

DRAFT

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

General Motors Corporation
Moraine, Ohio

March 1, 2005

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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.

§ 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.

- ME-3, total VOCs were 159.7 ug/L in the 1999 baseline sampling event, then decreasing to 23.54 ug/L in 2004.
- EAST, total VOCs were 152.6 ug/L in the 1999 baseline sampling event, then decreasing to 71.36 ug/L in 2004.
- 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.
- 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.
- GM-8, total VOCs were 150.3 ug/L in the 1999 baseline sampling event, then decreasing to 40.88 ug/L in 2004.
- 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:

- HR-1, total VOCs were 114 ug/L in the 1999 baseline event, decreasing to 82.91 ug/L in 2004.
- 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 ID # | Surface Elevation ft msl | TOC Elevation ft msl | Well Diameter Inches | Screened Interval ft bls | Total Well Depth ft bls | Northing y | Easting 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 ID # | Surface Elevation ft msl | TOC Elevation ft msl | Well Diameter Inches | Screened Interval ft bls | Total Well Depth ft bls | Northing y | Easting 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 ID # | Surface Elevation ft msl | TOC Elevation ft msl | Well Diameter Inches | Screened Interval ft bls | Total Well Depth ft bls | Northing y | Easting 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 Constituents | Units | Upgradient Well GM-29 | | | | | | | | | | | | |
|-----------------------------------|-------|--------------------------|---------|---------|---------|---------|---------|----------|----------|---------|---------|---------|---------|---------|
| | | 9/1/99 | 2/22/00 | 5/26/00 | 9/21/00 | 3/20/01 | 6/26/01 | 11/13/01 | 12/12/01 | 6/13/02 | 9/25/02 | 5/22/03 | 9/24/03 | 9/15/04 |
| <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 Constituents | Units | Downgradient Well GM-28 | | | | | | | | | | | | | |
|-----------------------------------|-------|----------------------------|---------|---------|---------|---------|---------|----------|----------|---------|---------|---------|---------|---------|---------|
| | | 9/1/99 | 2/23/00 | 5/26/00 | 9/21/00 | 3/20/01 | 6/26/01 | 11/15/01 | 12/12/01 | 7/21/02 | 9/24/02 | 5/23/03 | 10/1/03 | 4/30/04 | 9/14/04 |
| <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 Constituents | Units | Introduction Well ME-6 | | | | | | | | | | | | Introduction Well ME-1 | | |
|-----------------------------------|-------|---------------------------|---------|---------|---------|----------|---------|----------|----------|---------|---------|---------|---------|---------------------------|---------|---------|
| | | 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 Constituents | Units | Introduction Well ME-3 | | | | | | | | | | | Introduction Well 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 Constituents | Units | Below Introduction Zone GM-31 | | | | | | | |
|-----------------------------------|-------|----------------------------------|---------|---------|---------|----------|---------|---------|---------|
| | | 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>Volatile Organic Compounds</u> | | | | | | | | | |
| 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 Constituents | Units | Upgradient Well EAST | | | | | | | | | | | | | Upgradient Well 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.

ARCADIS

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

| RZ-3 West Constituents | Units | Upgradient Well GM-19S | | | | | | | | | | | | |
|-----------------------------------|-------|---------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | 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.

ARCADIS

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

| RZ-3 West Constituents | Units | Downgradient Well GM-32 | | | | | | | | | | | | | Downgradient Well GM-8 | | | | | | |
|------------------------------------------|-------|----------------------------|----------|----------|----------|----------|----------|----------|----------|---------|---------|---------|---------|---------|---------------------------|---------|---------|---------|---------|---------|---------|
| | | 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.

ARCADIS

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

| RZ-3 West | Units | Downgradient Well | | | | | | |
|-----------------------------------|-------|-------------------|---------|---------|---------|---------|---------|---------|
| | | GM-6 | | | | | | |
| Constituents | | 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.

ARCADIS

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

| RZ-3 East | Units | Upgradient Well | | | | | | | | | | | | |
|-----------------------------------|-------|-----------------|----------|----------|----------|----------|----------|----------|----------|---------|---------|---------|---------|---------|
| | | GM-22 | | | | | | | | | | | | |
| Constituents | | 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 |
| <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 | <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.

ARCADIS

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

| RZ-3 East Constituents | Units | Downgradient Well GM-21 | | | | | | | | | | | | |
|-----------------------------------|-------|----------------------------|----------|----------|----------|----------|----------|----------|----------|---------|---------|---------|---------|---------|
| | | 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 |
| <u>Volatile Organic Compounds</u> | | | | | | | | | | | | | | |
| 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.

ARCADIS

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

| RZ-1 Constituents | Units | Upgradient Well GM-29 | | | | | | | | | | | | |
|-------------------------------|----------|--------------------------|----------|---------|---------|---------|---------|----------|----------|---------|---------|---------|---------|---------|
| | | 9/1/99 | 2/22/00 | 5/26/00 | 9/21/00 | 3/20/01 | 6/26/01 | 11/13/01 | 12/12/01 | 6/13/02 | 9/25/02 | 5/22/03 | 9/24/03 | 9/15/04 |
| <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 Constituents | Units | Downgradient Well GM-28 | | | | | | | | | | | | | |
|-------------------------------|----------|----------------------------|----------|---------|---------|---------|---------|----------|----------|---------|---------|---------|---------|---------|---------|
| | | 9/1/99 | 2/23/00 | 5/26/00 | 9/21/00 | 3/20/01 | 6/26/01 | 11/15/01 | 12/12/01 | 7/21/02 | 9/24/02 | 5/23/03 | 10/1/03 | 4/30/04 | 9/15/04 |
| <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 | Units | Introduction Well ME-6 | | | | | | | | | | | Introduction Well ME-1 | | | |
|-------------------------------|----------|---------------------------|---------|---------|---------|---------|---------|----------|----------|---------|---------|---------|---------------------------|----------|---------|---------|
| | | 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 | Units | Introduction Well | | | | | | | | | | | Introduction Well ME-5 6/26/01 | |
|-------------------------------|----------|-------------------|---------|---------|----------|----------|--------|--------|----------|---------|---------|---------|--------------------------------------|---------|
| | | 8/31/99 | 2/22/00 | 5/25/00 | 9/21/00 | 11/15/01 | ME-3 | | 12/12/01 | 7/21/02 | 9/24/02 | 5/21/03 | | 10/1/03 |
| <u>Inorganics & TOC</u> | | | | | | | | | | | | | | |
| Nitrate | mg/l | 22 | NA | 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 | NA |
| Nitrogen, Ammonia | mg/l | <0.30 | 3.10 | 12.6 | NA | 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 | NA |
| Oxygen | mg/l | 1.72 | 0.47 | 0.78 | NA | 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 | 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 | 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 Constituents | Units | Below Introduction Zone GM-31 | | | | | | | |
|-------------------------------|----------|----------------------------------|---------|---------|---------|----------|---------|---------|---------|
| | | 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 Constituents | Units | Upgradient Well EAST | | | | | | | | | | | | Upgradient Well WEST | | |
|-------------------------------|----------|-------------------------|----------|---------|---------|---------|----------|----------|---------|---------|---------|---------|---------|-------------------------|----------|----------|
| | | 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 | Units | Upgradient Well | | | | | | | | | | | |
|-------------------------------|----------|-----------------|----------|----------|----------|---------|----------|----------|---------|---------|---------|---------|---------|
| | | GM-19S | | | | | | | | | | | |
| Constituents | | 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 Constituents | Units | Downgradient Well GM-32 | | | | | | | | | | | |
|-------------------------------|----------|----------------------------|---------|---------|---------|---------|----------|----------|---------|---------|---------|---------|---------|
| | | 9/22/99 | 2/28/00 | 5/30/00 | 9/25/00 | 3/19/01 | 11/12/01 | 12/11/01 | 6/12/02 | 9/20/02 | 5/23/03 | 10/1/03 | 9/14/04 |
| <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.

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Samples collected in September 1999 represent baseline conditions.

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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 Constituents | Units | Downgradient Well GM-8 | | | | | Downgradient Well GM-6 | | | | |
|-------------------------------|----------|---------------------------|---------|---------|---------|---------|---------------------------|----------|---------|---------|---------|
| | | 3/6/98 | 9/20/99 | 9/20/02 | 12/9/03 | 9/14/04 | 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.

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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 | Units | Upgradient Well GM-22 | | | | | | | | | | | |
|-------------------------------|----------|--------------------------|---------|---------|----------|---------|----------|----------|---------|---------|---------|---------|---------|
| | | 9/1/99 | 2/23/00 | 5/25/00 | 9/21/00 | 3/20/01 | 11/13/01 | 12/12/01 | 6/13/02 | 9/25/02 | 5/22/03 | 9/24/03 | 9/14/04 |
| <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 Constituents | Units | Downgradient Well GM-21 | | | | | | | | | | | |
|-------------------------------|----------|----------------------------|---------|---------|---------|---------|----------|----------|---------|---------|---------|---------|---------|
| | | 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.

| | Units | 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 |
| <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.

| | Units | 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 |
| <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.

| | Units | On-Site | | | | | |
|-----------------------------------|-------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|----------------------------------|-----------------------------------|
| | | GM-23 9/14/04 Upper Aquifer | GM-27 9/15/04 Upper Aquifer | GM-29 9/15/04 Upper Aquifer | GM-28 9/15/04 Upper Aquifer | ME-6 9/15/04 Upper Aquifer | GM-31 9/15/04 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.

| | Units | 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 |
| <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.

| | Units | 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 |
| <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.

| | Units | 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 |
| <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.

| | Units | 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 |
| <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.

| | Units | 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 |
| <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.

| | Units | 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 |
| <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 | | February | | March | | April | |
|-----------------|----------------|------------------------------------|-----------------|------------------------------------|-----------------|------------------------------------|-----------------|------------------------------------|-----------------|
| | | Injection Event #45 ⁽¹⁾ | | Injection Event #46 ⁽²⁾ | | Injection Event #47 ⁽³⁾ | | 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 | | June | | July | | August | |
|-----------------|----------------|------------------------------------|-----------------|------------------------------------|-----------------|------------------------------------|-----------------|------------------------------------|-----------------|
| | | Injection Event #49 ⁽⁵⁾ | | Injection Event #50 ⁽⁶⁾ | | Injection Event #51 ⁽⁷⁾ | | 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 | | June | | July | | August | |
|-----------------|----------------|------------------------------------|-----------------|------------------------------------|-----------------|------------------------------------|-----------------|------------------------------------|-----------------|
| | | Injection Event #49 ⁽⁵⁾ | | Injection Event #50 ⁽⁶⁾ | | Injection Event #51 ⁽⁷⁾ | | 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 | | June | | July | | August | |
|-----------------|----------------|------------------------------------|-----------------|------------------------------------|-----------------|------------------------------------|-----------------|------------------------------------|-----------------|
| | | Injection Event #49 ⁽⁵⁾ | | Injection Event #50 ⁽⁶⁾ | | Injection Event #51 ⁽⁷⁾ | | 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 | | October | | November | | December | |
|-----------------|----------------|------------------------------------|-----------------|-------------------------------------|-----------------|-------------------------------------|-----------------|-------------------------------------|-----------------|
| | | Injection Event #53 ⁽⁹⁾ | | Injection Event #54 ⁽¹⁰⁾ | | Injection Event #55 ⁽¹¹⁾ | | 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 | Mean 2004 | Max of 2004 | Min of 2003 | Mean 2003 | Max of 2003 | Min of 1999 | Mean of 1999 | Max of 1999 | RTL (mg/L) | Ratio: Min | Ratio: Mean | Ratio: Max | Ratio: Min | Ratio: Mean | Ratio: Max | Ratio: Min | Ratio: Mean | Ratio: Max |
|---------|--------------------|------------------------|-----------------|----------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|------------|---------------------------|---------------------------|---------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | | | | | Value ¹ (mg/l) | Value ¹ (mg/L) | Value ¹ (mg/l) | Value ¹ (mg/l) | Value ¹ (mg/L) | Value ¹ (mg/l) | Value ¹ (mg/L) | Value ¹ (mg/l) | Value ¹ (mg/L) | | Value ¹ (mg/l) | Value ¹ (mg/L) | Value ¹ (mg/l) | to RTL | to RTL | to RTL | to RTL | to RTL | to RTL |
| SHALLOW | AOI 7 SHALLOW | 1,1-Dichloroethene | 3 | 2 | 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 | 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 | 1 | 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 | 1 | 9.50E-04 | 1.00E-03 | 1.05E-03 | 1.80E-04 | 6.73E-04 | 1.20E-03 | 5.00E-04 | 1.75E-03 | 3.00E-03 | 2.00E-02 | 4.8E-02 | 5.0E-02 | 5.3E-02 | 9.0E-03 | 3.4E-02 | 6.0E-02 | 2.5E-02 | 8.8E-02 | 1.5E-01 |
| SHALLOW | ZONE S3 TO GM-10 | 1,1-Dichloroethene | 11 | 2 | 9.00E-05 | 4.90E-04 | 3.10E-03 | 1.10E-04 | 3.82E-04 | 2.00E-03 | 5.00E-04 | 9.90E-04 | 3.90E-03 | 4.70E-02 | 1.9E-03 | 1.0E-02 | 6.6E-02 | 2.3E-03 | 8.1E-03 | 4.3E-02 | 1.1E-02 | 2.1E-02 | 8.3E-02 |
| SHALLOW | ZONE S3 TO GM-10 | cis-1,2-Dichloroethene | 11 | 8 | 1.05E-04 | 9.27E-03 | 5.60E-02 | 1.25E-04 | 2.08E-02 | 1.30E-01 | 5.00E-04 | 2.20E-02 | 6.64E-02 | 4.67E-01 | 2.2E-04 | 2.0E-02 | 1.2E-01 | 2.7E-04 | 4.5E-02 | 2.8E-01 | 1.1E-03 | 4.7E-02 | 1.4E-01 |
| SHALLOW | ZONE S3 TO GM-10 | Tetrachloroethene | 11 | 8 | 9.50E-05 | 1.66E-02 | 1.30E-01 | 1.20E-04 | 1.47E-02 | 1.10E-01 | 5.00E-04 | 1.80E-02 | 8.14E-02 | 3.30E-02 | 2.9E-03 | 5.0E-01 | 3.9E+00 | 3.6E-03 | 4.5E-01 | 3.3E+00 | 1.5E-02 | 5.5E-01 | 2.5E+00 |
| SHALLOW | ZONE S3 TO GM-10 | Trichloroethene | 11 | 9 | 1.40E-04 | 3.59E-02 | 1.80E-01 | 2.10E-04 | 3.93E-02 | 2.00E-01 | 3.20E-03 | 3.55E-02 | 1.31E-01 | 3.30E-02 | 4.2E-03 | 1.1E+00 | 5.5E+00 | 6.4E-03 | 1.2E+00 | 6.1E+00 | 9.7E-02 | 1.1E+00 | 4.0E+00 |
| SHALLOW | ZONE S3 TO GM-10 | Vinyl Chloride | 11 | 3 | 1.05E-04 | 6.32E-04 | 3.00E-03 | 1.30E-04 | 6.52E-04 | 3.30E-03 | 5.00E-04 | 1.74E-03 | 8.40E-03 | 1.30E-02 | 8.1E-03 | 4.9E-02 | 2.3E-01 | 1.0E-02 | 5.0E-02 | 2.5E-01 | 3.8E-02 | 1.3E-01 | 6.5E-01 |
| SHALLOW | GM-10 | 1,1-Dichloroethene | 1 | 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 | 1.90E-02 | 4.7E-03 | 4.7E-03 | 4.7E-03 | 5.8E-03 | 5.8E-03 | 5.8E-03 | 2.6E-02 | 2.6E-02 | 2.6E-02 |
| SHALLOW | GM-10 | cis-1,2-Dichloroethene | 1 | 1 | 3.80E-04 | 3.80E-04 | 3.80E-04 | 5.00E-04 | 5.00E-04 | 5.00E-04 | 5.00E-04 | 5.00E-04 | 5.00E-04 | 1.87E-01 | 2.0E-03 | 2.0E-03 | 2.0E-03 | 2.7E-03 | 2.7E-03 | 2.7E-03 | 2.7E-03 | 2.7E-03 | 2.7E-03 |
| SHALLOW | GM-10 | Tetrachloroethene | 1 | 1 | 1.50E-03 | 1.50E-03 | 1.50E-03 | 1.30E-03 | 1.30E-03 | 1.30E-03 | 5.00E-04 | 5.00E-04 | 5.00E-04 | 1.30E-02 | 1.2E-01 | 1.2E-01 | 1.2E-01 | 1.0E-01 | 1.0E-01 | 1.0E-01 | 3.8E-02 | 3.8E-02 | 3.8E-02 |
| SHALLOW | GM-10 | Trichloroethene | 1 | 1 | 1.50E-02 | 1.50E-02 | 1.50E-02 | 1.60E-02 | 1.60E-02 | 1.60E-02 | 1.43E-02 | 1.43E-02 | 1.43E-02 | 1.30E-02 | 1.2E+00 | 1.2E+00 | 1.2E+00 | 1.2E+00 | 1.2E+00 | 1.2E+00 | 1.1E+00 | 1.1E+00 | 1.1E+00 |
| SHALLOW | GM-10 | Vinyl Chloride | 1 | 1 | 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 | 5.00E-03 | 2.1E-02 | 2.1E-02 | 2.1E-02 | 2.6E-02 | 2.6E-02 | 2.6E-02 | 1.0E-01 | 1.0E-01 | 1.0E-01 |
| SHALLOW | POC SHALLOW | 1,1-Dichloroethene | 1 | 1 | 9.00E-05 | 9.00E-05 | 9.00E-05 | 1.10E-04 | 1.10E-04 | 1.10E-04 | 5.00E-04 | 5.0 | | | | | | | | | | | |

**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 | Ratio: Mean | Ratio: Max | Ratio: Min | Ratio: Mean | Ratio: Max | Ratio: Min | Ratio: Mean | Ratio: Max |
|---------|------------------|------------------------|-----------------|----------------|---------------------------------------|-------------------------------------|---------------------------------------|---------------------------------------|-------------------------------------|---------------------------------------|---------------------------------------|----------------------------------------|---------------------------------------|------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | | | | | | | | | | | | | | 2004 Value to RTL | 2004 Value to RTL | 2004 Value to RTL | 2003 Value to RTL | 2003 Value to RTL | 2003 Value to RTL | 1999 Value to RTL | 1999 Value to RTL | 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.

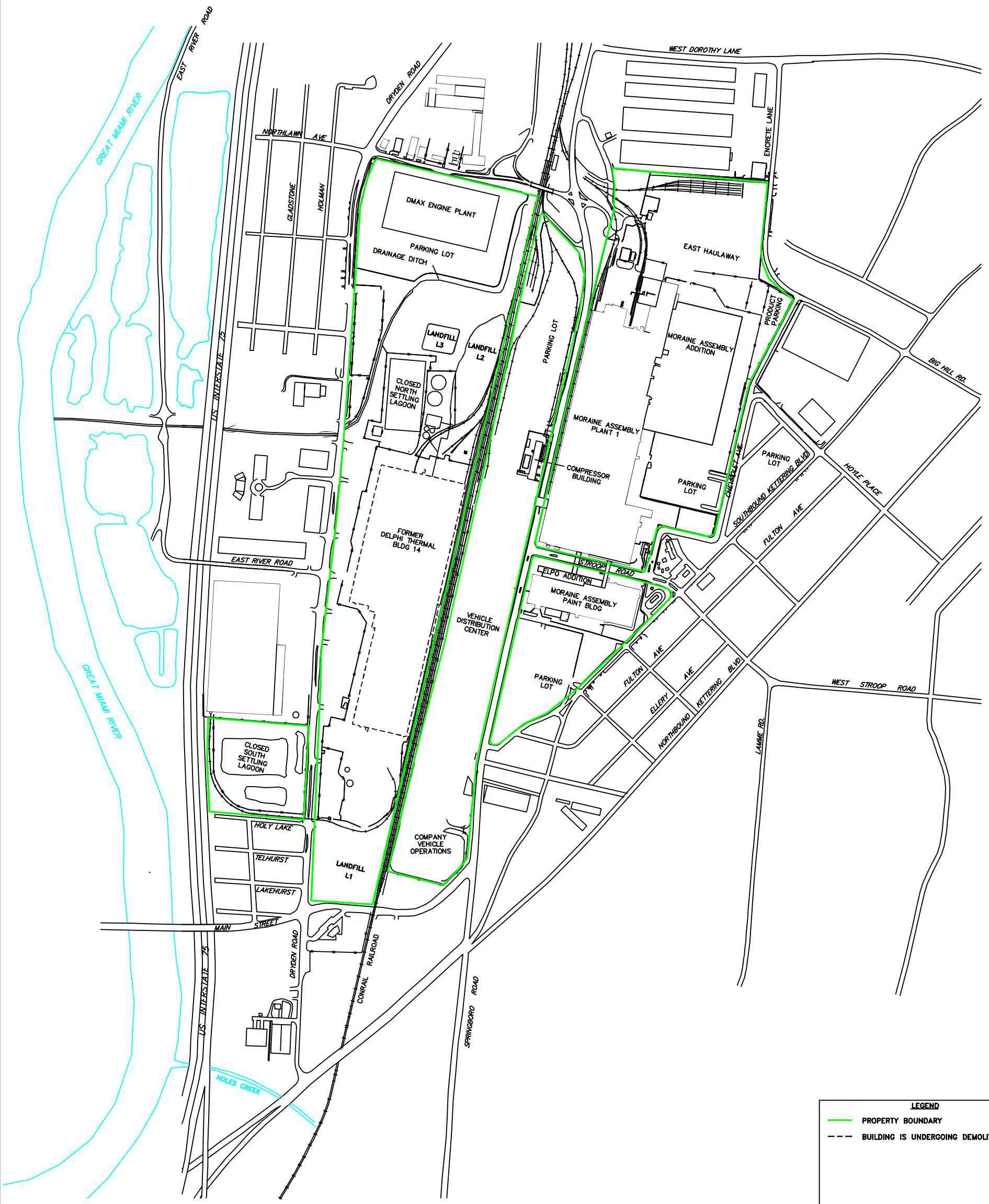
| Monitoring Wells | Reason for Monitoring | Monitoring Frequency | Parameter List |
|----------------------------|--------------------------------------------------------------------|----------------------|---------------------|
| <u>Lower Aquifer Wells</u> | | | |
| GM-39 | Monitoring groundwater quality 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.



0 200 500ft



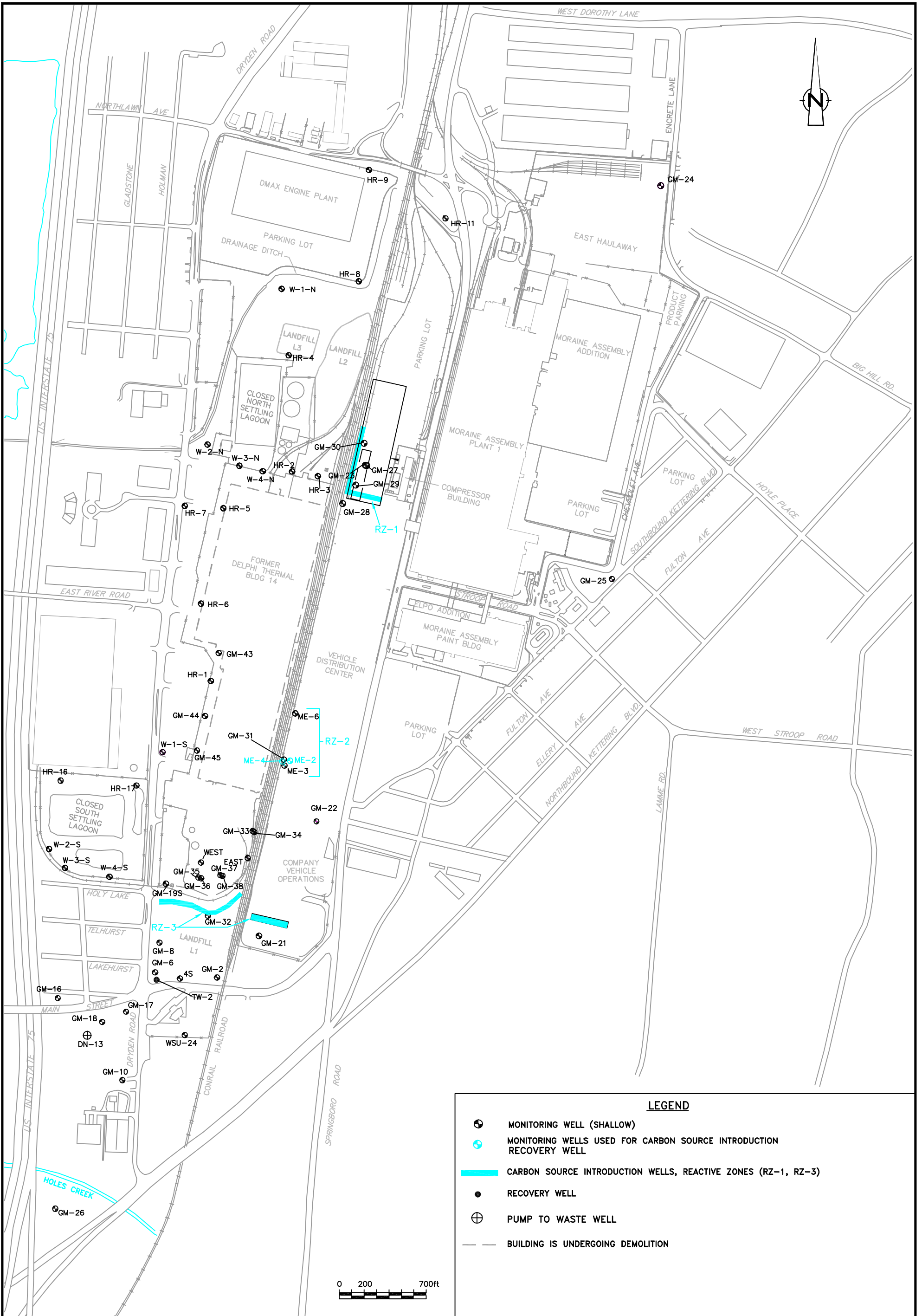
| LEGEND | |
|--------|-----------------------------------|
| | PROPERTY BOUNDARY |
| | BUILDING IS UNDERGOING DEMOLITION |



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 Dublin, OH 43017
 Tel: 614/764-2310 Fax: 614/764-1270

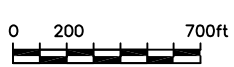
SITE LAYOUT
GENERAL MOTORS CORPORATION
MORaine, OHIO

| | | |
|--------------------------------------|--------------------------------|------------------------------------|
| DATE 2/7/2005 | PROJECT MANAGER N. GILLOTTI | DRAWING NAME CRA\ANNO4\ANNO4-01 |
| DRAWN R. SMITH | LEAD DESIGN PROF. J. REID | CHECKED N. GILLOTTI |
| PROJECT NUMBER OH000294.0007.0003 | | DRAWING NUMBER 1 |



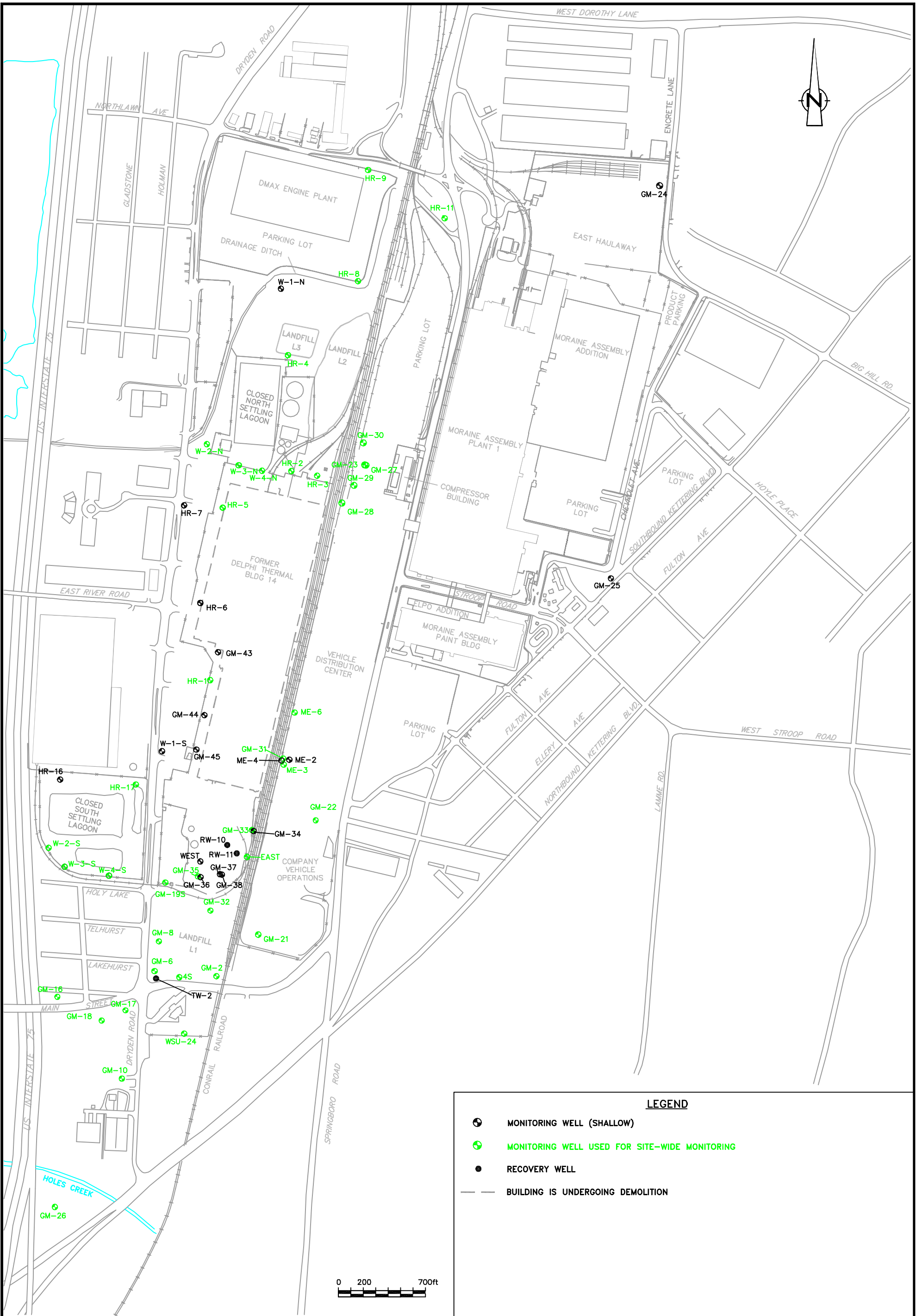
LEGEND

- MONITORING WELL (SHALLOW)
- MONITORING WELLS USED FOR CARBON SOURCE INTRODUCTION RECOVERY WELL
- CARBON SOURCE INTRODUCTION WELLS, REACTIVE ZONES (RZ-1, RZ-3)
- RECOVERY WELL
- ⊕ PUMP TO WASTE WELL
- BUILDING IS UNDERGOING DEMOLITION



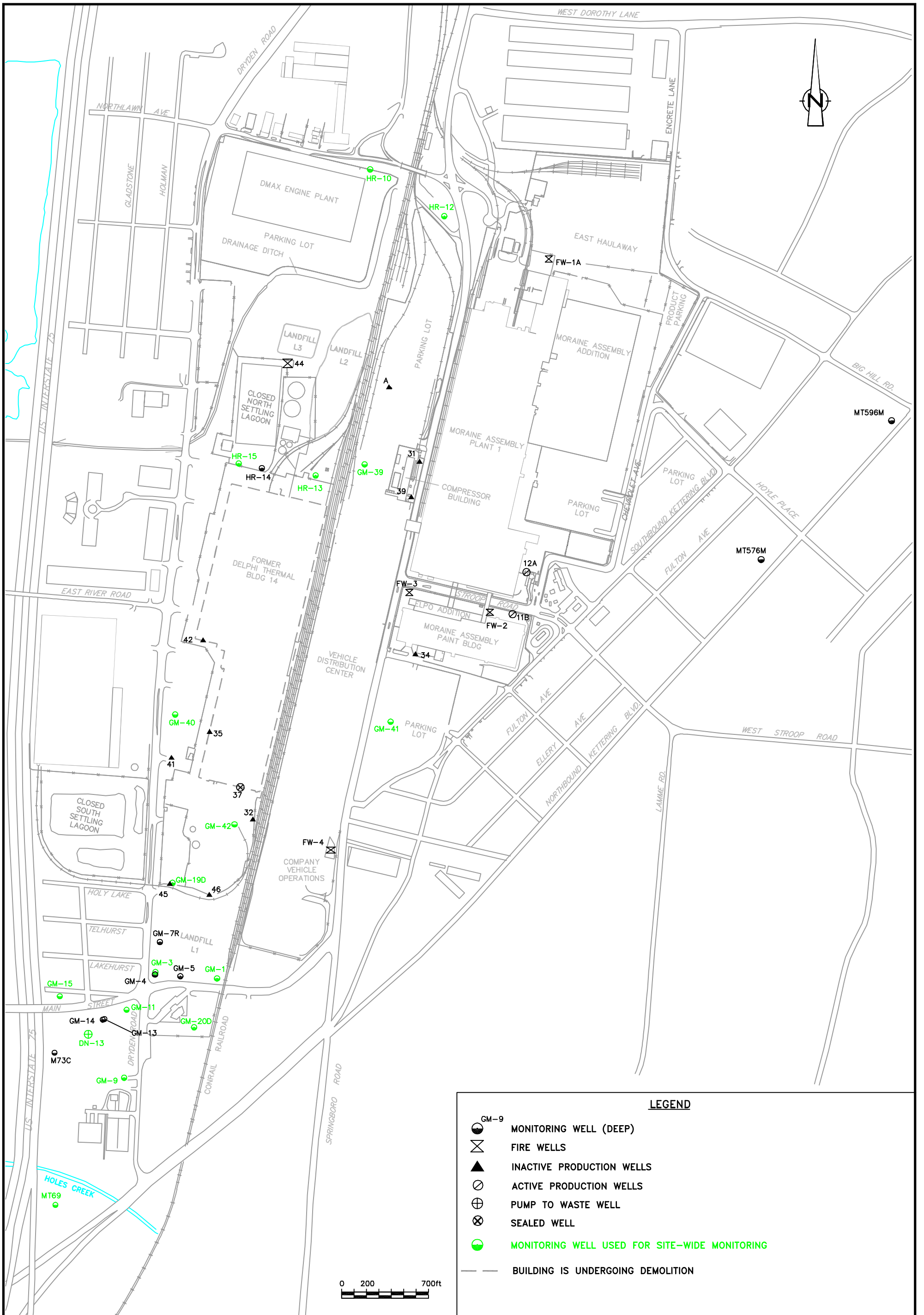
**SITE-WIDE CORRECTIVE MEASURES
 GENERAL MOTORS CORPORATION
 MORAINE, OHIO**

| | | |
|--------------------------------------|--------------------------------|------------------------------------|
| DATE 2/7/2005 | PROJECT MANAGER N. GILLOTTI | DRAWING NAME CRA\ANN04\ANN04-02 |
| DRAWN R. SMITH | LEAD DESIGN PROF. J. REID | CHECKED N. GILLOTTI |
| PROJECT NUMBER OH000294.0007.0003 | DRAWING NUMBER 2 | |



**UPPER AQUIFER MONITORING WELLS
 FOR SITE-WIDE
 GROUNDWATER MONITORING
 GENERAL MOTORS CORPORATION
 MORaine, OHIO**

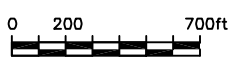
| | | |
|--------------------------------------|--------------------------------|------------------------------------|
| DATE 2/7/2005 | PROJECT MANAGER N. GILLOTTI | DRAWING NAME CRA\ANN04\ANN04-03 |
| DRAWN R. SMITH | LEAD DESIGN PROF. J. REID | CHECKED N. GILLOTTI |
| PROJECT NUMBER OH000294.0007.0003 | | DRAWING NUMBER 3 |



**LOWER AQUIFER MONITORING WELLS
FOR SITE-WIDE
GROUNDWATER MONITORING
GENERAL MOTORS CORPORATION
MORAINE, OHIO**

LEGEND

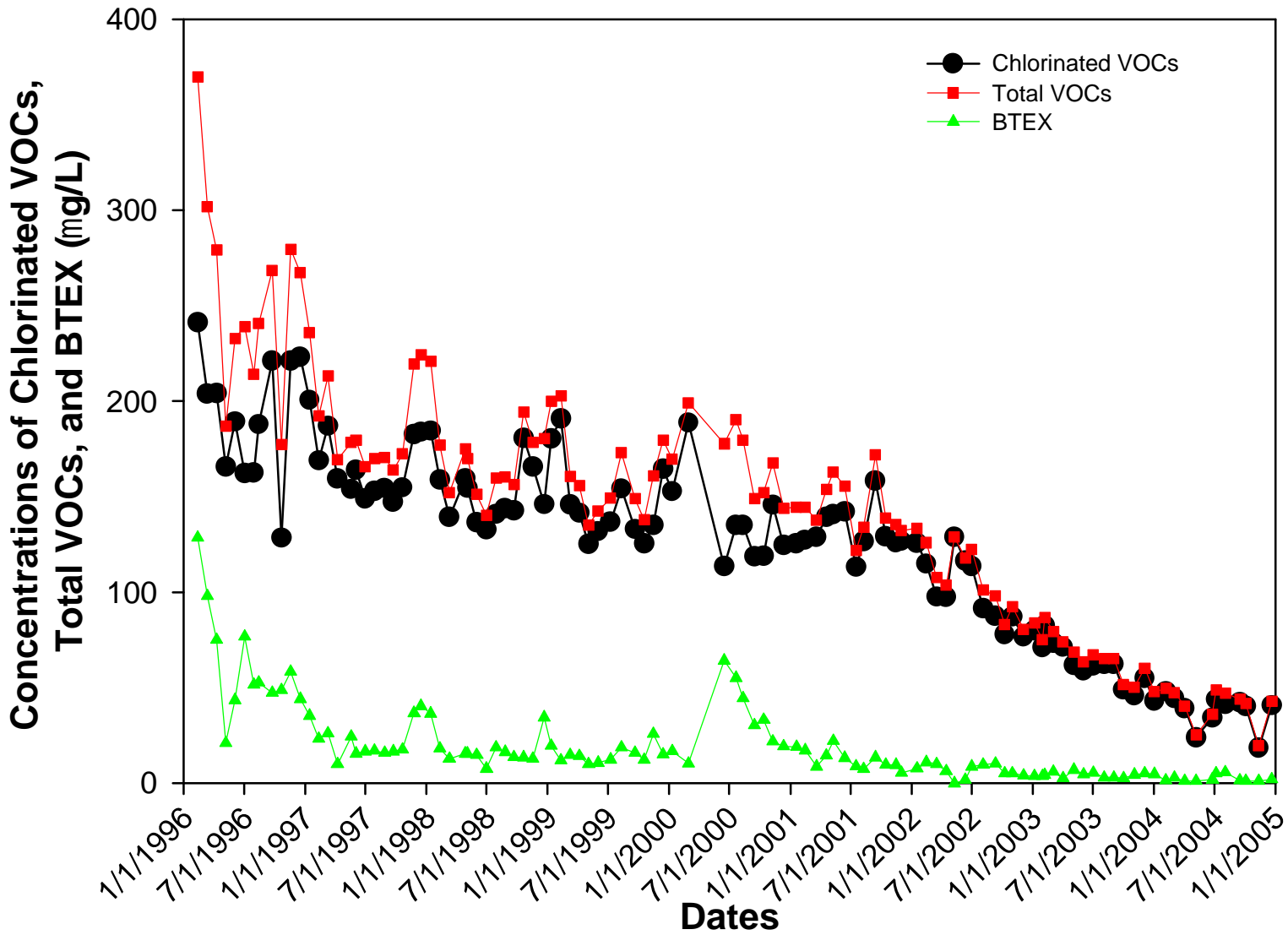
- GM-9 MONITORING WELL (DEEP)
- FIRE WELLS
- INACTIVE PRODUCTION WELLS
- ACTIVE PRODUCTION WELLS
- PUMP TO WASTE WELL
- SEALED WELL
- MONITORING WELL USED FOR SITE-WIDE MONITORING
- BUILDING IS UNDERGOING DEMOLITION

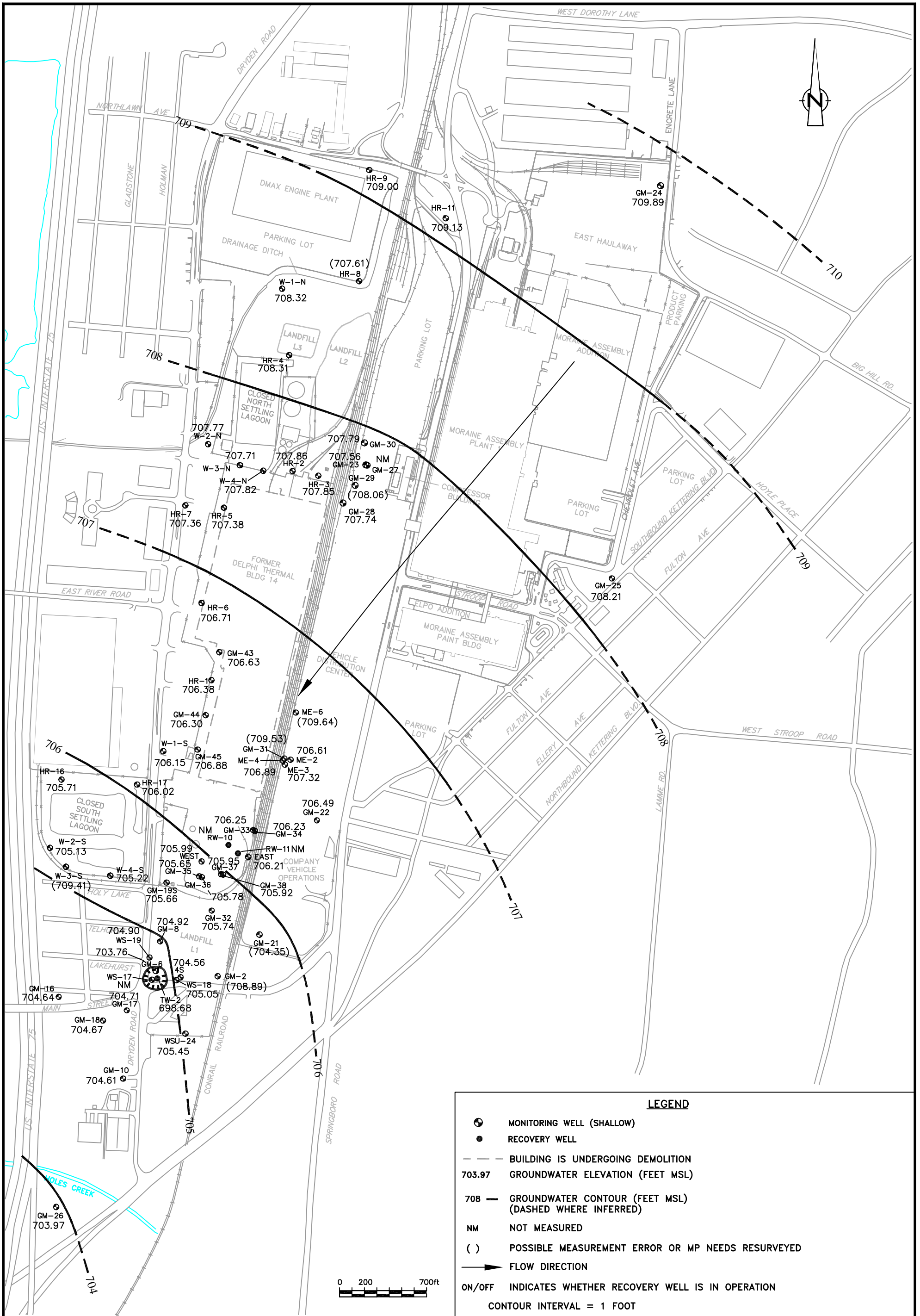


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| | | |
|--------------------------------------|--------------------------------|------------------------------------|
| DATE 2/7/2005 | PROJECT MANAGER N. GILLOTTI | DRAWING NAME CRA\ANN04\ANN04-04 |
| DRAWN R. SMITH | LEAD DESIGN PROF. J. REID | CHECKED N. GILLOTTI |
| PROJECT NUMBER OH000294.0007.0003 | | DRAWING NUMBER 4 |

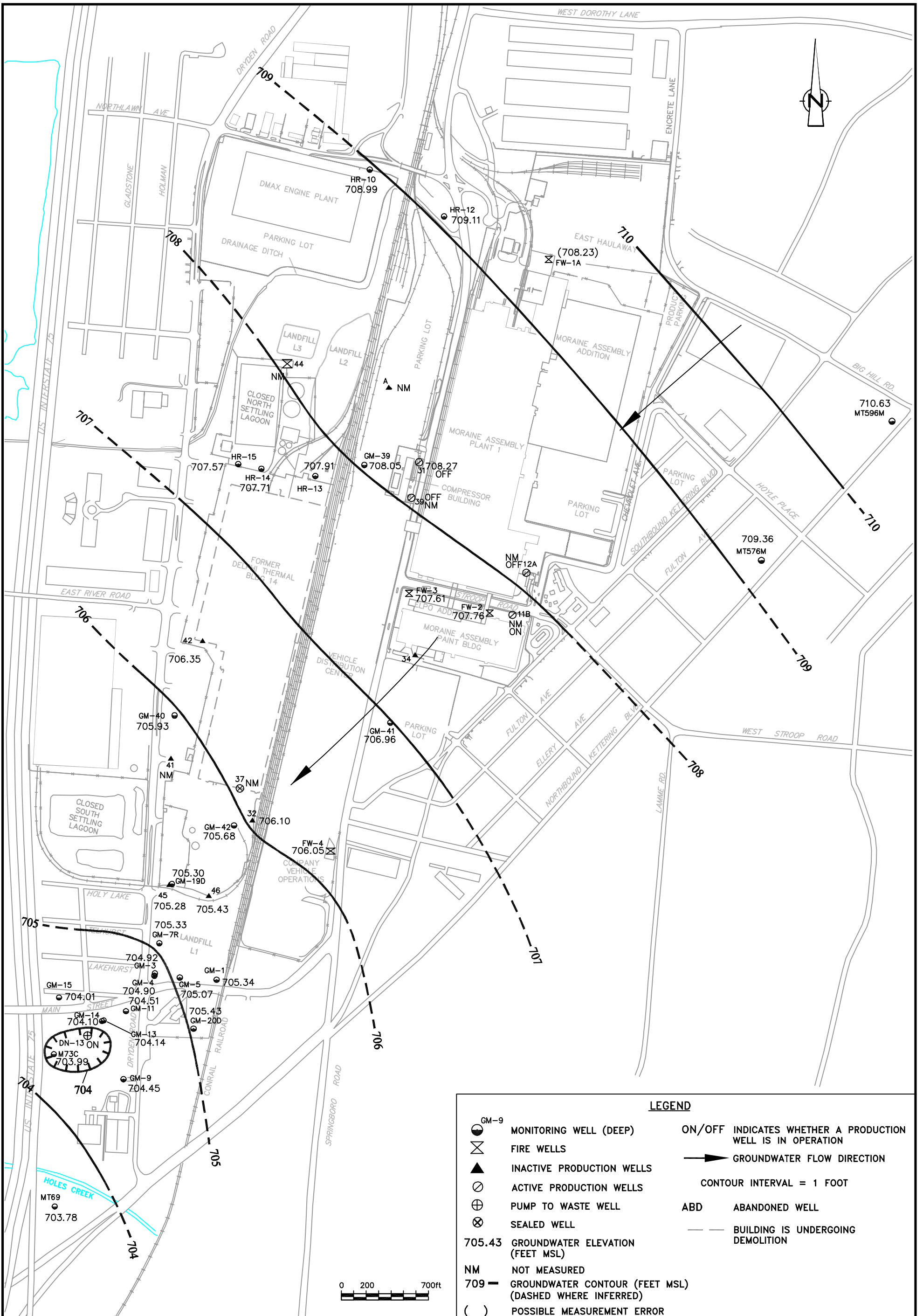
Figure 5. VOC Concentrations at the Influent to Air Stripper Tower Since System Start-up, Groundwater Recovery, and Treatment System





**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 |



POTENTIOMETRIC SURFACE (LOWER AQUIFER)
 ON SEPTEMBER 7 AND 8, 2004
 GENERAL MOTORS CORPORATION
 MORaine, OHIO

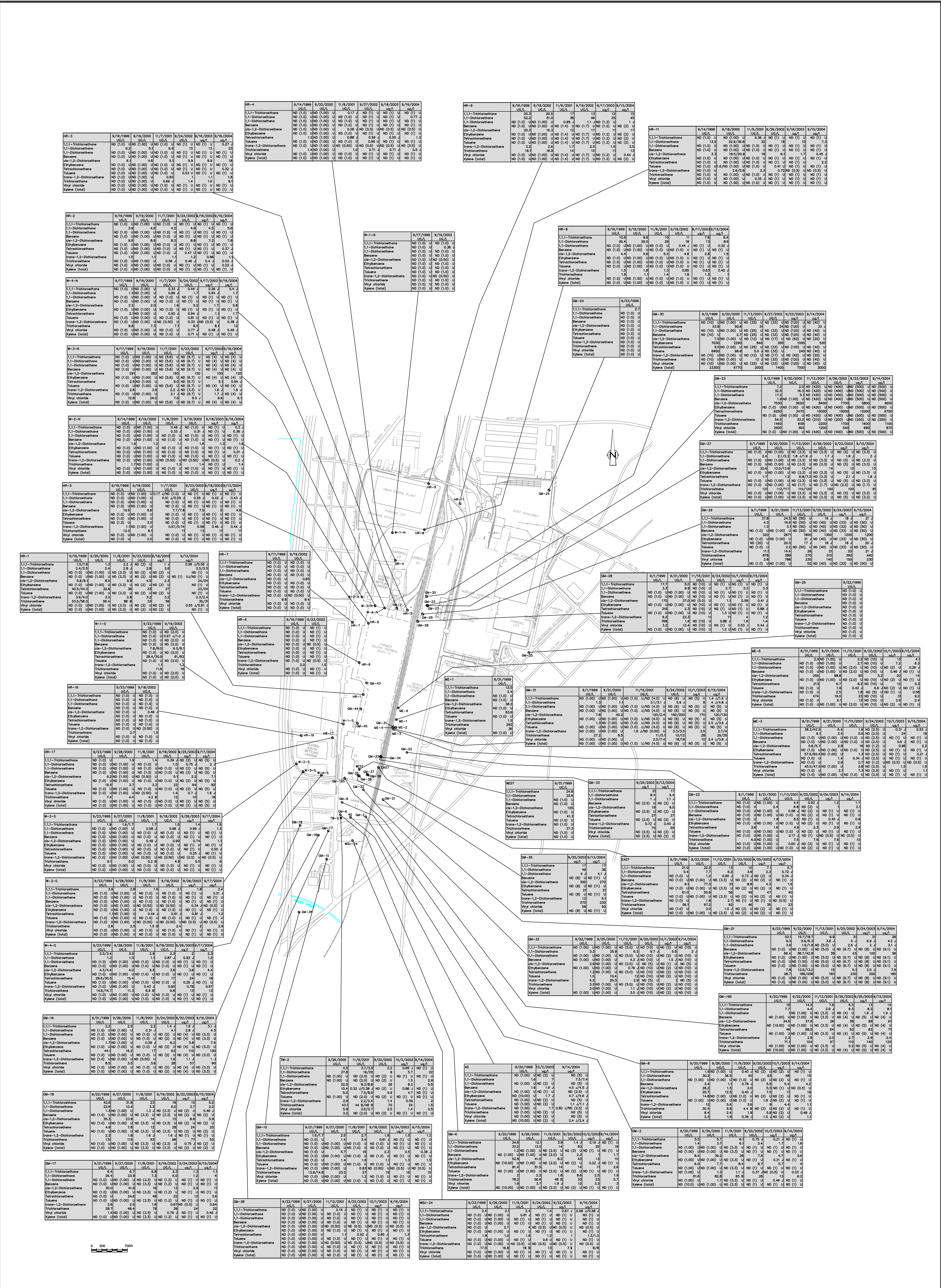
LEGEND

- GM-9 MONITORING WELL (DEEP)
- ⊗ FIRE WELLS
- ▲ INACTIVE PRODUCTION WELLS
- ⊙ ACTIVE PRODUCTION WELLS
- ⊕ PUMP TO WASTE WELL
- ⊗ SEALED WELL
- 705.43 GROUNDWATER ELEVATION (FEET MSL)
- NM NOT MEASURED
- 709 — GROUNDWATER CONTOUR (FEET MSL) (DASHED WHERE INFERRED)
- () POSSIBLE MEASUREMENT ERROR
- ON/OFF INDICATES WHETHER A PRODUCTION WELL IS IN OPERATION
- ➔ GROUNDWATER FLOW DIRECTION
- CONTOUR INTERVAL = 1 FOOT
- ABD ABANDONED WELL
- BUILDING IS UNDERGOING DEMOLITION



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| | | |
|--------------------------------------|--------------------------------|------------------------------------|
| DATE 2/7/2005 | PROJECT MANAGER N. GILLOTTI | DRAWING NAME CRA\ANN04\ANN04-07 |
| DRAWN R. SMITH | LEAD DESIGN PROF. J. REID | CHECKED S. CLOUSE |
| PROJECT NUMBER OH000294.0007.0003 | | DRAWING NUMBER 7 |



LEGEND

- Monitoring Well (Shallow)
- Recovery Well
- Building Undergoing Demolition
- Non-Detect: If Result is ND the Detection Limit is Shown
- µg/L: Micrograms Per Liter
- MCL Exceedances are Underlined at Point of Compliance Well GM-26

VOC DATABASES FOR UPPER QUATERNARY WELLS
 GENERAL MOTORS CORPORATION
 MORAIN, OHIO

| HR-10 | 9/15/1999 | 9/29/2000 | 11/14/2001 | 9/27/2002 | 9/17/2003 | 9/20/2004 |
|--------------------------|-----------|-----------|------------|-----------|-----------|-----------|
| UG/L | UG/L | UG/L | UG/L | UG/L | UG/L | UG/L |
| 1,1,1-Trichloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Benzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| cis-1,2-Dichloroethane | ND (1.0) | ND (1.0) | ND (0.50) | ND (0.5) | ND (0.5) | ND (0.5) |
| Ethylbenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Tetrachloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Toluene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| trans-1,2-Dichloroethene | ND (1.0) | ND (1.0) | ND (0.50) | ND (0.5) | ND (0.5) | ND (0.5) |
| Trichloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Vinyl chloride | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Xylene (total) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |

| HR-12 | 9/14/1999 | 9/28/2000 | 11/14/2001 | 9/26/2002 | 9/18/2003 | 9/21/2004 |
|--------------------------|-----------|-----------|------------|-----------|-----------|-----------|
| UG/L | UG/L | UG/L | UG/L | UG/L | UG/L | UG/L |
| 1,1,1-Trichloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethane | 2.7 | 2.0/2.2 | 3.6 | 2.4/2.5 | 1.7 | 1.8 |
| 1,1-Dichloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Benzene | 1.2 | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| cis-1,2-Dichloroethane | 1.8 | 1.8/2.0 | 2.7 | 2.1/2.2 | 1.4 | 1.2 |
| Ethylbenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Tetrachloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Toluene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| trans-1,2-Dichloroethene | ND (1.0) | ND (1.0) | 0.23 | ND (0.5) | ND (0.5) | ND (0.5) |
| Trichloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Vinyl chloride | 1.7 | 2.5/2.6 | 3.8 | 1.7/1.8 | 1.6 | 1.1 |
| Xylene (total) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |

| GM-39 | 12/10/2003 | 9/20/2004 |
|--------------------------|------------|-----------|
| UG/L | UG/L | UG/L |
| 1,1,1-Trichloroethane | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethane | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethene | ND (1.0) | ND (1.0) |
| Benzene | ND (1.0) | ND (0.5) |
| cis-1,2-Dichloroethane | ND (1.0) | ND (0.5) |
| Ethylbenzene | ND (1.0) | ND (1.0) |
| Tetrachloroethane | ND (1.0) | ND (1.0) |
| Toluene | 0.18 | ND (1.0) |
| trans-1,2-Dichloroethene | ND (0.5) | ND (0.5) |
| Trichloroethene | ND (1.0) | ND (1.0) |
| Vinyl chloride | 1.3 | 1.8 |
| Xylene (total) | ND (1.0) | ND (1.0) |

| HR-15 | 9/15/1999 | 9/29/2000 | 11/14/2001 | 9/30/2002 | 9/17/2003 | 9/21/2004 |
|--------------------------|-----------|-----------|------------|-----------|-----------|-----------|
| UG/L | UG/L | UG/L | UG/L | UG/L | UG/L | UG/L |
| 1,1,1-Trichloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Benzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| cis-1,2-Dichloroethane | 2.5 | 0.98 | 1.1 | 2.2 | 2.6 | 2.6 |
| Ethylbenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Tetrachloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Toluene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| trans-1,2-Dichloroethene | ND (1.0) | ND (1.0) | ND (0.50) | ND (0.5) | ND (0.5) | ND (0.5) |
| Trichloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Vinyl chloride | 11.0 | 11.2 | ND (1.0) | 0.38 | 14 | 19 |
| Xylene (total) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |

| HR-13 | 9/15/1999 | 9/29/2000 | 11/14/2001 | 9/30/2002 | 9/16/2003 | 9/21/2004 |
|--------------------------|-----------|-----------|------------|-----------|-----------|-----------|
| UG/L | UG/L | UG/L | UG/L | UG/L | UG/L | UG/L |
| 1,1,1-Trichloroethane | 1.6/1.6 | 1.7 | 0.74 | 1.4 | 2.2 | 2.6 |
| 1,1-Dichloroethane | 41.4/42.8 | 39.5 | 15 | 25 | 33 | 30 |
| 1,1-Dichloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | 0.27 |
| Benzene | ND (1.0) | ND (1.0) | 0.18 | ND (1.0) | ND (1.0) | ND (1.0) |
| cis-1,2-Dichloroethane | 20.8/21.2 | 14.1 | 0.5 | 11 | 12 | 12 |
| Ethylbenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Tetrachloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Toluene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| trans-1,2-Dichloroethene | 3.1/3.3 | 2.5 | 0.65 | 1.4 | 1.8 | 1.5 |
| Trichloroethene | 3.3/3.4 | 2.0 | 1.2 | 3.6 | 5.7 | 2.1 |
| Vinyl chloride | ND (1.0) | ND (1.0) | ND (1.0) | 0.4 | ND (1.0) | 0.43 |
| Xylene (total) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |

| HR-14 | 9/15/1999 | 9/30/2002 |
|--------------------------|-----------|-----------|
| UG/L | UG/L | UG/L |
| 1,1,1-Trichloroethane | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethane | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethene | ND (1.0) | ND (1.0) |
| Benzene | ND (1.0) | ND (1.0) |
| cis-1,2-Dichloroethane | 7.9 | 3.6 |
| Ethylbenzene | ND (1.0) | ND (1.0) |
| Tetrachloroethane | ND (1.0) | ND (1.0) |
| Toluene | ND (1.0) | 0.57 |
| trans-1,2-Dichloroethene | ND (1.0) | ND (0.5) |
| Trichloroethene | 3.4 | 1.2 |
| Vinyl chloride | 1.4 | 1.2 |
| Xylene (total) | ND (1.0) | ND (1.0) |

| GM-40 | 12/10/2003 | 9/20/2004 |
|--------------------------|------------|-----------|
| UG/L | UG/L | UG/L |
| 1,1,1-Trichloroethane | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethane | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethene | ND (1.0) | ND (1.0) |
| Benzene | ND (1.0) | ND (1.0) |
| cis-1,2-Dichloroethane | ND (0.5) | ND (0.5) |
| Ethylbenzene | ND (1.0) | ND (1.0) |
| Tetrachloroethane | ND (1.0) | ND (1.0) |
| Toluene | ND (1.0) | ND (1.0) |
| trans-1,2-Dichloroethene | ND (0.5) | ND (0.5) |
| Trichloroethene | ND (1.0) | ND (1.0) |
| Vinyl chloride | 3.1 | 3.2 |
| Xylene (total) | ND (1.0) | ND (1.0) |

| GM-42 | 12/9/2003 | 9/20/2004 |
|--------------------------|-----------|-----------|
| UG/L | UG/L | UG/L |
| 1,1,1-Trichloroethane | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethane | 0.46 | 0.7 |
| 1,1-Dichloroethene | ND (1.0) | 0.25 |
| Benzene | ND (1.0) | ND (1.0) |
| cis-1,2-Dichloroethane | 11 | 16 |
| Ethylbenzene | ND (1.0) | ND (1.0) |
| Tetrachloroethane | 0.27 | ND (1.0) |
| Toluene | 0.34 | 0.44 |
| trans-1,2-Dichloroethene | 0.37 | 0.43 |
| Trichloroethene | 1 | 0.92 |
| Vinyl chloride | ND (1.0) | ND (1.0) |
| Xylene (total) | ND (1.0) | ND (1.0) |

| GM-19D | 9/28/1999 | 10/2/2000 | 11/14/2001 | 9/25/2002 | 9/20/2004 |
|--------------------------|-----------|-----------|------------|-----------|-----------|
| UG/L | UG/L | UG/L | UG/L | UG/L | UG/L |
| 1,1,1-Trichloroethane | ND (1.0) | ND (1.0) | 0.18 | ND (1.0) | 0.31 |
| 1,1-Dichloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Benzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| cis-1,2-Dichloroethane | 1.2 | 3.5 | 0.92 | 1.8 | 2.1 |
| Ethylbenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Tetrachloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Toluene | ND (1.0) | ND (1.0) | 0.38 | ND (1.0) | ND (1.0) |
| trans-1,2-Dichloroethene | ND (1.0) | ND (1.0) | ND (0.50) | ND (0.5) | ND (0.5) |
| Trichloroethene | 13.5 | 15.7 | 3.7 | 3.1 | 3.5 |
| Vinyl chloride | 1.5 | 1.7 | 0.36 | 0.24 | 1.8 |
| Xylene (total) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |

| GM-15 | 9/24/1999 | 10/2/2000 | 11/14/2001 | 9/27/2002 | 9/22/2003 | 9/20/2004 |
|--------------------------|-----------|-----------|------------|-----------|-----------|-----------|
| UG/L | UG/L | UG/L | UG/L | UG/L | UG/L | UG/L |
| 1,1,1-Trichloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethane | 2.4 | 2.2/2.3 | 1.4 | 1.6 | 1.7 | 1.8 |
| 1,1-Dichloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Benzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| cis-1,2-Dichloroethane | 4.3 | 2.6/3.8 | 1.2 | 1.6 | 1.4 | 1.4 |
| Ethylbenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Tetrachloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Toluene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| trans-1,2-Dichloroethene | ND (1.0) | ND (1.0) | ND (0.50) | ND (0.5) | ND (0.5) | ND (0.5) |
| Trichloroethene | 4.1 | 4.5/4.7 | 4.9 | 4.7 | 5.9 | 5.8 |
| Vinyl chloride | 1.5 | 1.3 | 0.36 | 0.17 | 3.5 | 1.7 |
| Xylene (total) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |

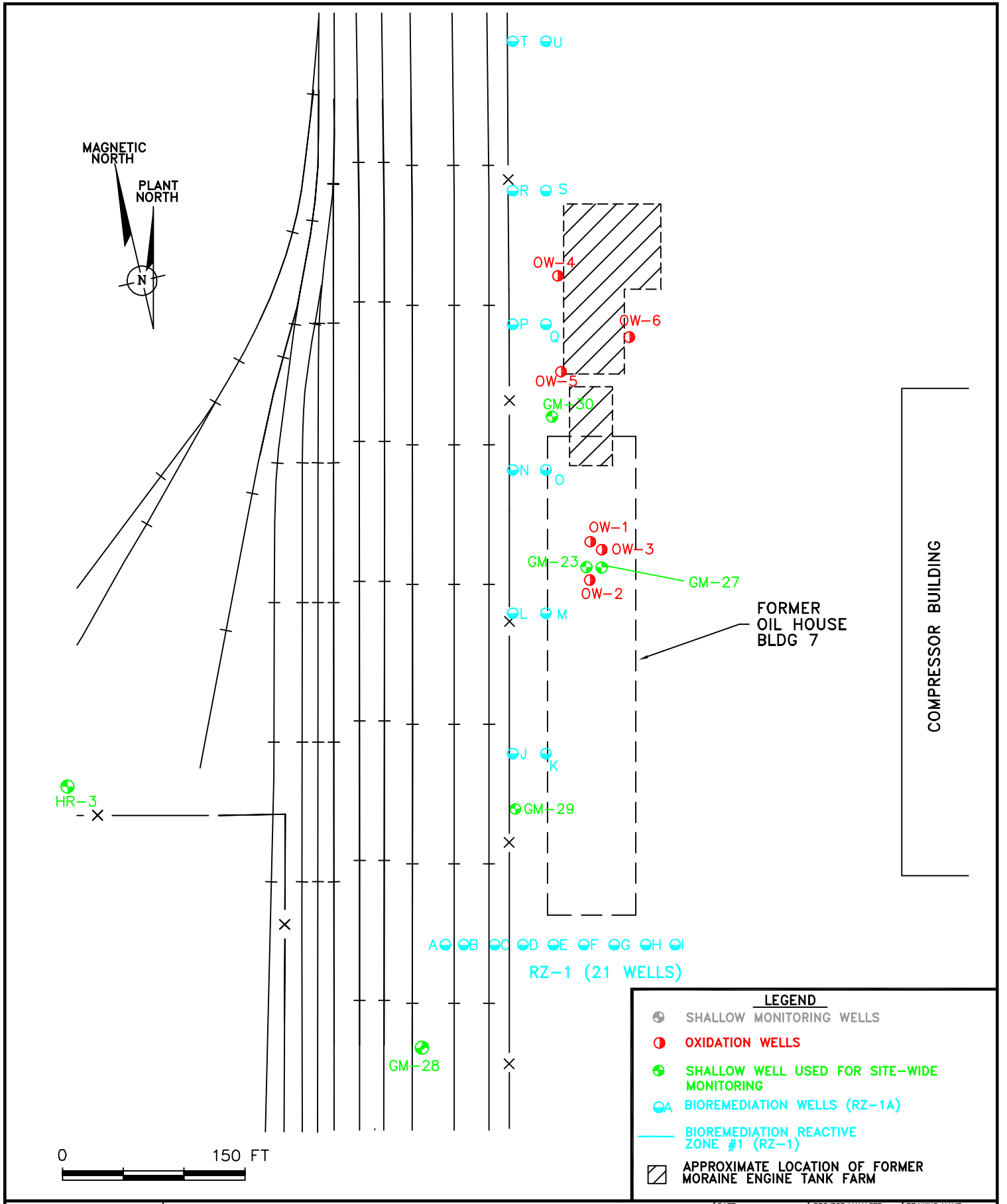
| GM-14 | 9/24/1999 |
|--------------------------|-----------|
| UG/L | UG/L |
| 1,1,1-Trichloroethane | ND (1.0) |
| 1,1-Dichloroethane | ND (1.0) |
| 1,1-Dichloroethene | ND (1.0) |
| Benzene | ND (1.0) |
| cis-1,2-Dichloroethane | ND (1.0) |
| Ethylbenzene | ND (1.0) |
| Tetrachloroethane | ND (1.0) |
| Toluene | ND (1.0) |
| trans-1,2-Dichloroethene | ND (1.0) |
| Trichloroethene | ND (1.0) |
| Vinyl chloride | ND (1.0) |
| Xylene (total) | ND (1.0) |

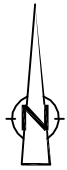
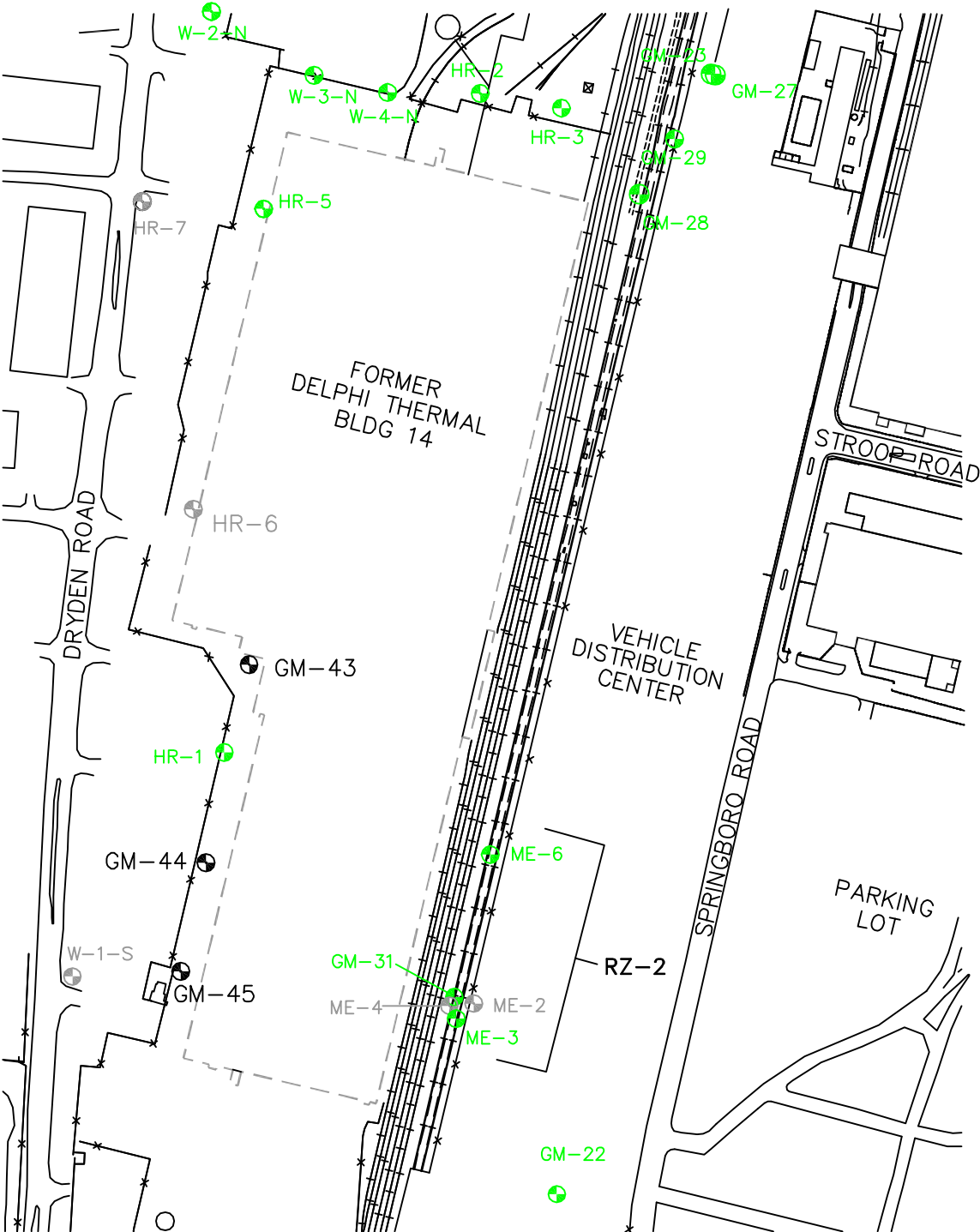
| GM-13 | 9/24/1999 |
|--------------------------|-----------|
| UG/L | UG/L |
| 1,1,1-Trichloroethane | ND (1.0) |
| 1,1-Dichloroethane | ND (1.0) |
| 1,1-Dichloroethene | ND (1.0) |
| Benzene | ND (1.0) |
| cis-1,2-Dichloroethane | ND (1.0) |
| Ethylbenzene | ND (1.0) |
| Tetrachloroethane | ND (1.0) |
| Toluene | ND (1.0) |
| trans-1,2-Dichloroethene | ND (1.0) |
| Trichloroethene | 31.0 |
| Vinyl chloride | ND (1.0) |
| Xylene (total) | ND (1.0) |

| DN-13 | 11/14/2001 | 9/27/2002 | 9/22/2003 | 9/16/2004 |
|--------------------------|------------|-----------|-----------|-----------|
| UG/L | UG/L | UG/L | UG/L | UG/L |
| 1,1,1-Trichloroethane | 1.1 | 1.1 | 1.1 | 0.84 |
| 1,1-Dichloroethane | 2.5 | 2.5 | 2.4 | 2.2 |
| 1,1-Dichloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Benzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| cis-1,2-Dichloroethane | 2.2 | 3.3 | 6.8 | 6.3 |
| Ethylbenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Tetrachloroethane | ND (1.0) | ND (1.0) | 0.31 | 0.44 |
| Toluene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| trans-1,2-Dichloroethene | 0.37 | 0.48 | 0.4 | 0.49 |
| Trichloroethene | 5.0 | 6.1 | 6.4 | 6.8 |
| Vinyl chloride | 1.2 | 1.3 | 1.1 | 2.1 |
| Xylene (total) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |

| MT-69 | 9/24/1999 | 10/3/2000 | 11/15/2001 | 9/30/2002 | 10/1/2003 | 9/27/2004 |
|--------------------------|-----------|-----------|------------|-----------|-----------|-----------|
| UG/L | UG/L | UG/L | UG/L | UG/L | UG/L | UG/L |
| 1,1,1-Trichloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| 1,1-Dichloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Benzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| cis-1,2-Dichloroethane | ND (1.0) | ND (1.0) | ND (0.50) | ND (0.5) | ND (0.5) | ND (0.5) |
| Ethylbenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Tetrachloroethane | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Toluene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| trans-1,2-Dichloroethene | ND (1.0) | ND (1.0) | ND (0.50) | ND (0.5) | ND (0.5) | ND (0.5) |
| Trichloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Vinyl chloride | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Xylene (total) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |

| GM-11 | 9/24/1999 | 10/2/2000 | 11/14/2001 | 10/1/2002 | 9/24/2003 | 9/21/2004 |
|------------------------|-----------|-----------|------------|-----------|-----------|-----------|
| UG/L | UG/L | UG/L | UG/L | UG/L | UG/L | UG/L |
| 1,1,1-Trichloroethane | ND (1.0) | ND (1.0) | 1.4 | 0.33 | 1 | 0.96 |
| 1,1-Dichloroethane | ND (1.0) | ND (1.0) | ND (1.0) | 0.34 | ND (1.0) | 0.89 |
| 1,1-Dichloroethene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Benzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| cis-1,2-Dichloroethane | ND (1.0) | ND (1.0) | ND (0.50) | 0.62 | ND (0.5) | ND (0.5) |
| Ethylbenzene | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) | ND (1.0) |
| Tetrachloroethane | 1.5 | 3.0 | 1.0 | 2.2 | 2.2 | 2.1 |
| Toluene | ND (1.0) | ND (1.0) | | | | |



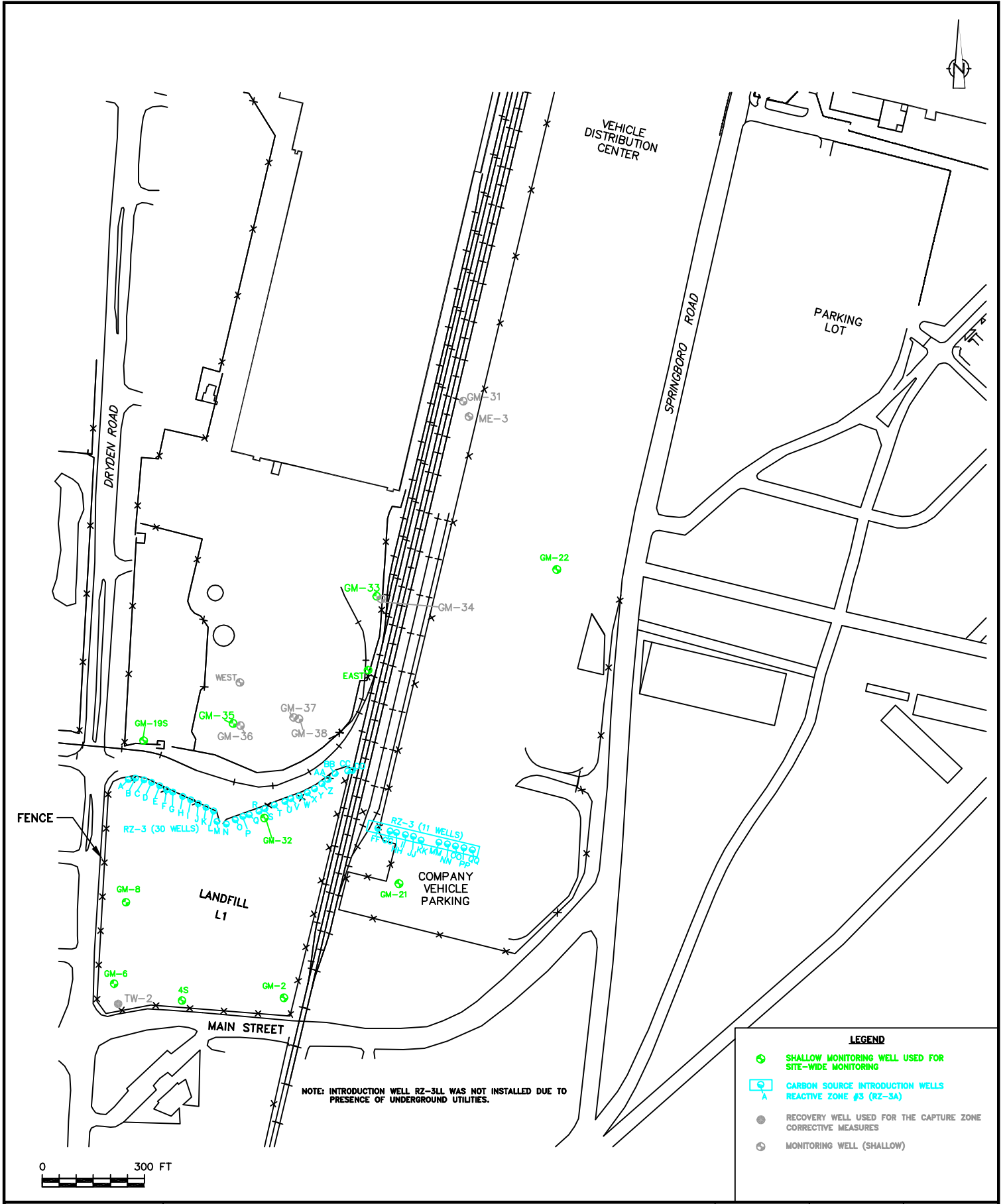


LEGEND

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

**REACTIVE ZONE #2
GENERAL MOTORS CORPORATION
MORaine, 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 |



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

| LEGEND | | |
|--------|-------------------------------------------------------------|--|
| | SHALLOW MONITORING WELL USED FOR SITE-WIDE MONITORING | |
| | CARBON SOURCE INTRODUCTION WELLS | |
| | REACTIVE ZONE #3 (RZ-3A) | |
| | RECOVERY WELL USED FOR THE CAPTURE ZONE CORRECTIVE MEASURES | |
| | MONITORING WELL (SHALLOW) | |

ARCADIS

Appendix A

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

ARCADIS

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

| COMPOUND | UNITS | HR-9 | HR-11 | GM-24 | HR-8 | W-1-N | HR-4 | W-2-N | W-3-N | W-4-N | HR-2 | HR-3 |
|-----------------------------------|-------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | 09/16/99 | 09/14/99 | 09/23/99 | 09/16/99 | 09/17/99 | 09/14/99 | 09/14/99 | 09/17/99 | 09/17/99 | 09/16/99 | 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 |

ARCADIS

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 | DUP-77 | ME-6 | ME-1 | GM-31 | ME-3 | DUP-72 | HR-16 | HR-17 | W-2-S | W-3-S |
|-----------------------------------|-------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | 09/22/99 | 09/22/99 | 08/31/99 | 08/31/99 | 09/01/99 | 08/31/99 | 08/31/99 | 09/23/99 | 09/23/99 | 09/23/99 | 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 | DUP-78 | GM-19S | EAST | WEST | GM-32 | GM-22 | GM-21 | GM-8 | GM-6 |
|-----------------------------------|-------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | 09/23/99 | 09/23/99 | 09/20/99 | 09/21/99 | 09/21/99 | 09/22/99 | 09/01/99 | 09/22/99 | 09/20/99 | 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 |

ARCADIS

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

| COMPOUND | UNITS | 4S | GM-2 | GM-16 | GM-17 | GM-18 | GM-10 | DUP-76 | WSU-24 | GM-26 |
|-----------------------------------|-------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | 09/20/99 | 09/20/99 | 09/21/99 | 09/21/99 | 09/22/99 | 09/21/99 | 09/21/99 | 09/21/99 | 09/23/99 |
| <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.

ARCADIS

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 | HR-11 | DUP-89 | HR-8 | HR-4 | W-2-N | W-3-N | W-4-N | HR-2 |
|-----------------------------------|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | | 9/18/2000 | 9/18/2000 | 9/18/2000 | 9/18/2000 | 9/20/2000 | 9/19/2000 | 9/19/2000 | 9/19/2000 | 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 | HR-12 | DUP-93 | HR-13 | HR-15 | 31 | GM-19D | GM-1 | GM-3 | GM-11 |
|-----------------------------------|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| | | 9/29/2000 | 9/28/2000 | 9/28/2000 | 9/29/2000 | 9/29/2000 | 9/29/2000 | 10/2/2000 | 10/2/2000 | 10/2/2000 | 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.

| COMPOUND | UNITS | GM-15 | DUP-94 | GM-20D | GM-9 | MT69 |
|-----------------------------------|-------|-----------|-----------|-----------|-----------|-----------|
| | | 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.

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Appendix B

Groundwater Sampling Logs for 2004

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. DN-13 Replicate No. N/A Code No. N/A
 Weather Clear, 70° Sampling Time: Begin 1655 End 1700

| Evacuation Data | | Field Parameters | |
|-----------------------------------------|---------------------------------|-------------------------|---------------------------|
| Measuring Point | <u>N/A</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>N/A</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>N/A</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>N/A</u> | pH (s.u.) | <u>NR</u> |
| Depth to Water (ft bmp) | <u>N/A</u> | Conductivity (mS/cm) | <u>NR</u> |
| Water-Level Elevation (ft) | <u>N/A</u> | (µS/cm) | <u>NR</u> |
| Water Column in Well (ft) | <u>N/A</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>N/A</u> | Temperature (°C) | <u>NR</u> |
| Gallons in Well | <u>N/A</u> | Dissolved Oxygen (mg/L) | <u>NR</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>N/A</u> | ORP (mV) | <u>NR</u> |
| Sample Pump Intake Setting (ft bmp) | <u>N/A</u> | Sampling Method | <u>Grab</u> |
| Purge Time | begin <u>N/A</u> end <u>N/A</u> | Remarks | <u>Sample time @ 1655</u> |
| Pumping Rate | <u>NM</u> | | |
| Evacuation Method | <u>Submersible pump/port</u> | | |

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

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

| Constituents Sampled | Container Description | Number | Preservative |
|----------------------------------|-------------------------|----------|------------------|
| <u>Site-Specific VOCs (8260)</u> | <u>40 ml glass vial</u> | <u>3</u> | <u>Cool, HCl</u> |
| <u> </u> | <u> </u> | <u> </u> | <u> </u> |
| <u> </u> | <u> </u> | <u> </u> | <u> </u> |
| <u> </u> | <u> </u> | <u> </u> | <u> </u> |
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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 | 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. 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

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

| Constituents Sampled | Container Description | Number | Preservative |
|---------------------------|-------------------------|----------|-------------------|
| Site-Specific VOCs (8260) | <u>40 ml glass vial</u> | <u>3</u> | <u>Cool, HCl</u> |
| As and Ba, Total | <u>500 ml plastic</u> | <u>1</u> | <u>Cool, HN03</u> |
| As and Ba, Dissolved | <u>500 ml plastic</u> | <u>1</u> | <u>Cool, HN03</u> |
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Sampling Personnel K. Dombrauckas/J. Manzo

| Well Casing Volumes | | | | |
|---------------------|--------------------|--------------------|--------------------|------------------|
| Gal./Ft. | <u>1-¼" = 0.06</u> | <u>2" = 0.16</u> | <u>3" = 0.37</u> | <u>4" = 0.65</u> |
| | <u>1-½" = 0.09</u> | <u>2-½" = 0.26</u> | <u>3-½" = 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-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 |
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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. 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

Measuring Point Top of PVC Casing
 MP Elevation (ft) 730.27
 Land Surface Elevation (ft) NM
 Sounded Well Depth (ft bmp) 46.33
 Depth to Water (ft bmp) 25.61
 Water-Level Elevation (ft) 704.66
 Water Column in Well (ft) 20.72
 Casing Diameter/Type 2"
 Gallons in Well 3.32
 Gallons Pumped/Bailed Prior to Sampling 5 Pumped
 Sample Pump Intake Setting (ft bmp) 40'
 Purge Time begin 9:09 end 9:24
 Pumping Rate 500 mL/min
 Evacuation Method Submersible pump

Field Parameters

Color Colorless
 Odor Slight organic
 Appearance Clear
 pH (s.u.) 7.16
 Conductivity (mS/cm) N/A
 (µS/cm) 1,830
 Turbidity (NTU) NR
 Temperature (°C) 16.80
 Dissolved Oxygen (mg/L) 0.0
 ORP (mV) -111
 Sampling Method Low flow
 Remarks Sample time @ 9:24
DTW final = 25.63

| 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. 1-1/4" = 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-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 | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>735.17</u> | Odor | <u>None</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>51.58</u> | pH (s.u.) | <u>7.76</u> |
| Depth to Water (ft bmp) | <u>30.35</u> | Conductivity (mS/cm) | <u>NR</u> |
| Water-Level Elevation (ft) | <u>704.82</u> | (µS/cm) | <u>1,900</u> |
| Water Column in Well (ft) | <u>21.23</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2" PVC</u> | Temperature (°C) | <u>16.60</u> |
| Gallons in Well | <u>3.40</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>6 Pumped</u> | ORP (mV) | <u>-186</u> |
| Sample Pump Intake Setting (ft bmp) | <u>45.44'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | begin <u>8:24</u> end <u>8:39</u> | Remarks | <u>Sample time @ 8:40</u> |
| Pumping Rate | <u>1000 mL/min</u> | | <u>DTW final = 30.35</u> |
| Evacuation Method | <u>Submersible pump</u> | | |

| 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 _____

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-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 |
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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 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-10 Replicate No. N/A Code No. N/A
 Weather Sunny, 85° Sampling Time: Begin 1502 End 1525

Evacuation Data

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

Field Parameters

Color Colorless
 Odor No
 Appearance Clear
 pH (s.u.) 7.00
 Conductivity (mS/cm) N/A
 (µS/cm) 1100
 Turbidity (NTU) NR
 Temperature (°C) 15.40
 Dissolved Oxygen (mg/L) 3.80
 ORP (mV) 182
 Sampling Method Low flow
 Remarks Sample time @ 1518
DTW final = 19.46

| Constituents Sampled | Container Description | Number | Preservative |
|---------------------------|-----------------------|--------|--------------|
| Site-Specific VOCs (8260) | 40 ml glass vial | 3 | Cool, HCl |
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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 |
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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 |
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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 | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>725.30</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>57.10</u> | pH (s.u.) | <u>7.14</u> |
| Depth to Water (ft bmp) | <u>20.91</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>704.39</u> | Conductivity (µS/cm) | <u>1490</u> |
| Water Column in Well (ft) | <u>36.19</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2"</u> | Temperature (°C) | <u>17.60</u> |
| Gallons in Well | <u>5.79</u> | Dissolved Oxygen (mg/L) | <u>0.59</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>4 pumped</u> | ORP (mV) | <u>181</u> |
| Sample Pump Intake Setting (ft bmp) | <u>53'</u> | Sampling Method | <u>Low Flow</u> |
| Purge Time | begin <u>9:39</u> end <u>9:54</u> | Remarks | <u>Sample time @ 9:55</u> |
| Pumping Rate | <u>600 mL/min</u> | | <u>DTW final = 20.91</u> |
| Evacuation Method | <u>Submersible Pump</u> | | |

| Constituents Sampled | Container Description | Number | Preservative |
|---------------------------|-----------------------|--------|--------------|
| Site specific VOCs (8260) | 40 ml glass | 3 | HCl, Cool |
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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 | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>723.84</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>49.80</u> | pH (s.u.) | <u>7.13</u> |
| Depth to Water (ft bmp) | <u>19.24</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>704.63</u> | (µS/cm) | <u>1,280</u> |
| Water Column in Well (ft) | <u>30.56</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2"</u> | Temperature (°C) | <u>16.3</u> |
| Gallons in Well | <u>4.89</u> | Dissolved Oxygen (mg/L) | <u>0.00</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>7 Pumped</u> | ORP (mV) | <u>-23.0</u> |
| Sample Pump Intake Setting (ft bmp) | <u>52'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | <u>begin 1534 end 1555</u> | Remarks | <u>Sample time @ 1556</u> |
| Pumping Rate | <u>1200 mL/min</u> | | <u>DTW final = 19.21</u> |
| Evacuation Method | <u>Submersible pump</u> | | |

| Constituents Sampled | Container Description | Number | Preservative |
|----------------------------------|-------------------------|----------|------------------|
| <u>Site-Specific VOCs (8260)</u> | <u>40 ml glass vial</u> | <u>3</u> | <u>Cool, HCl</u> |
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Sampling Personnel K. Dombrauckas/J. Manzo

| Well Casing Volumes | | | | |
|---------------------|--------------------|--------------------|--------------------|------------------|
| Gal./Ft. | <u>1-¼" = 0.06</u> | <u>2" = 0.16</u> | <u>3" = 0.37</u> | <u>4" = 0.65</u> |
| | <u>1-½" = 0.09</u> | <u>2-½" = 0.26</u> | <u>3-½" = 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-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 | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>723.80</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>54.25</u> | pH (s.u.) | <u>7.06</u> |
| Depth to Water (ft bmp) | <u>19.27</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>704.53</u> | (µS/cm) | <u>1,270</u> |
| Water Column in Well (ft) | <u>34.98</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2"</u> | Temperature (°C) | <u>16.50</u> |
| Gallons in Well | <u>5.60</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>6 pumped</u> | ORP (mV) | <u>-53</u> |
| Sample Pump Intake Setting (ft bmp) | <u>48'</u> | Sampling Method | <u>Low Flow</u> |
| Purge Time | begin <u>1610</u> end <u>1628</u> | Remarks | <u>Sample time @ 1629</u> |
| Pumping Rate | <u>800 mL/min</u> | | <u>DTW final = 19.28</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> |
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Sampling Personnel K. Dombrauckas/J. Manzo

| Well Casing Volumes | | | | |
|---------------------|--------------------|--------------------|--------------------|------------------|
| Gal./Ft. | <u>1-¼" = 0.06</u> | <u>2" = 0.16</u> | <u>3" = 0.37</u> | <u>4" = 0.65</u> |
| | <u>1-½" = 0.09</u> | <u>2-½" = 0.26</u> | <u>3-½" = 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-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 | <u>Top of Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>730.25</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>149.00</u> | pH (s.u.) | <u>6.95</u> |
| Depth to Water (ft bmp) | <u>25.11</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>705.14</u> | (µS/cm) | <u>1260</u> |
| Water Column in Well (ft) | <u>123.89</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>4"</u> | Temperature (°C) | <u>19.0</u> |
| Gallons in Well | <u>80.53</u> | Dissolved Oxygen (mg/L) | <u>0.25</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>7 Pumped</u> | ORP (mV) | <u>-110</u> |
| Sample Pump Intake Setting (ft bmp) | <u>75'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | begin <u>1425</u> end <u>1453</u> | Remarks | <u>Sample time @ 1454</u> |
| Pumping Rate | <u>1000 mL/min</u> | | <u>MS/MSD taken</u> |
| Evacuation Method | <u>Submersible Pump</u> | | |

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

Measuring Point Top of PVC Casing
 MP Elevation (ft) 730.85
 Land Surface Elevation (ft) NM
 Sounded Well Depth (ft bmp) 55.90
 Depth to Water (ft bmp) 25.24
 Water-Level Elevation (ft) 705.61
 Water Column in Well (ft) 30.66
 Casing Diameter/Type 2"
 Gallons in Well 4.91
 Gallons Pumped/Bailed Prior to Sampling 8 Pumped
 Sample Pump Intake Setting (ft bmp) 49'
 Purge Time begin 1304 end 1328
 Pumping Rate 1000 mL/min
 Evacuation Method Submersible pump

Field Parameters

Color Colorless
 Odor No
 Appearance Clear
 pH (s.u.) 7.13
 Conductivity (mS/cm) N/A
 (µS/cm) 1970
 Turbidity (NTU) NR
 Temperature (°C) 18.60
 Dissolved Oxygen (mg/L) 0.0
 ORP (mV) 160.0
 Sampling Method Low flow
 Remarks Sample time @ 1328
DTW final = 25.24

| 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 |
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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-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 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-20D Replicate No. N/A Code No. N/A
 Weather Sunny, 85° Sampling Time: Begin 1543 End 1609

Evacuation Data

Measuring Point Top of Casing
 MP Elevation (ft) 727.26
 Land Surface Elevation (ft) NM
 Sounded Well Depth (ft bmp) 101.00
 Depth to Water (ft bmp) 22.11
 Water-Level Elevation (ft) 705.15
 Water Column in Well (ft) 78.89
 Casing Diameter/Type 4"
 Gallons in Well 51.27
 Gallons Pumped/Bailed
 Prior to Sampling 7 Pumped
 Sample Pump Intake
 Setting (ft bmp) 95'
 Purge Time begin 1543 end 1602
 Pumping Rate 1000 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) 909
 Turbidity (NTU) NR
 Temperature (°C) 16.00
 Dissolved Oxygen (mg/L) 0.85
 ORP (mV) 99
 Sampling Method Low flow
 Remarks Sample time @ 1603
DTW final = 22.13

| Constituents Sampled | Container Description | Number | Preservative |
|---------------------------|-----------------------|--------|--------------|
| Site specific VOCs (8260) | 40 ml glass | 3 | HCl, Cool |
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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 mi milliliter NTU Nephelometric Turbidity Units
 °C Degrees Celsius mS/cm Millisiemens per centimeter PVC Polyvinyl chloride
 bmp below measuring point mi 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 | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>728.28</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>56.75</u> | pH (s.u.) | <u>7.10</u> |
| Depth to Water (ft bmp) | <u>25.24</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>703.04</u> | (µS/cm) | <u>1,760</u> |
| Water Column in Well (ft) | <u>31.51</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2"</u> | Temperature (°C) | <u>17.20</u> |
| Gallons in Well | <u>5.04</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>9 Pumped</u> | ORP (mV) | <u>62</u> |
| Sample Pump Intake Setting (ft bmp) | <u>50'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | <u>begin 1438 end 1459</u> | Remarks | <u>Sample time @ 1500</u> |
| Pumping Rate | <u>1200 mL/min</u> | | <u>DTW final = 25.24</u> |
| Evacuation Method | <u>Peristaltic pump</u> | | |

| Constituents Sampled | Container Description | Number | Preservative |
|-------------------------------------------|--------------------------|----------|------------------------------------------|
| <u>Site-Specific VOCs (8260)</u> | <u>40 ml glass vial</u> | <u>3</u> | <u>Cool, HCl</u> |
| <u>Iron & Manganese Tot. (6010A)</u> | <u>500 ml plastic</u> | <u>1</u> | <u>Cool, HNO₃</u> |
| <u>Iron & Manganese Diss. (6010A)</u> | <u>500 ml plastic</u> | <u>1</u> | <u>Cool, HNO₃</u> |
| <u>Chlorides (SM325.2)</u> | <u>250 ml plastic</u> | <u>1</u> | <u>Cool</u> |
| <u>Sulfide (SM376.1)</u> | <u>500 ml plastic</u> | <u>1</u> | <u>Cool, NaOH/ZnAc</u> |
| <u>TOC (SM415.1)</u> | <u>40 ml glass vial</u> | <u>2</u> | <u>Cool, H₂SO₄</u> |
| <u>Sulfate (SM375.4)</u> | <u>250 ml plastic</u> | <u>1</u> | <u>Cool</u> |
| <u>Light Hydrocarbons (AM18G)</u> | <u>40 ml glass vials</u> | <u>2</u> | <u>Cool, BAK</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-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 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-23 Replicate No. N/A Code No. N/A
 Weather Sunny, 80° Sampling Time: Begin 1605 End 1637

Evacuation Data

Measuring Point Top of PVC Casing
 MP Elevation (ft) 731.07
 Land Surface Elevation (ft) NM
 Sounded Well Depth (ft bmp) 31.98
 Depth to Water (ft bmp) 23.51
 Water-Level Elevation (ft) 707.56
 Water Column in Well (ft) 8.47
 Casing Diameter/Type 2"
 Gallons in Well 1.36
 Gallons Pumped/Bailed Prior to Sampling 8 Pumped
 Sample Pump Intake Setting (ft bmp) 29'
 Purge Time begin 1605 end 1626
 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) 2,130
 Turbidity (NTU) NR
 Temperature (°C) 16.30
 Dissolved Oxygen (mg/L) 0.0
 ORP (mV) 57
 Sampling Method Low Flow
 Remarks Sample time @ 1627
DTW final = 23.51

| 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.

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-26 Replicate No. N/A Code No. N/A
 Weather Overcast, 75° Sampling Time: Begin 10:15 End 10:36

Evacuation Data

Measuring Point Top of PVC Casing
 MP Elevation (ft) 722.29
 Land Surface Elevation (ft) NM
 Sounded Well Depth (ft bmp) 58.67
 Depth to Water (ft bmp) 19.51
 Water-Level Elevation (ft) 702.78
 Water Column in Well (ft) 39.16
 Casing Diameter/Type 2"
 Gallons in Well 6.27
 Gallons Pumped/Bailed Prior to Sampling 7 Pumped
 Sample Pump Intake Setting (ft bmp) 53'
 Purge Time begin 10:15 end 10:30
 Pumping Rate 1000 mL/min
 Evacuation Method Submersible pump

Field Parameters

Color Colorless
 Odor No
 Appearance Clear
 pH (s.u.) 7.22
 Conductivity (mS/cm) N/A
 (µS/cm) 940
 Turbidity (NTU) NR
 Temperature (°C) 15.30
 Dissolved Oxygen (mg/L) 5.34
 ORP (mV) 239
 Sampling Method Low flow
 Remarks Sample time @ 10:31
DTW final = 19.51

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

Measuring Point TOC
 MP Elevation (ft) 730.57
 Land Surface Elevation (ft) NM
 Sounded Well Depth (ft bmp) 50.00
 Depth to Water (ft bmp) 22.58
 Water-Level Elevation (ft) 707.99
 Water Column in Well (ft) 27.42
 Casing Diameter/Type 2"
 Gallons in Well 4.39
 Gallons Pumped/Bailed Prior to Sampling 8 Pumped
 Sample Pump Intake Setting (ft bmp) 45'
 Purge Time begin 1416 end 1440
 Pumping Rate 1000 mL/min
 Evacuation Method Submersible Pump

Field Parameters

Color Colorless
 Odor Yes
 Appearance Clear
 pH (s.u.) 6.80
 Conductivity (mS/cm) N/A
 (µS/cm) 1,400
 Turbidity (NTU) NR
 Temperature (°C) 16.70
 Dissolved Oxygen (mg/L) 0.35
 ORP (mV) 36.0
 Sampling Method Low Flow

Remarks Sample time @ 1441
DTW final = 22.58

| Constituents Sampled | Container Description | Number | Preservative |
|---------------------------|-----------------------|--------|--------------|
| Site specific VOCs (8260) | 40 ml glass | 3 | Cool, HCl |
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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 | | Field Parameters | |
|-----------------------------------------|------------------------------|-------------------------|----------------------------|
| Measuring Point | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>736.46</u> | Odor | <u>Slight</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>36.74</u> | pH (s.u.) | <u>6.85</u> |
| Depth to Water (ft bmp) | <u>28.83</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>707.63</u> | (µS/cm) | <u>2030</u> |
| Water Column in Well (ft) | <u>7.91</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2"</u> | Temperature (°C) | <u>16.20</u> |
| Gallons in Well | <u>1.27</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>6 Pumped</u> | ORP (mV) | <u>-165</u> |
| Sample Pump Intake Setting (ft bmp) | <u>33'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | <u>begin 10:30 end 10:45</u> | Remarks | <u>Sample time @ 10:46</u> |
| Pumping Rate | <u>1200 mL/min</u> | | <u>DTW final = 28.83</u> |
| Evacuation Method | <u>Submersible pump</u> | | |

| 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. 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-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. | 1-¼" = 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-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 | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>736.71</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>63.38</u> | pH (s.u.) | <u>7.04</u> |
| Depth to Water (ft bmp) | <u>25.81</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>710.90</u> | (µS/cm) | <u>1,790</u> |
| Water Column in Well (ft) | <u>37.57</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2"</u> | Temperature (°C) | <u>18.30</u> |
| Gallons in Well | <u>6.01</u> | Dissolved Oxygen (mg/L) | <u>0.41</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>6 Pumped</u> | ORP (mV) | <u>-86</u> |
| Sample Pump Intake Setting (ft bmp) | <u>59'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | begin <u>9:25</u> end <u>9:50</u> | Remarks | <u>Sample time @ 9:52</u> |
| Pumping Rate | <u>1000 mL/min</u> | | <u>DTW final = 25.81</u> |
| Evacuation Method | <u>Submersible pump</u> | | <u>DUP-140 + MS/MSD taken</u> |

| Constituents Sampled | Container Description | Number | Preservative |
|-------------------------------------------|--------------------------|------------------|------------------------------------------|
| <u>Site-Specific VOCs (8260)</u> | <u>40 ml glass vial</u> | <u>3 (3) (6)</u> | <u>Cool, HCl</u> |
| <u>Iron & Manganese Tot. (6010A)</u> | <u>500 ml plastic</u> | <u>1 (1)</u> | <u>Cool, HNO₃</u> |
| <u>Iron & Manganese Diss. (6010A)</u> | <u>500 ml plastic</u> | <u>1 (1)</u> | <u>Cool, HNO₃</u> |
| <u>Chlorides (SM325.2)</u> | <u>250 ml plastic</u> | <u>1 (1)</u> | <u>Cool</u> |
| <u>Sulfide (SM376.1)</u> | <u>500 ml plastic</u> | <u>1 (1)</u> | <u>Cool, NaOH/ZnAc</u> |
| <u>TOC (SM415.1)</u> | <u>40 ml glass vial</u> | <u>2 (2)</u> | <u>Cool, H₂SO₄</u> |
| <u>Sulfate (SM375.4)</u> | <u>250 ml plastic</u> | <u>1 (1)</u> | <u>Cool</u> |
| <u>Light Hydrocarbons (AM18G)</u> | <u>40 ml glass vials</u> | <u>2 (2)</u> | <u>Cool, BAK</u> |
| | | | |
| | | | |

Sampling Personnel K. Dombrauckas/J. Manzo

| Well Casing Volumes | | | | |
|---------------------|--------------------|--------------------|--------------------|------------------|
| Gal./Ft. | <u>1-¼" = 0.06</u> | <u>2" = 0.16</u> | <u>3" = 0.37</u> | <u>4" = 0.65</u> |
| | <u>1-½" = 0.09</u> | <u>2-½" = 0.26</u> | <u>3-½" = 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 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 | <u>Top of PVC Casing</u> | Color | <u>Yellowish orange</u> |
| MP Elevation (ft) | <u>732.10</u> | Odor | <u>Organic</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>59.80</u> | pH (s.u.) | <u>6.86</u> |
| Depth to Water (ft bmp) | <u>26.35</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>705.75</u> | (µS/cm) | <u>4,210</u> |
| Water Column in Well (ft) | <u>33.45</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2"</u> | Temperature (°C) | <u>17.20</u> |
| Gallons in Well | <u>5.35</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>7 Pumped</u> | ORP (mV) | <u>-160</u> |
| Sample Pump Intake Setting (ft bmp) | <u>54'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | begin <u>1305</u> end <u>1320</u> | Remarks | <u>Sample time @ 1321</u> |
| Pumping Rate | <u>1200 ml/min</u> | | <u>DTW final = 26.35</u> |
| Evacuation Method | <u>Submersible pump</u> | | |

| Constituents Sampled | Container Description | Number | Preservative |
|------------------------------|--------------------------|----------|------------------------------------------|
| Site-Specific VOCs (8260) | <u>40 ml glass vial</u> | <u>3</u> | <u>Cool, HCl</u> |
| As, Be, Fe, Mn Tot. (6010A) | <u>500 ml plastic</u> | <u>1</u> | <u>Cool, HNO₃</u> |
| As, Be, Fe, Mn Diss. (6010A) | <u>500 ml plastic</u> | <u>1</u> | <u>Cool, HNO₃</u> |
| Chlorides (SM325.2) | <u>250 ml plastic</u> | <u>1</u> | <u>Cool</u> |
| Sulfide (SM376.1) | <u>500 ml plastic</u> | <u>1</u> | <u>Cool, NaOH/ZnAc</u> |
| TOC (SM415.1) | <u>40 ml glass vial</u> | <u>2</u> | <u>Cool, H₂SO₄</u> |
| Sulfate (SM375.4) | <u>250 ml plastic</u> | <u>1</u> | <u>Cool</u> |
| Light Hydrocarbons (AM18G) | <u>40 ml glass vials</u> | <u>2</u> | <u>Cool, BAK</u> |
| | | | |
| | | | |

Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

| | | | | |
|-----------------|--------------------|--------------------|--------------------|------------------|
| Gal./Ft. | <u>1-¼" = 0.06</u> | <u>2" = 0.16</u> | <u>3" = 0.37</u> | <u>4" = 0.65</u> |
| | <u>1-½" = 0.09</u> | <u>2-½" = 0.26</u> | <u>3-½" = 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-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 | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>729.77</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>54.78</u> | pH (s.u.) | <u>7.05</u> |
| Depth to Water (ft bmp) | <u>23.60</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>706.17</u> | (µS/cm) | <u>2060</u> |
| Water Column in Well (ft) | <u>31.18</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2"</u> | Temperature (°C) | <u>17.90</u> |
| Gallons in Well | <u>4.99</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>6 Pumped</u> | ORP (mV) | <u>52.0</u> |
| Sample Pump Intake Setting (ft bmp) | <u>48'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | begin <u>1444</u> end <u>1502</u> | Remarks | <u>Sample time @ 1503</u> |
| Pumping Rate | <u>800 mL/min</u> | | <u>DTW final = 23.60</u> |
| Evacuation Method | <u>Submersible pump</u> | | |

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

Time

| | 1447 | 1450 | 1453 | 1456 | 1459 | 1502 | | | | | |
|------------------------------|-------|-------|-------|-------|-------|-------|--|--|--|--|--|
| 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 | | Field Parameters | |
|-----------------------------------------|-----------------------------------|-------------------------|---------------------------|
| Measuring Point | <u>Top of PVC Casing</u> | Color | <u>Yellow orange</u> |
| MP Elevation (ft) | <u>731.27</u> | Odor | <u>Organic</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>66.08</u> | pH (s.u.) | <u>8.55</u> |
| Depth to Water (ft bmp) | <u>25.62</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>705.65</u> | (µS/cm) | <u>5550</u> |
| Water Column in Well (ft) | <u>40.46</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2"</u> | Temperature (°C) | <u>18.50</u> |
| Gallons in Well | <u>6.47</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>6 Pumped</u> | ORP (mV) | <u>-253.0</u> |
| Sample Pump Intake Setting (ft bmp) | <u>49'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | begin <u>1407</u> end <u>1419</u> | Remarks | <u>Sample time @ 1420</u> |
| Pumping Rate | <u>1000 mL/min</u> | | <u>DTW final = 25.62</u> |
| Evacuation Method | <u>Submersible pump</u> | | |

| Constituents Sampled | Container Description | Number | Preservative |
|---------------------------|-----------------------|--------|--------------|
| Site-Specific VOCs (8260) | 40 ml glass vial | 3 | Cool, HCl |
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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 | | Field Parameters | |
|-----------------------------------------|----------------------------|-------------------------|--------------------------|
| Measuring Point | <u>Top of casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>730.95</u> | Odor | <u>Yes</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>116.90</u> | pH (s.u.) | <u>6.81</u> |
| Depth to Water (ft bmp) | <u>23.12</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>707.83</u> | (µS/cm) | <u>1700</u> |
| Water Column in Well (ft) | <u>93.78</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2" PVC</u> | Temperature (°F) | <u>16</u> |
| Gallons in Well | <u>15.00</u> | Dissolved Oxygen (mg/L) | <u>0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>8 Pumped</u> | ORP (mV) | <u>-130</u> |
| Sample Pump Intake Setting (ft bmp) | <u>Midpoint of screen</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | <u>begin 1625 end 1647</u> | Remarks | <u>Sampled @ 1648</u> |
| Pumping Rate | <u>1200 mL/min</u> | | <u>DTW final = 23.16</u> |
| Evacuation Method | <u>Submersible pump</u> | | |

| Constituents Sampled | Container Description | Number | Preservative |
|----------------------------------|-------------------------|----------|------------------|
| <u>Site-Specific VOCs (8260)</u> | <u>40 ml glass vial</u> | <u>3</u> | <u>Cool, HCl</u> |
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Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

| | | | | |
|-----------------|--------------------|--------------------|--------------------|------------------|
| Gal./Ft. | <u>1-¼" = 0.06</u> | <u>2" = 0.16</u> | <u>3" = 0.37</u> | <u>4" = 0.65</u> |
| | <u>1-½" = 0.09</u> | <u>2-½" = 0.26</u> | <u>3-½" = 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-39

Time Pump Started 1625

Depth of Sampling Midpoint of Screen

Date 9/20/04

Parameters

Time

| | 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 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-40 Replicate No. N/A Code No. N/A
 Weather Sunny, 80° Sampling Time: Begin 9:25 End 9:58

Evacuation Data

Measuring Point TOC
 MP Elevation (ft) 727.04
 Land Surface Elevation (ft) 727.28
 Sounded Well Depth (ft bmp) 149.61
 Depth to Water (ft bmp) 21.32
 Water-Level Elevation (ft) 705.72
 Water Column in Well (ft) 128.29
 Casing Diameter/Type 2" PVC
 Gallons in Well 20.53
 Gallons Pumped/Bailed Prior to Sampling 6 Pumped
 Sample Pump Intake Setting (ft bmp) 144'
 Purge Time begin 9:25 end 9:52
 Pumping Rate 700 mL/min
 Evacuation Method Submersible pump

Field Parameters

Color Colorless
 Odor No
 Appearance Clear
 pH (s.u.) 7.04
 Conductivity (mS/cm) N/A
 (µmhos/cm) 1120
 Turbidity (NTU) NR
 Temperature (°C) 17.2
 Dissolved Oxygen (mg/L) 0.07
 ORP (mV) -138
 Sampling Method Low flow
 Remarks Sampled @ 9:53
DTW final = 21.32

| Constituents Sampled | Container Description | Number | Preservative |
|---------------------------|-----------------------|--------|--------------|
| Site-Specific VOCs (8260) | 40 ml VOA | 3 | HCl, cool |
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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. 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 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-41 Replicate No. N/A Code No. N/A
 Weather Sunny, 60° Sampling Time: Begin 8:00 End 8:30

| Evacuation Data | | Field Parameters | |
|-----------------------------------------|-----------------------------------|-------------------------|--------------------------|
| Measuring Point | <u>TOC</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>733.65</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>731.22</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>116.31</u> | pH (s.u.) | <u>6.95</u> |
| Depth to Water (ft bmp) | <u>27.11</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>706.54</u> | (µmhos/cm) | <u>1290</u> |
| Water Column in Well (ft) | <u>89.20</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2" PVC</u> | Temperature (°C) | <u>16.9</u> |
| Gallons in Well | <u>14.27</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>7 Pumped</u> | ORP (mV) | <u>-84</u> |
| Sample Pump Intake Setting (ft bmp) | <u>112'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | begin <u>8:00</u> end <u>8:19</u> | Remarks | <u>Sampled @ 8:20</u> |
| Pumping Rate | <u>1000 mL/min</u> | | <u>DTW final = 27.03</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> |
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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 |
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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

Measuring Point Top of PVC Casing
 MP Elevation (ft) 732.71
 Land Surface Elevation (ft) NM
 Sounded Well Depth (ft bmp) 59.45
 Depth to Water (ft bmp) 26.41
 Water-Level Elevation (ft) 706.30
 Water Column in Well (ft) 33.04
 Casing Diameter/Type 2"
 Gallons in Well 5.29
 Gallons Pumped/Bailed Prior to Sampling 7 Pumped
 Sample Pump Intake Setting (ft bmp) 55'
 Purge Time begin 8:50 end 9:05
 Pumping Rate 1000 mL/min
 Evacuation Method Submersible Pump

Field Parameters

Color Colorless
 Odor No
 Appearance Clear
 pH (s.u.) 7.08
 Conductivity (mS/cm) N/A
 (µS/cm) 1,420
 Turbidity (NTU) NR
 Temperature (°C) 18.00
 Dissolved Oxygen (mg/L) 0.0
 ORP (mV) 158.0
 Sampling Method Low Flow
 Remarks Sampled @ 9:07
DUP-138 taken RB-115 @ 9:25
MSMD taken.

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

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 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-4 Replicate No. N/A Code No. N/A
 Weather Cloudy, 75° Sampling Time: Begin 8:54 End 9:15

| Evacuation Data | | Field Parameters | |
|-----------------------------------------|-----------------------------------|-------------------------|---------------------------|
| Measuring Point | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (tt) | <u>742.60</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>67.00</u> | pH (s.u.) | <u>7.18</u> |
| Depth to Water (ft bmp) | <u>34.41</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>708.19</u> | (µS/cm) | <u>1190</u> |
| Water Column in Well (ft) | <u>32.59</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2"</u> | Temperature (°C) | <u>15.50</u> |
| Gallons in Well | <u>5.21</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>7 Pumped</u> | ORP (mV) | <u>163</u> |
| Sample Pump Intake Setting (ft bmp) | <u>62'</u> | Sampling Method | <u>Low Flow</u> |
| Purge Time | begin <u>8:54</u> end <u>9:09</u> | Remarks | <u>Sample time @ 9:10</u> |
| Pumping Rate | <u>1000 mL/min</u> | | <u>DTW final = 34.41</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> |
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Sampling Personnel K. Dombrackas/J. Manzo

| Well Casing Volumes | | | | |
|---------------------|--------------------|--------------------|--------------------|------------------|
| Gal./Ft. | <u>1-¼" = 0.06</u> | <u>2" = 0.16</u> | <u>3" = 0.37</u> | <u>4" = 0.65</u> |
| | <u>1-½" = 0.09</u> | <u>2-½" = 0.26</u> | <u>3-½" = 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. 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 |
|---------------------------|-----------------------|--------|--------------|
| Site specific VOCs (8260) | 40 ml glass | 3 | HCl, Cool |
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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-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 |
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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 | | Field Parameters | |
|-----------------------------------------|-----------------------------------|-------------------------|---------------------------|
| Measuring Point | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>743.51</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>70.03</u> | pH (s.u.) | <u>6.96</u> |
| Depth to Water (ft bmp) | <u>34.53</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>708.98</u> | (µS/cm) | <u>1400</u> |
| Water Column in Well (ft) | <u>35.50</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2"</u> | Temperature (°C) | <u>15.00</u> |
| Gallons in Well | <u>5.68</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>5 Pumped</u> | ORP (mV) | <u>136.0</u> |
| Sample Pump Intake Setting (ft bmp) | <u>64'</u> | Sampling Method | <u>Low Flow</u> |
| Purge Time | begin <u>1618</u> end <u>1634</u> | Remarks | <u>Sample time @ 1634</u> |
| Pumping Rate | <u>1200 mL/min</u> | | <u>DTW final = 34.53</u> |
| Evacuation Method | <u>Submersible Pump</u> | | |

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

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 | | Field Parameters | |
|-----------------------------------------|-----------------------------------|-------------------------|---------------------------|
| Measuring Point | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>742.64</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>132.00</u> | pH (s.u.) | <u>7.01</u> |
| Depth to Water (ft bmp) | <u>33.78</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>708.86</u> | (µS/cm) | <u>1,420</u> |
| Water Column in Well (ft) | <u>98.22</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>4"</u> | Temperature (°C) | <u>16.50</u> |
| Gallons in Well | <u>63.84</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>6 Pumped</u> | ORP (mV) | <u>-109</u> |
| Sample Pump Intake Setting (ft bmp) | <u>125'</u> | Sampling Method | <u>Low Flow</u> |
| Purge Time | begin <u>1623</u> end <u>1651</u> | Remarks | <u>Sample time @ 1652</u> |
| Pumping Rate | <u>600 mL/min</u> | | <u>DTW final = 33.78</u> |
| Evacuation Method | <u>Submersible Pump</u> | | <u>RB-120 Taken</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> |
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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 | | Field Parameters | |
|-----------------------------------------|-----------------------------------|-------------------------|---------------------------|
| Measuring Point | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>735.03</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>86.20</u> | pH (s.u.) | <u>6.97</u> |
| Depth to Water (ft bmp) | <u>27.42</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>707.61</u> | (µS/cm) | <u>1,240</u> |
| Water Column in Well (ft) | <u>58.78</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>4"</u> | Temperature (°C) | <u>15.10</u> |
| Gallons in Well | <u>38.20</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>7 Pumped</u> | ORP (mV) | <u>76.0</u> |
| Sample Pump Intake Setting (ft bmp) | <u>81'</u> | Sampling Method | <u>Low Flow</u> |
| Purge Time | begin <u>9:31</u> end <u>9:50</u> | Remarks | <u>Sample time @ 9:51</u> |
| Pumping Rate | <u>800 mL/min</u> | | <u>DTW final = 27.43</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> |
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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 | | Field Parameters | |
|-----------------------------------------|-----------------------------------|-------------------------|---------------------------|
| Measuring Point | <u>* Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>733.74</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>102.35</u> | pH (s.u.) | <u>7.16</u> |
| Depth to Water (ft bmp) | <u>26.44</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>707.30</u> | (µS/cm) | <u>1020</u> |
| Water Column in Well (ft) | <u>75.91</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>4"</u> | Temperature (°C) | <u>15.50</u> |
| Gallons in Well | <u>49.34</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>8 Pumped</u> | ORP (mV) | <u>-123</u> |
| Sample Pump Intake Setting (ft bmp) | <u>97'</u> | Sampling Method | <u>Low Flow</u> |
| Purge Time | begin <u>8:49</u> end <u>9:08</u> | Remarks | <u>Sample time @ 9:09</u> |
| Pumping Rate | <u>1200 mL/min</u> | | <u>DTW final = 26.46</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> |
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Sampling Personnel K. Dombrackas/J. Manzo

| Well Casing Volumes | | | | |
|---------------------|--------------------|--------------------|--------------------|------------------|
| Gal./Ft. | <u>1-¼" = 0.06</u> | <u>2" = 0.16</u> | <u>3" = 0.37</u> | <u>4" = 0.65</u> |
| | <u>1-½" = 0.09</u> | <u>2-½" = 0.26</u> | <u>3-½" = 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. 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 | | Field Parameters | |
|-----------------------------------------|----------------------------|-------------------------|---------------------------|
| Measuring Point | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>726.43</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>48.08</u> | pH (s.u.) | <u>7.10</u> |
| Depth to Water (ft bmp) | <u>21.54</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>704.89</u> | (µS/cm) | <u>1,160</u> |
| Water Column in Well (ft) | <u>26.54</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>4"</u> | Temperature (°C) | <u>17.40</u> |
| Gallons in Well | <u>17.25</u> | Dissolved Oxygen (mg/L) | <u>0.39</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>7 Pumped</u> | ORP (mV) | <u>191</u> |
| Sample Pump Intake Setting (ft bmp) | <u>42'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | <u>begin 8:00 end 8:18</u> | Remarks | <u>Sample time @ 8:19</u> |
| Pumping Rate | <u>1200 mL/min</u> | | <u>DTW final = 20.55</u> |
| Evacuation Method | <u>Submersible pump</u> | | |

| Constituents Sampled | Container Description | Number | Preservative |
|----------------------------------|-------------------------|----------|------------------|
| <u>Site-Specific VOCs (8260)</u> | <u>40 ml glass vial</u> | <u>3</u> | <u>Cool, HCl</u> |
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Sampling Personnel K. Dombrauckas/J. Manzo

Well Casing Volumes

| | | | | |
|-----------------|--------------------|--------------------|--------------------|------------------|
| Gal./Ft. | <u>1-¼" = 0.06</u> | <u>2" = 0.16</u> | <u>3" = 0.37</u> | <u>4" = 0.65</u> |
| | <u>1-½" = 0.09</u> | <u>2-½" = 0.26</u> | <u>3-½" = 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 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 | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>726.64</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>67.10</u> | pH (s.u.) | <u>7.27</u> |
| Depth to Water (ft bmp) | <u>21.70</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>704.94</u> | (µS/cm) | <u>1230</u> |
| Water Column in Well (ft) | <u>45.40</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>4"</u> | Temperature (°C) | <u>15.70</u> |
| Gallons in Well | <u>29.51</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>6 Pumped</u> | ORP (mV) | <u>170</u> |
| Sample Pump Intake Setting (ft bmp) | <u>62'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | begin <u>8:34</u> end <u>8:49</u> | Remarks | <u>Sample time @ 8:50</u> |
| Pumping Rate | <u>800 mL/min</u> | | <u>DTW final = 21.70</u> |
| Evacuation Method | <u>Submersible pump</u> | | |

| Constituents Sampled | Container Description | Number | Preservative |
|----------------------------------|-------------------------|----------|------------------|
| <u>Site-Specific VOCs (8260)</u> | <u>40 ml glass vial</u> | <u>3</u> | <u>Cool, HCl</u> |
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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 | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>733.42</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>73.85</u> | pH (s.u.) | <u>7.34</u> |
| Depth to Water (ft bmp) | <u>24.16</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>709.26</u> | (µS/cm) | <u>1020</u> |
| Water Column in Well (ft) | <u>49.69</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>4"</u> | Temperature (°C) | <u>15.20</u> |
| Gallons in Well | <u>32.30</u> | Dissolved Oxygen (mg/L) | <u>0.94</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>6 Pumped</u> | ORP (mV) | <u>144.0</u> |
| Sample Pump Intake Setting (ft bmp) | <u>70'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | begin <u>9:02</u> end <u>9:20</u> | Remarks | <u>Sample time @ 9:21</u> |
| Pumping Rate | <u>700 mL/min</u> | | <u>DTW final = 24.16</u> |
| Evacuation Method | <u>Submersible pump</u> | | |

| Constituents Sampled | Container Description | Number | Preservative |
|---------------------------|-----------------------|--------|--------------|
| Site-Specific VOCs (8260) | 40 ml glass vial | 3 | Cool, HCl |
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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 | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>727.68</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>71.20</u> | pH (s.u.) | <u>7.18</u> |
| Depth to Water (ft bmp) | <u>22.63</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>705.05</u> | (µS/cm) | <u>1320</u> |
| Water Column in Well (ft) | <u>48.57</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>4"</u> | Temperature (°C) | <u>17.70</u> |
| Gallons in Well | <u>31.57</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>7 Pumped</u> | ORP (mV) | <u>140</u> |
| Sample Pump Intake Setting (ft bmp) | <u>65'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | begin <u>9:37</u> end <u>9:58</u> | Remarks | <u>Sample time @ 9:59</u> |
| Pumping Rate | <u>1200 mL/min</u> | | <u>DTW final = 22.63</u> |
| Evacuation Method | <u>Submersible pump</u> | | |

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

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. WSU-24 Replicate No. DUP-141 Code No. N/A
 Weather Cloudy, 80° Sampling Time: Begin 10:50 End 11:10

| Evacuation Data | | Field Parameters | |
|-----------------------------------------|-------------------------------------|-------------------------|----------------------------|
| Measuring Point | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>725.10</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>65.70</u> | pH (s.u.) | <u>7.19</u> |
| Depth to Water (ft bmp) | <u>19.72</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>705.38</u> | (µS/cm) | <u>1,340</u> |
| Water Column in Well (ft) | <u>45.98</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2"</u> | Temperature (°C) | <u>15.60</u> |
| Gallons in Well | <u>7.36</u> | Dissolved Oxygen (mg/L) | <u>5.29</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>5 Pumped</u> | ORP (mV) | <u>239.0</u> |
| Sample Pump Intake Setting (ft bmp) | <u>~59'</u> | Sampling Method | <u>Low Flow</u> |
| Purge Time | begin <u>10:50</u> end <u>11:05</u> | Remarks | <u>Sample time @ 11:06</u> |
| Pumping Rate | <u>800 mL/min</u> | | <u>DTW final = 19.73</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> |
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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. WSU-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 | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>733.38</u> | Odor | <u>Organic</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>42.05</u> | pH (s.u.) | <u>7.38</u> |
| Depth to Water (ft bmp) | <u>34.63</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>698.75</u> | (µS/cm) | <u>1,870</u> |
| Water Column in Well (ft) | <u>7.42</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>10"</u> | Temperature (°C) | <u>16.7</u> |
| Gallons in Well | <u>18.2</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>6 Pumped</u> | ORP (mV) | <u>-140.0</u> |
| Sample Pump Intake Setting (ft bmp) | <u>37'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | begin <u>9:50</u> end <u>10:11</u> | Remarks | <u>Sample time @ 10:11</u> |
| Pumping Rate | <u>1000 mL/min</u> | | <u>DTW final = 34.63</u> |
| Evacuation Method | <u>Submersible pump</u> | | |

| Constituents Sampled | Container Description | Number | Preservative |
|---------------------------|-------------------------|----------|-------------------|
| Site-Specific VOCs (8260) | <u>40 ml glass vial</u> | <u>3</u> | <u>Cool, HCl</u> |
| As and Ba, total | <u>500 ml plastic</u> | <u>1</u> | <u>Cool, HN03</u> |
| As and Ba, dissolved | <u>500 ml plastic</u> | <u>1</u> | <u>Cool, HN03</u> |
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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. 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 | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>731.68</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>59.72</u> | pH (s.u.) | <u>7.04</u> |
| Depth to Water (ft bmp) | <u>24.05</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>707.63</u> | (µS/cm) | <u>1000</u> |
| Water Column in Well (ft) | <u>35.67</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>4"</u> | Temperature (°C) | <u>14.90</u> |
| Gallons in Well | <u>23.19</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>8 Pumped</u> | ORP (mV) | <u>-96</u> |
| Sample Pump Intake Setting (ft bmp) | <u>47'</u> | Sampling Method | <u>Low Flow</u> |
| Purge Time | begin <u>8:00</u> end <u>8:15</u> | Remarks | <u>Sample time @ 8:16</u> |
| Pumping Rate | <u>1200 mL/min</u> | | <u>DTW final = 24.05</u> |
| Evacuation Method | <u>Submersible Pump</u> | | <u>RB-118 @ 8:30</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> |
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Sampling Personnel K. Dombrackas/J. Manzo

Well Casing Volumes

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

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|------|-----------------------|-------|-----------------------------|-------|-------------------------------|
| 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 | | Field Parameters | |
|-----------------------------------------|-------------------------------------|-------------------------|----------------------------|
| Measuring Point | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>733.66</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>57.75</u> | pH (s.u.) | <u>7.17</u> |
| Depth to Water (ft bmp) | <u>28.08</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>705.58</u> | Conductivity (µS/cm) | <u>984</u> |
| Water Column in Well (ft) | <u>29.67</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>4"</u> | Temperature (°C) | <u>15.40</u> |
| Gallons in Well | <u>19.29</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>7 Pumped</u> | ORP (mV) | <u>-129</u> |
| Sample Pump Intake Setting (ft bmp) | <u>52'</u> | Sampling Method | <u>Low Flow</u> |
| Purge Time | begin <u>12:28</u> end <u>12:49</u> | Remarks | <u>Sample time @ 12:50</u> |
| Pumping Rate | <u>1200 mL/min</u> | | <u>DTW final = 28.07</u> |
| Evacuation Method | <u>Submersible Pump</u> | | |

| Constituents Sampled | Container Description | Number | Preservative |
|---------------------------|-----------------------|--------|--------------|
| Site specific VOCs (8260) | 40 ml glass | 3 | HCl, Cool |
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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 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-4-N Replicate No. N/A Code No. N/A
 Weather Sunny, 80° Sampling Time: Begin 1335 End 1410

Evacuation Data

Measuring Point Top of PVC Casing
 MP Elevation (ft) 731.63
 Land Surface Elevation (ft) NM
 Sounded Well Depth (ft bmp) 66.60
 Depth to Water (ft bmp) 23.97
 Water-Level Elevation (ft) 707.66
 Water Column in Well (ft) 42.63
 Casing Diameter/Type 4"
 Gallons in Well 27.71
 Gallons Pumped/Bailed
 Prior to Sampling 8 Pumped
 Sample Pump Intake
 Setting (ft bmp) 62'
 Purge Time begin 1335 end 1359
 Pumping Rate 600 mL/min
 Evacuation Method Submersible Pump

Field Parameters

Color Colorless
 Odor No
 Appearance Clear
 pH (s.u.) 7.08
 Conductivity (mS/cm) N/A
 (µS/cm) 968
 Turbidity (NTU) NR
 Temperature (°C) 15.90
 Dissolved Oxygen (mg/L) 0.0
 ORP (mV) -37
 Sampling Method Low Flow
 Remarks Sample time @ 1400
DTW final = 23.97

| Constituents Sampled | Container Description | Number | Preservative |
|---------------------------|-----------------------|--------|--------------|
| Site specific VOCs (8260) | 40 ml glass | 3 | HCl, Cool |
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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 | <u>Top of PVC Casing</u> | Color | <u>Light yellow</u> |
| MP Elevation (ft) | <u>731.36</u> | Odor | <u>Organic</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>66.95</u> | pH (s.u.) | <u>8.63</u> |
| Depth to Water (ft bmp) | <u>26.80</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>704.56</u> | (µS/cm) | <u>3950</u> |
| Water Column in Well (ft) | <u>40.15</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>4"</u> | Temperature (°C) | <u>16.30</u> |
| Gallons in Well | <u>26.10</u> | Dissolved Oxygen (mg/L) | <u>0.0</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>5 pumped</u> | ORP (mV) | <u>-255.0</u> |
| Sample Pump Intake Setting (ft bmp) | <u>60'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | begin <u>10:29</u> end <u>10:42</u> | Remarks | <u>Sample time @ 10:42</u> |
| Pumping Rate | <u>1000 mL/min</u> | | <u>DTW final = 26.80</u> |
| Evacuation Method | <u>Submersible pump</u> | | <u>RB-116 @ 11:00</u> |

| Constituents Sampled | Container Description | Number | Preservative |
|---------------------------|-------------------------|--------------|-------------------|
| Site-Specific VOCs (8260) | <u>40 ml glass vial</u> | <u>3 (3)</u> | <u>Cool, HCl</u> |
| As and Ba, total | <u>500 ml plastic</u> | <u>1 (1)</u> | <u>Cool, HN03</u> |
| As and Ba, dissolved | <u>500 ml plastic</u> | <u>1 (1)</u> | <u>Cool, HN03</u> |
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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 | | Field Parameters | |
|-----------------------------------------|------------------------------|-------------------------|----------------------------|
| Measuring Point | <u>Top of PVC Casing</u> | Color | <u>Colorless</u> |
| MP Elevation (ft) | <u>730.98</u> | Odor | <u>No</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear</u> |
| Sounded Well Depth (ft bmp) | <u>71.30</u> | pH (s.u.) | <u>7.18</u> |
| Depth to Water (ft bmp) | <u>24.86</u> | Conductivity (mS/cm) | <u>NK</u> |
| Water-Level Elevation (ft) | <u>706.12</u> | (µS/cm) | <u>1700</u> |
| Water Column in Well (ft) | <u>46.44</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2"</u> | Temperature (°C) | <u>17.40</u> |
| Gallons in Well | <u>7.43</u> | Dissolved Oxygen (mg/L) | <u>0.94</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>6 Pumped</u> | ORP (mV) | <u>195</u> |
| Sample Pump Intake Setting (ft bmp) | <u>65'</u> | Sampling Method | <u>Low flow</u> |
| Purge Time | <u>begin 10:59 end 11:14</u> | Remarks | <u>Sample time @ 11:14</u> |
| Pumping Rate | <u>1000 mL/min</u> | | <u>DTW final = 24.84</u> |
| Evacuation Method | <u>Submersible pump</u> | | |

| 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 |

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-6 Replicate No. N/A Code No. N/A
 Weather Sunny, 70° Sampling Time: Begin 7:56 End 8:25

| Evacuation Data | | Field Parameters | |
|-----------------------------------------|-----------------------------------|-------------------------|-----------------------------------------------|
| Measuring Point | <u>Top of PVC Casing</u> | Color | <u>Olive gray</u> |
| MP Elevation (ft) | <u>734.84</u> | Odor | <u>Yes</u> |
| Land Surface Elevation (ft) | <u>NM</u> | Appearance | <u>Clear w/abundance of black/gray flecks</u> |
| Sounded Well Depth (ft bmp) | <u>35.60</u> | pH (s.u.) | <u>6.49</u> |
| Depth to Water (ft bmp) | <u>26.41</u> | Conductivity (mS/cm) | <u>N/A</u> |
| Water-Level Elevation (ft) | <u>708.43</u> | (µS/cm) | <u>1,710</u> |
| Water Column in Well (ft) | <u>9.19</u> | Turbidity (NTU) | <u>NR</u> |
| Casing Diameter/Type | <u>2"</u> | Temperature (°C) | <u>17.40</u> |
| Gallons in Well | <u>1.47</u> | Dissolved Oxygen (mg/L) | <u>2.51</u> |
| Gallons Pumped/Bailed Prior to Sampling | <u>5 bailed</u> | ORP (mV) | <u>-4</u> |
| Sample Pump Intake Setting (ft bmp) | <u>34'</u> | Sampling Method | <u>Disposable bailer</u> |
| Purge Time | begin <u>7:56</u> end <u>8:15</u> | Remarks | <u>Sample time @ 8:15</u> |
| Pumping Rate | <u>N/A</u> | | |
| Evacuation Method | <u>Disposable bailer</u> | | |

| Constituents Sampled | Container Description | Number | Preservative |
|-------------------------------------------|--------------------------|----------|-------------------------------------------|
| <u>Site-Specific VOCs (8260)</u> | <u>40 ml glass vial</u> | <u>3</u> | <u>Cool, HCl</u> |
| <u>Iron & Manganese Tot. (6010A)</u> | <u>500 ml plastic</u> | <u>1</u> | <u>Cool, HNO₃</u> |
| <u>Iron & Manganese Diss. (6010A)</u> | <u>500 ml plastic</u> | <u>1</u> | <u>Cool, HNO₃</u> |
| <u>Chlorides (SM325.2)</u> | <u>250 ml plastic</u> | <u>1</u> | <u>Cool</u> |
| <u>Sulfide (SM376.1)</u> | <u>500 ml plastic</u> | <u>1</u> | <u>Cool, NaOH/ZnAc</u> |
| <u>TOC (SM415.1)</u> | <u>40 ml glass vial</u> | <u>2</u> | <u>Cool, H₂SO₄</u> |
| <u>Sulfate (SM375.4)</u> | <u>250 ml plastic</u> | <u>1</u> | <u>Cool</u> |
| <u>Light Hydrocarbons (AM18G)</u> | <u>40 ml glass vials</u> | <u>2</u> | <u>Cool, Na₃PO₄</u> |
| | | | |
| | | | |

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

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 |
| | | | |
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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 |

ARCADIS

Appendix C

Groundwater Analytical Database for
2004

ARCADIS

Table C-1. Groundwater Analytical Results for April 2004, General Motors Corporation, Moraine, Ohio.

| | Units | 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 |
|-----------------------------------|-------|-----------------------------------|-----------------------------|-----------------------------------|----------------------------|----------------------------|
| <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 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 | W-4-N 9/16/04 Upper Aquifer |
|-----------------------------------|-------|----------------------------------|-----------------------------------|----------------------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| <u>Volatile Organic Compounds</u> | Units | | | | | | | |
| 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 |
|-----------------------------------|-------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|-----------------------------|-----------------------------------|-----------------------------------|
| <u>Volatile Organic Compounds</u> | Units | | | | | | | |
| 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.

ARCADIS

Table C-2. Groundwater Analytical Results for September 2004, General Motors Corporation, Moraine, Ohio.

| | | GM-27 9/15/04 Upper Aquifer | GM-29 9/15/04 Upper Aquifer | GM-28 9/15/04 Upper Aquifer | ME-6 9/15/04 Upper Aquifer | GM-31 9/15/04 Upper Aquifer | DUP 140 9/15/04 QA/QC | ME-3 9/15/04 Upper Aquifer |
|-----------------------------------|-------|-----------------------------------|-----------------------------------|-----------------------------------|----------------------------------|-----------------------------------|-----------------------------|----------------------------------|
| | Units | | | | | | | |
| <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.

ARCADIS

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.

ARCADIS

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.

ARCADIS

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 |
|-----------------------------------|-------|--------------------------------|-----------------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|------------------------------------|
| <u>Volatile Organic Compounds</u> | Units | | | | | | | |
| 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.

ARCADIS

Table C-2. Groundwater Analytical Results for September 2004, General Motors Corporation, Moraine, Ohio.

| | Units | 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 |
|-----------------------------------|-------|-----------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------|-----------------------------------|-----------------------------------|
| Volatile Organic Compounds | | | | | | | | |
| 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.

TB - Trip 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 |
|-----------------------------------|-------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|------------------------------------|----------------------------------|
| <u>Volatile Organic Compounds</u> | Units | | | | | | | |
| 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.

TB - Trip 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 |
|-----------------------------------|-------|----------------------------------|-----------------------------------|-----------------------------------|------------------------------------|-----------------------------------|----------------------------------|-----------------------------|
| <u>Volatile Organic Compounds</u> | Units | | | | | | | |
| 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.

TB - Trip 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 |
|-----------------------------------|-------|-----------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| <u>Volatile Organic Compounds</u> | Units | | | | | | | |
| 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.

| | Units | TB-179 9/13/2004 QA/QC | TB-180 9/14/2004 QA/QC | TB-181 9/15/2004 QA/QC | TB-182 9/16/2004 QA/QC | TB-183 9/17/2004 QA/QC | TB-184 9/21/2004 QA/QC | TB-185 9/27/2004 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.

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Appendix D

In-Situ Reactive Zones Performance
Results for 2004

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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:

- 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;
- 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;
- 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
- 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

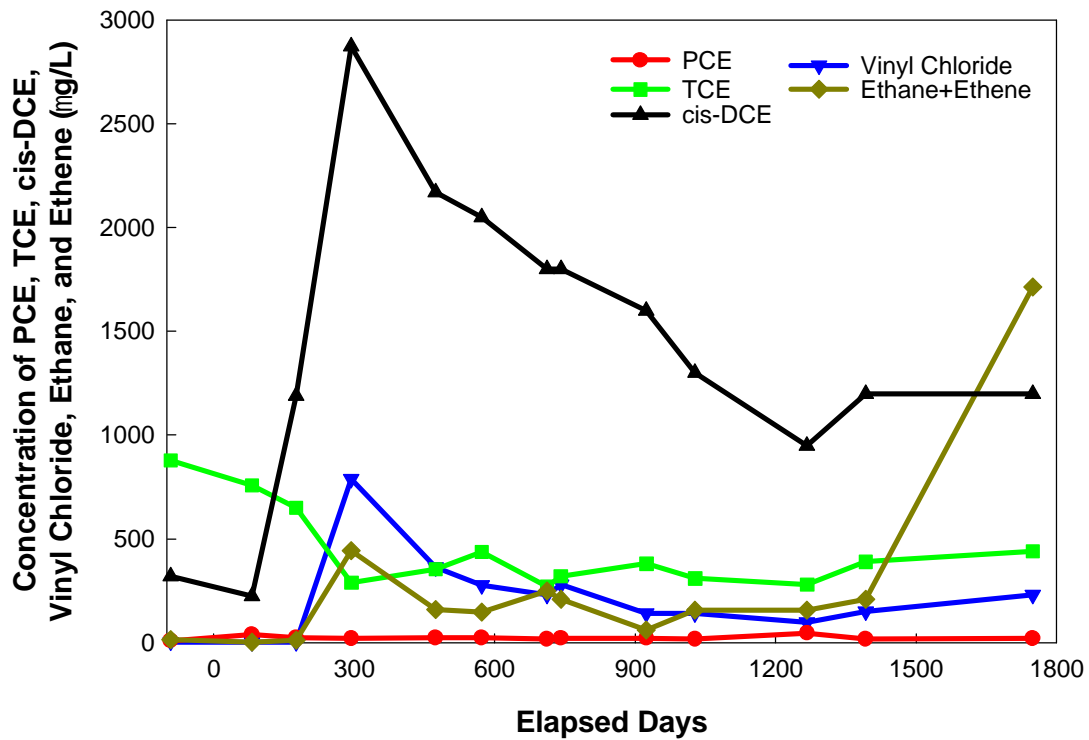


Figure D-2: Reductive Dechlorination at GM-28 - Downgradient Well in RZ-1

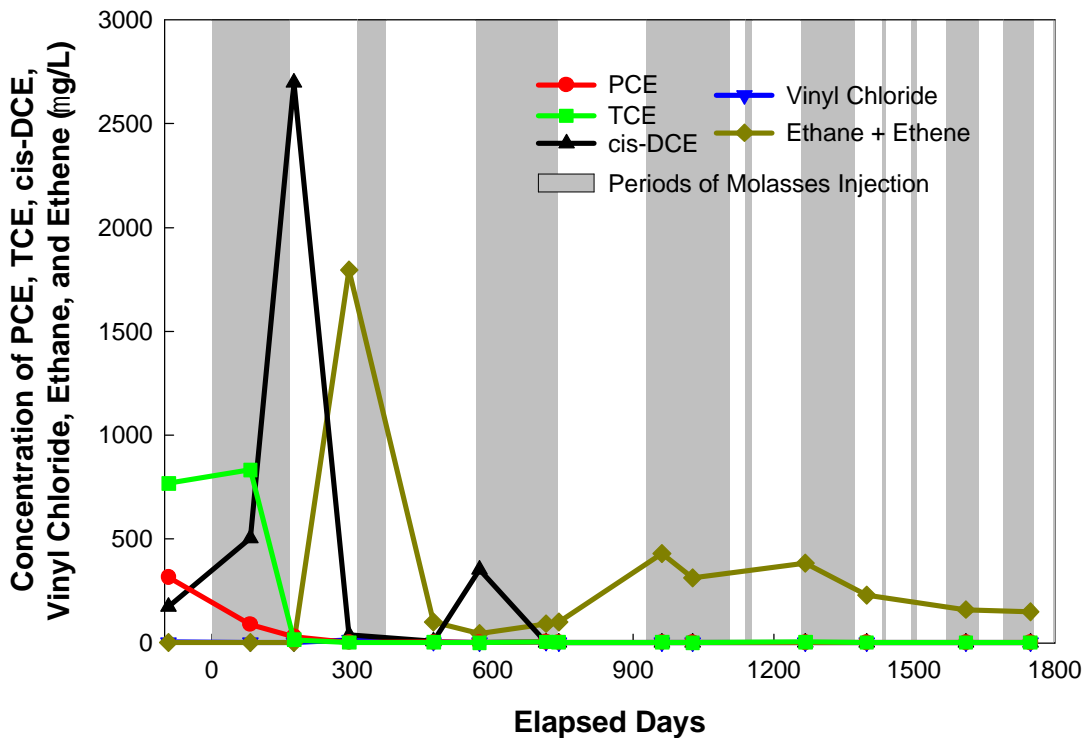


Figure D-3. Reductive Dechlorination at ME-6 - Upgradient Well in RZ-2

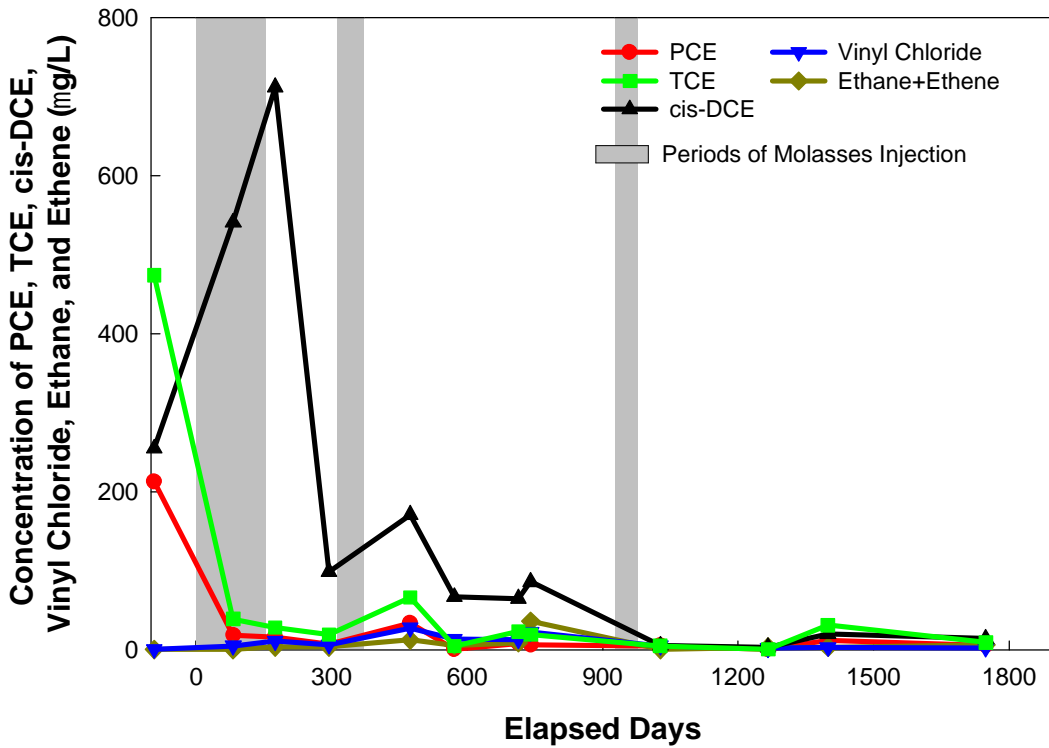


Figure D-4. Reductive Dechlorination at ME-3 - Downgradient Well in RZ-2

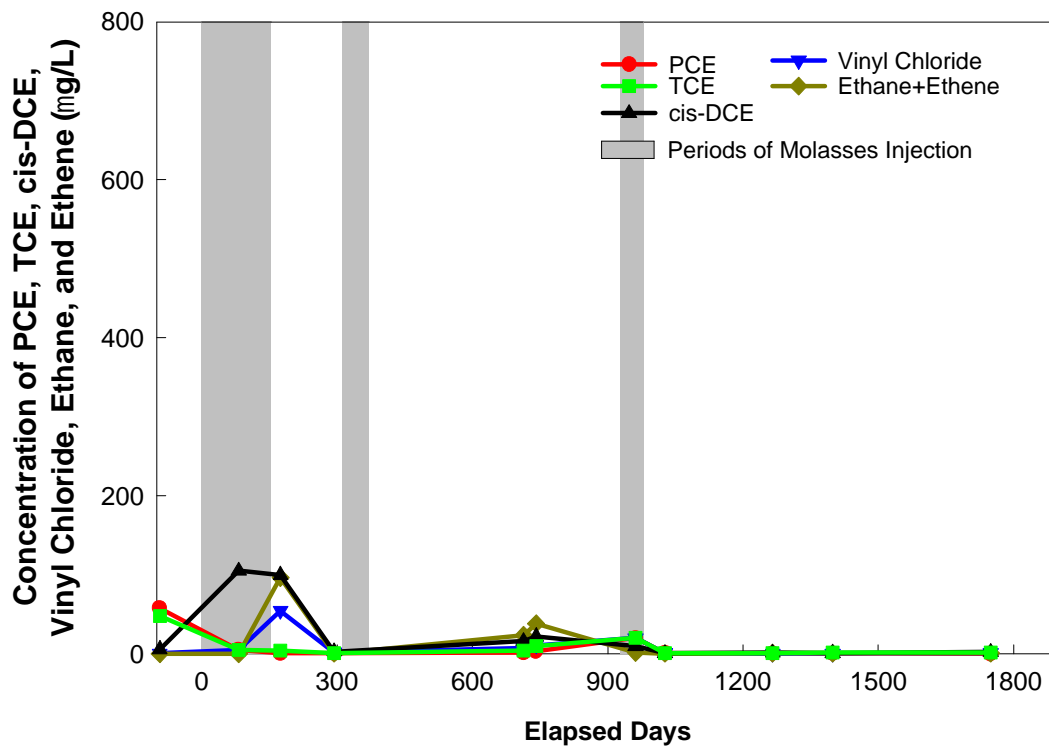


Figure D-5. Reductive Dechlorination at EAST - Upgradient Well in RZ-3 West

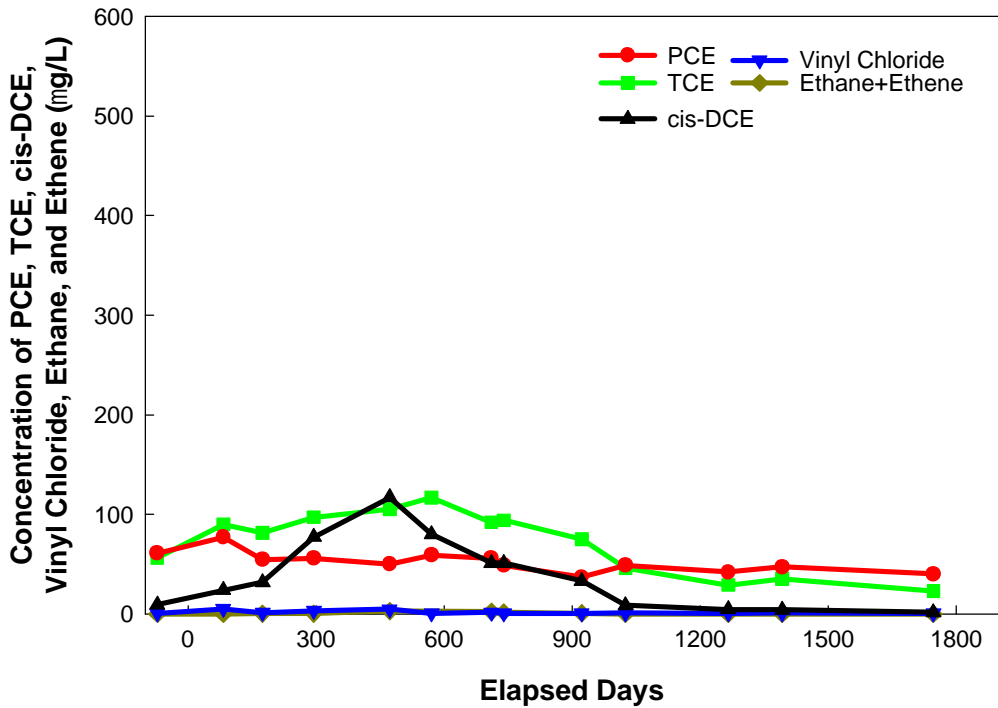


Figure D-6. Reductive Dechlorination at GM-32 - Downgradient Well in RZ-3 West

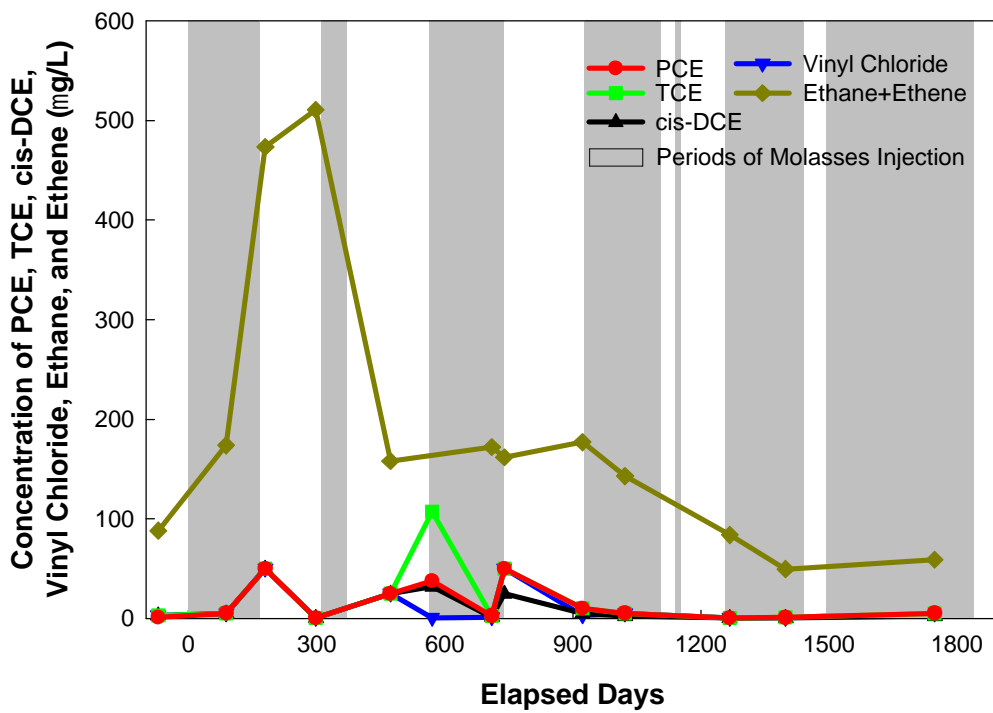


Figure D-7: Reductive Dechlorination at GM-8 - Downgradient to RZ-3 West

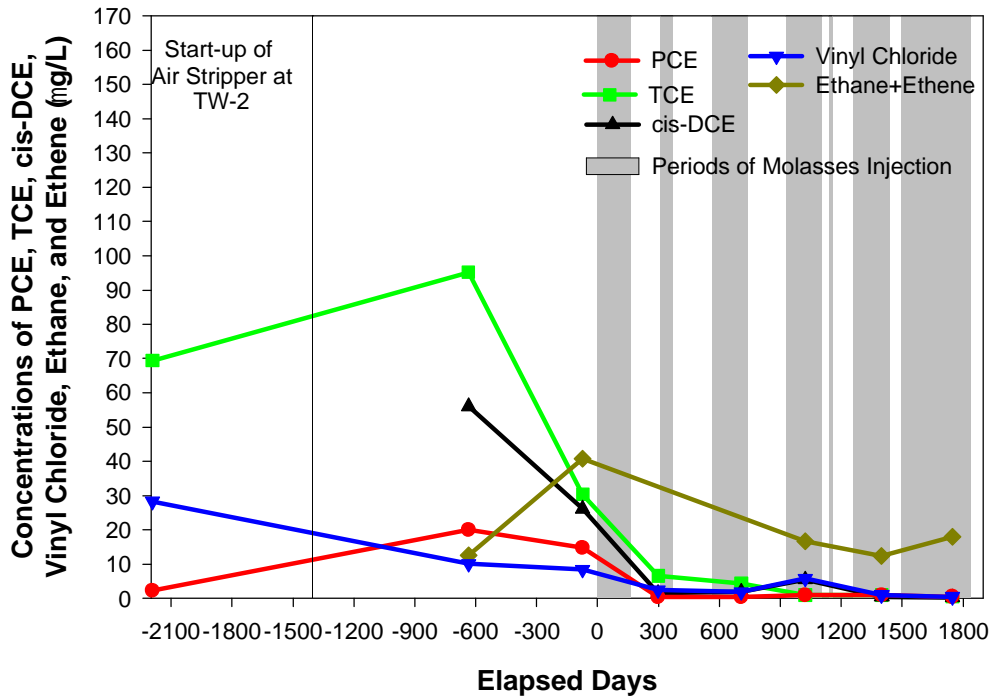


Figure D-8: Reductive Dechlorination at GM-6 - Downgradient to RZ-3 West

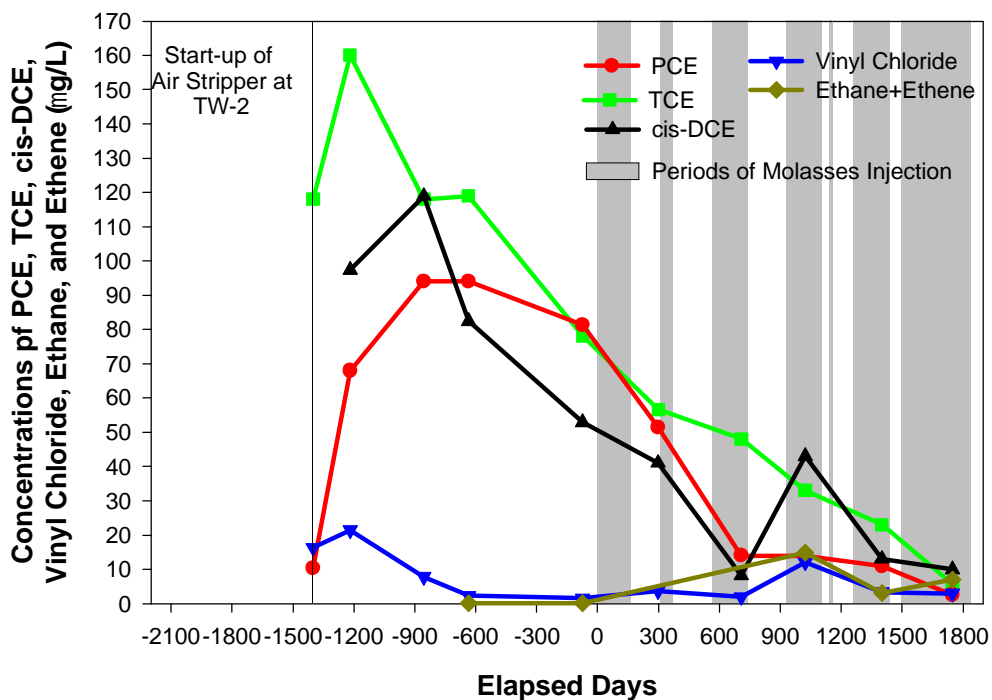


Figure D-9. Reductive Dechlorination at GM-22 - Upgradient Well in RZ-3 East

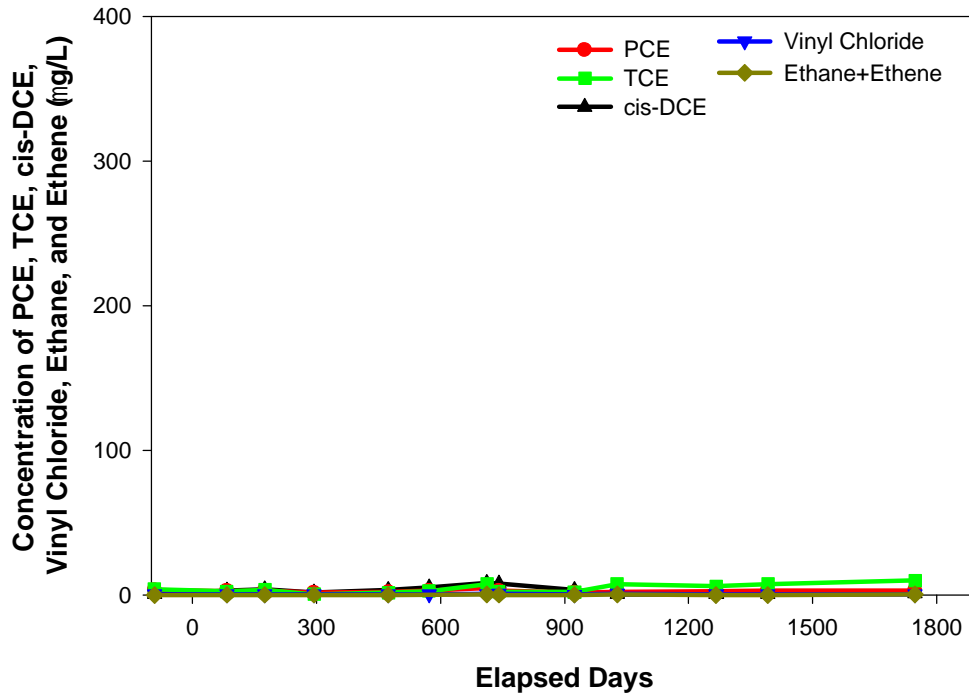


Figure D-10. Reductive Dechlorination at GM-21 - Downgradient Well in RZ-3 East

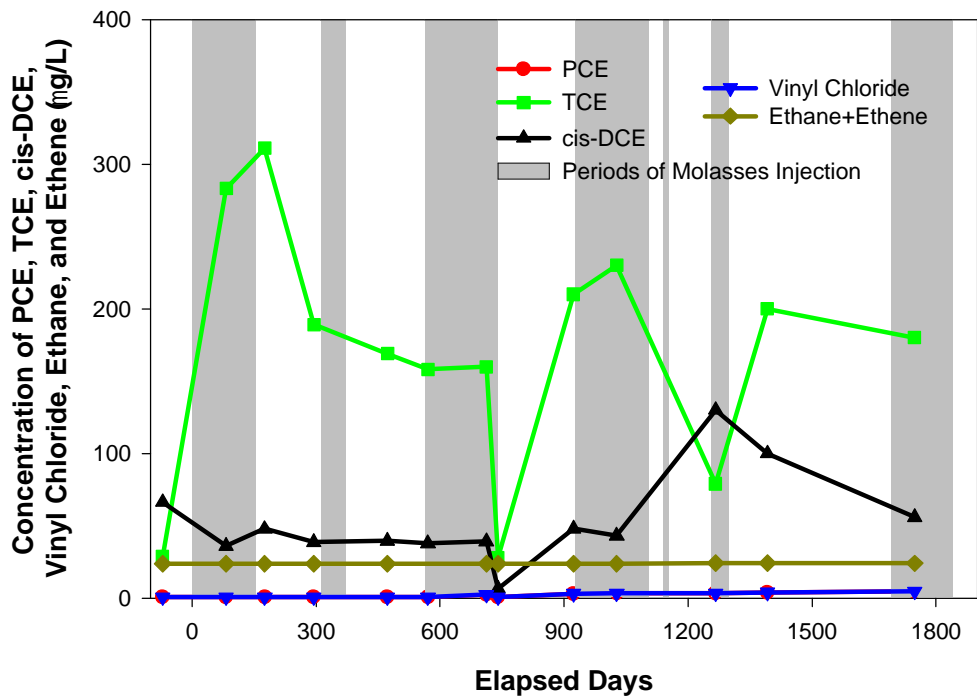


Figure D-11. Bioattenuation Parameters at GM-29 - Upgradient Well in RZ-1

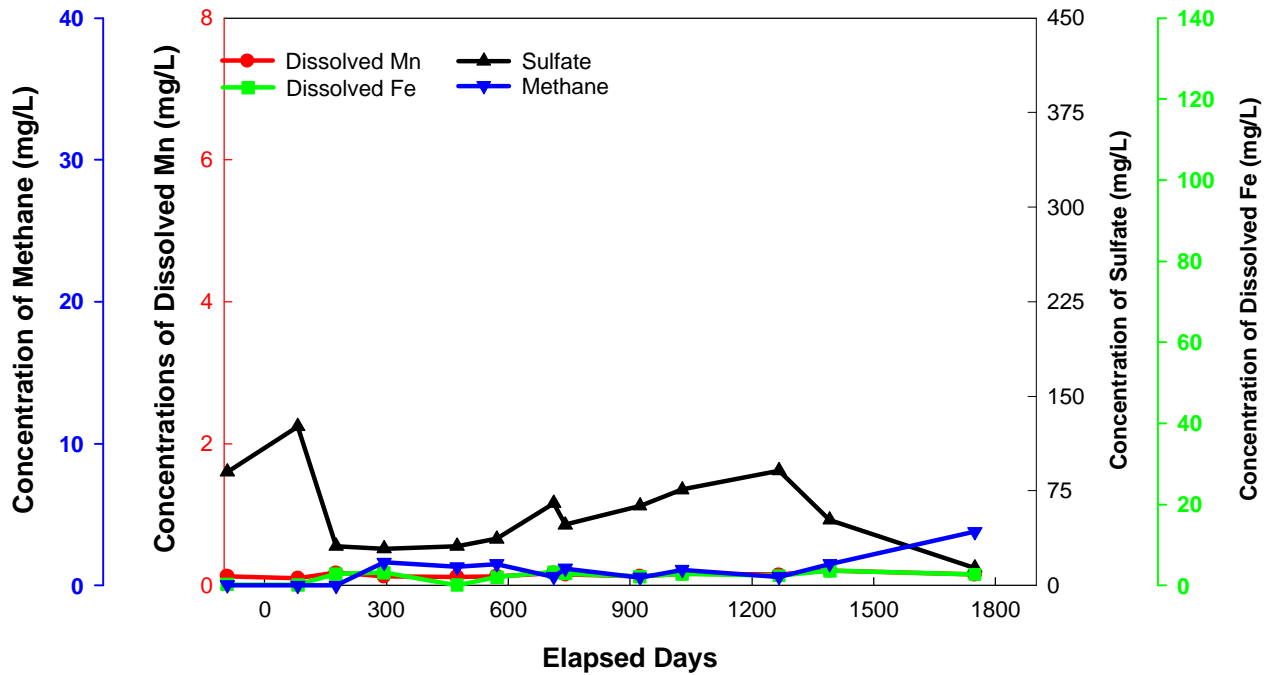


Figure D-12. Bioattenuation Parameters at GM-28 - Downgradient Well in RZ-1

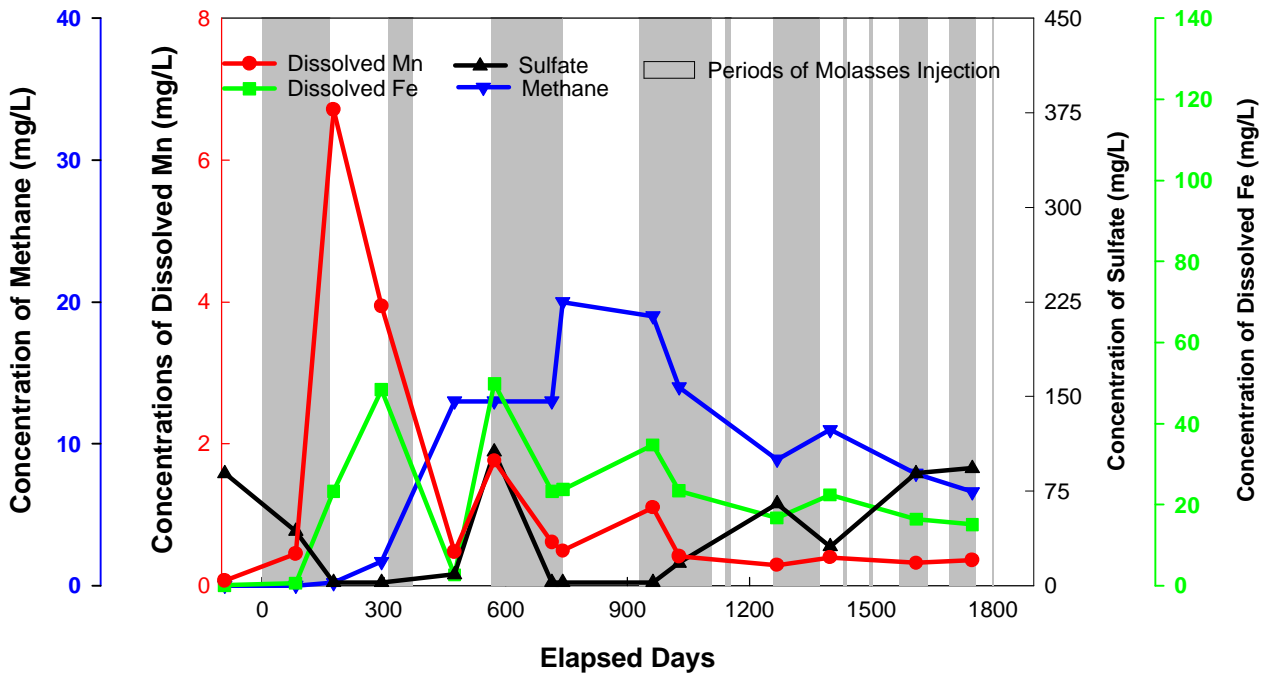


Figure D-13. Bioattenuation Parameters at ME-6 - Upgradient Well in RZ-2

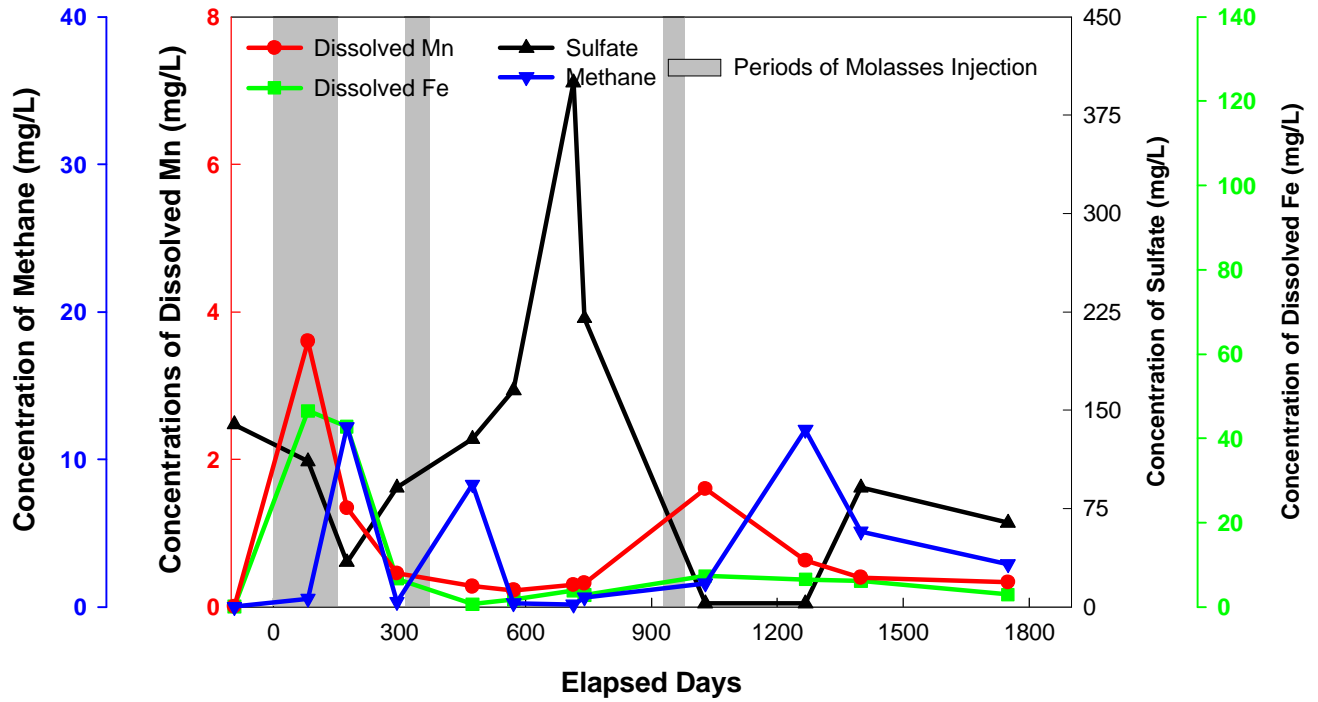


Figure D-14. Bioattenuation Parameters at ME-3 - Downgradient Well in RZ-2

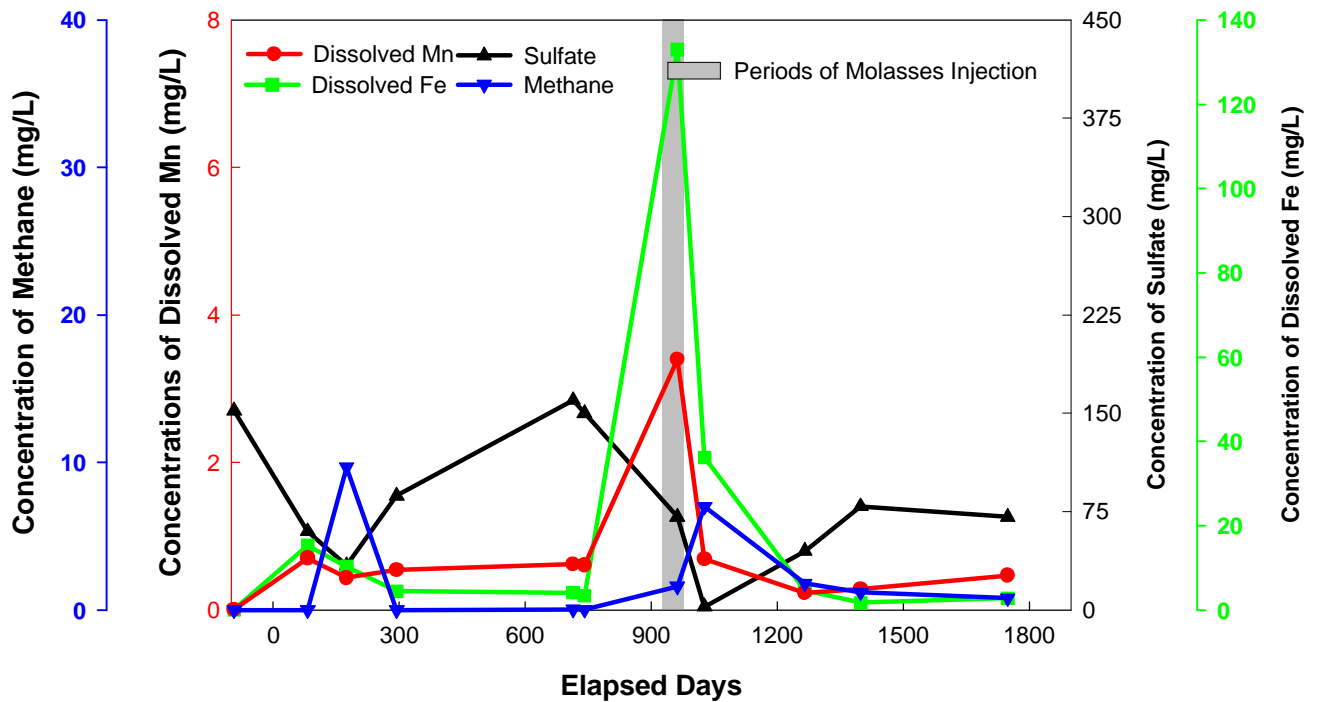


Figure D-15. Bioattenuation Parameters at EAST - Upgradient Well in RZ-3 West

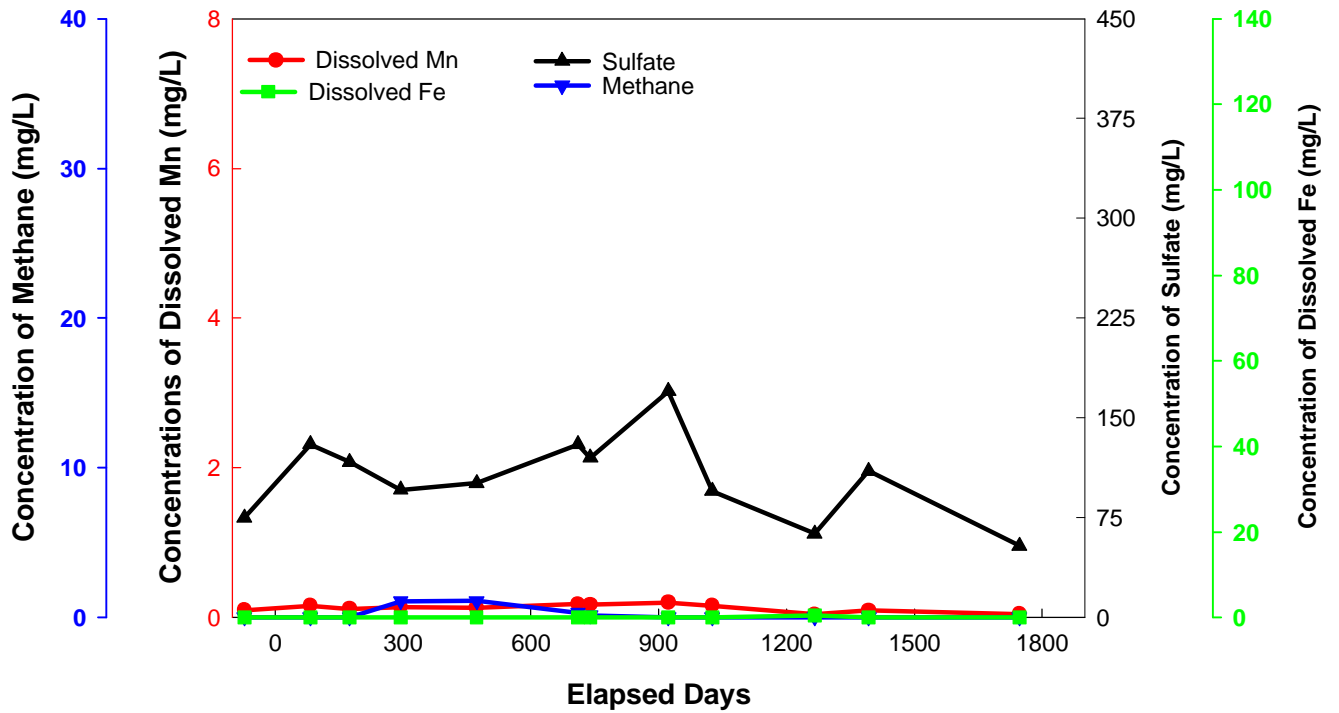


Figure D-16. Bioattenuation Parameters at GM-32 - Downgradient Well in RZ-3 West

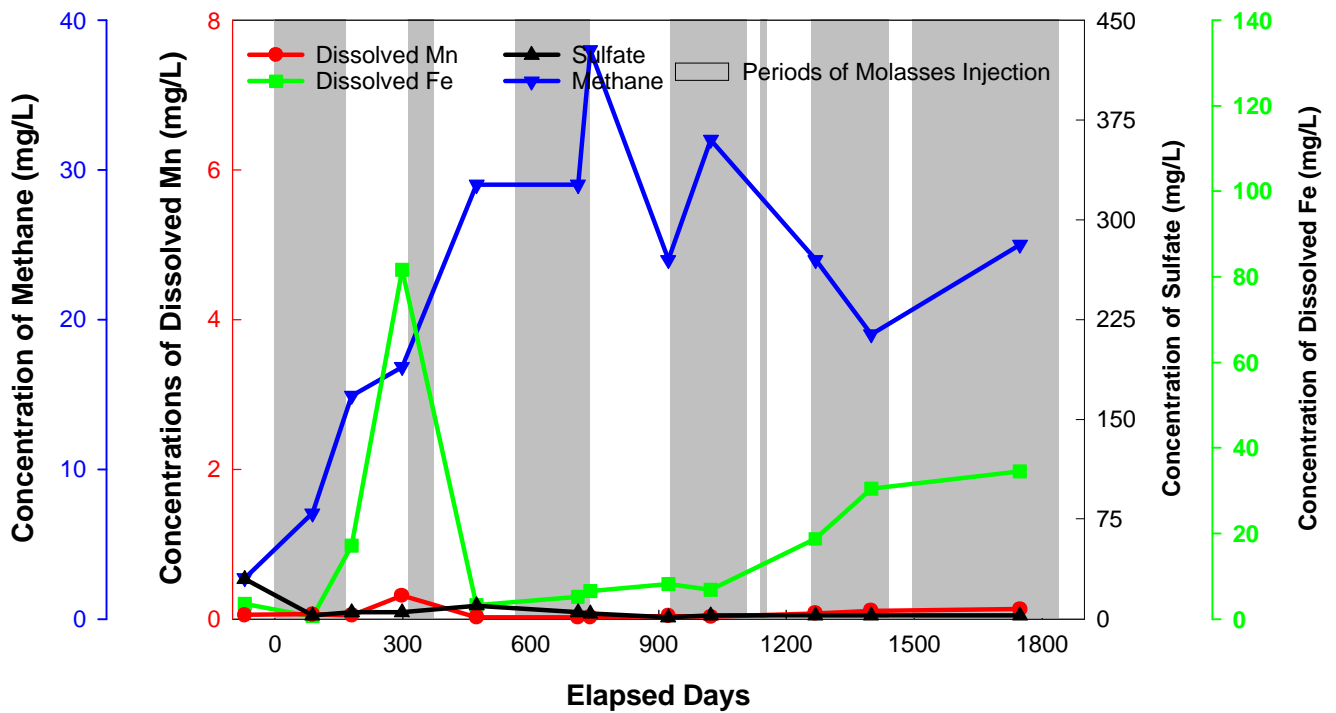


Figure D-17. Bioattenuation Parameters at GM-8 - Downgradient to RZ-3 West

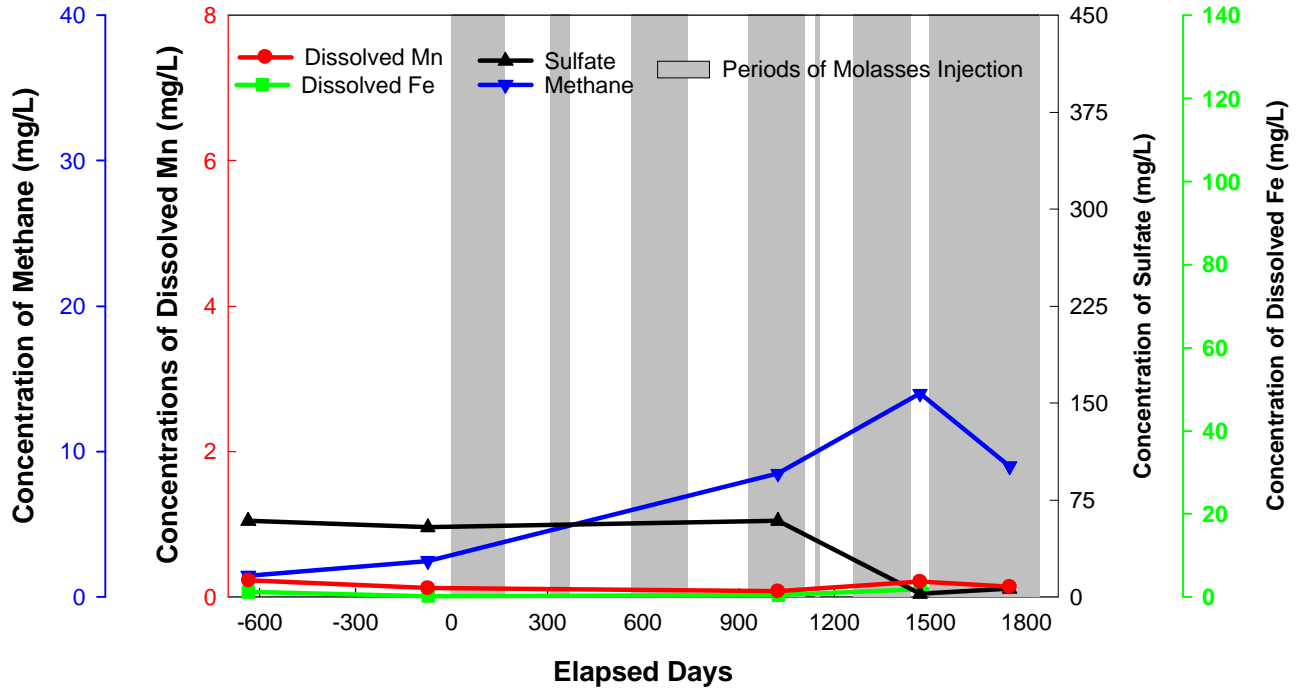


Figure D-18. Bioattenuation Parameters at GM-6 - Downgradient to RZ-3 West

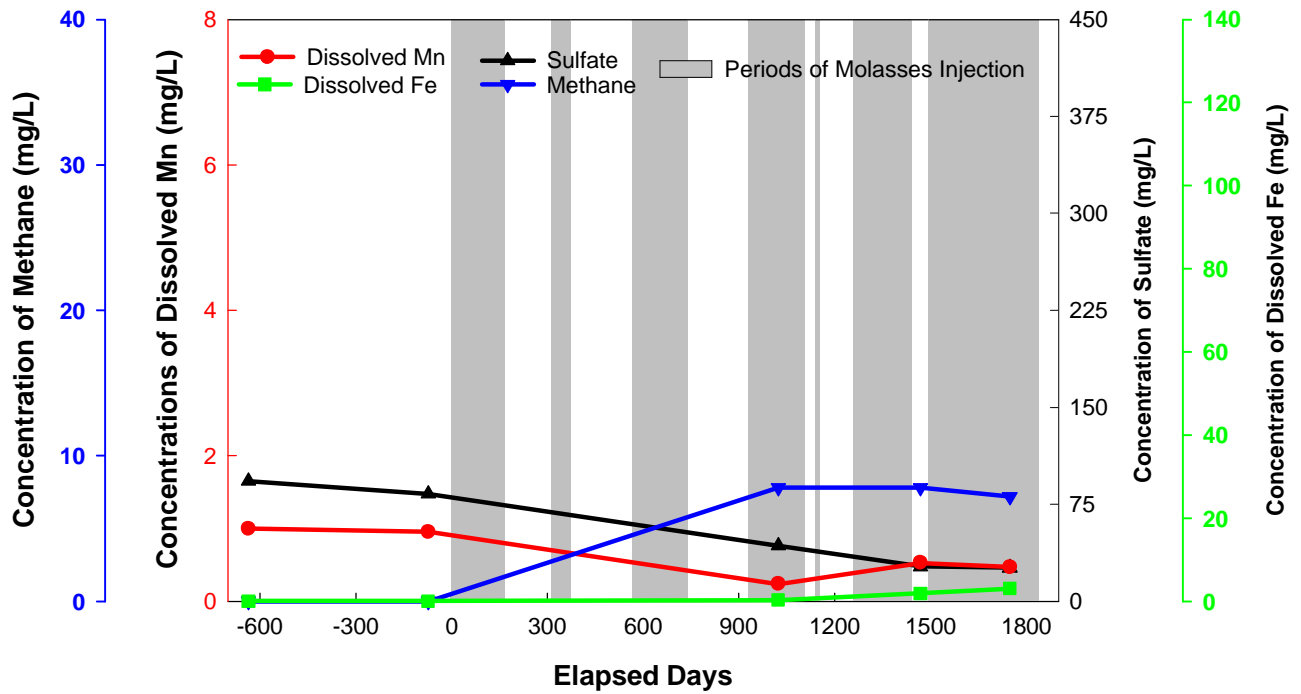


Figure D-19. Bioattenuation Parameters at GM-22 - Upgradient Well in RZ-3 East

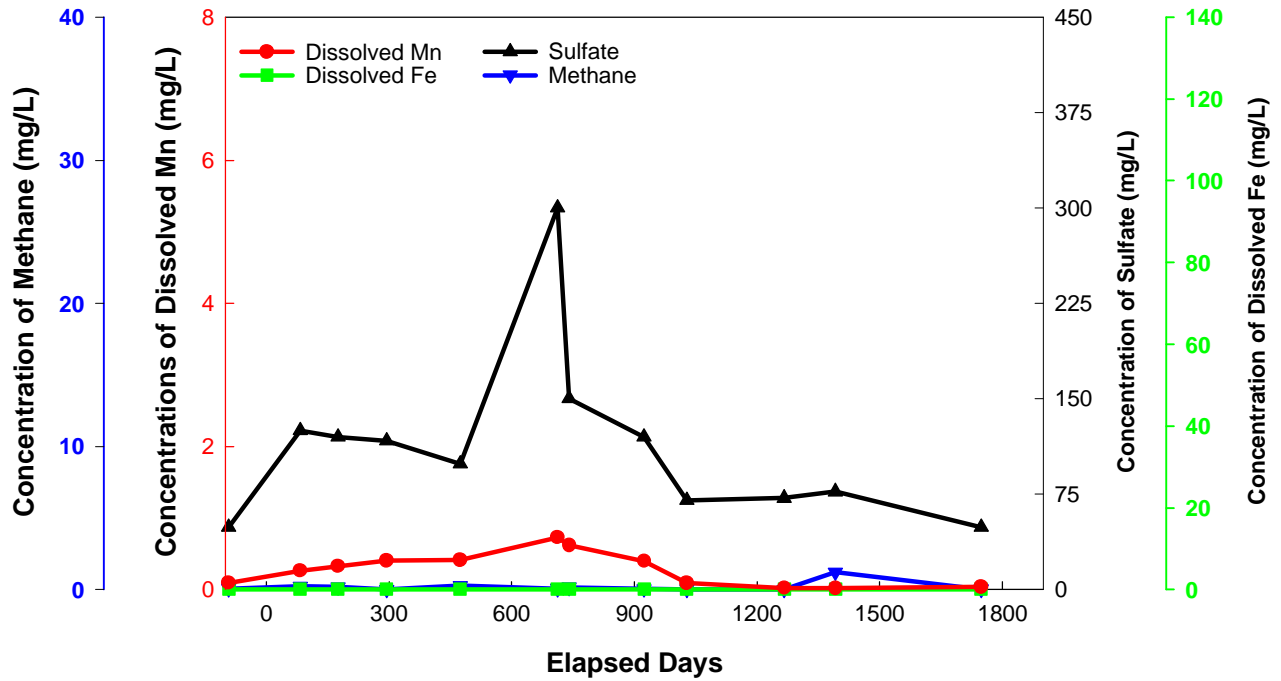
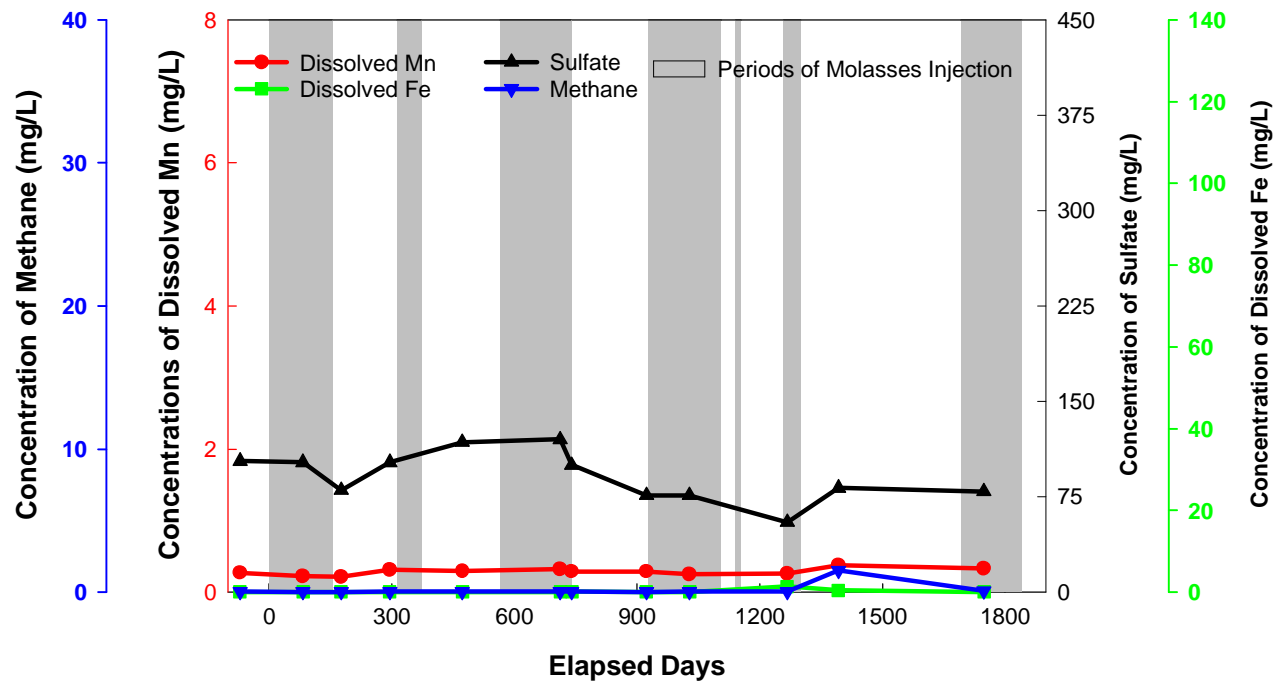


Figure D-20. Bioattenuation Parameters at GM-21 - Downgradient Well in RZ-3 East



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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 | South Settling Lagoon |
| Proposed Shallow Well | TW-2 | (82,55,1) | 166 | 1.00E+00 | 9.50E-04 | 4.56E-03 | 2.60E-02 | 0.00E+00 |
| Dryden North Well | DW-13 | (89,46,3) | 1850 | 8.89E-02 | 8.13E-05 | 1.66E-03 | 8.17E-03 | 3.61E-01 |
| Dryden South Well | DS-7 | (98,43,3) | 463 | 1.29E-02 | 8.09E-06 | 2.98E-04 | 1.14E-03 | 2.99E-02 |
| Miami Shores Well Field | MS-14 | (98,38,3) | 257 | 4.03E-03 | 2.38E-06 | 9.61E-05 | 4.01E-04 | 1.51E-02 |
| | MS-15 | | | | | | | |
| | MS-16 | (98,35,3) | 257 | 3.88E-03 | 2.03E-06 | 9.20E-05 | 4.21E-04 | 2.50E-02 |
| | MS-17 | | | | | | | |
| | MS-18 | (100,37,3) | 257 | 3.70E-03 | 1.89E-07 | 8.53E-05 | 3.42E-04 | 1.09E-02 |
| | MS-19 | | | | | | | |
| MS-20 | | | | | | | | |
| MS-21 | | | | | | | | |
| MS-22 | (101,33,3) | 257 | 2.79E-03 | 1.42E-07 | 5.63E-05 | 2.62E-04 | 1.03E-02 | |
| Moraine Assembly Production Wells | 11A | (50,94,3) | 353 | 0.00E+00 | 1.31E-02 | 5.36E-04 | 3.67E-05 | 0.00E+00 |
| | 12A | (46,93,3) | 117 | 0.00E+00 | 5.81E-05 | 5.67E-07 | 2.55E-08 | 0.00E+00 |
| Moraine Engine Well 28 | 28 | (58,80,3) | 235 | 0.00E+00 | 7.73E-02 | 2.06E-02 | 1.12E-03 | 0.00E+00 |
| Moraine Engine Plant | 31 | (37,82,3) | 35 | 0.00E+00 | 1.73E-04 | 1.31E-07 | 2.00E-10 | 0.00E+00 |
| | 39 | (40,81,3) | 154 | 0.00E+00 | 1.01E-02 | 1.03E-03 | 2.26E-05 | 0.00E+00 |
| Harrison Production Wells | 44 | (29,70,3) | 176 | 0.00E+00 | 7.12E-06 | 1.70E-02 | 0.00E+00 | 0.00E+00 |
| | 42 | (54,59,3) | 176 | 0.00E+00 | 1.36E-08 | 5.88E-05 | 2.07E-02 | 0.00E+00 |
| | 45 | (74,56,3) | 176 | 0.00E+00 | 4.56E-03 | 4.31E-02 | 8.02E-02 | 0.00E+00 |
| West Carrollton Well Field | MI-41AP | (111, 21, 3) | 347 | 3.26E-04 | 0.00E+00 | 0.00E+00 | 7.20E-07 | 2.18E-03 |
| | MI-41CP | (111, 20, 3) | 347 | 4.55E-04 | 0.00E+00 | 0.00E+00 | 8.63E-07 | 4.77E-03 |
| | MI-41DP | (112, 19, 3) | 347 | 3.72E-04 | 1.80E-09 | 0.00E+00 | 4.57E-07 | 4.08E-03 |
| 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 | |