling Personnel	K. Dombrackas/J. Manzo
--------------------	------------------------

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-15 Time Pump Started 1530

Depth of Sampling 95' Date 9/20/04

Parameters	Time									
	1533	1536	1539	1542	1545	1548	1551	1554		
Redox Potential (millivolts)	-63.0	-61.0	-60.0	-61.0	-63.0	-64.0	-66.0	-67.0		
Dissolved Oxygen (mg/L)	1.30	0.68	0.38	0.27	0.14	0.09	0.04	0.03		
pH (s.u.)	7.02	6.94	6.92	6.92	6.92	6.93	6.94	6.95		
Specific Conductance (uS/cm)	1,580	1,590	1,580	1,580	1,570	1,560	1,540	1,530		
Temperature (C)	18.00	18.30	18.50	18.60	18.60	18.60	18.60	18.60		

Flow Rate 1000 mL/min Total Depth of Well: 98.90

Time Sampled 1555 Depth to Water Before Purging: 21.45

Total Water Pumped 8 gallons Depth to Water After Purging: 21.46

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/16/2004		
Site/Well No.	GM-16	Replicate No.	N/A	Code No.	N/A		
Weather	Cloudy, 75°	Sampling Time:	Begin 9:39	End	10:00		

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	725.30	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	57.10	pH (s.u.)	7.14
Depth to Water (ft bmp)	20.91	Conductivity (mS/cm)	N/A
		(µS/cm)	1490
Water-Level Elevation (ft)	704.39	Turbidity (NTU)	NR
Water Column in Well (ft)	36.19	Temperature (°C)	17.60
Casing Diameter/Type	2"	Dissolved Oxygen (mg/L)	0.59
Gallons in Well	5.79	ORP (mV)	181
Gallons Pumped/Bailed Prior to Sampling	4 pumped	Sampling Method	Low Flow
Sample Pump Intake Setting (ft bmp)	53'	Remarks	Sample time @ 9:55
Purge Time	begin 9:39 end 9:54		DTW final = 20.91
Pumping Rate	600 mL/min		
Evacuation Method	Submersible Pump		

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	HCl, Cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294 0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-16 Time Pump Started 9:39

Depth of Sampling 53' Date 9/16/04

Parameters	Time									
	9:42	9:45	9:48	9:51	9:54					
Redox Potential (millivolts)	221.0	212.0	200.0	189.0	181.0					
Dissolved Oxygen (mg/L)	1.09	0.80	0.69	0.63	0.59					
pH (s.u.)	7.14	7.13	7.13	7.13	7.14					
Specific Conductance (uS/cm)	1,490	1,490	1,490	1,490	1,490					
Temperature (C)	17.50	17.50	17.50	17.50	17.60					

Flow Rate 600 mL/min Total Depth of Well: 57.10

Time Sampled 9:55 Depth to Water Before Purging: 20.91

Total Water Pumped 4 gallons Depth to Water After Purging: 20.91

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/15/2004
Site/Well No.	GM-17	Replicate No.	N/A	Code No.	N/A
Weather	Sunny, 89°	Sampling Time:	Begin 1534	End	1600

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	723.84	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	49.80	pH (s.u.)	7.13
Depth to Water (ft bmp)	19.24	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	704.63	(µS/cm)	1,280
Water Column in Well (ft)	30.56	Turbidity (NTU)	NR
Casing Diameter/Type	2"	Temperature (°C)	16.3
Gallons in Well	4.89	Dissolved Oxygen (mg/L)	0.00
Gallons Pumped/Bailed Prior to Sampling	7 Pumped	ORP (mV)	-23.0
Sample Pump Intake Setting (ft bmp)	52'	Sampling Method	Low flow
Purge Time	begin 1534 end 1555	Remarks	Sample time @ 1556
Pumping Rate	1200 mL/min		DTW final = 19.21
Evacuation Method	Submersible pump		

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl

Sampling Personnel K. Dombrauckas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-17 Time Pump Started 1534

Depth of Sampling 52' Date 9/15/04

Parameters	Time									
	1537	1540	1543	1546	1549	1552	1555			
Redox Potential (millivolts)	37.0	8.0	-6.0	-16.0	-19.0	-21.0	-23.0			
Dissolved Oxygen (mg/L)	0.97	0.42	0.24	0.10	0.07	0.00	0.00			
pH (s.u.)	7.16	7.15	7.14	7.15	7.14	7.10	7.13			
Specific Conductance (uS/cm)	1,310	1,300	1,290	1,290	1,280	1,280	1,280			
Temperature (C)	16.20	16.30	16.30	16.50	16.50	16.30	16.30			

Flow Rate 1200 mL/min Total Depth of Well: 49.80

Time Sampled 1556 Depth to Water Before Purging: 19.24

Total Water Pumped 7 gallons Depth to Water After Purging: 19.24

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/15/2004		
Site/Well No.	GM-18	Replicate No.	N/A	Code No.	N/A		
Weather	Sunny, 85°	Sampling Time:	Begin 1610	End	1635		

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	723.80	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	54.25	pH (s.u.)	7.06
Depth to Water (ft bmp)	19.27	Conductivity (mS/cm)	N/A
		(µS/cm)	1,270
Water-Level Elevation (ft)	704.53	Turbidity (NTU)	NR
Water Column in Well (ft)	34.98	Temperature (°C)	16.50
Casing Diameter/Type	2"	Dissolved Oxygen (mg/L)	0.0
Gallons in Well	5.60	ORP (mV)	-53
Gallons Pumped/Bailed Prior to Sampling	6 pumped	Sampling Method	Low Flow
Sample Pump Intake Setting (ft bmp)	48'	Remarks	Sample time @ 1629
Purge Time	begin 1610 end 1628		DTW final = 19.28
Pumping Rate	800 mL/min		
Evacuation Method	Submersible Pump		

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	HCl, Cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-18 Time Pump Started 1610

Depth of Sampling 48' Date 9/15/04

Parameters	Time									
	1613	1616	1619	1622	1625	1628				
Redox Potential (millivolts)	-44.0	-54.0	-57.0	-56.0	-54.0	-53.0				
Dissolved Oxygen (mg/L)	4.53	0.48	0.31	0.13	0.00	0.00				
pH (s.u.)	7.17	7.05	7.05	7.06	7.06	7.06				
Specific Conductance (uS/cm)	1,290	1,270	1,270	1,270	1,280	1,270				
Temperature (C)	16.30	16.30	16.30	16.30	16.30	16.50				

Flow Rate 800 mL/min Total Depth of Well: 54.25

Time Sampled 1629 Depth to Water Before Purging: 19.27

Total Water Pumped 6 gallons Depth to Water After Purging: 19.28

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/20/2004
Site/Well No.	GM-19D	Replicate No.	N/A	Code No.	N/A
Weather	Sunny, 80°	Sampling Time:	Begin 1425	End	1459

Evacuation Data		Field Parameters	
Measuring Point	Top of Casing	Color	Colorless
MP Elevation (ft)	730.25	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	149.00	pH (s.u.)	6.95
Depth to Water (ft bmp)	25.11	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	705.14	(µS/cm)	1260
Water Column in Well (ft)	123.89	Turbidity (NTU)	NR
Casing Diameter/Type	4"	Temperature (°C)	19.0
Gallons in Well	80.53	Dissolved Oxygen (mg/L)	0.25
Gallons Pumped/Bailed Prior to Sampling	7 Pumped	ORP (mV)	-110
Sample Pump Intake Setting (ft bmp)	75'	Sampling Method	Low flow
Purge Time	begin 1425 end 1453	Remarks	Sample time @ 1454
Pumping Rate	1000 mL/min		MS/MSD taken
Evacuation Method	Submersible Pump		

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3 (6)	Cool, HCl

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-19D Time Pump Started 1425

Depth of Sampling 75' Date 9/20/04

Parameters	Time									
	1428	1431	1434	1437	1440	1443	1447	1450	1453	
Redox Potential (millivolts)	-92.0	-103.0	-106.0	-108.0	-109.0	-109.0	-110.0	-110.0	-110.0	
Dissolved Oxygen (mg/L)	2.02	1.06	0.76	0.53	0.43	0.34	0.29	0.26	0.25	
pH (s.u.)	6.92	6.92	6.92	6.92	6.93	6.94	6.95	6.95	6.95	
Specific Conductance (uS/cm)	1,350	1,310	1,300	1,270	1,270	1,220	1,270	1,240	1,260	
Temperature (C)	18.30	18.40	18.50	18.60	18.60	18.70	18.90	18.90	19.00	

Flow Rate 1000 mL/min Total Depth of Well: 149.00

Time Sampled 1454 Depth to Water Before Purging: 25.11

Total Water Pumped 7 gallons Depth to Water After Purging: 25.11

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio	Date	9/13/2004		
Site/Well No.	GM-19S	Replicate No.	N/A	Code No.	N/A
Weather	Sunny, 80°	Sampling Time:	Begin 1304	End	1340

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	730.85	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	55.90	pH (s.u.)	7.13
Depth to Water (ft bmp)	25.24	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	705.61	(µS/cm)	1970
Water Column in Well (ft)	30.66	Turbidity (NTU)	NR
Casing Diameter/Type	2"	Temperature (°C)	18.60
Gallons in Well	4.91	Dissolved Oxygen (mg/L)	0.0
Gallons Pumped/Bailed Prior to Sampling	8 Pumped	ORP (mV)	160.0
Sample Pump Intake Setting (ft bmp)	49'	Sampling Method	Low flow
Purge Time	begin 1304 end 1328	Remarks	Sample time @ 1328
Pumping Rate	1000 mL/min		DTW final = 25.24
Evacuation Method	Submersible pump		

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO ₃
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO ₃
Chlorides (SM325.2)/Sulfates	250 ml plastic	1	Cool
Sulfide (SM376.1)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM415.1)	40 ml glass vial	2	Cool, H ₂ SO ₄
Light Hydrocarbons (AM18G)	40 ml glass vials	2	Cool, BAK

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes			
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50
			4" = 0.65
			6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-19S Time Pump Started 1304

Depth of Sampling 49' Date 9/13/04

Parameters	Time									
	1307	1310	1313	1316	1319	1321	1324	1327		
Redox Potential (millivolts)	252.0	237.0	224.0	202.0	190.0	177.0	170.0	160.0		
Dissolved Oxygen (mg/L)	2.17	0.60	0.37	0.18	0.06	0.06	0.00	0.00		
pH (s.u.)	7.05	6.99	6.97	6.98	7.01	7.09	7.11	7.13		
Specific Conductance (uS/cm)	1,940	1,950	1,960	1,960	1,960	1,970	1,970	1,970		
Temperature (C)	18.50	18.70	18.50	18.60	18.40	18.50	18.50	18.60		

Flow Rate 1000 mL/min Total Depth of Well: 55.90

Time Sampled 1328 Depth to Water Before Purging: 25.24

Total Water Pumped 8 gallons Depth to Water After Purging: 25.24

Comments _____

ARCADIS

Water Sampling Log

Project	<u>GM Annual Site-Wide GWS 2004</u>	Project No.	<u>OH000294.07.02</u>	Page	<u>1</u>	of	<u>1</u>
Site Location	<u>Moraine, Ohio</u>			Date	<u>9/21/2004</u>		
Site/Well No.	<u>GM-20D</u>	Replicate No.	<u>N/A</u>	Code No.	<u>N/A</u>		
Weather	<u>Sunny, 85°</u>	Sampling Time:	Begin <u>1543</u>	End	<u>1609</u>		

Evacuation Data		Field Parameters	
Measuring Point	<u>Top of Casing</u>	Color	<u>Colorless</u>
MP Elevation (ft)	<u>727.26</u>	Odor	<u>No</u>
Land Surface Elevation (ft)	<u>NM</u>	Appearance	<u>Clear</u>
Sounded Well Depth (ft bmp)	<u>101.00</u>	pH (s.u.)	<u>7.16</u>
Depth to Water (ft bmp)	<u>22.11</u>	Conductivity (mS/cm)	<u>N/A</u>
		(µS/cm)	<u>909</u>
Water-Level Elevation (ft)	<u>705.15</u>	Turbidity (NTU)	<u>NR</u>
Water Column in Well (ft)	<u>78.89</u>	Temperature (°C)	<u>16.00</u>
Casing Diameter/Type	<u>4"</u>	Dissolved Oxygen (mg/L)	<u>0.85</u>
Gallons in Well	<u>51.27</u>	ORP (mV)	<u>99</u>
Gallons Pumped/Bailed Prior to Sampling	<u>7 Pumped</u>	Sampling Method	<u>Low flow</u>
Sample Pump Intake Setting (ft bmp)	<u>95'</u>	Remarks	<u>Sample time @ 1603</u>
Purge Time	begin <u>1543</u> end <u>1602</u>		<u>DTW final = 22.13</u>
Pumping Rate	<u>1000 mL/min</u>		
Evacuation Method	<u>Submersible Pump</u>		

Constituents Sampled	Container Description	Number	Preservative
<u>Site specific VOCs (8260)</u>	<u>40 ml glass</u>	<u>3</u>	<u>HCl, Cool</u>

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-20D Time Pump Started 1543

Depth of Sampling 95' Date 9/21/04

Parameters	Time									
	1544	1547	1550	1553	1556	1559	1602			
Redox Potential (millivolts)	175.0	152.0	137.0	121.0	110.0	104.0	99.0			
Dissolved Oxygen (mg/L)	16.48	2.77	1.72	1.23	1.03	0.94	0.85			
pH (s.u.)	7.29	7.17	7.15	7.14	7.15	7.15	7.16			
Specific Conductance (uS/cm)	922	914	909	904	899	913	909			
Temperature (C)	15.70	15.70	16.00	16.10	16.10	16.10	16.00			

Flow Rate 1000 mL/min Total Depth of Well: 101.00

Time Sampled 1603 Depth to Water Before Purging: 22.11

Total Water Pumped 7 gallons Depth to Water After Purging: 22.13

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/14/2004
Site/Well No.	GM-21	Replicate No.	N/A	Code No.	N/A
Weather	Sunny, 80°	Sampling Time:	Begin 1356	End	1425

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	723.50
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	53.97
Depth to Water (ft bmp)	19.26
Water-Level Elevation (ft)	704.24
Water Column in Well (ft)	34.71
Casing Diameter/Type	2"
Gallons in Well	5.55
Gallons Pumped/Bailed Prior to Sampling	7 Pumped
Sample Pump Intake Setting (ft bmp)	49'
Purge Time	begin 1356 end 1414
Pumping Rate	1000 mL/min
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	7.19
Conductivity (mS/cm)	N/A
(µS/cm)	1,180
Turbidity (NTU)	NR
Temperature (°C)	17.10
Dissolved Oxygen (mg/L)	0.0
ORP (mV)	-7
Sampling Method	Low flow
Remarks	Sample time @ 1415
	DTW final = 19.26

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl
As, Ba, Fe, Mn Tot. (6010A)	500 ml plastic	1	Cool, HNO ₃
As, Ba, Fe, Mn Diss. (6010A)	500 ml plastic	1	Cool, HNO ₃
Chlorides (SM325.2)/Sulfate	250 ml plastic	1	Cool
Sulfide (SM376.1)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM415.1)	40 ml VOA	2	Cool, H ₂ SO ₄
Light Hydrocarbons (AM18G)	40 ml glass vials	2	Cool, BAK

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-21 Time Pump Started 1356

Depth of Sampling 49' Date 9/14/04

Parameters	Time									
	1359	1402	1405	1408	1411	1414				
Redox Potential (millivolts)	11.0	2.0	-1.0	-3.0	-5.0	-7.0				
Dissolved Oxygen (mg/L)	2.25	0.40	0.17	0.50	0.00	0.00				
pH (s.u.)	7.23	7.18	7.17	7.17	7.18	7.19				
Specific Conductance (uS/cm)	1,170	1,170	1,170	1,170	1,160	1,180				
Temperature (C)	16.90	16.90	16.90	17.10	17.10	17.10				

Flow Rate 1000 mL/min Total Depth of Well: 53.97

Time Sampled 1415 Depth to Water Before Purging: 19.26

Total Water Pumped 7 gallons Depth to Water After Purging: 19.26

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/14/2004
Site/Well No.	GM-22	Replicate No.	N/A	Code No.	N/A
Weather	Sunny, 80°	Sampling Time:	Begin 1438	End	1510

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	728.28	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	56.75	pH (s.u.)	7.10
Depth to Water (ft bmp)	25.24	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	703.04	(µS/cm)	1,760
Water Column in Well (ft)	31.51	Turbidity (NTU)	NR
Casing Diameter/Type	2"	Temperature (°C)	17.20
Gallons in Well	5.04	Dissolved Oxygen (mg/L)	0.0
Gallons Pumped/Bailed Prior to Sampling	9 Pumped	ORP (mV)	62
Sample Pump Intake Setting (ft bmp)	50'	Sampling Method	Low flow
Purge Time	begin 1438 end 1459	Remarks	Sample time @ 1500
Pumping Rate	1200 mL/min		DTW final = 25.24
Evacuation Method	Peristaltic pump		

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO ₃
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO ₃
Chlorides (SM325.2)	250 ml plastic	1	Cool
Sulfide (SM376.1)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM415.1)	40 ml glass vial	2	Cool, H ₂ SO ₄
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml glass vials	2	Cool, BAK

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-22 Time Pump Started 1438

Depth of Sampling 50' Date 9/14/04

Parameters	Time									
	1441	1444	1447	1450	1453	1456	1459			
Redox Potential (millivolts)	121.0	110.0	96.0	88.0	78.0	67.0	62.0			
Dissolved Oxygen (mg/L)	1.65	0.53	0.22	0.13	0.02	0.00	0.00			
pH (s.u.)	7.10	7.09	7.08	7.08	7.08	7.09	7.10			
Specific Conductance (uS/cm)	1,710	1,730	1,750	1,750	1,760	1,760	1,760			
Temperature (C)	17.30	17.30	17.30	17.30	17.30	17.20	17.20			

Flow Rate 1200 mL/min Total Depth of Well: 56.75

Time Sampled 1500 Depth to Water Before Purging: 25.24

Total Water Pumped 9 gallons Depth to Water After Purging: 25.24

Comments _____

ARCADIS

Water Sampling Log

Project	<u>GM Annual Site-Wide GWS 2004</u>	Project No.	<u>OH000294.07.02</u>	Page	<u>1</u>	of	<u>1</u>
Site Location	<u>Moraine, Ohio</u>			Date	<u>9/14/2004</u>		
Site/Well No.	<u>GM-23</u>	Replicate No.	<u>N/A</u>	Code No.	<u>N/A</u>		
Weather	<u>Sunny, 80°</u>	Sampling Time:	Begin <u>1605</u>	End	<u>1637</u>		

Evacuation Data

Measuring Point	<u>Top of PVC Casing</u>
MP Elevation (ft)	<u>731.07</u>
Land Surface Elevation (ft)	<u>NM</u>
Sounded Well Depth (ft bmp)	<u>31.98</u>
Depth to Water (ft bmp)	<u>23.51</u>
Water-Level Elevation (ft)	<u>707.56</u>
Water Column in Well (ft)	<u>8.47</u>
Casing Diameter/Type	<u>2"</u>
Gallons in Well	<u>1.36</u>
Gallons Pumped/Bailed Prior to Sampling	<u>8 Pumped</u>
Sample Pump Intake Setting (ft bmp)	<u>29'</u>
Purge Time	begin <u>1605</u> end <u>1626</u>
Pumping Rate	<u>1000 mL/min</u>
Evacuation Method	<u>Submersible Pump</u>

Field Parameters

Color	<u>Colorless</u>
Odor	<u>No</u>
Appearance	<u>Clear</u>
pH (s.u.)	<u>7.04</u>
Conductivity (mS/cm)	<u>N/A</u>
(µS/cm)	<u>2,130</u>
Turbidity (NTU)	<u>NR</u>
Temperature (°C)	<u>16.30</u>
Dissolved Oxygen (mg/L)	<u>0.0</u>
ORP (mV)	<u>57</u>
Sampling Method	<u>Low Flow</u>
Remarks	<u>Sample time @ 1627</u>
	<u>DTW final = 23.51</u>

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCL
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO ₃
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO ₃
Chlorides (SM325.2)/Sulfate	250 ml plastic	1	Cool
Sulfide (SM376.1)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM415.1)	40 ml glass vials	2	Cool, H ₂ SO ₄
Light Hydrocarbons (AM18G)	40 ml glass vials	2	Cool, BAK

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-23 Time Pump Started 1605

Depth of Sampling 29' Date 9/14/04

Parameters	Time									
	1608	1611	1614	1617	1620	1623	1626			
Redox Potential (millivolts)	47.0	*	66.0	65.0	61.0	59.0	57.0			
Dissolved Oxygen (mg/L)	4.18	*	2.62	1.01	0.28	0.05	0.00			
pH (s.u.)	7.02	*	7.09	7.05	7.04	7.05	7.04			
Specific Conductance (uS/cm)	1,910	*	1,900	2,010	2,090	2,120	2,130			
Temperature (C)	16.50	*	17.80	16.70	16.50	16.40	16.30			

Flow Rate 1000 mL/min Total Depth of Well: 31.98

Time Sampled 1627 Depth to Water Before Purging: 23.51

Total Water Pumped 8 gallons Depth to Water After Purging: 23.51

Comments Temporary lost power to pump. No measurements were taken.

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Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio	Date	9/16/2004		
Site/Well No.	GM-26	Replicate No.	N/A	Code No.	N/A
Weather	Overcast, 75°	Sampling Time:	Begin 10:15	End	10:36

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	722.29	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	58.67	pH (s.u.)	7.22
Depth to Water (ft bmp)	19.51	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	702.78	(µS/cm)	940
Water Column in Well (ft)	39.16	Turbidity (NTU)	NR
Casing Diameter/Type	2"	Temperature (°C)	15.30
Gallons in Well	6.27	Dissolved Oxygen (mg/L)	5.34
Gallons Pumped/Bailed Prior to Sampling	7 Pumped	ORP (mV)	239
Sample Pump Intake Setting (ft bmp)	53'	Sampling Method	Low flow
Purge Time	begin 10:15 end 10:30	Remarks	Sample time @ 10:31
Pumping Rate	1000 mL/min		DTW final = 19.51
Evacuation Method	Submersible pump		

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-26 Time Pump Started 10:15

Depth of Sampling 53' Date 9/16/04

Parameters	Time						
	10:18	10:21	10:24	10:27	10:30		
Redox Potential (millivolts)	243.0	242.0	241.0	240.0	239.0		
Dissolved Oxygen (mg/L)	6.67	5.52	5.45	5.37	5.34		
pH (s.u.)	7.27	7.21	7.21	7.22	7.22		
Specific Conductance (uS/cm)	950	940	940	940	940		
Temperature (C)	15.60	15.30	15.30	15.30	15.30		

Flow Rate 1000 mL/min Total Depth of Well: 58.67

Time Sampled 10:31 Depth to Water Before Purging: 19.51

Total Water Pumped 7 gallons Depth to Water After Purging: 19.51

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/15/2004		
Site/Well No.	GM-27	Replicate No.	N/A	Code No.	N/A		
Weather	Sunny, 85°	Sampling Time:	Begin 1416	End	1450		

Evacuation Data			Field Parameters		
Measuring Point	TOC		Color	Colorless	
MP Elevation (ft)	730.57		Odor	Yes	
Land Surface Elevation (ft)	NM		Appearance	Clear	
Sounded Well Depth (ft bmp)	50.00		pH (s.u.)	6.80	
Depth to Water (ft bmp)	22.58		Conductivity (mS/cm)	N/A	
Water-Level Elevation (ft)	707.99		(µS/cm)	1,400	
Water Column in Well (ft)	27.42		Turbidity (NTU)	NR	
Casing Diameter/Type	2 "		Temperature (°C)	16.70	
Gallons in Well	4.39		Dissolved Oxygen (mg/L)	0.35	
Gallons Pumped/Bailed Prior to Sampling	8 Pumped		ORP (mV)	36.0	
Sample Pump Intake Setting (ft bmp)	45'		Sampling Method	Low Flow	
Purge Time	begin 1416	end 1440	Remarks	Sample time @ 1441	
Pumping Rate	1000 mL/min			DTW final = 22.58	
Evacuation Method	Submersible Pump				

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	Cool, HCl

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-27 Time Pump Started 1416

Depth of Sampling 45' Date 9/15/04

Parameters	Time									
	1419	1422	1425	1428	1431	1434	1437	1440		
Redox Potential (millivolts)	134.0	89.0	71.0	60.0	47.0	40.0	38.0	36.0		
Dissolved Oxygen (mg/L)	2.26	1.29	1.03	0.52	0.19	0.60	0.15	0.35		
pH (s.u.)	6.84	6.77	6.74	6.73	6.74	6.78	6.79	6.80		
Specific Conductance (uS/cm)	1,350	1,360	1,360	1,370	1,410	1,410	1,410	1,400		
Temperature (C)	16.50	16.60	16.70	16.90	17.20	16.80	17.00	16.70		

Flow Rate 1000 mL/min Total Depth of Well: 50.00

Time Sampled 1441 Depth to Water Before Purging: 22.58

Total Water Pumped 8 gallons Depth to Water After Purging: 22.58

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/15/2004
Site/Well No.	GM-28	Replicate No.	N/A	Code No.	N/A
Weather	Sunny, 80°	Sampling Time:	Begin 10:30	End	10:55

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	736.46
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	36.74
Depth to Water (ft bmp)	28.83
Water-Level Elevation (ft)	707.63
Water Column in Well (ft)	7.91
Casing Diameter/Type	2"
Gallons in Well	1.27
Gallons Pumped/Bailed Prior to Sampling	6 Pumped
Sample Pump Intake Setting (ft bmp)	33'
Purge Time	begin 10:30 end 10:45
Pumping Rate	1200 mL/min
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	Slight
Appearance	Clear
pH (s.u.)	6.85
Conductivity (mS/cm)	N/A
(µS/cm)	2030
Turbidity (NTU)	NR
Temperature (°C)	16.20
Dissolved Oxygen (mg/L)	0.0
ORP (mV)	-165
Sampling Method	Low flow
Remarks	Sample time @ 10:46
	DTW final = 28.83

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl
As, Ba, Fe, Mn Tot. (6010A)	500 ml plastic	1	Cool, HNO ₃
As, Ba, Fe, Mn Diss. (6010A)	500 ml plastic	1	Cool, HNO ₃
Chlorides (SM325.2)	250 ml plastic	1	Cool
Sulfide (SM376.1)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM415.1)	40 ml glass vial	2	Cool, H ₂ SO ₄
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml glass vials	2	Cool, BAK

Sampling Personnel K. Dombrauckas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-28 Time Pump Started 10:30

Depth of Sampling 33' Date 9/15/04

Parameters	Time									
	10:33	10:36	10:39	10:42	10:45					
Redox Potential (millivolts)	-156.0	-165.0	-166.0	-165.0	-165.0					
Dissolved Oxygen (mg/L)	1.54	0.48	0.15	0.00	0.00					
pH (s.u.)	7.05	6.94	6.88	6.86	6.85					
Specific Conductance (uS/cm)	2,230	2,160	2,090	2,060	2,030					
Temperature (C)	16.20	16.20	16.10	16.20	16.20					

Flow Rate 1200 mL/min Total Depth of Well: 36.74

Time Sampled 10:46 Depth to Water Before Purging: 28.83

Total Water Pumped 6 gallons Depth to Water After Purging: 28.83

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/15/2004
Site/Well No.	GM-29	Replicate No.	N/A	Code No.	N/A
Weather	Sunny, 85°	Sampling Time:	Begin 1312	End	1345

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	731.37
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	33.50
Depth to Water (ft bmp)	23.90
Water-Level Elevation (ft)	707.47
Water Column in Well (ft)	9.60
Casing Diameter/Type	2"
Gallons in Well	1.54
Gallons Pumped/Bailed Prior to Sampling	8 Pumped
Sample Pump Intake Setting (ft bmp)	28'
Purge Time	begin 1312 end 1333
Pumping Rate	1000 mL/min
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	Yes
Appearance	Clear
pH (s.u.)	6.85
Conductivity (mS/cm)	N/A
(µS/cm)	2,580
Turbidity (NTU)	NR
Temperature (°C)	16.40
Dissolved Oxygen (mg/L)	0.04
ORP (mV)	-134.0
Sampling Method	Low flow

Remarks	Sample time @ 1334
	DTW final = 23.90
	RB-117 taken @ 1350

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO ₃
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO ₃
Chlorides (SM325.2)	250 ml plastic	1	Cool
Sulfide (SM376.1)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM415.1)	40 ml glass vial	2	Cool, H ₂ SO ₄
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml glass vials	2	Cool, BAK

Sampling Personnel	K. Dombrackas/J. Manzo
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Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-29 Time Pump Started 1312

Depth of Sampling 28' Date 9/15/04

Parameters	Time									
	1315	1318	1321	1324	1327	1330	1333			
Redox Potential (millivolts)	-91.0	-106.0	-114.0	-123.0	-128.0	-132.0	-134.0			
Dissolved Oxygen (mg/L)	2.01	0.87	0.43	0.20	0.04	0.04	0.04			
pH (s.u.)	6.72	6.69	6.68	6.73	6.78	6.80	6.85			
Specific Conductance (uS/cm)	2,640	2,650	2,640	2,630	2,640	2,600	2,580			
Temperature (C)	16.70	16.60	16.60	16.50	16.40	16.30	16.40			

Flow Rate 1000 mL/min Total Depth of Well: 33.50

Time Sampled 1334 Depth to Water Before Purging: 23.90

Total Water Pumped 8 gallons Depth to Water After Purging: 23.90

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/14/2004		
Site/Well No.	GM-30	Replicate No.	N/A	Code No.	N/A		
Weather	Sunny, 80°	Sampling Time:	Begin 1525	End	1554		

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	734.79
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	37.00
Depth to Water (ft bmp)	26.75
Water-Level Elevation (ft)	708.04
Water Column in Well (ft)	10.25
Casing Diameter/Type	2"
Gallons in Well	1.64
Gallons Pumped/Bailed Prior to Sampling	7 Pumped
Sample Pump Intake Setting (ft bmp)	35'
Purge Time	begin 1525 end 1543
Pumping Rate	600 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Light yellow
Odor	Yes
Appearance	Slight cloudy
pH (s.u.)	6.62
Conductivity (mS/cm)	N/A
(µS/cm)	2,350
Turbidity (NTU)	NR
Temperature (°C)	17.30
Dissolved Oxygen (mg/L)	0.0
ORP (mV)	-109
Sampling Method	Low flow
Remarks	Sample time @ 1544
	DTW final = 26.75

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCL
Iron & Manganese Tot. (6010A)	500 mL plastic	1	Cool, HNO ₃
Iron & Manganese Diss. (6010A)	500 mL plastic	1	Cool, HNO ₃
Chlorides (SM325.2)/Sulfate	250 ml plastic	1	Cool
Sulfide (SM376.1)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM415.1)	40 ml glass vials	2	Cool, H ₂ SO ₄
Light Hydrocarbons (AM18G)	40 ml glass vials	2	Cool, BAK
Sampling Personnel	K. Dombrackas/J. Manzo		

Well Casing Volumes

Gal./Ft.	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-30 Time Pump Started 1525

Depth of Sampling 35' Date 9/14/04

Parameters	Time									
	1528	1531	1534	1537	1540	1543				
Redox Potential (millivolts)	-99.0	-102.0	-104.0	-106.0	-107.0	-109.0				
Dissolved Oxygen (mg/L)	0.65	0.42	0.29	0.16	0.01	0.00				
pH (s.u.)	6.64	6.62	6.62	6.62	6.63	6.62				
Specific Conductance (uS/cm)	2,430	2,400	2,390	2,370	2,370	2,350				
Temperature (C)	17.80	17.60	17.50	17.50	17.40	17.30				

Flow Rate 600 mL/min Total Depth of Well: 37.00

Time Sampled 1544 Depth to Water Before Purging: 26.75

Total Water Pumped 7 gallons Depth to Water After Purging: 26.75

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/15/2004
Site/Well No.	GM-31	Replicate No.	DUP-140	Code No.	N/A
Weather	Sunny, 70°	Sampling Time:	Begin 9:25	End	10:13

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	736.71	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	63.38	pH (s.u.)	7.04
Depth to Water (ft bmp)	25.81	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	710.90	(µS/cm)	1,790
Water Column in Well (ft)	37.57	Turbidity (NTU)	NR
Casing Diameter/Type	2"	Temperature (°C)	18.30
Gallons in Well	6.01	Dissolved Oxygen (mg/L)	0.41
Gallons Pumped/Bailed Prior to Sampling	6 Pumped	ORP (mV)	-86
Sample Pump Intake Setting (ft bmp)	59'	Sampling Method	Low flow
Purge Time	begin 9:25 end 9:50	Remarks	Sample time @ 9:52
Pumping Rate	1000 mL/min		DTW final = 25.81
Evacuation Method	Submersible pump		DUP-140 + MS/MSD taken

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3 (3) (6)	Cool, HCl
Iron & Manganese Tot. (6010A)	500 ml plastic	1 (1)	Cool, HNO ₃
Iron & Manganese Diss. (6010A)	500 ml plastic	1 (1)	Cool, HNO ₃
Chlorides (SM325.2)	250 ml plastic	1 (1)	Cool
Sulfide (SM376.1)	500 ml plastic	1 (1)	Cool, NaOH/ZnAc
TOC (SM415.1)	40 ml glass vial	2 (2)	Cool, H ₂ SO ₄
Sulfate (SM375.4)	250 ml plastic	1 (1)	Cool
Light Hydrocarbons (AM18G)	40 ml glass vials	2 (2)	Cool, BAK

Sampling Personnel K. Dombrauckas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location Moraine, Ohio

Monitoring Well No. GM-31 Time Pump Started 9:25

Depth of Sampling 59' Date 9/15/04

Parameters	Time									
	9:28	9:31	9:34	9:37	9:40	9:43	9:46	9:49		
Redox Potential (millivolts)	123.0	100.0	13.0	-60.0	-74.0	-79.0	-86.0	-86.0		
Dissolved Oxygen (mg/L)	2.40	0.95	0.63	0.65	0.60	0.35	0.34	0.41		
pH (s.u.)	7.01	6.96	6.96	6.98	7.00	7.00	7.02	7.04		
Specific Conductance (uS/cm)	1,920	1,900	1,880	1,850	1,840	1,820	1,790	1,790		
Temperature (C)	18.00	18.10	18.20	18.30	18.30	18.30	18.30	18.30		

Flow Rate 1000 mL/min Total Depth of Well: 63.38

Time Sampled 9:52 Depth to Water Before Purging: 25.81

Total Water Pumped 6 gallons Depth to Water After Purging: 25.81

Comments _____

ARCADIS
Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/14/2004
Site/Well No.	GM-32	Replicate No.	N/A	Code No.	N/A
Weather	Cloudy, 80°	Sampling Time:	Begin 1305	End	1335

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Yellowish orange
MP Elevation (ft)	732.10	Odor	Organic
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	59.80	pH (s.u.)	6.86
Depth to Water (ft bmp)	26.35	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	705.75	(µS/cm)	4,210
Water Column in Well (ft)	33.45	Turbidity (NTU)	NR
Casing Diameter/Type	2"	Temperature (°C)	17.20
Gallons in Well	5.35	Dissolved Oxygen (mg/L)	0.0
Gallons Pumped/Bailed Prior to Sampling	7 Pumped	ORP (mV)	-160
Sample Pump Intake Setting (ft bmp)	54'	Sampling Method	Low flow
Purge Time	begin 1305 end 1320	Remarks	Sample time @ 1321
Pumping Rate	1200 ml/min		DTW final = 26.35
Evacuation Method	Submersible pump		

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl
As, Be, Fe, Mn Tot. (6010A)	500 ml plastic	1	Cool, HNO ₃
As, Be, Fe, Mn Diss. (6010A)	500 ml plastic	1	Cool, HNO ₃
Chlorides (SM325.2)	250 ml plastic	1	Cool
Sulfide (SM376.1)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM415.1)	40 ml glass vial	2	Cool, H ₂ SO ₄
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml glass vials	2	Cool, BAK

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-32 Time Pump Started 1305

Depth of Sampling 54' Date 9/14/04

Parameters	Time									
	1308	1311	1314	1317	1320					
Redox Potential (millivolts)	-159.0	-158.0	-159.0	-161.0	-160.0					
Dissolved Oxygen (mg/L)	0.39	0.00	0.00	0.00	0.00					
pH (s.u.)	7.00	6.91	6.87	6.86	6.86					
Specific Conductance (uS/cm)	4,480	4,320	4,210	4,210	4,210					
Temperature (C)	17.20	17.20	17.20	17.20	17.20					

Flow Rate 1200 mL/min Total Depth of Well: 59.80

Time Sampled 1321 Depth to Water Before Purging: 26.35

Total Water Pumped 7 gallons Depth to Water After Purging: 26.35

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/13/2004
Site/Well No.	GM-33	Replicate No.	N/A	Code No.	N/A
Weather	Sunny, 80°	Sampling Time:	Begin 1444	End	1513

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	729.77	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	54.78	pH (s.u.)	7.05
Depth to Water (ft bmp)	23.60	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	706.17	(µS/cm)	2060
Water Column in Well (ft)	31.18	Turbidity (NTU)	NR
Casing Diameter/Type	2"	Temperature (°C)	17.90
Gallons in Well	4.99	Dissolved Oxygen (mg/L)	0.0
Gallons Pumped/Bailed Prior to Sampling	6 Pumped	ORP (mV)	52.0
Sample Pump Intake Setting (ft bmp)	48'	Sampling Method	Low flow
Purge Time	begin 1444 end 1502	Remarks	Sample time @ 1503
Pumping Rate	800 mL/min		DTW final = 23.60
Evacuation Method	Submersible pump		

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-33 Time Pump Started 1444

Depth of Sampling Midpoint of Screen Date 9/13/04

Parameters	1447	1450	1453	1456	1459	1502	Time
Redox Potential (millivolts)	94.0	93.0	80.0	64.0	58.0	52.0	
Dissolved Oxygen (mg/L)	1.12	0.72	0.26	0.40	0.00	0.00	
pH (s.u.)	7.11	7.08	7.05	7.05	7.06	7.05	
Specific Conductance (uS/cm)	2,040	2,040	2,060	2,060	2,060	2,060	
Temperature (C)	18.00	18.10	18.10	18.20	18.10	17.90	

Flow Rate 800 mL/min Total Depth of Well: 54.78

Time Sampled 1503 Depth to Water Before Purging: 23.60

Total Water Pumped 6 gallons Depth to Water After Purging: 23.60

Comments

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/13/2004
Site/Well No.	GM-35	Replicate No.	N/A	Code No.	N/A
Weather	Clear, 70°	Sampling Time:	Begin 1405	End	1427

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	731.27
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	66.08
Depth to Water (ft bmp)	25.62
Water-Level Elevation (ft)	705.65
Water Column in Well (ft)	40.46
Casing Diameter/Type	2"
Gallons in Well	6.47
Gallons Pumped/Bailed Prior to Sampling	6 Pumped
Sample Pump Intake Setting (ft bmp)	49'
Purge Time	begin 1407 end 1419
Pumping Rate	1000 mL/min
Evacuation Method	Submersible pump

Field Parameters

Color	Yellow orange
Odor	Organic
Appearance	Clear
pH (s.u.)	8.55
Conductivity (mS/cm)	N/A
(µS/cm)	5550
Turbidity (NTU)	NR
Temperature (°C)	18.50
Dissolved Oxygen (mg/L)	0.0
ORP (mV)	-253.0
Sampling Method	Low flow
Remarks	Sample time @ 1420
	DTW final = 25.62

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-35 Time Pump Started 1404

Depth of Sampling 49' Date 9/13/04

Parameters	Time						
	1407	1410	1413	1416	1419		
Redox Potential (millivolts)	-158.0	-231.0	-239.0	-245.0	-253.0		
Dissolved Oxygen (mg/L)	2.02	0.11	0.05	0.01	0.00		
pH (s.u.)	7.87	8.47	8.50	8.52	8.55		
Specific Conductance (uS/cm)	4,220	5,480	5,530	5,510	5,550		
Temperature (C)	18.40	18.80	18.70	18.70	18.50		

Flow Rate 1000 mL/min Total Depth of Well: 66.08

Time Sampled 1420 Depth to Water Before Purging: 25.62

Total Water Pumped 6 gallons Depth to Water After Purging: 25.62

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/20/2004
Site/Well No.	GM-39	Replicate No.	N/A	Code No.	N/A
Weather	Sunny, 80°	Sampling Time:	Begin 1625	End	1652

Evacuation Data

Measuring Point	Top of casing
MP Elevation (ft)	730.95
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	116.90
Depth to Water (ft bmp)	23.12
Water-Level Elevation (ft)	707.83
Water Column in Well (ft)	93.78
Casing Diameter/Type	2" PVC
Gallons in Well	15.00
Gallons Pumped/Bailed Prior to Sampling	8 Pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 1625 end 1647
Pumping Rate	1200 mL/min
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	Yes
Appearance	Clear
pH (s.u.)	6.81
Conductivity (mS/cm)	N/A
(µS/cm)	1700
Turbidity (NTU)	NR
Temperature (°F)	16
Dissolved Oxygen (mg/L)	0
ORP (mV)	-130
Sampling Method	Low flow

Remarks	Sampled @ 1648
	DTW final = 23.16

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-39 Time Pump Started 1625

Depth of Sampling Midpoint of Screen Date 9/20/04

Parameters	1626	1629	1632	1635	1638	1641	1644	1647		
Redox Potential (millivolts)	-132.0	-148.0	-133.0	-129.0	-128.0	-128.0	-129.0	-130.0		
Dissolved Oxygen (mg/L)	6.23	1.12	0.57	0.38	0.24	0.09	0.00	0.00		
pH (s.u.)	6.98	6.89	6.79	6.75	6.75	6.77	6.80	6.81		
Specific Conductance (uS/cm)	1,760	1,790	1,760	1,740	1,720	1,710	1,680	1,700		
Temperature (C)	16.20	15.80	15.90	16.00	15.90	15.90	16.00	16.00		

Flow Rate 1200 mL/min Total Depth of Well: 116.90

Time Sampled 1648 Depth to Water Before Purging: 23.12

Total Water Pumped 8 gallons Depth to Water After Purging: 23.16

Comments _____

ARCADIS

Water Sampling Log

Project	<u>GM Annual Site-Wide GWS 2004</u>	Project No.	<u>OH000294.07.02</u>	Page	<u>1</u> of <u>1</u>
Site Location	<u>Moraine, Ohio</u>			Date	<u>9/20/2004</u>
Site/Well No.	<u>GM-40</u>	Replicate No.	<u>N/A</u>	Code No.	<u>N/A</u>
Weather	<u>Sunny, 80°</u>	Sampling Time:	Begin <u>9:25</u>	End	<u>9:58</u>

Evacuation Data		Field Parameters	
Measuring Point	<u>TOC</u>	Color	<u>Colorless</u>
MP Elevation (ft)	<u>727.04</u>	Odor	<u>No</u>
Land Surface Elevation (ft)	<u>727.28</u>	Appearance	<u>Clear</u>
Sounded Well Depth (ft bmp)	<u>149.61</u>	pH (s.u.)	<u>7.04</u>
Depth to Water (ft bmp)	<u>21.32</u>	Conductivity (mS/cm)	<u>N/A</u>
Water-Level Elevation (ft)	<u>705.72</u>	(µmhos/cm)	<u>1120</u>
Water Column in Well (ft)	<u>128.29</u>	Turbidity (NTU)	<u>NR</u>
Casing Diameter/Type	<u>2" PVC</u>	Temperature (°C)	<u>17.2</u>
Gallons in Well	<u>20.53</u>	Dissolved Oxygen (mg/L)	<u>0.07</u>
Gallons Pumped/Bailed Prior to Sampling	<u>6 Pumped</u>	ORP (mV)	<u>-138</u>
Sample Pump Intake Setting (ft bmp)	<u>144'</u>	Sampling Method	<u>Low flow</u>
Purge Time	begin <u>9:25</u> end <u>9:52</u>	Remarks	<u>Sampled @ 9:53</u>
Pumping Rate	<u>700 mL/min</u>		<u>DTW final = 21.32</u>
Evacuation Method	<u>Submersible pump</u>		

Constituents Sampled	Container Description	Number	Preservative
<u>Site-Specific VOCs (8260)</u>	<u>40 ml VOA</u>	<u>3</u>	<u>HCl, cool</u>

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	<u>1-1/4" = 0.06</u>	<u>2" = 0.16</u>	<u>3" = 0.37</u>	<u>4" = 0.65</u>
	<u>1-1/2" = 0.09</u>	<u>2-1/2" = 0.26</u>	<u>3-1/2" = 0.50</u>	<u>6" = 1.47</u>

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-40 Time Pump Started 9:25

Depth of Sampling Midpoint of Screen Date 9/20/04

Parameters	Time									
	9:28	9:31	9:34	9:37	9:40	9:43	9:46	9:49	9:52	
Redox Potential (millivolts)	-119.0	-129.0	-132.0	-135.0	-136.0	-137.0	-137.0	-138.0	-138.0	
Dissolved Oxygen (mg/L)	2.86	0.86	0.60	0.33	0.18	0.14	0.10	0.09	0.07	
pH (s.u.)	6.92	7.01	7.01	7.04	7.02	7.03	7.03	7.04	7.04	
Specific Conductance (uS/cm)	1,040	1,080	1,080	1,040	1,010	1,150	1,130	1,130	1,120	
Temperature (C)	16.50	16.90	17.00	17.00	17.10	17.10	17.10	17.10	17.20	

Flow Rate 700 mL/min Total Depth of Well: NM

Time Sampled 9:53 Depth to Water Before Purging: 21.32

Total Water Pumped 6 gallons Depth to Water After Purging: 21.32

Comments _____

ARCADIS

Water Sampling Log

Project	<u>GM Annual Site-Wide GWS 2004</u>	Project No.	<u>OH000294.07.02</u>	Page	<u>1</u> of <u>1</u>
Site Location	<u>Moraine, Ohio</u>	Date	<u>9/21/2004</u>		
Site/Well No.	<u>GM-41</u>	Replicate No.	<u>N/A</u>	Code No.	<u>N/A</u>
Weather	<u>Sunny, 60°</u>	Sampling Time:	Begin <u>8:00</u>	End	<u>8:30</u>

Evacuation Data

Measuring Point	<u>TOC</u>
MP Elevation (ft)	<u>733.65</u>
Land Surface Elevation (ft)	<u>731.22</u>
Sounded Well Depth (ft bmp)	<u>116.31</u>
Depth to Water (ft bmp)	<u>27.11</u>
Water-Level Elevation (ft)	<u>706.54</u>
Water Column in Well (ft)	<u>89.20</u>
Casing Diameter/Type	<u>2" PVC</u>
Gallons in Well	<u>14.27</u>
Gallons Pumped/Bailed Prior to Sampling	<u>7 Pumped</u>
Sample Pump Intake Setting (ft bmp)	<u>112'</u>
Purge Time	begin <u>8:00</u> end <u>8:19</u>
Pumping Rate	<u>1000 mL/min</u>
Evacuation Method	<u>Submersible pump</u>

Field Parameters

Color	<u>Colorless</u>
Odor	<u>No</u>
Appearance	<u>Clear</u>
pH (s.u.)	<u>6.95</u>
Conductivity (mS/cm)	<u>N/A</u>
(µmhos/cm)	<u>1290</u>
Turbidity (NTU)	<u>NR</u>
Temperature (°C)	<u>16.9</u>
Dissolved Oxygen (mg/L)	<u>0.0</u>
ORP (mV)	<u>-84</u>
Sampling Method	<u>Low flow</u>
Remarks	<u>Sampled @ 8:20</u>
	<u>DTW final = 27.03</u>

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml VOA	3	HCl, cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msi	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-41 Time Pump Started 8:00

Depth of Sampling 112' Date 9/21/04

Parameters	Time									
	8:01	8:04	8:07	8:10	8:13	8:16	8:19			
Redox Potential (millivolts)	-14.0	-69.0	-76.0	-79.0	-82.0	-84.0	-84.0			
Dissolved Oxygen (mg/L)	3.67	0.75	0.31	0.15	0.07	0.01	0.00			
pH (s.u.)	6.52	6.87	6.92	6.94	6.95	6.95	6.95			
Specific Conductance (uS/cm)	1,310	1,300	1,300	1,270	1,300	1,270	1,290			
Temperature (C)	16.20	16.60	16.70	16.80	16.80	16.80	16.90			

Flow Rate 1000 mL/min Total Depth of Well: 116.31

Time Sampled 8:20 Depth to Water Before Purging: 27.11

Total Water Pumped 7 gallons Depth to Water After Purging: 27.03

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/20/2004
Site/Well No.	GM-42	Replicate No.	N/A	Code No.	N/A
Weather	Sunny, 80°	Sampling Time:	Begin 12:32	End	1310

Evacuation Data

Measuring Point	TOC
MP Elevation (ft)	729.16
Land Surface Elevation (ft)	729.48
Sounded Well Depth (ft bmp)	150.09
Depth to Water (ft bmp)	23.66
Water-Level Elevation (ft)	705.50
Water Column in Well (ft)	126.43
Casing Diameter/Type	2" PVC
Gallons in Well	20.23
Gallons Pumped/Bailed Prior to Sampling	8 Pumped
Sample Pump Intake Setting (ft bmp)	145'
Purge Time	begin 12:32 end 12:59
Pumping Rate	800 mL/min
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	6.99
Conductivity (mS/cm)	N/A
(µmhos/cm)	1270
Turbidity (NTU)	NR
Temperature (°C)	17.8
Dissolved Oxygen (mg/L)	0.09
ORP (mV)	-92
Sampling Method	Low flow
Remarks	Sampled @ 1300
	DTW final = 23.64

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml VOA	3	HCl, cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. GM-42 Time Pump Started 12:32

Depth of Sampling Midpoint of Screen Date 9/20/04

Parameters	Time									
	12:35	12:38	12:41	12:44	12:47	12:50	12:53	12:56	12:59	
Redox Potential (millivolts)	-130.0	-121.0	-110.0	-106.0	-101.0	-97.0	-94.0	-92.0	-92.0	
Dissolved Oxygen (mg/L)	5.21	1.12	0.55	0.47	0.31	0.25	0.19	0.12	0.09	
pH (s.u.)	7.11	7.02	6.96	6.95	6.95	6.96	6.98	6.99	6.99	
Specific Conductance (uS/cm)	1,240	1,260	1,280	1,280	1,280	1,280	1,270	1,270	1,270	
Temperature (C)	18.10	17.60	17.70	17.70	17.80	17.80	17.80	17.70	17.80	

Flow Rate 800 mL/min Total Depth of Well: NM

Time Sampled 1300 Depth to Water Before Purging: 23.66

Total Water Pumped 8 gallons Depth to Water After Purging: 23.64

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/13/2004		
Site/Well No.	HR-1	Replicate No.	DUP-138	Code No.	N/A		
Weather	Overcast, 70°	Sampling Time:	Begin 8:50	End	9:15		

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	732.71	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	59.45	pH (s.u.)	7.08
Depth to Water (ft bmp)	26.41	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	706.30	(µS/cm)	1,420
Water Column in Well (ft)	33.04	Turbidity (NTU)	NR
Casing Diameter/Type	2"	Temperature (°C)	18.00
Gallons in Well	5.29	Dissolved Oxygen (mg/L)	0.0
Gallons Pumped/Bailed Prior to Sampling	7 Pumped	ORP (mV)	158.0
Sample Pump Intake Setting (ft bmp)	55'	Sampling Method	Low Flow
Purge Time	begin 8:50 end 9:05	Remarks	Sampled @ 9:07
Pumping Rate	1000 mL/min		DUP-138 taken RB-115 @ 9:25
Evacuation Method	Submersible Pump		MSMD taken.

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3 (3)(6)	HCl, Cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. HR-1 Time Pump Started 8:50

Depth of Sampling 55' Date 9/13/04

Parameters		Time									
		8:53	8:56	8:59	9:02	9:05					
Redox Potential (millivolts)		189.0	185.0	177.0	166.0	158.0					
Dissolved Oxygen (mg/L)		0.88	0.31	0.16	0.00	0.00					
pH (s.u.)		7.07	7.06	7.07	7.07	7.08					
Specific Conductance (uS/cm)		1,420	1,430	1,430	1,420	1,420					
Temperature (C)		18.00	18.00	18.00	18.00	18.00					

Flow Rate 1000 mL/min Total Depth of Well: 59.45

Time Sampled 9:07 Depth to Water Before Purging: 26.41

Total Water Pumped 7 gallons Depth to Water After Purging: 26.41

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/16/2004		
Site/Well No.	HR-2	Replicate No.	N/A	Code No.	N/A		
Weather	Sunny, 85°	Sampling Time:	Begin 1445	End	1513		

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	734.75
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	58.75
Depth to Water (ft bmp)	27.04
Water-Level Elevation (ft)	707.71
Water Column in Well (ft)	31.71
Casing Diameter/Type	2"
Gallons in Well	5.07
Gallons Pumped/Bailed Prior to Sampling	6 Pumped
Sample Pump Intake Setting (ft bmp)	53'
Purge Time	begin 1445 end 1506
Pumping Rate	600 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	6.94
Conductivity (mS/cm)	N/A
(µS/cm)	1,100
Turbidity (NTU)	NR
Temperature (°C)	14.60
Dissolved Oxygen (mg/L)	0.0
ORP (mV)	190.0
Sampling Method	Low Flow
Remarks	Sample time @ 1507
	DTW final = 27.04

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	HCl, Cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. HR-2 Time Pump Started 1445

Depth of Sampling 53' Date 9/16/04

Parameters	Time									
	1448	1451	1454	1457	1500	1503	1506			
Redox Potential (millivolts)	230.0	225.0	223.0	214.0	206.0	195.0	190.0			
Dissolved Oxygen (mg/L)	2.99	1.01	0.68	0.29	0.09	0.00	0.00			
pH (s.u.)	7.13	6.93	6.92	6.90	6.91	6.92	6.94			
Specific Conductance (uS/cm)	1,060	1,060	1,060	1,060	1,060	1,100	1,100			
Temperature (C)	14.70	14.70	14.70	14.60	14.70	14.70	14.60			

Flow Rate 600 mL/min Total Depth of Well: 58.75

Time Sampled 1507 Depth to Water Before Purging: 27.04

Total Water Pumped 6 gallons Depth to Water After Purging: 27.04

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/16/2004		
Site/Well No.	HR-3	Replicate No.	N/A	Code No.	N/A		
Weather	Sunny, 85°	Sampling Time:	Begin 1524	End	1547		

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	736.75
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	62.22
Depth to Water (ft bmp)	29.06
Water-Level Elevation (ft)	707.69
Water Column in Well (ft)	30.26
Casing Diameter/Type	2"
Gallons in Well	4.84
Gallons Pumped/Bailed Prior to Sampling	7 Pumped
Sample Pump Intake Setting (ft bmp)	57'
Purge Time	begin 1524 end 1542
Pumping Rate	1000 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	7.04
Conductivity (mS/cm)	N/A
(µS/cm)	1,160
Turbidity (NTU)	NR
Temperature (°C)	15.60
Dissolved Oxygen (mg/L)	0.0
ORP (mV)	32.0
Sampling Method	Low Flow
Remarks	Sample time @ 1543
	DTW final = 29.03
	RB-119 @ 1610

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	HCl, Cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msi	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. HR-3 Time Pump Started 1524

Depth of Sampling 57' Date 9/16/04

Parameters		Time									
		1527	1530	1533	1536	1539	1542				
Redox Potential (millivolts)	100.0	57.0	37.0	36.0	34.0	32.0					
Dissolved Oxygen (mg/L)	4.43	0.37	0.13	0.05	0.00	0.00					
pH (s.u.)	7.07	7.01	7.03	7.03	7.04	7.04					
Specific Conductance (uS/cm)	1,200	1,190	1,190	1,190	1,180	1,160					
Temperature (C)	15.10	16.00	15.50	15.40	15.50	15.60					

Flow Rate 1000 mL/min Total Depth of Well: 62.22

Time Sampled 1543 Depth to Water Before Purging: 29.06

Total Water Pumped 7 gallons Depth to Water After Purging: 29.03

Comments _____

ARCADIS

Water Sampling Log

Project	<u>GM Annual Site-Wide GWS 2004</u>	Project No.	<u>OH000294.07.02</u>	Page	<u>1</u>	of	<u>1</u>
Site Location	<u>Moraine, Ohio</u>			Date	<u>9/16/2004</u>		
Site/Well No.	<u>HR-4</u>	Replicate No.	<u>N/A</u>	Code No.	<u>N/A</u>		
Weather	<u>Cloudy, 75°</u>	Sampling Time:	Begin <u>8:54</u>	End	<u>9:15</u>		

Evacuation Data

Measuring Point	<u>Top of PVC Casing</u>
MP Elevation (ft)	<u>742.60</u>
Land Surface Elevation (ft)	<u>NM</u>
Sounded Well Depth (ft bmp)	<u>67.00</u>
Depth to Water (ft bmp)	<u>34.41</u>
Water-Level Elevation (ft)	<u>708.19</u>
Water Column in Well (ft)	<u>32.59</u>
Casing Diameter/Type	<u>2"</u>
Gallons in Well	<u>5.21</u>
Gallons Pumped/Bailed Prior to Sampling	<u>7 Pumped</u>
Sample Pump Intake Setting (ft bmp)	<u>62'</u>
Purge Time	begin <u>8:54</u> end <u>9:09</u>
Pumping Rate	<u>1000 mL/min</u>
Evacuation Method	<u>Submersible Pump</u>

Field Parameters

Color	<u>Colorless</u>
Odor	<u>No</u>
Appearance	<u>Clear</u>
pH (s.u.)	<u>7.18</u>
Conductivity (mS/cm)	<u>N/A</u>
(µS/cm)	<u>1190</u>
Turbidity (NTU)	<u>NR</u>
Temperature (°C)	<u>15.50</u>
Dissolved Oxygen (mg/L)	<u>0.0</u>
ORP (mV)	<u>163</u>
Sampling Method	<u>Low Flow</u>

Remarks	<u>Sample time @ 9:10</u>
	<u>DTW final = 34.41</u>

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	HCl, Cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. HR-4 Time Pump Started 8:54

Depth of Sampling 62' Date 9/16/04

Parameters	Time									
	8:57	9:00	9:03	9:06	9:09					
Redox Potential (millivolts)	211.0	199.0	182.0	171.0	163.0					
Dissolved Oxygen (mg/L)	3.62	0.57	0.19	0.00	0.00					
pH (s.u.)	7.19	7.17	7.17	7.18	7.18					
Specific Conductance (uS/cm)	1,190	1,190	1,190	1,190	1,190					
Temperature (C)	15.50	15.50	15.50	15.50	15.50					

Flow Rate 1000 mL/min Total Depth of Well: 67.00

Time Sampled 9:10 Depth to Water Before Purging: 34.41

Total Water Pumped 7 gallons Depth to Water After Purging: 34.41

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/13/2004		
Site/Well No.	HR-5	Replicate No.	N/A	Code No.	N/A		
Weather	Clear, 70°	Sampling Time:	Begin 10:00	End	10:30		

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	734.27
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	58.02
Depth to Water (ft bmp)	26.96
Water-Level Elevation (ft)	707.31
Water Column in Well (ft)	31.06
Casing Diameter/Type	2"
Gallons in Well	4.97
Gallons Pumped/Bailed Prior to Sampling	4 Pumped
Sample Pump Intake Setting (ft bmp)	52'
Purge Time	begin 10:04 end 10:22
Pumping Rate	400 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	7.05
Conductivity (mS/cm)	NR
(µS/cm)	926
Turbidity (NTU)	10.5
Temperature (°C)	16.40
Dissolved Oxygen (mg/L)	0.0
ORP (mV)	-7
Sampling Method	Low Flow

Remarks	Sample time @ 10:23
	DTW final = 26.96

Constituents Sampled

Container Description

Number

Preservative

[illegible]

Sampling Personnel K. Dombrauckas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-1/4" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. HR-5 Time Pump Started 10:04

Depth of Sampling 52' Date 9/13/04

Parameters	Time									
	10:07	10:10	10:13	10:16	10:19	10:22				
Redox Potential (millivolts)	9.0	1.0	2.0	1.0	-4.0	-7.0				
Dissolved Oxygen (mg/L)	1.84	0.38	0.15	0.04	0.00	0.00				
pH (s.u.)	7.10	6.99	6.96	6.99	7.03	7.05				
Specific Conductance (uS/cm)	930	926	926	927	927	926				
Temperature (C)	15.50	16.00	16.40	16.30	16.40	16.40				

Flow Rate 400 mL/min Total Depth of Well: 58.02

Time Sampled 10:23 Depth to Water Before Purging: 26.96

Total Water Pumped 4 gallons Depth to Water After Purging: 26.96

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio	Date	9/13/2004				
Site/Well No.	HR-8	Replicate No.	N/A	Code No.	N/A		
Weather	Sunny, 80°	Sampling Time:	Begin	1535	End	1607	

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	743.42
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	66.90
Depth to Water (ft bmp)	34.81
Water-Level Elevation (ft)	708.61
Water Column in Well (ft)	32.09
Casing Diameter/Type	2"
Gallons in Well	5.13
Gallons Pumped/Bailed Prior to Sampling	7 Pumped
Sample Pump Intake Setting (ft bmp)	61'
Purge Time	begin 1535 end 1600
Pumping Rate	800 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	7.09
Conductivity (mS/cm)	N/A
(µS/cm)	1,310
Turbidity (NTU)	NR
Temperature (°C)	15.70
Dissolved Oxygen (mg/L)	2.6
ORP (mV)	76
Sampling Method	Low Flow
Remarks	Sample time @ 1600
	DTW final = 34.82

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	HCl, Cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. HR-8 Time Pump Started 1535

Depth of Sampling 61' Date 9/13/04

Parameters	Time									
	1538	1541	1544	1547	1550	1553	1556	1559		
Redox Potential (millivolts)	79.0	1.0	13.0	31.0	51.0	67.0	71.0	76.0		
Dissolved Oxygen (mg/L)	7.11	2.53	2.50	2.56	2.57	2.58	2.60	2.60		
pH (s.u.)	7.29	7.09	7.06	7.04	7.04	7.06	7.08	7.09		
Specific Conductance (uS/cm)	1,330	1,320	1,310	1,300	1,300	1,300	1,310	1,310		
Temperature (C)	15.90	15.60	15.70	15.70	15.70	15.60	15.70	15.70		

Flow Rate 800 mL/min Total Depth of Well: 66.90

Time Sampled 1600 Depth to Water Before Purging: 34.81

Total Water Pumped 7 gallons Depth to Water After Purging: 34.82

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/13/2004		
Site/Well No.	HR-9	Replicate No.	N/A	Code No.	N/A		
Weather	Sunny, 80°	Sampling Time:	Begin 1618	End	1637		

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	743.51
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	70.03
Depth to Water (ft bmp)	34.53
Water-Level Elevation (ft)	708.98
Water Column in Well (ft)	35.50
Casing Diameter/Type	2"
Gallons in Well	5.68
Gallons Pumped/Bailed Prior to Sampling	5 Pumped
Sample Pump Intake Setting (ft bmp)	64'
Purge Time	begin 1618 end 1634
Pumping Rate	1200 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	6.96
Conductivity (mS/cm)	N/A
(µS/cm)	1400
Turbidity (NTU)	NR
Temperature (°C)	15.00
Dissolved Oxygen (mg/L)	0.0
ORP (mV)	136.0
Sampling Method	Low Flow
Remarks	Sample time @ 1634
	DTW final = 34.53

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	HCl, Cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. HR-9 Time Pump Started 1618

Depth of Sampling 64' Date 9/13/04

Parameters	Time									
	1621	1624	1627	1630	1633					
Redox Potential (millivolts)	181.0	173.0	158.0	145.0	136.0					
Dissolved Oxygen (mg/L)	1.40	0.51	0.11	0.00	0.00					
pH (s.u.)	6.95	6.94	6.94	6.96	6.96					
Specific Conductance (uS/cm)	1,400	1,400	1,410	1,410	1,400					
Temperature (C)	15.00	15.00	14.90	15.00	15.00					

Flow Rate 1200 mL/min Total Depth of Well: 70.03

Time Sampled 1634 Depth to Water Before Purging: 34.53

Total Water Pumped 5 gallons Depth to Water After Purging: 34.53

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/20/2004		
Site/Well No.	HR-10	Replicate No.	DUP-142	Code No.	N/A		
Weather	Sunny, 80°	Sampling Time:	Begin 1337	End	1405		

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	742.81
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	126.40
Depth to Water (ft bmp)	34.03
Water-Level Elevation (ft)	708.78
Water Column in Well (ft)	92.37
Casing Diameter/Type	2"
Gallons in Well	14.78
Gallons Pumped/Bailed Prior to Sampling	7 Pumped
Sample Pump Intake Setting (ft bmp)	121'
Purge Time	begin 1337 end 1358
Pumping Rate	1000 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	6.92
Conductivity (mS/cm)	N/A
(µS/cm)	1,280
Turbidity (NTU)	NR
Temperature (°C)	15.60
Dissolved Oxygen (mg/L)	0.0
ORP (mV)	-1240
Sampling Method	Low Flow
Remarks	Sample time @ 1359
	DTW final = 34.01

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3 (3)	HCl, Cool

Sampling Personnel K. Dombrauckas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. HR-10 Time Pump Started 1337

Depth of Sampling 121' Date 9/20/04

Parameters	Time									
	1340	1343	1346	1349	1352	1355	1358			
Redox Potential (millivolts)	-121.0	-119.0	-118.0	-119.0	-120.0	-122.0	-124.0			
Dissolved Oxygen (mg/L)	1.72	0.60	0.30	0.20	0.11	0.00	0.00			
pH (s.u.)	7.02	6.90	6.85	6.85	6.87	6.90	6.92			
Specific Conductance (uS/cm)	1,320	1,320	1,310	1,300	1,300	1,320	1,280			
Temperature (C)	15.10	15.40	15.60	15.60	15.70	15.50	15.60			

Flow Rate 1000 mL/min Total Depth of Well: 126.40

Time Sampled 1359 Depth to Water Before Purging: 34.03

Total Water Pumped 7 gallons Depth to Water After Purging: 34.01

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/15/2004		
Site/Well No.	HR-11	Replicate No.	N/A	Code No.	N/A		
Weather	Sunny, 80°	Sampling Time:	Begin 11:10	End	11:39		

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	743.33
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	69.13
Depth to Water (ft bmp)	34.28
Water-Level Elevation (ft)	709.05
Water Column in Well (ft)	34.85
Casing Diameter/Type	2"
Gallons in Well	5.58
Gallons Pumped/Bailed Prior to Sampling	5 Pumped
Sample Pump Intake Setting (ft bmp)	64'
Purge Time	begin 11:10 end 11:28
Pumping Rate	800 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	6.80
Conductivity (mS/cm)	N/A
(µS/cm)	1,190
Turbidity (NTU)	NR
Temperature (°C)	16.70
Dissolved Oxygen (mg/L)	0.0
ORP (mV)	27.0
Sampling Method	Low Flow

Remarks	Sample time @ 11:29
	DTW final = 34.28

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	HCl, Cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. HR-11 Time Pump Started 11:10

Depth of Sampling 64' Date 9/15/04

Parameters	Time									
	11:13	11:16	11:19	11:22	11:25	11:28				
Redox Potential (millivolts)	35.0	31.0	30.0	28.0	28.0	27.0				
Dissolved Oxygen (mg/L)	1.09	0.22	0.17	0.04	0.00	0.00				
pH (s.u.)	6.81	6.78	6.78	6.79	6.79	6.80				
Specific Conductance (uS/cm)	1,200	1,190	1,190	1,190	1,190	1,190				
Temperature (C)	16.30	16.50	16.40	16.60	16.80	16.70				

Flow Rate 800 mL/min Total Depth of Well: 69.13

Time Sampled 11:29 Depth to Water Before Purging: 34.28

Total Water Pumped 5 gallons Depth to Water After Purging: 34.28

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/21/2004		
Site/Well No.	HR-12	Replicate No.	N/A	Code No.	N/A		
Weather	Sunny, 85°	Sampling Time:	Begin 1623	End	1659		

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	742.64
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	132.00
Depth to Water (ft bmp)	33.78
Water-Level Elevation (ft)	708.86
Water Column in Well (ft)	98.22
Casing Diameter/Type	4"
Gallons in Well	63.84
Gallons Pumped/Bailed Prior to Sampling	6 Pumped
Sample Pump Intake Setting (ft bmp)	125'
Purge Time	begin 1623 end 1651
Pumping Rate	600 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	7.01
Conductivity (mS/cm)	N/A
(µS/cm)	1,420
Turbidity (NTU)	NR
Temperature (°C)	16.50
Dissolved Oxygen (mg/L)	0.0
ORP (mV)	-109
Sampling Method	Low Flow
Remarks	Sample time @ 1652
	DTW final = 33.78
	RB-120 Taken

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	HCl, Cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. HR-12 Time Pump Started 1623

Depth of Sampling 125' Date 9/21/04

Parameters	Time										
	1624	1630	1633	1636	1639	1642	1645	1648	1651		
Redox Potential (millivolts)	-62.0	-98.0	-99.0	-101.0	-103.0	-104.0	-105.0	-108.0	-109.0		
Dissolved Oxygen (mg/L)	5.47	1.24	0.91	0.61	0.39	0.27	0.20	0.06	0.00		
pH (s.u.)	7.25	7.02	7.00	7.00	7.00	7.00	7.01	7.01	7.01		
Specific Conductance (uS/cm)	1,380	1,430	1,430	1,420	1,420	1,420	1,420	1,420	1,420		
Temperature (C)	17.20	16.20	16.30	16.60	16.70	16.80	16.50	16.60	16.50		

Flow Rate 600 mL/min Total Depth of Well: 132.00

Time Sampled 1652 Depth to Water Before Purging: 33.78

Total Water Pumped 6 gallons Depth to Water After Purging: 33.78

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/21/2004		
Site/Well No.	HR-13	Replicate No.	N/A	Code No.	N/A		
Weather	Sunny, 65°	Sampling Time:	Begin 9:31	End	9:58		

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	735.03
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	86.20
Depth to Water (ft bmp)	27.42
Water-Level Elevation (ft)	707.61
Water Column in Well (ft)	58.78
Casing Diameter/Type	4"
Gallons in Well	38.20
Gallons Pumped/Bailed Prior to Sampling	7 Pumped
Sample Pump Intake Setting (ft bmp)	81'
Purge Time	begin 9:31 end 9:50
Pumping Rate	800 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	6.97
Conductivity (mS/cm)	N/A
(µS/cm)	1,240
Turbidity (NTU)	NR
Temperature (°C)	15.10
Dissolved Oxygen (mg/L)	0.0
ORP (mV)	76.0
Sampling Method	Low Flow
Remarks	Sample time @ 9:51
	DTW final = 27.43

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	HCl, Cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. HR-13 Time Pump Started 9:31

Depth of Sampling 81' Date 9/21/04

Parameters	Time									
	9:32	9:35	9:38	9:41	9:44	9:47	9:50			
Redox Potential (millivolts)	117.0	109.0	97.0	88.0	82.0	78.0	76.0			
Dissolved Oxygen (mg/L)	8.93	1.12	0.42	0.21	0.06	0.00	0.00			
pH (s.u.)	7.23	6.99	6.96	6.96	6.96	6.97	6.97			
Specific Conductance (uS/cm)	1,230	1,260	1,260	1,260	1,250	1,250	1,240			
Temperature (C)	14.40	14.50	14.80	14.90	15.10	15.10	15.10			

Flow Rate 800 mL/min Total Depth of Well: 86.20

Time Sampled 9:51 Depth to Water Before Purging: 27.42

Total Water Pumped 7 gallons Depth to Water After Purging: 27.43

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/21/2004		
Site/Well No.	HR-15	Replicate No.	N/A	Code No.	N/A		
Weather	Sunny, 65°	Sampling Time:	Begin 8:49	End	9:15		

Evacuation Data

Measuring Point	* Top of PVC Casing
MP Elevation (ft)	733.74
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	102.35
Depth to Water (ft bmp)	26.44
Water-Level Elevation (ft)	707.30
Water Column in Well (ft)	75.91
Casing Diameter/Type	4"
Gallons in Well	49.34
Gallons Pumped/Bailed Prior to Sampling	8 Pumped
Sample Pump Intake Setting (ft bmp)	97'
Purge Time	begin 8:49 end 9:08
Pumping Rate	1200 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	7.16
Conductivity (mS/cm)	N/A
(µS/cm)	1020
Turbidity (NTU)	NR
Temperature (°C)	15.50
Dissolved Oxygen (mg/L)	0.0
ORP (mV)	-123
Sampling Method	Low Flow
Remarks	Sample time @ 9:09
	DTW final = 26.46

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	HCl, Cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. HR-15 Time Pump Started 8:49

Depth of Sampling 97' Date 9/21/04

Parameters	Time									
	8:50	8:53	8:56	8:59	9:02	9:05	9:08			
Redox Potential (millivolts)	-101.0	-110.0	-117.0	-119.0	-122.0	-122.0	-123.0			
Dissolved Oxygen (mg/L)	6.77	0.95	0.34	0.21	0.02	0.00	0.00			
pH (s.u.)	7.19	7.15	7.15	7.15	7.16	7.16	7.16			
Specific Conductance (uS/cm)	1,040	1,040	1,020	1,010	1,000	1,010	1,020			
Temperature (C)	14.90	15.20	15.40	15.50	15.50	15.50	15.50			

Flow Rate 1200 mL/min Total Depth of Well: 102.35

Time Sampled 9:09 Depth to Water Before Purging: 26.44

Total Water Pumped 8 gallons Depth to Water After Purging: 26.46

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio	Date	9/17/2004		
Site/Well No.	HR-17	Replicate No.	N/A	Code No.	N/A
Weather	Overcast, 65°	Sampling Time:	Begin 8:00	End	8:24

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	726.43
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	48.08
Depth to Water (ft bmp)	21.54
Water-Level Elevation (ft)	704.89
Water Column in Well (ft)	26.54
Casing Diameter/Type	4"
Gallons in Well	17.25
Gallons Pumped/Bailed Prior to Sampling	7 Pumped
Sample Pump Intake Setting (ft bmp)	42'
Purge Time	begin 8:00 end 8:18
Pumping Rate	1200 mL/min
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	7.10
Conductivity (mS/cm)	N/A
(µS/cm)	1,160
Turbidity (NTU)	NR
Temperature (°C)	17.40
Dissolved Oxygen (mg/L)	0.39
ORP (mV)	191
Sampling Method	Low flow
Remarks	Sample time @ 8:19
	DTW final = 20.55

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location Moraine, Ohio

Monitoring Well No. HR-17 Time Pump Started 8:00

Depth of Sampling 42' Date 9/17/04

Parameters	Time									
	8:03	8:06	8:09	8:12	8:15	8:18				
Redox Potential (millivolts)	232.0	221.0	212.0	202.0	197.0	191.0				
Dissolved Oxygen (mg/L)	1.16	0.76	0.56	0.46	0.43	0.39				
pH (s.u.)	6.87	6.99	7.05	7.08	7.09	7.10				
Specific Conductance (uS/cm)	1,170	1,170	1,180	1,170	1,160	1,160				
Temperature (C)	17.30	17.30	17.30	17.30	17.30	17.40				

Flow Rate 1200 mL/min Total Depth of Well: 48.08

Time Sampled 8:19 Depth to Water Before Purging: 20.55

Total Water Pumped 7 gallons Depth to Water After Purging: 20.55

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio	Date	9/17/2004		
Site/Well No.	W-2-S	Replicate No.	N/A	Code No.	N/A
Weather	Drizzle, 65°	Sampling Time:	Begin 8:34	End	8:55

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	726.64	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	67.10	pH (s.u.)	7.27
Depth to Water (ft bmp)	21.70	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	704.94	(µS/cm)	1230
Water Column in Well (ft)	45.40	Turbidity (NTU)	NR
Casing Diameter/Type	4"	Temperature (°C)	15.70
Gallons in Well	29.51	Dissolved Oxygen (mg/L)	0.0
Gallons Pumped/Bailed Prior to Sampling	6 Pumped	ORP (mV)	170
Sample Pump Intake Setting (ft bmp)	62'	Sampling Method	Low flow
Purge Time	begin 8:34 end 8:49	Remarks	Sample time @ 8:50
Pumping Rate	800 mL/min		DTW final = 21.70
Evacuation Method	Submersible pump		

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. W-2-S Time Pump Started 8:34

Depth of Sampling 62' Date 9/17/04

Parameters	Time									
	8:37	8:40	8:43	8:46	8:49					
Redox Potential (millivolts)	195.0	189.0	182.0	174.0	170.0					
Dissolved Oxygen (mg/L)	2.29	0.43	0.14	0.00	0.00					
pH (s.u.)	7.32	7.28	7.27	7.27	7.27					
Specific Conductance (uS/cm)	1,260	1,260	1,250	1,240	1,230					
Temperature (C)	15.60	15.70	15.70	15.70	15.70					

Flow Rate 800 mL/min Total Depth of Well: 67.10

Time Sampled 8:50 Depth to Water Before Purging: 21.70

Total Water Pumped 6 gallons Depth to Water After Purging: 21.70

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/17/2004
Site/Well No.	W-3-S	Replicate No.	N/A	Code No.	N/A
Weather	Drizzle, 65°	Sampling Time:	Begin 9:02	End	9:27

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	733.42	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	73.85	pH (s.u.)	7.34
Depth to Water (ft bmp)	24.16	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	709.26	(µS/cm)	1020
Water Column in Well (ft)	49.69	Turbidity (NTU)	NR
Casing Diameter/Type	4"	Temperature (°C)	15.20
Gallons in Well	32.30	Dissolved Oxygen (mg/L)	0.94
Gallons Pumped/Bailed Prior to Sampling	6 Pumped	ORP (mV)	144.0
Sample Pump Intake Setting (ft bmp)	70'	Sampling Method	Low flow
Purge Time	begin 9:02 end 9:20	Remarks	Sample time @ 9:21
Pumping Rate	700 mL/min		DTW final = 24.16
Evacuation Method	Submersible pump		

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl

Sampling Personnel K. Dombrauckas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. W-3-S Time Pump Started 9:02

Depth of Sampling 70' Date 9/17/04

Parameters	Time									
	9:05	9:08	9:11	9:14	9:17	9:20				
Redox Potential (millivolts)	196.0	191.0	172.0	161.0	151.0	144.0				
Dissolved Oxygen (mg/L)	4.00	1.94	1.19	1.06	0.98	0.94				
pH (s.u.)	7.37	7.35	7.34	7.34	7.34	7.34				
Specific Conductance (uS/cm)	1,030	1,030	1,030	1,020	1,020	1,020				
Temperature (C)	15.10	15.20	15.20	15.20	15.20	15.20				

Flow Rate 700 mL/min Total Depth of Well: 73.85

Time Sampled 9:21 Depth to Water Before Purging: 24.16

Total Water Pumped 6 gallons Depth to Water After Purging: 24.16

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/17/2004
Site/Well No.	W-4-S	Replicate No.	N/A	Code No.	N/A
Weather	Overcast, 65°	Sampling Time:	Begin 9:37	End	10:10

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	727.68	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	71.20	pH (s.u.)	7.18
Depth to Water (ft bmp)	22.63	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	705.05	(µS/cm)	1320
Water Column in Well (ft)	48.57	Turbidity (NTU)	NR
Casing Diameter/Type	4"	Temperature (°C)	17.70
Gallons in Well	31.57	Dissolved Oxygen (mg/L)	0.0
Gallons Pumped/Bailed Prior to Sampling	7 Pumped	ORP (mV)	140
Sample Pump Intake Setting (ft bmp)	65'	Sampling Method	Low flow
Purge Time	begin 9:37 end 9:58	Remarks	Sample time @ 9:59
Pumping Rate	1200 mL/min		DTW final = 22.63
Evacuation Method	Submersible pump		

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes			
Gal./Ft.	1-1/4" = 0.06	2" = 0.16	3" = 0.37
	1-1/2" = 0.09	2-1/2" = 0.26	3-1/2" = 0.50
			4" = 0.65
			6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. W-4-S Time Pump Started 9:37

Depth of Sampling 65' Date 9/17/04

Parameters	Time									
	9:40	9:43	9:46	9:49	9:52	9:55	9:58			
Redox Potential (millivolts)	193.0	182.0	172.0	165.0	155.0	147.0	140.0			
Dissolved Oxygen (mg/L)	5.20	0.51	0.25	0.14	0.06	0.00	0.00			
pH (s.u.)	7.21	7.19	7.18	7.18	7.18	7.18	7.18			
Specific Conductance (uS/cm)	1,370	1,360	1,350	1,340	1,320	1,330	1,320			
Temperature (C)	17.60	17.60	17.70	17.70	17.70	17.70	17.70			

Flow Rate 1200 mL/min Total Depth of Well: 71.20

Time Sampled 9:59 Depth to Water Before Purging: 22.63

Total Water Pumped 7 gallons Depth to Water After Purging: 22.63

Comments _____

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/16/2004		
Site/Well No.	WSU-24	Replicate No.	DUP-141	Code No.	N/A		
Weather	Cloudy, 80°	Sampling Time:	Begin 10:50	End	11:10		

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	725.10
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	65.70
Depth to Water (ft bmp)	19.72
Water-Level Elevation (ft)	705.38
Water Column in Well (ft)	45.98
Casing Diameter/Type	2"
Gallons in Well	7.36
Gallons Pumped/Bailed Prior to Sampling	5 Pumped
Sample Pump Intake Setting (ft bmp)	~59'
Purge Time	begin 10:50 end 11:05
Pumping Rate	800 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	7.19
Conductivity (mS/cm)	N/A
(μ S/cm)	1,340
Turbidity (NTU)	NR
Temperature ($^{\circ}$ C)	15.60
Dissolved Oxygen (mg/L)	5.29
ORP (mV)	239.0
Sampling Method	Low Flow
Remarks	Sample time @ 11:06 DTW final = 19.73

[illegible]

Sampling Personnel K. Dombrauckas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nepheometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s. u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. W/SU-24 Time Pump Started 10:50

Depth of Sampling 59' Date 9/16/04

Parameters	Time									
	10:53	10:56	10:59	11:02	11:05					
Redox Potential (millivolts)	247.0	244.0	242.0	240.0	239.0					
Dissolved Oxygen (mg/L)	6.03	5.35	5.32	5.30	5.29					
pH (s.u.)	7.23	7.19	7.18	7.18	7.19					
Specific Conductance (uS/cm)	1,340	1,350	1,350	1,350	1,340					
Temperature (C)	15.80	15.60	15.70	15.70	15.60					

Flow Rate 800 mL/min Total Depth of Well: 65.70

Time Sampled 11:06 Depth to Water Before Purging: 19.72

Total Water Pumped 5 gallons Depth to Water After Purging: 19.73

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/14/2004
Site/Well No.	TW2	Replicate No.	N/A	Code No.	N/A
Weather	Cloudy, 75°	Sampling Time:	Begin 9:50	End	10:18

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	733.38	Odor	Organic
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	42.05	pH (s.u.)	7.38
Depth to Water (ft bmp)	34.63	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	698.75	(µS/cm)	1,870
Water Column in Well (ft)	7.42	Turbidity (NTU)	NR
Casing Diameter/Type	10"	Temperature (°C)	16.7
Gallons in Well	18.2	Dissolved Oxygen (mg/L)	0.0
Gallons Pumped/Bailed Prior to Sampling	6 Pumped	ORP (mV)	-140.0
Sample Pump Intake Setting (ft bmp)	37'	Sampling Method	Low flow
Purge Time	begin 9:50 end 10:11	Remarks	Sample time @ 10:11
Pumping Rate	1000 mL/min		DTW final = 34.63
Evacuation Method	Submersible pump		

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl
As and Ba, total	500 ml plastic	1	Cool, HN03
As and Ba, dissolved	500 ml plastic	1	Cool, HN03

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. TW2 Time Pump Started 9:50

Depth of Sampling 37' Date 9/14/04

Parameters	Time									
	9:58	10:01	10:04	10:07	10:10					
Redox Potential (millivolts)	-127.0	-134.0	-129.0	-137.0	-140.0					
Dissolved Oxygen (mg/L)	0.28	0.02	0.40	0.00	0.00					
pH (s.u.)	7.37	7.38	7.38	7.37	7.38					
Specific Conductance (uS/cm)	1,870	1,880	1,880	1,870	1,870					
Temperature (C)	16.70	16.70	16.70	16.60	16.70					

Flow Rate 1000 mL/min Total Depth of Well: 42.05

Time Sampled 10:11 Depth to Water Before Purging: 34.63

Total Water Pumped 6 gallons Depth to Water After Purging: 34.63

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/16/2004		
Site/Well No.	W-2-N	Replicate No.	N/A	Code No.	N/A		
Weather	Cloudy, 70°	Sampling Time:	Begin 8:00	End	8:22		

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Colorless
MP Elevation (ft)	731.68	Odor	No
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	59.72	pH (s.u.)	7.04
Depth to Water (ft bmp)	24.05	Conductivity (mS/cm)	N/A
		(µS/cm)	1000
Water-Level Elevation (ft)	707.63	Turbidity (NTU)	NR
Water Column in Well (ft)	35.67	Temperature (°C)	14.90
Casing Diameter/Type	4"	Dissolved Oxygen (mg/L)	0.0
Gallons in Well	23.19	ORP (mV)	-96
Gallons Pumped/Bailed Prior to Sampling	8 Pumped	Sampling Method	Low Flow
Sample Pump Intake Setting (ft bmp)	47'	Remarks	Sample time @ 8:16
Purge Time	begin 8:00 end 8:15		DTW final = 24.05
Pumping Rate	1200 mL/min		RB-118 @ 8:30
Evacuation Method	Submersible Pump		

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	HCl, Cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. W-2-N Time Pump Started 8:00

Depth of Sampling 47' Date 9/16/2004

Parameters	Time						
	8:03	8:06	8:09	8:12	8:15		
Redox Potential (millivolts)	-55.0	-74.0	-86.0	-93.0	-96.0		
Dissolved Oxygen (mg/L)	1.00	0.43	0.19	0.00	0.00		
pH (s.u.)	6.84	6.90	6.95	7.01	7.04		
Specific Conductance (uS/cm)	1,100	1,060	1,030	1,030	1,000		
Temperature (C)	14.90	14.80	14.90	14.90	14.90		

Flow Rate 1200 mL/min Total Depth of Well: 59.72

Time Sampled 8:16 Depth to Water Before Purging: 24.05

Total Water Pumped 8 gallons Depth to Water After Purging: 24.05

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1	of	1
Site Location	Moraine, Ohio			Date	9/16/2004		
Site/Well No.	W-3-N	Replicate No.	N/A	Code No.	N/A		
Weather	Sunny, 80°	Sampling Time:	Begin 12:28	End	12:59		

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	733.66
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	57.75
Depth to Water (ft bmp)	28.08
Water-Level Elevation (ft)	705.58
Water Column in Well (ft)	29.67
Casing Diameter/Type	4"
Gallons in Well	19.29
Gallons Pumped/Bailed Prior to Sampling	7 Pumped
Sample Pump Intake Setting (ft bmp)	52'
Purge Time	begin 12:28 end 12:49
Pumping Rate	1200 mL/min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	7.17
Conductivity (mS/cm)	N/A
(µS/cm)	984
Turbidity (NTU)	NR
Temperature (°C)	15.40
Dissolved Oxygen (mg/L)	0.0
ORP (mV)	-129
Sampling Method	Low Flow

Remarks	Sample time @ 12:50
	DTW final = 28.07

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	HCl, Cool

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. W-3-N Time Pump Started 12:28

Depth of Sampling 52' Date 9/16/04

Parameters	Time									
	12:31	12:34	12:37	12:40	12:43	12:46	12:49			
Redox Potential (millivolts)	-111.0	-116.0	-118.0	-120.0	-123.0	-125.0	-129.0			
Dissolved Oxygen (mg/L)	4.14	0.83	0.33	0.18	0.02	0.00	0.00			
pH (s.u.)	7.31	7.12	7.08	7.07	7.09	7.11	7.17			
Specific Conductance (uS/cm)	1,070	1,050	1,030	1,030	1,030	983	984			
Temperature (C)	15.40	15.40	15.40	15.40	15.40	15.40	15.40			

Flow Rate 1200 mL/min Total Depth of Well: 57.75

Time Sampled 12:50 Depth to Water Before Purging: 28.08

Total Water Pumped 7 gallons Depth to Water After Purging: 28.07

Comments _____

ARCADIS

Water Sampling Log

Project	<u>GM Annual Site-Wide GWS 2004</u>	Project No.	<u>OH000294.07.02</u>	Page	<u>1</u>	of	<u>1</u>
Site Location	<u>Moraine, Ohio</u>			Date	<u>9/16/2004</u>		
Site/Well No.	<u>W-4-N</u>	Replicate No.	<u>N/A</u>	Code No.	<u>N/A</u>		
Weather	<u>Sunny, 80°</u>	Sampling Time:	Begin <u>1335</u>	End	<u>1410</u>		

Evacuation Data

Measuring Point	<u>Top of PVC Casing</u>
MP Elevation (ft)	<u>731.63</u>
Land Surface Elevation (ft)	<u>NM</u>
Sounded Well Depth (ft bmp)	<u>66.60</u>
Depth to Water (ft bmp)	<u>23.97</u>
Water-Level Elevation (ft)	<u>707.66</u>
Water Column in Well (ft)	<u>42.63</u>
Casing Diameter/Type	<u>4"</u>
Gallons in Well	<u>27.71</u>
Gallons Pumped/Bailed Prior to Sampling	<u>8 Pumped</u>
Sample Pump Intake Setting (ft bmp)	<u>62'</u>
Purge Time	begin <u>1335</u> end <u>1359</u>
Pumping Rate	<u>600 mL/min</u>
Evacuation Method	<u>Submersible Pump</u>

Field Parameters

Color	<u>Colorless</u>
Odor	<u>No</u>
Appearance	<u>Clear</u>
pH (s.u.)	<u>7.08</u>
Conductivity (mS/cm)	<u>N/A</u>
(µS/cm)	<u>968</u>
Turbidity (NTU)	<u>NR</u>
Temperature (°C)	<u>15.90</u>
Dissolved Oxygen (mg/L)	<u>0.0</u>
ORP (mV)	<u>-37</u>
Sampling Method	<u>Low Flow</u>
Remarks	<u>Sample time @ 1400</u>
	<u>DTW final = 23.97</u>

Constituents Sampled	Container Description	Number	Preservative
Site specific VOCs (8260)	40 ml glass	3	HCl, Cool

Sampling Personnel K. Dombrauckas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. W-4-N Time Pump Started 1335

Depth of Sampling 62' Date 9/16/04

Parameters	Time									
	1338	1341	1344	1347	1350	1353	1356	1359		
Redox Potential (millivolts)	138.0	68.0	32.0	2.0	-12.0	-24.0	-31.0	-37.0		
Dissolved Oxygen (mg/L)	4.01	0.61	0.39	0.17	0.06	0.00	0.00	0.00		
pH (s.u.)	7.12	7.07	7.05	7.04	7.05	7.06	7.07	7.08		
Specific Conductance (uS/cm)	966	974	973	970	969	969	967	968		
Temperature (C)	17.10	16.40	16.40	16.30	16.30	16.20	15.90	15.90		

Flow Rate 600 mL/min Total Depth of Well: 66.60

Time Sampled 1400 Depth to Water Before Purging: 23.97

Total Water Pumped 8 gallons Depth to Water After Purging: 23.97

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/14/2004
Site/Well No.	4S	Replicate No.	DUP-139	Code No.	N/A
Weather	Cloudy, 75°	Sampling Time:	Begin 10:29	End	10:52

Evacuation Data		Field Parameters	
Measuring Point	Top of PVC Casing	Color	Light yellow
MP Elevation (ft)	731.36	Odor	Organic
Land Surface Elevation (ft)	NM	Appearance	Clear
Sounded Well Depth (ft bmp)	66.95	pH (s.u.)	8.63
Depth to Water (ft bmp)	26.80	Conductivity (mS/cm)	N/A
Water-Level Elevation (ft)	704.56	(µS/cm)	3950
Water Column in Well (ft)	40.15	Turbidity (NTU)	NR
Casing Diameter/Type	4"	Temperature (°C)	16.30
Gallons in Well	26.10	Dissolved Oxygen (mg/L)	0.0
Gallons Pumped/Bailed Prior to Sampling	5 pumped	ORP (mV)	-255.0
Sample Pump Intake Setting (ft bmp)	60'	Sampling Method	Low flow
Purge Time	begin 10:29 end 10:42	Remarks	Sample time @ 10:42
Pumping Rate	1000 mL/min		DTW final = 26.80
Evacuation Method	Submersible pump		RB-116 @ 11:00

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3 (3)	Cool, HCl
As and Ba, total	500 ml plastic	1 (1)	Cool, HN03
As and Ba, dissolved	500 ml plastic	1 (1)	Cool, HN03

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes				
Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. 4S Time Pump Started 10:29

Depth of Sampling 60' Date 9/14/04

Parameters	Time						
	10:32	10:35	10:38	10:41			
Redox Potential (millivolts)	-260.0	-260.0	-257.0	-255.0			
Dissolved Oxygen (mg/L)	0.06	0.00	0.00	0.00			
pH (s.u.)	8.62	8.63	8.63	8.63			
Specific Conductance (uS/cm)	4,200	4,120	4,000	3,950			
Temperature (C)	16.20	16.30	16.30	16.30			

Flow Rate 1000 mL/min Total Depth of Well: 66.95

Time Sampled 10:42 Depth to Water Before Purging: 26.80

Total Water Pumped 5 gallons Depth to Water After Purging: 26.80

Comments _____

ARCADIS

Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/13/2004
Site/Well No.	EAST	Replicate No.	N/A	Code No.	N/A
Weather	Sunny, 80°	Sampling Time:	Begin 10:59	End	11:25

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.98
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	71.30
Depth to Water (ft bmp)	24.86
Water-Level Elevation (ft)	706.12
Water Column in Well (ft)	46.44
Casing Diameter/Type	2"
Gallons in Well	7.43
Gallons Pumped/Bailed Prior to Sampling	6 Pumped
Sample Pump Intake Setting (ft bmp)	65'
Purge Time	begin 10:59 end 11:14
Pumping Rate	1000 mL/min
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	7.18
Conductivity (mS/cm)	NK
(µS/cm)	1700
Turbidity (NTU)	NR
Temperature (°C)	17.40
Dissolved Oxygen (mg/L)	0.94
ORP (mV)	195
Sampling Method	Low flow

Remarks	Sample time @ 11:14
	DTW final = 24.84

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO ₃
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO ₃
Chlorides (SM325.2)	250 ml plastic	1	Cool
Sulfide (SM376.1)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM415.1)	40 ml glass vial	2	Cool, H ₂ SO ₄
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml glass vials	2	Cool, BAK

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING GROUNDWATER FIELD PARAMETER LOG

Project Number OH000294.0007.00002

Site Location General Motors Corporation, Moraine, Ohio

Monitoring Well No. EAST Time Pump Started 10:59

Depth of Sampling 65' Date 9/13/04

Parameters	Time						
	11:02	11:05	11:08	11:11	11:14		
Redox Potential (millivolts)	217.0	212.0	207.0	202.0	195.0		
Dissolved Oxygen (mg/L)	1.62	1.20	1.09	1.09	0.94		
pH (s.u.)	7.16	7.16	7.16	7.17	7.18		
Specific Conductance (uS/cm)	1,710	1,710	1,710	1,700	1,700		
Temperature (C)	17.50	17.40	17.40	17.40	17.40		

Flow Rate 1000 mL/min Total Depth of Well: 71.30

Time Sampled 11:14 Depth to Water Before Purging: 24.86

Total Water Pumped 6 gallons Depth to Water After Purging: 24.84

Comments _____

ARCADIS
Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio	Date	9/15/2004		
Site/Well No.	ME-3	Replicate No.	N/A	Code No.	N/A
Weather	Clear, 70°	Sampling Time:	Begin 8:23	End	9:05

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.40
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	36.60
Depth to Water (ft bmp)	25.40
Water-Level Elevation (ft)	705.00
Water Column in Well (ft)	11.20
Casing Diameter/Type	2"
Gallons in Well	1.79
Gallons Pumped/Bailed Prior to Sampling	5 bailed
Sample Pump Intake Setting (ft bmp)	N/A
Purge Time	begin 8:38 end 8:54
Pumping Rate	N/A
Evacuation Method	Disposable bailer

Field Parameters

Color	Orange
Odor	Organic
Appearance	Slightly turbid
pH (s.u.)	6.88
Conductivity (mS/cm)	NK
(µS/cm)	2,130
Turbidity (NTU)	NR
Temperature (°C)	17.40
Dissolved Oxygen (mg/L)	3.12
ORP (mV)	-6.2
Sampling Method	Disposable bailer
Remarks	Sample time @ 8:55
	DTW final = 25.40

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl
As, Ba, Fe, Mn Total (6010A)	500 ml plastic	1	Cool, HNO ₃
As, Ba, Fe, Mn Diss. (6010A)	500 ml plastic	1	Cool, HNO ₃
Chlorides (SM325.2)	250 ml plastic	1	Cool
Sulfide (SM376.1)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM415.1)	40 ml glass vial	2	Cool, H ₂ SO ₄
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml glass vials	2	Cool, BAK

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	GM Annual Site-Wide GWS 2004	Project No.	OH000294.07.02	Page	1 of 1
Site Location	Moraine, Ohio	Date	9/15/2004		
Site/Well No.	ME-6	Replicate No.	N/A	Code No.	N/A
Weather	Sunny, 70°	Sampling Time:	Begin 7:56	End	8:25

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	734.84
Land Surface Elevation (ft)	NM
Sounded Well Depth (ft bmp)	35.60
Depth to Water (ft bmp)	26.41
Water-Level Elevation (ft)	708.43
Water Column in Well (ft)	9.19
Casing Diameter/Type	2"
Gallons in Well	1.47
Gallons Pumped/Bailed Prior to Sampling	5 bailed
Sample Pump Intake Setting (ft bmp)	34'
Purge Time	begin 7:56 end 8:15
Pumping Rate	N/A
Evacuation Method	Disposable bailer

Field Parameters

Color	Olive gray
Odor	Yes
Appearance	Clear w/abundance of black/gray flecks
pH (s.u.)	6.49
Conductivity (mS/cm)	N/A
(µS/cm)	1,710
Turbidity (NTU)	NR
Temperature (°C)	17.40
Dissolved Oxygen (mg/L)	2.51
ORP (mV)	-4
Sampling Method	Disposable bailer
Remarks	Sample time @ 8:15

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO ₃
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO ₃
Chlorides (SM325.2)	250 ml plastic	1	Cool
Sulfide (SM376.1)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM415.1)	40 ml glass vial	2	Cool, H ₂ SO ₄
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml glass vials	2	Cool, Na ₃ PO ₄

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

Gal./Ft.	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
NM	Not Measured	N/A	Not Applicable	µS/cm	Microsiemens per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project GM Annual Site-Wide GWS 2004 Project No. OH000294.07.02 Page 1 of 1
 Site Location Moraine, Ohio Date 9/18/2004
 Site/Well No. MT-69 Replicate No. N/A Code No. N/A
 Weather Cloudy, 60s Sampling Time: Begin 10:30 End 12:20

Evacuation Data

Measuring Point Top of Casing
 MP Elevation (ft) 722.71
 Land Surface Elevation (ft) NM
 Sounded Well Depth (ft bmp) 116.60
 Depth to Water (ft bmp) 19.26
 Water-Level Elevation (ft) 703.78
 Water Column in Well (ft) 97.34
 Casing Diameter/Type 8"
 Gallons in Well 254.06
 Gallons Pumped/Bailed
 Prior to Sampling 762
 Sample Pump Intake
 Setting (ft bmp) 90'
 Purge Time begin 10:36 end 12:06
 Pumping Rate 1.7 gpm
 Evacuation Method Submersible pump

Field Parameters

Color None
 Odor None
 Appearance Clear
 pH (s.u.) NM
 Conductivity (mS/cm) NM
 (µS/cm) NM
 Turbidity (NTU) NM
 Temperature (°C) NM
 Dissolved Oxygen (mg/L) NM
 ORP (mV) NM
 Sampling Method Disposable bailer
 Remarks Sample time @ 12:15

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass vial	3	Cool, HCl

Sampling Personnel N. Gillotti/D. Chattopadhyay

Well Casing Volumes

Gal./Ft. 1-¼" = 0.06 2" = 0.16 3" = 0.37 4" = 0.65
 1-½" = 0.09 2-½" = 0.26 3-½" = 0.50 6" = 1.47

bmp below measuring point ml milliliter NTU Nephelometric Turbidity Units
 °C Degrees Celsius mS/cm Millisiemens per centimeter PVC Polyvinyl chloride
 ft feet msl mean sea-level s.u. Standard units
 NM Not Measured N/A Not Applicable µS/cm Microsiemens per centimeter
 mg/L Milligrams per liter NR Not Recorded VOC volatile Organic Compounds

Appendix C

Groundwater Analytical Database for
2004

ARCADIS

Table C-1. Groundwater Analytical Results for April 2004, General Motors Corporation, Moraine, Ohio.

		GM-28 4/30/04 Upper Aquifer	DUP 134 4/30/04 QA/QC	GM-41 4/30/04 Lower Aquifer	RB-111 4/30/04 QA/QC	TB-171 4/30/04 QA/QC
	Units					
<u>Volatile Organic Compounds</u>						
Benzene	ug/l	< 1 U	< 1 U	< 8 U	< 1 U	< 1 U
1,1-Dichloroethane	ug/l	3.5	3.5	< 8 U	< 1 U	< 1 U
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 8 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	0.45 J	0.41 J	16	< 0.5 U	< 0.5 U
trans-1,2-Dichloroethene	ug/l	2.2	2.4	< 4 U	< 0.5 U	< 0.5 U
Ethylbenzene	ug/l	< 1 U	< 1 U	< 8 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	< 1 U	< 1 U	< 8 U	< 1 U	< 1 U
Toluene	ug/l	< 1 U	< 1 U	< 8 U	< 1 U	< 1 U
1,1,1-Trichloroethane	ug/l	< 1 U	< 1 U	< 8 U	< 1 U	< 1 U
Trichloroethene	ug/l	1.6	1.7	250	< 1 U	< 1 U
Vinyl chloride	ug/l	< 1 U	< 1 U	< 8 U	< 1 U	< 1 U
Xylene (total)	ug/l	< 1 U	< 1 U	< 8 U	< 1 U	< 1 U

ug/l - Micrograms per liter.

DUP 134 - Duplicate of GM-28.

< - Constituent not detected above
laboratory reporting limit shown.

J - Value is estimated.

RB - Rinseate blank.

TB - Trip blank.

ARCADIS

Table C-2. Groundwater Analytical Results for September 2004, General Motors Corporation, Moraine, Ohio.

		HR-9 9/13/04	HR-11 9/15/04	HR-8 9/13/04	HR-4 9/16/04	W-2-N 9/16/04	W-3-N 9/16/04	W-4-N 9/16/04
	Units	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer
<u>Volatile Organic Compounds</u>								
Benzene	ug/l	< 2 U	< 1 U	< 1 U	< 1 U	< 1 U	< 4 U	< 1 U
1,1-Dichloroethane	ug/l	45	7.3	8.6	0.77 J	0.36 J	< 4 U	1.7
1,1-Dichloroethene	ug/l	1 J	< 1 U	0.32 J	< 1 U	< 1 U	< 4 U	< 1 U
cis-1,2-Dichloroethene	ug/l	17	0.45 J	1.5	< 0.5 U	1.8	120	5.8
trans-1,2-Dichloroethene	ug/l	2.5	< 0.5 U	0.45 J	< 0.5 U	0.2 J	1.6 J	0.38 J
Ethylbenzene	ug/l	< 2 U	< 1 U	< 1 U	< 1 U	< 1 U	< 4 U	< 1 U
Tetrachloroethene	ug/l	< 2 U	2.2	< 1 U	1.3	0.31 J	0.94 J	1.7
Toluene	ug/l	< 2 U	< 1 U	< 1 U	< 1 U	< 1 U	< 4 U	< 1 U
1,1,1-Trichloroethane	ug/l	15	< 1 U	6.4	< 1 U	0.3 J	< 4 U	0.4 J
Trichloroethene	ug/l	13	< 1 U	1	0.5 J	1.4	< 4 U	12
Vinyl chloride	ug/l	0.44 J	< 1 U	< 1 U	< 1 U	< 1 U	6.1	0.49 J
Xylene (total)	ug/l	< 2 U	< 1 U	< 1 U	< 1 U	< 1 U	< 4 U	< 1 U

ug/l - Micrograms per liter.

DUP 138 - Duplicate of HR-1.

DUP 139 - Duplicate of 4S.

DUP 140 - Duplicate of GM-31.

DUP 141 - Duplicate of WSU-24.

DUP 142 - Duplicate of HR-10.

DUP 143 - Duplicate of GM-09.

< - Constituent not detected above
laboratory reporting limit shown.

J - Value is estimated.

RB - Rinseate blank.

TB - Trip blank.

ARCADIS

Table C-2. Groundwater Analytical Results for September 2004, General Motors Corporation, Moraine, Ohio.

		HR-2 9/16/04 Upper Aquifer	HR-5 9/13/04 Upper Aquifer	HR-3 9/16/04 Upper Aquifer	HR-1 9/13/04 Upper Aquifer	DUP 138 9/13/04 QA/QC	GM-30 9/14/04 Upper Aquifer	GM-23 9/14/04 Upper Aquifer
	Units							
<u>Volatile Organic Compounds</u>								
Benzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 UJ	< 1 U	< 40 U	< 500 U
1,1-Dichloroethane	ug/l	5.6	0.43 J	23	2.5	2.5	33 J	< 500 U
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 40 U	< 500 U
cis-1,2-Dichloroethene	ug/l	7.8	4.8	18	24	24	< 20 U	4600
trans-1,2-Dichloroethene	ug/l	1.1	0.44 J	1.8	2.3	2.4	< 20 U	< 250 U
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	530	< 500 U
Tetrachloroethene	ug/l	0.37 J	< 1 U	0.32 J	23	24	< 40 U	6700
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 40 U	< 500 U
1,1,1-Trichloroethane	ug/l	< 1 U	< 1 U	0.27 J	0.56 J	0.56 J	< 40 U	< 500 U
Trichloroethene	ug/l	0.53 J	11	8.1	30	31	< 40 U	1100
Vinyl chloride	ug/l	0.23 J	< 1 U	< 1 U	0.55 J	0.61 J	< 40 U	870
Xylene (total)	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	3000	< 500 U

ug/l - Micrograms per liter.

DUP 138 - Duplicate of HR-1.

DUP 139 - Duplicate of 4S.

DUP 140 - Duplicate of GM-31.

DUP 141 - Duplicate of WSU-24.

DUP 142 - Duplicate of HR-10.

DUP 143 - Duplicate of GM-09.

< - Constituent not detected above
laboratory reporting limit shown.

J - Value is estimated.

RB - Rinseate blank.

TB - Trip blank.

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Table C-2. Groundwater Analytical Results for September 2004, General Motors Corporation, Moraine, Ohio.

		GM-27 9/15/04	GM-29 9/15/04	GM-28 9/15/04	ME-6 9/15/04	GM-31 9/15/04	DUP 140 9/15/04	ME-3 9/15/04
	Units	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	QA/QC	Upper Aquifer
<u>Volatile Organic Compounds</u>								
Benzene	ug/l	< 3.3 U	< 50 U	< 1 U	< 1 U	< 5 U	< 5 U	< 1 U
1,1-Dichloroethane	ug/l	2 J	< 50 U	3.3	6.3	4 J	4.8 J	18
1,1-Dichloroethene	ug/l	< 3.3 U	< 50 U	< 1 U	0.26 J	< 5 U	< 5 U	< 1 U
cis-1,2-Dichloroethene	ug/l	13	1200	0.41 J	14	120	130	2.2
trans-1,2-Dichloroethene	ug/l	< 1.7 U	21 J	1.2	0.56	2.7	4	< 0.5 U
Ethylbenzene	ug/l	< 3.3 U	< 50 U	< 1 U	< 1 U	< 5 U	< 5 U	< 1 U
Tetrachloroethene	ug/l	1.8 J	20 J	0.88 J	5.3	2.5 J	3.6 J	0.21 J
Toluene	ug/l	< 3.3 U	< 50 U	< 1 U	< 1 U	< 5 U	< 5 U	< 1 U
1,1,1-Trichloroethane	ug/l	< 3.3 U	21 J	< 1 U	4.1	1.4 J	1.9 J	0.53 J
Trichloroethene	ug/l	81	440	1.4	9.2	29	35	1.5
Vinyl chloride	ug/l	< 3.3 U	230	0.44 J	2.4	2.4 J	3.8 J	1.1
Xylene (total)	ug/l	< 3.3 U	< 50 U	< 1 U	< 1 U	< 5 U	< 5 U	< 1 U

ug/l - Micrograms per liter.

DUP 138 - Duplicate of HR-1.

DUP 139 - Duplicate of 4S.

DUP 140 - Duplicate of GM-31.

DUP 141 - Duplicate of WSU-24.

DUP 142 - Duplicate of HR-10.

DUP 143 - Duplicate of GM-09.

< - Constituent not detected above
laboratory reporting limit shown.

J - Value is estimated.

RB - Rinseate blank.

TB - Trip blank.

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Table C-2. Groundwater Analytical Results for September 2004, General Motors Corporation, Moraine, Ohio.

		GM-22 9/14/04	GM-19S 9/13/04	EAST 09/13/04	GM-33 09/13/04	GM-35 09/13/04	GM-32 9/14/04	GM-21 9/14/04
	Units	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer
<u>Volatile Organic Compounds</u>								
Benzene	ug/l	< 1 U	< 4 U	< 1 U	< 2 U	< 11 U	< 10 U	< 9.1 U
1,1-Dichloroethane	ug/l	2.1	8.1	0.72 J	5.4	36	3 J	4.2 J
1,1-Dichloroethene	ug/l	< 1 U	1.9 J	0.34 J	1.1 J	4.1 J	< 10 U	3.1 J
cis-1,2-Dichloroethene	ug/l	0.9	61	1.6	9.5	270	< 5 U	56
trans-1,2-Dichloroethene	ug/l	< 0.5 U	2.4	< 0.5 U	0.45 J	9.1	< 5 U	7.9
Ethylbenzene	ug/l	< 1 U	< 4 U	< 1 U	< 2 U	< 11 U	< 10 U	< 9.1 U
Tetrachloroethene	ug/l	2.9	71	40	37	21	< 10 U	< 9.1 U
Toluene	ug/l	< 1 U	< 4 U	< 1 U	< 2 U	< 11 U	< 10 U	< 9.1 U
1,1,1-Trichloroethane	ug/l	1.7	14	5.7	17	17	< 10 U	26
Trichloroethene	ug/l	10	120	23	55	230	< 10 U	180
Vinyl chloride	ug/l	< 1 U	< 4 U	< 1 U	< 2 U	50	< 10 U	< 9.1 U
Xylene (total)	ug/l	< 1 U	< 4 U	< 1 U	< 2 U	< 11 U	< 10 U	< 9.1 U

ug/l - Micrograms per liter.

DUP 138 - Duplicate of HR-1.

DUP 139 - Duplicate of 4S.

DUP 140 - Duplicate of GM-31.

DUP 141 - Duplicate of WSU-24.

DUP 142 - Duplicate of HR-10.

DUP 143 - Duplicate of GM-09.

< - Constituent not detected above
laboratory reporting limit shown.

J - Value is estimated.

RB - Rinseate blank.

TB - Trip blank.

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Table C-2. Groundwater Analytical Results for September 2004, General Motors Corporation, Moraine, Ohio.

		HR-17 9/17/04	W-2-S 9/17/04	W-3-S 9/17/04	W-4-S 9/17/04	GM-8 9/14/04	GM-6 9/14/04	TW-2 9/14/04
	Units	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer	Upper Aquifer
<u>Volatile Organic Compounds</u>								
Benzene	ug/l	< 5 U	< 1 U	< 1 U	< 1 U	4.2	1.7	2.9
1,1-Dichloroethane	ug/l	2 J	1.3	0.21 J	1.2	15	18	22
1,1-Dichloroethene	ug/l	< 5 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	7.1	1.1	< 0.5 U	4.4	< 0.5 U	10	5.5
trans-1,2-Dichloroethene	ug/l	1.6 J	< 0.5 U	< 0.5 U	0.97	1.1	1.9	2
Ethylbenzene	ug/l	< 5 U	< 1 U	< 1 U	< 1 U	19	< 1 U	< 1 U
Tetrachloroethene	ug/l	82	0.55 J	1.2	18	< 1 U	2.6	< 1 U
Toluene	ug/l	< 5 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,1-Trichloroethane	ug/l	< 5 U	1.5	2.4	2.3	< 1 U	< 1 U	< 1 U
Trichloroethene	ug/l	18	6	2.9	13	< 1 U	5.7	1.5
Vinyl chloride	ug/l	< 5 U	< 1 U	< 1 U	< 1 U	0.48 J	3	2.5
Xylene (total)	ug/l	< 5 U	< 1 U	< 1 U	< 1 U	1.1	< 1 U	< 1 U

ug/l - Micrograms per liter.

DUP 138 - Duplicate of HR-1.

DUP 139 - Duplicate of 4S.

DUP 140 - Duplicate of GM-31.

DUP 141 - Duplicate of WSU-24.

DUP 142 - Duplicate of HR-10.

DUP 143 - Duplicate of GM-09.

< - Constituent not detected above
laboratory reporting limit shown.

J - Value is estimated.

RB - Rinseate blank.

TB - Trip blank.

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Table C-2. Groundwater Analytical Results for September 2004, General Motors Corporation, Moraine, Ohio.

		4S 9/14/04 Upper Aquifer	DUP 139 9/14/04 QA/QC	GM-2 9/14/04 Upper Aquifer	GM-16 9/16/04 Upper Aquifer	GM-17 9/15/04 Upper Aquifer	GM-18 9/15/04 Upper Aquifer	WSU-24 9/16/04 Upper Aquifer
	Units							
<u>Volatile Organic Compounds</u>								
Benzene	ug/l	4.5 J	4.5 J	< 1 U	< 3.3 U	< 1 U	< 2 U	< 1 U
1,1-Dichloroethane	ug/l	7.5	7.4	1.6	4.3	4	2.2	< 1 U
1,1-Dichloroethene	ug/l	< 5 U	< 5 U	< 1 U	< 3.3 U	< 1 U	0.46 J	< 1 U
cis-1,2-Dichloroethene	ug/l	< 2.5 U	< 2.5 U	5.6	7.4	11	5.9	< 0.5 U
trans-1,2-Dichloroethene	ug/l	< 2.5 U	0.82 J	0.23 J	1 J	0.64	< 1 U	< 0.5 U
Ethylbenzene	ug/l	4.7 J	4.6 J	< 1 U	< 3.3 U	< 1 U	< 2 U	< 1 U
Tetrachloroethene	ug/l	< 5 U	< 5 U	4	130	3.6	20	1.3
Toluene	ug/l	1.1 J	1.1 J	< 1 U	< 3.3 U	< 1 U	< 2 U	< 1 U
1,1,1-Trichloroethane	ug/l	< 5 U	< 5 U	< 1 U	3.1 J	1.1	5.2	0.58 J
Trichloroethene	ug/l	< 5 U	< 5 U	6.2	90	22	53	8
Vinyl chloride	ug/l	< 5 U	< 5 U	< 1 U	< 3.3 U	0.49 J	< 2 U	< 1 U
Xylene (total)	ug/l	2.4 J	2.4 J	< 1 U	< 3.3 U	< 1 U	< 2 U	< 1 U

ug/l - Micrograms per liter.

DUP 138 - Duplicate of HR-1.

DUP 139 - Duplicate of 4S.

DUP 140 - Duplicate of GM-31.

DUP 141 - Duplicate of WSU-24.

DUP 142 - Duplicate of HR-10.

DUP 143 - Duplicate of GM-09.

< - Constituent not detected above
laboratory reporting limit shown.

J - Value is estimated.

RB - Rinseate blank.

TB - Trip blank.

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Table C-2. Groundwater Analytical Results for September 2004, General Motors Corporation, Moraine, Ohio.

		DUP 141 9/16/04 QA/QC	GM-10 9/14/04 Upper Aquifer	GM-26 9/16/04 Upper Aquifer	HR-10 9/20/04 Lower Aquifer	DUP 142 9/20/04 QA/QC	HR-12 9/21/04 Lower Aquifer	HR-15 9/21/04 Lower Aquifer
	Units							
<u>Volatile Organic Compounds</u>								
Benzene	ug/l	< 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	1.8	< 1 U
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	< 0.5 U	0.38 J	< 0.5 U	< 0.5 U	< 0.5 U	1.2	2.5
trans-1,2-Dichloroethene	ug/l	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	1.3	1.5	1.3	< 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
1,1,1-Trichloroethane	ug/l	0.58 J	1.2	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Trichloroethene	ug/l	8	15	< 1 U	< 1 U	< 1 U	< 1 U	0.38 J
Vinyl chloride	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	1.1	19
Xylene (total)	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U

ug/l - Micrograms per liter.

DUP 138 - Duplicate of HR-1.

DUP 139 - Duplicate of 4S.

DUP 140 - Duplicate of GM-31.

DUP 141 - Duplicate of WSU-24.

DUP 142 - Duplicate of HR-10.

DUP 143 - Duplicate of GM-09.

< - Constituent not detected above
laboratory reporting limit shown.

J - Value is estimated.

RB - Rinseate blank.

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Table C-2. Groundwater Analytical Results for September 2004, General Motors Corporation, Moraine, Ohio.

		HR-13 9/21/04 Lower Aquifer	GM-39 9/20/04 Lower Aquifer	GM-40 9/20/04 Lower Aquifer	GM-41 9/21/04 Lower Aquifer	GM-42 9/20/04 Lower Aquifer	GM-19D 9/20/04 Lower Aquifer	GM-3 9/21/04 Lower Aquifer
	Units							
<u>Volatile Organic Compounds</u>								
Benzene	ug/l	< 1 U	< 1 U	< 1 U	< 6.2 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	ug/l	30	< 1 U	< 1 U	< 6.2 U	0.7 J	< 1 U	1.8
1,1-Dichloroethene	ug/l	0.27 J	< 1 U	< 1 U	< 6.2 U	0.25 J	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	12	< 0.5 U	< 0.5 U	24	16	2	4.9
trans-1,2-Dichloroethene	ug/l	1.5	< 0.5 U	< 0.5 U	< 3.1 U	0.44 J	< 0.5 U	0.75
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 6.2 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 6.2 U	< 1 U	< 1 U	2
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 6.2 U	< 1 U	< 1 U	< 1 U
1,1,1-Trichloroethane	ug/l	2.6	< 1 U	< 1 U	< 6.2 U	< 1 U	0.31 J	1
Trichloroethene	ug/l	21	< 1 U	< 1 U	180	0.43 J	3.5	13
Vinyl chloride	ug/l	0.43 J	1.8	3.2	< 6.2 U	0.92 J	18	< 1 U
Xylene (total)	ug/l	< 1 U	< 1 U	< 1 U	< 6.2 U	< 1 U	< 1 U	< 1 U

ug/l - Micrograms per liter.

DUP 138 - Duplicate of HR-1.

DUP 139 - Duplicate of 4S.

DUP 140 - Duplicate of GM-31.

DUP 141 - Duplicate of WSU-24.

DUP 142 - Duplicate of HR-10.

DUP 143 - Duplicate of GM-09.

< - Constituent not detected above
laboratory reporting limit shown.

J - Value is estimated.

RB - Rinseate blank.

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Table C-2. Groundwater Analytical Results for September 2004, General Motors Corporation, Moraine, Ohio.

		GM-1 9/21/04 Lower Aquifer	GM-15 9/20/04 Lower Aquifer	GM-11 9/21/04 Lower Aquifer	GM-20D 9/21/04 Lower Aquifer	DN-13 9/16/04 Lower Aquifer	GM-9 9/21/04 Lower Aquifer	DUP 143 9/21/04 QA/QC
	Units							
<u>Volatile Organic Compounds</u>								
Benzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1-Dichloroethane	ug/l	< 1 U	1.8	< 1 U	< 1 U	2.2	0.6 J	0.7 J
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	< 0.5 U	1.4	< 0.5 U	< 0.5 U	6.7	0.97	0.83
trans-1,2-Dichloroethene	ug/l	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	0.49 J	< 0.5 U	< 0.5 U
Ethylbenzene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Tetrachloroethene	ug/l	2.1	< 1 U	2.1	2.9	0.44 J	< 1 U	< 1 U
Toluene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
1,1,1-Trichloroethane	ug/l	1.2	< 1 U	0.89 J	0.96 J	0.84 J	1.1	1.2
Trichloroethene	ug/l	35	5.8	33	11	6.8	16	16
Vinyl chloride	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	2.1	< 1 U	< 1 U
Xylene (total)	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U

ug/l - Micrograms per liter.

DUP 138 - Duplicate of HR-1.

DUP 139 - Duplicate of 4S.

DUP 140 - Duplicate of GM-31.

DUP 141 - Duplicate of WSU-24.

DUP 142 - Duplicate of HR-10.

DUP 143 - Duplicate of GM-09.

< - Constituent not detected above
laboratory reporting limit shown.

J - Value is estimated.

RB - Rinseate blank.

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Table C-2. Groundwater Analytical Results for September 2004, General Motors Corporation, Moraine, Ohio.

		MT-69 9/27/04 Lower Aquifer	RB-115 9/13/2004 QA/QC	RB-116 9/14/2004 QA/QC	RB-117 9/15/2004 QA/QC	RB-118 9/16/2004 QA/QC	RB-119 9/16/2004 QA/QC	RB-120 9/21/2004 QA/QC
	Units							
<u>Volatile Organic Compounds</u>								
Benzene	ug/l	< 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
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
trans-1,2-Dichloroethene	ug/l	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Ethylbenzene	ug/l	< 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
Toluene	ug/l	< 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
Trichloroethene	ug/l	< 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
Xylene (total)	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U

ug/l - Micrograms per liter.

DUP 138 - Duplicate of HR-1.

DUP 139 - Duplicate of 4S.

DUP 140 - Duplicate of GM-31.

DUP 141 - Duplicate of WSU-24.

DUP 142 - Duplicate of HR-10.

DUP 143 - Duplicate of GM-09.

< - Constituent not detected above
laboratory reporting limit shown.

J - Value is estimated.

RB - Rinseate blank.

TB - Trip blank.

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Table C-2. Groundwater Analytical Results for September 2004, General Motors Corporation, Moraine, Ohio.

		TB-179 9/13/2004	TB-180 9/14/2004	TB-181 9/15/2004	TB-182 9/16/2004	TB-183 9/17/2004	TB-184 9/21/2004	TB-185 9/27/2004
	Units	QA/QC	QA/QC	QA/QC	QA/QC	QA/QC	QA/QC	QA/QC
<u>Volatile Organic Compounds</u>								
Benzene	ug/l	< 1 U	< 1 U	0.24 J	< 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
1,1-Dichloroethene	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
cis-1,2-Dichloroethene	ug/l	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
trans-1,2-Dichloroethene	ug/l	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U	< 0.5 U
Ethylbenzene	ug/l	< 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
Toluene	ug/l	< 1 U	< 1 U	0.23 J	< 1 U	< 1 U	0.17 J	< 1 U
1,1,1-Trichloroethane	ug/l	< 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
Vinyl chloride	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U
Xylene (total)	ug/l	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U	< 1 U

ug/l - Micrograms per liter.

DUP 138 - Duplicate of HR-1.

DUP 139 - Duplicate of 4S.

DUP 140 - Duplicate of GM-31.

DUP 141 - Duplicate of WSU-24.

DUP 142 - Duplicate of HR-10.

DUP 143 - Duplicate of GM-09.

< - Constituent not detected above
laboratory reporting limit shown.

J - Value is estimated.

RB - Rinseate blank.

TB - Trip blank.

Appendix D

In-Situ Reactive Zones Performance
Results for 2004

In-Situ Reactive Zones Performance Results

As described in Section 3.1.1 of the Site-Wide Groundwater Monitoring Report for 2004 (Monitoring Report), the carbon solution delivery network consists of three reactive zones, RZ-1, RZ-2, and RZ-3 (West and East). During 2004 molasses was introduced into the groundwater through introduction points at RZ-1 and RZ-3 (East and West) shown on Figures 10 and 12 of the Monitoring Report, respectively. No molasses was introduced into RZ-2 (Figure 11) in 2004 based on the operational data that was collected in 2003. 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 and Figures D-1 through D-10, for RZ-1, RZ-2, RZ-3 West and RZ-3 East. The bioattenuation parameter data is presented on Tables 13 through 16 of the Monitoring Report and Figures D-11 through D-18 for RZ-1, RZ-2, RZ-3 West and RZ-3 East, respectively. 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 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, 11, and 12 of the Monitoring Report.

§ At RZ-1, GM-29 is designated as the upgradient monitor well, while GM-28 is designated as the downgradient monitor well. These wells are ideally positioned, relative to estimated

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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 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).

- § At RZ-2, existing monitor wells, screened at the top of the water table, were used for introduction points in this area during the initial phase of this remedial action. After a period of introduction in all ME-series wells, it was decided to stop introducing and the most upgradient (ME-6) and downgradient (ME-3) wells are currently used for RZ-2 monitoring. Groundwater quality was also monitored at GM-31, which is an upper aquifer monitor well screened at the top of the regional clay till, below the introduction zone.
- § For RZ-3 West, monitor wells EAST and GM-19S are used as the upgradient wells. 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.
- § For RZ-3 East, GM-22 is designated as the upgradient monitor well and GM-21 is designated as the downgradient monitor well.

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 2004.

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 during 2004 were in the preferred pH range.

Total Organic Carbon

In 2004, 500 gallons of 10 percent molasses solution was injected into the introduction wells of RZ-1 during January, March through May, August, September, and November, and 750 gallons of 10 percent molasses solution was injected during July. No molasses was injected in RZ-2 during 2004. The introduction wells at RZ-3 West received 750 gallons of 10 percent molasses solution in January through August, and 950 gallons of 10 percent molasses solution in September through December. The introduction wells at RZ-3 East received 750 gallons of 10

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percent molasses solution in July and August, and 950 gallons of 10 percent molasses solution in September through December.

At RZ-1, the reductive dechlorination process is continuing effectively even though the TOC levels at the designated downgradient well, GM-28, is less than 100 milligrams per liter (mg/L), which is considered to be the most effective concentration for a dechlorination reactive zone. Considering the differences in the VOC concentrations at the upgradient well, GM-29, and GM-28, the molasses introduction zone is acting as an effective barrier for reducing the VOC concentrations from approximately 1,930 microgram per liter ($\mu\text{g/L}$) to less than 20 $\mu\text{g/L}$ at GM-28. However, based on the TOC values, it can be said that the carbon is consumed at a high rate and the reactive zone ends at some location in between the RZ-1 introduction wells and GM-28.

As indicated earlier, no molasses was injected in the RZ-2 wells during 2004, resulting in an overall reduction of TOC in this area. Despite a decrease in TOC concentrations, the concentrations of VOCs at ME-3, which is the downgradient monitor well, decreased from approximately 33 $\mu\text{g/L}$ in 2003 to 23 $\mu\text{g/L}$ in 2004.

Increases in TOC concentrations were observed at RZ-3 West downgradient well GM-32 since 2003, and that can be attributed to monthly molasses introductions. Additionally, TOC concentrations observed at further downgradient wells, GM-8 and GM-6, were similar to those observed during 2003. The level of TOC recorded at RZ-3 East downgradient well GM-21 was approximately 2 mg/L, indicating absence of carbon at this location.

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-2, Table 11 for RZ-3 West, and Table 12 for RZ-3 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 for the upgradient and downgradient monitor wells in RZ-1, RZ-2, RZ-3 West and RZ-3 East on Figures D-1 through D-10, respectively.

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

- Comparing the 2004 profiles of chlorinated compounds in the upgradient and downgradient wells in RZ-1 (Figures D-1 and D-2, respectively), it was found that degradation of the chlorinated VOCs was sustained throughout 2004. The concentrations of PCE, TCE, and 1,1,1-TCA are all below 1.5 $\mu\text{g/L}$, while concentrations of vinyl chloride was less than 0.5 $\mu\text{g/L}$. Concentrations of the final end products (ethene and ethane) are similar to that observed during 2003, indicating progress of the dechlorination process. Additionally, a significant increase in ethene concentration was noted at GM-29. This increase in ethene concentration is possibly due to the carbon introduction at the RZ-1 expansion wells (RZ-1J through RZ-1U), which are located west and north of GM-29. The introduction of carbon at these wells is likely resulting

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in a redox recovery zone near GM-29 and the presence of higher ethene and methane concentrations noted in GM-29.

- n The concentrations of PCE, TCE, cis-1,2-DCE, and vinyl chloride at the monitor well ME-3 in RZ-2 decreased to non-detectable levels by the end of 2002. No molasses was injected in 2003 and 2004 in response to the 2002 data. Though a slight increase in total VOCs were observed at the downgradient wells (ME-3 and GM-31) in 2003, total VOCs in both these wells decreased in 2004. The latest data at ME-3 show a total VOC of 23.54 micrograms per liter ($\mu\text{g/L}$), with the maximum contributor being 1,1-DCA (concentration at $18 \mu\text{g/L}$), which is a daughter product of 1,1,1-TCA degradation. Concentrations of TCE detected at GM-31 were close to pre-carbon introduction levels, though cis-1,2-DCE was also detected at GM-31 indicating some on-going degradation. Overall, a decrease in total VOCs were observed at GM-31 in 2004 ($218.8 \mu\text{g/L}$ in 2003 and $162 \mu\text{g/L}$ in 2004). Even though carbon introductions were not completed in 2004, the reduction in VOCs was still noted.
- n At RZ-3 West, concentrations of PCE, TCE, cis-1,2-DCE, and vinyl chloride monitored at GM-32, located within the influence of the introduction zone, remained at non-detectable levels at the end of 2004 (Table 11 of the Monitoring Report). The only VOC detected at GM-32 was 1,1-DCA at a concentration of $3 \mu\text{g/L}$. It is important to note that GM-32 is close to the introduction zone, and VOC results at this location may not reflect the full extent of dechlorination achieved by the reactive zone. The fact that PCE, TCE, cis-1,2-DCE, and vinyl chloride are below detection at GM-32 indicates the dechlorination is proceeding very rapidly in this area.
- n Data from monitor wells GM-8 and GM-6, which are located downgradient of RZ-3 West along the west side of Landfill L1, are also being considered to evaluate the effect of carbon introductions at RZ-3 West. As shown in Figures D-7 and D-8, a significant decrease was noted in total VOCs for GM-8 (total VOCs $40.88 \mu\text{g/L}$) and GM-6 (total VOCs $42.0 \mu\text{g/L}$) compared to the 2003 results. Concentrations of PCE, TCE, and cis-1,2-DCE at GM-8 were below detection limits by the end of 2004. Though GM-6 is located further downgradient, concentrations of PCE and TCE have consistently decreased since 1998. An increase in cis-1,2-DCE and vinyl chloride at GM-6 was observed during September 2002 corresponding with a continuing decrease in parent products. Concentrations of cis-1,2-DCE and vinyl chloride have continued to decrease since then. It is expected that consistent molasses introduction at RZ-3 West will eventually reduce the concentrations of all chlorinated VOCs at GM-6. It is important to realize that though GM-6 is located in the redox recovery zone for RZ-3 West (because of their distance from the introduction zone), the effectiveness of the enhanced reductive dechlorination in this downgradient area may be adversely affected by the proximity of GM-6 to groundwater recovery well TW-2 which draws fresh, oxygenated groundwater into the area, thereby limiting the ability to develop the desired reducing conditions.
- n No significant degradation of VOCs was evident from the data collected from GM-21, which is the downgradient monitor well for RZ-3 East. The lack of dechlorination appears to be linked

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to an absence of TOC at this point, indicating that the reactive zone is not receiving sufficient loading and/or groundwater flow is not directed towards GM-21. GM is proceeding with a plan to enhance the design of the introduction system in RZ-3 East to improve performance in this area. This plan will be submitted to the U.S. EPA under separate cover.

- n 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 molasses in RZ-3 commenced in December 1999. On reviewing the data presented in Figure 5, it is seen that the rate of VOC concentrations reduction increased in approximately January of 2002, two years after carbon introduction began in RZ-3.

Bioattenuation Indicator Parameter Diagrams of Secondary Operational Monitoring Data

Figures D-11 through D-18 show the trends for biogeochemical indicator parameters for RZ-1, RZ-2, RZ-3 West, and RZ-3 East, respectively, as a means of demonstrating the interaction of the bioattenuation indicator parameters discussed above. These indicators show that the biogeochemistry of the upper aquifer at the Moraine facilities has been altered to more reducing conditions, and thereby, more conducive to enhanced reductive dechlorination. These figures have been developed to include dissolved manganese, dissolved iron, sulfate, and methane.

Figures D-11 and D-12 illustrate conditions upgradient and downgradient of the RZ-1 introduction wells, respectively. The shapes of the plots for the two wells in RZ-1 indicate that increases in dissolved manganese and iron coincide with the introduction of molasses, with high levels of the reduced form persisting in the period between introductions. The increase in sulfate concentrations noted at GM-28 coincidental with molasses introduction is probably due to high sulfate content of the molasses itself. Evidence of methanogenesis was also present from the increased levels of methane.

Figures D-13 and D-14 illustrate conditions in RZ-2. No significant trends are noted in these secondary parameters as molasses was not introduced in RZ-2 during 2004.

Figures D-15 and D-16 represent the upgradient and immediate downgradient conditions in RZ-3 West, respectively. Increases in dissolved iron concentrations were found coincident with molasses introduction. On comparing the plots for concentrations of methane, which is the distinct evidence of ongoing methanogenesis, it was found that methane concentrations in GM-32 were significantly higher than the upgradient well. Biogeochemical conditions at GM-8 and GM-6, which are located downgradient to RZ-3 West, are shown in Figures D-17 and D-18. Significant increases in methane production have occurred since molasses introduction has commenced at RZ-3 West wells. Consistent decreases in sulfate concentration in the same period also indicate favorable conditions for the reductive dechlorination process.

The biogeochemical conditions existing at the upgradient and downgradient wells of RZ-3 East are shown in Figures D-19 and D-20. However, as discussed earlier, since the concentration of TOC has remained low at downgradient monitor well GM-21 and no significant trends are noted.

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By-products Formed

Vinyl chloride is one of the daughter products of the reductive dechlorination process of PCE and TCE. As indicated earlier, carbon introduction rates can be adjusted so that the dechlorination of vinyl chloride proceeds at rates more than 20-fold greater than those for cis-1,2-DCE, thus circumventing the formation of a vinyl chloride concentration peak. On reviewing the data collected and the preceding discussion, no vinyl chloride peak was observed in the downgradient monitor wells of RZ-1, RZ-2, and RZ-3 West. A transient peak of vinyl chloride was observed at GM-6 during the September 2002 sampling event; however, the concentrations subsided in 2003.

Arsenic and barium concentrations were monitored in eight wells (GM-28, ME-3, GM-32, GM-21, GM-6, TW-2, 4S, and GM-2). Arsenic concentrations were detected above the Maximum Contaminant Levels (MCLs) at GM-28 and GM-32, and barium concentrations were detected above the MCL at GM-32 only. On comparing the data with that of 2003, a slight increase in the arsenic concentration was noted in GM-6 and TW-2, and a slight increase in barium concentration was noted in ME-3, GM-32, GM-6, and TW-2. Despite the detection of arsenic observed at GM-28 and GM-32 and the detection of barium observed at GM-32, which are located downgradient to RZ-1 and RZ-3 West respectively, concentrations above MCLs were not detected in any of the downgradient wells located at the property boundary. Through the isolated detections of arsenic and barium in 2003 and 2004, GM has demonstrated that these metals do not pose a concern at the site and that MCLs for these metals have not been exceeded at the property boundary wells.

Conclusions

The following observations and conclusions can be made:

- n 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;
- n 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 based on a review of the VOC results;
- n 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, without production of significant vinyl chloride peaks;
- n The primary and secondary operational monitoring data from RZ-2 will continue to be evaluated to determine if the carbon source introduction schedule should be resumed; and
- n VOC concentrations at RZ-3 East have not decreased in response to molasses introductions, in contrast to the other three reaction zone segments. TOC levels, as well as other primary and secondary operational monitoring data, indicate that the effects of molasses introductions are

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not reaching the GM-21 downgradient monitoring location. GM is proceeding with a plan to enhance the design of the introduction system in RZ-3 East to improve performance in this area. This plan will be submitted to the U.S. EPA under separate cover.

Overall, the process of enhanced reductive dechlorination at this site has been successful in achieving the desired reduction of VOC concentrations. GM is proceeding with a plan to enhance the design of the introduction system in RZ-3 East to improve performance in this area to achieve the desired reduction in VOCs.

Figure D-1: Reductive Dechlorination at GM-29 - Upgradient Well in RZ-1

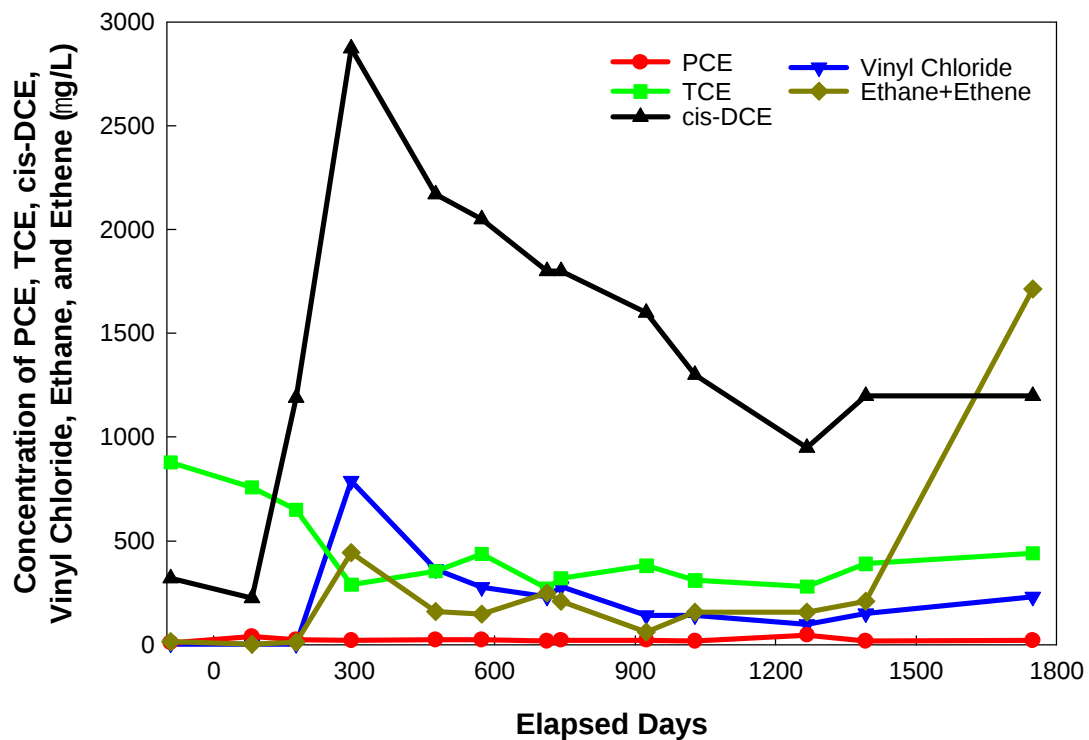


Figure D-2: Reductive Dechlorination at GM-28 - Downgradient Well in RZ-1

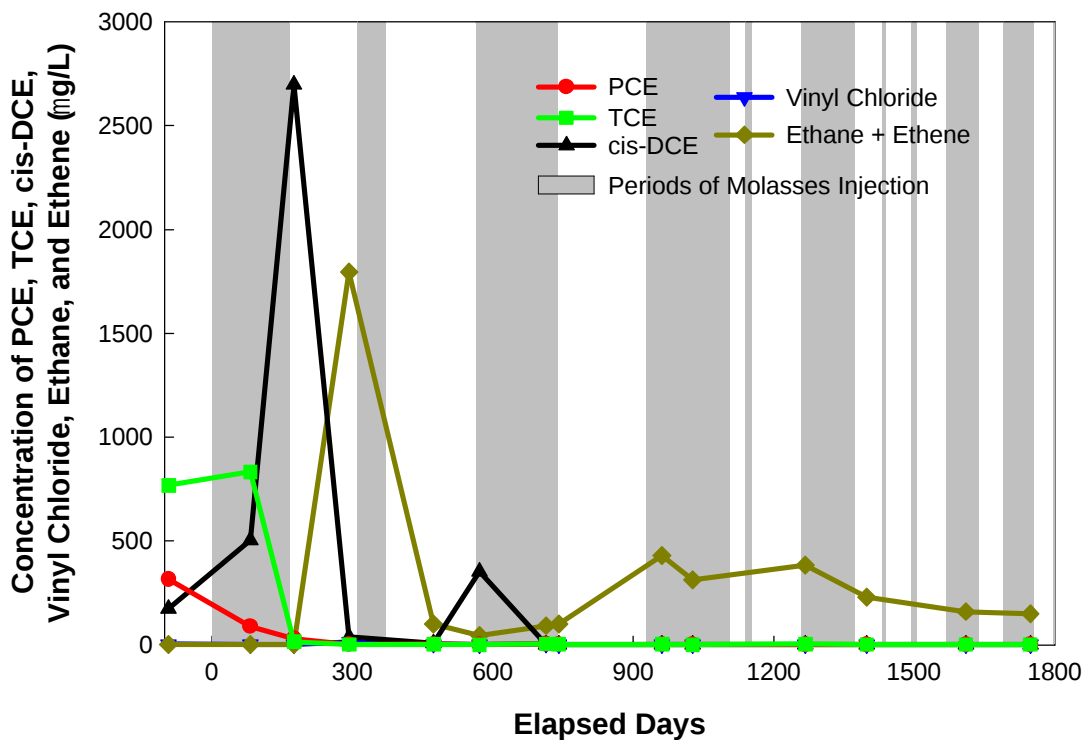


Figure D-3. Reductive Dechlorination at ME-6 - Upgradient Well in RZ-2

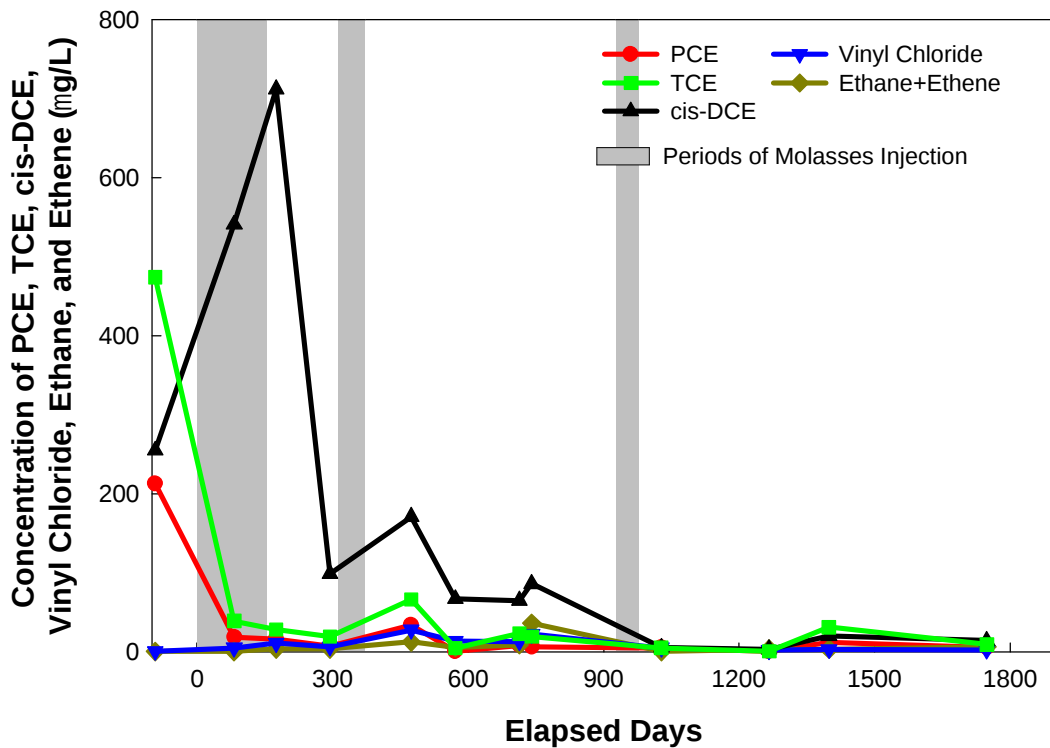


Figure D-4. Reductive Dechlorination at ME-3 - Downgradient Well in RZ-2

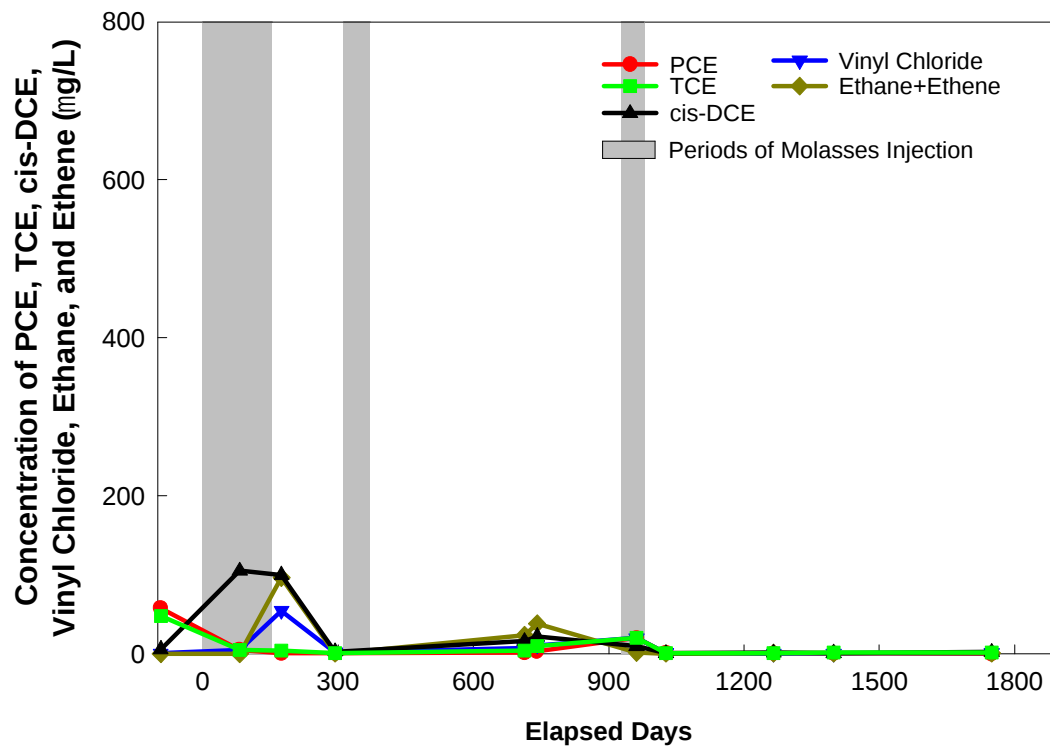


Figure D-5. Reductive Dechlorination at EAST - Upgradient Well in RZ-3 West

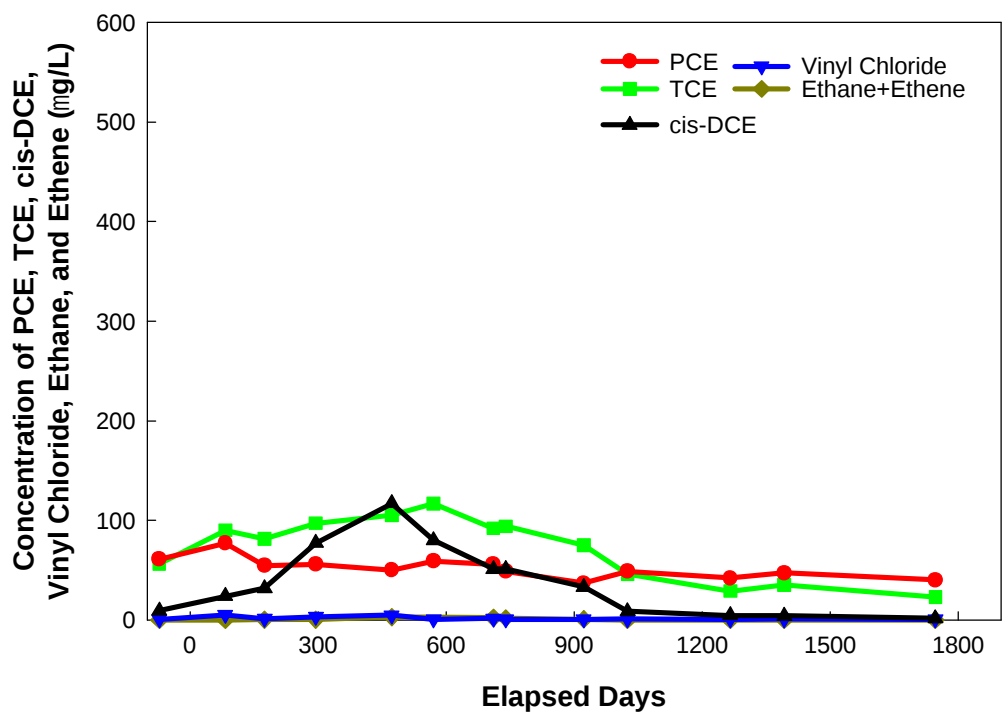


Figure D-6. Reductive Dechlorination at GM-32 - Downgradient Well in RZ-3 West

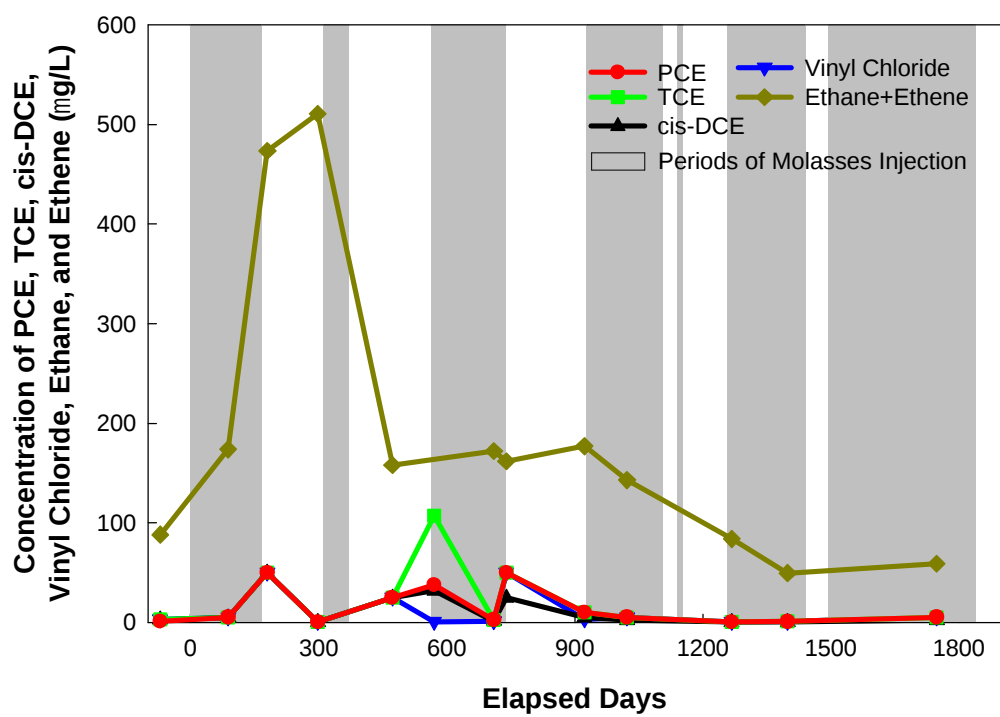


Figure D-7: Reductive Dechlorination at GM-8 - Downgradient to RZ-3 West

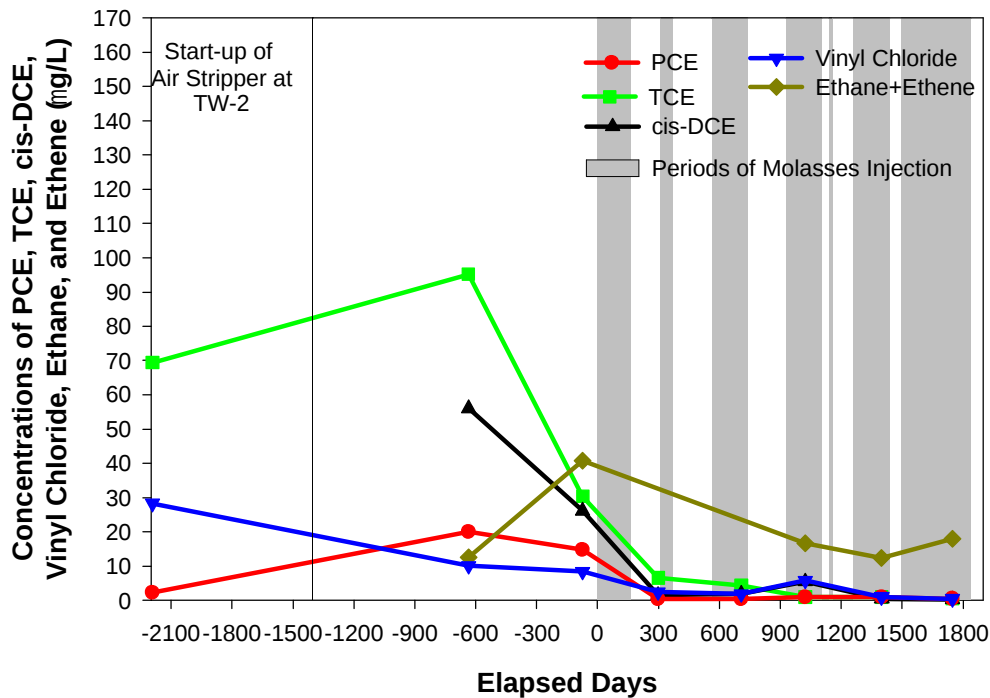


Figure D-8: Reductive Dechlorination at GM-6 - Downgradient to RZ-3 West

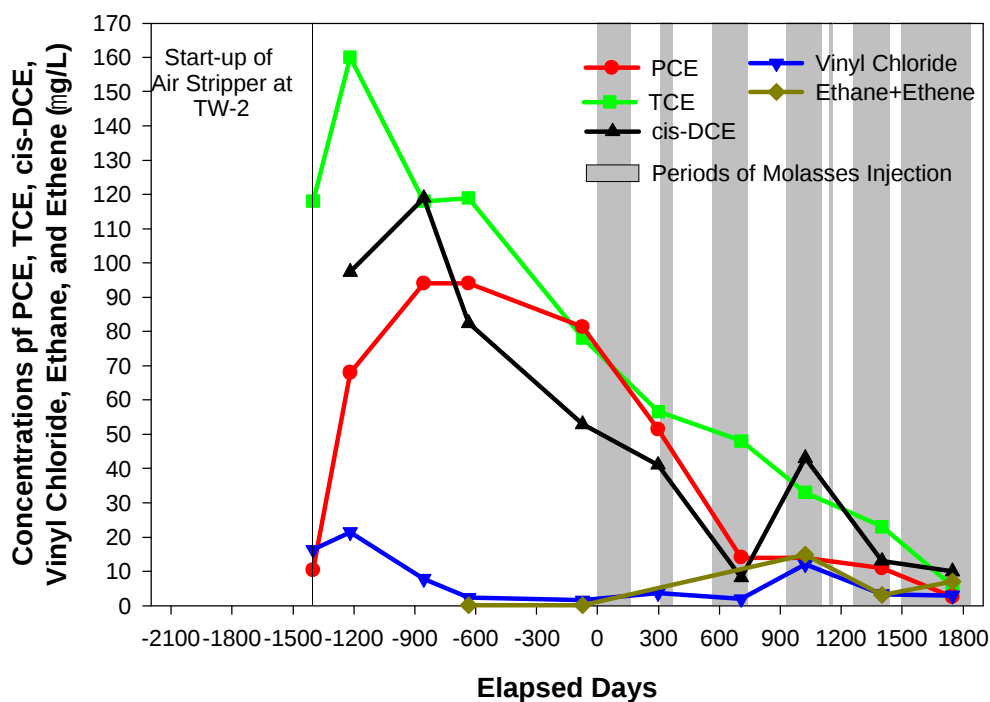


Figure D-9. Reductive Dechlorination at GM-22 - Upgradient Well in RZ-3 East

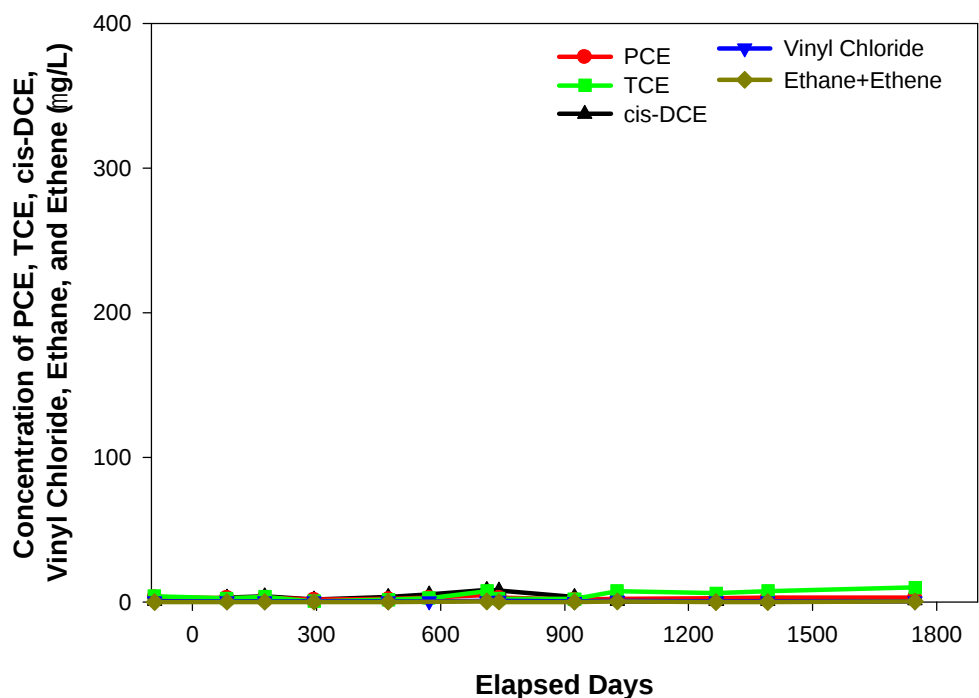


Figure D-10. Reductive Dechlorination at GM-21 - Downgradient Well in RZ-3 East

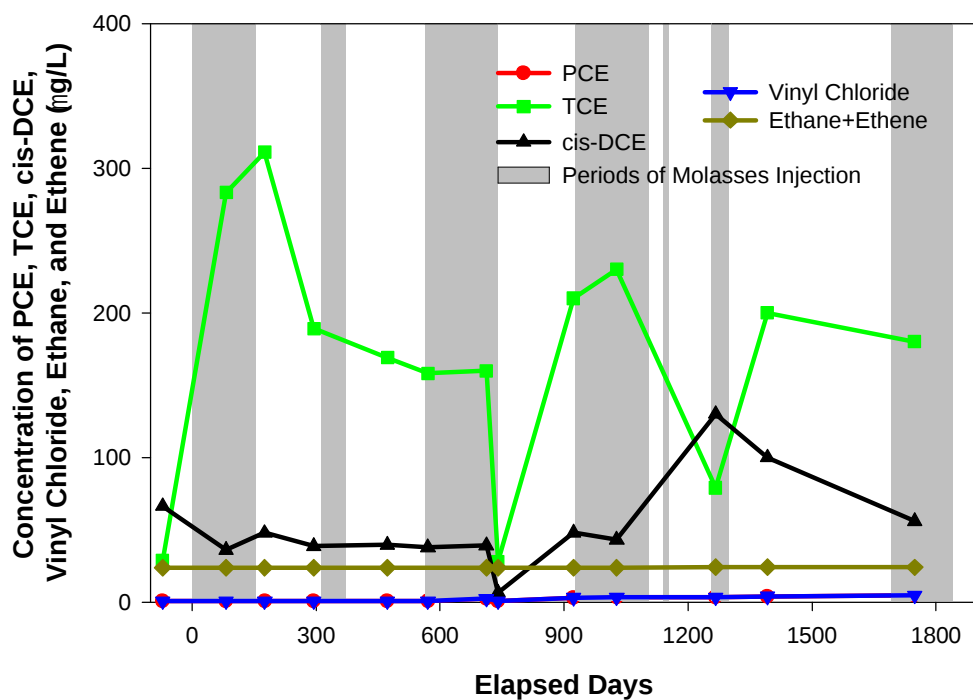


Figure D-11. Bioattenuation Parameters at GM-29 - Upgradient Well in RZ-1

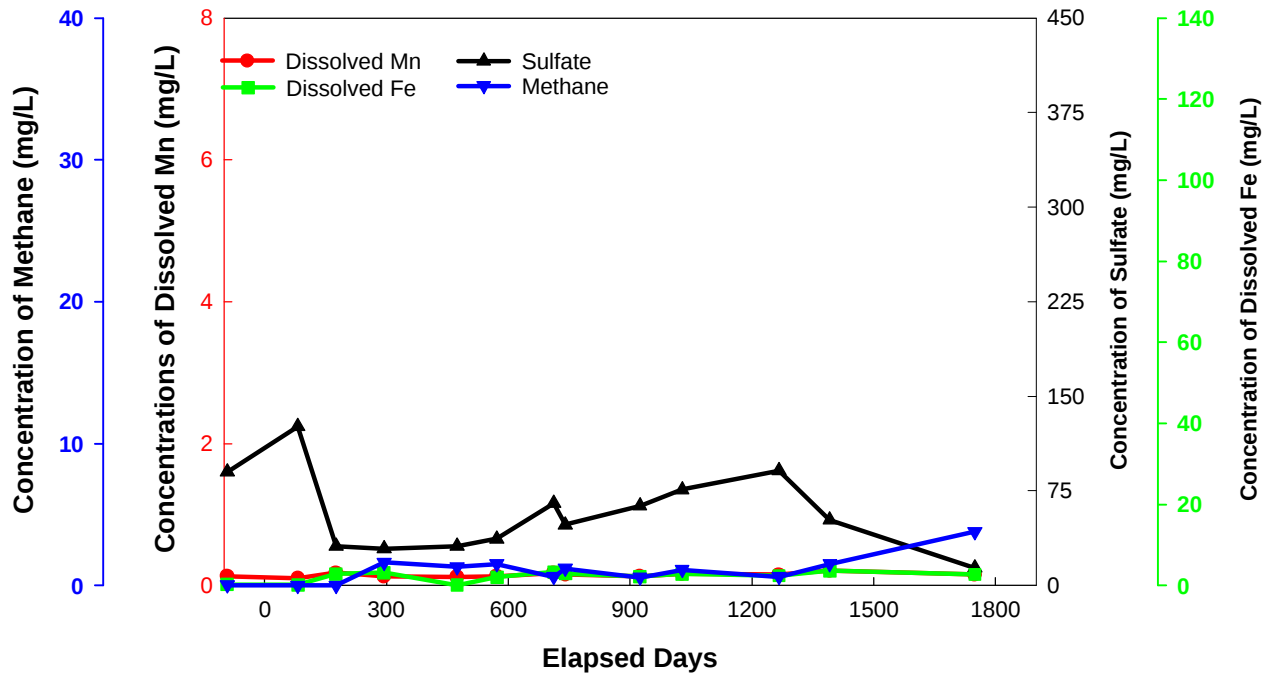


Figure D-12. Bioattenuation Parameters at GM-28 - Downgradient Well in RZ-1

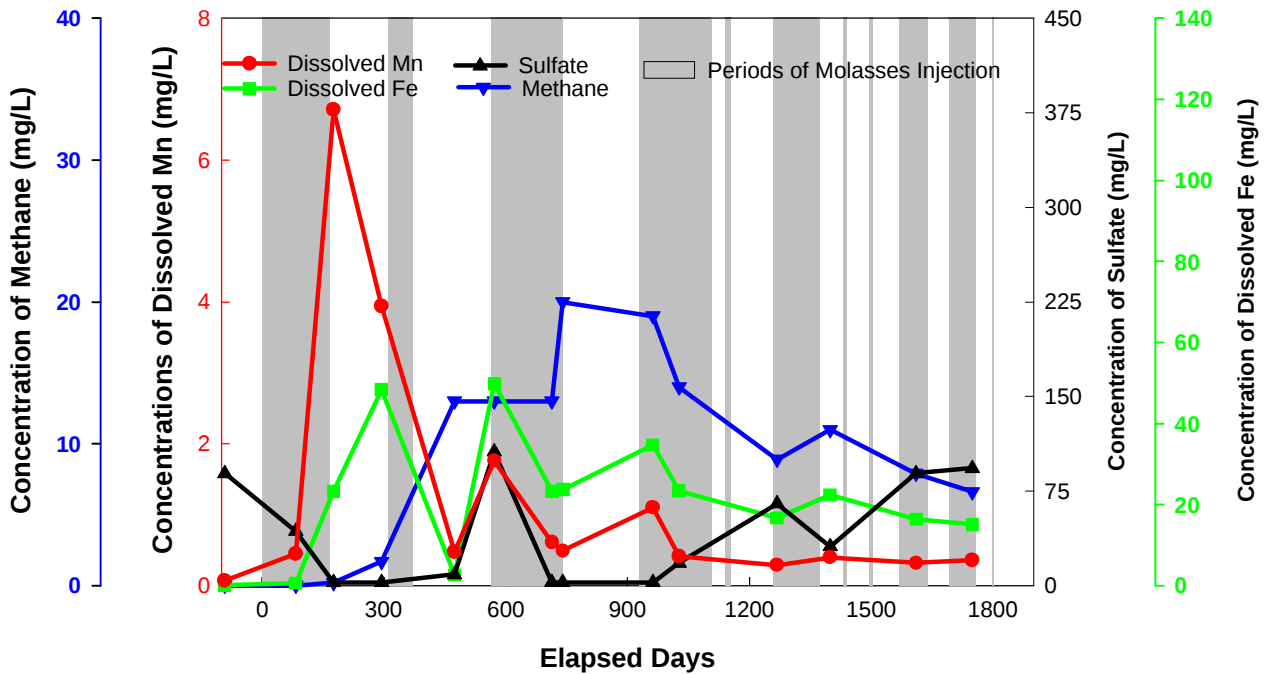


Figure D-13. Bioattenuation Parameters at ME-6 - Upgradient Well in RZ-2

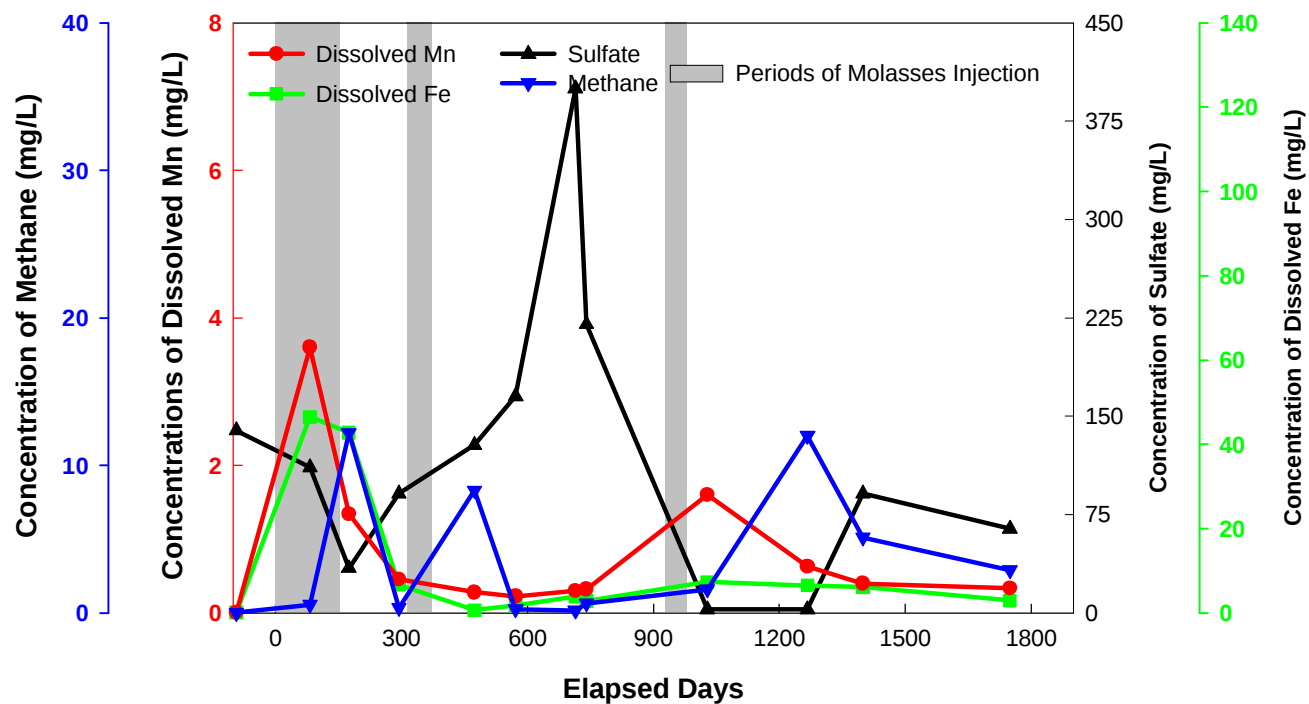


Figure D-14. Bioattenuation Parameters at ME-3 - Downgradient Well in RZ-2

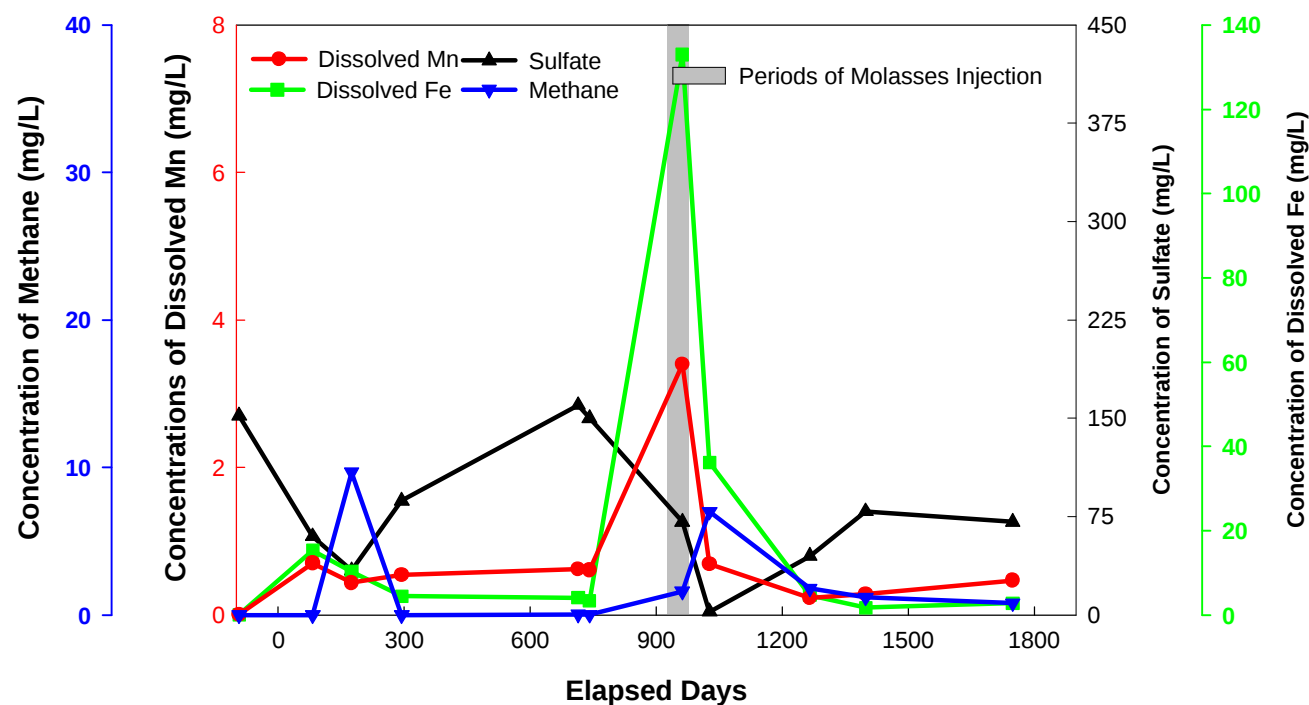


Figure D-15. Bioattenuation Parameters at EAST - Upgradient Well in RZ-3 West

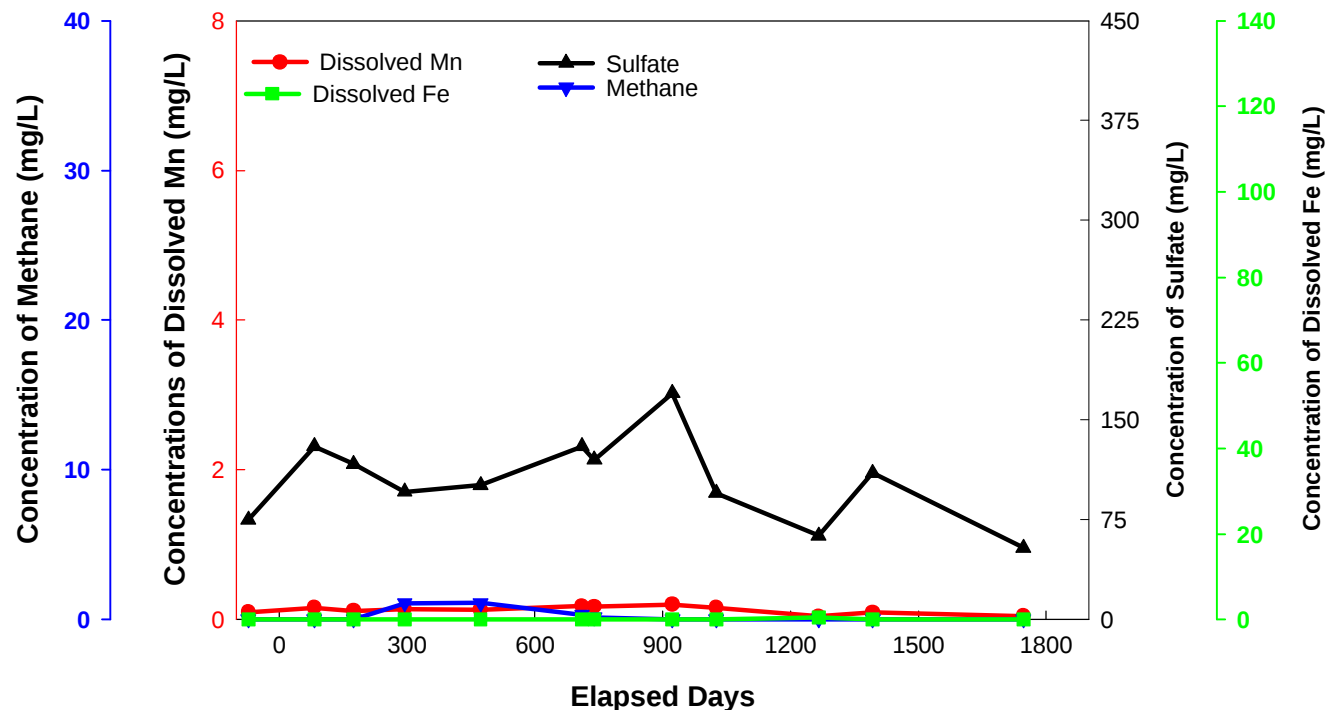


Figure D-16. Bioattenuation Parameters at GM-32 - Downgradient Well in RZ-3 West

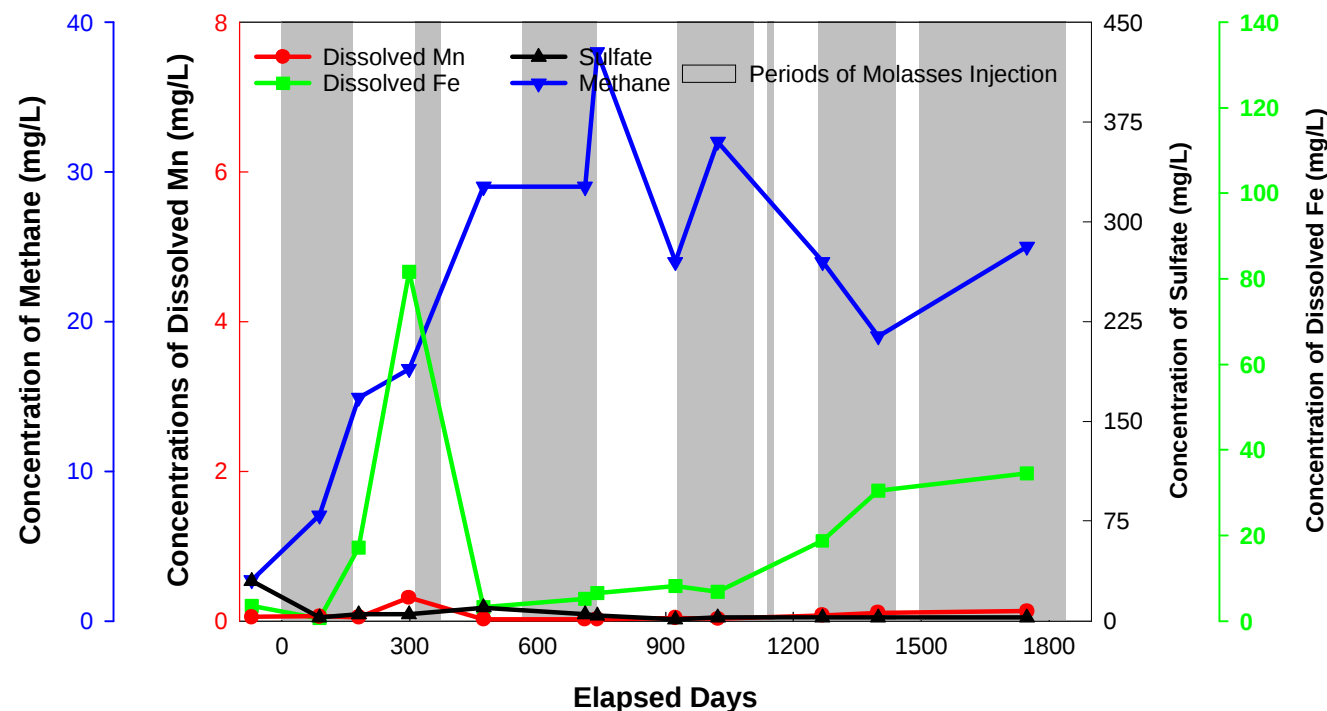


Figure D-17. Bioattenuation Parameters at GM-8 - Downgradient to RZ-3 West

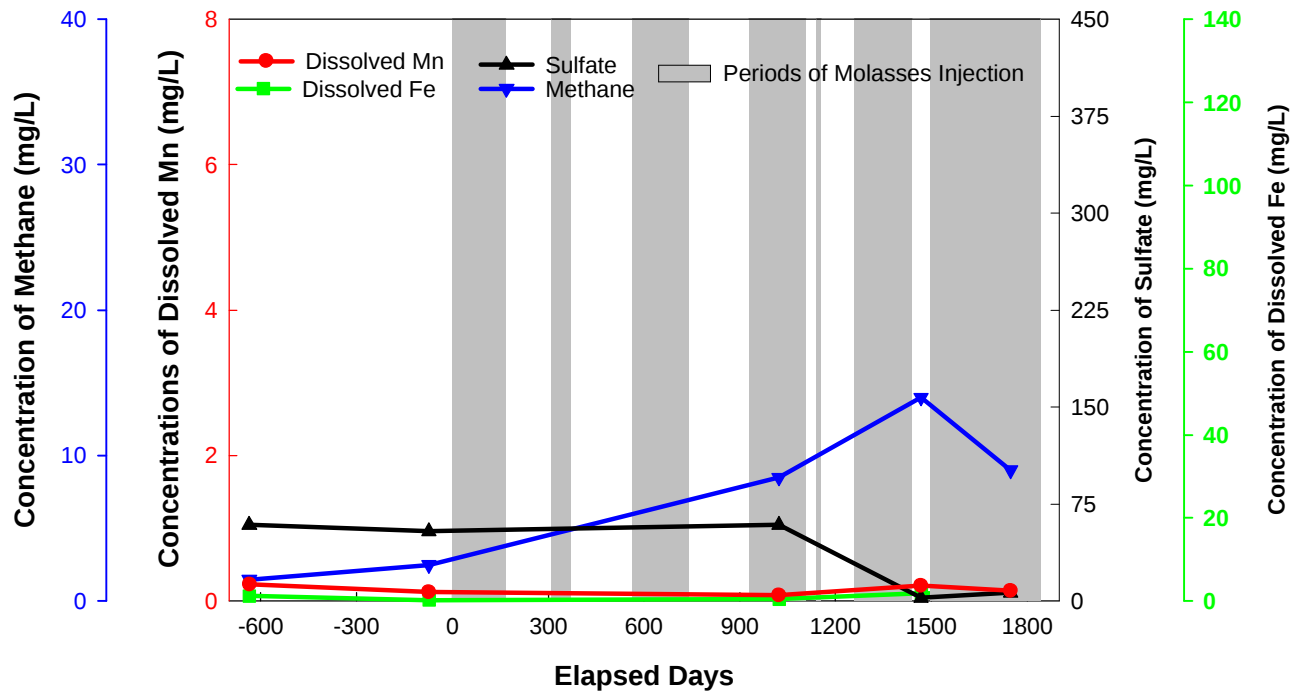


Figure D-18. Bioattenuation Parameters at GM-6 - Downgradient to RZ-3 West

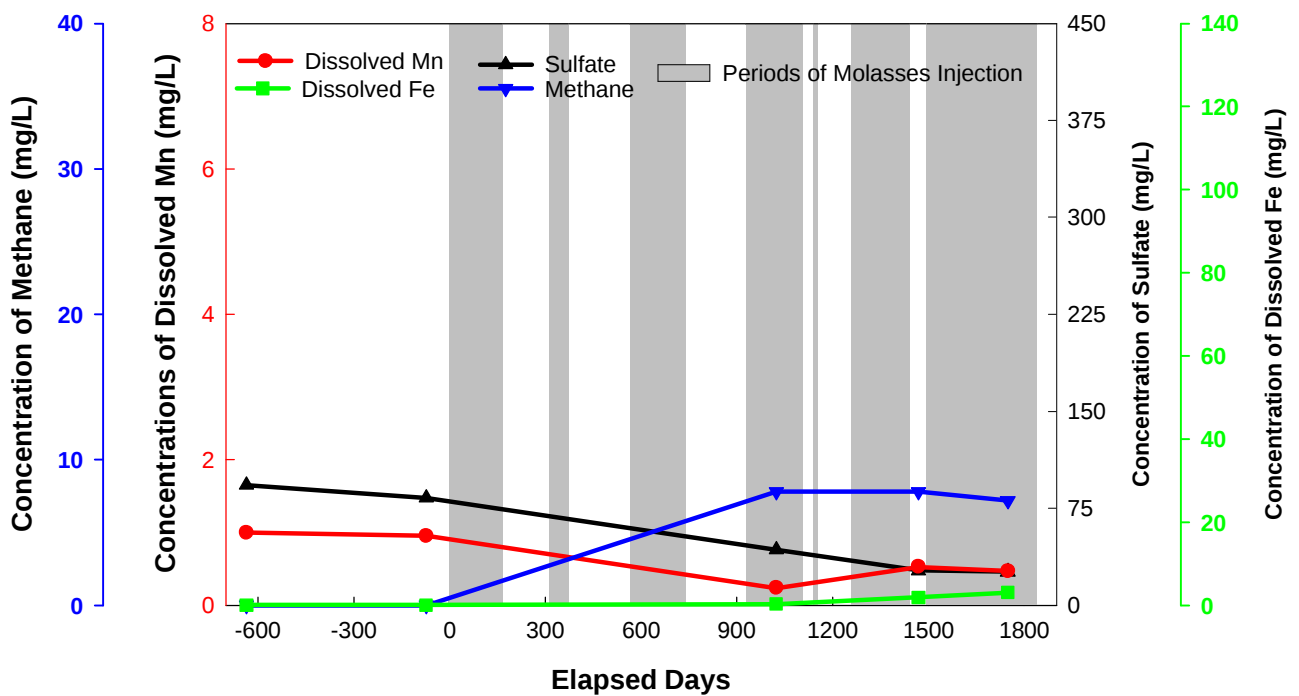


Figure D-19. Bioattenuation Parameters at GM-22 - Upgradient Well in RZ-3 East

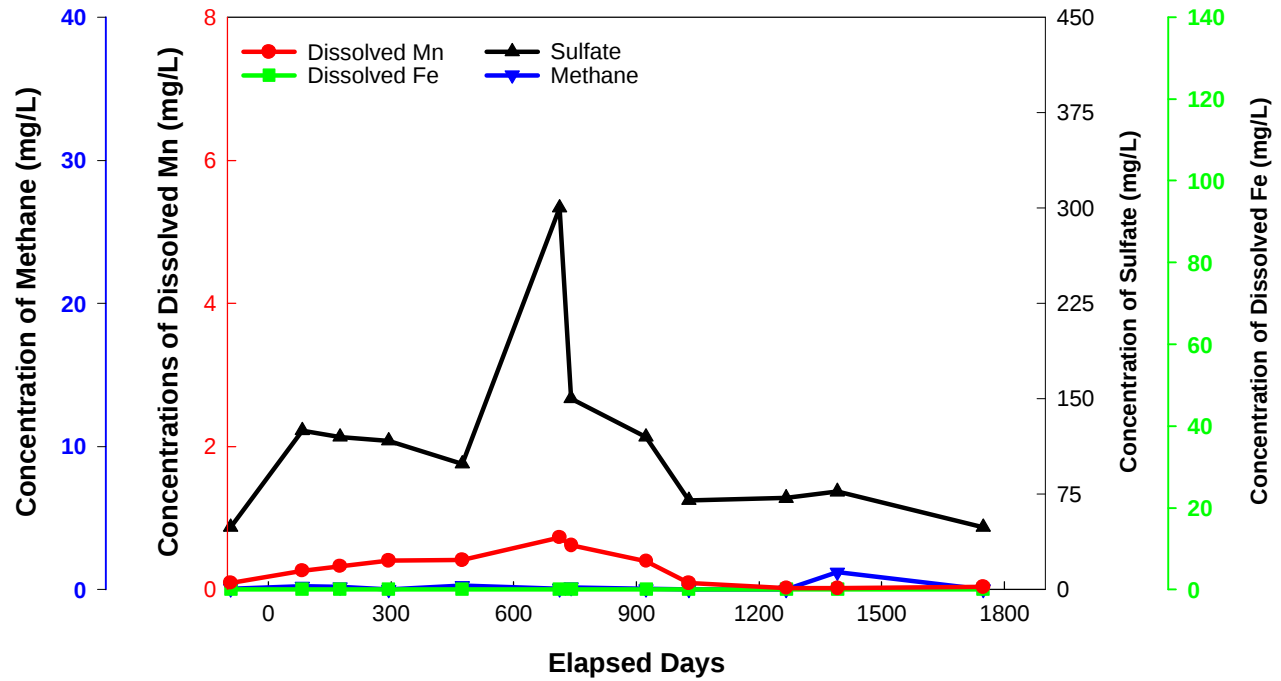
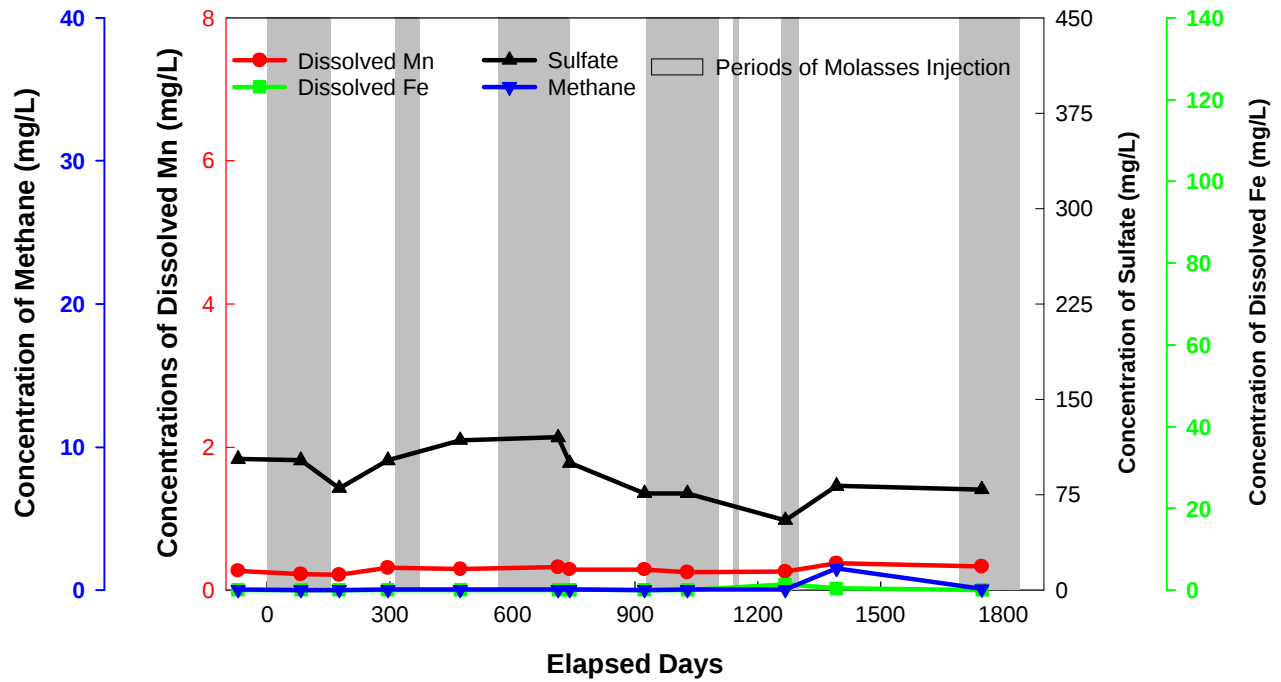


Figure D-20. Bioattenuation Parameters at GM-21 - Downgradient Well in RZ-3 East



Appendix E

Supporting Documentation for Risk
Evaluation

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
Proposed Shallow Well	TW-2	(82,55,1)	166	1.00E+00	9.50E-04	4.56E-03	2.60E-02
Dryden North Well	DW-13	(89,46,3)	1850	8.89E-02	8.13E-05	1.66E-03	8.17E-03
Dryden South Well	DS-7	(98,43,3)	463	1.29E-02	8.09E-06	2.98E-04	1.14E-03
Miami Shores Well Field	MS-14						
	MS-15	(98,38,3)	257	4.03E-03	2.38E-06	9.61E-05	4.01E-04
	MS-16						
	MS-17	(98,35,3)	257	3.88E-03	2.03E-06	9.20E-05	4.21E-04
	MS-18						
	MS-19						
	MS-20	(100,37,3)	257	3.70E-03	1.89E-07	8.53E-05	3.42E-04
Moraine Assembly Production Wells	MS-21	(100,34,3)	257	3.29E-03	1.50E-07	7.65E-05	3.25E-04
	MS-22	(101,33,3)	257	2.79E-03	1.42E-07	5.63E-05	2.62E-04
	11A	(50,94,3)	353	0.00E+00	1.31E-02	5.36E-04	3.67E-05
	12A	(46,93,3)	117	0.00E+00	5.81E-05	5.67E-07	2.55E-08
Moraine Engine Well 28	28	(58,80,3)	235	0.00E+00	7.73E-02	2.06E-02	1.12E-03
Moraine Engine Plant	31	(37,82,3)	35	0.00E+00	1.73E-04	1.31E-07	2.00E-10
	39	(40,81,3)	154	0.00E+00	1.01E-02	1.03E-03	2.26E-05
	44	(29,70,3)	176	0.00E+00	7.12E-06	1.70E-02	0.00E+00
Harrison Production Wells	42	(54,59,3)	176	0.00E+00	1.36E-08	5.88E-05	2.07E-02
	45	(74,56,3)	176	0.00E+00	4.56E-03	4.31E-02	8.02E-02
West Carrollton Well Field	MI-41AP	(111, 21, 3)	347	3.26E-04	0.00E+00	0.00E+00	7.20E-07
	MI-41CP	(111, 20, 3)	347	4.55E-04	0.00E+00	0.00E+00	8.63E-07
	MI-41DP	(112, 19, 3)	347	3.72E-04	1.80E-09	0.00E+00	4.57E-07
Miami River 1	--	--	--	3.94E-03	1.78E-07	0.00E+00	2.16E-04
							8.27E-01

¹ 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 2004 Sampling Data)

SWMU	TCL/TAL Group	Constituent	CASRN	Maximum Downgradient Ground Water Concentration (mg/L)
Landfill L1	VOC	1,1-Dichloroethane	75-34-3	0.022
Landfill L1	VOC	Benzene	71-43-2	0.0045
Landfill L1	VOC	cis-1,2-Dichloroethene	156-59-2	0.0055
Landfill L1	VOC	Ethyl Benzene	100-41-4	0.0047
Landfill L1	VOC	Toluene	108-88-3	0.0011
Landfill L1	VOC	trans-1,2-Dichloroethene	156-60-5	0.002
Landfill L1	VOC	Trichloroethene	79-01-6	0.0015
Landfill L1	VOC	Vinyl Chloride	75-01-4	0.0025
Landfill L1	VOC	Xylenes (total)	1330-20-7	0.0024
Landfill L1	INORG	Arsenic	7440-38-2	0.02
Landfill L1	INORG	Barium	7440-39-3	0.47
Landfill L2	VOC	1,1,1-Trichloroethane	71-55-6	0.0004
Landfill L2	VOC	1,1-Dichloroethane	75-34-3	0.0017
Landfill L2	VOC	cis-1,2-Dichloroethene	156-59-2	0.0058
Landfill L2	VOC	Tetrachloroethene	127-18-4	0.0017
Landfill L2	VOC	trans-1,2-Dichloroethene	156-60-5	0.0004
Landfill L2	VOC	Trichloroethene	79-01-6	0.012
Landfill L2	VOC	Vinyl Chloride	75-01-4	0.0005
Landfill L3	VOC	1,1,1-Trichloroethane	71-55-6	0.0004
Landfill L3	VOC	1,1-Dichloroethane	75-34-3	0.0017
Landfill L3	VOC	cis-1,2-Dichloroethene	156-59-2	0.0058
Landfill L3	VOC	Tetrachloroethene	127-18-4	0.0017
Landfill L3	VOC	trans-1,2-Dichloroethene	156-60-5	0.0004
Landfill L3	VOC	Trichloroethene	79-01-6	0.012
Landfill L3	VOC	Vinyl Chloride	75-01-4	0.0005
North Settling Lagoon	VOC	1,1,1-Trichloroethane	71-55-6	0.0004
North Settling Lagoon	VOC	1,1-Dichloroethane	75-34-3	0.0017
North Settling Lagoon	VOC	cis-1,2-Dichloroethene	156-59-2	0.12
North Settling Lagoon	VOC	Tetrachloroethene	127-18-4	0.0017
North Settling Lagoon	VOC	trans-1,2-Dichloroethene	156-60-5	0.0016
North Settling Lagoon	VOC	Trichloroethene	79-01-6	0.012
North Settling Lagoon	VOC	Vinyl Chloride	75-01-4	0.0061
South Settling Lagoon	VOC	1,1,1-Trichloroethane	71-55-6	0.0024
South Settling Lagoon	VOC	1,1-Dichloroethane	75-34-3	0.0013
South Settling Lagoon	VOC	cis-1,2-Dichloroethene	156-59-2	0.0044
South Settling Lagoon	VOC	Tetrachloroethene	127-18-4	0.018
South Settling Lagoon	VOC	trans-1,2-Dichloroethene	156-60-5	0.001
South Settling Lagoon	VOC	Trichloroethene	79-01-6	0.013

Supporting Calculations										
Table E-3a: Estimated Contributions to Ground Water Concentrations (mg/L) at Moraine Assembly Receptor Point (Pumping Scenario 1)										
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		3.94E-06	1.61E-07	1.10E-08		0.	0.2	
VOC	1,1-Dichloroethane	75-34-3		1.68E-05	6.85E-07	4.69E-08		0.	3.65	
VOC	1,1-Dichloroethene	75-35-4							0.007	
VOC	1,2-Dichloroethene (total)	540-59-0							0.07	
VOC	2-Butanone	78-93-3							21.9	
VOC	Acetone	67-64-1							3.65	
VOC	Benzene	71-43-2							0.005	
VOC	Carbon Disulfide	75-15-0							3.65	
VOC	Chlorobenzene	108-90-7							0.1	
VOC	Chloroethane	75-00-3							0.01	
VOC	Chloroform	67-66-3							0.1	
VOC	cis-1,2-Dichloroethene	156-59-2		5.71E-05	2.34E-06	3.31E-06		0.0001	0.07	
VOC	Ethyl Benzene	100-41-4							0.7	
VOC	Styrene	100-42-5							0.1	
VOC	Tetrachloroethene	127-18-4		1.68E-05	6.85E-07	4.69E-08		0.	0.005	
VOC	Toluene	108-88-3							1.	
VOC	trans-1,2-Dichloroethene	156-60-5		3.74E-06	1.53E-07	4.41E-08		0.	0.1	
VOC	Trichloroethene	79-01-6		1.18E-04	4.83E-06	3.31E-07		0.0001	0.005	
VOC	Trichlorofluoromethane	75-69-4							10.95	
VOC	Vinyl Chloride	75-01-4		4.83E-06	1.97E-07	1.68E-07		0.	0.002	
VOC	Xylenes (total)	1330-20-7							10.	
SVOC	1,2-Dichlorobenzene	95-50-1							0.6	
SVOC	2-Methylnaphthalene	91-57-6							0.73	
SVOC	Benzo(a)anthracene	56-55-3							0.01	
SVOC	Benzo(a)pyrene	50-32-8							0.0002	
SVOC	Benzo(b)fluoranthene	205-99-2							0.01	
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7							0.006	
SVOC	Butylbenzylphthalate	85-68-7							7.3	
SVOC	Chrysene	218-01-9							0.0117	
SVOC	Di-n-butylphthalate	84-74-2							3.65	
SVOC	Fluoranthene	206-44-0							1.46	
SVOC	Fluorene	86-73-7							1.46	
SVOC	Naphthalene	91-20-3							0.73	
SVOC	Phenanthrene	85-01-8							1.095	
SVOC	Pyrene	129-00-0							1.095	
P/PCB	Aroclor-1242	53469-21-9							0.0005	
P/PCB	Aroclor-1254	11097-69-1							0.0005	
P/PCB	Aroclor-1260	11096-82-5							0.0005	
INORG	Antimony	7440-36-0							0.006	
INORG	Arsenic	7440-38-2							0.05	
INORG	Barium	7440-39-3							2.	
INORG	Beryllium	7440-41-7							0.004	
INORG	Cadmium	7440-43-9							0.005	
INORG	Chromium (total)	7440-47-3							0.1	
INORG	Cobalt	7440-48-4							2.19	
INORG	Copper	7440-50-8							1.3	
INORG	Cyanide (total)	57-12-5							0.2	
INORG	Lead	7439-92-1							0.015	
INORG	Manganese	7439-96-5							5.11	
INORG	Mercury	7439-97-6							0.002	
INORG	Nickel	7440-02-0							0.1	
INORG	Selenium	7782-49-2							0.05	
INORG	Silver	7440-22-4							0.1825	
INORG	Thallium	7440-28-0							0.002	
INORG	Vanadium	7440-62-2							0.2555	
INORG	Zinc	7440-66-6							10.95	

Supporting Calculations										
Table E-3b: Estimated Contributions to Ground Water Concentrations (mg/L) at Moraine Engine Receptor Point (Pumping Scenario 1)										
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		3.30E-06	3.36E-07	7.37E-09		0.	0.2	
VOC	1,1-Dichloroethane	75-34-3		1.40E-05	1.43E-06	3.13E-08		0.	3.65	
VOC	1,1-Dichloroethene	75-35-4							0.007	
VOC	1,2-Dichloroethene (total)	540-59-0							0.07	
VOC	2-Butanone	78-93-3							21.9	
VOC	Acetone	67-64-1							3.65	
VOC	Benzene	71-43-2							0.005	
VOC	Carbon Disulfide	75-15-0							3.65	
VOC	Chlorobenzene	108-90-7							0.1	
VOC	Chloroethane	75-00-3							0.01	
VOC	Chloroform	67-66-3							0.1	
VOC	cis-1,2-Dichloroethene	156-59-2		4.79E-05	4.87E-06	2.21E-06		0.0001	0.07	
VOC	Ethyl Benzene	100-41-4							0.7	
VOC	Styrene	100-42-5							0.1	
VOC	Tetrachloroethene	127-18-4		1.40E-05	1.43E-06	3.13E-08		0.	0.005	
VOC	Toluene	108-88-3							1.	
VOC	trans-1,2-Dichloroethene	156-60-5		3.14E-06	3.19E-07	2.95E-08		0.	0.1	
VOC	Trichloroethene	79-01-6		9.91E-05	1.01E-05	2.21E-07		0.0001	0.005	
VOC	Trichlorofluoromethane	75-69-4							10.95	
VOC	Vinyl Chloride	75-01-4		4.05E-06	4.11E-07	1.12E-07		0.	0.002	
VOC	Xylenes (total)	1330-20-7							10.	
SVOC	1,2-Dichlorobenzene	95-50-1							0.6	
SVOC	2-Methylnaphthalene	91-57-6							0.73	
SVOC	Benzo(a)anthracene	56-55-3							0.01	
SVOC	Benzo(a)pyrene	50-32-8							0.0002	
SVOC	Benzo(b)fluoranthene	205-99-2							0.01	
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7							0.006	
SVOC	Butylbenzylphthalate	85-68-7							7.3	
SVOC	Chrysene	218-01-9							0.0117	
SVOC	Di-n-butylphthalate	84-74-2							3.65	
SVOC	Fluoranthene	206-44-0							1.46	
SVOC	Fluorene	86-73-7							1.46	
SVOC	Naphthalene	91-20-3							0.73	
SVOC	Phenanthrene	85-01-8							1.095	
SVOC	Pyrene	129-00-0							1.095	
P/PCB	Aroclor-1242	53469-21-9							0.0005	
P/PCB	Aroclor-1254	11097-69-1							0.0005	
P/PCB	Aroclor-1260	11096-82-5							0.0005	
INORG	Antimony	7440-36-0							0.006	
INORG	Arsenic	7440-38-2							0.05	
INORG	Barium	7440-39-3							2.	
INORG	Beryllium	7440-41-7							0.004	
INORG	Cadmium	7440-43-9							0.005	
INORG	Chromium (total)	7440-47-3							0.1	
INORG	Cobalt	7440-48-4							2.19	
INORG	Copper	7440-50-8							1.3	
INORG	Cyanide (total)	57-12-5							0.2	
INORG	Lead	7439-92-1							0.015	
INORG	Manganese	7439-96-5							5.11	
INORG	Mercury	7439-97-6							0.002	
INORG	Nickel	7440-02-0							0.1	
INORG	Selenium	7782-49-2							0.05	
INORG	Silver	7440-22-4							0.1825	
INORG	Thallium	7440-28-0							0.002	
INORG	Vanadium	7440-62-2							0.2555	
INORG	Zinc	7440-66-6							10.95	

Supporting Calculations										
Table E-3c: Estimated Contributions to Ground Water Concentrations (mg/L) at West Carrollton Receptor Point (Pumping Scenario 1)										
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		2.40E-13		2.72E-10	8.82E-06	0.	0.2	
VOC	1,1-Dichloroethane	75-34-3	8.46E-06	1.02E-12		1.16E-09	4.78E-06	0.	3.65	
VOC	1,1-Dichloroethene	75-35-4							0.007	
VOC	1,2-Dichloroethene (total)	540-59-0							0.07	
VOC	2-Butanone	78-93-3							21.9	
VOC	Acetone	67-64-1							3.65	
VOC	Benzene	71-43-2	1.73E-06					0.	0.005	
VOC	Carbon Disulfide	75-15-0							3.65	
VOC	Chlorobenzene	108-90-7							0.1	
VOC	Chloroethane	75-00-3							0.01	
VOC	Chloroform	67-66-3							0.1	
VOC	cis-1,2-Dichloroethene	156-59-2	2.11E-06	3.48E-12		8.16E-08	1.62E-05	0.	0.07	
VOC	Ethyl Benzene	100-41-4	1.81E-06					0.	0.7	
VOC	Styrene	100-42-5							0.1	
VOC	Tetrachloroethene	127-18-4		1.02E-12		1.16E-09	6.62E-05	0.0001	0.005	
VOC	Toluene	108-88-3	4.23E-07					0.	1.	
VOC	trans-1,2-Dichloroethene	156-60-5	7.69E-07	2.28E-13		1.09E-09	3.57E-06	0.	0.1	
VOC	Trichloroethene	79-01-6	5.77E-07	7.20E-12		8.16E-09	4.78E-05	0.	0.005	
VOC	Trichlorofluoromethane	75-69-4							10.95	
VOC	Vinyl Chloride	75-01-4	9.61E-07	2.94E-13		4.15E-09		0.	0.002	
VOC	Xylenes (total)	1330-20-7	9.22E-07					0.	10.	
SVOC	1,2-Dichlorobenzene	95-50-1							0.6	
SVOC	2-Methylnaphthalene	91-57-6							0.73	
SVOC	Benzo(a)anthracene	56-55-3							0.01	
SVOC	Benzo(a)pyrene	50-32-8							0.0002	
SVOC	Benzo(b)fluoranthene	205-99-2							0.01	
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7							0.006	
SVOC	Butylbenzylphthalate	85-68-7							7.3	
SVOC	Chrysene	218-01-9							0.0117	
SVOC	Di-n-butylphthalate	84-74-2							3.65	
SVOC	Fluoranthene	206-44-0							1.46	
SVOC	Fluorene	86-73-7							1.46	
SVOC	Naphthalene	91-20-3							0.73	
SVOC	Phenanthrene	85-01-8							1.095	
SVOC	Pyrene	129-00-0							1.095	
P/PCB	Aroclor-1242	53469-21-9							0.0005	
P/PCB	Aroclor-1254	11097-69-1							0.0005	
P/PCB	Aroclor-1260	11096-82-5							0.0005	
INORG	Antimony	7440-36-0							0.006	
INORG	Arsenic	7440-38-2	7.69E-06					0.	0.05	
INORG	Barium	7440-39-3	1.81E-04					0.0002	2.	
INORG	Beryllium	7440-41-7							0.004	
INORG	Cadmium	7440-43-9							0.005	
INORG	Chromium (total)	7440-47-3							0.1	
INORG	Cobalt	7440-48-4							2.19	
INORG	Copper	7440-50-8							1.3	
INORG	Cyanide (total)	57-12-5							0.2	
INORG	Lead	7439-92-1							0.015	
INORG	Manganese	7439-96-5							5.11	
INORG	Mercury	7439-97-6							0.002	
INORG	Nickel	7440-02-0							0.1	
INORG	Selenium	7782-49-2							0.05	
INORG	Silver	7440-22-4							0.1825	
INORG	Thallium	7440-28-0							0.002	
INORG	Vanadium	7440-62-2							0.2555	
INORG	Zinc	7440-66-6							10.95	

Supporting Calculations										
Table E-3d: Estimated Contributions to Ground Water Concentrations (mg/L) at Great Miami River Receptor Point (Pumping Scenario 1)										
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		5.38E-15		6.53E-12	1.50E-07	0	0.2	
VOC	1,1-Dichloroethane	75-34-3	6.55E-09	2.29E-14		2.77E-11	8.12E-08	0	3.65	
VOC	1,1-Dichloroethene	75-35-4							0.007	
VOC	1,2-Dichloroethene (total)	540-59-0							0.07	
VOC	2-Butanone	78-93-3							21.9	
VOC	Acetone	67-64-1							3.65	
VOC	Benzene	71-43-2	1.34E-09					0	0.005	
VOC	Carbon Disulfide	75-15-0							3.65	
VOC	Chlorobenzene	108-90-7							0.1	
VOC	Chloroethane	75-00-3							0.01	
VOC	Chloroform	67-66-3							0.1	
VOC	cis-1,2-Dichloroethene	156-59-2	1.64E-09	7.80E-14		1.96E-09	2.75E-07	0	0.07	
VOC	Ethyl Benzene	100-41-4	1.40E-09					0	0.7	
VOC	Styrene	100-42-5							0.1	
VOC	Tetrachloroethene	127-18-4		2.29E-14		2.77E-11	1.12E-06	0	0.005	
VOC	Toluene	108-88-3	3.27E-10					0	1	
VOC	trans-1,2-Dichloroethene	156-60-5	5.95E-10	5.11E-15		2.61E-11	6.06E-08	0	0.1	
VOC	Trichloroethene	79-01-6	4.47E-10	1.61E-13		1.96E-10	8.12E-07	0	0.005	
VOC	Trichlorofluoromethane	75-69-4							10.95	
VOC	Vinyl Chloride	75-01-4	7.44E-10	6.59E-15		9.95E-11		0	0.002	
VOC	Xylenes (total)	1330-20-7	7.14E-10					0	10	
SVOC	1,2-Dichlorobenzene	95-50-1							0.6	
SVOC	2-Methylnaphthalene	91-57-6							0.73	
SVOC	Benzo(a)anthracene	56-55-3							0.01	
SVOC	Benzo(a)pyrene	50-32-8							0.0002	
SVOC	Benzo(b)fluoranthene	205-99-2							0.01	
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7							0.006	
SVOC	Butylbenzylphthalate	85-68-7							7.3	
SVOC	Chrysene	218-01-9							0.0117	
SVOC	Di-n-butylphthalate	84-74-2							3.65	
SVOC	Fluoranthene	206-44-0							1.46	
SVOC	Fluorene	86-73-7							1.46	
SVOC	Naphthalene	91-20-3							0.73	
SVOC	Phenanthrene	85-01-8							1.095	
SVOC	Pyrene	129-00-0							1.095	
P/PCB	Aroclor-1242	53469-21-9							0.0005	
P/PCB	Aroclor-1254	11097-69-1							0.0005	
P/PCB	Aroclor-1260	11096-82-5							0.0005	
INORG	Antimony	7440-36-0							0.006	
INORG	Arsenic	7440-38-2	5.95E-09					0	0.05	
INORG	Barium	7440-39-3	1.40E-07					0	2	
INORG	Beryllium	7440-41-7							0.004	
INORG	Cadmium	7440-43-9							0.005	
INORG	Chromium (total)	7440-47-3							0.1	
INORG	Cobalt	7440-48-4							2.19	
INORG	Copper	7440-50-8							1.3	
INORG	Cyanide (total)	57-12-5							0.2	
INORG	Lead	7439-92-1							0.015	
INORG	Manganese	7439-96-5							5.11	
INORG	Mercury	7439-97-6							0.002	
INORG	Nickel	7440-02-0							0.1	
INORG	Selenium	7782-49-2							0.05	
INORG	Silver	7440-22-4							0.1825	
INORG	Thallium	7440-28-0							0.002	
INORG	Vanadium	7440-62-2							0.2555	
INORG	Zinc	7440-66-6							10.95	