Site-Wide Groundwater Monitoring Report for 2001/2002

General Motors Corporation
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Executive Summary

This Site-Wide Groundwater Monitoring Report presents the groundwater monitoring activities completed in 2001 and 2002 at the following General Motors Corporation (GM) facilities located in Moraine, Ohio (Figure 1): Delphi Harrison Thermal Systems Moraine Plant (Delphi Thermal Moraine [leased to Delphi Corporation since 1999]), 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 site-wide groundwater monitoring is also designed to meet the objectives of RCRA post-closure monitoring at the two closed lagoons located at the Delphi Thermal Moraine facility. 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 consistent with post-closure groundwater monitoring requirements.

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 VOCs related to the Former Oil House Area.

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 2001 and 2002 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

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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 always been below Safe Drinking Water Act, Maximum Contaminant Levels (MCLs). However, concentrations of certain VOCs remained above MCLs in downgradient lower aquifer wells GM-11 and GM-20D (the short-/intermediate-term goal point of compliance wells for the lower aquifer). VOC concentrations in GM-15, another short-/intermediate-term goal point of compliance well for the lower aquifer, remained below MCLs.

- 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 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 initial 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 2001-2002 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 is conducting additional investigations in RZ-3 East so that suitable modifications can be undertaken to achieve the desired reduction in VOCs downgradient of this area.

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- Based on the data collected during the 2001-2002 monitoring period, GM believes that the monitoring program defined for the upper aquifer, in terms of the monitoring locations, the constituents monitored and the frequency of monitoring, continue to provide sufficient data for a comprehensive evaluation of these corrective action goals, with one modification. GM will add wells GM-33 and GM-35, installed as part of the Waste Pile Staging Area investigation in 2001, to the site-wide program.

- Based on the data collected during the 2001-2002 monitoring period, GM believes that the monitoring program defined for the lower aquifer, in terms of the monitoring locations, the constituents monitored and the frequency of monitoring, continue to provide sufficient data for a comprehensive evaluation of these corrective action goals in regard to evaluating the downgradient point of compliance performance goals. However, given the likely redevelopment of the Delphi Thermal Moraine facility, the need for additional monitoring points in the lower aquifer within the facilities is under consideration as existing production wells that are currently part of the site-wide groundwater monitoring program may not be available on a long-term basis.

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1. Introduction

This Site-Wide Groundwater Monitoring Report presents the groundwater monitoring activities completed in 2001 and 2002 at the following General Motors Corporation (GM) facilities located in Moraine, Ohio (Figure 1): Delphi Harrison Thermal Systems Moraine Plant (Delphi Thermal Moraine [leased to Delphi Corporation since 1999]), 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 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;
- The Former Oil House Area corrective measures (in-situ remediation technologies downgradient of the source area, Figure 2);
- Institutional actions (the three facilities will remain industrial); 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

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measures. All groundwater monitoring for the facilities was conducted in accordance with the 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 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. 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, and Oldsmobile Bravadas are produced at this facility. Delphi Thermal Moraine's major operations, which began in 1941, are the machining and assembly of automotive air conditioning compressors, accumulator dehydrators, and miscellaneous air conditioning valves.

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 consistent with post-closure groundwater monitoring requirements.

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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 VOCs related to the Former Oil House Area.

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.

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2. Groundwater Monitoring Summary for 2001/2002

In accordance with the Site-Wide Groundwater Monitoring Plan (ARCADIS G&M, Inc. 2002), groundwater monitoring was conducted in 2001 and 2002 to evaluate; groundwater quality upgradient and downgradient of the closed lagoons, performance of the in-situ reactive zones, and the performance of the capture zones (as discussed in Section 3.2). A summary of the activities and methodologies that were completed in 2001 and 2002 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. Additionally, the first annual 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-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 first annual event are presented in the Interim Measures/Corrective Measures Report (ARCADIS Geraghty & Miller, Inc. 2001). The 1999 baseline and 2000 groundwater quality data for the site-specific VOC parameter list are reproduced in Appendix A tables of this report to support the evaluation of the on-going remedial activities.

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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 was implemented during 2001 and 2002. The following sections summarize the collection of water-level measurements, the monthly groundwater monitoring, and the site-wide groundwater monitoring.

2.1.1 Water-Level Measurements

Water-level elevations were measured on November 5, 2001 and September 16 and 17, 2002, in upper aquifer monitoring wells shown on Figure 3 and lower aquifer wells

shown on Figure 4. The measured wells included all on-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, three lower aquifer wells (MT68, 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. 1997) and recorded on a field data sheet.

2.1.2 Monthly Groundwater Monitoring

The Air Permit and NPDES Permit issued to GM for the groundwater recovery and treatment system requires periodic monitoring and reporting of water quality in the influent and effluent streams, 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 permits. Tables 2 and 3 summarize the VOC results for the monthly air stripper tower influent stream during 2001 and 2002, respectively. 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 2002. Tables 4 and 5 summarize the VOC results for the monthly air stripper tower effluent stream during 2001 and 2002, respectively. Tables 6 and 7 summarize the VOC results for the monthly DN-13 sampling during 2001 and 2002, respectively. 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 during four events in 2001 and two events in 2002. The wells upgradient and downgradient of the reactive zones were sampled in March 2001, June 2001, December 2001, and June/July 2002, while the annual site-wide sampling events were conducted in November 2001 and September 2002. A summary of these 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 8.

Groundwater samples were collected using low-flow sampling procedures from selected upper aquifer monitoring wells. Field parameters including pH, specific

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conductance, temperature, oxidation/reduction potential, and dissolved oxygen were measured during purging of each upper aquifer well using a multi-parameter flow-through cell. SOP #21 was followed when sampling upper aquifer wells (ARCADIS G&M, Inc., 2002). Groundwater samples from the lower aquifer wells were collected using a 2-inch submersible pump or site-dedicated bailers. Once three well volumes were evacuated, field parameters (pH, specific conductance, and temperature) were measured. SOP #3 was followed when sampling lower aquifer wells (ARCADIS G&M, Inc., 2002). Groundwater samples from the production wells were collected 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., 1997). All pertinent field data were recorded on groundwater sampling logs. The logs for 2001 and 2002 are presented in Appendix B. Analytical results are presented and discussed in Section 2.2.3.

2.1.4 Laboratory Analytical Methods

All 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-DCE, SVOCs, and metals), conducted as part of the Former Oil House Area interim measures. The site-specific parameter list includes: benzene, 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), cis-DCE, trans-1,2-dichloroethene (trans-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 dissolved permanent gases (carbon dioxide, oxygen, nitrogen, methane, and carbon monoxide). Table 1 lists specific field, laboratory, and biogeochemical indicator parameters, and field and laboratory analytical methods. All samples were submitted to TestAmerica in Dayton, Ohio up to October 2001, Severn Trent Laboratory in North Canton, Ohio (STL North Canton) after October 2001, or Microseeps in Pittsburgh, Pennsylvania for ethene, ethane, methane analysis only.

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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 2001 and 2002 are presented on Tables 9 and 10, respectively.

2.2.1.1 Upper Aquifer

The water-table surface on November 5, 2001 and September 16 and 17, 2002 (Figures 6 and 7, respectively) 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 November 2001 and September 2002. 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 south and southwest of well TW-2.

Tables 11 and 12 present the 2001 and 2002 monthly precipitation totals, respectively, recorded by the National Weather Service, and the deviation from calculated average amounts. The 2001 annual total precipitation recorded at the Dayton, Ohio monitoring station was 42.20 inches, which was 5.56 inches above average. Precipitation for the months of January, February, March, June, and November were below normal, while precipitation for all other months were above normal. The 2002 annual total precipitation recorded at the Dayton, Ohio monitoring station was 39.13 inches, which was 0.45 inches below average. Precipitation for the months of January, February, June, July, August, October and November were below normal, while precipitation for all other months were above normal. The decrease in water-level elevations observed in 2002, compared to 2001, reflect the seasonal decrease in precipitation during 2002.

The average hydraulic gradient of the upper aquifer, calculated from site-wide groundwater elevation measurements in November 2001 and September 2002 was

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0.0007 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 from November 2001 and September 2002, groundwater flow velocities in the upper aquifer ranged from 2.15 ft/day to 3.82 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, it is likely that some soil-VOC interaction is occurring, and that 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 2001 and 2002 could be as low as 0.21 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 November 2001, groundwater flow velocities in the upper aquifer above the upper clay till ranged from 1.60 ft/day to 2.66 ft/day. In 2002, the water level elevation in GM-28 could not be measured during the annual site-wide groundwater elevation gauging

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event (September 16 and 17, 2002) due to railroad access issues. In addition, GM-30 and GM-29 had the same water-level elevation (i.e., no gradient). Access was provided to GM-28 for groundwater sampling (September 24, 2002) when railroad access issues were resolved. Using gauging data measured prior to sampling wells in the AOI 7 area, the groundwater flow velocity in 2002 ranged from 0.71 ft/day to 1.84 ft/day.

2.2.1.2 Lower Aquifer

The potentiometric surface (lower aquifer) on November 5, 2001 and September 16 and 17, 2002 (Figures 8 and 9, respectively) 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 Delphi Thermal facility in the Dryden Road North Wellfield, was in operation during water-level elevation measurement collection in November 2001 and September 2002.

The average hydraulic gradient of the potentiometric surface in the lower aquifer, calculated from groundwater elevation measurements in November 2001 and September 2002 was 0.0008 ft/ft. Assuming a porosity of 0.3 to 0.5 and using the equation presented earlier ($V_w = Ki/N_e$), groundwater flow velocity in the lower aquifer ranged between 0.63 ft/day and 1.07 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 2001 and 2002 could be as low as 0.06 ft/day.

2.2.2 Vertical Gradients

The water-level measurements collected on November 5, 2001 and September 16 and 17, 2002 were used to determine the direction and magnitude of vertical gradients between the upper and lower aquifers (Table 13). 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 upward in shallow/deep monitoring well pairs HR- 9/HR-10 and HR-11/HR-12 in 2001. In 2002, the vertical gradients were downward. The vertical gradient in these monitoring well pairs have always fluctuated from upward (approximately 53 percent of the time in 59 events since June 1995), to no vertical gradient (20 percent since June 1995), to downward (27 percent since June 1995).

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In 2001 and 2002, 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). Well pairs in the vicinity of Landfill L1 (GM-8/GM-7R, GM-16/GM-15, GM-2/GM-1, GM-18/GM-13, GM-6/GM-3, GM17/GM-11) all showed downward vertical gradients, with the exception of well pair GM-18/GM-13 in 2001 (vertical gradient has been upward only 10 percent of the time since June 1995) and well pair GM-8/GM-7R in 2002 (since June 1995 the vertical gradient was upward 50 percent of the time and downward 50 percent of the time). The downward vertical gradient at well pairs in these two areas of the site is likely due to the proximity of these well pairs to lower aquifer extraction well DN-13.

Downgradient of the site, vertical gradients were downward in well pairs GM-10/GM-9 and GM-26/MT69 in both 2001 and 2002; therefore, the potential existed for groundwater to migrate downward from the upper aquifer to the lower aquifer in this area. This downward vertical gradient is likely due to the effects of groundwater extraction in the lower aquifer as a result of DN-13 pumping.

At AOI 7, 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. Vertical gradients could not be calculated for 2001 because GM-27 was dry, but this low groundwater elevation in GM-27 indicates the vertical gradient in this area is likely downward. An upward vertical gradient was present across the upper clay till in 2002.

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 14 through 17 present the VOC results upgradient and downgradient of the reactive zones. Tables 18 through 21 present the bioattenuation parameter results upgradient and downgradient of the reactive zones. These results are discussed in Section 3.2.1 as they pertain to the performance of the reactive zone corrective measures. Tables 22 and 23 present the VOC results for the annual site-wide groundwater sampling events (November 2001 and September 2002, respectively) for the upper and lower aquifer wells. Data for the 1999, 2000, November 2001, and September 2002 groundwater sampling events are presented on Figures 10 and 11 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

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data used as a point of comparison for the 2001 and 2002 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 2001 and 2002, two upgradient upper aquifer monitor wells exhibited the presence of VOCs:

- HR-9, total VOCs were 83.65 ug/L in 2001 and 94.6 ug/L in 2002, compared to a 1999 baseline total VOC concentration of 116 ug/L.
- HR-11, total VOCs were 53.6 ug/L in 2001 and 24.82 in 2002, 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) and RFI Reports 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-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, five upper aquifer monitoring wells (GM-23, GM-27, GM-28, GM-29, GM-30) were sampled in 2001 and 2002. With the exception of GM-27, all of these wells are screened above the upper clay till present at the Former Oil House Area.

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- GM-30 (northern most AOI 7 well, located next to the former tank farm) - total VOC concentrations decreased from 37,350 ug/L in the 1999 baseline to 2,888 ug/L in 2001 and 1,784 ug/L in 2002. This well predominantly contained ethylbenzene and xylenes.

- GM-23 (located next to the Former Oil House building) - total VOC concentrations increased from 17,853.3 ug/L in the 1999 baseline to 26,800 ug/L in 2001 and 19,940 ug/L in 2002. This well predominantly contained PCE, TCE, DCE, and vinyl chloride and the increase from baseline conditions is predominately due to higher PCE concentrations attributable to desorption as a result of the Fenton's reagent oxidation pilot test conducted in 2000 (ARCADIS Geraghty & Miller, Inc. 2001). This well is upgradient of RZ-1.

- GM-27 (paired with GM-23 and screened below the upper clay till) - also exhibited a slight decrease of total VOCs between the 1999 baseline (145.7 ug/L) 2001 (131.6 ug/L) and 2002 (115.7 ug/L). This well is upgradient of 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 2,416 ug/L in 2001 and 1,805 ug/L in 2002, with the increase in VOCs caused by a desorption from the upgradient AOI 7 source area as a result of the Fenton's reagent oxidation pilot test conducted in 2000 (ARCADIS Geraghty & Miller, Inc. 2001). 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 1,377.7 ug/L in 1999 to 11 ug/L in 2001 and 15.66 ug/L in 2002.

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 makes 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, the total VOC concentrations have decreased in all but two wells, as follows:

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- ME-6, total VOCs were 944.9 ug/L in 1999 baseline, then decreasing to 116.32 ug/L in 2001 and 11.8 ug/L in 2002.
- ME-3, total VOCs were 159.7 ug/L in 1999 baseline, decreasing to 38.94 ug/L in 2001 and nondetect in 2002.
- GM-22, total VOCs were 7.6 ug/L in 1999 baseline, increasing to 33.45 ug/L in 2001 and then decreasing to 10.83 ug/L in 2002.
- EAST, total VOCs were 152.6 ug/L in 1999 baseline, increasing to 223.3 ug/L in 2001 (primarily due to 1,1,1-TCA) and then decreasing to 118.43 ug/L in 2002.
- GM-21, total VOCs were 168.9 ug/L in 1999 baseline, increasing to 224.7 ug/L in 2001 (primarily due to TCE) and 316.7 ug/L in 2002 (primarily due to TCE).
- GM-2, total VOCs were 82.9 ug/L in 1999 baseline, increasing to 112.7 ug/L in 2001 (due to cis-DCE) and then decreasing to 46.82 ug/L in 2002.

These data indicate that VOC concentrations in monitor wells hydraulically downgradient of the Former Oil House Area and RZ-1 decreased from the 1999 baseline to 2002, with the exception of well GM-21 and GM-22. The significance of these concentrations is further discussed in Sections 3.2 and 4.0.

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

- HR-1, total VOCs were 114 ug/L in the 1999 baseline event, increasing to 139.7 ug/L in 2001 (primarily due to TCE) and then decreasing to 76.5 ug/L in 2002.
- W-1-S, total VOCs were 51.6 ug/L in the 1999 baseline event, increasing to 86.27 ug/L in 2002 (primarily due to PCE) (this well was not sampled in 2001).
- HR-17, total VOCs were 29.1 ug/L in the 1999 baseline event, decreasing to 8.9 ug/L in 2001 and then increasing to 42.39 ug/L in 2002.

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:

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- HR-2, total VOC concentrations were 15 ug/L in the 1999 baseline event, 14.16 ug/L in 2001, and 15.36 ug/L in 2002.

- HR-3, total VOC concentrations were 12.3 ug/L in the 1999 baseline event, 13.26 ug/L in 2001, and 27.3 ug/L in 2002.

- HR-4, total VOC concentrations were 2.6 ug/L in the 1999 baseline event, 2.33 ug/L in 2001, and 1.3 ug/L in 2002.

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 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, 3.21 ug/L to 180.9 ug/L in 2001 and 3.31 ug/L to 156.5 ug/L in 2002. 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, 3.54 ug/L to 29.63 ug/L in 2001 and 5.11 ug/L to 34.17 ug/L in 2002. 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.

2.2.3.1.3 Downgradient Groundwater Quality

On-site downgradient wells (GM-6, TW-2, 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 2001 and 2002, total VOC concentrations in these wells ranged from 15.6 ug/L to 166.6 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 2001, PCE (1.1 ug/L) and 1,1,1-TCA (0.19J ug/L) were detected in GM-26. In 2002 only PCE (0.92J ug/L) was detected in GM-26. The decreasing concentrations in the wells downgradient of the site, 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 initial effects of the in-situ reactive zones and on-going natural attenuation of the VOCs.

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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, 2001 and 2002, the upgradient lower aquifer monitor well HR-12 exhibited the presence of VOCs (total VOCs of 7.4 ug/L, 10.33 ug/L and 6.2 ug/L, respectively). The detected VOCs included DCA, cis-DCE, and vinyl chloride, suggesting that some degradation of the chlorinated VOCs from the upgradient releases has occurred. The detected VOCs in HR-12 are consistent with historical values for upgradient groundwater quality as indicated in the DOCC and RFI Reports for the GM Moraine facilities. This confirms that upgradient sources of VOCs, not related to GM operations, do exist 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 2001 and 2002.

On-site lower-aquifer monitor wells that were part of the site-wide evaluation included HR-14 (1999 and 2002 only), HR-15, HR-13, 31 (2001 only), 39 (2002 only), 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 2001 and 2002, total VOC concentrations in these wells ranged from 0.86 ug/L to 42.4 ug/L.

On-site downgradient wells (GM-3, GM-1) and off-site downgradient wells (GM-15, GM-11, GM-20D, DN-13 [2002 only], 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 2001 and 2002, total VOC concentrations in these wells ranged from 5.1 ug/L to 44.03 ug/L. VOCs were not detected in off-site, downgradient well MT-69 in 1999, 2001 and 2002. 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.

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3. Corrective Measures Implementation and Performance

To address the source of VOCs in groundwater (AOI 7 Source Area) and the downgradient plume, GM continued to operate the corrective measures systems in 2001 and 2002. This involved operation of the In-situ Reactive Zones 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 2001/2002 (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.

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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-DCE, and vinyl chloride. This enhanced reductive dechlorination process has been developed at the GM Moraine site through the use of In-situ Reactive Zones 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 barrier curtain south of Delphi Thermal Moraine (RZ-3 west) and the former Moraine Engine plant (RZ-3 east). The reactive zone locations are shown on Figure 2. The actual layouts of each reactive zone are shown on Figures 12, 13, and 14, 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. As recommended in the Draft Interim Measures/ Corrective Measures Report, RZ-1 was expanded to more effectively remediate groundwater emanating from the Former Oil House Area. After coordination with the railroad expansion project and the Regional Haulaway yard, the 12 expansion wells were installed in July and September 2002. Carbon source introductions were initiated in these wells as soon as they were installed, and has continued through December 2002.

- RZ-2 consists of four existing monitoring wells, located along the western edge of the Moraine Engine Plant 3 building. The existing wells provided complete coverage of the planned injection barrier for RZ-2, therefore, no new introduction points were necessary. The RZ-2 wells were screened within the upper 3 ft of the upper aquifer. No molasses was injected in RZ-2 wells in 2001, while in 2002, molasses was injected in four of the six RZ-2 wells during the months of June and July only.

- RZ-3 introduction well network consists of 42 introduction wells, 30 wells in RZ-3 West and 12 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 reactive zones, 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, and from June 2002 through December 2002.

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. Details regarding the frequency

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and strength of carbon source introductions are provided in Tables 24 and 25, for 2001 and 2002, respectively.

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 National Pollutant Discharge Elimination System (NPDES) permitted outfall to the Great Miami River. Groundwater recovery from TW-2 began on the afternoon of January 31, 1996. During the first seven years of operation (January 31, 1996 through December 31, 2002), the system has recovered and treated a total of 506,570,508 gallons of groundwater at an average flow rate of approximately 144 gallons per minute (gpm). Annual total gallons recovered and average flow rate during 2001 were 77,493,034 gallons and approximately 148 gpm, respectively. Annual total gallons recovered and average flow rate during 2002 were 60,186,244 gallons and approximately 115 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 2001 and 2002, adjustments to the flow rate were not necessary (discussed further in Section 3.2.2).

Between January 1, 2001 and December 31, 2001, the TW-2 component of the remediation system was in operation except for a period of 34 hours between April 3rd and 4th, when the air stripper tower was cleaned and the packing was replaced; a period of 1 hour on April 23rd when new chemical introduction fittings were installed; and in November 2001 when the system experienced periodic shutdowns due to computer system upgrades.

Between January 1, 2002 and December 31, 2002, the TW-2 component of the remediation system was in operation except for 3.4 hours on May 27th, when the pump cycled off; 6 hours on June 6th, when the top 10 feet of packing was replaced; 28 hours on June 24th and 25th, when the influent line was pressure tested; 32 minutes on July

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15th, when a leaking valve was repaired; 20 minutes on August 20th, for routine operation and maintenance procedures; 3.2 hours on September 6th, to clean the distributor tray and inspect the packing; and 3 hours on December 18th, to clean the distributor tray.

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 2001 (January 1, 2001 through December 31, 2001) except for a temporary shut down on May 11th to 12th, due to a storm; June 18th to 31st, to replace a burned out pump motor; 22 nonconsecutive hours in August, due to thunderstorms; and December 18th to 19th, to control water levels in a drainage ditch to the Miami River after a flood event. Well DN-13 was operational throughout 2002 (January 1, 2002 through December 31, 2002) except for 28 hours on April 16th and 17th, when the local power company was switching utility poles and the system was without power; and for 7.5 hours on November 20th, when the system tripped and needed restarting. As further discussed in Section 3.1, 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.

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3.2 Corrective Measures Performance

3.2.1 In-Situ Reactive Zones Performance Results

As described earlier in Section 3.1.1, the bioremediation delivery network consists of three reactive zones, RZ-1, RZ-2, and RZ-3 (West and East). Molasses was introduced into the groundwater through introduction points shown on Figures 12, 13, and 14 for RZ-1, RZ-2, and RZ-3, respectively. Operation of the reactive zones 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 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-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-DCE to ethene and ethane, without production of significant vinyl chloride peaks.

- Collateral effects of the carbon injections caused desorption of chlorinated solvents that would have been unaffected by other remedial measures. This desorption effect is probably due to the solvent effects of fermentation products, and effects of microbial surfactants that are released into the formation.

- VOC concentrations at RZ-3 East have not responded to molasses injections, 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 injections are not yet reaching the MW-21 downgradient monitoring location.

Overall, the process of enhanced reductive dechlorination at this site has been successful in achieving the desired reduction of VOC concentrations. Additional investigation is being conducted 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 through 9 indicate that the capture zone corrective measures continue to be effective at maintaining hydraulic control at the southern end of the 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 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 (Tables 11 and 12). The

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observed elevation differences are a result of the above average precipitation in 2001. Water-level elevations in TW-2 are constantly 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 2001 and 2002, 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 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. The evaluation of this data will continue into 2003 to determine whether the decrease in total chlorinated VOC concentrations noted in the 4th quarter of 2002 are attributable to operation of RZ-3 West, located at the northern edge of Landfill L1 approximately 600 feet upgradient from TW-2.

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4. Corrective Action Completion Strategy

4.1 Effectiveness of Corrective Measures Activities

4.1.1 Background and Objectives

GM's goal under its corrective action program 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 interim and 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 has 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 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

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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 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 POC can be shifted to the downgradient facility boundary.

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4.1.2 Methodology

In accordance with the Site-Wide Groundwater Monitoring Plan, groundwater data are compared to remediation performance 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 equal to concentrations in on-site groundwater at locations downgradient of AOI 7 that would not be expected to result in exceedances of the MCL at the designated POCs. 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 AOI 7:

- Upper Aquifer
  - AOI 7, Shallow: the AOI 7 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 former RZ-2 (wells GM-28, ME-6),
- Zone 2: the monitoring zone immediately downgradient of former RZ-2 (wells ME-6, ME-3, GM-31),
- Zone S2 to Zone S3: the monitoring zone between former RZ-2 and RZ-3 (wells ME-6, ME-3, GM-31, GM-22, GM-19S, EAST),
- 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 (GM-10), and
- POC Shallow: monitoring at well GM-26.

- Lower Aquifer

  - AOI 7, Deep: the AOI 7 source area (wells GM-23, GM-29 and GM-30),
  - Zone D1: the monitoring zone encompassing GM-19D,
  - Zone D2: the monitoring zone encompassing Well GM-1 and GM-3,
  - POC Deep: the monitoring at 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 3, groundwater flow patterns remain the same as those evaluated during the RFI, 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 2001-2002 monitoring period. One-half sample quantitation limits were used for non-detect results.

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- 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 2001 to 2002 in each remediation monitoring zone wells are discussed in Section 2.2.3. A comparison of the site-specific parameter minimum, mean and maximum concentrations in each remediation monitoring zone to the RTLs is presented on Table 26.

The comparison of the 2001 and 2002 shallow zone monitoring data with the RTLs indicates the following:

- AOI 7, Shallow (wells GM-23, GM-29 and GM-30): in 2002, the maximum concentrations of PCE, TCE and vinyl chloride in the source area exceed the RTLs; on average, only PCE exceeds the RTL.
- Zone S1 (well GM-28): concentrations remain below RTLs.
- Zone S1 to S2 (wells GM-28, ME-6): concentrations remain below RTLs.
- Zone S2 (wells ME-6, ME-3, GM-31): concentrations are now below RTLs.
- Zone S2 to S3 (wells ME-6, ME-3, GM-31, GM-22, GM-19S, EAST): in 2002, the maximum concentrations of TCE exceed the RTL; on average, concentrations are below RTLs.
- Zone S3 (wells GM-32, GM-21): maximum and average concentrations of TCE exceed the RTL.
- Zone S3 to GM-10 (wells GM-32, GM-21, GM-8, GM-6, 4S, GM-2, GM-16, GM-18, WSU-24, and GM-10): in 2002, the maximum concentrations of PCE and TCE exceed the RTLs; on average, only TCE exceeds the RTL.
- GM-10: concentrations of TCE exceed the RTLs.
- GM-26: all concentrations remain below the RTLs.

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The comparison of the 2001 and 2002 deep zone monitoring data with the RTLs indicates the following:

- AOI 7, Deep (wells GM-23, GM-29 and GM-30): in 2002, the maximum concentrations of cis-DCE, PCE, TCE and vinyl chloride exceed the RTLs for the deep zone; on average, PCE, TCE and vinyl chloride concentrations exceed the RTLs.
- Zone D1 (GM-19D): concentrations are now below the RTLs.
- Zone D2 (Well GM-1 and GM-3): the maximum and average concentrations for TCE exceed the RTL.
- POC Deep (GM-11, GM-15 and GM-20D): the maximum and average concentrations for TCE exceed 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 AOI 7 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 AOI 7 in the upper aquifer. Continued corrective measures are also required downgradient of RZ-1 (i.e., at RZ-3) to address 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

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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 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 will monitor 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 to be 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 will be conducted to identify whether this 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.

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- 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 this current evaluation, the maximum concentrations detected during the 2001 and 2002 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).

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4.2.3 Results

As proposed in the Site-Wide Groundwater Monitoring Plan, post-closure monitoring data collected those wells assigned to the North and South Settling Lagoons are to be evaluated for temporal trends. Data considered in the evaluation included results from the September 2002 monitoring event and data ranging back to the initial post-closure monitoring event conducted in November 2001. Currently, the post-closure data set includes only two data points for any monitoring well/constituent pair, and therefore, no regression analysis was performed.

The potential significance of concentrations detected during the 2001 and 2002 sampling events in each set of downgradient monitoring wells for the lagoons and landfills were assessed. Based on the maximum concentrations detected during the 2001 and 2002 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 27 in comparison with MCLs or EDWLs. As shown on Table 27, 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 2001 and 2002 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, interim/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 Ground Water Monitoring Plan (ARCADIS G&M, Inc. 2002), monitoring data collected immediately downgradient of the 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 2001-2002 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 through a combination of corrective measures that achieve plume migration control via hydraulic control, and reduce existing plume concentrations via in-situ treatment.

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 Delphi Thermal Moraine. Additionally, the observed flow conditions are consistent with the conditions predicted by the capture zone modeling performed in developing the interim

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measures pumping plan, confirming 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 2001-2002 monitoring, no changes to the hydraulic control component of the ongoing corrective measures are proposed.

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 2001-2002 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-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 is conducting additional investigations so that suitable modifications can be undertaken in RZ-3 East to achieve the desired reduction in VOCs downgradient of this area.

GM's ongoing groundwater monitoring program includes the assessment of changes in site-specific VOCs in both the upper and lower aquifer 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, 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 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. However, concentrations of certain VOCs remained above MCLs in downgradient lower aquifer wells GM-11 and GM-20D, but were below MCLs in GM-15 (the short-/intermediate-term goal point of compliance wells for the lower aquifer).

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The decreasing concentrations in the wells downgradient of the site, compared to the RFI data, is likely attributable to the 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 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.

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

5.3 Site-Wide Groundwater Monitoring Program

In accordance with the Site-Wide Groundwater Monitoring Plan (ARCADIS G&M, Inc. 2002), groundwater monitoring was conducted in 2001 and 2002 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 2001-2002 monitoring period, GM believes that the monitoring program defined for the upper aquifer, in terms of the monitoring locations, the constituents monitored and the frequency of monitoring, continue to provide sufficient data for a comprehensive evaluation of these corrective action goals, with on modification. GM will add wells GM-33 and GM-35, installed as part of the Waste Pile Staging Area investigation in 2001, to the site-wide program.

Based on the data collected during the 2001-2002 monitoring period, GM believes that the monitoring program defined for the lower aquifer, in terms of the monitoring locations, the constituents monitored and the frequency of monitoring, continue to provide sufficient data for a comprehensive evaluation of these corrective action goals in regard to evaluating the downgradient point of compliance performance goals. However, given the likely redevelopment of the Delphi Thermal Moraine facility, the need for additional monitoring points in the lower aquifer within the facilities is under consideration as the existing production wells that are currently part of the site-wide groundwater monitoring program may not be available on a long-term basis.

Data collected for metals during the 2000 sampling event indicated that detected arsenic and barium concentrations exceeding MCLs at wells GM-28, HR-17 and/or GM-32 appear to be anomalous with respect to other data collected during this site-

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wide monitoring event. In particular, sampling of monitoring wells immediately downgradient of these three wells either did not detect these constituents, or detected these constituents at much lower concentrations below MCLs. Therefore, GM concluded that there is no evidence that a significant release of these inorganics to groundwater has occurred at the facilities. Nonetheless, GM is proposing resampling of wells HR-17, GM-28, and GM-32 for analysis of arsenic and barium to confirm the September 2000 sampling results. Additionally, GM is proposing that arsenic and barium will be added to the site-specific parameter list used for the site-wide groundwater monitoring program, 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). These constituents will be included in the site-wide monitoring program for the 2003 sampling events to demonstrate that the random detection of these two metals does not pose a concern at this site. GM will evaluate the arsenic and barium concentrations in the Site-Wide Groundwater Monitoring Report for 2003 to determine the need for further monitoring of arsenic and barium as part of the monitoring program. Once this has been demonstrated, only samples collected from the property boundary wells will be analyzed for arsenic and barium.

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Table 1. Site-Wide Groundwater Monitoring Events in 2001/2002, General Motors Corporation, Moraine, Ohio.

March 2001, June 2001, December 2001, June/July 2002 Groundwater Sampling

Site-specific list of VOCs[1], field parameters[2], and biogeochemical parameters[3] were analyzed during these sampling events from the following upper aquifer monitoring wells:

GM-30	ME-6	EAST
GM-23	ME-3	GM-32
GM-29	GM-22	GM-21
GM-28	GM-19S	

Notes:
ME-3 was not sampled during March 2001 and June 2001 because it was not accessible due to the railroad expansion project.
GM-30 was not sampled during June 2001 because it was not accessible due to the railroad expansion project.
ME-6 was not sampled during June/July 2002 because a recent carbon source introduction event made the water too viscous to pump.

November 2001, September 2002 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*
W-3-N	HR-17	GM-17	GM-23*
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	GM-21*	GM-32*
HR-9	GM-10		

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-15	GM-9
HR-12	GM-3	GM-11	MT69
HR-13	GM-1	GM-20D	
HR-15	39	DN-13	

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-dichlorethene, 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. Benzene, ethylbenzene, toluene, xylenes, oil and grease, and pH were analyzed during the effluent sampling events from the air stripper tower. Beginning in May 2002, the stripping tower effluent sample was analyzed for the following expanded 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.

Table 1. Site-Wide Groundwater Monitoring Events in 2001/2002, General Motors Corporation, Moraine, Ohio.

1. Site-specific list of VOCs include: 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.

Parameter	Analytical Method
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. Air Permit Influent Monitoring of the Air Stripper Tower for 2001, General Motor Corporation, Moraine, Ohio. **Draft**

Volatile Organic Compound[1]	Units	1/19/01	2/14/01	3/21/01	4/20/01	5/10/01	6/14/01	7/18/01	8/10/01	9/14/01	10/15/01	11/15/01	12/14/01
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0
Chloroethane	ug/L	3.5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	4.5	5.9	<5.0	6.4	4.0
1,1-Dichloroethane	ug/L	18.0	20.7	18.3	20.4	21.9	22.0	20.2	25.4	30.0	25.6	21	22.0
trans-1,2-Dichloroethene	ug/L	2.6	3.1	2.7	2.5	3.2	2.6	2.4	2.7	3.7	2.9	2.5	2.2
Ethylbenzene	ug/L	8.1	7.3	8.7	8.7	8.4	7.2	6.8	6.1	10.4	8.3	5.8	5.5
Tetrachloroethene	ug/L	29.4	33.7	36.4	35.4	40.4	38.4	28.6	27.6	36.5	27.4	29	29.0
Toluene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	<2.0
1,1,1-Trichloroethane	ug/L	5.0	4.6	4.9	5.0	4.2	4.2	3.4	3.8	4.2	3.6	3.1	2.8
Trichloroethene	ug/L	63.0	60.3	61.9	72.1	66.0	69.8	53.8	56.5	70.4	65.0	57	63.0
Vinyl chloride	ug/L	3.9	4.9	4.7	3.9	5.0	5.1	4.7	6.1	7.5	4.7	6.9	3.7
Xylenes	ug/L	10.9	9.9	8.0	5.8	13.8	6.1	2.0	1.3	3.2	1.4	3.8	<2.0
Total VOCs[2]	**ug/L**	**144.4**	**144.5**	**145.6**	**153.8**	**162.9**	**155.4**	**121.9**	**134**	**171.8**	**138.9**	**135.5**	**132.2**

1 Analytical method for VOC analysis is SW-846 Method 8260.
2 Permit Limit 850 ug/L.
All concentrations in micrograms per liter (ug/L) as reported by the laboratory.

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Table 3. Air Permit Influent Monitoring of the Air Stripper Tower for 2002, General Motors Corporation, Moraine, Ohio.

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Volatile Organic Compound[1]	Units	1/17/02	2/14/02	3/18/02	4/15/02	5/10/02	6/12/02	7/01/02	8/05/02	9/10/02	10/08/02	11/01/02	12/04/02
Benzene	ug/L	<2.0	<1.4	<1.7	<1.7	<2.0	1.7	2.2	1.8	1.6	1.4	1.7	1.6
Chloroethane	ug/L	4.8	6.8	4.2	3.0	7.3	7.0	8.6	6.7	6.5	4.6	6.2	6.4
1,1-Dichloroethane	ug/L	27.0	27.0	25	22	29	32	36	31	31	21	30	25
trans-1,2-Dichloroethene	ug/L	2.6	2.7	2.5	2.2	2.9	3.5	3.8	3.2	3.2	2.7	3.0	2.5
Ethylbenzene	ug/L	5.0	8.2	8.0	4.4	<2.0	<1.7	4.6	5.0	6.6	3.8	3.6	2.4
Tetrachloroethene	ug/L	26	21.0	18.0	17	21	17	12	9.2	8.2	9.1	8.8	7.9
Toluene	ug/L	<2.0	<1.4	<1.7	<1.7	<2.0	<1.7	<1.0	<1.3	<1.0	<1.3	<1.0	<1.0
1,1,1-Trichloroethane	ug/L	2.6	2.1	1.8	2.0	<2.0	<1.7	1.2	<1.3	1.1	<1.3	1.0	<1.0
Trichloroethene	ug/L	58	49	42	48	62	52	41	32	30	37	33	31
Vinyl chloride	ug/L	4.8	6.3	4.1	3.2	6.6	4.8	11	9.5	7.5	3.5	5.2	3.8
Xylenes	ug/L	2.7	2.8	2.1	1.8	<2.0	<1.7	1.9	2.9	2.2	<1.3	<1.0	<1.0
Total VOCs[2]	ug/L	133.5	125.9	107.7	103.6	128.8	118.0	122.3	101.3	97.9	83.1	92.5	80.6

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

2 Permit Limit 850 ug/L.

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

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Table 4. NPDES Permit Effluent Monitoring of the Air Stripper Tower for 2001, General Motors Corporation, Moraine, Ohio. **Draft**

Constituent	Units	Permit Limit	1/19/01	2/14/01	3/21/01	4/20/01	5/10/01	6/14/01	7/18/01	8/10/01	9/14/01	10/15/01	11/15/01	12/14/01
Oil & Grease[1]	mg/L	10 mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5.0	<5.0
pH[2]	S.U.	6.5 - 9.0 S.U.	8.12	8.18	7.51[4]	7.78	7.73	7.73	7.70	7.83	7.91	7.57	8.2	8.2
Benzene[3]	ug/L	5 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[3]	ug/L	5 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[3]	ug/L	5 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
Xylenes[3]	ug/L	NA	<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 VOC analysis is SW-846 Method 8260.
4 Value represents field pH reading.

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Table 5. NPDES Permit Effluent Monitoring of the Air Stripper Tower for 2002, General Motors Corporation, Moraine, Ohio. **Draft**

Constituent	Units	Permit Limit	1/17/02	2/14/02	3/18/02	4/15/02	5/10/02	6/12/02	7/01/02	8/05/02	9/10/02	10/08/02	11/01/02	12/04/02
Oil & Grease[1]	mg/L	10 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
pH[2]	S.U.	6.5 - 9.0 S.U.	8.2	8.3	8.3	8.1	8.1	8.1	8.2	8.0	8.2	8.2	8.1	8.2
VOCs[3]														
Benzene	ug/L	5 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	(4)	--	--	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/L	(4)	--	--	--	--	2.4	<1.0	<1.0	1.3	<1.0	<1.0	1.7	3.5
cis-1,2-Dichloroethene	ug/L	(4)	--	--	--	--	2.6	0.80	0.89	1.5	0.70	0.81	1.8	3.3
trans-1,2-Dichloroethene	ug/L	(4)	--	--	--	--	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	ug/L	5 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	(4)	--	--	--	--	1.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	ug/L	5 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	(4)	--	--	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	ug/L	(4)	--	--	--	--	4.2	1.1	<1.0	1.2	<1.0	<1.0	1.6	3.2
Vinyl Chloride	ug/L	(4)	--	--	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Xylenes	ug/L	(4)	<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 VOC analysis is SW-846 Method 8260.
4 Draft permit limit of 5 ug/L.
-- Not Analyzed.

ARCADIS

Table 6. DN-13 Monthly Monitoring for 2001, General Motors Corporation, Moraine, Ohio.

Draft

Volatile Organic Compound [1]	Units	1/19/01	2/14/01	3/21/01	4/20/01	5/10/01	6/14/01	7/18/01	8/10/01	9/14/01	10/15/01	11/15/01	12/14/01
Acetone	ug/L	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0	NS	<20.0	<20.0	<20.0	<10	<10
Acrolein	ug/L	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	NS	<50.0	<50.0	<50.0	<20	<20
Acrylonitrile	ug/L	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	NS	<50.0	<50.0	<50.0	<20	<20
Allyl chloride	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	<20	<20
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NS	<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	NS	<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	NS	<1.0	<1.0	<1.0	<1.0	<1.0
2-Butanone	ug/L	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5	NS	<12.5	<12.5	<12.5	<10	<10
Carbon disulfide	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NS	<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	NS	<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	NS	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	<1.0	<1.0
Chloroform	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	<1.0	<1.0
Chloromethane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	<1.0	<1.0
Chloroprene	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	<1.0	<2.0
Dibromochloromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NS	<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	NS	<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	NS	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dibromo-3-chloropropane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	<2.0	<2.0
1,2-Dibromoethane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	<1.0	<1.0
trans-1,4-Dichloro-2-butene	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	<1.0	<1.0
1,1-Dichloroethane	ug/L	2.4	2.8	2.4	2.4	2.3	2.8	NS	2.4	2.8	2.6	2.2	2.4
1,2-Dichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NS	<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	NS	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/L	6.3	7.4	6.1	6.2	6.4	7.1	NS	6.5	7.5	7.3	5.8	6.5
trans-1,2-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	<0.50	<0.50
1,2-Dichloropropane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NS	<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	NS	<1.0	<1.0	<1.0	<1.0	<1.0

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Table 6. DN-13 Monthly Monitoring for 2001, General Motors Corporation, Moraine, Ohio.

Draft

Volatile Organic Compound [1]	Units	1/19/01	2/14/01	3/21/01	4/20/01	5/10/01	6/14/01	7/18/01	8/10/01	9/14/01	10/15/01	11/15/01	12/14/01
trans-1,3-Dichloropropene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl methacrylate	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	<1.0	<1.0
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	<1.0	<1.0
2-Hexanone	ug/L	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5	NS	<12.5	<12.5	<12.5	<10	<10
Iodomethane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	<1.0	<1.0
Methacrylonitrile	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	<2.0	<2.0
Bromomethane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	<1.0	<1.0
Methylene chloride	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	<1.0	<1.0
4-Methyl-2-pentanone	ug/L	<12.5	<12.5	<12.5	<12.5	<12.5	<12.5	NS	<12.5	<12.5	<12.5	<10	<10
Methyl methacrylate	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	<2.0	<2.0
Pentachloroethane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	NA	NA
Propionitrile	ug/L	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	NS	<50.0	<50.0	<50.0	<4.0	<4.0
Styrene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NS	<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	NS	<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	NS	<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	NS	<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	NS	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,1-Trichloroethane	ug/L	<1.0	1.1	1.1	1.1	<1.0	1.0	NS	1.2	<1.0	1.2	<1.0	1.0
1,1,2-Trichloroethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	ug/L	4.7	5.6	4.8	4.9	4.8	5.2	NS	4.9	5.6	5.4	4.7	5.1
Trichlorofluoromethane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,3-Trichloropropane	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	<1.0	<1.0
Vinyl acetate	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	NS	<5.0	<5.0	<5.0	<2.0	<2.0
Vinyl chloride	ug/L	1.4	1.4	1.4	1.2	1.1	1.3	NS	1.6	1.6	1.1	1.2	1.2
Xylenes	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NS	<1.0	<1.0	<1.0	<1.0	<1.0
Total VOCs	**ug/L**	**14.8**	**18.3**	**15.8**	**15.8**	**14.6**	**17.4**		**16.6**	**17.5**	**17.6**	**13.9**	**16.2**

1 Analytical method for VOC analysis is SW-846 Method 8260.
All concentrations in micrograms per liter (ug/L) as reported by the laboratory.

NS - Not Sampled, DN-13 was not in operation.
NA - Not Analyzed.

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Table 7. DN-13 Monthly Monitoring for 2002, General Motors Corporation, Moraine, Ohio.

Draft

Volatile Organic Compound[1]	Units	1/17/02	2/14/02	3/18/02	4/15/02	5/10/02	6/12/02	7/01/02	8/06/02	9/10/02	10/08/02	11/01/02	12/04/02
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	2.5	2.4	2.1	2.4	2.2	2.3	2.1	2.7	2.3	1.8	2.3	2.3
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	6.5	6.3	6.3	7.5	5.9	7.0	6.6	6.5	6.1	6.5	6.5	6.4
trans-1,2-Dichloroethene	ug/L	<1.0	<1.0	<1.0	0.50	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
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 7. DN-13 Monthly Monitoring for 2002, General Motors Corporation, Moraine, Ohio.

Draft

Volatile Organic Compound[1]	Units	1/17/02	2/14/02	3/18/02	4/15/02	5/10/02	6/12/02	7/01/02	8/06/02	9/10/02	10/08/02	11/01/02	12/04/02
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	1.1	<1.0	<1.0	1.3	<1.0	1.2	1.3	1.3	1.1	1.1	1.1	1.1
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	5.3	4.9	5.4	6.6	5.1	6.5	6.8	5.8	5.2	6.5	5.9	5.8
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	1.2	1.3	1.1	1.4	1.1	1.1	<1.0	1.4	1.1	<1.0	1.3	1.4
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**	**16.6**	**14.9**	**14.9**	**19.7**	**14.3**	**18.1**	**16.8**	**17.7**	**15.8**	**15.9**	**17.1**	**17.0**

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 8. Monitoring Well Construction Details, General Motors Corporation, Moraine, Ohio.

Draft

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
Shallow Aquifer Wells							
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 8. Monitoring Well Construction Details, General Motors Corporation, Moraine, Ohio.

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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
Shallow Aquifer Wells							
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	23-32	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
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
Deep Aquifer Wells							
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

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Table 8. 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
Deep Aquifer Wells							
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
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.

Table 9. Water-Level Measurements Collected During November 2001, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Water-Level Elevation
Shallow Aquifer Wells			
W-1-N	739.02	31.87	707.15
W-2-N	731.68	25.13	706.55
W-3-N	733.66	27.28	706.38
W-4-N	731.63	25.25	706.38
HR-1	732.71	27.81	704.90
HR-2	734.75	28.38	706.37
HR-3	736.75	30.44	706.31
HR-4	742.60	35.64	706.96
HR-5	734.27	28.30	705.97
HR-6	732.66	27.35	705.31
HR-7	731.73	25.66	706.07
HR-8	743.42	36.14	707.28
HR-9	743.51	35.75	707.76
HR-11	743.33	35.71	707.62
HR-16	727.01	22.47	704.54
HR-17	726.43	21.73	704.7
W-1-S	729.29	24.52	704.77
W-2-S	726.64	22.73	703.91
W-3-S	733.42	25.29	708.13
W-4-S	727.68	23.77	703.91
GM-2	735.81	32.13	703.68
4S	731.36	NA	NA
GM-6	730.27	27.00	703.27
GM-8	735.17	31.65	703.52
GM-10	723.90	21.00	702.90
GM-16	725.30	22.04	703.26
GM-17	723.84	20.66	703.18
GM-18	723.80	21.92	701.88
GM-19S	730.85	26.68	704.17
EAST	730.98	26.53	704.45
WEST	731.08	26.62	704.46
WSU-24	725.10	21.44	703.66
WS-17	726.18	22.83	703.35
WS-18	733.52	30.10	703.42

Table 9. Water-Level Measurements Collected During November 2001, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Water-Level Elevation
WS-19	726.62	NM	NM
TW-2	733.38	36.42	696.96
RW-10	728.53	24.06	704.47
RW-11	729.74	25.26	704.48
GM-21	723.50	20.95	702.55
GM-22	731.63	29.76	701.87
GM-23	731	14.86	716.14
GM-24	747.29	39.32	707.97
GM-25	746.17	40.40	705.77
GM-26	722.29	19.85	702.44
GM-27	730.57	Dry	Dry
GM-28	738.02	31.93	706.09
GM-29	730.78	27.32	703.46
GM-30	734.73	29.80	704.93
GM-31	735.23	30.49	704.74
GM-32	732.08	34.12	697.96
GM-33	729.77	25.25	704.52
GM-34	730.56	26.03	704.53
GM-35	731.27	27.25	704.02
GM-36	731.11	26.99	704.12
GM-37	730.05	25.81	704.24
GM-38	729.88	25.66	704.22
ME-2	732.08	28.00	704.08
ME-3	732.59	27.86	704.73
ME-4	732.74	28.35	704.39
ME-6	735.91	31.05	704.86
Deep Aquifer Wells			
GM-1	735.74	32.39	703.35
GM-3	730.44	27.52	702.92
GM-4	731.46	28.54	702.92
GM-5	731.29	28.18	703.11
GM-7R	735.61	32.20	703.41
GM-9	724.07	21.54	702.53
GM-11	723.71	21.30	702.41
GM-13	723.82	21.92	701.90
GM-14	723.50	20.62	702.88
GM-15	725.23	23.40	701.83
GM-19D	730.25	26.71	703.54
GM-20D	727.26	23.83	703.43
HR-10	742.81	35.04	707.77

Table 9. Water-Level Measurements Collected During November 2001, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Water-Level Elevation
HR-12	742.64	34.99	707.65
HR-13	735.03	28.68	706.35
HR-14	731.63	25.33	706.30
HR-15	733.74	27.55	706.19
M73C	716.55	14.61	701.94
MT68	746.45	41.35	705.10
MT69	722.71	20.43	702.28
MT576M	751.46	44.72	706.74
MT596M*	757.73	50.20	707.53
Production and Fire Wells			
11B	NS	NM	NM
12A	742.35	On	On
28	733.67	NM	NM
31	734.05	27.80	Off
32	732.10	NM	NM
35	733.96	NM	NM
37	731.24	NM	NM
39	732.07	23.10	708.97
42	731.62	26.75	704.87
44	734.62	27.19	707.43
45	731.03	NM	NM
46	733.34	NM	NM
A	739.00	NM	NM
FW-1A	739.89	33.28	706.61
FW-2	737.48	31.84	705.64
FW-3	739.26	33.53	705.73
FW-4	731.62	27.50	704.12

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 November 5, 2001 using an electronic water level indicator.
Depth-to-water measurements are reported in feet below the measuring point.
NS - Not Surveyed.
NA - Not accessible because 4S still contains a submersible pump.
NM - Not measured.
*Measuring point is top of cement housing.

Table 10. Water-Level Measurements Collected During September 2002, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Water-Level Elevation
Shallow Aquifer Wells			
W-1-N	739.02	31.33	707.69
W-2-N	731.68	24.64	707.04
W-3-N	733.66	26.71	706.95
W-4-N	731.63	24.55	707.08
HR-1	732.71	27.18	705.53
HR-2	734.75	27.65	707.1
HR-3	736.75	29.62	707.13
HR-4	742.60	35.00	707.6
HR-5	734.27	27.65	706.62
HR-6	732.66	26.73	705.93
HR-7	731.73	25.12	706.61
HR-8	743.42	55.50	687.92
HR-9	743.51	35.18	708.33
HR-11	743.33	34.89	708.44
HR-16	727.01	22.11	704.9
HR-17	726.43	21.19	705.24
W-1-S	729.29	23.94	705.35
W-2-S	726.64	22.36	704.28
W-3-S	733.42	24.84	708.58
W-4-S	727.68	23.25	704.43
GM-2	735.81	31.00	704.81
4S	731.36	NA	NA
GM-6	730.27	26.24	704.03
GM-8	735.17	31.02	704.15
GM-10	723.90	20.09	703.81
GM-16	725.30	21.42	703.88
GM-17	723.84	19.81	704.03
GM-18	723.80	19.96	703.84
GM-19S	730.85	26.01	704.84
EAST	730.98	25.51	705.47
WEST	731.08	25.90	705.18
WSU-24	725.10	20.35	704.75
WS-17	726.18	22.10	704.08
WS-18	733.52	29.17	704.35

Table 10. Water-Level Measurements Collected During September 2002, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Water-Level Elevation
WS-19	726.62	22.26	704.36
TW-2	733.38	32.00	701.38
RW-10	728.53	23.15	705.38
RW-11	729.74	24.35	705.39
GM-21	723.50	19.87	703.63
GM-22	731.63	25.87	705.76
GM-23	731	23.92	707.08
GM-24	747.29	38.08	709.21
GM-25	746.17	38.54	707.63
GM-26	722.29	18.94	703.35
GM-27	730.57	23.21	707.36
GM-28	738.02	NM	NM
GM-29	730.78	23.92	706.86
GM-30	734.73	27.87	706.86
GM-31	735.23	NM	NM
GM-32	732.08	26.45	705.63
GM-33	729.77	24.29	705.48
GM-34	730.56	25.11	705.45
GM-35	731.27	26.41	704.86
GM-36	731.11	25.11	706
GM-37	730.05	24.87	705.18
GM-38	729.88	24.71	705.17
ME-2	732.08	NM	NM
ME-3	732.59	25.57	707.02
ME-4	732.74	NM	NM
ME-6	735.91	27.09	708.82
Deep Aquifer Wells			
GM-1	735.74	31.17	704.57
GM-3	730.44	26.50	703.94
GM-4	731.46	27.50	703.96
GM-5	731.29	27.10	704.19
GM-7R	735.61	31.19	704.42
GM-9	724.07	20.69	703.38
GM-11	723.71	20.50	703.21
GM-13	723.82	21.16	702.66
GM-14	723.50	20.98	702.52
GM-15	725.23	22.88	702.35
GM-19D	730.25	27.77	702.48
GM-20D	727.26	22.73	704.53
HR-10	742.81	34.49	708.32

Table 10. Water-Level Measurements Collected During September 2002, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Water-Level Elevation
HR-12	742.64	34.21	708.43
HR-13	735.03	27.87	707.16
HR-14	731.63	24.71	706.92
HR-15	733.74	31.48	702.26
M73C	716.55	NM	NM
MT68	746.45	38.99	707.46
MT69	722.71	19.54	703.17
MT576M	751.46	42.65	708.81
MT596M*	757.73	47.52	710.21
Production and Fire Wells			
11B	NS	On	On
12A	742.35	On	On
31	734.05	Off	Off
32	732.10	26.68	705.42
35	733.96	Off	Off
37	731.24	NM	NM
39	732.07	On	On
42	731.62	Off	Off
44	734.62	NM	NM
45	731.03	26.55	704.48
46	733.34	29.73	703.61
A	739.00	NM	NM
FW-1A	739.89	31.95	707.94
FW-2	737.48	30.74	706.74
FW-3	739.26	32.17	707.09
FW-4	731.62	25.88	705.74

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 16 and 17, 2002 using an electronic water level indicator.
Depth-to-water measurements are reported in feet below the measuring point.
NS - Not Surveyed.
NA - Not accessible because 4S still contains a submersible pump.
NM - Not measured.
*Measuring point is top of cement housing.

Table 11. Summary of Precipitation Measurements Recorded by the National Weather Service, During 2001 - Dayton, Ohio.

Date	Actual Precipitation	Average Precipitation	Departure from Average
January 2001	0.84	2.13	1.29 below average
February 2001	1.69	2.17	0.48 below average
March 2001	1.35	3.42	2.07 below average
April 2001	3.60	3.46	0.14 above average
May 2001	4.54	3.88	0.66 above average
June 2001	2.91	3.82	0.91 below average
July 2001	5.48	3.54	1.94 above average
August 2001	6.40	3.20	3.20 above average
September 2001	3.88	2.54	1.34 above average
October 2001	4.99	2.48	2.51 above average
November 2001	2.86	3.07	0.21 below average
December 2001	3.66	2.93	0.73 above average
2001 Total	42.20	36.64	5.56 above average

All precipitation measurements are reported in inches.

Table 12. Summary of Precipitation Measurements Recorded by the National Weather Service, During 2002 - Dayton, Ohio.

Date	Actual Precipitation	Average Precipitation	Departure from Average
January 2002	1.52	2.60	1.08 below average
February 2002	1.31	2.29	0.98 below average
March 2002	3.89	3.29	0.60 above average
April 2002	5.72	4.03	1.69 above average
May 2002	6.20	4.17	2.03 above average
June 2002	3.26	4.21	0.95 below average
July 2002	1.81	3.75	1.94 below average
August 2002	0.87	3.49	2.62 below average
September 2002	5.74	2.65	3.09 above average
October 2002	2.53	2.72	0.19 below average
November 2002	3.07	3.30	0.23 below average
December 2002	3.21	3.09	0.13 above average
2002 Total	39.13	39.59	0.46 below average

All precipitation measurements are reported in inches.

Table 13. Vertical Gradients For Shallow/Deep Well Pairs During 2001/2002, General Motors Corporation, Moraine, Ohio.

Shallow/Deep Wells	Vertical Gradient in November 2001 [1]		Vertical Gradient in September 2002 [2]	
	Direction	Direction	Direction	Direction
Ugradient				
HR-9/HR-10	U	0.01	D	-0.01
HR-11/HR-12	U	0.03	D	-0.01
On-Site				
W-3-N/HR-15	D	-0.19	D	-4.69
W-4-N/HR-14	D	-0.08	D	-0.16
HR-3/HR-13	U	0.04	U	0.03
GM-8/GM-7R	D	-0.11	U	0.27
GM-16/GM-15	D	-1.43	D	-1.53
GM-2/GM-1	D	-0.33	D	-0.24
GM-18/GM-13	U	0.02	D	-1.18
GM-17/GM-11	D	-0.77	D	-0.82
GM-6/GM-3	D	-0.35	D	-0.09
AOI 7				
GM-23/GM-27	--	--	U	0.28
Downgradient				
GM-10/GM-9	D	-0.37	D	-0.43
GM-26/GM-69	D	-0.16	D	-0.18

D - Downward gradient (-).

U - Uward gradient (+).

[1] - Water-level measurements collected on November 5, 2001.

[2] - Water-level measurements collected on September 16 and 17, 2002.

-- - GM-27 was dry in November 2001.

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Table 14. Summary of Groundwater Analytical Results from Reactive Zone 1 Wells, General Motors Corporation, Moraine, Ohio.

RZ-1		Upgradient Well GM-29										Introduction Well RZ-1A		
Constituents	**Units**	**9/1/99**	**2/22/00**	**5/26/00**	**9/21/00**	**3/20/01**	**6/26/01**	**11/13/01**	**12/12/01**	**6/13/02**	**9/25/02**	**9/29/99**	**2/22/00**	**5/26/00**
Volatile Organic Compounds														
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0UJ	<50	<50	<50	<40	<1.0	<50	<5.0
1,1-Dichloroethane	ug/L	4.3	4.1	6.3	16.6	10.8	6.3J	<50	<50	<50	<40	1.8	<50	<5.0
1,1-Dichloroethene	ug/L	1.3	1.1	1.6	3.1	3.5	3.0J	<50	<50	<50	<40	<1.0	<50	<5.0
cis-1,2-Dichloroethene	ug/L	320	223	1,190J	2,871	2,170	2050J	1,800	1,800	1600	1300	68.6	294	688
trans-1,2-Dichloroethene	ug/L	11.1	9.1	8.9	14.4	20.4	25.6J	26	24J	21	21	3.6	<50	5
Ethylbenzene	ug/L	<1.0	1.4	<1.0	<1.0	<1.0	<1.0UJ	21J	<50	<50	<40	<1.0	<50	<5.0
Tetrachloroethene	ug/L	<20	38.7	24.6	20.0	24.4	24.8J	17J	22J	22	18J	252	<50	45.4
Toluene	ug/L	<1.0	<1.0	<1.0	2.2	<1.0	<1.0UJ	<50	<50	<50	<40	<1.0	<50	2.1J
1,1,1-Trichloroethane	ug/L	37.8	36.0	32.5	24.5	27.0	23.8J	<50	19J	17	16J	5.7	<50	<5.0
Trichloroethene	ug/L	878	758	649J	289	354	437J	270	320	380	310	158	88.5	37.9
Vinyl chloride	ug/L	3.8	1.0	1.7	788	362	276J	230	280	140	140	3.3	<50	43.1
Xylenes	ug/L	<1.0	6.0	<1.0	<1.0	<1.0	<1.0UJ	52	<50	<50	<40	<1.0	<50	<5.0
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**	**493**	**382.5**	**821.5**

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.

Table 14. Summary of Groundwater Analytical Results from Reactive Zone 1 Wells, General Motors Corporation, Moraine, Ohio.

RZ-1		Introduction Well RZ-1G			Downgradient Well GM-28									
Constituents	**Units**	**9/29/99**	**2/22/00**	**5/26/00**	**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**
Volatile Organic Compounds														
Benzene	ug/L	<1.0	<50	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<5.0UJ	<4.0	<1
1,1-Dichloroethane	ug/L	<1.0	<50	<5.0	3.3	4.2	11.8	9.9	<1.0	<1.0	<10	<5.0UJ	<4.0	2.7
1,1-Dichloroethene	ug/L	<1.0	<50	<5.0	<1.0	<1.0	3.8	<1.0	<1.0	<1.0	<10	<5.0UJ	<4.0	<1
cis-1,2-Dichloroethene	ug/L	14.8	306	161	175	503	2,700	37.0	7.7	352	<5.0	2.2UJ	<2.0	1.1
trans-1,2-Dichloroethene	ug/L	<1.0	<50	<5.0	9.2	9.7	36.5	22.3	17.6	<1.0	11	11J	8.6	11
Ethylbenzene	ug/L	<1.0	<50	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<5.0UJ	<4.0	<1
Tetrachloroethene	ug/L	91.5	50.5	17.5	316	88.4	30.2	2.3	2.8	<1.0	<10	<5.0UJ	<4.0	<1
Toluene	ug/L	<1.0	<50	1.1J	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	< 1.8UJ	<4.0	<1.3U
1,1,1-Trichloroethane	ug/L	<1.0	<50	<5.0	17.7	23.2	18.1	5.0	<1.0	<1.0	<10	<5.0UJ	<4.0	<1
Trichloroethene	ug/L	44.1	<50	13.8	768	833	14.8	1.6	1.8	<1.0	<10	<5.0UJ	<4.0	0.86J
Vinyl chloride	ug/L	<1.0	<50	136.0	3.2	<1.0	1.9	12.4	2.6	<1.0	<10	<5.0UJ	<4.0	<1
Xylenes	ug/L	<1.0	<50	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<10	<5.0UJ	<4.0	<1.2U
Total VOCs	**ug/L**	**150.4**	**356.5**	**331.4**	**1,292.4**	**1,461.5**	**2,817.1**	**90.5**	**32.5**	**352**	**11**	**11**	**8.6**	**15.66**

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.

Table 15. Summary of Groundwater Analytical Results from Reactive Zone 2 Wells, General Motors Corporation, Moraine, Ohio.

RZ-2		Introduction Well ME-6									Introduction Well ME-1		
Constituents	**Units**	**8/31/99**	**2/22/00**	**5/25/00**	**9/21/00**	**03/20/01**	**6/26/01**	**11/15/01**	**12/12/01**	**9/25/02**	**8/31/99**	**2/22/00**	**5/25/00**
Volatile Organic Compounds													
Benzene	ug/L	<1.0	<10	<5.0	<1.0	<1.0	<1.0	<2.0	<3.3	<10	<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	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	<1.0	<10	<5.0
cis-1,2-Dichloroethene	ug/L	255	541	712	98.8	171	67.0	65	86	5.2	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	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	<10	1.5J
Tetrachloroethene	ug/L	213	18.3	16.2	6.7	34.0	<1.0	8.2	6.1	<10	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	<1.0	<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	13.5	<10	<5.0
Trichloroethene	ug/L	474	39.0	28.0	19.0	66.0	4.8	23	19	<10	292	<10	5.8
Vinyl chloride	ug/L	<1.0	<10	10.8	6.1	27.7	13.3	13	22	<10	36	<10	9.1
Xylenes	ug/L	<1.0	<10	<5.0	<1.0	<1.0	2.9	<2.0	<3.3	<10	<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	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.

Table 15. Summary of Groundwater Analytical Results from Reactive Zone 2 Wells, General Motors Corporation, Moraine, Ohio.

RZ-2		Introduction Well ME-3								Introduction Well ME-5	Below Introduction Zone GM-31					
Constituents	Units	8/31/99	2/22/00	5/25/00	9/21/00	11/15/01	12/12/01	7/21/02	9/24/02	6/26/01	9/1/99	2/23/00	5/31/00	9/21/00	11/15/01	9/24/02
Volatile Organic Compounds																
Benzene	ug/L	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<40	<2.5	<1.0	<1.0	<1.0	<1.0	<1.0	<4.0	<6
1,1-Dichloroethane	ug/L	6.1	12.4	4.7	3.4	5.9	5.6	<40	<2.5	<1.0	1.3	1.4	1.8	1.1	3.1J	5.9J
1,1-Dichloroethene	ug/L	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<40	<2.5	<1.0	<1.0	<1.0	<1.0	<1.0	<4.0	<6
cis-1,2-Dichloroethene	ug/L	5.7	105	100	2.9	16	22	<20	<1.2	1.8	7.80	27.8	48.1	40.2	120	200
trans-1,2-Dichloroethene	ug/L	<1.0	<10	7.5	2.9	2.7	2.8	<20	<1.2	<1.0	<1.0	<1.0	<1.0	<1.0	1.8J	3.5
Ethylbenzene	ug/L	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<40	<2.5	<1.0	<1.0	<1.0	<1.0	<1.0	<4.0	<6
Tetrachloroethene	ug/L	57.9	<10	<1.0	<1.0	1.3	3.4	<40	<2.5	<1.0	1.3	<1.0	<1.0	<1.0	<4.0	<6
Toluene	ug/L	<1.0	<10	<1.0	1.4	0.34J	0.19J	<40	<2.5	3.8	<1.0	<1.0	1.5	<1.0	<4.0	<6
1,1,1-Trichloroethane	ug/L	42.5	16.0	4.8	6.4	1.6	1.9	<40	<2.5	<1.0	<1.0	<1.0	<1.0	<1.0	<4.0	<6
Trichloroethene	ug/L	47.5	<10	4.3	<1.0	3.8	9.7	<40	<2.5	<1.0	27.2	13.6	8.4	8.5	11	10
Vinyl chloride	ug/L	<1.0	<10	54.7	2.1	7.3	11	<40	<2.5	<1.0	<1.0	<1.0	<1.0	<1.0	7.4	19
Xylenes	ug/L	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<40	<2.5	4.3	<1.0	1.1	1.6	<1.0	<4.0	<6
Total VOCs	ug/L	159.7	133.4	176	19.1	38.94	56.59	0	0	9.9	37.6	43.9	61.4	49.8	143.3	238.4

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.

Table 16. Summary of Groundwater Analytical Results from Reactive Zone 3 West Wells, General Motors Corporation, Moraine, Ohio.

RZ-3 West		Upgradient Well EAST										Upgradient Well WEST		
Constituents	**Units**	**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**	**09/21/99**	**02/23/00**	**05/25/00**
Volatile Organic Compounds														
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	<2.5	<2	<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	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	0.82J	<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	9.5	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	<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	<1.0	<1.0	<1.0
Tetrachloroethene	ug/L	61.0	77.1	54.6	55.8	49.9	59.3	56	49	37	47	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	<1.0	<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	24.8	25.1	27.4
Trichloroethene	ug/L	56.1	90.1	81.3	97.2	105	117	92	94	75	44	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	<1.0	<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	<1.0	<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**	**115.22**	**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.

Table 16. Summary of Groundwater Analytical Results from Reactive Zone 3 West Wells, General Motors Corporation, Moraine, Ohio.

RZ-3 West		Upgradient Well GM-19S										Introduction Well RZ-3E			Introduction Well RZ-3L		
Constituents	**Units**	**09/20/99**	**02/23/00**	**05/24/00**	**09/22/00**	**03/19/01**	**06/25/01**	**11/12/01**	**12/11/01**	**06/12/02**	**09/26/02**	**09/30/99**	**02/28/00**	**05/30/00**	**09/30/99**	**02/28/00**	**05/30/00**
Volatile Organic Compounds																	
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	0.62	<4	<1.0	<10	<5.0	8.2	35.4	105
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	20.9	49.7	27.1	59.7	583	638
1,1-Dichloroethene	ug/L	1.0	1.0	1.1	<1.0	<1.0	<1.0	<3.3	<3.3	0.98	<4	1.6	<10	<5.0	<1.0	<10	5.0
cis-1,2-Dichloroethene	ug/L	34.6	38.8	42.9	37.6	38.2	31.5	26	27	28	39	112	320	144	96.6	260	566
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	2.0	<10	2.7J	2.0	<10	9.2
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	<3.3	<4	<1.0	<10	2.4	22.1	111	308
Tetrachloroethene	ug/L	46.0	71.3	57.1	68.0	67.6	71.7	64	64	60	52	58.2	23.6	4.6J	<1.0	<10	<5.0
Toluene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	<3.3	<4	<1.0	<10	2.2J	124	416	706
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	28.4	<10	<5.0	2.4	<10	<5.0
Trichloroethene	ug/L	71.1	101	104	104	107	121	97	110	110	110	124	34.1	4.7J	18.2	<10	4.2J
Vinyl chloride	ug/L	<1.0	1.7	1.4	<1.0	<1.0	<1.0	<3.3	0.66J	0.70	5.2	2.7	<10	9.0	14.1	43.7	104
Xylenes	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<3.3	<3.3	<3.3	<4	<1.0	77.2	39.7	182.4	606	1,190
Total VOCs	**ug/L**	**178.7**	**240.3**	**234.1**	**231.1**	**231.8**	**239.1**	**199.5**	**213.96**	**213.5**	**221.5**	**349.8**	**504.6**	**236.4**	**529.7**	**2,055.1**	**3,635.4**

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.

Table 16. Summary of Groundwater Analytical Results from Reactive Zone 3 West Wells, General Motors Corporation, Moraine, Ohio.

RZ-3 West		Introduction Well RZ-3T			Introduction Well RZ-3Z			Downgradient Well GM-32									
Constituents	**Units**	**09/30/99**	**02/28/00**	**05/30/00**	**09/29/99**	**02/28/00**	**05/30/00**	**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**
Volatile Organic Compounds																	
Benzene	ug/L	<1.0	<10	<5.0	<1.0	<10	<5.0	<1.0	<10	<100	<1.0	<50	<1.0	4.3J	<100	4.0	<10
1,1-Dichloroethane	ug/L	4.9	<10	4.9	1.5	<10	<5.0	3.3	101	46.0J	35.9	<50	3.1	6.2	<100	12	9.7J
1,1-Dichloroethene	ug/L	<1.0	<10	<5.0	<1.0	<10	<5.0	<1.0	<10	<100	<1.0	<50	<1.0	<5.0	<100	<20	<10
cis-1,2-Dichloroethene	ug/L	23.8	213	139	3.2	130	99.3	2.6	<10	<100	<1.0	<50	32.0	<2.5	<50	<10	<5
trans-1,2-Dichloroethene	ug/L	<1.0	<10	<5.0	<1.0	<10	<5.0	4.2	111	41.0J	20.3	<50	2.5	2.9	<50	3.0	<5
Ethylbenzene	ug/L	<1.0	<10	<5.0	<1.0	<10	<5.0	<1.0	<10	<100	<1.0	<50	<1.0	0.79J	<100	<20	<10
Tetrachloroethene	ug/L	19.8	16.5	3.2J	20.6	<10	<5.0	1.2	<10	<100	<1.0	<50	37.6	<5.0	<100	<20	<10
Toluene	ug/L	<1.0	<10	2.0J	<1.0	<10	2.2J	1.0	20.6	<100	10.4	<50	<1.0	12	<100	4.9	<10
1,1,1-Trichloroethane	ug/L	7.2	<10	1.2J	3.8	<10	<5.0	<1.0	<10	<100	<1.0	<50	9.2	<5.0	<100	<20	<10
Trichloroethene	ug/L	97.3	17.1	5.0J	33.9	<10	3.2J	3.2	<10	<100	<1.0	<50	107	<5.0	<100	<20	<10
Vinyl chloride	ug/L	<1.0	<10	<5.0	<1.0	<10	8.6	3.0	<10	<100	<1.0	<50	<1.0	1.1J	<100	3.0	<10
Xylenes	ug/L	<1.0	<10	1.8J	<1.0	<10	<5.0	<1.0	<10	<100	<1.0	<50	<1.0	3.0J	<100	<20	<10
Total VOCs	**ug/L**	**153**	**246.6**	**157.1**	**63**	**130**	**113.3**	**18.5**	**232.6**	**87**	**66.6**	**0**	**191.4**	**30.29**	**0**	**26.9**	**9.7**

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

RZ-3 East		Upgradient Well GM-22										Introduction Well RZ-3FF			Introduction Well RZ-3KK		
Constituents	**Units**	**09/01/99**	**02/23/00**	**05/25/00**	**09/21/00**	**03/20/01**	**06/26/01**	**11/13/01**	**12/12/01**	**6/13/02**	**9/25/02**	**10/07/99**	**02/24/00**	**05/25/00**	**10/07/99**	**02/24/00**	**05/25/00**
Volatile Organic Compounds																	
Benzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2	<1.0	<10	<5.0	<1.0	<10	<5.0
1,1-Dichloroethane	ug/L	<1.0	2.2	2.8	2.4	3.8	4.7	6.8	6.6	4.1	<2	2.8J	<10	<5.0	<1.0	<10	5.4
1,1-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.58J	0.32J	<1.0	<2	<1.0	<10	<5.0	<1.0	<10	<5.0
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	9.3J	50.4	91.5	<1.0	40.7	148
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	<1.0	<10	<5.0	<1.0	<10	<5.0
Ethylbenzene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2	400J	30.4	79.3	<1.0	<10	<5.0
Tetrachloroethene	ug/L	3.6	2.8	3.0	1.6	2.2	3.2	4.9	2.9	1.9	2.3	6.6J	<10	<5.0	8.0	<10	<5.0
Toluene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	0.32J	<1.0	<2	42.9J	<10	14.0	<1.0	<10	<5.0
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	3.2J	<10	<5.0	3.6	<10	<5.0
Trichloroethene	ug/L	4.0	2.5	3.6	<1.0	1.6	2.8	7.5	2.3	2.1	7.6	36.8J	20.3	1.4J	38.9	<10	<5.0
Vinyl chloride	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.60J	0.85J	0.38	<2	6.6J	<10	3.8J	<1.0	<10	1.4J
Xylenes	ug/L	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2	2,210J	147	467	<1.0	<10	<5.0
Total VOCs	**ug/L**	**7.6**	**11.8**	**13.4**	**5.9**	**11.1**	**16.9**	**33.45**	**21.72**	**12.55**	**10.83**	**2,718.2**	**248.1**	**657**	**50.5**	**40.7**	**154.8**

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.

Table 17. Summary of Groundwater Analytical Results from Reactive Zone 3 East Wells, General Motors Corporation, Moraine, Ohio.

RZ-3 East		Introduction Well RZ-3PP			Downgradient Well GM-21									
Constituents	**Units**	**10/08/99**	**02/24/00**	**05/26/00**	**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**
Volatile Organic Compounds														
Benzene	ug/L	<1.0	<10	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<6.0	<6.7
1,1-Dichloroethane	ug/L	<1.0	<10	<5	9.0	5.8	6.8	5.6	5.1	4.1	3.8J	0.71J	5.4	5J
1,1-Dichloroethene	ug/L	<1.0	<10	<5	3.9	1.6	2.4	1.6	1.2	<1.0	<5.0	<1.0	3.6	2.6J
cis-1,2-Dichloroethene	ug/L	<1.0	33.7	40.8	66.4	35.9	47.8	38.7	39.5	37.8	39	6.5	48	43
trans-1,2-Dichloroethene	ug/L	<1.0	<10	<5	7.8	9.3	7.4	12.9	16.4	15.7	15	2.8	8.3	5.1
Ethylbenzene	ug/L	<1.0	<10	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<6.0	<6.7
Tetrachloroethene	ug/L	2.0	<10	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<6.0	<6.7
Toluene	ug/L	1.3	<10	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<6.0	<6.7
1,1,1-Trichloroethane	ug/L	<1.0	<10	<5	53.1	15.4	27.9	15.7	7.0	7.7	6.9	1.2	23	31
Trichloroethene	ug/L	14.7	<10	<5	28.7	283	311	189	169	158	160	28	210	230
Vinyl chloride	ug/L	<1.0	<10	<5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<6.0	<6.7
Xylenes	ug/L	<1.0	<10	<5	<1.0	2.3	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	<6.0	<6.7
Total VOCs	**ug/L**	**18**	**33.7**	**40.8**	**168.9**	**353.3**	**403.3**	**263.5**	**238.2**	**223.3**	**224.7**	**39.21**	**298.3**	**316.7**

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.

Table 18. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 1, General Motors Corporation, Moraine, Ohio.

RZ-1		Upgradient Well GM-29										Introduction Well RZ-1A		
Constituents	**Units**	**9/1/99**	**2/22/00**	**5/26/00**	**9/21/00**	**3/20/01**	**6/26/01**	**11/13/01**	**12/12/01**	**6/13/02**	**9/25/02**	**9/29/99**	**2/22/00**	**5/26/00**
Inorganics & TOC														
Nitrate	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	0	NA	NA
Nitrite	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	0	NA	NA
Nitrogen, Ammonia	mg/l	<0.30	<0.30	<0.30	NA	NA	NA	NA	NA	NA	NA	<0.30	39.0	37.9
Manganese (Total)	mg/l	0.552	0.136	0.35	0.248	0.203	0.136	0.17B	0.17	1.5B	0.18B	0.422	18.7	9.78
Manganese (Dissolved)	mg/l	0.13	0.101	0.177	0.125	0.116	0.128	0.17B	0.15	0.13B	0.16B	0.203	13.2	10.7
Iron (Total)	mg/l	18	1.43	10.1	8.48	5.84	2.52	3.4	3.8	47.8B	3.8	6.78	566	374
Iron (Dissolved)	mg/l	0.24	0.13	2.78	3.09	<0.10	2.03	3.3	2.9	2.2B	2.8	<0.10	366	417
Iron (Ferrous)	mg/l	0.02	0	2.2	NA	NA	NA	NA	NA	NA	NA	0	NA	NA
Sulfate	mg/l	90	126	31	29	31	37	65	48	63	76	61	508	140
Sulfide	mg/l	<4	<1	<1	<1	<1.0	<1	1.3	<1.0	<1.0	<1.0	<1	<10	5.18
Total Organic Carbon	mg/l	18	11	22	<1	7.57	7.3	10	10	8	8	6	14,100	5550
Chloride	mg/l	254	426	508	373	337	262	600B	460	490	490	397	1,560	1080
Permanent Gases														
Carbon Dioxide	mg/l	46.52	49.87	44.05	NA	NA	NA	NA	NA	NA	NA	16.96	999.4	918.87
Oxygen	mg/l	1.02	0.66	1.41	NA	NA	NA	NA	NA	NA	NA	8.23	0.20	0.17
Nitrogen	mg/l	20.29	18.7	15.61	NA	NA	NA	NA	NA	NA	NA	14.51	7.13	6.19
Methane	mg/l	0.01152	0.007699	0.00017	1.62	1.30	1.5	0.610	1.2	0.56	1.1	0.004308	0.02551	0.88
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	NA	<0.40	<0.40
Light Hydrocarbon Scan														
Ethane	ng/l	5641	1861	751	639	460	17000	20000	28000	14000	16000	1218	1495	770
Ethene	ng/l	9769	1275	12098	441796	160000	130000	230000	180000	48000	140000	2458	1980	11737
Field Parameters														
pH	S.U.	6.99	7.02	6.86	7.24	7.31	7.20	7.47	7.57	7.14	7.22	7.24	5.76	5.48
Specific Conductivity	umhos/cm	1502	3044	2388	1942	1733	1291	2703	2860	1977	2354	2033	28360	11895
Dissolved Oxygen	mg/l	0.35	0.51	0.45	3.44	8.20	0.40	0.22	0.01	3.57	1.40	0.82	2.84	4.32
Redox Potential	mV	-526.6	19.6	-105.4	-35.0	-158.2	-166.4	-129.7	-168	-122.9	-91.3	175	-118.4	-65.4
Temperature	°C	17.8	16.9	17.97	17.64	20.04	20.47	16.42	17.13	19.33	17.63	18.33	20.24	21.74

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.

Table 18. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 1, General Motors Corporation, Moraine, Ohio.

RZ-1		Introduction Well RZ-1G			Downgradient Well GM-28									
Constituents	**Units**	**9/29/99**	**2/22/00**	**5/26/00**	**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**
Inorganics & TOC														
Nitrate	mg/l	0	NA	NA	0.08	0	0	NA	NA	NA	NA	NA	NA	NA
Nitrite	mg/l	0	NA	NA	0.06	0	0	NA	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	mg/l	<0.30	28.1	26.1	<0.30	<0.30	0.68	NA	NA	NA	NA	NA	NA	NA
Manganese (Total)	mg/l	0.227	23	15.0	3.2	1.15	6.26	4.1	0.594	2.24	0.58	0.47	1.1	0.488
Manganese (Dissolved)	mg/l	0.198	19.9	14.9	0.068	0.449	6.71	3.94	0.477	1.76	0.61	0.49	1.1	0.418
Iron (Total)	mg/l	<0.10	276	332	106	25.3	22.7	58.9	29.6	59	23.6	23.5	36.2	28.7
Iron (Dissolved)	mg/l	<0.10	234	311	<0.10	0.59	23.3	48.3	2.65	49.8	23.3	23.7	34.7	23.4
Iron (Ferrous)	mg/l	0	NA	NA	0	0.03	2.6	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	65	199	55	89	43	<5	<5	9	106	<5	<5	<5	18
Sulfide	mg/l	<1	<10	2.33	<4	<1	<1	<1	<1	<1	1.5	<1.0	2.0	4.3
Total Organic Carbon	mg/l	12	7,640	3560	15	24	742	571	90.0	360	74	68B	140	23
Chloride	mg/l	483	2,540	702	208	664	805	782	1030	508	730B	560	370	450
Permanent Gases														
Carbon Dioxide	mg/l	42.51	1096	643.31	41.52	63.57	16.51	NA	NA	NA	NA	NA	NA	NA
Oxygen	mg/l	5.03	0.26	<0.15	2.32	0.59	0.64	NA	NA	NA	NA	NA	NA	NA
Nitrogen	mg/l	13.85	5.82	4.33	19.42	16.39	19.82	NA	NA	NA	NA	NA	NA	NA
Methane	mg/l	0.001898	0.02337	2.59	0.002487	0.001832	0.21	1.70	13.0	13.0	13	20	19	14
Carbon Monoxide	mg/l	NA	<0.40	<0.40	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA
Light Hydrocarbon Scan														
Ethane	ng/l	967	142	123	750	493	865	1198	42000	39000	91000	98000	420000	300000
Ethene	ng/l	1783	674	325	48	98	646	1794606	57000	5000	1100	1400	8800	12000
Field Parameters														
pH	S.U.	6.78	5.45	5.55	7.02	6.92	7.01	7.18	7.10	6.64	6.50	7.45	6.84	7.24
Specific Conductivity	umhos/cm	3191	21151	7990	1359	3124	4402	4538	3724	3216	3136	3700	2187	2195
Dissolved Oxygen	mg/l	0.12	3.64	6.45	0.95	1.45	2.52	6.78	4.36	0.41	0.83	0.20	0.68	0.35
Redox Potential	mV	164.9	-18.5	-68.1	90.5	56.0	-93.7	-200.1	-70.6	-177.8	-148.2	-203	-153.3	-135.3
Temperature	°C	18.09	19.96	20.50	16.4	18.48	19.24	20.21	18.93	19.04	19.24	18.92	20.44	18.68

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.

Table 19. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 2, General Motors Corporation, Moraine, Ohio.

RZ-2		Introduction Well ME-6									Introduction Well ME-1		
Constituents	**Units**	**8/31/99**	**2/22/00**	**5/25/00**	**9/21/00**	**3/20/01**	**6/26/01**	**11/15/01**	**12/12/01**	**9/25/02**	**8/31/99**	**2/22/00**	**5/25/00**
Inorganics & TOC													
Nitrate	mg/l	0.08	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	0.333	NA	NA
Nitrogen, Ammonia	mg/l	<0.30	10.9	23.4	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	0.5	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	0.493	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	<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	<0.10	63.4	20.4
Iron (Ferrous)	mg/l	0.02	NA	NA	NA	NA	NA	NA	NA	NA	0	NA	NA
Sulfate	mg/l	139	111	34	91	128	165	400	220	<5	143	41	16
Sulfide	mg/l	<2	2.00	1.11	1.58	<1.0	<1	<1.0	<1.0	1.7	<1	<1	1.52
Total Organic Carbon	mg/l	9	1,560	374	35	21.5	38	41	34	1500	2	985	219
Chloride	mg/l	182	350	302	196	261	289	390B	320	430	177	467	324
Permanent Gases													
Carbon Dioxide	mg/l	51.08	173.39	156.4	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	1.27	0.40	0.41
Nitrogen	mg/l	18.57	12.44	9.03	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	0.000627	1.11	15.6
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	<0.40	<0.40	<0.40
Light Hydrocarbon Scan													
Ethane	ng/l	134	97	<5	134	4900	3600	4600	16000	26	32	164	<5
Ethene	ng/l	134	164	3508	3316	7600	1900	4000	20000	340	40	293	129
Field Parameters													
pH	S.U.	7.02	6.64	6.58	7.00	7.06	6.82	6.92	7.50	6.78	7.03	6.19	6.49
Specific Conductivity	umhos/cm	1424	4645	3118	1864	1922	2630	3004	3000	6309	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	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	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	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.

Table 19. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 2, General Motors Corporation, Moraine, Ohio.

RZ-2		Introduction Well ME-3								Introduction Well ME-5	Below Introduction Zone GM-31					
Constituents	**Units**	**8/31/99**	**2/22/00**	**5/25/00**	**9/21/00**	**11/15/01**	**12/12/01**	**7/21/02**	**9/24/02**	**6/26/01**	**9/1/99**	**2/23/00**	**5/31/00**	**9/21/00**	**11/15/01**	**9/24/02**
Inorganics & TOC																
Nitrate	mg/l	22	NA	NA	NA	NA	NA	NA	NA	NA	0	0	0	NA	NA	NA
Nitrite	mg/l	0.1665	NA	NA	NA	NA	NA	NA	NA	NA	0	0	0	NA	NA	NA
Nitrogen, Ammonia	mg/l	<0.30	3.10	12.6	NA	NA	NA	NA	NA	NA	0.41	<0.3	<0.30	NA	NA	NA
Manganese (Total)	mg/l	0.016	0.870	1.16	0.556	0.580	0.60	3.0	0.67B	0.258	7.45	0.53	0.899	0.605	0.470	0.97B
Manganese (Dissolved)	mg/l	<0.010	0.702	0.436	0.543	0.620	0.610	3.4	0.69B	0.225	0.293	0.208	0.189	0.163	0.19	0.27B
Iron (Total)	mg/l	<0.10	20.5	38.2	4.9	3.9	3.6	162	41.1	8.98	288	17.4	34.9	18.7	16.3	33.4
Iron (Dissolved)	mg/l	<0.10	15.3	10.3	4.45	4.10	3.40	133	36.2	7.57	0.27	1.87	2.37	2.51	3.2	2.8
Iron (Ferrous)	mg/l	0	NA	NA	NA	NA	NA	NA	NA	NA	0	1.6	1.6	NA	NA	NA
Sulfate	mg/l	152	60	34	87	160	150	71B	<5	219	118	105	131	105	120	130
Sulfide	mg/l	<1	1.39	1.32	<1	<1	<1.0	0.32J	<1.0	<1	<4	<1	1.06	<1	<1	<1.0
Total Organic Carbon	mg/l	1	162	69	4	<1	6	1100	340	65	176	4	12	<1	3B	3
Chloride	mg/l	336	208	235	184	260B	330	370	380	297	240	249	259	221	190B	240
Permanent Gases																
Carbon Dioxide	mg/l	57.26	183.76	85.52	NA	NA	NA	NA	NA	NA	32.12	49.58	38.89	NA	NA	NA
Oxygen	mg/l	1.72	0.47	0.78	NA	NA	NA	NA	NA	NA	0.60	0.61	0.66	NA	NA	NA
Nitrogen	mg/l	16.44	13.39	13.0	NA	NA	NA	NA	NA	NA	16.05	19.79	23.03	NA	NA	NA
Methane	mg/l	0.000129	0.01088	9.68	0.001226	0.0430	0.0160	1.6	7	0.15	0.0124	0.03339	0.08616	0.04758	0.034	0.11
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	<0.40	<0.40	<0.40	NA	NA	NA
Light Hydrocarbon Scan																
Ethane	ng/l	10	73	138	47	520	470	370	210	560	2472	4550	9895	2507	1900	1300
Ethene	ng/l	<5	109	96276	218	23000	38000	1500	200	620	2295	1283	2439	413	500	2000
Field Parameters																
pH	S.U.	6.96	6.75	6.89	7.15	6.52	7.40	5.77	6.96	6.87	7.25	7.19	7.03	7.30	6.70	6.80
Specific Conductivity	umhos/cm	1889	2305	1752	1509	1477	2280	4081	3454	2679	1514	1786	1538	1580	1275	1635
Dissolved Oxygen	mg/l	2.01	4.06	0.59	1.11	1.70	0.19	1.60	2.41	0.49	1.61	0.39	0.81	1.71	ME	0.31
Redox Potential	mV	80.9	-96.8	-136.7	-193.2	-36.1	-127.0	-103.4	-59.7	167.5	-328.2	-61.9	-73.7	-188.5	-82.1	-66.2
Temperature	°C	22.86	19.28	20.00	21.09	18.63	20.05	20.82	21.65	23.07	28.93	20.75	21.91	21.11	19.45	20.87

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.

Table 20. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 3 West, General Motors Corporation, Moraine, Ohio.

RZ-3 West		Upgradient Well EAST									Upgradient Well WEST		
Constituents	**Units**	**9/21/99**	**2/23/00**	**5/25/00**	**9/22/00**	**3/19/01**	**11/12/01**	**12/11/01**	**6/12/02**	**9/23/02**	**9/21/99**	**2/23/00**	**5/25/00**
Inorganics & TOC													
Nitrate	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	0	0	0
Nitrite	mg/l	0	0	0	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	<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	0.391	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	0.383	<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	0.27	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	<0.10	<0.10	<0.10
Iron (Ferrous)	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	0	0	0
Sulfate	mg/l	75	130	117	96	101	130	120	170	95	73	129	155
Sulfide	mg/l	<1	<1	<1	<1	<1.0	1.2	1.6	<1.0	<1.0	<1	<1	<1
Total Organic Carbon	mg/l	3	10	4	<1	<1.0	3B	2	4	2	2	7	3
Chloride	mg/l	283	254	194	196	198	190B	180	270	310	260	166	164
Permanent Gases													
Carbon Dioxide	mg/l	34.69	58.08	52.02	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	1.30	1.50	2.20
Nitrogen	mg/l	17.88	17.50	19.1	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	0.001409	0.000217	0.002179
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	<0.40	<0.40	<0.40
Light Hydrocarbon Scan													
Ethane	ng/l	32	39	118	126	2600	2000	1800	440	50	37	33	57
Ethene	ng/l	18	107	57	73	190	150	56	170	37	100	17	47
Field Parameters													
pH	S.U.	6.99	7.04	7.00	7.11	7.34	7.15	7.32	7.02	7.18	6.89	6.97	6.97
Specific Conductivity	umhos/cm	1777	1955	1503	1133	1189	1363	1480	1439	1467	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	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	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	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.

Table 20. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 3 West, General Motors Corporation, Moraine, Ohio.

RZ-3 West		Upgradient Well GM-19S									Introduction Well RZ-3E			Introduction Well RZ-3L			Introduction Well RZ-3T		
Constituents	**Units**	**9/20/99**	**2/23/00**	**5/24/00**	**9/22/00**	**3/19/01**	**11/20/01**	**12/11/01**	**6/12/02**	**9/26/02**	**9/30/99**	**2/28/00**	**5/30/00**	**9/30/99**	**2/28/00**	**5/30/00**	**9/30/99**	**2/28/00**	**5/30/00**
Inorganics & TOC																			
Nitrate	mg/l	11	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrite	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	mg/l	<0.30	<0.30	<0.30	NA	NA	NA	NA	NA	NA	<0.30	0.88	31.3	2.22	2.00	24.2	<0.30	2.48	19.9
Manganese (Total)	mg/l	0.726	1.09	0.247	0.238	0.191	0.20	0.21B	0.25B	0.39B	2.4	18.9	5.5	0.333	0.939	0.604	1.54	15	4.75
Manganese (Dissolved)	mg/l	0.185	0.205	0.200	0.187	0.155	0.19	0.18B	0.18B	0.19B	0.942	16.8	6.46	0.25	0.861	0.528	0.799	13.2	4.91
Iron (Total)	mg/l	16.9	39.4	1.19	0.40	0.90	0.091	0.18	0.26	0.44	32.4	199	234	4.9	26.1	3.05	10.2	282	83.5
Iron (Dissolved)	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	179	275	0.23	23.4	2.0	0.14	220	87.4
Iron (Ferrous)	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	127	131	131	118	113	100	90	110	110	83	114	<10	46	<10	<10	73	76	127
Sulfide	mg/l	<1	<1	<1	<1	<1	<1	0.96J	<1.0	<1.0	<4	<10	<1	<1	<10	<1	<1	<10	1.11
Total Organic Carbon	mg/l	2	7	5	<1	<1	2B	1	1	3	8	2670	1610	55	1040	1430	5	3050	2410
Chloride	mg/l	247	197	168	165	158	130B	150	140	210	262	695	286	262	249	221	231	405	470
Permanent Gases																			
Carbon Dioxide	mg/l	41.85	57.12	50.12	NA	NA	NA	NA	NA	NA	22.61	10.62	475.70	0.83	545.7	1.89	13.98	238.3	546.58
Oxygen	mg/l	4.43	1.01	1.24	NA	NA	NA	NA	NA	NA	7.23	0.51	0.35	0.61	0.67	0.20	8.17	0.63	0.26
Nitrogen	mg/l	20.87	17.07	17.13	NA	NA	NA	NA	NA	NA	15.83	12.20	11.67	15.35	12.70	8.35	13.90	18.34	7.85
Methane	mg/l	0.009863	0.002712	0.003325	0.003706	0.039	0.005	0.0088	0.002	0.46	0.009056	8.92	4.09	1.29	0.03261	11.13	0.002506	0.1037	3.25
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	NA	<0.40	<0.40	NA	<0.40	<0.40	NA	<0.40	<0.40
Light Hydrocarbon Scan																			
Ethane	ng/l	71	104	139	184	210	300	350	410	730	1975	11704	887	2797	208	2327	674	118	162
Ethene	ng/l	55	45	43	36	61	34	27	130	770	2225	175096	13452	27685	529	137794	1373	270	1643
Field Parameters																			
pH	S.U.	7.05	7.05	7.00	7.19	7.14	7.28	7.31	7.09	7.02	7.16	5.76	5.98	9.45	8.76	8.98	7.36	6.15	5.82
Specific Conductivity	umhos/cm	1500	1784	1548	1235	1097	1190	1350	1052	1474	1503	8926	4477	2902	8372	8714	1445	10043	4793
Dissolved Oxygen	mg/l	0.92	0.30	1.94	1.36	0.96	1.75	0.06	0.90	0.47	0.06	1.65	0.58	0.30	0.21	1.59	0.09	1.27	4.17
Redox Potential	mV	31.3	149.6	200.1	187.7	320.8	195.6	13	446.3	259.6	144.8	-36.2	-94.4	-27.6	-352.0	-110.3	-109.2	-103.2	-54.2
Temperature	°C	20.85	18.69	20.80	20.09	20.14	19.24	19.10	20.39	20.36	18.20	19.70	20.47	18.75	19.33	20.05	18.04	19.24	18.32

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.

Table 20. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 3 West, General Motors Corporation, Moraine, Ohio.

RZ-3 West		Introduction Well RZ-3Z			Downgradient Well GM-32								
Constituents	**Units**	**9/29/99**	**2/28/00**	**5/30/00**	**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**
Inorganics & TOC													
Nitrate	mg/l	0	NA	NA	0	0	NA	NA	NA	NA	NA	NA	NA
Nitrite	mg/l	0	NA	NA	0	0	NA	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	mg/l	<0.30	1.20	3.23	2.29	2.00	19.3	NA	NA	NA	NA	NA	NA
Manganese (Total)	mg/l	1.04	1.49	2.65	0.147	0.516	0.051	0.30	0.17	0.16B	0.087B	0.043B	0.053B
Manganese (Dissolved)	mg/l	0.276	1.24	2.82	0.052	0.061	0.048	0.31	<0.050	0.020B	0.024B	0.042B	0.028B
Iron (Total)	mg/l	33.1	76.8	120	8.14	42.4	18.4	81.0	13.0	16.5	10.5	7.5	8.4B
Iron (Dissolved)	mg/l	0.18	22.4	128	3.53	0.59	17.1	81.6	3.17	5.2	6.5	8.1	6.8B
Iron (Ferrous)	mg/l	0	NA	NA	1.8	2.2	NA	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	55	<10	<20	30	<5	<10	<10	<20	5	4J	1J	<5
Sulfide	mg/l	<4	<10	1.72	<1	<10	<1	<1	1.60	<1	<1.0	0.50J	1.3
Total Organic Carbon	mg/l	8	434	1490	68	1200	2020	2720	1120	320B	250	240	160
Chloride	mg/l	231	311	362	317	638	740	740	798	700B	630	470	510
Permanent Gases													
Carbon Dioxide	mg/l	19.08	10.33	450.25	39.79	8.94	24.32	NA	NA	NA	NA	NA	NA
Oxygen	mg/l	7.90	0.38	<0.15	1.67	0.85	<0.15	NA	NA	NA	NA	NA	NA
Nitrogen	mg/l	14.45	7.88	2.29	14.93	15.23	2.40	NA	NA	NA	NA	NA	NA
Methane	mg/l	0.000424	22.30	12.81	2.73	7.06	14.91	16.84	29	29	38	24	32
Carbon Monoxide	mg/l	NA	<0.40	<0.40	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA
Light Hydrocarbon Scan													
Ethane	ng/l	64	553	33	1649	9965	1029	189	7900	42000	72000	84000	94000
Ethene	ng/l	46	1072138	3120	86509	163855	472312	510593	150000	130000	90000	93000	49000
Field Parameters													
pH	S.U.	7.09	6.41	6.05	7.54	8.59	7.64	7.73	8.36	8.42	8.13	8.55	8.13
Specific Conductivity	umhos/cm	1400	3513	4369	2750	9030	9195	9225	7483	6874	6200	5432	4289
Dissolved Oxygen	mg/l	4.30	0.89	10.64	0.09	0.23	10.82	2.55	0.36	0.07	0.03	1.14	0.22
Redox Potential	mV	271.0	-99.0	-109.8	-226.4	-279.1	-213.6	-353.8	-152.5	-222.8	-279	-220.5	-227.1
Temperature	°C	17.51	18.96	19.92	19.27	19.72	23.48	19.27	19.30	18.84	18.62	20.83	19.81

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.

Table 21. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 3 East, General Motors Corporation, Moraine, Ohio.

RZ-3 East		Upgradient Well GM-22									Introduction Well RZ-3FF			Introduction Well RZ-3KK		
Constituents	**Units**	**9/1/99**	**2/23/00**	**5/25/00**	**9/21/00**	**3/20/01**	**11/13/01**	**12/12/01**	**6/13/02**	**9/25/02**	**10/7/99**	**2/24/00**	**5/25/00**	**10/7/99**	**2/24/00**	**5/25/00**
Inorganics & TOC																
Nitrate	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	0	0	NA	13.2	0	0
Nitrite	mg/l	0	0	0	NA	NA	NA	NA	NA	NA	0	0	NA	0	0	0
Nitrogen, Ammonia	mg/l	<0.30	<0.30	<0.30	NA	NA	NA	NA	NA	NA	<0.30	4.50	20.6	<0.30	6.00	88.8
Manganese (Total)	mg/l	0.089	0.273	0.355	0.422	0.458	0.74B	0.63	0.38B	0.029B	0.991	1.26	2.25	0.622	2.45	1.89
Manganese (Dissolved)	mg/l	0.096	0.263	0.328	0.403	0.413	0.73B	0.62	0.40B	0.093B	0.579	1.27	2.23	0.176	2.18	2.09
Iron (Total)	mg/l	<0.10	0.16	0.96	0.94	0.28	<0.10	<0.10	0.11B	0.18	21.3	65.5	134	19.6	158	125
Iron (Dissolved)	mg/l	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.1	67.2	133	<0.10	150	140
Iron (Ferrous)	mg/l	0.6	0	0	NA	NA	NA	NA	NA	NA	0	0	NA	0	0	0
Sulfate	mg/l	49	125	120	117	99	300	150	120	70	45	23	<10	38	<20	66
Sulfide	mg/l	<1	<1	<1	<1	<1.0	<1	<1.0	<1.0	0.40J	<1	<1	<1	<1	1.1	2.74
Total Organic Carbon	mg/l	6	4	4	<1	<1.0	16B	6B	3	2	4	514.0	814	3	1050	505
Chloride	mg/l	246	270	279	248	326	220B	280	290	370	203	296	335	229	353	270
Permanent Gases																
Carbon Dioxide	mg/l	40.15	43.99	40.20	NA	NA	NA	NA	NA	NA	34.37	252.34	489.4	29.45	305.57	340.2
Oxygen	mg/l	1.05	0.86	1.28	NA	NA	NA	NA	NA	NA	0.62	0.22	0.47	1.38	0.24	<0.15
Nitrogen	mg/l	23.38	19.43	21.3	NA	NA	NA	NA	NA	NA	20.34	15.68	4.69	13.31	14.65	2.40
Methane	mg/l	0.05818	0.23	0.18	0.000967	0.280	0.067	0.16	0.039	0.014	0.014674	0.01111	13.4	0.010751	0.3552	19.4
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40
Light Hydrocarbon Scan																
Ethane	ng/l	42	91	69	29	83	130	120	140	270	2546	148	<5	3584	154	<5
Ethene	ng/l	67	32	64	111	39	210	12	54	62	6250	785	8562	1175	255	387
Field Parameters																
pH	S.U.	7.12	7.15	7.08	7.17	7.00	7.33	7.39	7.21	7.02	7.22	6.24	6.07	7.24	6.09	6.33
Specific Conductivity	umhos/cm	1373	1975	1671	1684	1610	1753	2020	1415	1720	1345	3576	3430	1352	6396	3219
Dissolved Oxygen	mg/l	0.32	0.46	0.49	1.73	0.82	0.01	0.15	0.94	2.14	0.32	1.11	1.21	1.23	1.43	2.42
Redox Potential	mV	62.2	70.2	26.1	-80.8	175.1	54.8	-110	105.2	181.2	116.1	-84.7	-121.6	-61.6	-108.6	-61.9
Temperature	°C	19.41	18.87	20.87	22.28	20.79	19.45	18.99	20.29	19.49	17.88	18.80	19.22	17.93	19.85	18.54

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.

Table 21. Bioattenuation Parameter Results for Groundwater Samples Collected in Reactive Zone 3 East, General Motors Corporation, Moraine, Ohio.

RZ-3 East		Introduction Well RZ-3PP			Downgradient Well GM-21								
Constituents	**Units**	**10/8/99**	**2/24/00**	**5/26/00**	**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**
Inorganics & TOC													
Nitrate	mg/l	0	0	NA	0	0	0	NA	NA	NA	NA	NA	NA
Nitrite	mg/l	0	0	NA	0	0	0	NA	NA	NA	NA	NA	NA
Nitrogen, Ammonia	mg/l	<0.30	36.4	15.2	<0.30	<0.3	<0.30	NA	NA	NA	NA	NA	NA
Manganese (Total)	mg/l	0.93	1.64	1.62	0.321	0.233	0.215	0.336	0.298	0.30B	0.30B	0.31B	0.29B
Manganese (Dissolved)	mg/l	0.222	1.63	1.76	0.273	0.225	0.212	0.312	0.291	0.32B	0.29B	0.29B	0.25B
Iron (Total)	mg/l	29.3	61.5	85.7	2.58	0.30	0.83	0.63	0.11	<0.10	0.16	0.65	0.56
Iron (Dissolved)	mg/l	0.41	62	93	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.11	<0.10	<0.10
Iron (Ferrous)	mg/l	0	0	NA	0.4	0	0	NA	NA	NA	NA	NA	NA
Sulfate	mg/l	40	5	<10	103	102	80	102	118	120	100	76	76
Sulfide	mg/l	<1	<1	2.33	<1	<1	<1	<1	<1	<1	1.9	0.50J	0.40J
Total Organic Carbon	mg/l	4	394	394	1	3	2	<1	<1	2B	1	0.9J	2
Chloride	mg/l	184	260	302	136	145	126	129	165	140	150	170	180
Permanent Gases													
Carbon Dioxide	mg/l	23.06	156.80	264.33	37.04	37.40	18.70	NA	NA	NA	NA	NA	NA
Oxygen	mg/l	2.06	0.31	0.18	1.41	0.99	1.89	NA	NA	NA	NA	NA	NA
Nitrogen	mg/l	10.25	17.95	4.80	23.40	21.67	23.64	NA	NA	NA	NA	NA	NA
Methane	mg/l	0.024394	0.2308	14.52	0.03744	0.01769	0.01370	0.04218	0.048	0.049	0.035	0.022	0.03
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	NA	NA	NA	NA	NA	NA
Light Hydrocarbon Scan													
Ethane	ng/l	7341	54	<5	72	67	84	72	82	76	120	150	120
Ethene	ng/l	1834	126	<5	169	38	70	69	46	46	100	120	64
Field Parameters													
pH	S.U.	7.35	6.48	6.27	6.99	7.22	7.06	7.21	7.85	7.50	7.45	7.22	7.09
Specific Conductivity	umhos/cm	1251	3161	2613	1188	1299	1048	1096	1067	1190	1360	1045	1245
Dissolved Oxygen	mg/l	0.12	0.79	1.03	0.66	0.60	0.40	0.99	0.57	0.04	0.04	0.63	0.41
Redox Potential	mV	-105.5	-131.3	-58.8	-26.9	113.3	167.1	153.9	218.5	168.8	-25	373.8	238.1
Temperature	°C	18.07	18.72	19.43	20.43	18.43	17.92	19.03	17.59	16.73	15.82	18.67	18.67

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 22. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in November 2001, General Motors Corporation, Moraine, Ohio.

		Upgradient of the Site		On-Site			
	Unit	HR-9 11/6/01 Upper Aquifer	HR-11 11/6/01 Upper Aquifer	HR-8 11/6/01 Upper Aquifer	HR-4 11/6/01 Upper Aquifer	W-2-N 11/6/01 Upper Aquifer	W-3-N 11/7/01 Upper Aquifer
Volatile Organic Compound							
Benzene	ug/l	< 1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 5.6
1,1-Dichloroethane	ug/l	38	32	26	< 1.0	0.33J	< 5.6
1,1-Dichloroethene	ug/l	0.95J	<1.0	< 1.0	< 1.0	< 1.0	< 5.6
cis-1,2-Dichloroethene	ug/l	12	18	5.4	0.28J	1.1	160
trans-1,2-Dichloroethene	ug/l	1.7	2.3	1.3	< 0.50	< 0.50	2.2J
Ethylbenzene	ug/l	< 1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 5.6
Tetrachloroethene	ug/l	< 1.4	< 1.0	< 1.0	0.88J	< 1.0	9.0
Toluene	ug/l	< 1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 5.6
1,1,1-Trichloroethane	ug/l	17	0.36J	10	0.17J	0.48J	< 5.6
Trichloroethene	ug/l	14	< 1.0	1.4	1.0	1.3	2.1J
Vinyl chloride	ug/l	< 1.4	0.35J	< 1.0	< 1.0	< 1.0	7.6
Xylene (total)	ug/l	< 1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 5.6
Total VOCs	**ug/l**	**83.65**	**53.01**	**44.1**	**2.33**	**3.21**	**180.9**

ug/l - Micrograms per liter.
All QA/QC results for 2001 data are shown in Appendix B.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.
ND - Non detect.

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Table 22. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in November 2001, General Motors Corporation, Moraine, Ohio.

		On-Site					
	Unit	W-4-N 11/7/01 Upper Aquifer	HR-2 11/7/01 Upper Aquifer	HR-5 11/7/01 Upper Aquifer	HR-3 11/7/01 Upper Aquifer	HR-1 11/8/01 Upper Aquifer	GM-30 11/13/01 Upper Aquifer
Volatile Organic Compound							
Benzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 3.3	< 25
1,1-Dichloroethane	ug/l	0.89J	4.2	0.55J	6.9	2.8J	31
1,1-Dichloroethene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 3.3	< 25
cis-1,2-Dichloroethene	ug/l	1.6	8.3	7.8	5.1	9.9	< 12
trans-1,2-Dichloroethene	ug/l	< 0.50	1.1	0.74	0.60	2.8	< 12
Ethylbenzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 3.3	840
Tetrachloroethene	ug/l	0.92J	< 1.0	< 1.0	< 1.0	36	< 25
Toluene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 3.3	5.0J
1,1,1-Trichloroethane	ug/l	0.33J	< 1.0	0.17J	< 1.0	2.2J	< 25
Trichloroethene	ug/l	7.1	0.56J	11	0.66J	86B	12J
Vinyl chloride	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 3.3	< 25
Xylene (total)	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 3.3	2000
Total VOCs	**ug/l**	**10.84**	**14.16**	**20.26**	**13.26**	**139.7**	**2,888**

ug/l - Micrograms per liter.
All QA/QC results for 2001 data are shown in Appendix B.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.
ND - Non detect.

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Table 22. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in November 2001, General Motors Corporation, Moraine, Ohio.

		On-Site					
	Unit	GM-23 11/12/01 Upper Aquifer	GM-27 11/13/01 Upper Aquifer	GM-29 11/13/01 Upper Aquifer	GM-28 11/15/01 Upper Aquifer	ME-6 11/15/01 Upper Aquifer	GM-31 11/15/01 Upper Aquifer
Volatile Organic Compound							
Benzene	ug/l	< 420	< 3.3	< 50	< 10	< 2.0	< 4.0
1,1-Dichloroethane	ug/l	< 420	1.8J	< 50	< 10	2.7	3.1J
1,1-Dichloroethene	ug/l	< 420	< 3.3	< 50	< 10	< 2.0	< 4.0
cis-1,2-Dichloroethene	ug/l	8400	13	1800	< 5.0	65	120
trans-1,2-Dichloroethene	ug/l	< 210	< 1.7	26	11	1.8	1.8J
Ethylbenzene	ug/l	< 420	< 3.3	21J	< 10	< 2.0	< 4.0
Tetrachloroethene	ug/l	15000	6.8	17J	< 10	8.2	< 4.0
Toluene	ug/l	< 420	< 3.3	< 50	< 10	0.42J	< 4.0
1,1,1-Trichloroethane	ug/l	< 420	< 3.3	< 50	< 10	2.2	< 4.0
Trichloroethene	ug/l	2200	110	270	< 10	23	11
Vinyl chloride	ug/l	1200	< 3.3	230	< 10	13	7.4
Xylene (total)	ug/l	< 420	< 3.3	52	< 10	< 2.0	< 4.0
Total VOCs	**ug/l**	**26,800**	**131.6**	**2,416**	**11**	**116.32**	**143.3**

ug/l - Micrograms per liter.
All QA/QC results for 2001 data are shown in Appendix B.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.
ND - Non detect.

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Table 22. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in November 2001, General Motors Corporation, Moraine, Ohio.

		On-Site					
	Unit	ME-3 11/15/01 Upper Aquifer	GM-22 11/13/01 Upper Aquifer	GM-19S 11/12/01 Upper Aquifer	EAST 11/12/01 Upper Aquifer	GM-32 11/12/01 Upper Aquifer	GM-21 11/13/01 Upper Aquifer
Volatile Organic Compound							
Benzene	ug/l	< 1.0	< 1.0	< 3.3	< 3.3	4.3J	< 5.0
1,1-Dichloroethane	ug/l	5.9	6.8	2.9J	6.2	6.2	3.8J
1,1-Dichloroethene	ug/l	< 1.0	0.58J	< 3.3	0.90J	< 5.0	< 5.0
cis-1,2-Dichloroethene	ug/l	16	8.5	26	51	< 2.5	39
trans-1,2-Dichloroethene	ug/l	2.7	0.17J	2.0	2.7	2.9	15
Ethylbenzene	ug/l	< 1.0	< 1.0	< 3.3	< 3.3	0.79J	< 5.0
Tetrachloroethene	ug/l	1.3	4.9	64	56	< 5.0	< 5.0
Toluene	ug/l	0.34J	< 1.0	< 3.3	< 3.3	12	< 5.0
1,1,1-Trichloroethane	ug/l	1.6	4.4	7.6	13	< 5.0	6.9
Trichloroethene	ug/l	3.8	7.5	97	92	< 5.0	160
Vinyl chloride	ug/l	7.3	0.60J	< 3.3	1.5J	1.1J	< 5.0
Xylene (total)	ug/l	< 1.0	< 1.0	< 3.3	< 3.3	3.0J	< 5.0
Total VOCs	**ug/l**	**38.94**	**33.45**	**199.5**	**223.3**	**30.29**	**224.7**

ug/l - Micrograms per liter.
All QA/QC results for 2001 data are shown in Appendix B.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.
ND - Non detect.

Table 22. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in November 2001, General Motors Corporation, Moraine, Ohio.

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		On-Site					
	Unit	HR-17 11/8/01 Upper Aquifer	W-2-S 11/8/01 Upper Aquifer	W-3-S 11/8/01 Upper Aquifer	W-4-S 11/8/01 Upper Aquifer	GM-8 11/9/01 Upper Aquifer	GM-6 11/9/01 Upper Aquifer
Volatile Organic Compound							
Benzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	0.78J	< 2.0
1,1-Dichloroethane	ug/l	< 1.0	0.58J	< 1.0	1.1	40	14
1,1-Dichloroethene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
cis-1,2-Dichloroethene	ug/l	< 0.50	0.49J	< 0.50	3.3	2.0	8.2
trans-1,2-Dichloroethene	ug/l	< 0.50	< 0.50	< 0.50	0.43J	3.6	1.8
Ethylbenzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	0.40J	< 2.0
Tetrachloroethene	ug/l	3.3	< 1.0	0.44J	13	< 1.0	14
Toluene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
1,1,1-Trichloroethane	ug/l	1.4	1.7	1.6	2.9	0.40J	3.9
Trichloroethene	ug/l	4.2B	5.2B	1.5B	8.9B	4.4	48
Vinyl chloride	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	1.9	1.9J
Xylene (total)	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	0.39J	< 2.0
Total VOCs	**ug/l**	**8.9**	**7.97**	**3.54**	**29.63**	**53.87**	**91.8**

ug/l - Micrograms per liter.
All QA/QC results for 2001 data are shown in Appendix B.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.
ND - Non detect.

Table 22. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in November 2001, General Motors Corporation, Moraine, Ohio.

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		Downgradient of the Site					
	Unit	TW-2 11/9/01 Upper Aquifer	GM-2 11/9/01 Upper Aquifer	GM-16 11/8/01 Upper Aquifer	GM-17 11/8/01 Upper Aquifer	GM-18 11/8/01 Upper Aquifer	WSU-24 11/9/01 Upper Aquifer
Volatile Organic Compound							
Benzene	ug/l	< 2.0	< 3.3	< 1.0	< 3.3	< 3.3	< 1.0
1,1-Dichloroethane	ug/l	20	6.1	0.31J	7.3	3.3	0.81J
1,1-Dichloroethene	ug/l	< 2.0	< 3.3	< 1.0	< 3.3	1.3J	< 1.0
cis-1,2-Dichloroethene	ug/l	8.8	26	0.39J	16	14	4.0
trans-1,2-Dichloroethene	ug/l	2.4	1.1J	< 0.50	1.8	1.6J	< 0.50
Ethylbenzene	ug/l	0.38J	< 3.3	< 1.0	< 3.3	< 3.3	< 1.0
Tetrachloroethene	ug/l	8.5	8.4	17	48	12	1.6
Toluene	ug/l	< 2.0	< 3.3	< 1.0	< 3.3	< 3.3	< 1.0
1,1,1-Trichloroethane	ug/l	3.9	6.1	2.2	6.8	23	2.4
Trichloroethene	ug/l	48B	65B	3.6	79	93	18B
Vinyl chloride	ug/l	2.7	< 3.3	< 1.0	< 3.3	< 3.3	< 1.0
Xylene (total)	ug/l	< 2.0	< 3.3	< 1.0	< 3.3	< 3.3	< 1.0
Total VOCs	**ug/l**	**94.68**	**112.7**	**23.5**	**158.9**	**148.2**	**26.81**

ug/l - Micrograms per liter.
All QA/QC results for 2001 data are shown in Appendix B.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.
ND - Non detect.

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Table 22. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in November 2001, General Motors Corporation, Moraine, Ohio.

		Downgradient of the Site		Upgradient of the Site		On-Site	
		GM-10	GM-26	HR-10	HR-12	HR-15	HR-13
		11/8/01	11/12/01	11/14/01	11/14/01	11/14/01	11/14/01
	Unit	Upper Aquifer	Upper Aquifer	Lower Aquifer	Lower Aqufier	Lower Aquifer	Lower Aquifer
Volatile Organic Compound							
Benzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	0.18J
1,1-Dichloroethane	ug/l	3.4	< 1.0	< 1.0	3.6	< 1.0	15
1,1-Dichloroethene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	16	< 0.50	< 0.50	2.7	0.86	6.5
trans-1,2-Dichloroethene	ug/l	0.93	< 0.50	< 0.50	0.23	< 0.50	0.65
Ethylbenzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	1.9	1.1	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	2.7	0.19J	< 1.0	< 1.0	< 1.0	0.74J
Trichloroethene	ug/l	27	< 1.0	< 1.0	< 1.0	< 1.0	1.2
Vinyl chloride	ug/l	1.2	< 1.0	< 1.0	3.8	< 1.0	< 1.0
Xylene (total)	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs	**ug/l**	**53.13**	**1.29**	**ND**	**10.33**	**0.86**	**24.27**

ug/l - Micrograms per liter.
All QA/QC results for 2001 data are shown in Appendix B.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.
ND - Non detect.

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Table 22. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in November 2001, General Motors Corporation, Moraine, Ohio.

		On-Site		Downgradient of the Site			
	Unit	31 11/15/01 Lower Aquifer	GM-19D 11/14/01 Lower Aquifer	GM-3 11/14/01 Lower Aquifer	GM-1 11/14/01 Lower Aquifer	GM-15 11/14/01 Lower Aquifer	GM-11 11/14/01 Lower Aquifer
Volatile Organic Compound							
Benzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	3.1	< 1.0	0.95J	0.29J	1.4	< 1.0
1,1-Dichloroethene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	2.4	0.92	2.6	< 0.50	1.2	< 0.50
trans-1,2-Dichloroethene	ug/l	< 0.50	< 0.50	0.25J	< 0.50	< 0.50	< 0.50
Ethylbenzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	< 1.0	< 1.0	0.48J	1.3	< 1.0	1.0
Toluene	ug/l	< 1.0	0.38J	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	< 1.0	0.18J	0.16J	0.80J	< 1.0	0.33J
Trichloroethene	ug/l	5.1	3.7	2.9	19	4.9	12
Vinyl chloride	ug/l	2.5	13	< 1.0	< 1.0	< 1.0	< 1.0
Xylene (total)	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs	**ug/l**	**13.1**	**18.18**	**7.34**	**21.39**	**7.5**	**13.33**

ug/l - Micrograms per liter.
All QA/QC results for 2001 data are shown in Appendix B.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.
ND - Non detect.

Table 22. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in November 2001, General Motors Corporation, Moraine, Ohio.

		Downgradient of the Site			
	Unit	GM-20D 11/14/01 Lower Aquifer	DN-13 11/14/01 Lower Aquifer	GM-9 11/14/01 Lower Aquifer	MT-69 11/15/01 Lower Aquifer
Volatile Organic Compound					
Benzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	< 1.0	2.5	0.58J	< 1.0
1,1-Dichloroethene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	< 0.50	6.2	1.1	< 0.50
trans-1,2-Dichloroethene	ug/l	< 0.50	0.37J	< 0.50	< 0.50
Ethylbenzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	2.0	< 1.0	0.38J	< 1.0
Toluene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	0.64J	1.1	0.48J	< 1.0
Trichloroethene	ug/l	5.9	5.0	8.6	< 1.0
Vinyl chloride	ug/l	< 1.0	1.2	< 1.0	< 1.0
Xylene (total)	ug/l	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs	**ug/l**	**8.54**	**16.37**	**11.14**	**ND**

ug/l - Micrograms per liter.
All QA/QC results for 2001 data are shown in Appendix B/C
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.
ND - Non detect.

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Table 23. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2002, General Motors Corporation, Moraine, Ohio.

		Upgradient of the Site		On-Site			
	Units	HR-9 9/19/02 Upper Aquifer	HR-11 9/26/02 Upper Aquifer	HR-8 9/19/02 Upper Aquifer	W-1-N 9/19/02 Upper Aquifer	HR-4 9/27/02 Upper Aquifer	W-2-N 9/19/02 Upper Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 1.7	< 1	< 1.0	< 1.0	< 1	< 1.0
1,1-Dichloroethane	ug/l	46	18	18	0.36J	< 1	0.31J
1,1-Dichloroethene	ug/l	1.1J	< 1	0.44J	< 1.0	< 1	< 1.0
cis-1,2-Dichloroethene	ug/l	17	6.1	4.8	< 0.50	< 0.5	1.6
trans-1,2-Dichloroethene	ug/l	2.5	0.72	0.85	< 0.50	< 0.5	< 0.50
Ethylbenzene	ug/l	< 1.7	< 1	< 1.0	< 1.0	< 1	< 1.0
Tetrachloroethene	ug/l	< 1.7	< 1	< 1.0	< 1.0	0.59J	< 1.0
Toluene	ug/l	< 1.7	< 1	< 1.0	< 1.0	< 1	< 1.0
1,1,1-Trichloroethane	ug/l	13	< 1	11	< 1.0	< 1	< 1.0
Trichloroethene	ug/l	15	< 1	1.8	< 1.0	0.71J	1.4
Vinyl chloride	ug/l	< 1.7	< 1	< 1.0	< 1.0	< 1	< 1.0
Xylene (total)	ug/l	< 1.7	< 1	< 1.0	< 1.0	< 1	< 1.0
Total VOCs	**ug/l**	**94.6**	**24.82**	**36.89**	**0.36**	**1.3**	**3.31**

ug/l - Micrograms per liter.
All QA/QC results for 2002 data are shown in Appendix B.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
ND - Non detect.

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Table 23. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2002, General Motors Corporation, Moraine, Ohio.

		On-Site					
	Units	W-3-N 9/23/02 Upper Aquifer	W-4-N 9/24/02 Upper Aquifer	HR-2 9/24/02 Upper Aquifer	HR-5 9/23/02 Upper Aquifer	HR-7 9/19/02 Upper Aquifer	HR-6 9/23/02 Upper Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 6.7	< 1	< 1	< 1	< 1.0	< 1
1,1-Dichloroethane	ug/l	< 6.7	1.7	4.9	0.55J	< 1.0	< 1
1,1-Dichloroethene	ug/l	< 6.7	< 1	< 1	< 1	< 1.0	< 1
cis-1,2-Dichloroethene	ug/l	150	5.2	8.8	7.5	0.65	< 0.5
trans-1,2-Dichloroethene	ug/l	< 3.3	0.33J	1.2	0.58	< 0.50	< 0.5
Ethylbenzene	ug/l	< 6.7	< 1	< 1	< 1	< 1.0	< 1
Tetrachloroethene	ug/l	< 6.7	0.94J	< 1	< 1	< 1.0	< 1
Toluene	ug/l	< 6.7	< 1	< 1	< 1	< 1.0	< 1
1,1,1-Trichloroethane	ug/l	< 6.7	0.44J	< 1	< 1	< 1.0	< 1
Trichloroethene	ug/l	< 6.7	8.5	0.46J	13	9.4	1.5
Vinyl chloride	ug/l	6.5J	0.77J	< 1	< 1	< 1.0	< 1
Xylene (total)	ug/l	< 6.7	< 1	< 1	< 1	< 1.0	< 1
Total VOCs	**ug/l**	**156.5**	**17.88**	**15.36**	**21.63**	**10.05**	**1.5**

ug/l - Micrograms per liter.
All QA/QC results for 2002 data are shown in Appendix B.
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J - Value is estimated.
ND - Non detect.

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Table 23. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2002, General Motors Corporation, Moraine, Ohio.

		On-Site					
	Units	HR-3 9/24/02 Upper Aquifer	HR-1 9/23/02 Upper Aquifer	GM-30 9/27/02 Upper Aquifer	GM-23 9/26/02 Upper Aquifer	GM-27 9/26/02 Upper Aquifer	GM-29 9/25/02 Upper Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 1	< 2	< 33	< 400	< 3.3	< 40
1,1-Dichloroethane	ug/l	15	2.8	34	< 400	1.7J	< 40
1,1-Dichloroethene	ug/l	< 1	< 2	< 33	< 400	< 3.3	< 40
cis-1,2-Dichloroethene	ug/l	9.9	4.5	< 17	7700	14	1300
trans-1,2-Dichloroethene	ug/l	1	3.2	< 17	< 200	< 1.7	21
Ethylbenzene	ug/l	< 1	< 2	350	< 400	< 3.3	< 40
Tetrachloroethene	ug/l	< 1	33	< 33	10000	< 3.3	18J
Toluene	ug/l	< 1	< 2	< 33	< 400	< 3.3	< 40
1,1,1-Trichloroethane	ug/l	< 1	< 2	< 33	< 400	< 3.3	16J
Trichloroethene	ug/l	1.4	33	< 33	1700	100	310
Vinyl chloride	ug/l	< 1	< 2	< 33	540	< 3.3	140
Xylene (total)	ug/l	< 1	< 2	1400	< 400	< 3.3	< 40
Total VOCs	**ug/l**	**27.3**	**76.5**	**1,784**	**19,940**	**115.7**	**1,805**

ug/l - Micrograms per liter.
All QA/QC results for 2002 data are shown in Appendix B.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
ND - Non detect.

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Table 23. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2002, General Motors Corporation, Moraine, Ohio.

	Units	On-Site GM-28 9/24/02 Upper Aquifer	ME-6 9/25/02 Upper Aquifer	GM-31 9/24/02 Upper Aquifer	ME-3 9/24/02 Upper Aquifer	GM-22 9/25/02 Upper Aquifer	GM-19S 9/26/02 Upper Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 1	< 10	< 6	< 2.5	< 2	< 4
1,1-Dichloroethane	ug/l	2.7	< 10	5.9J	< 2.5	< 2	6.3
1,1-Dichloroethene	ug/l	< 1	< 10	< 6	< 2.5	< 2	< 4
cis-1,2-Dichloroethene	ug/l	1.1	5.2	200	< 1.2	< 1	39
trans-1,2-Dichloroethene	ug/l	11	< 5	3.5	< 1.2	< 1	2.7
Ethylbenzene	ug/l	< 1	< 10	< 6	< 2.5	< 2	< 4
Tetrachloroethene	ug/l	< 1	< 10	< 6	< 2.5	2.3	52
Toluene	ug/l	< 1.3 U	6.6J	< 6	< 2.5	< 2	< 4
1,1,1-Trichloroethane	ug/l	< 1	< 10	< 6	< 2.5	0.93J	6.3
Trichloroethene	ug/l	0.86J	< 10	10	< 2.5	7.6	110
Vinyl chloride	ug/l	< 1	< 10	19	< 2.5	< 2	5.2
Xylene (total)	ug/l	< 1.2 U	< 10	< 6	< 2.5	< 2	< 4
Total VOCs	**ug/l**	**15.66**	**11.8**	**238.4**	**ND**	**10.83**	**221.5**

ug/l - Micrograms per liter.
All QA/QC results for 2002 data are shown in Appendix B.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
ND - Non detect.

Table 23. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2002, General Motors Corporation, Moraine, Ohio.

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	Units	On-Site					
		EAST 9/23/2002 Upper Aquifer	GM-32 9/20/02 Upper Aquifer	GM-21 9/25/02 Upper Aquifer	W-1-S 9/19/02 Upper Aquifer	HR-16 9/18/02 Upper Aquifer	HR-17 9/18/02 Upper Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 2	< 10	< 6.7	< 2.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	3.9	9.7J	5J	0.97J	< 1.0	1.5
1,1-Dichloroethene	ug/l	0.73J	< 10	2.6J	< 2.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	8.8	< 5	43	6.0	0.46J	5.1
trans-1,2-Dichloroethene	ug/l	< 1	< 5	5.1	1.3	< 0.50	1.4
Ethylbenzene	ug/l	< 2	< 10	< 6.7	< 2.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	49	< 10	< 6.7	62	< 1.0	22
Toluene	ug/l	< 2	< 10	< 6.7	< 2.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	10	< 10	31	< 2.0	< 1.0	0.39J
Trichloroethene	ug/l	46	< 10	230	16	1.5	12
Vinyl chloride	ug/l	< 2	< 10	< 6.7	< 2.0	< 1.0	< 1.0
Xylene (total)	ug/l	< 2	< 10	< 6.7	< 2.0	< 1.0	< 1.0
Total VOCs	**ug/l**	**118.43**	**9.7**	**316.7**	**86.27**	**1.96**	**42.39**

ug/l - Micrograms per liter.
All QA/QC results for 2002 data are shown in Appendix B.
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J - Value is estimated.
ND - Non detect.

Table 23. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2002, General Motors Corporation, Moraine, Ohio.

	Units	W-2-S 9/18/02 Upper Aquifer	W-3-S 9/18/02 Upper Aquifer	On-Site W-4-S 9/18/02 Upper Aquifer	GM-8 9/20/02 Upper Aquifer	GM-6 9/20/02 Upper Aquifer
Volatile Organic Compounds						
Benzene	ug/l	< 1.0	< 1.0	< 1.0	5.5	2.2
1,1-Dichloroethane	ug/l	0.98J	< 1.0	0.87J	63	60
1,1-Dichloroethene	ug/l	< 1.0	< 1.0	< 1.0	< 2	< 2
cis-1,2-Dichloroethene	ug/l	0.90	< 0.50	3.6	5.5	43
trans-1,2-Dichloroethene	ug/l	< 0.50	< 0.50	0.60	9	8.6
Ethylbenzene	ug/l	< 1.0	< 1.0	< 1.0	7.5	< 2
Tetrachloroethene	ug/l	< 1.0	0.61J	17	< 2	14
Toluene	ug/l	< 1.0	< 1.0	< 1.0	1.8J	< 2
1,1,1-Trichloroethane	ug/l	1.5	2.1	2.3	< 2	1.4J
Trichloroethene	ug/l	4.9	2.4	9.8	< 2	33
Vinyl chloride	ug/l	< 1.0	< 1.0	< 1.0	5.8	12
Xylene (total)	ug/l	< 1.0	< 1.0	< 1.0	1.5J	< 2
Total VOCs	**ug/l**	**8.28**	**5.11**	**34.17**	**99.6**	**174.2**

ug/l - Micrograms per liter.
All QA/QC results for 2002 data are shown in Appendix B.
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J - Value is estimated.
ND - Non detect.

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Table 23. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2002, General Motors Corporation, Moraine, Ohio.

				Downgradient of the Site			
	Units	TW-2 9/20/02 Upper Aquifer	GM-2 9/20/02 Upper Aquifer	GM-16 9/24/02 Upper Aquifer	GM-17 9/19/02 Upper Aquifer	GM-18 9/19/02 Upper Aquifer	WSU-24 9/24/02 Upper Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 2	< 1	< 2	< 1.2	< 3.3	< 1
1,1-Dichloroethane	ug/l	9	3.4	4.1	6.0	6.0	< 1
1,1-Dichloroethene	ug/l	< 2	< 1	< 2	< 1.2	< 3.3	< 1
cis-1,2-Dichloroethene	ug/l	26	7.6	6.2	13	15	< 0.5
trans-1,2-Dichloroethene	ug/l	1.4	0.37J	1.6	0.67	1.6J	< 0.5
Ethylbenzene	ug/l	< 2	< 1	< 2	< 1.2	< 3.3	< 1
Tetrachloroethene	ug/l	5.9	8.7	63	22	28	1.2
Toluene	ug/l	< 2	< 1	< 2	< 1.2	< 3.3	< 1
1,1,1-Trichloroethane	ug/l	2.2	0.75J	1.4J	2.3	18	1.4
Trichloroethene	ug/l	70	26	28	39	98	13
Vinyl chloride	ug/l	2.5	< 1	< 2	0.79J	< 3.3	< 1
Xylene (total)	ug/l	< 2	< 1	< 2	< 1.2	< 3.3	< 1
Total VOCs	**ug/l**	**117**	**46.82**	**104.3**	**83.76**	**166.6**	**15.6**

ug/l - Micrograms per liter.
All QA/QC results for 2002 data are shown in Appendix B.
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J - Value is estimated.
ND - Non detect.

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Table 23. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2002, General Motors Corporation, Moraine, Ohio.

		Downgradient of the Site		Upgradient of the Site		On-Site	
	Units	GM-10 9/18/02 Upper Aquifer	GM-26 9/25/02 Upper Aquifer	HR-10 9/27/02 Lower Aquifer	HR-12 9/26/02 Lower Aquifer	HR-14 9/30/02 Lower Aquifer	HR-15 9/30/02 Lower Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 1.0	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	ug/l	0.61J	< 1	< 1	2.4	< 1	< 1UJ
1,1-Dichloroethene	ug/l	< 1.0	< 1	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	ug/l	2.3	< 0.5	< 0.5	2.1	3.6	1
trans-1,2-Dichloroethene	ug/l	< 0.50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	ug/l	< 1.0	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	ug/l	1.1	0.92J	< 1	< 1	< 1	< 1
Toluene	ug/l	< 1.0	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	ug/l	1.8	< 1	< 1	< 1	< 1	< 1
Trichloroethene	ug/l	19	< 1	< 1	< 1	1.2	< 1
Vinyl chloride	ug/l	< 1.0	< 1	< 1	1.7	< 1	< 1
Xylene (total)	ug/l	< 1.0	< 1	< 1	< 1	< 1	< 1
Total VOCs	**ug/l**	**24.81**	**0.92**	**ND**	**6.2**	**4.8**	**1**

ug/l - Micrograms per liter.
All QA/QC results for 2002 data are shown in Appendix B.
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J - Value is estimated.
ND - Non detect.

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Table 23. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2002, General Motors Corporation, Moraine, Ohio.

		On-Site			Downgradient of the Site	
	Units	HR-13 9/30/02 Lower Aquifer	39 9/27/02 Lower Aquifer	GM-19D 9/26/02 Lower Aquifer	GM-3 10/1/02 Lower Aquifer	GM-1 10/1/02 Lower Aquifer
Volatile Organic Compounds						
Benzene	ug/l	< 1	< 1	< 1	< 1	< 1.4 U
1,1-Dichloroethane	ug/l	25	1.6	< 1	1.8	0.48 J
1,1-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1.4 U
cis-1,2-Dichloroethene	ug/l	11	1.3	0.81	8.9	0.95
trans-1,2-Dichloroethene	ug/l	1.4	< 0.5	< 0.5	1.2	< 0.72 U
Ethylbenzene	ug/l	< 1	< 1	< 1	< 1	< 1.4 U
Tetrachloroethene	ug/l	< 1	< 1	< 1	1.4	2.3
Toluene	ug/l	< 1	< 1	< 1	< 1	< 1.4 U
1,1,1-Trichloroethane	ug/l	1.4	< 1	< 1	0.74J	1.3 J
Trichloroethene	ug/l	3.6	3.8	3.1	9.5	39
Vinyl chloride	ug/l	< 1	0.51J	0.36J	0.63J	< 1.4 U
Xylene (total)	ug/l	< 1	< 1	< 1	< 1	< 1.4 U
Total VOCs	**ug/l**	**42.4**	**7.21**	**4.27**	**24.17**	**44.03**

ug/l - Micrograms per liter.
All QA/QC results for 2002 data are shown in Appendix B.
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J - Value is estimated.
ND - Non detect.

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Table 23. Summary of Groundwater VOC Analytical Results from Upper/Lower Aquifer Monitoring Wells in September 2002, General Motors Corporation, Moraine, Ohio.

	Units	Downgradient of the Site					
		GM-15 9/27/02 Lower Aquifer	GM-11 10/1/02 Lower Aquifer	GM-20D 9/30/02 Lower Aquifer	DN-13 9/27/02 Lower Aquifer	GM-9 9/30/02 Lower Aquifer	MT-69 9/30/02 Lower Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	ug/l	1.6	0.34J	< 1	2.5	0.48J	< 1
1,1-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	ug/l	1.8	0.62	< 0.5	7.3	0.66	< 0.5
trans-1,2-Dichloroethene	ug/l	< 0.5	< 0.5	< 0.5	0.48J	< 0.5	< 0.5
Ethylbenzene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	ug/l	< 1	2.2	1.3	< 1	< 1	< 1
Toluene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	ug/l	< 1	1	< 1	1.1	0.99J	< 1
Trichloroethene	ug/l	4.7	35	3.8	6.1	16	< 1
Vinyl chloride	ug/l	< 1	< 1	< 1	1.3	< 1	< 1
Xylene (total)	ug/l	< 1	< 1	< 1	< 1	< 1	< 1
Total VOCs	**ug/l**	**8.1**	**39.16**	**5.1**	**18.78**	**18.13**	**ND**

ug/l - Micrograms per liter.
All QA/QC results for 2002 data are shown in Appendix B.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
ND - Non detect.

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Table 24. Carbon Source Solution Introduction Volumes for 2001, General Motors Corporation, Moraine, Ohio.

Draft

Location	Injection Well	June Injection Event #18[1]		July Injection Event #19[2]		July Injection Event #20[3]		Total Volume Injected in July (gal.)
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	
Reactive Zone 1								
	RZ-1A	500	31	500	30	500	34	1,000
	RZ-1B	500	50	500	49	500	42	1,000
	RZ-1C	500	33	500	30	500	42	1,000
	RZ-1D	500	40	500	32	500	32	1,000
	RZ-1E	500	35	500	28	500	54	1,000
	RZ-1F	500	39	500	31	500	52	1,000
	RZ-1G	500	15	500	21	500	13	1,000
	RZ-1H	500	20	500	37	500	30	1,000
	RZ-1I	500	36	500	36	500	53	1,000
Reactive Zone 3								
	RZ-3A	500	32	500	33	500	34	1,000
	RZ-3B	500	52	500	50	500	50	1,000
	RZ-3C	500	35	500	42	500	55	1,000
	RZ-3D	500	29	500	34	500	35	1,000
	RZ-3E	500	47	500	48	500	52	1,000
	RZ-3F	500	37	500	41	500	44	1,000
	RZ-3G	500	47	500	40	500	37	1,000
	RZ-3H	500	30	500	33	500	50	1,000
	RZ-3I	500	35	500	42	500	30	1,000
	RZ-3J	500	34	500	34	500	35	1,000
	RZ-3K	500	42	500	49	500	54	1,000
	RZ-3L	500	36	500	42	500	44	1,000
	RZ-3M	500	32	500	35	500	56	1,000
	RZ-3N	500	54	500	31	500	35	1,000
	RZ-3O	500	36	500	43	500	50	1,000

Table 24. Carbon Source Solution Introduction Volumes for 2001, General Motors Corporation, Moraine, Ohio.

Draft

Location	Injection Well	June Injection Event #18[1]		July Injection Event #19[2]		July Injection Event #20[3]		Total Volume Injected in July (gal.)
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	
Reactive Zone 3								
	RZ-3P	500	34	500	35	500	50	1,000
	RZ-3Q	500	45	500	48	500	50	1,000
	RZ-3R	500	35	500	42	500	36	1,000
	RZ-3S	500	33	500	32	500	34	1,000
	RZ-3T	500	50	500	54	500	52	1,000
	RZ-3U	500	36	500	43	500	42	1,000
	RZ-3V	500	34	500	35	500	33	1,000
	RZ-3W	500	47	500	48	500	50	1,000
	RZ-3X	500	38	500	40	500	40	1,000
	RZ-3Y	500	32	500	33	500	32	1,000
	RZ-3Z	500	52	500	51	500	51	1,000
	RZ-3AA	500	42	500	43	500	48	1,000
	RZ-3BB	500	33	500	31	500	33	1,000
	RZ-3CC	500	48	500	45	500	50	1,000
	RZ-3DD	500	35	500	39	500	54	1,000
	RZ-3EE	500	39	500	35	500	40	1,000
	RZ-3FF	500	34	500	42	500	33	1,000
	RZ-3GG	500	37	500	42	500	47	1,000
	RZ-3HH	500	36	500	34	500	37	1,000
	RZ-3II	500	37	500	50	500	45	1,000
	RZ-3JJ	324	34	500	10	500	11	1,000
	RZ-3KK	500	38	500	60	500	55	1,000
	RZ-3MM	500	38	500	58	500	51	1,000
	RZ-3NN	500	36	500	38	500	41	1,000
	RZ-3OO	500	37	500	60	500	39	1,000
	RZ-3PP	500	36	500	38	500	38	1,000
	RZ-3QQ	500	37	500	54	500	37	1,000
Site-Wide Total		25,324		25,500		25,500		51,000

Table 24. Carbon Source Solution Introduction Volumes for 2001, General Motors Corporation, Moraine, Ohio.

Draft

Location	Injection Well	August Injection Event #21[4]		August Injection Event #22[5]		Total Volume Injected in August (gal.)	September Injection Event #23[6]	
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)		Volume (gal.)	Flow Rate (gpm)
Reactive Zone 1								
	RZ-1A	0[10]	0[10]	500	32	500	500	33
	RZ-1B	500	37	500	47	1,000	500	40
	RZ-1C	500	46	500	38	1,000	500	35
	RZ-1D	500	35	500	35	1,000	500	34
	RZ-1E	500	34	500	31	1,000	500	40
	RZ-1F	500	52	500	47	1,000	500	39
	RZ-1G	100	13	97	32	197	500	20
	RZ-1H	500	20	500	47	1,000	500	36
	RZ-1I	0[10]	0[10]	500	38	500	500	10
Reactive Zone 3								
	RZ-3A	500	36	500	36	1,000	500	34
	RZ-3B	500	49	500	43	1,000	500	50
	RZ-3C	500	42	500	42	1,000	500	50
	RZ-3D	500	35	500	35	1,000	500	35
	RZ-3E	500	51	500	49	1,000	500	49
	RZ-3F	500	40	500	40	1,000	500	41
	RZ-3G	500	37	500	35	1,000	500	35
	RZ-3H	500	41	500	50	1,000	500	50
	RZ-3I	500	50	500	46	1,000	500	43
	RZ-3J	500	30	500	36	1,000	500	35
	RZ-3K	500	48	500	48	1,000	500	41
	RZ-3L	500	36	500	40	1,000	500	41
	RZ-3M	500	36	500	49	1,000	500	34
	RZ-3N	500	40	500	35	1,000	500	35
	RZ-3O	500	37	500	50	1,000	500	49

Table 24. Carbon Source Solution Introduction Volumes for 2001, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	August Injection Event #21[4]		August Injection Event #22[5]		Total Volume Injected in August (gal.)	September Injection Event #23[6]	
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)		Volume (gal.)	Flow Rate (gpm)
Reactive Zone 3								
	RZ-3P	500	37	500	41	1,000	500	48
	RZ-3Q	500	44	500	36	1,000	500	48
	RZ-3R	500	50	500	50	1,000	500	35
	RZ-3S	500	37	500	42	1,000	500	45
	RZ-3T	500	44	500	34	1,000	500	43
	RZ-3U	500	45	500	53	1,000	500	35
	RZ-3V	500	34	500	50	1,000	500	37
	RZ-3W	500	50	500	37	1,000	500	39
	RZ-3X	500	48	500	40	1,000	500	40
	RZ-3Y	500	35	500	40	1,000	500	46
	RZ-3Z	500	53	500	36	1,000	500	34
	RZ-3AA	500	49	500	42	1,000	500	50
	RZ-3BB	500	36	500	42	1,000	500	43
	RZ-3CC	500	50	500	34	1,000	500	51
	RZ-3DD	500	38	500	50	1,000	500	34
	RZ-3EE	0[10]	0[10]	0[10]	0[10]	0	0[11]	0[11]
	RZ-3FF	0[10]	0[10]	0[10]	0[10]	0	0[10]	0[10]
	RZ-3GG	500	43	500	39	1,000	500	33
	RZ-3HH	500	32	500	30	1,000	500	50
	RZ-3II	500	32	500	50	1,000	500	41
	RZ-3JJ	500	14	500	13	1,000	500	20
	RZ-3KK	500	27	500	39	1,000	500	37
	RZ-3MM	500	24	500	46	1,000	500	36
	RZ-3NN	500	35	500	36	1,000	500	37
	RZ-3OO	500	48	500	38	1,000	500	52
	RZ-3PP	500	33	500	35	1,000	500	37
	RZ-3QQ	500	50	500	49	1,000	500	37
Site-Wide Total		23,100		24,097		47,197	24,500	

Table 24. Carbon Source Solution Introduction Volumes for 2001, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	October Injection Event #24[7]		November Injection Event #25[8]		December Injection Event #26[9]	
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)
Reactive Zone 1							
	RZ-1A	500	39	0[10]	0[10]	500	25
	RZ-1B	500	39	0[10]	0[10]	500	25
	RZ-1C	500	38	500	34	500	26
	RZ-1D	500	37	500	37	500	36
	RZ-1E	500	38	500	36	500	33
	RZ-1F	500	37	500	34	500	36
	RZ-1G	500	14	500	15	500	18
	RZ-1H	500	37	500	35	500	20
	RZ-1I	500	39	500	37	500	38
Reactive Zone 3							
	RZ-3A	500	35	500	42	500	38
	RZ-3B	500	50	500	43	500	38
	RZ-3C	500	42	500	40	500	38
	RZ-3D	500	42	500	37	500	38
	RZ-3E	500	52	500	35	500	39
	RZ-3F	500	41	500	39	500	40
	RZ-3G	500	36	500	33	500	40
	RZ-3H	500	50	500	33	500	39
	RZ-3I	500	42	500	33	500	40
	RZ-3J	500	36	500	37	500	37
	RZ-3K	500	46	500	36	500	36
	RZ-3L	500	45	500	37	500	37
	RZ-3M	500	37	500	35	500	36
	RZ-3N	500	44	500	42	500	42
	RZ-3O	500	46	500	41	500	40

Table 24. Carbon Source Solution Introduction Volumes for 2001, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	October Injection Event #24[7]		November Injection Event #25[8]		December Injection Event #26[9]	
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)
Reactive Zone 3							
	RZ-3P	500	39	500	36	500	39
	RZ-3Q	500	41	500	36	500	38
	RZ-3R	500	38	500	36	500	39
	RZ-3S	500	36	500	41	500	38
	RZ-3T	500	43	500	38	500	39
	RZ-3U	500	42	500	37	500	37
	RZ-3V	500	33	500	36	500	36
	RZ-3W	500	53	500	37	500	37
	RZ-3X	500	42	500	37	500	37
	RZ-3Y	500	37	500	37	500	36
	RZ-3Z	500	46	500	39	500	37
	RZ-3AA	500	51	500	39	500	37
	RZ-3BB	500	39	500	39	500	36
	RZ-3CC	500	46	500	38	500	37
	RZ-3DD	500	49	500	39	500	37
	RZ-3EE	0[11]	0[11]	0[11]	0[11]	0[11]	0[11]
	RZ-3FF	0[10]	0[10]	0[10]	0[10]	500	29
	RZ-3GG	500	43	500	37	500	36
	RZ-3HH	500	40	500	38	500	38
	RZ-3II	500	35	500	39	500	35
	RZ-3JJ	500	18	500	19	500	16
	RZ-3KK	500	38	500	37	500	40
	RZ-3MM	500	39	500	33	500	37
	RZ-3NN	500	43	500	39	500	33
	RZ-3OO	500	43	500	39	500	34
	RZ-3PP	500	43	500	40	500	35
	RZ-3QQ	500	37	499	33	500	31
Site-Wide Total		24,500		23,499		25,000	

Table 24. Carbon Source Solution Introduction Volumes for 2001, General Motors Corporation, Moraine, Ohio.

Notes:
Carbon source introduced into each well is a 10 to 1 solution (potable water to molasses).
(1) Injection event #18 was completed from June 18, 2001 to June 21, 2001.
(2) Injection event #19 was completed from June 27, 2001 to July 11, 2001.
(3) Injection event #20 was completed from July 17, 2001 to July 27, 2001.
(4) Injection event #21 was completed from July 30, 2001 to August 13, 2001.
(5) Injection event #22 was completed from August 14, 2001 to August 24, 2001.
(6) Injection event #23 was completed from September 17, 2001 to September 25, 2001.
(7) Injection event #24 was completed from October 3, 2001 to October 11, 2001.
(8) Injection event #25 was completed from October 26, 2001 to November 7, 2001.
(9) Injection event #26 completed from December 3, 2001 to December 10, 2001.
(10) Well was not accessible.
(11) Well RZ-3EE was abandoned in September 2001 due to the railroad expansion project.

Table 25. Carbon Source Solution Introduction Volumes for 2002, General Motors Corporation, Moraine, Ohio.

Draft

Location	Injection Well	June Injection Event #28[1]		July Injection Event #29[2]		July Injection Event #30[3]		Total Volume Injected in July (gal.)
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	
Reactive Zone 1								
	RZ-1A	NA	NA	NA	NA	500	33	500
	RZ-1B	501	36	NA	NA	500	33	500
	RZ-1C	500	26	501	34	501	31	1,002
	RZ-1D	565	29	501	35	500	40	1,001
	RZ-1E	501	33	501	38	502	40	1,003
	RZ-1F	500	44	501	39	501	31	1,002
	RZ-1G	500	13	501	27	501	27	1,002
	RZ-1H	500	30	501	35	500	45	1,001
	RZ-1I	500	27	502	39	501	36	1,003
	RZ-1J	--	--	--	--	--	--	--
	RZ-1K	--	--	--	--	--	--	--
	RZ-1L	--	--	--	--	--	--	--
	RZ-1M	--	--	--	--	--	--	--
	RZ-1N	--	--	--	--	--	--	--
	RZ-1O	--	--	--	--	--	--	--
	RZ-1P	--	--	--	--	--	--	--
	RZ-1Q	--	--	--	--	--	--	--
	RZ-1R	--	--	--	--	--	--	--
	RZ-1S	--	--	--	--	--	--	--
	RZ-1T	--	--	--	--	--	--	--
	RZ-1U	--	--	--	--	--	--	--
Reactive Zone 2								
	ME-2	501	37	502	40	500	39	1,002
	ME-3	501	38	501	39	500	40	1,001
	ME-4	NI	NI	NI	NI	NI	NI	NI
	ME-6	501	38	501	38	500	39	1,001

Table 25. Carbon Source Solution Introduction Volumes for 2002, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	June Injection Event #28[1]		July Injection Event #29[2]		July Injection Event #30[3]		Total Volume Injected in July (gal.)
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	
Reactive Zone 3								
	RZ-3A	502	38	501	31	502	40	1,003
	RZ-3B	501	40	501	48	501	36	1,002
	RZ-3C	502	41	501	40	501	35	1,002
	RZ-3D	501	36	500	34	500	46	1,000
	RZ-3E	501	36	500	47	502	38	1,002
	RZ-3F	501	38	501	40	502	33	1,003
	RZ-3G	502	35	501	34	500	49	1,001
	RZ-3H	502	36	501	31	501	29	1,002
	RZ-3I	501	39	500	44	502	35	1,002
	RZ-3J	501	37	501	34	501	31	1,002
	RZ-3K	501	35	501	31	500	47	1,001
	RZ-3L	502	37	500	36	502	38	1,002
	RZ-3M	502	30	501	28	502	35	1,003
	RZ-3N	501	37	501	34	501	33	1,002
	RZ-3O	502	36	501	31	500	47	1,001
	RZ-3P	501	37	500	47	502	40	1,002
	RZ-3Q	501	35	502	36	501	32	1,003
	RZ-3R	502	38	502	35	500	50	1,002
	RZ-3S	501	37	501	35	502	39	1,003
	RZ-3T	502	38	500	49	501	32	1,001
	RZ-3U	501	30	501	41	500	47	1,001
	RZ-3V	500	47	501	27	501	38	1,002
	RZ-3W	502	35	500	40	500	34	1,000
	RZ-3X	502	33	501	34	501	32	1,002
	RZ-3Y	501	34	501	34	500	46	1,001
	RZ-3Z	502	36	502	40	500	38	1,002
	RZ-3AA	501	39	501	38	501	31	1,002
	RZ-3BB	501	37	501	30	500	47	1,001

Table 25. Carbon Source Solution Introduction Volumes for 2002, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	June Injection Event #28[1]		July Injection Event #29[2]		July Injection Event #30[3]		Total Volume Injected in July (gal.)
		Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	Volume (gal.)	Flow Rate (gpm)	
Reactive Zone 3								
	RZ-3CC	501	33	500	49	501	38	1,001
	RZ-3DD	501	37	501	41	501	35	1,002
	RZ-3FF	501	34	502	36	501	37	1,003
	RZ-3GG	501	21	500	33	501	29	1,001
	RZ-3HH	500	32	500	41	500	45	1,000
	RZ-3II	501	32	500	55	501	35	1,001
	RZ-3JJ	501	21	500	31	502	20	1,002
	RZ-3KK	500	32	500	55	501	35	1,001
	RZ-3MM	501	32	500	31	501	36	1,001
	RZ-3NN	501	42	500	22	502	33	1,002
	RZ-3OO	501	30	500	36	500	45	1,000
	RZ-3PP	500	47	500	45	501	27	1,001
	RZ-3QQ	502	37	500	28	502	30	1,002
Site-Wide Total		26,120		25,539		26,546		52,085

Table 25. Carbon Source Solution Introduction Volumes for 2002, General Motors Corporation, Moraine, Ohio.

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Location	Injection Well	August Injection Event #31[4]		September Injection Event #32[5]		October Injection Event #33[6]		November Injection Event #34[7]	
		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	21	500	36	500	20	500	10
	RZ-1B	500	15	500	38	500	31	500	54
	RZ-1C	500	34	500	28	500	18	500	30
	RZ-1D	500	42	NA	NA	500	30	500	33
	RZ-1E	500	30	750	33	500	38	500	58
	RZ-1F	500	39	750	42	500	37	500	45
	RZ-1G	500	27	500	37	500	31	500	26
	RZ-1H	500	30	750	33	500	38	497	25
	RZ-1I	500	26	750	42	500	38	500	50
	RZ-1J	--	--	--	--	500	36	500	41
	RZ-1K	500	33	500	33	500	36	500	33
	RZ-1L	--	--	--	--	315	11	130	21
	RZ-1M	500	29	500	34	500	36	500	36
	RZ-1N	--	--	--	--	500	39	500	29
	RZ-1O	500	18	336	19	500	28	51	26
	RZ-1P	--	--	--	--	500	39	500	24
	RZ-1Q	500	27	500	34	500	36	500	51
	RZ-1R	--	--	--	--	500	29	500	51
	RZ-1S	500	36	500	10	500	16	500	47
	RZ-1T	--	--	--	--	500	39	500	50
	RZ-1U	502	30	500	34	500	33	500	48
Reactive Zone 2									
	ME-2	NA	NA	NA	NA	NA	NA	NA	NA
	ME-3	NI	NI	NI	NI	NI	NI	NI	NI
	ME-4	NI	NI	NA	NA	NA	NA	NA	NA
	ME-6	NI	NI	NI	NI	NI	NI	NI	NI

Table 25. Carbon Source Solution Introduction Volumes for 2002, General Motors Corporation, Moraine, Ohio.

Draft

Location	Injection Well	August Injection Event #31[4]		September Injection Event #32[5]		October Injection Event #33[6]		November Injection Event #34[7]	
		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	499	36	750	33	750	36	750	54
	RZ-3B	500	36	750	44	750	53	750	34
	RZ-3C	500	31	750	25	750	37	750	53
	RZ-3D	499	38	754	43	750	52	750	20
	RZ-3E	500	41	750	39	750	60	750	46
	RZ-3F	500	34	754	50	750	53	750	53
	RZ-3G	500	30	759	35	750	38	750	37
	RZ-3H	500	36	750	48	750	46	750	35
	RZ-3I	500	36	749	18	750	36	750	42
	RZ-3J	500	22	750	31	750	34	750	23
	RZ-3K	500	32	750	57	750	45	750	39
	RZ-3L	500	25	751	37	750	23	750	32
	RZ-3M	500	42	750	44	750	53	750	38
	RZ-3N	500	45	750	36	750	39	750	48
	RZ-3O	500	33	750	39	750	44	750	40
	RZ-3P	500	27	750	27	750	30	750	50
	RZ-3Q	500	38	750	38	750	49	750	38
	RZ-3R	500	19	750	34	750	35	750	49
	RZ-3S	500	26	750	35	750	36	750	48
	RZ-3T	500	25	750	31	750	50	750	36
	RZ-3U	500	33	747	38	750	39	750	49
	RZ-3V	500	26	750	50	750	51	750	50
	RZ-3W	500	27	750	36	485	44	750	27
	RZ-3X	500	50	750	47	750	50	750	48
	RZ-3Y	500	35	754	30	750	36	750	32
	RZ-3Z	500	34	750	49	750	50	777	48
	RZ-3AA	500	36	752	40	750	32	750	35
	RZ-3BB	500	30	750	31	750	38	750	46

Table 25. Carbon Source Solution Introduction Volumes for 2002, General Motors Corporation, Moraine, Ohio.

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Location	Injection Well	August Injection Event #31[4]		September Injection Event #32[5]		October Injection Event #33[6]		November Injection Event #34[7]	
		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	500	31	750	44	750	51	750	28
	RZ-3DD	500	33	750	38	750	38	752	43
	RZ-3FF	500	33	750	35	500	36	750	54
	RZ-3GG	500	31	750	31	750	50	750	33
	RZ-3HH	500	38	750	36	750	33	750	48
	RZ-3II	500	31	750	34	750	38	750	38
	RZ-3JJ	500	20	750	25	420	24	305	18
	RZ-3KK	500	41	750	47	750	36	750	57
	RZ-3MM	500	23	752	33	750	39	710	43
	RZ-3NN	500	29	750	33	750	38	750	49
	RZ-3OO	500	35	750	46	750	38	750	47
	RZ-3PP	500	26	750	37	750	38	750	56
	RZ-3QQ	500	24	750	44	750	31	735	56
Site-Wide Total		28,000		38,608		40,220		39,957	

Table 25. Carbon Source Solution Introduction Volumes for 2002, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	December Injection Event #35[8]	
		Volume (gal.)	Flow Rate (gpm)
Reactive Zone 1			
	RZ-1A	500	37
	RZ-1B	500	32
	RZ-1C	500	32
	RZ-1D	500	30
	RZ-1E	501	51
	RZ-1F	500	56
	RZ-1G	500	28
	RZ-1H	500	34
	RZ-1I	500	34
	RZ-1J	500	39
	RZ-1K	500	36
	RZ-1L	500	24
	RZ-1M	500	41
	RZ-1N	500	46
	RZ-1O	500	43
	RZ-1P	500	50
	RZ-1Q	500	49
	RZ-1R	500	54
	RZ-1S	NA	NA
	RZ-1T	500	57
	RZ-1U	296	54
Reactive Zone 2			
	ME-2	NA	NA
	ME-3	NI	NI
	ME-4	NA	NA
	ME-6	NI	NI

Table 25. Carbon Source Solution Introduction Volumes for 2002, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	December Injection Event #35[8]	
		Volume (gal.)	Flow Rate (gpm)
Reactive Zone 3			
	RZ-3A	750	38
	RZ-3B	750	51
	RZ-3C	750	55
	RZ-3D	750	32
	RZ-3E	750	46
	RZ-3F	750	36
	RZ-3G	750	52
	RZ-3H	750	32.6
	RZ-3I	750	50
	RZ-3J	750	41
	RZ-3K	750	30
	RZ-3L	750	55
	RZ-3M	750	36
	RZ-3N	750	56
	RZ-3O	750	38
	RZ-3P	750	47
	RZ-3Q	750	34
	RZ-3R	750	44
	RZ-3S	750	49
	RZ-3T	750	30
	RZ-3U	795	48
	RZ-3V	750	34
	RZ-3W	750	51
	RZ-3X	750	68
	RZ-3Y	750	39
	RZ-3Z	750	34
	RZ-3AA	750	51
	RZ-3BB	750	49

Table 25. Carbon Source Solution Introduction Volumes for 2002, General Motors Corporation, Moraine, Ohio.

Location	Injection Well	December Injection Event #35[8]	
		Volume (gal.)	Flow Rate (gpm)
Reactive Zone 3			
	RZ-3CC	750	38
	RZ-3DD	750	33
	RZ-3FF	750	24
	RZ-3GG	750	50
	RZ-3HH	750	32
	RZ-3II	750	45
	RZ-3JJ	750	22
	RZ-3KK	750	57
	RZ-3MM	750	44
	RZ-3NN	750	27
	RZ-3OO	750	50
	RZ-3PP	750	37
	RZ-3QQ	500	51
Site-Wide Total		40,342	

Table 25. Carbon Source Solution Introduction Volumes for 2002, General Motors Corporation, Moraine, Ohio.

Draft

Notes:
Carbon source introduced into each well is a 10 to 1 solution (potable water to molasses).
NA - Not accessible.
NI - Not injected.
-- - Well not installed.
(1) Injection Event #28 was completed from June 17, 2002 to June 28, 2002.
(2) Injection Event #29 was completed from June 28, 2002 to July 12, 2002.
(3) Injection Event #30 was completed from July 12, 2002 to August 6, 2002.
(4) Injection Event #31 was completed from August 12, 2002 to August 20, 2002.
(5) Injection Event #32 was completed from September 23, 2002 to October 1, 2002.
(6) Injection Event #33 was completed from October 14, 2002 to October 23, 2002.
(7) Injection Event #34 was completed from November 12, 2002 to November 20, 2002.
(8) Injection Event #35 was completed from December 3, 2002 to December 12, 2002.

Table 26: 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 Value[1] (mg/L)	Mean Value[1] (mg/L)	Max of Value[1] (mg/l)	Max of Value[1] 2002 Only (mg/l)	Remediation Target Level (mg/L)	Ratio: Min Value to RTL	Ratio: Mean Value to RTL	Ratio: Max Value to RTL	Ratio: Max Value to RTL 2002 Only
SHALLOW	AOI 7 SHALLOW	1,1-Dichloroethene	20	6	2.50E-03	1.93E-02	6.00E-02	6.00E-02	2.33E+00	1.1E-03	8.3E-03	2.6E-02	2.6E-02
SHALLOW	AOI 7 SHALLOW	cis-1,2-Dichloroethene	20	15	2.50E-03	4.53E+00	1.10E+01	9.90E+00	2.33E+01	1.1E-04	1.9E-01	4.7E-01	4.2E-01
SHALLOW	AOI 7 SHALLOW	Tetrachloroethene	20	16	2.90E-03	4.22E+00	1.50E+01	1.00E+01	1.67E+00	1.7E-03	**2.5E+00**	**9.0E+00**	**6.0E+00**
SHALLOW	AOI 7 SHALLOW	Trichloroethene	20	16	1.75E-03	8.45E-01	2.20E+00	1.90E+00	1.67E+00	1.0E-03	5.1E-01	**1.3E+00**	**1.1E+00**
SHALLOW	AOI 7 SHALLOW	Vinyl Chloride	20	13	1.90E-03	2.88E-01	1.20E+00	8.10E-01	6.67E-01	2.8E-03	4.3E-01	**1.8E+00**	**1.2E+00**
SHALLOW	ZONE S1	1,1-Dichloroethene	7		1.55E-04	5.79E-04	1.20E-03	6.00E-04	2.10E+00	7.4E-05	2.8E-04	5.7E-04	2.9E-04
SHALLOW	ZONE S1	cis-1,2-Dichloroethene	7	4	5.50E-04	5.21E-02	3.52E-01	1.50E-03	2.10E+01	2.6E-05	2.5E-03	1.7E-02	7.1E-05
SHALLOW	ZONE S1	Tetrachloroethene	7	1	2.10E-04	9.73E-04	2.80E-03	8.50E-04	1.50E+00	1.4E-04	6.5E-04	1.9E-03	5.7E-04
SHALLOW	ZONE S1	Trichloroethene	7	2	3.50E-04	8.23E-04	1.80E-03	8.60E-04	1.50E+00	2.3E-04	5.5E-04	1.2E-03	5.7E-04
SHALLOW	ZONE S1	Vinyl Chloride	7	1	1.80E-04	8.15E-04	2.50E-03	7.00E-04	6.00E-01	3.0E-04	1.4E-03	4.3E-03	1.2E-03
SHALLOW	ZONE S1 TO ZONE S2	1,1-Dichloroethene	12		1.55E-04	6.04E-04	1.55E-03	1.55E-03	1.63E+00	9.5E-05	3.7E-04	9.5E-04	9.5E-04
SHALLOW	ZONE S1 TO ZONE S2	cis-1,2-Dichloroethene	12	9	5.50E-04	6.32E-02	3.52E-01	5.20E-03	1.63E+01	3.4E-05	3.9E-03	2.2E-02	3.2E-04
SHALLOW	ZONE S1 TO ZONE S2	Tetrachloroethene	12	4	2.10E-04	4.81E-03	3.40E-02	2.10E-03	1.17E+00	1.8E-04	4.1E-03	2.9E-02	1.8E-03
SHALLOW	ZONE S1 TO ZONE S2	Trichloroethene	12	6	3.50E-04	1.01E-02	6.60E-02	2.10E-03	1.17E+00	3.0E-04	8.7E-03	5.7E-02	1.8E-03
SHALLOW	ZONE S1 TO ZONE S2	Vinyl Chloride	12	5	1.80E-04	6.96E-03	2.77E-02	1.80E-03	4.67E-01	3.9E-04	1.5E-02	5.9E-02	3.9E-03
SHALLOW	ZONE S2	1,1-Dichloroethene	12		1.20E-04	1.02E-03	6.00E-03	6.00E-03	2.33E-01	5.2E-04	4.4E-03	2.6E-02	2.6E-02
SHALLOW	ZONE S2	cis-1,2-Dichloroethene	12	10	4.40E-04	7.91E-02	2.00E-01	2.00E-01	2.33E+00	1.9E-04	3.4E-02	8.6E-02	8.6E-02
SHALLOW	ZONE S2	Tetrachloroethene	12	5	4.60E-04	5.63E-03	3.40E-02	8.50E-03	1.67E-01	2.8E-03	3.4E-02	2.0E-01	5.1E-02
SHALLOW	ZONE S2	Trichloroethene	12	9	5.00E-04	1.42E-02	6.60E-02	1.20E-02	1.67E-01	3.0E-03	8.5E-02	4.0E-01	7.2E-02
SHALLOW	ZONE S2	Vinyl Chloride	12	9	4.50E-04	1.23E-02	2.77E-02	1.90E-02	6.70E-02	6.7E-03	1.8E-01	4.1E-01	2.8E-01
SHALLOW	ZONE S2 TO ZONE S3	1,1-Dichloroethene	34	7	1.20E-04	7.30E-04	6.00E-03	6.00E-03	9.30E-02	1.3E-03	7.8E-03	6.5E-02	6.5E-02
SHALLOW	ZONE S2 TO ZONE S3	cis-1,2-Dichloroethene	34	31	3.50E-04	4.81E-02	2.00E-01	2.00E-01	9.33E-01	3.8E-04	5.2E-02	2.1E-01	2.1E-01
SHALLOW	ZONE S2 TO ZONE S3	Tetrachloroethene	34	27	4.60E-04	3.01E-02	7.17E-02	6.00E-02	6.70E-02	6.9E-03	4.5E-01	**1.1E+00**	9.0E-01
SHALLOW	ZONE S2 TO ZONE S3	Trichloroethene	34	31	5.00E-04	5.30E-02	1.21E-01	1.10E-01	6.70E-02	7.5E-03	7.9E-01	**1.8E+00**	**1.6E+00**
SHALLOW	ZONE S2 TO ZONE S3	Vinyl Chloride	34	20	2.50E-04	4.97E-03	2.77E-02	1.90E-02	2.70E-02	9.3E-03	1.8E-01	1.0E+00	7.0E-01
SHALLOW	ZONE S3	1,1-Dichloroethene	12	3	1.20E-04	4.22E-03	2.50E-02	3.60E-03	7.00E-02	1.7E-03	6.0E-02	3.6E-01	5.1E-02
SHALLOW	ZONE S3	cis-1,2-Dichloroethene	12	7	5.50E-04	2.39E-02	4.80E-02	4.80E-02	7.00E-01	7.9E-04	3.4E-02	6.9E-02	6.9E-02
SHALLOW	ZONE S3	Tetrachloroethene	12	1	1.15E-04	6.91E-03	3.76E-02	2.30E-03	5.00E-02	2.3E-03	1.4E-01	7.5E-01	4.6E-02
SHALLOW	ZONE S3	Trichloroethene	12	7	3.50E-04	9.15E-02	2.30E-01	2.30E-01	5.00E-02	7.0E-03	**1.8E+00**	**4.6E+00**	**4.6E+00**
SHALLOW	ZONE S3	Vinyl Chloride	12	2	7.50E-05	3.50E-03	2.50E-02	3.00E-03	2.00E-02	3.8E-03	1.8E-01	**1.3E+00**	1.5E-01
SHALLOW	ZONE S3 TO GM-10	1,1-Dichloroethene	29	4	1.20E-04	1.92E-03	2.50E-02	3.60E-03	4.70E-02	2.6E-03	4.1E-02	5.3E-01	7.7E-02
SHALLOW	ZONE S3 TO GM-10	cis-1,2-Dichloroethene	29	23	1.75E-04	1.62E-02	4.80E-02	4.80E-02	4.67E-01	3.7E-04	3.5E-02	1.0E-01	1.0E-01
SHALLOW	ZONE S3 TO GM-10	Tetrachloroethene	29	16	1.15E-04	1.22E-02	6.30E-02	6.30E-02	3.30E-02	3.5E-03	3.7E-01	**1.9E+00**	**1.9E+00**
SHALLOW	ZONE S3 TO GM-10	Trichloroethene	29	23	3.50E-04	5.84E-02	2.30E-01	2.30E-01	3.30E-02	1.1E-02	**1.8E+00**	**7.0E+00**	**7.0E+00**
SHALLOW	ZONE S3 TO GM-10	Vinyl Chloride	29	8	7.50E-05	2.35E-03	2.50E-02	1.20E-02	1.30E-02	5.8E-03	1.8E-01	**1.9E+00**	9.2E-01
SHALLOW	GM-10	1,1-Dichloroethene	2		1.20E-04	1.38E-04	1.55E-04	1.55E-04	1.90E-02	6.3E-03	7.3E-03	8.2E-03	8.2E-03
SHALLOW	GM-10	cis-1,2-Dichloroethene	2	2	2.30E-03	9.15E-03	1.60E-02	2.30E-03	1.87E-01	1.2E-02	4.9E-02	8.6E-02	1.2E-02
SHALLOW	GM-10	Tetrachloroethene	2	2	1.10E-03	1.50E-03	1.90E-03	1.10E-03	1.30E-02	8.5E-02	1.2E-01	1.5E-01	8.5E-02
SHALLOW	GM-10	Trichloroethene	2	2	1.90E-02	2.30E-02	2.70E-02	1.90E-02	1.30E-02	**1.5E+00**	**1.8E+00**	**2.1E+00**	**1.5E+00**
SHALLOW	GM-10	Vinyl Chloride	2	1	1.80E-04	6.90E-04	1.20E-03	1.80E-04	5.00E-03	3.6E-02	1.4E-01	2.4E-01	3.6E-02
SHALLOW	POC SHALLOW	1,1-Dichloroethene	2		1.20E-04	1.38E-04	1.55E-04	1.55E-04	7.00E-03	1.7E-02	2.0E-02	2.2E-02	2.2E-02
SHALLOW	POC SHALLOW	cis-1,2-Dichloroethene	2		1.10E-04	1.43E-04	1.75E-04	1.75E-04	7.00E-02	1.6E-03	2.0E-03	2.5E-03	2.5E-03
SHALLOW	POC SHALLOW	Tetrachloroethene	2	2	9.20E-04	1.01E-03	1.10E-03	9.20E-04	5.00E-03	1.8E-01	2.0E-01	2.2E-01	1.8E-01
SHALLOW	POC SHALLOW	Trichloroethene	2		7.00E-05	1.40E-04	2.10E-04	2.10E-04	5.00E-03	1.4E-02	2.8E-02	4.2E-02	4.2E-02
SHALLOW	POC SHALLOW	Vinyl Chloride	2		7.50E-05	1.28E-04	1.80E-04	1.80E-04	2.00E-03	3.8E-02	6.4E-02	9.0E-02	9.0E-02
DEEP	AOI 7 DEEP	1,1-Dichloroethene	20	6	2.50E-03	1.93E-02	6.00E-02	6.00E-02	7.78E-01	3.2E-03	2.5E-02	7.7E-02	7.7E-02
DEEP	AOI 7 DEEP	cis-1,2-Dichloroethene	20	15	2.50E-03	4.53E+00	1.10E+01	9.90E+00	7.78E+00	3.2E-04	5.8E-01	**1.4E+00**	**1.3E+00**
DEEP	AOI 7 DEEP	Tetrachloroethene	20	16	2.90E-03	4.22E+00	1.50E+01	1.00E+01	5.56E-01	5.2E-03	**7.6E+00**	**2.7E+01**	**1.8E+01**
DEEP	AOI 7 DEEP	Trichloroethene	20	16	1.75E-03	8.45E-01	2.20E+00	1.90E+00	5.56E-01	3.1E-03	**1.5E+00**	**4.0E+00**	**3.4E+00**
DEEP	AOI 7 DEEP	Vinyl Chloride	20	13	1.90E-03	2.88E-01	1.20E+00	8.10E-01	2.22E-01	8.6E-03	**1.3E+00**	**5.4E+00**	**3.6E+00**
DEEP	ZONE D1	1,1-Dichloroethene	2		1.20E-04	1.38E-04	1.55E-04	1.55E-04	2.30E-02	5.2E-03	6.0E-03	6.7E-03	6.7E-03
DEEP	ZONE D1	cis-1,2-Dichloroethene	2	2	8.10E-04	8.65E-04	9.20E-04	8.10E-04	2.33E-01	3.5E-03	3.7E-03	3.9E-03	3.5E-03
DEEP	ZONE D1	Tetrachloroethene	2		1.15E-04	1.63E-04	2.10E-04	2.10E-04	1.70E-02	6.8E-03	9.6E-03	1.2E-02	1.2E-02
DEEP	ZONE D1	Trichloroethene	2	2	3.10E-03	3.40E-03	3.70E-03	3.10E-03	1.70E-02	1.8E-01	2.0E-01	2.2E-01	1.8E-01
DEEP	ZONE D1	Vinyl Chloride	2	2	3.60E-04	6.68E-03	1.30E-02	3.60E-04	7.00E-03	5.1E-02	9.5E-01	**1.9E+00**	5.1E-02
DEEP	ZONE D2	1,1-Dichloroethene	4		1.20E-04	1.54E-04	2.20E-04	2.20E-04	1.60E-02	7.5E-03	9.6E-03	1.4E-02	1.4E-02
DEEP	ZONE D2	cis-1,2-Dichloroethene	4	3	1.10E-04	3.14E-03	8.90E-03	8.90E-03	1.56E-01	7.1E-04	2.0E-02	5.7E-02	5.7E-02
DEEP	ZONE D2	Tetrachloroethene	4	4	4.80E-04	1.37E-03	2.30E-03	2.30E-03	1.10E-02	4.4E-02	1.2E-01	2.1E-01	2.1E-01
DEEP	ZONE D2	Trichloroethene	4	4	2.90E-03	1.76E-02	3.90E-02	3.90E-02	1.10E-02	2.6E-01	**1.6E+00**	**3.5E+00**	**3.5E+00**
DEEP	ZONE D2	Vinyl Chloride	4	1	7.50E-05	2.59E-04	6.30E-04	6.30E-04	4.00E-03	1.9E-02	6.5E-02	1.6E-01	1.6E-01
DEEP	POC DEEP	1,1-Dichloroethene	6		1.20E-04	1.38E-04	1.55E-04	1.55E-04	7.00E-03	1.7E-02	2.0E-02	2.2E-02	2.2E-02
DEEP	POC DEEP	cis-1,2-Dichloroethene	6	3	1.10E-04	6.69E-04	1.80E-03	1.80E-03	7.00E-02	1.6E-03	9.6E-03	2.6E-02	2.6E-02
DEEP	POC DEEP	Tetrachloroethene	6	4	1.15E-04	1.14E-03	2.20E-03	2.20E-03	5.00E-03	2.3E-02	2.3E-01	4.4E-01	4.4E-01
DEEP	POC DEEP	Trichloroethene	6	6	3.80E-03	1.11E-02	3.50E-02	3.50E-02	5.00E-03	7.6E-01	**2.2E+00**	**7.0E+00**	**7.0E+00**
DEEP	POC DEEP	Vinyl Chloride	6		7.50E-05	1.28E-04	1.80E-04	1.80E-04	2.00E-03	3.8E-02	6.4E-02	9.0E-02	9.0E-02

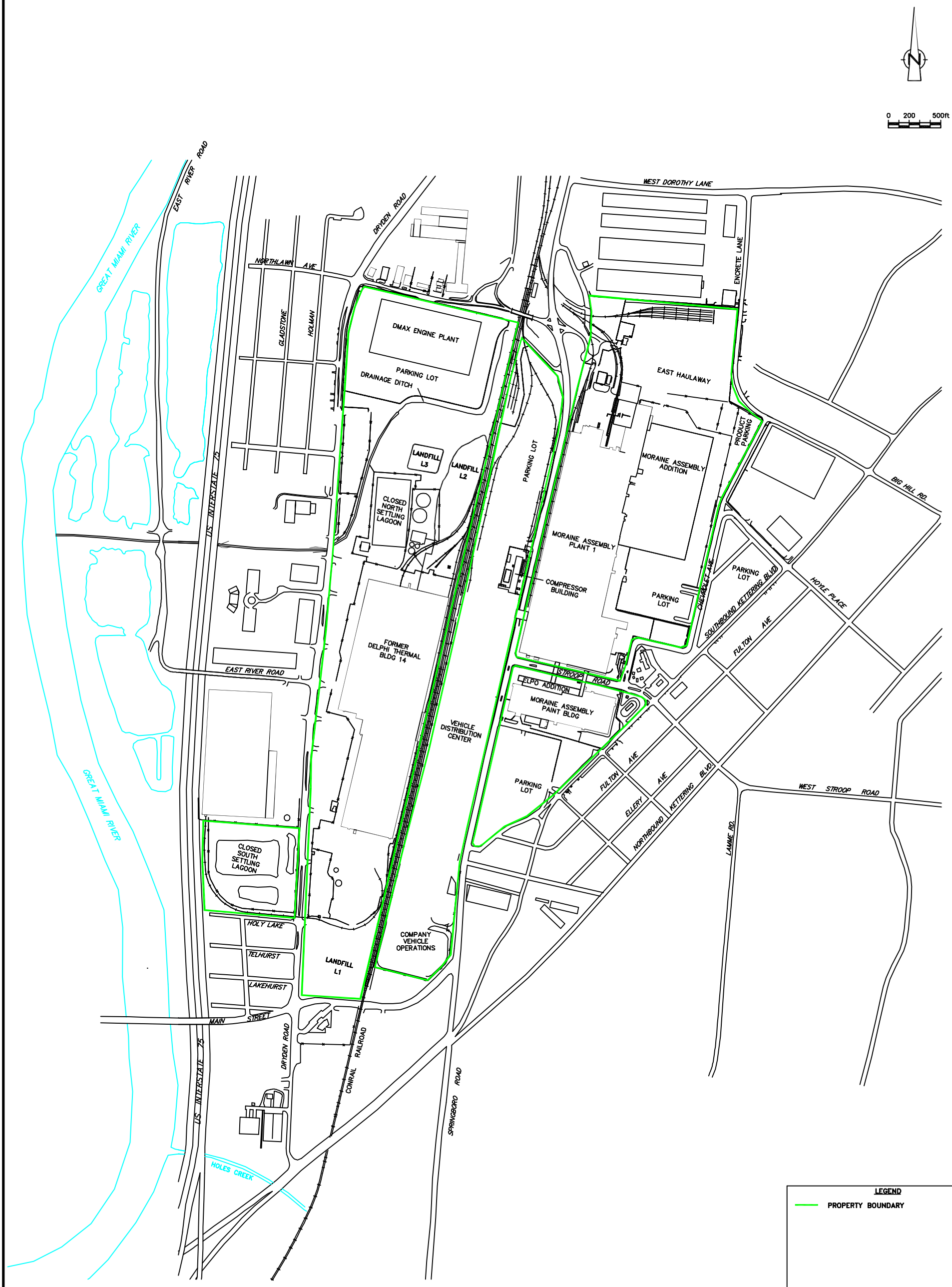
Notes:
1 - Value is calculated either from detected concentrations or 1/2 the sample quantitation limit for non-detects.

Table 27: 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	0.0001	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	0.0001	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	)3469-21-9	0.	0.	0.	0.0005	
P/PCB	Aroclor-1254	1097-69-1	0.	0.	0.	0.0005	
P/PCB	Aroclor-1260	1096-82-5	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.	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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SITE LAYOUT
GENERAL MOTORS CORPORATION
MORAINE, OHIO

DATE	PROJECT MANAGER	DRAWING NAME
2/24/2004	N. GILLOTTI	CRA\SITEW\SWGW00
DRAWN	LEAD DESIGN PROF.	CHECKED
R. SMITH	J. REID	N. GILLOTTI
PROJECT NUMBER		DRAWING NUMBER
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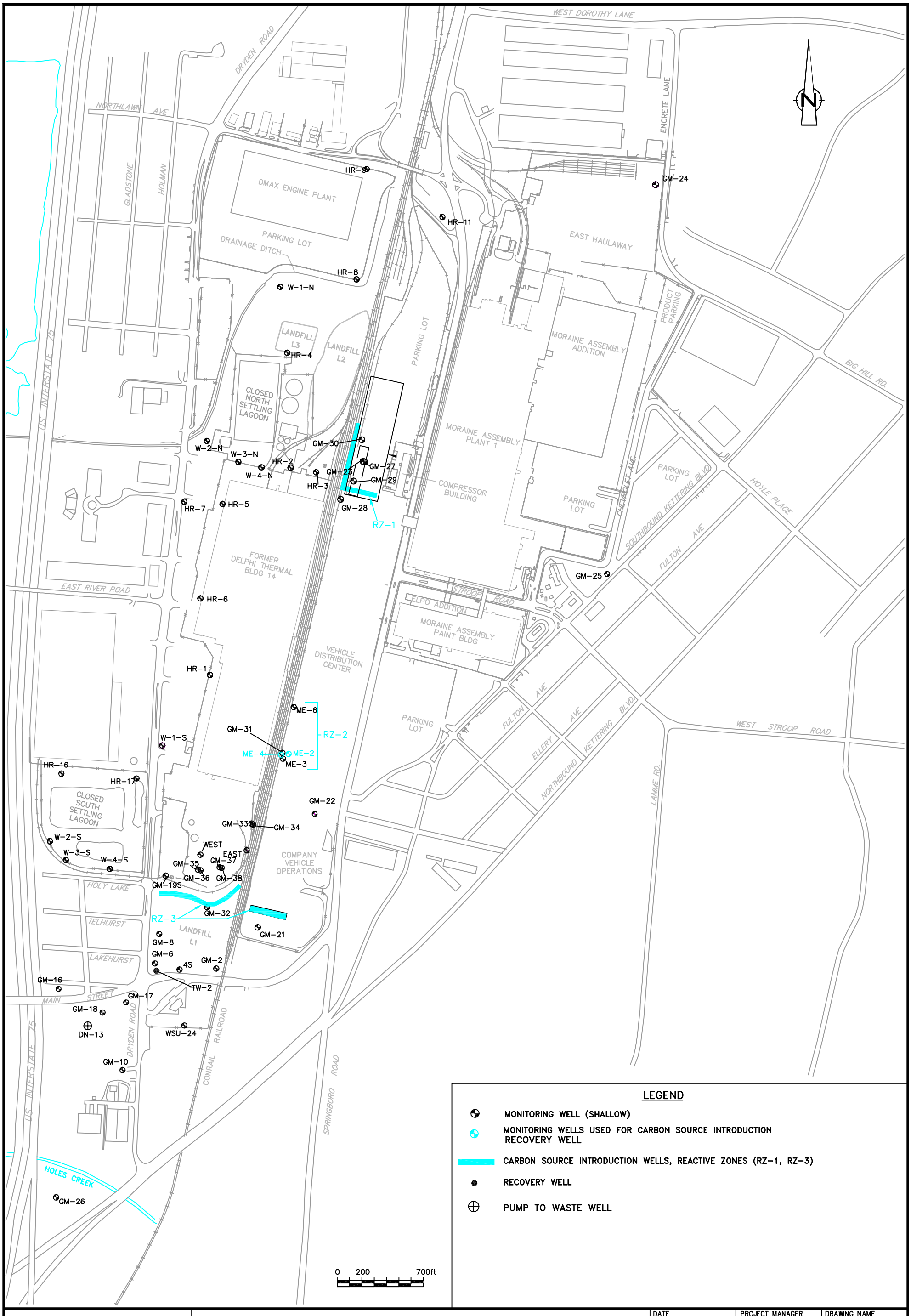

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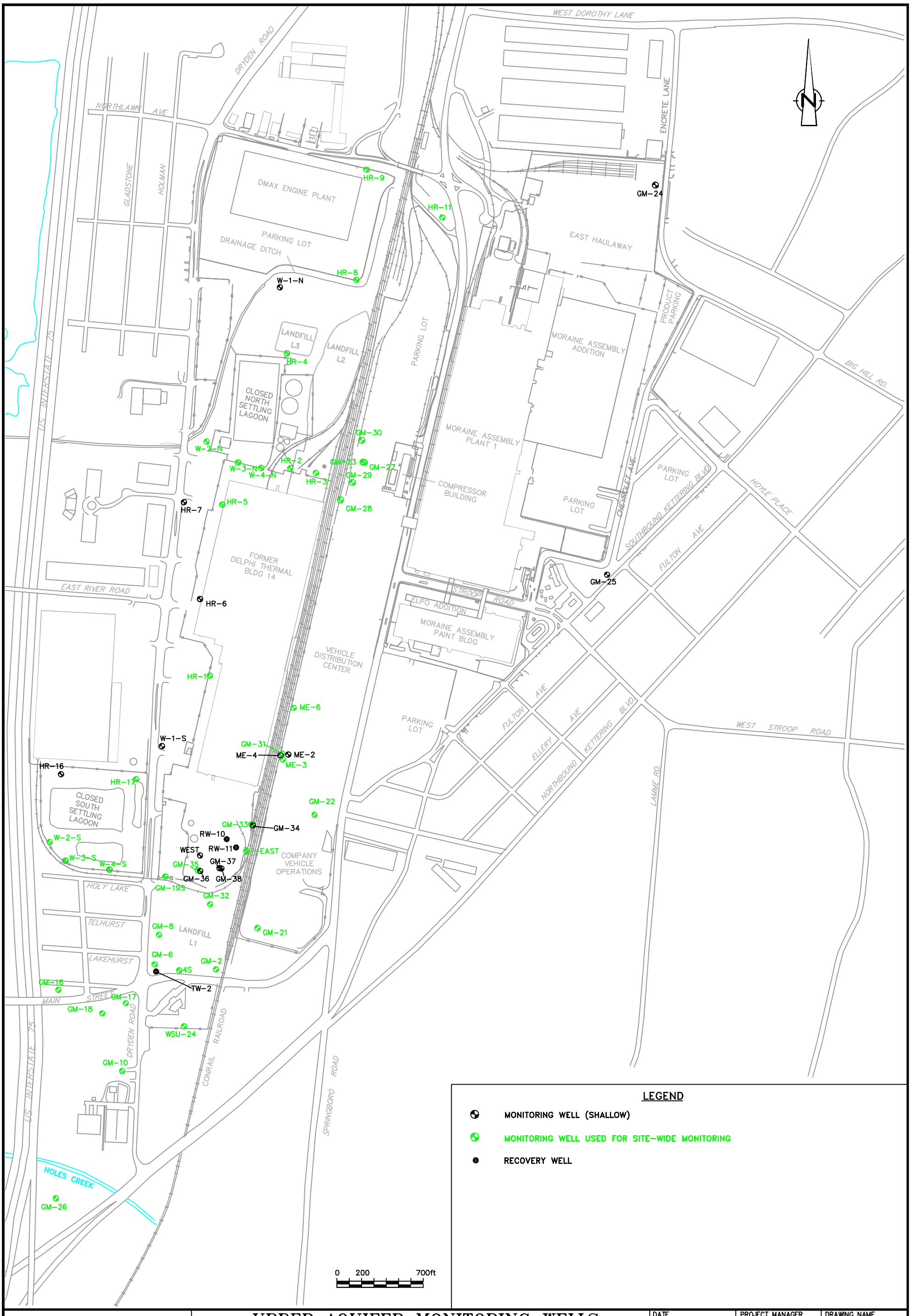
SITE-WIDE CORRECTIVE MEASURES
GENERAL MOTORS CORPORATION
MORAINE, OHIO

DATE	PROJECT MANAGER	DRAWING NAME
2/24/2004	N. GILLOTTI	CRA\SITEWIDE\SWGW05
DRAWN	LEAD DESIGN PROF.	CHECKED
R. SMITH	J. REID	N. GILLOTTI
PROJECT NUMBER		DRAWING NUMBER
OH000294.0006.0003		2



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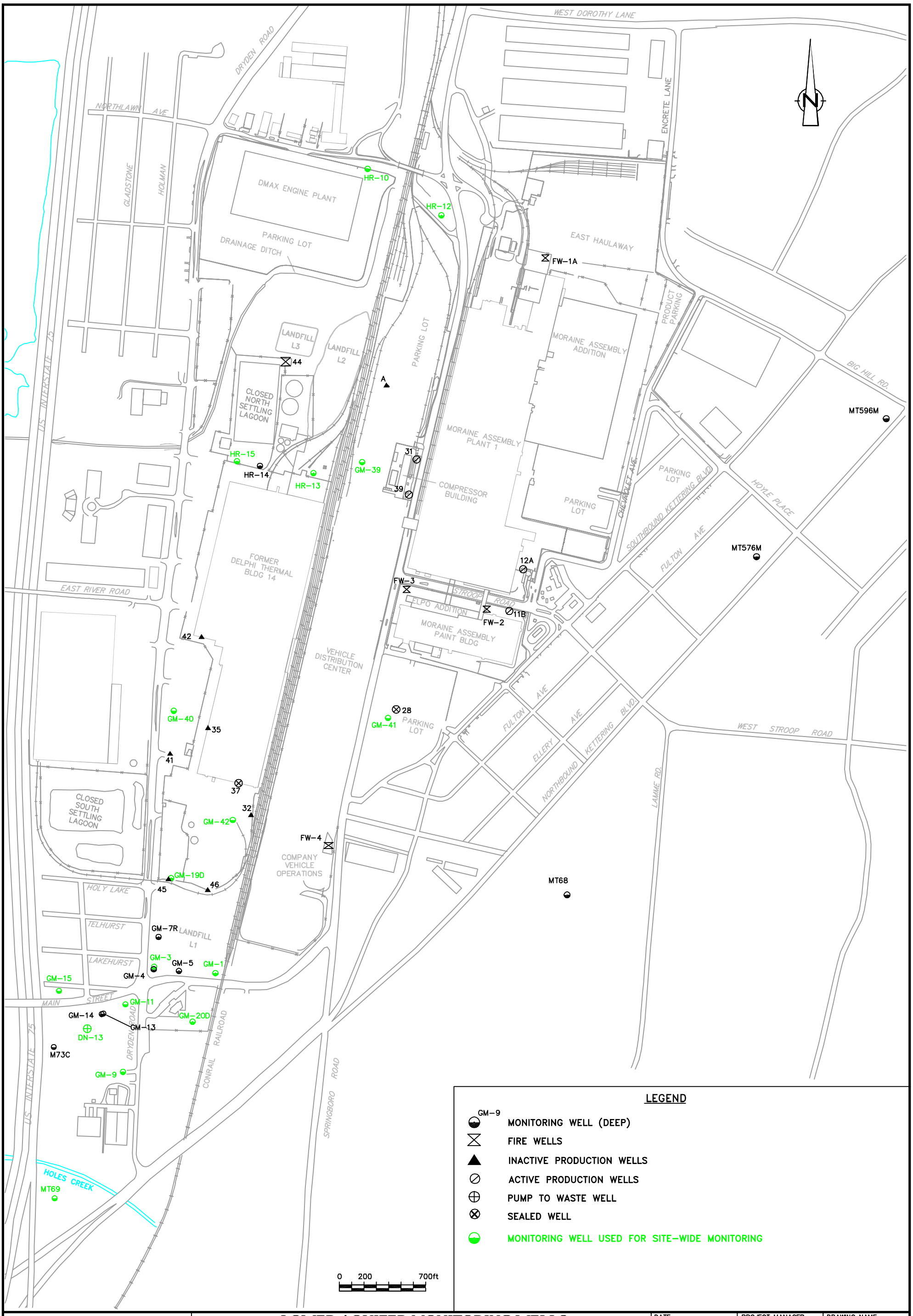
UPPER AQUIFER MONITORING WELLS FOR SITE-WIDE GROUNDWATER MONITORING GENERAL MOTORS CORPORATION MORAINE, OHIO

DATE 2/24/2004	PROJECT MANAGER N. GILLOTTI	DRAWING NAME CRA\SITEWID\SWGW-3B
DRAWN R. SMITH	LEAD DESIGN PROF. J. REID	CHECKED N. GILLOTTI
PROJECT NUMBER OH000294.0006.0003		DRAWING NUMBER 3



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

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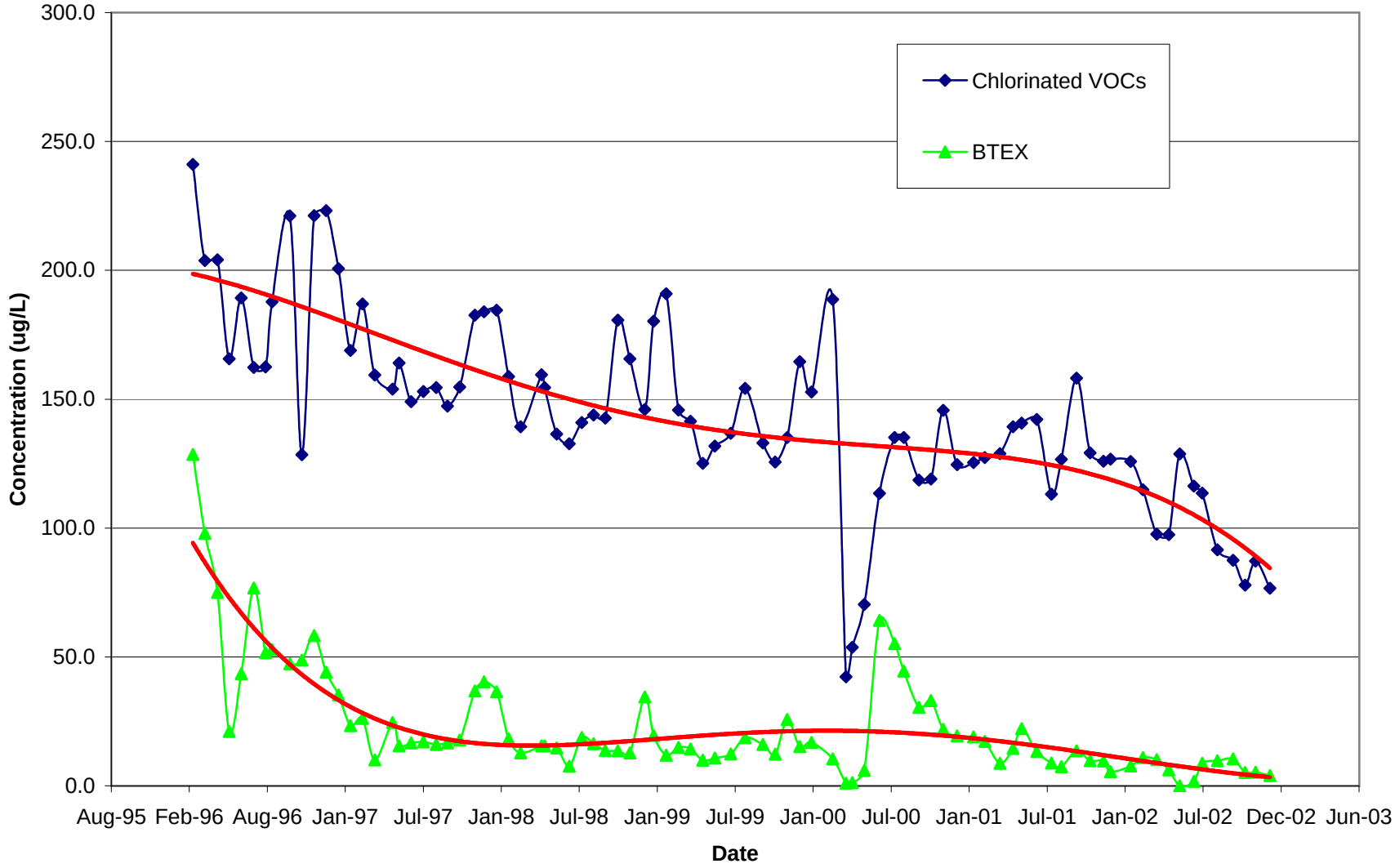
LOWER AQUIFER MONITORING WELLS FOR SITE-WIDE GROUNDWATER MONITORING GENERAL MOTORS CORPORATION MORAINE, OHIO

DATE	PROJECT MANAGER	DRAWING NAME
2/24/2004	N. GILLOTTI	CRA\SITEWIDE\SWGW04
DRAWN	LEAD DESIGN PROF.	CHECKED
R. SMITH	J. REID	N. GILLOTTI
PROJECT NUMBER		DRAWING NUMBER
0H000294.0006.0003		4

Figure 5. TW-2 Influent VOCs Since System Start-Up, Groundwater Recovery and Treatment System, General Motors Corporation, Moraine, Ohio.



WEST DOROTHY LANE
DRYDEN ROAD
NORTHLAWN AVE
GLADSTONE
HOLMAN
ENCRETE LANE
DMAX ENGINE PLANT
PARKING LOT
DRAINAGE DITCH
EAST HAULAWAY
PRODUCT PARKING
MORAINE ASSEMBLY ADDITION
BIG HILL RD.
PARKING LOT
MORAINE ASSEMBLY PLANT 1
COMPRESSOR BUILDING
PARKING LOT
CHEVROLET AVE.
SOUTHBOUND KETTERING BLVD.
HOYLE PLACE
FULTON AVE
LANDFILL L3
LANDFILL L2
CLOSED NORTH SETTLING LAGOON
HOLY LAKE
FORMER DELPHI THERMAL BLDG 14
EAST RIVER ROAD
STROOP ROAD
DELPO ADDITION
MORAINE ASSEMBLY PAINT BLDG.
VEHICLE DISTRIBUTION CENTER
PARKING LOT
FULTON AVE
ELLERY AVE
KETTERING BLVD.
NORTHBOUND
WEST STROOP ROAD
LAMME RD.
CLOSED SOUTH SETTLING LAGOON
COMPANY VEHICLE OPERATIONS
TELHURST
LAKEHURST
MAIN STREET
LANDFILL L1
DRYDEN ROAD
CONRAIL RAILROAD
SPRINGBORO ROAD
US INTERSTATE 75
HOLES CREEK

HR-9 707.76
GM-24 707.97
707.62 HR-11
707.28 HR-8
W-1-N 707.15
HR-4 706.96
GM-30* (704.93)
(716.14) GM-23* DRY GM-27
W-2-N 706.55
706.38
706.37 HR-2
W-3-N
W-4-N 706.38
HR-3 706.31
GM-29* (703.46)
GM-28* 706.09
706.07 HR-7
HR-5 705.97
GM-25 705.77
HR-6 705.31
HR-1 704.90
704.86 ME-6
704.77 W-1-S
704.74 GM-31
704.08 ME-2
ME-4
704.39 ME-3 704.73
HR-16 704.54
704.70 HR-17
GM-22 (701.87)
704.52 GM-33
704.53 GM-34
704.47 RW-10
RW-11
704.46 WEST
704.48 EAST
704.24
704.45
W-2-S 703.91
W-3-S
W-4-S
(708.13) 703.91
704.02 GM-37
GM-35
GM-38
GM-19S
GM-36
704.22
704.17
704.12
GM-32
NM WS-19
703.52 (697.96)
GM-21 703.55
GM-8
703.27
GM-6
703.26
NM 4S
703.68 GM-2
WS-17 703.35
GM-16 703.18
GM-17
703
WS-18 703.42
TW-2 696.96
GM-18 (701.88)
WSU-24 703.66
GM-10 702.90
GM-26 702.44

708
707
706
705
704
703

0 200 700ft

LEGEND

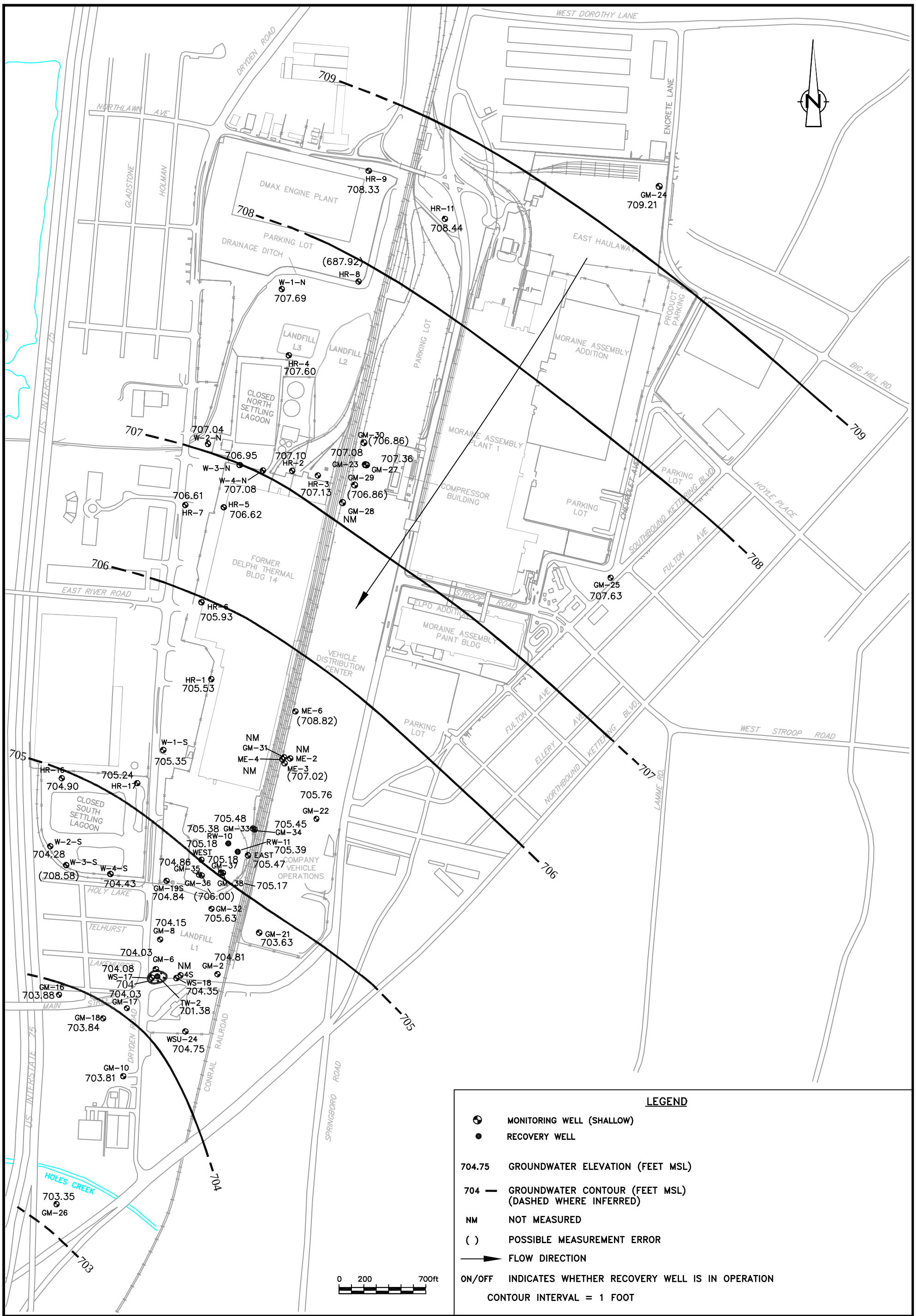
GM-18	MONITORING WELL (SHALLOW)
●	RECOVERY WELL
*	WELL SCREENED ABOVE THE UPPER CLAY TILL
703.52	GROUNDWATER ELEVATION (FEET MSL)
704 —	GROUNDWATER CONTOUR (FEET MSL) (DASHED WHERE INFERRED)
NM	NOT MEASURED
( )	POSSIBLE MEASUREMENT ERROR
→	FLOW DIRECTION
ON/OFF	INDICATES WHETHER RECOVERY WELL IS IN OPERATION

CONTOUR INTERVAL = 1 FOOT

ARCADIS
6397 Emerald Parkway
Suite 150, Dublin, OH 43016
Tel: 614/764-2310 Fax: 614/764-1270

WATER TABLE SURFACE (UPPER AQUIFER) ON NOVEMBER 5, 2001 GENERAL MOTORS CORPORATION MORAINE, OHIO

DATE 3/26/2003	PROJECT MANAGER N. GILLOTTI		DRAWING NAME CRA\SITEWID\SWSHAL01
DRAWN R. SMITH	LEAD DESIGN PROF. J. REID		CHECKED N. GILLOTTI
PROJECT NUMBER 0H000294.0005.0002			DRAWING NUMBER 6



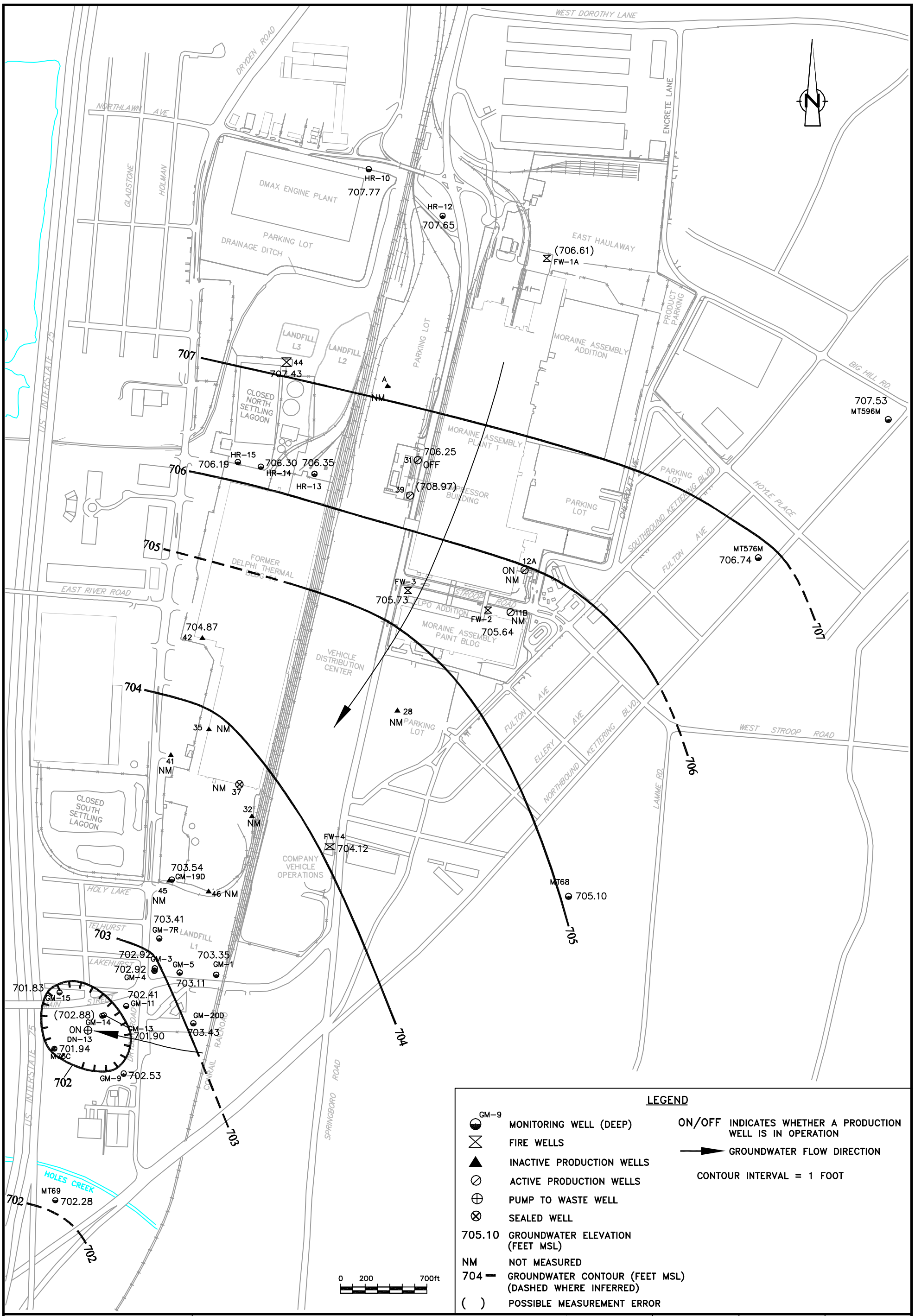
LEGEND

- MONITORING WELL (SHALLOW)
- RECOVERY WELL
- 704.75 GROUNDWATER ELEVATION (FEET MSL)
- 704 GROUNDWATER CONTOUR (FEET MSL) (DASHED WHERE INFERRED)
- NM NOT MEASURED
- ( ) POSSIBLE MEASUREMENT ERROR
- FLOW DIRECTION
- ON/OFF INDICATES WHETHER RECOVERY WELL IS IN OPERATION
- CONTOUR INTERVAL = 1 FOOT

ARCADIS
6397 Emerald Parkway
Suite 150, Dublin, OH 43016
Tel: 614/764-2310 Fax: 614/764-1270

WATER TABLE SURFACE (UPPER AQUIFER) ON SEPTEMBER 16 AND 17, 2002 GENERAL MOTORS CORPORATION MORAINE, OHIO

DATE	PROJECT MANAGER	DRAWING NAME
3/26/2003	N. GILLOTTI	CRA\SITEWID\SWSHAL02
DRAWN	LEAD DESIGN PROF.	CHECKED
R. SMITH	J. REID	N. GILLOTTI
PROJECT NUMBER		DRAWING NUMBER
0H000294.0005.0002		7



LEGEND

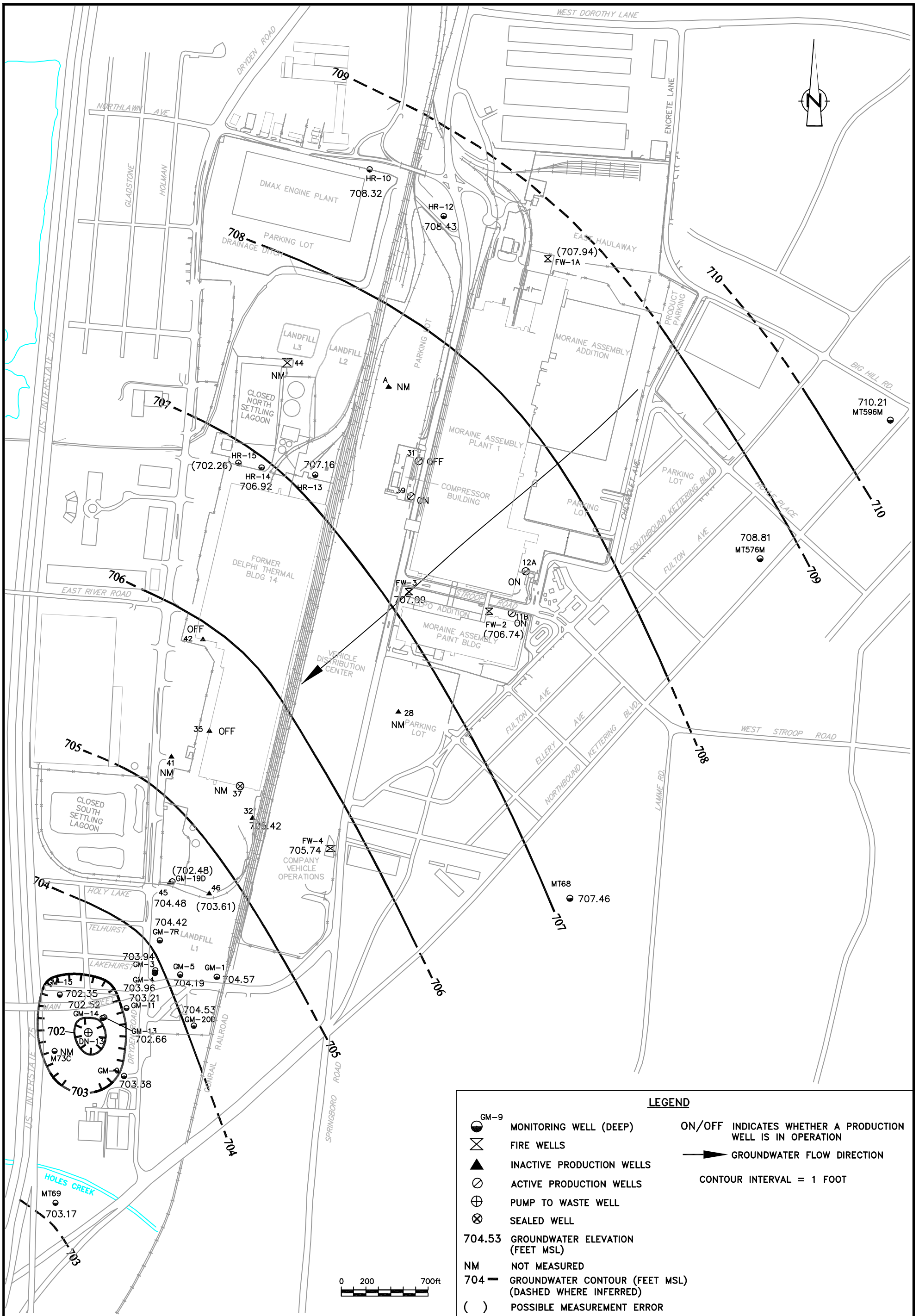
GM-9	MONITORING WELL (DEEP)
	FIRE WELLS
	INACTIVE PRODUCTION WELLS
	ACTIVE PRODUCTION WELLS
	PUMP TO WASTE WELL
	SEALED WELL
705.10	GROUNDWATER ELEVATION (FEET MSL)
NM	NOT MEASURED
704	GROUNDWATER CONTOUR (FEET MSL) (DASHED WHERE INFERRED)
( )	POSSIBLE MEASUREMENT ERROR
ON/OFF	INDICATES WHETHER A PRODUCTION WELL IS IN OPERATION
	GROUNDWATER FLOW DIRECTION

CONTOUR INTERVAL = 1 FOOT

ARCADIS
6397 Emerald Parkway
Suite 150, Dublin, OH 43016
Tel: 614/764-2310 Fax: 614/764-1270

POTENTIOMETRIC SURFACE (LOWER AQUIFER) ON NOVEMBER 5, 2001 GENERAL MOTORS CORPORATION MORAINE, OHIO

DATE 3/26/2003	PROJECT MANAGER N. GILLOTTI	DRAWING NAME CRA\SITEWID\SWDEEP01
DRAWN R. SMITH	LEAD DESIGN PROF. J. REID	CHECKED N. GILLOTTI
PROJECT NUMBER 0H000294.0005.0002		DRAWING NUMBER 8



LEGEND

- GM-9 — MONITORING WELL (DEEP)
- FIRE WELLS
- INACTIVE PRODUCTION WELLS
- ACTIVE PRODUCTION WELLS
- PUMP TO WASTE WELL
- SEALED WELL
- 704.53 — GROUNDWATER ELEVATION (FEET MSL)
- NM — NOT MEASURED
- 704 — 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

ARCADIS
6397 Emerald Parkway
Suite 150, Dublin, OH 43016
Tel: 614/764-2310 Fax: 614/764-1270

POTENTIOMETRIC SURFACE (LOWER AQUIFER) ON SEPTEMBER 16 AND 17, 2002 GENERAL MOTORS CORPORATION MORAINE, OHIO

DATE	PROJECT MANAGER	DRAWING NAME
3/26/2003	N. GILLOTTI	CRA\SITEWID\SWDEEP02
DRAWN	LEAD DESIGN PROF.	CHECKED
R. SMITH	J. REID	N. GILLOTTI
PROJECT NUMBER		DRAWING NUMBER
0H000294.0005.0002		9

HR-3	9/16/1999 UG/L	9/19/2000 UG/L	11/7/2001 UG/L	9/24/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
1,1-Dichloroethane	6.2	5.1	6.9	15
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	6.1	4.6	5.1	9.9
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	0.53 U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	0.60	1
Trichloroethene	ND (1.0) U	ND (1.00) U	0.66 J	1.4
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U

HR-4	9/14/1999 UG/L	9/20/2000 UG/L	11/8/2001 UG/L	9/27/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	0.17 J	ND (1) U
1,1-Dichloroethane	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	0.39 J	ND (0.5) U
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	1.2	ND (1.00) U	0.65 J	0.59 J
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	0.66 U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	ND (0.5) U
Trichloroethene	1.4	ND (1.00) U	1.0	0.71 J
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U

HR-9	9/16/1999 UG/L	9/19/2000 UG/L	11/8/2001 UG/L	9/19/2002 UG/L
1,1,1-Trichloroethane	20.3	20.5	17	13
1,1-Dichloroethane	52.2	51.0	38	46
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	0.85 J	1.1 J
Benzene	ND (1.0) U	ND (1.00) U	ND (1.4) U	ND (1.7) U
cis-1,2-Dichloroethene	25.3	15.3	12	17
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.4) U	ND (1.7) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	ND (1.4) U	ND (1.7) U
Toluene	ND (1.0) U	ND (1.00) U	ND (1.4) U	ND (1.7) U
trans-1,2-Dichloroethene	3.5	2.6	1.7	2.5
Trichloroethene	18.1	16.9	14	15
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.4) U	ND (1.7) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.4) U	ND (1.7) U

HR-11	9/14/1999 UG/L	9/18/2000 UG/L	11/8/2001 UG/L	9/25/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	0.38 J	ND (1) U
1,1-Dichloroethane	13.5	32.9/36.5	33	18
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	3.3	18.5/20.6	19	6.1
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Toluene	ND (1.0) U	0.6/ND (1.00) U	ND (1.0) U	0.46 U
trans-1,2-Dichloroethene	ND (1.0) U	2.6/2.6	2.3	0.72
Trichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Vinyl chloride	ND (1.0) U	ND (1.00) U	0.35 J	ND (1) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U

HR-2	9/16/1999 UG/L	9/19/2000 UG/L	11/7/2001 UG/L	9/24/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
1,1-Dichloroethane	3.9	4.6	4.2	4.9
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	9.6	8.6	8.3	8.6
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	0.47 U
trans-1,2-Dichloroethene	1.5	1.1	1.1	1.2
Trichloroethene	ND (1.0) U	ND (1.00) U	0.58 J	0.48 J
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U

W-1-N	9/17/1999 UG/L	9/19/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.0) U
1,1-Dichloroethane	ND (1.0) U	0.36 J
1,1-Dichloroethene	ND (1.0) U	ND (1.0) U
Benzene	ND (1.0) U	ND (1.0) U
cis-1,2-Dichloroethene	ND (1.0) U	ND (0.50) U
Ethylbenzene	ND (1.0) U	ND (1.0) U
Tetrachloroethene	ND (1.0) U	ND (1.0) U
Toluene	ND (1.0) U	ND (1.0) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (0.50) U
Trichloroethene	ND (1.0) U	ND (1.0) U
Vinyl chloride	ND (1.0) U	ND (1.0) U
Xylene (total)	ND (1.0) U	ND (1.0) U

HR-8	9/16/1999 UG/L	9/18/2000 UG/L	11/8/2001 UG/L	9/19/2002 UG/L
1,1,1-Trichloroethane	10.6	9.8	10	11
1,1-Dichloroethane	26.4	29.0	26	18
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	0.44 J
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
cis-1,2-Dichloroethene	4.4	5.6	5.4	4.8
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
trans-1,2-Dichloroethene	1.5	1.9	1.3	0.85
Trichloroethene	1.6	1.1	1.1	1.8
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U

W-4-N	9/17/1999 UG/L	9/19/2000 UG/L	11/7/2001 UG/L	9/24/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	0.33 J	0.44 J
1,1-Dichloroethane	1.3	ND (1.00) U	0.89 J	1.7
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	2.2	2.0	1.6	5.2
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	2.1	ND (1.00) U	0.92 J	0.94 J
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	0.81 U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	0.33 J
Trichloroethene	9.8	7.3	7.1	8.5
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	0.77 J
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	0.71 U

GM-24	9/23/1999 UG/L
1,1,1-Trichloroethane	2.7
1,1-Dichloroethane	ND (1.0) U
1,1-Dichloroethene	ND (1.0) U
Benzene	ND (1.0) U
cis-1,2-Dichloroethene	ND (1.0) U
Ethylbenzene	ND (1.0) U
Tetrachloroethene	ND (1.0) U
Toluene	ND (1.0) U
trans-1,2-Dichloroethene	ND (1.0) U
Trichloroethene	ND (1.0) U
Vinyl chloride	ND (1.0) U
Xylene (total)	ND (1.0) U

GM-30	9/2/1999 UG/L	9/20/2000 UG/L	11/13/2001 UG/L	9/27/2002 UG/L
1,1,1-Trichloroethane	ND (10) U	ND (1.00) U	ND (25) U	ND (33) U
1,1-Dichloroethane	53.8	50.6	31	34
1,1-Dichloroethene	ND (10) U	ND (1.00) U	ND (25) U	ND (33) U
Benzene	ND (10) U	2.7	ND (25) U	ND (33) U
cis-1,2-Dichloroethene	7.5	ND (1.00) U	ND (12) U	ND (17) U
Ethylbenzene	7030	2280	640	280
Tetrachloroethene	9.5	ND (1.00) U	ND (25) U	ND (33) U
Toluene	9950	98.9	8.0 J	ND (33) U
trans-1,2-Dichloroethene	ND (10) U	ND (1.00) U	ND (12) U	ND (17) U
Trichloroethene	ND (10) U	ND (1.00) U	12 J	ND (33) U
Vinyl chloride	ND (10) U	ND (1.00) U	ND (25) U	ND (33) U
Xylene (total)	23300	6770	2000	1400

W-3-N	9/17/1999 UG/L	9/18/2000 UG/L	11/7/2001 UG/L	9/23/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	ND (5.6) U	ND (6.7) U
1,1-Dichloroethane	ND (1.0) U	ND (1.00) U	ND (5.6) U	ND (6.7) U
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (5.6) U	ND (6.7) U
Benzene	ND (1.0) U	ND (1.00) U	ND (5.6) U	ND (6.7) U
cis-1,2-Dichloroethene	291	282	160	150
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (5.6) U	ND (6.7) U
Tetrachloroethene	2.5	ND (1.00) U	9.0	ND (6.7) U
Toluene	ND (1.0) U	ND (1.00) U	ND (5.6) U	ND (6.7) U
trans-1,2-Dichloroethene	2.6	3.9	2.2 J	ND (3.3) U
Trichloroethene	ND (1.0) U	ND (1.00) U	2.1 J	ND (6.7) U
Vinyl chloride	12.5	24.0	7.6	6.5 J
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (5.6) U	ND (6.7) U

GM-23	9/2/1999 UG/L	9/20/2000 UG/L	11/12/2001 UG/L	9/26/2002 UG/L
1,1,1-Trichloroethane	7.2	2.0	ND (420) U	ND (400) U
1,1-Dichloroethane	32.5	16.3	ND (420) U	ND (400) U
1,1-Dichloroethene	17.2	5.1	ND (420) U	ND (400) U
Benzene	1.9	ND (1.00) U	ND (420) U	ND (400) U
cis-1,2-Dichloroethene	7530	5630	6400	7700
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (420) U	ND (400) U
Tetrachloroethene	6280	3470	15000	10000
Toluene	ND (1.0) U	ND (1.00) U	ND (420) U	ND (400) U
trans-1,2-Dichloroethene	540	33.2	ND (210) U	ND (200) U
Trichloroethene	1480	900	2250	1700
Vinyl chloride	2500	801	1200	540
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (420) U	ND (400) U

W-2-N	9/14/1999 UG/L	9/19/2000 UG/L	11/8/2001 UG/L	9/19/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	0.46 J	ND (1.0) U
1,1-Dichloroethane	ND (1.0) U	ND (1.00) U	0.33 J	0.31 J
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
cis-1,2-Dichloroethene	1.6	1.3	1.1	1.6
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (0.50) U	ND (0.50) U	ND (0.50) U
Trichloroethene	1.7	ND (1.00) U	1.4	1.4
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U

HR-5	9/16/1999 UG/L	9/19/2000 UG/L	11/7/2001 UG/L	9/23/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	0.17 J/ND (1.0) U	ND (1) U
1,1-Dichloroethane	ND (1.0) U	ND (1.00) U	0.91 J/0.85 J	0.55 J
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	10.5	8.6	7.7/7.8	7.5
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
trans-1,2-Dichloroethene	ND (1.0) U	3.0	ND (1.0) U	ND (1) U
Trichloroethene	12.0	8.1	11	13
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Xylene (total)	ND (1.0) U	2.0	ND (1.0) U	ND (1) U

HR-7	9/17/1999 UG/L	9/19/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.0) U
1,1-Dichloroethane	ND (1.0) U	ND (1.0) U
1,1-Dichloroethene	ND (1.0) U	ND (1.0) U
Benzene	ND (1.0) U	ND (1.0) U
cis-1,2-Dichloroethene	ND (1.0) U	0.65
Ethylbenzene	ND (1.0) U	ND (1.0) U
Tetrachloroethene	ND (1.0) U	ND (1.0) U
Toluene	ND (1.0) U	ND (1.0) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (0.50) U
Trichloroethene	5.4	5.9
Vinyl chloride	ND (1.0) U	ND (1.0) U
Xylene (total)	ND (1.0) U	ND (1.0) U

HR-6	9/16/1999 UG/L	9/23/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1) U
1,1-Dichloroethane	ND (1.0) U	ND (1) U
1,1-Dichloroethene	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	ND (1.0) U	ND (0.5) U
Ethylbenzene	ND (1.0) U	ND (1) U
Tetrachloroethene	ND (1.0) U	ND (1) U
Toluene	ND (1.0) U	ND (1) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (0.5) U
Trichloroethene	2.0	1.5
Vinyl chloride	ND (1.0) U	ND (1) U
Xylene (total)	ND (1.0) U	ND (1) U

W-1-S	9/22/1999 UG/L	9/19/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (2.0) U
1,1-Dichloroethane	ND (1.0) U	0.97 J/1.0 J
1,1-Dichloroethene	ND (1.0) U	ND (2.0) U
Benzene	ND (1.0) U	ND (2.0) U
cis-1,2-Dichloroethene	7.8/8.0	6.0/9.1
Ethylbenzene	ND (1.0) U	ND (2.0) U
Tetrachloroethene	38.4/39.8	61/62
Toluene	ND (1.0) U	ND (2.0) U
trans-1,2-Dichloroethene	1.1	1.3
Trichloroethene	11.6	14
Vinyl chloride	ND (1.0) U	ND (2.0) U
Xylene (total)	ND (1.0) U	ND (2.0) U

ME-1	8/31/1999 UG/L
1,1,1-Trichloroethane	13.5
1,1-Dichloroethane	2.4
1,1-Dichloroethene	ND (1.0) U
Benzene	ND (1.0) U
cis-1,2-Dichloroethene	38.2
Ethylbenzene	ND (1.0) U
Tetrachloroethene	53.6
Toluene	ND (1.0) U
trans-1,2-Dichloroethene	1.5
Trichloroethene	292
Vinyl chloride	38
Xylene (total)	ND (1.0) U

GM-31	9/1/1999 UG/L	9/21/2000 UG/L	11/15/2001 UG/L	9/24/2002 UG/L
1,1,1-Trichloroethane	ND (1.00) U	ND (1.00) U	ND (4.0) U	ND (6) U
1,1-Dichloroethane	1.3	1.1	3.1/3.1 J	5.9 J
1,1-Dichloroethene	ND (1.00) U	ND (1.00) U	ND (4.0) U	ND (6) U
Benzene	ND (1.00) U	ND (1.00) U	ND (4.0) U	ND (6) U
cis-1,2-Dichloroethene	7.6	40.2	120/24	190/200
Ethylbenzene	ND (1.00) U	ND (1.00) U	ND (4.0) U	ND (6) U
Tetrachloroethene	1.3	ND (1.00) U	ND (4.0) U	ND (6) U
Toluene	ND (1.00) U	ND (1.00) U	ND (4.0) U	ND (6) U
trans-1,2-Dichloroethene	ND (1.00) U	ND (1.00) U	1.8 J/ND (0.50) U	3.3/3.5
Trichloroethene	27.2	8.9	11/5.1	10/12
Vinyl chloride	ND (1.00) U	ND (1.00) U	2.5/7.4	18/19
Xylene (total)	ND (1.00) U	ND (1.00) U	ND (4.0) U	ND (6) U

ME-3	8/31/1999 UG/L	9/21/2000 UG/L	11/15/2001 UG/L	9/24/2002 UG/L
1,1,1-Trichloroethane	38.3/42.5	6.4	1.6	ND (2.5) U
1,1-Dichloroethane	6.1	3.4	5.8	ND (2.5) U
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (2.5) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (2.5) U
cis-1,2-Dichloroethene	5.6/5.7	2.6	16	ND (1.2) U
Ethylbenzene	ND (1.00) U	ND (1.00) U	ND (1.0) U	ND (2.5) U
Tetrachloroethene	57.9/60.4	ND (1.00) U	1.3	ND (2.5) U
Toluene	ND (1.0) U	1.4	0.34 J	ND (2.5) U
trans-1,2-Dichloroethene	ND (1.0) U	2.6	2.7	ND (1.2) U
Trichloroethene	45.0/47.5	ND (1.00) U	3.8	ND (2.5) U
Vinyl chloride	ND (1.0) U	2.1	7.3	ND (2.5) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (2.5) U

HR-17	9/23/1999 UG/L	9/28/2000 UG/L	11/8/2001 UG/L	9/18/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	1.9	1.4	0.39 J
1,1-Dichloroethane	ND (1.0) U	ND (1.00) U	ND (1.0) U	1.5
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
cis-1,2-Dichloroethene	6.2	ND (1.00) U	ND (0.50) U	5.1
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Tetrachloroethene	19.5	3.7	3.3	22
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	1.4
Trichloroethene	7.4	4.2 B	ND (1.0) U	12
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U

GM-22	9/1/1999 UG/L	9/21/2000 UG/L	11/13/2001 UG/L	9/25/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	4.4	0.53 J
1,1-Dichloroethane	ND (1.0) U	2.4	6.8	ND (2) U
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	0.56 J	ND (2) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (2) U
cis-1,2-Dichloroethene	ND (1.0) U	1.8	6.5	ND (1) U
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (2) U
Tetrachloroethene	3.0	1.6	4.9	2.3
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (2) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	0.17 J	ND (1) U
Trichloroethene	4.0	ND (1.00) U	7.5	7.8
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (2) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (2) U

W-2-S	9/23/1999 UG/L	9/27/2000 UG/L	11/8/2001 UG/L	9/18/2002 UG/L
1,1,1-Trichloroethane	1.9	1.6/1.7	1.7	1.5
1,1-Dichloroethane	ND (1.0) U	ND (1.00) U	0.58 J	0.98 J
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
cis-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	0.48 J	0.80
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (0.50) U	ND (0.50) U	ND (0.50) U
Trichloroethene	6.1	5.0	5.2 B	5.9
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U

NEST	9/21/1999 UG/L
1,1,1-Trichloroethane	24.8
1,1-Dichloroethane	25.6
1,1-Dichloroethene	ND (1.0) U
Benzene	ND (1.0) U
cis-1,2-Dichloroethene	125
Ethylbenzene	ND (1.0) U
Tetrachloroethene	41.3
Toluene	ND (1.0) U
trans-1,2-Dichloroethene	ND (1.0) U
Trichloroethene	37.3
Vinyl chloride	ND (1.0) U
Xylene (total)	ND (1.0) U

EAST	9/21/1999 UG/L	9/22/2000 UG/L	11/12/2001 UG/L	9/23/2002 UG/L
1,1,1-Trichloroethane	21.0	22.2	13	10
1,1-Dichloroethane	8.4	7.7	6.2	3.5
1,1-Dichloroethene	ND (1.0) U	1.2	0.90 J	0.73 J
Benzene	ND (1.0) U	ND (1.00) U	ND (3.3) U	ND (2) U
cis-1,2-Dichloroethene	5.1	77.5	61	8.5
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (3.3) U	ND (2) U
Tetrachloroethene	61.0	35.6	58	49
Toluene	ND (1.0) U	ND (1.00) U	ND (3.3) U	ND (2) U
trans-1,2-Dichloroethene	ND (1.0) U	1.6	2.7	ND (1) U
Trichloroethene	58.1	97.2	82	48
Vinyl chloride	ND (1.0) U	3.0	1.5 J	ND (2) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (3.3) U	ND (2) U

GM-27	9/1/1999 UG/L	9/20/2000 UG/L	11/13/2001 UG/L	9/26/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	ND (3.3) U	ND (3.3) U
1,1-Dichloroethane	2.4	2.1/2.2	1.8 J/1.9 J	1.7 J
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (3.3) U	ND (3.3) U
Benzene	ND (1.0) U	ND (1.00) U	ND (3.3) U	ND (3.3) U
cis-1,2-Dichloroethene	20.6	13.9/13.9	13/14	14
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (3.3) U	ND (3.3) U
Tetrachloroethene	1.7	1.2	6.8/7.2	ND (3.3) U
Toluene	ND (1.0) U	ND (1.00) U	ND (3.3) U	ND (3.3) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.7) U	ND (1.7) U
Trichloroethene	121	112/117	110/120	100
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (3.3) U	ND (3.3) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (3.3) U	ND (3.3) U

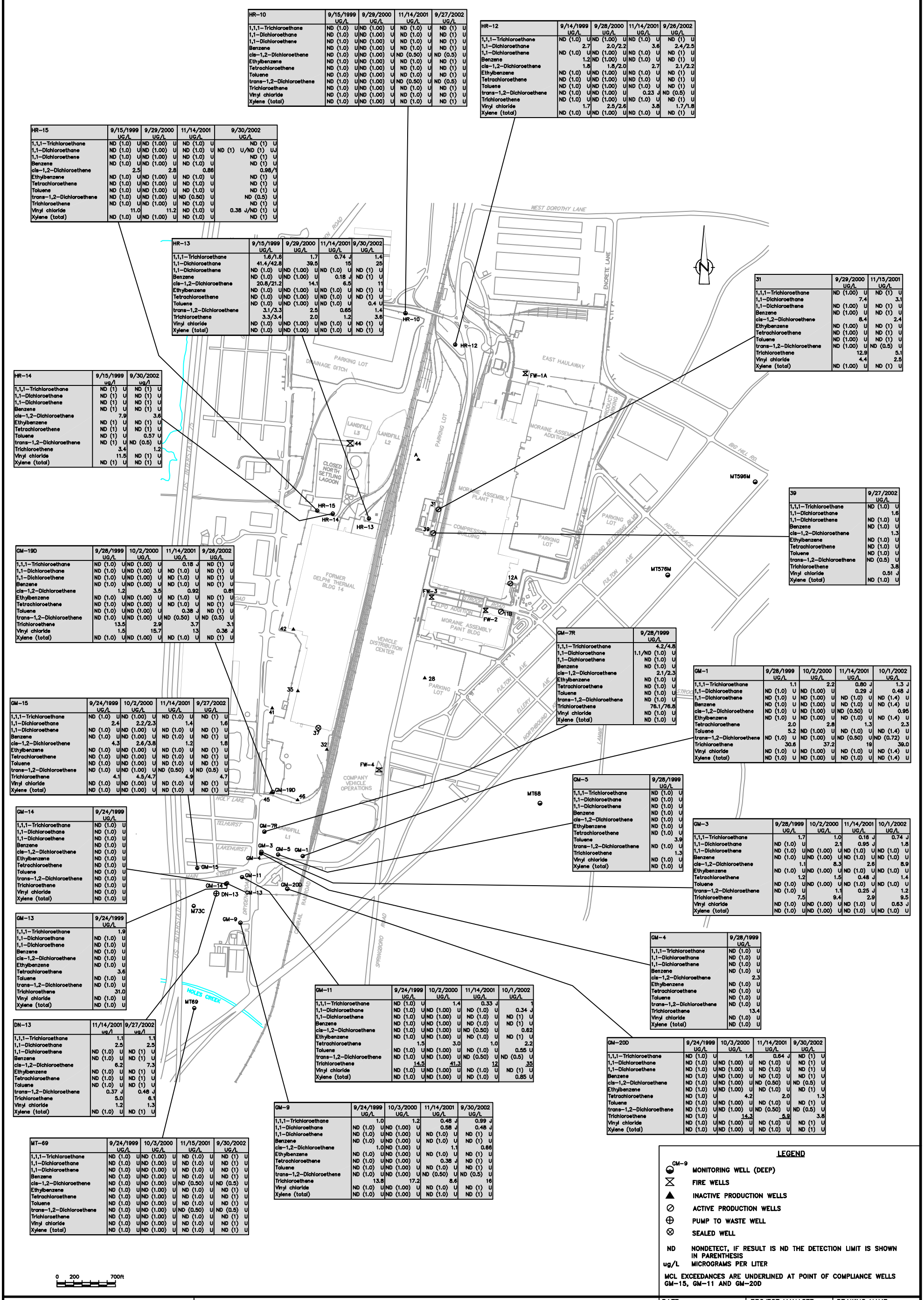
GM-29	9/1/1999 UG/L	9/21/2000 UG/L	11/13/2001 UG/L	9/25/2002 UG/L
1,1,1-Trichloroethane	37.8	24.5	ND (50) U	16 J
1,1-Dichloroethane	4.3	10.8	ND (50) U	ND (40) U
1,1-Dichloroethene	1.3	3.1	ND (50) U	ND (40) U
Benzene	ND (1.0) U	ND (1.00) U	ND (50) U	ND (40) U
cis-1,2-Dichloroethene	320	287	1800	1300
Ethylbenzene	ND (1.0) U	ND (1.00) U	21 J	ND (40) U
Tetrachloroethene	ND (20) U	20.0	17 J	18 J
Toluene	ND (1.0) U	2.2	ND (50) U	ND (40) U
trans-1,2-Dichloroethene	11.1	14.4	26	21
Trichloroethene	578	289	270	310
Vinyl chloride	3.8	798	230	140
Xylene (total)	ND (1.0) U	ND (1.00) U	52	ND (40) U

GM-28	9/1/1999 UG/L	9/21/2000 UG/L	11/15/2001 UG/L	9/24/2002 UG/L
1,1,1-Trichloroethane	17.7	5.0	ND (10) U	ND (1) U
1,1-Dichloroethane	3.2	0.9	ND (10) U	2.7
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (10) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	ND (10) U	ND (1) U
cis-1,2-Dichloroethene	178	37.0	ND (3.0) U	1.3
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (10) U	ND (1) U
Tetrachloroethene	316	2.3	ND (10) U	ND (1) U
Toluene	ND (1.0) U	ND (1.00) U	ND (10) U	1.3 U
trans-1,2-Dichloroethene	8.2	22.3	11	11
Trichloroethene	768	1.6	ND (10) U	0.88 J
Vinyl chloride	3.2	12.4	ND (10) U	ND (1) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (10) U	1.2 U

GM-25	9/22/1999 UG/L
1,1,1-Trichloroethane	ND (1.0) U
1,1-Dichloroethane	ND (1.0) U
1,1-Dichloroethene	ND (1.0) U
Benzene	ND (1.0) U
cis-1,2-Dichloroethene	ND (1.0) U
Ethylbenzene	ND (1.0) U
Tetrachloroethene	ND (1.0) U
Toluene	ND (1.0) U
trans-1,2-Dichloroethene	ND (1.0) U
Trichloroethene	ND (1.0) U
Vinyl chloride	ND (1.0) U
Xylene (total)	ND (1.0) U

ME-5	8/31/1999 UG/L	9/21/2000 UG/L	11/15/2001 UG/L	9/25/2002 UG/L
1,1,1-Trichloroethane	2.9	ND (1.00) U	2.2	ND (10) U
1,1-Dichloroethane	ND (1.0) U	ND (1.00) U	ND (10) U	ND (10) U
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (10) U	ND (10) U
Benzene	ND (1.0) U	ND (1.00) U	ND (2.0) U	ND (10) U
cis-1,2-Dichloroethene	250	96.6	86	8.2
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (2.0) U	ND (10) U
Tetrachloroethene	21.3	6.7	8.2	ND (10) U
Toluene	ND (1.0) U	1.9	0.42 J	6.6 J
trans-1,2-Dichloroethene	ND (1.0) U	2.5	1.8	ND (5) U
Trichloroethene	474	19.0	23	ND (10) U
Vinyl chloride	ND (1.0) U	6.1	13	ND (10) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (2.0) U	ND (10) U

GM-33	9/20/1999 UG/L	9/22/2000 UG/L	11/12/2001 UG/L	9/26/2002 UG/L
1,1,1-Trichloroethane	10	14.5	7.6	6.3
1,1-Dichloroethane	7.7	4.4	2.9 J	6.3
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (3.3) U	ND (4) U
Benzene	ND (1.00) U	ND (1.00) U	ND (3.3) U	ND (4) U
cis-1,2-Dichloroethene	34.0	37.5	38	39
Ethylbenzene	ND (10.0) U	ND (1.00) U	ND (3.3) U	ND (4) U
Tetrachloroethene	46	28.0	64	52
Toluene	ND (1.00) U	ND (1.00) U	ND (3.3) U	ND (4) U
trans-



HR-10	9/15/1999 UG/L	9/29/2000 UG/L	11/14/2001 UG/L	9/27/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
1,1-Dichloroethane	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	ND (0.5) U
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	ND (0.5) U
Trichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U

HR-12	9/14/1999 UG/L	9/28/2000 UG/L	11/14/2001 UG/L	9/26/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
1,1-Dichloroethane	2.7	2.0/2.2	3.6	2.4/2.5
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	1.2	ND (1.00) U	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	1.8	1.8/2.0	2.7	2.1/2.2
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	0.23 J	ND (0.5) U
Trichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Vinyl chloride	1.7	2.5/2.6	3.8	1.7/1.8
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U

HR-15	9/15/1999 UG/L	9/29/2000 UG/L	11/14/2001 UG/L	9/30/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
1,1-Dichloroethane	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U/ND (1) UJ
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	2.5	2.8	0.86	0.98/1
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	ND (0.5) U
Trichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Vinyl chloride	11.0	11.2	ND (1.0) U	0.38 J/ND (1) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U

HR-13	9/15/1999 UG/L	9/29/2000 UG/L	11/14/2001 UG/L	9/30/2002 UG/L
1,1,1-Trichloroethane	1.6/1.6	1.7	0.74 J	1.4
1,1-Dichloroethane	41.4/42.8	39.5	15	25
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	0.18 J	ND (1) U
cis-1,2-Dichloroethene	20.8/21.2	14.1	6.5	11
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	0.4 U
trans-1,2-Dichloroethene	3.1/3.3	2.5	0.65	1.4
Trichloroethene	3.3/3.4	2.0	1.2	3.6
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U

31	9/29/2000 UG/L	11/15/2001 UG/L
1,1,1-Trichloroethane	ND (1.00) U	ND (1) U
1,1-Dichloroethane	7.4	3.1
1,1-Dichloroethene	ND (1.00) U	ND (1) U
Benzene	ND (1.00) U	ND (1) U
cis-1,2-Dichloroethene	8.4	2.4
Ethylbenzene	ND (1.00) U	ND (1) U
Tetrachloroethene	ND (1.00) U	ND (1) U
Toluene	ND (1.00) U	ND (1) U
trans-1,2-Dichloroethene	ND (1.00) U	ND (0.5) U
Trichloroethene	12.9	5.1
Vinyl chloride	4.4	2.5
Xylene (total)	ND (1.00) U	ND (1) U

39	9/27/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U
1,1-Dichloroethane	1.6
1,1-Dichloroethene	ND (1.0) U
Benzene	ND (1.0) U
cis-1,2-Dichloroethene	1.3
Ethylbenzene	ND (1.0) U
Tetrachloroethene	ND (1.0) U
Toluene	ND (1.0) U
trans-1,2-Dichloroethene	ND (0.5) U
Trichloroethene	3.8
Vinyl chloride	0.51 J
Xylene (total)	ND (1.0) U

GM-14	9/15/1999 ug/l	9/30/2002 ug/l
1,1,1-Trichloroethane	ND (1) U	ND (1) U
1,1-Dichloroethane	ND (1) U	ND (1) U
1,1-Dichloroethene	ND (1) U	ND (1) U
Benzene	ND (1) U	ND (1) U
cis-1,2-Dichloroethene	7.9	3.6
Ethylbenzene	ND (1) U	ND (1) U
Tetrachloroethene	ND (1) U	ND (1) U
Toluene	ND (1) U	0.57 U
trans-1,2-Dichloroethene	ND (1) U	ND (0.5) U
Trichloroethene	3.4	1.2
Vinyl chloride	11.5	ND (1) U
Xylene (total)	ND (1) U	ND (1) U

GM-19D	9/28/1999 UG/L	10/2/2000 UG/L	11/14/2001 UG/L	9/26/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	0.18 J	ND (1) U
1,1-Dichloroethane	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	1.2	3.5	0.92	0.81
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Toluene	ND (1.0) U	ND (1.00) U	0.38 J	ND (1) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	ND (0.5) U
Trichloroethene	13.5	2.9	3.7	3.1
Vinyl chloride	1.5	15.7	13	0.36 J
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U

GM-7R	9/28/1999 UG/L
1,1,1-Trichloroethane	4.2/4.8
1,1-Dichloroethane	1.1/ND (1.0) U
1,1-Dichloroethene	ND (1.0) U
Benzene	ND (1.0) U
cis-1,2-Dichloroethene	2.1/2.3
Ethylbenzene	ND (1.0) U
Tetrachloroethene	ND (1.0) U
Toluene	ND (1.0) U
trans-1,2-Dichloroethene	ND (1.0) U
Trichloroethene	76.1/76.8
Vinyl chloride	ND (1.0) U
Xylene (total)	ND (1.0) U

GM-1	9/28/1999 UG/L	10/2/2000 UG/L	11/14/2001 UG/L	10/1/2002 UG/L
1,1,1-Trichloroethane	1.1	2.2	0.80 J	1.3 J
1,1-Dichloroethane	ND (1.0) U	ND (1.00) U	0.29 J	0.48 J
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.4) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.4) U
cis-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	0.95
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.4) U
Tetrachloroethene	2.0	2.8	1.3	2.3
Toluene	5.2	ND (1.00) U	ND (1.0) U	ND (1.4) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	ND (0.72) U
Trichloroethene	30.6	37.2	19	39.0
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.4) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.4) U

GM-15	9/24/1999 UG/L	10/2/2000 UG/L	11/14/2001 UG/L	9/27/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
1,1-Dichloroethane	2.4	2.2/2.3	1.4	1.6
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	4.3	2.6/3.8	1.2	1.8
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	ND (0.5) U
Trichloroethene	4.1	4.5/4.7	4.9	4.7
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U

GM-5	9/28/1999 UG/L
1,1,1-Trichloroethane	ND (1.0) U
1,1-Dichloroethane	ND (1.0) U
1,1-Dichloroethene	ND (1.0) U
Benzene	ND (1.0) U
cis-1,2-Dichloroethene	ND (1.0) U
Ethylbenzene	ND (1.0) U
Tetrachloroethene	ND (1.0) U
Toluene	3.9
trans-1,2-Dichloroethene	ND (1.0) U
Trichloroethene	1.3
Vinyl chloride	ND (1.0) U
Xylene (total)	ND (1.0) U

GM-3	9/28/1999 UG/L	10/2/2000 UG/L	11/14/2001 UG/L	10/1/2002 UG/L
1,1,1-Trichloroethane	1.7	1.0	0.16 J	0.74 J
1,1-Dichloroethane	ND (1.0) U	2.1	0.95 J	1.8
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
cis-1,2-Dichloroethene	1.1	8.3	2.6	8.9
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
Tetrachloroethene	1.2	1.5	0.48 J	1.4
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U
trans-1,2-Dichloroethene	ND (1.0) U	1.1	0.25 J	1.2
Trichloroethene	7.5	9.4	2.9	9.5
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	0.63 J
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1.0) U

GM-13	9/24/1999 UG/L
1,1,1-Trichloroethane	1.9
1,1-Dichloroethane	ND (1.0) U
1,1-Dichloroethene	ND (1.0) U
Benzene	ND (1.0) U
cis-1,2-Dichloroethene	ND (1.0) U
Ethylbenzene	ND (1.0) U
Tetrachloroethene	3.6
Toluene	ND (1.0) U
trans-1,2-Dichloroethene	ND (1.0) U
Trichloroethene	31.0
Vinyl chloride	ND (1.0) U
Xylene (total)	ND (1.0) U

GM-4	9/28/1999 UG/L
1,1,1-Trichloroethane	ND (1.0) U
1,1-Dichloroethane	ND (1.0) U
1,1-Dichloroethene	ND (1.0) U
Benzene	ND (1.0) U
cis-1,2-Dichloroethene	2.3
Ethylbenzene	ND (1.0) U
Tetrachloroethene	ND (1.0) U
Toluene	ND (1.0) U
trans-1,2-Dichloroethene	ND (1.0) U
Trichloroethene	13.4
Vinyl chloride	ND (1.0) U
Xylene (total)	ND (1.0) U

DN-13	11/14/2001 ug/l	9/27/2002 ug/l
1,1,1-Trichloroethane	1.1	1.1
1,1-Dichloroethane	2.5	2.5
1,1-Dichloroethene	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	6.2	7.3
Ethylbenzene	ND (1.0) U	ND (1) U
Tetrachloroethene	ND (1.0) U	ND (1) U
Toluene	ND (1.0) U	ND (1) U
trans-1,2-Dichloroethene	0.37 J	0.48 J
Trichloroethene	5.0	6.1
Vinyl chloride	1.2	1.3
Xylene (total)	ND (1.0) U	ND (1) U

GM-11	9/24/1999 UG/L	10/2/2000 UG/L	11/14/2001 UG/L	10/1/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	1.4	0.33 J	1
1,1-Dichloroethane	ND (1.0) U	ND (1.00) U	ND (1.0) U	0.34 J
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	0.62
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	1.5	3.0	1.0	2.2
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	0.55 U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	ND (0.5) U
Trichloroethene	14.5	41.3	12	35
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	0.85 U

GM-20D	9/24/1999 UG/L	10/3/2000 UG/L	11/14/2001 UG/L	9/30/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	1.6	0.64 J	ND (1) U
1,1-Dichloroethane	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	ND (0.5) U
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	ND (1.0) U	4.2	2.0	1.3
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	ND (0.5) U
Trichloroethene	ND (1.0) U	14.3	5.9	3.8
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U

GM-9	9/24/1999 UG/L	10/3/2000 UG/L	11/14/2001 UG/L	9/30/2002 UG/L
1,1,1-Trichloroethane	1.0	1.2	0.48 J	0.99 J
1,1-Dichloroethane	ND (1.0) U	ND (1.00) U	0.58 J	0.48 J
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	1.0	ND (1.00) U	1.1	0.66
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	0.38 J	ND (1) U
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	ND (0.5) U
Trichloroethene	13.8	17.2	8.6	16
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U

MT-69	9/24/1999 UG/L	10/3/2000 UG/L	11/15/2001 UG/L	9/30/2002 UG/L
1,1,1-Trichloroethane	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
1,1-Dichloroethane	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
1,1-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Benzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
cis-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	ND (0.5) U
Ethylbenzene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Tetrachloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Toluene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
trans-1,2-Dichloroethene	ND (1.0) U	ND (1.00) U	ND (0.50) U	ND (0.5) U
Trichloroethene	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Vinyl chloride	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U
Xylene (total)	ND (1.0) U	ND (1.00) U	ND (1.0) U	ND (1) U

LEGEND

- GM-9 — MONITORING WELL (DEEP)
- FIRE WELLS
- INACTIVE PRODUCTION WELLS
- ACTIVE PRODUCTION WELLS
- PUMP TO WASTE WELL
- SEALED WELL

ND — NONDETECT, IF RESULT IS ND THE DETECTION LIMIT IS SHOWN IN PARENTHESIS

ug/L — MICROGRAMS PER LITER

MCL EXCEEDANCES ARE UNDERLINED AT POINT OF COMPLIANCE WELLS GM-15, GM-11 AND GM-20D

ARCADIS
6397 Emerald Parkway
Suite 150, Dublin, OH 43016
Tel: 614/764-2310 Fax: 614/764-1270

VOC DATABOXES FOR LOWER AQUIFER WELLS
GENERAL MOTORS CORPORATION
MORAINE, OHIO

DATE	PROJECT MANAGER	DRAWING NAME
4/2/2003	N. GILLOTTI	CRA\ANNUAL\ANNUAL01
DRAWN	LEAD DESIGN PROF.	CHECKED
R. SMITH	J. REID	N. GILLOTTI
PROJECT NUMBER		DRAWING NUMBER
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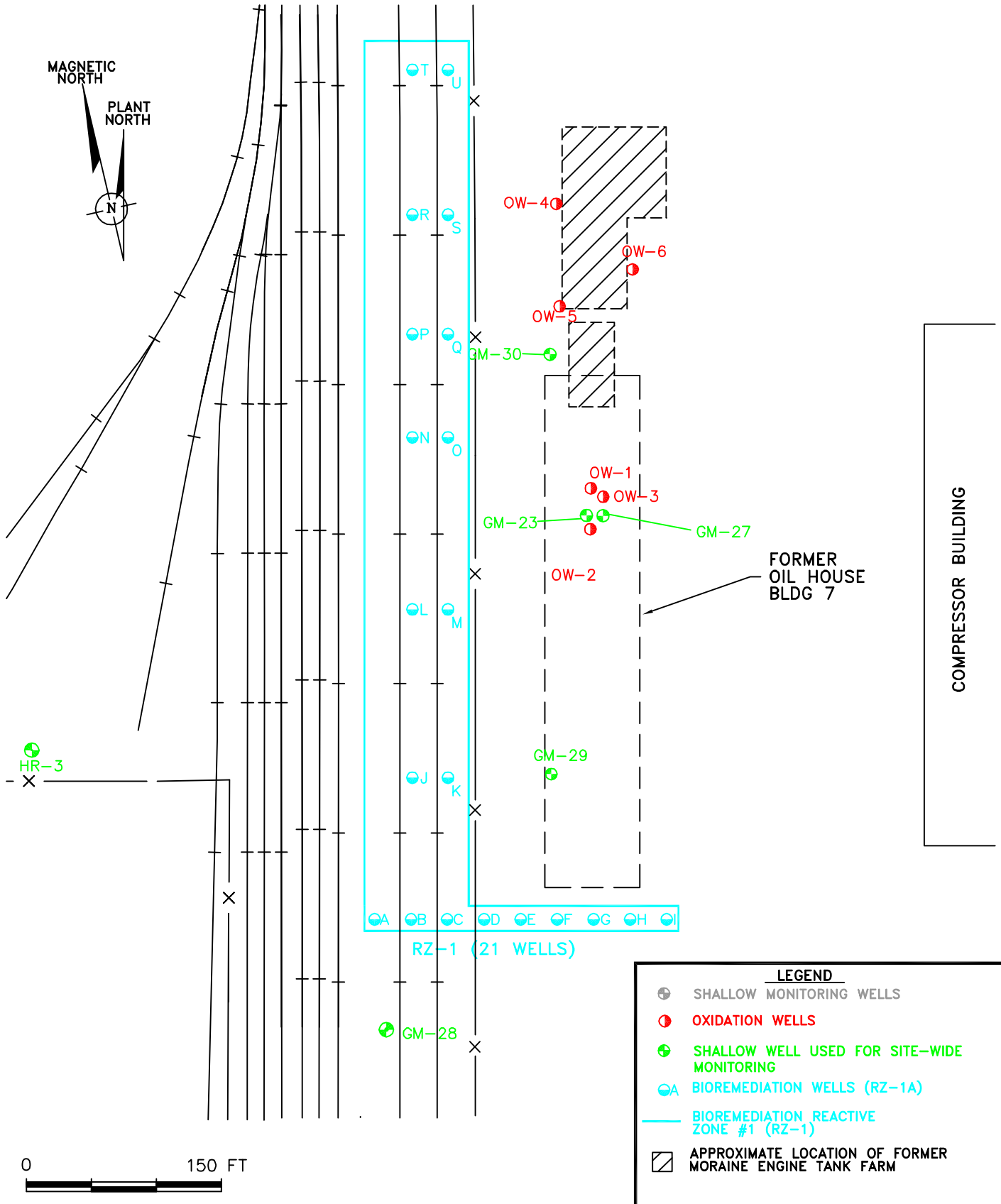
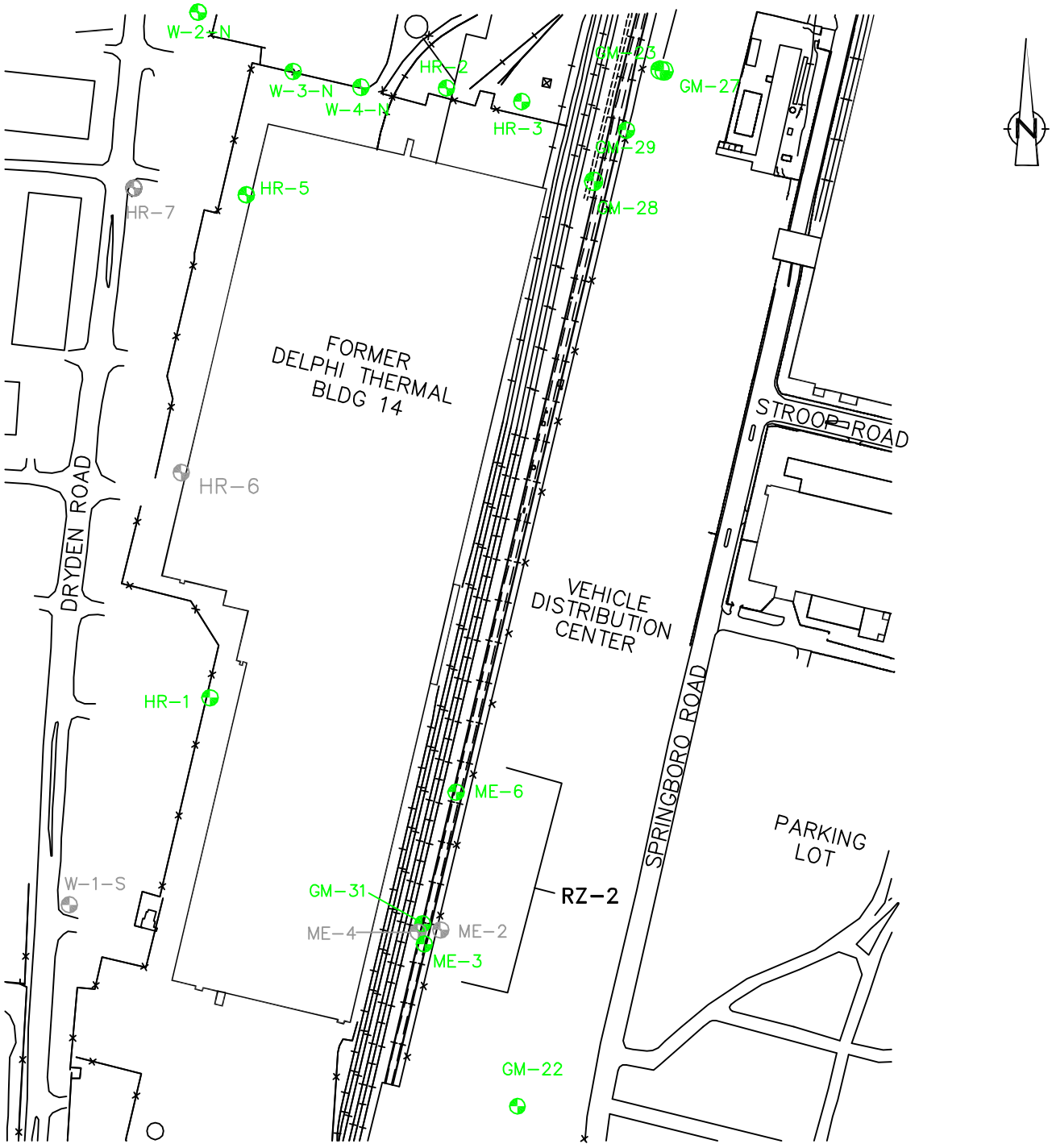


ARCADIS
6397 Emerald Parkway
Suite 150, Dublin, OH 43016
Tel: 614/764-2310 Fax: 614/764-1270

REACTIVE ZONE #1
GENERAL MOTORS CORPORATION
MORAINE, OHIO

DATE	PROJECT MANAGER	DRAWING NAME
3/28/2003	N. GILLOTTI	CRA\SITEWID\SWGW09
DRAWN	LEAD DESIGN PROF.	CHECKED
R. SMITH	J. REID	N. GILLOTTI
PROJECT NUMBER		FIGURE NUMBER
0H000294.0005.0002		12



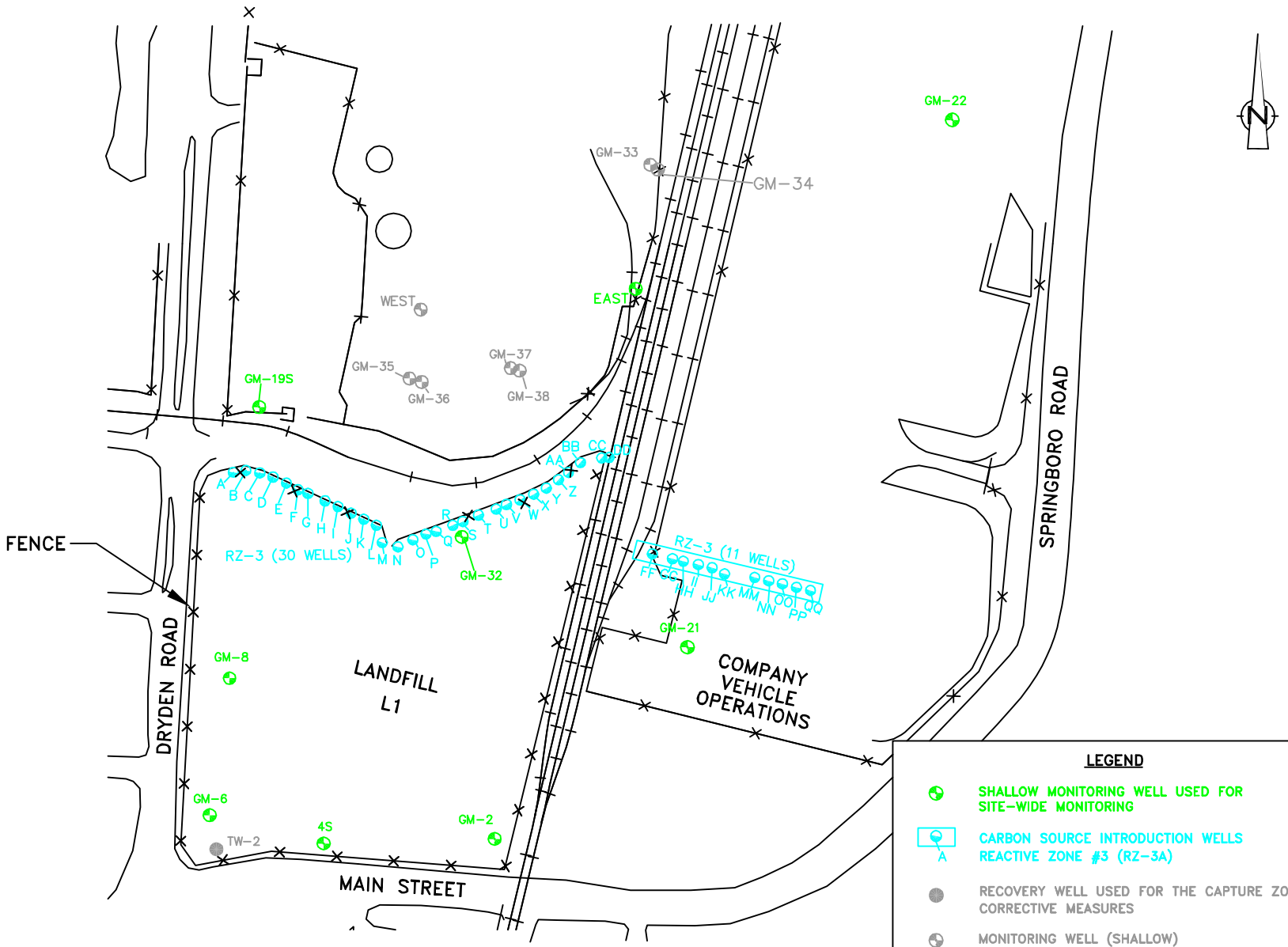
LEGEND

- MONITORING WELL (SHALLOW)
- MONITORING WELL USED FOR SITE-WIDE MONITORING

ARCADIS
6397 Emerald Parkway
Suite 150, Dublin, OH 43016
Tel: 614/764-2310 Fax: 614/764-1270

REACTIVE ZONE #2
GENERAL MOTORS CORPORATION
MORAINE, OHIO

DATE	PROJECT MANAGER	DRAWING NAME
2/24/2004	N. GILLOTTI	CRA\SITEWIDE\SWGW10
DRAWN	LEAD DESIGN PROF.	CHECKED
R. SMITH	J. REID	N. GILLOTTI
PROJECT NUMBER		FIGURE NUMBER
0H000294.0006.0003		13



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

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

DATE	PROJECT MANAGER	DRAWING NAME
2/24/2004	N. GILLOTTI	CRA\SITEWIDE\SWGW11
DRAWN	LEAD DESIGN PROF.	CHECKED
R. SMITH	J. REID	N. GILLOTTI
PROJECT NUMBER		FIGURE NUMBER
0H000294.0006.0003		14

ARCADIS

DRAFT

Appendix A

Groundwater Analytical Results for
1999 and 2000 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 09/16/99	HR-11 09/14/99	GM-24 09/23/99	HR-8 09/16/99	W-1-N 09/17/99	HR-4 09/14/99	W-2-N 09/14/99	W-3-N 09/17/99	W-4-N 09/17/99	HR-2 09/16/99	HR-3 09/16/99
Volatile Organic Compounds												
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

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
Volatile Organic Compounds												
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

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

COMPOUND	UNITS	W-1-S 09/22/99	DUP-77 09/22/99	ME-6 08/31/99	ME-1 08/31/99	GM-31 09/01/99	ME-3 08/31/99	DUP-72 08/31/99	HR-16 09/23/99	HR-17 09/23/99	W-2-S 09/23/99	W-3-S 09/23/99
Volatile Organic Compounds												
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

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

COMPOUND	UNITS	W-4-S 09/23/99	DUP-78 09/23/99	GM-19S 09/20/99	EAST 09/21/99	WEST 09/21/99	GM-32 09/22/99	GM-22 09/01/99	GM-21 09/22/99	GM-8 09/20/99	GM-6 09/20/99
Volatile Organic Compounds											
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

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

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

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
Volatile Organic Compounds									
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

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
Volatile Organic Compounds									
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

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
Volatile Organic Compounds					
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.

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

COMPOUND	UNITS	HR-9 9/18/2000	HR-11 9/18/2000	DUP-89 9/18/2000	HR-8 9/18/2000	HR-4 9/20/2000	W-2-N 9/19/2000	W-3-N 9/19/2000	W-4-N 9/19/2000	HR-2 9/19/2000
Volatile Organic Compounds										
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

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
Volatile Organic Compounds										
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

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
Volatile Organic Compounds									
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

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
Volatile Organic Compounds									
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

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
Volatile Organic Compounds									
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.

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

COMPOUND	UNITS	HR-10 9/29/2000	HR-12 9/28/2000	DUP-93 9/28/2000	HR-13 9/29/2000	HR-15 9/29/2000	31 9/29/2000	GM-19D 10/2/2000	GM-1 10/2/2000	GM-3 10/2/2000	GM-11 10/2/2000
Volatile Organic Compounds											
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

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

COMPOUND	UNITS	GM-15 10/2/2000	DUP-94 10/2/2000	GM-20D 10/3/2000	GM-9 10/3/2000	MT69 10/3/2000
Volatile Organic Compounds						
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 2001/2002

DRAFT

March 2001

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	3/19/01
Site/Well No.	GM-19S	Replicate No.	DUP-95 @ 13:20	Code No.	
Weather	Sunny, 40's	Sampling Time:	Begin 12:30	End	14:11

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.85
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	55.04
Depth to Water (ft bmp)	29.48
Water-Level Elevation (ft)	701.37
Water Column in Well (ft)	25.56
Casing Diameter/Type	2"
Gallons in Well	4.1
Gallons Pumped/Bailed Prior to Sampling	7 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 12:55 end 13:19
Pumping Rate (gpm)	0.17 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Light Brown
Odor	None
Appearance	Clear
pH (s.u.)	7.14
Conductivity (mS/cm)	
(µmhos/cm)	1097
Turbidity (NTU)	N/A
Temperature (°C)	20.41
Dissolved Oxygen (mg/L)	0.96
ORP (mV)	320.8
Sampling Method	Low Flow
Remarks	Sample time @ 13:20; RB-72 @ 14:00
	MS-127 @ 13:35; MSD-126 @ 13:35
	DTW final = 29.48
	Dissolved sample not field filtered.

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: GM-19S

Time Pump Started: 12:55

Depth of Sampling: Midpoint of Screen

Date: 3/19/01

Parameters / Time

	12:58	13:01	13:04	13:07	13:10	13:13	13:15	13:18			
Redox Potential (millivolts)	370.5	361.9	349.0	336.6	330.7	326.7	321.5	320.8			
Dissolved Oxygen (mg/L)	0.87	5.62	1.51	0.76	0.80	0.88	0.94	0.96			
pH (s.u.)	6.47	6.62	6.91	7.02	7.07	7.09	7.12	7.14			
Specific Conductance (uS/cm)	1,093	1,092	1,095	1,097	1,099	1,098	1,098	1,097			
Temperature (C)	18.99	19.17	20.00	20.09	20.17	20.29	20.37	20.41			

Flow Rate: 0.17 gpm

Total Depth of Well: 55.04

Time Sampled: 13:20

Depth to Water Before Purging: 29.48

Total Water Pumped: 7 gallons

Depth to Water After Purging: 29.48

Comments:

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	3/19/01
Site/Well No.	EAST	Replicate No.		Code No.	
Weather	Sunny, 40's	Sampling Time:	Begin 14:26	End	15:12

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.98
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	71.64
Depth to Water (ft bmp)	29.20
Water-Level Elevation (ft)	701.78
Water Column in Well (ft)	42.44
Casing Diameter/Type	2"
Gallons in Well	6.8
Gallons Pumped/Bailed Prior to Sampling	7 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 14:39 end 14:55
Pumping Rate (gpm)	0.26 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Light Brown
Odor	None
Appearance	Clear
pH (s.u.)	7.34
Conductivity (mS/cm)	
(µmhos/cm)	1189
Turbidity (NTU)	N/A
Temperature (°C)	19.60
Dissolved Oxygen (mg/L)	1.00
ORP (mV)	468.4
Sampling Method	Low Flow
Remarks	Sample time @ 14:59
	DTW final = 29.18
	Dissolved sample not field filtered.

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: EAST

Time Pump Started: 14:39

Depth of Sampling: Midpoint of Screen

Date: 3/19/01

Parameters / Time

	14:42	14:45	14:48	14:51	14:54						
Redox Potential (millivolts)	516.5	489.5	479.4	472.7	468.4						
Dissolved Oxygen (mg/L)	0.37	0.75	0.90	0.99	1.00						
pH (s.u.)	6.38	7.34	7.35	7.35	7.34						
Specific Conductance (uS/cm)	1,182	1,184	1,185	1,186	1,189						
Temperature (C)	19.91	19.41	19.50	19.58	19.60						

Flow Rate: 0.26 gpm

Total Depth of Well: 71.64

Time Sampled: 14:59

Depth to Water Before Purging: 29.20

Total Water Pumped: 7 gallons

Depth to Water After Purging: 29.18

Comments:

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	3/19/01
Site/Well No.	GM-32	Replicate No.		Code No.	
Weather	Sunny 53°	Sampling Time:	Begin 15:20	End	16:28

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	732.08
Land Surface Elevation (ft)	732.47
Sounded Well Depth (ft bmp)	60.21
Depth to Water (ft bmp)	32.42
Water-Level Elevation (ft)	699.66
Water Column in Well (ft)	27.79
Casing Diameter/Type	2"
Gallons in Well	4.4
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 15:33 end 15:50
Pumping Rate (gpm)	0.26 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Brown/yellow
Odor	Moderate
Appearance	Slightly Cloudy
pH (s.u.)	8.36
Conductivity (mS/cm)	
(µmhos/cm)	7483
Turbidity (NTU)	N/A
Temperature (°C)	19.30
Dissolved Oxygen (mg/L)	0.36
ORP (mV)	-152.5
Sampling Method	Low Flow
Remarks	Sample time @ 15:55

DTW final = 30.95

Dissolved sample not field filtered.

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: GM-32

Time Pump Started: 15:33

Depth of Sampling: Midpoint of Screen

Date: 3/19/01

Parameters / Time

	15:36	15:39	15:42	15:45	15:48	15:51					
Redox Potential (millivolts)	468.9	386.2	230.8	36.5	-127.5	-152.5					
Dissolved Oxygen (mg/L)	3.33	1.33	0.78	0.53	0.40	0.36					
pH (s.u.)	7.81	8.42	8.44	8.41	8.38	8.36					
Specific Conductance (uS/cm)	7,722	7,511	7,566	7,586	7,494	7,483					
Temperature (C)	17.33	18.70	19.25	19.31	19.30	19.30					

Flow Rate: 0.26 gpm

Total Depth of Well: 60.21

Time Sampled: 15:55

Depth to Water Before Purging: 32.42

Total Water Pumped: 5 gallons

Depth to Water After Purging: 30.95

Comments:

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	3/19/01
Site/Well No.	GM-21	Replicate No.		Code No.	
Weather	Sunny, 40's	Sampling Time:	Begin 16:33	End	17:13

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	725.01
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	53.70
Depth to Water (ft bmp)	23.82
Water-Level Elevation (ft)	701.19
Water Column in Well (ft)	29.88
Casing Diameter/Type	2"
Gallons in Well	4.8
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 16:42 end 16:58
Pumping Rate (gpm)	0.26 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Light Brown
Odor	None
Appearance	Clear
pH (s.u.)	7.85
Conductivity (mS/cm)	
(µmhos/cm)	1067
Turbidity (NTU)	N/A
Temperature (°C)	17.59
Dissolved Oxygen (mg/L)	0.57
ORP (mV)	218.5
Sampling Method	Low Flow
Remarks	Sample time @ 17:00
	DTW Final: 23.84
	Dissolved sample not field filtering.

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: GM-21

Time Pump Started: 16:42

Depth of Sampling: Midpoint of Screen

Date: 3/19/01

Parameters / Time

	16:45	16:48	16:51	16:54	16:57						
Redox Potential (millivolts)	243.5	242.7	227.5	220.8	218.5						
Dissolved Oxygen (mg/L)	0.93	0.61	0.53	0.55	0.57						
pH (s.u.)	7.96	8.07	7.98	7.87	7.85						
Specific Conductance (uS/cm)	737	1,030	1,066	1,068	1,067						
Temperature (C)	16.51	17.05	17.56	17.57	17.59						

Flow Rate: 0.26 gpm

Total Depth of Well: 53.70

Time Sampled: 17:00

Depth to Water Before Purging: 23.82

Total Water Pumped: 5 gallons

Depth to Water After Purging: 23.84

Comments:

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	3/20/01
Site/Well No.	GM-22	Replicate No.		Code No.	
Weather	Sunny, 30's	Sampling Time:	Begin 8:45	End	10:33

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	728.28
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	53.10
Depth to Water (ft bmp)	26.28
Water-Level Elevation (ft)	702.00
Water Column in Well (ft)	26.82
Casing Diameter/Type	2"
Gallons in Well	4.3
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 9:48 end 10:07
Pumping Rate (gpm)	0.17 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.00
Conductivity (mS/cm)	
(µmhos/cm)	1610
Turbidity (NTU)	N/A
Temperature (°C)	20.79
Dissolved Oxygen (mg/L)	0.82
ORP (mV)	175.1
Sampling Method	Low Flow
Remarks	Sample time @ 10:10
	DTW Final = 26.26
	Dissolved sample not field filtered.

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: GM-22

Time Pump Started: 9:48

Depth of Sampling: Midpoint of Screen

Date: 3/20/01

Parameters

Time

	9:51	9:54	9:57	10:00	10:03	10:06					
Redox Potential (millivolts)	203.6	186.3	183.0	179.2	177.4	175.1					
Dissolved Oxygen (mg/L)	2.58	0.95	0.98	0.90	0.92	0.82					
pH (s.u.)	6.36	6.77	6.83	6.90	6.95	7.00					
Specific Conductance (uS/cm)	1,507	1,599	1,602	1,605	1,607	1,610					
Temperature (C)	17.96	20.37	20.53	20.65	20.73	20.79					

Flow Rate: 0.17 gpm

Total Depth of Well: 53.10

Time Sampled: 10:10

Depth to Water Before Purging: 26.28

Total Water Pumped: 5 gallons

Depth to Water After Purging: 26.26

Comments

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	3/20/01
Site/Well No.	ME-6	Replicate No.		Code No.	
Weather	Sunny, 40's	Sampling Time:	Begin 10:58	End	12:01

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	728.11
Land Surface Elevation (ft)	728.55
Sounded Well Depth (ft bmp)	31.85
Depth to Water (ft bmp)	26.03
Water-Level Elevation (ft)	702.08
Water Column in Well (ft)	5.82
Casing Diameter/Type	2"
Gallons in Well	0.9
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 11:18 end 11:39
Pumping Rate (gpm)	0.21 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Black-yellow
Odor	Moderate
Appearance	Opaque-slightly cloudy
pH (s.u.)	7.06
Conductivity (mS/cm)	
(µmhos/cm)	1922
Turbidity (NTU)	N/A
Temperature (°C)	21.68
Dissolved Oxygen (mg/L)	4.83
ORP (mV)	-294.0
Sampling Method	Low Flow
Remarks	Sample time @ 11:40

DTW final = 26.03

Dissolved sample not field filtered.

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: ME-6

Time Pump Started: 11:18

Depth of Sampling: Midpoint of Screen

Date: 3/20/01

Parameters

Time

	11:21	11:24	11:27	11:30	11:33	11:36					
Redox Potential (millivolts)	-222.4	-261.8	-284.8	-289.3	-293.0	-294.0					
Dissolved Oxygen (mg/L)	3.52	4.26	4.66	4.58	4.80	4.83					
pH (s.u.)	6.80	7.00	7.06	7.06	7.06	7.06					
Specific Conductance (uS/cm)	2,490	2,319	2,069	1,994	1,936	1,922					
Temperature (C)	19.26	20.81	21.46	21.56	21.74	21.68					

Flow Rate: 0.21 gpm

Total Depth of Well: 31.85

Time Sampled: 11:40

Depth to Water Before Purging: 26.03

Total Water Pumped: 5 gallons

Depth to Water After Purging: 26.03

Comments

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	3/20/01
Site/Well No.	GM-28	Replicate No.		Code No.	
Weather	Cloudy, 40's	Sampling Time:	Begin 13:35	End	14:24

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	729.19
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	30.70
Depth to Water (ft bmp)	25.21
Water-Level Elevation (ft)	703.98
Water Column in Well (ft)	5.49
Casing Diameter/Type	2"
Gallons in Well	0.87
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 13:50 end 14:06
Pumping Rate (gpm)	0.21 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Yellow
Odor	Moderate
Appearance	Slightly cloudy
pH (s.u.)	7.10
Conductivity (mS/cm)	
(µmhos/cm)	3724
Turbidity (NTU)	N/A
Temperature (°C)	18.93
Dissolved Oxygen (mg/L)	4.36
ORP (mV)	-70.6
Sampling Method	Low Flow
Remarks	Sample time @ 14:10
	DTW final: 25.24
	Dissolved sample not field filtered.

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: GM-28

Time Pump Started: 13:50

Depth of Sampling: Midpoint of Screen

Date: 3/20/01

Parameters / Time

	13:53	13:56	13:59	14:02	14:05						
Redox Potential (millivolts)	25.3	-59.1	-68.7	-74.2	-70.6						
Dissolved Oxygen (mg/L)	6.78	5.84	5.21	4.67	4.36						
pH (s.u.)	6.94	7.03	7.06	7.09	7.10						
Specific Conductance (uS/cm)	3,792	3,757	3,737	3,727	3,724						
Temperature (C)	16.91	17.10	17.88	18.47	18.93						

Flow Rate: 0.21 gpm

Total Depth of Well: 30.70

Time Sampled: 14:10

Depth to Water Before Purging: 25.21

Total Water Pumped: 5 gallons

Depth to Water After Purging: 25.24

Comments:

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	3/20/01
Site/Well No.	GM-29	Replicate No.		Code No.	
Weather	Cloudy, 40's	Sampling Time:	Begin 14:32	End	15:15

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.78
Land Surface Elevation (ft)	731.27
Sounded Well Depth (ft bmp)	34.20
Depth to Water (ft bmp)	26.13
Water-Level Elevation (ft)	704.65
Water Column in Well (ft)	8.07
Casing Diameter/Type	2"
Gallons in Well	1.3
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 14:40 end 15:05
Pumping Rate (gpm)	0.21 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Yellow
Odor	None
Appearance	Slightly cloudy
pH (s.u.)	7.31
Conductivity (mS/cm)	
(µmhos/cm)	1733
Turbidity (NTU)	N/A
Temperature (°C)	20.04
Dissolved Oxygen (mg/L)	8.20
ORP (mV)	-158.2
Sampling Method	Low Flow
Remarks	Sample time @ 15:06
	DTW final = 26.25
	Dissolved sample not field filtered.

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: GM-29

Time Pump Started: 14:40

Depth of Sampling: Midpoint of Screen

Date: 3/20/01

Parameters / Time

	14:43	14:46	14:49	14:52	14:55	14:58	15:01				
Redox Potential (millivolts)	159.8	80.5	-2.7	-58.1	-52.6	-125.3	-158.2				
Dissolved Oxygen (mg/L)	2.10	2.25	2.33	10.65	9.89	8.58	8.20				
pH (s.u.)	7.49	7.45	7.38	7.17	7.43	7.36	7.31				
Specific Conductance (uS/cm)	1,714	1,730	1,755	1,727	1,746	1,734	1,733				
Temperature (C)	17.54	18.27	18.01	18.42	19.94	19.97	20.04				

Flow Rate: 0.21 gpm

Total Depth of Well: 34.20

Time Sampled: 15:06

Depth to Water Before Purging: 26.13

Total Water Pumped: 5 gallons

Depth to Water After Purging: 26.25

Comments:

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	3/20/01
Site/Well No.	GM-23	Replicate No.	DUP-96 @ 15:50	Code No.	
Weather	Cloudy 40's	Sampling Time:	Begin 15:18	End	16:21

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.99
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	34.00
Depth to Water (ft bmp)	26.51
Water-Level Elevation (ft)	704.48
Water Column in Well (ft)	7.49
Casing Diameter/Type	2"
Gallons in Well	1.2
Gallons Pumped/Bailed Prior to Sampling	7 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 15:29 end 15:48
Pumping Rate (gpm)	0.26 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Colorless
Odor	Slight
Appearance	Clear
pH (s.u.)	6.64
Conductivity (mS/cm)	
(µmhos/cm)	3448
Turbidity (NTU)	N/A
Temperature (°C)	19.08
Dissolved Oxygen (mg/L)	8.38
ORP (mV)	160.4
Sampling Method	Low Flow
Remarks	Sample time @ 15:50
	DTW final = 26.56
	Sheen on top of water. Dissolved sample
	not field filtered.

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: GM-23

Time Pump Started: 15:29

Depth of Sampling: Midpoint of Screen

Date: 3/20/01

Parameters / Time

	15:32	15:35	15:38	15:41	15:44	15:47					
Redox Potential (millivolts)	194.2	180.4	163.7	149.0	177.0	160.4					
Dissolved Oxygen (mg/L)	9.90	9.08	8.67	8.51	7.73	8.38					
pH (s.u.)	6.91	6.91	6.88	6.85	6.59	6.64					
Specific Conductance (uS/cm)	3,139	3,272	3,381	3,421	3,446	3,448					
Temperature (C)	17.27	18.11	18.58	18.75	18.98	19.08					

Flow Rate: 0.26 gpm

Total Depth of Well: 34.00

Time Sampled: 15:50

Depth to Water Before Purging: 26.51

Total Water Pumped: 7 gallons

Depth to Water After Purging: 26.56

Comments: Sheen on top of water.

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	3/20/01
Site/Well No.	GM-30	Replicate No.		Code No.	
Weather	Cloudy 40's	Sampling Time:	Begin 16:25	End	17:20

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	732.33
Land Surface Elevation (ft)	733.13
Sounded Well Depth (ft bmp)	34.40
Depth to Water (ft bmp)	704.98
Water-Level Elevation (ft)	27.35
Water Column in Well (ft)	7.05
Casing Diameter/Type	2"
Gallons in Well	1.1
Gallons Pumped/Bailed Prior to Sampling	3 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 16:37 end 16:50
Pumping Rate (gpm)	0.21 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Yellow-colorless
Odor	Moderate
Appearance	Slightly cloudy
pH (s.u.)	6.69
Conductivity (mS/cm)	
(µmhos/cm)	999
Turbidity (NTU)	N/A
Temperature (°C)	20.64
Dissolved Oxygen (mg/L)	7.77
ORP (mV)	-71.5
Sampling Method	Low Flow
Remarks	Sample time @ 16:55
	DTW final = 27.46
	Dissolved sample not field filtered.

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: GM-30

Time Pump Started: 16:37

Depth of Sampling: Midpoint of Screen

Date: 3/20/01

Parameters	Time										
	16:40	16:43	16:46	16:49							
Redox Potential (millivolts)	276.0	148.1	-4.2	-71.5							
Dissolved Oxygen (mg/L)	6.92	5.20	7.53	7.77							
pH (s.u.)	6.93	7.10	6.70	6.69							
Specific Conductance (uS/cm)	981	991	998	999							
Temperature (C)	17.04	16.69	18.96	20.64							

Flow Rate: 0.21 gpm

Total Depth of Well: 34.40

Time Sampled: 16:55

Depth to Water Before Purging: 27.35

Total Water Pumped: 3 gallons

Depth to Water After Purging: 27.46

Comments:

DRAFT

June 2001

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/25/01
Site/Well No.	GM-19S	Replicate No.	DUP-105 @ 12:28	Code No.	
Weather	Sunny, 80's	Sampling Time:	Begin 11:40	End	13:00

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.85
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	55.04
Depth to Water (ft bmp)	27.81
Water-Level Elevation (ft)	703.04
Water Column in Well (ft)	27.23
Casing Diameter/Type	2"
Gallons in Well	4.4
Gallons Pumped/Bailed Prior to Sampling	4.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 11:49 end 12:15
Pumping Rate (gpm)	0.04
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.92
Conductivity (mS/cm)	
(µmhos/cm)	1040
Turbidity (NTU)	N/A
Temperature (°C)	22.81
Dissolved Oxygen (mg/L)	0.56
ORP (mV)	366.8
Sampling Method	Low Flow
Remarks	Sample time @ 12:20
	RB-82 @ 12:55
	MS-129 @ 12:40; MSD-128 @ 12:42
	DTW final = 27.78

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/T. Trommer

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: GM-19S

Time Pump Started: 11:49

Depth of Sampling: Midpoint of Screen

Date: 6/25/01

Parameters / Time

	11:52	11:55	11:58	12:01	12:03	12:06	12:09	12:12	12:15		
Redox Potential (millivolts)	296.1	312.2	325.8	330.1	346.1	353.6	360.7	365.5	366.8		
Dissolved Oxygen (mg/L)	1.46	1.14	0.88	0.83	0.76	0.71	0.61	0.56	0.56		
pH (s.u.)	6.54	6.53	6.60	6.64	6.67	6.74	6.82	6.90	6.92		
Specific Conductance (uS/cm)	1,042	1,038	1,039	1,038	1,040	1,044	1,040	1,040	1,040		
Temperature (C)	20.78	21.41	21.91	21.95	22.15	22.17	22.47	22.71	22.81		

Flow Rate: 0.04 gpm

Total Depth of Well: 55.04

Time Sampled: 12:20

Depth to Water Before Purging: 27.81

Total Water Pumped: 4.5 gallons

Depth to Water After Purging: 27.78

Comments:

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/25/01
Site/Well No.	EAST	Replicate No.		Code No.	
Weather	Sunny, 80's	Sampling Time:	Begin 14:15	End	15:00

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.98
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	71.64
Depth to Water (ft bmp)	27.54
Water-Level Elevation (ft)	703.44
Water Column in Well (ft)	44.1
Casing Diameter/Type	2"
Gallons in Well	7
Gallons Pumped/Bailed Prior to Sampling	7 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 14:24 end 14:48
Pumping Rate (gpm)	0.08
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.72
Conductivity (mS/cm)	
(µmhos/cm)	1176
Turbidity (NTU)	N/A
Temperature (°C)	20.61
Dissolved Oxygen (mg/L)	2.57
ORP (mV)	374.6
Sampling Method	Low Flow
Remarks	Sample time @ 14:50
	DTW final = 27.53

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	1 liter plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	1 liter plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/T. Trommer

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: EAST

Time Pump Started: 14:24

Depth of Sampling: Midpoint of Screen

Date: 6/25/01

Parameters / Time

	14:27	14:30	14:33	14:36	14:39	14:42	14:45	14:48			
Redox Potential (millivolts)	248.9	268.1	292.0	316.7	329.0	349.8	360.3	374.6			
Dissolved Oxygen (mg/L)	5.00	4.49	3.99	3.61	3.39	2.98	2.75	2.57			
pH (s.u.)	7.04	6.94	6.84	6.78	6.76	6.75	6.75	6.72			
Specific Conductance (uS/cm)	1,171	1,166	1,169	1,173	1,175	1,176	1,178	1,176			
Temperature (C)	19.54	19.95	20.22	20.34	20.52	20.62	20.61	20.61			

Flow Rate: 0.08 gpm

Total Depth of Well: 71.64

Time Sampled: 14:50

Depth to Water Before Purging: 27.54

Total Water Pumped: 7 gallons

Depth to Water After Purging: 27.53

Comments:

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/25/01
Site/Well No.	GM-32	Replicate No.		Code No.	
Weather	Sunny, 80s	Sampling Time:	Begin 15:30	End	16:20

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	732.08
Land Surface Elevation (ft)	732.47
Sounded Well Depth (ft bmp)	60.21
Depth to Water (ft bmp)	33.44
Water-Level Elevation (ft)	698.64
Water Column in Well (ft)	26.77
Casing Diameter/Type	2"
Gallons in Well	4.3
Gallons Pumped/Bailed Prior to Sampling	4.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 15:38 end 16:04
Pumping Rate (gpm)	0.18
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Pale yellow
Odor	Slight
Appearance	Cloudy
pH (s.u.)	7.71
Conductivity (mS/cm)	
(µmhos/cm)	7048
Turbidity (NTU)	N/A
Temperature (°C)	21.71
Dissolved Oxygen (mg/L)	0.27
ORP (mV)	-217.5
Sampling Method	Low Flow
Remarks	Sample time @ 16:05
	DTW final = 33.48

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	1 liter plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	500 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	1 liter plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/T. Trommer

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: GM-32

Time Pump Started: 15:38

Depth of Sampling: Midpoint of Screen

Date: 6/25/01

Parameters / Time

	15:40	15:43	15:46	15:49	15:52	15:53	15:55	15:58	16:01		
Redox Potential (millivolts)	231.7	-116.6	-132.3	-198.1	-146.0	-169.7	-186.9	-209.7	-217.5		
Dissolved Oxygen (mg/L)	0.78	3.90	3.90	3.00	2.43	1.28	0.52	0.30	0.27		
pH (s.u.)	6.92	7.33	7.42	7.44	7.63	7.61	7.63	7.69	7.71		
Specific Conductance (uS/cm)	5,950	6,775	6,724	6,324	6,729	6,930	6,941	7,027	7,048		
Temperature (C)	19.74	20.48	20.56	19.91	21.17	21.10	21.34	21.68	21.71		

Flow Rate: 0.18 gpm

Total Depth of Well: 60.21

Time Sampled: 16:05

Depth to Water Before Purging: 33.44

Total Water Pumped: 4.5 gallons

Depth to Water After Purging: 33.48

Comments:

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/25/01
Site/Well No.	GM-21	Replicate No.		Code No.	
Weather	Sunny, 80's	Sampling Time:	Begin 17:10	End	18:00

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	725.01
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	53.70
Depth to Water (ft bmp)	22.09
Water-Level Elevation (ft)	702.92
Water Column in Well (ft)	31.61
Casing Diameter/Type	2"
Gallons in Well	5.1
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 17:23 end 17:43
Pumping Rate (gpm)	0.13
Evacuation Method	High performance peristaltic pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.40
Conductivity (mS/cm)	
(µmhos/cm)	1041
Turbidity (NTU)	N/A
Temperature (°C)	19.87
Dissolved Oxygen (mg/L)	0.36
ORP (mV)	401.1
Sampling Method	Low Flow
Remarks	Sample time @ 17:45
	DTW Final: 22.1

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/T. Trommer

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: GM-21

Time Pump Started: 17:23

Depth of Sampling: Midpoint of Screen

Date: 6/25/01

Parameters / Time

	17:26	17:29	17:32	17:35	17:38	17:40	17:43				
Redox Potential (millivolts)	274.7	318.4	353.8	369.0	385.4	390.3	401.1				
Dissolved Oxygen (mg/L)	0.62	0.40	0.38	0.42	0.39	0.37	0.36				
pH (s.u.)	6.88	6.74	6.61	6.56	6.48	6.44	6.40				
Specific Conductance (uS/cm)	855	1,007	1,039	1,052	1,042	1,041	1,041				
Temperature (C)	18.49	18.94	19.21	19.42	19.58	19.60	19.87				

Flow Rate: 0.13 gpm

Total Depth of Well: 53.70

Time Sampled: 17:45

Depth to Water Before Purging: 22.09

Total Water Pumped: 5 gallons

Depth to Water After Purging: 22.10

Comments:

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/26/01
Site/Well No.	GM-22	Replicate No.		Code No.	
Weather	Clear, 70s	Sampling Time:	Begin 8:10	End	8:58

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	728.28
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	53.10
Depth to Water (ft bmp)	24.71
Water-Level Elevation (ft)	703.57
Water Column in Well (ft)	28.39
Casing Diameter/Type	2"
Gallons in Well	4.5
Gallons Pumped/Bailed Prior to Sampling	4.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 8:22 end 8:46
Pumping Rate (gpm)	0.12
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.09
Conductivity (mS/cm)	
(µmhos/cm)	1551
Turbidity (NTU)	N/A
Temperature (°C)	21.89
Dissolved Oxygen (mg/L)	0.38
ORP (mV)	242.3
Sampling Method	Low Flow
Remarks	Sample time @ 8:48
	DTW Final = 24.70

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/T. Trommer

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: GM-22

Time Pump Started: 8:22

Depth of Sampling: Midpoint of Screen

Date: 6/26/01

Parameters / Time

	8:25	8:28	8:31	8:34	8:37	8:40	8:43	8:46			
Redox Potential (millivolts)	247.1	244.4	242.6	241.6	241.8	242.0	242.3	242.3			
Dissolved Oxygen (mg/L)	1.17	0.64	0.56	0.49	0.44	0.42	0.38	0.38			
pH (s.u.)	6.77	6.88	6.94	7.00	7.05	7.07	7.09	7.09			
Specific Conductance (uS/cm)	1,486	1,509	1,523	1,540	1,545	1,547	1,548	1,551			
Temperature (C)	19.75	20.81	21.12	21.55	21.67	21.76	21.87	21.89			

Flow Rate: 0.12 gpm

Total Depth of Well: 53.10

Time Sampled: 8:48

Depth to Water Before Purging: 24.71

Total Water Pumped: 4.5 gallons

Depth to Water After Purging: 24.70

Comments:

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/26/01
Site/Well No.	GM-28	Replicate No.		Code No.	
Weather	Sunny, 80s	Sampling Time:	Begin 9:05	End	9:50

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	729.19
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	30.70
Depth to Water (ft bmp)	23.88
Water-Level Elevation (ft)	705.31
Water Column in Well (ft)	6.82
Casing Diameter/Type	2"
Gallons in Well	1.09
Gallons Pumped/Bailed Prior to Sampling	5.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 9:11 end 9:31
Pumping Rate (gpm)	0.13
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Light gray to yellow
Odor	Yes
Appearance	Cloudy
pH (s.u.)	6.64
Conductivity (mS/cm)	
(µmhos/cm)	3216
Turbidity (NTU)	N/A
Temperature (°C)	19.04
Dissolved Oxygen (mg/L)	0.41
ORP (mV)	-177.8
Sampling Method	Low Flow
Remarks	Sample time @ 9:33
	DTW final: 23.88
	No well lid.

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/T. Trommer

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: GM-28

Time Pump Started: 9:11

Depth of Sampling: Midpoint of Screen

Date: 6/26/01

Parameters

Time

	9:14	9:17	9:20	9:23	9:26	9:29					
Redox Potential (millivolts)	61.8	-78.3	-128.7	-149.2	-167.7	-177.8					
Dissolved Oxygen (mg/L)	1.00	0.62	0.52	0.46	0.43	0.41					
pH (s.u.)	7.18	7.00	6.89	6.80	6.72	6.64					
Specific Conductance (uS/cm)	2,602	2,986	3,105	3,146	3,185	3,216					
Temperature (C)	17.09	17.95	17.98	18.15	18.57	19.04					

Flow Rate: 0.13 gpm

Total Depth of Well: 30.70

Time Sampled: 9:33

Depth to Water Before Purging: 23.88

Total Water Pumped: 5.5 gallons

Depth to Water After Purging: 23.88

Comments

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/26/01
Site/Well No.	GM-29	Replicate No.		Code No.	
Weather	Sunny, 80s	Sampling Time:	Begin 10:00	End	10:47

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.78
Land Surface Elevation (ft)	731.27
Sounded Well Depth (ft bmp)	34.20
Depth to Water (ft bmp)	24.76
Water-Level Elevation (ft)	706.51
Water Column in Well (ft)	9.44
Casing Diameter/Type	2"
Gallons in Well	1.5
Gallons Pumped/Bailed Prior to Sampling	4.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 10:10 end 10:30
Pumping Rate (gpm)	0.07
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Light yellow to colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.20
Conductivity (mS/cm)	
(µmhos/cm)	1291
Turbidity (NTU)	N/A
Temperature (°C)	20.47
Dissolved Oxygen (mg/L)	0.40
ORP (mV)	-166.4
Sampling Method	Low Flow
Remarks	Sample time @ 10:33
	DTW final = 24.79

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/T. Trommer

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: GM-29

Time Pump Started: 10:10

Depth of Sampling: Midpoint of Screen

Date: 6/26/01

Parameters / Time

	10:13	10:16	10:19	10:22	10:25	10:28					
Redox Potential (millivolts)	247.6	184.9	51.7	-56.3	-146.6	-166.4					
Dissolved Oxygen (mg/L)	1.02	1.18	1.44	0.41	0.38	0.40					
pH (s.u.)	7.06	7.16	7.11	7.13	7.16	7.20					
Specific Conductance (uS/cm)	1,302	1,297	1,302	1,294	1,292	1,291					
Temperature (C)	20.66	21.22	19.67	20.25	21.08	20.47					

Flow Rate: 0.07 gpm

Total Depth of Well: 34.20

Time Sampled: 10:33

Depth to Water Before Purging: 24.76

Total Water Pumped: 4.5 gallons

Depth to Water After Purging: 24.79

Comments:

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/26/01
Site/Well No.	ME-5	Replicate No.		Code No.	
Weather	Sunny, 80's	Sampling Time:	Begin 12:35	End	13:45

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	728.29
Land Surface Elevation (ft)	728.65
Sounded Well Depth (ft bmp)	31.20
Depth to Water (ft bmp)	24.85
Water-Level Elevation (ft)	703.44
Water Column in Well (ft)	6.36
Casing Diameter/Type	2"
Gallons in Well	1
Gallons Pumped/Bailed Prior to Sampling	3 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 12:56 end 13:18
Pumping Rate (gpm)	0.05
Evacuation Method	High performance peristaltic pump

Field Parameters

Color	Dark brownish orange/yellow
Odor	Yes
Appearance	Clear
pH (s.u.)	6.87
Conductivity (mS/cm)	
(µmhos/cm)	2679
Turbidity (NTU)	N/A
Temperature (°C)	23.07
Dissolved Oxygen (mg/L)	0.49
ORP (mV)	167.5
Sampling Method	Low Flow
Remarks	Sample time @ 13:20
	DTW final = 24.84
	Redeveloped 6/25/01.

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/T. Trommer

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: ME-5

Time Pump Started: 12:56

Depth of Sampling: Midpoint of Screen

Date: 6/26/01

Parameters / Time

	13:00	13:03	13:06	13:09	13:12	13:15	13:18				
Redox Potential (millivolts)	217.4	229.6	229.7	219.6	180.1	174.9	167.5				
Dissolved Oxygen (mg/L)	1.89	1.14	0.94	0.76	0.54	0.51	0.49				
pH (s.u.)	7.10	6.93	6.84	6.83	6.85	6.84	6.87				
Specific Conductance (uS/cm)	3,270	3,130	2,990	2,818	2,697	2,684	2,679				
Temperature (C)	26.39	24.16	22.76	22.18	22.33	22.84	23.07				

Flow Rate: 0.05 gpm

Total Depth of Well: 31.20

Time Sampled: 13:20

Depth to Water Before Purging: 24.85

Total Water Pumped: 3 gallons

Depth to Water After Purging: 24.84

Comments: Used high performance peristaltic pump

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/26/01
Site/Well No.	ME-6	Replicate No.		Code No.	
Weather	Sunny, 80's	Sampling Time:	Begin 13:52	End	14:43

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	728.11
Land Surface Elevation (ft)	728.55
Sounded Well Depth (ft bmp)	31.85
Depth to Water (ft bmp)	24.37
Water-Level Elevation (ft)	703.74
Water Column in Well (ft)	7.48
Casing Diameter/Type	2"
Gallons in Well	1.2
Gallons Pumped/Bailed Prior to Sampling	3 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 14:02 end 14:23
Pumping Rate (gpm)	0.03
Evacuation Method	High performance peristaltic pump

Field Parameters

Color	Brownish yellow
Odor	Yes
Appearance	Clear
pH (s.u.)	6.82
Conductivity (mS/cm)	
(µmhos/cm)	2630
Turbidity (NTU)	N/A
Temperature (°C)	19.42
Dissolved Oxygen (mg/L)	0.33
ORP (mV)	43.5
Sampling Method	Low Flow
Remarks	Sample time @ 14:25
	DTW final = 24.46

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/T. Trommer

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: ME-6

Time Pump Started: 14:02

Depth of Sampling: Midpoint of Screen

Date: 6/26/01

Parameters / Time

	14:05	14:08	14:11	14:14	14:17	14:20	14:23				
Redox Potential (millivolts)	144.7	156.1	137.7	114.1	86.9	59.8	43.5				
Dissolved Oxygen (mg/L)	1.53	0.75	0.53	0.45	0.41	0.37	0.33				
pH (s.u.)	7.33	7.15	7.01	6.94	6.87	6.88	6.82				
Specific Conductance (uS/cm)	3,879	3,389	3,004	2,910	2,780	2,636	2,630				
Temperature (C)	19.80	19.49	20.14	20.40	19.76	19.70	19.42				

Flow Rate: 0.03 gpm

Total Depth of Well: 31.85

Time Sampled: 14:25

Depth to Water Before Purging: 24.37

Total Water Pumped: 3 gallons

Depth to Water After Purging: 24.46

Comments: White bugs in well.

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/26/01
Site/Well No.	GM-23	Replicate No.	DUP-106 @ 15:45	Code No.	
Weather	Sunny, 80s	Sampling Time:	Begin 14:52	End	16:00

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.99
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	34.00
Depth to Water (ft bmp)	25.35
Water-Level Elevation (ft)	705.64
Water Column in Well (ft)	8.65
Casing Diameter/Type	2"
Gallons in Well	1.3
Gallons Pumped/Bailed Prior to Sampling	2.2 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 15:11 end 15:29
Pumping Rate (gpm)	0.08
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Clear
Odor	Yes
Appearance	Oily
pH (s.u.)	6.15
Conductivity (mS/cm)	
(µmhos/cm)	1801
Turbidity (NTU)	N/A
Temperature (°C)	18.64
Dissolved Oxygen (mg/L)	8.48
ORP (mV)	307.6
Sampling Method	Low Flow
Remarks	Sample time @ 15:37
	RB-83 @ 16:16
	DTW final = 25.40
	Oily material in well.

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool
Iron & Manganese Tot. (6010A)	500 ml plastic	1	Cool, HNO_3
Chlorides (SM4500-CL-C)	250 ml plastic	1	Cool
Sulfide (SM4500-S2E)	500 ml plastic	1	Cool, NaOH/ZnAc
TOC (SM5310B)	250 ml plastic	1	Cool, H_2SO_4
Sulfate (SM4500S04-E)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown/T. Trommer

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.04.02

Site Location: Moraine, Ohio

Monitoring Well No.: GM-23

Time Pump Started: 15:11

Depth of Sampling: Midpoint of Screen

Date: 6/26/01

Parameters / Time

	15:14	15:17	15:20	15:23	15:26	15:29					
Redox Potential (millivolts)	194.5	246.6	251.0	283.6	299.5	307.6					
Dissolved Oxygen (mg/L)	9.40	10.14	10.13	9.47	9.15	8.48					
pH (s.u.)	6.49	6.31	6.24	6.23	6.16	6.15					
Specific Conductance (uS/cm)	1,762	1,768	1,770	1,787	1,795	1,801					
Temperature (C)	18.61	18.21	18.21	18.45	18.48	18.64					

Flow Rate: 0.08 gpm

Total Depth of Well: 34.00

Time Sampled: 15:37

Depth to Water Before Purging: 25.35

Total Water Pumped: 2.2 gallons

Depth to Water After Purging: 25.40

Comments:

DRAFT

November 2001

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/6/2001
Site/Well No.	HR-11	Replicate No.	DUP-107 @ 10:49	Code No.	
Weather	Sun 30s	Sampling Time:	Begin 7:15	End	11:15

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	743.33
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	69.25
Depth to Water (ft bmp)	35.70
Water-Level Elevation (ft)	709.78
Water Column in Well (ft)	33.55
Casing Diameter/Type	2"
Gallons in Well	5.37
Gallons Pumped/Bailed Prior to Sampling	18 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 9:45 end 10:45
Pumping Rate (gpm)	200 ml/25 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	6.64
Conductivity (mS/cm)	
(µmhos/cm)	1356
Turbidity (NTU)	N/A
Temperature (°C)	16.20
Dissolved Oxygen (mg/L)	3.4
ORP (mV)	225.8
Sampling Method	Low flow
Remarks	Sample time @ 10:46
	OVM =0.0 ppm. DTW final=37.70
	RB-84 @ 11:05
	MS-130 @ 10:51; MSD-129 @ 10:53

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-11

Time Pump Started: 9:45

Depth of Sampling: Midpoint of Screen

Date: 11/6/2001

Parameters

Time

	9:45	9:55	10:05	10:15	10:25	10:35	10:45				
Redox Potential (millivolts)	242.3	261.0	250.4	241.6	235.0	227.7	225.8				
Dissolved Oxygen (mg/L)	4.76	5.70	5.70	4.40	3.90	3.60	3.40				
pH (s.u.)	7.09	6.53	6.56	6.59	6.62	6.65	6.64				
Specific Conductance (uS/cm)	1,318	1,356	1,357	1,355	1,352	1,352	1,356				
Temperature (C)	14.46	15.95	16.11	16.09	16.11	16.14	16.20				

Flow Rate: 200 ml/25 sec

Total Depth of Well: 69.25 feet

Time Sampled: 10:46

Depth to Water Before Purging: 35.70

Total Water Pumped: 18 gallons

Depth to Water After Purging: 37.70

Comments

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/6/2001
Site/Well No.	HR-9	Replicate No.		Code No.	
Weather	Sun 50s	Sampling Time:	Begin 12:00	End	13:15

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	743.51
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	70.15
Depth to Water (ft bmp)	35.75
Water-Level Elevation (ft)	707.76
Water Column in Well (ft)	34.40
Casing Diameter/Type	2"
Gallons in Well	5.50
Gallons Pumped/Bailed Prior to Sampling	15 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 12:16 end 12:59
Pumping Rate (gpm)	200 ml/20 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.01
Conductivity (mS/cm)	
(µmhos/cm)	964
Turbidity (NTU)	N/A
Temperature (°C)	15.57
Dissolved Oxygen (mg/L)	3.0
ORP (mV)	266.5
Sampling Method	Low flow
Remarks	Sample time @ 13:00
	OVM = 0.0 ppm
	DTW final = 35.74

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-9

Time Pump Started: 12:16

Depth of Sampling: Midpoint of Screen

Date: 11/6/2001

Parameters / Time

	12:18	12:28	12:38	12:48	12:58						
Redox Potential (millivolts)	246.9	256.2	261.4	265.1	266.5						
Dissolved Oxygen (mg/L)	7.70	3.70	3.10	3.00	3.00						
pH (s.u.)	7.65	7.22	7.07	7.01	7.01						
Specific Conductance (uS/cm)	960	968	966	966	964						
Temperature (C)	15.07	15.83	15.58	15.55	15.57						

Flow Rate: 200 ml/20 sec

Total Depth of Well: 70.15 feet

Time Sampled: 13:00

Depth to Water Before Purging: 35.75

Total Water Pumped: 15 gallons

Depth to Water After Purging: 35.74

Comments:

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/6/2001
Site/Well No.	HR-8	Replicate No.		Code No.	
Weather	Sun 60s	Sampling Time:	Begin 13:20	End	14:25

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	743.42
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	66.72
Depth to Water (ft bmp)	38.12
Water-Level Elevation (ft)	705.30
Water Column in Well (ft)	28.60
Casing Diameter/Type	2"
Gallons in Well	4.58
Gallons Pumped/Bailed Prior to Sampling	22 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 13:28 end 14:10
Pumping Rate (gpm)	200 ml/10 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.12
Conductivity (mS/cm)	
(µmhos/cm)	1158
Turbidity (NTU)	N/A
Temperature (°C)	14.21
Dissolved Oxygen (mg/L)	0.81
ORP (mV)	281.4
Sampling Method	Low flow
Remarks	Sample time @ 14:12
	OVM =0.0 ppm
	DTW final = 36.19

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-8

Time Pump Started: 13:28

Depth of Sampling: Midpoint of Screen

Date: 11/6/2001

Parameters

Time

	13:30	13:40	13:50	14:00	14:10						
Redox Potential (millivolts)	249.1	280.1	281.6	281.7	281.4						
Dissolved Oxygen (mg/L)	5.09	1.08	0.90	0.82	0.81						
pH (s.u.)	7.72	7.22	7.15	7.12	7.12						
Specific Conductance (uS/cm)	1,085	1,158	1,158	1,158	1,158						
Temperature (C)	14.52	14.23	14.24	14.20	14.21						

Flow Rate: 200 ml/10 sec

Total Depth of Well: 66.72 feet

Time Sampled: 14:12

Depth to Water Before Purging: 38.12

Total Water Pumped: 22 gallons

Depth to Water After Purging: 36.19

Comments

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/6/2001
Site/Well No.	HR-4	Replicate No.		Code No.	
Weather	Sun 60s	Sampling Time:	Begin 14:40	End	15:52

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	742.60
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	67.16
Depth to Water (ft bmp)	35.65
Water-Level Elevation (ft)	706.95
Water Column in Well (ft)	31.51
Casing Diameter/Type	2"
Gallons in Well	5.04
Gallons Pumped/Bailed Prior to Sampling	27 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 14:54 end 15:36
Pumping Rate (gpm)	250 ml/10 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.32
Conductivity (mS/cm)	
(µmhos/cm)	872
Turbidity (NTU)	N/A
Temperature (°C)	15.68
Dissolved Oxygen (mg/L)	0.15
ORP (mV)	287.4
Sampling Method	Low flow
Remarks	DTW final = 35.64
	OVM = 0.0 ppm
	Sample time @ 15:38

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-4

Time Pump Started: 14:54

Depth of Sampling: Midpoint of Screen

Date: 11/6/2001

Parameters

Time

	14:55	15:05	15:15	15:25	15:35						
Redox Potential (millivolts)	270.8	293.6	292.7	290.1	287.4						
Dissolved Oxygen (mg/L)	1.62	0.27	0.19	0.16	0.15						
pH (s.u.)	7.89	7.43	7.35	7.34	7.32						
Specific Conductance (uS/cm)	866	876	874	873	872						
Temperature (C)	15.12	15.68	15.69	15.68	15.68						

Flow Rate: 250 ml/10 sec

Total Depth of Well: 67.16 feet

Time Sampled: 15:38

Depth to Water Before Purging: 35.65

Total Water Pumped: 27 gallons

Depth to Water After Purging: 35.64

Comments

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/6/2001
Site/Well No.	W-2-N	Replicate No.		Code No.	
Weather	Sun 50s	Sampling Time:	Begin 16:00	End	17:20

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	731.68
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	59.85
Depth to Water (ft bmp)	25.16
Water-Level Elevation (ft)	706.52
Water Column in Well (ft)	34.69
Casing Diameter/Type	4"
Gallons in Well	5.55
Gallons Pumped/Bailed Prior to Sampling	23 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 16:05 end 16:57
Pumping Rate (gpm)	200 ml/10 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.21
Conductivity (mS/cm)	
(µmhos/cm)	1171
Turbidity (NTU)	N/A
Temperature (°C)	15.03
Dissolved Oxygen (mg/L)	0.45
ORP (mV)	227.1
Sampling Method	Low flow
Remarks	DTW final = 25.17
	OVM = 0.0 ppm
	Sample time @ 16:58

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: W-2-N

Time Pump Started: 16:05

Depth of Sampling: Midpoint of Screen

Date: 11/6/2001

Parameters

Time

	16:06	16:16	16:26	16:36	16:46	16:56					
Redox Potential (millivolts)	283.9	278.4	269.2	253.4	243.3	227.1					
Dissolved Oxygen (mg/L)	4.00	2.88	2.70	4.00	0.31	0.45					
pH (s.u.)	7.35	7.40	7.21	7.29	7.19	7.21					
Specific Conductance (uS/cm)	1,168	1,167	1,168	1,173	1,174	1,171					
Temperature (C)	14.67	14.99	14.93	14.96	14.94	15.03					

Flow Rate: 200 ml/10 sec

Total Depth of Well: 59.85 feet

Time Sampled: 16:58

Depth to Water Before Purging: 25.16

Total Water Pumped: 23 gallons

Depth to Water After Purging: 25.17

Comments

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/7/2001
Site/Well No.	W-4-N	Replicate No.		Code No.	
Weather	Sun 30s	Sampling Time:	Begin 7:05	End	8:44

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	731.63
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	67.07
Depth to Water (ft bmp)	25.29
Water-Level Elevation (ft)	706.34
Water Column in Well (ft)	41.78
Casing Diameter/Type	4"
Gallons in Well	27.16
Gallons Pumped/Bailed Prior to Sampling	20 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 7:38 end 8:31
Pumping Rate (gpm)	225 ml/15 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Milky white
Odor	None
Appearance	Slightly turbid
pH (s.u.)	7.29
Conductivity (mS/cm)	
(µmhos/cm)	1075
Turbidity (NTU)	N/A
Temperature (°C)	15.31
Dissolved Oxygen (mg/L)	0.33
ORP (mV)	259.3
Sampling Method	Low flow
Remarks	DTW final = 25.29
	OVM = 0.0 ppm
	Sample time @ 8:32

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: W-4-N

Time Pump Started: 7:38

Depth of Sampling: Midpoint of Screen

Date: 11/7/2001

Parameters

Time

	7:40	7:50	8:00	8:10	8:20	8:30					
Redox Potential (millivolts)	252.8	262.1	261.2	259.0	259.7	259.3					
Dissolved Oxygen (mg/L)	3.90	0.57	0.40	0.32	0.29	0.33					
pH (s.u.)	8.03	7.64	7.49	7.38	7.33	7.29					
Specific Conductance (uS/cm)	1,084	1,083	1,081	1,079	1,076	1,075					
Temperature (C)	14.10	15.11	15.18	15.19	15.27	15.31					

Flow Rate: 225 ml/15 sec

Total Depth of Well: 67.07 feet

Time Sampled: 8:32

Depth to Water Before Purging: 25.29

Total Water Pumped: 20 gallons

Depth to Water After Purging: 25.29

Comments

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/7/2001
Site/Well No.	W-3-N	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 8:46	End	10:07

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	733.66
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	57.85
Depth to Water (ft bmp)	27.34
Water-Level Elevation (ft)	706.32
Water Column in Well (ft)	30.51
Casing Diameter/Type	4"
Gallons in Well	19.83
Gallons Pumped/Bailed Prior to Sampling	18 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 8:54 end 9:56
Pumping Rate (gpm)	250 ml/15 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Yellow tint
Odor	None
Appearance	Not turbid
pH (s.u.)	7.18
Conductivity (mS/cm)	
(µmhos/cm)	1076
Turbidity (NTU)	N/A
Temperature (°C)	15.46
Dissolved Oxygen (mg/L)	0.20
ORP (mV)	115.3
Sampling Method	Low flow
Remarks	DTW final = 27.32
	OVM = 0.0 ppm
	Sample time @ 9:57

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: W-3-N

Time Pump Started: 8:54

Depth of Sampling: Midpoint of Screen

Date: 11/7/2001

Parameters

	Time										
	8:55	9:05	9:15	9:25	9:35	9:45	9:55				
Redox Potential (millivolts)	270.5	240.1	216.8	187.3	155.7	130.8	115.3				
Dissolved Oxygen (mg/L)	4.16	0.30	0.26	0.22	0.21	0.22	0.20				
pH (s.u.)	7.51	7.35	7.31	7.27	7.25	7.20	7.18				
Specific Conductance (uS/cm)	1,100	1,137	1,129	1,115	1,098	1,089	1,076				
Temperature (C)	13.15	15.62	15.64	15.40	15.41	15.37	15.46				

Flow Rate: 250 ml/15 sec

Total Depth of Well: 57.85 feet

Time Sampled: 9:57

Depth to Water Before Purging: 27.34

Total Water Pumped: 18 gallons

Depth to Water After Purging: 27.32

Comments: Will recalibrate ORP after sampling well to ensure ORP probe is working correctly.

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/7/2001
Site/Well No.	HR-3	Replicate No.		Code No.	
Weather	Sun 50s	Sampling Time:	Begin 10:27/11:25	End	13:30/15:15

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	736.75
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	62.29
Depth to Water (ft bmp)	30.40
Water-Level Elevation (ft)	706.35
Water Column in Well (ft)	31.89
Casing Diameter/Type	2"
Gallons in Well	5.10
Gallons Pumped/Bailed Prior to Sampling	26 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 13:59 end 15:03
Pumping Rate (gpm)	250 ml/10 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.21
Conductivity (mS/cm)	
(µmhos/cm)	1150
Turbidity (NTU)	N/A
Temperature (°C)	16.97
Dissolved Oxygen (mg/L)	2.21
ORP (mV)	17.0
Sampling Method	Low flow

Remarks: DTW final = 30.40; OVM = 0.0 ppm; Sample time @ 15:05

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-3

Time Pump Started: 13:59

Depth of Sampling: Midpoint of Screen

Date: 11/7/2001

Parameters

	Time										
	14:00	14:10	14:20	14:30	14:40	14:50	15:00				
Redox Potential (millivolts)	108.0	51.0	41.0	34.0	27.0	19.0	17.0				
Dissolved Oxygen (mg/L)	12.44	2.82	2.50	2.33	2.26	2.22	2.21				
pH (s.u.)	6.90	7.15	7.16	7.19	7.18	7.18	7.21				
Specific Conductance (uS/cm)	907	1,200	1,190	1,200	1,170	1,150	1,150				
Temperature (C)	16.68	17.12	17.15	17.19	16.96	16.98	16.97				

Flow Rate: 250 ml/10 sec

Total Depth of Well: 62.29 feet

Time Sampled: 15:05

Depth to Water Before Purging: 30.40

Total Water Pumped: 26 gallons

Depth to Water After Purging: 30.40

Comments: Used Horiba U-22 for parameters.

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.0002(9)	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/7/2001
Site/Well No.	HR-2	Replicate No.		Code No.	
Weather	Sun 50s	Sampling Time:	Begin 15:17	End	16:30

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	734.75
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	58.80
Depth to Water (ft bmp)	28.39
Water-Level Elevation (ft)	706.36
Water Column in Well (ft)	30.41
Casing Diameter/Type	2"
Gallons in Well	4.87
Gallons Pumped/Bailed Prior to Sampling	21 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 15:22 end 16:14
Pumping Rate (gpm)	250 ml/10 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.04
Conductivity (mS/cm)	
(µmhos/cm)	859
Turbidity (NTU)	N/A
Temperature (°C)	17.10
Dissolved Oxygen (mg/L)	2.82
ORP (mV)	84.0
Sampling Method	Low flow
Remarks	DTW final = 28.38
	OVM =0.0 ppm
	Sample time @ 16:15

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-2

Time Pump Started: 15:20

Depth of Sampling: Midpoint of Screen

Date: 11/7/2001

Parameters

Time

	15:23	15:33	15:43	15:53	16:03	16:13					
Redox Potential (millivolts)	107.0	181.0	103.0	80.0	99.0	84.0					
Dissolved Oxygen (mg/L)	14.22	5.18	3.03	2.83	3.60	2.82					
pH (s.u.)	7.16	6.77	7.01	7.03	7.04	7.04					
Specific Conductance (uS/cm)	996	880	866	856	878	859					
Temperature (C)	17.03	17.38	17.40	17.43	17.12	17.10					

Flow Rate: 250 ml/10 sec

Total Depth of Well: 58.80 feet

Time Sampled: 16:15

Depth to Water Before Purging: 28.39

Total Water Pumped: 21 gallons

Depth to Water After Purging: 28.38

Comments: Used Horiba U-22 for parameters.

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/7/2001
Site/Well No.	HR-5	Replicate No.	DUP-108/11701/GW	Code No.	
Weather	Sun 50s	Sampling Time:	Begin 16:38	End	17:45

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	734.27
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	58.19
Depth to Water (ft bmp)	28.34
Water-Level Elevation (ft)	705.93
Water Column in Well (ft)	29.85
Casing Diameter/Type	2"
Gallons in Well	4.77
Gallons Pumped/Bailed Prior to Sampling	17 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 16:49 end 17:32
Pumping Rate (gpm)	250 ml/10 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Light brown
Odor	None
Appearance	Slightly turbid
pH (s.u.)	7.04
Conductivity (mS/cm)	
(µmhos/cm)	1260
Turbidity (NTU)	N/A
Temperature (°C)	17.20
Dissolved Oxygen (mg/L)	3.19
ORP (mV)	-83.0
Sampling Method	Low flow
Remarks	DTW final = 28.34
	OVM = 0.0 ppm
	Sample time @ 17:33
	DUP taken @ 17:35

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-5

Time Pump Started: 16:49

Depth of Sampling: Midpoint of Screen

Date: 11/7/2001

Parameters

Time

	16:50	17:00	17:10	17:20	17:30						
Redox Potential (millivolts)	-45.0	-63.0	-69.0	-77.0	-83.0						
Dissolved Oxygen (mg/L)	18.50	6.02	3.61	3.27	3.19						
pH (s.u.)	7.10	7.02	7.03	7.04	7.04						
Specific Conductance (uS/cm)	988	1,240	1,250	1,240	1,260						
Temperature (C)	16.97	17.24	17.22	17.21	17.20						

Flow Rate: 250 ml/10 sec

Total Depth of Well: 58.19 feet

Time Sampled: 17:33

Depth to Water Before Purging: 28.34

Total Water Pumped: 17 gallons

Depth to Water After Purging: 28.34

Comments: Used Horiba U-22 for parameters.

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/8/2001
Site/Well No.	HR-1	Replicate No.		Code No.	
Weather	Sun 50s	Sampling Time:	Begin 7:20	End	8:40

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	732.71
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	59.31
Depth to Water (ft bmp)	27.93
Water-Level Elevation (ft)	704.78
Water Column in Well (ft)	31.38
Casing Diameter/Type	2"
Gallons in Well	5.02
Gallons Pumped/Bailed Prior to Sampling	26 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 7:48 end 8:21
Pumping Rate (gpm)	325 ml/10 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.06
Conductivity (mS/cm)	
(µmhos/cm)	970
Turbidity (NTU)	N/A
Temperature (°C)	20.68
Dissolved Oxygen (mg/L)	2.15
ORP (mV)	91
Sampling Method	Low flow
Remarks	Sample time @ 8:22
	OVM = 0.0 ppm
	DTW final = 27.93
	RB-85 @ 8:30

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

Sampling Personnel: H. Stamm/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-1

Time Pump Started: 7:48

Depth of Sampling: Midpoint of Screen

Date: 11/8/2001

Parameters

Time

	7:50	8:00	8:10	8:15	8:20						
Redox Potential (millivolts)	219.0	131.0	106.0	96.0	91.0						
Dissolved Oxygen (mg/L)	10.15	2.49	2.23	2.19	2.15						
pH (s.u.)	6.76	7.02	7.05	7.05	7.06						
Specific Conductance (uS/cm)	922	926	973	971	970						
Temperature (C)	19.87	20.30	20.56	20.64	20.68						

Flow Rate: 325 ml/10 sec

Total Depth of Well: 59.31 feet

Time Sampled: 8:22

Depth to Water Before Purging: 27.93

Total Water Pumped: 26 gallons

Depth to Water After Purging: 27.93

Comments: Used Horiba U-22 for parameters.

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/8/2001
Site/Well No.	HR-17	Replicate No.		Code No.	
Weather	Sun 50s	Sampling Time:	Begin 8:55	End	9:55

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	726.43
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	48.08
Depth to Water (ft bmp)	21.87
Water-Level Elevation (ft)	704.56
Water Column in Well (ft)	26.21
Casing Diameter/Type	4"
Gallons in Well	17.04
Gallons Pumped/Bailed Prior to Sampling	18 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 9:25 end 9:44
Pumping Rate (gpm)	250 ml/9 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Light tan
Odor	None
Appearance	Slightly turbid
pH (s.u.)	7.54
Conductivity (mS/cm)	
(µmhos/cm)	1053
Turbidity (NTU)	N/A
Temperature (°C)	17.66
Dissolved Oxygen (mg/L)	3.13
ORP (mV)	223.3
Sampling Method	Low flow
Remarks	DTW final = 21.89
	OVM = 0.0 ppm
	Sample time @ 9:45

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

Sampling Personnel: H. Stamm/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: Moraine, Ohio

Monitoring Well No.: HR-17

Time Pump Started: 9:25

Depth of Sampling: Midpoint of Screen

Date: 11/8/2001

Parameters

	Time										
	9:26	9:29	9:32	9:35	9:38	9:41	9:44				
Redox Potential (millivolts)	235.7	235.4	231.2	229.0	224.2	223.2	223.2				
Dissolved Oxygen (mg/L)	3.75	3.30	3.17	3.23	3.13	3.12	3.13				
pH (s.u.)	7.24	7.36	7.48	7.50	7.53	7.54	7.54				
Specific Conductance (uS/cm)	1,059	1,054	1,051	1,053	1,052	1,053	1,053				
Temperature (C)	17.05	17.33	17.50	17.61	17.65	17.65	17.66				

Flow Rate: 250 ml/9 sec

Time Sampled: 9:45

Total Water Pumped: 18 gallons

Comments: YSI

Total Depth of Well: 48.08 feet

Depth to Water Before Purging: 21.87

Depth to Water After Purging: 21.89

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/8/2001
Site/Well No.	W-2-S	Replicate No.		Code No.	
Weather	Sun 50s	Sampling Time:	Begin 9:58	End	10:34

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	726.64
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	67.20
Depth to Water (ft bmp)	22.92
Water-Level Elevation (ft)	703.72
Water Column in Well (ft)	44.28
Casing Diameter/Type	4"
Gallons in Well	28.78
Gallons Pumped/Bailed Prior to Sampling	4 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 10:08 end 10:26
Pumping Rate (gpm)	250 ml/21 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Brown
Odor	None
Appearance	Very turbid
pH (s.u.)	7.55
Conductivity (mS/cm)	
(µmhos/cm)	1043
Turbidity (NTU)	N/A
Temperature (°C)	15.46
Dissolved Oxygen (mg/L)	0.31
ORP (mV)	163.5
Sampling Method	Low flow
Remarks	DTW final = 22.91
	OVM = 0.0 ppm
	Sample time @ 10:27

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

Sampling Personnel: H. Stamm/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: W-2-S

Time Pump Started: 10:08

Depth of Sampling: Midpoint of Screen

Date: 11/8/2001

Parameters / Time

	10:10	10:13	10:16	10:19	10:22	10:25					
Redox Potential (millivolts)	251.2	190.8	174.7	170.8	167.6	163.5					
Dissolved Oxygen (mg/L)	0.87	0.46	0.37	0.33	0.33	0.31					
pH (s.u.)	7.67	7.59	7.58	7.56	7.56	7.55					
Specific Conductance (uS/cm)	1,042	1,041	1,044	1,044	1,043	1,043					
Temperature (C)	14.70	15.18	15.39	15.40	15.43	15.46					

Flow Rate: 250 ml/21 sec

Total Depth of Well: 67.2 feet

Time Sampled: 10:27

Depth to Water Before Purging: 22.92

Total Water Pumped: 4 gallons

Depth to Water After Purging: 22.91

Comments: YSI

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/8/2001
Site/Well No.	W-3-S	Replicate No.		Code No.	
Weather	Sun 60s	Sampling Time:	Begin 10:36	End	11:17

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	733.42
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	77.87
Depth to Water (ft bmp)	25.43
Water-Level Elevation (ft)	707.99
Water Column in Well (ft)	52.44
Casing Diameter/Type	4"
Gallons in Well	34.08
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 10:42 end 11:07
Pumping Rate (gpm)	500 ml/1 min
Evacuation Method	Submersible pump

Field Parameters

Color	Tan/colorless
Odor	None
Appearance	Slighty turbid/clear
pH (s.u.)	7.57
Conductivity (mS/cm)	
(µmhos/cm)	1105
Turbidity (NTU)	N/A
Temperature (°C)	16.13
Dissolved Oxygen (mg/L)	0.96
ORP (mV)	86.8
Sampling Method	Low flow
Remarks	DTW final = 25.43
	OVM = 0.0 ppm
	Sample time @ 11:08

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

Sampling Personnel: H. Stamm/C. Capeli

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: W-3-S

Time Pump Started: 10:42

Depth of Sampling: Midpoint of Screen

Date: 11/8/2001

Parameters / Time

	10:45	10:48	10:51	10:54	10:57	11:00	11:03	11:06			
Redox Potential (millivolts)	244.5	84.5	71.2	82.9	89.3	86.4	85.1	86.8			
Dissolved Oxygen (mg/L)	3.52	1.23	1.15	1.16	1.01	0.93	0.97	0.96			
pH (s.u.)	7.77	7.64	7.60	7.59	7.58	7.57	7.57	7.57			
Specific Conductance (uS/cm)	1,074	1,102	1,100	1,104	1,105	1,106	1,105	1,105			
Temperature (C)	15.20	15.40	15.84	16.05	16.12	16.15	16.13	16.13			

Flow Rate: 500 ml/min

Total Depth of Well: 77.87 feet

Time Sampled: 11:08

Depth to Water Before Purging: 25.43

Total Water Pumped: 5 gallons

Depth to Water After Purging: 25.43

Comments: YSI

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/8/2001
Site/Well No.	W-4-S	Replicate No.		Code No.	
Weather	Sun 60s	Sampling Time:	Begin 11:20	End	12:03

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	727.68
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	71.00
Depth to Water (ft bmp)	23.92
Water-Level Elevation (ft)	703.76
Water Column in Well (ft)	47.08
Casing Diameter/Type	4"
Gallons in Well	30.60
Gallons Pumped/Bailed Prior to Sampling	4.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 11:25 end 11:52
Pumping Rate (gpm)	500 ml/1 min
Evacuation Method	Submersible pump

Field Parameters

Color	Gray tint
Odor	None
Appearance	Not turbid
pH (s.u.)	7.49
Conductivity (mS/cm)	
(µmhos/cm)	1322
Turbidity (NTU)	N/A
Temperature (°C)	17.64
Dissolved Oxygen (mg/L)	0.70
ORP (mV)	188.4
Sampling Method	Low flow
Remarks	DTW final = 23.93
	OVM =0.0 ppm
	Sample time @ 11:53

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

Sampling Personnel: H. Stamm/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: W-4-S

Time Pump Started: 11:25

Depth of Sampling: Midpoint of Screen

Date: 11/8/2001

Parameters

Time

	11:27	11:30	11:33	11:36	11:39	11:42	11:45	11:48	11:51		
Redox Potential (millivolts)	232.0	220.6	212.6	214.6	214.4	208.7	203.3	192.4	188.4		
Dissolved Oxygen (mg/L)	3.53	0.94	3.02	2.58	2.26	1.28	1.01	0.78	0.70		
pH (s.u.)	7.68	7.56	7.60	7.58	7.56	7.51	7.50	7.49	7.49		
Specific Conductance (uS/cm)	1,285	1,289	1,318	1,318	1,318	1,315	1,315	1,320	1,322		
Temperature (C)	16.33	16.64	17.28	17.14	17.12	17.18	17.52	17.61	17.64		

Flow Rate: 500 ml/min

Total Depth of Well: 71.00 feet

Time Sampled: 11:53

Depth to Water Before Purging: 23.92

Total Water Pumped: 4.5 gallons

Depth to Water After Purging: 23.93

Comments: YSI

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/8/2001
Site/Well No.	GM-16	Replicate No.		Code No.	
Weather	Sun 60s	Sampling Time:	Begin 13:25	End	14:00

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	725.30
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	57.05
Depth to Water (ft bmp)	22.18
Water-Level Elevation (ft)	703.12
Water Column in Well (ft)	34.87
Casing Diameter/Type	2"
Gallons in Well	5.58
Gallons Pumped/Bailed Prior to Sampling	8 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 13:38 end 13:56
Pumping Rate (gpm)	250 ml/10 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.62
Conductivity (mS/cm)	
(µmhos/cm)	1065
Turbidity (NTU)	N/A
Temperature (°C)	16.82
Dissolved Oxygen (mg/L)	1.31
ORP (mV)	228.4
Sampling Method	Low flow
Remarks	DTW final = 22.18
	OVM = 0.0 ppm
	Sample time @ 13:57

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

Sampling Personnel: H. Stamm/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-16

Time Pump Started: 13:38

Depth of Sampling: Midpoint of Screen

Date: 11/8/2001

Parameters / Time

	13:40	13:43	13:46	13:49	13:52	13:55					
Redox Potential (millivolts)	259.6	254.4	247.7	240.5	234.0	228.4					
Dissolved Oxygen (mg/L)	2.85	1.43	1.30	1.34	1.34	1.31					
pH (s.u.)	8.10	7.81	7.70	7.65	7.63	7.62					
Specific Conductance (uS/cm)	1,124	1,074	1,073	1,069	1,067	1,065					
Temperature (C)	16.96	17.06	16.85	16.82	16.84	16.82					

Flow Rate: 250 ml/10 sec

Total Depth of Well: 57.05 feet

Time Sampled: 13:57

Depth to Water Before Purging: 22.18

Total Water Pumped: 8 gallons

Depth to Water After Purging: 22.18

Comments: YSI

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/8/2001
Site/Well No.	GM-17	Replicate No.		Code No.	
Weather	Sun 60s	Sampling Time:	Begin 14:07	End	14:38

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	723.84
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	49.90
Depth to Water (ft bmp)	20.71
Water-Level Elevation (ft)	703.13
Water Column in Well (ft)	29.19
Casing Diameter/Type	2"
Gallons in Well	4.67
Gallons Pumped/Bailed Prior to Sampling	8 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 14:15 end 14:32
Pumping Rate (gpm)	250 ml/10 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.49
Conductivity (mS/cm)	
(µmhos/cm)	1287
Turbidity (NTU)	N/A
Temperature (°C)	18.29
Dissolved Oxygen (mg/L)	0.44
ORP (mV)	179.3
Sampling Method	Low flow
Remarks	DTW final = 20.71
	OVM = 0.0 ppm
	Sample time @ 14:33

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

Sampling Personnel: H. Stamm/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-17

Time Pump Started: 14:15

Depth of Sampling: Midpoint of Screen

Date: 11/8/2001

Parameters / Time

	14:16	14:19	14:22	14:25	14:28	14:31					
Redox Potential (millivolts)	209.0	204.9	200.5	193.0	185.5	179.3					
Dissolved Oxygen (mg/L)	3.47	0.76	0.61	0.48	0.63	0.44					
pH (s.u.)	7.72	7.56	7.52	7.50	7.51	7.49					
Specific Conductance (uS/cm)	1,307	1,279	1,280	1,283	1,286	1,287					
Temperature (C)	18.00	18.15	18.24	18.27	18.29	18.29					

Flow Rate: 250 ml/10 sec

Total Depth of Well: 49.90 feet

Time Sampled: 14:33

Depth to Water Before Purging: 20.71

Total Water Pumped: 8 gallons

Depth to Water After Purging: 20.71

Comments: YSI

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/8/2001
Site/Well No.	GM-18	Replicate No.		Code No.	
Weather	Sun 60s	Sampling Time:	Begin 14:50	End	15:28

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	723.80
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	54.08
Depth to Water (ft bmp)	20.77
Water-Level Elevation (ft)	703.03
Water Column in Well (ft)	33.31
Casing Diameter/Type	2"
Gallons in Well	5.33
Gallons Pumped/Bailed Prior to Sampling	7 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 15:03 end 15:20
Pumping Rate (gpm)	250 ml/12 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.48
Conductivity (mS/cm)	
(µmhos/cm)	1245
Turbidity (NTU)	N/A
Temperature (°C)	17.93
Dissolved Oxygen (mg/L)	0.36
ORP (mV)	231.3
Sampling Method	Low flow
Remarks	DTW final = 20.76
	OVM = 0.0 ppm
	Sample time @ 15:21

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

Sampling Personnel: H. Stamm/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-18

Time Pump Started: 15:03

Depth of Sampling: Midpoint of Screen

Date: 11/8/2001

Parameters

Time

	15:04	15:07	15:10	15:13	15:16	15:19					
Redox Potential (millivolts)	263.3	264.0	256.3	243.9	236.4	231.3					
Dissolved Oxygen (mg/L)	6.66	0.81	0.56	0.49	0.40	0.36					
pH (s.u.)	8.03	7.70	7.58	7.63	7.48	7.48					
Specific Conductance (uS/cm)	1,282	1,246	1,244	1,244	1,245	1,245					
Temperature (C)	17.99	17.61	17.88	17.93	17.90	17.93					

Flow Rate: 250 ml/12 sec

Total Depth of Well: 54.08 feet

Time Sampled: 15:21

Depth to Water Before Purging: 20.77

Total Water Pumped: 7 gallons

Depth to Water After Purging: 20.76

Comments:

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/8/2001
Site/Well No.	GM-10	Replicate No.		Code No.	
Weather	Sun 50s, Windy	Sampling Time:	Begin 15:30	End	16:20

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	723.46
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	49.56
Depth to Water (ft bmp)	21.18
Water-Level Elevation (ft)	702.28
Water Column in Well (ft)	28.38
Casing Diameter/Type	2"
Gallons in Well	4.54
Gallons Pumped/Bailed Prior to Sampling	7 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 15:50 end 16:10
Pumping Rate (gpm)	250 ml/12 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.45
Conductivity (mS/cm)	
(µmhos/cm)	1563
Turbidity (NTU)	N/A
Temperature (°C)	16.94
Dissolved Oxygen (mg/L)	0.37
ORP (mV)	250.0
Sampling Method	Low flow
Remarks	DTW final = 21.20
	OVM = 0.0 ppm
	Sample time @ 16:11
	TB-132 @ 15:40

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

Sampling Personnel: H. Stamm/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-10

Time Pump Started: 15:50

Depth of Sampling: Midpoint of Screen

Date: 11/8/2001

Parameters / Time

	15:51	15:54	15:57	16:00	16:03	16:06	16:09				
Redox Potential (millivolts)	287.3	283.2	274.3	265.1	261.8	256.8	250.0				
Dissolved Oxygen (mg/L)	1.76	0.58	0.66	0.45	0.51	0.37	0.37				
pH (s.u.)	7.64	7.52	7.48	7.45	7.45	7.44	7.45				
Specific Conductance (uS/cm)	1,635	1,630	1,607	1,578	1,577	1,570	1,563				
Temperature (C)	16.66	16.76	16.86	16.90	16.92	16.95	16.94				

Flow Rate: 250 ml/12 sec

Total Depth of Well: 49.56 feet

Time Sampled: 16:11

Depth to Water Before Purging: 21.18

Total Water Pumped: 7 gallons

Depth to Water After Purging: 21.20

Comments:

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/9/2001
Site/Well No.	GM-8	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 8:40	End	9:50

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	735.17
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	51.45
Depth to Water (ft bmp)	31.92
Water-Level Elevation (ft)	703.25
Water Column in Well (ft)	19.53
Casing Diameter/Type	2"
Gallons in Well	3.12
Gallons Pumped/Bailed Prior to Sampling	6 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 9:20 end 9:41
Pumping Rate (gpm)	250 ml/15 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Yellow tint
Odor	None
Appearance	Not turbid
pH (s.u.)	7.54
Conductivity (mS/cm)	
(µmhos/cm)	1560
Turbidity (NTU)	N/A
Temperature (°C)	17.80
Dissolved Oxygen (mg/L)	3.38
ORP (mV)	-161.4
Sampling Method	Low flow
Remarks	DTW final = 31.91
	OVM = 0.0 ppm
	Sample time @ 9:42

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

Sampling Personnel: H. Stamm/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-8

Time Pump Started: 9:20

Depth of Sampling: Midpoint of Screen

Date: 11/8/2001

Parameters

Time

	9:22	9:25	9:28	9:31	9:34	9:37	9:40				
Redox Potential (millivolts)	-116.9	-117.3	-130.5	-151.4	-152.2	-157.4	-161.4				
Dissolved Oxygen (mg/L)	2.33	2.46	2.80	3.04	3.22	3.35	3.38				
pH (s.u.)	7.95	7.84	7.66	7.53	7.55	7.49	7.54				
Specific Conductance (uS/cm)	1,546	1,550	1,559	1,560	1,563	1,565	1,560				
Temperature (C)	17.05	17.30	17.57	17.75	17.75	17.79	17.80				

Flow Rate: 250 ml/15 sec

Total Depth of Well: 51.45 feet

Time Sampled: 9:42

Depth to Water Before Purging: 31.92

Total Water Pumped: 6 gallons

Depth to Water After Purging: 31.91

Comments:

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/9/2001
Site/Well No.	GM-6	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 9:55	End	10:36

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.27
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	46.48
Depth to Water (ft bmp)	27.31
Water-Level Elevation (ft)	702.96
Water Column in Well (ft)	19.17
Casing Diameter/Type	2"
Gallons in Well	3.07
Gallons Pumped/Bailed Prior to Sampling	13 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 10:06 end 10:25
Pumping Rate (gpm)	250 ml8 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.35
Conductivity (mS/cm)	
(µmhos/cm)	1309
Turbidity (NTU)	N/A
Temperature (°C)	18.02
Dissolved Oxygen (mg/L)	2.79
ORP (mV)	-119.2
Sampling Method	Low flow
Remarks	DTW final = 27.30
	OVM = 0.0 ppm
	Sample time @ 10:26

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

Sampling Personnel: H. Stamm/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-6

Time Pump Started: 10:06

Depth of Sampling: Midpoint of Screen

Date: 11/9/2001

Parameters

	Time										
	10:07	10:10	10:13	10:16	10:19	10:21	10:24				
Redox Potential (millivolts)	-85.9	-103.0	-107.9	-112.3	-115.6	-118.0	-119.2				
Dissolved Oxygen (mg/L)	3.58	3.12	2.93	2.77	2.85	2.75	2.79				
pH (s.u.)	7.84	7.51	7.44	7.40	7.30	7.37	7.35				
Specific Conductance (uS/cm)	1,311	1,309	1,308	1,309	1,309	1,309	1,309				
Temperature (C)	17.00	17.92	18.00	18.00	18.03	18.02	18.02				

Flow Rate: 250 ml/8 sec

Total Depth of Well: 46.48 feet

Time Sampled: 10:26

Depth to Water Before Purging: 27.31

Total Water Pumped: 13 gallons

Depth to Water After Purging: 27.30

Comments: YSI

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/9/2001
Site/Well No.	TW2	Replicate No.	DUP-109 @ 11:29	Code No.	
Weather	Sun 50s	Sampling Time:	Begin 10:40	End	12:00

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	733.38
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	42.05
Depth to Water (ft bmp)	34.23
Water-Level Elevation (ft)	699.15
Water Column in Well (ft)	7.82
Casing Diameter/Type	10"
Gallons in Well	32
Gallons Pumped/Bailed Prior to Sampling	9 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 11:05 end 11:26
Pumping Rate (gpm)	250 ml/10 sec
Evacuation Method	Submersible pump

Field Parameters

Color	None
Odor	Yes
Appearance	Not turbid
pH (s.u.)	7.41
Conductivity (mS/cm)	
(µmhos/cm)	1353
Turbidity (NTU)	N/A
Temperature (°C)	18.25
Dissolved Oxygen (mg/L)	3.43
ORP (mV)	-141.7
Sampling Method	Low flow
Remarks	DTW final = 34.06
	OVM = 0.0 ppm; Sample time @ 11:27
	RB-86 @ 11:50; MS-131 @ 11:30; MSD-130 @
	11:33; TW-2 was sampled as an alternate to 4S

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

Sampling Personnel: H. Stamm/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: TW2

Time Pump Started: 11:05

Depth of Sampling: Midpoint of Screen

Date: 11/9/2001

Parameters

Time

	11:07	11:10	11:13	11:16	11:19	11:22	11:25				
Redox Potential (millivolts)	-89.9	-128.9	-132.8	-138.0	-140.8	-140.9	-141.7				
Dissolved Oxygen (mg/L)	3.75	3.31	3.22	3.45	3.37	3.38	3.43				
pH (s.u.)	7.78	7.52	7.48	7.44	7.42	7.44	7.41				
Specific Conductance (uS/cm)	1,364	1,346	1,346	1,351	1,354	1,352	1,353				
Temperature (C)	17.22	18.26	18.36	18.41	18.32	18.13	18.25				

Flow Rate: 250 ml/10 sec

Time Sampled: 11:27

Total Water Pumped: 9 gallons

Comments:

Total Depth of Well: 42.05 feet

Depth to Water Before Purging: 34.23

Depth to Water After Purging: 34.06

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/9/2001
Site/Well No.	GM-2	Replicate No.		Code No.	
Weather	Sun 60s	Sampling Time:	Begin 12:05	End	13:20

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	735.81
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	56.35
Depth to Water (ft bmp)	32.32
Water-Level Elevation (ft)	738.36
Water Column in Well (ft)	24.03
Casing Diameter/Type	2"
Gallons in Well	3.85
Gallons Pumped/Bailed Prior to Sampling	8 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 12:41 end 13:04
Pumping Rate (gpm)	250 ml/13 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Clear
Odor	Colorless
Appearance	Not turbid
pH (s.u.)	7.29
Conductivity (mS/cm)	
(µmhos/cm)	1567
Turbidity (NTU)	N/A
Temperature (°C)	17.23
Dissolved Oxygen (mg/L)	2.27
ORP (mV)	-10.3
Sampling Method	Low flow
Remarks	DTW final = 32.32
	OVM = 0.0 ppm
	Sample time @ 13:05

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

Sampling Personnel: H. Stamm/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-2

Time Pump Started: 12:41

Depth of Sampling: Midpoint of Screen

Date: 11/9/2001

Parameters

	Time										
	12:42	12:45	12:48	12:51	12:54	12:57	13:00	13:03			
Redox Potential (millivolts)	18.5	17.3	12.3	7.2	1.9	-2.6	-6.8	-10.3			
Dissolved Oxygen (mg/L)	5.93	2.61	2.47	2.32	2.27	2.28	2.20	2.27			
pH (s.u.)	8.07	7.70	7.53	7.43	7.38	7.34	7.31	7.29			
Specific Conductance (uS/cm)	1,555	1,565	1,569	1,569	1,566	1,566	1,570	1,567			
Temperature (C)	16.91	16.87	17.14	17.30	17.30	17.34	17.31	17.23			

Flow Rate: 250 ml/13 sec

Total Depth of Well: 56.35 feet

Time Sampled: 13:05

Depth to Water Before Purging: 32.32

Total Water Pumped: 8 gallons

Depth to Water After Purging: 32.32

Comments:

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/9/2001
Site/Well No.	WSU-24	Replicate No.		Code No.	
Weather	Sun 60s	Sampling Time:	Begin 13:30	End	14:25

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	725.10
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	65.51
Depth to Water (ft bmp)	21.65
Water-Level Elevation (ft)	704.45
Water Column in Well (ft)	43.86
Casing Diameter/Type	2"
Gallons in Well	7.02
Gallons Pumped/Bailed Prior to Sampling	10 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 13:38 end 14:09
Pumping Rate (gpm)	250 ml/10 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.33
Conductivity (mS/cm)	
(µmhos/cm)	1561
Turbidity (NTU)	N/A
Temperature (°C)	16.38
Dissolved Oxygen (mg/L)	1.38
ORP (mV)	48.3
Sampling Method	Low flow

Remarks: Sample time @ 14:10; OVM = 0.0 ppm; DTW final = 21.65

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: WSU-24

Time Pump Started: 13:38

Depth of Sampling: Midpoint of Screen

Date: 11/9/2001

Parameters

Time

	13:39	13:42	13:45	13:48	13:51	13:54	13:57	14:00	14:03	14:06	14:09
Redox Potential (millivolts)	89.4	75.8	68.2	61.6	52.0	45.7	77.0	74.1	65.0	56.3	48.3
Dissolved Oxygen (mg/L)	2.08	1.63	1.57	1.46	1.42	5.77	3.56	1.55	1.27	1.25	1.38
pH (s.u.)	7.57	7.41	7.37	7.35	7.33	7.46	7.53	7.41	7.36	7.33	7.33
Specific Conductance (uS/cm)	1,551	1,555	1,558	1,559	1,559	1,569	1,567	1,559	1,562	1,560	1,561
Temperature (C)	16.33	16.38	16.34	16.36	16.40	16.34	16.25	16.40	16.40	16.39	16.38

Flow Rate: 250 ml/10 sec

Total Depth of Well: 65.51 feet

Time Sampled: 14:10

Depth to Water Before Purging: 21.65

Total Water Pumped: 10 gallons

Depth to Water After Purging: 21.65

Comments: Pump turned off @ 13:54 and immediately restarted.

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/12/2001
Site/Well No.	EAST	Replicate No.		Code No.	
Weather	Sun 60s	Sampling Time:	Begin 8:15	End	10:20

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.98
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	71.64
Depth to Water (ft bmp)	26.82
Water-Level Elevation (ft)	704.16
Water Column in Well (ft)	44.82
Casing Diameter/Type	2"
Gallons in Well	7.17
Gallons Pumped/Bailed Prior to Sampling	10 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 9:03 end 9:23
Pumping Rate (gpm)	250ml/10 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.15
Conductivity (mS/cm)	
(µmhos/cm)	1363
Turbidity (NTU)	N/A
Temperature (°C)	18.68
Dissolved Oxygen (mg/L)	1.73
ORP (mV)	177.1
Sampling Method	Low flow
Remarks	DTW final = 26.82
	OVM = 0.0 ppm
	Sample time @ 9:25

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C.Capell / S.Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: EAST

Time Pump Started: 9:03

Depth of Sampling: Midpoint of Screen

Date: 11/12/2001

Parameters

Time

	9:05	9:08	9:11	9:14	9:17	9:20	9:23				
Redox Potential (millivolts)	195.6	195.1	190.7	184.0	181.5	180.2	177.1				
Dissolved Oxygen (mg/L)	2.18	2.70	2.96	1.99	1.80	1.75	1.73				
pH (s.u.)	6.96	7.01	7.07	7.12	7.14	7.14	7.15				
Specific Conductance (uS/cm)	1,354	1,348	1,352	1,363	1,365	1,362	1,363				
Temperature (C)	17.61	18.21	18.45	18.60	18.60	18.62	18.68				

Flow Rate: 250 ml/10 sec

Total Depth of Well: 71.64 feet

Time Sampled: 9:25

Depth to Water Before Purging: 26.82

Total Water Pumped: 10 gallons

Depth to Water After Purging: 26.82

Comments

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/12/2001
Site/Well No.	19S	Replicate No.		Code No.	
Weather	Sun 30s	Sampling Time:	Begin 10:27	End	11:16

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.85
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	55.04
Depth to Water (ft bmp)	27.05
Water-Level Elevation (ft)	703.80
Water Column in Well (ft)	27.99
Casing Diameter/Type	2"
Gallons in Well	4.48
Gallons Pumped/Bailed Prior to Sampling	7.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 10:35 end 10:52
Pumping Rate (gpm)	250 ml/9 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.28
Conductivity (mS/cm)	
(µmhos/cm)	1190
Turbidity (NTU)	N/A
Temperature (°C)	19.24
Dissolved Oxygen (mg/L)	1.75
ORP (mV)	195.6
Sampling Method	Low flow

Remarks: DTW final = 27.05; OVM = 0.0 ppm; Sample time @ 10:55

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C.Capell/ S.Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: 19S

Time Pump Started: 10:35

Depth of Sampling: Midpoint of Screen

Date: 11/12/2001

Parameters

Time	10:37	10:40	10:43	10:46	10:49	10:52					
Redox Potential (millivolts)	224.4	222.3	216.0	209.6	200.6	195.6					
Dissolved Oxygen (mg/L)	2.37	2.06	1.87	1.80	1.80	1.75					
pH (s.u.)	7.40	7.33	7.32	7.30	7.29	7.28					
Specific Conductance (uS/cm)	1,191	1,190	1,191	1,191	1,191	1,190					
Temperature (C)	18.52	19.03	19.07	19.13	19.19	19.24					

Flow Rate: 250 ml/9 sec

Total Depth of Well: 55.04 feet

Time Sampled: 10:55

Depth to Water Before Purging: 27.05

Total Water Pumped: 7.5 gallons

Depth to Water After Purging: 27.05

Comments:

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/12/2001
Site/Well No.	GM-32	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 13:00	End	14:23

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	732.10
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	149.0
Depth to Water (ft bmp)	28.63
Water-Level Elevation (ft)	703.47
Water Column in Well (ft)	120.37
Casing Diameter/Type	2"
Gallons in Well	19.26
Gallons Pumped/Bailed Prior to Sampling	2.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 13:31 end 13:50
Pumping Rate (gpm)	100 ml/ min
Evacuation Method	Submersible pump

Field Parameters

Color	Yellow
Odor	Moderate
Appearance	Cloudy
pH (s.u.)	8.42
Conductivity (mS/cm)	
(µmhos/cm)	6874
Turbidity (NTU)	N/A
Temperature (°C)	18..84
Dissolved Oxygen (mg/L)	0.07
ORP (mV)	-222.8
Sampling Method	Low flow

Remarks: DTW final = 28.64; OVM = 0.0 ppm; Sample time @ 13:55; samples effervesced

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C.Capell/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-32

Time Pump Started: 13:31

Depth of Sampling: Midpoint of Screen

Date: 11/12/2001

Parameters

	Time										
	13:32	13:35	13:38	13:41	13:44	13:47	13:50				
Redox Potential (millivolts)	-116.1	-176.2	-190.1	-202.8	-211.4	-216.8	-222.8				
Dissolved Oxygen (mg/L)	2.41	0.28	0.15	0.11	0.07	0.07	0.07				
pH (s.u.)	8.38	8.21	8.27	8.36	8.39	8.40	8.42				
Specific Conductance (uS/cm)	4,234	5,359	5,910	6,480	6,746	6,819	6,874				
Temperature (C)	17.79	17.90	18.10	18.28	18.48	18.60	18.84				

Flow Rate: 100 ml/min

Total Depth of Well: 149.00 feet

Time Sampled: 13:55

Depth to Water Before Purging: 28.63

Total Water Pumped: 2.5 gallons

Depth to Water After Purging: 28.64

Comments: Samples effervesced.

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/12/2001
Site/Well No.	GM-26	Replicate No.		Code No.	
Weather	Sun 50s	Sampling Time:	Begin 14:30	End	15:07

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	722.29
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	58.65
Depth to Water (ft bmp)	20.25
Water-Level Elevation (ft)	702.04
Water Column in Well (ft)	38.40
Casing Diameter/Type	2"
Gallons in Well	6.14
Gallons Pumped/Bailed Prior to Sampling	10 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 14:44 end 15:00
Pumping Rate (gpm)	250ml/12 sec
Evacuation Method	Submersible pump

Field Parameters

Color	colorless
Odor	none
Appearance	clear
pH (s.u.)	7.69
Conductivity (mS/cm)	
(µmhos/cm)	1111
Turbidity (NTU)	N/A
Temperature (°C)	15.81
Dissolved Oxygen (mg/L)	3.80
ORP (mV)	86.8
Sampling Method	Low flow
Remarks	DTW final = 20.26
	OVM = 0.0 ppm
	Sample time @ 15:02

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

Sampling Personnel: C.Capell/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-26

Time Pump Started: 14:44

Depth of Sampling: Midpoint of Screen

Date: 11/12/2001

Parameters / Time	14:45	14:48	14:51	14:54	14:57	15:00					
Redox Potential (millivolts)	-17.0	8.1	34.0	56.1	77.9	86.8					
Dissolved Oxygen (mg/L)	4.44	3.87	3.80	3.80	3.81	3.80					
pH (s.u.)	8.95	8.44	8.10	7.91	7.75	7.69					
Specific Conductance (uS/cm)	1,112	1,111	1,112	1,113	1,111	1,111					
Temperature (C)	15.25	15.35	15.60	15.74	15.78	15.81					

Flow Rate: 250 ml/12 sec

Total Depth of Well: 58.65 feet

Time Sampled: 15:02

Depth to Water Before Purging: 20.25

Total Water Pumped: 10 gallons

Depth to Water After Purging: 20.26

Comments:

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/12/2001
Site/Well No.	GM-23	Replicate No.		Code No.	
Weather	Sun 50s	Sampling Time:	Begin 16:15	End	17:02

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.99
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	34.0
Depth to Water (ft bmp)	25.12
Water-Level Elevation (ft)	705.87
Water Column in Well (ft)	8.88
Casing Diameter/Type	2"
Gallons in Well	1.42
Gallons Pumped/Bailed Prior to Sampling	3.2 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 16:42 end 17:01
Pumping Rate (gpm)	250 ml/22 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	Yes
Appearance	Not turbid
pH (s.u.)	7.00
Conductivity (mS/cm)	
(µmhos/cm)	1591
Turbidity (NTU)	N/A
Temperature (°C)	16.57
Dissolved Oxygen (mg/L)	0.89
ORP (mV)	193.2
Sampling Method	Low flow
Remarks	DTW final= 25.12
	OVM = 0.0 ppm
	Sample time @ 17:02

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C.Capell/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-23

Time Pump Started: 16:42

Depth of Sampling: Midpoint of Screen

Date: 11/12/2001

Parameters

Time

	16:43	16:46	16:49	16:52	16:55	16:58	17:01				
Redox Potential (millivolts)	202.5	209.5	207.0	204.2	199.8	195.5	193.2				
Dissolved Oxygen (mg/L)	4.17	0.87	0.65	0.57	0.61	0.73	0.89				
pH (s.u.)	7.69	7.31	7.13	7.10	7.03	6.99	7.00				
Specific Conductance (uS/cm)	1,418	1,488	1,524	1,546	1,568	1,579	1,591				
Temperature (C)	16.57	16.55	16.60	16.56	16.57	16.57	16.57				

Flow Rate: 250 ml/22 sec

Total Depth of Well: 34.00 feet

Time Sampled: 17:02

Depth to Water Before Purging: 25.12

Total Water Pumped: 3.2 gallons

Depth to Water After Purging: 25.12

Comments

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/13/2001
Site/Well No.	GM-22	Replicate No.		Code No.	
Weather	Sun 30s	Sampling Time:	Begin 7:50	End	9:30

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	728.28
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	54.0
Depth to Water (ft bmp)	29.97
Water-Level Elevation (ft)	698.31
Water Column in Well (ft)	24.03
Casing Diameter/Type	2"
Gallons in Well	3.84
Gallons Pumped/Bailed Prior to Sampling	4 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 8:15 end 8:45
Pumping Rate (gpm)	250 ml/ 15 sec
Evacuation Method	Peristaltic pump

Field Parameters

Color	Colorless
Odor	Yes
Appearance	Not turbid
pH (s.u.)	7.33
Conductivity (mS/cm)	
(µmhos/cm)	1753
Turbidity (NTU)	N/A
Temperature (°C)	19.45
Dissolved Oxygen (mg/L)	0.01
ORP (mV)	54.8
Sampling Method	Low flow
Remarks	DTW final = 29.97
	OVM = 0.0 ppm
	Sample time @ 8:45

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-22

Time Pump Started: 8:15

Depth of Sampling: Midpoint of Screen

Date: 11/13/2001

Parameters

Time

	8:28	8:31	8:34	8:37	8:41	8:44					
Redox Potential (millivolts)	32.9	48.3	52.9	53.0	54.6	54.8					
Dissolved Oxygen (mg/L)	0.02	0.02	0.01	0.01	0.01	0.01					
pH (s.u.)	7.61	7.41	7.37	7.36	7.34	7.33					
Specific Conductance (uS/cm)	1,632	1,740	1,748	1,749	1,752	1,753					
Temperature (C)	18.51	19.33	19.35	19.36	19.39	19.45					

Flow Rate: 250 ml/15 sec

Total Depth of Well: 54 feet

Time Sampled: 8:45

Depth to Water Before Purging: 29.97

Total Water Pumped: 4 gallons

Depth to Water After Purging: 29.97

Comments:

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/13/2001
Site/Well No.	GM-21	Replicate No.		Code No.	
Weather	Sun, 30s	Sampling Time:	Begin 9:35	End	10:45

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	723.50
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	55.0
Depth to Water (ft bmp)	21.38
Water-Level Elevation (ft)	702.12
Water Column in Well (ft)	33.62
Casing Diameter/Type	2"
Gallons in Well	5.37
Gallons Pumped/Bailed Prior to Sampling	3.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 10:08 end 10:24
Pumping Rate (gpm)	250 ml/20 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.50
Conductivity (mS/cm)	
(µmhos/cm)	1190
Turbidity (NTU)	N/A
Temperature (°C)	16.73
Dissolved Oxygen (mg/L)	0.04
ORP (mV)	168.8
Sampling Method	Low flow
Remarks	DTW final = 21.38
	OVM = 0.0
	Sample time @ 10:25

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 VOA	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-21

Time Pump Started: 10:08

Depth of Sampling: Midpoint of Screen

Date: 11/13/2001

Parameters

Time

	10:10	10:13	10:16	10:19	10:21	10:24					
Redox Potential (millivolts)	183.7	181.9	179.0	174.7	171.7	168.8					
Dissolved Oxygen (mg/L)	0.06	0.03	0.03	0.05	0.04	0.04					
pH (s.u.)	7.60	7.58	7.54	7.50	7.50	7.50					
Specific Conductance (uS/cm)	1,058	1,136	1,163	1,193	1,191	1,190					
Temperature (C)	16.65	16.81	16.83	16.70	16.71	16.73					

Flow Rate: 250 ml/20 sec

Total Depth of Well: 55.00 feet

Time Sampled: 10:25

Depth to Water Before Purging: 21.38

Total Water Pumped: 3.5 gallons

Depth to Water After Purging: 21.38

Comments

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/13/2001
Site/Well No.	GM-30	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 11:35	End	12:35

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	732.33
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	32.0
Depth to Water (ft bmp)	29.92
Water-Level Elevation (ft)	702.41
Water Column in Well (ft)	2.08
Casing Diameter/Type	2"
Gallons in Well	0.3
Gallons Pumped/Bailed Prior to Sampling	4 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 12:10 end 12:25
Pumping Rate (gpm)	250 ml/45 sec
Evacuation Method	Peristaltic pump

Field Parameters

Color	Grey
Odor	Yes
Appearance	Cloudy
pH (s.u.)	7.13
Conductivity (mS/cm)	
(µmhos/cm)	972
Turbidity (NTU)	N/A
Temperature (°C)	16.68
Dissolved Oxygen (mg/L)	0.81
ORP (mV)	-81.2
Sampling Method	Low flow
Remarks	DTW final = 29.92
	OVM = 0.0 ppm
	Sample time @ 12:25

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-30

Time Pump Started: 12:10

Depth of Sampling: Midpoint of Screen

Date: 11/13/2001

Parameters

Time

	12:10	12:13	12:16	12:19	12:22						
Redox Potential (millivolts)	-2.8	-62.9	-71.9	-78.7	-81.2						
Dissolved Oxygen (mg/L)	0.54	0.74	0.78	0.81	0.81						
pH (s.u.)	7.07	7.14	7.10	7.11	7.13						
Specific Conductance (uS/cm)	967	975	973	972	972						
Temperature (C)	17.23	16.62	16.62	16.64	16.68						

Flow Rate: 250 ml/45 sec

Total Depth of Well: 32.0 feet

Time Sampled: 12:25

Depth to Water Before Purging: 29.92

Total Water Pumped: 4 gallons

Depth to Water After Purging: 29.92

Comments

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/13/2001
Site/Well No.	GM-29	Replicate No.		Code No.	
Weather	Sun 50s	Sampling Time:	Begin 13:00	End	13:55

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.78
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	32.0
Depth to Water (ft bmp)	27.37
Water-Level Elevation (ft)	703.41
Water Column in Well (ft)	4.63
Casing Diameter/Type	2"
Gallons in Well	0.74
Gallons Pumped/Bailed Prior to Sampling	4 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 13:27 end 13:44
Pumping Rate (gpm)	250 ml/15 sec
Evacuation Method	Peristaltic pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.47
Conductivity (mS/cm)	
(µmhos/cm)	2703
Turbidity (NTU)	N/A
Temperature (°C)	16.42
Dissolved Oxygen (mg/L)	0.22
ORP (mV)	-129.7
Sampling Method	Low flow
Remarks	DTW final = 27.37
	OVM = 0.0 ppm
	Sample time @ 13:45

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-29

Time Pump Started: 13:27

Depth of Sampling: Midpoint of Screen

Date: 11/13/2001

Parameters

	Time										
	13:29	13:32	13:35	13:38	13:41	13:44					
Redox Potential (millivolts)	-70.4	-102.9	-114.2	-121.4	-126.9	-129.7					
Dissolved Oxygen (mg/L)	1.73	0.38	0.32	0.27	0.25	0.22					
pH (s.u.)	7.73	7.56	7.53	7.51	7.48	7.47					
Specific Conductance (uS/cm)	2,702	2,710	2,703	2,699	2,703	2,703					
Temperature (C)	17.58	16.77	16.63	16.51	16.43	16.42					

Flow Rate: 250 ml/15 sec

Total Depth of Well: 32.0 feet

Time Sampled: 13:45

Depth to Water Before Purging: 27.37

Total Water Pumped: 4 gallons

Depth to Water After Purging: 27.37

Comments:

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/13/2001
Site/Well No.	GM-27	Replicate No.	DUP-110 @ 16:05	Code No.	
Weather	Sun 50s	Sampling Time:	Begin 15:05	End	16:36

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	731.03
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	55.0
Depth to Water (ft bmp)	24.20
Water-Level Elevation (ft)	706.83
Water Column in Well (ft)	30.8
Casing Diameter/Type	2"
Gallons in Well	4.93
Gallons Pumped/Bailed Prior to Sampling	7 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 15:28 end 16:00
Pumping Rate (gpm)	250 ml/15 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Tan
Odor	None
Appearance	Very turbid
pH (s.u.)	7.24
Conductivity (mS/cm)	
(µmhos/cm)	1185
Turbidity (NTU)	N/A
Temperature (°C)	16.39
Dissolved Oxygen (mg/L)	0.89
ORP (mV)	82.5
Sampling Method	Low flow
Remarks	DTW final = 24.20
	OVM = 0.0 ppm
	Sample time @ 16:01
	RB-87 @ 16:25

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

Sampling Personnel: H. Stamm/C. Capell

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-27

Time Pump Started: 15:12

Depth of Sampling: Midpoint of Screen

Date: 11/13/2001

Parameters / Time

	15:29	15:32	15:35	15:38	15:41	15:44	15:47	15:50	15:53	15:56	15:54
Redox Potential (millivolts)	148.9	116.0	112.0	110.8	102.3	102.2	97.7	93.8	89.6	85.9	82.5
Dissolved Oxygen (mg/L)	0.97	0.80	0.79	0.69	0.76	0.76	0.77	0.71	0.83	0.82	0.89
pH (s.u.)	7.43	7.31	7.27	7.27	7.21	7.21	7.23	7.21	7.20	7.21	7.24
Specific Conductance (uS/cm)	1,185	1,199	1,196	1,193	1,178	1,176	1,148	1,129	1,158	1,178	1,185
Temperature (C)	15.79	15.74	15.75	15.83	15.87	15.88	15.93	16.03	16.20	16.37	16.39

Flow Rate: 250 ml/15 sec

Total Depth of Well: 55 feet

Time Sampled: 16:01

Depth to Water Before Purging: 24.20

Total Water Pumped: 7 gallons

Depth to Water After Purging: 24.20

Comments:

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/14/2001
Site/Well No.	GM-19D	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 7:00	End	9:05

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	730.25
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	148.46
Depth to Water (ft bmp)	27.08
Water-Level Elevation (ft)	703.17
Water Column in Well (ft)	121.38
Casing Diameter/Type	4"
Gallons in Well	78.90
Gallons Pumped/Bailed Prior to Sampling	287 pumped/2 bailed
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 7:50 end 8:54
Pumping Rate (gpm)	5 gal/2 min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	6.97
Conductivity (mS/cm)	
(µmhos/cm)	1181
Turbidity (NTU)	N/A
Temperature (°C)	16.87
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable bailer
Remarks	Sample time @ 9:00
	OVM = 0.0 ppm
	DTW final = 27.08
	pH will not calibrate on YSI

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/14/2001
Site/Well No.	HR-10	Replicate No.	DUP-111 @ 9:57	Code No.	
Weather	Sun 40s	Sampling Time:	Begin 9:15	End	10:10

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	742.81
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	130.90
Depth to Water (ft bmp)	35.18
Water-Level Elevation (ft)	707.63
Water Column in Well (ft)	95.72
Casing Diameter/Type	4"
Gallons in Well	62.21
Gallons Pumped/Bailed Prior to Sampling	187 pumped/2 bailed
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 9:19 end 9:51
Pumping Rate (gpm)	5 gal/2 min
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	Slight
Appearance	Not turbid
pH (s.u.)	6.85
Conductivity (mS/cm)	
(µmhos/cm)	1258
Turbidity (NTU)	N/A
Temperature (°C)	14.47
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable bailer
Remarks	DTW final= 35.19
	OVM =0.0 ppm
	Sample time @ 9:55
	RB-88 @ 10:05; MS-132 @ 9:59; MSD-131 @ 10:01

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/14/2001
Site/Well No.	HR-13	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 10:20	End	11:11

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	735.03
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	86.07
Depth to Water (ft bmp)	28.84
Water-Level Elevation (ft)	706.19
Water Column in Well (ft)	57.23
Casing Diameter/Type	4"
Gallons in Well	37.20
Gallons Pumped/Bailed Prior to Sampling	115 pumped/2 bailed
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 10:24 end 10:57
Pumping Rate (gpm)	5 gal/2 min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	6.90
Conductivity (mS/cm)	
(µmhos/cm)	1233
Turbidity (NTU)	N/A
Temperature (°C)	14.51
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 10:58
	OVM = 0.0 ppm
	DTW final = 28.83

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/14/2001
Site/Well No.	HR-15	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 11:40	End	12:45

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	733.74
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	102.10
Depth to Water (ft bmp)	27.77
Water-Level Elevation (ft)	705.97
Water Column in Well (ft)	74.33
Casing Diameter/Type	4"
Gallons in Well	48.31
Gallons Pumped/Bailed Prior to Sampling	145 pumped/2 bailed
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 11:47 end 12:27
Pumping Rate (gpm)	5 gal/2 min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	6.78
Conductivity (mS/cm)	
(µmhos/cm)	979
Turbidity (NTU)	N/A
Temperature (°C)	14.85
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 12:30
	OVM = 0.0 ppm
	DTW final = 27.77

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/14/2001
Site/Well No.	GM-3	Replicate No.		Code No.	
Weather	Sun 50s	Sampling Time:	Begin 12:50	End	13:15

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	730.44
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	109.9
Depth to Water (ft bmp)	28.12
Water-Level Elevation (ft)	702.32
Water Column in Well (ft)	81.78
Casing Diameter/Type	2"
Gallons in Well	13.08
Gallons Pumped/Bailed Prior to Sampling	40 pumped/2 bailed
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 12:55 end 13:08
Pumping Rate (gpm)	5 gal/2 min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	6.90
Conductivity (mS/cm)	
(µmhos/cm)	1315
Turbidity (NTU)	N/A
Temperature (°C)	15.71
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 13:10
	OVM =0.0 ppm
	DTW final = 28.15

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/14/2001
Site/Well No.	GM-1	Replicate No.		Code No.	
Weather	Sun 50s	Sampling Time:	Begin 13:18	End	13:50

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	735.74
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	101.88
Depth to Water (ft bmp)	32.87
Water-Level Elevation (ft)	702.87
Water Column in Well (ft)	69.01
Casing Diameter/Type	2"
Gallons in Well	11.04
Gallons Pumped/Bailed Prior to Sampling	33 pumped/2 bailed
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 13:21 end 13:35
Pumping Rate (gpm)	5 gal/2 min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	6.88
Conductivity (mS/cm)	
(µmhos/cm)	1185
Turbidity (NTU)	N/A
Temperature (°C)	15.52
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 13:36
	OVM = 0.0 ppm
	DTW final = 32.88

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/14/2001
Site/Well No.	GM-9	Replicate No.		Code No.	
Weather	Sun 50s	Sampling Time:	Begin 14:20	End	14:56

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	724.07
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	99.55
Depth to Water (ft bmp)	22.04
Water-Level Elevation (ft)	702.03
Water Column in Well (ft)	77.51
Casing Diameter/Type	2"
Gallons in Well	12.40
Gallons Pumped/Bailed Prior to Sampling	38 pumped/2 bailed
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 14:33 end 14:46
Pumping Rate (gpm)	5 gal/2 min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Dark particles
pH (s.u.)	6.96
Conductivity (mS/cm)	
(µmhos/cm)	1462
Turbidity (NTU)	N/A
Temperature (°C)	15.30
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 14:48
	OVM = 0.0 ppm
	DTW final = 22.05

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/14/2001
Site/Well No.	GM-11	Replicate No.		Code No.	
Weather	Sun 60s	Sampling Time:	Begin 14:59	End	15:35

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	723.71
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	99.65
Depth to Water (ft bmp)	21.79
Water-Level Elevation (ft)	701.92
Water Column in Well (ft)	77.86
Casing Diameter/Type	2"
Gallons in Well	12.46
Gallons Pumped/Bailed Prior to Sampling	38 pumped/2 bailed
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 15:03 end 15:27
Pumping Rate (gpm)	5 gal/2 min
Evacuation Method	Submersible Pump

Field Parameters

Color	Yellow tint
Odor	None
Appearance	Not turbid
pH (s.u.)	7.07
Conductivity (mS/cm)	
(µmhos/cm)	1185
Turbidity (NTU)	N/A
Temperature (°C)	15.22
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 15:30
	OVM = 0.0 ppm
	DTW final = 21.80

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/14/2001
Site/Well No.	DN-13	Replicate No.		Code No.	
Weather	Sun 50s	Sampling Time:	Begin 15:38	End	15:50

Evacuation Data

Measuring Point	N/A
MP Elevation (ft)	N/A
Land Surface Elevation (ft)	N/A
Sounded Well Depth (ft bmp)	N/A
Depth to Water (ft bmp)	N/A
Water-Level Elevation (ft)	N/A
Water Column in Well (ft)	N/A
Casing Diameter/Type	N/A
Gallons in Well	N/A
Gallons Pumped/Bailed Prior to Sampling	N/A
Sample Pump Intake Setting (ft bmp)	N/A
Purge Time	begin 15:40 end 15:46
Pumping Rate (gpm)	N/A
Evacuation Method	N/A

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.21
Conductivity (mS/cm)	
(µmhos/cm)	855
Turbidity (NTU)	N/A
Temperature (°C)	15.10
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	grab
Remarks	Sample time @ 15:47
	OVM = 0.0 ppm
	Production Well

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/14/2001
Site/Well No.	GM-20D	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 16:00	End	17:05

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	727.26
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	99.82
Depth to Water (ft bmp)	24.23
Water-Level Elevation (ft)	703.03
Water Column in Well (ft)	75.59
Casing Diameter/Type	4"
Gallons in Well	49.13
Gallons Pumped/Bailed Prior to Sampling	147 pumped/2 bailed
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 16:03 end 16:53
Pumping Rate (gpm)	5 gal/2 min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	6.93
Conductivity (mS/cm)	
(µmhos/cm)	1059
Turbidity (NTU)	N/A
Temperature (°C)	14.67
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 16:55
	OVM = 0.0 ppm
	DTW final = 24.22

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/14/2001
Site/Well No.	HR-12	Replicate No.		Code No.	
Weather	Sun 30s	Sampling Time:	Begin 17:45	End	18:57

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	742.64
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	130.19
Depth to Water (ft bmp)	35.12
Water-Level Elevation (ft)	707.52
Water Column in Well (ft)	95.07
Casing Diameter/Type	4"
Gallons in Well	61.80
Gallons Pumped/Bailed Prior to Sampling	185 pumped/2 bailed
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 17:50 end 18:46
Pumping Rate (gpm)	5 gal/2 min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	6.73
Conductivity (mS/cm)	
(µmhos/cm)	1403
Turbidity (NTU)	N/A
Temperature (°C)	14.87
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 18:48
	OVM =0.0 ppm
	DTW final = 35.12

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/15/2001
Site/Well No.	ME-3	Replicate No.		Code No.	
Weather	Sun 30s	Sampling Time:	Begin 7:30	End	8:40

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.40
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	37.55
Depth to Water (ft bmp)	28.12
Water-Level Elevation (ft)	702.28
Water Column in Well (ft)	9.43
Casing Diameter/Type	2"
Gallons in Well	1.51
Gallons Pumped/Bailed Prior to Sampling	4 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 7:58 end 8:19
Pumping Rate (gpm)	250 ml/12 sec
Evacuation Method	High performance pump

Field Parameters

Color	Light brown
Odor	None
Appearance	Slightly turbid
pH (s.u.)	6.52
Conductivity (mS/cm)	
(µmhos/cm)	1477
Turbidity (NTU)	N/A
Temperature (°C)	18.63
Dissolved Oxygen (mg/L)	1.70
ORP (mV)	-36.1
Sampling Method	Low flow
Remarks	DTW final = 28.18
	Sample time @ 8:20
	OVM = 0.0 ppm

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: ME-3

Time Pump Started: 7:58

Depth of Sampling: Midpoint of Screen

Date: 11/15/2001

Parameters

	Time										
	7:59	8:02	8:05	8:08	8:11	8:14	8:17				
Redox Potential (millivolts)	-73.4	-35.9	-26.4	-25.9	28.8	-33.3	-36.1				
Dissolved Oxygen (mg/L)	2.34	2.89	2.66	2.02	2.21	1.97	1.70				
pH (s.u.)	8.14	6.95	6.76	6.67	6.58	6.56	6.52				
Specific Conductance (uS/cm)	1,807	1,482	1,481	1,479	1,478	1,478	1,477				
Temperature (C)	16.15	18.53	18.60	18.63	18.62	18.62	18.63				

Flow Rate: 250 ml/12 sec

Total Depth of Well: 37.55 feet

Time Sampled: 8:20

Depth to Water Before Purging: 28.12

Total Water Pumped: 4 gallons

Depth to Water After Purging: 28.18

Comments:

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/15/2001
Site/Well No.	GM-31	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 8:45	End	9:40

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	736.71
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	66.51
Depth to Water (ft bmp)	30.84
Water-Level Elevation (ft)	705.87
Water Column in Well (ft)	35.67
Casing Diameter/Type	2"
Gallons in Well	5.71
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 8:57 end 9:18
Pumping Rate (gpm)	250 ml/14 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Brown
Odor	None
Appearance	Slightly turbid
pH (s.u.)	6.70
Conductivity (mS/cm)	
(µmhos/cm)	1275
Turbidity (NTU)	N/A
Temperature (°C)	19.45
Dissolved Oxygen (mg/L)	NR
ORP (mV)	-82.1
Sampling Method	Low flow
Remarks	DTW final = 31.17
	OVM = 0.0 ppm
	Sample time @ 9:20

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: Moraine, Ohio

Monitoring Well No.: GM-31

Time Pump Started: 8:57

Depth of Sampling: Midpoint of Screen

Date: 11/15/2001

Parameters

	Time										
	9:00	9:03	9:06	9:09	9:12	9:15	9:18				
Redox Potential (millivolts)	35.0	-27.9	-53.6	-65.7	-77.4	-80.0	-82.1				
Dissolved Oxygen (mg/L)	NR	NR	NR	NR	NR	NR	NR				
pH (s.u.)	6.84	6.78	6.73	6.72	6.71	6.70	6.70				
Specific Conductance (uS/cm)	1,248	1,253	1,261	1,247	1,263	1,267	1,275				
Temperature (C)	18.21	18.11	19.30	19.37	19.49	19.51	19.45				

Flow Rate: 250 ml/14 sec

Time Sampled: 9:20

Total Water Pumped: 5 gallons

Comments:

Total Depth of Well: 66.51 feet

Depth to Water Before Purging: 30.84

Depth to Water After Purging: 31.17

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/15/2001
Site/Well No.	ME-6	Replicate No.		Code No.	
Weather	Sun 50s	Sampling Time:	Begin 9:44	End	10:47

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	734.84
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	38.73
Depth to Water (ft bmp)	31.41
Water-Level Elevation (ft)	703.43
Water Column in Well (ft)	7.32
Casing Diameter/Type	2"
Gallons in Well	1.17
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 10:13 end 10:30
Pumping Rate (gpm)	250 ml/15 sec
Evacuation Method	High performance pump

Field Parameters

Color	Dark brown
Odor	Yes
Appearance	Turbid
pH (s.u.)	6.92
Conductivity (mS/cm)	
(µmhos/cm)	3004
Turbidity (NTU)	N/A
Temperature (°C)	20.01
Dissolved Oxygen (mg/L)	0.67
ORP (mV)	-80.4
Sampling Method	Low flow
Remarks	DTW final = 31.45
	OVM = 0.0 ppm
	Sample time @ 10:31

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: ME-6

Time Pump Started: 10:13

Depth of Sampling: Midpoint of Screen

Date: 11/15/2001

Parameters / Time

	10:14	10:17	10:20	10:23	10:26	10:29					
Redox Potential (millivolts)	43.0	1.7	-43.4	-73.9	-74.4	-80.4					
Dissolved Oxygen (mg/L)	5.30	4.68	0.62	0.53	0.55	0.67					
pH (s.u.)	7.01	6.98	6.94	6.92	6.92	6.92					
Specific Conductance (uS/cm)	4,488	3,560	3,192	3,087	3,074	3,004					
Temperature (C)	19.03	19.51	19.89	19.91	19.95	20.01					

Flow Rate: 250 ml/15 sec

Total Depth of Well: 38.73 feet

Time Sampled: 10:31

Depth to Water Before Purging: 31.41

Total Water Pumped: 5 gallons

Depth to Water After Purging: 31.45

Comments:

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Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/15/2001
Site/Well No.	39	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 11:05	End	11:28

Evacuation Data

Measuring Point	N/A
MP Elevation (ft)	N/A
Land Surface Elevation (ft)	N/A
Sounded Well Depth (ft bmp)	N/A
Depth to Water (ft bmp)	N/A
Water-Level Elevation (ft)	N/A
Water Column in Well (ft)	N/A
Casing Diameter/Type	N/A
Gallons in Well	N/A
Gallons Pumped/Bailed Prior to Sampling	N/A
Sample Pump Intake Setting (ft bmp)	N/A
Purge Time	begin 11:18 end 11:24
Pumping Rate (gpm)	N/A
Evacuation Method	N/A

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.63
Conductivity (mS/cm)	
(µmhos/cm)	1284
Turbidity (NTU)	N/A
Temperature (°C)	16.96
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	grab
Remarks	Sample time @ 11:25
	OVM = 0.0 ppm
	Production Well
	31-off line; therefore, sampled 39

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

Sampling Personnel: H. Stamm/S.Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/15/2001
Site/Well No.	MT-69	Replicate No.	DUP-112 @ 13:55	Code No.	
Weather	Sun 60s	Sampling Time:	Begin 12:20	End	14:05

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	722.71
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	117.71
Depth to Water (ft bmp)	20.89
Water-Level Elevation (ft)	701.82
Water Column in Well (ft)	96.82
Casing Diameter/Type	8"
Gallons in Well	150
Gallons Pumped/Bailed Prior to Sampling	300 pumped/2 bailed
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 12:25 end 13:50
Pumping Rate (gpm)	5 gal/1.25 min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	8.24
Conductivity (mS/cm)	
(µmhos/cm)	446
Turbidity (NTU)	N/A
Temperature (°C)	15.46
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 13:52
	OVM = 0.0 ppm
	DTW final = 21.05
	RB-89 @ 14:00

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/15/2001
Site/Well No.	GM-28	Replicate No.		Code No.	
Weather	Sun 60s	Sampling Time:	Begin 14:23	End	15:10

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	735.32
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	38.13
Depth to Water (ft bmp)	32.12
Water-Level Elevation (ft)	703.20
Water Column in Well (ft)	6.01
Casing Diameter/Type	2"
Gallons in Well	0.96
Gallons Pumped/Bailed Prior to Sampling	4 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 14:31 end 14:52
Pumping Rate (gpm)	250 ml/15 sec
Evacuation Method	Submersible pump

Field Parameters

Color	Yellow
Odor	Yes
Appearance	Not turbid
pH (s.u.)	6.50
Conductivity (mS/cm)	
(µmhos/cm)	3136
Turbidity (NTU)	N/A
Temperature (°C)	19.24
Dissolved Oxygen (mg/L)	0.83
ORP (mV)	-148.2
Sampling Method	Low flow
Remarks	DTW final = 32.12
	OVM = 0.0
	Sample time @ 14:52

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-28

Time Pump Started: 14:31

Depth of Sampling: Midpoint of Screen

Date: 11/15/2001

Parameters

	Time										
	14:31	14:34	14:37	14:40	14:43	14:46	14:49				
Redox Potential (millivolts)	-117.7	-142.0	-151.8	-150.4	-149.3	-148.5	-148.2				
Dissolved Oxygen (mg/L)	0.22	0.67	0.73	1.01	1.27	0.89	0.83				
pH (s.u.)	6.95	6.88	6.82	6.67	6.60	6.52	6.50				
Specific Conductance (uS/cm)	3,428	3,408	3,358	3,279	3,212	3,166	3,136				
Temperature (C)	18.45	18.86	19.08	19.18	19.18	19.20	19.24				

Flow Rate: 250 ml/15 sec

Time Sampled: 14:52

Total Water Pumped: 5 gallons

Comments:

Total Depth of Well: 38.13 feet

Depth to Water Before Purging: 32.12

Depth to Water After Purging: 32.12

ARCADIS

Water Sampling Log

Project	GM 2nd Annual	Project No.	OH000294.04.02	Page	1 of 1
Site Location	Moraine, Ohio			Date	11/19/2001
Site/Well No.	GM-15	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 17:09	End	17:37

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	725.23
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	98.77
Depth to Water (ft bmp)	23.86
Water-Level Elevation (ft)	701.37
Water Column in Well (ft)	74.91
Casing Diameter/Type	2"
Gallons in Well	11.99
Gallons Pumped/Bailed Prior to Sampling	36 pumped/2 bailed
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin 17:14 end 17:26
Pumping Rate (gpm)	5 gal/2 min
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid; some dark particles
pH (s.u.)	7.23
Conductivity (mS/cm)	
(µmhos/cm)	1089
Turbidity (NTU)	N/A
Temperature (°C)	16.00
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 17:28
	OVM= 0.0 ppm
	DTW final = 23.90

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

Sampling Personnel: H. Stamm/S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

DRAFT

December 2001

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0004.0002	Page	1 of 1
Site Location	Moraine, Ohio			Date	12/11/01
Site/Well No.	GM-32	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 13:50	End	14:50

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	732.08
Land Surface Elevation (ft)	732.47
Sounded Well Depth (ft bmp)	60.21
Depth to Water (ft bmp)	28.42
Water-Level Elevation (ft)	703.66
Water Column in Well (ft)	31.79
Casing Diameter/Type	2"
Gallons in Well	5.09
Gallons Pumped/Bailed Prior to Sampling	6 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 14:10 end 14:28
Pumping Rate (gpm)	1gal / 3min
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Yellow tint
Odor	Slight
Appearance	Slightly turbid
pH (s.u.)	8.13
Conductivity (mS/cm)	
(µmhos/cm)	6200
Turbidity (NTU)	N/A
Temperature (°C)	18.62
Dissolved Oxygen (mg/L)	0.03
ORP (mV)	-279
Sampling Method	Low Flow
Remarks	Sample time @ 14:30
	DTW final = 28.45

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	250 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (6010A)	250 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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown, H. Stamm

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: Moraine, Ohio

Monitoring Well No.: GM-32

Time Pump Started: 14:10

Depth of Sampling: Midpoint of Screen

Date: 12/11/01

Parameters / Time

	14:12	14:15	14:18	14:21	14:24	14:27					
Redox Potential (millivolts)	-263.0	-270.0	-274.0	-275.0	-277.0	-279.0					
Dissolved Oxygen (mg/L)	0.27	0.13	0.24	0.14	0.07	0.03					
pH (s.u.)	8.40	8.12	8.13	8.13	8.12	8.13					
Specific Conductance (uS/cm)	6,060	6,560	6,610	6,570	6,360	6,200					
Temperature (C)	18.46	18.52	18.62	18.75	18.62	18.62					

Flow Rate: 1 gal / 3 min

Total Depth of Well: 60.21

Time Sampled: 14:30

Depth to Water Before Purging: 28.42

Total Water Pumped: 6 gallons

Depth to Water After Purging: 28.45

Comments:

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0004.0002	Page	1 of 1
Site Location	Moraine, Ohio			Date	12/11/01
Site/Well No.	GM-19S	Replicate No.	DUP-114 @ 15:35	Code No.	
Weather	Sun 40s	Sampling Time:	Begin 14:50	End	16:55

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.85
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	55.04
Depth to Water (ft bmp)	27.03
Water-Level Elevation (ft)	703.82
Water Column in Well (ft)	28.01
Casing Diameter/Type	2"
Gallons in Well	4.48
Gallons Pumped/Bailed Prior to Sampling	9 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 15:00 end 15:28
Pumping Rate (gpm)	1 gal / 3 min
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.31
Conductivity (mS/cm)	
(µmhos/cm)	1350
Turbidity (NTU)	N/A
Temperature (°C)	19.10
Dissolved Oxygen (mg/L)	0.06
ORP (mV)	13
Sampling Method	Low Flow

Remarks: Sample time @ 15:30
RB-91 @ 16:30
MS-133 @ 15:38 ; MSD-132 @ 15:42
DTW final = 27.03

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	250 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (6010A)	250 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 plastic	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: H. Stamm, S. Brown

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
	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: Moraine, Ohio

Monitoring Well No.: GM-19S

Time Pump Started: 15:00

Depth of Sampling: Midpoint of Screen

Date: 12/11/01

Parameters

Time

	15:00	15:03	15:06	15:09	15:12	15:15	15:18	15:21	15:24	15:27	
Redox Potential (millivolts)	21.0	4.0	1.0	1.0	3.0	5.0	10.0	11.0	12.0	13.0	
Dissolved Oxygen (mg/L)	1.51	0.39	0.29	0.10	0.07	0.08	0.05	0.04	0.05	0.06	
pH (s.u.)	7.86	7.51	7.44	7.39	7.37	7.35	7.31	7.31	7.31	7.31	
Specific Conductance (uS/cm)	1,360	1,350	1,350	1,350	1,340	1,350	1,350	1,350	1,350	1,350	
Temperature (C)	17.83	18.75	18.91	19.10	19.17	19.15	19.07	19.10	19.10	19.10	

Flow Rate: 1gal / 3min

Total Depth of Well: 55.04

Time Sampled: 15:30

Depth to Water Before Purging: 27.03

Total Water Pumped: 9 gallons

Depth to Water After Purging: 27.03

Comments

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0004.0002	Page	1 of 1
Site Location	Moraine, Ohio			Date	12/11/01
Site/Well No.	EAST	Replicate No.		Code No.	
Weather	Sun 30s	Sampling Time:	Begin 17:06	End	17:50

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.98
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	71.64
Depth to Water (ft bmp)	26.77
Water-Level Elevation (ft)	704.21
Water Column in Well (ft)	44.87
Casing Diameter/Type	2"
Gallons in Well	7.18
Gallons Pumped/Bailed Prior to Sampling	6 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 17:16 end 17:34
Pumping Rate (gpm)	1gal / 3min
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.32
Conductivity (mS/cm)	
(µmhos/cm)	1480
Turbidity (NTU)	N/A
Temperature (°C)	18.69
Dissolved Oxygen (mg/L)	0.05
ORP (mV)	86
Sampling Method	Low Flow
Remarks	Sample time @ 17:35
	DTW final = 26.88

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	250 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (6010A)	250 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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: H. Stamm, S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: Moraine, Ohio

Monitoring Well No.: EAST

Time Pump Started: 17:16

Depth of Sampling: Midpoint of Screen

Date: 12/11/01

Parameters

Time

	17:18	17:21	17:24	17:27	17:30	17:33					
Redox Potential (millivolts)	170.0	143.0	119.0	102.0	91.0	86.0					
Dissolved Oxygen (mg/L)	2.08	0.50	0.20	0.11	0.07	0.05					
pH (s.u.)	7.56	7.40	7.35	7.33	7.32	7.32					
Specific Conductance (uS/cm)	1,450	1,440	1,450	1,470	1,470	1,480					
Temperature (C)	17.82	18.23	18.49	18.63	18.65	18.69					

Flow Rate: 1 gal / 3 min

Total Depth of Well: 71.64

Time Sampled: 17:35

Depth to Water Before Purging: 26.77

Total Water Pumped: 6 gallons

Depth to Water After Purging: 26.88

Comments

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0004.0002	Page	1 of 1
Site Location	Moraine, Ohio			Date	12/11/01
Site/Well No.	GM-21	Replicate No.		Code No.	
Weather	Sun 30s	Sampling Time:	Begin 18:20	End	19:20

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	725.01
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	53.70
Depth to Water (ft bmp)	21.28
Water-Level Elevation (ft)	703.73
Water Column in Well (ft)	32.42
Casing Diameter/Type	2"
Gallons in Well	5.14
Gallons Pumped/Bailed Prior to Sampling	7 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 18:33 end 18:54
Pumping Rate (gpm)	1gal / 3 min
Evacuation Method	Peristaltic pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.45
Conductivity (mS/cm)	
(µmhos/cm)	1360
Turbidity (NTU)	N/A
Temperature (°C)	15.82
Dissolved Oxygen (mg/L)	0.04
ORP (mV)	-25
Sampling Method	Low Flow
Remarks	Sample time @ 18:55
	DTW Final: 20.29

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	250 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (6010A)	250 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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: H. Stamm, S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: Moraine, Ohio

Monitoring Well No.: GM-21

Time Pump Started: 18:33

Depth of Sampling: Midpoint of Screen

Date: 12/11/01

Parameters

	Time										
	18:36	18:39	18:41	18:44	18:47	18:50	18:53				
Redox Potential (millivolts)	95.0	86.0	49.0	11.0	-10.0	-24.0	-25.0				
Dissolved Oxygen (mg/L)	2.66	0.42	0.61	0.24	0.09	0.05	0.04				
pH (s.u.)	7.01	6.87	7.20	7.30	7.40	7.44	7.45				
Specific Conductance (uS/cm)	910	734	938	989	1,300	1,360	1,360				
Temperature (C)	15.83	15.93	15.77	15.81	15.75	15.81	15.82				

Flow Rate: 1 gal / 3 min

Total Depth of Well: 53.70

Time Sampled: 18:55

Depth to Water Before Purging: 21.28

Total Water Pumped: 7 gallons

Depth to Water After Purging: 20.29

Comments

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0004.0002	Page	1 of 1
Site Location	Moraine, Ohio			Date	12/12/01
Site/Well No.	GM-22	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 7:15	End	7:59

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	728.28
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	53.10
Depth to Water (ft bmp)	27.25
Water-Level Elevation (ft)	701.03
Water Column in Well (ft)	25.85
Casing Diameter/Type	2"
Gallons in Well	4.13
Gallons Pumped/Bailed Prior to Sampling	7 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 7:24 end 7:45
Pumping Rate (gpm)	1gal / 3 min
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.39
Conductivity (mS/cm)	
(µmhos/cm)	2020
Turbidity (NTU)	N/A
Temperature (°C)	18.99
Dissolved Oxygen (mg/L)	0.15
ORP (mV)	-110
Sampling Method	Low Flow
Remarks	Sample time @ 7:46
	DTW Final = 27.27

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	250 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (6010A)	250 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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: H. Stamm, S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: Moraine, Ohio

Monitoring Well No.: GM-22

Time Pump Started: 7:24

Depth of Sampling: Midpoint of Screen

Date: 12/12/01

Parameters

	Time										
	7:26	7:29	7:32	7:35	7:38	7:41	7:44				
Redox Potential (millivolts)	-180.0	-162.0	-149.0	-132.0	-125.0	-114.0	-110.0				
Dissolved Oxygen (mg/L)	2.46	0.66	0.45	0.21	0.16	0.21	0.15				
pH (s.u.)	7.08	7.26	7.31	7.35	7.36	7.38	7.39				
Specific Conductance (uS/cm)	1,680	1,950	1,980	2,010	2,010	2,020	2,020				
Temperature (C)	17.55	18.71	18.82	18.92	18.93	19.03	18.99				

Flow Rate: 1 gal / 3 min

Total Depth of Well: 53.10

Time Sampled: 7:46

Depth to Water Before Purging: 27.25

Total Water Pumped: 7 gallons

Depth to Water After Purging: 27.27

Comments: Well is once again a flush mount.

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0004.0002	Page	1 of 1
Site Location	Moraine, Ohio			Date	12/12/01
Site/Well No.	GM-28	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 9:00	End	9:30

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	736.67
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	38.18 - Well has been extended
Depth to Water (ft bmp)	32.04
Water-Level Elevation (ft)	704.63
Water Column in Well (ft)	6.14
Casing Diameter/Type	2"
Gallons in Well	0.98
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 9:05 end 9:19
Pumping Rate (gpm)	1gal / 3 min
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Yellow - tan tint
Odor	None
Appearance	Not turbid
pH (s.u.)	7.45
Conductivity (mS/cm)	
(µmhos/cm)	3700
Turbidity (NTU)	N/A
Temperature (°C)	18.92
Dissolved Oxygen (mg/L)	0.20
ORP (mV)	-203
Sampling Method	Low Flow
Remarks	Sample time @ 9:20
	DTW final: 32.00

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	250 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (6010A)	250 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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: H. Stamm, S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: Moraine, Ohio

Monitoring Well No.: GM-28

Time Pump Started: 9:05

Depth of Sampling: Midpoint of Screen

Date: 12/12/01

Parameters

Time

	9:06	9:09	9:12	9:15	9:18						
Redox Potential (millivolts)	-206.0	-207.0	-206.0	-205.0	-203.0						
Dissolved Oxygen (mg/L)	0.60	0.39	0.26	0.23	0.20						
pH (s.u.)	7.55	7.53	7.50	7.47	7.45						
Specific Conductance (uS/cm)	3,860	3,810	3,760	3,730	3,700						
Temperature (C)	18.49	18.76	18.86	18.90	18.92						

Flow Rate: 1 gal / 3 min

Total Depth of Well: 38.18

Time Sampled: 9:20

Depth to Water Before Purging: 32.04

Total Water Pumped: 5 gallons

Depth to Water After Purging: 32.00

Comments

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0004.0002	Page	1 of 1
Site Location	Moraine, Ohio			Date	12/12/01
Site/Well No.	ME-3	Replicate No.		Code No.	
Weather	Scattered Rain 40s	Sampling Time:	Begin 9:42	End	10:20

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	731.41
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	37.51-Well has been extended
Depth to Water (ft bmp)	28.05
Water-Level Elevation (ft)	703.36
Water Column in Well (ft)	9.46
Casing Diameter/Type	2"
Gallons in Well	1.51
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 9:54 end 10:09
Pumping Rate (gpm)	1gal / 3min
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Colorless
Odor	Slight
Appearance	Not turbid
pH (s.u.)	7.40
Conductivity (mS/cm)	
(µmhos/cm)	2280
Turbidity (NTU)	N/A
Temperature (°C)	20.05
Dissolved Oxygen (mg/L)	0.19
ORP (mV)	-127
Sampling Method	Low Flow

Remarks: Sample time @ 10:10
DTW final = 28.06

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	250 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (6010A)	250 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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: H. Stamm, S. Brown

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
	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: Moraine, Ohio

Monitoring Well No.: ME-3

Time Pump Started: 9:54

Depth of Sampling: Midpoint of Screen

Date: 12/12/01

Parameters

Time

	9:56	9:59	10:02	10:05	10:08						
Redox Potential (millivolts)	-105.0	-113.0	-120.0	-125.0	-127.0						
Dissolved Oxygen (mg/L)	2.41	0.66	0.34	0.22	0.19						
pH (s.u.)	7.50	7.41	7.40	7.40	7.40						
Specific Conductance (uS/cm)	2,280	2,270	2,270	2,280	2,280						
Temperature (C)	18.89	19.66	19.92	20.01	20.05						

Flow Rate: 1gal / 3min

Time Sampled: 10:10

Total Water Pumped: 5 gallons

Comments:

Total Depth of Well: 37.51

Depth to Water Before Purging: 28.05

Depth to Water After Purging: 28.06

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0004.0002	Page	1 of 1
Site Location	Moraine, Ohio			Date	12/12/01
Site/Well No.	ME-6	Replicate No.		Code No.	
Weather	Scattered rain 40s	Sampling Time:	Begin 10:26	End	11:04

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	736.24
Land Surface Elevation (ft)	736.68
Sounded Well Depth (ft bmp)	39.63-Well has been extended
Depth to Water (ft bmp)	31.30
Water-Level Elevation (ft)	704.94
Water Column in Well (ft)	8.33
Casing Diameter/Type	2"
Gallons in Well	1.33
Gallons Pumped/Bailed Prior to Sampling	6 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of screen
Purge Time	begin 10:35 end 10:53
Pumping Rate (gpm)	1gal / 3min
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Tan tint
Odor	Slight
Appearance	Not turbid
pH (s.u.)	7.50
Conductivity (mS/cm)	
(µmhos/cm)	3000
Turbidity (NTU)	N/A
Temperature (°C)	19.74
Dissolved Oxygen (mg/L)	0.48
ORP (mV)	-129
Sampling Method	Low Flow
Remarks	Sample time @ 10:55
	DTW final = 31.31

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	250 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (6010A)	250 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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: H. Stamm, S. Brown

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
	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: Moraine, Ohio

Monitoring Well No.: ME-6

Time Pump Started: 10:35

Depth of Sampling: Midpoint of Screen

Date: 12/12/01

Parameters

Time

	10:37	10:40	10:43	10:46	10:49	10:52					
Redox Potential (millivolts)	-80.0	-109.0	-119.0	-124.0	-128.0	-129.0					
Dissolved Oxygen (mg/L)	4.16	1.25	0.78	0.61	0.51	0.48					
pH (s.u.)	7.61	7.54	7.51	7.50	7.50	7.50					
Specific Conductance (uS/cm)	4,600	3,560	3,250	3,120	3,010	3,000					
Temperature (C)	17.52	19.26	19.61	19.69	19.72	19.74					

Flow Rate: 1gal / 3min

Total Depth of Well: 39.63

Time Sampled: 10:55

Depth to Water Before Purging: 31.30

Total Water Pumped: 6 gallons

Depth to Water After Purging: 31.31

Comments

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0004.0002	Page	1 of 1
Site Location	Moraine, Ohio			Date	12/12/01
Site/Well No.	GM-29	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 12:40	End	13:25

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	731.37
Land Surface Elevation (ft)	731.86
Sounded Well Depth (ft bmp)	33.61 measured
Depth to Water (ft bmp)	24.80
Water-Level Elevation (ft)	706.57
Water Column in Well (ft)	8.81
Casing Diameter/Type	2"
Gallons in Well	1.41
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 13:00 end 13:14
Pumping Rate (gpm)	1gal / 3min
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.57
Conductivity (mS/cm)	
(µmhos/cm)	2860
Turbidity (NTU)	N/A
Temperature (°C)	17.13
Dissolved Oxygen (mg/L)	0.01
ORP (mV)	-168
Sampling Method	Low Flow
Remarks	Sample time @ 13:15
	DTW final = 24.93

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	250 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (6010A)	250 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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: S. Brown, H. Stamm

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: Moraine, Ohio

Monitoring Well No.: GM-29

Time Pump Started: 13:00

Depth of Sampling: Midpoint of Screen

Date: 12/12/01

Parameters / Time

	13:01	13:04	13:07	13:10	13:13						
Redox Potential (millivolts)	-138.0	-156.0	-163.0	-167.0	-168.0						
Dissolved Oxygen (mg/L)	5.90	0.54	0.11	0.02	0.01						
pH (s.u.)	7.79	7.59	7.57	7.57	7.57						
Specific Conductance (uS/cm)	2,830	2,830	2,840	2,850	2,860						
Temperature (C)	16.93	17.04	17.12	17.12	17.13						

Flow Rate: 1 gal / 3 min

Total Depth of Well: 33.61

Time Sampled: 13:15

Depth to Water Before Purging: 24.80

Total Water Pumped: 5 gallons

Depth to Water After Purging: 24.93

Comments:

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0004.0002	Page	1 of 1
Site Location	Moraine, Ohio			Date	12/12/01
Site/Well No.	GM-30	Replicate No.		Code No.	
Weather	Sun 40s	Sampling Time:	Begin 13:30	End	14:00

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	734.66
Land Surface Elevation (ft)	735.46
Sounded Well Depth (ft bmp)	36.73-Well has been extended
Depth to Water (ft bmp)	28.01
Water-Level Elevation (ft)	706.65
Water Column in Well (ft)	8.72
Casing Diameter/Type	2"
Gallons in Well	1.40
Gallons Pumped/Bailed Prior to Sampling	6 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 13:40 end 13:56
Pumping Rate (gpm)	1gal / 3min
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Gray tint
Odor	Strong
Appearance	Turbid
pH (s.u.)	7.39
Conductivity (mS/cm)	
(µmhos/cm)	1160
Turbidity (NTU)	N/A
Temperature (°C)	17.45
Dissolved Oxygen (mg/L)	0.26
ORP (mV)	-134
Sampling Method	Low Flow

Remarks: Sample time @ 13:57

DTW final = 28:12

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	250 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (6010A)	250 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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: H. Stamm, S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: Moraine, Ohio

Monitoring Well No.: GM-30

Time Pump Started: 13:40

Depth of Sampling: Midpoint of Screen

Date: 12/12/01

Parameters / Time

	13:43	13:46	13:49	13:52	13:55						
Redox Potential (millivolts)	-114.0	-128.0	-131.0	-134.0	-134.0						
Dissolved Oxygen (mg/L)	2.65	0.34	0.26	0.28	0.26						
pH (s.u.)	7.52	7.41	7.39	7.39	7.39						
Specific Conductance (uS/cm)	1,150	1,160	1,160	1,160	1,160						
Temperature (C)	16.20	16.69	17.11	17.30	17.45						

Flow Rate: 1 gal / 3 min

Total Depth of Well: 36.73

Time Sampled: 13:57

Depth to Water Before Purging: 28.01

Total Water Pumped: 6 gal

Depth to Water After Purging: 28.12

Comments:

ARCADIS G&M

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0004.0002	Page	1 of 1
Site Location	Moraine, Ohio			Date	12/12/01
Site/Well No.	GM-23	Replicate No.	DUP-115 @ 15:20	Code No.	
Weather	Sun 40s	Sampling Time:	Begin 14:15	End	15:20

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.99
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	34.00
Depth to Water (ft bmp)	24.62
Water-Level Elevation (ft)	706.37
Water Column in Well (ft)	9.38
Casing Diameter/Type	2"
Gallons in Well	1.50
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 14:28 end 15:09
Pumping Rate (gpm)	1gal / 8 min
Evacuation Method	High performance peristaltic

Field Parameters

Color	Slight yellow tint
Odor	None
Appearance	Not turbid
pH (s.u.)	7.36
Conductivity (mS/cm)	
(µmhos/cm)	1790
Turbidity (NTU)	N/A
Temperature (°C)	15.84
Dissolved Oxygen (mg/L)	7.52
ORP (mV)	163
Sampling Method	Low Flow
Remarks	Sample time @ 15:10
	RB-92 @ 15:35
	DTW final = 24.65

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	250 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (6010A)	250 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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: H. Stamm, S. Brown

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS G&M

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0004.00002

Site Location: Moraine, Ohio

Monitoring Well No.: GM-23

Time Pump Started: 14:28

Depth of Sampling: Midpoint of Screen

Date: 12/12/01

Parameters / Time

	14:42	14:47	14:52	14:57	15:02	15:07					
Redox Potential (millivolts)	125.0	137.0	147.0	154.0	160.0	163.0					
Dissolved Oxygen (mg/L)	4.73	7.25	7.58	7.67	7.66	7.52					
pH (s.u.)	7.22	7.32	7.31	7.36	7.31	7.36					
Specific Conductance (uS/cm)	1,750	1,760	1,770	1,780	1,780	1,790					
Temperature (C)	16.00	16.07	16.19	15.99	15.89	15.84					

Flow Rate: 1 gal / 8 min

Total Depth of Well: 34.00

Time Sampled: 15:10

Depth to Water Before Purging: 24.62

Total Water Pumped: 5 gallons

Depth to Water After Purging: 24.65

Comments:

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DRAFT

June/July 2002

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Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0005.0003	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/12/2002
Site/Well No.	EAST	Replicate No.		Code No.	
Weather	Sunny, 80s	Sampling Time:	Begin 11:20	End	12:12

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.98
Land Surface Elevation (ft)	NR
Sounded Well Depth (ft bmp)	71.64
Depth to Water (ft bmp)	23.02
Water-Level Elevation (ft)	707.96
Water Column in Well (ft)	48.62
Casing Diameter/Type	2"
Gallons in Well	7.7
Gallons Pumped/Bailed Prior to Sampling	6 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 11:31 end 11:55
Pumping Rate (gpm)	0.18 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Light brown
Odor	None
Appearance	Cloudy
pH (s.u.)	7.02
Conductivity (mS/cm)	N/A
(µmhos/cm)	1439
Turbidity (NTU)	NR
Temperature (°C)	19.61
Dissolved Oxygen (mg/L)	1.05
ORP (mV)	306.5
Sampling Method	Low Flow
Remarks	Sample time @ 11:57
	DTW final = 23.02

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: T. Trommer/D. Hendershott

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: Moraine, Ohio

Monitoring Well No.: EAST

Time Pump Started: 11:31

Depth of Sampling: Midpoint of Screen

Date: 6/12/2002

Parameters

Time

	11:34	11:37	11:40	11:43	11:46	11:49	11:52	11:55			
Redox Potential (millivolts)	231.7	103.4	107.4	116.7	205.4	245.6	301.4	306.5			
Dissolved Oxygen (mg/L)	0.58	0.64	0.72	0.74	0.87	0.95	1.04	1.05			
pH (s.u.)	6.77	6.81	6.87	6.88	6.94	6.97	7.01	7.02			
Specific Conductance (uS/cm)	1,477	1,475	1,457	1,457	1,443	1,439	1,438	1,439			
Temperature (C)	18.55	18.94	19.30	19.32	19.42	19.50	19.60	19.61			

Flow Rate: 0.18 gpm

Time Sampled: 11:57

Total Water Pumped: 6 gallons

Total Depth of Well: 71.64

Depth to Water Before Purging: 23.02

Depth to Water After Purging: 23.02

Comments

ARCADIS

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0005.0003	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/12/2002
Site/Well No.	GM-19S	Replicate No.	DUP-115A	Code No.	
Weather	Cloudy, 70s	Sampling Time:	Begin 13:50	End	15:15

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.85
Land Surface Elevation (ft)	NR
Sounded Well Depth (ft bmp)	55.04
Depth to Water (ft bmp)	23.36
Water-Level Elevation (ft)	707.49
Water Column in Well (ft)	31.68
Casing Diameter/Type	2"
Gallons in Well	5.06
Gallons Pumped/Bailed Prior to Sampling	7 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 13:57 end 14:17
Pumping Rate (gpm)	0.21 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	7.09
Conductivity (mS/cm)	N/A
(µmhos/cm)	1052
Turbidity (NTU)	NR
Temperature (°C)	20.39
Dissolved Oxygen (mg/L)	0.90
ORP (mV)	446.3
Sampling Method	Low Flow
Remarks	Sample time @ 14:20
	RB-92 @ 15:00
	DTW final = 23.36

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (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 plastic	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: T. Trommer/D. Hendershott

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: Moraine, Ohio

Monitoring Well No.: GM-19S

Time Pump Started: 13:56

Depth of Sampling: Midpoint of Screen

Date: 6/12/02

Parameters

Time

	13:59	14:02	14:05	14:08	14:11	14:14	14:17				
Redox Potential (millivolts)	350.1	375.6	393.5	406.0	421.1	439.6	446.3				
Dissolved Oxygen (mg/L)	1.72	1.11	1.09	1.06	1.03	0.95	0.90				
pH (s.u.)	7.08	7.09	7.10	7.11	7.10	7.10	7.09				
Specific Conductance (uS/cm)	1,042	1,049	1,050	1,048	1,051	1,051	1,052				
Temperature (C)	19.47	19.81	20.02	20.07	20.18	20.36	20.39				

Flow Rate: 0.21 gpm

Total Depth of Well: 55.04

Time Sampled: 14:20

Depth to Water Before Purging: 23.36

Total Water Pumped: 6 gallons

Depth to Water After Purging: 23.36

Comments

ARCADIS

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0005.0003	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/12/02
Site/Well No.	GM-32	Replicate No.		Code No.	
Weather	Cloudy, 80s	Sampling Time:	Begin 15:21	End	16:20

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	732.08
Land Surface Elevation (ft)	732.47
Sounded Well Depth (ft bmp)	60.21
Depth to Water (ft bmp)	24.51
Water-Level Elevation (ft)	707.57
Water Column in Well (ft)	35.7
Casing Diameter/Type	2"
Gallons in Well	5.7
Gallons Pumped/Bailed Prior to Sampling	4.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 15:29 end 15:53
Pumping Rate (gpm)	0.16 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Dark brown/greenish
Odor	Yes
Appearance	Foamy, clear
pH (s.u.)	8.55
Conductivity (mS/cm)	N/A
(µmhos/cm)	5432
Turbidity (NTU)	NR
Temperature (°C)	20.83
Dissolved Oxygen (mg/L)	1.14
ORP (mV)	-220.5
Sampling Method	Low Flow
Remarks	Sample time @ 15:55
	DTW final = 24.53

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: T. Trommer/D. Hendershott

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: Moraine, Ohio

Monitoring Well No.: GM-32

Time Pump Started: 15:29

Depth of Sampling: Midpoint of Screen

Date: 6/12/02

Parameters

Time

	15:32	15:35	15:38	15:41	15:44	15:47	15:50	15:53			
Redox Potential (millivolts)	-240.5	-219.6	-228.2	-224.5	-244.3	-255.9	-246.4	-220.5			
Dissolved Oxygen (mg/L)	0.18	0.46	0.61	0.63	0.30	0.76	0.84	1.14			
pH (s.u.)	8.46	8.50	8.48	8.36	8.51	8.55	8.56	8.55			
Specific Conductance (uS/cm)	4,735	4,918	4,775	5,212	5,400	5,501	5,438	5,432			
Temperature (C)	19.02	19.42	19.88	19.93	20.33	20.64	20.83	20.83			

Flow Rate: 0.16 gpm - dropped to 0.05 gpm

Total Depth of Well: 60.21

Time Sampled: 15:55

Depth to Water Before Purging: 24.51

Total Water Pumped: 4.5 gallons

Depth to Water After Purging: 24.53

Comments

ARCADIS

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0005.0003	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/12/2002
Site/Well No.	GM-21	Replicate No.		Code No.	
Weather	Sunny, 70s	Sampling Time:	Begin 17:03	End	18:10

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	725.01
Land Surface Elevation (ft)	N/A
Sounded Well Depth (ft bmp)	53.70
Depth to Water (ft bmp)	17.33
Water-Level Elevation (ft)	707.68
Water Column in Well (ft)	36.37
Casing Diameter/Type	2"
Gallons in Well	5.8
Gallons Pumped/Bailed Prior to Sampling	approx. 6 gallons
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 17:12 end 17:39
Pumping Rate (gpm)	0.17 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	7.22
Conductivity (mS/cm)	N/A
(µmhos/cm)	1045
Turbidity (NTU)	NR
Temperature (°C)	18.67
Dissolved Oxygen (mg/L)	0.63
ORP (mV)	373.8
Sampling Method	Low Flow
Remarks	Sample time @ 17:39
	DTW Final: 17.33

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: T. Trommer/D. Hendershott

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: Moraine, Ohio

Monitoring Well No.: GM-21

Time Pump Started: 17:12

Depth of Sampling: Midpoint of Screen

Date: 6/12/02

Parameters

Time

	17:12	17:15	17:19	17:24	17:27	17:30	17:33	17:36	17:39		
Redox Potential (millivolts)	290.0	304.8	331.9	345.6	353.1	358.8	362.2	367.9	373.8		
Dissolved Oxygen (mg/L)	-0.06	0.27	0.43	0.75	0.75	0.73	0.74	0.63	0.63		
pH (s.u.)	7.01	7.07	7.13	7.17	7.20	7.21	7.22	7.22	7.22		
Specific Conductance (uS/cm)	1,007	1,030	1,040	1,042	1,042	1,042	1,042	1,045	1,045		
Temperature (C)	17.43	17.53	18.08	18.59	18.77	18.92	19.01	18.88	18.67		

Flow Rate: 0.17 gpm

Time Sampled: 17:39

Total Water Pumped: 6 gallons

Total Depth of Well: 53.7

Depth to Water Before Purging: 17.33

Depth to Water After Purging: 17.33

Comments

ARCADIS

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0005.0003	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/13/02
Site/Well No.	GM-22	Replicate No.		Code No.	
Weather	Cloudy, 70s	Sampling Time:	Begin 8:50	End	9:46

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	728.28
Land Surface Elevation (ft)	NR
Sounded Well Depth (ft bmp)	53.10
Depth to Water (ft bmp)	23.48
Water-Level Elevation (ft)	704.80
Water Column in Well (ft)	29.62
Casing Diameter/Type	2"
Gallons in Well	4.7
Gallons Pumped/Bailed Prior to Sampling	5.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 9:10 end 9:30
Pumping Rate (gpm)	0.21 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Colorless
Odor	No
Appearance	Clear
pH (s.u.)	7.21
Conductivity (mS/cm)	N/A
(µmhos/cm)	1415
Turbidity (NTU)	NR
Temperature (°C)	20.29
Dissolved Oxygen (mg/L)	0.94
ORP (mV)	105.2
Sampling Method	Low Flow
Remarks	Sample time @ 9:30
	DTW Final = 23.46

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: T. Trommer/D. Hendershott

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: Moraine, Ohio

Monitoring Well No.: GM-22

Time Pump Started: 9:10

Depth of Sampling: Midpoint of Screen

Date: 6/13/2002

Parameters

	Time										
	9:10	9:13	9:18	9:21	9:24	9:27	9:30				
Redox Potential (millivolts)	98.4	96.0	98.5	103.5	102.0	99.3	105.2				
Dissolved Oxygen (mg/L)	-0.33	0.32	0.72	0.82	0.87	0.91	0.94				
pH (s.u.)	7.01	7.14	7.18	7.20	7.21	7.20	7.21				
Specific Conductance (uS/cm)	1,411	1,420	1,423	1,422	1,422	1,419	1,415				
Temperature (C)	18.45	18.84	19.16	19.67	19.91	20.07	20.29				

Flow Rate: 0.21 gpm

Total Depth of Well: 53.10

Time Sampled: 9:30

Depth to Water Before Purging: 23.48

Total Water Pumped: 5.5 gallons

Depth to Water After Purging: 23.46

Comments: Calibrated YSI before sampling this well. See log book for details.

ARCADIS

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0005.0003	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/13/2002
Site/Well No.	GM-29	Replicate No.		Code No.	
Weather	Cloudy, 70s	Sampling Time:	Begin 10:00	End	11:00

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	731.37
Land Surface Elevation (ft)	731.86
Sounded Well Depth (ft bmp)	33.61
Depth to Water (ft bmp)	21.90
Water-Level Elevation (ft)	709.47
Water Column in Well (ft)	11.71
Casing Diameter/Type	2"
Gallons in Well	1.8
Gallons Pumped/Bailed Prior to Sampling	4 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 10:11 end 10:32
Pumping Rate (gpm)	0.12 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Light brown
Odor	No
Appearance	Cloudy
pH (s.u.)	7.14
Conductivity (mS/cm)	N/A
(µmhos/cm)	1977
Turbidity (NTU)	NR
Temperature (°C)	19.33
Dissolved Oxygen (mg/L)	3.57
ORP (mV)	-122.9
Sampling Method	Low Flow
Remarks	Sample time @ 10:35
	DTW final = 21.90

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: T. Trommer/D. Hendershott

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: Moraine, Ohio

Monitoring Well No.: GM-29

Time Pump Started: 10:11

Depth of Sampling: Midpoint of Screen

Date: 6/13/02

Parameters

	Time										
	10:14	10:17	10:20	10:23	10:26	10:29	10:32				
Redox Potential (millivolts)	-104.0	-111.9	-113.4	-114.0	-114.3	-120.6	-122.9				
Dissolved Oxygen (mg/L)	2.67	3.14	3.33	3.30	3.31	3.31	3.57				
pH (s.u.)	7.07	7.14	7.14	7.14	7.14	7.12	7.14				
Specific Conductance (uS/cm)	1,934	1,979	1,999	2,002	2,011	1,964	1,977				
Temperature (C)	17.68	18.55	18.88	19.30	19.77	19.37	19.33				

Flow Rate: 0.12 gpm

Total Depth of Well: 33.61

Time Sampled: 10:35

Depth to Water Before Purging: 21.90

Total Water Pumped: 4 gallons

Depth to Water After Purging: 21.90

Comments

ARCADIS

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0005.0003	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/13/2002
Site/Well No.	GM-30	Replicate No.		Code No.	
Weather	Cloudy, 70s	Sampling Time:	Begin 12:20	End	13:35

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	734.66
Land Surface Elevation (ft)	735.46
Sounded Well Depth (ft bmp)	36.73
Depth to Water (ft bmp)	25.11
Water-Level Elevation (ft)	709.55
Water Column in Well (ft)	11.62
Casing Diameter/Type	2"
Gallons in Well	1.8
Gallons Pumped/Bailed Prior to Sampling	1 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 12:30 end 12:39
Pumping Rate (gpm)	0.12 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Light greenish brown
Odor	Yes
Appearance	Cloudy
pH (s.u.)	6.85
Conductivity (mS/cm)	N/A
(µmhos/cm)	1119
Turbidity (NTU)	NR
Temperature (°C)	17.83
Dissolved Oxygen (mg/L)	3.08
ORP (mV)	-65.4
Sampling Method	Low Flow
Remarks	Sample time @ 13:10
	DTW final = 25.07

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: T. Trommer/D. Hendershott

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: Moraine, Ohio

Monitoring Well No.: GM-30

Time Pump Started: 12:30

Depth of Sampling: Midpoint of Screen

Date: 6/13/2002

Parameters

Time

	12:33	12:36	12:39								
Redox Potential (millivolts)	-62.6	-62.7	-65.4								
Dissolved Oxygen (mg/L)	2.82	2.80	3.08								
pH (s.u.)	6.81	6.83	6.85								
Specific Conductance (uS/cm)	1,112	1,118	1,119								
Temperature (C)	17.50	17.61	17.83								

Flow Rate: 0.12 gpm

Total Depth of Well: 36.73

Time Sampled: 13:10

Depth to Water Before Purging: 25.11

Total Water Pumped: 1 gallon

Depth to Water After Purging: 25.07

Comments: 12:41 well dry. Allow to recharge before sampling. Well recharged very quickly.

ARCADIS

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0005.0003	Page	1 of 1
Site Location	Moraine, Ohio			Date	6/13/2002
Site/Well No.	GM-23	Replicate No.		Code No.	
Weather	Cloudy, 70s	Sampling Time:	Begin 16:02	End	17:20

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.99
Land Surface Elevation (ft)	NR
Sounded Well Depth (ft bmp)	34.00
Depth to Water (ft bmp)	21.56
Water-Level Elevation (ft)	709.43
Water Column in Well (ft)	12.44
Casing Diameter/Type	2"
Gallons in Well	1.9
Gallons Pumped/Bailed Prior to Sampling	3.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 16:29 end 16:52
Pumping Rate (gpm)	1.32 gpm
Evacuation Method	Perstaltic Pump

Field Parameters

Color	Pale yellow
Odor	Yes
Appearance	Clear-sheen-product globules
pH (s.u.)	6.81
Conductivity (mS/cm)	N/A
(µmhos/cm)	2290
Turbidity (NTU)	NR
Temperature (°C)	16.40
Dissolved Oxygen (mg/L)	4.23
ORP (mV)	346.5
Sampling Method	Low Flow

Remarks: Sample time @ 16:55

DTP = 21.44 DTP final = 21.46

DTW final = 21.48

Initial product thickness = 0.12'

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: T. Trommer/D. Hendershott

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: Moraine, Ohio

Monitoring Well No.: GM-23

Time Pump Started: 16:26

Depth of Sampling: Midpoint of Screen

Date: 6/13/02

Parameters

Time

	16:29	16:32	16:35	16:38	16:41	16:43	16:46	16:49	16:52		
Redox Potential (millivolts)	202.2	237.7	264.5	288.7	315.0	328.0	337.7	342.7	346.5		
Dissolved Oxygen (mg/L)	5.47	5.19	4.56	4.43	4.33	4.23	4.20	4.19	4.23		
pH (s.u.)	6.91	6.81	6.79	6.79	6.79	6.79	6.80	6.81	6.81		
Specific Conductance (uS/cm)	2,418	2,432	2,406	2,381	2,351	2,318	2,301	2,296	2,290		
Temperature (C)	17.05	16.71	16.68	16.53	16.57	16.41	16.47	16.46	16.40		

Flow Rate: 1.32 gpm

Total Depth of Well: 34

Time Sampled: 16:55

Depth to Water Before Purging: 21.56

Total Water Pumped: 3.5 gallons

Depth to Water After Purging: 21.48

Comments

ARCADIS

Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0005.0003	Page	1 of 1
Site Location	Moraine, Ohio			Date	7/21/2002
Site/Well No.	GM-28	Replicate No.	DUP-117	Code No.	
Weather	Hazy, 70s	Sampling Time:	Begin 8:20	End	10:22

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	Top of PVC Casing
Land Surface Elevation (ft)	736.67
Sounded Well Depth (ft bmp)	36.5
Depth to Water (ft bmp)	28.0
Water-Level Elevation (ft)	708.67
Water Column in Well (ft)	8.5
Casing Diameter/Type	2"
Gallons in Well	1.36
Gallons Pumped/Bailed Prior to Sampling	3 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 9:00 end 9:18
Pumping Rate (gpm)	0.2 gpm
Evacuation Method	2" Submersible Pump

Field Parameters

Color	Grayish brown to colorless
Odor	Slight
Appearance	Cloudy
pH (s.u.)	6.84
Conductivity (mS/cm)	NA
(µmhos/cm)	2187
Turbidity (NTU)	NR
Temperature (°C)	20.44
Dissolved Oxygen (mg/L)	0.68
ORP (mV)	-158.3
Sampling Method	Low Flow
Remarks	Sample time @ 9:20
	DTW final = 28.0
	DUP 117
	MS/MSD taken

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: T. Trommer

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: Moraine, Ohio

Monitoring Well No.: GM-28

Time Pump Started: 9:00

Depth of Sampling: Midpoint of Screen

Date: 7/21/2002

Parameters / Time

	9:03	9:06	9:09	9:12	9:15	9:18					
Redox Potential (millivolts)	-131.6	-149.6	-154.2	-157.1	-158.5	-158.3					
Dissolved Oxygen (mg/L)	1.48	0.81	0.77	0.72	0.69	0.68					
pH (s.u.)	6.89	6.96	6.92	6.98	6.86	6.84					
Specific Conductance (uS/cm)	2,039	2,040	2,037	2,075	2,149	2,187					
Temperature (C)	19.92	19.17	19.63	20.12	20.35	20.44					

Flow Rate: 450 mL/min

Total Depth of Well: 36.5

Time Sampled: 9:20

Depth to Water Before Purging: 28.0

Total Water Pumped: 3 gallons

Depth to Water After Purging: 28.0

Comments:

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Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0005.0003	Page	1 of 1
Site Location	Moraine, Ohio			Date	7/21/2002
Site/Well No.	ME-6	Replicate No.		Code No.	
Weather	Hazy, 90s	Sampling Time:	Begin 11:40	End	12:50

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	736.24
Land Surface Elevation (ft)	736.68
Sounded Well Depth (ft bmp)	32.45
Depth to Water (ft bmp)	25.55
Water-Level Elevation (ft)	710.69
Water Column in Well (ft)	6.9
Casing Diameter/Type	2"
Gallons in Well	1
Gallons Pumped/Bailed Prior to Sampling	NA
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin ____ end ____
Pumping Rate (gpm)	
Evacuation Method	High performance perstaltic pump

Field Parameters

Color	Brown
Odor	Yes
Appearance	Thick
pH (s.u.)	NR
Conductivity (mS/cm)	NR
(µmhos/cm)	NR
Turbidity (NTU)	NR
Temperature (°C)	NR
Dissolved Oxygen (mg/L)	NR
ORP (mV)	NR
Sampling Method	NR

Remarks: Not sampled
Unable to pump or sample.

Constituents Sampled	Container Description	Number	Preservative

Sampling Personnel: T. Trommer

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: Moraine, Ohio

Monitoring Well No.: ME-6

Time Pump Started: _____

Depth of Sampling: Midpoint of Screen

Date: 7/21/2002

Parameters

Time

Redox Potential (millivolts)											
Dissolved Oxygen (mg/L)											
pH (s.u.)											
Specific Conductance (uS/cm)											
Temperature (C)											

Flow Rate: _____

Time Sampled: _____

Total Water Pumped: _____

Total Depth of Well: 39.63

Depth to Water Before Purging: 25.55

Depth to Water After Purging: _____

Comments: No parameters collected. Unable to pump or sample.

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Water Sampling Log

Project	GM Site-Wide Monitoring	Project No.	OH000294.0005.0003	Page	1 of 1
Site Location	Moraine, Ohio			Date	7/21/2002
Site/Well No.	ME-3	Replicate No.		Code No.	
Weather	Hazy, 90s	Sampling Time:	Begin 12:55	End	13:40

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	731.41
Land Surface Elevation (ft)	728.31
Sounded Well Depth (ft bmp)	36.5
Depth to Water (ft bmp)	24.50
Water-Level Elevation (ft)	706.91
Water Column in Well (ft)	12
Casing Diameter/Type	2"
Gallons in Well	1.92
Gallons Pumped/Bailed Prior to Sampling	3 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of Screen
Purge Time	begin 12:57 end 13:18
Pumping Rate (gpm)	.16
Evacuation Method	High performance perstaltic pump

Field Parameters

Color	Greenish brown
Odor	Yes
Appearance	Thick, turbid
pH (s.u.)	5.77
Conductivity (mS/cm)	NA
(µmhos/cm)	4081
Turbidity (NTU)	NR
Temperature (°C)	20.82
Dissolved Oxygen (mg/L)	1.60
ORP (mV)	-103.4
Sampling Method	Low Flow

Remarks: Sample time @ 13:20
DTW final = 24.5
RB-94 @ 13:40

Constituents Sampled	Container Description	Number	Preservative
Site-Specific VOCs (8260B)	40 ml glass	3	Cool, HCl
Iron & Manganese Diss. (6010A)	500 ml plastic	1	Cool, HNO_3
Iron & Manganese Tot. (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 voa	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass	2	Cool

Sampling Personnel: T. Trommer

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: Moraine, Ohio

Monitoring Well No.: ME-3

Time Pump Started: 12:57

Depth of Sampling: Midpoint of Screen

Date: 7/21/2002

Parameters

Time

	13:00	13:03	13:06	13:09	13:12	13:15	13:18				
Redox Potential (millivolts)	-105.5	-103.3	-103.2	-103.5	-103.2	-103.2	-103.4				
Dissolved Oxygen (mg/L)	1.65	1.30	1.32	1.39	1.54	1.59	1.60				
pH (s.u.)	5.78	5.75	5.75	5.76	5.77	5.77	5.77				
Specific Conductance (uS/cm)	4,535	4,397	4,345	4,236	4,123	4,092	4,081				
Temperature (C)	22.29	20.71	20.77	20.81	20.83	20.85	20.82				

Flow Rate: Approx. 500 mL/min

Total Depth of Well: 37.51

Time Sampled: 13:20

Depth to Water Before Purging: 24.5

Total Water Pumped: 3 gallons

Depth to Water After Purging: 24.5

Comments

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DRAFT

September 2002

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/18/2002
Site/Well No.	W-2-S	Replicate No.		Code No.	
Weather	Clouds, 66	Sampling Time:	Begin 8:50	End	10:10

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	726.64
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	67.31
Depth to Water (ft bmp)	22.41
Water-Level Elevation (ft)	704.23
Water Column in Well (ft)	44.90
Casing Diameter/Type	3" PVC
Gallons in Well	16.6
Gallons Pumped/Bailed Prior to Sampling	6.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 9:31 end 9:52
Pumping Rate (gpm)	0.24
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.22
Conductivity (mS/cm)	
(µmhos/cm)	958
Turbidity (NTU)	N/A
Temperature (°C)	16.51
Dissolved Oxygen (mg/L)	0.40
ORP (mV)	123.4
Sampling Method	Low flow
Remarks	Sample time @ 9:53
	OVM = 0.0
	DTW final = 22.41

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: W-2-S

Time Pump Started: 9:31

Depth of Sampling: Midpoint of Screen

Date: 9/18/2002

Parameters

Time	9:34	9:37	9:40	9:43	9:46	9:49	9:52				
Redox Potential (millivolts)	161.0	87.5	78.1	90.7	102.4	109.1	123.4				
Dissolved Oxygen (mg/L)	1.67	0.92	0.66	0.52	0.47	0.44	0.40				
pH (s.u.)	7.10	7.11	7.17	7.18	7.21	7.21	7.22				
Specific Conductance (uS/cm)	1,035	997	971	962	959	958	958				
Temperature (C)	15.47	16.17	16.35	16.40	16.47	16.51	16.51				

Flow Rate: 900 mL/min

Time Sampled: 9:53

Total Water Pumped: 6.5 gallons

Total Depth of Well: 67.31

Depth to Water Before Purging: 22.41

Depth to Water After Purging: 22.41

Comments:

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/18/2002
Site/Well No.	W-3-S	Replicate No.	DUP-118A @ 11:20	Code No.	
Weather	Sun, 73	Sampling Time:	Begin 10:30	End	11:50

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	733.42
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	73.90
Depth to Water (ft bmp)	24.87
Water-Level Elevation (ft)	708.55
Water Column in Well (ft)	49.03
Casing Diameter/Type	3" PVC
Gallons in Well	18.14
Gallons Pumped/Bailed Prior to Sampling	4 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 10:50 end 11:15
Pumping Rate (gpm)	0.07
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.77
Conductivity (mS/cm)	
(µmhos/cm)	953
Turbidity (NTU)	N/A
Temperature (°C)	18.00
Dissolved Oxygen (mg/L)	1.79
ORP (mV)	524.2
Sampling Method	Low flow
Remarks	Sample time @ 11:20
	OVM = 0.0
	DTW final = 24.87
	MS/MSD @ 11:20 RB-95A

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

Sampling Personnel: C. Capell, 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	Nepheiometric 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: W-3-S

Time Pump Started: 10:50

Depth of Sampling: Midpoint of Screen

Date: 9/18/2002

Parameters

Time

	10:53	10:56	10:59	11:02	11:05	11:08	11:11	11:14	11:17		
Redox Potential (millivolts)	264.5	358.8	415.4	437.9	454.0	472.7	500.8	514.7	524.2		
Dissolved Oxygen (mg/L)	2.95	2.11	2.02	1.89	1.91	1.99	1.94	1.83	1.79		
pH (s.u.)	7.19	7.09	7.04	7.02	7.01	6.99	6.80	6.80	6.77		
Specific Conductance (uS/cm)	957	959	961	964	965	966	968	953	953		
Temperature (C)	17.13	17.83	18.25	18.57	19.05	19.78	16.74	17.90	18.00		

Flow Rate: 250 mL/min

Time Sampled: 11:20

Total Water Pumped: 4 gallons

Comments:

Total Depth of Well: 73.90

Depth to Water Before Purging: 24.87

Depth to Water After Purging: 24.87

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/18/2002
Site/Well No.	W-4-S	Replicate No.		Code No.	
Weather	Sun, 78	Sampling Time:	Begin 12:45	End	13:55

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	727.68
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	70.92
Depth to Water (ft bmp)	23.29
Water-Level Elevation (ft)	704.39
Water Column in Well (ft)	47.63
Casing Diameter/Type	3" PVC
Gallons in Well	17.6
Gallons Pumped/Bailed Prior to Sampling	7 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 13:22 end 13:35
Pumping Rate (gpm)	0.32
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.98
Conductivity (mS/cm)	
(µmhos/cm)	1326
Turbidity (NTU)	N/A
Temperature (°C)	18.47
Dissolved Oxygen (mg/L)	0.36
ORP (mV)	444.0
Sampling Method	Low flow
Remarks	Sample time @ 13:40
	OVM = 0.0
	DTW final = 23.29
	Replaced lock

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: W-4-S

Time Pump Started: 13:22

Depth of Sampling: Midpoint of Screen

Date: 9/18/2002

Parameters

Time

	13:25	13:28	13:31	13:34	13:37						
Redox Potential (millivolts)	312.7	386.6	404.1	422.9	444.0						
Dissolved Oxygen (mg/L)	1.00	0.55	0.48	0.42	0.36						
pH (s.u.)	6.71	6.85	6.90	6.96	6.98						
Specific Conductance (uS/cm)	1,343	1,328	1,327	1,326	1,326						
Temperature (C)	17.94	18.38	18.41	18.47	18.47						

Flow Rate: 1200 mL/min

Time Sampled: 13:40

Total Water Pumped: 7 gallons

Comments:

Total Depth of Well: 70.92

Depth to Water Before Purging: 23.29

Depth to Water After Purging: 23.29

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/18/2002
Site/Well No.	HR-16	Replicate No.		Code No.	
Weather	Sun, 81	Sampling Time: Begin	14:00	End	14:45

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	727.01
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	64.67
Depth to Water (ft bmp)	22.15
Water-Level Elevation (ft)	704.86
Water Column in Well (ft)	45.52
Casing Diameter/Type	3" PVC
Gallons in Well	15.7
Gallons Pumped/Bailed Prior to Sampling	9 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 14:12 end 14:25
Pumping Rate (gpm)	0.32
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.98
Conductivity (mS/cm)	
(µmhos/cm)	1087
Turbidity (NTU)	N/A
Temperature (°C)	16.54
Dissolved Oxygen (mg/L)	0.32
ORP (mV)	506.6
Sampling Method	Low flow
Remarks	Sample time @ 14:32
	OVM = 0.0
	DTW final = 22.15

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-16

Time Pump Started: 14:12

Depth of Sampling: Midpoint of Screen

Date: 9/18/2002

Parameters

Time

	14:15	14:18	14:21	14:24	14:27	14:30					
Redox Potential (millivolts)	384.4	451.5	479.7	490.7	502.6	506.6					
Dissolved Oxygen (mg/L)	0.90	0.53	0.41	0.34	0.32	0.32					
pH (s.u.)	6.93	6.95	6.98	6.99	6.97	6.98					
Specific Conductance (uS/cm)	1,078	1,088	1,091	1,089	1,087	1,087					
Temperature (C)	16.13	16.42	16.52	16.61	16.52	16.54					

Flow Rate: 1200 mL/min

Time Sampled: 14:32

Total Water Pumped: 9 gallons

Comments:

Total Depth of Well: 64.67

Depth to Water Before Purging: 22.15

Depth to Water After Purging: 22.14

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/18/2002
Site/Well No.	HR-17	Replicate No.		Code No.	
Weather	Sun, 81	Sampling Time:	Begin 14:55	End	15:30

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	726.43
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	48.11
Depth to Water (ft bmp)	21.25
Water-Level Elevation (ft)	705.18
Water Column in Well (ft)	26.86
Casing Diameter/Type	3" PVC
Gallons in Well	9.94
Gallons Pumped/Bailed Prior to Sampling	8 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 15:03 end 15:15
Pumping Rate (gpm)	0.32
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.85
Conductivity (mS/cm)	
(µmhos/cm)	1354
Turbidity (NTU)	N/A
Temperature (°C)	18.57
Dissolved Oxygen (mg/L)	0.88
ORP (mV)	517.3
Sampling Method	Low flow
Remarks	Sample time @ 15:20
	OVM = 0.0
	DTW final = 21.29

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: Moraine, Ohio

Monitoring Well No.: HR-17

Time Pump Started: 15:03

Depth of Sampling: Midpoint of Screen

Date: 9/18/2002

Parameters

Time

	15:06	15:09	15:12	15:15	15:18						
Redox Potential (millivolts)	295.2	436.2	491.5	509.2	517.3						
Dissolved Oxygen (mg/L)	2.01	1.04	0.92	0.89	0.88						
pH (s.u.)	7.20	6.92	6.84	6.84	6.85						
Specific Conductance (uS/cm)	1,373	1,356	1,356	1,354	1,354						
Temperature (C)	18.12	18.51	18.51	18.45	18.57						

Flow Rate: 1200 mL/min

Time Sampled: 15:20

Total Water Pumped: 8 gallons

Comments:

Total Depth of Well: 48.11

Depth to Water Before Purging: 21.25

Depth to Water After Purging: 21.29

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/18/2002
Site/Well No.	GM-10	Replicate No.		Code No.	
Weather	Sun, 83	Sampling Time:	Begin 15:55	End	16:40

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	723.46
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	49.54
Depth to Water (ft bmp)	20.11
Water-Level Elevation (ft)	703.35
Water Column in Well (ft)	29.43
Casing Diameter/Type	2" PVC
Gallons in Well	4.71
Gallons Pumped/Bailed Prior to Sampling	7 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 16:05 end 16:23
Pumping Rate (gpm)	0.03
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.90
Conductivity (mS/cm)	
(µmhos/cm)	1065
Turbidity (NTU)	N/A
Temperature (°C)	16.87
Dissolved Oxygen (mg/L)	4.15
ORP (mV)	537.6
Sampling Method	Low flow
Remarks	Sample time @ 16:25
	OVM = 0.0
	DTW final = 20.10

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-10

Time Pump Started: 16:05

Depth of Sampling: Midpoint of Screen

Date: 9/18/2002

Parameters / Time

	16:08	16:11	16:14	16:17	16:20	16:23					
Redox Potential (millivolts)	398.5	486.0	527.5	537.5	537.9	537.6					
Dissolved Oxygen (mg/L)	4.84	4.58	4.42	4.28	4.19	4.15					
pH (s.u.)	6.78	6.74	6.67	6.77	6.86	6.90					
Specific Conductance (uS/cm)	1,011	1,030	1,044	1,047	1,054	1,065					
Temperature (C)	16.50	16.79	16.84	16.97	16.91	16.87					

Flow Rate: 1000 mL/min

Time Sampled: 16:25

Total Water Pumped: 7 gallons

Comments:

Total Depth of Well: 49.54

Depth to Water Before Purging: 20.11

Depth to Water After Purging: 20.10

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/19/2002
Site/Well No.	HR-7	Replicate No.		Code No.	
Weather	Sun, 76	Sampling Time:	Begin 10:27	End	11:05

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	731.73
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	57.35
Depth to Water (ft bmp)	25.17
Water-Level Elevation (ft)	706.56
Water Column in Well (ft)	32.18
Casing Diameter/Type	2" PVC
Gallons in Well	5.15
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 10:36 end 10:45
Pumping Rate (gpm)	0.24
Evacuation Method	Submersible pump

Field Parameters

Color	Colorlesss
Odor	None
Appearance	Clear
pH (s.u.)	7.09
Conductivity (mS/cm)	
(µmhos/cm)	1337
Turbidity (NTU)	N/A
Temperature (°C)	18.06
Dissolved Oxygen (mg/L)	0.28
ORP (mV)	420.4
Sampling Method	Low flow
Remarks	Sample time @ 10:53
	OVM = 0.0
	DTW final = 25.18

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-7

Time Pump Started: 10:36

Depth of Sampling: Midpoint of Screen

Date: 9/19/2002

Parameters / Time

	10:39	10:42	10:45	10:48	10:51						
Redox Potential (millivolts)	334.4	375.2	390.8	410.2	420.4						
Dissolved Oxygen (mg/L)	0.49	0.47	0.34	0.31	0.28						
pH (s.u.)	7.28	7.16	7.13	7.10	7.09						
Specific Conductance (uS/cm)	1,347	1,339	1,333	1,340	1,337						
Temperature (C)	16.81	17.58	17.76	17.95	18.06						

Flow Rate: 900 mL/min

Time Sampled: 10:53

Total Water Pumped: 5 gallons

Total Depth of Well: 57.35

Depth to Water Before Purging: 25.17

Depth to Water After Purging: 25.18

Comments:

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/19/2002
Site/Well No.	HR-8	Replicate No.		Code No.	
Weather	Sun, 70s	Sampling Time:	Begin 8:30	End	9:35

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	743.42
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	66.39
Depth to Water (ft bmp)	35.52
Water-Level Elevation (ft)	707.90
Water Column in Well (ft)	30.87
Casing Diameter/Type	2" PVC
Gallons in Well	4.94
Gallons Pumped/Bailed Prior to Sampling	7.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 9:03 end 9:20
Pumping Rate (gpm)	0.26
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.07
Conductivity (mS/cm)	
(µmhos/cm)	1057
Turbidity (NTU)	N/A
Temperature (°C)	16.45
Dissolved Oxygen (mg/L)	2.68
ORP (mV)	292.4
Sampling Method	Low flow
Remarks	Sample time @ 9:23
	OVM = 0.0
	DTW final = 35.53

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-8

Time Pump Started: 9:03

Depth of Sampling: Midpoint of Screen

Date: 9/19/2002

Parameters

Time

	9:06	9:09	9:12	9:15	9:18	9:21					
Redox Potential (millivolts)	245.5	268.6	284.5	300.3	292.8	292.4					
Dissolved Oxygen (mg/L)	4.13	2.67	2.67	2.65	2.68	2.68					
pH (s.u.)	6.67	6.86	6.95	7.01	7.04	7.07					
Specific Conductance (uS/cm)	1,113	1,061	1,059	1,057	1,057	1,057					
Temperature (C)	16.03	16.32	16.42	16.57	16.45	16.45					

Flow Rate: 1000 mL/min

Total Depth of Well: 66.39

Time Sampled: 9:23

Depth to Water Before Purging: 35.52

Total Water Pumped: 7.5 gallons

Depth to Water After Purging: 35.53

Comments

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/19/2002
Site/Well No.	HR-9	Replicate No.		Code No.	
Weather	Sun, 70s	Sampling Time:	Begin 9:40	End	10:20

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	743.51
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	69.81
Depth to Water (ft bmp)	35.22
Water-Level Elevation (ft)	708.29
Water Column in Well (ft)	34.59
Casing Diameter/Type	2" PVC
Gallons in Well	5.53
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 9:53 end 10:05
Pumping Rate (gpm)	0.32
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.12
Conductivity (mS/cm)	
(µmhos/cm)	1216
Turbidity (NTU)	N/A
Temperature (°C)	16.99
Dissolved Oxygen (mg/L)	0.26
ORP (mV)	312.1
Sampling Method	Low flow
Remarks	Sample time @ 10:07
	OVM = 0.0
	DTW final = 35.21

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-9

Time Pump Started: 9:53

Depth of Sampling: Midpoint of Screen

Date: 9/19/2002

Parameters

Time

	9:56	9:59	10:02	10:05							
Redox Potential (millivolts)	238.9	283.7	301.8	312.1							
Dissolved Oxygen (mg/L)	0.20	0.26	0.24	0.26							
pH (s.u.)	7.14	7.13	7.12	7.12							
Specific Conductance (uS/cm)	1,152	1,211	1,213	1,216							
Temperature (C)	16.25	16.82	16.82	16.99							

Flow Rate: 1200 mL/min

Time Sampled: 10:07

Total Water Pumped: 5 gallons

Comments:

Total Depth of Well: 69.81

Depth to Water Before Purging: 35.22

Depth to Water After Purging: 35.21

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/19/2002
Site/Well No.	W-1-S	Replicate No.	DUP-119A @ 11:35	Code No.	
Weather	Sun, 78	Sampling Time:	Begin 11:10	End	11:54

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	729.29
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	58.68
Depth to Water (ft bmp)	23.94
Water-Level Elevation (ft)	705.35
Water Column in Well (ft)	34.74
Casing Diameter/Type	2" PVC
Gallons in Well	5.56
Gallons Pumped/Bailed Prior to Sampling	6 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 11:18 end 11:33
Pumping Rate (gpm)	0.32
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.00
Conductivity (mS/cm)	
(µmhos/cm)	1318
Turbidity (NTU)	N/A
Temperature (°C)	19.12
Dissolved Oxygen (mg/L)	0.23
ORP (mV)	458.0
Sampling Method	Low flow
Remarks	Sample time @ 11:35
	OVM = 0.0
	DTW final = 23.94
	RB-96A @ 11:45

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: W-1-S

Time Pump Started: 11:18

Depth of Sampling: Midpoint of Screen

Date: 9/19/2002

Parameters

Time

	11:21	11:24	11:27	11:30	11:33						
Redox Potential (millivolts)	446.7	449.5	451.4	456.4	458.0						
Dissolved Oxygen (mg/L)	-0.14	0.18	0.21	0.23	0.23						
pH (s.u.)	6.86	6.95	7.03	7.04	7.00						
Specific Conductance (uS/cm)	1,297	1,296	1,301	1,310	1,318						
Temperature (C)	18.50	18.82	19.08	19.17	19.12						

Flow Rate: 1200 mL/min

Time Sampled: 11:35

Total Water Pumped: 6 gallons

Total Depth of Well: 58.68

Depth to Water Before Purging: 23.94

Depth to Water After Purging: 23.94

Comments

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/19/2002
Site/Well No.	W-2-N	Replicate No.		Code No.	
Weather	Sun, 80s	Sampling Time:	Begin 12:55	End	13:57

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	731.68
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	59.57
Depth to Water (ft bmp)	24.65
Water-Level Elevation (ft)	707.03
Water Column in Well (ft)	34.92
Casing Diameter/Type	3" PVC
Gallons in Well	12.9
Gallons Pumped/Bailed Prior to Sampling	6.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 13:15 end 13:35
Pumping Rate (gpm)	0.26
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.80
Conductivity (mS/cm)	
(µmhos/cm)	1175
Turbidity (NTU)	N/A
Temperature (°C)	17.42
Dissolved Oxygen (mg/L)	0.58
ORP (mV)	-17.9
Sampling Method	Low flow
Remarks	Sample time @ 13:45
	OVM = 0.0
	DTW final = 24.67

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: W-2-N

Time Pump Started: 13:15

Depth of Sampling: Midpoint of Screen

Date: 9/19/2002

Parameters / Time

	13:18	13:21	13:24	13:27	13:34	13:37	13:40	13:43			
Redox Potential (millivolts)	-43.0	-52.2	-51.1	-49.1	-23.8	-21.2	-18.8	-17.9			
Dissolved Oxygen (mg/L)	0.81	0.55	0.47	0.40	NR	1.27	0.86	0.58			
pH (s.u.)	6.42	6.58	6.65	6.65	6.84	6.78	6.79	6.80			
Specific Conductance (uS/cm)	1,199	1,182	1,180	1,178	1,175	1,174	1,173	1,175			
Temperature (C)	16.25	16.70	16.86	17.03	17.40	17.57	17.54	17.42			

Flow Rate: 1000 mL/min

Total Depth of Well: 59.57

Time Sampled: 13:45

Depth to Water Before Purging: 24.65

Total Water Pumped: 6.5 gallons

Depth to Water After Purging: 24.67

Comments: Ran out of gas @ 13:27 turned pump back on @ 13:31

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/19/2002
Site/Well No.	W-1-N	Replicate No.		Code No.	
Weather	Sun, 80s	Sampling Time:	Begin 14:35	End	15:25

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	739.02
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	71.67
Depth to Water (ft bmp)	31.41
Water-Level Elevation (ft)	707.61
Water Column in Well (ft)	40.26
Casing Diameter/Type	3" PVC
Gallons in Well	14.9
Gallons Pumped/Bailed Prior to Sampling	4 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 14:51 end 15:06
Pumping Rate (gpm)	0.21
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.75
Conductivity (mS/cm)	
(µmhos/cm)	931
Turbidity (NTU)	N/A
Temperature (°C)	18.14
Dissolved Oxygen (mg/L)	0.30
ORP (mV)	479.0
Sampling Method	Low flow
Remarks	Sample time @ 15:09
	OVM = 0.0
	DTW final = 31.40

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: W-1-N

Time Pump Started: 14:51

Depth of Sampling: Midpoint of Screen

Date: 9/19/2002

Parameters / Time

	14:54	14:57	15:00	15:03	15:06						
Redox Potential (millivolts)	260.0	345.4	408.3	469.9	479.0						
Dissolved Oxygen (mg/L)	0.34	0.40	0.34	0.30	0.30						
pH (s.u.)	7.09	6.94	6.86	6.77	6.75						
Specific Conductance (uS/cm)	951	938	937	934	931						
Temperature (C)	17.03	17.61	17.89	17.97	18.14						

Flow Rate: 800 mL/min

Time Sampled: 15:09

Total Water Pumped: 4 gallons

Comments:

Total Depth of Well: 71.67

Depth to Water Before Purging: 31.41

Depth to Water After Purging: 31.40

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/19/2002
Site/Well No.	GM-17	Replicate No.		Code No.	
Weather	Sun, 80s	Sampling Time:	Begin 15:45	End	16:15

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	723.84
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	49.57
Depth to Water (ft bmp)	19.81
Water-Level Elevation (ft)	704.03
Water Column in Well (ft)	29.76
Casing Diameter/Type	2" PVC
Gallons in Well	4.76
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 15:34 end 16:06
Pumping Rate (gpm)	0.30
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.01
Conductivity (mS/cm)	
(µmhos/cm)	1549
Turbidity (NTU)	N/A
Temperature (°C)	18.09
Dissolved Oxygen (mg/L)	0.23
ORP (mV)	465.7
Sampling Method	Low flow
Remarks	Sample time @ 16:08
	OVM = 0.0
	DTW final = 19.81

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-17

Time Pump Started: 15:54

Depth of Sampling: Midpoint of Screen

Date: 9/19/2002

Parameters / Time

	15:57	16:00	16:03	16:06							
Redox Potential (millivolts)	354.4	422.0	454.1	465.7							
Dissolved Oxygen (mg/L)	0.29	0.25	0.24	0.23							
pH (s.u.)	6.97	6.99	6.99	7.07							
Specific Conductance (uS/cm)	1,540	1,547	1,548	1,549							
Temperature (C)	17.58	17.91	17.97	18.09							

Flow Rate: 1100 mL/min

Total Depth of Well: 49.57

Time Sampled: 16:08

Depth to Water Before Purging: 19.81

Total Water Pumped: 5 gallons

Depth to Water After Purging: 19.81

Comments:

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/19/2002
Site/Well No.	GM-18	Replicate No.		Code No.	
Weather	Sun, 80s	Sampling Time:	Begin 16:20	End	16:57

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	723.80
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	54.07
Depth to Water (ft bmp)	19.91
Water-Level Elevation (ft)	703.89
Water Column in Well (ft)	34.16
Casing Diameter/Type	2" PVC
Gallons in Well	5.47
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 16:28 end 16:43
Pumping Rate (gpm)	0.24
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.04
Conductivity (mS/cm)	
(µmhos/cm)	1588
Turbidity (NTU)	N/A
Temperature (°C)	18.69
Dissolved Oxygen (mg/L)	0.30
ORP (mV)	462.1
Sampling Method	Low flow
Remarks	Sample time @ 16:45
	OVM = 0.0
	DTW final = 19.91

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-18

Time Pump Started: 16:28

Depth of Sampling: Midpoint of Screen

Date: 9/19/2002

Parameters / Time

	16:31	16:34	16:37	16:40	16:43						
Redox Potential (millivolts)	349.1	421.4	452.1	455.5	462.1						
Dissolved Oxygen (mg/L)	1.04	0.50	0.38	0.32	0.30						
pH (s.u.)	7.10	7.02	7.02	7.04	7.04						
Specific Conductance (uS/cm)	1,568	1,584	1,585	1,587	1,588						
Temperature (C)	17.82	18.31	18.44	18.56	18.69						

Flow Rate: 900 mL/min

Time Sampled: 16:45

Total Water Pumped: 5 gallons

Total Depth of Well: 54.07

Depth to Water Before Purging: 19.91

Depth to Water After Purging: 19.91

Comments:

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/20/2002
Site/Well No.	GM-8	Replicate No.		Code No.	
Weather	Clouds, 70s	Sampling Time:	Begin 8:15	End	10:30

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	735.17
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	51.41
Depth to Water (ft bmp)	31.00
Water-Level Elevation (ft)	704.17
Water Column in Well (ft)	20.41
Casing Diameter/Type	2" PVC
Gallons in Well	3.27
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 8:45 end 9:05
Pumping Rate (gpm)	0.26
Evacuation Method	Submersible pump

Field Parameters

Color	Light yellow
Odor	None
Appearance	Clear
pH (s.u.)	8.18
Conductivity (mS/cm)	
(µmhos/cm)	1734
Turbidity (NTU)	N/A
Temperature (°C)	19.20
Dissolved Oxygen (mg/L)	0.37
ORP (mV)	-150.6
Sampling Method	Low flow
Remarks	Sample time @ 9:10
	OVM = 0.0
	DTW final = 31.00

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-8

Time Pump Started: 8:48

Depth of Sampling: Midpoint of Screen

Date: 9/20/2002

Parameters / Time

	8:51	8:54	8:57	9:00	9:03	9:06					
Redox Potential (millivolts)	-97.7	-130.0	-141.2	-131.0	-141.9	-150.6					
Dissolved Oxygen (mg/L)	1.24	0.66	0.44	0.36	0.38	0.37					
pH (s.u.)	7.71	7.90	8.04	8.11	8.12	8.18					
Specific Conductance (uS/cm)	1,708	1,709	1,731	1,735	1,733	1,734					
Temperature (C)	17.39	18.15	18.54	18.83	18.99	19.20					

Flow Rate: 1000 mL/min

Total Depth of Well: 51.41

Time Sampled: 9:10

Depth to Water Before Purging: 31.00

Total Water Pumped: 5 gallons

Depth to Water After Purging: 31.00

Comments:

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/20/2002
Site/Well No.	GM-6	Replicate No.		Code No.	
Weather	Clouds, 70s	Sampling Time:	Begin 10:40	End	11:20

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.27
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	46.20
Depth to Water (ft bmp)	26.21
Water-Level Elevation (ft)	704.06
Water Column in Well (ft)	19.99
Casing Diameter/Type	2" PVC
Gallons in Well	3.20
Gallons Pumped/Bailed Prior to Sampling	6 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 10:44 end 11:00
Pumping Rate (gpm)	0.26
Evacuation Method	Submersible pump

Field Parameters

Color	Light yellow
Odor	None
Appearance	Clear
pH (s.u.)	7.46
Conductivity (mS/cm)	
(µmhos/cm)	1658
Turbidity (NTU)	N/A
Temperature (°C)	19.07
Dissolved Oxygen (mg/L)	0.34
ORP (mV)	-27.7
Sampling Method	Low flow
Remarks	Sample time @ 11:05
	OVM = 0.0
	DTW final = 26.22
	Replaced lock

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-6

Time Pump Started: 10:44

Depth of Sampling: Midpoint of Screen

Date: 9/20/2002

Parameters	Time										
	10:47	10:50	10:53	10:56	10:59	11:02					
Redox Potential (millivolts)	55.8	-23.5	-30.4	-30.8	-28.0	-27.7					
Dissolved Oxygen (mg/L)	1.07	0.70	0.59	0.49	0.36	0.34					
pH (s.u.)	7.53	7.57	7.55	7.53	7.47	7.46					
Specific Conductance (uS/cm)	1,631	1,657	1,661	1,659	1,657	1,658					
Temperature (C)	17.55	18.27	18.56	18.67	18.98	19.07					

Flow Rate: 1000 mL/min

Total Depth of Well: 46.20

Time Sampled: 11:05

Depth to Water Before Purging: 26.21

Total Water Pumped: 6 gallons

Depth to Water After Purging: 26.22

Comments: Replaced lock

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/20/2002
Site/Well No.	TW2	Replicate No.		Code No.	
Weather	Clouds, 70s	Sampling Time:	Begin 11:20	End	12:00

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	733.38
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	42.05
Depth to Water (ft bmp)	31.95
Water-Level Elevation (ft)	701.43
Water Column in Well (ft)	10.1
Casing Diameter/Type	6" steel
Gallons in Well	14.85
Gallons Pumped/Bailed Prior to Sampling	4 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 11:29 end 11:47
Pumping Rate (gpm)	0.16
Evacuation Method	Submersible pump

Field Parameters

Color	Light yellow
Odor	None
Appearance	Clear
pH (s.u.)	7.19
Conductivity (mS/cm)	
(µmhos/cm)	1539
Turbidity (NTU)	N/A
Temperature (°C)	19.09
Dissolved Oxygen (mg/L)	0.60
ORP (mV)	206.4
Sampling Method	Low flow
Remarks	Sample time @ 11:50
	OVM = 0.0
	DTW final = 31.95
	TW-2 was sampled as an alternate to 4S

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: TW2

Time Pump Started: 11:29

Depth of Sampling: Midpoint of Screen

Date: 9/20/2002

Parameters / Time

	11:32	11:35	11:38	11:41	11:44	11:47					
Redox Potential (millivolts)	148.8	176.1	178.5	180.4	191.7	206.4					
Dissolved Oxygen (mg/L)	2.36	1.29	1.06	0.79	0.67	0.60					
pH (s.u.)	7.34	7.29	7.23	7.21	7.20	7.19					
Specific Conductance (uS/cm)	1,546	1,538	1,541	1,539	1,539	1,539					
Temperature (C)	17.44	18.31	18.38	18.54	18.88	19.09					

Flow Rate: 600 mL/min

Time Sampled: 11:50

Total Water Pumped: 4 gallons

Total Depth of Well: 42.05

Depth to Water Before Purging: 31.95

Depth to Water After Purging: 31.81

Comments:

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/20/2002
Site/Well No.	GM-2	Replicate No.		Code No.	
Weather	Sun/clouds, 70s	Sampling Time:	Begin 13:07	End	13:50

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	735.81
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	56.46
Depth to Water (ft bmp)	30.99
Water-Level Elevation (ft)	704.82
Water Column in Well (ft)	25.47
Casing Diameter/Type	2" PVC
Gallons in Well	4.08
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 13:18 end 13:36
Pumping Rate (gpm)	0.26
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.89
Conductivity (mS/cm)	
(µmhos/cm)	1398
Turbidity (NTU)	N/A
Temperature (°C)	18.69
Dissolved Oxygen (mg/L)	0.56
ORP (mV)	453.6
Sampling Method	Low flow
Remarks	Sample time @ 13:38
	OVM = 0.0
	DTW final = 30.97

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-2

Time Pump Started: 13:18

Depth of Sampling: Midpoint of Screen

Date: 9/20/2002

Parameters / Time

	13:21	13:24	13:27	13:30	13:33	13:36					
Redox Potential (millivolts)	301.9	340.5	368.3	404.4	428.1	453.6					
Dissolved Oxygen (mg/L)	1.71	1.15	0.76	0.69	0.83	0.56					
pH (s.u.)	7.21	7.12	7.06	6.97	6.93	6.89					
Specific Conductance (uS/cm)	1397	1395	1396	1400	1399	1398					
Temperature (C)	17.74	18.14	18.40	18.56	18.65	18.69					

Flow Rate: 1000 mL/min

Time Sampled: 13:38

Total Water Pumped: 5 gallons

Comments:

Total Depth of Well: 56.46

Depth to Water Before Purging: 30.99

Depth to Water After Purging: 30.97

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/20/2002
Site/Well No.	GM-32	Replicate No.		Code No.	
Weather	Sun/clouds, 70s	Sampling Time: Begin	13:55	End	14:55

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	732.10
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	60.37
Depth to Water (ft bmp)	27.08
Water-Level Elevation (ft)	705.02
Water Column in Well (ft)	33.29
Casing Diameter/Type	2" PVC
Gallons in Well	5.33
Gallons Pumped/Bailed Prior to Sampling	7 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 14:07 end 14:20
Pumping Rate (gpm)	0.32
Evacuation Method	Submersible pump

Field Parameters

Color	Dark yellow/brown
Odor	Slight
Appearance	Clear
pH (s.u.)	8.13
Conductivity (mS/cm)	
(µmhos/cm)	4289
Turbidity (NTU)	N/A
Temperature (°C)	19.81
Dissolved Oxygen (mg/L)	0.22
ORP (mV)	-227.1
Sampling Method	Low flow
Remarks	Sample time @ 14:25
	OVM = 0.0
	DTW final = 27.09

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-32

Time Pump Started: 14:07

Depth of Sampling: Midpoint of Screen

Date: 9/20/2002

Parameters

Time

	14:10	14:13	14:16	14:19	14:22						
Redox Potential (millivolts)	-127.3	-236.2	-211.3	-216.8	-227.1						
Dissolved Oxygen (mg/L)	1.11	0.38	0.27	0.25	0.22						
pH (s.u.)	7.39	8.22	8.18	8.17	8.13						
Specific Conductance (uS/cm)	2,251	4,779	4,611	4,435	4,289						
Temperature (C)	18.43	19.18	19.52	19.56	19.81						

Flow Rate: 1200 mL/min

Total Depth of Well: 60.37

Time Sampled: 14:25

Depth to Water Before Purging: 27.08

Total Water Pumped: 7 gallons

Depth to Water After Purging: 27.09

Comments

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/23/2002
Site/Well No.	EAST	Replicate No.	DUP-120A@11:00	Code No.	
Weather	Sun, 60s	Sampling Time:	Begin 10:25	End	12:00

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.98
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	71.23
Depth to Water (ft bmp)	25.50
Water-Level Elevation (ft)	705.48
Water Column in Well (ft)	45.73
Casing Diameter/Type	2" PVC
Gallons in Well	7.32
Gallons Pumped/Bailed Prior to Sampling	4.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 10:41 end 10:58
Pumping Rate (gpm)	0.18
Evacuation Method	Submersible pump

Field Parameters

Color	Light brown
Odor	None
Appearance	Slightly turbid
pH (s.u.)	7.18
Conductivity (mS/cm)	
(µmhos/cm)	1467
Turbidity (NTU)	N/A
Temperature (°C)	19.62
Dissolved Oxygen (mg/L)	1.82
ORP (mV)	215.6
Sampling Method	Low flow
Remarks	Sample time @ 11:00
	OVM = 0.0
	DTW final = 25.5
	MS/MSD @ 11:00
	RB-97A @ 11:30

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	4	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C. Capell, 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" = 0.25	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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: EAST

Time Pump Started: 10:41

Depth of Sampling: Midpoint of Screen

Date: 9/23/2002

Parameters

Time

	10:43	10:46	10:49	10:52	10:55	10:58					
Redox Potential (millivolts)	2023	173.1	174.5	189.9	198.7	215.6					
Dissolved Oxygen (mg/L)	5.06	3.42	2.64	2.33	2.09	1.82					
pH (s.u.)	6.93	7.06	7.13	7.17	7.18	7.18					
Specific Conductance (uS/cm)	1,497	1,479	1,466	1,465	1,464	1,467					
Temperature (C)	18.13	18.31	19.00	19.35	19.53	19.62					

Flow Rate: 700 mL/min

Total Depth of Well: 7.23

Time Sampled: 11:00

Depth to Water Before Purging: 25.50

Total Water Pumped: 4.5 gallons

Depth to Water After Purging: 25.50

Comments

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/23/2002
Site/Well No.	HR-1	Replicate No.		Code No.	
Weather	Sun, 60s	Sampling Time:	Begin 14:20	End	15:36

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	732.71
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	59.30
Depth to Water (ft bmp)	27.15
Water-Level Elevation (ft)	705.56
Water Column in Well (ft)	32.15
Casing Diameter/Type	2" PVC
Gallons in Well	5.14
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 15:06 end 15:21
Pumping Rate (gpm)	0.21
Evacuation Method	Submersible pump

Field Parameters

Color	Colorlesss
Odor	None
Appearance	Clear
pH (s.u.)	7.14
Conductivity (mS/cm)	
(µmhos/cm)	1320
Turbidity (NTU)	N/A
Temperature (°C)	21.40
Dissolved Oxygen (mg/L)	1.27
ORP (mV)	444.5
Sampling Method	Low flow
Remarks	Sample time @ 15:23
	OVM = 0.0
	DTW final = 27.15

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-1

Time Pump Started: 15:06

Depth of Sampling: Midpoint of Screen

Date: 9/23/2002

Parameters / Time

	15:09	15:12	15:15	15:18	15:21						
Redox Potential (millivolts)	369.0	407.2	424.2	439.1	444.5						
Dissolved Oxygen (mg/L)	1.78	1.41	1.32	1.27	1.27						
pH (s.u.)	6.91	7.05	7.09	7.13	7.14						
Specific Conductance (uS/cm)	1,308	1,319	1,323	1,320	1,320						
Temperature (C)	19.87	20.65	21.02	21.32	21.40						

Flow Rate: 800 mL/min

Total Depth of Well: 59.30

Time Sampled: 15:23

Depth to Water Before Purging: 27.15

Total Water Pumped: 5 gallons

Depth to Water After Purging: 27.15

Comments: Replaced lock

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/23/2002
Site/Well No.	HR-6	Replicate No.		Code No.	
Weather	Sun, 70	Sampling Time:	Begin 15:40	End	16:20

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	732.66
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	55.21
Depth to Water (ft bmp)	26.72
Water-Level Elevation (ft)	705.94
Water Column in Well (ft)	28.49
Casing Diameter/Type	2" PVC
Gallons in Well	4.56
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 15:49 end 16:00
Pumping Rate (gpm)	0.30
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.98
Conductivity (mS/cm)	
(µmhos/cm)	1148
Turbidity (NTU)	N/A
Temperature (°C)	18.38
Dissolved Oxygen (mg/L)	3.49
ORP (mV)	476.3
Sampling Method	Low flow
Remarks	Sample time @ 16:05
	OVM = 0.0
	DTW final = 26.72

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-6

Time Pump Started: 15:49

Depth of Sampling: Midpoint of Screen

Date: 9/23/2002

Parameters / Time

	15:52	15:55	15:58	16:01	16:04						
Redox Potential (millivolts)	312.7	397.1	420.9	458.1	476.3						
Dissolved Oxygen (mg/L)	4.36	3.63	3.52	3.54	3.49						
pH (s.u.)	7.29	7.12	7.07	7.00	6.98						
Specific Conductance (uS/cm)	1,153	1,147	1,147	1,148	1,148						
Temperature (C)	17.63	18.02	18.13	18.30	18.38						

Flow Rate: 1150 mL/min

Time Sampled: 16:05

Total Water Pumped: 5 gallons

Comments: Replaced lock

Total Depth of Well: 55.21

Depth to Water Before Purging: 26.72

Depth to Water After Purging: 26.72

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/23/2002
Site/Well No.	HR-5	Replicate No.		Code No.	
Weather	Sun, 70s	Sampling Time:	Begin 16:20	End	17:00

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	734.27
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	57.85
Depth to Water (ft bmp)	27.65
Water-Level Elevation (ft)	706.62
Water Column in Well (ft)	30.20
Casing Diameter/Type	2" PVC
Gallons in Well	4.8
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 16:31 end 16:46
Pumping Rate (gpm)	0.24
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.78
Conductivity (mS/cm)	
(µmhos/cm)	1032
Turbidity (NTU)	N/A
Temperature (°C)	17.04
Dissolved Oxygen (mg/L)	0.34
ORP (mV)	144.7
Sampling Method	Low flow
Remarks	Sample time @ 16:48
	OVM = 0.0
	DTW final = 27.66

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-5

Time Pump Started: 16:31

Depth of Sampling: Midpoint of Screen

Date: 9/23/2002

Parameters / Time

	16:34	16:37	16:40	16:43	16:46						
Redox Potential (millivolts)	96.3	81.1	103.0	129.3	144.7						
Dissolved Oxygen (mg/L)	0.92	0.59	0.46	0.40	0.34						
pH (s.u.)	7.17	7.09	6.94	6.81	6.78						
Specific Conductance (uS/cm)	1,032	1,031	1,033	1,033	1,032						
Temperature (C)	16.33	16.56	16.70	16.83	17.04						

Flow Rate: 900 mL/min

Time Sampled: 16:48

Total Water Pumped: 5 gallons

Total Depth of Well: 57.85

Depth to Water Before Purging: 27.65

Depth to Water After Purging: 27.66

Comments:

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/23/2002
Site/Well No.	W-3-N	Replicate No.		Code No.	
Weather	Sun, 70s	Sampling Time:	Begin 17:05	End	18:00

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	733.66
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	57.60
Depth to Water (ft bmp)	26.70
Water-Level Elevation (ft)	706.96
Water Column in Well (ft)	30.90
Casing Diameter/Type	3" PVC
Gallons in Well	11.43
Gallons Pumped/Bailed Prior to Sampling	7 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 17:17 end 17:45
Pumping Rate (gpm)	0.29
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.32
Conductivity (mS/cm)	
(µmhos/cm)	1050
Turbidity (NTU)	N/A
Temperature (°C)	16.30
Dissolved Oxygen (mg/L)	0.28
ORP (mV)	-94.0
Sampling Method	Low flow
Remarks	Sample time @ 17:47
	OVM = 0.0
	DTW final = 26.69

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: W-3-N

Time Pump Started: 17:17

Depth of Sampling: Midpoint of Screen

Date: 9/23/2002

Parameters / Time

	17:20	17:23	17:26	17:29	17:39	17:42	17:45				
Redox Potential (millivolts)	-88.6	-90.5	-91.8	pump	-90.5	-93.7	-94.0				
Dissolved Oxygen (mg/L)	0.66	0.53	0.46	stopped	0.51	0.31	0.28				
pH (s.u.)	7.52	7.46	7.41	stopped	7.33	7.32	7.32				
Specific Conductance (uS/cm)	1,050	1,050	1,049	stopped	1,051	1,051	1,050				
Temperature (C)	16.03	16.32	16.61	17.42	16.37	16.43	16.30				

Flow Rate: 1100 mL/min

Time Sampled: 17:47

Total Water Pumped: 7 gallons

Comments: 17:36 pump restarted

Total Depth of Well: 57.60

Depth to Water Before Purging: 26.70

Depth to Water After Purging: 26.69

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/24/2002
Site/Well No.	W-4-N	Replicate No.		Code No.	
Weather	Sun, 60s	Sampling Time:	Begin 8:50	End	10:03

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	731.63
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	66.47
Depth to Water (ft bmp)	24.61
Water-Level Elevation (ft)	707.02
Water Column in Well (ft)	41.86
Casing Diameter/Type	3" PVC
Gallons in Well	15.49
Gallons Pumped/Bailed Prior to Sampling	4 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 9:31 end 9:46
Pumping Rate (gpm)	0.24
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.07
Conductivity (mS/cm)	
(µmhos/cm)	1010
Turbidity (NTU)	N/A
Temperature (°C)	16.51
Dissolved Oxygen (mg/L)	0.47
ORP (mV)	-42.5
Sampling Method	Low flow
Remarks	Sample time @ 9:48
	OVM = 0.0
	DTW final = 24.60

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: W-4-N

Time Pump Started: 9:31

Depth of Sampling: Midpoint of Screen

Date: 9/24/2002

Parameters

Time

	9:34	9:37	9:40	9:43	9:46						
Redox Potential (millivolts)	99.7	-22.9	-39.2	-42.1	-42.5						
Dissolved Oxygen (mg/L)	1.39	0.75	0.59	0.51	0.47						
pH (s.u.)	7.05	7.02	7.06	7.07	7.07						
Specific Conductance (uS/cm)	1,225	1,044	1,015	1,012	1,010						
Temperature (C)	14.95	15.78	16.23	16.42	16.51						

Flow Rate: 900 mL/min

Time Sampled: 9:48

Total Water Pumped: 4 gallons

Total Depth of Well: 66.47

Depth to Water Before Purging: 24.61

Depth to Water After Purging: 24.60

Comments

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/24/2002
Site/Well No.	HR-2	Replicate No.		Code No.	
Weather	Sun, 60s	Sampling Time:	Begin 10:15	End	10:52

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	734.75
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	58.56
Depth to Water (ft bmp)	27.69
Water-Level Elevation (ft)	707.06
Water Column in Well (ft)	30.87
Casing Diameter/Type	2" PVC
Gallons in Well	4.94
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 10:25 end 10:35
Pumping Rate (gpm)	0.26
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.09
Conductivity (mS/cm)	
(µmhos/cm)	1031
Turbidity (NTU)	N/A
Temperature (°C)	16.47
Dissolved Oxygen (mg/L)	0.46
ORP (mV)	216.9
Sampling Method	Low flow
Remarks	Sample time @ 10:42
	OVM = 0.0
	DTW final = 27.67

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-2

Time Pump Started: 10:25

Depth of Sampling: Midpoint of Screen

Date: 9/24/2002

Parameters

Time

	10:28	10:31	10:34	10:37	10:40						
Redox Potential (millivolts)	210.4	211.5	213.1	214.4	216.9						
Dissolved Oxygen (mg/L)	1.71	0.88	0.57	0.52	0.46						
pH (s.u.)	7.01	7.07	7.09	7.10	7.09						
Specific Conductance (uS/cm)	1,027	1,033	1,036	1,034	1,031						
Temperature (C)	15.78	16.11	16.32	16.40	16.47						

Flow Rate: 1000 mL/min

Total Depth of Well: 58.56

Time Sampled: 10:42

Depth to Water Before Purging: 27.69

Total Water Pumped: 5 gallons

Depth to Water After Purging: 27.67

Comments

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/24/2002
Site/Well No.	HR-3	Replicate No.		Code No.	
Weather	Sun, 60s	Sampling Time:	Begin 10:55	End	11:30

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	736.75
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	62.10
Depth to Water (ft bmp)	29.67
Water-Level Elevation (ft)	707.08
Water Column in Well (ft)	32.43
Casing Diameter/Type	2" PVC
Gallons in Well	5.19
Gallons Pumped/Bailed Prior to Sampling	4.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 11:03 end 11:18
Pumping Rate (gpm)	0.24
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.05
Conductivity (mS/cm)	
(µmhos/cm)	1094
Turbidity (NTU)	N/A
Temperature (°C)	16.02
Dissolved Oxygen (mg/L)	0.40
ORP (mV)	267.3
Sampling Method	Low flow
Remarks	Sample time @ 11:20
	OVM = 0.0
	DTW final = 29.64

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-3

Time Pump Started: 11:03

Depth of Sampling: Midpoint of Screen

Date: 9/24/2002

Parameters / Time

	11:06	11:09	11:12	11:15	11:18						
Redox Potential (millivolts)	275.3	272.9	269.3	267.7	267.3						
Dissolved Oxygen (mg/L)	1.48	0.91	0.66	0.48	0.40						
pH (s.u.)	6.41	6.95	7.04	7.04	7.05						
Specific Conductance (uS/cm)	1,097	1,088	1,095	1,095	1,094						
Temperature (C)	14.90	15.53	15.85	15.94	16.02						

Flow Rate: 900 mL/min

Total Depth of Well: 62.10

Time Sampled: 11:20

Depth to Water Before Purging: 29.67

Total Water Pumped: 4.5 gallons

Depth to Water After Purging: 29.64

Comments:

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/24/2002
Site/Well No.	GM-16	Replicate No.		Code No.	
Weather	Sun, 60s	Sampling Time:	Begin 11:35	End	12:15

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	725.30
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	57.02
Depth to Water (ft bmp)	21.47
Water-Level Elevation (ft)	703.83
Water Column in Well (ft)	35.55
Casing Diameter/Type	2" PVC
Gallons in Well	5.69
Gallons Pumped/Bailed Prior to Sampling	4 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 11:49 end 12:04
Pumping Rate (gpm)	0.13
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.97
Conductivity (mS/cm)	
(µmhos/cm)	1345
Turbidity (NTU)	N/A
Temperature (°C)	19.27
Dissolved Oxygen (mg/L)	1.65
ORP (mV)	370.3
Sampling Method	Low flow
Remarks	Sample time @ 12:05
	OVM = 0.0
	DTW final = 21.49

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-16

Time Pump Started: 11:49

Depth of Sampling: Midpoint of Screen

Date: 9/24/2002

Parameters / Time

	11:52	11:55	11:58	12:01	12:04						
Redox Potential (millivolts)	259.6	289.7	325.4	351.0	370.3						
Dissolved Oxygen (mg/L)	2.16	1.81	1.71	1.68	1.65						
pH (s.u.)	7.18	7.10	7.03	7.00	6.97						
Specific Conductance (uS/cm)	1,337	1,333	1,342	1,344	1,345						
Temperature (C)	17.62	18.65	18.94	19.13	19.27						

Flow Rate: 500 mL/min

Total Depth of Well: 57.02

Time Sampled: 12:05

Depth to Water Before Purging: 21.47

Total Water Pumped: 4 gallons

Depth to Water After Purging: 21.49

Comments: Replaced lock

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/24/2002
Site/Well No.	WSU-24	Replicate No.		Code No.	
Weather	Sun, 70s	Sampling Time:	Begin 13:45	End	14:57

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	725.10
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	65.51
Depth to Water (ft bmp)	20.33
Water-Level Elevation (ft)	704.77
Water Column in Well (ft)	45.18
Casing Diameter/Type	2" PVC
Gallons in Well	7.23
Gallons Pumped/Bailed Prior to Sampling	3.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 14:34 end 14:46
Pumping Rate (gpm)	0.24
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.65
Conductivity (mS/cm)	
(µmhos/cm)	1154
Turbidity (NTU)	N/A
Temperature (°C)	16.34
Dissolved Oxygen (mg/L)	6.30
ORP (mV)	440.7
Sampling Method	Low flow
Remarks	Sample time @ 14:48
	OVM = 0.0
	DTW final = 20.32

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: WSU-24

Time Pump Started: 14:34

Depth of Sampling: Midpoint of Screen

Date: 9/24/2002

Parameters / Time

	14:37	14:40	14:43	14:46							
Redox Potential (millivolts)	313.4	379.9	415.8	440.7							
Dissolved Oxygen (mg/L)	6.80	6.48	6.36	6.30							
pH (s.u.)	6.57	6.64	6.63	6.65							
Specific Conductance (uS/cm)	1,153	1,152	1,152	1,154							
Temperature (C)	16.16	16.14	16.26	16.34							

Flow Rate: 900 mL/min

Time Sampled: 14:48

Total Water Pumped: 3.5 gallons

Total Depth of Well: 65.51

Depth to Water Before Purging: 20.33

Depth to Water After Purging: 20.32

Comments:

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/24/2002
Site/Well No.	GM-31	Replicate No.	DUP-121A @ 15:50	Code No.	
Weather	Sun, 70s	Sampling Time:	Begin 15:15	End	16:43

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	736.71
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	68.51
Depth to Water (ft bmp)	26.45
Water-Level Elevation (ft)	710.26
Water Column in Well (ft)	42.06
Casing Diameter/Type	2" PVC
Gallons in Well	6.73
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 15:31 end 15:46
Pumping Rate (gpm)	0.24
Evacuation Method	Submersible pump

Field Parameters

Color	Light brown
Odor	Slight
Appearance	Slightly Turbid
pH (s.u.)	6.80
Conductivity (mS/cm)	
(µmhos/cm)	1635
Turbidity (NTU)	N/A
Temperature (°C)	20.87
Dissolved Oxygen (mg/L)	0.31
ORP (mV)	-66.2
Sampling Method	Low flow
Remarks	Sample time @ 15:50
	OVM = 0.0
	DTW final = 26.45
	RB-98A @ 16:30

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: Moraine, Ohio

Monitoring Well No.: GM-31

Time Pump Started: 15:31

Depth of Sampling: Midpoint of Screen

Date: 9/24/2002

Parameters / Time

	15:34	15:37	15:40	15:43	15:46						
Redox Potential (millivolts)	-51.0	-57.4	-64.2	-66.1	-66.2						
Dissolved Oxygen (mg/L)	0.95	0.59	0.38	0.34	0.31						
pH (s.u.)	6.62	6.64	6.71	6.74	6.80						
Specific Conductance (uS/cm)	1,710	1,704	1,683	1,664	1,635						
Temperature (C)	19.24	20.01	20.63	20.77	20.87						

Flow Rate: 900 mL/min

Total Depth of Well: 68.51

Time Sampled: 15:50

Depth to Water Before Purging: 26.45

Total Water Pumped: 5 gallons

Depth to Water After Purging: 26.52

Comments:

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/24/2002
Site/Well No.	GM-28	Replicate No.		Code No.	
Weather	Sun, 70s	Sampling Time:	Begin 16:50	End	17:25

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	735.32
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	36.53
Depth to Water (ft bmp)	29.52
Water-Level Elevation (ft)	705.8
Water Column in Well (ft)	7.01
Casing Diameter/Type	2" PVC
Gallons in Well	1.12
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 17:00 end 17:15
Pumping Rate (gpm)	0.29
Evacuation Method	Submersible pump

Field Parameters

Color	Light yellow
Odor	Slight
Appearance	Clear
pH (s.u.)	7.24
Conductivity (mS/cm)	
(µmhos/cm)	2195
Turbidity (NTU)	N/A
Temperature (°C)	18.68
Dissolved Oxygen (mg/L)	0.35
ORP (mV)	-135.3
Sampling Method	Low flow
Remarks	Sample time @ 17:17
	OVM = 0.0
	DTW final = 29.52

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-28

Time Pump Started: 17:00

Depth of Sampling: Midpoint of Screen

Date: 9/24/2002

Parameters

Time

	17:03	17:06	17:09	17:12	17:15						
Redox Potential (millivolts)	-139.8	-138.8	-138.3	-136.4	-135.3						
Dissolved Oxygen (mg/L)	0.92	0.56	0.41	0.36	0.35						
pH (s.u.)	7.36	7.40	7.33	7.25	7.24						
Specific Conductance (uS/cm)	2,256	2,228	2,210	2,198	2,195						
Temperature (C)	17.80	18.13	18.31	18.56	18.68						

Flow Rate: 1100 mL/min

Total Depth of Well: 36.53

Time Sampled: 17:17

Depth to Water Before Purging: 29.52

Total Water Pumped: 5 gallons

Depth to Water After Purging: 29.52

Comments

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/24/2002
Site/Well No.	ME-3	Replicate No.		Code No.	
Weather	Sun, 70s	Sampling Time:	Begin 17:45	End	19:05

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.40
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	36.52
Depth to Water (ft bmp)	26.10
Water-Level Elevation (ft)	704.30
Water Column in Well (ft)	10.42
Casing Diameter/Type	2" PVC
Gallons in Well	1.67
Gallons Pumped/Bailed Prior to Sampling	1 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 17:57 end 18:16
Pumping Rate (gpm)	0.04
Evacuation Method	High performance pump

Field Parameters

Color	Dark yellow/brown
Odor	Moderate
Appearance	Foamy/clear
pH (s.u.)	6.96
Conductivity (mS/cm)	
(µmhos/cm)	3454
Turbidity (NTU)	N/A
Temperature (°C)	21.65
Dissolved Oxygen (mg/L)	2.41
ORP (mV)	-59.7
Sampling Method	Low flow

Remarks: Sample time @ 18:20; OVM = 0.0; DTW final = 26.10; Very foamy - VOAs had bubbles

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: ME-3

Time Pump Started: 17:57

Depth of Sampling: Midpoint of Screen

Date: 9/24/2002

Parameters / Time

	18:04	18:07	18:10	18:13	18:16						
Redox Potential (millivolts)	-79.4	-61.1	-54.7	-54.2	-59.7						
Dissolved Oxygen (mg/L)	2.70	2.72	2.68	2.58	2.41						
pH (s.u.)	7.05	7.02	6.98	6.97	6.96						
Specific Conductance (uS/cm)	3,496	3,483	3,463	3,459	3,454						
Temperature (C)	22.19	21.95	21.67	21.63	21.65						

Flow Rate: 150 mL/min

Total Depth of Well: 36.52

Time Sampled: 18:20

Depth to Water Before Purging: 26.10

Total Water Pumped: 1 gallons

Depth to Water After Purging: 26.10

Comments: Water was very foamy - all VOAs had bubbles

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/25/2002
Site/Well No.	GM-26	Replicate No.		Code No.	
Weather	Sun, 60s	Sampling Time:	Begin 8:20	End	9:30

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	722.29
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	58.73
Depth to Water (ft bmp)	18.98
Water-Level Elevation (ft)	703.31
Water Column in Well (ft)	39.75
Casing Diameter/Type	2" PVC
Gallons in Well	6.36
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 9:06 end 9:18
Pumping Rate (gpm)	0.29
Evacuation Method	Submersible pump

Field Parameters

Color	Light brown
Odor	None
Appearance	Slightly turbid
pH (s.u.)	7.11
Conductivity (mS/cm)	
(µmhos/cm)	976
Turbidity (NTU)	N/A
Temperature (°C)	16.81
Dissolved Oxygen (mg/L)	4.21
ORP (mV)	210.7
Sampling Method	Low flow
Remarks	Sample time @ 9:20
	OVM = 0.0
	DTW final = 18.98

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-26

Time Pump Started: 9:03

Depth of Sampling: Midpoint of Screen

Date: 9/25/2002

Parameters / Time

	9:06	9:09	9:12	9:15	9:18						
Redox Potential (millivolts)	211.3	210.6	209.5	210.0	210.7						
Dissolved Oxygen (mg/L)	4.43	4.29	4.27	4.25	4.21						
pH (s.u.)	6.89	7.01	7.05	7.06	7.11						
Specific Conductance (uS/cm)	984	980	979	975	976						
Temperature (C)	16.15	16.66	16.71	16.74	16.81						

Flow Rate: 1100 mL/min

Total Depth of Well: 58.73

Time Sampled: 9:20

Depth to Water Before Purging: 18.98

Total Water Pumped: 5 gallons

Depth to Water After Purging: 18.98

Comments:

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/25/2002
Site/Well No.	ME-6	Replicate No.		Code No.	
Weather	Sun, 60s	Sampling Time:	Begin 9:10	End	11:30

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	734.84
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	35.43
Depth to Water (ft bmp)	27.06
Water-Level Elevation (ft)	707.78
Water Column in Well (ft)	8.37
Casing Diameter/Type	2" PVC
Gallons in Well	1.34
Gallons Pumped/Bailed Prior to Sampling	0.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 10:95 end 10:30
Pumping Rate (gpm)	0.04
Evacuation Method	High performance pump

Field Parameters

Color	Dark brown
Odor	Strong
Appearance	Foamy/clear
pH (s.u.)	6.78
Conductivity (mS/cm)	
(µmhos/cm)	6309
Turbidity (NTU)	N/A
Temperature (°C)	22.17
Dissolved Oxygen (mg/L)	0.59
ORP (mV)	-107.2
Sampling Method	Low flow
Remarks	Sample time @ 10:35
	OVM = 0.0
	DTW final = 27.07
	Water was foamy

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: ME-6

Time Pump Started: 10:05

Depth of Sampling: Midpoint of Screen

Date: 9/25/2002

Parameters / Time

	10:10	10:13	10:16	10:19	10:22	10:25	10:28	10:31			
Redox Potential (millivolts)	66.1	-86.0	-87.7	-89.4	-93.3	-97.1	-110.3	-107.2			
Dissolved Oxygen (mg/L)	7.06	5.32	3.45	2.02	1.14	0.88	0.64	0.59			
pH (s.u.)	7.15	6.96	6.87	6.86	6.83	6.82	6.81	6.78			
Specific Conductance (uS/cm)	13	6,009	6,125	6,173	6,214	6,248	6,280	6,309			
Temperature (C)	22.30	21.87	21.94	21.96	21.97	22.00	22.10	22.17			

Flow Rate: 150 mL/min

Total Depth of Well: 35.43

Time Sampled: 10:35

Depth to Water Before Purging: 27.06

Total Water Pumped: 0.5 gallons

Depth to Water After Purging: 27.07

Comments: Water was foamy - all VOAs had bubbles

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/25/2002
Site/Well No.	GM-21	Replicate No.		Code No.	
Weather	Sun, 60s	Sampling Time:	Begin 11:50	End	12:40

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	723.50
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	53.84
Depth to Water (ft bmp)	20.88
Water-Level Elevation (ft)	702.62
Water Column in Well (ft)	32.96
Casing Diameter/Type	2" PVC
Gallons in Well	5.27
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 12:06 end 12:21
Pumping Rate (gpm)	0.29
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.09
Conductivity (mS/cm)	
(µmhos/cm)	1245
Turbidity (NTU)	N/A
Temperature (°C)	18.67
Dissolved Oxygen (mg/L)	0.41
ORP (mV)	238.1
Sampling Method	Low flow
Remarks	Sample time @ 12:21
	OVM = 0.0
	DTW final = 20.89

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 VOA	2	Cool, H_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-21

Time Pump Started: 12:06

Depth of Sampling: Midpoint of Screen

Date: 9/25/2002

Parameters / Time

	12:09	12:12	12:15	12:18	12:21						
Redox Potential (millivolts)	185.0	198.1	211.0	226.6	238.1						
Dissolved Oxygen (mg/L)	0.99	0.61	0.50	0.44	0.41						
pH (s.u.)	7.21	7.16	7.14	7.11	7.09						
Specific Conductance (uS/cm)	1,235	1,248	1,247	1,246	1,245						
Temperature (C)	17.87	18.30	18.43	18.56	18.67						

Flow Rate: 1000 mL/min

Time Sampled: 12:21

Total Water Pumped: 5 gallons

Total Depth of Well: 53.84

Depth to Water Before Purging: 20.88

Depth to Water After Purging: 20.89

Comments:

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/25/2002
Site/Well No.	GM-22	Replicate No.		Code No.	
Weather	Sun, 70	Sampling Time:	Begin 14:25	End	15:47

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	728.28
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	56.67
Depth to Water (ft bmp)	25.88
Water-Level Elevation (ft)	702.40
Water Column in Well (ft)	30.79
Casing Diameter/Type	2" PVC
Gallons in Well	4.93
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 15:03 end 15:18
Pumping Rate (gpm)	0.24
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.02
Conductivity (mS/cm)	
(µmhos/cm)	1720
Turbidity (NTU)	N/A
Temperature (°C)	19.49
Dissolved Oxygen (mg/L)	2.14
ORP (mV)	181.2
Sampling Method	Low flow
Remarks	Sample time @ 15:20
	OVM = 0.0
	DTW final = 25.88

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-22

Time Pump Started: 15:03

Depth of Sampling: Midpoint of Screen

Date: 9/25/2002

Parameters

Time

	15:06	15:09	15:12	15:15	15:18						
Redox Potential (millivolts)	81.4	112.4	138.7	159.7	181.2						
Dissolved Oxygen (mg/L)	2.48	2.24	2.21	2.19	2.14						
pH (s.u.)	6.78	6.90	6.96	7.00	7.02						
Specific Conductance (uS/cm)	1,696	1,714	1,719	1,719	1,720						
Temperature (C)	18.49	18.98	19.16	19.28	19.49						

Flow Rate: 900 mL/min

Time Sampled: 15:20

Total Water Pumped: 5 gallons

Comments:

Total Depth of Well: 56.67

Depth to Water Before Purging: 25.88

Depth to Water After Purging: 25.88

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/25/2002
Site/Well No.	GM-29	Replicate No.		Code No.	
Weather	Clouds, 70s	Sampling Time:	Begin 15:50	End	16:40

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.78
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	33.82
Depth to Water (ft bmp)	24.02
Water-Level Elevation (ft)	706.76
Water Column in Well (ft)	9.8
Casing Diameter/Type	2" PVC
Gallons in Well	1.57
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 16:02 end 16:17
Pumping Rate (gpm)	0.32
Evacuation Method	Submersible pump

Field Parameters

Color	Light yellow
Odor	None
Appearance	Clear
pH (s.u.)	7.22
Conductivity (mS/cm)	
(µmhos/cm)	2354
Turbidity (NTU)	N/A
Temperature (°C)	17.63
Dissolved Oxygen (mg/L)	1.40
ORP (mV)	-91.3
Sampling Method	Low flow
Remarks	Sample time @ 16:18
	OVM = 0.0
	DTW final = 24.09

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-29

Time Pump Started: 16:02

Depth of Sampling: Midpoint of Screen

Date: 9/25/2002

Parameters / Time

	16:05	16:08	16:11	16:14	16:17						
Redox Potential (millivolts)	-88.5	-114.4	-115.2	-99.8	-91.3						
Dissolved Oxygen (mg/L)	3.52	2.51	2.02	1.61	1.40						
pH (s.u.)	7.23	7.29	7.27	7.24	7.22						
Specific Conductance (uS/cm)	2,340	2,354	2,357	2,353	2,354						
Temperature (C)	16.97	17.27	17.49	17.55	17.63						

Flow Rate: 1200 mL/min

Time Sampled: 16:18

Total Water Pumped: 5 gallons

Comments:

Total Depth of Well: 33.82

Depth to Water Before Purging: 24.02

Depth to Water After Purging: 24.09

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/26/2002
Site/Well No.	GM-27	Replicate No.		Code No.	
Weather	Clouds, 60s	Sampling Time:	Begin 8:20	End	9:40

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	731.03
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	46.79
Depth to Water (ft bmp)	23.25
Water-Level Elevation (ft)	707.78
Water Column in Well (ft)	23.54
Casing Diameter/Type	2" PVC
Gallons in Well	3.77
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 9:21 end 9:36
Pumping Rate (gpm)	0.29
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.78
Conductivity (mS/cm)	
(µmhos/cm)	1320
Turbidity (NTU)	N/A
Temperature (°C)	17.68
Dissolved Oxygen (mg/L)	0.37
ORP (mV)	217.7
Sampling Method	Low flow
Remarks	Sample time @ 9:38
	OVM = 0.0 ppm
	DTW final = 23.25

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-27

Time Pump Started: 9:21

Depth of Sampling: Midpoint of Screen

Date: 9/26/2002

Parameters / Time

	9:24	9:27	9:30	9:33	9:36						
Redox Potential (millivolts)	227.4	223.5	219.3	217.9	217.7						
Dissolved Oxygen (mg/L)	1.60	0.64	0.43	0.40	0.37						
pH (s.u.)	6.49	6.60	6.73	6.75	6.78						
Specific Conductance (uS/cm)	963	1,174	1,292	1,307	1,320						
Temperature (C)	16.81	17.43	17.66	17.68	17.68						

Flow Rate: 1100 mL/min

Time Sampled: 9:38

Total Water Pumped: 5 gallons

Comments:

Total Depth of Well: 46.79

Depth to Water Before Purging: 23.25

Depth to Water After Purging: 23.25

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/26/2002
Site/Well No.	GM-23	Replicate No.		Code No.	
Weather	Rain, 60s	Sampling Time:	Begin 9:45	End	10:40

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.99
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	31.98
Depth to Water (ft bmp)	26.90
Water-Level Elevation (ft)	704.09
Water Column in Well (ft)	5.08
Casing Diameter/Type	2" PVC
Gallons in Well	0.81
Gallons Pumped/Bailed Prior to Sampling	5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 9:57 end 10:10
Pumping Rate (gpm)	0.16
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless/light yellow
Odor	None
Appearance	Clear
pH (s.u.)	6.76
Conductivity (mS/cm)	
(µmhos/cm)	2390
Turbidity (NTU)	N/A
Temperature (°C)	19.06
Dissolved Oxygen (mg/L)	0.42
ORP (mV)	215.6
Sampling Method	Low flow
Remarks	Sample time @ 10:15
	OVM = 0.0
	DTW final = 26.90
	Product present in well.

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-23

Time Pump Started: 9:57

Depth of Sampling: Midpoint of Screen

Date: 9/26/2002

Parameters / Time

	10:00	10:03	10:06	10:09	10:12						
Redox Potential (millivolts)	214.5	216.7	215.5	215.4	215.6						
Dissolved Oxygen (mg/L)	1.33	0.55	0.52	0.44	0.42						
pH (s.u.)	6.66	6.72	6.75	6.73	6.76						
Specific Conductance (uS/cm)	2,315	2,342	2,375	2,383	2,390						
Temperature (C)	17.37	18.35	18.82	18.97	19.06						

Flow Rate: 600 mL/min

Time Sampled: 10:15

Total Water Pumped: 5 gallons

Comments: Product present in well

Total Depth of Well: 31.98

Depth to Water Before Purging: 26.90

Depth to Water After Purging: 26.90

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/26/2002
Site/Well No.	HR-12	Replicate No.	DUP-122A @ 14:00	Code No.	
Weather	Rain, 60s	Sampling Time:	Begin 13:10	End	14:55

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	742.64
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	130.21
Depth to Water (ft bmp)	34.23
Water-Level Elevation (ft)	708.41
Water Column in Well (ft)	95.98
Casing Diameter/Type	2" PVC
Gallons in Well	35.5
Gallons Pumped/Bailed Prior to Sampling	110 / 5
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 13:25 end 13:47
Pumping Rate (gpm)	5
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.62
Conductivity (mS/cm)	
(µmhos/cm)	1410
Turbidity (NTU)	N/A
Temperature (°C)	15.6
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 14:00
	OVM = 0.0
	DTW final = 34.25
	RB-99 @ 14:55 MS/MSD @ 14:00

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/26/2002
Site/Well No.	HR-11	Replicate No.		Code No.	
Weather	Rain, 60s	Sampling Time:	Begin 14:55	End	15:40

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	743.33
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	68.97
Depth to Water (ft bmp)	34.90
Water-Level Elevation (ft)	708.43
Water Column in Well (ft)	34.07
Casing Diameter/Type	2" PVC
Gallons in Well	5.45
Gallons Pumped/Bailed Prior to Sampling	6 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 15:06 end 15:20
Pumping Rate (gpm)	0.26
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.78
Conductivity (mS/cm)	
(µmhos/cm)	1311
Turbidity (NTU)	N/A
Temperature (°C)	17.25
Dissolved Oxygen (mg/L)	1.11
ORP (mV)	306.3
Sampling Method	Low flow
Remarks	Sample time @ 15:25
	OVM = 0.0
	DTW final = 34.90

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-11

Time Pump Started: 15:06

Depth of Sampling: Midpoint of Screen

Date: 9/26/2002

Parameters

Time

	15:09	15:12	15:15	15:18	15:21	15:24					
Redox Potential (millivolts)	354.4	343.0	319.6	312.6	307.4	306.3					
Dissolved Oxygen (mg/L)	1.09	0.81	0.51	1.11	1.12	1.11					
pH (s.u.)	6.48	6.59	6.72	6.76	6.77	6.78					
Specific Conductance (uS/cm)	1,305	1,308	1,310	1,311	1,309	1,311					
Temperature (C)	15.97	16.40	17.03	17.16	17.26	17.25					

Flow Rate: 1000 mL/min

Total Depth of Well: 68.97

Time Sampled: 15:25

Depth to Water Before Purging: 34.90

Total Water Pumped: 6 gallons

Depth to Water After Purging: 34.90

Comments

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/26/2002
Site/Well No.	GM-19S	Replicate No.		Code No.	
Weather	Rain, 60s	Sampling Time:	Begin 15:50	End	16:30

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	730.85
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	55.59
Depth to Water (ft bmp)	26.03
Water-Level Elevation (ft)	704.82
Water Column in Well (ft)	29.56
Casing Diameter/Type	2"PVC
Gallons in Well	4.73
Gallons Pumped/Bailed Prior to Sampling	4.5 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 15:58 end 16:10
Pumping Rate (gpm)	0.20
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.02
Conductivity (mS/cm)	
(µmhos/cm)	1474
Turbidity (NTU)	N/A
Temperature (°C)	20.36
Dissolved Oxygen (mg/L)	0.47
ORP (mV)	259.6
Sampling Method	Low flow
Remarks	Sample time @ 16:15
	OVM = 0.0
	DTW final = 26.03

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-19S

Time Pump Started: 15:58

Depth of Sampling: Midpoint of Screen

Date: 9/26/2002

Parameters / Time

	16:01	16:04	16:07	16:10	16:13						
Redox Potential (millivolts)	284.2	278.8	271.5	265.7	259.6						
Dissolved Oxygen (mg/L)	1.05	0.64	0.53	0.50	0.47						
pH (s.u.)	6.83	7.01	7.04	7.03	7.02						
Specific Conductance (uS/cm)	1,389	1,453	1,475	1,477	1,474						
Temperature (C)	18.69	19.62	20.05	20.20	20.36						

Flow Rate: 750 mL/min

Total Depth of Well: 55.59

Time Sampled: 16:15

Depth to Water Before Purging: 26.03

Total Water Pumped: 4.5 gallons

Depth to Water After Purging: 26.03

Comments:

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/26/2002
Site/Well No.	GM-19D	Replicate No.		Code No.	
Weather	Rain, 60s	Sampling Time:	Begin 16:30	End	17:55

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	730.25
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	148.11
Depth to Water (ft bmp)	25.82
Water-Level Elevation (ft)	704.43
Water Column in Well (ft)	122.29
Casing Diameter/Type	4" PVC
Gallons in Well	79.49
Gallons Pumped/Bailed Prior to Sampling	240 / 5
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 16.39 end 17:27
Pumping Rate (gpm)	5
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.15
Conductivity (mS/cm)	
(µmhos/cm)	1190
Turbidity (NTU)	N/A
Temperature (°C)	18.2
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable bailer
Remarks	Sample time @ 17:45
	OVM = 0.0
	DTW final = 25.80

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

Sampling Personnel: C. Capell, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/27/2002
Site/Well No.	DN-13	Replicate No.		Code No.	
Weather	Rain, 60s	Sampling Time:	Begin 9:02	End	9:17

Evacuation Data

Measuring Point	N/A
MP Elevation (ft)	N/A
Land Surface Elevation (ft)	N/A
Sounded Well Depth (ft bmp)	N/A
Depth to Water (ft bmp)	N/A
Water-Level Elevation (ft)	-
Water Column in Well (ft)	-
Casing Diameter/Type	-
Gallons in Well	-
Gallons Pumped/Bailed Prior to Sampling	-
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 9:04 end 9:14
Pumping Rate (gpm)	-
Evacuation Method	N/A

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	NM
Conductivity (mS/cm)	
(µmhos/cm)	NM
Turbidity (NTU)	N/A
Temperature (°C)	NM
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	grab
Remarks	Sample time @ 9:15
	OVM = N/A
	DTW final = N/A

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

Sampling Personnel: C. Capell, D. Hendershott

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/27/2002
Site/Well No.	39	Replicate No.		Code No.	
Weather	Rain, 60s	Sampling Time:	Begin 9:23	End	9:40

Evacuation Data

Measuring Point	N/A
MP Elevation (ft)	N/A
Land Surface Elevation (ft)	N/A
Sounded Well Depth (ft bmp)	N/A
Depth to Water (ft bmp)	-
Water-Level Elevation (ft)	-
Water Column in Well (ft)	-
Casing Diameter/Type	-
Gallons in Well	-
Gallons Pumped/Bailed Prior to Sampling	-
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 9:26 end 9:36
Pumping Rate (gpm)	
Evacuation Method	N/A

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	NM
Conductivity (mS/cm)	
(µmhos/cm)	NM
Turbidity (NTU)	N/A
Temperature (°C)	NM
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	grab
Remarks	Sample time @ 9:37
	31-off line; therefore, sampled 39

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

Sampling Personnel: C. Capell, D. Hendershott

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/27/2002
Site/Well No.	HR-10	Replicate No.		Code No.	
Weather	Rain, 60s	Sampling Time:	Begin 10:00	End	11:05

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	742.81
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	130.53
Depth to Water (ft bmp)	34.17
Water-Level Elevation (ft)	708.34
Water Column in Well (ft)	96.36
Casing Diameter/Type	4" PVC
Gallons in Well	62.6
Gallons Pumped/Bailed Prior to Sampling	190 / 5
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 10:10 end 10:48
Pumping Rate (gpm)	5
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.95
Conductivity (mS/cm)	
(µmhos/cm)	1270
Turbidity (NTU)	N/A
Temperature (°C)	15.5
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable bailer
Remarks	Sample time @ 11:00
	OVM = 0.0
	DTW final = 34.17

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

Sampling Personnel: C. Capell, D. Hendershott

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/27/2002
Site/Well No.	GM-15	Replicate No.		Code No.	
Weather	Rain, 60s	Sampling Time:	Begin 11:10	End	11:55

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	725.23
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	98.78
Depth to Water (ft bmp)	21.70
Water-Level Elevation (ft)	703.53
Water Column in Well (ft)	77.08
Casing Diameter/Type	2" PVC
Gallons in Well	12.3
Gallons Pumped/Bailed Prior to Sampling	40 / 5
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 11:20 end 11:28
Pumping Rate (gpm)	5
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.13
Conductivity (mS/cm)	
(µmhos/cm)	1130
Turbidity (NTU)	N/A
Temperature (°C)	16.8
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 11:40
	OVM = 0.0
	DTW final = 21.70
	Replaced locking cap & lock. Snake in well.

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

Sampling Personnel: C. Capell, D. Hendershott

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/27/2002
Site/Well No.	HR-4	Replicate No.		Code No.	
Weather	Clouds, 60s	Sampling Time:	Begin 13:25	End	14:42

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	742.60
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	66.85
Depth to Water (ft bmp)	34.58
Water-Level Elevation (ft)	708.02
Water Column in Well (ft)	32.27
Casing Diameter/Type	2" PVC
Gallons in Well	5.16
Gallons Pumped/Bailed Prior to Sampling	4 pumped
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 14:13 end 14:28
Pumping Rate (gpm)	0.15
Evacuation Method	Submersible pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.04
Conductivity (mS/cm)	
(µmhos/cm)	813
Turbidity (NTU)	N/A
Temperature (°C)	17.66
Dissolved Oxygen (mg/L)	0.69
ORP (mV)	303.5
Sampling Method	Low flow
Remarks	Sample time @ 14:30
	OVM = 0.0
	DTW final = 34.60

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

Sampling Personnel: C. Capell, D. Hendershott

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: HR-4

Time Pump Started: 14:13

Depth of Sampling: Midpoint of Screen

Date: 9/27/2002

Parameters / Time

	14:16	14:19	14:22	14:25	14:28						
Redox Potential (millivolts)	323.4	314.4	309.4	305.1	303.5						
Dissolved Oxygen (mg/L)	1.16	0.91	0.76	0.70	0.69						
pH (s.u.)	6.83	6.89	6.96	7.00	7.04						
Specific Conductance (uS/cm)	836	803	808	817	813						
Temperature (C)	16.09	16.97	17.25	17.45	17.66						

Flow Rate: 550 mL/min

Total Depth of Well: 66.85

Time Sampled: 14:30

Depth to Water Before Purging: 34.58

Total Water Pumped: 4 gallons

Depth to Water After Purging: 34.60

Comments:

ARCADIS

Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/27/2002
Site/Well No.	GM-30	Replicate No.		Code No.	
Weather	Rain, 60s	Sampling Time:	Begin 14:50	End	15:45

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	732.33
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	32.00
Depth to Water (ft bmp)	27.57
Water-Level Elevation (ft)	704.76
Water Column in Well (ft)	4.43
Casing Diameter/Type	2" PVC
Gallons in Well	0.71
Gallons Pumped/Bailed Prior to Sampling	0.9
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 15:23 end 15:40
Pumping Rate (gpm)	0.05
Evacuation Method	Peristaltic pump

Field Parameters

Color	Gray
Odor	Slight
Appearance	Cloudy
pH (s.u.)	6.85
Conductivity (mS/cm)	
(µmhos/cm)	1240
Turbidity (NTU)	N/A
Temperature (°C)	19.87
Dissolved Oxygen (mg/L)	0.53
ORP (mV)	-104.1
Sampling Method	Low flow

Remarks: Sample time @ 15:45
OVM = 21.0 on 9/26 15.0 on 9/27
DTW final = 27.51
Well under pressure.

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_2SO_4
Sulfate (SM375.4)	250 ml plastic	1	Cool
Light Hydrocarbons (AM18G)	40 ml amber glass vials	2	Cool

Sampling Personnel: C. Capell, D. Hendershott

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

LOW FLOW SAMPLING
GROUNDWATER FIELD PARAMETER LOG

Project Number: OH000294.0005.00003

Site Location: General Motors Corporation, Moraine, Ohio

Monitoring Well No.: GM-30

Time Pump Started: 15:23

Depth of Sampling: Midpoint of Screen

Date: 9/27/2002

Parameters / Time

	15:26	15:29	15:32	15:36	15:39	15:42					
Redox Potential (millivolts)	-96.0	-101.9	Turned	-91.4	-99.2	-104.1					
Dissolved Oxygen (mg/L)	0.98	0.63	off	2.22	0.74	0.53					
pH (s.u.)	6.91	6.86	pump	6.94	6.88	6.85					
Specific Conductance (uS/cm)	1,245	1,240		1,208	1,238	1,240					
Temperature (C)	17.68	18.75		20.20	19.69	19.87					

Flow Rate: 200 mL/min

Total Depth of Well: 32.00

Time Sampled: 15:45

Depth to Water Before Purging: 27.57

Total Water Pumped: 0.9 gallons

Depth to Water After Purging: 27.57

Comments: Dedicated tubing was too short, cut a new piece and resumed purge.

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/30/2002
Site/Well No.	HR-15	Replicate No.	DUP-123A @ 10:40	Code No.	
Weather	Sun, 70s	Sampling Time:	Begin 9:35	End	11:05

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	733.74
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	102.10
Depth to Water (ft bmp)	26.16
Water-Level Elevation (ft)	707.58
Water Column in Well (ft)	75.94
Casing Diameter/Type	4" PVC
Gallons in Well	49.36
Gallons Pumped/Bailed Prior to Sampling	150
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 9:50 end 10:22
Pumping Rate (gpm)	5
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	6.75
Conductivity (mS/cm)	
(µmhos/cm)	1060
Turbidity (NTU)	N/A
Temperature (°C)	16.2
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 10:35
	OVM = 0.0
	DTW final = 26.16
	RB-100 @ 10:20

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

Sampling Personnel: H. Stamm/ 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/30/2002
Site/Well No.	HR-14	Replicate No.		Code No.	
Weather	Sun, 70s	Sampling Time:	Begin 11:10	End	12:01

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	731.63
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	89.45
Depth to Water (ft bmp)	23.87
Water-Level Elevation (ft)	707.76
Water Column in Well (ft)	65.58
Casing Diameter/Type	4" PVC
Gallons in Well	72.63
Gallons Pumped/Bailed Prior to Sampling	130
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 11:18 end 11:41
Pumping Rate (gpm)	6
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.32
Conductivity (mS/cm)	
(µmhos/cm)	980
Turbidity (NTU)	N/A
Temperature (°C)	20.3
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 11:50
	OVM = 0.0
	DTW final = 23.87

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

Sampling Personnel: H. Stamm/ 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/30/2002
Site/Well No.	HR-13	Replicate No.		Code No.	
Weather	Sun, 70s	Sampling Time:	Begin 12:32	End	13:20

Evacuation Data

Measuring Point	Top of PVC Casing
MP Elevation (ft)	735.03
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	86.07
Depth to Water (ft bmp)	27.18
Water-Level Elevation (ft)	707.85
Water Column in Well (ft)	58.89
Casing Diameter/Type	4" PVC
Gallons in Well	38.28
Gallons Pumped/Bailed Prior to Sampling	115
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 12:41 end 13:02
Pumping Rate (gpm)	6
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.13
Conductivity (mS/cm)	
(µmhos/cm)	1170
Turbidity (NTU)	N/A
Temperature (°C)	16.5
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 13:10
	OVM = 0.0
	DTW final = 27.18

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

Sampling Personnel: H. Stamm/ 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/30/2002
Site/Well No.	MT-69	Replicate No.		Code No.	
Weather	Sun, 70s	Sampling Time:	Begin 14:30	End	17:10

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	722.71
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	117.71
Depth to Water (ft bmp)	18.74
Water-Level Elevation (ft)	703.97
Water Column in Well (ft)	98.97
Casing Diameter/Type	8" Steel
Gallons in Well	161.32
Gallons Pumped/Bailed Prior to Sampling	485
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 14:47 end 5:50-16:5
Pumping Rate (gpm)	7
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Turbid - some rust particles
pH (s.u.)	7.14
Conductivity (mS/cm)	
(µmhos/cm)	950
Turbidity (NTU)	N/A
Temperature (°C)	17.6
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 17:00
	OVM = 0.0
	DTW final = 27.29

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

Sampling Personnel: H. Stamm/ 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/30/2002
Site/Well No.	GM-9	Replicate No.		Code No.	
Weather	Sun, 70s	Sampling Time:	Begin 17:30	End	17:55

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	724.07
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	99.55
Depth to Water (ft bmp)	19.61
Water-Level Elevation (ft)	704.46
Water Column in Well (ft)	79.94
Casing Diameter/Type	2" PVC
Gallons in Well	12.79
Gallons Pumped/Bailed Prior to Sampling	40
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 17:39 end 17:46
Pumping Rate (gpm)	6
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Clear
pH (s.u.)	7.28
Conductivity (mS/cm)	
(µmhos/cm)	1150
Turbidity (NTU)	N/A
Temperature (°C)	17.7
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 17:51
	OVM = 0.0
	DTW final = 19.59

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

Sampling Personnel: H. Stamm/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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	9/30/2002
Site/Well No.	GM-20D	Replicate No.		Code No.	
Weather	Sun, 70s	Sampling Time:	Begin 18:05	End	19:00

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	727.26
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	99.82
Depth to Water (ft bmp)	21.72
Water-Level Elevation (ft)	705.54
Water Column in Well (ft)	78.10
Casing Diameter/Type	4" PVC
Gallons in Well	50.77
Gallons Pumped/Bailed Prior to Sampling	155
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 18:12 end 18:35
Pumping Rate (gpm)	7
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.81
Conductivity (mS/cm)	
(µmhos/cm)	1010
Turbidity (NTU)	N/A
Temperature (°C)	17.5
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 18:47
	OVM = 0
	DTW final = 21.72

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

Sampling Personnel: J. Manzo/ H. Stamm

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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	10/1/2002
Site/Well No.	GM-11	Replicate No.		Code No.	
Weather	Sun, 60s	Sampling Time:	Begin 7:45	End	8:20

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	723.71
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	99.65
Depth to Water (ft bmp)	19.34
Water-Level Elevation (ft)	704.31
Water Column in Well (ft)	80.31
Casing Diameter/Type	2" PVC
Gallons in Well	12.85
Gallons Pumped/Bailed Prior to Sampling	40
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 7:54 end 8:00
Pumping Rate (gpm)	7.5
Evacuation Method	Submersible Pump

Field Parameters

Color	Light brown
Odor	None
Appearance	Slightly Turbid
pH (s.u.)	7.07
Conductivity (mS/cm)	
(µmhos/cm)	1160
Turbidity (NTU)	N/A
Temperature (°C)	16.3
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 805
	OVM = 0
	DTW final = 19.35

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

Sampling Personnel: H. Stamm, 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	10/1/2002
Site/Well No.	GM-3	Replicate No.		Code No.	
Weather	Sun, 60s	Sampling Time:	Begin 8:20	End	9:00

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	730.44
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	109.9
Depth to Water (ft bmp)	25.59
Water-Level Elevation (ft)	704.85
Water Column in Well (ft)	84.31
Casing Diameter/Type	2" PVC
Gallons in Well	13.50
Gallons Pumped/Bailed Prior to Sampling	42
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 8:35 end 8:45
Pumping Rate (gpm)	8
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.04
Conductivity (mS/cm)	
(µmhos/cm)	1340
Turbidity (NTU)	N/A
Temperature (°C)	16.7
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 8:50
	OVM = 0.0
	DTW final = 25.60

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

Sampling Personnel: H. Stamm/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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	GM 3rd Annual	Project No.	OH000294.05.03	Page	1 of 1
Site Location	Moraine, Ohio			Date	10/1/2002
Site/Well No.	GM-1	Replicate No.		Code No.	
Weather	Sun, 60s	Sampling Time:	Begin 9:02	End	9:45

Evacuation Data

Measuring Point	Top of Casing
MP Elevation (ft)	735.74
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	101.88
Depth to Water (ft bmp)	30.31
Water-Level Elevation (ft)	705.43
Water Column in Well (ft)	71.57
Casing Diameter/Type	2" PVC
Gallons in Well	11.45
Gallons Pumped/Bailed Prior to Sampling	35
Sample Pump Intake Setting (ft bmp)	Midpoint of well screen
Purge Time	begin 9:06 end 9:12
Pumping Rate (gpm)	8
Evacuation Method	Submersible Pump

Field Parameters

Color	Colorless
Odor	None
Appearance	Not turbid
pH (s.u.)	7.19
Conductivity (mS/cm)	
(µmhos/cm)	1160
Turbidity (NTU)	N/A
Temperature (°C)	16.1
Dissolved Oxygen (mg/L)	N/A
ORP (mV)	N/A
Sampling Method	Disposable Bailer
Remarks	Sample time @ 9:20
	OVM = 0
	DTW final = 30.32

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

Sampling Personnel: H. Stamm/J. Manzo

Well Casing Volumes

Gal./Ft.				
	1-⅛" = 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	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Appendix C

Groundwater Analytical Database
for 2001/2002

Table C-1. Identification of Duplicate Samples Submitted for Laboratory Analysis, General Motors Corporation, Moraine, Ohio.

Replicate Sample	Original Sample	Sample Medium	Date Taken
DUP-95	GM-19S	Groundwater	3/19/2001
DUP-96	GM-23	Groundwater	3/20/2001
DUP-105	GM-19S	Groundwater	6/25/2001
DUP-106	GM-23	Groundwater	6/26/2001
DUP-107	HR-11	Groundwater	11/6/2001
DUP-108	HR-5	Groundwater	11/7/2001
DUP-109	TW-2	Groundwater	11/9/2001
DUP-110	GM-27	Groundwater	11/13/2001
DUP-111	HR-10	Groundwater	11/14/2001
DUP-112	MT-69	Groundwater	11/15/2001
DUP-114	GM-19S	Groundwater	12/11/2001
DUP-115	GM-23	Groundwater	12/12/2001
DUP-115A	GM-19S	Groundwater	6/12/2002
DUP-117	GM-28	Groundwater	7/21/2002
DUP-118A	W-3-S	Groundwater	9/18/2002
DUP-119A	W-1-S	Groundwater	9/19/2002
DUP-120A	EAST	Groundwater	9/23/2002
DUP-121A	GM-31	Groundwater	9/24/2002
DUP-122A	HR-12	Groundwater	9/26/2002
DUP-123A	HR-15	Groundwater	9/30/2002

DUP - Duplicate.

Table C-2. Groundwater Analytical Results for March 2001, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound	Unit	GM-19S 03/19/01	DUP-95 03/19/01	GM-32 03/19/01	EAST 03/19/01	GM-21 03/19/01	GM-22 03/20/01	GM-28 03/20/01	ME-6 03/20/01
Benzene	ug/l	< 1.0	< 1.0	< 50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	4.1	4.1	< 50	5.9	5.1	3.8	< 1.0	1.6
1,1-Dichloroethene	ug/l	< 1.0	< 1.0	< 50	1.2	1.2	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	38.2	37.9	< 50	117	39.5	3.5	7.7	171
trans-1,2-Dichloroethene	ug/l	3.0	2.8	< 50	5.8	16.4	< 1.0	17.6	4.3
Ethylbenzene	ug/l	< 1.0	< 1.0	< 50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	67.6	68.6	< 50	49.9	< 1.0	2.2	2.8	34.0
Toluene	ug/l	< 1.0	< 1.0	< 50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	11.9	11.5	< 50	19.3	7.0	< 1.0	< 1.0	1.3
Trichloroethene	ug/l	107	104	< 50	105	169	1.6	1.8	66.0
Vinyl chloride	ug/l	< 1.0	< 1.0	< 50	4.8	< 1.0	< 1.0	2.6	27.7
Xylenes	ug/l	< 1.0	< 1.0	< 50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

ug/l - Micrograms per liter.
DUP 95 - Duplicate of GM-19S.
DUP 96 - Duplicate of GM-23.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.

Table C-2. Groundwater Analytical Results for March 2001, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound	Unit	GM-29 3/20/01	GM-30 3/20/01	GM-23 3/20/01	DUP-96 3/20/01	RB-72 3/19/01	RB-73 3/20/01	TB-108 3/19/01	TB-109 3/20/01
Benzene	ug/l	< 1.0	< 5.0	1.4	1.3	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	10.8	36.0	17.9	17.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	ug/l	3.5	< 5.0	15.9	15.3	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	2170	< 5.0	9640	9580	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	ug/l	20.4	< 5.0	85.5	77.6	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	ug/l	< 1.0	1660	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	24.4	21.2	2910	3130	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	ug/l	< 1.0	21.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	27.0	< 5.0	3.1	3.2	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	ug/l	354	< 5.0	745	751	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl chloride	ug/l	362	< 5.0	765	782	< 1.0	< 1.0	< 1.0	< 1.0
Xylenes	ug/l	< 1.0	4740	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

ug/l - Micrograms per liter.
DUP 95 - Duplicate of GM-19S.
DUP 96 - Duplicate of GM-23.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.

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Table C-3. Groundwater Analytical Results for June 2001, General Motors Corporation, Moraine, Ohio.

	Unit	GM-19S 6/25/01	DUP-105 6/25/01	GM-32 6/25/01	EAST 6/25/01	GM-21 6/25/01	GM-22 6/26/01	GM-28 6/26/01	ME-6 6/26/01	ME-5 6/26/01
Volatile Organic Compound										
Acetone	ug/l	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0
Acrolein	ug/l	R	R	R	R	R	R	R	R	R
Acrylonitrile	ug/l	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0UJ	< 50.0	< 50.0
Allyl chloride	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	ug/l	< 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
Bromoform	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone	ug/l	R	R	R	R	R	R	R	R	R
Bromomethane	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Carbon disulfide	ug/l	< 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
Chlorobenzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	6.2	< 5.0
Chloroform	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroprene	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromochloromethane	ug/l	< 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
Dichlorodifluoromethane	ug/l	< 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	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0UJ	< 5.0	< 5.0
1,2-Dibromoethane	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
trans-1,4-Dichloro-2-butene	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethane	ug/l	2.9	3.3	3.1	5.5	4.1	4.7	< 1.0	1.8	< 1.0
1,2-Dichloroethane	ug/l	< 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
cis-1,2-Dichloroethene	ug/l	31.5	32.9	32.0	80.1	37.8	5.1	352	67.0	1.8
trans-1,2-Dichloroethene	ug/l	2.4	2.5	2.5	3.3	15.7	< 1.0	< 1.0	1.8	< 1.0
1,2-Dichloropropane	ug/l	< 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
trans-1,3-Dichloropropene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethyl methacrylate	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Table C-3. Groundwater Analytical Results for June 2001, General Motors Corporation, Moraine, Ohio.

	Unit	GM-19S 6/25/01	DUP-105 6/25/01	GM-32 6/25/01	EAST 6/25/01	GM-21 6/25/01	GM-22 6/26/01	GM-28 6/26/01	ME-6 6/26/01	ME-5 6/26/01
Volatile Organic Compound										
2-Hexanone	ug/l	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5
Iodomethane	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Methacrylonitrile	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Methylene chloride	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Methyl-2-pentanone	ug/l	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5UJ	< 12.5	< 12.5
Methyl methacrylate	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Pentachloroethane	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Propionitrile	ug/l	R	R	R	R	R	R	R	R	R
Styrene	ug/l	< 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
1,1,2,2-Tetrachloroethane	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	71.7	71.4	37.6	59.3	< 1.0	3.2	< 1.0	< 1.0	< 1.0
Toluene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.1	< 1.0	2.1	3.8
1,1,1-Trichloroethane	ug/l	9.6	10.4	9.2	16.7	7.7	< 1.0	< 1.0	1.2	< 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
Trichloroethene	ug/l	121	111	107	117	158	2.8	< 1.0	4.8	< 1.0
Trichlorofluoromethane	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl acetate	ug/l	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	13.3	< 1.0
Xylene (total)	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.9	4.3

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Table C-3. Groundwater Analytical Results for June 2001, General Motors Corporation, Moraine, Ohio.

	Unit	GM-29 6/26/01	GM-23 6/26/01	DUP-106 6/26/01	RB-82 6/25/01	RB-83 6/26/01	TB-128 6/25/01	TB-129 6/25/01	TB-130 6/26/01
Volatile Organic Compound									
Acetone	ug/l	< 20.0UJ	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0	< 20.0
Acrolein	ug/l	R	R	R	R	R	R	R	R
Acrylonitrile	ug/l	< 50.0UJ	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0	< 50.0
Allyl chloride	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone	ug/l	R	R	R	R	R	R	R	R
Bromomethane	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Carbon disulfide	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Carbon tetrachloride	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroform	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	1.1	< 1.0	< 1.0	< 1.0
Chloromethane	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Chloroprene	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Dibromochloromethane	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichlorodifluoromethane	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,2-Dibromoethane	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
trans-1,4-Dichloro-2-butene	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1-Dichloroethane	ug/l	6.3J	3.7	3.9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	ug/l	3.0J	16.3	15.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	2050J	11000	9260	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	ug/l	25.6J	60.8	61.9	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethyl methacrylate	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Ethylbenzene	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

Table C-3. Groundwater Analytical Results for June 2001, General Motors Corporation, Moraine, Ohio.

	Unit	GM-29 6/26/01	GM-23 6/26/01	DUP-106 6/26/01	RB-82 6/25/01	RB-83 6/26/01	TB-128 6/25/01	TB-129 6/25/01	TB-130 6/26/01
Volatile Organic Compound									
2-Hexanone	ug/l	< 12.5UJ	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5
Iodomethane	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Methacrylonitrile	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Methylene chloride	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Methyl-2-pentanone	ug/l	< 12.5UJ	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5	< 12.5
Methyl methacrylate	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Pentachloroethane	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Propionitrile	ug/l	R	R	R	R	R	R	R	R
Styrene	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	ug/l	< 1.0UJ	5.6	5.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	ug/l	< 1.0UJ	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	24.8J	8600	7220	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	ug/l	< 1.0UJ	2.3	2.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	23.8J	1.5	1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	ug/l	< 1.0UJ	1.8	1.7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	ug/l	437J	1780J	1420J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	ug/l	92.6J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichloropropane	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl acetate	ug/l	< 5.0UJ	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Vinyl chloride	ug/l	276J	68.1	71.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene (total)	ug/l	< 1.0UJ	1.4	1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

ug/l - Micrograms per liter.
DUP 105 - Duplicate of GM-19S.
DUP 106 - Duplicate of GM-23.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
UJ - Constituent not detected above the reporting limit. Reporting limit estimated.
J - Value is estimated.
R - Value is unusable.

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Table C-4. Groundwater Analytical Results for November 2001, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound	Unit	HR-11 11/6/01 Upper Aquifer	DUP-107 11/6/01	HR-9 11/6/01 Upper Aquifer	HR-8 11/6/01 Upper Aquifer	HR-4 11/6/01 Upper Aquifer	W-2-N 11/6/01 Upper Aquifer
Benzene	ug/l	< 1.0	< 1.0	< 1.4	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	32	32	38	26	< 1.0	0.33J
1,1-Dichloroethene	ug/l	<1.0	< 1.0	0.95J	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	18	18	12	5.4	0.28J	1.1
trans-1,2-Dichloroethene	ug/l	2.3	2.3	1.7	1.3	< 0.50	< 0.50
Ethylbenzene	ug/l	< 1.0	< 1.0	< 1.4	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	< 1.0	< 1.0	< 1.4	< 1.0	0.88J	< 1.0
Toluene	ug/l	< 1.0	< 1.0	< 1.4	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	0.36J	0.36J	17	10	0.17J	0.48J
Trichloroethene	ug/l	< 1.0	< 1.0	14	1.4	1.0	1.3
Vinyl chloride	ug/l	0.35J	0.35J	< 1.4	< 1.0	< 1.0	< 1.0
Xylene (total)	ug/l	< 1.0	< 1.0	< 1.4	< 1.0	< 1.0	< 1.0

ug/l - Micrograms per liter.
DUP 107 - Duplicate of HR-11.
DUP 108 - Duplicate of HR-5.
DUP 109 - Duplicate of TW-2.
DUP 110 - Duplicate of GM-27.
DUP 111 - Duplicate of HR-10.
DUP 112 - Duplicate of MT-69.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.

Table C-4. Groundwater Analytical Results for November 2001, General Motors Corporation, Moraine, Ohio.

	Unit	W-3-N 11/7/01 Upper Aquifer	W-4-N 11/7/01 Upper Aquifer	HR-3 11/7/01 Upper Aquifer	HR-2 11/7/01 Upper Aquifer	HR-5 11/7/01 Upper Aquifer	DUP-108 11/7/01
Volatile Organic Compound							
Benzene	ug/l	< 5.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	< 5.6	0.89J	6.9	4.2	0.55J	0.51J
1,1-Dichloroethene	ug/l	< 5.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	160	1.6	5.1	8.3	7.8	7.7
trans-1,2-Dichloroethene	ug/l	2.2J	< 0.50	0.60	1.1	0.74	0.67
Ethylbenzene	ug/l	< 5.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	9.0	0.92J	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	ug/l	< 5.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	< 5.6	0.33J	< 1.0	< 1.0	0.17J	< 1.0
Trichloroethene	ug/l	2.1J	7.1	0.66J	0.56J	11	11
Vinyl chloride	ug/l	7.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene (total)	ug/l	< 5.6	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

ug/l - Micrograms per liter.
DUP 107 - Duplicate of HR-11.
DUP 108 - Duplicate of HR-5.
DUP 109 - Duplicate of TW-2.
DUP 110 - Duplicate of GM-27.
DUP 111 - Duplicate of HR-10.
DUP 112 - Duplicate of MT-69.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.

Table C-4. Groundwater Analytical Results for November 2001, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound	Unit	HR-1 11/8/01 Upper Aquifer	HR-17 11/8/01 Upper Aquifer	W-2-S 11/8/01 Upper Aquifer	W-3-S 11/8/01 Upper Aquifer	W-4-S 11/8/01 Upper Aquifer	GM-16 11/8/01 Upper Aquifer
Benzene	ug/l	< 3.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	2.8J	< 1.0	0.58J	< 1.0	1.1	0.31J
1,1-Dichloroethene	ug/l	< 3.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	9.9	< 0.50	0.49J	< 0.50	3.3	0.39J
trans-1,2-Dichloroethene	ug/l	2.8	< 0.50	< 0.50	< 0.50	0.43J	< 0.50
Ethylbenzene	ug/l	< 3.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	36	3.3	< 1.0	0.44J	13	17
Toluene	ug/l	< 3.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	2.2J	1.4	1.7	1.6	2.9	2.2
Trichloroethene	ug/l	86B	4.2B	5.2B	1.5B	8.9B	3.6
Vinyl chloride	ug/l	< 3.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene (total)	ug/l	< 3.3	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

ug/l - Micrograms per liter.
DUP 107 - Duplicate of HR-11.
DUP 108 - Duplicate of HR-5.
DUP 109 - Duplicate of TW-2.
DUP 110 - Duplicate of GM-27.
DUP 111 - Duplicate of HR-10.
DUP 112 - Duplicate of MT-69.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.

Table C-4. Groundwater Analytical Results for November 2001, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound	Unit	GM-17 11/8/01 Upper Aquifer	GM-18 11/8/01 Upper Aquifer	GM-10 11/8/01 Upper Aquifer	GM-6 11/9/01 Upper Aquifer	GM-8 11/9/01 Upper Aquifer	TW-2 11/9/01 Upper Aquifer
Benzene	ug/l	< 3.3	< 3.3	< 1.0	< 2.0	0.78J	< 2.0
1,1-Dichloroethane	ug/l	7.3	3.3	3.4	14	40	20
1,1-Dichloroethene	ug/l	< 3.3	1.3J	< 1.0	< 2.0	< 1.0	< 2.0
cis-1,2-Dichloroethene	ug/l	16	14	16	8.2	2.0	8.8
trans-1,2-Dichloroethene	ug/l	1.8	1.6J	0.93	1.8	3.6	2.4
Ethylbenzene	ug/l	< 3.3	< 3.3	< 1.0	< 2.0	0.40J	0.38J
Tetrachloroethene	ug/l	48	12	1.9	14	< 1.0	8.5
Toluene	ug/l	< 3.3	< 3.3	< 1.0	< 2.0	< 1.0	< 2.0
1,1,1-Trichloroethane	ug/l	6.8	23	2.7	3.9	0.40J	3.9
Trichloroethene	ug/l	79	93	27	48	4.4	48B
Vinyl chloride	ug/l	< 3.3	< 3.3	1.2	1.9J	1.9	2.7
Xylene (total)	ug/l	< 3.3	< 3.3	< 1.0	< 2.0	0.39J	< 2.0

ug/l - Micrograms per liter.
DUP 107 - Duplicate of HR-11.
DUP 108 - Duplicate of HR-5.
DUP 109 - Duplicate of TW-2.
DUP 110 - Duplicate of GM-27.
DUP 111 - Duplicate of HR-10.
DUP 112 - Duplicate of MT-69.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.

Table C-4. Groundwater Analytical Results for November 2001, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound	Unit	DUP-109 11/9/01	GM-2 11/9/01 Upper Aquifer	WSU-24 11/9/01 Upper Aquifer	EAST 11/12/01 Upper Aquifer	GM-19S 11/12/01 Upper Aquifer	GM-32 11/12/01 Upper Aquifer
Benzene	ug/l	< 2.0	< 3.3	< 1.0	< 3.3	< 3.3	4.3J
1,1-Dichloroethane	ug/l	19	6.1	0.81J	6.2	2.9J	6.2
1,1-Dichloroethene	ug/l	< 2.0	< 3.3	< 1.0	0.90J	< 3.3	< 5.0
cis-1,2-Dichloroethene	ug/l	8.3	26	4.0	51	26	< 2.5
trans-1,2-Dichloroethene	ug/l	2.2	1.1J	< 0.50	2.7	2.0	2.9
Ethylbenzene	ug/l	0.32J	< 3.3	< 1.0	< 3.3	< 3.3	0.79J
Tetrachloroethene	ug/l	7.5	8.4	1.6	56	64	< 5.0
Toluene	ug/l	< 2.0	< 3.3	< 1.0	< 3.3	< 3.3	12
1,1,1-Trichloroethane	ug/l	3.7	6.1	2.4	13	7.6	< 5.0
Trichloroethene	ug/l	44B	65B	18B	92	97	< 5.0
Vinyl chloride	ug/l	2.6	< 3.3	< 1.0	1.5J	< 3.3	1.1J
Xylene (total)	ug/l	< 2.0	< 3.3	< 1.0	< 3.3	< 3.3	3.0J

ug/l - Micrograms per liter.
DUP 107 - Duplicate of HR-11.
DUP 108 - Duplicate of HR-5.
DUP 109 - Duplicate of TW-2.
DUP 110 - Duplicate of GM-27.
DUP 111 - Duplicate of HR-10.
DUP 112 - Duplicate of MT-69.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.

Table C-4. Groundwater Analytical Results for November 2001, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound	Unit	GM-26 11/12/01 Upper Aquifer	GM-23 11/12/01 Upper Aquifer	GM-22 11/13/01 Upper Aquifer	GM-21 11/13/01 Upper Aquifer	GM-30 11/13/01 Upper Aquifer	GM-29 11/13/01 Upper Aquifer
Benzene	ug/l	< 1.0	< 420	< 1.0	< 5.0	< 25	< 50
1,1-Dichloroethane	ug/l	< 1.0	< 420	6.8	3.8J	31	< 50
1,1-Dichloroethene	ug/l	< 1.0	< 420	0.58J	< 5.0	< 25	< 50
cis-1,2-Dichloroethene	ug/l	< 0.50	8400	8.5	39	< 12	1800
trans-1,2-Dichloroethene	ug/l	< 0.50	< 210	0.17J	15	< 12	26
Ethylbenzene	ug/l	< 1.0	< 420	< 1.0	< 5.0	840	21J
Tetrachloroethene	ug/l	1.1	15000	4.9	< 5.0	< 25	17J
Toluene	ug/l	< 1.0	< 420	< 1.0	< 5.0	5.0J	< 50
1,1,1-Trichloroethane	ug/l	0.19J	< 420	4.4	6.9	< 25	< 50
Trichloroethene	ug/l	< 1.0	2200	7.5	160	12J	270
Vinyl chloride	ug/l	< 1.0	1200	0.60J	< 5.0	< 25	230
Xylene (total)	ug/l	< 1.0	< 420	< 1.0	< 5.0	2000	52

ug/l - Micrograms per liter.
DUP 107 - Duplicate of HR-11.
DUP 108 - Duplicate of HR-5.
DUP 109 - Duplicate of TW-2.
DUP 110 - Duplicate of GM-27.
DUP 111 - Duplicate of HR-10.
DUP 112 - Duplicate of MT-69.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.

Table C-4. Groundwater Analytical Results for November 2001, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound	Unit	GM-27 11/13/01 Upper Aquifer	DUP-110 11/13/01	GM-19D 11/14/01 Lower Aquifer	HR-10 11/14/01 Lower Aquifer	DUP-111 11/14/01	HR-13 11/14/01 Lower Aquifer
Benzene	ug/l	< 3.3	< 3.3	< 1.0	< 1.0	< 1.0	0.18J
1,1-Dichloroethane	ug/l	1.8J	1.9J	< 1.0	< 1.0	< 1.0	15
1,1-Dichloroethene	ug/l	< 3.3	< 3.3	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	13	14	0.92	< 0.50	< 0.50	6.5
trans-1,2-Dichloroethene	ug/l	< 1.7	< 1.7	< 0.50	< 0.50	< 0.50	0.65
Ethylbenzene	ug/l	< 3.3	< 3.3	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	6.8	7.2	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	ug/l	< 3.3	< 3.3	0.38J	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	< 3.3	< 3.3	0.18J	< 1.0	< 1.0	0.74J
Trichloroethene	ug/l	110	120	3.7	< 1.0	< 1.0	1.2
Vinyl chloride	ug/l	< 3.3	< 3.3	13	< 1.0	< 1.0	< 1.0
Xylene (total)	ug/l	< 3.3	< 3.3	< 1.0	< 1.0	< 1.0	< 1.0

ug/l - Micrograms per liter.
DUP 107 - Duplicate of HR-11.
DUP 108 - Duplicate of HR-5.
DUP 109 - Duplicate of TW-2.
DUP 110 - Duplicate of GM-27.
DUP 111 - Duplicate of HR-10.
DUP 112 - Duplicate of MT-69.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.

Table C-4. Groundwater Analytical Results for November 2001, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound	Unit	HR-15 11/14/01 Lower Aquifer	GM-3 11/14/01 Lower Aquifer	GM-1 11/14/01 Lower Aquifer	GM-9 11/14/01 Lower Aquifer	GM-11 11/14/01 Lower Aquifer	DN-13 11/14/01 Lower Aquifer
Benzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	< 1.0	0.95J	0.29J	0.58J	< 1.0	2.5
1,1-Dichloroethene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	0.86	2.6	< 0.50	1.1	< 0.50	6.2
trans-1,2-Dichloroethene	ug/l	< 0.50	0.25J	< 0.50	< 0.50	< 0.50	0.37J
Ethylbenzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	< 1.0	0.48J	1.3	0.38J	1.0	< 1.0
Toluene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	< 1.0	0.16J	0.80J	0.48J	0.33J	1.1
Trichloroethene	ug/l	< 1.0	2.9	19	8.6	12	5.0
Vinyl chloride	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.2
Xylene (total)	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

ug/l - Micrograms per liter.
DUP 107 - Duplicate of HR-11.
DUP 108 - Duplicate of HR-5.
DUP 109 - Duplicate of TW-2.
DUP 110 - Duplicate of GM-27.
DUP 111 - Duplicate of HR-10.
DUP 112 - Duplicate of MT-69.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.

Table C-4. Groundwater Analytical Results for November 2001, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound	Unit	GM-20D 11/14/01 Lower Aquifer	HR-12 11/14/01 Lower Aqufier	GM-15 11/14/01 Lower Aquifer	HR-12 11/14/01 Lower Aquifer	ME-3 11/15/01 Upper Aquifer	GM-31 11/15/01 Upper Aquifer
Benzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0
1,1-Dichloroethane	ug/l	< 1.0	3.6	1.4	3.6	5.9	3.1J
1,1-Dichloroethene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0
cis-1,2-Dichloroethene	ug/l	< 0.50	2.7	1.2	2.7	16	120
trans-1,2-Dichloroethene	ug/l	< 0.50	0.23	< 0.50	0.23J	2.7	1.8J
Ethylbenzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0
Tetrachloroethene	ug/l	2.0	< 1.0	< 1.0	< 1.0	1.3	< 4.0
Toluene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	0.34J	< 4.0
1,1,1-Trichloroethane	ug/l	0.64J	< 1.0	< 1.0	< 1.0	1.6	< 4.0
Trichloroethene	ug/l	5.9	< 1.0	4.9	< 1.0	3.8	11
Vinyl chloride	ug/l	< 1.0	3.8	< 1.0	3.8	7.3	7.4
Xylene (total)	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 4.0

ug/l - Micrograms per liter.
DUP 107 - Duplicate of HR-11.
DUP 108 - Duplicate of HR-5.
DUP 109 - Duplicate of TW-2.
DUP 110 - Duplicate of GM-27.
DUP 111 - Duplicate of HR-10.
DUP 112 - Duplicate of MT-69.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.

Table C-4. Groundwater Analytical Results for November 2001, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound	Unit	ME-6 11/15/01 Upper Aquifer	31 11/15/01 Lower Aquifer	MT-69 11/15/01 Lower Aquifer	DUP-112 11/15/01	GM-28 11/15/01 Upper Aquifer	RB-84 11/6/01
Benzene	ug/l	< 2.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0
1,1-Dichloroethane	ug/l	2.7	3.1	< 1.0	< 1.0	< 10	< 1.0
1,1-Dichloroethene	ug/l	< 2.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0
cis-1,2-Dichloroethene	ug/l	65	2.4	< 0.50	< 0.50	< 5.0	< 0.50
trans-1,2-Dichloroethene	ug/l	1.8	< 0.50	< 0.50	< 0.50	11	< 0.50
Ethylbenzene	ug/l	< 2.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0
Tetrachloroethene	ug/l	8.2	< 1.0	< 1.0	< 1.0	< 10	< 1.0
Toluene	ug/l	0.42J	< 1.0	< 1.0	< 1.0	< 10	< 1.0
1,1,1-Trichloroethane	ug/l	2.2	< 1.0	< 1.0	< 1.0	< 10	< 1.0
Trichloroethene	ug/l	23	5.1	< 1.0	< 1.0	< 10	< 1.0
Vinyl chloride	ug/l	13	2.5	< 1.0	< 1.0	< 10	< 1.0
Xylene (total)	ug/l	< 2.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0

ug/l - Micrograms per liter.
DUP 107 - Duplicate of HR-11.
DUP 108 - Duplicate of HR-5.
DUP 109 - Duplicate of TW-2.
DUP 110 - Duplicate of GM-27.
DUP 111 - Duplicate of HR-10.
DUP 112 - Duplicate of MT-69.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.

Table C-4. Groundwater Analytical Results for November 2001, General Motors Corporation, Moraine, Ohio.

	Unit	RB-85 11/8/01	RB-86 11/9/01	RB-87 11/13/01	RB-88 11/14/01	RB-89 11/15/01	TB-131 11/6/01
Volatile Organic Compound							
Benzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	< 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
cis-1,2-Dichloroethene	ug/l	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/l	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Ethylbenzene	ug/l	< 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
Toluene	ug/l	0.28J	0.25J	< 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
Trichloroethene	ug/l	0.36JB	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl chloride	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene (total)	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

ug/l - Micrograms per liter.
DUP 107 - Duplicate of HR-11.
DUP 108 - Duplicate of HR-5.
DUP 109 - Duplicate of TW-2.
DUP 110 - Duplicate of GM-27.
DUP 111 - Duplicate of HR-10.
DUP 112 - Duplicate of MT-69.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.

Table C-4. Groundwater Analytical Results for November 2001, General Motors Corporation, Moraine, Ohio.

	Unit	TB-132 11/8/01	TB-133 11/9/01	TB-134 11/12/01	TB-135 11/14/01	TB-136 11/15/01
Volatile Organic Compound						
Benzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	< 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
cis-1,2-Dichloroethene	ug/l	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/l	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Ethylbenzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	< 1.0	< 1.0	< 1.0	< 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	< 1.0	< 1.0	< 1.0
Trichloroethene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl chloride	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene (total)	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

ug/l - Micrograms per liter.
DUP 107 - Duplicate of HR-11.
DUP 108 - Duplicate of HR-5.
DUP 109 - Duplicate of TW-2.
DUP 110 - Duplicate of GM-27.
DUP 111 - Duplicate of HR-10.
DUP 112 - Duplicate of MT-69.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
B - Blank contamination.

Table C-5. Groundwater Analytical Results for December 2001, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound	Unit	GM-19S 12/11/01	DUP-114 12/11/01	GM-32 12/11/01	EAST 12/11/01	GM-21 12/11/01	GM-22 12/12/01
Benzene	ug/l	< 3.3	< 3.3	< 100	< 3.3	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	2.8J	3.0J	< 100	5.3	0.71J	6.6
1,1-Dichloroethene	ug/l	< 3.3	< 3.3	< 100	< 3.3	< 1.0	0.32J
cis-1,2-Dichloroethene	ug/l	27	27	< 50	51	6.5	7.8
trans-1,2-Dichloroethene	ug/l	2.0	2.4	< 50	2.4	2.8	< 0.50
Ethylbenzene	ug/l	< 3.3	< 3.3	< 100	< 3.3	< 1.0	< 1.0
Tetrachloroethene	ug/l	64	68	< 100	49	< 1.0	2.9
Toluene	ug/l	< 3.3	< 3.3	< 100	< 3.3	< 1.0	0.32J
1,1,1-Trichloroethane	ug/l	7.5	7.8	< 100	12	1.2	0.63J
Trichloroethene	ug/l	110	110	< 100	94	28	2.3
Vinyl chloride	ug/l	0.66J	0.55J	< 100	0.66J	< 1.0	0.85J
Xylene (total)	ug/l	< 3.3	< 3.3	< 100	< 3.3	< 1.0	< 1.0

ug/l - Micrograms per liter.
DUP 114 - Duplicate of GM-19S.
DUP 115 - Duplicate of GM-23.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
UJ - Constituent not detected above the reporting limit. Reporting limit estimated.
J - Value is estimated.

Table C-5. Groundwater Analytical Results for December 2001, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound	Unit	GM-28 12/12/01	ME-3 12/12/01	ME-6 12/12/01	GM-29 12/12/01	GM-30 12/12/01	GM-23 12/12/01
Benzene	ug/l	< 5.0UJ	< 1.0	< 3.3	< 50	< 71	< 500
1,1-Dichloroethane	ug/l	< 5.0UJ	5.6	4.8	< 50	32J	< 500
1,1-Dichloroethene	ug/l	< 5.0UJ	< 1.0	< 3.3	< 50	< 71	< 500
cis-1,2-Dichloroethene	ug/l	2.2UJ	22	86	1800	< 36	7200
trans-1,2-Dichloroethene	ug/l	11J	2.8	2.0	24J	< 36	< 250
Ethylbenzene	ug/l	< 5.0UJ	< 1.0	< 3.3	< 50	1000	< 500
Tetrachloroethene	ug/l	< 5.0UJ	3.4	6.1	22J	< 71	14000
Toluene	ug/l	1.8UJ	0.19J	1.5J	< 50	13J	< 500
1,1,1-Trichloroethane	ug/l	< 5.0UJ	1.9	2.9J	19J	< 71	< 500
Trichloroethene	ug/l	< 5.0UJ	9.7	19	320	< 71	2100
Vinyl chloride	ug/l	< 5.0UJ	11	22	280	< 71	< 500
Xylene (total)	ug/l	< 5.0UJ	< 1.0	< 3.3	< 50	3400	< 500

ug/l - Micrograms per liter.
DUP 114 - Duplicate of GM-19S.
DUP 115 - Duplicate of GM-23.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
UJ - Constituent not detected above the reporting limit. Reporting limit estimated.
J - Value is estimated.

Table C-5. Groundwater Analytical Results for December 2001, General Motors Corporation, Moraine, Ohio.

Volatile Organic Compound	Unit	DUP-115 12/12/01	RB-91 12/11/01	RB-92 12/12/01	TB-141 12/11/01	TB-142 12/12/01
Benzene	ug/l	< 500	< 1.0	0.23J	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	< 500	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	ug/l	< 500	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	7200	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/l	< 250	< 0.50	< 0.50	< 0.50	< 0.50
Ethylbenzene	ug/l	< 500	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	15000	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	ug/l	< 500	0.25J	1.3	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	< 500	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	ug/l	2200	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl chloride	ug/l	< 500	< 1.0	< 1.0	< 1.0	< 1.0
Xylene (total)	ug/l	< 500	< 1.0	< 1.0	< 1.0	< 1.0

ug/l - Micrograms per liter.
DUP 114 - Duplicate of GM-19S.
DUP 115 - Duplicate of GM-23.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
UJ - Constituent not detected above the reporting limit. Reporting limit estimated.
J - Value is estimated.

Table C-6. Groundwater Analytical Results for June/July 2002, General Motors Corporation, Moraine, Ohio.

	Units	EAST 6/12/02	GM-19S 6/12/02	DUP-115A 6/12/02	GM-21 6/12/02	GM-32 6/12/02
Volatile Organic Compounds						
Benzene	ug/l	< 2.5	0.62	< 4.0	< 6.0	4.0
1,1-Dichloroethane	ug/l	6.0	3.7	3.4	5.4	12
1,1-Dichloroethene	ug/l	1.3	0.98	< 4.0	3.6	< 20
cis-1,2-Dichloroethene	ug/l	33	28	28	48	< 10
trans-1,2-Dichloroethene	ug/l	1.3	2.3	2.3	8.3	3.0
Ethylbenzene	ug/l	< 2.5	< 3.3	< 4.0	< 6.0	< 20
Tetrachloroethene	ug/l	37	60	50	< 6.0	< 20
Toluene	ug/l	< 2.5	< 3.3	< 4.0	< 6.0	4.9
1,1,1-Trichloroethane	ug/l	14	7.2	6.6	23	< 20
Trichloroethene	ug/l	75	110	100	210	< 20
Vinyl chloride	ug/l	0.48	0.70	< 4.0	< 6.0	3.0
Xylene (total)	ug/l	< 2.5	< 3.3	< 4.0	< 6.0	< 20

ug/l - Micrograms per liter.
DUP 115A - Duplicate of GM-19S.
DUP 117 - Duplicate of GM-28.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.

Table C-6. Groundwater Analytical Results for June/July 2002, General Motors Corporation, Moraine, Ohio.

	Units	GM-22 6/13/02	GM-23 6/13/02	GM-29 6/13/02	GM-30 6/13/02	GM-28 7/21/02
Volatile Organic Compounds						
Benzene	ug/l	< 1.0	< 330	< 50	< 25	< 4.0
1,1-Dichloroethane	ug/l	4.1	< 330	< 50	26	< 4.0
1,1-Dichloroethene	ug/l	< 1.0	< 330	< 50	< 25	< 4.0
cis-1,2-Dichloroethene	ug/l	3.6	9900	1600	< 12	< 2.0
trans-1,2-Dichloroethene	ug/l	< 0.50	< 170	21	< 12	8.6
Ethylbenzene	ug/l	< 1.0	< 330	< 50	360	< 4.0
Tetrachloroethene	ug/l	1.9	8400	22	< 25	< 4.0
Toluene	ug/l	< 1.0	< 330	< 50	5.1	< 4.0
1,1,1-Trichloroethane	ug/l	0.47	< 330	17	< 25	< 4.0
Trichloroethene	ug/l	2.1	1900	380	< 25	< 4.0
Vinyl chloride	ug/l	0.38	810	140	< 25	< 4.0
Xylene (total)	ug/l	< 1.0	< 330	< 50	1300	< 4.0

ug/l - Micrograms per liter.
DUP 115A - Duplicate of GM-19S.
DUP 117 - Duplicate of GM-28.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.

Table C-6. Groundwater Analytical Results for June/July 2002, General Motors Corporation, Moraine, Ohio.

	Units	DUP-117 7/21/02	ME-3 7/21/02	RB-92 6/12/02	RB-94 7/21/02	TB-143 6/13/02	TB-144 6/12/02	TB-145 7/21/02
Volatile Organic Compounds								
Benzene	ug/l	< 3.3	< 40	0.47	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	1.4	< 40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	ug/l	< 3.3	< 40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	1.5	< 20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/l	9.0	< 20	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Ethylbenzene	ug/l	< 3.3	< 40	0.42	0.41	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	< 3.3	< 40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	ug/l	< 3.3	< 40	3.3	2.2	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	< 3.3	< 40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	ug/l	< 3.3	< 40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl chloride	ug/l	< 3.3	< 40	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene (total)	ug/l	< 3.3	< 40	1.9	1.9	< 1.0	< 1.0	< 1.0

ug/l - Micrograms per liter.
DUP 115A - Duplicate of GM-19S.
DUP 117 - Duplicate of GM-28.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.

Table C-7. Groundwater Analytical Results for September 2002, General Motors Corporation, Moraine, Ohio.

	Units	W-2-S 9/18/02 Upper Aquifer	W-3-S 9/18/02 Upper Aquifer	DUP-118A 9/18/02	W-4-S 9/18/02 Upper Aquifer	HR-16 9/18/02 Upper Aquifer	HR-17 9/18/02 Upper Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	0.98J	< 1.0	< 1.0	0.87J	< 1.0	1.5
1,1-Dichloroethene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	0.90	< 0.50	< 0.50	3.6	0.46J	5.1
trans-1,2-Dichloroethene	ug/l	< 0.50	< 0.50	< 0.50	0.60	< 0.50	1.4
Ethylbenzene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	ug/l	< 1.0	0.61J	0.61J	17	< 1.0	22
Toluene	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	1.5	2.1	2.1	2.3	< 1.0	0.39J
Trichloroethene	ug/l	4.9	2.4	2.4	9.8	1.5	12
Vinyl chloride	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene (total)	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

ug/l - Micrograms per liter.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
DUP 118A - Duplicate of W-3-S.
DUP 119A - Duplicate of W-1-S.
DUP 120A - Duplicate of EAST.
DUP 121A - Duplicate of GM-31.
DUP 122A - Duplicate of HR-12.
DUP 123A - Duplicate of HR-15.

Table C-7. Groundwater Analytical Results for September 2002, General Motors Corporation, Moraine, Ohio.

	Units	GM-10 9/18/02 Upper Aquifer	HR-8 9/19/02 Upper Aquifer	HR-9 9/19/02 Upper Aquifer	HR-7 9/19/02 Upper Aquifer	W-1-S 9/19/02 Upper Aquifer	DUP-119A 9/19/02
Volatile Organic Compounds							
Benzene	ug/l	< 1.0	< 1.0	< 1.7	< 1.0	< 2.0	< 2.0
1,1-Dichloroethane	ug/l	0.61J	18	46	< 1.0	0.97J	1.0J
1,1-Dichloroethene	ug/l	< 1.0	0.44J	1.1J	< 1.0	< 2.0	< 2.0
cis-1,2-Dichloroethene	ug/l	2.3	4.8	17	0.65	6.0	6.1
trans-1,2-Dichloroethene	ug/l	< 0.50	0.85	2.5	< 0.50	1.3	1.3
Ethylbenzene	ug/l	< 1.0	< 1.0	< 1.7	< 1.0	< 2.0	< 2.0
Tetrachloroethene	ug/l	1.1	< 1.0	< 1.7	< 1.0	62	61
Toluene	ug/l	< 1.0	< 1.0	< 1.7	< 1.0	< 2.0	< 2.0
1,1,1-Trichloroethane	ug/l	1.8	11	13	< 1.0	< 2.0	< 2.0
Trichloroethene	ug/l	19	1.8	15	9.4	16	16
Vinyl chloride	ug/l	< 1.0	< 1.0	< 1.7	< 1.0	< 2.0	< 2.0
Xylene (total)	ug/l	< 1.0	< 1.0	< 1.7	< 1.0	< 2.0	< 2.0

ug/l - Micrograms per liter.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
DUP 118A - Duplicate of W-3-S.
DUP 119A - Duplicate of W-1-S.
DUP 120A - Duplicate of EAST.
DUP 121A - Duplicate of GM-31.
DUP 122A - Duplicate of HR-12.
DUP 123A - Duplicate of HR-15.

Table C-7. Groundwater Analytical Results for September 2002, General Motors Corporation, Moraine, Ohio.

	Units	W-2-N 9/19/02 Upper Aquifer	W-1-N 9/19/02 Upper Aquifer	GM-17 9/19/02 Upper Aquifer	GM-18 9/19/02 Upper Aquifer	GM-8 9/20/02 Upper Aquifer	GM-6 9/20/02 Upper Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 1.0	< 1.0	< 1.2	< 3.3	5.5	2.2
1,1-Dichloroethane	ug/l	0.31J	0.36J	6.0	6.0	63	60
1,1-Dichloroethene	ug/l	< 1.0	< 1.0	< 1.2	< 3.3	< 2	< 2
cis-1,2-Dichloroethene	ug/l	1.6	< 0.50	13	15	5.5	43
trans-1,2-Dichloroethene	ug/l	< 0.50	< 0.50	0.67	1.6J	9	8.6
Ethylbenzene	ug/l	< 1.0	< 1.0	< 1.2	< 3.3	7.5	< 2
Tetrachloroethene	ug/l	< 1.0	< 1.0	22	28	< 2	14
Toluene	ug/l	< 1.0	< 1.0	< 1.2	< 3.3	1.8J	< 2
1,1,1-Trichloroethane	ug/l	< 1.0	< 1.0	2.3	18	< 2	1.4J
Trichloroethene	ug/l	1.4	< 1.0	39	98	< 2	33
Vinyl chloride	ug/l	< 1.0	< 1.0	0.79J	< 3.3	5.8	12
Xylene (total)	ug/l	< 1.0	< 1.0	< 1.2	< 3.3	1.5J	< 2

ug/l - Micrograms per liter.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
DUP 118A - Duplicate of W-3-S.
DUP 119A - Duplicate of W-1-S.
DUP 120A - Duplicate of EAST.
DUP 121A - Duplicate of GM-31.
DUP 122A - Duplicate of HR-12.
DUP 123A - Duplicate of HR-15.

Table C-7. Groundwater Analytical Results for September 2002, General Motors Corporation, Moraine, Ohio.

	Units	TW-2 9/20/02 Upper Aquifer	GM-2 9/20/02 Upper Aquifer	GM-32 9/20/02 Upper Aquifer	EAST 9/23/2002 Upper Aquifer	DUP-120A 9/23/02	HR-1 9/23/02 Upper Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 2	< 1	< 10	< 2	< 2	< 2
1,1-Dichloroethane	ug/l	9	3.4	9.7J	3.9	3.9	2.8
1,1-Dichloroethene	ug/l	< 2	< 1	< 10	0.73J	0.82J	< 2
cis-1,2-Dichloroethene	ug/l	26	7.6	< 5	8.8	9.5	4.5
trans-1,2-Dichloroethene	ug/l	1.4	0.37J	< 5	< 1	< 1	3.2
Ethylbenzene	ug/l	< 2	< 1	< 10	< 2	< 2	< 2
Tetrachloroethene	ug/l	5.9	8.7	< 10	49	47	33
Toluene	ug/l	< 2	< 1	< 10	< 2	< 2	< 2
1,1,1-Trichloroethane	ug/l	2.2	0.75J	< 10	10	10	< 2
Trichloroethene	ug/l	70	26	< 10	46	44	33
Vinyl chloride	ug/l	2.5	< 1	< 10	< 2	< 2	< 2
Xylene (total)	ug/l	< 2	< 1	< 10	< 2	< 2	< 2

ug/l - Micrograms per liter.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
DUP 118A - Duplicate of W-3-S.
DUP 119A - Duplicate of W-1-S.
DUP 120A - Duplicate of EAST.
DUP 121A - Duplicate of GM-31.
DUP 122A - Duplicate of HR-12.
DUP 123A - Duplicate of HR-15.

Table C-7. Groundwater Analytical Results for September 2002, General Motors Corporation, Moraine, Ohio.

	Units	HR-6 9/23/02 Upper Aquifer	HR-5 9/23/02 Upper Aquifer	W-3-N 9/23/02 Upper Aquifer	W-4-N 9/24/02 Upper Aquifer	HR-2 9/24/02 Upper Aquifer	HR-3 9/24/02 Upper Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 1	< 1	< 6.7	< 1	< 1	< 1
1,1-Dichloroethane	ug/l	< 1	0.55J	< 6.7	1.7	4.9	15
1,1-Dichloroethene	ug/l	< 1	< 1	< 6.7	< 1	< 1	< 1
cis-1,2-Dichloroethene	ug/l	< 0.5	7.5	150	5.2	8.8	9.9
trans-1,2-Dichloroethene	ug/l	< 0.5	0.58	< 3.3	0.33J	1.2	1
Ethylbenzene	ug/l	< 1	< 1	< 6.7	< 1	< 1	< 1
Tetrachloroethene	ug/l	< 1	< 1	< 6.7	0.94J	< 1	< 1
Toluene	ug/l	< 1	< 1	< 6.7	< 1	< 1	< 1
1,1,1-Trichloroethane	ug/l	< 1	< 1	< 6.7	0.44J	< 1	< 1
Trichloroethene	ug/l	1.5	13	< 6.7	8.5	0.46J	1.4
Vinyl chloride	ug/l	< 1	< 1	6.5J	0.77J	< 1	< 1
Xylene (total)	ug/l	< 1	< 1	< 6.7	< 1	< 1	< 1

ug/l - Micrograms per liter.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
DUP 118A - Duplicate of W-3-S.
DUP 119A - Duplicate of W-1-S.
DUP 120A - Duplicate of EAST.
DUP 121A - Duplicate of GM-31.
DUP 122A - Duplicate of HR-12.
DUP 123A - Duplicate of HR-15.

Table C-7. Groundwater Analytical Results for September 2002, General Motors Corporation, Moraine, Ohio.

	Units	GM-16 9/24/02 Upper Aquifer	WSU-24 9/24/02 Upper Aquifer	GM-31 9/24/02 Upper Aquifer	DUP-121A 9/24/02 Upper Aquifer	GM-28 9/24/02 Upper Aquifer	ME-3 9/24/02 Upper Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 2	< 1	< 6	< 6	< 1	< 2.5
1,1-Dichloroethane	ug/l	4.1	< 1	5.9J	5.9J	2.7	< 2.5
1,1-Dichloroethene	ug/l	< 2	< 1	< 6	< 6	< 1	< 2.5
cis-1,2-Dichloroethene	ug/l	6.2	< 0.5	200	190	1.1	< 1.2
trans-1,2-Dichloroethene	ug/l	1.6	< 0.5	3.5	3.3	11	< 1.2
Ethylbenzene	ug/l	< 2	< 1	< 6	< 6	< 1	< 2.5
Tetrachloroethene	ug/l	63	1.2	< 6	< 6	< 1	< 2.5
Toluene	ug/l	< 2	< 1	< 6	< 6	1.3 U	< 2.5
1,1,1-Trichloroethane	ug/l	1.4J	1.4	< 6	< 6	< 1	< 2.5
Trichloroethene	ug/l	28	13	10	12	0.86J	< 2.5
Vinyl chloride	ug/l	< 2	< 1	19	18	< 1	< 2.5
Xylene (total)	ug/l	< 2	< 1	< 6	< 6	< 1.2 U	< 2.5

ug/l - Micrograms per liter.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
DUP 118A - Duplicate of W-3-S.
DUP 119A - Duplicate of W-1-S.
DUP 120A - Duplicate of EAST.
DUP 121A - Duplicate of GM-31.
DUP 122A - Duplicate of HR-12.
DUP 123A - Duplicate of HR-15.

Table C-7. Groundwater Analytical Results for September 2002, General Motors Corporation, Moraine, Ohio.

	Units	GM-26 9/25/02 Upper Aquifer	ME-6 9/25/02 Upper Aquifer	GM-21 9/25/02 Upper Aquifer	GM-22 9/25/02 Upper Aquifer	GM-29 9/25/02 Upper Aquifer	GM-27 9/26/02 Upper Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 1	< 10	< 6.7	< 2	< 40	< 3.3
1,1-Dichloroethane	ug/l	< 1	< 10	5J	< 2	< 40	1.7J
1,1-Dichloroethene	ug/l	< 1	< 10	2.6J	< 2	< 40	< 3.3
cis-1,2-Dichloroethene	ug/l	< 0.5	5.2	43	< 1	1300	14
trans-1,2-Dichloroethene	ug/l	< 0.5	< 5	5.1	< 1	21	< 1.7
Ethylbenzene	ug/l	< 1	< 10	< 6.7	< 2	< 40	< 3.3
Tetrachloroethene	ug/l	0.92J	< 10	< 6.7	2.3	18J	< 3.3
Toluene	ug/l	< 1	6.6J	< 6.7	< 2	< 40	< 3.3
1,1,1-Trichloroethane	ug/l	< 1	< 10	31	0.93J	16J	< 3.3
Trichloroethene	ug/l	< 1	< 10	230	7.6	310	100
Vinyl chloride	ug/l	< 1	< 10	< 6.7	< 2	140	< 3.3
Xylene (total)	ug/l	< 1	< 10	< 6.7	< 2	< 40	< 3.3

ug/l - Micrograms per liter.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
DUP 118A - Duplicate of W-3-S.
DUP 119A - Duplicate of W-1-S.
DUP 120A - Duplicate of EAST.
DUP 121A - Duplicate of GM-31.
DUP 122A - Duplicate of HR-12.
DUP 123A - Duplicate of HR-15.

Table C-7. Groundwater Analytical Results for September 2002, General Motors Corporation, Moraine, Ohio.

	Units	GM-23 9/26/02 Upper Aquifer	HR-11 9/26/02 Upper Aquifer	GM-19S 9/26/02 Upper Aquifer	HR-4 9/27/02 Upper Aquifer	GM-30 9/27/02 Upper Aquifer	HR-12 9/26/02 Lower Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 400	< 1	< 4	< 1	< 33	< 1
1,1-Dichloroethane	ug/l	< 400	18	6.3	< 1	34	2.4
1,1-Dichloroethene	ug/l	< 400	< 1	< 4	< 1	< 33	< 1
cis-1,2-Dichloroethene	ug/l	7700	6.1	39	< 0.5	< 17	2.1
trans-1,2-Dichloroethene	ug/l	< 200	0.72	2.7	< 0.5	< 17	< 0.5
Ethylbenzene	ug/l	< 400	< 1	< 4	< 1	350	< 1
Tetrachloroethene	ug/l	10000	< 1	52	0.59J	< 33	< 1
Toluene	ug/l	< 400	< 1	< 4	< 1	< 33	< 1
1,1,1-Trichloroethane	ug/l	< 400	< 1	6.3	< 1	< 33	< 1
Trichloroethene	ug/l	1700	< 1	110	0.71J	< 33	< 1
Vinyl chloride	ug/l	540	< 1	5.2	< 1	< 33	1.7
Xylene (total)	ug/l	< 400	< 1	< 4	< 1	1400	< 1

ug/l - Micrograms per liter.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
DUP 118A - Duplicate of W-3-S.
DUP 119A - Duplicate of W-1-S.
DUP 120A - Duplicate of EAST.
DUP 121A - Duplicate of GM-31.
DUP 122A - Duplicate of HR-12.
DUP 123A - Duplicate of HR-15.

Table C-7. Groundwater Analytical Results for September 2002, General Motors Corporation, Moraine, Ohio.

	Units	DUP-122A 9/26/02	GM-19D 9/26/02 Lower Aquifer	DN-13 9/27/02 Lower Aquifer	39 9/27/02 Lower Aquifer	HR-10 9/27/02 Lower Aquifer	GM-15 9/27/02 Lower Aquifer
Volatile Organic Compounds							
Benzene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	ug/l	2.5	< 1	2.5	1.6	< 1	1.6
1,1-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	ug/l	2.2	0.81	7.3	1.3	< 0.5	1.8
trans-1,2-Dichloroethene	ug/l	< 0.5	< 0.5	0.48J	< 0.5	< 0.5	< 0.5
Ethylbenzene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1
Toluene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	ug/l	< 1	< 1	1.1	< 1	< 1	< 1
Trichloroethene	ug/l	< 1	3.1	6.1	3.8	< 1	4.7
Vinyl chloride	ug/l	1.8	0.36J	1.3	0.51J	< 1	< 1
Xylene (total)	ug/l	< 1	< 1	< 1	< 1	< 1	< 1

ug/l - Micrograms per liter.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
DUP 118A - Duplicate of W-3-S.
DUP 119A - Duplicate of W-1-S.
DUP 120A - Duplicate of EAST.
DUP 121A - Duplicate of GM-31.
DUP 122A - Duplicate of HR-12.
DUP 123A - Duplicate of HR-15.

Table C-7. Groundwater Analytical Results for September 2002, General Motors Corporation, Moraine, Ohio.

	Units	HR-15 9/30/02 Lower Aquifer	DUP-123A 9/30/02	HR-14 9/30/02 Lower Aquifer	HR-13 9/30/02 Lower Aquifer	MT-69 9/30/02 Lower Aquifer
Volatile Organic Compounds						
Benzene	ug/l	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	ug/l	< 1UJ	< 1	< 1	25	< 1
1,1-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	ug/l	1	0.98	3.6	11	< 0.5
trans-1,2-Dichloroethene	ug/l	< 0.5	< 0.5	< 0.5	1.4	< 0.5
Ethylbenzene	ug/l	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	ug/l	< 1	< 1	< 1	< 1	< 1
Toluene	ug/l	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	ug/l	< 1	< 1	< 1	1.4	< 1
Trichloroethene	ug/l	< 1	< 1	1.2	3.6	< 1
Vinyl chloride	ug/l	< 1	0.38J	< 1	< 1	< 1
Xylene (total)	ug/l	< 1	< 1	< 1	< 1	< 1

ug/l - Micrograms per liter.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
DUP 118A - Duplicate of W-3-S.
DUP 119A - Duplicate of W-1-S.
DUP 120A - Duplicate of EAST.
DUP 121A - Duplicate of GM-31.
DUP 122A - Duplicate of HR-12.
DUP 123A - Duplicate of HR-15.

Table C-7. Groundwater Analytical Results for September 2002, General Motors Corporation, Moraine, Ohio.

	Units	GM-9 9/30/02 Lower Aquifer	GM-20D 9/30/02 Lower Aquifer	GM-11 10/1/02 Lower Aquifer	GM-3 10/1/02 Lower Aquifer	GM-1 10/1/02 Lower Aquifer
Volatile Organic Compounds						
Benzene	ug/l	< 1	< 1	< 1	< 1	< 1.4 U
1,1-Dichloroethane	ug/l	0.48J	< 1	0.34J	1.8	0.48 J
1,1-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1.4 U
cis-1,2-Dichloroethene	ug/l	0.66	< 0.5	0.62	8.9	0.95
trans-1,2-Dichloroethene	ug/l	< 0.5	< 0.5	< 0.5	1.2	< 0.72 U
Ethylbenzene	ug/l	< 1	< 1	< 1	< 1	< 1.4 U
Tetrachloroethene	ug/l	< 1	1.3	2.2	1.4	2.3
Toluene	ug/l	< 1	< 1	< 1	< 1	< 1.4 U
1,1,1-Trichloroethane	ug/l	0.99J	< 1	1	0.74J	1.3 J
Trichloroethene	ug/l	16	3.8	35	9.5	39
Vinyl chloride	ug/l	< 1	< 1	< 1	0.63J	< 1.4 U
Xylene (total)	ug/l	< 1	< 1	< 1	< 1	< 1.4 U

ug/l - Micrograms per liter.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
DUP 118A - Duplicate of W-3-S.
DUP 119A - Duplicate of W-1-S.
DUP 120A - Duplicate of EAST.
DUP 121A - Duplicate of GM-31.
DUP 122A - Duplicate of HR-12.
DUP 123A - Duplicate of HR-15.

Table C-7. Groundwater Analytical Results for September 2002, General Motors Corporation, Moraine, Ohio.

	Units	RB-95A 9/18/02	RB-96A 9/19/02	RB-97A 9/23/02	RB-98A 9/24/02	RB-99 9/26/02	RB-100 9/30/02	TB-146A 9/18/02	TB-147A 9/19/02
Volatile Organic Compounds									
Benzene	ug/l	< 1.0	0.62J	4.4	4.7	3.8	6.9	< 1.0	< 1.0
1,1-Dichloroethane	ug/l	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1.0	< 1.0
1,1-Dichloroethene	ug/l	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1.0	< 1.0
cis-1,2-Dichloroethene	ug/l	< 0.50	< 0.50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.50	< 0.50
trans-1,2-Dichloroethene	ug/l	< 0.50	< 0.50	< 0.5	< 0.5	< 0.5	< 0.5	< 0.50	< 0.50
Ethylbenzene	ug/l	< 1.0	0.51J	5.3	5.7	3.9	6.6	< 1.0	< 1.0
Tetrachloroethene	ug/l	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1.0	< 1.0
Toluene	ug/l	1.9	2.9	25	26	18	34	< 1.0	< 1.0
1,1,1-Trichloroethane	ug/l	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1.0	< 1.0
Trichloroethene	ug/l	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1.0	< 1.0
Vinyl chloride	ug/l	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1.0	< 1.0
Xylene (total)	ug/l	1.4	2.4	29	32	23	36	< 1.0	< 1.0

ug/l - Micrograms per liter.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
DUP 118A - Duplicate of W-3-S.
DUP 119A - Duplicate of W-1-S.
DUP 120A - Duplicate of EAST.
DUP 121A - Duplicate of GM-31.
DUP 122A - Duplicate of HR-12.
DUP 123A - Duplicate of HR-15.

Table C-7. Groundwater Analytical Results for September 2002, General Motors Corporation, Moraine, Ohio.

	Units	TB-148A 9/20/02	TB-149A 9/23/02	TB-150A 9/24/02	TB-151A 9/25/02	TB-152A 9/26/02	TB-153A 9/27/02	TB-154A 9/30/02	TB-155A 10/1/02
Volatile Organic Compounds									
Benzene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	ug/l	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
trans-1,2-Dichloroethene	ug/l	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Ethylbenzene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Toluene	ug/l	< 1	0.48J	0.66J	< 1	< 1	0.55J	0.95J	1.1
1,1,1-Trichloroethane	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Trichloroethene	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl chloride	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Xylene (total)	ug/l	< 1	< 1	< 1	< 1	< 1	< 1	0.53J	1

ug/l - Micrograms per liter.
RB - Rinseate blank.
TB - Trip blank.
< - Constituent not detected above laboratory reporting limit shown.
J - Value is estimated.
DUP 118A - Duplicate of W-3-S.
DUP 119A - Duplicate of W-1-S.
DUP 120A - Duplicate of EAST.
DUP 121A - Duplicate of GM-31.
DUP 122A - Duplicate of HR-12.
DUP 123A - Duplicate of HR-15.

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Appendix D

In-Situ Reactive Zones Performance Results for 2001/2002

In-Situ Reactive Zones Performance Results

As described in Section 3.1.1 of the Site-Wide Groundwater Monitoring Report for 2001/2002 (Monitoring Report), the bioremediation delivery network consists of three reactive zones, RZ-1, RZ-2, and RZ-3 (West and East). Molasses was introduced into the groundwater through introduction points shown on Figures 12, 13, and 14 of the Monitoring Report for RZ-1, RZ-2, and RZ-3, respectively. 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 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 dissolved permanent gases (carbon dioxide, oxygen, nitrogen, methane, and carbon monoxide). The monitored VOCs included: benzene, toluene, ethylbenzene, xylenes, tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-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-DCE). The data collected are presented in Tables 14 through 17 of the Monitoring Report and Figures D-1 through D-8, for RZ-1, RZ-2, RZ-3 West and RZ-3 East. The bioattenuations parameter data is presented on Tables 18 through 21 of the Monitoring Report and Figures D-9 through D-16 for RZ-1, RZ-2, RZ-3 West and RZ-3 East. 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, and light gases (ethene, ethane, and methane). Secondary operational monitoring data includes ORP, temperature, DO, specific conductance, nitrate, nitrite, total and dissolved manganese, total and dissolved iron, sulfate, sulfite, and chlorides.

The purpose of upgradient and downgradient monitoring wells, separate from the injection zone, is to collect and compare data before and after biodegradation by the stimulated microbial population. Locations of these wells are shown on Figures 12, 13, and 14 of the Monitoring Report.

- At RZ-1, GM-29 is designated as the upgradient monitoring well, while GM-28 is designated as the downgradient monitoring well. These wells are ideally positioned, approximately 100 days upgradient, and 100 days downgradient from the west-east injection zone.

- At RZ-2, there was insufficient space to construct upgradient or downgradient monitoring wells due to railroad access issues. Consequently, limited monitoring was conducted at two of the wells that were used for molasses introduction (ME-3 and ME-6). The data collected from these wells represent conditions in the center of the injection zone, and cannot be used to assess the operational effect of the reactive zone on downgradient portions of the aquifer.

- A similar situation is encountered in RZ-3 West, where the designated downgradient monitoring well, GM-32, is within the injection zone due to the proximity of Landfill L1. For RZ-3 West, monitoring wells EAST and GM-19S are used as the upgradient wells. Annual data collected from GM-6 and GM-8, which are further downgradient from the injection zone, have also been discussed with respect to monitoring the performance of RZ-3 West. However, it is important to realize that GM-6 and GM-8 are located in the redox recovery zone for the RZ-3 West (because of their distance from the injection zone), and also these wells are located in proximity to Landfill L1.

- For RZ-3 East, GM-22 is designated as the upgradient monitoring well and GM-21 is designated as the downgradient monitoring well.

Analysis of Primary Operational Monitoring Data

The primary operational data is comprised of a limited number of variables that are monitored at a high frequency, supplying the information required for the operation of the remediation system. The entire dataset is presented in Tables 14 through 21 of the Monitoring Report. These tables are organized such that upgradient and downgradient changes can be easily identified for each reactive zone.

pH

The preferred pH range for reductive dechlorination is between 6 and 8, and the acceptable pH range extends from 5 to 9. pH remained within the preferred range for all observations at monitoring wells outside the injection zones. Occasional readings outside the preferred range were seen in the injection zone wells, although none of those readings exceeded the acceptable range.

pH values below 6.0 were noted in the monitored introduction wells within RZ-1 during the pilot test (wells RZ-1A and RZ-1G), RZ-2 (ME-3, one occasion only), and RZ-3 West (wells RZ-3E and RZ-3T) (Tables 16, 17, and 18 of the Monitoring Report). The observations of pH below the preferred range was most likely due to the presence of the molasses injection solution in the vicinity of the injection well (the pH of molasses solutions ranges between 5 and 6). It is also possible that the formation of acetic acid during the breakdown of sugars might have reduced the groundwater pH. Though pH values above 8.0 were noted in RZ-3 West (wells RZ-3L [during the pilot test] and GM-32), a value below 9 is considered to be suitable for the reductive dechlorination process.

Based on the VOC results discussed below, pH variations did not adversely affect reactive zone performance.

Total Organic Carbon

Molasses was injected at regular intervals into the introduction wells of each reactive zone, as discussed earlier. At RZ-1, the reductive dechlorination process was most effective when injection zone carbon loadings were high enough to leave more than 100 milligrams per liter (mg/L) TOC at a distance of 100 days downgradient from the injection zone (the downgradient well, GM-28, is approximately 100 days downgradient from the injection zone). Under these conditions, the dechlorination of vinyl chloride appears to have proceeded at rates more than 20-fold greater than those for cis-DCE, suppressing the formation of a vinyl chloride concentration peak[1]. Rapid dechlorination with vinyl chloride peak suppression has now been observed at other sites where carbon loading is sufficient to support more than 100 mg/L, 100 days downgradient from the injection zone. Consequently, TOC measurements in the reactive zone have become a valuable tool in the operational management of enhanced reductive dechlorination reactive zones.

The observation of TOC does not have to be conducted at the 100-day distance from the injection zone. An alternative method is to quantify the injection zone concentration based on groundwater flux and the mass of carbon injected, and combine that information with observations of TOC at a known time of travel downgradient. From those observations, a first-order degradation rate constant can be calculated and carbon loadings can be maintained at levels that will generate a minimum 100 mg/L TOC at the 100-day distance. Groundwater monitoring at distances other than 100 days can be maintained to track the carbon degradation rate, with adjustments to carbon loadings made accordingly.

VOC Analytical Results

The groundwater analytical data for the site-specific list of VOCs are presented in Table 14 for RZ-1, Table 15 for RZ-2, Table 16 for RZ-3 West, and Table 17 for RZ-3 East in the Monitoring Report. Additionally, the degradation of PCE and TCE (parent compounds) to cis-DCE, vinyl chloride (daughter products), and ethene (end product) are provided for the upgradient and downgradient monitoring wells in RZ-1, RZ-2, RZ-3 West and RZ-3 East on Figures D-1 through D-8, 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:

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[1] It is also possible that abiotic destruction of cis-DCE was responsible for elimination of the vinyl chloride peak. The DCE-to-ethene reaction can be accomplished by a 2-chlorine removal reaction that forms acetylene (β-elimination), which is then reduced to ethene. The abiotic reaction cannot be ruled out, although redox conditions in the dechlorinating zone appear to be too low to support iron-mediated abiotic β-elimination.

- Comparing the profiles of chlorinated compounds in the upgradient and downgradient wells in RZ-1 (Figures D-1 and D-2, respectively), it was found that complete degradation of the PCE and TCE occurred, and the process of degradation coincided with the introduction of molasses. There was a transient increase in the concentration of cis-DCE at GM-28 immediately after the first phase of molasses injection (May 2000), associated with the TCE inhibition of cis-DCE degradation. A much smaller increase in cis-DCE was observed late in 2001, when TOC levels temporarily fell to less than 100 mg/L in GM-28. Cis-DCE concentrations also increased at the upgradient well (GM-29) as an indirect result of the oxidation pilot study that was conducted further upgradient, beginning in September 1999. Partially-oxidized organic material from that test caused a temporary increase in aquifer TOC, partially dechlorinating PCE and TCE. This dechlorination was not sustained, and notably, vinyl chloride levels in GM-29 reached a peak of 788 ug/L. Downgradient from this location, PCE, TCE, cis-DCE and vinyl chloride are all fully dechlorinated by the reactive zone.

- The concentrations of PCE, TCE, cis-DCE, and vinyl chloride at the monitoring well ME-3 in RZ-2 decreased to non-detectable levels by the end of 2002. It should be noted that ME-3 is not a "true" downgradient monitoring well as molasses was injected in this well. As indicated earlier, RZ-2 does not have a suitable downgradient monitoring well due to current space restrictions.

- At RZ-3 West, concentrations of all chlorinated compounds monitored at GM-32, located within the influence of the injection zone, reached non-detectable levels by the end of 2002 (Table 16 of the Monitoring Report). It is important to note that GM-32 is quite close to the injection zone, and VOC results at this location may not reflect the full extent of dechlorination achieved by the reactive zone. The fact that all VOCs are below detection at GM-32 indicates the dechlorination is proceeding very rapidly in this sector.

- No significant degradation of VOCs was evident from the data collected from GM-21, which is the designated downgradient monitoring well for RZ-3 East. The lack of dechlorination appears to be linked to an absence of TOC at this point, indicating that the reactive zone is not receiving sufficient loading. Carbon loading was increased in RZ-3 East in September 2002. Additional investigation is being conducted to determine the cause of the problem, and steps will be taken promptly to correct the carbon shortage.

- The concentration of ethene, which is the principal end-product for the reductive dechlorination process for PCE and TCE has declined dramatically since complete dechlorination was first established at RZ-1, RZ-2 and RZ-3West (as shown in Tables 18 through 21 of the Monitoring Report, and on Figures D-1 through D-8). This is an indication of the continuing development of the dechlorinating microbial community in the aquifer. The decrease in ethene concentrations was accompanied by an increase in ethane concentrations, showing that ethene is being further reduced in the reactive zone.

Methane

Methane concentrations can increase during methanogenesis when acetate (a product of sugar fermentation) is split to form carbon dioxide and methane, or when carbon dioxide is utilized as an electron acceptor under extreme reducing conditions, producing methane. The presence of increased methane concentrations in the downgradient wells of RZ-1 and RZ-3 West (Figures D-10 and D-14, respectively) is further evidence that strongly reducing conditions have developed and a sign that methanogenesis is occurring. The methanogens can provide a significant contribution to dechlorination through the production of enzymes and cofactors that cometabolically dechlorinate ethenes such as PCE and TCE.

Analysis of Secondary Operational Monitoring Data

Dissolved Manganese and Iron

Manganese can be used as an alternate electron acceptor during anaerobic degradation of VOCs and is reduced in the process. The reduced form of manganese is more soluble and an increase in dissolved manganese is an indicator of microbial consumption of manganese as an alternative electron acceptor. The concentration of manganese at the site prior to injecting the carbon solution was fairly low, as indicated by the results of the baseline groundwater sampling event in September 1999 (Tables 18 through 21 of the Monitoring Report). The total manganese levels detected in the downgradient wells were 3.2 mg/L for RZ-1, 0.016 mg/L for RZ-2, 0.147 mg/L for RZ-3 West, and 0.321 mg/L for RZ-3 East.

Comparing the dissolved manganese concentrations at the upgradient and downgradient monitoring wells at RZ-1, it was found that the dissolved manganese concentrations at the downgradient well GM-28 were consistently higher than those recorded at GM-29 (Table 18 of the Monitoring Report). Increases in the concentration of dissolved manganese at the downgradient monitoring wells provide a good indication of increased anaerobic and reducing conditions in groundwater, and progression of the effects of carbon source introduction away from the injection zone. RZ-2 showed a consistent increased level of dissolved manganese within introduction wells ME-6 and ME-3 in 2001 and 2002 ranging from 0.222 mg/L to 0.32 mg/L in ME-6 and 0.61 mg/L to 3.4 mg/L in ME-3. This is distinctly higher than the concentrations of dissolved manganese detected (< 0.01 mg/L) during the baseline groundwater monitoring event.

Ferric iron may also be used as an electron acceptor in reductive dechlorination reactions after the depletion of available oxygen, nitrate and manganese from the local groundwater environment, and is converted to a more soluble ferrous or "dissolved" iron in the process. Increases in dissolved iron are an important indication of the depletion of more "aerobic" electron acceptors. The aquifer bacteria community that persists at iron-reducing and lower redox levels is capable of reductive dechlorination. The observation of significant increases in dissolved iron marks the passing of an important benchmark in development of the dechlorinating reactive zone.

Strong reducing conditions were evident in RZ-1 as the dissolved iron concentrations at GM-28 (downgradient) were considerably higher than that of GM-29 (upgradient). Also, concentration

peaks for dissolved iron, observed in Figure D-10, can be directly correlated to periods of molasses injection. Similar observations were made in RZ-2 and RZ-3 West.

These dissolved metals data provide strong evidence that the effects of carbon source introductions changed the groundwater geochemistry and promoted reducing conditions in the targeted portions of the upper aquifer at the site. The less distinct effects noted within the RZ-3 areas are likely due to the larger area of the aquifer being targeted for remediation (thickness of aquifer up to 30 ft) compared to RZ-1 where the aquifer thickness is between 10 and 15 ft.

Sulfate

Under more strongly reducing conditions, sulfate can be used as an alternate electron acceptor, and in the process is reduced to elemental sulfur or sulfide. However, the phenomenon of sulfate reduction can be masked in some cases by the introduction of sulfur present in the molasses solution. The sulfate concentrations within GM-28 in RZ-1 were found to be low (18 mg/L during September 2002 sampling) or non-detectable (in 2001 and July 2002), compared to the sulfate concentrations measured in GM-29, and this provided evidence of the presence of anaerobic and reducing conditions favorable for reductive dechlorination. Similar observations were made with RZ-3 West. Though sulfate levels were high in ME-6 and ME-3 (RZ-2) in 2001, and during the first sampling event of 2002, concentrations dropped to non-detectable levels by the end of 2002, indicating use of sulfate as an alternate electron acceptor.

Dissolved Oxygen

Field-measured DO readings collected during the monitoring period indicate that DO levels within the reactive zones were, in general, relatively low (< 2 mg/L). Dissolved oxygen measurements below 2 mg/L become fairly unreliable or imprecise when measured in the field with a portable DO meter. Though higher DO levels were observed, they were more common at the introduction wells than at the monitoring wells. However, when compared with the corresponding ORP measurements, the recorded DO values can be attributed to instrumentation errors. All recorded DO values above 2 mg/L in monitoring wells located in RZ-1, RZ-2, and downgradient RZ-3 West are associated with negative ORP readings, which is indicative of reducing conditions.

Sulfides, carbon dioxide, and other dissolved gases readily exert positive interference on the DO probe. Consequently, DO probes often read 1 to 2 mg/L in very low redox waters. As such the DO data collected to date should be used in a qualitative manner, which suggests that introduction of molasses solution has maintained a low DO concentration in the reactive zones. Future sampling events will attempt to reduce these measurement problems by recommending more frequent field calibration of the DO probe during measurement events and more frequent maintenance of the DO probe when questionable data is identified (i.e., physical replacement of the DO membrane on the probe).

Oxidation/Reduction Potential

The ORP of groundwater is a measure of electron activity and is an indicator of the relative tendency of a solution to accept or transfer electrons. ORP reactions in groundwater containing organic compounds are usually biologically mediated and, therefore, the ORP of a groundwater system is dependent on and influences biodegradation. ORP measurements below 0 millivolts (mV) (i.e. negative measurements) are indicative of reducing conditions in the groundwater. The ORP readings measured during the site-wide groundwater monitoring events (Tables 18 through 21 of the Monitoring Report) indicate that reducing conditions were maintained within RZ-1, RZ-2, and RZ-3 West due to the introduction of the carbon source. For instance, within RZ-1, the ORP measurements recorded at the downgradient monitoring well GM-28 since the completion of the 6-month study in May 2000 indicates that reducing conditions were maintained with ORP readings ranging between –70 mV and –203 mV. Similar observations were made in RZ-2, where the ORP readings at GM-31 were –82 mV and –66 mV in 2001 and 2002, respectively. In well ME-3, the ORP readings ranged between –36 mV and –193 mV since the completion of the 6-month study in May 2000. Finally, in RZ-3 West, highly reducing conditions were noted in the downgradient monitoring well GM-32, where the ORP readings ranged between –152 mV and –354 mV.

In contrast to the above reactive zones, the ORP measurements recorded at the RZ-3 East downgradient monitoring well GM-21 showed positive values, indicative of non-reducing conditions. Comparing the ORP data with the recorded data for TCE indicates that carbon source solutions probably did not reach GM-21. This conclusion is corroborated with the low TOC (< 2 mg/L in 2001 and 2002) recorded at GM-21, though high TOC values were recorded in the introduction wells for RZ-3 East during the pilot test.

Bioattenuation Indicator Parameter Diagrams

Figures D-9 through D-16 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-9 and D-10 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 increase in dissolved manganese and iron coincides with the injection of molasses, with high levels of the reduced form persisting in the period between injections. Evidence of methanogenesis was also present from the increased levels of methane. Sulfate reduction was also occurring as a result of molasses injection.

Figures D-11 and D-12 illustrate conditions in RZ-2. Molasses injection was conducted only for a period of 2 months during 2001 and 2002. Despite the limited supply of carbon source, there is strong evidence of iron reduction coinciding with the injection event. Also evident is the increase in methane concentrations in the monitoring well ME-3, indicating ongoing methanogenesis.

Figures D-13 and D-14 represent the upgradient and immediate downgradient conditions in RZ-3 West, respectively. Increase in dissolved iron was found coincident with molasses injection. 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. Additionally, sulfate concentrations decreased significantly.

In contrast to the above-mentioned reactive zones, RZ-3 East (Figures D-15 and D-16) did not display the evidence of methanogenesis, sulfate reduction, or increase in the concentrations of dissolved manganese and iron. It is probable that the injected molasses did not reach the contaminated zone. Additional investigation will be conducted to optimize this zone. It is possible that the distance of downgradient monitoring well, GM-21, from the introduction wells (approximately 160 ft) and a larger aquifer targeted area for remediation (thickness of aquifer up to 30 ft) might be responsible for non-detection of evidence for reductive dechlorination in RZ-3 East.

By-products Formed

Vinyl chloride is one of the daughter products of the reductive dechlorination process of PCE and TCE. As indicated earlier, carbon injection rates can be adjusted so that the dechlorination of vinyl chloride proceeds at rates more than 20-fold greater than those for cis-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 reactive zones.

Data collected for metals during the 2000 sampling event (ARCADIS Geraghty & Miller, Inc., 2001), indicated that detected arsenic and barium concentrations exceeding Maximum Contaminant Levels (MCLs) at wells GM-28, HR-17 and/or GM-32 appear to be anomalous with respect to other data collected during this site-wide monitoring event. In particular, sampling of monitoring wells immediately downgradient of these three wells either did not detect these constituents, or detected these constituents at much lower concentrations below MCLs. Therefore, it was concluded that there is no evidence that a significant release of these inorganics to groundwater has occurred at the facilities. Additional information on arsenic and barium was presented in the Responses to U.S. EPA Items for Discussion Regarding the Site-Wide Groundwater Monitoring Plan and the Interim Measures/Corrective Measures Report by General Motors Corporation, Moraine, Ohio, dated December 10, 2002.

Higher levels of the naturally occurring arsenic and barium in groundwater may be associated with localized changes in groundwater geochemistry immediately downgradient of the in-situ reactive zone barriers. The groundwater conditions downgradient of the reactive zones are changed to a more reducing environment (i.e., the oxidation reduction potential is less than –200 mV) in order to degrade the chlorinated VOCs. This process can contribute to solubilizing arsenic bound to the naturally-occurring iron hydroxide molecule (Welch, A.H., et al, 2000). A similar process occurs for barium where it is bound to the naturally-occurring calcium carbonate present in the upper aquifer. The Dayton, Ohio area has elevated concentrations of calcium carbonate in the groundwater (CH_2M Hill, Inc., 1986). Both arsenic and barium are naturally-occurring elements in the clay-rich soils of Ohio (Shacklette, H.T. et al, 1984; Dragun, J., et al, 1991; Cox, C.A., et al, 1996). As discussed in the Monitoring Report, GM will further evaluate the occurrence of arsenic and barium.

Conclusions

The following observations can be made:

- Existing aquifer conditions have been converted to more reducing conditions 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-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-DCE to ethene and ethane, without production of significant vinyl chloride peaks.

- Collateral effects of the carbon injections caused desorption of chlorinated solvents that would have been unaffected by other remedial measures. This desorption effect is probably due to the solvent effects of fermentation products, and effects of microbial surfactants that are released into the formation.

- VOC concentrations at RZ-3 East have not responded to molasses injections, 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 injections are not yet reaching the MW-21 downgradient monitoring location.

Overall, the process of enhanced reductive dechlorination at this site has been successful in achieving the desired reduction of VOC concentrations. Additional investigation is being conducted so that suitable corrective actions can be undertaken in RZ-3 East to achieve the desired reduction in VOCs.

Figure D-1: Reductive Dechlorination at GM-29 - Upgradient Well in RZ-1

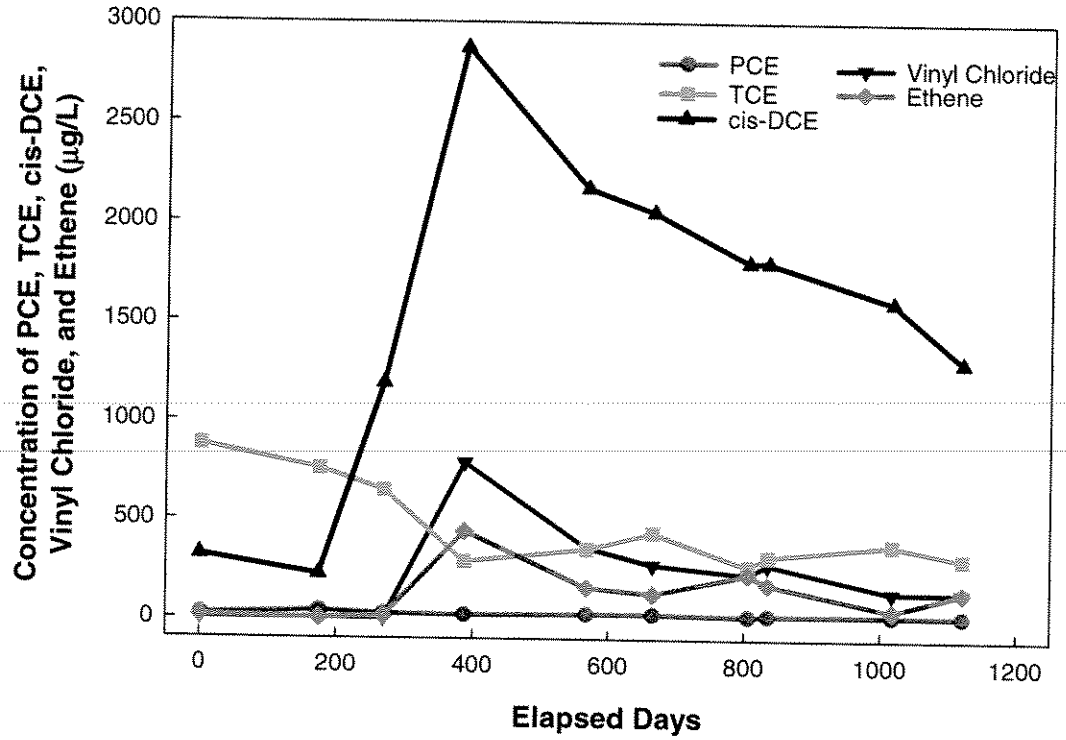


Figure D-2: Reductive Dechlorination at GM-28 - Downgradient Well in RZ-1

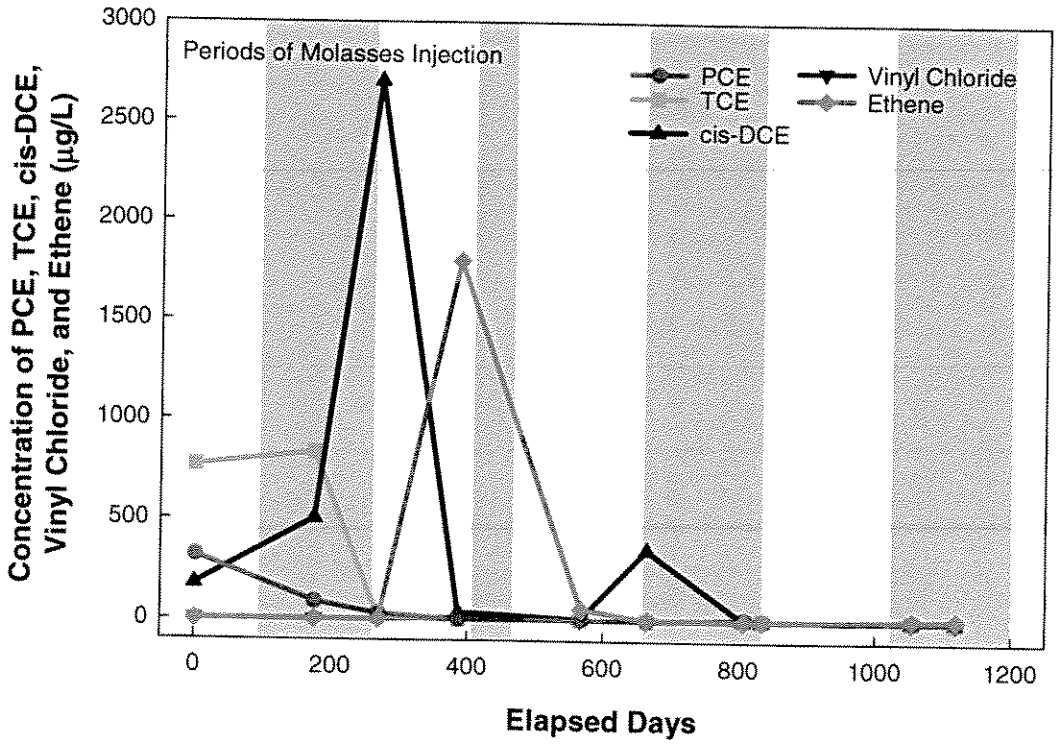


Figure D-3. Reductive Dechlorination at ME-6 - Upgradient Well in RZ-2

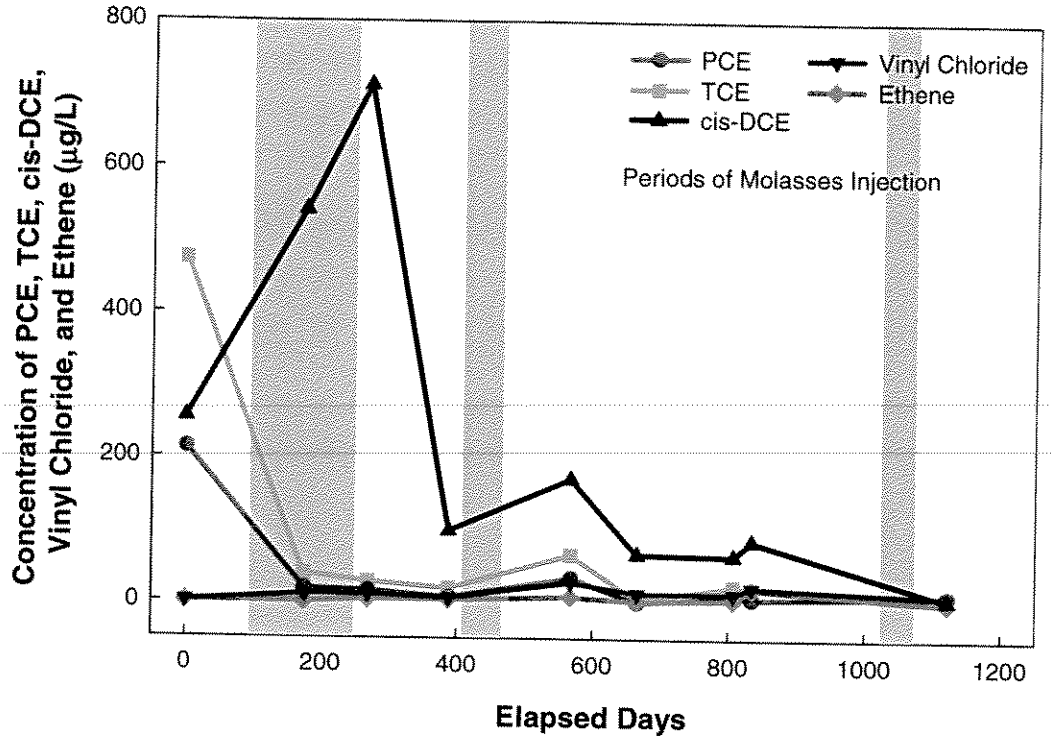


Figure D-4. Reductive Dechlorination at ME-3 - Downgradient Well in RZ-2

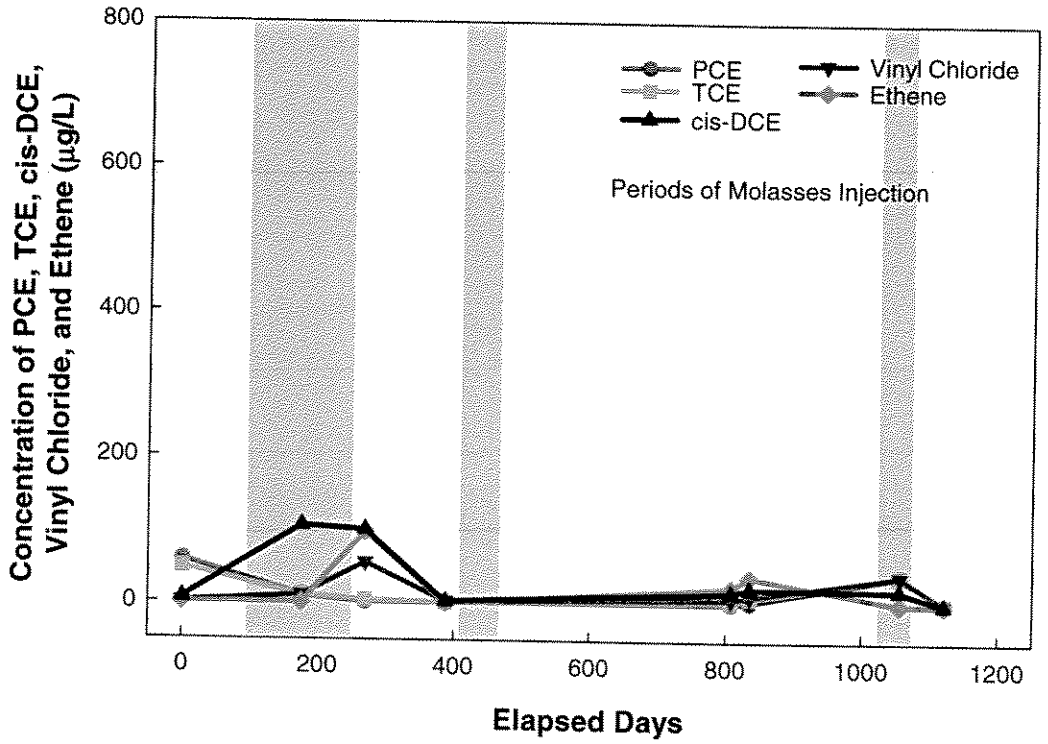


Figure D-5. Reductive Dechlorination at EAST - Upgradient Well in RZ-3 West

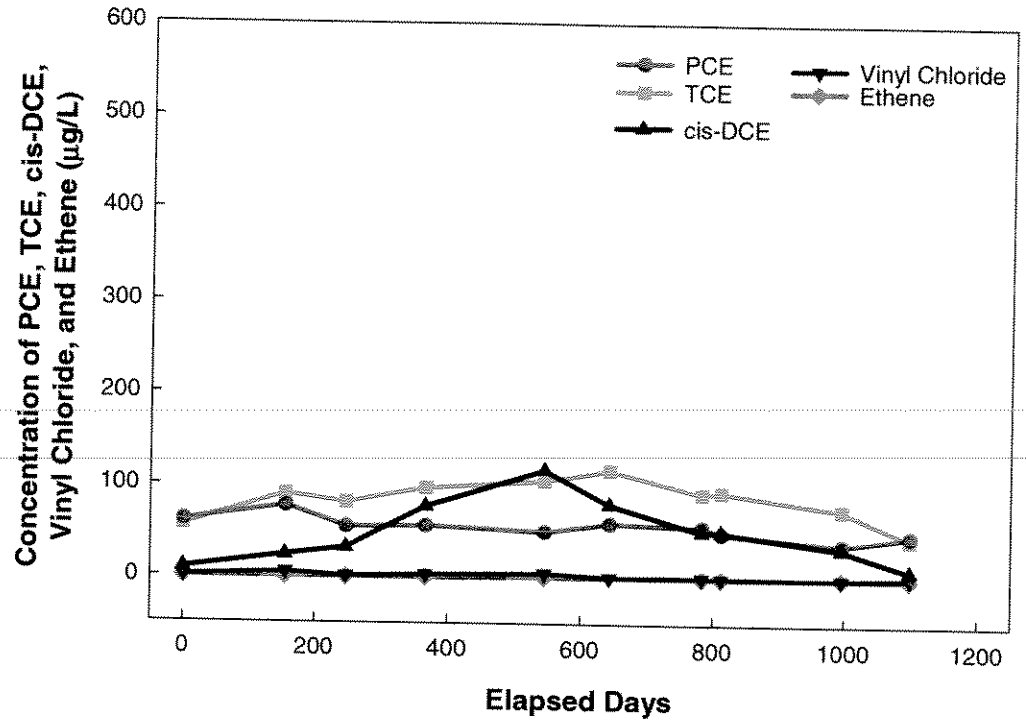


Figure D-6. Reductive Dechlorination at GM-32 - Downgradient Well in RZ-3 West

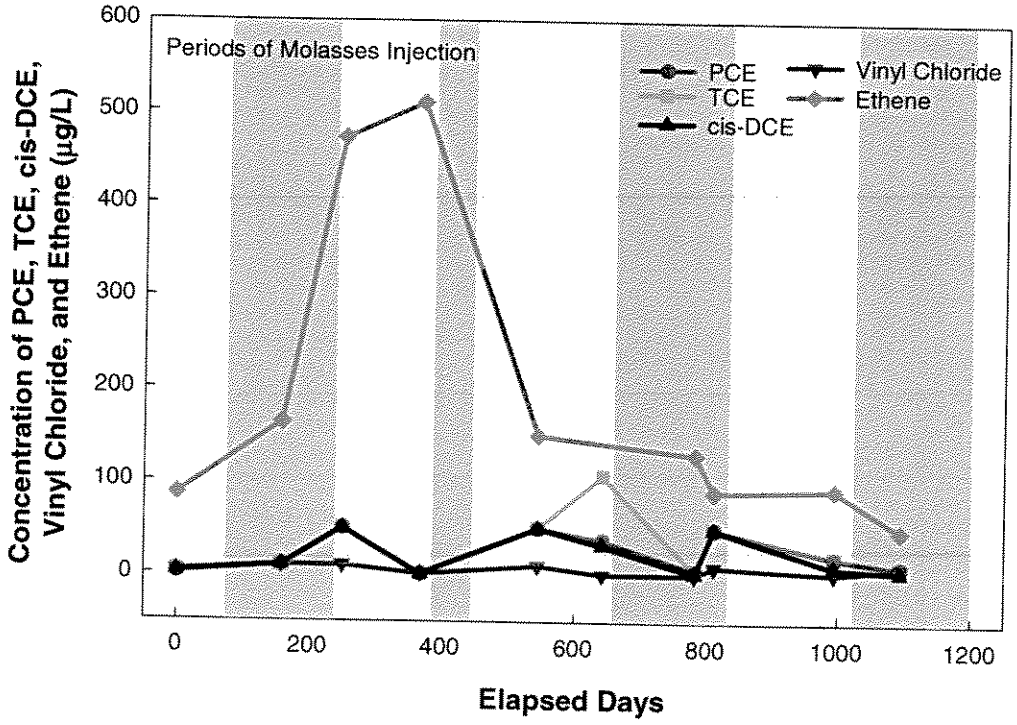


Figure D-7. Reductive Dechlorination at GM-22 - Upgradient Well in RZ-3 East

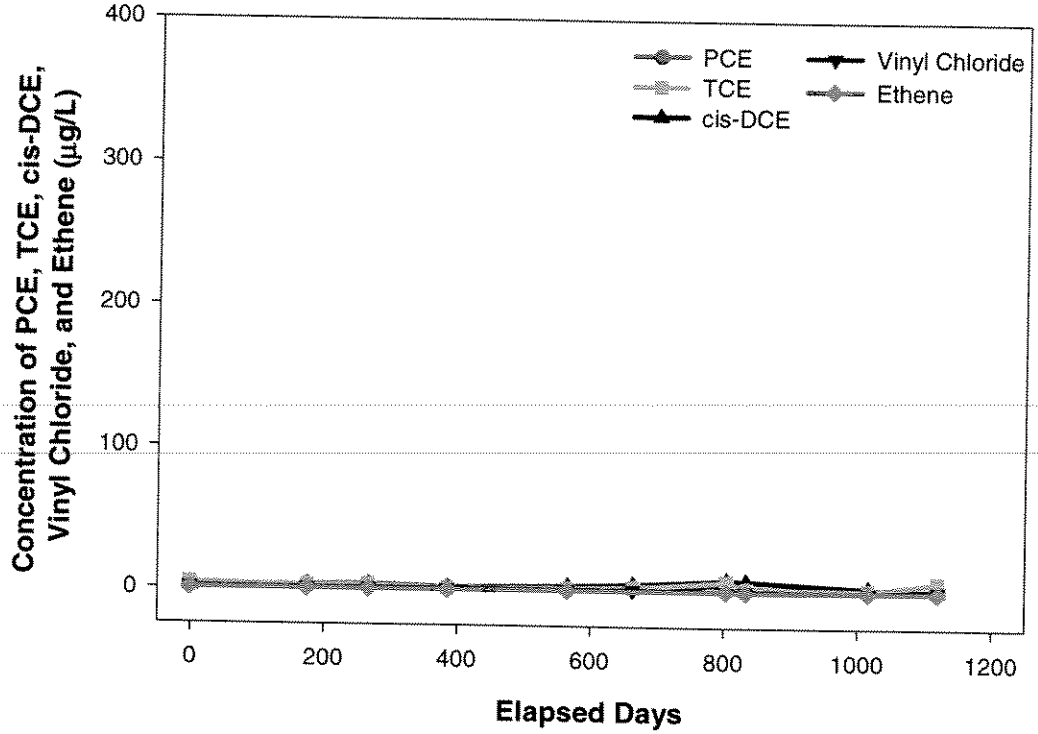


Figure D-8. Reductive Dechlorination at GM-21 - Downgradient Well in RZ-3 East

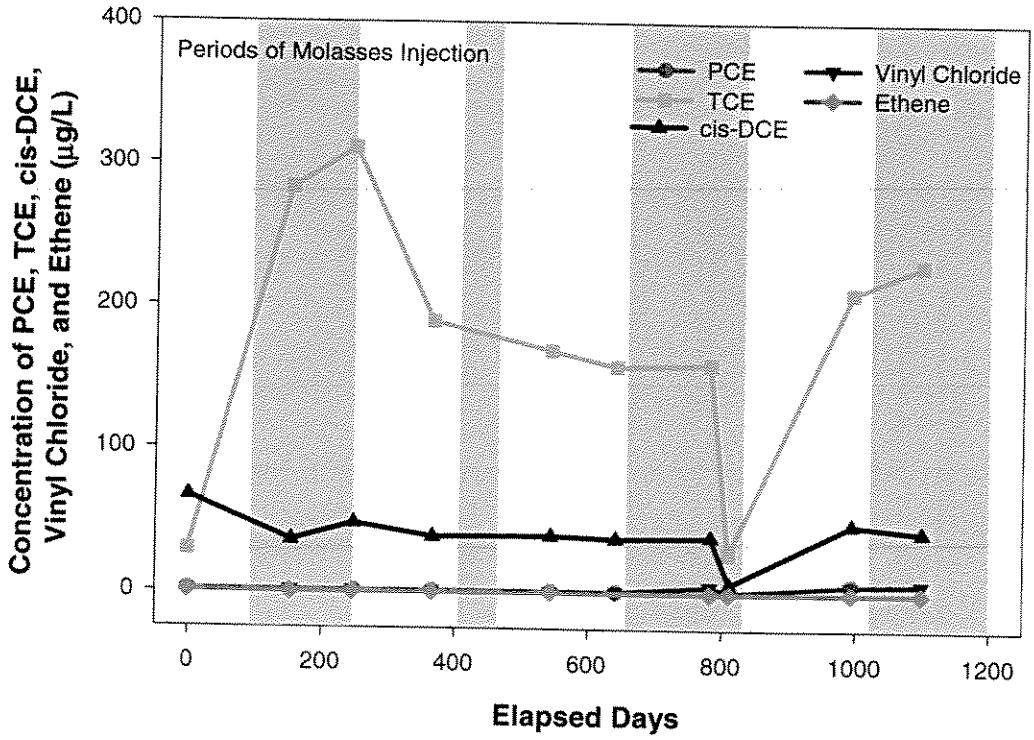


Figure D-9. Bioattenuation Parameters at GM-29 - Upgradient Well in RZ-1

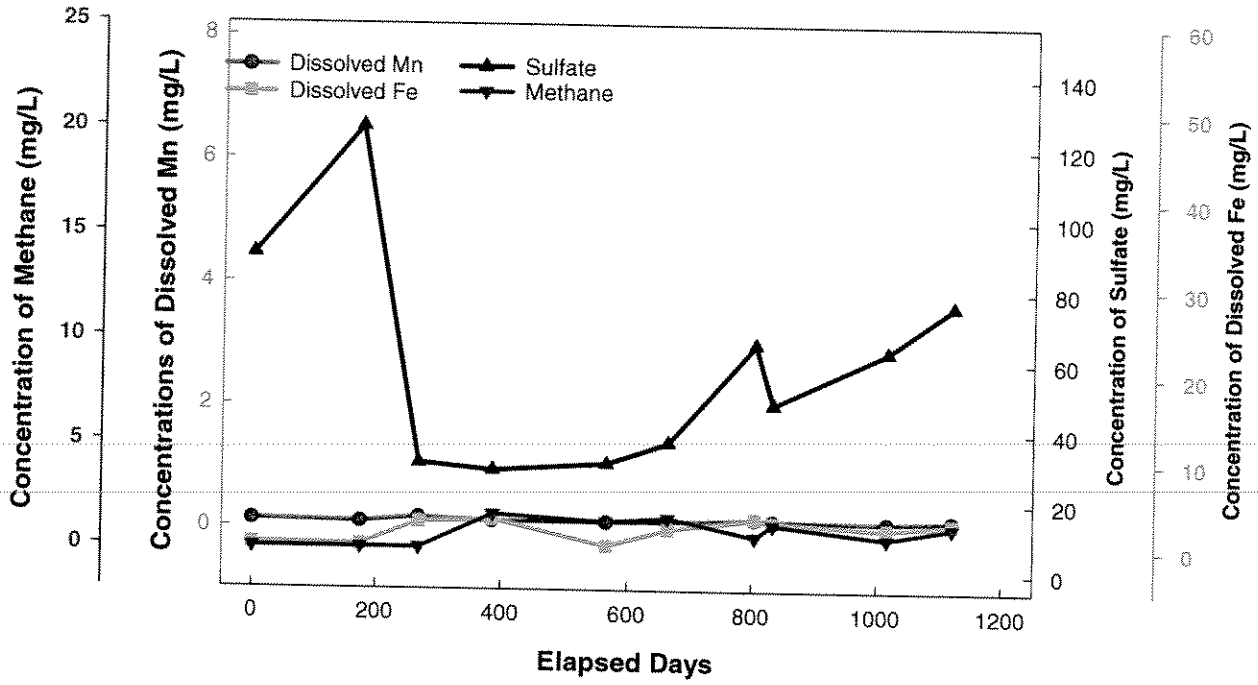


Figure D-10. Bioattenuation Parameters at GM-28 - Downgradient Well in RZ-1

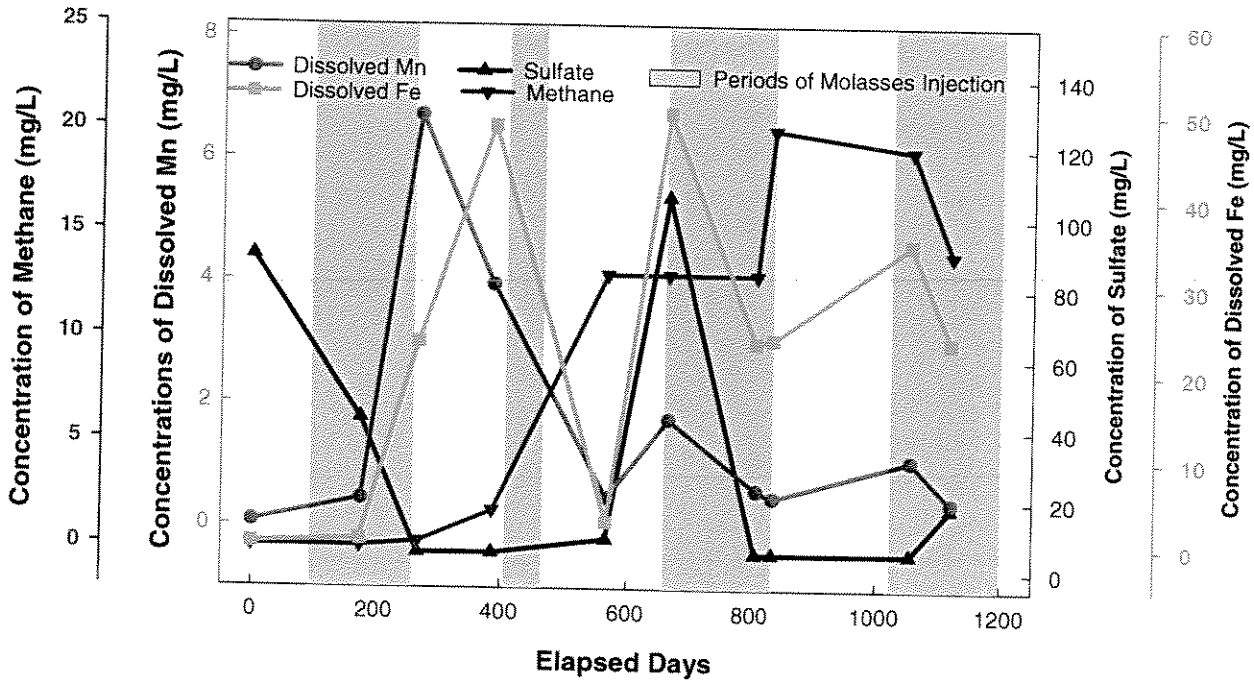


Figure D-11. Bioattenuation Parameters at ME-6 - Upgradient Well in RZ-2

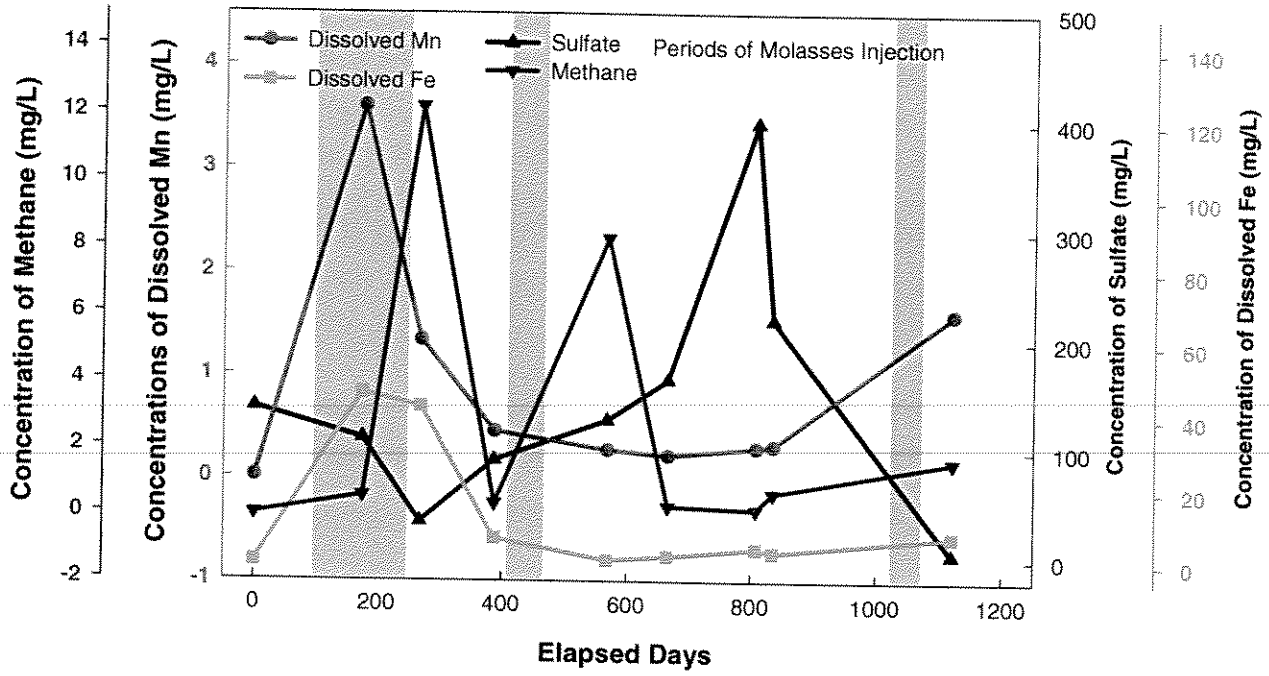


Figure D-12. Bioattenuation Parameters at ME-3 - Downgradient Well in RZ-2

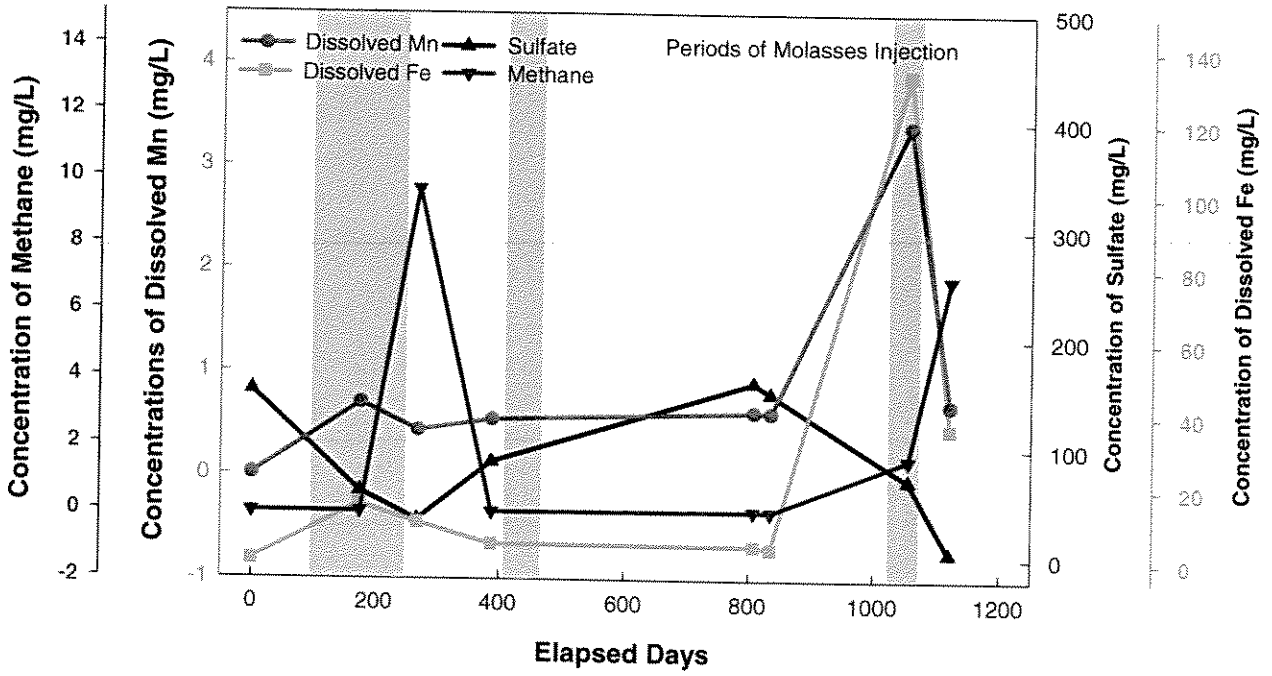


Figure D-13. Bioattenuation Parameters at EAST - Upgradient Well in RZ-3 West

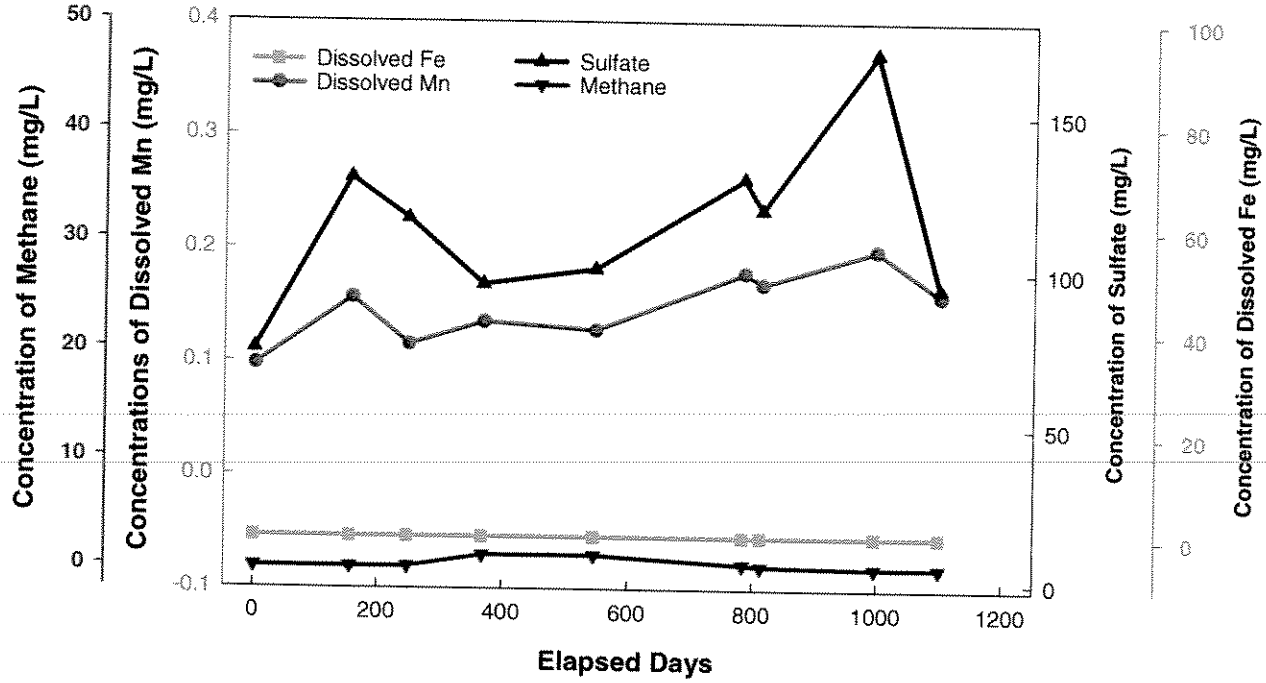


Figure D-14. Bioattenuation Parameters at GM-32 - Downgradient Well in RZ-3 West

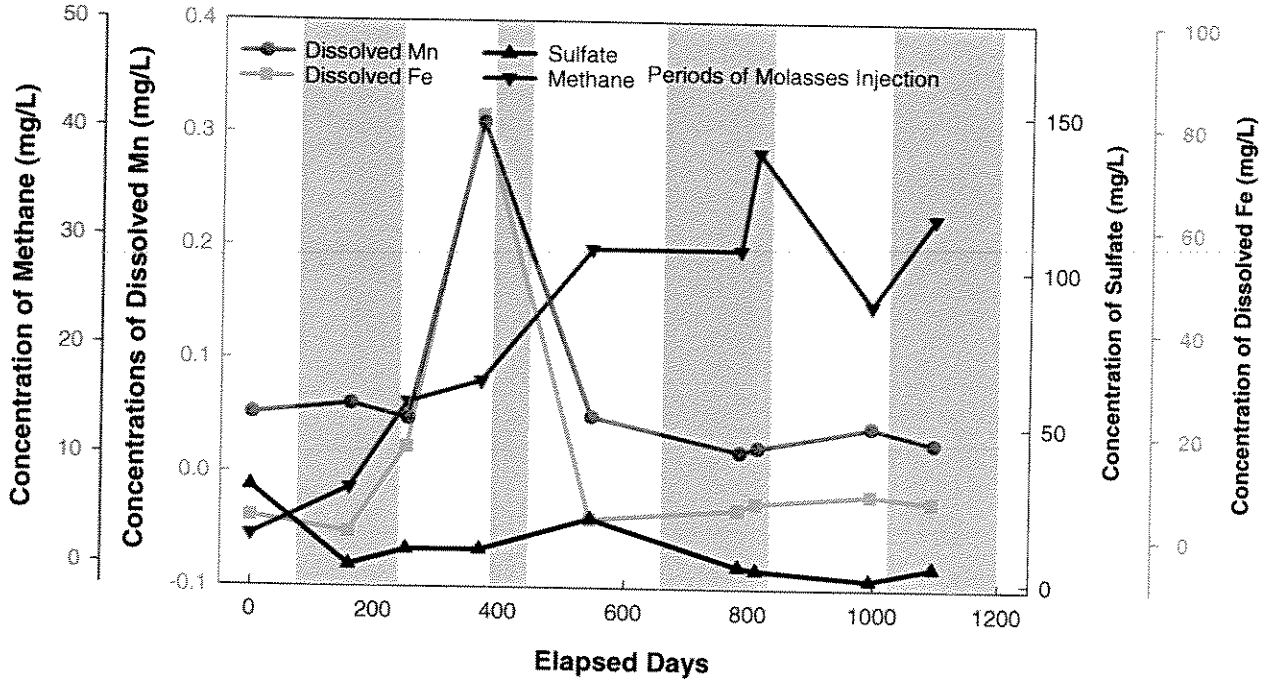


Figure D-15. Bioattenuation Parameters at GM-22 - Upgradient Well in RZ-3 East

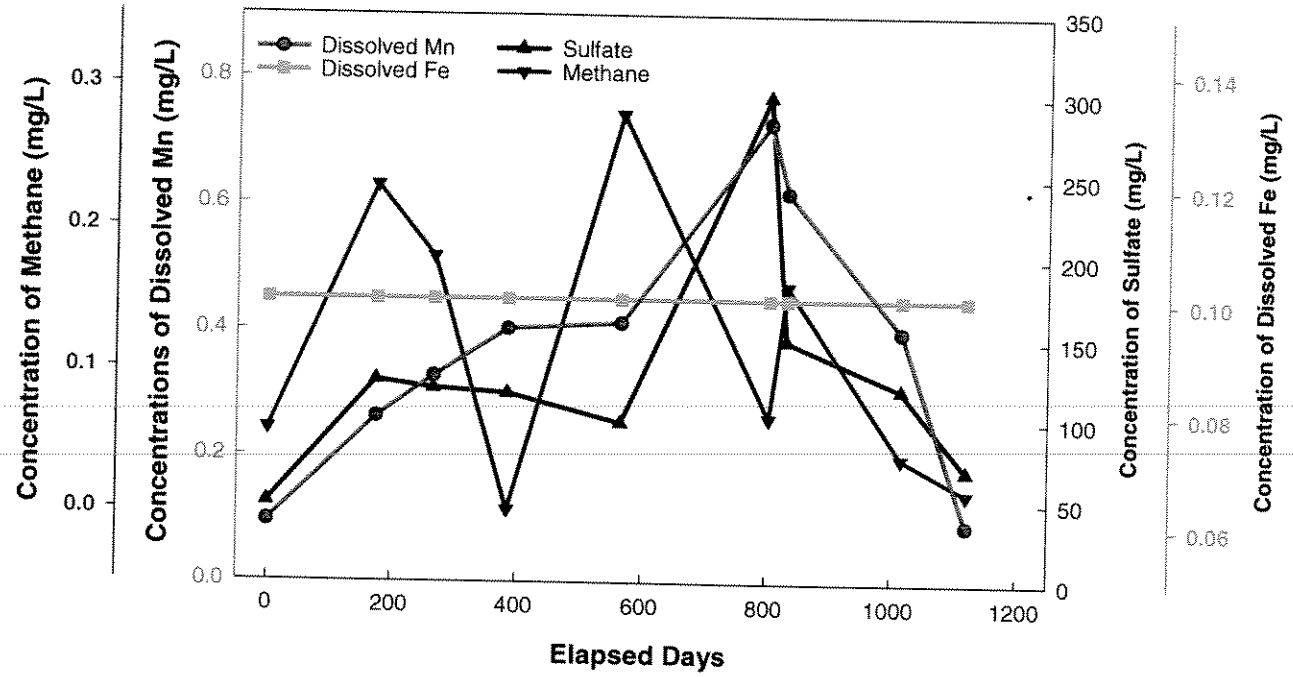
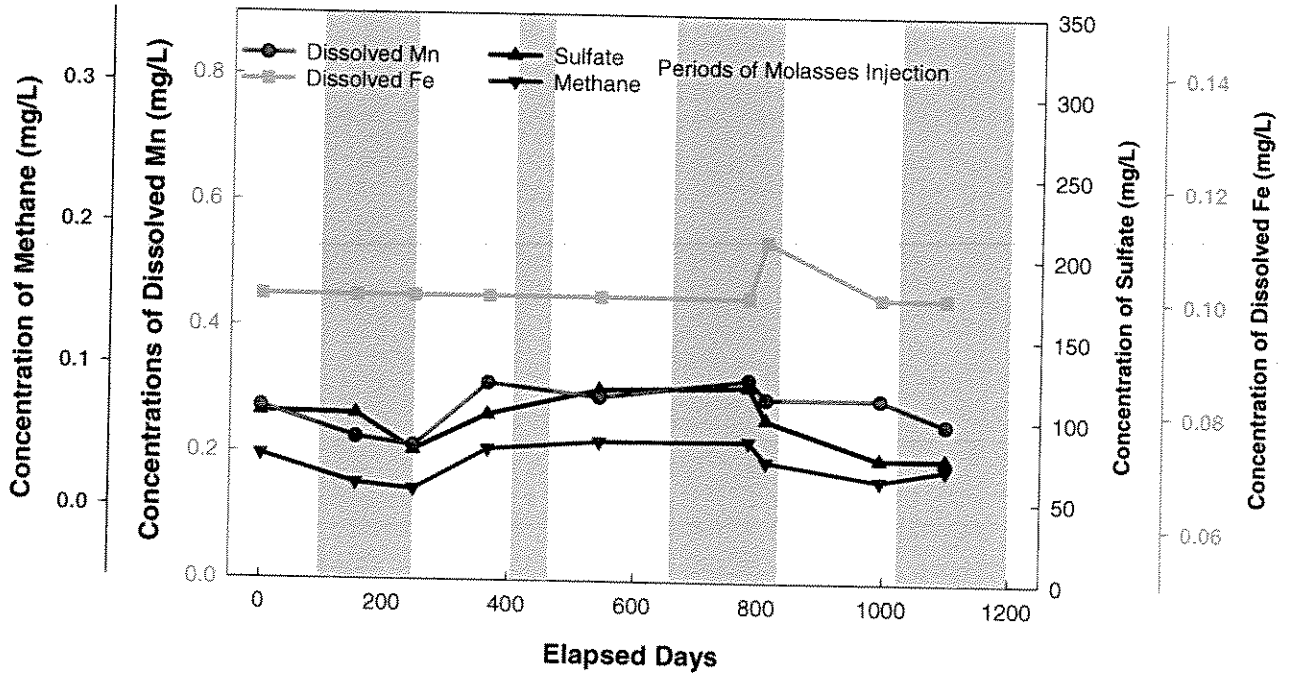


Figure D-16. Bioattenuation Parameters at GM-21 - Downgradient Well in RZ-3 East



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Appendix E

Supporting Documentation for Risk Evaluation

Supporting Calculations

Table 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 MS-15	(98,38,3)	257	4.03E-03	2.38E-06	9.61E-05	4.01E-04	1.51E-02
	MS-16 MS-17	(98,35,3)	257	3.88E-03	2.03E-06	9.20E-05	4.21E-04	2.50E-02
	MS-18 MS-19 MS-20	(100,37,3)	257	3.70E-03	1.89E-07	8.53E-05	3.42E-04	1.09E-02
	MS-21	(100,34,3)	257	3.29E-03	1.50E-07	7.65E-05	3.25E-04	1.37E-02
	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
	12B	(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 2: Source Concentrations for In-Place Waste Management Units (Based on 2001-2002 Sampling Data)

SWMU	Constituent	CASRN	Maximum Downgradient Ground Water Concentration (mg/L)
Landfill L1	1,1,1-Trichloroethane	71-55-6	0.0039
Landfill L1	1,1-Dichloroethane	75-34-3	0.06
Landfill L1	1,1-Dichloroethene	75-35-4	0.
Landfill L1	1,2-Dichloroethene (total)	540-59-0	0.
Landfill L1	2-Butanone	78-93-3	0.
Landfill L1	Acetone	67-64-1	0.
Landfill L1	Benzene	71-43-2	0.0022
Landfill L1	Carbon Disulfide	75-15-0	0.
Landfill L1	Chlorobenzene	108-90-7	0.
Landfill L1	Chloroethane	75-00-3	0.
Landfill L1	Chloroform	67-66-3	0.
Landfill L1	cis-1,2-Dichloroethene	156-59-2	0.043
Landfill L1	Ethyl Benzene	100-41-4	0.0004
Landfill L1	Styrene	100-42-5	0.
Landfill L1	Tetrachloroethene	127-18-4	0.014
Landfill L1	Toluene	108-88-3	0.
Landfill L1	trans-1,2-Dichloroethene	156-60-5	0.0086
Landfill L1	Trichloroethene	79-01-6	0.07
Landfill L1	Trichlorofluoromethane	75-69-4	0.
Landfill L1	Vinyl Chloride	75-01-4	0.012
Landfill L1	Xylenes (total)	1330-20-7	0.
Landfill L1	1,2-Dichlorobenzene	95-50-1	0.
Landfill L1	2-Methylnaphthalene	91-57-6	0.
Landfill L1	Benzo(a)anthracene	56-55-3	0.
Landfill L1	Benzo(a)pyrene	50-32-8	0.
Landfill L1	Benzo(b)fluoranthene	205-99-2	0.
Landfill L1	bis(2-Ethylhexyl)phthalate	117-81-7	0.
Landfill L1	Butylbenzylphthalate	85-68-7	0.
Landfill L1	Chrysene	218-01-9	0.
Landfill L1	Di-n-butylphthalate	84-74-2	0.
Landfill L1	Fluoranthene	206-44-0	0.
Landfill L1	Fluorene	86-73-7	0.
Landfill L1	Naphthalene	91-20-3	0.
Landfill L1	Phenanthrene	85-01-8	0.
Landfill L1	Pyrene	129-00-0	0.
Landfill L1	Aroclor-1242	53469-21-9	0.
Landfill L1	Aroclor-1254	11097-69-1	0.
Landfill L1	Aroclor-1260	11096-82-5	0.
Landfill L1	Antimony	7440-36-0	0.
Landfill L1	Arsenic	7440-38-2	0.
Landfill L1	Barium	7440-39-3	0.
Landfill L1	Beryllium	7440-41-7	0.
Landfill L1	Cadmium	7440-43-9	0.
Landfill L1	Chromium (total)	7440-47-3	0.
Landfill L1	Cobalt	7440-48-4	0.
Landfill L1	Copper	7440-50-8	0.
Landfill L1	Cyanide (total)	57-12-5	0.
Landfill L1	Lead	7439-92-1	0.
Landfill L1	Manganese	7439-96-5	0.
Landfill L1	Mercury	7439-97-6	0.
Landfill L1	Nickel	7440-02-0	0.
Landfill L1	Selenium	7782-49-2	0.
Landfill L1	Silver	7440-22-4	0.
Landfill L1	Thallium	7440-28-0	0.
Landfill L1	Vanadium	7440-62-2	0.
Landfill L1	Zinc	7440-66-6	0.

Supporting Calculations
Table 2: Source Concentrations for In-Place Waste Management Units
(Based on 2001-2002 Sampling Data)

SWMU	Constituent	CASRN	Maximum Downgradient Ground Water Concentration (mg/L)
Landfill L2	1,1,1-Trichloroethane	71-55-6	0.0004
Landfill L2	1,1-Dichloroethane	75-34-3	0.0049
Landfill L2	1,1-Dichloroethene	75-35-4	0.
Landfill L2	1,2-Dichloroethene (total)	540-59-0	0.
Landfill L2	2-Butanone	78-93-3	0.
Landfill L2	Acetone	67-64-1	0.
Landfill L2	Benzene	71-43-2	0.
Landfill L2	Carbon Disulfide	75-15-0	0.
Landfill L2	Chlorobenzene	108-90-7	0.
Landfill L2	Chloroethane	75-00-3	0.
Landfill L2	Chloroform	67-66-3	0.
Landfill L2	cis-1,2-Dichloroethene	156-59-2	0.0088
Landfill L2	Ethyl Benzene	100-41-4	0.
Landfill L2	Styrene	100-42-5	0.
Landfill L2	Tetrachloroethene	127-18-4	0.0009
Landfill L2	Toluene	108-88-3	0.
Landfill L2	trans-1,2-Dichloroethene	156-60-5	0.0012
Landfill L2	Trichloroethene	79-01-6	0.0085
Landfill L2	Trichlorofluoromethane	75-69-4	0.
Landfill L2	Vinyl Chloride	75-01-4	0.0008
Landfill L2	Xylenes (total)	1330-20-7	0.
Landfill L2	1,2-Dichlorobenzene	95-50-1	0.
Landfill L2	2-Methylnaphthalene	91-57-6	0.
Landfill L2	Benzo(a)anthracene	56-55-3	0.
Landfill L2	Benzo(a)pyrene	50-32-8	0.
Landfill L2	Benzo(b)fluoranthene	205-99-2	0.
Landfill L2	bis(2-Ethylhexyl)phthalate	117-81-7	0.
Landfill L2	Butylbenzylphthalate	85-68-7	0.
Landfill L2	Chrysene	218-01-9	0.
Landfill L2	Di-n-butylphthalate	84-74-2	0.
Landfill L2	Fluoranthene	206-44-0	0.
Landfill L2	Fluorene	86-73-7	0.
Landfill L2	Naphthalene	91-20-3	0.
Landfill L2	Phenanthrene	85-01-8	0.
Landfill L2	Pyrene	129-00-0	0.
Landfill L2	Aroclor-1242	53469-21-9	0.
Landfill L2	Aroclor-1254	11097-69-1	0.
Landfill L2	Aroclor-1260	11096-82-5	0.
Landfill L2	Antimony	7440-36-0	0.
Landfill L2	Arsenic	7440-38-2	0.
Landfill L2	Barium	7440-39-3	0.
Landfill L2	Beryllium	7440-41-7	0.
Landfill L2	Cadmium	7440-43-9	0.
Landfill L2	Chromium (total)	7440-47-3	0.
Landfill L2	Cobalt	7440-48-4	0.
Landfill L2	Copper	7440-50-8	0.
Landfill L2	Cyanide (total)	57-12-5	0.
Landfill L2	Lead	7439-92-1	0.
Landfill L2	Manganese	7439-96-5	0.
Landfill L2	Mercury	7439-97-6	0.
Landfill L2	Nickel	7440-02-0	0.
Landfill L2	Selenium	7782-49-2	0.
Landfill L2	Silver	7440-22-4	0.
Landfill L2	Thallium	7440-28-0	0.
Landfill L2	Vanadium	7440-62-2	0.
Landfill L2	Zinc	7440-66-6	0.

Supporting Calculations
Table 2: Source Concentrations for In-Place Waste Management Units
(Based on 2001-2002 Sampling Data)

SWMU	Constituent	CASRN	Maximum Downgradient Ground Water Concentration (mg/L)
Landfill L3	1,1,1-Trichloroethane	71-55-6	0.0004
Landfill L3	1,1-Dichloroethane	75-34-3	0.0049
Landfill L3	1,1-Dichloroethene	75-35-4	0.
Landfill L3	1,2-Dichloroethene (total)	540-59-0	0.
Landfill L3	2-Butanone	78-93-3	0.
Landfill L3	Acetone	67-64-1	0.
Landfill L3	Benzene	71-43-2	0.
Landfill L3	Carbon Disulfide	75-15-0	0.
Landfill L3	Chlorobenzene	108-90-7	0.
Landfill L3	Chloroethane	75-00-3	0.
Landfill L3	Chloroform	67-66-3	0.
Landfill L3	cis-1,2-Dichloroethene	156-59-2	0.0088
Landfill L3	Ethyl Benzene	100-41-4	0.
Landfill L3	Styrene	100-42-5	0.
Landfill L3	Tetrachloroethene	127-18-4	0.0009
Landfill L3	Toluene	108-88-3	0.
Landfill L3	trans-1,2-Dichloroethene	156-60-5	0.0012
Landfill L3	Trichloroethene	79-01-6	0.0085
Landfill L3	Trichlorofluoromethane	75-69-4	0.
Landfill L3	Vinyl Chloride	75-01-4	0.0008
Landfill L3	Xylenes (total)	1330-20-7	0.
Landfill L3	1,2-Dichlorobenzene	95-50-1	0.
Landfill L3	2-Methylnaphthalene	91-57-6	0.
Landfill L3	Benzo(a)anthracene	56-55-3	0.
Landfill L3	Benzo(a)pyrene	50-32-8	0.
Landfill L3	Benzo(b)fluoranthene	205-99-2	0.
Landfill L3	bis(2-Ethylhexyl)phthalate	117-81-7	0.
Landfill L3	Butylbenzylphthalate	85-68-7	0.
Landfill L3	Chrysene	218-01-9	0.
Landfill L3	Di-n-butylphthalate	84-74-2	0.
Landfill L3	Fluoranthene	206-44-0	0.
Landfill L3	Fluorene	86-73-7	0.
Landfill L3	Naphthalene	91-20-3	0.
Landfill L3	Phenanthrene	85-01-8	0.
Landfill L3	Pyrene	129-00-0	0.
Landfill L3	Aroclor-1242	53469-21-9	0.
Landfill L3	Aroclor-1254	11097-69-1	0.
Landfill L3	Aroclor-1260	11096-82-5	0.
Landfill L3	Antimony	7440-36-0	0.
Landfill L3	Arsenic	7440-38-2	0.
Landfill L3	Barium	7440-39-3	0.
Landfill L3	Beryllium	7440-41-7	0.
Landfill L3	Cadmium	7440-43-9	0.
Landfill L3	Chromium (total)	7440-47-3	0.
Landfill L3	Cobalt	7440-48-4	0.
Landfill L3	Copper	7440-50-8	0.
Landfill L3	Cyanide (total)	57-12-5	0.
Landfill L3	Lead	7439-92-1	0.
Landfill L3	Manganese	7439-96-5	0.
Landfill L3	Mercury	7439-97-6	0.
Landfill L3	Nickel	7440-02-0	0.
Landfill L3	Selenium	7782-49-2	0.
Landfill L3	Silver	7440-22-4	0.
Landfill L3	Thallium	7440-28-0	0.
Landfill L3	Vanadium	7440-62-2	0.
Landfill L3	Zinc	7440-66-6	0.

Supporting Calculations
Table 2: Source Concentrations for In-Place Waste Management Units
(Based on 2001-2002 Sampling Data)

SWMU	Constituent	CASRN	Maximum Downgradient Ground Water Concentration (mg/L)
North Settling Lagoon	1,1,1-Trichloroethane	71-55-6	0.0005
North Settling Lagoon	1,1-Dichloroethane	75-34-3	0.0017
North Settling Lagoon	1,1-Dichloroethene	75-35-4	0.
North Settling Lagoon	1,2-Dichloroethene (total)	540-59-0	0.
North Settling Lagoon	2-Butanone	78-93-3	0.
North Settling Lagoon	Acetone	67-64-1	0.
North Settling Lagoon	Benzene	71-43-2	0.
North Settling Lagoon	Carbon Disulfide	75-15-0	0.
North Settling Lagoon	Chlorobenzene	108-90-7	0.
North Settling Lagoon	Chloroethane	75-00-3	0.
North Settling Lagoon	Chloroform	67-66-3	0.
North Settling Lagoon	cis-1,2-Dichloroethene	156-59-2	0.16
North Settling Lagoon	Ethyl Benzene	100-41-4	0.
North Settling Lagoon	Styrene	100-42-5	0.
North Settling Lagoon	Tetrachloroethene	127-18-4	0.009
North Settling Lagoon	Toluene	108-88-3	0.
North Settling Lagoon	trans-1,2-Dichloroethene	156-60-5	0.0022
North Settling Lagoon	Trichloroethene	79-01-6	0.013
North Settling Lagoon	Trichlorofluoromethane	75-69-4	0.
North Settling Lagoon	Vinyl Chloride	75-01-4	0.0076
North Settling Lagoon	Xylenes (total)	1330-20-7	0.
North Settling Lagoon	1,2-Dichlorobenzene	95-50-1	0.
North Settling Lagoon	2-Methylnaphthalene	91-57-6	0.
North Settling Lagoon	Benzo(a)anthracene	56-55-3	0.
North Settling Lagoon	Benzo(a)pyrene	50-32-8	0.
North Settling Lagoon	Benzo(b)fluoranthene	205-99-2	0.
North Settling Lagoon	bis(2-Ethylhexyl)phthalate	117-81-7	0.
North Settling Lagoon	Butylbenzylphthalate	85-68-7	0.
North Settling Lagoon	Chrysene	218-01-9	0.
North Settling Lagoon	Di-n-butylphthalate	84-74-2	0.
North Settling Lagoon	Fluoranthene	206-44-0	0.
North Settling Lagoon	Fluorene	86-73-7	0.
North Settling Lagoon	Naphthalene	91-20-3	0.
North Settling Lagoon	Phenanthrene	85-01-8	0.
North Settling Lagoon	Pyrene	129-00-0	0.
North Settling Lagoon	Aroclor-1242	53469-21-9	0.
North Settling Lagoon	Aroclor-1254	11097-69-1	0.
North Settling Lagoon	Aroclor-1260	11096-82-5	0.
North Settling Lagoon	Antimony	7440-36-0	0.
North Settling Lagoon	Arsenic	7440-38-2	0.
North Settling Lagoon	Barium	7440-39-3	0.
North Settling Lagoon	Beryllium	7440-41-7	0.
North Settling Lagoon	Cadmium	7440-43-9	0.
North Settling Lagoon	Chromium (total)	7440-47-3	0.
North Settling Lagoon	Cobalt	7440-48-4	0.
North Settling Lagoon	Copper	7440-50-8	0.
North Settling Lagoon	Cyanide (total)	57-12-5	0.
North Settling Lagoon	Lead	7439-92-1	0.
North Settling Lagoon	Manganese	7439-96-5	0.
North Settling Lagoon	Mercury	7439-97-6	0.
North Settling Lagoon	Nickel	7440-02-0	0.
North Settling Lagoon	Selenium	7782-49-2	0.
North Settling Lagoon	Silver	7440-22-4	0.
North Settling Lagoon	Thallium	7440-28-0	0.
North Settling Lagoon	Vanadium	7440-62-2	0.
North Settling Lagoon	Zinc	7440-66-6	0.

Supporting Calculations
Table 2: Source Concentrations for In-Place Waste Management Units
(Based on 2001-2002 Sampling Data)

SWMU	Constituent	CASRN	Maximum Downgradient Ground Water Concentration (mg/L)
South Settling Lagoon	1,1,1-Trichloroethane	71-55-6	0.0029
South Settling Lagoon	1,1-Dichloroethane	75-34-3	0.0011
South Settling Lagoon	1,1-Dichloroethene	75-35-4	0.
South Settling Lagoon	1,2-Dichloroethene (total)	540-59-0	0.
South Settling Lagoon	2-Butanone	78-93-3	0.
South Settling Lagoon	Acetone	67-64-1	0.
South Settling Lagoon	Benzene	71-43-2	0.
South Settling Lagoon	Carbon Disulfide	75-15-0	0.
South Settling Lagoon	Chlorobenzene	108-90-7	0.
South Settling Lagoon	Chloroethane	75-00-3	0.
South Settling Lagoon	Chloroform	67-66-3	0.
South Settling Lagoon	cis-1,2-Dichloroethene	156-59-2	0.0036
South Settling Lagoon	Ethyl Benzene	100-41-4	0.
South Settling Lagoon	Styrene	100-42-5	0.
South Settling Lagoon	Tetrachloroethene	127-18-4	0.017
South Settling Lagoon	Toluene	108-88-3	0.
South Settling Lagoon	trans-1,2-Dichloroethene	156-60-5	0.0006
South Settling Lagoon	Trichloroethene	79-01-6	0.0098
South Settling Lagoon	Trichlorofluoromethane	75-69-4	0.
South Settling Lagoon	Vinyl Chloride	75-01-4	0.
South Settling Lagoon	Xylenes (total)	1330-20-7	0.
South Settling Lagoon	1,2-Dichlorobenzene	95-50-1	0.
South Settling Lagoon	2-Methylnaphthalene	91-57-6	0.
South Settling Lagoon	Benzo(a)anthracene	56-55-3	0.
South Settling Lagoon	Benzo(a)pyrene	50-32-8	0.
South Settling Lagoon	Benzo(b)fluoranthene	205-99-2	0.
South Settling Lagoon	bis(2-Ethylhexyl)phthalate	117-81-7	0.
South Settling Lagoon	Butylbenzylphthalate	85-68-7	0.
South Settling Lagoon	Chrysene	218-01-9	0.
South Settling Lagoon	Di-n-butylphthalate	84-74-2	0.
South Settling Lagoon	Fluoranthene	206-44-0	0.
South Settling Lagoon	Fluorene	86-73-7	0.
South Settling Lagoon	Naphthalene	91-20-3	0.
South Settling Lagoon	Phenanthrene	85-01-8	0.
South Settling Lagoon	Pyrene	129-00-0	0.
South Settling Lagoon	Aroclor-1242	53469-21-9	0.
South Settling Lagoon	Aroclor-1254	11097-69-1	0.
South Settling Lagoon	Aroclor-1260	11096-82-5	0.
South Settling Lagoon	Antimony	7440-36-0	0.
South Settling Lagoon	Arsenic	7440-38-2	0.
South Settling Lagoon	Barium	7440-39-3	0.
South Settling Lagoon	Beryllium	7440-41-7	0.
South Settling Lagoon	Cadmium	7440-43-9	0.
South Settling Lagoon	Chromium (total)	7440-47-3	0.
South Settling Lagoon	Cobalt	7440-48-4	0.
South Settling Lagoon	Copper	7440-50-8	0.
South Settling Lagoon	Cyanide (total)	57-12-5	0.
South Settling Lagoon	Lead	7439-92-1	0.
South Settling Lagoon	Manganese	7439-96-5	0.
South Settling Lagoon	Mercury	7439-97-6	0.
South Settling Lagoon	Nickel	7440-02-0	0.
South Settling Lagoon	Selenium	7782-49-2	0.
South Settling Lagoon	Silver	7440-22-4	0.
South Settling Lagoon	Thallium	7440-28-0	0.
South Settling Lagoon	Vanadium	7440-62-2	0.
South Settling Lagoon	Zinc	7440-66-6	0.

Supporting Calculations

Table 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	0.00E+00	4.34E-06	1.77E-07	1.32E-08	0.00E+00	0.	0.2	
VOC	1,1-Dichloroethane	75-34-3	0.00E+00	4.83E-05	1.97E-06	4.69E-08	0.00E+00	0.0001	3.65	
VOC	1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.007	
VOC	1,2-Dichloroethene (total)	540-59-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.07	
VOC	2-Butanone	78-93-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	21.9	
VOC	Acetone	67-64-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	3.65	
VOC	Benzene	71-43-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.005	
VOC	Carbon Disulfide	75-15-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	3.65	
VOC	Chlorobenzene	108-90-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
VOC	Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.01	
VOC	Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
VOC	cis-1,2-Dichloroethene	156-59-2	0.00E+00	8.67E-05	3.54E-06	4.41E-06	0.00E+00	0.0001	0.07	
VOC	Ethyl Benzene	100-41-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.7	
VOC	Styrene	100-42-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
VOC	Tetrachloroethene	127-18-4	0.00E+00	9.26E-06	3.79E-07	2.48E-07	0.00E+00	0.	0.005	
VOC	Toluene	108-88-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.	
VOC	trans-1,2-Dichloroethene	156-60-5	0.00E+00	1.18E-05	4.83E-07	6.07E-08	0.00E+00	0.	0.1	
VOC	Trichloroethene	79-01-6	0.00E+00	8.38E-05	3.42E-06	3.58E-07	0.00E+00	0.0001	0.005	
VOC	Trichlorofluoromethane	75-69-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	10.95	
VOC	Vinyl Chloride	75-01-4	0.00E+00	7.59E-06	3.10E-07	2.10E-07	0.00E+00	0.	0.002	
VOC	Xylenes (total)	1330-20-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	10.	
SVOC	1,2-Dichlorobenzene	95-50-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.6	
SVOC	2-Methylnaphthalene	91-57-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.73	
SVOC	Benzo(a)anthracene	56-55-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.01	
SVOC	Benzo(a)pyrene	50-32-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0002	
SVOC	Benzo(b)fluoranthene	205-99-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.01	
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.006	
SVOC	Butylbenzylphthalate	85-68-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	7.3	
SVOC	Chrysene	218-01-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0117	
SVOC	Di-n-butylphthalate	84-74-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	3.65	
SVOC	Fluoranthene	206-44-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.46	
SVOC	Fluorene	86-73-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.46	
SVOC	Naphthalene	91-20-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.73	
SVOC	Phenanthrene	85-01-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.095	
SVOC	Pyrene	129-00-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.095	
P/PCB	Aroclor-1242	53469-21-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0005	
P/PCB	Aroclor-1254	11097-69-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0	0.0005	
P/PCB	Aroclor-1260	11096-82-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0005	
INORG	Antimony	7440-36-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.006	
INORG	Arsenic	7440-38-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.05	
INORG	Barium	7440-39-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	2.	
INORG	Beryllium	7440-41-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.004	
INORG	Cadmium	7440-43-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.005	
INORG	Chromium (total)	7440-47-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
INORG	Cobalt	7440-48-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	2.19	
INORG	Copper	7440-50-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.3	
INORG	Cyanide (total)	57-12-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.2	
INORG	Lead	7439-92-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.015	
INORG	Manganese	7439-96-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	5.11	
INORG	Mercury	7439-97-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.002	
INORG	Nickel	7440-02-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
INORG	Selenium	7782-49-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.05	
INORG	Silver	7440-22-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1825	
INORG	Thallium	7440-28-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.002	
INORG	Vanadium	7440-62-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.2555	
INORG	Zinc	7440-66-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	10.95	

Supporting Calculations

Table 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	0.00E+00	3.64E-06	3.69E-07	8.84E-09	0.00E+00	0.	0.2	
VOC	1,1-Dichloroethane	75-34-3	0.00E+00	4.05E-05	4.11E-06	3.13E-08	0.00E+00	0.	3.65	
VOC	1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.007	
VOC	1,2-Dichloroethene (total)	540-59-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.07	
VOC	2-Butanone	78-93-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	21.9	
VOC	Acetone	67-64-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	3.65	
VOC	Benzene	71-43-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.005	
VOC	Carbon Disulfide	75-15-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	3.65	
VOC	Chlorobenzene	108-90-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
VOC	Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.01	
VOC	Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
VOC	cis-1,2-Dichloroethene	156-59-2	0.00E+00	7.27E-05	7.39E-06	2.95E-06	0.00E+00	0.0001	0.07	
VOC	Ethyl Benzene	100-41-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.7	
VOC	Styrene	100-42-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
VOC	Tetrachloroethene	127-18-4	0.00E+00	7.77E-06	7.89E-07	1.66E-07	0.00E+00	0.	0.005	
VOC	Toluene	108-88-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.	
VOC	trans-1,2-Dichloroethene	156-60-5	0.00E+00	9.91E-06	1.01E-06	4.05E-08	0.00E+00	0.	0.1	
VOC	Trichloroethene	79-01-6	0.00E+00	7.02E-05	7.13E-06	2.39E-07	0.00E+00	0.0001	0.005	
VOC	Trichlorofluoromethane	75-69-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	10.95	
VOC	Vinyl Chloride	75-01-4	0.00E+00	6.36E-06	6.46E-07	1.40E-07	0.00E+00	0.	0.002	
VOC	Xylenes (total)	1330-20-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	10.	
SVOC	1,2-Dichlorobenzene	95-50-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.6	
SVOC	2-Methylnaphthalene	91-57-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.73	
SVOC	Benzo(a)anthracene	56-55-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.01	
SVOC	Benzo(a)pyrene	50-32-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0002	
SVOC	Benzo(b)fluoranthene	205-99-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.01	
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.006	
SVOC	Butylbenzylphthalate	85-68-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	7.3	
SVOC	Chrysene	218-01-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0117	
SVOC	Di-n-butylphthalate	84-74-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	3.65	
SVOC	Fluoranthene	206-44-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.46	
SVOC	Fluorene	86-73-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.46	
SVOC	Naphthalene	91-20-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.73	
SVOC	Phenanthrene	85-01-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.095	
SVOC	Pyrene	129-00-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.095	
P/PCB	Aroclor-1242	53469-21-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0005	
P/PCB	Aroclor-1254	11097-69-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0005	
P/PCB	Aroclor-1260	11096-82-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0005	
INORG	Antimony	7440-36-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.006	
INORG	Arsenic	7440-38-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.05	
INORG	Barium	7440-39-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	2.	
INORG	Beryllium	7440-41-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.004	
INORG	Cadmium	7440-43-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.005	
INORG	Chromium (total)	7440-47-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
INORG	Cobalt	7440-48-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	2.19	
INORG	Copper	7440-50-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.3	
INORG	Cyanide (total)	57-12-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.2	
INORG	Lead	7439-92-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.015	
INORG	Manganese	7439-96-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	5.11	
INORG	Mercury	7439-97-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.002	
INORG	Nickel	7440-02-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
INORG	Selenium	7782-49-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.05	
INORG	Silver	7440-22-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1825	
INORG	Thallium	7440-28-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.002	
INORG	Vanadium	7440-62-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.2555	
INORG	Zinc	7440-66-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	10.95	

Supporting Calculations

Table 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	1.50E-06	2.64E-13	0.00E+00	3.26E-10	1.07E-05	0.	0.2	
VOC	1,1-Dichloroethane	75-34-3	2.31E-05	2.94E-12	0.00E+00	1.16E-09	4.04E-06	0.	3.65	
VOC	1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.007	
VOC	1,2-Dichloroethene (total)	540-59-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.07	
VOC	2-Butanone	78-93-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	21.9	
VOC	Acetone	67-64-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	3.65	
VOC	Benzene	71-43-2	8.46E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.005	
VOC	Carbon Disulfide	75-15-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	3.65	
VOC	Chlorobenzene	108-90-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
VOC	Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.01	
VOC	Chloroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
VOC	cis-1,2-Dichloroethene	156-59-2	1.65E-05	5.28E-12	0.00E+00	1.09E-07	1.32E-05	0.	0.07	
VOC	Ethyl Benzene	100-41-4	1.46E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.7	
VOC	Styrene	100-42-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
VOC	Tetrachloroethene	127-18-4	5.38E-06	5.64E-13	0.00E+00	6.12E-09	6.25E-05	0.0001	0.005	
VOC	Toluene	108-88-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.	
VOC	trans-1,2-Dichloroethene	156-60-5	3.31E-06	7.20E-13	0.00E+00	1.50E-09	2.21E-06	0.	0.1	
VOC	Trichloroethene	79-01-6	2.69E-05	5.10E-12	0.00E+00	8.84E-09	3.60E-05	0.0001	0.005	
VOC	Trichlorofluoromethane	75-69-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	10.95	
VOC	Vinyl Chloride	75-01-4	4.61E-06	4.62E-13	0.00E+00	5.17E-09	0.00E+00	0.	0.002	
VOC	Xylenes (total)	1330-20-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	10.	
SVOC	1,2-Dichlorobenzene	95-50-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.6	
SVOC	2-Methylnaphthalene	91-57-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.73	
SVOC	Benzo(a)anthracene	56-55-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.01	
SVOC	Benzo(a)pyrene	50-32-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0002	
SVOC	Benzo(b)fluoranthene	205-99-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.01	
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.006	
SVOC	Butylbenzylphthalate	85-68-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	7.3	
SVOC	Chrysene	218-01-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0117	
SVOC	Di-n-butylphthalate	84-74-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	3.65	
SVOC	Fluoranthene	206-44-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.46	
SVOC	Fluorene	86-73-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.46	
SVOC	Naphthalene	91-20-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.73	
SVOC	Phenanthrene	85-01-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.095	
SVOC	Pyrene	129-00-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.095	
P/PCB	Aroclor-1242	53469-21-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0005	
P/PCB	Aroclor-1254	11097-69-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0005	
P/PCB	Aroclor-1260	11096-82-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0005	
INORG	Antimony	7440-36-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.006	
INORG	Arsenic	7440-38-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.05	
INORG	Barium	7440-39-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	2	
INORG	Beryllium	7440-41-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.004	
INORG	Cadmium	7440-43-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.005	
INORG	Chromium (total)	7440-47-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
INORG	Cobalt	7440-48-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	2.19	
INORG	Copper	7440-50-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.3	
INORG	Cyanide (total)	57-12-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.2	
INORG	Lead	7439-92-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.015	
INORG	Manganese	7439-96-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	5.11	
INORG	Mercury	7439-97-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.002	
INORG	Nickel	7440-02-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
INORG	Selenium	7782-49-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.05	
INORG	Silver	7440-22-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1825	
INORG	Thallium	7440-28-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.002	
INORG	Vanadium	7440-62-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.2555	
INORG	Zinc	7440-66-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	10.95	

Supporting Calculations

Table 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	1.16E-09	5.92E-15	0.00E+00	7.83E-12	1.81E-07	0.	0.2	
VOC	1,1-Dichloroethane	75-34-3	1.79E-08	6.59E-14	0.00E+00	2.77E-11	6.87E-08	0.	3.65	
VOC	1,1-Dichloroethene	75-35-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.007	
VOC	1,2-Dichloroethene (total)	540-59-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.07	
VOC	2-Butanone	78-93-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	21.9	
VOC	Acetone	67-64-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	3.65	
VOC	Benzene	71-43-2	6.55E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.005	
VOC	Carbon Disulfide	75-15-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	3.65	
VOC	Chlorobenzene	108-90-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
VOC	Chloroethane	75-00-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.01	
VOC	Chioroform	67-66-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
VOC	cis-1,2-Dichloroethene	156-59-2	1.28E-08	1.18E-13	0.00E+00	2.61E-09	2.25E-07	0.	0.07	
VOC	Ethyl Benzene	100-41-4	1.13E-10	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.7	
VOC	Styrene	100-42-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
VOC	Tetrachloroethene	127-18-4	4.17E-09	1.26E-14	0.00E+00	1.47E-10	1.06E-06	0.	0.005	
VOC	Toluene	108-88-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.	
VOC	trans-1,2-Dichloroethene	156-60-5	2.56E-09	1.61E-14	0.00E+00	3.59E-11	3.75E-08	0.	0.1	
VOC	Trichloroethene	79-01-6	2.08E-08	1.14E-13	0.00E+00	2.12E-10	6.12E-07	0.	0.005	
VOC	Trichlorofluoromethane	75-69-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	10.95	
VOC	Vinyl Chloride	75-01-4	3.57E-09	1.04E-14	0.00E+00	1.24E-10	0.00E+00	0.	0.002	
VOC	Xylenes (total)	1330-20-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	10.	
SVOC	1,2-Dichlorobenzene	95-50-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.6	
SVOC	2-Methylnaphthalene	91-57-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.73	
SVOC	Benzo(a)anthracene	56-55-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.01	
SVOC	Benzo(a)pyrene	50-32-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0002	
SVOC	Benzo(b)fluoranthene	205-99-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.01	
SVOC	bis(2-Ethylhexyl)phthalate	117-81-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.006	
SVOC	Butylbenzylphthalate	85-68-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	7.3	
SVOC	Chrysene	218-01-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0117	
SVOC	Di-n-butylphthalate	84-74-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	3.65	
SVOC	Fluoranthene	206-44-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.46	
SVOC	Fluorene	86-73-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.46	
SVOC	Naphthalene	91-20-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.73	
SVOC	Phenanthrene	85-01-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.095	
SVOC	Pyrene	129-00-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.095	
P/PCB	Aroclor-1242	53469-21-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0005	
P/PCB	Aroclor-1254	11097-69-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0005	
P/PCB	Aroclor-1260	11096-82-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.0005	
INORG	Antimony	7440-36-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.006	
INORG	Arsenic	7440-38-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.05	
INORG	Barium	7440-39-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	2.	
INORG	Beryllium	7440-41-7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.004	
INORG	Cadmium	7440-43-9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.005	
INORG	Chromium (total)	7440-47-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
INORG	Cobalt	7440-48-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	2.19	
INORG	Copper	7440-50-8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	1.3	
INORG	Cyanide (total)	57-12-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.2	
INORG	Lead	7439-92-1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.015	
INORG	Manganese	7439-96-5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	5.11	
INORG	Mercury	7439-97-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.002	
INORG	Nickel	7440-02-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1	
INORG	Selenium	7782-49-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.05	
INORG	Silver	7440-22-4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.1825	
INORG	Thallium	7440-28-0	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.002	
INORG	Vanadium	7440-62-2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	0.2555	
INORG	Zinc	7440-66-6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.	10.95	