SUPPLEMENTAL DOCC FOR
GENERAL MOTORS POWERTRAIN GROUP
MORAINE ENGINE PLANT AND
GENERAL MOTORS TRUCK GROUP
MORAINE ASSEMBLY PLANT
MORAINE, OHIO

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Prepared for

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1.0 INTRODUCTION

For the purposes of Resource Conservation and Recovery Act (RCRA) Corrective Action, the General Motors Corporation (GMC) "site" in Moraine, Ohio, comprises the General Motors Truck Group Moraine Assembly Plant (Moraine Assembly), the General Motors Powertrain Group, Moraine Engine Plant (Moraine Engine), and the Delphi Harrison Thermal Systems Moraine Plant (Delphi Thermal Moraine) (Figure 1-1). Delphi Thermal Moraine, formerly Harrison Radiator Division, received an Administrative Order (Docket No. V-W-91R-2) from the United States Environmental Protection Agency (U.S. EPA) Region V, which became effective on January 30, 1991. The Administrative Order, issued under Section 3008(h) of RCRA, as amended, 42 U.S.C. 6928(h), requires GMC to implement a RCRA Corrective Action program at the Delphi Thermal Moraine facility consisting of the following: (1) perform Interim Measures, (2) conduct a RCRA Facility Investigation (RFI), and (3) conduct a RCRA Corrective Measures Study (CMS), if necessary.

Delphi Thermal Moraine is currently meeting the requirements of the Administrative Order by implementing an Interim Measure and through the completed two-phased RFI investigation. The Interim Measure was implemented per the Final Interim Measures Design Plans (Geraghty & Miller, Inc. 1995), which was approved by the U.S. EPA in a July 31, 1995 letter. The findings of the RFI, including a Baseline Risk Assessment, were reported to the U.S. EPA in a draft RCRA Facility Investigation Final Report (Geraghty & Miller, Inc. 1996 and ENVIRON Corporation 1996). The draft RCRA Facility Investigation Final Report determined a CMS was not necessary for any solid waste management units (SWMUs) at the Delphi Thermal Moraine facility.

In April 1991, a Preliminary Assessment/Visual Site Inspection (PA/VSI) of the Moraine Assembly and Moraine Engine facilities was conducted on behalf of the U.S. EPA (PRC Environmental Management, Inc. 1991a and b). In response to the findings of the PA/VSI reports, on-going RFI activities at Delphi Thermal Moraine, and extensive discussions between U.S. EPA and GMC, the U.S. EPA issued an Amendment to the Administrative Order (Docket No. VW-R-002-91), which became effective on April 24, 1997, which includes the Moraine Assembly and Moraine Engine facilities in the Corrective Action program. This Amendment requires GMC to conduct a supplemental RFI at the two additional facilities, beginning with the preparation of a Supplemental Description of Current Conditions Report (DOCC).

1.1 ORGANIZATION AND APPROACH TO THE DOCC REPORT

This Supplemental DOCC is based on information and data previously collected at the Moraine Engine and Moraine Assembly facilities and collected prior to and during the Delphi Thermal Moraine RFI activities. As described in Section 1.3, many investigations have been conducted to identify and understand the sources and extent of contamination at the GMC site.

Section 2.0 of this report presents a description of the site location, ownership and operations, physiographic and demographic settings, and the nature and extent of constituents detected in media at the site. Section 3.0 identifies Areas of Interest (AOIs) and summarizes the current and historical solid and hazardous waste management operations at the Moraine Assembly and Moraine Engine facilities. Section 3.0 also presents evaluations of AOIs and recommendations for further investigations. As this is a supplemental document, much of the information required by the DOCC exists in other RFI-related documents and is referenced accordingly.

1.2 HISTORY OF THE GMC SITE

The GMC site in Moraine, Ohio was acquired from the World War I Wright Airplane Company in the mid-1920's. During the late 1920's and throughout the 1930's, Frigidaire (a division of GMC) produced refrigerators, air conditioners, electric ranges, and electric water heaters at this site in Plant 2. Frigidaire plant numbers are provided on Table 1-1, which also includes references to other building and plant designations used at the facilities, and locations are shown with dashed lines on Figure 1-2. In the early 1940's Frigidaire was in trial production on automatic washers when World War II began. To support the war effort, Frigidaire built the first segment of Building 14 (Figure 1-2) in 1942 for manufacturing operations of complex parts and assemblies for the propellers that were being built by the Aeroproducts Division of GMC. Also in 1942, Plant 2 stopped producing consumer products and built disposable, auxiliary gas tanks for airplanes and propeller parts. When Germany surrendered in 1945, Frigidaire resumed production of refrigerators. By 1947, Frigidaire was also in full production of automatic washers and electric clothes dryers. Plant 3 (Figure 1-2) was built in 1952 as a manufacturing facility for ranges, washers, dryers, wall ovens, drop-in cook tops, and dish washers.

Production continued during the 1950's, 1960's, and 1970's with more updated and innovative products mostly associated with the refrigerators and ranges. GMC announced the shut down of all Frigidaire operations in January 1979. The site was then converted into the Moraine Engine and Moraine Assembly facilities. A complete discussion of these current facilities is presented in Section 2.2.

1.3 SUMMARY OF PREVIOUS AND ONGOING INVESTIGATIONS AND INFORMATION

GMC has conducted numerous environmental investigations at the Moraine Engine and Moraine Assembly facilities, most of which have been concerned with specific areas of the facilities. Information is also available from studies conducted at the adjacent Delphi Thermal

Moraine facility, where geology and hydrogeology have been characterized on area-wide, site wide, and facility-specific levels in the DOCC (Geraghty & Miller, Inc. 1991a), draft RFI (Geraghty & Miller, Inc. 1996 and ENVIRON Corporation 1996), and quarterly monitoring reports. Summaries of the previous investigations and reports are presented below in approximately chronological order. Copies of analytical data tables for these historical investigations at the Moraine Engine and Moraine Assembly facilities are presented in Appendix A, as appropriate to facilitate the readers understanding. References are provided as appropriate. Figure 1-2 indicates locations of plants, buildings and property boundaries.

1.3.1 Former Gasoline UST Closure and Assessment - Moraine Engine

On November 3, 1989, a 10,000-gallon underground storage tank (UST) was removed from an area along the west side of the Moraine Engine facility (Section 3.2.16 Former Frigidaire Plant 2 Tanks - Gasoline Tank). This steel UST was approximately 25 years old and contained leaded gasoline. Obvious rusting and corrosion were discovered on the tank upon its removal which may have caused leakage into the surrounding soil. There were some visible signs of soil staining in the pit. Soil samples were collected from beneath the base of the tank as described in the Underground Storage Tank Closure Investigation report, dated December 18, 1989 (Bowser - Morner 1989). Additional information on closure activities is presented in Appendix A-1.

Three soil samples were collected inside the pit at a 6-inch depth on November 3, 1989 and analyzed for total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, and total xylenes (BTEX), lead, and cadmium. Additional soil sampling from the pit at a 3-foot (ft) depth was conducted on November 13, 1989. Three samples were collected and analyzed for TPH, BTEX, lead, cadmium, and EP Toxicity analysis for lead and chromium. After excavation was conducted, two additional soil samples were collected from the pit at an 8-ft depth on November 21, 1989 and analyzed for TPH, BTEX, and EP Toxicity analysis for lead and chromium. Sample results for these three sampling events are presented in Table 1 of Appendix A-1.

Geraghty & Miller was retained by GMC in March 1990 to conduct a subsurface investigation in this area. The purpose of this investigation was to provide an evaluation of groundwater and soil quality in the vicinity of the Former Gasoline UST and to provide remedial measures, if necessary (Geraghty & Miller, Inc. 1990).

Six soil borings were drilled during March and May 1990 in upgradient and downgradient locations of the former UST. To assess soil conditions in the vicinity of the UST, soil samples were collected from three of the six borings and analyzed for BTEX, TPH, and total lead. Sample results are presented in Table 3 of the original report, provided in Appendix A-2. Monitor wells were then constructed in each of the soil boring locations (ME-1 through ME-6) to collect groundwater samples and water-level measurements (refer to Section 2.6 and Figure 2-3). Groundwater samples were collected from ME-1 through ME-4 in March 1990 and from ME-5 and ME-6 in June 1990. These samples were analyzed for BTEX, TPH, and total lead. Sample results are presented in Table 2 of the original report in Appendix A-2.

Geraghty & Miller concluded from this investigation that residual contamination detected during the initial tank removal operation had not migrated away from the area beneath the tank. The data suggested that only small quantities of product had been released from the tank and were being retained in the soils directly beneath the former tank location.

To further delineate the extent of hydrocarbon constituents detected in the samples taken from the tank removal operation, GMC retained Geraghty & Miller to perform a quarterly groundwater sampling program for a period of 1 year (reported in Geraghty & Miller, Inc. 1991b, c, d and 1992). During the first quarter (April 1991), ME-1 through ME-6 were sampled and analyzed for BTEX, TPH, and polychlorinated biphenyls (PCBs). Sample results indicated all constituents were not detected. In the second, third, and fourth quarters (July 1991, October 1991, and January 1992, respectively), ME-1 through ME-6 were only

sampled and analyzed for BTEX and TPH (for continued monitoring) because PCBs were not detected during the first quarter. Sample results indicated all constituents were not detected, with the exception of a benzene detection in ME-5 during the third quarter. Sample results for all four quarters are presented in Table 1 of the original report, provided in Appendix A-3. Based on the data, it was recommended to discontinue quarterly monitoring and request site closure. Closure was approved by the Ohio State Fire Marshall, Bureau of Underground Storage Tank Regulations (BUSTR) in a final letter of closure, dated April 10, 1992.

1.3.2 Closure Assessment for Former Fuel USTs at Building 12 - Moraine Engine

On September 18, 1991, two fiberglass USTs, one 6,000-gallon tank that contained unleaded gasoline and one 6,000-gallon tank that contained diesel fuel, were removed from a location adjacent to Building 12 of the Moraine Engine facility (Section 3.2.18 Former Moraine Engine Fuel USTs). Geraghty & Miller was retained by GMC to oversee removal of the two USTs from service and gain closure of the UST site through BUSTR (Geraghty & Miller, Inc. 1991e). Both tanks appeared to be in excellent condition with no obvious corrosion or holes.

Three soil samples (DTM, DTN, GTN) were collected from the UST pit after excavation was completed in September 1991 and analyzed for BTEX and TPH. Two soil composite samples (COMP-1 and COMP-2) were collected in September 1991 from the fill material and analyzed for BTEX, TPH, and toxicity characteristic leaching procedures (TCLP) metals. Two additional soil samples (FLD-C and FLG-B) were collected in September 1991, one from each fill line, and analyzed for BTEX and TPH. Results for these three sampling events are presented in Table 3 of the original report, provided in Appendix A-4. Based on an evaluation of this data, a no-further-action request was submitted to BUSTR. Closure was approved by BUSTR in a final letter of closure, dated December 18, 1991.

1.3.3 Used Oil Tank Removal North of Building 15 - Moraine Engine

On January 31, 1994, a 900-gallon steel UST, along with approximately 2 feet (ft) of piping, was removed from the area south of the Cleveland and Lake Erie Railroad Company (C&LE) Building (Building 13) (Figure 1-2) and directly north of Building 15 (Section 3.2.17 Building 15) during closure activities (Dames & Moore 1994a). Approximately 500 gallons of used oil were previously removed from the tank on September 15, 1993, and disposed of at an approved off-site facility (a copy of the laboratory report characterizing the used oil is provided in Appendix A-5). Soil samples were collected from the two ends of the tank cavity, from a portion of the piping run adjacent to the cavity, and from the stockpiled soils in January 1994. These four samples were analyzed for volatile organic compounds (VOCs) and TPH. BUSTR requested that an additional soil sample be collected from the stockpiled soil that had been returned to the pit. This sample was collected in April 1994 and was analyzed for VOCs and TPH. Results for these sampling events are presented in Table 1 of the original report, provided in Appendix A-5. Closure was approved by BUSTR in a final letter of closure, dated June 20, 1994.

1.3.4 Former Hazardous Waste Storage Pad - Moraine Engine

In April 1993, the Former Hazardous Waste Storage Pad (Section 3.2.14 Former Hazardous Waste Storage Pad) was clean closed according to an Ohio EPA-approved closure plan (Dames & Moore 1993a). The concrete storage pad covered an area of 2,400 square ft (30 ft by 80 ft) and had the capacity to store 250, 55-gallon drums. It was used for storage of drummed quantities of waste paint thinner and sludges, chlorinated solvents, and non-hazardous waste oil and process fluids prior to removal from the facility.

During closure the remaining inventory was removed, a visual inspection of the pad was conducted, twelve background soil samples were collected and analyzed for inorganic constituents (chromium, barium, and lead), soil samples from six locations beneath the pad were collected and analyzed for organic and inorganic compounds (chromium, barium, and

lead), and the pad was decontaminated (Dames & Moore 1994b). The sampling results for subsurface soil and the rinsewater met the criteria specified in the closure plan. Closure was approved by Ohio EPA in a final letter of closure, dated July 21, 1993.

The results for this closure sampling program are presented in Tables 2, 3, and 4 of the original report, provided in Appendix A-6. Figures 2 and 3 from the original report which show the sampling locations are also provided in Appendix A-6.

1.3.5 West Haulaway Storage Tanks Release Investigation - Moraine Assembly

In November 1990, work to upgrade the UST systems and dispensers at the West Haulaway facility began (Section 3.2.31 Moraine Assembly West Haulaway Storage Tanks). On November 19, 1990, during performance of this work, a stained area believed to be the result of a diesel fuel spill was discovered beneath the containment pad of a diesel fuel dispenser.

Soil samples were immediately collected and were initially analyzed for TPH and BTEX. TPH was detected and BTEX was not detected; therefore, all subsequent soil samples were analyzed only for TPH. The concrete refueling containment pad was removed, and excavation of the contaminated soil continued. Soil samples were collected and analyzed for TPH as the excavation progressed. When these results indicated that TPH levels were non-detect, excavation was considered complete. Approximately 4,600 cubic yards (yds^3) of soil were excavated and were temporarily stored on site in roll-off boxes for subsequent disposal at an off-site disposal facility. A sample of water that had collected in the excavation was also collected and analyzed for TPH and found to be non-detect. No free product was detected during excavation.

This information and the analytical data was submitted to BUSTR. On April 10, 1992, BUSTR issued a letter stating that no further corrective action to remediate this spill would be required.

1.3.6 Former Hazardous Waste Container Storage Area and Tank Farm - Moraine Assembly

Beginning on August 11, 1993, the container storage pad and a 15,000-gallon aboveground storage tank (AST) located in the Former Hazardous Waste Container Storage Area and Tank Farm were closed in place (Section 3.2.27 Former Hazardous Waste Container Storage Area). The container storage pad was used to store 55-gallon drums of waste chlorinated solvent and solvent contaminated waste oils, waste gasoline and water, and paint sludges. The AST was used to store waste paint thinner, and is located within a concrete diked area with 13 other ASTs used for storage of raw materials. Dames & Moore was retained by GMC to oversee decontamination and sampling, and to gain closure of these units through Ohio EPA (Dames & Moore 1993b).

Closure activities for the container storage pad included a visual inspection, collection of subsurface soil samples and rinseate samples, decontamination of the pad, and disposal of wastes generated during closure. The pad was found to be in generally good condition, with some minor cracks. Shallow soil samples were collected from 6 locations beneath the pad and analyzed for VOCs, SVOCs, cresol, formic acid, and formaldehyde. Rinseate samples were collected from each of the three final rinses during decontamination of the pad and were analyzed for VOCs, SVOCs, cresol, formic acid, formaldehyde, and flashpoint. These results indicated that the soils beneath the pad were not contaminated and that the rinse water was non-hazardous. Accordingly, the waste rinse water generated during closure activities was discharged to Delphi Thermal Moraine's wastewater treatment plant. The results for these sampling events are presented in Tables 2 and 3 of the original report, provided in Appendix A-7.

Closure activities for the AST included a visual inspection of the concrete pad beneath the tank, disposal of tank contents, decontamination of the tank, collection of rinseate samples, and disposal of wastes generated during closure. The concrete pad beneath the tank was in good condition with no visible staining, therefore it was not necessary to include the

pad in decontamination procedures. Approximately 12,600 gallons of liquid waste and sludge were removed from the AST prior to decontamination, and disposed at an off-site hazardous waste disposal facility. Rinseate samples were collected from each of the three final rinses during decontamination of the tank, and were analyzed for VOCs, SVOCs, cresol, formic acid, formaldehyde, and flashpoint. Results for these sampling events are presented in Table 4 of the original report, provided in Appendix A-7. VOCs were detected at concentrations below the "less than 90-day storage" standard set forth in the closure plan (Dames & Moore 1993b) so the rinseate samples were considered to be clean. Accordingly, the waste rinse water generated during closure activities was discharged through Delphi Thermal Moraine's wastewater treatment plant. This AST is currently being used for "less than 90-day" storage of hazardous waste.

The RCRA Closure Certification Report (Dames & Moore 1994c) was submitted to Ohio EPA in January 1994. Based upon an evaluation of the information and analytical data presented in this document, Ohio EPA approved closure of the container storage pad and the AST in a closure letter dated April 28, 1994.

1.3.7 Groundwater Monitoring Programs - Delphi Thermal Moraine

The following on-going groundwater monitoring programs for the Delphi Thermal Moraine facility are included in this Supplemental DOCC as they provide significant information on groundwater flow patterns at the GMC Moraine site.

Groundwater assessments are performed on a quarterly basis for the North Settling Lagoon of the Delphi Thermal Moraine facility. The purpose of the North Settling Lagoon Assessment Monitoring Program is to monitor the concentrations of hazardous constituents and rate and extent of migration of those constituents in the groundwater. The North Settling Lagoon Assessment Plan (Geraghty & Miller, Inc. 1989a) requires quarterly water levels from 26 shallow monitor wells and 27 deep wells on or near the Delphi Thermal Moraine facility. Of the 27 deep wells measured, 5 are located east of the Delphi Thermal Moraine

facility. One production well, which is no longer used, is located near the Moraine Engine facility and four fire-prevention wells are located at the Moraine Engine and Moraine Assembly facilities. Water levels are voluntarily measured in other wells near the site and included in the assessment of groundwater flow direction across the site during each quarterly monitoring event. The other wells consist of 18 shallow wells and two deep wells. Potentiometric maps are constructed, average hydraulic gradients across the site are calculated, groundwater flow rates are calculated, and the rate of migration of hazardous constituents is estimated.

A total of 19 monitor wells are sampled to provide groundwater-quality data for the North Settling Lagoon Assessment Monitoring Program. Eight of these wells are analyzed for Appendix IX VOCs, semi-volatile organic compounds (SVOCs), cyanide, and selected total and dissolved metals. The remaining 11 wells are analyzed for Appendix IX VOCs and selected indicator parameters. Reports summarizing this assessment program are submitted quarterly and annually to the Ohio EPA (current data referenced in Geraghty & Miller, Inc. 1997a).

Semi-annual monitoring (water levels and sampling) is conducted on five monitor wells surrounding the South Settling Lagoon, located west of Dryden Road, as part of the South Lagoon Detection Monitoring Program (current data referenced in Geraghty & Miller, Inc. 1997b). The five monitor wells are sampled for indicator parameters including pH, specific conductance, total organic carbon (TOC), and total organic halogens (TOX). Statistical techniques are applied on the analytical results to determine whether a statistically significant increase (or decrease in the case of pH) in the concentration of indicator parameters in the groundwater has occurred, or is occurring at the South Lagoon. In addition, groundwater-quality parameters including chloride, iron, manganese, phenols, sodium, and sulfate are sampled on an annual basis. A report summarizing this monitoring program is submitted annually to Ohio EPA.

1.3.8 Preliminary Evaluation of Groundwater - Moraine Engine

In 1994, a preliminary investigation of groundwater conditions at the Moraine Engine facility was conducted (Geraghty & Miller, Inc. 1994a). The objective was to develop an understanding of groundwater flow conditions at the site and to develop an initial understanding of potential sources which may have contributed to increased concentrations of VOCs in production wells at the Moraine Engine facility.

Four shallow monitor wells, GM-21, GM-22, GM-23, and GM-24 (refer to Section 2.6.1.2 and Figure 2-3) were installed in August 1994. One soil sample (GM-23 sample at 3 to 5 ft) indicated an elevated reading of organics during field screening with a photoionization detector and was submitted for analysis of Target Compound List (TCL) VOCs. The soil analytical results are presented in Table C-1 of the original report provided in Appendix A-8. Each monitor well was sampled in August 1994 and analyzed for Appendix IX VOCs and selected metals. Sample results are presented in Tables 2-3, 2-4, 2-6, and 2-7 and a sample results discussion is presented in Section 2.6.1.2.

To better characterize groundwater quality and flow east of the Moraine Assembly facility, GM-25 (refer to Section 2.6.1.1 and Figure 2-3) was installed as a separate investigation. The well was installed and sampled in December 1995. A composite sample was collected from the soil cuttings and analyzed for TCLP VOCs, TCLP SVOCs, PCBs, TCLP metals, ignitability (flash point), corrosivity (pH), reactive cyanide, and reactive sulfide for waste characterization purposes. No hazardous constituents, except barium reported at 0.68 milligrams per liter (mg/L), were detected in the soil sample, and pH was reported at 8.69 standard units. The groundwater sample was analyzed for Appendix IX VOCs. Sample results are presented in Table 2-3 and a sample results discussion is presented in Section 2.6.1.1.

1.3.9 Production Wells and Fire Wells Sampling Program - Moraine Assembly

A total of 11 production and fire wells are currently present on the east side of the Moraine site. Wells 11-A, 12, 31, 39, and 28 actively supply water or provide backup to the Moraine Engine and Moraine Assembly facilities. In late June 1997, Well 12 was taken out of service due to expansion at the Moraine Assembly paint shop. It was abandoned and construction of a new production well was started. Wells FW-1, FW-2, FW-3, and FW-4 serve as fire protection wells. Wells A and 34 are no longer used. Well usage information was provided in a letter to Ms. Rita Cestaric (U.S. EPA Region V) from Ms. Jean E. Caufield (GMC) dated May 13, 1994 (GMC 1994a). The following provides a summary of sampling programs for each well. Well locations are provided on Figure 2-3. A summary of detected constituents for each well may be found in Appendix A-9. Analytical results are discussed in Section 2.6.

Currently, Wells 11-A and 31 are sampled on a monthly basis. Well 12 was sampled monthly until it was abandoned in June 1997. A summary of data for Wells 11-A and 12 is provided in Appendix A-9. Since 1995, these wells have been sampled almost monthly and analyzed for VOCs, SVOCs, total metals and dissolved silica, and PCBs and pesticides. Well 31 (summary of data provided in Appendix A-9) was sampled nearly semi-annually from May 1992 through November 1993 and analyzed for VOCs, SVOCs, total metals, PCBs, and pesticides. Well 31 was sampled on an almost monthly basis during 1995 for analyses of Appendix IX VOCs and 1,2-cis-Dichloroethene was also analyzed during July, November, and December of 1995. Finally, Well 31 has been sampled on a monthly basis for the analyses of Appendix IX VOCs and 1,2-cis-dichloroethene from January 1996 to present.

Although Wells 28, 34, and FW-1 through FW-4 are not currently sampled on a regular basis, groundwater quality in these wells has been well defined (Appendix A-9). Well 28 was sampled and analyzed for VOCs during March, April, and September 1992 and during March, August and December 1993. Well 34 was sampled and analyzed for VOCs during February and August 1992 and during June 1995. The sample from Well 34 during

June 1995 was collected while the well was no longer in use. As a result, the well was not purged prior to sampling, which could explain some of the decrease in VOC concentrations from 1992. Well FW-1 was sampled and analyzed for VOCs during October 1993. Well FW-3 was sampled and analyzed for VOCs during March 1992, and was sampled and analyzed for total metals, calcium, sodium, dissolved silica, VOCs, SVOCs, PCBs and pesticides during June 1993. Well FW-4 was sampled and analyzed for VOCs during April 1992 and October 1993. Wells FW-1, FW-2, FW-3, and FW-4 were sampled and analyzed for total metals, calcium, sodium, dissolved silica, VOCs, SVOCs, PCBs, and pesticides during June 1996.

Depth to water is currently measured on a quarterly basis in Wells A, FW-1, FW-2, GW-3, and FW-4 to provide lower aquifer information for the North Settling Lagoon Groundwater Quality Assessment Monitoring Program at the Delphi Thermal Moraine facility (Section 1.3.7).

1.3.10 Three-Dimensional Groundwater Model - Delphi Thermal Moraine

Two reports, Three-Dimensional Steady-State Flow Model and Revised Three-Dimensional Steady-State Flow Model (Geraghty & Miller, Inc. 1989b and 1994b, respectively) describe the three-dimensional groundwater flow model that was constructed to characterize and assess hydrogeologic conditions and to support the Delphi Thermal Moraine RFI, including the Baseline Risk Assessment.

1.3.11 Description of Current Conditions - Delphi Thermal Moraine

The DOCC, Harrison Radiator Division, GMC (Geraghty & Miller, Inc. 1991a) presented the state of knowledge regarding the environmental setting at the Delphi Thermal Moraine facility, existing information from previous investigations conducted at the site, and the extent of contamination up to and including 1991. Because this site is adjacent to the Moraine Engine and Moraine Assembly facilities, it contains general information pertinent to this Supplemental DOCC.

1.3.12 Draft RFI Final Report - Delphi Thermal Moraine

The Draft RFI Final Report for the Delphi Thermal Moraine facility was submitted to U.S. EPA in February 1996 in two volumes. Volume I presents the methodologies and results for the two phases of RFI field activities (Geraghty & Miller, Inc. 1996) and Volume II presents the Baseline Risk Assessment (ENVIRON Corporation 1996). Comments on that document were received from the U.S. EPA in a letter dated June 11, 1996, and clarification of these comments, as well as additional comments, were received in a facsimile sent by PRC Environmental Management, Inc., on behalf of the U.S. EPA on August 6, 1996. GMC submitted a response to comments document to the U.S. EPA, dated September 11, 1996. In a letter from U.S. EPA to GMC, dated October 1, 1996, indication was provided that finalization of that Draft RFI Final Report will be deferred until this Supplemental RFI can be completed for the Moraine Engine and Moraine Assembly facilities, so that a supplemental RFI final report can be completed.

1.3.13 Interim Measures Capture Zone Monitoring - Delphi Thermal Moraine

In 1996, Delphi Thermal Moraine conducted monitoring of the Interim Measures per the requirements of the approved Final Interim Measures Design Plans (Geraghty & Miller, Inc. 1995). This involved collecting water levels from select wells prior to and during the time when operation of the interim measures for TW-2 and DN-13 began on January 31, 1996, and on an ongoing quarterly basis. Capture zone monitoring activities include monitoring the groundwater flow rate to the air stripping tower treatment system, groundwater sampling from TW-2 and four monitor wells prior to startup (January 31, 1996) and after TW-2 had operated for a period of 6 months (July 31, 1996). Additionally, sampling of the groundwater influent to and effluent from the air stripper tower is conducted monthly to meet the requirements of the air and National Pollutant Discharge Elimination System (NPDES) permits. The results of this monitoring is presented in a report dated March 1997 (Geraghty & Miller, Inc. 1997c).

1.3.14 PA/VSI - Moraine Engine

The PA for the Moraine Engine facility was completed by PRC Environmental Management, Inc. on April 5, 1991. It consisted of gathering and reviewing information from the Ohio EPA Southwest District Office files and from U.S. EPA Region 5 RCRA files. The VSI, conducted on April 9, 1991, included interviews with GMC facility representatives and a walk through inspection by PRC Environmental Management, Inc. The PA/VSI report (PRC Environmental Management, Inc. 1991a) presents a summary of facility operations, waste generating processes, release history, regulatory history, environmental setting, receptors, and a description of the seven SWMUs and one area of concern (AOC) identified during the VSI. The one AOC was included in the PA/VSI to cover historic GMC Frigidaire operations conducted at the site because limited information on waste management practices prior to 1980 was available. The SWMUs and AOC identified in the Moraine Engine PA/VSI are listed in Table 1-2.

1.3.15 PA/VSI - Moraine Assembly

The PA for the Moraine Assembly facility was completed by PRC Environmental Management, Inc. on April 5, 1991. It consisted of gathering and reviewing information from the Ohio EPA Southwest District Office files and from U.S. EPA Region 5 RCRA files. The VSI, conducted on April 10, 1991, included interviews with GMC facility representatives and a walk through inspection by PRC Environmental Management, Inc. The PA/VSI report (PRC Environmental Management, Inc. 1991b) presents a summary of facility operations, waste generating processes, release history, regulatory history, environmental setting, receptors, and a description of the three SWMUs and one AOC identified during the VSI. The one AOC was included in the PA/VSI to cover historic GMC Frigidaire operations conducted at the site because limited information on waste management practices prior to 1980 was available. The SWMUs and AOC identified in the Moraine Assembly PA/VSI are listed in Table 1-2.

1.3.16 Regulatory History

In November 1980, Moraine Engine filed a Part A permit application identifying the facility as a generator with greater than 90-day storage. In October 1988, Moraine Engine submitted a closure plan to Ohio EPA to close the Hazardous Waste Storage Pad (Section 1.3.4), to change to less than 90-day generator status. Once closure of the Former Hazardous Waste Storage Pad was approved by Ohio EPA (July 1993), the facility status changed to generator with less than 90-day storage. The Moraine Engine facility has two air permits which cover a diesel engine test facility and a maintenance spray booth. Dust collectors in the equipment machining areas are on registration status. Prior to September 1995, a permit was also in place to cover operation of an engine paint system (this operation was discontinued in 1995).

In August 1980, Moraine Assembly filed a Part A permit application identifying the facility as a generator with greater than 90-day storage. In late 1988, Moraine Assembly filed a revised Part A application to Ohio EPA that deleted three paint process units identified in the original application (two 15,000-gallon paint spill storage tanks, two 200,000-gallon paint pits, and a paint coating system). These three units did not fall under RCRA classification and should not have been listed in the original permit application. Additionally, once closure of the Former Hazardous Waste Container Storage Area and Tank Farm (Section 1.3.6) was approved (closure was approved in April 1994), facility status changed to generator with less than 90-day storage. The Moraine Assembly facility has 27 air permits which cover releases from paint-related systems and releases from an unleaded gasoline facility.

1.3.17 Spill History

A summary of information on known spills and/or releases identified by GMC is listed chronologically in Table 1-3.

1.3.18 Aerial Photographs

Aerial photographs of the site and surrounding area were obtained from the Ohio Department of Transportation (ODOT) (coverage from 1979 and 1984) and the Ohio Department of Natural Resources (ODNR) (coverage from 1949, 1956, 1975, and 1990). The photographs were produced at a scale of 1 inch = 400 ft. Copies of the ODNR aerial photographs are presented in Appendix B. Copies of the ODOT aerial photographs have not been reproduced for inclusion in this document due to their lower quality and similar coverage provided by the ODNR aerial photographs.

The 1949 aerial photograph (Figure B-1) shows the Main Office Building (Building 12), Buildings 2, 4, 6, 7 (Former Oil House), 13, and 15 and several small buildings north of Building 2 on the Moraine Engine site. The photograph also shows two ASTs in the southwest corner of the Moraine Engine facility near Building 15. The Moraine Assembly facility is an undeveloped field which is being used as farmland. A development with multi-family dwellings appears to exist east of the future site of Building 19, along Kettering Boulevard.

The 1956 aerial photograph (Figure B-2) shows one additional building and a water tower present north of Building 2 on the Moraine Engine site. Electrical towers are also visible running east to west across this northern end of the site. The photograph also shows three ASTs in the southwest corner of the Moraine Engine facility near Building 15. At the Moraine Assembly site, the major portion of Building 19 has been constructed. A parking lot to the east and a water tower to the north of this building are also seen in the photograph. An excavation area, which appears to be retaining water, is visible west of Building 19 and an area which appears to be excavated is present to the northeast of Building 19. East of Kettering Boulevard, much of the farmland has been developed for residential purposes.

The 1975 aerial photograph (Figure B-3) shows no significant changes to the overall footprint of the buildings and general layout of either the Moraine Engine or Moraine

Assembly facilities; however, changes in the roof-line across various areas of the plants were noted. The photograph also shows three ASTs in the southwest corner of the Moraine Engine facility near Building 15. The development east of Moraine Assembly Plant 1 (historic Building 19) and the excavation areas west of and northeast of Moraine Assembly Plant 1 are no longer present.

The 1990 aerial photograph (Figure B-4) shows the Moraine Engine facility covering all of its present area. The three southwest ASTs near Building 15 are no longer present. The Moraine Assembly facility has been expanded to the north, covering all of its present area, excluding the new paint plant. Additionally, parking lots have been expanded on the east side and added on the north side of Building 19.

1.3.19 Other Reports and Information

Spill Prevention Control and Countermeasure Plans (SPCCs). For the Moraine Engine facility, 1976, 1988, and 1994 SPCCs provided information on the location, operation and materials in receipt, storage, and use areas (General Motors Corporation 1976, 1988, 1994, respectively). For the Moraine Assembly facility, the 1976 SPCC (General Motors Corporation 1976), the 1984 SPCC (General Motors Corporation 1984), and the 1995 draft SPCC document (Dames & Moore, draft dated October 1995) were reviewed.

Analytical Reports, East Storm Sewer Sediment Study, December 1991. Three samples (two sediment sludge and one water) were collected from the stormwater conduit to evaluate the sediment sludge present within the sewer (Box Sewer) on the east side of the Moraine Engine facility. The samples were analyzed for VOCs. One of the sediment sludge samples (in line with column/row designation A-74) detected no VOCs and the other sediment sludge sample (in line with column/row designation A-20) showed cis-1,2, dichloroethene (0.13 milligram per kilogram [mg/kg]). The water sample (A-20) analysis detected trichloroethene (TCE) (102 micrograms per liter [ug/L]), tetrachloroethene (PCE) (13.1 ug/L), and cis-1,2,-dichloroethene (27.3 ug/L). This water quality data is consistent with

groundwater quality data in Well 34 used at that time for non-contact cooling water and fire protection wells both of which were discharged to this sewer system. Additionally, excess water produced by Well 34 was directly discharged ("blow-by" water) to this sewer system.

Other Information. Information reviewed included memoranda, maps, analytical results, facility plans, well data, and discussions with GMC personnel. The information was used to develop site descriptions and AOI evaluation information presented in Section 3.0 Evaluation of Areas of Interest.

2.0 SITE CHARACTERIZATION

The following sections present a summary of current site conditions at the Moraine Engine and Moraine Assembly facilities, along with some relevant background information.

2.1 LOCATION

The Moraine Engine and Moraine Assembly facilities occupy approximately 300 acres. The Moraine Engine and Moraine Assembly facilities are located in the City of Moraine in Montgomery County in southwestern Ohio, at 4100 Springboro Road and 2601 Stroop Road, respectively (Figure 1-1). A small portion of the GMC property east of the Moraine Assembly facility is in the city of Kettering. The approximate coordinates for the site boundaries are as follows: latitude 39° 41' 45" N and longitude 84° 13' 11" W. Figure 1-2 indicates the property boundaries.

2.2 PLANT OWNERSHIP AND OPERATIONS

As discussed in Section 1.2, Frigidaire produced appliances from the late 1920's until 1979. During 1980 and 1981, the majority of the former Frigidaire Plant 2 was converted to the Moraine Engine facility and the former Frigidaire Plant 3 and the northeast corner of former Frigidaire Plant 2 was converted to the Moraine Assembly facility. The conversion at the Moraine Assembly facility included adding approximately 500,000 square ft to the existing structure. Several smaller additions occurred at the Moraine Assembly facility during the 1990 addition of the utility vehicle production operation and a new paint building was constructed in 1993 in preparation for building the redesigned utility vehicle (Figure 1-2). Table 1-1 provides a reference between historic Frigidaire plant and building numbers to the current Moraine Engine and Moraine Assembly facility designations.

Since 1981, Moraine Engine operations have included the machining, painting (this operation was discontinued in September 1995), and assembly of diesel truck engines. These engines are shipped to several truck assembly plants within GMC and other commercial and industrial operations.

Since 1981, Moraine Assembly operations initially included the manufacture, assembly, and painting of small trucks. Currently, Chevrolet Blazers, GMC Jimmies, and Oldsmobile Bravadas are produced at this facility.

2.3 LOCAL DEMOGRAPHY AND LAND USE

The western portion of the Moraine Assembly facility is located in an area zoned for general industry, while the eastern portion is located in an area zoned for light industry. The Moraine Engine facility is located in an area zoned for general industry. Areas adjacent to the site are zoned for general industry, light industry, general business, neighborhood business, and one- and two-family residential uses. Area zoning information is presented on Figure 2-1. The businesses in the surrounding area north of the site include warehouses, office buildings, light manufacturing and assembly, a gravel pit, cosmetics manufacturing, and dry cleaning. Businesses located east of the site include an analytical laboratory, a motel, and a television station. The Delphi Thermal Moraine facility (located immediately west of the Conrail tracks) is the western boundary of the study area and is zoned for general industry. The area south of the site is zoned for general industry, light industry, neighborhood business, and general business. The Dryden North Wellfield (located southwest of the intersection of Sellers Road and Dryden Road) has been zoned as a Wellhead Operation District.

2.4 SURFACE WATER AND DRAINAGE FEATURES

Moraine and the surrounding region are in the Great Miami River drainage basin. This river generally flows north to south in the vicinity of the site and is closest to the site at the southern end of the site. The river is approximately 2,800 ft west of the southwest corner of the Moraine Engine facility and approximately 4,500 ft west of the northern end of the Moraine Assembly facility (Figure 1-1). No major tributaries to the Great Miami River pass through the facilities. The Flood Insurance Rate Map for Moraine (Figure 2-2) shows that the area affected by the 100-year flood does not include the GMC facilities (FEMA 1981).

Stormwater and non-contact cooling water from the site are discharged to the Great Miami River via stormwater sewers through one of two stormwater retention basin systems (SWRBs) at the Delphi Thermal Moraine facility, under existing NPDES permits. The retention facilities were brought on line during October 1989 and were designed to provide spill containment and solids settling capabilities required to maintain compliance with NPDES permit requirements. The stormwater sewers under much of the Moraine Assembly and Moraine Engine facilities consist of sewer lines historically used by the Frigidaire operations.

The North SWRB system consists of two parallel concrete basins, each having a normal operating capacity of approximately 130,000 gallons. This facility serves the Moraine Assembly facility and the northern portions of the Delphi Thermal Moraine and Moraine Engine facilities, which have an associated surface-drainage area of approximately 161 acres. The South SWRB system includes two similar parallel concrete basins with normal operating capacities of approximately 90,000 gallons each. The south facility handles discharges from the Moraine Engine facility and the southern portion of the Delphi Thermal Moraine property, covering an area of approximately 104 acres of surface drainage.

Stormwater runoff from areas north of the Moraine Engine facility (including the roadways around the Moraine Engine Tank Farm, the engine rack storage, and the chip pad area), the Moraine Assembly facility, the northern portion of the Delphi Thermal Moraine

facility, and some residential and commercial areas in the City of Moraine (including residential areas east of the Moraine Assembly facility and Springboro Road) flow to Delphi Thermal's north SWRB via a 66-inch storm line. Stormwater runoff at the north wall of the Moraine Engine facility flows eastward to the northeast corner of the facility, then southward along the east side of the facility, to Delphi Thermal's south SWRB. Stormwater from the Moraine Engine facility, the Administration Building, and parking lots are discharged southward toward Blanchard Avenue. The sewers south of the Moraine Assembly facility, starting at the Paint House (south of Stroop Road) join the box sewer at the east side of the Moraine Engine facility. The City of Moraine joins the system at the southeast corner of the Moraine Engine facility. These flow from the City of Moraine, the Moraine Engine facility, the Moraine Assembly facility, and Delphi Thermal Moraine facility join and are collected in the south SWRB.

The south cell of the SWRB system was designed to operate as one basin during normal non-storm flow conditions. The second adjacent basin is used for diversion of normal flow if a spilled material has been isolated in the first basin, as well as for additional retention capacity during storm conditions. The design criteria for sizing of the facilities was a minimum 30-minute retention based on a maximum flow of a 2-inch uniform rain over 24 hours plus normal non-contact cooling water flow. Any flow exceeding the maximum design capacity will bypass the basins by gravity overflow to the associated storm sewer outfall.

Stormwater from the East and West Haulaways is discharged into an unnamed drainage ditch located east and south of the West Haulaway (Figure 1-2), which was assessed during the RFI (Geraghty & Miller, Inc. 1996). This ditch originates in west Kettering, flows north to south along the east side of the West Haulaway, then east to west along the south side of the West Haulaway. The ditch eventually discharges into the Great Miami River.

2.5 HYDROGEOLOGY

Regional hydrogeologic conditions around the Moraine Engine and Moraine Assembly facilities have been studied extensively during the RFI at the Delphi Thermal Moraine facility. The results of these investigations into the regional hydrogeologic conditions have been presented in the Delphi Thermal DOCC (Geraghty & Miller, Inc. 1991a) and updated in the Draft RFI Final Report (Geraghty & Miller, Inc. 1996) and, therefore, will not be repeated in this Supplemental DOCC.

Likewise, local hydrogeologic conditions have been studied extensively at the Delphi Thermal Moraine site. The Delphi Thermal Moraine DOCC provides available boring logs and well construction logs for 45 monitoring wells, 15 production wells, and 80 soil borings. The Draft RFI Final Report (Geraghty & Miller, Inc. 1996) provides soil boring logs and well construction logs for 30 soil borings and 1 monitoring well installed during the two phases of investigation. These borings and monitor wells have been used to collect data on subsurface geology and hydrogeology.

In regards to the Moraine Engine and Moraine Assembly facilities, supplemental information has been obtained from a total of 11 borings/monitoring wells which have been installed during non-RFI related previous investigations, and soil borings which were advanced as required to support construction of the facilities. Appendix C contains soil boring and well construction logs for the 11 monitoring wells installed in the study area, as well as construction soil boring logs, which were not previously reported in the Delphi Thermal RFI documents. Figure 2-3 presents the locations for borings and monitoring wells located at, or in close proximity to, the Moraine Engine and Moraine Assembly facilities.

2.5.1 Site Hydrogeologic Units

Three main hydrogeologic units in the valley fill were defined for the site in the Delphi Thermal DOCC and RFI. These units also underlay the Moraine Engine and Moraine

Assembly facilities. The units are, from surface to bedrock, the upper sand and gravel unit, the till zone, and the lower sand and gravel unit.

The known thickness of the upper unit in the Moraine Engine and Moraine Assembly facility area is based on available soil boring logs generated during the installation of monitoring wells and production wells at the Moraine Engine, Moraine Assembly, and selected wells along the eastern edge of the Delphi Thermal Moraine facility. The upper unit varies in thickness, generally 30 feet to 70 feet thick, and consists of sand and gravel with minor till lenses. The upper unit has a saturated thickness ranging from 10 to 40 feet and is underlain by a discontinuous till zone. Information from soil borings and wells penetrating till, or believed deep enough to penetrate the till zone in the aforementioned area, is provided on Table 2-1 (GMC 1994a). Their locations are provided on Figure 2-3. Soil boring and well construction information not provided in the Delphi Thermal Moraine DOCC and RFI, including ODNR Well Log and Drilling Reports, and hand-drawn well construction diagrams, can be found in Appendix C of this document.

In addition to monitor wells and supply wells penetrating into or through the upper sand and gravel, numerous shallow (20- to 40-ft deep) foundation borings were advanced in the upper part of this unit during 1979 for the design and construction of Moraine Engine and Moraine Assembly facilities (Appendix C). Locations are provided on Figure 2-3. These geotechnical borings supplement information regarding the upper sand and gravel unit, including the presence of minor till lenses. A discontinuous till lens was encountered in the area north of the Moraine Engine facility in Borings GM-23, SB-8, and Production Well 39 at approximately 24 to 38 ft below land surface (bls) (702 to 690 feet above mean sea level [ft msl]) with a thickness up to 10 ft, and a traceable horizontal extent of at least 400 ft. This discontinuous till unit is believed to be a minor till lens within the upper sand and gravel unit. It is unknown if the till unit separating the upper and lower sand and gravel units exists beneath this local till unit.

The till zone consists of a clay- and silt-rich glacial deposit with low permeability. The till zone beneath the Moraine Engine and Moraine Assembly facilities was evaluated using information provided in Table 2-1 and the revised three-dimensional site flow model for Delphi Thermal (Geraghty & Miller, Inc. 1994b). An isopach map of the till zone was presented in the Draft RFI Final Report (Geraghty & Miller, Inc. 1996). This well information and the three-dimensional modeling interpretations of the till zone suggest that the till may be absent from northern portions of the site. No till was noted on the boring logs for wells considered deep enough to reach till (FW-1, FW-2, GM-24, HR-10, and HR-12). The boring log for Well 39 suggests till may have been present as a clay and gravel mixture which was reported at depths between 55 ft and 90 ft bls. Till was found along the western and southern boundary of the Moraine Engine facility and along the eastern boundary of the Moraine Assembly facility (Well GM-25). Although no till was noted during installation of Well GM-22, this well was not advanced deeper than 54 feet below land surface because of auger refusal and till may exist below the well.

The lower unit consists of at least 50 to 100 ft of sand and gravel with minor to significant till lenses. Boring logs illustrating the till thickness (if present) within the lower aquifer can be found in the Delphi Thermal DOCC and RFI and Appendix C of this document. This unit is a fully saturated, semi-confined aquifer (lower aquifer) throughout most of the Dayton area. In areas where the till is thin or discontinuous, the upper and lower aquifers respond as one hydrogeologic unit.

2.5.2 Water Levels and Hydraulic Gradients

Water levels in accessible wells are measured on a quarterly basis at the Delphi Thermal Moraine facility and include 16 wells on the Moraine Engine and Moraine Assembly facilities. Currently, water levels measured at the site are generally observed at approximately 20 to 35 ft bls. Groundwater flow maps of the water table surface and potentiometric surface from the RFI (Geraghty & Miller, Inc. 1996) and the North Settling Lagoon Fourth Quarter 1996 Groundwater Quality Assessment report (Geraghty & Miller, Inc. 1997a) are presented

on Figures 2-4 and 2-5, respectively, and Appendix D. These groundwater flow maps (January 1993, October 1994, and November 1996) are included on Figures 2-4 and 2-5 in the DOCC to illustrate variations in groundwater movement across the site over time.

2.5.2.1 Upper Aquifer

During the two phases of RFI (January 1993 and October 1994), groundwater flow in the upper aquifer was generally from north to south across the site, trending south-southwest near the Dryden North Wellfield (Figure 2-4). A cone of depression centered around Montgomery County Pump-to-Waste Well DN-13 is also depicted south of the site. This cone of depression in the upper aquifer reflects the influence on hydraulic head in the upper aquifer from pumping the lower unit at DN-13.

Groundwater flow during November 1996 is generally south-southwest across the northern half of the site. The installation of Monitoring Well GM-25 during December 1995 provided an additional water-level measurement location east of the Moraine Assembly facility and flow interpretations using this additional data point resulted in a more northeast to southwest depiction of groundwater flow during 1996 compared to previous years. Additionally, Interim Measures Recovery Well TW-2 (see Section 1.3.13), located in the southwest corner of Landfill L1 and screened in the upper aquifer began pumping in January 1996. A cone of depression centered on TW-2 can be seen at the southern end of the Delphi Thermal Moraine facility.

2.5.2.2 Lower Aquifer

During the RFI (January 1993 and October 1994), groundwater flow in the lower aquifer was generally from north to south across the site, bending southwest within the southern half of the site (Figure 2-5). During October 1994 when additional monitoring points around DN-13 were evaluated, a cone of depression is depicted in the Dryden North Wellfield. This cone of depression is the result of pumping the lower aquifer using Well

DN-13 at a rate of approximately 2.6 million gallons per day as part of the Montgomery County Pump-to-Waste Program.

During November 1996, groundwater flow in the lower aquifer was generally north to south across the northern half of the site, becoming southwest near the middle of the site. The cone of depression, centered around Well DN-13, is more pronounced during November 1996 than during January 1993 and October 1994, likely due to the operation of TW-2 in the upper aquifer. The use of Piezometer M73C, located south of DN-13, during November 1996 provided an additional data point for interpreting the cone of depression centered around DN-13.

2.5.2.3 Vertical Gradients

Vertical gradients are a comparison of potentiometric conditions between the upper and lower aquifers. 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. The water level measurements collected during Phases I and II of the RFI groundwater sampling in January 1993 and October 1994, respectively, were used to determine the direction of vertical gradients for selected well pairs at the Delphi Thermal Moraine facility (Geraghty & Miller, Inc. 1996).

During the RFI, vertical gradients at the northern (upgradient) end of the site were slightly upward (0.02 ft/ft) in well pairs HR-9/HR-10 and HR-11/HR-12 during both Phase I and Phase II. Therefore, the potential exists for groundwater to migrate upward through the confining unit to the upper aquifer in this area. Well pairs immediately downgradient from the North Settling Lagoon (W-3-N/HR-15, W-4-N/HR-14, and HR-3/HR-13) all showed downward vertical gradients (the average downward vertical gradient was 0.19 ft/ft) with the exception of well pair HR-3/HR-13 during Phase II of the RFI, which exhibited an upward vertical gradient of 0.42 ft/ft.

During the RFI, vertical gradients at the southern (downgradient) end of the site were downward in all of the well pairs measured during Phases I and II (average of 1.03 ft/ft and 0.79 ft/ft, respectively); therefore, the potential exists for groundwater to migrate downward from the upper aquifer through the confining unit to the lower aquifer in this area. The well pairs were as follows: 4S/GM-5, GM-8/GM-7R, GM-10/GM-9, GM-16/GM-15, GM-2/GM-1, GM-18/GM-13, GM-17/GM-11, and GM-6/GM-3.

During Phases I and II of the RFI, Montgomery County Well DN-13, screened in the lower aquifer, was being pumped as part of interim measures. After Phases I and II of the RFI, on January 31, 1996, Delphi Thermal Moraine began operating a groundwater recovery and treatment system at the southern end of their facility by extracting groundwater from the upper aquifer using TW-2 as a component of the interim measures, in conjunction with continued DN-13 operation.

A summary of vertical gradients from March 1995 through March 1997 in shallow/deep well pairs is provided in Table 2-2. Well pairs HR-9/HR-10 and HR-11/HR-12 show vertical gradients ranging from very slightly upward to very slightly downward from March 1995 through March 1997. Well pairs HR-3/HR-13, W-3-N/HR-15, and W-4-N/HR-14, located immediately downgradient from the North Settling Lagoon, all exhibit vertical gradients that are slightly downward from March 1995 through March 1997.

Vertical gradients near the southern end of the site were all downward during 1995. During 1996, following the start-up of Recovery Well TW-2 on January 30, 1996, vertical gradients in well pairs GM-8/GM-7R, GM-17/GM-11, GM-6/GM-3, and 4S/GM-5 (located nearest to Recovery Well TW-2) decreased in magnitude. Vertical gradients in the remaining well pairs at the southern end of the site, including well pairs GM-10/GM-9, GM-16/GM-15, GM-2/GM-1, and GM-18/GM-13 remained relatively unchanged during 1996. Upward vertical gradients in well pair GM-17/GM-11 on June 10, 1996 and GM-16/GM-15 on July 31, 1996 may be the result of measurement errors and have not been included in the

calculation of mean vertical gradients for 1996. On March 10, 1997, upward vertical gradients were seen in well pairs closest to TW-2 (GM-8/GM-7R, GM-17/GM-11, GM-6/GM-3, and 4S/GM-5). This is likely the result of the shut down of Montgomery County Well DN-13 during February 1996 due to mechanical problems. However, it should be noted that even in the absence of DN-13 pumping, vertical gradients have not reversed in the well pairs which are further south of the site (GM-10/GM-9, GM-16/GM-15, GM-2/GM-1, and GM-18/GM-13).

2.6 GROUNDWATER QUALITY

Groundwater quality at the site has been well defined over the last several years. Groundwater quality data has been collected at the Delphi Thermal Moraine facility through groundwater detection and assessment monitoring programs (Section 1.3.7) and two phases of RFI (Geraghty & Miller, Inc. 1996). Groundwater quality data has been collected at the Moraine Engine facility and Moraine Assembly facility through production well sampling (Section 1.3.9), UST closure assessment and removal activities (Section 1.3.1), and through voluntary investigations initiated by GMC (Section 1.3.8).

During the Delphi Thermal Moraine RFI, groundwater samples were collected facility wide and analyzed for Appendix IX constituents (VOCs, SVOCs, PCBs, pesticides, herbicides, cyanide, total metals, and dissolved metals). This data was used to support the Baseline Risk Assessment (ENVIRON Corporation 1996) at the Delphi Thermal Moraine facility. The Baseline Risk Assessment for groundwater determined that for all water receptors, SWMU-related contributions to groundwater quality are not expected to exceed Safe Drinking Water Act Maximum Contaminant Levels (MCLs) or risk-based drinking water concentrations under current and reasonably expected groundwater use at the facility and in the region, either in the absence or presence of Interim Measures (Geraghty & Miller, Inc. 1996).

The groundwater quality data collected from wells at the Moraine Engine and Moraine Assembly facilities, which is presented in the following sections, were evaluated on a preliminary basis in light of the Delphi Thermal Moraine facility Baseline Risk Assessment findings. Based on this preliminary evaluation, chlorinated VOCs are believed to be the only potential constituents of concern at the Moraine Engine and Moraine Assembly facilities. SVOCs, PCBs, pesticides, herbicides, and cyanide were not detected in wells at and downgradient from the Moraine Engine and Moraine Assembly facilities. Total metals and dissolved metals (where analyses were available) were either not detected or were found at concentrations in wells at and downgradient from the Moraine Engine and Moraine Assembly facilities within the range of constituent concentrations evaluated at the Delphi Thermal Moraine facility, which were determined to not be of concern.

2.6.1 Nature of Constituents

The following provides a discussion of conditions upgradient from the site, on site, and downgradient from the site.

2.6.1.1 Upgradient Groundwater Quality

Groundwater samples have been collected from four monitoring wells screened in the upper aquifer (GM-24, GM-25, HR-9, and HR-11) and two monitoring wells screened in the lower aquifer (HR-10 and HR-12), which are located upgradient of some portion of the site. Monitoring wells with the HR prefix are currently sampled and analyzed for Appendix IX VOCs using Method 8240, SVOCs, cyanide, total and dissolved metals, pH, and specific conductance on a quarterly basis as part of the Delphi Thermal Moraine North Settling Lagoon Assessment Monitoring Program (Section 1.3.7). Groundwater in the HR-series wells was also sampled and analyzed for Appendix IX constituents using Methods 8240 and 8015 during the Delphi Thermal Moraine RFI. The HR-series wells are located north of the Delphi Thermal Moraine and Moraine Engine facilities. Monitoring Well GM-24 is located north of the Moraine Assembly facility. Groundwater samples were collected from GM-24

and analyzed for Appendix IX VOCs using Methods 8240 and 8015 and selected total metals (nickel, zinc, arsenic, barium, cadmium, chromium, lead, mercury, and silver) during August 1994. Groundwater was collected from GM-24 and analyzed for VOCs using Method 8240 during June 1995. Monitoring Well GM-25 is located east of the Moraine Assembly facility, providing upgradient groundwater quality data for the southern portion of the Moraine Engine facility. Groundwater samples were collected from GM-25 during December 1995 and analyzed for Appendix IX VOCs using Method 8240.

VOCs most commonly detected in the upper aquifer, upgradient from the GMC site include: 1,1,1-trichloroethane, 1,1-dichloroethane, trans-1,2-dichloroethene, and TCE. 1,1,1-Trichloroethane was detected at a concentration as high as 45.8 ug/L in GM-24 during August 1994. 1,1-Dichloroethane was detected at a concentration as high as 60.1 ug/L in HR-9 during November 1996. Trans-1,2-dichloroethene has been detected consistently in HR-9 and sporadically in HR-11 at low concentrations. TCE was detected consistently in HR-9 reaching concentrations of 16.8 ug/L in November 1996. Chloroethane and 1,2-dichloroethane have also been detected in HR-9. Total VOC concentrations for upgradient wells in the upper aquifer have reached concentrations up to 140.2 ug/L in Well HR-9 during March 1996. Toluene, the only VOC detected in GM-25, was detected at a concentration of 2.9 ug/L during December 1995. Table 2-3 provides a summary of VOCs detected in each upper-aquifer well upgradient from the site.

Data for SVOCs, PCBs, pesticides, herbicides, cyanide, total metals, and dissolved metals for the four HR-series wells (upper and lower aquifers) was presented in the Delphi Thermal Moraine RFI (Geraghty & Miller, Inc. 1996) and the Delphi Thermal Moraine North Settling Lagoon Assessment (excluding pesticides and herbicides) (Geraghty & Miller, Inc. 1997a) and has not been repeated in this DOCC.

Only two of the nine total metals analyzed in upgradient Well GM-24 were detected. Total barium and zinc were detected during August 1994 at concentrations of 0.226 mg/L and

0.0214 mg/L, respectively (Geraghty & Miller, Inc. 1994a). Total metals data for GM-24 is summarized on Table 2-4.

VOCs detected in the lower aquifer upgradient from the site include vinyl chloride, 1,1-dichloroethane, and carbon disulfide, sporadically. Vinyl chloride was detected at concentrations reaching 8.1 ug/L in Well HR-12 during June 1994. 1,1-Dichloroethane has been detected at a concentration reaching 2.3 ug/L in HR-12 during November 1996. Table 2-5 provides a summary of VOCs detected in the monitor wells screened in the lower aquifer upgradient from the site.

2.6.1.2 On-Site Groundwater Quality

The following sections provide a discussion of groundwater quality in monitor and production wells located at the Moraine Engine and Moraine Assembly facilities.

2.6.1.2.1 Conditions in Monitor Well GM-23

Monitor Well GM-23 was installed in the upper aquifer downgradient (south) from the Moraine Engine Tank Farm located north of Building 2 during August 1994 as part of a voluntary investigation (Geraghty & Miller, Inc. 1994a). Groundwater samples were collected from Monitor Well GM-23 during August 1994 and analyzed for Appendix IX VOCs using Methods 8240 and 8015 and selected total metals (arsenic, barium, cadmium, chromium, lead, mercury, nickel, and zinc). GM-23 was resampled in June 1995 and analyzed for VOCs using Method 8240.

VOCs detected in GM-23 during August 1994 included PCE, TCE, and vinyl chloride at concentrations of an estimated 8,570J ug/L, 1,890 ug/l and an estimated 1,380J ug/L, respectively. During June 1995, PCE and TCE were detected at concentrations of 14,200 ug/L and 1,500 ug/L, respectively, while vinyl chloride was not detected during this event.

Detected VOCs in upper aquifer monitor wells located at the Moraine Engine and Moraine Assembly facilities, including GM-23, are provided on Table 2-6.

Total metal analyses detected the presence of arsenic, barium, chromium, lead, nickel, and zinc in groundwater during August 1994 (Geraghty & Miller, Inc. 1994a). Total metals data for GM-23 is presented on Table 2-4.

2.6.1.2.2 Conditions in Monitor Well GM-22

Monitor Well GM-22 was installed in the upper aquifer south of Building 2 on the Moraine Engine facility during August 1994 as part of a voluntary investigation (Geraghty & Miller, Inc. 1994a). Groundwater samples were collected from Monitor Well GM-22 during August 1994 and analyzed for Appendix IX VOCs using Methods 8240 and 8015 and selected total metals (arsenic, barium, cadmium, chromium, lead, mercury, nickel, and zinc). GM-22 was resampled in June 1995 and analyzed for VOCs using Method 8240.

VOCs detected in GM-22 during August 1994 included PCE, TCE, 1,1,1-trichloroethane, and 1,1-dichloroethane at concentrations of 9 ug/L, 34.2 ug/L, 4.2 ug/l, and 1.5 ug/L, respectively. During June 1995, the same four constituents were detected at concentrations similar to the 1994 data. Detected VOCs in upper aquifer monitor wells located at the Moraine Engine and Moraine Assembly facilities, including GM-22, are provided on Table 2-6.

Total metal analyses detected the presence of arsenic, barium, cadmium, chromium, lead, mercury, nickel, and zinc in groundwater during August 1994 (Geraghty & Miller, Inc. 1994a). Total metals data for GM-22 is presented on Table 2-4.

2.6.1.2.3 Contamination at Former UST

A UST containing 10,000 gallons of gasoline was removed from the west side of the Engine Plant in November 1989 (see Section 1.3.1). Six monitor wells (ME-1 through ME-6) were installed following tank removal to obtain groundwater-quality data. As discussed in Section 1.3.1, these monitor wells were sampled and analyzed for BTEX, TPH, PCBs, and total lead during the UST closure activities. Data for these sampling and analysis events is presented in Appendices A-2 and A-3.

Additionally, ME-3 and ME-6 were sampled and analyzed for VOCs using Methods 624 and 8240. Groundwater in ME-3 was sampled and analyzed in June 1993, September 1993, and June 1995, while ME-6 was sampled and analyzed in August 1993, September 1993, and June 1995. 1,1,1-Trichloroethane ranged in concentrations from not detected to 17.1 ug/L in ME-6 (September 1993). TCE was detected at concentrations ranging from 30.4 ug/L in ME-3 (September 1993) to 330 ug/L in ME-6 (September 1993). PCE was detected ranging in concentration from 24.3 ug/L in ME-3 (September 1993) to 167 ug/L in ME-6 (June 1995). 1,1-Dichloroethane, trans-1,2-dichloroethene, and toluene were infrequently detected at low concentrations. Table 2-6 provides a summary of detected VOCs in the vicinity of the former gasoline tank at the Moraine Engine facility.

2.6.1.2.4 Conditions in Production Wells

The Moraine Engine and Moraine Assembly production well sampling program is discussed in Section 1.3.9. Due to the high variability in sampling frequency and analytical parameters lists of each production and fire well, data are summarized in Appendix A-9. Well locations are provided on Figure 2-4. The following provides a discussion of analytical results.

VOCs most commonly detected in production and fire wells include TCE, cis-1,2-dichloroethene, PCE, and 1,1-dichloroethane. With the exception of Production Well 34,

these constituents were found at concentrations as high as 22.9 ug/L (Well FW-4), 11.6 ug/L (Well 31), 6.3 ug/L (Well 30), and 9.8 ug/L (Well 31), respectively. The highest VOC concentrations were found in Production Well 34, located downgradient (south) from the Moraine Assembly facility and east of the Moraine Engine facility. Well 34 was sampled during February and August 1992 while active. During 1992, TCE, PCE, and cis-1,2-dichloroethene were detected with total VOCs reaching a concentration of 229.1 ug/L (August 1992). Well 34 was taken out of service during July 1993, later converted to a flushmount well, and sampled during June 1995. Because Well 34 was out of service, no water was purged from the well prior to sampling. The June 1995 results indicated the presence of ethylbenzene, TCE, and total xylenes at concentrations of 2 ug/L, 5.4 ug/L, and 7.5 ug/L, respectively. Total VOCs detected in Well 34 during 1995 were considerably lower than those of 1992, which may be the result of not purging the well when it was sampled. No VOCs were detected in Fire Well FW-1.

Production Wells 11-A, 12, and 31 and Fire Wells FW-1, FW-2, FW-3, and FW-4 have also been sampled for total metals, dissolved silica, SVOCs, PCBs, and pesticides. The most commonly detected total metals in the wells include barium, calcium, iron, magnesium, manganese, and sodium. Dissolved silica is also commonly detected in these wells. Concentrations for all detected metals are provided in Appendix A-9. The only SVOC detected in any production wells and fire wells was di-n-butylpthalate in Well 12 at a concentration of 12 ug/L. Di-n-butylpthalate is a commonly laboratory contaminant, and is likely not present in groundwater. No PCBs and pesticides were detected in any production wells and fire wells analyzed.

2.6.1.3 Downgradient Groundwater Quality

Monitor Well GM-21 was installed in the upper aquifer at the southern (downgradient) portion of the Moraine Engine facility during August 1994 as part of a voluntary investigation (Geraghty & Miller, Inc. 1994a). Additionally, two upper aquifer monitor wells (GM-2 and EAST) and one lower aquifer monitor well (GM-1), located along the Delphi Thermal

Moraine southeastern property boundary, which were sampled prior to and during the RFI, as well as one upper aquifer monitor well (WSU-24) and one lower aquifer monitor well (GM-20D installed during Phase II of the RFI), located south of the site across Sellars Road, which were sampled during Phase II of the RFI (Geraghty & Miller, Inc. 1996), may also provide information on groundwater conditions downgradient from the Moraine Engine and Moraine Assembly facilities.

Groundwater samples were collected from GM-21 in August 1994 and analyzed for Appendix IX VOCs using Methods 8240 and 8015 and selected total metals (arsenic, barium, cadmium, chromium, lead, mercury, nickel, and zinc). GM-21 was resampled in June 1995 and analyzed for VOCs using Method 8240. VOCs detected in GM-21 during August 1994 included TCE, 1,1,1-trichloroethane, 1,1-dichloroethane and trans-1,2-dichloroethene at concentrations of 361 ug/L, 22.8 ug/L, 8.2 ug/L and 6.2 ug/L, respectively. During June 1995, only TCE and 1,1,1-trichloroethane were detected at concentrations of 252 ug/L and 15.4, respectively. Concentrations of detected VOCs in upper aquifer monitor wells located downgradient of the Moraine Engine and Moraine Assembly facilities are presented on Table 2-7.

Upper aquifer Monitor Wells East and GM-2 were sampled during the Delphi Thermal Moraine RFI and analyzed for Appendix IX VOCs by Method 8240 and 8015, SVOCs, PCBs, pesticides, herbicides, cyanide, and total and dissolved metals. GM-2 was also sampled for VOCs during a voluntary semi-annual monitoring conducted by Delphi Thermal Moraine. Data for VOCs detected in groundwater samples collected at the Delphi Thermal Moraine upper aquifer monitor wells, East and GM-2, during the RFI and at GM-2 during the voluntary monitoring conducted in the same time period are presented on Table 2-7. 1,1,1-Trichloroethane, 1,1-dichloroethane, PCE, and TCE were detected consistently at each well, while trans-1,2-dichloroethene was identified sporadically at low concentrations in GM-2. Total VOC concentrations in these wells range from 111.1 ug/L in GM-2 in November 1995 to 189.7 ug/L in East in January 1993.

Upper aquifer Monitor Well WSU-24 was sampled during Phase II of the Delphi Thermal Moraine RFI and analyzed for Appendix IX VOCs by Method 8240 and 8015, PCBs, pesticides, herbicides, cyanide, and total and dissolved metals. As presented on Table 2-7, 1,1,1-trichloroethane, PCE, and TCE were detected at concentrations of 3.1 ug/L, 2.3 ug/L, and 20.7 ug/L, respectively. Dissolved barium was the only dissolved metal detected in WSU-24, at a concentration of 115 ug/L. No PCBs, pesticides, herbicides or cyanide were detected in WSU-24 during Phase II of the RFI.

Total metals detected in upper aquifer Well GM-21 include barium (0.136 mg/L), chromium (0.003 mg/L), and zinc (0.016B ug/L) Total metals data for GM-21 is presented on Table 2-4. During the Delphi Thermal Moraine RFI, dissolved barium (0.103 ug/L) and cobalt (0.0089 ug/L) were detected in GM-2, while dissolved antimony (0.0562 mg/L), barium (0.0909 ug/L), cobalt (0.0099 mg/L), copper (0.0094 mg/L), nickel (0.0158 mg/L), and zinc (0.0117 mg/L) were detected in East (Geraghty & Miller, Inc. 1996). No SVOCs, PCBs, herbicides, or pesticides were detected during the RFI in East and GM-2, and cyanide was only detected in East, at a concentration of 0.008 mg/L.

Lower aquifer Monitor Well GM-1 was sampled during the Delphi Thermal Moraine RFI and analyzed for the same list of constituents described above for East and GM-2. This well is located in the southeast corner of the Delphi Thermal Moraine property and provides groundwater-quality data from the lower aquifer downgradient from the Moraine Engine and Moraine Assembly facilities. The most commonly detected VOCs found in this well include: 1,1,1-trichloroethane, PCE, and TCE. Total VOC concentrations in this well over the past 3 years have ranged from 57.2 ug/L (November 1991) to 73.6 ug/L (June 1993) (Table 2-8). The only dissolved metals detected in GM-1 during the Delphi Thermal Moraine RFI were barium (0.0792 mg/L) and cobalt (0.0086 mg/L).

Lower aquifer Monitor Well GM-20D was sampled during Phase II of the Delphi Thermal Moraine RFI and analyzed for the same list of constituents described above for WSU-24. As presented in Table 2-8, PCE and TCE were detected at concentrations of 6.1 ug/L and 1.8 ug/L, respectively. Dissolved barium and dissolved zinc were detected in GM-20D at concentrations of 74.8 ug/L and 17.5 ug/L, respectively. No PCBs, pesticides, herbicides, or cyanide were detected in GM-20D during Phase II of the RFI.

3.0 EVALUATION OF AREAS OF INTEREST

AOIs are areas that contained solid or hazardous waste at the facilities, either historically or presently. Those areas designated by the U.S. EPA as SWMUs in the PA/VSI Reports and the Amendment to the Administrative Order, and additional areas identified by GMC as a result of previous operations of Frigidaire, are included as AOIs in this section.

Resource information used to generate the AOI descriptions included the PA/VSI Reports, consultant's technical reports, GMC file information, and interviews with plant personnel. Data sources for individual units are included in the description of each AOI. Some of the SWMU names and numbers identified in the PA/VSI Reports and the Amendment to the Administrative Order were modified to match the GMC nomenclature for the AOIs. These changes are indicated in the AOI description and on Table 3-1. Table 3-2 summarizes the AOIs described in Section 3.0. Locations of the AOIs are indicated on Figure 3-1. Figure 3-2 shows the column numbering system for Frigidaire Plants 2 and 3, which is used in describing some of the AOI locations.

3.1 AOI DISCUSSION FORMAT

The AOI discussions were developed to provide a comprehensive, concise, consistent, and accessible reference that summarizes relevant information obtained from the resources mentioned above. Inaccuracies in the PA/VSI's have been addressed and corrected in this report. Each AOI discussion includes a summary of information, including the following.

- Descriptions of the process that occurs or occurred at the area, the approximate size of the area, and major pieces of equipment associated with the area.

- The general location of the area within the facilities.

- The period of time in which the area has been or was in operation.

- Information regarding waste management practices for the area, including the process which generated the waste, if applicable, and a list of hazardous constituents expected to be located in the area, if available.

- Descriptions of any engineered features designed to control potential releases to the environment. A typical engineering control is secondary containment for a tank.

- Historical releases that are documented and evidence of releases observed.

- The sources used to obtain information regarding the area.

- An evaluation of whether an AOI warrants further investigation. This determination is based on three considerations: (1) whether hazardous constituents were managed, (2) whether sufficient evidence of a release of hazardous constituents exists, and (3) whether potentially significant levels of released hazardous constituents exist in the environment. The potential significance of any released hazardous constituents was evaluated using information and findings from the Delphi Thermal Moraine RFI and Baseline Risk Assessment. A "yes" under all three considerations would support a determination that the AOI constitutes a potentially significant source and further investigation would be warranted.

3.2 SUMMARY OF AOIS

The following sections provide detailed descriptions of AOIs identified at the Moraine Engine and Moraine Assembly facilities. The AOI numbers are included in the title for each of the following sections to simplify cross-referencing from the text to Tables 3-1 and 3-2 and Figure 3-1. References to information for this compilation are presented in each of the AOI discussions. The locations of the AOIs are indicated on Figure 3-1, and the data presented here is summarized on Table 3-2.

FORMER FRIGIDAIRE PLANT 2

3.2.1 1 - Former Acid-Alkali Tank for #2 and #4 Anodize Systems

This AOI consisted of an 18,000-gallon underground, concrete holding tank located outdoors near the northeast corner of the Moraine Assembly Plant 2 (former Frigidaire Plant 2). The tank was constructed in 1951 and was cleaned out by removing residual sludges and closed in place by backfilling in 1979. It contained acid-alkali process solutions for the #2 and #4 Anodize Systems in the Frigidaire operations line (alkaline cleaners, sodium hydroxide etchants, nitric acid, sulfuric acid), and was used to prevent high- and low-pH slug discharges to the process sewer from the process tank dump. Aluminum was the metal processed. There was no secondary containment, and it is not known whether engineered controls were implemented at this AOI. The sources of information regarding this AOI include:

- "Industrial Waste Holding Tanks, Moraine Plants," General Motors Corporation Correspondence, July 1969.

- "Predicted Sludge Removal Schedule, Moraine Plants," General Motors Corporation Correspondence, 1969-1973.

- Employee Interviews.

The primary metal constituent, aluminum, is not a hazardous constituent and is a naturally occurring element and essential nutrient in a normal diet; therefore, it was not included in the Delphi Thermal Moraine RFI Baseline Risk Assessment. Review of available records show there are no documented releases from this holding tank and no evidence of a release from this holding tank based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI, which was removed 18 years ago, does not warrant further investigation because it did not manage hazardous constituents and it is not a potentially significant source of contamination.

3.2.2 2 - Former Acid-Alkali Tank for #5 Anodize System

This AOI consisted of a 24,000-gallon underground, concrete holding tank located indoors at Columns A/B-59 of the Moraine Engine Plant 3 (former Frigidaire Plant 2). The tank was constructed in 1954 and was cleaned out by removing residual sludges and closed in place by backfilling in 1979. Acid-alkali process solution (alkaline cleaners, sodium hydroxide etchants, nitric acid, and sulfuric acid) for the #5 Anodize System, which processed aluminum, was managed in this AOI. This AOI was used to prevent and control flow of high- and low-pH slug discharges to the process sewer from process tank dumps. There was no secondary containment, and it is not known whether engineered controls were implemented at this AOI. The sources of information regarding this AOI include:

- "Industrial Waste Holding Tanks, Moraine Plants," General Motors Corporation Correspondence, July 1969.

- "Predicted Sludge Removal Schedule, Moraine Plants," General Motors Corporation Correspondence, 1969-1973.

- Employee Interviews.

The primary metal constituent, aluminum, is not a hazardous constituent and is a naturally occurring element and essential nutrient in a normal diet; therefore, it was not included in the Delphi Thermal Moraine RFI Baseline Risk Assessment. Review of available records show there are no documented releases from this holding tank and no evidence of a release from this holding tank based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI, which was removed 18 years ago, does not warrant further investigation because it did not manage hazardous constituents and it is not a potentially significant source of contamination.

3.2.3 3 - Former Acid-Alkali Tank for #6 Anodize System

This AOI was located outdoors north of the Moraine Assembly Plant 2 (former Frigidaire Plant 2), Column H/115 and consisted of a 30,000-gallon underground, concrete holding tank. The tank was constructed in 1956 and was cleaned out by removing residual sludges and closed in place by backfilling in 1979. Acid-alkali process materials, including nitric, sulfuric and phosphoric acids, nickel sulfate, dyes, and alkali cleaners, were managed in this AOI. Aluminum was processed at this AOI. This AOI was used to prevent and control flow of high- and low-pH slug discharges to the process sewer from process tank dumps. It is not known whether engineered controls were implemented at this AOI, but there was no secondary containment. The sources of information regarding this AOI include:

- "Industrial Waste Holding Tanks, Moraine Plants," General Motors Corporation Correspondence, July 1969.

- "Predicted Sludge Removal Schedule, Moraine Plants," General Motors Corporation Correspondence, 1969-1973.

- Employee Interviews.

The primary metal constituent, aluminum, is not a hazardous constituent and is a naturally occurring element and essential nutrient in a normal diet; therefore, it was not included in the Delphi Thermal Moraine RFI Baseline Risk Assessment. This unit did use nickel, which is a hazardous constituent but is not a potential constituent of concern in groundwater. Review of available records show there are no documented releases from this holding tank and no evidence of a release from this holding tank based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI, which was removed 18 years ago, does not warrant further investigation because groundwater has not been impacted by the hazardous constituent (nickel) and it is not a potentially significant source of contamination.

3.2.4 4 - Former Acid-Alkali Tank for Hand Anodize Process

This AOI consisted of an 11,000-gallon concrete, underground holding tank which was located indoors at Columns A/B-61/63 of the Moraine Engine Plant 3 (former Frigidaire Plant 2). It was constructed in 1954, and was cleaned out by removing residual sludges and closed in place by backfilling in 1979. Acid-alkali process solutions (phosphoric, nitric and sulfuric acids, and alkali cleaners) from the aluminum Hand Anodize Process were managed at this holding tank. This AOI was used to prevent and control flow of slug discharges to the process sewer from process tank dumps. There was no secondary containment, and it is not known whether any other engineered controls were in use at this AOI. The sources of information regarding this AOI include:

- "Industrial Waste Holding Tanks, Moraine Plants," General Motors Corporation Correspondence, July 1969.

- "Predicted Sludge Removal Schedule, Moraine Plants," General Motors Corporation Correspondence, 1969-1973.

- Employee Interviews.

The primary metal constituent, aluminum, is not a hazardous constituent and is a naturally occurring element and essential nutrient in a normal diet; therefore, it was not included in the Delphi Thermal Moraine RFI Baseline Risk Assessment. Review of available records show there are no documented releases from this holding tank and no evidence of a release from this holding tank based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI, which was removed 18 years ago, does not warrant further investigation because it did not manage hazardous constituents and it is not a potentially significant source of contamination.

3.2.5 5 - Former Acid-Alkali Tank for #4 Pickle Process

This AOI consisted of a 17,000-gallon, concrete, underground holding tank located outdoors west of the Moraine Engine Plant 3 and near Column R/20 (former Frigidaire Plant 2). The tank was constructed in 1969 and cleaned out by removing residual sludges and closed in place by backfilling in 1979. This AOI managed acid-alkali process solutions for the #4 Pickle Process, including sulfuric acid, alkali cleaners, ferric sulfate, and nickel sulfate. Iron was the metal processed at this AOI. This AOI was used to prevent and control slug discharges to the process sewer from the process tank dumps. There was no secondary containment and it is not known what engineered controls were implemented at this AOI. The sources of information regarding this AOI include:

- "Industrial Waste Holding Tanks, Moraine Plants," General Motors Corporation Correspondence, July 1969.

- "Predicted Sludge Removal Schedule, Moraine Plants," General Motors Corporation Correspondence, 1969-1973.

- Employee Interviews.

The primary metal constituent, iron, is not a hazardous constituent and is a naturally occurring element and essential nutrient in a normal diet; therefore, it was not included in the Delphi Thermal Moraine RFI Baseline Risk Assessment. This unit did use nickel, which is a hazardous constituent but is not a potential constituent of concern in groundwater. Review of available records show there are no documented releases from this holding tank and no evidence of a release from this holding tank based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI, which was removed 18 years ago, does not warrant further investigation because groundwater has not been impacted by the hazardous constituent (nickel) and it is not a potentially significant source of contamination.

3.2.6 6 - Former Acid-Alkali Tank for Udylite Etch System

This AOI consisted of a 26,000-gallon concrete, underground holding tank located indoors at Columns C/D-59 of the Moraine Engine Plant 3 (former Frigidaire Plant 2). The AOI was constructed in 1952 and was cleaned out by removing residual sludges and closed in place by backfilling in 1979. Acid-alkali process solutions from the Udylite Etch System, including nitric acid and sodium hydroxide, were managed at this AOI. The metals processed were aluminum and copper. There was no secondary containment, and it is not known

whether engineering controls were implemented at the AOI. The sources of information regarding this AOI include:

- "Industrial Waste Holding Tanks, Moraine Plants," General Motors Corporation Correspondence, July 1969.

- "Predicted Sludge Removal Schedule, Moraine Plants," General Motors Corporation Correspondence, 1969-1973.

- Employee Interviews.

The primary metal constituents were aluminum and copper. Aluminum is not a hazardous constituent and is a naturally occurring element and essential nutrient in a normal diet; therefore, it was not included in the Delphi Thermal Moraine RFI Baseline Risk Assessment. Copper is a hazardous constituent but is not a potential constituent of concern in groundwater. Review of available records show there are no documented releases from this holding tank and no evidence of a release from this holding tank based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI which was removed 18 years ago, does not warrant further investigation because groundwater has not been impacted by the hazardous constituent (copper), and it is not a potentially significant source of contamination.

3.2.7 7 - Former Oil House Area

The Oil House (Building 7) was located north of the Moraine Engine Plant 3 (former Frigidaire Plant 2), at least as early as 1949. The Former Oil House Area consisted of the Oil House (Building 7) and an outdoor area that contained USTs, ASTs, and a drum storage area. This AOI was removed from service in 1979 when at least three buildings were demolished

and some tanks were removed and replaced or reused. The Oil House Building 7 and associated outside structures covered a total area of approximately 48,000 square ft.

Virgin paints and chemicals necessary for production at the Frigidaire facilities were stored and mixed in the Oil House, and pumped or transferred to various production areas. Materials were stored in both drums and tanks. Materials were shipped to this area by railroad tank cars and tanker trucks. Virgin chemicals including oils, paints, thinners, solvents, acids, toluene diisocyanate (TDI) and resins were stored inside the Oil House. Alcohols were reclaimed at the Oil House.

The outdoor area just north of the Oil House had seventeen 8,000 to 15,000-gallon ASTs used to store oil and acids, and three 15,000-gallon USTs used to store oil. Per the 1976 SPCC Plan, these tanks had gravel and concrete containment dikes for spill containment. A drummed waste storage area was also located just north of the Oil House and was used to store drummed waste oils, thinners, alcohols, still bottoms from the Oil House and sludges containing chromium, nickel, and phosphorus.

It is not known what other engineering controls were in place. Appendix A-10 lists what was stored, capacities of storage containers, and locations both inside and outside the Oil House, from the original 1976 GMC SPCC Plan. Figure 3-3 shows the entire Oil House Area and lists the chemicals stored in the outside tank farm, as well as the relationship of this AOI to AOI 20-Moraine Engine Tank Farm (Section 3.2.20) which was constructed in this area. A discussion of groundwater quality in the vicinity of this AOI is presented in Section 2.6. The sources of information regarding this AOI include:

- "Spill Prevention Control and Countermeasure Plan," GMC Frigidaire Division, December 1976.

- "Preliminary Evaluation of Groundwater Conditions and Potential Contaminant Source Areas at the General Motors Engine Plant, Moraine, Ohio," Geraghty & Miller, Inc. December 1994.

- Employee Interviews.

Hazardous constituents were managed at this AOI. Review of available records show there are no documented releases from the Oil House Area; however, based on the age, design, and conditions described, the potential for past releases was likely based on groundwater quality and soil data in this area (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, the Oil House Area may be a potentially significant source for soil and groundwater contamination and further investigation is warranted.

FORMER FRIGIDAIRE PLANT 3

3.2.8 8 - Former Acid-Alkali Tanks for Plating/Pickling Processes

This AOI consisted of two 48,000-gallon concrete, below ground holding tanks. These tanks were located near the northwest corner of the Moraine Assembly Plant 1 (former Frigidaire Plant 3), west of Springboro Road. The tanks were constructed in 1966 and removed in 1979. The tanks were used to prevent and control slug discharges to process sewers from process tanks. Process solutions included ferric sulfate, nickel sulfate and sulfuric acid from pickling, zinc from zinc platers, Elpo bonderites, chrome (converted from hexavalent to trivalent chromium by using sodium sulfite to form sodium dichromate prior to discarding), sodium hydroxide to control pH, and alkaline cleaners. It is not known what engineering controls were in use at the AOI. The sources of information regarding this AOI include:

- "Industrial Waste Holding Tanks, Moraine Plants," General Motors Corporation Correspondence, July 1969.

- "Predicted Sludge Removal Schedule, Moraine Plants," General Motors Corporation Correspondence, 1969 - 1973.

- Employee Interviews.

While this AOI managed nickel and zinc, which are hazardous constituents, it did not manage chlorinated VOCs. Review of available records show there are no documented releases from these holding tanks and no evidence of a release from these holding tanks based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI which was removed 18 years ago, does not warrant further investigation because groundwater has not been impacted by the hazardous constituents (nickel and zinc) and it is not a potentially significant source of contamination.

3.2.9 9 - Former Cyanide Processing Tank

A cyanide processing tank was located outdoors near the northwest corner of the Moraine Assembly Plant 1 (former Frigidaire Plant 3), west of Springboro Road. The tank had a 38,000-gallon capacity and was an aboveground concrete tank. The tank was built in 1966 and removed from service in 1979. This tank contained a cyanide solution used to buffer pickling solution. It is not known if engineered controls were implemented at this AOI, but it did have an acid-resistant coating inside. The sources of information regarding this AOI include:

- "Industrial Waste Holding Tanks, Moraine Plants," General Motors Corporation Correspondence, July 1969.

- "Predicted Sludge Removal Schedule, Moraine Plants," General Motors Corporation Correspondence, 1969 - 1973.

- Employee Interviews.

While this AOI managed cyanide, which is a hazardous constituent, it did not manage chlorinated VOCs. Review of available records show there are no documented releases from the cyanide processing tank and no evidence of a release from the tank based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI which was removed 18 years ago, does not warrant further investigation because groundwater has not been impacted by the hazardous constituent (cyanide) and it is not a potentially significant source of contamination.

3.2.10 10 - Former Oil Separator Area

The Former Oil Separator Area was located at the south end of the Moraine Assembly Plant 1 at the former Frigidaire Plant 3. It is not known when this AOI was constructed, although it was removed in 1979. The AOI was indoors, on concrete, and enclosed on three sides. Chips from the automatic screw machine area were brought here to allow for oil drainage. The oil was collected in a 200-gallon underground pit. The oil was drained from screw machine metal chips, was filtered, and was stored in one of three above ground tanks with capacities of 300, 375, and 475 gallons. Oil was pumped from this area back to the screw machine area for reuse. The sources of information regarding this AOI include:

- "Spill Prevention Control and Countermeasure Plan," GMC Frigidaire Division, December 1976.

- Employee Interviews.

This AOI had the potential to manage hazardous constituents, though these did not include chlorinated VOCs. Review of available records show there are no documented releases from the Former Oil Separator Area and no evidence of a release from this area based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI which was removed 18 years ago, does not warrant further investigation because it did not manage chlorinated VOCs and it is not a potentially significant source of contamination.

3.2.11 11 - Former Porcelain Manufacturing Area

The Porcelain Manufacturing Area was located inside the Moraine Assembly Plant 1 at Columns N/P-24 of the former Frigidaire Plant 3. The area was constructed in 1965 and removed in 1979. The area manufactured and stored porcelain components assembled into the household appliances in the former Frigidaire Plant 3. A 4,000-gallon above-ground holding tank which stored porcelain frit was located in this AOI. It is not known if engineered controls were implemented at this AOI. The sources of information regarding this AOI include:

- "Industrial Waste Holding Tanks, Moraine Plants," General Motors Corporation Correspondence, July 1969.
- "Predicted Sludge Removal Schedule, Moraine Plants," General Motors Corporation Correspondence, 1969-1973.
- Employee Interviews.

This AOI did not manage hazardous constituents. Review of available records show there are no documented releases from this area and no evidence of a release from this area

based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI which was removed 18 years ago, does not warrant further investigation because it did not manage hazardous constituents and it is not a potentially significant source of contamination.

3.2.12 12 - Former Frigidaire Plant 3 USTs

Two 6,000-gallon USTs which contained gasoline were located near the southeast corner of the Moraine Assembly Plant 1 (former Frigidaire Plant 3). It is not known when the tanks were constructed or whether there were any engineered controls, but they were believed to be removed in 1979. The sources of information regarding this area include:

- "Spill Prevention Control and Countermeasure Plan," GMC Frigidaire Division, December 1976.

- Employee Interviews.

While this AOI did manage BTEX and lead, which are hazardous constituents, it did not manage chlorinated VOCs. Review of available records show there are no documented releases from these tanks and no evidence of a release from these tanks based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI which was believed to be removed 18 years ago, does not warrant further investigation because it did not manage chlorinated VOCs and it is not a potentially significant source of contamination.

MORAINE ENGINE (CURRENT FACILITY)

3.2.13 13 - Buildings 4, 6, and 13

Building 4, 6, and 13 of the Frigidaire facilities are located south of the Moraine Engine Plant 3. Buildings 4 and 6 (also known as Moraine Engine Plant 4) consist of approximately 300,000 square ft. Buildings 4 and 6 were constructed in 1917 and 1926, respectively, and the buildings had many previous uses including manufacturing of services parts, chemical storage, storage for oil recovery, and offices. Frigidaire discontinued operations in 1979 and by late 1981 these buildings were empty without heat.

Building 13 (also known as Moraine Engine Plant 5) was built in 1916 by the C&LE and was used for railroad maintenance. It consists of approximately 60,000 square ft. GMC acquired the building in 1941. From 1941 until 1979, the building was used for maintenance purposes and storage. After 1979, part of Building 13 was used as a Hazardous Waste Storage Pad (discussed in Section 3.2.14).

3.2.13.1 Pre-Demolition Activities Buildings 4 and 6

In 1983, GMC removed ten PCB-contaminated electrical transformers and disposed of them off site at a TSCA-approved facility. Prior to 1985, GMC removed asbestos from piping within Buildings 4 and 6 and disposed of this material in an approved off-site facility.

In 1990, GMC conducted a comprehensive study of wood floor block in these buildings. The results indicated that PCB's were present in the floor block. It was estimated that approximately 70 percent of the wood floor block was impacted by PCBs. Additionally, an area on the south side of Building 4, formerly used for plating was impacted by metals (primarily cadmium). This area was estimated as being approximately 5,000 square ft.

In 1994, a deactivation assessment of the building was made prior to demolition. In addition to the wood floor block discussed above, it identified asbestos materials, lights and ballast, and three ASTs which were part of the screw machine oil recovery system as items to be addressed prior to demolition.

3.2.13.2 Pre-Demolition Activities Building 13

The former Hazardous Waste Storage Pad (AOI 14, Section 3.2.14) was clean closed in 1993 in accordance with the Ohio EPA approved closure plan. Closure certification was received from Ohio EPA in 1994. In 1994, a deactivation assessment of this building was conducted prior to demolition. It identified light fixtures, old hydraulic equipment, and an oil residue on the floor as items to be addressed prior to demolition. The oil residue was found to contain low levels of PCBs.

3.2.13.3 Demolition Buildings 4 and 6

Prior to demolition, light ballast and capacitors were containerized and shipped off site for disposal. Mercury vapor bulbs were removed and sent off site for disposal. The three ASTs were cleaned then scrapped. All asbestos materials were sent off site for disposal. All floor block in the former plating area which potentially contained cadmium was removed and sent offsite for disposal prior to demolition. A total of 24 samples were taken from the concrete slab underlying the area and tested for cadmium. The slab was found to be minimally impacted with cadmium levels ranging from <0.97 to 2.6 mg/kg.

All remaining floor block was removed prior to demolition and sent off site for disposal as PCB-impacted material. Wipe tests were taken from 136 sections of the concrete floor, approximately 2,500 square ft each. These wipe tests utilized Ensys wipe kits and were used to identify areas above 100 micrograms per square centimeter (ug/100 cm^2) and areas between 10 and 100 ug/100 cm^2. This methodology identified eight areas above 100 ug/100 cm^2 and 31 areas between 10 and 100 ug/100 cm^2. These areas were treated with the Capsur

cleaning procedures. After the Capsur cleanup was performed, Hexane wipe tests were performed. These results showed five spots were above 100 ug/100 cm^2, and one area was 82.5 ug/100 cm^2. All other areas were below 10 ug/100 cm^2. Due to potential safety concerns with the structure, decontamination activities had to be interrupted to demolish the building. Steel plates were placed over the impacted areas to prevent contamination of the building debris.

Core samples were taken from six spots in the concrete slab and it was determined that PCB's had permeated below the surface of the concrete but in no case did it extend to the base of the slab. Scarification of the five areas was conducted and then wipe samples were taken. All samples were below 50 ug/100 cm^2.

In summary, the building slab was cleaned to less than 100 ug/100 cm2 in all areas, and to less than 10 ug/100 cm^2 in approximately 95 percent of the slab. The building slab was left in place. As part of the cleaning and decontamination of these buildings, open sewer drains, two paint vaults, and two additional vaults were cleaned. Inactive drains and sumps were then back filled.

Cleaning and decontamination activities described above started in 1995. Demolition of the buildings took place in 1996. A site walk of AOI 13 was conducted by GMC and Geraghty & Miller in June 1997. Figure 3-4 indicates current conditions and features of the Buildings 4 and 6 floor slab, noted during the site walk.

3.2.13.4 Demolition Building 13

Prior to demolition, light ballast and capacitors were containerized and shipped off site for disposal. Mercury vapor bulbs were removed and sent off site for disposal. All hydraulic equipment was drained. The fluid was placed in drums and sent off site for disposal.

During demolition, a portion of a UST was found. The partial tank was approximately 5,000 gallons in volume and was determined to previously contain fuel oil used for heating purposes and was decommissioned prior to 1970. While tanks used for storing heating fuel for consumptive use on the premises are specifically exempted from BUSTR regulations, a closure procedure patterned after BUSTR closure for a diesel fuel tank was executed. The tank was removed along with approximately 55 cubic yards of soil. Photoionization readings were taken along the cavity walls and the areas with the highest reading were sampled and analyzed for TPH, PAH, and BTEX. Results of the sample from the cavity wall were: TPH detected at 8.8 mg/kg, BTEX was nondetect at 5.0 ug/kg, and pyrene detected at 7,460 ug/kg.

Cleaning (including the floor slab in Building 13) and decontamination activities described above started in 1995. Demolition of the building took place in 1996. A site walk of AOI 13 was conducted by GMC and Geraghty & Miller in June 1997. During the site walk, Building 13's floor slab was observed to be clean with no staining. Figure 3-4 indicates current conditions and features of Building 13 floor slab, noted during the site walk.

3.2.13.5 Information Sources

- "Proposed Revised Closure Plan - Hazardous Waste Management Facility," Dames and Moore, January 8, 1993.

- "RCRA Closure Certification Report, GMC Powertrain Division, Moraine Engine Plant, Moraine, Ohio OHD 980 569 388," Dames and Moore, January 20, 1993.

- "Preliminary Evacuation of Groundwater Conditions and Potential Contamination Source Areas at the General Motors Engine Plant, Moraine, Ohio," Geraghty & Miller, Inc., December 1994.

- "Deactivation Assessment GM Powertrain Plants 4 & 5, Moraine, Ohio," O'Brien and Gere Engineers, Inc., 1994.

- "Draft Observations and Certification Report, Oversite Related to the Environmental Deactivation of the Specified Harrison Powerhouse and Powertrain Plants 4 and 5, Moraine, Ohio," Earth Tech, Inc., March 1997.

- Employee Interviews.

3.2.13.6 Summary

The AOI did manage hazardous constituents including chlorinated VOCs. Through clean closure of the Hazardous Waste Storage Pad and cleaning and subsequent demolition of the three buildings, all known sources of contamination have been satisfactorily addressed. However, review of existing groundwater data from GM-22 and GM-21 indicates there is a potential for a release of chlorinated VOCs from the AOI. In summary, Buildings 4, 6, and 13 may be a potentially significant source for soil and groundwater contamination and further investigation is warranted.

3.2.14 14 - Former Hazardous Waste Storage Pad

The Hazardous Waste Storage Pad (U.S. EPA designation SWMU 3 - Hazardous Waste Storage Pad) was located inside Building 13. The Hazardous Waste Storage Pad was constructed in 1978 and was used for storage of hazardous waste. This area managed all hazardous wastes, including chlorinated solvents, waste thinner, paint solids, corrosive wastes, old and new floor stripper sludges, and lab chemicals (barium and cyanide). Drummed materials were stored on a concrete containment pad that was ramped and curbed to prevent possible spills from impacting the surrounding area. This pad was 30 feet by 80 feet and had the capacity to store approximately 250 55-gallon drums. Closure activities were performed

at this AOI in accordance with an approved closure plan and certification for clean closure was granted by the Ohio EPA on July 21, 1993 (Section 1.3.4). As discussed in Section 3.2.13, Building 13, which housed this unit, has been removed. The sources of information regarding this AOI include:

- "Proposed Revised Closure Plan - Hazardous Waste Management Facility," Dames & Moore, January 8, 1993.
- "Preliminary Assessment/Visual Site Inspection," PRC Environmental Management, Inc., August 1991.
- "Oil Spill Prevention Control and Countermeasure Plan," Moraine Engine Plant Powertrain Division, September 1, 1988.
- Employee Interviews.

This AOI managed hazardous constituents, including chlorinated VOCs. Review of available records show there were no documented releases from this storage pad and this was confirmed during closure activities. In summary, this AOI does not warrant further investigation because of the Ohio EPA-approved closure and it is not a potentially significant source of contamination.

3.2.15 15 - Former Frigidaire Plant 2 Tanks - Three Oil Tanks

Three 10,000-gallon USTs were used to store virgin hydraulic oil. These tanks were built in the 1960's and were removed in 1979. They were located west of the Moraine Engine Plant 3. It is unknown whether engineering controls were implemented at this AOI. Sources of information regarding this AOI include:

- Employee Interviews.

This AOI potentially managed hazardous constituents, although no chlorinated VOCs were managed at this AOI. Review of available records show there are no documented releases from the oil tanks and no evidence of a release from the tanks based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI which was removed 18 years ago, does not warrant further investigation because it did not manage chlorinated VOCs and it is not a potentially significant source of contamination.

3.2.16 16 - Former Frigidaire Plant 2 Tanks - Gasoline Tank

A steel 10,000-gallon UST located along the west side of the Moraine Engine Plant 3 was used to store gasoline. The tank was installed in approximately 1965 and was emptied, cleaned, and removed in 1989 because of a known release of gasoline to soil (Bowser-Morner 1989). Section 1.3.1 presents a summary of closure activities. A subsequent soils and groundwater investigation was conducted (Geraghty & Miller, Inc. 1991c, d, e and 1992) and showed that groundwater had not been affected and that the soils directly beneath the tank were affected by releases from the gasoline tank. These soils were excavated and removed in 1990. Quarterly groundwater monitoring was conducted for one year, beginning in 1991 and indicated no impacts to groundwater. Closure of this unit was approved by BUSTR on April 10, 1992. Section 1.3.1 presents a summary of this investigation. Sources of information regarding this AOI include:

- "Underground Storage Tank Closure Investigation," Bowser-Morner, 1989.

- "Assessment of Subsurface Conditions Near a Former Gasoline Underground Storage Tank at the Moraine Engine Plant," Geraghty & Miller, Inc., 1990.

- "First Quarterly Ground-Water Monitoring Report, General Motors Power Train Division, Moraine Engine Plant, Moraine, Ohio," Geraghty & Miller, Inc., 1991.

- "Second Quarterly Ground-Water Monitoring Report, General Motors Power Train Division, Moraine Engine Plant, Moraine, Ohio," Geraghty & Miller, Inc., 1991.

- "Third Quarterly Ground-Water Monitoring Report, General Motors Power Train Division, Moraine Engine Plant, Moraine, Ohio," Geraghty & Miller, Inc., 1991.

- "Fourth Quarterly Ground-Water Monitoring Report, General Motors Power Train Division, Moraine Engine Plant, Moraine, Ohio," Geraghty & Miller, Inc., 1992.

- Employee Interviews.

While this AOI did manage BTEX and lead, which are hazardous constituents, no chlorinated VOCs were managed at this AOI. There are documented releases from this tank; however, contaminated soil was removed and groundwater was not impacted. In summary, this AOI does not warrant further investigation because of the BUSTR-approved closure and it is not a potentially significant source of contamination.

3.2.17 17 - Building 15

This AOI consists of Building 15 and a former Frigidaire Plant 2 used oil tank. Building 15 consists of approximately 17,000 square ft, and based on a review of aerial photographs, was constructed prior to 1949. The building has been used for maintenance purposes and included a truck maintenance repair area, an equipment steam booth area and a

maintenance spray booth area located in the center of the building, as shown on Figure 3-5. A sample of oils generated during maintenance activities and stored in the used oil tank was collected prior to closure of the tank. Analysis of this sample indicated that the used oil contained several VOCs (ethylbenzene at 25.9 mg/kg, PCE at 114 mg/kg, toluene at 61.5 mg/kg and xylenes at 142 mg/kg [Appendix A-5]). The building is no longer in use.

A 900-gallon steel UST located south of the C&LE Building and north of Building 15 was used to store used oil from garage operations. It is unknown when this tank began operation. It was removed and clean closed under BUSTR in 1994. The tank was inspected during closure activities and found not to have leaked. Soil samples were analyzed for VOCs and TPH to confirm that contaminants in soil were at levels below BUSTR action levels, and that no chlorinated VOCs were present. Closure of this tank was approved by BUSTR on June 2, 1994 after soil sample analysis indicated no detectable concentrations of VOCs, and TPH levels below BUSTR action levels. Section 1.3.3 presents a summary of closure activities. Sources of information regarding this AOI include:

- "Underground Storage Tank Closure Report," Dames & Moore, 1994.

- Employee interviews.

While this AOI did potentially manage hazardous constituents, including chlorinated VOCs, there are no documented releases from the used oil tank. This was confirmed during closure activities and, therefore, this used oil tank does not warrant further investigation because of the BUSTR-approved closure and it is not a potentially significant source of contamination. However, limited information is available regarding the maintenance areas within Building 15, where hazardous constituents were potentially managed. Due to the potential for these areas to have served as a historical source of chlorinated VOCs present in GM-21, further investigation is warranted.

3.2.18 18 - Former Moraine Engine Fuel USTs

This AOI consisted of two 6,000-gallon fiberglass-reinforced plastic USTs located east of Building 12. They were constructed in 1981 and contained gasoline and diesel fuel. These tanks were emptied, removed, and clean closed under BUSTR in 1991. Soils were sampled and found to be below BUSTR action levels. Closure of these tanks was approved by BUSTR on December 18, 1991. A summary of closure activities is presented in Section 1.3.2. The sources of information regarding this AOI include:

- "Closure Assessment for Underground Storage Tanks at Building 12," Geraghty & Miller, Inc., 1991.

- Employee Interviews.

While this AOI did manage BTEX and lead, which are hazardous constituents, it did not manage chlorinated VOCs. Review of available records show one documented release from these tanks (Table 1-3). Limited impacts from this release was confirmed during closure activities. In summary, this AOI does not warrant further investigation because of the BUSTR-approved closure and it is not a potentially significant source of contamination.

3.2.19 19 - Chip Salvage Area

The Chip Salvage Area (U.S. EPA designation SWMU 7 - Chip Salvage Area) is located inside the west side of the Moraine Engine Plant 3 at Columns N/S-34/40. The area was constructed in 1980 and is currently in operation. The salvage area is approximately 100 ft by 50 ft and is used for the collection and processing of fine metal pieces (iron, steel, and aluminum) from wet and dry machining operations. The entire AOI is on concrete and is indoors. The metal chips are put through a wringer to remove water and oils. These wastes are discharged to the process wastewater system (Section 3.2.23), while the metal pieces are stored in one of four silos for recycling. Dry cast iron, nodular iron, steel, and aluminum chips

are stored in separate silos. Oils and water from the bottoms are transferred to the process wastewater collection system for reclamation. Grinding swarf is stored in a waste container. All sludges are stored in leak-proof containers and placed in the dockwell located just south of the Chip Salvage Area for recycle. The sources of information regarding this AOI include:

- "Preliminary Assessment/Visual Site Inspection," PRC Environmental Management, Inc., August 1991.

- "Oil Spill Prevention Control and Countermeasure Plan," Moraine Engine Plant Powertrain Division, September 1, 1994.

- Employee Interviews.

This AOI does not manage hazardous constituents. Review of available records show there are no documented releases from this area and no evidence of a release from this area based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI does not warrant further investigation because it does not manage hazardous constituents and it is not a potentially significant source of contamination.

3.2.20 20 - Moraine Engine Tank Farm

The Engine Plant Tank Farm (U.S. EPA designation SWMU 1 - Bulk Tank Farm) is located north of the Moraine Engine Plant 3. This AOI was constructed in 1980 and it is still in service. This AOI is an outdoor structure which includes 15 bulk ASTs, a holding sump, and a tanker-truck unloading area. The tanks are constructed of steel and have capacities ranging from 8,900 to 14,700 gallons. The spare tanks (#12, #13, #15) can be used to store waste oil for short periods of time to solve plant operational problems. All of the other tanks contain virgin chemicals used for production such as engine oil, diesel fuel, way lube,

hydraulic oil, cleaners, and coolants. The tank farm's concrete base covers an area of approximately 10,000 square ft. The tanker-truck unloading area is located south of the bulk tanks. Tanker trucks periodically deliver production chemicals and deliver waste oils in this area. Figure 3-6 illustrates the Engine Plant Tank Farm.

The tanks are surrounded by a 6-ft-high steel, chain-link fence mounted on a 3-ft by 6-inch concrete retaining wall. The entire tank farm is supported by a concrete base, sloped to drains leading to the 22,000-gallon capacity holding sump. The concrete tank farm sump is used to contain run-off material from rainwater and spills, tanker discharge, and tanker cleaning procedures. Tanker trucks and drums, excluding those containing hazardous waste, are periodically cleaned over a concrete slab that is sloped toward a drain that flows to the holding sump. The tank farm sump is connected to the Plant's process wastewater system (Section 3.2.23) which flows to the Delphi Thermal Moraine wastewater pretreatment plant. The sources of information regarding this AOI include:

- "Preliminary Assessment/Visual Site Inspection," PRC Environmental Management, Inc., August 1991.

- "Oil Spill Prevention Control and Countermeasure Plan," Moraine Engine Plant Powertrain Division, September 1, 1994.

- Employee Interviews.

This AOI potentially manages hazardous constituents, although these do not include chlorinated VOCs. Review of available records show there are no documented releases from the Moraine Engine Tank Farm and no evidence of a release from this area based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI does not warrant

further investigation because it does not manage chlorinated VOCs and it is not a potentially significant source of contamination.

3.2.21 21 - High Bay Area Storage Pad

The High Bay Area Storage Pad (U.S. EPA designation SWMU 4 - High Bay) is located inside the south end of the Moraine Engine Plant 3 at Columns B/D-0/1. The use of the High Bay Area for a 90-day accumulation pad began in 1988 and is currently active; however, it is not known when the pad was built. Since 1992, this storage pad has been used for storage of empty drums, drums of non-hazardous wastes, recyclable materials, and provides less than 90-day accumulation for hazardous wastes (e.g., lead sludge and flammable liquids). Used engine oils, hydraulic oils, and unused or obsolete chemicals are managed at this AOI for disposal by outside contractors. The entire 2,000-square-ft, concrete-paved area is surrounded by a trench drain for spill containment. This drain leads to a blind sump near a dock doorway for pumping and/or cleaning activities. Painted lines denote storage areas for the different forms of waste managed at the High Bay Area Storage Pad. The sources of information regarding this AOI include:

- "Preliminary Assessment/Visual Site Inspection," PRC Environmental Management, Inc., August 1991.

- "Oil Spill Prevention Control and Countermeasure Plan," Moraine Engine Plant Powertrain Division, September 1, 1994.

- Employee Interviews.

This AOI manages hazardous constituents (formerly including chlorinated VOCs), but for less than 90-days. Review of available records, including RCRA inspection records, show there are no documented releases from this storage pad. In summary, this AOI does not

warrant further investigation even though hazardous constituents are managed for less than 90-day storage as there is no evidence of a release based on RCRA inspections; therefore, it is not a potentially significant source.

3.2.22 22 - Satellite Accumulation Areas

As documented in the PA/VSI Report (PRC 1991b), several drums were stored at various locations throughout Moraine Engine Plant 3 (locations not indicated on Figure 3-1) until they were full enough to be taken to the High Bay Area Storage Pad (Section 3.2.21). These were described as Satellite Accumulation Areas (U.S. EPA designation SWMU 6 - Satellite Accumulation Areas).

Currently, the Moraine Engine facility uses two satellite accumulation drums, holding less than 55 gallons, one at the Carpenter Shop for the temporary storage of paint waste and thinners and the second at the Conrod Department for lead-bearing sludge collection (located at Column E/67). The drum of paint thinner in the Carpenter Shop is located indoors at Column L/10, stored in a heavy-duty, steel cabinet and is carefully monitored. The sources of information regarding this AOI include:

- "Preliminary Assessment/Visual Site Inspection," PRC Environmental Management, Inc., August 1991.

- "Oil Spill Prevention Control and Countermeasure Plan," Moraine Engine Plant Powertrain Division, September 1, 1994.

- Employee Interviews.

This AOI does manage hazardous constituents, although no chlorinated VOCs are managed at this AOI. Review of available records show there are no documented releases

from these current areas and no evidence of a release from the areas based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI does not warrant further investigation even though hazardous constituents are managed, they do not include chlorinated VOCs and there is no evidence of a release; therefore, it is not a potentially significant source of contamination.

3.2.23 23 - Wastewater Collection System

The Moraine Engine facility uses a Wastewater Collection System (U.S. EPA designation SWMU 5 - Wastewater Sumps) which consists of six zone sumps (below ground) and a final sump (below ground) for process wastewaters. This system was constructed in 1980 and is currently active. These sumps are located indoors, and constructed of concrete lined with an acid-proof coating. The six zone sumps are located at Columns G/2, B/34, L/35, F/61, L/64, and M/105 and are used for the temporary accumulation of process wastewater including coolants, oils, corrosives, and metal-contaminated wastewaters. Each zone sump has an estimated 2,000-gallon capacity and automatic pumps which discharge the wastewater to the final sump via aboveground pipes once it has reached a certain level. The final sump is located at Column N/97. This final sump receives wastewater from the six zone sumps as well as the tank farm sump. The final sump is a double sump connected by a weir. The capacity of one side of the final sump is approximately 30,000 gallons to accommodate the higher flow rates and volumes in the coolant collection system, while the capacity of the other side is 7,000 gallons. Wastewater collected in the final sump is pumped automatically via aboveground pipes to the Delphi Thermal Moraine wastewater pretreatment plant. Each sump has a minimum of two pumps in case one pump fails. The sources of information regarding this AOI include:

- "Preliminary Assessment/Visual Site Inspection," PRC Environmental Management, Inc., August 1991.

- "Oil Spill Prevention Control and Countermeasure Plan," Moraine Engine Plant Powertrain Division, September 1, 1994.

- Employee Interviews.

This AOI can occasionally manage characteristically hazardous waste (D002), although it does not manage chlorinated VOCs. Review of available records show there are no documented releases from this collection system and no evidence of a release from this AOI based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI does not warrant further investigation even though it does manage hazardous waste, they do not include chlorinated VOCs and there is no evidence of a release; therefore, it is not a potentially significant source of contamination.

3.2.24 24 - Non-Hazardous Waste Storage Pad

The Non-Hazardous Waste Storage Pad (U.S. EPA designation SWMU 2 - Waste Storage Pad) is a 157.5-ft by 120-ft concrete slab with all sides sloping to a center catch basin that in turn drains to the 30,000-gallon Tank Farm Sump Basin. This AOI is located outdoors, north of the Moraine Engine Plant 3 and is northeast of the Moraine Engine Tank Farm (Section 3.2.20). The pad was constructed in 1980 and is still in operation. The Non-Hazardous Waste Storage Pad is used to store various non-hazardous wastes in 12-cubic-yard boxes (luggers), roll-offs, and larger containers. This area is used to manage tank farm sump sludge from the weekly maintenance of the Moraine Engine facility's coolant systems. Miscellaneous non-hazardous debris including soils, concrete, and process equipment may be stored at this pad as a result of plant renovations. Surplus non-hazardous materials such as grinding wheel waste, spent shot peen, and used oil filters are also sometimes managed at the unit. This concrete area is also utilized for plant fire brigade training. All run-off and rainwater is contained in the Tank Farm Sump Basin and eventually pumped to the Delphi

Thermal Moraine wastewater pretreatment plant. The sources of information regarding this area include:

- "Preliminary Assessment/Visual Site Inspection," PRC Environmental Management, Inc., August 1991.

- "Oil Spill Prevention Control and Countermeasure Plan," Moraine Engine Plant Powertrain Division, September 1, 1994.

- Employee Interviews.

This AOI does manage hazardous constituents, although these do not include chlorinated VOCs. Review of available records show there are no documented releases from this storage pad and no evidence of a release from the pad based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI does not warrant further investigation even though it does manage hazardous constituents, they do not include chlorinated VOCs and there is no evidence of a release; therefore, it is not a potentially significant source of contamination.

MORAINE ASSEMBLY (CURRENT FACILITY)

3.2.25 25 - Former Paint Shop Sludge Pits

The Former Paint Shop Sludge Pits (U.S. EPA designation SWMU 3 - Transfer Sump and Paint Pits) consisted of two 200,000-gallon sludge separation pits, piping, pumps, chemical dispensing equipment, and equipment to collect paint residue. The residue was treated and deposited into the final transfer sump (Section 3.2.26), then pumped to the Delphi Thermal Moraine wastewater pretreatment plant. The sludge pits were constructed in 1980,

removed from service in 1994 (pits were cleaned out but minimal amounts of sludge may remain), and are currently inactive but still contain some water. The sources of information regarding this AOI include:

- "Spill Prevention Control and Countermeasure Plan," prepared for GMC Truck Group by Dames & Moore, October 1995.

- "Preliminary Assessment/Visual Site Inspection," PRC Environmental Management, Inc. August 1991.

- Employee Interviews.

This AOI did potentially manage hazardous constituents prior to 1986, although these did not include chlorinated VOCs. Review of available records show there are no documented releases from the sludge pits and no evidence of a release from the pits based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI does not warrant further investigation even though it did manage hazardous constituents, it did not manage chlorinated VOCs and it is not a potentially significant source of contamination.

3.2.26 26 - Moraine Assembly Process Waste Collection Systems

The Moraine Assembly Process Waste Collection Systems were constructed in 1980 and are still active. Small sumps (under ground) located throughout the Moraine Assembly facility collect process wastewater which drains to a final transfer sump (under ground) at the south end of the Moraine Assembly Plant 1. The collected waste is then pumped to the Delphi Thermal Moraine wastewater pretreatment plant via aboveground pipes. Wastes include electrodeposition painting wastewater and rinses, auto fluids, paint sludges, ELPO phosphates, oily wastes and alkaline cleaners.

This AOI previously contained waste from the paint sludge system; however, since the construction of the Paint Shop facility in 1992 and 1993, the paint sludge waste stream flows into the Paint Shop Sludge System. The solids along with some liquids are pumped to the final transfer sump at the south end of the Moraine Assembly Plant 1. The sources of information regarding this AOI include:

- "Spill Prevention Control and Countermeasure Plan," Truck Group, GMC Moraine Assembly Plant, draft, October 1995.
- "Spill Prevention Control and Countermeasure Plan," GMC Truck & Bus Group, August 1992.
- "Waste Management Program for the Moraine Assembly Plant," GMC Truck & Bus Group, August 1992.
- "Spill Prevention Control and Countermeasure Plan," GMC Truck & Bus Group, August 1984.
- Employee Interviews.

This AOI manages aqueous wastes, which at times could be characteristically hazardous, but does not include chlorinated VOCs. Review of available records show there are no documented releases from this waste collection system and no evidence of a release from the system based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI does not warrant further investigation because it manages aqueous wastes that do not include chlorinated VOCs and it is not a potentially significant source of contamination.

3.2.27 27 - Former Hazardous Waste Container Storage Area

The Former Hazardous Waste Container Storage Area (U.S. EPA designation SWMU 1 - Hazardous Waste Container Storage Unit) was located north of the Moraine Assembly facility, just north of the Moraine Assembly Tank Farm. This area was constructed in 1980 and clean closed under Ohio EPA in 1993. This AOI was a 60-ft by 75-ft concrete area which sloped to a drain in the center of the pad. The drain discharged to a 10,000-gallon-capacity blind sump which also handled the run-off/spill drainage from the Moraine Assembly Tank Farm. This AOI was used for temporary storage (less than 90-day) of waste chlorinated solvents, waste oil, solvent-contaminated waste oil and water, waste gasoline and water, and paint sludge. Hazardous wastes were contained in 55-gallon drums and temporarily placed on the north end of the concrete pad. Non-hazardous wastes were stored in wheeled carts on the south end of the pad. A maximum of 2,160 55-gallon drums could be stored at this AOI at one time. The north and west perimeters were bordered by a highway guardrail, a 3-foot-wide area of rock and gravel fill, and then a 6-foot-high concrete wall. The south perimeter was bordered by a 20-foot-wide concrete roadway.

Closure activities were conducted for the Former Hazardous Waste Container Storage Area in 1993. A summary of the closure activities is presented in Section 1.3.6. Ohio EPA approved closure in a letter dated April 28, 1994. The area is currently used for storing empty drums and drums of non-hazardous oils used for reclamation. The sources of information regarding this AOI include:

- "RCRA Closure Certification Report, General Motors Corporation Truck and Bus Group, Moraine Assembly Plant. " Dames & Moore. January 1994.

- "Closure Plan, Hazardous Waste Management Facility, Moraine Assembly Plant. General Motors Corporation Truck and Bus Group." Dames & Moore. January 1993.

- "Spill Prevention Control and Countermeasure Plan," GMC Truck & Bus Group, August 1992.

- "Waste Management Program for the Moraine Assembly Plant," GMC Truck & Bus Group, August 1992.

- "Preliminary Assessment/Visual Site Inspection," PRC Environmental Management, Inc. August 1991.

- "Spill Prevention Control and Countermeasure Plan," GMC Truck & Bus Group, August 1984.

- Employee Interviews.

This AOI managed hazardous constituents, including chlorinated VOCs. Review of available records show there are no documented releases from this AOI and this was confirmed during closure activities. In summary, this AOI does not warrant further investigation because of the Ohio EPA-approved closure and it is not a potentially significant source of contamination.

3.2.28 28 - Moraine Assembly Tank Farm

The Moraine Assembly Tank Farm (U.S. EPA designation SWMU 2 - Bulk Tank Farm) is located on the north side of Moraine Assembly Plant 1. This outdoor AOI was constructed in 1980, is currently active, and consists of 14 bulk ASTs and a tanker truck loading/unloading area. Figure 3-7 shows the layout of the Tank Farm and lists each tank's contents. The tanks are oriented horizontally in saddle supports. They are constructed of steel and coated on the outside with sprayed-on insulation and paint. There are 12 tanks of 15,000-gallon capacity which contain gasoline, diesel fuel, motor oil, antifreeze, transmission

fluid, axle fluid, power steering fluid, reducing solvents, purge solvents, and reclaimed waste solvents. There is also an 8,500-gallon-capacity tank that contains windshield washer fluid and a 6,000-gallon-capacity tank that holds manual transmission fluid.

Only the 15,000-gallon reclaimed solvent tank (Tank #5) contained waste; all the other tanks hold virgin chemicals used for the Moraine Assembly operations. This 15,000-gallon tank contained hazardous waste and was cleaned and closed in 1993 at the same time as the Former Hazardous Waste Container Storage Area (Section 3.2.27). A summary of closure activities is presented in Section 1.3.6. Ohio EPA approved closure in a letter dated April 28, 1994. This AST is currently being used for less than 90-day storage of hazardous waste.

The tank farm is supported on a concrete pad which is surrounded by a diked wall with a 30,000-gallon capacity. The concrete floor is sloped to a drain which leads to a 10,000-gallon wastewater treatment sump. The wastewater treatment sump is pumped as required, usually monthly except during periods of low precipitation, to the Delphi Thermal Moraine wastewater pretreatment plant. The loading/unloading area also has a drain which leads to the 10,000-gallon wastewater treatment sump. The sources of information regarding this AOI include:

- "RCRA Closure Certification Report, General Motors Corporation Truck and Bus Group, Moraine Assembly Plant." Dames & Moore. January 1994.

- "Closure Plan, Hazardous Waste Management Facility, Moraine Assembly Plant. General Motors Corporation Truck and Bus Group." Dames & Moore. January 1993.

- "Spill Prevention Control and Countermeasure Plan," GMC Truck & Bus Group, August 1992.

- "Waste Management Program for the Moraine Assembly Plant," GMC Truck & Bus Group, August 1992.

- "Preliminary Assessment/Visual Site Inspection," PRC Environmental Management, Inc. August 1991.

- "Spill Prevention Control and Countermeasure Plan," GMC Truck & Bus Group, August 1984.

- Employee Interviews.

While this AOI does manage hazardous constituents for less than 90-day storage, it does not manage chlorinated VOCs. Review of available records show there are no documented releases from the Moraine Assembly Tank Farm and no evidence of a release from the AOI based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). Ohio EPA approved closure of Tank #5 and the waste container storage on April 28, 1994 (Section 1.3.6). In summary, this AOI does not warrant further investigation even though it does manage hazardous constituents, they do not include chlorinated VOCs and it is not a potentially significant source of contamination.

3.2.29 29 - Mix Room Storage Tank

This AOI consists of a 6,000-gallon AST in the Paint Shop Mix Room, which is located in the Moraine Assembly Paint Building on the south end of Building 19. It was constructed in 1993 and is currently active. This AOI holds waste thinner, stored less than 90 days for reclamation by outside contractors. Secondary containment for the AST, as well as for the paint stored in the area, is present. The floor is also coated with a premium coating for resistance to chemical attack. Sources of information about this AOI include:

- "Spill Prevention Control and Countermeasure Plan," Truck Group, GMC, October 1995.

- Employee Interviews.

This AOI does manage material which could contain hazardous constituents, but does not include chlorinated VOCs. Review of available records show there are no documented releases from the storage tank and no evidence of a release from the tank based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI does not warrant further investigation even though hazardous constituents are managed for less than 90-day storage, they do not include chlorinated VOCs and there is no evidence of a release; therefore, it is not a potentially significant source of contamination.

3.2.30 30 - Moraine Assembly Flammable Collection/Storage Containment Area

This AOI consists of three outdoor, underground, secondary containment areas for collection of spills of flammable fluids. It is located on the east side of the Moraine Assembly Plant 1. These areas were constructed in 1980 and are currently active. One area at the southeast corner of the Moraine Assembly facility, has a 2,000-gallon capacity, and provides secondary containment for gasoline. Two 12,000-gallon capacity areas are located at the southeast corner of the facility. One provides secondary spill containment for ELPO phosphate materials at the receiving dock. The other provides secondary containment for the receiving dock, mix room drains, and bulk storage room. The containments are checked routinely and are emptied when fluids are present. The flammable fluids are disposed of by an outside contractor. Sources of information regarding this AOI include:

- "Spill Prevention Control and Countermeasure Plan," Truck Group, GMC, October 1995.

- Employee Interviews.

This AOI could manage hazardous constituents, although these do not include chlorinated VOCs. Review of available records show there are no documented releases from the Flammable Collection/Storage Containment Area and no evidence of a release from the area based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater at the site). In summary, this AOI does not warrant further investigation because it does not manage chlorinated VOCs and it is not a potentially significant source of contamination.

3.2.31 31 - Moraine Assembly West Haulaway Storage Tanks

This AOI consists of ten upgraded, monitored fiberglass USTs. These tanks range in size from 1,000 to 20,000 gallons. They are located near the corner of Dryden Road and Northlawn Avenue. These tanks were constructed in 1980, upgraded in 1990, and are currently active. Upgrading activities, conducted to comply with the December 1998 requirements, included spill and overfill protection and double-wall piping. A monitoring system to check daily inventory was also installed. The original tanks had to be excavated to install these new protective measures and then replaced. The storage tanks contain diesel fuel, motor oil, waste oil, power steering fluid, transmission fluid, hydraulic oil, and antifreeze. Secondary containment is present for filling operations.

Documented releases occurred at the diesel fuel dispenser and clean closure was achieved by removal of soil around the release and by removal of the concrete refueling containment pad (Section 1.3.5). BUSTR issued a letter (April 10, 1992) stating that no further corrective action was required. Sources of information regarding this AOI include:

- Truck and Bus Group Complete Haulaway Facilities Underground Storage Tank Upgrade Program, Qsource Engineering, 1990.

- Employee Interviews.

This AOI does manage hazardous constituents, although these not include chlorinated VOCs. Review of available records show a release of diesel fuel to soil occurred during filling operations and impacted soil was removed. In summary, this AOI does not warrant further investigation because it does not manage chlorinated VOCs, BUSTR approval addressing the release, and it is not a potentially significant source.

3.2.32 32 - Moraine Assembly East Haulaway Storage Tank

This AOI consists of one upgraded, monitored fiberglass UST. The tank is 1,000-gallons and contains unleaded gasoline. It is located north of the Moraine Assembly Plant 1 in the East Haulaway Area. The UST was built in 1980, upgraded in 1990 and is currently active. Upgrading activities were discussed in Section 3.2.31. Sources of information regarding this AOI include:

- Truck and Bus Group Complete Haulaway Facilities Underground Storage Tank Upgrade Program, Qsource Engineering, 1990.

- Employee Interviews.

This AOI does manage hazardous constituents, although these do not include chlorinated VOCs. Review of available records show there are no documented releases from the UST and no evidence of a release from the UST based on groundwater quality (Section 2.6 identified chlorinated VOCs as the only potential constituents of concern in groundwater

at the site). In summary, this AOI does not warrant further investigation because it does not manage chlorinated VOCs and it is not a potentially significant source of contamination.

3.2.33 33 - Moraine Assembly Former Paint Shop Storage Tanks

The Moraine Assembly Former Paint Shop Storage Tanks consisted of two 4,000-gallon ASTs that were located outdoors near the southeast corner of the Moraine Assembly Plant 1. The tanks were installed during 1979 and 1980 and were used until 1993. One tank was used for stripper and the other one was used as a purge solvent intermediate tank. The tanks were deactivated in 1994, subsequently cleaned and are currently empty. The source of information regarding this AOI includes:

- Employee Interviews

This AOI did manage hazardous constituents. Review of available records show there are no documented releases from these ASTs. In summary, this AOI does not warrant further investigation because there were no documented releases including no visual evidence of a release from these ASTs (which are in a highly visible location), and they have been deactivated and cleaned; therefore, it is not a potentially significant source of contamination.

HISTORICAL AREAS

3.2.34 34 - Excavation Area 1

This AOI is located north of the Moraine Engine Plant 3 and west of Springboro Road, and was identified from a 1956 aerial photograph. The excavation area was approximately 300 ft long by 40 ft wide, with the southern end containing a depression that was possibly filled with liquid. This area is currently covered with grass. The source of information regarding this AOI include:

- 1956 Aerial Photograph, Ohio Department of Natural Resources.

No information is available regarding the types of materials which may have been handled in this area and their potential for releasing hazardous constituents. Therefore, no specific basis exists for further investigation. However, GMC is proposing a very limited investigation to assess the potential presence of contamination in this area.

3.2.35 35 - Excavation Area 2

This AOI is located north of the Moraine Assembly Plant 1 and east of Springboro Road, and was identified from a 1956 aerial photograph. The excavation area is approximately 200 ft long by 150 ft wide. This area is currently covered by a parking lot. The sources of information regarding this AOI include:

- 1956 Aerial Photograph, Ohio Department of Natural Resources.

No information is available regarding the types of materials which may have been handled in this area and their potential for releasing hazardous constituents. Therefore, no specific basis exists for further investigation. However, GMC is proposing a very limited investigation to assess the potential presence of contamination in this area.

3.2.36 36 - Former Southwest ASTs

This AOI is located in the southwest corner of the Moraine Engine facility and consists of four sets of concrete AST saddles (Figure 3-5). The two southern most sets of saddles consist of four larger saddles per tank and are contained in an earthen dike area approximately 50 ft by 70 ft. The two northern most sets of saddles consist of two saddles per tank and are contained in a separate 40 ft. by 55 ft. earthen dike area. These tank saddles and earthen berms were identified during a site walkover in June 1997. A review of aerial photographs indicates that the two southern most tanks were installed prior to 1949. One tank was

installed on the northern most set of saddles between 1949 and 1956. These three tanks are present in the 1975 aerial photograph, but have been removed prior to the 1990 aerial photograph. Based on a review of the four aerial photographs, there is no evidence that the fourth set of saddles was ever used. Use of these tanks is thought to have ceased prior to the early 1970's; however, the tank saddles and earthen berms are still present.

- 1949, 1956, 1975 and 1990 Aerial Photographs, Ohio Department of Natural Resources.

- Employee Interviews.

No specific information is available regarding the types of materials which were handled in this area or the potential that a release may have occurred. Therefore, no specific basis exists for further investigation. However, given the probable use of the area for storage of liquid materials, GMC is proposing a limited investigation to determine if a release may have occurred.

3.3 FURTHER INVESTIGATION DETERMINATION

Following review of AOI information presented in Section 3.2, the technical approach for decision making indicated in Section 3.1 was used to determine whether an AOI would require further investigation. This evaluation was based on three considerations: (1) whether hazardous constituents were managed, (2) whether sufficient evidence of a release of hazardous constituents exists, and (3) whether potentially significant levels of released hazardous constituents exist in the environment. As a result, further investigation is recommended at the following AOIs.

- 7 - Former Oil House Area was retained because it may be a potentially significant source for soil and groundwater contamination.

- 13 - Buildings 4, 6, and 13 was retained because it may be a potentially significant source for soil and groundwater contamination.

- 17 - Building 15 was retained because it may be a potentially significant source for soil and groundwater contamination.

- 34 - Excavation Area 1 was retained to assess the potential for significant levels of hazardous constituents.

- 35 - Excavation Area 2 was retained to assess the potential for significant levels of hazardous constituents.

- 36 - Former Southwest ASTs were retained to assess the potential for significant levels of hazardous constituents.

An evaluation of potential exposure pathways affecting potentially exposed populations was presented in the Baseline Risk Assessment, Volume II of the draft RFI Final Report (ENVIRON Corporation 1996). An evaluation similar to the one used in the Baseline Risk Assessment will be conducted on each AOI warranting further investigation, using the following criteria. An exposure pathway generally requires the existence of: (1) a waste source and mechanism of waste constituent release, (2) a transport medium, (3) a point of potential human contact with the affected medium, and (4) an exposure route at the point of contact. Exposure pathways lacking one or more of the necessary elements are identified as "incomplete." Information will be collected during the Supplemental RFI to complete this evaluation.

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Table 1-1. Former and Current Building Designations, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

Current Designation	Frigidaire Designation	Historic Building Number
Moraine Assembly Plant 1	Plant 3	19
Moraine Assembly Plant 2	Plant 2 (Northeast Corner)	2
Moraine Engine Plant 3	Plant 2	2
Moraine Engine Plant 4	Plant 5	4, 6
Moraine Engine Plant 5	C&LE	13
--	Oil House	7

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Table 1-2. U.S. EPA Identified SWMUs and AOCs, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

SWMU Number	SWMU Title
Moraine Engine	
1	Bulk Tank Farm
2	Waste Storage Pad
3	Hazardous Waste Storage Pad
4	High Bay
5	Wastewater Sumps
6	Satellite Accumulation Areas
7	Chip Salvage Area
Moraine Assembly	
1	Hazardous Waste Container Storage Unit
2	Bulk Tank Farm
3	Transfer Sump and Paint Pits
AOCs	
Moraine Engine	
The entire facility.	
Moraine Assembly	
The entire facility.	

Source: PRC Environmental Management, Inc., 1991a and b.
SWMU Solid Waste Management Unit.
AOC Area of Concern.

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Table 1-3. Spill/Release History, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

Date	Summary of Spill/Release
April 26, 1971	A cave-in under the #1 Pickle allowed acid to be released to the storm sewer. The storm-sewer line was repaired and a new line was to be installed at a later time. The quantity of acid released was not documented.
August 6, 1971	An acid leak was discovered in the #5 Anodize System tank. Acid went to a storm basin which led directly to the storm sewer and the South Settling Lagoon. A fail-safe system was to be initiated. The quantity of acid released was not documented.
August 16, 1978	A leak in a solution tank containing a 10% phosphoric acid, 90% water mixture was discovered after phosphorous levels in the South Settling Lagoon discharge was above maximum allowable levels. Repairs to the tank liner were scheduled to be completed by August 20, 1978. Release quantity was not documented.
July 3, 1980	Transformer-type oils were spilled during removal of electrical switch gear from Vault 3, Plant 3 (Columns F/G-2). Oil was spilled within the vault, on the plant floor near the vault, on the steel building floor area, on the east ramp down to the north side of the roadway, and on the south side of the roadway. The truck used to move the electrical equipment was also contaminated with oil. Oil soak materials were used to prevent leakage into the storm sewer system. Total volume of the spill was estimated to be 35 gallons. Samples showed PCB content so the oils had to be treated as PCBs. Oil soak materials were placed into the approved drums for disposal. The roadway was scrubbed with 1,1,1-trichloroethane and the truck was cleaned up on-site during the week of July 3rd over a large sheet of Visqueen surrounded by oil soak materials for further pollution prevention. All materials generated from the spill were managed, stored, and disposed in accordance with Federal TSCA regulations.
January 30, 1989	Approximately 3 to 5 gallons of diesel fuel overflowed from filling procedures in the underground storage tank at Building 12. The fuel ran off and soaked into the ground as a result of the structure of the cement slab around the tank. The slab and area was flushed with water and no fuel was observed running into drains located on the asphalt area. These tanks were clean closed under BUSTR in 1991.

Table 1-3. Spill/Release History, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

Date	Summary of Spill/Release
April 8, 1997	A Moraine Engine Plant wastewater pipe became clogged, resulting in a pressure build-up and rupture of a surface cleanout located in an outside concrete storage pad. This allowed a wastewater-soluble machine coolant to flow across the pad and enter a nearby storm drain. This drain was connected to the North Stormwater Retention Basin (SWRB). While the majority of the spilled material was contained in the basin, some material passed through the basin and was discharged to the ditch which conveys the storm and non-contact cooling water to the Great Miami River. Two additional overflows occurred on April 11, 1997 and April 16, 1997. Each of these discharges was contained in the North SWRB. The cause of the discharges was ascertained during the April 16, 1997 occurrence and corrected.

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Table 2-1. Information from Moraine Engine, Moraine Assesmby, and Selected Delphi Thermal Moraine Facility Wells and Soil Borings Penetrating or Believed Deep Enough to Penetrate the Clay Rich Aquitard (Till), Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

Well ID	Ground Elevation (feet msl)	Depth (feet)	Screened Interval (feet)	Upper Elevation of Till (feet msl)	Lower Elevation of Till (feet msl)	Till Thickness
A	738[4]	118	88 to 118	671	663	8
EAST	730.0	72	-	-	-	-
FW-1	739.83	175	-	NT	NT	NT
FW-2	736.24	160	-	NT	NT	NT
FW-3	738.21	200	-	659	636	23
FW-4	730.87	160	93 to 133	641	619	22
GM-1	733.7	100	90 to 100	674	662.5	11.5
GM-21	723.79	55	45 to 55	664	662[1]	2[1]
GM-22	728.67	54[2]	44 to 54	NT[2]	NT[2]	NT[2]
GM-23	731.22	34[3]	24 to 34	697.5	696[1]	0.5[1]
GM-24	747.61	68	58 to 68	NT	NT	NT
GM-25	747.05	58	48 to 58	692	689[1]	3[1]
HR-8	740.77	76.5	54.2 to 64.2	665.8	664.3[1]	1.5[1]
HR-10	741.0	125.5	115.5 to 125.5	NT	NT	NT
HR-12	741.0	130	120 to 130	NT	NT	NT
HR-13	733.2	85	75 to 85	677	667	10
SB-8	729.5	40.5	NA	698	690	8
11-A	-	166	125 to 155	-	-	-
12	-	95[4]	-	-	-	-
22	-	114	84 to 114	-	-	-
28	-	207	150 to 161 177 to 204	-	-	-
29	-	-	-	-	-	-
30	730[4]	150	118 to 148	694	644	50
31	-	120	90 to 120	-	-	-
32	-	149	94 to 149	-	-	-
34	-	141	106 to 138	-	-	-
39	-	115	90 to 115	PT	PT	PT

- No information.
NA Not applicable.
NT No till encountered.
PT Possible till present.
(1) Boring terminated upon reaching till, till may be thicker than indicated.
(2) The boring was terminated due to auger refusal, and may not have been deep enough to reach the till.
(3) Till was encountered at a higher than expected elevation, and the boring was terminated to avoid breaching the till.
(4) Estimated value.

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Table 2-2. Vertical Gradients from March 1995 through March 1997 in Shallow/Deep Well Pairs at Delphi Harrison Thermal Systems, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

WELL PAIR	3/6/95	6/5/95	8/28/95	10/30/95	MEAN 1995	3/12/96	6/10/96	7/31/96	9/9/96	10/30/96	11/11/96	MEAN 1996	3/10/97
Northern End of Site													
HR-9/HR-10	-0.01	0.00	-0.01	-0.07	-0.02	-0.01	0.01	NA	0.01	NA	0.00	0.00	-0.01
HR-11/HR-12	-0.02	-0.01	-0.01	0.01	-0.01	0.00	-0.02	NA	0.01	NA	0.00	0.00	-0.01
North Settling Lagoon Area													
HR-3/HR-13	0.02	0.10	0.10	0.05	0.07	0.04	0.20	NA	0.05	NA	0.21	0.13	0.00
W-3-N/HR-15	0.38	0.25	0.35	0.21	0.30	0.29	0.33	NA	0.29	NA	0.21	0.28	0.11
W-4-N/HR-14	0.11	0.12	0.22	0.12	0.14	0.16	0.21	NA	0.24	NA	0.13	0.19	0.05
Southern End of Site													
GM-8/GM-7R	0.08	0.34	0.41	0.21	0.26	0.07	0.16	0.06	-0.03	0.04	0.03	0.05	-0.44
GM-10/GM-9	0.46	0.54	0.51	0.48	0.50	0.46	0.55	NA	0.51	NA	0.50	0.50	0.00
GM-16/GM-15	1.72	1.41	1.94	1.83	1.72	1.80	1.86	-1.68[1]	1.75	1.79	1.79	1.80[2]	0.22
GM-2/GM-1	0.28	0.50	0.55	0.42	0.44	0.37	0.50	0.53	0.43	0.40	0.40	0.44	0.01
GM-18/GM-13	1.53	1.66	1.69	1.57	1.61	1.52	1.60	1.55	1.28	1.52	0.18	1.27	0.07
GM-17/GM-11	1.00	2.16	1.22	1.10	1.37	1.31	-0.84[1]	1.06	1.00	1.04	1.03	1.09[2]	-0.02
GM-6/GM-3	0.50	0.73	0.80	0.63	0.66	0.23	0.46	0.31	0.19	0.23	0.21	0.27	-0.28
4S/GM-5	0.76	0.64	0.68	0.58	0.67	0.50	0.56	0.61	0.48	0.46	0.44	0.51	-0.17
Mean (Southern End of Site)	0.79	1.00	0.97	0.85	0.90	0.78	0.81	0.69	0.70	0.78	0.57	0.72	-0.08

Notes:

\+ Indicates a downward gradient.

\- Indicates and upward gradient.

[1]Possible measurement error.

[2]1996 Mean does not include data point with possible measurement error.

Upper Aquifer Recovery Well TW-2 began operating on January 30, 1996.

Lower Aquifer Well DN-13 was shut down during February 1997 due to mechanical problems.

Table 2-3. Detected and Total VOCs in Upper-Aquifer Wells, Upgradient from the Site, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

PARAMETER	UNITS	3/94	6/94	8/94	9/94	11/94	3/95	6/95	8/95	12/95	3/96	6/96	9/96	11/96
HR-9														
1,1,1-Trichloroethane	ug/L	14.8	14	NA	11.7	15.5	15.2	13.5	14.2	NA	14.4	17.7	14.4	15.9
1,1-Dichloroethane	ug/L	51.1	60	NA	58.2	60	51.3	57.1	49.2	NA	57.9	58.4	54.5	60.1
1,2-Dichloroethane	ug/L	--	--	NA	1.4	--	1.2	1.4	1.2	NA	2.1	1.7	2.3	2.3
Chloroethane	ug/L	28.5	29.3	NA	38	33.3	28.4	43.2	41.6	NA	50.4	38.4	43.7	34.7
trans-1,2-Dichloroethene	ug/L	1.6	2.1	NA	1.7	2.5	2.1	2.4	2	NA	2.5	2.0	2.6	3.1
Trichloroethene	ug/L	11.5	12.6	NA	12.6	15.6	13.9	13.7	10.3	NA	12.9	9.4	14.2	16.8
TOTAL VOCs	ug/L	107.5	118		123.6	126.9	112.1	131.3	118.5		140.2	127.6	131.7	132.9
HR-11														
1,1,1-Trichloroethane	ug/L	--	--	NA	--	--	--	1.6	1.2	NA	--	1.1	--	--
1,1-Dichloroethane	ug/L	13.8	16.3	NA	14.5	15.9	15.5	26.8	26.2	NA	20.4	23.1	20	15.5
trans-1,2-Dichloroethene	ug/L	--	--	NA	--	--	--	2.1	2.3	NA	--	1.6	--	--
TOTAL VOCS	ug/L	13.8	16.3		14.5	15.9	15.5	30.5	29.7		20.4	25.8	20	15.5
GM-24														
1,1,1-Trichloroethane	ug/L	NA	NA	45.8	NA	NA	NA	26.1	NA	NA	NA	NA	26.1	NA
TOTAL VOCS	ug/L			45.8				26.1					26.1	
GM-25														
Toluene	ug/L	NA	NA	NA	NA	NA	NA	NA	NA	2.9	NA	NA	NA	NA

NA Not analyzed.
ug/L Micrograms per liter.
-- Not detected.
VOCs Volatile organic compounds.

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Table 2-4. Summary of Results of Total Metals in Groundwater Samples from the Moraine Engine and Moraine Assembly Facilities, Suppplemental DOCC, General Motors Corporation, Moraine, Ohio.

Parameter	Analytical Method	Sample ID					
		GM-21	GM-22	GM-23	DUP-24	GM-24	RB-13
Arsenic	7061	<0.005	0.0936	0.0751	NA	<0.005	NA
Barium	6010	0.136	0.796	0.588	NA	0.226	NA
Cadmium	7131	<0.001	0.0015	<0.001	NA	<0.001	NA
Chromium	7191	0.003	0.0044	0.0468	NA	<0.002	NA
Lead	7421	<0.005	0.0676	0.0584	NA	<0.005	NA
Mercury	7470	<0.0002	0.0002	<0.0002	NA	<0.0002	NA
Nickel	6010	<0.015	0.271	0.0343B	0.0416	0.015	<0.015
Selenium	7740	<0.005	<0.005	<0.005	NA	<0.005	NA
Silver	6010	<0.001	<0.001	<0.001	NA	<0.001	NA
Zinc	6010	0.016B	0.292	0.233	0.231	0.0214	0.0068B

All concentrations are reported in milligrams per liter (mg/L).
DUP-24 is a field duplicate of GM-23.
RB-13 is a bailer rinseate blank.
B Parameter was also detected in a laboratory blank.
NA Not analyzed.
< Not detected above the detection limit.

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Table 2-5. Detected and Total VOCs in Lower-Aquifer Monitor Wells Upgradient from the Site, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

Parameter	Units	3/94	6/94	11/94	3/95	6/95	8/95	3/96	6/96	8/96	11/96
HR-10											
Carbon Disulfide	ug/L	2.3	--	--	--	--	--	--	--	--	--
TOTAL VOCs	ug/L	2.3									
HR-12											
1,1-Dichloroethane	ug/L	--	--	1.4	1.1	1	1.1	1.9	1.8	2.2	2.3
Vinyl Chloride	ug/L	6.2	8.1	6	--	7.5	6	7	7.8	5.4	3.7
TOTAL VOCS	ug/L	6.2	8.1	7.4	1.1	8.5	7.1	8.9	9.6	7.6	6.0

ug/L Micrograms per liter
-- Not detected
VOCs Volatile organic compounds

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Table 2-6. Detected and Total VOCs in Upper-Aquifer Monitor Wells at the Engine Plant, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

PARAMETER	Units	6/93	8/93	9/93	8/94	6/95
GM-23						
Tetrachloroethene	ug/L	NI	NI	NI	8,570J	14,200
Trichloroethene	ug/L	NI	NI	NI	1,890	1,500
Vinyl Chloride	ug/L	NI	NI	NI	1,380J	--
TOTAL VOCS	ug/L				11,840J	15,700
ME-6						
1,1,1-Trichloroethane	ug/L	NA	--	17.1	NA	--
1,1-Dichloroethane	ug/L	NA	--	1.6	NA	--
Tetrachloroethene	ug/L	NA	52.6	85.6	NA	167
trans-1,2-Dichloroethene	ug/L	NA	--	1.5	NA	--
Trichloroethene	ug/L	NA	221	330	NA	246
TOTAL VOCS	ug/L		273.6	417.1		413
ME-3						
1,1,1-Trichloroethane	ug/L	13.2	NA	9.1	NA	12.7
Tetrachloroethene	ug/L	30.7	NA	24.3	NA	56
Toluene	ug/L	1.6	NA	--	NA	--
Trichloroethene	ug/L	38.1	NA	30.4	NA	136
TOTAL VOCS	ug/L	83.6		63.8		204.7
GM-22						
1,1,1-Trichloroethane	ug/L	NI	NI	NI	4.2	8.7
1,1-Dichloroethane	ug/L	NI	NI	NI	1.5	3.4
Tetrachloroethene	ug/L	NI	NI	NI	9	9.4
Trichloroethene	ug/L	NI	NI	NI	34.2	22.4
TOTAL VOCS	ug/L				48.9	53.8

NA Not analyzed.
NI Not installed.
ug/L Micrograms per liter.
-- Not detected.
J Estimated concentration.
VOCs Volatile organic compounds.

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Table 2-7. Detected and Total VOCs in Upper-Aquifer Monitor Wells Downgradient from the Moraine Engine and Moraine Assembly Facilities, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

Parameter	Units	1/93*	6/93	11/93	6/94	8/94	10/94*	11/94	6/95	11/95
EAST										
1,1,1-Trichloroethane	ug/L	18.9	NA	NA	NA	NA	16	NA	NA	NA
1,1-Dichloroethane	ug/L	8	NA	NA	NA	NA	10.5	NA	NA	NA
Tetrachloroethene	ug/L	79.4	NA	NA	NA	NA	62.4	NA	NA	NA
Trichloroethene	ug/L	83.4	NA	NA	NA	NA	71.4	NA	NA	NA
TOTAL VOCS	ug/L	189.7					160.3			
GM-21										
1,1,1-Trichloroethane	ug/L	NI	NI	NI	NI	22.8	NA	NA	15.4	NA
1,1-Dichloroethane	ug/L	NI	NI	NI	NI	8.2	NA	NA	--	NA
Trichloroethene	ug/L	NI	NI	NI	NI	361	NA	NA	252	NA
trans-1,2-Dichloroethene	ug/L	NI	NI	NI	NI	6.2	NA	NA	--	NA
TOTAL VOCS	ug/L					398.2			267.4	NA
GM-2										
1,1,1-Trichloroethane	ug/L	13.7	12.7	13.8	11.2	NA	NA	9.4	21.4	8.7
1,1-Dichloroethane	ug/L	3.1	--	2.2	1.8	NA	NA	2.4	3.4	3.4
Tetrachloroethene	ug/L	7.6	9.1	10.6	8.9	NA	NA	11.2	12.6	10.2
Trichloroethene	ug/L	108	102	102	89.6	NA	NA	89.8	104	87.5
Trans-1,2-dichloroethene	ug/L	--	--	--	--	NA	NA	--	--	1.3
TOTAL VOCS	ug/L	132.4	123.8	128.6	128.6			128.6	141.4	111.1
WSU-24										
1,1,1-Trichloroethane	ug/L	NA	NA	NA	NA	NA	3.1	NA	NA	NA
Tetrachloroethene	ug/L	NA	NA	NA	NA	NA	2.3	NA	NA	NA
Trichloroethene	ug/L	NA	NA	NA	NA	NA	20.7	NA	NA	NA
TOTAL VOCS	ug/L						26.1			

NA Not analyzed
NI Not installed
ug/L Micrograms per liter
-- Not detected
VOCs Volatile organic compounds
* RFI Sampling events

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Table 2-8. Detected and Total VOCs in Lower-Aquifer Monitor Wells Downgradient from the Moraine Engine and Moraine Assembly Facilities, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

Parameter	Units	1/93*	6/93	11/93	6/94	10/94*	11/94	6/95	11/95
GM-1									
1,1,1-Trichloroethane	ug/L	8	9	5.9	5.4	NA	3.6	4.8	3.7
Tetrachloroethene	ug/L	4.7	6.6	4.6	4.8	NA	3.5	5.2	4.6
Trichloroethene	ug/L	42.4	58	44	49.6	NA	44.1	55.7	46.6
TOTAL VOCs	ug/L	55.1	73.6	54.5	59.8		51.2	65.7	54.9
GM-20D									
Tetrachloroethene	ug/L	NI	NI	NI	NI	6.1	NA	NA	NA
Trichloroethene	ug/L	NI	NI	NI	NI	1.8	NA	NA	NA
TOTAL VOCs	ug/L					7.9			

NA Not analyzed
NI Not installed
ug/L Micrograms per liter
-- Not detected
VOCs Volatile organic compounds
* RFI Sampling events

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Table 3-1 List of Areas of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

AOI Number	AOI Title	SWMUs Identified in the PA/VSI[1]	SWMUs Identified in the Amended Order[2]	AOI Status
Former Frigidaire Plant 2				
1	Former Acid-Alkali Tank for #2 and #4 Anozide Systems[3]			Closed
2	Former Acid-Alkali Tank for #5 Anozide System[3]			Closed
3	Former Acid-Alkali Tank for #6 Anozide System[3]			Closed
4	Former Acid-Alkali Tank for Hand Anodize Process[3]			Closed
5	Former Acid-Alkali Tank for #4 Pickle Process[3]			Closed
6	Former Acid-Alkali Tank for Udylite Etch System[3]			Closed
7	Former Oil House Area[3]			Closed
Former Frigidaire Plant 3				
8	Former Acid-Alkali Tanks for Plating/Pickling Processes[3]			Closed
9	Former Cyanide Processing Tank[3]			Closed
10	Oil Separator Area[4]			Closed
11	Former Porcelain Manufacturing Area[4]			Closed
12	Former Frigidaire Plant 3 USTs[4]			Closed

Table 3-1 List of Areas of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

AOI Number	AOI Title	SWMUs Identified in the PA/VSI[1]	SWMUs Identified in the Amended Order[2]	AOI Status
Moraine Engine (Current Facility)				
13	Buildings 4, 6, and 13			Closure Pending[4]
14	Former Hazardous Waste Storage Pad	SWMU 3 - Hazardous Waste Storage Pad		Closed[5]
15	Former Frigidaire Plant 2 Tanks - Three Oil Tanks			Closed
16	Former Frigidaire Plant 2 Tanks - Gasoline Tank			Closed[6]
17	Building 15			Closed[6]
18	Former Moraine Engine Fuel USTs			Closed[6]
19	Chip Salvage Area	SWMU 7 - Chip Salvage Area	Chip Salvage Area	Active
20	Moraine Engine Tank Farm	SWMU 1 - Bulk Tank Farm	Bulk Tank Farm	Active
21	High Bay Area Storage Pad	SWMU 4 - High Bay	High Bay	Active
22	Satellite Accumulation Areas	SWMU 6 - Satellite Accumulation Areas		Active
23	Wastewater Collection System	SWMU 5 - Wastewater Sumps	Wastewater Sump System	Active
24	Non-Hazardous Waste Storage Pad	SWMU 2 - Waste Storage Pad	Waste Storage Pad	Active
Moraine Assembly (Current Facility)				
25	Former Paint Shop Sludge Pits	SWMU 3 - Transfer Sump and Paint Pits	Transfer Sump and Paint Booth Water Processing System	Inactive

Table 3-1 List of Areas of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

AOI Number	AOI Title	SWMUs Identified in the PA/VSI[1]	SWMUs Identified in the Amended Order[2]	AOI Status
26	Moraine Assembly Process Waste Collection Systems			Active
27	Former Hazardous Waste Container Storage Area	SWMU 1 - Hazardous Waste Container Storage Unit		Closed[5]
28	Moraine Assembly Tank Farm	SWMU 2 - Bulk Tank Farm		Active
29	Mix Room Storage Tank			Active
30	Moraine Assembly Flammable Collection/Storage Containment Area			Active
31	Moraine Assembly West Haulaway Storage Tanks			Active
32	Moraine Assembly East Haulaway Storage Tank			Active
33	Moraine Assembly Former Paint Shop Storage Tanks			Inactive
Historical Areas				
34	Excavation Area 1			Closed
35	Excavation Area 2			Closed
36	Former Southwest ASTs			Closed

[1] U.S. EPA designation for SWMUs identified in the PA/VSI (PRC Environmental Management, Inc. 1991a and b).
[2] U.S. EPA designation for SWMUs identified in the Amendment to the Administrative Order (April 1997).
[3] Former AOI location is the current Moraine Engine facility.

Table 3-1 List of Areas of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

[4] Former AOI location is the current Moraine Assembly facility.
[5] Closure was approved by Ohio EPA.
[6] Closure of the tank was approved by BUSTR.

AOI Area of Interest
DOCC Description of Current Conditions
SWMU Solid Waste Management Unit

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Table 3-2. Summary of Areas Of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

AOI	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
FORMER FRIGIDAIRE PLANT 2				
1. **Former Acid-Alkali Tank for #2 and #4 Anodize Systems**	Cleaned out and closed in place by backfilling in 1979.	18,000-gallon underground concrete tank with no secondary containment; built in 1951; outdoors; used to prevent and control flow of slug discharges to process sewer from process tank dumps. Process solutions consisted of alkaline cleaners, sodium hydroxide etchants, nitric acid, and sulfuric acid. Metal processed was aluminum. No hazardous constituents were managed at this AOI.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination. This AOI was removed 18 years ago. In addition, aluminum is a naturally occurring element and essential nutrient in a normal diet; therefore, it was not included in the Delphi Thermal Moraine RFI Baseline Risk Assessment.
2. **Former Acid-Alkali Tank for #5 Anodize System**	Cleaned out and closed in place by backfilling in 1979.	24,000-gallon underground concrete tank with no secondary containment; built in 1954; indoors; used to prevent and control flow of high- and low-pH slug discharges to process sewer from process tank dumps. Process solutions consisted of alkaline cleaners, sodium hydroxide etchants, nitric acid and sulfuric acid. Metal processed was aluminum. No hazardous constituents were managed at this AOI.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination. This AOI was removed 18 years ago. In addition, aluminum is a naturally occurring element and essential nutrient in a normal diet; therefore, it was not included in the Delphi Thermal Moraine RFI Baseline Risk Assessment.
3. **Former Acid-Alkali Tank for #6 Anodize System**	Cleaned out and closed in place by backfilling in 1979.	30,000-gallon underground concrete tank with no secondary containment; built in 1956; outdoors; used to prevent and control flow of high- and low-pH slug discharges to process sewer from process tank dumps. Process materials included nitric, sulfuric and phosphoric acids, nickel sulfate, dyes, and alkali cleaners. Metal processed was aluminum. A hazardous constituent (nickel) was managed at this AOI, but chlorinated VOCs were not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination. This AOI was removed 18 years ago. In addition, aluminum is a naturally occurring element and essential nutrient in a normal diet; therefore, it was not included in the Delphi Thermal Moraine RFI Baseline Risk Assessment.

Table 3-2. Summary of Areas Of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

AOI	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
4. **Former Acid-Alkali Tank for Hand Anodize Process**	Cleaned out and closed in place by backfilling in 1979.	11,000-gallon underground concrete tank with no secondary containment; built in 1954; indoors; used to prevent and control flow of slug discharges to process sewer from process tank dumps. Process solutions included phosphoric, nitric, and sulfuric acid, and alkali cleaners. Metal processed was aluminum. No hazardous constituents were managed at this AOI.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination. This AOI was removed 18 years ago. In addition, aluminum is a naturally occurring element and essential nutrient in a normal diet; therefore, it was not included in the Delphi Thermal Moraine RFI Baseline Risk Assessment.
5. **Former Acid-Alkali Tank for #4 Pickle Process**	Cleaned out and closed in place by backfilling in 1979.	17,000-gallon underground concrete tank with no secondary containment; built in 1969; outdoors; used to prevent and control slug discharges to process sewer from process tank dumps. Process solutions included ferric sulfate and nickel sulfate, sulfuric acid, alkali cleaners. Metal processed was iron. A hazardous constituent (nickel) was managed at this AOI, but chlorinated VOCs were not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination. This AOI was removed 18 years ago. In addition, iron is a naturally occurring element and essential nutrient in a normal diet; therefore, it was not included in the Delphi Thermal Moraine RFI Baseline Risk Assessment.
6. **Former Acid-Alkali Tank for Udylite Etch System**	Cleaned out and closed in place by backfilling in 1979.	26,000-gallon underground concrete tank with no secondary containment; built in 1952; indoors. Used to prevent slug discharges to process sewer from process tank dumps. Process solutions included nitric acid and alkalis (sodium hydroxide). Metals processed were aluminum and copper. A hazardous constituent (copper) was managed at this AOI, but chlorinated VOCs were not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination. This AOI was removed 18 years ago. In addition, aluminum is a naturally occurring element and essential nutrient in a normal diet; therefore, it was not included in the Delphi Thermal Moraine RFI Baseline Risk Assessment.

Table 3-2. Summary of Areas Of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

AOI	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
7. **Former Oil House Area**	Removed from service in 1979. Buildings demolished. Some tanks removed and replaced.	Former Bldg. 7 and area north of building used to store, transfer, and mix virgin chemicals including oils, paints, thinners, solvents, acids, toluene diisocyanate (TDI), and resins. Constructed at least as early as 1949. Materials were stored both in drums and tanks. Outside tank farm 17 ASTs ranging from 8,000 to 30,000 gallons and three 15,000-gallon USTs used to store oil. Tanks A4-A13 and A17-A20 were provided with gravel and concrete containment dikes for spill containment. Spent materials were also handled in the area, such as TDI-contaminated solvent, oils, thinners, 1,1,1-trichloroethane, tetrachloroethene, trichloroethene, perchloroethane, and sludges containing chromium, nickel, and phosphorus. Hazardous constituents were managed at this AOI, including chlorinated VOCs.	No documented releases, but the potential for past releases was likely based on soil and groundwater quality.	This AOI may be a potentially significant source for soil and groundwater contamination.

Table 3-2. Summary of Areas Of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

AOI	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
FORMER FRIGIDAIRE PLANT 3				
8. Former Acid-Alkali Tanks for Plating/ Pickling Processes	Tanks removed in 1979.	Two 48,000-gallon concrete below-ground holding tanks near northwest corner of Bldg. 19, west of Springboro Road. Constructed in 1966. Used to prevent and control slug discharges to process sewer from process tank dumps. Process solutions included ferric sulfate, nickel sulfate and sulfuric acid from pickling; zinc from zinc platers and ELPO bonderites; chrome (converted from hexavalent to trivalent chromium by using sodium sulfite to form sodium dichromate prior to discarding); sodium hydroxide to control pH; alkaline cleaners. This AOI managed hazardous constituents (nickel and zinc), but chlorinated VOCs were not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination. This AOI was removed 18 years ago.
9. Former Cyanide Processing Tank	Tank removed in 1979.	38,000-gallon above-ground, outdoor, concrete tank built in 1966 near northwest corner of Bldg. 19; acid-resistant coating inside. Contained cyanide solution used to buffer pickling solution. This AOI managed a hazardous constituent (cyanide), but chlorinated VOCs were not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination. This AOI was removed 18 years ago.
10. Former Oil Separator Area	Removed in 1979.	200-gal underground pit and three ASTs (300, 375, and 475 gallons); indoors at south end of Bldg. 19. Date of construction is not known. Contained oil drained from screw machine metal chips, filtered, and stored in ASTs for reuse. Hazardous constituents were potentially managed at this AOI, but chlorinated VOCs were not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination. This AOI was removed 18 years ago.

Table 3-2. Summary of Areas Of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

AOI	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
11. Former Porcelain Manufacturing Area	Tank removed in 1979.	4,000-gal above-ground holding tank inside Bldg. 19 stored porcelain frit. Constructed in 1965. No hazardous constituents were managed at this AOI.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination. This AOI was removed 18 years ago.
12. Former Frigidaire Plant 3 USTs	Tanks removed in 1979.	Two 6,000-gal USTs near southeast corner of Bldg. 19. Contained gasoline. Hazardous constituents (BTEX and lead) were managed at this AOI, but chlorinated VOCs were not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination. This AOI was removed 18 years ago.
MORAINE ENGINE (Current Facility)				
13. Buildings 4, 6, and 13	Inactive since 1979. Buildings were demolished in 1996 and is pending closure.	Former Frigidaire service parts manufacturing areas; also used for chemical storage, offices; AST's for oil recovery. Contaminated materials in building included PCBs in floor blocks, paint; cadmium from plating. This AOI managed hazardous constituents, including chlorinated VOCs.	No documented releases, but the potential for past releases was likely.	This AOI may be a potentially significant source for soil and groundwater contamination.
14. Former Hazardous Waste Storage Pad	Ohio EPA-approved clean closure 1993.	Ramped and curbed concrete pad inside Bldg. 13 for storage of drummed hazardous waste, including chlorinated VOCs. Contents included chlorinated solvents, waste thinner and paint solids, corrosive wastes, old and new floor stripper sludges, lab chemicals (barium and cyanide). Operation began in 1978.	No evidence of a release under Ohio EPA-approved closure.	Not a potentially significant source of contamination.

Table 3-2. Summary of Areas Of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

AOI	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
15. **Former Frigidaire Plant 2 Tanks - Three Oil Tanks**	Oil tanks removed in 1979.	Three 10,000-gallon USTs west of Bldg. 2, stored virgin hydraulic oil. Built in 1960's. Hazardous constituents were potentially managed at this AOI, but chlorinated VOCs were not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination.
16. **Former Frigidaire Plant 2 Tanks - Gasoline Tank**	Gas tank removed and BUSTR-approved closure in 1992.	10,000-gallon steel tank west of Bldg. 2. Stored gasoline. Installed in 1965. Emptied, cleaned, and removed in 1989. Hazardous constituents (BTEX and lead) were managed at this AOI, but chlorinated VOCs were not managed.	Known release to soil from gasoline UST, remediated by excavation. Subsequent groundwater investigation showed groundwater had not been affected.	Not a potentially significant source of contamination.
17. **Building 15**	Tank removed and BUSTR-approved closure in 1994. Building is inactive.	900-gallon steel UST at north wall of Bldg. 15; stored used oil from garage operations. Unknown age, removed in 1994. Bldg. 15 contained a truck maintenance repair area, an equipment steam booth area, and a maintenance spray booth area. Hazardous constituents were managed at this AOI, including chlorinated VOCs.	No evidence of a release from the UST during closure, soil samples below BUSTR action levels. No documented releases from Bldg. 15, but the potential for past releases was likely based on groundwater quality.	The former UST is not a potentially significant source of contamination, but Bldg. 15 may be a potentially significant source of soil and groundwater contamination.
18. **Former Moraine Engine Fuel USTs**	Tanks removed and BUSTR-approved closure in 1991.	Two 6,000-gallon fiberglass-reinforced plastic tanks east of Bldg. 12; contained gasoline and diesel fuel. Constructed in 1981. Hazardous constituents (BTEX and lead) were managed at this AOI, but chlorinated VOCs were not managed.	No evidence of a release, soil samples below BUSTR action levels.	Not a potentially significant source of contamination.

Table 3-2. Summary of Areas Of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

AOI	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
19. Chip Salvage Area	Active unit.	100 x 50-ft concrete area inside west end of Bldg. 2 used for collection and processing of fine metal pieces (iron, steel, and aluminum) from machining operations, silos store dry chips prior to reclamation; silo holds oils and water for reclamation. Contents include iron, steel, and aluminum chips; oils. Built in 1980. No hazardous constituents were managed at this AOI.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination.
20. Moraine Engine Tank Farm	Active unit.	Outdoor area including 15 steel ASTs, a holding sump, and tanker-truck unloading area. Tank #12 empty and formerly contained used engine and hydraulic oils; others hold virgin chemicals. Area 10,000 ft^2 paved with concrete, sloped to 22,000-gal acid-proofed blind sump to collect rainwater and contain any release, fenced, and enclosed by 3-ft-high retaining wall. Constructed in 1980. Hazardous constituents are potentially managed at this AOI, but chlorinated VOCs are not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination.
21. High Bay Area Storage Pad	Active unit.	2,000-ft^2 indoor area at south end of Bldg. 2 used for storage of empty drums, drums of non-hazardous wastes, recyclables, and since 1992, <90-day storage of hazardous waste (eg., lead sludge, flammable liquids). Contents include used engine and hydraulic oils, unused/obsolete chemicals. Surrounded by trench drain leading to blind sump. This AOI manages hazardous constituents (formerly including chlorinated VOCs) but for <90 days.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination.

Table 3-2. Summary of Areas Of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

AOI	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
22. Satellite Accumulation Areas	Active unit.	One 55-gallon drum storing <55-gal at Carpenter Shop of hazardous waste (paint waste and thinner) and the Conrod Dept. (lead-bearing sludge). Stored indoors, monitored, removed for offsite disposal. Hazardous constituents are managed at this AOI, but chlorinated VOCs are not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination.
23. Wastewater Collection System	Active unit.	Six underground zone sumps with 80 gpm pumps and a 2-compartment final sump (30,000 gallons + 7,000 gallons) located inside building. Contain process wastewater, coolants, oils, corrosives, and metal-contaminated wastewaters. Acid-proofed concrete. Constructed 1980. Occasionally may manage characteristically hazardous waste (D002), but chlorinated VOCs are not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination.
24. Non-Hazardous Waste Storage Pad	Active unit.	157.5 x 200-ft concrete slab north of Moraine Engine facility. Sloped to center catch basin. Drains to 22,000- gallon Tank Farm Sump basin. Non-hazardous waste stored in luggers, roll-offs. Contains debris (soil, concrete, equipment). AOI manages hazardous constituents, but chlorinated VOCs are not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination.

Table 3-2. Summary of Areas Of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

AOI	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
MORAINE ASSEMBLY (Current Facility)				
25. Former Paint Shop Sludge Pits	Removed from service and cleaned out in 1994. Currently inactive.	Two 200,000-gallon pits to collect paint residue. Residue treated, deposited in transfer sump, pumped to Treatment Plant (Delphi Thermal Moraine). Contains paint sludges. Constructed 1980 and removed from service in 1994. Hazardous constituents were potentially managed at this AOI, but chlorinated VOCs were not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination.
26. Moraine Assembly Process Waste Collection Systems	Active unit.	Small sumps located throughout the plant collect process wastewater which drains to final sump at southwest corner of plant. Pumped to treatment plant. Wastes include wastewater containing electrodeposition painting wastewater and rinses, auto fluids, paint sludges, ELPO phosphates, oily wastes, alkaline cleaners. Constructed 1980. Manages nonhazardous aqueous waste, at times could be characteristically hazardous, but chlorinated VOCs are not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination.

Table 3-2. Summary of Areas Of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

AOI	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
27. **Former Hazardous Waste Container Storage Area**	Ohio EPA-approved clean closure in 1994.	60 x 75-ft concrete area sloped to center drain: stored hazardous waste in 55-gal drums at north end, non-hazardous at south end. Maximum capacity 2,160 55-gallon drums. Drain discharged to a 10,000-gal-capacity blind sump. Built in 1980. Formerly used for temporary storage of waste chlorinated solvents, waste oil, solvent-contaminated waste oil and water, waste gasoline and water, and paint sludge. Currently used for storing empty drums and drums of used oil for reclamation. This AOI managed hazardous constituents including chlorinated VOCs.	No documented releases and no evidence of a release under Ohio EPA-approved closure and based on groundwater quality.	Not a potentially significant source of contamination.
28. **Moraine Assembly Tank Farm**	Active unit.	14 outdoor steel bulk ASTs north of Bldg. 19; includes tanker truck load/unload area. Outside coatings of insulation & paint. Twelve 15,000-gallon tanks hold gasoline; diesel; motor oil; antifreeze; transmission, axle, and power steering fluids; reducing, purge, and reclaimed waste solvents (this tank was clean closed with Ohio EPA approval in 1994). 6,000-gallon tank holds transmission fluid. 8,500-gallon tank holds windshield fluid. Tanks on concrete pad sloped to drain to 10,000-gallon wastewater collection sump and diked by wall; loading area also drains to UST. Constructed 1980. Hazardous constituents are managed at this AOI, but chlorinated VOCs are not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination.

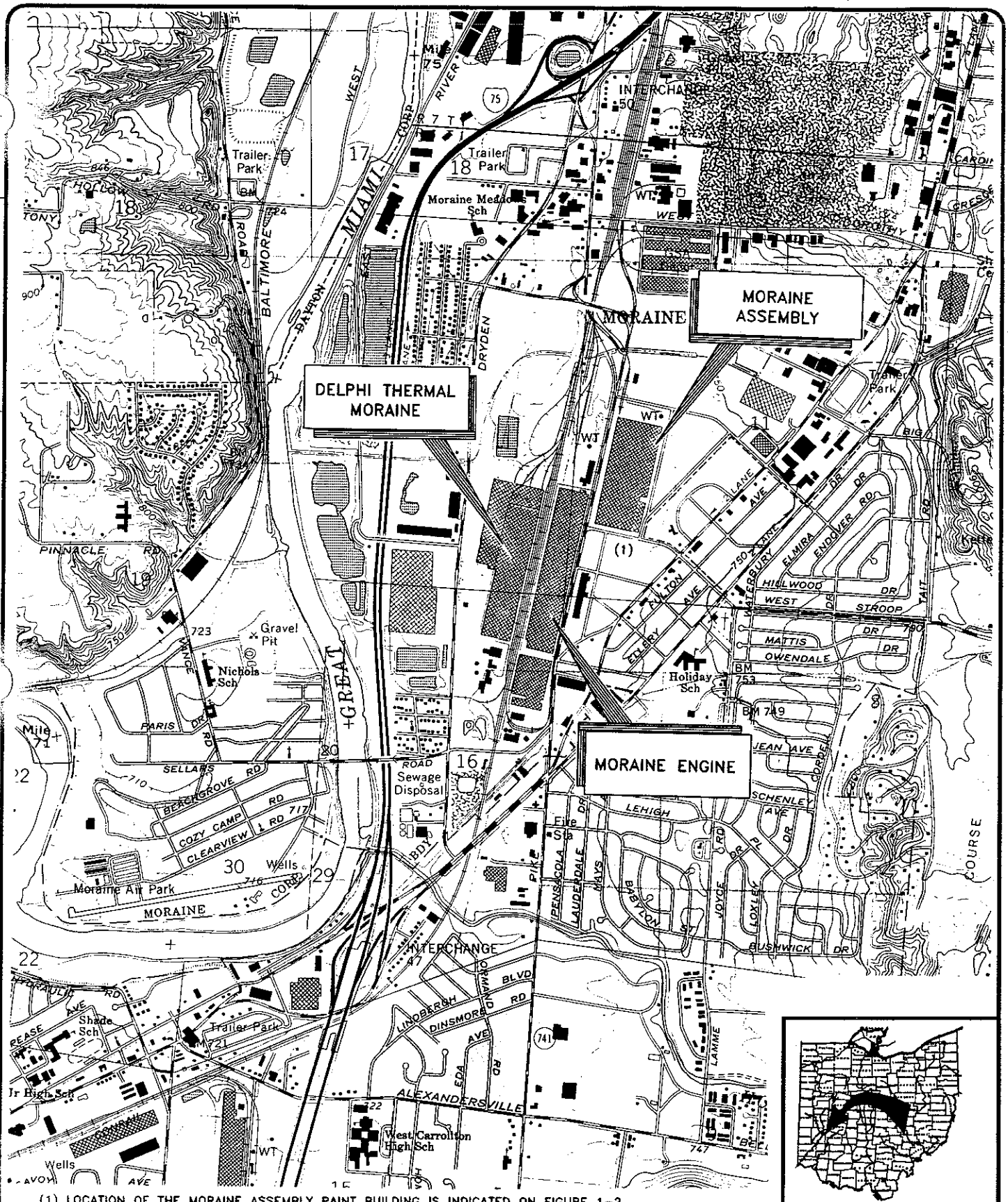
Table 3-2. Summary of Areas Of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

AOI	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
29. Mix Room Storage Tank	Active unit.	One 6,000-gallon tank at Paint Shop Mix Room holds waste thinner for reclamation by outside contractors. Secondary containment in coated area. <90-day accumulation of hazardous waste, but chlorinated VOCs are not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination.
30. Moraine Assembly Flammable Collection/ Storage Containment Area	Active unit.	Three secondary containment areas for collection of spills of flammable fluids. All indoors. One 2,000-gallon spill containment area at east side of plant is secondary containment for gasoline. Two 12,000-gallon areas at southeast corner of plant: one for secondary spill containment of ELPO phosphate materials at the receiving dock, other secondary containment for receiving dock, mix room drains, bulk storage room. Hazardous constituents could be managed at this AOI, but chlorinated VOCs are not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination.
31. Moraine Assembly West Haulaway Storage Tanks	Active unit.	Ten upgraded, monitored, fiberglass USTs. Used to store diesel fuel, motor oil, waste oil, power steering fluid, transmission fluid, hydraulic oil, and antifreeze. Hazardous constituents are managed at this AOI, but chlorinated VOCs are not managed.	Known release to soil from filling operations. Impacted soil was removed and groundwater was not affected. BUSTR-approved cleanup of release.	Not a potentially significant source of contamination.
32. Moraine Assembly East Haulaway Storage Tank	Active unit.	One upgraded, monitored, fiberglass UST. Used to store unleaded gasoline. Hazardous constituents are managed at this AOI, but chlorinated VOCs are not managed.	No documented releases and no evidence of a release based on groundwater quality.	Not a potentially significant source of contamination.

Table 3-2. Summary of Areas Of Interest, Supplemental DOCC, General Motors Corporation, Moraine, Ohio.

AOI	Current Status	Description and Waste Type	Evidence of Release	Potential Significance
33. Moraine Assembly Former Paint Shop Storage Tanks	Inactive	Two 4,000-gallon ASTs located outdoors. Built in 1979/1980. Used to store stripper and purge solvent until 1993. Deactivated in 1994, subsequently cleaned, and is currently empty. Hazardous constituents were managed at this AOI.	No documented releases.	Not a potentially significant source of contamination.
HISTORICAL AREAS				
34. Excavation Area 1	Closed.	Area identified on 1956 aerial photograph. Information is not available to complete waste description and type.	Sufficient information is not available to evaluate evidence of a release.	No specific basis exists; however, a limited investigation to assess the presence of contamination is proposed.
35. Excavation Area 2	Closed.	Area identified on 1956 aerial photograph. Information is not available to complete waste description and type.	Sufficient information is not available to evaluate evidence of a release.	No specific basis exists; however, a limited investigation to assess the presence of contamination is proposed.
36. Former Southwest ASTS	Closed.	AOI consists of four sets of concrete AST saddles within two earthen dike areas (two sets per dike). The tanks were installed approximately in the 1940's and 1950's. It is unknown whether hazardous constituents were managed at this AOI.	Sufficient information is not available to evaluate evidence of a release.	No specific basis exists; however, a limited investigation to determine if a release may have occurred is proposed.

AOI - Area of Interest.
BUSTR - Bureau of Underground Storage Tank Regulations.
AST - Aboveground Storage Tank.
UST - Underground Storage Tank.



(1) LOCATION OF THE MORAINE ASSEMBLY PAINT BUILDING IS INDICATED ON FIGURE 1-2.

GERAGHTY & MILLER, INC.
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0 1/4 1/2 MILE

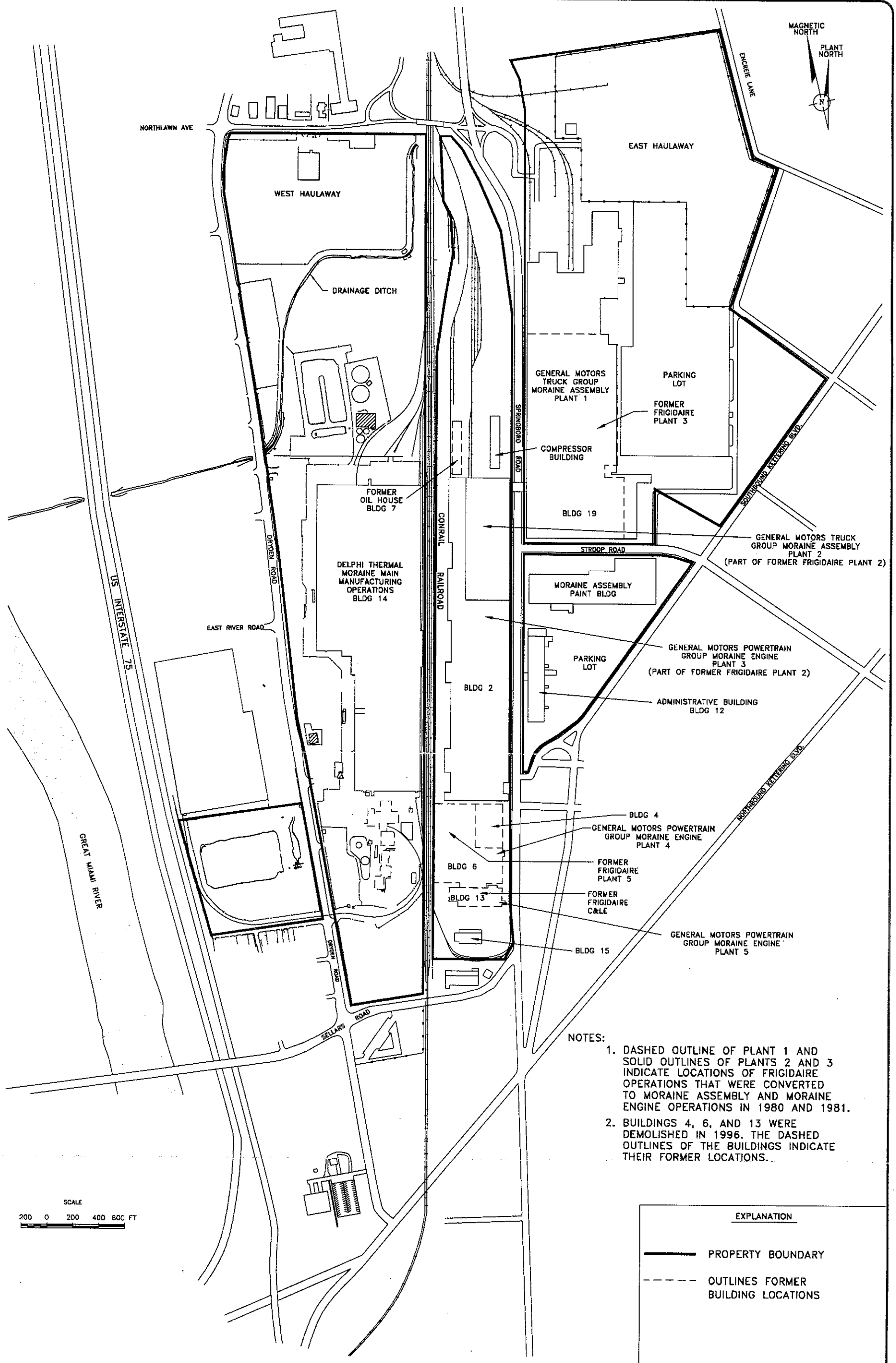
FACILITIES LOCATION MAP
SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
1-1

DRAFTED:
APPROVED: JR
CHECKED: JR
DRAWING:
FILE NO.: DWG--TEMP
PROJECT NO.: OH0288.001
DWG DATE:

DWG DATE: APR97	PRJCT NO.: OH01918	FILE NO.: HAR\DOCC\	DRAWING: SITE	CHECKED: J.R.	APPROVED: J.R.	DRAFTER: R



NOTES:

1. DASHED OUTLINE OF PLANT 1 AND SOLID OUTLINES OF PLANTS 2 AND 3 INDICATE LOCATIONS OF FRIGIDAIRE OPERATIONS THAT WERE CONVERTED TO MORAINE ASSEMBLY AND MORAINE ENGINE OPERATIONS IN 1980 AND 1981.
2. BUILDINGS 4, 6, AND 13 WERE DEMOLISHED IN 1996. THE DASHED OUTLINES OF THE BUILDINGS INDICATE THEIR FORMER LOCATIONS.

EXPLANATION

PROPERTY BOUNDARY

OUTLINES FORMER BUILDING LOCATIONS

GERAGHTY & MILLER, INC.
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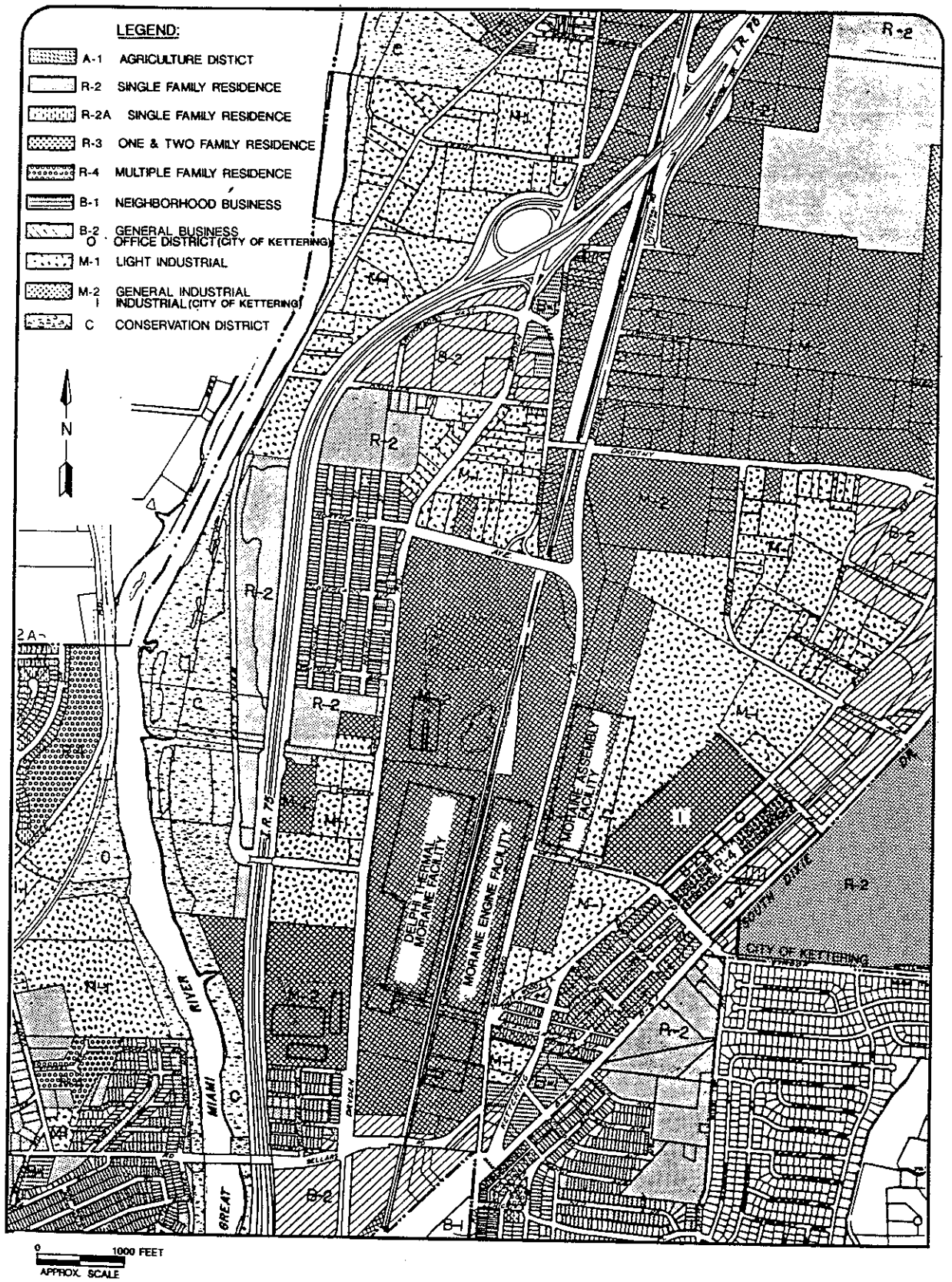
SITE LAYOUT
MORAINE ENGINE AND MORAINE ASSEMBLY FACILITIES
SUPPLEMENTAL DOCC
GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
1-2



GERAGHTY & MILLER, INC.
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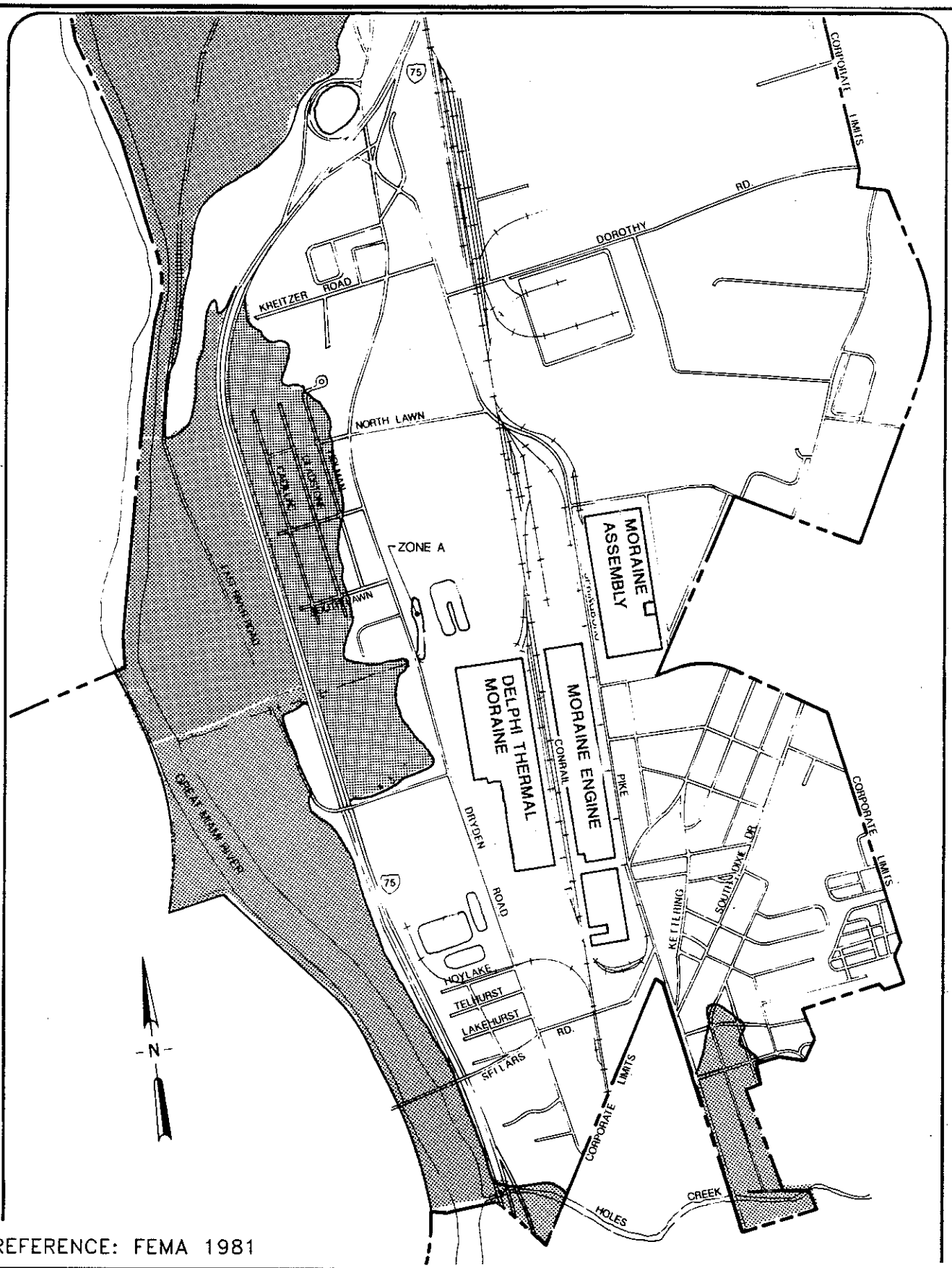
LOCAL ZONING

SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
2-1

DRAFTED:
APPROVED: JR
CHECKED: JR
DRAWING:
FILE NO.: DWG-TEMP
PRJCT NO.: OH0288.001
DWG D: 25/97



REFERENCE: FEMA 1981

GERAGHTY & MILLER, INC.
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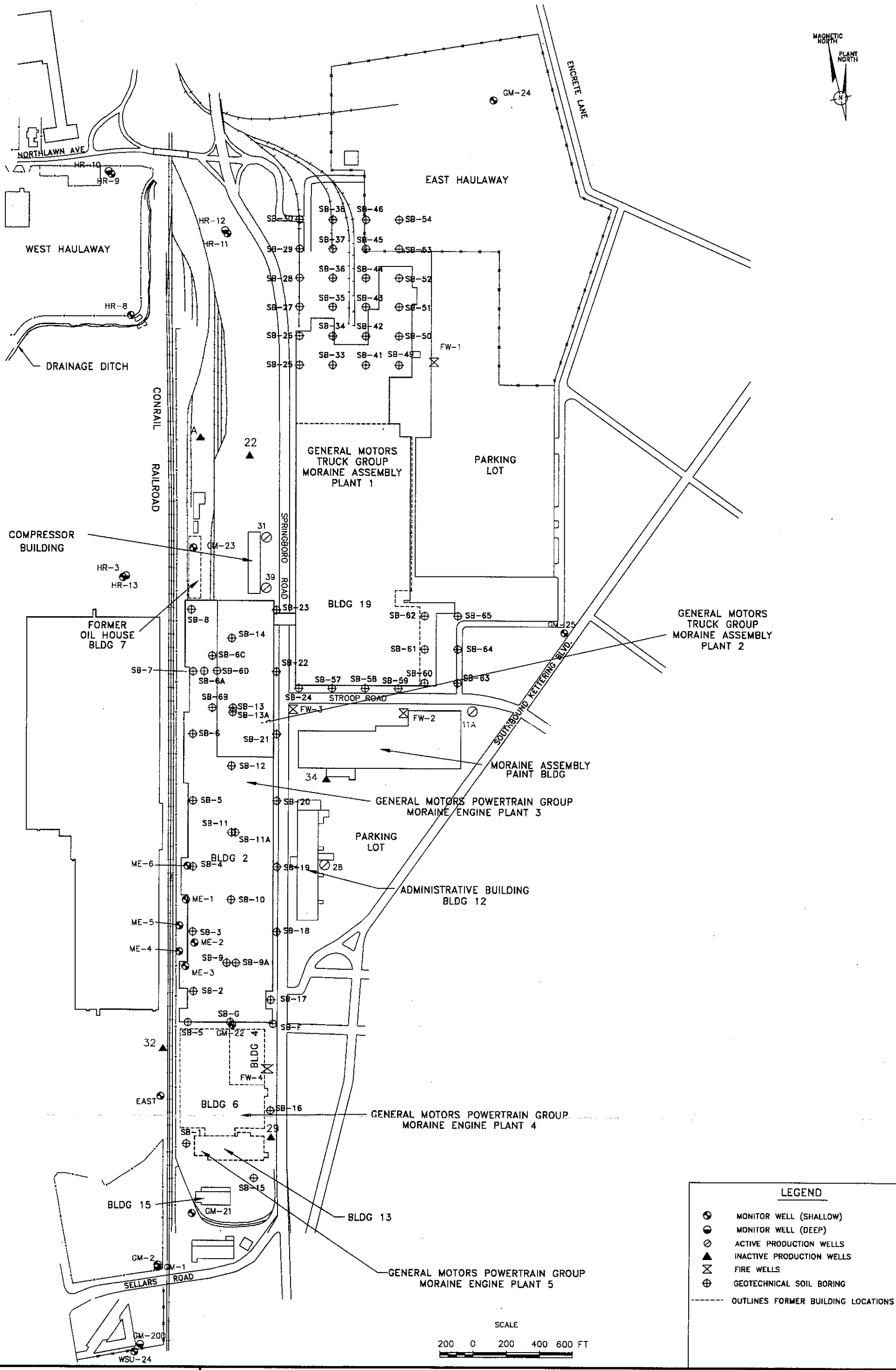
100 YEAR FLOOD ZONE
SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
2-2

DWG D | 26/97 | PROJCT NO.: OH0288.001 | FILE NO.: DWG-TEMP | DRAWING: U | CHECKED: JR | APPROVED: JR | DRAFT

DWG DA	APR97	PRJCT NO.: OH0288.001	FILE NO.: \DOCC	DRAWING: SITE	CHECKED: J.R.	APPROVED: J.R.	DRAFTER:



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SITE MAP SHOWING LOCATIONS OF SOIL BORINGS AND MONITOR WELLS

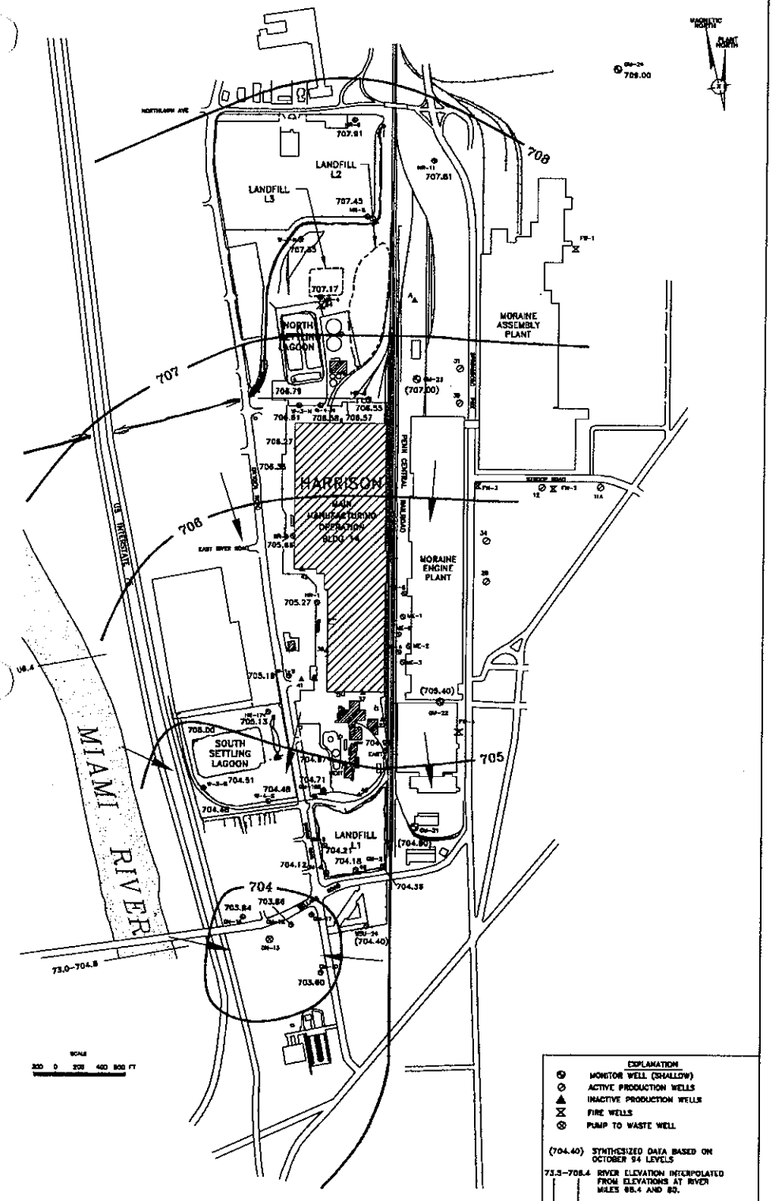
SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION

MORAINE, OHIO

FIGURE

2-3

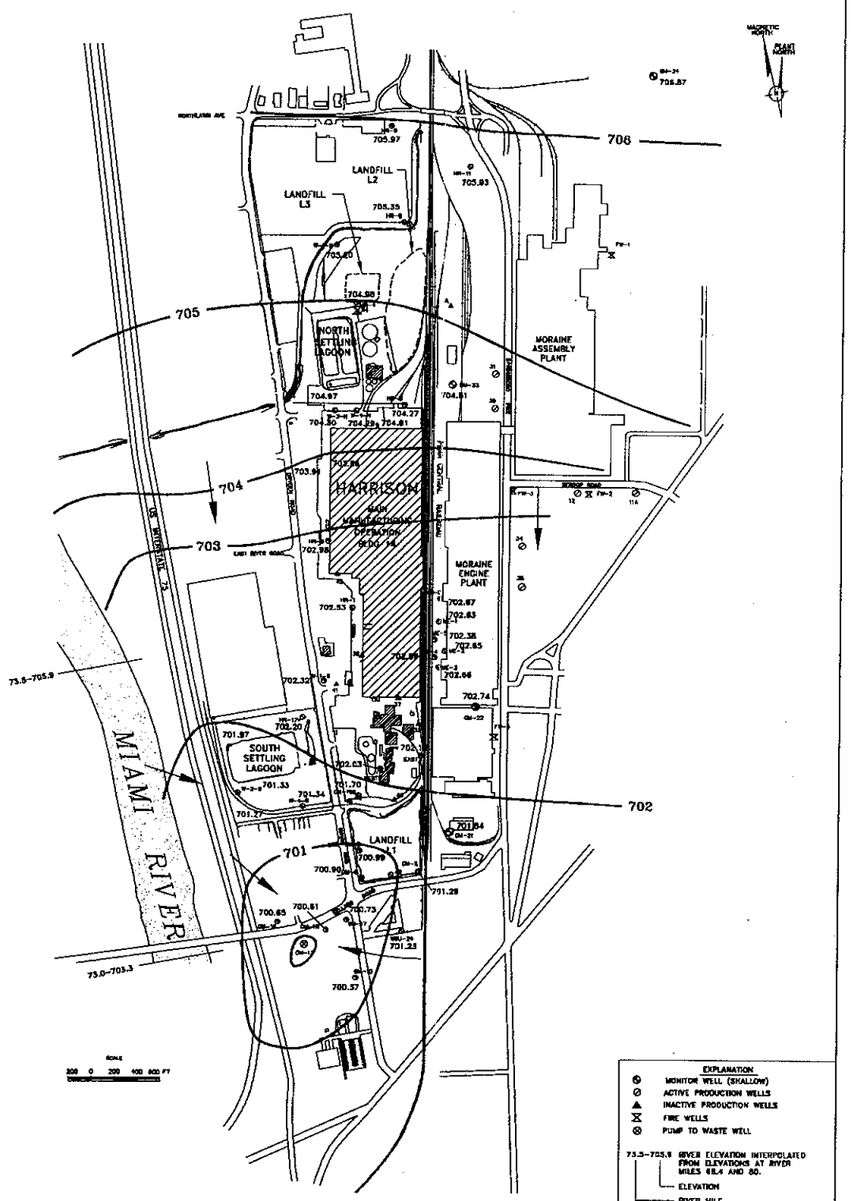


EXPLANATION
- MONITOR WELL (SHALLOW)
- ACTIVE PRODUCTION WELLS
- INACTIVE PRODUCTION WELLS
- FIRE WELLS
- PUMP TO WASTE WELL

(704.40) SYNTHESIZED DATA BASED ON OCTOBER 94 LEVELS

73.5–705.9 RIVER ELEVATION INTERPOLATED FROM ELEVATIONS AT RIVER MILES 68.4 AND 80.
- ELEVATION
- RIVER MILE

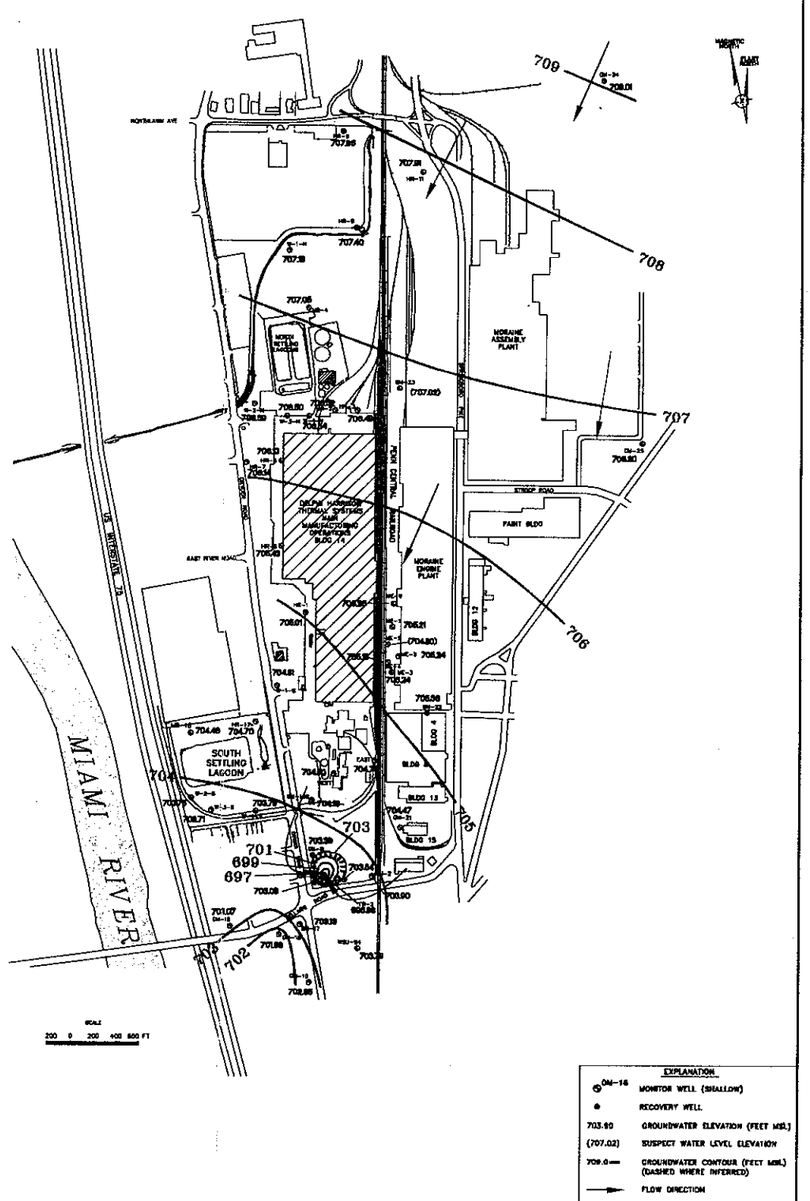
RFI – PHASE 1
JANUARY 29, 1993



EXPLANATION
- MONITOR WELL (SHALLOW)
- ACTIVE PRODUCTION WELLS
- INACTIVE PRODUCTION WELLS
- FIRE WELLS
- PUMP TO WASTE WELL

73.5–705.9 RIVER ELEVATION INTERPOLATED FROM ELEVATIONS AT RIVER MILES 68.4 AND 80.
- ELEVATION
- RIVER MILE

RFI – PHASE 2
OCTOBER 20, 1994



EXPLANATION
- MW-16 MONITOR WELL (SHALLOW)
- RECOVERY WELL
- 703.90 GROUNDWATER ELEVATION (FEET MSL)
- (707.02) SUSPECT WATER LEVEL ELEVATION
- 709.0 GROUNDWATER CONTOUR (FEET MSL) (DASHED WHERE INFERRED)
- FLOW DIRECTION
- CONE OF DEPRESSION

NORTH SETTLING LAGOON GROUNDWATER QUALITY ASSESSMENT
NOVEMBER 11, 1996

GERAGHTY & MILLER, INC.
Environmental Services

SCALE VERIFICATION
THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING.
USE TO VERIFY FIGURE REPRODUCTION SCALE

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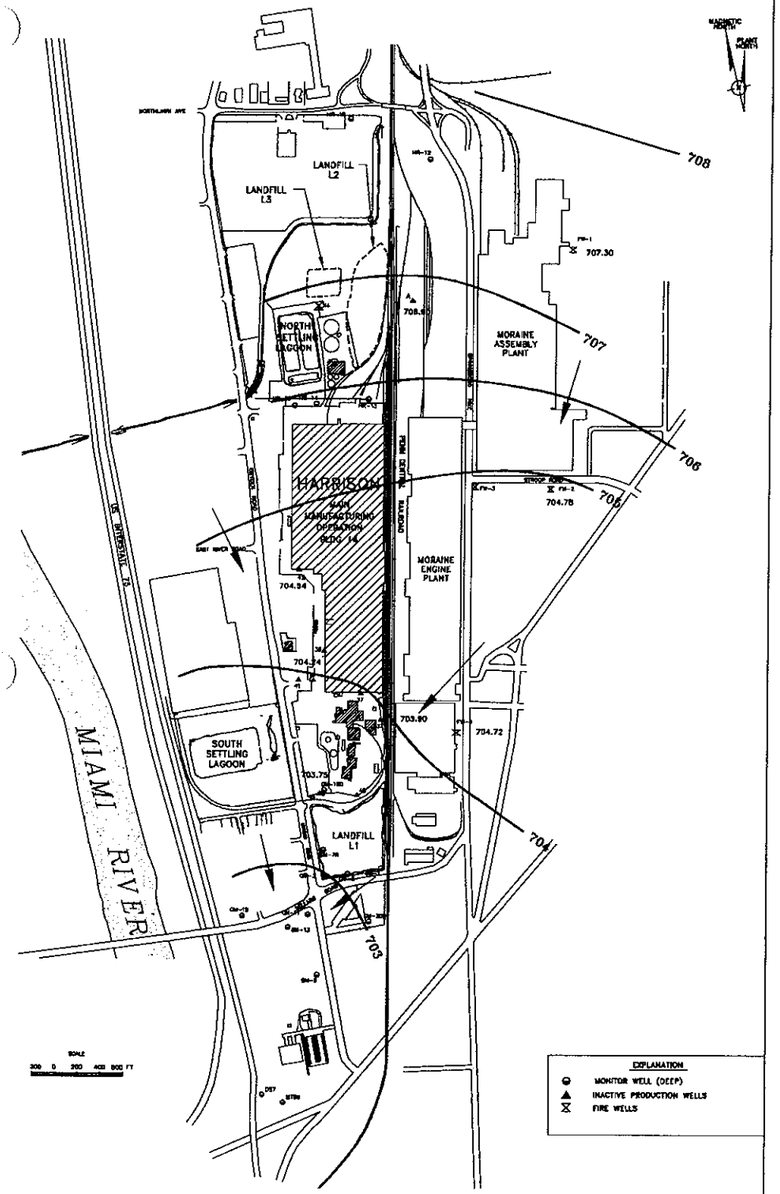
DRAWING: FLOW1IST	PLOT SIZE: –
DRAFTED BY: RTS	DATE: 02APR97
CHECKED BY: R.A.	DATE: –
APPROVED BY: –	DATE: –

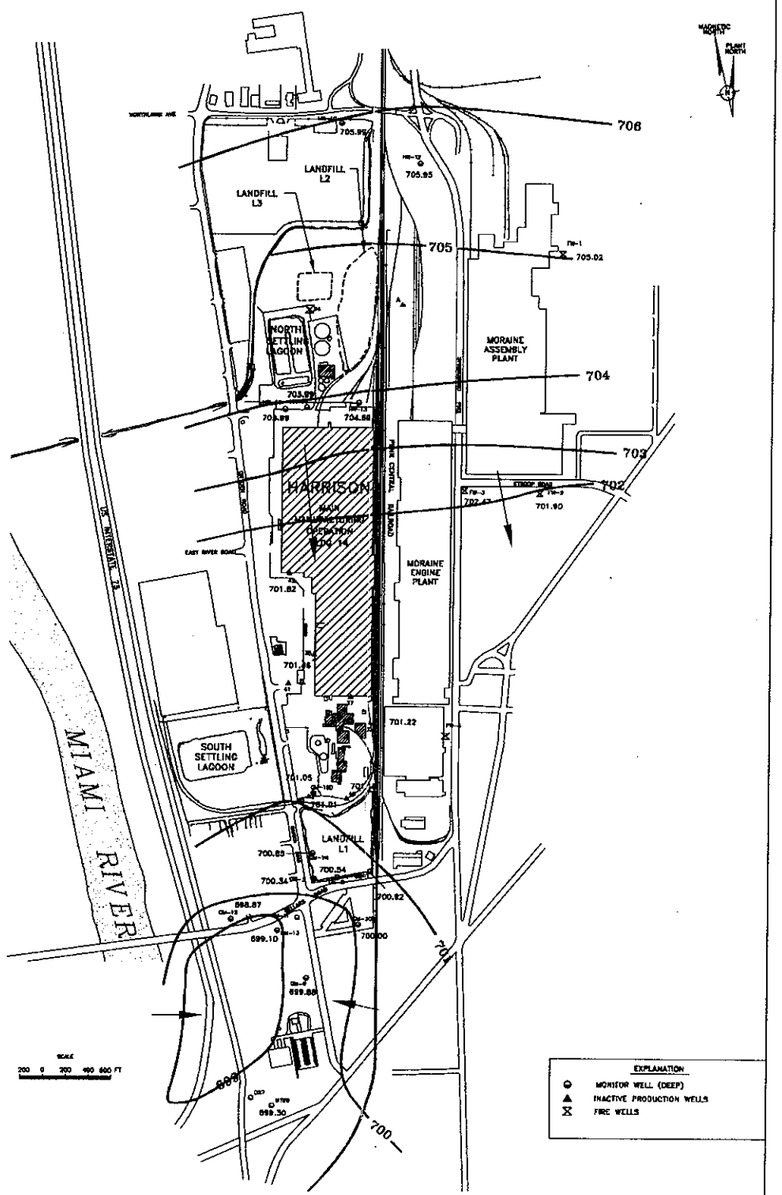
WATER TABLE SURFACE ON JANUARY 29, 1993, OCTOBER 20, 1994, AND NOVEMBER 11, 1996

GENERAL MOTORS CORPORATION
MORAINE, OHIO

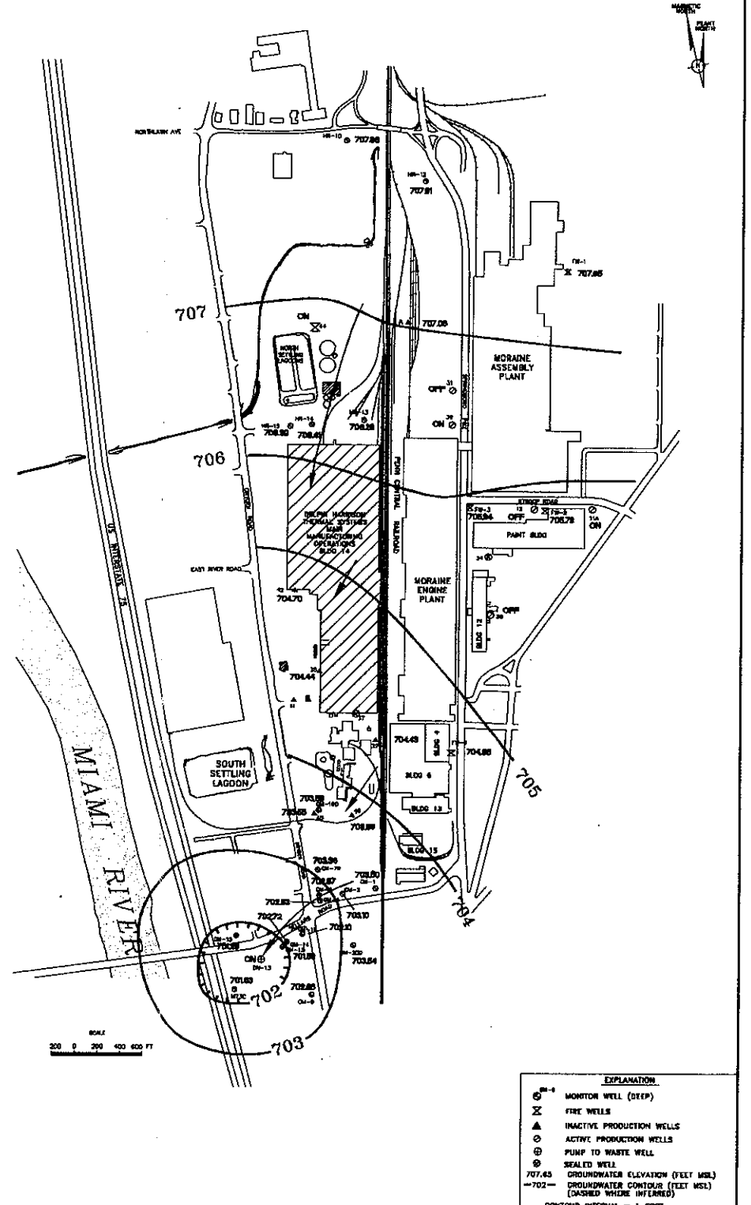
FIGURE
2-4



RFI – PHASE 1
JANUARY 29, 1993



RFI – PHASE 2
OCTOBER 20, 1994



NORTH SETTLING LAGOON GROUNDWATER QUALITY ASSESSMENT
NOVEMBER 11, 1996

GERAGHTY & MILLER, INC.
Environmental Services

SCALE VERIFICATION
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USE TO VERIFY FIGURE REPRODUCTION SCALE

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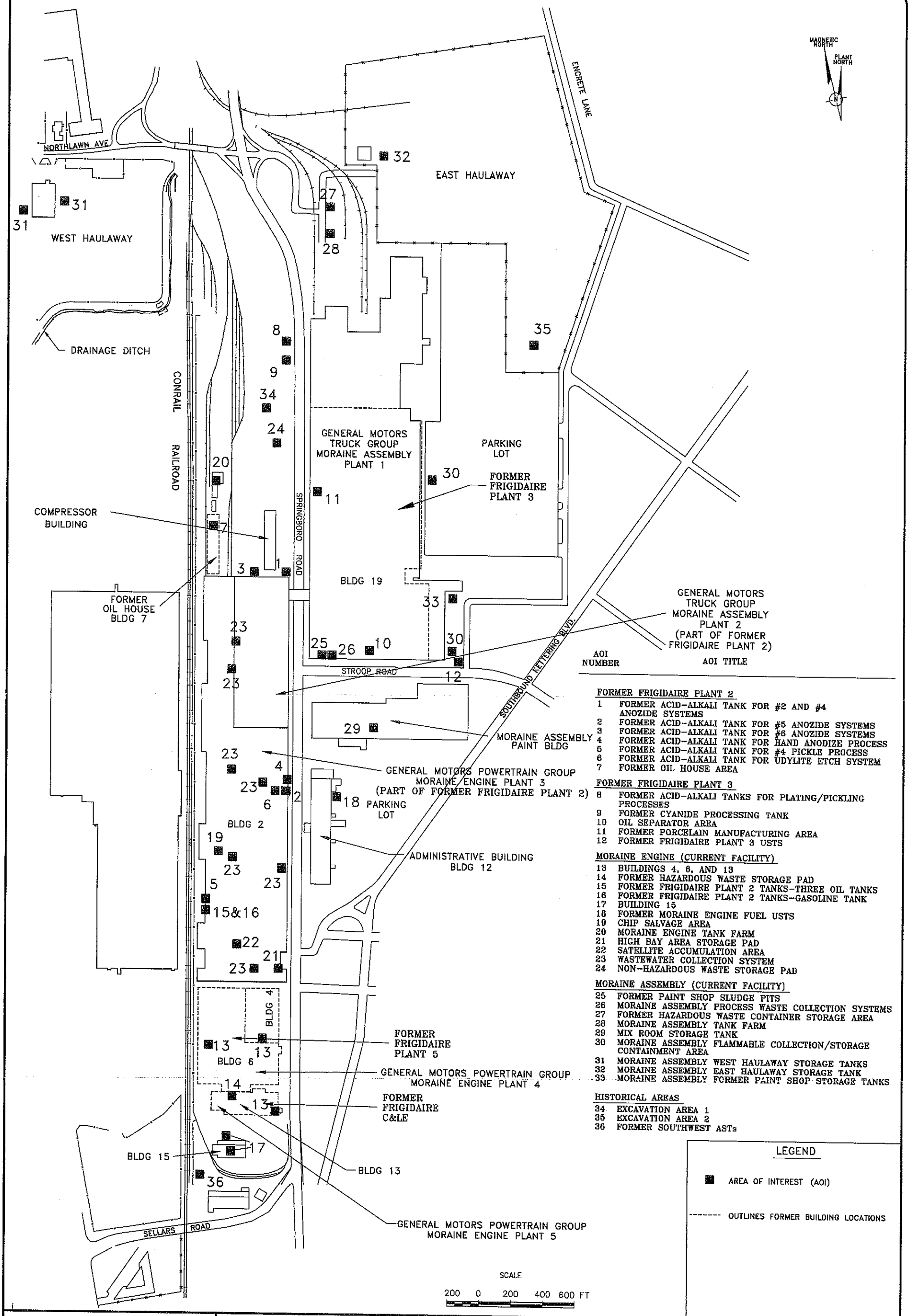
DRAFTED BY:	RTS	DATE:	02APR97
CHECKED BY:	R.A.	DATE:	–
APPROVED BY:	–	DATE:	–

POTENTIOMETRIC SURFACE ON JANUARY 29, 1993, OCTOBER 20, 1994, AND NOVEMBER 11, 1996

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
2-5

DWG DATE: 02APR97	PRJCT NO.: OH0288.001	FILE NO.: \DOCC	DRAWING: SITEX3	CHECKED: J.R.	APPROVED: J.R.	DRAFTER: RTS



AOI NUMBER	AOI TITLE
	FORMER FRIGIDAIRE PLANT 2
1	FORMER ACID-ALKALI TANK FOR #2 AND #4 ANOZIDE SYSTEMS
2	FORMER ACID-ALKALI TANK FOR #5 ANOZIDE SYSTEMS
3	FORMER ACID-ALKALI TANK FOR #6 ANOZIDE SYSTEMS
4	FORMER ACID-ALKALI TANK FOR HAND ANODIZE PROCESS
5	FORMER ACID-ALKALI TANK FOR #4 PICKLE PROCESS
6	FORMER ACID-ALKALI TANK FOR UDYLITE ETCH SYSTEM
7	FORMER OIL HOUSE AREA
	FORMER FRIGIDAIRE PLANT 3
8	FORMER ACID-ALKALI TANKS FOR PLATING/PICKLING PROCESSES
9	FORMER CYANIDE PROCESSING TANK
10	OIL SEPARATOR AREA
11	FORMER PORCELAIN MANUFACTURING AREA
12	FORMER FRIGIDAIRE PLANT 3 USTS
	MORAINE ENGINE (CURRENT FACILITY)
13	BUILDINGS 4, 6, AND 13
14	FORMER HAZARDOUS WASTE STORAGE PAD
15	FORMER FRIGIDAIRE PLANT 2 TANKS-THREE OIL TANKS
16	FORMER FRIGIDAIRE PLANT 2 TANKS-GASOLINE TANK
17	BUILDING 15
18	FORMER MORAINE ENGINE FUEL USTS
19	CHIP SALVAGE AREA
20	MORAINE ENGINE TANK FARM
21	HIGH BAY AREA STORAGE PAD
22	SATELLITE ACCUMULATION AREA
23	WASTEWATER COLLECTION SYSTEM
24	NON-HAZARDOUS WASTE STORAGE PAD
	MORAINE ASSEMBLY (CURRENT FACILITY)
25	FORMER PAINT SHOP SLUDGE PITS
26	MORAINE ASSEMBLY PROCESS WASTE COLLECTION SYSTEMS
27	FORMER HAZARDOUS WASTE CONTAINER STORAGE AREA
28	MORAINE ASSEMBLY TANK FARM
29	MIX ROOM STORAGE TANK
30	MORAINE ASSEMBLY FLAMMABLE COLLECTION/STORAGE CONTAINMENT AREA
31	MORAINE ASSEMBLY WEST HAULAWAY STORAGE TANKS
32	MORAINE ASSEMBLY EAST HAULAWAY STORAGE TANK
33	MORAINE ASSEMBLY FORMER PAINT SHOP STORAGE TANKS
	HISTORICAL AREAS
34	EXCAVATION AREA 1
35	EXCAVATION AREA 2
36	FORMER SOUTHWEST ASTs

LEGEND

- AREA OF INTEREST (AOI)
- OUTLINES FORMER BUILDING LOCATIONS

GERAGHTY & MILLER, INC.
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MORAINE ENGINE AND MORAINE ASSEMBLY AREAS OF INTEREST

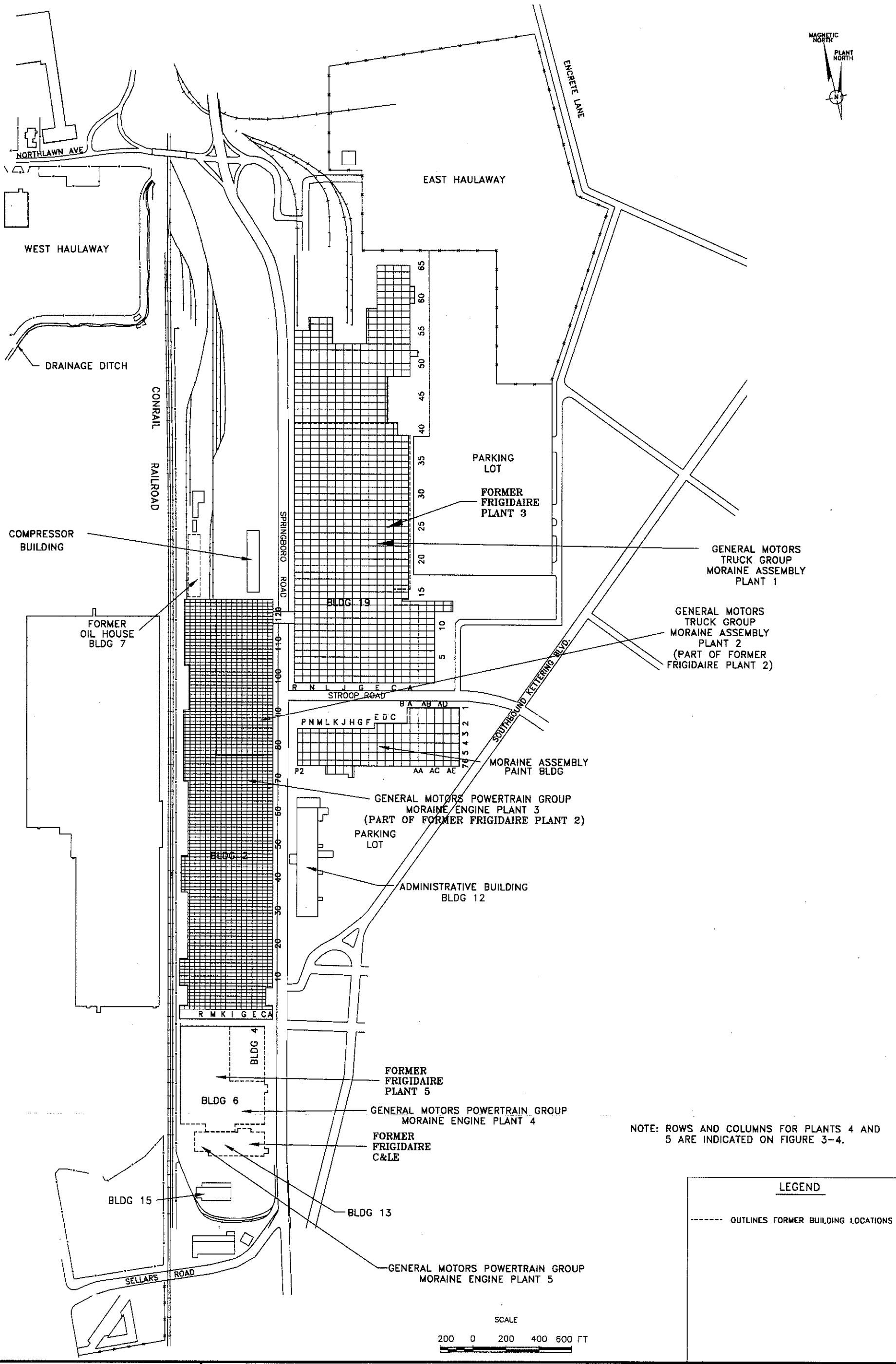
SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION

MORAINE, OHIO

FIGURE 3-1

DWG DATE: 02APR97	PRJCT NO.: OH0288.001	FILE NO.: \DOCC	DRAWING: SITE2	CHECKED: J.R.	APPROVED: J.R.	DRAFTER: RTC



NOTE: ROWS AND COLUMNS FOR PLANTS 4 AND 5 ARE INDICATED ON FIGURE 3-4.

LEGEND

------ OUTLINES FORMER BUILDING LOCATIONS

GERAGHTY & MILLER, INC.
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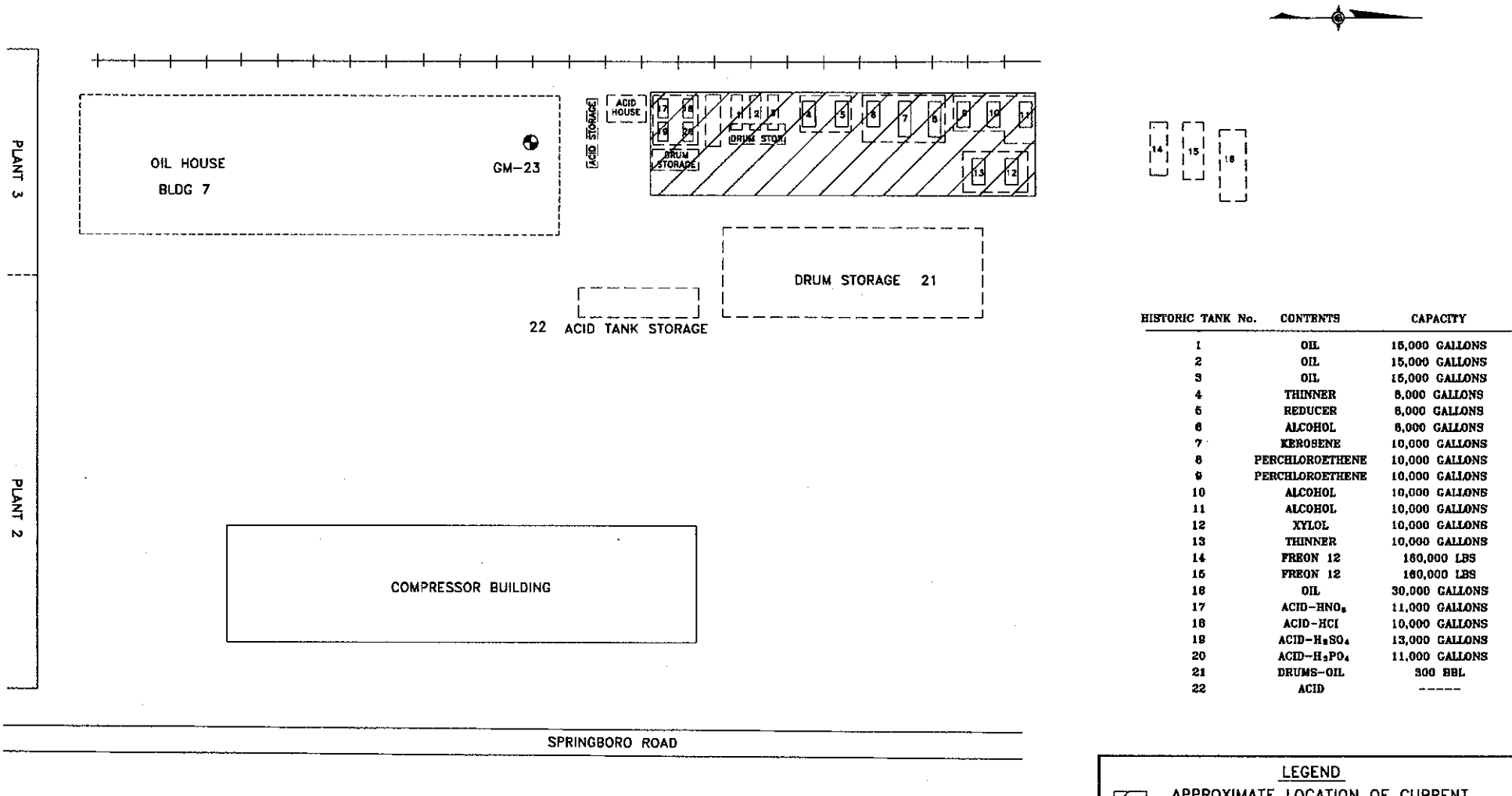
FRIGIDAIRE PLANTS 2 AND 3 COLUMN LOCATIONS

SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
3-2

DWG DATE: CT95	PRJCT NO.: OH0288.001	FILE NO.: HAR\N-B	DRAWING: GMC	CHECKED: NG	APPROVED: JR	DRAFTER:



HISTORIC TANK No.	CONTENTS	CAPACITY
1	OIL	15,000 GALLONS
2	OIL	15,000 GALLONS
3	OIL	15,000 GALLONS
4	THINNER	6,000 GALLONS
5	REDUCER	6,000 GALLONS
6	ALCOHOL	6,000 GALLONS
7	KEROSENE	10,000 GALLONS
8	PERCHLOROETHENE	10,000 GALLONS
9	PERCHLOROETHENE	10,000 GALLONS
10	ALCOHOL	10,000 GALLONS
11	ALCOHOL	10,000 GALLONS
12	XYLOL	10,000 GALLONS
13	THINNER	10,000 GALLONS
14	FREON 12	180,000 LBS
15	FREON 12	180,000 LBS
16	OIL	30,000 GALLONS
17	ACID-HNO_3	11,000 GALLONS
18	ACID-HCl	10,000 GALLONS
19	ACID-H_2SO_4	13,000 GALLONS
20	ACID-H_3PO_4	11,000 GALLONS
21	DRUMS-OIL	300 BBL
22	ACID	-----

LEGEND

- APPROXIMATE LOCATION OF CURRENT MORAINE ENGINE TANK FARM (AOI 20), REFER TO FIGURE 3-6
- MONITOR WELL
- FORMER LOCATION OF OIL HOUSE STRUCTURES

GERAGHTY & MILLER, INC.
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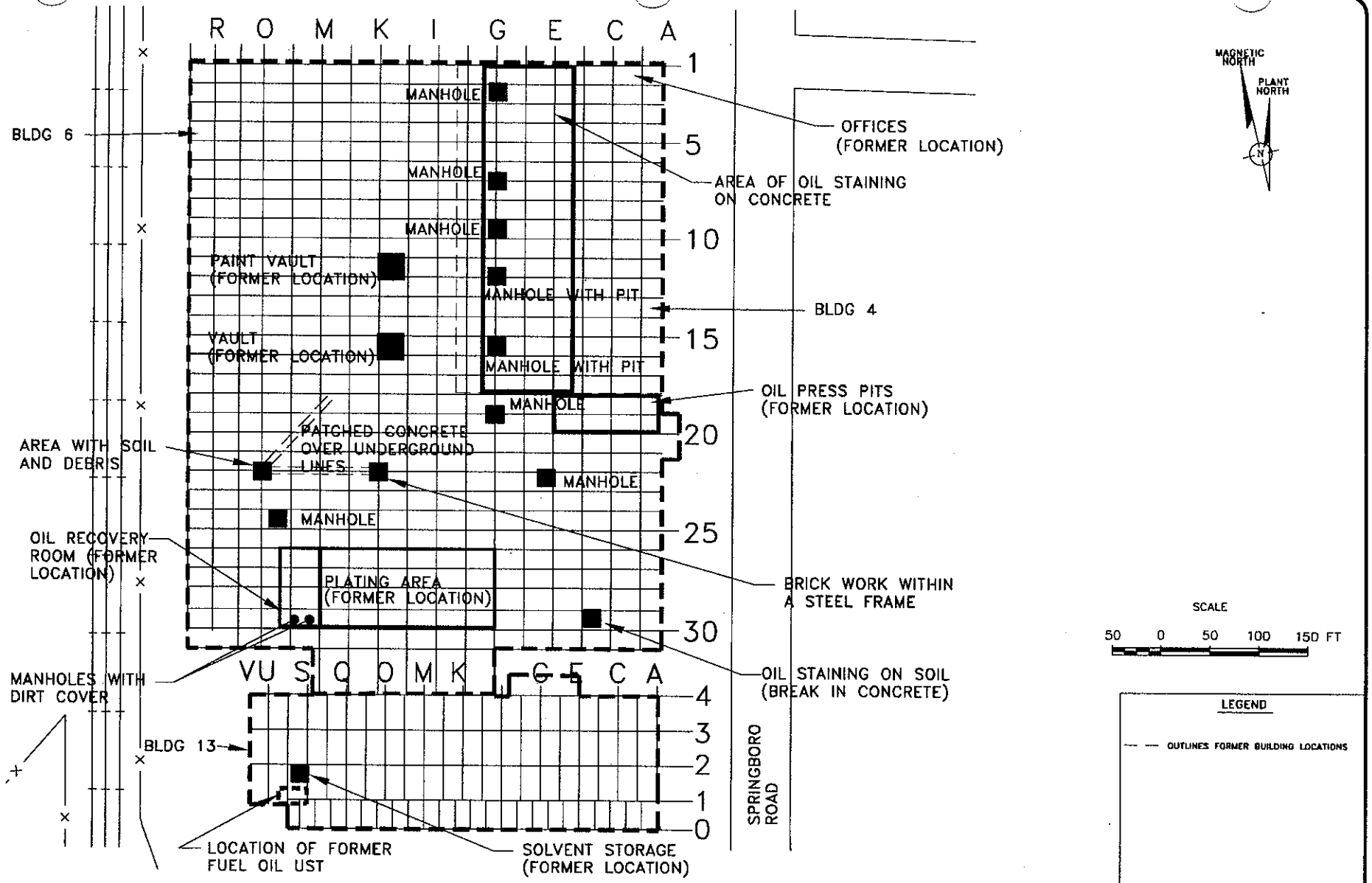
NOT TO SCALE

AOI 7. FORMER OIL HOUSE AREA
SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
3-3

DWG DATE	JULY97	PRJCT NO.: OH0288.002	FILE NO.: HAR\DOCC\	DRAWING: SITE	CHECKED: N.G.	APPROVED: N.G.	DRAFTER

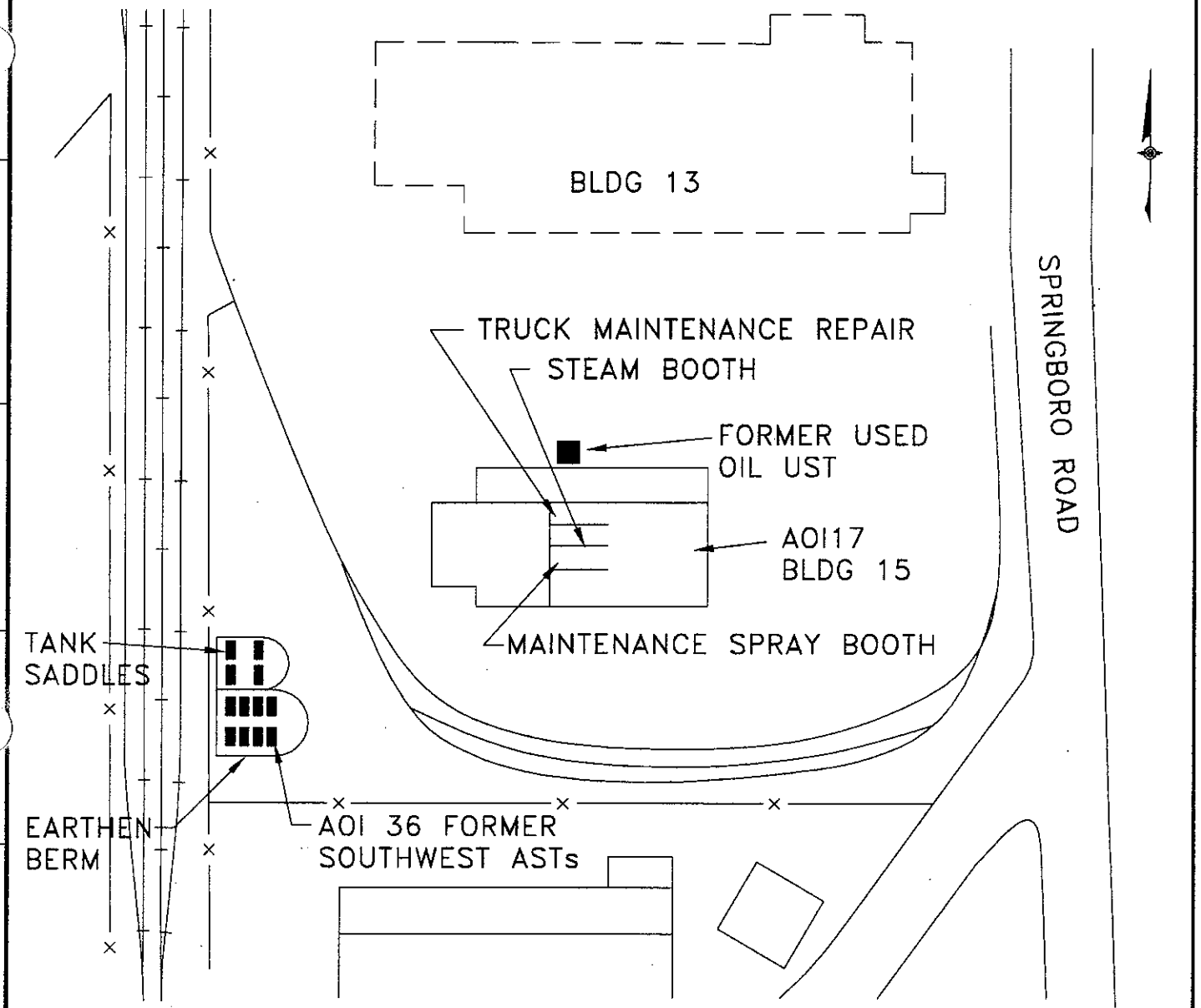


GERAGHTY & MILLER, INC.
Environmental Services

AOI 13 BUILDINGS 4, 6, AND 13 CONDITIONS AFTER DEMOLITION, SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
3-4



LEGEND

AOI AREA OF INTEREST

— — OUTLINES FORMER BUILDING LOCATIONS

DRAFTER:
APPROVED: N.G.
CHECKED: N.G.
DRAWING: FILE NO.: HARR\DOCC\
PRJCT NO.: OH0288.00B
02JULY97
DWG.

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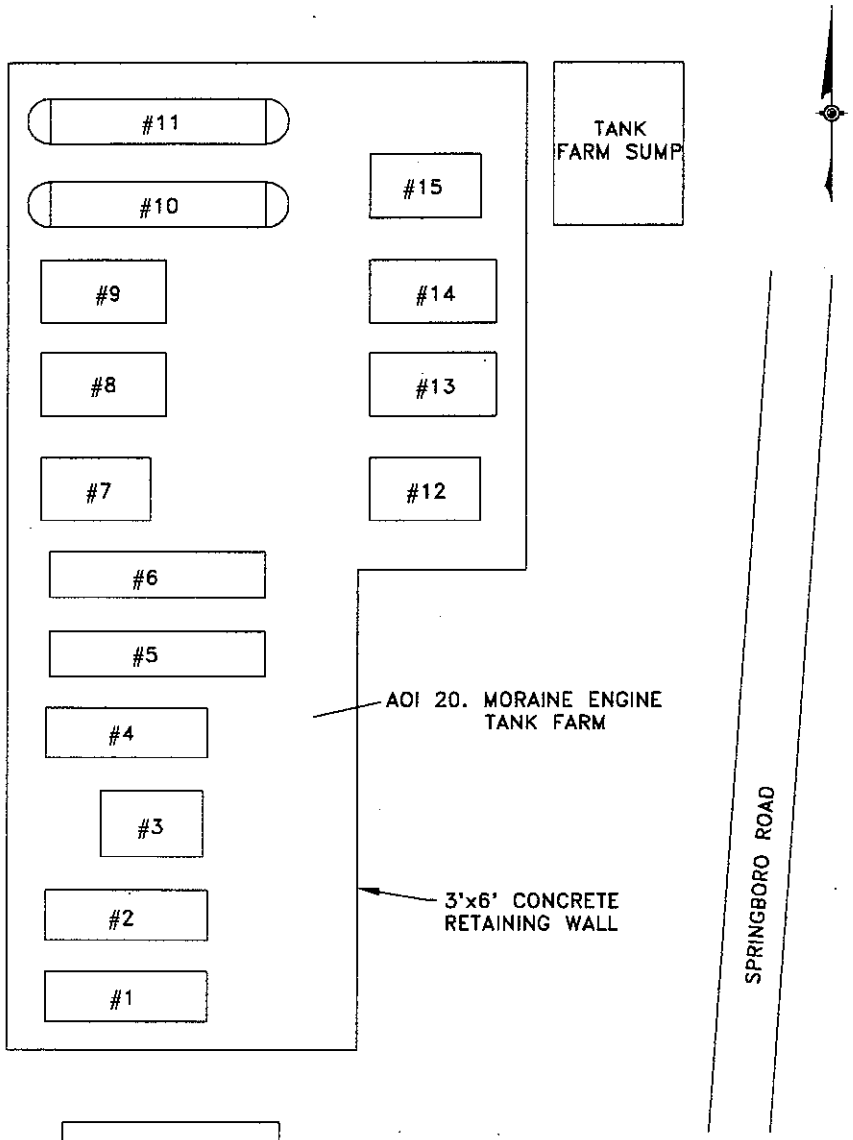
Environmental Services

AOI 17. BUILDING 15 AND AOI 36. FORMER SOUTHWEST ASTs SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
3-5



TANK No.	CONTENTS	CAPACITY
1	ENGINE OIL	8,900 GALLONS
2	ENGINE OIL	8,900 GALLONS
3	ENGINE OIL	9,900 GALLONS
4	ENGINE OIL (SPARE)	8,900 GALLONS
5	DIESEL FUEL	10,000 GALLONS
6	DIESEL FUEL	10,000 GALLONS
7	WAY LUBE	10,000 GALLONS
8	HYDRAULIC OIL	10,600 GALLONS
9	SPARE	10,900 GALLONS
10	HYDRAULIC OIL	14,700 GALLONS
11	CLEANER	14,700 GALLONS
12	EMPTY (FORMERLY USED FOR WASTE OIL)	10,000 GALLONS
13	SPARE	10,000 GALLONS
14	CLEANER	10,000 GALLONS
15	SPARE	10,000 GALLONS

DRAFTEF | APPROVED: JR | CHECKED: NG | DRAWING: | FILE NO.: HAR\N-B | PRJCT NO.: OH0288.001 | 19OCT95 | DWG I

GERAGHTY & MILLER, INC.
Environmental Services

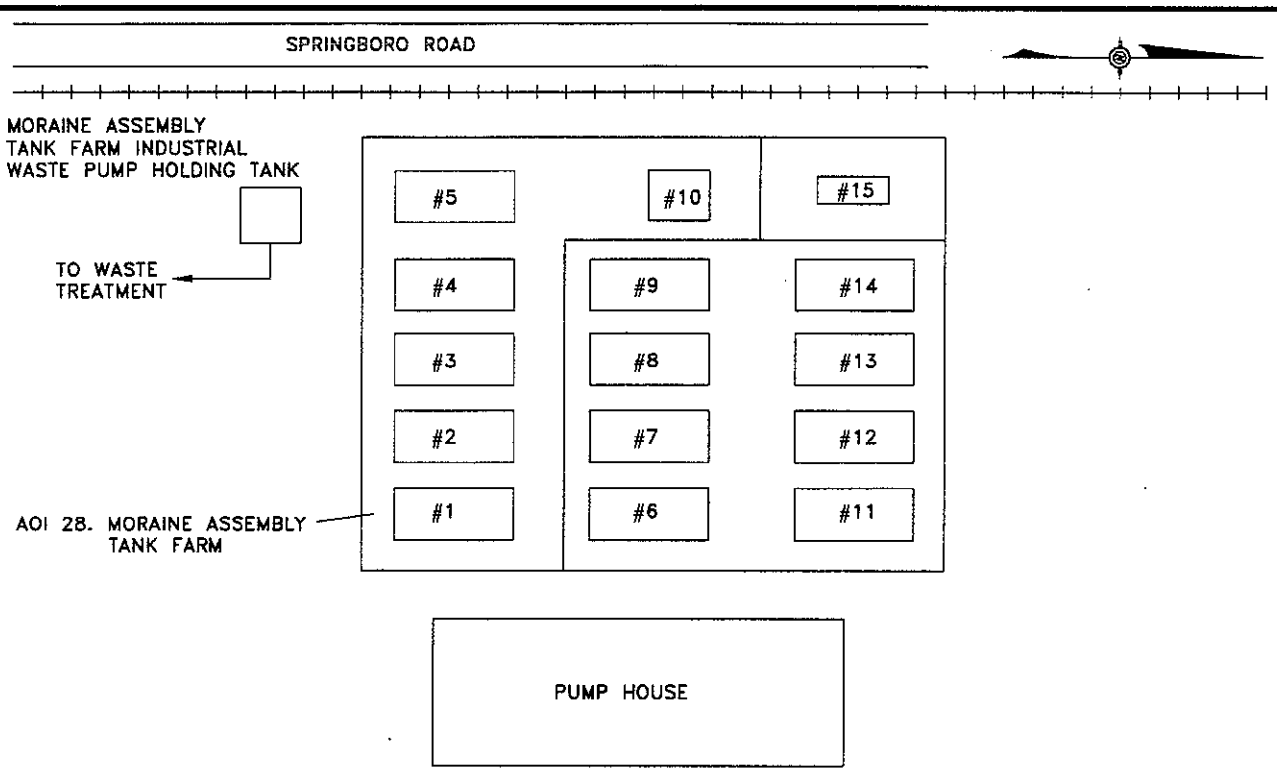
NOT TO SCALE

AOI 20. MORAINE ENGINE TANK FARM

SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
3-6



TANK No.	CONTENTS	CAPACITY
1	NO-LEAD GASOLINE	15,000 GALLONS
2	NO-LEAD GASOLINE	15,000 GALLONS
3	REDUCING SOLVENT	15,000 GALLONS
4	CLEANING SOLVENT	15,000 GALLONS
5	WASTE SOLVENT	15,000 GALLONS
6	ENGINE OIL	15,000 GALLONS
7	AUTOMATIC TRANSMISSION FLUID	15,000 GALLONS
8	ANTI-FREEZE	15,000 GALLONS
9	ANTI-FREEZE	15,000 GALLONS
10	WINDSHIELD WASHER SOLVENT	8,500 GALLONS
11	AXLE LUBE	15,000 GALLONS
12	POWER STEERING FLUID	15,000 GALLONS
13	DIESEL FUEL	15,000 GALLONS
14	MANUAL TRANSMISSION FLUID	15,000 GALLONS
15	SPARE	6,000 GALLONS

DRAFTED: 19OCT95 | APPROVED: JR | CHECKED: NG | DRAWING: DWG 1 | FILE NO.: HAR\N-8 | PRJCT NO.: OH0288.001

GERAGHTY & MILLER, INC.
Environmental Services

NOT TO SCALE

AOI 28. MORAINE ASSEMBLY TANK FARM

SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION

MORAINE, OHIO

FIGURE

3-7

APPENDIX A

Supporting Analytical Data

APPENDIX A
SUPPORTING ANALYTICAL DATA

Tabs	Title
A-1	Former Gasoline UST Closure Report, Bowser-Morner, December 1989.
A-2	Former Gasoline UST Assessment Analytical Data, Geraghty & Miller, Inc., August 1990.
A-3	Former Gasoline UST Quarterly Groundwater Monitoring Data, Geraghty & Miller, Inc., April, July, and October 1991 and January 1992.
A-4	Former Moraine Engine Fuel USTs Closure Assessment Analytical Data, Geraghty & Miller, Inc., October 1991.
A-5	Used Oil Tank Closure Analytical Data, Dames & Moore, May 1994.
A-6	Former Hazardous Waste Storage Pad Analytical Data, Dames & Moore, January 1994.
A-7	Former Hazardous Waste Container Storage Area and Tank Farm Closure, Analytical Data, Dames & Moore, January 1994.
A-8	GM-23 Soil Analytical Results, Geraghty & Miller, Inc., December 1994.
A-9	Summary of Detected Constituents from Moraine Engine and Moraine Assembly Facilities, Analytical Data from Active and Inactive Production Wells, General Motors Corporation, July 1989 to Present.
A-10	Spill Prevention Control and Countermeasure Plan, GMC Frigidaire Division, December 1976.

Appendix A-1

Former Gasoline UST Closure Report
Bowser-Morner
December 1989

BOWSER-MORNER

4518 TAYLORSVILLE ROAD, P.O. BOX 51, DAYTON, OHIO 45401

ENGINEERING REPORT

REPORT TO: General Motors
Moraine Engine Plant
P.O. Box 184
Dayton, Ohio 45401

Attention: Mr. Vince Festa

REPORT DATE: December 18, 1989

REPORT NO.: 51088-1289-927

REPORT ON: Underground Storage Tank Closure Investigation, Moraine Engine Plant, Dayton, Ohio

1.0 PURPOSE OF INVESTIGATION

The purpose of this investigation was to determine if any contamination of the soil has occurred due to leakage from an underground gasoline storage tank.

2.0 WORK PERFORMED

On November 3, 1989, an underground gasoline storage tank was removed. The day the tank was removed a representative from Bowser-Morner's Environmental staff was at the site to observe and sample the excavated pit. Soils inside the pit and the excavated material were analyzed with a photo-ionization detector or HNu meter. The HNu meter estimates concentrations, in parts per million (ppm), of volatile organic vapors escaping from the soil.

3.0 SAMPLING

On November 3, 1989, samples were collected in the excavation after the tank had been removed. Samples of the soil from inside the pit were collected for chemical analysis.

Soil samples were collected from each wall and on the bottom at both ends of the excavation. After screening with the photo-ionizer, three (3) samples were selected for laboratory analyses.

The soil samples were taken to Bowser-Morner's Chemistry Laboratory, where they

were analyzed for total petroleum hydrocarbons (TPH), benzene-toluene-ethylbenzene-xylene (BTEX), total lead, and total cadmium. These type of test will indicate if there are any petroleum hydrocarbons and/or gasoline products in the soil.

On November 13, 1989, additional samples were collected from the tank pit. These samples were used to determine if soil contamination could be removed by conventional excavation methods. Samples were obtained with a soil auger at a depth 3 feet below the existing pit bottom.

Additional samples were collected on November 21, 1989, after the pit had been further excavated. Samples were obtained from approximately 8 feet below the original pit bottom.

4.0 RESULTS

4.1 FIELD OBSERVATIONS

No free product or water was observed in the excavated pit. There were some visible signs of contamination present in the pit. The tank appeared to be in poor condition, with obvious rusting and corrosion.

4.2 LABORATORY RESULTS

The following table lists the laboratory results obtained for the soil samples submitted for laboratory analysis.

TABLE 1

LABORATORY RESULTS

SAMPLE	TPH (mg/kg)	BTEX (ug/kg)	LEAD (mg/kg)	CADMIUM (mg/kg)
		NOVEMBER 3, 1989, 6-INCH		
Bottom North	76	460 (X)	18.8	1.8
Bottom South	111	N.D.	N.D.	N.D.
Bottom Mid	56	260 (X)	11.9	N.D.

TABLE 1 -- CONTINUED

NOVEMBER 13, 1989, 3-FEET

SAMPLE	TPH (mg/kg)	BTEX (ug/kg)	LEAD (mg/kg)	EP LEAD (mg/kg)	CADMIUM ( )	EP CADMIUM ( )
Bottom North	32	N.D.	10.3	N.D.	N.D.	N.D.
Bottom South	33	N.D.	13.7	N.D.	N.D.	N.D.
Bottom Mid	33	N.D.	5.0	N.D.	N.D.	N.D.

NOVEMBER 21, 1989, 8-FEET

SAMPLE	TPH (mg/kg)	BTEX (ug/kg)	EP LEAD (mg/kg)	EP CADMIUM (mg/kg)
North End	108	12,000 (B) 200,000 (T) 100,000 (E) 200,000 (X)	N.D.	N.D.
South End	31	140 (X)	N.D.	N.D.

N.D. = Not Detected.

The laboratory reports for the soil samples are attached.

5.0 CONCLUSIONS

Field observations and laboratory results indicated that soil contamination is present in some of the soils that surrounded the removed tank. As you are aware, the State Fire Marshal's office will require further corrective actions.

The State Fire Marshal will require that the full extent of contamination be defined and possibly a site assessment.

If you have any questions, please contact us.

Respectfully submitted,

Bowser-Morner Associates, Inc.

JDF/mja(#174)
3-Client
3-File

Jeffrey D. Floyd
Project Manager

BOWSER MORNER

Appendix A-2

Former Gasoline UST Assessment Analytical Data
Geraghty & Miller, Inc.
August 1990

TABLE 2

RESULTS OF BTEX, TPH, AND TOTAL LEAD
FROM GROUND-WATER AND QA/QC SAMPLES
CPC-MORAINE ENGINE PLANT
MORAINE, OHIO

ANALYTE	DETECTION LIMIT	ME-1	ME-2	ME-3	ME-4	ME-5	ME-7*	ME-6	ME-5(1)	TRIP BLANK	DRILLING WATER
BENZENE	1.0 ug/l	--	--	--	--	--	--	--	--	--	--
TOLUENE	1.0 ug/l	--	--	--	--	--	--	--	--	--	--
ETHYLBENZENE	1.0 ug/l	--	--	--	--	--	--	--	--	--	--
XYLENES	1.0 ug/l	--	--	--	--	--	--	--	--	--	--
TOTAL PETROLEUM HYDROCARBON	2.0 mg/l	--	--	--	--	36	10	16	--	NA	NA
TOTAL LEAD	0.005 mg/l	0.102	0.44	0.29	0.28	0.66	0.20	0.63	--	NA	NA

-- Below Detection Limit
(1) Quality Control Field Blank
* Duplicate of ME-5
NA Not Analyzed

TABLE 3

RESULTS OF BTEX, TPH AND TOTAL LEAD ANALYSIS
FROM BACKGROUND SOIL
CPC MORAINE ENGINE PLANT
MORAINE, OHIO

ANALYTE	UNITS	ME-1 (23-25)	ME-5 (22-24)	ME-6 (22-24)
BENZENE	ug/kg	<113	<10	<10
TOLUENE	ug/kg	<113	<10	<10
ETHYLBENZENE	ug/kg	<113	<10	<10
XYLENES	ug/kg	<113	<10	<10
TOTAL PETROLEUM HYDROCARBONS	mg/kg	8300	160	68
TOTAL LEAD	mg/kg	2.52	<3.96	<4.85

Values reported with a "less-than" sign (<) indicate below detection limit.

Appendix A-3

Former Gasoline UST Quarterly
Groundwater Monitoring Data
Geraghty & Miller, Inc.
April, July, and October 1991 and January 1992

TABLE 1

SUMMARY OF LABORATORY ANALYSIS OF
GROUND-WATER SAMPLES FROM THE
MORAINE ENGINE PLANT
MORAINE, OHIO

SAMPLE ID	UNITS	ME-1	ME-2	ME-3	ME-4	ME-5	ME-6	ME-5*
June and July, 1990 (Site Investigation)								
Benzene	ug/l	<1	<1	<1	<1	<1	<1	<1
Toluene	ug/l	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	ug/l	<1	<1	<1	<1	<1	<1	<1
Xylenes	ug/l	<1	<1	<1	<1	<1	<1	<1
Total Petroleum Hydrocarbons	mg/l	<2	<2	<2	<2	36	10	16
April 12, 1991 (First Quarterly Event)								
Benzene	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes	ug/l	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5
Total Petroleum Hydrocarbons	mg/l	<1	<1	<1	<1	<1	<1	<1
July 9, 1991 (Second Quarterly Event)								
Benzene	ug/l	<.05	<.05	<.05	<.05	<.05	<.05	<.05
Toluene	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene	ug/l	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<0.5
Total Petroleum Hydrocarbons	mg/l	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
October 16, 1991 (Third Quarterly Event)								
Benzene	ug/l	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5
Toluene	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

TABLE 1 CONTINUED

Ethylbenzene	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylene	ug/l	<1	<1	<1	<1	<1	<1	<1
Total Petroleum Hydrocarbons	mg/l	<1	<1	<1	<1	<1	<1	<1
January 30, 1992 (Fourth Quarterly Event)								
Benzene	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes	ug/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Petroleum Hydrocarbons	mg/l	<1	<1	<1	<1	<1	<1	<1

<0.5 indicates compound not present above stated detection level.

* Duplicate of ME-5.

Appendix A-4

Former Moraine Engine Fuel USTs
Closure Assessment Analytical Data
Geraghty & Miller, Inc.
October 1991

TABLE 3

RESULTS OF LABORATORY ANALYSIS OF SOIL SAMPLES
BUILDING #12, GENERAL MOTORS POWERTRAIN DIVISION
MORAINE ENGINE PLANT, MORAINE, OHIO
SEPTEMBER 19, 1991

	UNITS	DTM	DTN	GTN	COMP-1	COMP-2	FLD-C	FLG-B
Benzene (8020)	ug/kg	<5	<5	5.87	<5	5.13	<5	<5
Ethylbenzene (8020)	ug/kg	<5	<5	17.2	<5	<5	<5	<5
Toluene (8020)	ug/kg	8.93	7.16	88.5	9.46	7.39	7.4	6.97
Xylenes (8020)	ug/kg	<10	<10	120	<10	17.5	<10	<10
Total Petroleum Hydrocarbons	mg/kg	100	98	<10	14	510	14	<10
TCLP Metals								
Arsenic	mg/l				<0.005	<0.005		
Barium	mg/l				<5.0	<5.0		
Cadmium	mg/l				<0.50	<0.50		
Chromium	mg/l				<0.4	<0.4		
Lead	mg/l				<1.0	<1.0		
Mercury	mg/l				<0.0002	<0.0002		
Selenium	mg/l				<0.05	<0.05		
Silver	mg/l				<0.20	<0.20		
Benzene (8240)	mg/kg				<0.11	<0.11		
Ethylbenzene (8240)	mg/kg				<0.11	<0.11		
Toluene (8240)	mg/kg				<0.11	<0.11		
Xylenes (8240)	mg/kg				<0.11	<0.11		
Dry Weight	%				95.5	90.4		
Flash Point	degrees C				>100	>100		
Free Liquids					complies	complies		

Appendix A-5

Used Oil Tank Closure Analytical Data
Dames & Moore
May 1994

TABLE 1

ANALYTICAL RESULTS (µG/KG*)
SOIL SAMPLE ANALYSES
UNDERGROUND STORAGE TANK CLOSURE

GENERAL MOTORS MORAINE ENGINER PLANT
MORAINE, OHIO

Sample No. Sample Location Sample Depth		A West Side of Tank Cavity 6"	B East Side of Tank Cavity 6"	C Piping Pump 6"	D Exc. Soils Composite 6"	E Exc. Soils Cavity 6"
PARAMETER	METHOD					
HNu Reading		0	0	0	0	0
Acetone	8240	<100	<100	<100	<100	<100
Acrolein	8240	<250	<250	<250	<250	<250
Acrylonitrile	8240	<250	<250	<250	<250	<250
Benzene	8240	<5.0	<5.0	<5.0	<5.0	<5.0
Bromodichloromethane	8240	<5.0	<5.0	<5.0	<5.0	<5.0
Bromoform	8240	<5.0	<5.0	<5.0	<5.0	<5.0
Bromomethane	8240	<25.0	<25.0	<25.0	<25.0	<25.0
2-Butanone (MEK)	8240	<50.0	<50.0	<50.0	<50.0	<50.0
Carbon disulfide	8240	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon tetrachloride	8240	<5.0	<5.0	<5.0	<5.0	<5.0
Chlorobenzene	8240	<5.0	<5.0	<5.0	<5.0	<5.0
Chloroethane	8240	<50.0	<50.0	<50.0	<50.0	<50.0
2-Chloroethyl vinyl ether	8240	<25.0	<25.0	<25.0	<25.0	<25.0
Chloroform	8240	<5.0	<5.0	<5.0	<5.0	<5.0
Chloromethane	8240	<50.0	<50.0	<50.0	<50.0	<50.0
Dibromochloromethane	8240	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethane	8240	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloroethane	8240	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethene	8240	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,2-Dichloroethene	8240	<5.0	<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene	8240	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloropropane	8240	<5.0	<5.0	<5.0	<5.0	<5.0
cis-1,3-Dichloropropene	8240	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,3-Dichloropropene	8240	<5.0	<5.0	<5.0	<5.0	<5.0
Ethylbenzene	8240	<5.0	<5.0	<5.0	<5.0	<5.0
2-Hexaone	8240	<50.0	<50.0	<50.0	<50.0	<50.0
Methylene chloride	8240	<50.0	<50.0	<50.0	<50.0	<50.0
4-Methyl-2-pentanone (MIBK)	8240	<50.0	<50.0	<50.0	<50.0	<50.0
Styrene	8240	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	8240	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	8240	<5.0	<5.0	<5.0	<5.0	<5.0
Toluene	8240	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,1-Trichloroethane	8240	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2-Trichloroethane	8240	<5.0	<5.0	<5.0	<5.0	<5.0
Trichloroethene	8240	<50.0	<50.0	<50.0	<50.0	<50.0
Trichlorofluoromethane	8240	<5.0	<5.0	<5.0	<5.0	<5.0
Vinyl acetate	8240	<25.0	<25.0	<25.0	<25.0	<25.0
Vinyl chloride	8240	<5.0	<5.0	<5.0	<5.0	<5.0
Xylenes						
Total Petroleum Hydrocarbons (mg/kg)	418.1	<10 mg/kg	22 mg/kg	93 mg/kg	361 mg/kg	9 mg/kg

Samples collected by NET Laboratories of Dayton, Ohio on January 31, 1994 (Except Sample E, collected on April 28, 1994)
All samples analyzed by NET Laboratories of Dayton, Ohio on January 31, 1994.
*Unless otherwise indicated.

NATIONAL ENVIRONMENTAL TESTING, INC.

Dayton Division
3601 South Dixie Drive
Dayton, OH 45439
Tel: (513) 294-6856
Fax: (513) 294-7816

ANALYTICAL REPORT

Vince Festa
GMC-CPC GROUP
Moraine Engine Plant
4100 Springboro Pike
Moraine, OH 45439

09/17/1993

JOB NUMBER: 93.12465

SAMPLE NO.: 210849

Sample Description: UST-Oil-Grab BLDG15

Date Taken: 09/15/1993

Date Received: 09/15/1993

Ignitability (Flash Point)	>100	Degree C	09/16/1993	alm

Gayle Galbraith
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

Dayton Division
3601 South Dixie Drive
Dayton, OH 45439
Tel: (513) 294-6856
Fax: (513) 294-7816

ANALYTICAL AND QUALITY CONTROL REPORT

GMC-CPC GROUP
Moraine Engine Plant
4100 Springboro Pike
Moraine, OH 45439
Vince Festa

09/22/1993

NET Job Number: 93.12466

Enclosed is the Analytical and Quality Control reports for the following samples submitted to the Dayton Division of NET, Inc. for analysis.

Sample Number	Sample Description	Date Taken	Date Received
210850	UST-Oil-Grab	09/15/1993	09/15/1993

BLDG 15

The Quality Control report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

Gayle Galbraith
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

Dayton Division
3601 South Dixie Drive
Dayton, OH 45439
Tel: (513) 294-6856
Fax: (513) 294-7816

ANALYTICAL REPORT

GMC-CPC GROUP
Moraine Engine Plant
4100 Springboro Pike
Moraine, OH 45439
Vince Festa

09/22/1993

NET Job Number: 93.12466

Client Project ID: UST-Oil

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Reporting Limit	Analyst Initials	Method Reference
SAMPLE NO. 210850	**SAMPLE DESCRIPTION** UST-Oil-Grab							**DATE/TIME TAKEN** 09/15/1993 14:30
Jt Evaluation	COMPLETE		09/20/1993		136		jph	
METALS (NON-AQUEOUS)	COMPLETE		09/20/1993		81	COMPLETE	deh	S-6010 ; EPA-200.7
Lead, ICP	459	mg/Kg	09/20/1993	228	64	<0.080	deh	S-6010 ; EPA-200.7
Metals Digestion - Flame/ICP	9-16C		09/16/1993	228		COMPLETE	bws	S-3050
Prep, PCB in Oil	complete		09/17/1993	110		COMPLETE	imp	S-3580

Gayle Galbraith
Project Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

Dayton Division
3601 South Dixie Drive
Dayton, OH 45439
Tel: (513) 294-6856
Fax: (513) 294-7816

ANALYTICAL REPORT

GMC-CPC GROUP
Moraine Engine Plant
4100 Springboro Pike
Moraine, OH 45439
Vince Festa

09/22/1993

NET Job Number: 93.12466

Client Project ID: UST-Oil

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Reporting Limit	Analyst Initials	Method Reference
SAMPLE NO. 210850	**SAMPLE DESCRIPTION** UST-Oil-Grab							**DATE/TIME TAKEN** 09/15/1993 14:30
VOLATILE COMPOUNDS-8240 Non-aq								
Acetone	<172	mg/Kg	09/17/1993		122	<100	gak	S-8240
Acrolein	<215	mg/Kg	09/17/1993		122	<250	gak	S-8240
Acrylonitrile	<215	mg/Kg	09/17/1993		122	<250	gak	S-8240
Benzene	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
Bromodichloromethane	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
Bromoform	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
Bromomethane	<43.0	mg/Kg	09/17/1993		122	<25.0	gak	S-8240
2-Butanone (MEK)	<86.0	mg/Kg	09/17/1993		122	<50.0	gak	S-8240
Carbon disulfide	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
Carbon tetrachloride	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
Chlorobenzene	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
Chloroethane	<86.0	mg/Kg	09/17/1993		122	<50.0	gak	S-8240
2-Chloroethyl vinyl ether	<43.0	mg/Kg	09/17/1993		122	<25.0	gak	S-8240
Chloroform	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
Chloromethane	<43.0	mg/Kg	09/17/1993		122	<50.0	gak	S-8240
Dibromochloromethane	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
1,1-Dichloroethane	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
1,2-Dichloroethane	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
1,1-Dichloroethene	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
trans-1,2-Dichloroethene	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
cis-1,2-Dichloroethene	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
1,2-Dichloropropane	<8.60	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
cis-1,3-Dichloropropene	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
trans-1,3-Dichloropropene	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
Ethylbenzene	25.9	mg/Kg	09/17/1993		122	<5.0	gak	S-8240

Gayle Galbraith
Project Manager

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ANALYTICAL REPORT

GMC-CPC GROUP
Moraine Engine Plant
4100 Springboro Pike
Moraine, OH 45439
Vince Festa

09/22/1993

NET Job Number: 93.12466

Client Project ID: UST-Oil

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Reporting Limit	Analyst Initials	Method Reference
SAMPLE NO. 210850	**SAMPLE DESCRIPTION UST-Oil-Grab**							**DATE/TIME TAKEN 09/15/1993 14:30**
Hexanone	<86.0	mg/Kg	09/17/1993		122	<50.0	gak	S-8240
Methylene chloride	<86.0	mg/Kg	09/17/1993		122	<50.0	gak	S-8240
4-Methyl-2-pentanone (MIBK)	<86.0	mg/Kg	09/17/1993		122	<50.0	gak	S-8240
Styrene	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
1,1,2,2-Tetrachloroethane	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
Tetrachloroethene	114	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
Toluene	61.5	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
1,1,1-Trichloroethane	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
1,1,2-Trichloroethane	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
Trichloroethene	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
Trichlorofluoromethane	<8.6	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
Vinyl acetate	<86.0	mg/Kg	09/17/1993		122	<50.0	gak	S-8240
Vinyl chloride	<43.0	mg/Kg	09/17/1993		122	<25.0	gak	S-8240
Xylenes	142	mg/Kg	09/17/1993		122	<5.0	gak	S-8240
Surrogate: d4-1,2-DCE	102 Note	%	09/17/1993		122	-	gak	S-8240
Surrogate: d8-Toluene	102	%	09/17/1993		122	-	gak	S-8240
Surrogate: BFB	101	%	09/17/1993		122	-	gak	S-8240

Gayle Galbraith
Project Manager

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ANALYTICAL REPORT

GMC-CPC GROUP
Moraine Engine Plant
4100 Springboro Pike
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Vince Festa

09/22/1993

NET Job Number: 93.12466

Client Project ID: UST-Oil

	Result	Units	Date Analyzed	Prep Batch Number	Run Batch Number	Reporting Limit	Analyst Initials	Method Reference
SAMPLE NO. 210850	**SAMPLE DESCRIPTION** UST-Oil-Grab							**DATE/TIME TAKEN** 09/15/1993 14:30
%S, OIL MATRIX								
Aroclor 1016	<5.0	mg/Kg	09/21/1993	110	163	<5.0	dde	S-8080
Aroclor 1221	<5.0	mg/Kg	09/21/1993	110	163	<5.0	dde	S-8080
Aroclor 1232	<5.0	mg/Kg	09/21/1993	110	163	<5.0	dde	S-8080
Aroclor 1242	<5.0	mg/Kg	09/21/1993	110	163	<5.0	dde	S-8080
Aroclor 1248	<5.0	mg/Kg	09/21/1993	110	163	<5.0	dde	S-8080
Aroclor 1254	<5.0	mg/Kg	09/21/1993	110	163	<5.0	dde	S-8080
Aroclor 1260	<5.0	mg/Kg	09/21/1993	110	163	<5.0	dde	S-8080
Surrogate: 2,4,5,6-TCX	92	%	09/21/1993	110	163	.	dde	S-8080
Surrogate: DCB	53	%	09/21/1993	110	163	.	dde	S-8080

Gayle Galbraith
Project Manager

Appendix A-6

Former Hazardous Waste Storage Pad
Analytical Data
Dames & Moore
January 1994

TABLE 2

ANALYTICAL RESULTS (MG/KG)
BACKGROUND SOIL SAMPLES

GM CLOSURE PLAN
MORAINE, OHIO

Parameter	Sample # Method	BG-1	BG-2	BG-3	BG-4	BG-5	BG-6	BG-7	BG-8	BG-9	BG-10	BG-11	BG-12	Mean	Standard Deviation	Action Level
Barium		111.4	81.2	105	81.4	57.1	47.5	71.6	93.6	78.4	65.4	71.3	46.4	75.9	19.84	115.1
Chromium		9.75	7.88	9.55	7.52	6.91	5.91	8.32	11.7	8.89	9.85	9.98	5.79	8.5	1.78	12.1
Lead		74.1	119	16.5	88.4	119	58.1	13.3	91.8	19.5	21.7	36.2	24.1	56.8	40.3	137.4

All samples collected by Bowser-Morner on September 15, 1993.
All samples analyzed by National Environmental Testing Laboratory of Dayton, Ohio.

TABLE 3

ANALYTICAL RESULTS*
SUBSURFACE SOIL SAMPLES
HAZARDOUS WASTE STORAGE PAD

GM CLOSURE PLAN
MORAINE, OHIO

Parameter	Sample # / Method	HP-1 A	HP-1 B	HP-2 A	HP-2 B	HP-3 A	HP-3 QA	HP-3 B	HP-3 QB	HP-4 A	HP-4 B	HP-5 A	HP-5 B	HP-6 A	HP-6 QA	HP-6 B	HP-6 QB	Action Level†
Ethylbenzene	8240	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0
Toluene	8240	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0
Methylene Chloride	8240	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	50.0
1,1,1 Trichloroethane	8240	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0
Tetrachloroethylene	8240	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0
Methyl Ethyl Ketone	8240	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	50.0
Xylene	8240	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0
Benzene	8240	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0
Vinyl chloride	8240	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	<25.0	25.0
1,1-dichloroethane	8240	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0
1,1-dichloroethene	8240	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0
Chloroethane	8240	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	<50.0	50.0
Phenol	8270	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	330.0
Nitrophenol	8270	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	330.0
Dinitrophenol	8270	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	330.0
Nitrobenzene	8270	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	<330.0	330.0
Trichloroethylene	8240	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0
Dichloroethylene	8240	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0
Carbon tetrochloride	8240	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.0
Lead (mg/kg)	6010	6.63	10.8	91.8	96.1	11.6	12.3	12.7	13	10.8	11.4	8.41	10.3	8.61	10.2	9.4	8.16	137.4
Chromium (mg/kg)	6010	7.28	7.22	8.25	8.16	7.5	8.42	8.36	7.98	7.82	10.3	6.34	9.4	10.1	11.3	10.1	8.06	12.1
Barium (mg/kg)	6010	58.7	75	81.2	96.1	106	93.1	82.6	71.7	63	55.3	52.2	72.2	46.1	46.9	52.4	41.2	115.1

* All units ug/kg, unless otherwise noted.

† See Table 2, and Section 3.11, Ohio EPA "Closure Plan Review Guidance Document."

All samples collected by Bowser Morner of Dayton, Ohio.

All samples analyzed by National Environmental Testing of Dayton, Ohio.

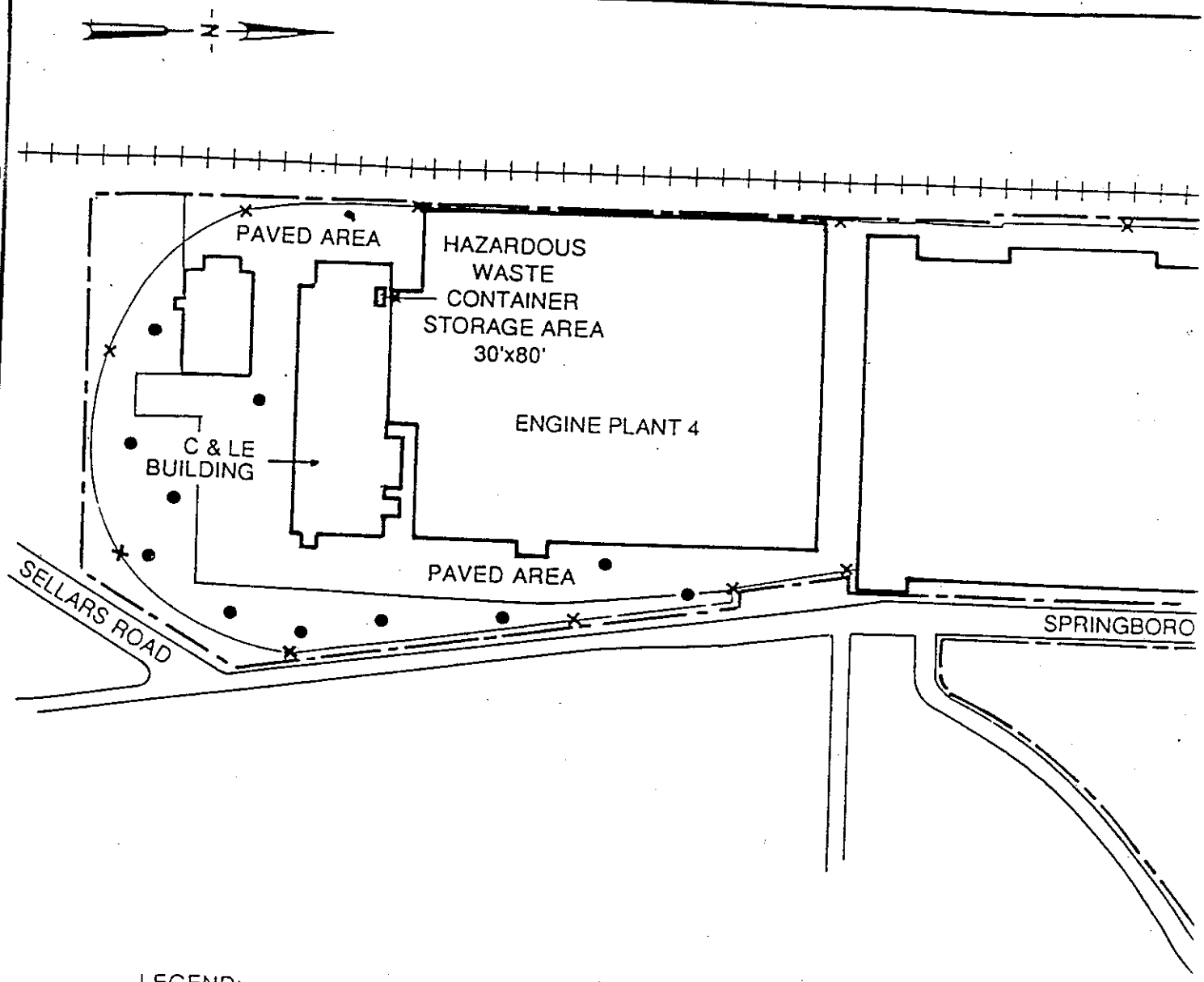
TABLE 4

ANALYTICAL RESULTS*
HAZARDOUS WASTE STORAGE PAD RINSATE SAMPLES

GM CLOSURE PLAN
MORAINE, OHIO

Parameter	Sample # Method	Rinsate #1	Rinsate #2	Rinsate #3	Rinsate #3 (Dup)	EQ Blank	Trip Blank	Tank Sample	Action† Level
Ethylbenzene	8240	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1000
Toluene	8240	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1000
Methylene Chloride	8240	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	1000
1,1,1-Trichloroethane	8240	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1000
Methyl Ethyl Ketone	8240	19.5	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	1000
Xylene	8240	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1000
Benzene	8240	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	75
Vinyl chloride	8240	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	30
1,1-dichloroethane	8240	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1000
1,1-dichloroethene	8240	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	105
Chloroethane	8240	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	1000
Phenol	8270	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	1000
Nitrophenol	8270	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	1000
Ditrophenol	8270	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	1000
Nitrobenzene	8270	<100.0	<100.0	<100.0	<100.0	<100.0	<100.0	<100.0	1000
Trichloroethylene	8270	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	75
Dichloroethylene	8240	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1000
Carbon tetrachloride	8240	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	75
Lead (mg/l)	6010	1.58	1.65	0.343	0.349	<0.080	<0.080	0.567	0.75
Chromium (mg/l)	6010	0.192	0.165	0.056	0.055	<0.040	<0.040	0.081	0.75
Barium (mg/l)	6010	0.737	0.691	0.21	0.204	0.058	<0.020	0.295	15

* All units µg/L unless otherwise noted.
† As determined in Section 2.3.1 of the approved Closure Plan.
All samples collected and analyzed by National Environmental Testing Laboratory of Dayton, Ohio.



LEGEND:

PROPERTY BOUNDARY

FENCE

HAZARDOUS WASTE MANAGEMENT UNIT

BACKGROUND SOIL SAMPLE LOCATION

0 250 500

SCALE IN FEET

BASE MAP SOURCE: General Motors Plant Engineering and Construction; sheet number P-1; final revision date: December 21, 1982.

GM

POWERTRAIN DIVISION
Moraine Engine Plant

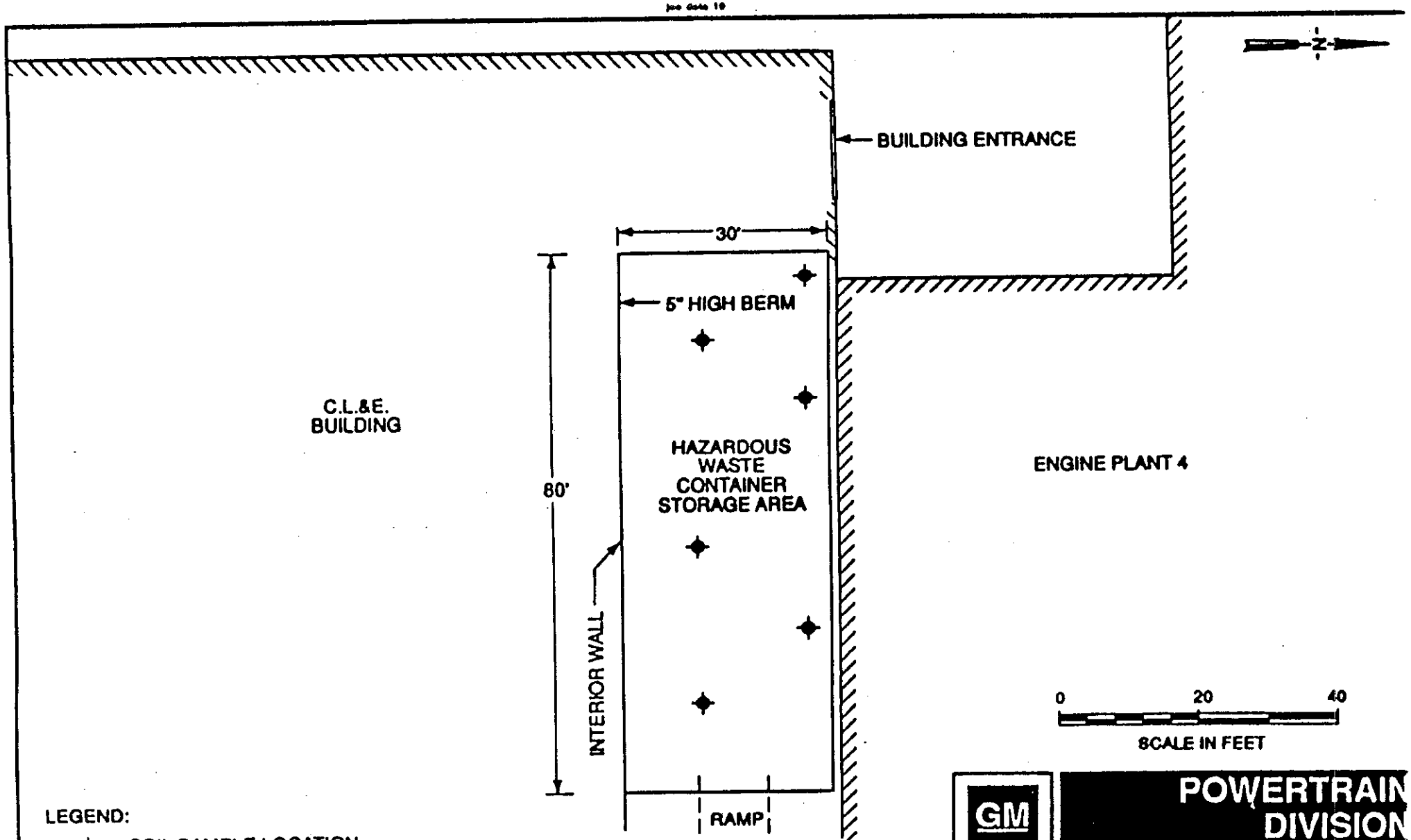
Moraine, Ohio

FIGURE 2

SITE LAYOUT MAP

Job No. 299-217-122

Dames & Moore



LEGEND:

✦ SOIL SAMPLE LOCATION

BASE MAP SOURCE: General Motors Plant Engineering and Construction; sheet number P-1 final revision date: December 21, 1982.

GM POWERTRAIN DIVISION
Moraine Engine Plan

Moraine, Ohio

FIGURE 3

SAMPLE LOCATIONS

Job No. 299-217-122 Dames & Moore

Appendix A-7

Former Hazardous Waste Container Storage Area
and Tank Farm Closure Analytical Data
Dames & Moore
January 1994

TABLE 2

ANALYTICAL RESULTS OF SUBSURFACE SOIL SAMPLES (mg/kg)

GENERAL MOTORS
MORAINE, OHIO

Parameter	Method	Sample No. / Standard**	1A	1B	2A	2A (dup)	2B	2B (dup)	3A	3B	4A	4B	5A	5A (dup)	5B	5B (dup)	6A	6B
Toluene	8240	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Xylene	8240	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,1,1-trichloroethane	8240	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Acetone	8240	4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
Benzene	8240	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Ethylbenzene	8240	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
2-Butanone (MEK)	8240	4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4	< 4
DECAY PRODUCTS																		
Vinyl Chloride	8240	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
1,1-Dichloroethane	8240	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
1,1-Dichloroethene	8240	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chloroethane	8240	0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nitrophenol	8270	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Cresols	8270	0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Phenol	8270	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Nitrobenzene	8270	0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33	< 0.33
Dintrophenol	8270	1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
Formic Acid	5173†	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	3.9	2.7	< 1	< 1	< 1	< 1	< 1	< 1
Formaldehyde	D2194††	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

All samples collected and analyzed by Bowser Morner of Dayton, Ohio.
* unless otherwise indicated
** Based on standards set forth in Subsection 2.3.1 of the approved January 8, 1993 Closure Plan
† NIOSH Method
††ASTM Method

TABLE 3

ANALYTICAL RESULTS OF CONTAINER STORAGE
PAD RINSATE SAMPLES (ug/L)

GENERAL MOTORS
MORAINE, OHIO

		Sample No.	Rinsate 1	Rinsate 2	Rinsate 3	Rinsate 3 (dup)	Field Blank	Trip Blank	Equipment Rinse
Parameter	Method	Standard**							
Flashpoint	1010	> 210 Deg F	none	none	none	none	none	none	none
Toluene	624	1000	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Xylene	624	1000	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,1-trichloroethane	624	1000	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Acetone	624	1000	< 100	< 100	< 100	< 100	< 100	< 100	< 100
Benzene	624	75	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	624	1000	< 5	< 5	< 5	< 5	< 5	< 5	< 5
2-Butanone (MEK)	624	1000	< 200	< 200	< 200	< 200	< 200	< 200	< 200
DECAY PRODUCTS									
Vinyl Chloride	624	30	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1-Dichloroethane	624	1000	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethene	624	105	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroethane	624	1000	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Nitrophenol	625	1000	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Cresols	8270	1000	< 50	< 50	< 50	< 50	< 50	< 50	< 50
Phenol	625	1000	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Nitrobenzene	625	1000	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Dinitrophenol	625	1000	< 50	< 50	< 50	< 50	< 50	< 50	< 50
Formic Acid	5173†	1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
Formaldehyde	D2194††	1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000

All samples collected and analyzed by Bowser Morner of Dayton, Ohio.
* unless otherwise indicated
** Based on standards set forth in Subsection 2.3.1 of the approved January 8, 1993 Closure Plan
† NIOSH Method
††ASTM Method

TABLE 4

ANALYTICAL RESULTS OF HAZARDOUS WASTE
TANK RINSATE SAMPLES (ppb*)

GENERAL MOTORS
MORAINE, OHIO

Parameter	Method	Sample No. / Clean-up Standard**	310038 / Tank Rinsate #1	310040 / Tank Rinsate #2	310041 / Tank Rinsate #3	310042 / Tank Pad#3 (DUP)	310043 / Field Blank	310044 / Trip Blank	31005 / Equipment Rinsate
FLASHPOINT	1010	> 210 Deg F	None	None	None	None	None	None	None
Toluene	624	1000	79	59	48	42	< 5	< 5	< 5
Xylene	624	1000	2500	1300	1700	1600	< 10	< 10	< 10
1,1,1-trichloroethane	524	1000	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Acetone	624	1000	2400	3200	3000	3000	< 100	< 100	< 100
Benzene	624	75 †	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	624	1000	770	660	550	490	< 5	< 5	< 5
2-Butanone (MEK)	624	1000	43	66	50	46	< 5	< 5	< 5
DECAY PRODUCTS							< 20	< 20	< 20
Vinyl Chloride	624	300	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1-Dichloroethane	624	1000	< 5	< 5	< 5	< 5	< 5	< 5	< 5
1,1-Dichloroethene	624	105	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroethane	624	1000	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Nitrophenol	625	1000	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Cresols	8270	1000	< 50	< 50	< 50	< 50	< 50	< 50	< 50
Phenol	625	1000	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Nitrobenzene	625	1000	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Formic Acid	5173†	1000	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Formaldehyde	D2194††	1000	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

All samples collected and analyzed by Bowser Morner of Dayton, Ohio.
* unless otherwise indicated
** Based on standards set forth in Subsection 2.3.1 of the approved January 8, 1993 Closure Plan
† NIOSH Method
††ASTM Method

Appendix A-8

GM-23 Soil Analytical Results
Geraghty & Miller, Inc.
December 1994

TABLE C-1

GM POWERTRAIN DIVISION
GENERAL MOTORS CORPORATION ENGINE PLANT
VOLATILE ORGANIC COMPOUNDS
(TARGET COMPOUND LIST, METHOD 8240)
MATRIX = SOIL

Parameter	GM-23 (3-5) MG/KG
1,1,1-Trichloroethane	< .52
1,1,2,2-Tetrachloroethane	< .52
1,1,2-Trichloroethane	< .52
1,1-Dichloroethane	< .52
1,1-Dichloroethene	< .52
1,2-Dichloroethane	< .52
1,2-Dichloroethene (Total)	< .52
1,2-Dichloropropane	< .52
2-Butanone	< 5.2 R
2-Hexanone	< 5.2
4-Methyl-2-Pentanone	< 5.2
Acetone	< 10
Benzene	< .52
Bromodichloromethane	< .52
Bromoform	< .52
Bromomethane	< 2.6
Carbon Disulfide	< .52
Carbon Tetrachloride	< .52
Chlorobenzene	< .52
Chloroethane	< 5.2
Chloroform	< .52
Chloromethane	< 5.2
Dibromochloromethane	< .52
Ethylbenzene	< .52
Methylene Chloride	< 5.2
Styrene	< .52
Tetrachloroethene	63.5
Toluene	< .52
Total Xylenes	< .52
Trichloroethene	0.53
Vinyl Chloride	< 2.6
cis-1,3-Dichloropropene	< .52
trans-1,3-Dichloropropene	< .52

< Not Detected
R Rejected

Appendix A-9

Summary of Detected Constituents from Moraine Engine and Moraine Assembly Facilities Analytical Data from Active and Inactive Production Wells General Motors Corporation July 1989 to Present

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides in Groundwater from Fire Well FW-1, Moraine Engine and Moraine Assembly Facility, General Motors Corporation, Moraine, Ohio

PARAMETERS	UNITS	10/7/93	6/21/96
VOCs	ug/L	--	--
SVOCs	ug/L	NA	--
TOTAL METALS			
Barium	mg/L	NA	0.039
Calcium	mg/L	NA	170
Iron	mg/L	NA	4.24
Lead	mg/L	NA	--
Magnesium	mg/L	NA	61.9
Manganese	mg/L	NA	0.139
Nickel	mg/L	NA	--
Silica, Dissolved	mg/L	NA	22
Sodium	mg/L	NA	12.6
Zinc	mg/L	NA	--
PCBs/PESTICIDES	ug/L	NA	--

-- Not detected.
mg/L Milligrams per liter.
ug/L Micrograms per liter.
VOCs Volatile organic compounds.
SVOCs Semi-volatile organic compounds.
PCBs Polychlorinated biphenyls.
NA Not analyzed.

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides in Groundwater from Fire Well FW-2, Moraine Engine and Moraine Assembly Facility, General Motors Corporation, Moraine, Ohio

PARAMETERS	UNITS	6/21/96
VOCs		
Trichloroethene	ug/L	2
SVOCs	ug/L	--
TOTAL METALS		
Aluminum	mg/L	--
Barium	mg/L	0.068
Calcium	mg/L	121
Chromium	mg/L	--
Copper	mg/L	--
Iron	mg/L	0.144
Lead	mg/L	--
Magnesium	mg/L	38.7
Manganese	mg/L	0.22
Nickel	mg/L	--
Silica, Dissolved	mg/L	14.6
Sodium	mg/L	52.7
Zinc	mg/L	--
PCBs/PESTICIDES	ug/L	--

-- Not detected.
mg/L Milligrams per liter.
ug/L Micrograms per liter.
VOCs Volatile organic compounds.
SVOCs Semi-volatile organic compounds.
PCBs Polychlorinated biphenyls.

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides in Groundwater from Fire Well FW-3, Moraine Engine and Moraine Assembly Facility, General Motors Corporation, Moraine, Ohio

PARAMETERS	UNITS	3/6/92	5/21/93	6/21/96
VOCs				
cis-1,2-Dichloroethene	ug/L	7	NA	NA
Tetrachloroethene	ug/L	5.5	6	2.2
Trichloroethene	ug/L	17.8	20	5.8
SVOCs	ug/L	NA	--	--
TOTAL METALS				
Aluminum	mg/L	NA	NA	--
Barium	mg/L	NA	NA	0.123
Calcium	mg/L	NA	415	127
Chromium	mg/L	NA	NA	--
Copper	mg/L	NA	--	--
Iron	mg/L	NA	7.8	2.09
Lead	mg/L	NA	NA	--
Magnesium	mg/L	NA	209	38.8
Manganese	mg/L	NA	0.41	0.221
Nickel	mg/L	NA	NA	--
Silica, Dissolved	mg/L	NA	18	19.1
Sodium	mg/L	NA	48	45.3
Zinc	mg/L	NA	NA	--
PCBs/PESTICIDES	ug/L	NA	--	--

-- Not detected.
mg/L Milligrams per liter.
ug/L Micrograms per liter.
VOCs Volatile organic compounds.
SVOCs Semi-volatile organic compounds.
PCBs Polychlorinated biphenyls.
NA Not analyzed.

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides in Groundwater from Fire Well FW-4, Moraine Engine and Moraine Assembly Facility, General Motors Corporation, Moraine, Ohio

PARAMETERS	UNITS	4/30/92	10/7/93	6/21/96
VOCs				
1,1-Dichloroethane	ug/L	--	--	3.8
trans-1,2-Dichloroethene	ug/L	NA	NA	2.9
cis-1,2-Dichloroethene	ug/L	9.5	NA	NA
Trichloroethene	ug/L	22.9	17	21.8
SVOCs	ug/L	NA	NA	--
TOTAL METALS				
Aluminum	mg/L	NA	NA	--
Barium	mg/L	NA	NA	0.06
Calcium	mg/L	NA	NA	141
Chromium	mg/L	NA	NA	--
Copper	mg/L	NA	NA	--
Iron	mg/L	NA	NA	1.08
Lead	mg/L	NA	NA	--
Magnesium	mg/L	NA	NA	48.9
Manganese	mg/L	NA	NA	0.371
Nickel	mg/L	NA	NA	--
Silica, Dissolved	mg/L	NA	NA	18.8
Sodium	mg/L	NA	NA	41.2
Zinc	mg/L	NA	NA	--
PCBs/PESTICIDES	ug/L	NA	NA	--

-- Not detected.
mg/L Milligrams per liter.
ug/L Micrograms per liter.
VOCs Volatile organic compounds.
SVOCs Semi-volatile organic compounds.
PCBs Polychlorinated biphenyls.
NA Not analyzed.

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides in Groundwater from Production Well 11-A Moraine Assembly Facility General Motors Corporation, Moraine, Ohio

PARAMETERS	UNITS	12/7/87	7/31/89	7/30/90	7/25/91	7/7/92	7/19/93	10/7/93	1/16/95	2/1/95	3/9/95	4/24/95
VOCs												
Trichloroethene	ug/L	--	--	--	--	--	--	--	--	--	--	--
1,1,1-Trichloroethane	ug/L	--	--	--	--	2J	--	--	--	--	--	--
SVOCS	ug/L	--	--	--	--	--	--	NA	--	--	--	--
TOTAL METALS												
Aluminum	mg/L	NA	NA	NA	NA	NA	NA	NA	--	--	--	--
Barium	mg/L	NA	NA	NA	NA	NA	NA	NA	0.148	0.158	0.162	0.148
Calcium	mg/L	NA	428	369	335	366	336	NA	124	126	133	121
Chromium	mg/L	NA	NA	NA	NA	NA	NA	NA	--	--	--	--
Copper	mg/L	NA	--	--	--	--	--	NA	--	--	--	--
Iron	mg/L	NA	1.2	0.72	0.48	0.61	0.21	NA	0.585	0.73	0.712	0.69
Lead	mg/L	NA	NA	NA	NA	NA	NA	NA	--	--	--	--
Magnesium	mg/L	NA	273	244	222	235	213	NA	48.1	48.9	49.2	47.3
Manganese	mg/L	NA	NA	NA	0.46	0.51	0.47	NA	0.442	0.441	0.443	0.42
Nickel	mg/L	NA	NA	NA	NA	NA	NA	NA	--	--	--	--
Silica, Dissolved	mg/L	NA	15	17	14	16	17	NA	7.37	16.3	17.1	18.3
Sodium	mg/L	NA	41	42	43	50	44	NA	44.9	45.1	46.3	43
Zinc	mg/L	NA	NA	NA	NA	NA	NA	NA	--	--	--	--
PCBs/PESTICIDES	ug/L	NA	--	--	--	--	--	NA	--	--	--	--

-- Not detected.
NA Not analyzed.
J Value below quantitation but above zero.
ug/L Micrograms per liter.
mg/L Milligrams per liter.
VOCs Volatile organic compounds.
SVOCs Semi-volatile organic compounds.
PCBs Polychlorinated biphenyls.

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides in Groundwater from Production Well 11-A Moraine Assembly Facility General Motors Corporation, Moraine, Ohio

PARAMETERS	UNITS	6/22/95	7/31/95	8/31/95	9/21/95	10/10/95	11/20/95	12/18/95	2/23/96	3/26/96	4/29/96	5/30/96
VOCs												
Trichloroethene	ug/L	--	1.3	1	1.1	--	1.1	1.4	1	1.1	1.2	--
1,1,1-Trichloroethane	ug/L	--	--	--	--	--	--	--	--	--	--	--
SVOCS	ug/L	--	--	--	--	--	--	--	--	--	--	--
TOTAL METALS												
Aluminum	mg/L	0.17	0.51	--	0.14	--	--	--	--	0.176	0.108	--
Barium	mg/L	0.092	0.145	0.147	0.154	0.149	0.147	0.127	0.175	0.155	0.161	0.155
Calcium	mg/L	54.5	117	123	129	131	124	109	131	130	127	132
Chromium	mg/L	--	--	--	--	--	--	--	--	--	--	--
Copper	mg/L	--	--	--	--	--	--	--	--	0.023	--	0.025
Iron	mg/L	0.141	0.59	0.63	0.55	0.78	0.59	0.64	3.68	0.469	0.822	0.975
Lead	mg/L	--	--	--	--	--	--	--	--	--	--	--
Magnesium	mg/L	36.1	46	47.4	49.3	48.5	47.7	42	52	49	48.5	51.6
Manganese	mg/L	0.13	0.405	0.425	0.427	0.437	0.414	0.364	1.24	0.427	0.439	0.512
Nickel	mg/L	--	--	--	--	--	--	--	--	--	--	--
Silica, Dissolved	mg/L	--	17	15.8	17.9	18.1	16.5	12.7	18.2	8.29	--	18.7
Sodium	mg/L	29.9	42.7	45.1	46.8	44.4	45.6	41.1	49.6	52	46.2	37.8
Zinc	mg/L	--	--	--	--	--	--	--	--	--	--	--
PCBs/PESTICIDES	ug/L	--	--	--	--	--	--	--	--	--	--	--

-- Not detected.
NA Not analyzed.
J Value below quantitation but above zero.
ug/L Micrograms per liter.
mg/L Milligrams per liter.
VOCs Volatile organic compounds.
SVOCs Semi-volatile organic compounds.
PCBs Polychlorinated biphenyls.

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides in Groundwater from Production Well 11-A Moraine Assembly Facility General Motors Corporation, Moraine, Ohio

PARAMETERS	UNITS	6/26/96	7/31/96	8/13/96	9/26/96	10/10/96	11/22/96	12/13/96	1/21/97	2/14/97	3/26/97	4/28/97
VOCs												
Trichloroethene	ug/L	--	1.1	1.6	1.2	1.2	--	1.1	1.1	1.3	--	1.4
1,1,1-Trichloroethane	ug/L	--	--	--	--	--	--	--	--	--	--	--
SVOCS	ug/L	--	--	--	--	--	--	--	--	--	--	--
TOTAL METALS												
Aluminum	mg/L	--	--	--	--	--	--	--	--	--	--	--
Barium	mg/L	0.147	0.14	0.149	0.145	0.154	0.132	0.141	0.148	0.164	--	0.141
Calcium	mg/L	116	114	112	124	126	119	125	121	133	194	116
Chromium	mg/L	--	--	--	--	--	--	--	--	--	--	--
Copper	mg/L	--	--	--	--	--	--	--	--	--	0.252	--
Iron	mg/L	0.586	0.641	0.48	0.56	0.48	0.61	0.52	0.41	0.53	--	0.47
Lead	mg/L	--	--	--	--	--	--	--	--	--	--	--
Magnesium	mg/L	44.7	44.3	46.9	44.6	46	41.8	44.4	45.2	49.9	55.2	44.7
Manganese	mg/L	0.401	0.389	0.355	0.377	0.397	0.373	0.386	0.389	0.426	--	0.402
Nickel	mg/L	--	--	--	--	--	--	--	--	--	0.015	--
Silica, Dissolved	mg/L	--	7.73	17.9	15.1	14.5	6.24	6.54	12.8	11.8	11.5	5.98
Sodium	mg/L	41.9	39.2	43	46.3	48.8	40.8	45.7	46.7	49.4	9.4	44.5
Zinc	mg/L	--	--	--	--	--	--	--	--	--	0.05	--
PCBs/PESTICIDES	ug/L	--	--	--	--	--	--	--	--	--	--	--

-- Not detected.
NA Not analyzed.
J Value below quantitation but above zero.
ug/L Micrograms per liter.
mg/L Milligrams per liter.
VOCs Volatile organic compounds.
SVOCs Semi-volatile organic compounds.
PCBs Polychlorinated biphenyls.

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides in Groundwater from Production Well 12 Moraine Assembly Facility, General Motors Corporation, Moraine, Ohio

PARAMETERS	UNITS	6/22/95	7/31/95	9/21/95	10/12/95	11/28/95	2/23/96	3/26/96	4/29/96	5/30/96	6/26/96	7/31/96
VOCs												
Trichloroethene	ug/L	5	6.8	9.3	7.3	8.3	7	6.9	12.6	10.5	7.9	11.3
Vinyl Chloride	ug/L	--	--	--	--	--	--	--	--	--	--	--
SVOCs												
Di-n-butylphthalate	ug/L	--	--	12	--	--	--	--	--	--	--	--
TOTAL METALS												
Aluminum	mg/L	0.108	0.32	0.12	--	--	--	--	--	--	--	--
Barium	mg/L	0.084	0.083	0.08	0.08	0.076	0.083	0.081	0.082	0.079	0.087	0.071
Calcium	mg/L	12.1	145	146	143	144	152	152	141	140	152	126
Chromium	mg/L	--	--	--	--	--	--	--	--	--	--	--
Copper	mg/L	--	--	--	--	--	--	--	--	--	--	--
Iron	mg/L	1.1	0.76	0.71	0.76	0.75	0.76	0.841	0.716	0.869	0.719	0.606
Lead	mg/L	--	--	--	--	--	--	--	--	--	--	--
Magnesium	mg/L	21.8	56.4	54.4	54.1	54.7	58.8	56.8	52.4	52.5	56.5	47.2
Manganese	mg/L	--	0.346	0.339	0.335	0.335	0.361	0.341	0.388	0.343	0.364	0.3
Nickel	mg/L	--	--	--	--	--	--	--	--	--	--	--
Silica, Dissolved	mg/L	--	18	18.9	19.2	17	20.8	8.8	--	19.1	5.48	7.89
Sodium	mg/L	41.2	43.8	45	41	37.8	44.5	40.8	42.7	45.9	49.4	38.6
Zinc	mg/L	23.4	--	--	--	--	--	--	--	--	--	--
PCBs/PESTICIDES	ug/L	--	--	--	--	--	--	--	--	--	--	--

-- Not detected.
mg/L Milligrams per liter.
ug/L Micrograms per liter.
VOCs Volatile organic compounds.
SVOCs Semi-volatile organic compounds.
PCBs Polychlorinated biphenyls.
NA Not analyzed.

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides in Groundwater from Production Well 12 Moraine Assembly Facility, General Motors Corporation, Moraine, Ohio

PARAMETERS	UNITS	8/13/96	10/10/96	11/22/96	12/13/96	1/27/97	2/14/97	3/26/97	4/28/97
VOCs									
Trichloroethene	ug/L	8.2	7.4	4.9	4	4	3.5	2.6	3.3
Vinyl Chloride	ug/L	--	--	--	--	2.2	--	--	--
SVOCs									
Di-n-butylphthalate	ug/L	--	--	--	--	--	--	--	--
TOTAL METALS									
Aluminum	mg/L	--	--	--	--	--	--	--	--
Barium	mg/L	0.076	0.08	0.072	0.077	0.077	0.091	0.077	0.076
Calcium	mg/L	127	156	153	154	147	171	157	146
Chromium	mg/L	--	--	--	--	--	--	--	--
Copper	mg/L	--	--	--	--	--	--	--	--
Iron	mg/L	0.59	0.92	0.98	1.36	1.47	1.51	1.2	1.41
Lead	mg/L	--	--	--	--	--	--	--	--
Magnesium	mg/L	51.3	58.1	56.2	61.3	59.3	68.5	60.8	60.6
Manganese	mg/L	0.285	0.326	0.298	0.249	0.23	0.297	0.222	0.236
Nickel	mg/L	--	--	--	--	--	--	--	--
Silica, Dissolved	mg/L	19.7	16.5	7.59	7.42	15.8	6.53	13.4	7.24
Sodium	mg/L	35.8	27.4	22.8	21.4	21	23.5	19.9	20.6
Zinc	mg/L	--	--	--	--	--	--	--	--
PCBs/PESTICIDES	ug/L	--	--	--	--	--	--	--	--

-- Not detected.
mg/L Milligrams per liter.
ug/L Micrograms per liter
VOCs Volatile organic co
SVOCs Semi-volatile organi
PCBs Polychlorinated biph
NA Not analyzed.

Summary of Detected VOCs in Groundwater Production Well 28
Moraine Engine Facility,
General Motors Corporation, Moraine, Ohio

PARAMETERS	UNITS	3/5/92	4/23/92	9/18/92	3/24/93	8/12/93	12/15/93
VOCs							
Trichloroethene	ug/L	4.8	5.4	3.8	4.3	3.9	4.8
cis-1,2-Dichloroethene	ug/L	--	4	3.4	--	--	--

-- Not detected.
ug/L Micrograms per liter.
VOCs Volatile organic compounds.

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides
in Groundwater from Production Well 31
Moraine Engine Facility,
General Motors Corporation, Moraine, Ohio

PARAMETERS	UNITS	5/28/92	1/7/93	5/20/93	11/18/93	2/16/95	3/1/95	4/6/95
VOCs								
1,1-Dichloroethane	ug/L	--	--	--	--	--	--	1.5
cis-1,2-Dichloroethene	ug/L	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	ug/L	--	--	--	--	--	--	--
Trichloroethene	ug/L	--	--	2.7	1.8	5.9	5.1	5.9
Vinyl Chloride	ug/L	--	--	--	--	--	--	--
SVOCs	ug/L	--	--	--	--	NA	NA	NA
TOTAL METALS								
Aluminum	mg/L	--	--	--	--	NA	NA	NA
Antimony	mg/L	--	--	--	--	NA	NA	NA
Arsenic	mg/L	--	--	--	--	NA	NA	NA
Barium	mg/L	--	--	0.107	0.094	NA	NA	NA
Beryllium	mg/L	--	--	--	--	NA	NA	NA
Boron	mg/L	NA	NA	0.189	0.228	NA	NA	NA
Cadmium	mg/L	--	--	--	--	NA	NA	NA
Chromium	mg/L	0.0111	--	--	--	NA	NA	NA
Cobalt	mg/L	--	--	--	--	NA	NA	NA
Copper	mg/L	--	--	--	--	NA	NA	NA
Iron	mg/L	2.34	1.03	0.58	1.33	NA	NA	NA
Lead	mg/L	--	--	--	--	NA	NA	NA
Magnesium	mg/L	47.3	57.8	54	53.1	NA	NA	NA
Manganese	mg/L	0.16	0.14	0.383	0.184	NA	NA	NA
Mercury	mg/L	--	--	--	--	NA	NA	NA
Molybdenum	mg/L	--	--	--	--	NA	NA	NA
Nickel	mg/L	--	--	--	--	NA	NA	NA
Selenium	mg/L	--	--	--	--	NA	NA	NA
Silver	mg/L	--	--	--	--	NA	NA	NA
Thallium	mg/L	--	--	--	--	NA	NA	NA
Tin	mg/L	--	--	--	--	NA	NA	NA
Titanium	mg/L	--	--	--	--	NA	NA	NA
Zinc	mg/L	5	--	--	--	NA	NA	NA

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides
in Groundwater from Production Well 31
Moraine Engine Facility,
General Motors Corporation, Moraine, Ohio

PARAMETERS	UNITS	5/28/92	1/7/93	5/20/93	11/18/93	2/16/95	3/1/95	4/6/95
PCBs/PESTICIDES	ug/L	--	--	--	--	NA	NA	NA

-- Not detected.
mg/L Milligrams per liter.
ug/L Micrograms per liter.
VOCs Volatile organic compounds.
SVOCs Semi-volatile organic compounds.
PCBs Polychlorinated biphenyls.
NA Not analyzed.
*Detection level was changed from 5 to 2 ug/L.

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides
in Groundwater from Production Well 31
Moraine Engine Facility,
General Motors Corporation, Moraine, Ohio

PARAMETERS	5/1/95	5/22/95	6/1/95	7/5/95	8/3/95	9/5/95	10/10/95	11/9/95
VOCs								
1,1-Dichloroethane	1.6	2	1.4	1.8	1.9	2.1	2.4	2.9
cis-1,2-Dichloroethene	NA	NA	NA	2.6	NA	NA	NA	3.4
Tetrachloroethene	--	--	--	--	--	--	--	--
Trichloroethene	6	6.8	4.8	5.2	5.6	5.7	5.9	6.1
Vinyl Chloride	--	--	--	--	--	--	--	--
SVOCs	NA	--	NA	NA	NA	NA	NA	NA
TOTAL METALS								
Aluminum	NA	--	NA	NA	NA	NA	NA	NA
Antimony	NA	--	NA	NA	NA	NA	NA	NA
Arsenic	NA	--	NA	NA	NA	NA	NA	NA
Barium	NA	0.087	NA	NA	NA	NA	NA	NA
Beryllium	NA	--	NA	NA	NA	NA	NA	NA
Boron	NA	0.295	NA	NA	NA	NA	NA	NA
Cadmium	NA	--	NA	NA	NA	NA	NA	NA
Chromium	NA	--	NA	NA	NA	NA	NA	NA
Cobalt	NA	--	NA	NA	NA	NA	NA	NA
Copper	NA	--	NA	NA	NA	NA	NA	NA
Iron	NA	2.07	NA	NA	NA	NA	NA	NA
Lead	NA	--	NA	NA	NA	NA	NA	NA
Magnesium	NA	53	NA	NA	NA	NA	NA	NA
Manganese	NA	0.202	NA	NA	NA	NA	NA	NA
Mercury	NA	0.0002	NA	NA	NA	NA	NA	NA
Molybdenum	NA	--	NA	NA	NA	NA	NA	NA
Nickel	NA	0.01	NA	NA	NA	NA	NA	NA
Selenium	NA	--	NA	NA	NA	NA	NA	NA
Silver	NA	--	NA	NA	NA	NA	NA	NA
Thallium	NA	--	NA	NA	NA	NA	NA	NA
Tin	NA	--	NA	NA	NA	NA	NA	NA
Titanium	NA	--	NA	NA	NA	NA	NA	NA
Zinc	NA	--	NA	NA	NA	NA	NA	NA

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides
in Groundwater from Production Well 31
Moraine Engine Facility,
General Motors Corporation, Moraine, Ohio

PARAMETERS	5/1/95	5/22/95	6/1/95	7/5/95	8/3/95	9/5/95	10/10/95	11/9/95
PCBs/PESTICIDES	NA	--	NA	NA	NA	NA	NA	NA

-- Not detected.
mg/L Milligrams per liter.
ug/L Micrograms per liter.
VOCs Volatile organic compounds.
SVOCs Semi-volatile organic compounds.
PCBs Polychlorinated biphenyls.
NA Not analyzed.
*Detection level was changed from 5 to 2 ug/L.

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides
in Groundwater from Production Well 31
Moraine Engine Facility,
General Motors Corporation, Moraine, Ohio

PARAMETERS	11/30/95	12/5/95	1/18/96	2/23/96	3/14/96	4/10/96	5/15/96	5/9/96
VOCs								
1,1-Dichloroethane	2.1	2	2.3	2.4	3.1	2.7	2.6	2.5
cis-1,2-Dichloroethene	NA	2.5	NA	2.8	3.1	2.8	NA	3
Tetrachloroethene	--	--	--	--	--	--	2.9	--
Trichloroethene	5.3	4.8	5.7	6	5.9	5.7	7.3	5.7
Vinyl Chloride	--	--	--	--	--	5	--	--
SVOCs	--	NA	NA	NA	NA	NA	--	NA
TOTAL METALS								
Aluminum	--	NA	NA	NA	NA	NA	--	NA
Antimony	--	NA	NA	NA	NA	NA	--	NA
Arsenic	--	NA	NA	NA	NA	NA	--	NA
Barium	0.097	NA	NA	NA	NA	NA	0.094	NA
Beryllium	--	NA	NA	NA	NA	NA	--	NA
Boron	0.277	NA	NA	NA	NA	NA	0.321	NA
Cadmium	--	NA	NA	NA	NA	NA	--	NA
Chromium	--	NA	NA	NA	NA	NA	--	NA
Cobalt	--	NA	NA	NA	NA	NA	--	NA
Copper	--	NA	NA	NA	NA	NA	--	NA
Iron	2.63	NA	NA	NA	NA	NA	1.56	NA
Lead	--	NA	NA	NA	NA	NA	--	NA
Magnesium	54.5	NA	NA	NA	NA	NA	53.4	NA
Manganese	0.213	NA	NA	NA	NA	NA	0.196	NA
Mercury	--	NA	NA	NA	NA	NA	--	NA
Molybdenum	--	NA	NA	NA	NA	NA	--	NA
Nickel	0.018	NA	NA	NA	NA	NA	0.014	NA
Selenium	0.0051	NA	NA	NA	NA	NA	--	NA
Silver	--	NA	NA	NA	NA	NA	--	NA
Thallium	--	NA	NA	NA	NA	NA	--	NA
Tin	--	NA	NA	NA	NA	NA	--	NA
Titanium	--	NA	NA	NA	NA	NA	--	NA
Zinc	--	NA	NA	NA	NA	NA	--	NA

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides
in Groundwater from Production Well 31
Moraine Engine Facility,
General Motors Corporation, Moraine, Ohio

PARAMETERS	11/30/95	12/5/95	1/18/96	2/23/96	3/14/96	4/10/96	5/15/96	5/9/96
PCBs/PESTICIDES	--	NA	NA	NA	NA	NA	--	NA

-- Not detected.
mg/L Milligrams per liter.
ug/L Micrograms per liter.
VOCs Volatile organic compounds.
SVOCs Semi-volatile organic compounds.
PCBs Polychlorinated biphenyls.
NA Not analyzed.
*Detection level was changed from 5 to 2 ug/L.

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides
in Groundwater from Production Well 31
Moraine Engine Facility,
General Motors Corporation, Moraine, Ohio

PARAMETERS	6/13/96	7/8/96	8/14/96	9/6/96	10/23/96	11/18/96	12/6/96	12/19/96
VOCs								
1,1-Dichloroethane	--	1.9	2.5	3	1.4	9.8	8.6	8.5
cis-1,2-Dichloroethene	2.6	2.2	2.6	2.9	1.6	11.6	10.2	10.4
Tetrachloroethene	5.3	6.3	--	--	--	--	--	--
Trichloroethene	7.2	6.9	5.6	7.4	4.1	13.8	14	12.1
Vinyl Chloride	--	--	--	3.8*	2.6	4.3	4.2	3.6
SVOCs	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL METALS								
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	NA	NA	NA	NA	NA	NA	NA	NA
Barium	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	NA	NA	NA	NA	NA	NA	NA	NA
Boron	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	NA	NA	NA	NA	NA	NA	NA	NA
Copper	NA	NA	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	NA	NA	NA	NA	NA	NA	NA	NA
Silver	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	NA	NA	NA	NA	NA	NA	NA	NA
Tin	NA	NA	NA	NA	NA	NA	NA	NA
Titanium	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides
in Groundwater from Production Well 31
Moraine Engine Facility,
General Motors Corporation, Moraine, Ohio

PARAMETERS	6/13/96	7/8/96	8/14/96	9/6/96	10/23/96	11/18/96	12/6/96	12/19/96
PCBs/PESTICIDES	NA	NA	NA	NA	NA	NA	NA	NA

-- Not detected.
mg/L Milligrams per liter.
ug/L Micrograms per liter.
VOCs Volatile organic compounds.
SVOCs Semi-volatile organic compounds.
PCBs Polychlorinated biphenyls.
NA Not analyzed.
*Detection level was changed from 5 to 2 ug/L.

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides
in Groundwater from Production Well 31
Moraine Engine Facility,
General Motors Corporation, Moraine, Ohio

PARAMETERS	1/24/97	2/26/97	3/21/97	4/11/97	5/15/97	5/28/97
VOCs						
1,1-Dichloroethane	3.2	2.7	2.9	3	3.3	3.4
cis-1,2-Dichloroethene	3.1	2.6	NA	2.8	3.1	NA
Tetrachloroethene	--	--	--	--	--	--
Trichloroethene	6	5.3	5.7	5.5	5.6	5.6
Vinyl Chloride	4.1	3.4	3.5	--	3.4	3.6
SVOCs	NA	NA	NA	NA	NA	--
TOTAL METALS						
Aluminum	NA	NA	NA	NA	NA	--
Antimony	NA	NA	NA	NA	NA	--
Arsenic	NA	NA	NA	NA	NA	--
Barium	NA	NA	NA	NA	NA	0.094
Beryllium	NA	NA	NA	NA	NA	--
Boron	NA	NA	NA	NA	NA	0.298
Cadmium	NA	NA	NA	NA	NA	--
Chromium	NA	NA	NA	NA	NA	--
Cobalt	NA	NA	NA	NA	NA	--
Copper	NA	NA	NA	NA	NA	--
Iron	NA	NA	NA	NA	NA	1.82
Lead	NA	NA	NA	NA	NA	--
Magnesium	NA	NA	NA	NA	NA	56.8
Manganese	NA	NA	NA	NA	NA	0.208
Mercury	NA	NA	NA	NA	NA	--
Molybdenum	NA	NA	NA	NA	NA	--
Nickel	NA	NA	NA	NA	NA	0.012
Selenium	NA	NA	NA	NA	NA	--
Silver	NA	NA	NA	NA	NA	--
Thallium	NA	NA	NA	NA	NA	--
Tin	NA	NA	NA	NA	NA	--
Titanium	NA	NA	NA	NA	NA	--
Zinc	NA	NA	NA	NA	NA	--

Summary of Detected VOCs, SVOCs, Metals, PCBs, and Pesticides
in Groundwater from Production Well 31
Moraine Engine Facility,
General Motors Corporation, Moraine, Ohio

PARAMETERS	1/24/97	2/26/97	3/21/97	4/11/97	5/15/97	5/28/97
PCBs/PESTICIDES	NA	NA	NA	NA	NA	--

-- Not detected.
mg/L Milligrams per liter.
ug/L Micrograms per liter.
VOCs Volatile organic compounds.
SVOCs Semi-volatile organic compounds.
PCBs Polychlorinated biphenyls.
NA Not analyzed.
*Detection level was changed from 5 to 2 ug/L.

Summary of Detected VOCs in Groundwater from Production Well 34
Moraine Engine Facility,
General Motors Corporation, Moraine, Ohio

PARAMETERS	UNITS	2/11/92	8/24/92	6/19/1995[1]
VOCs				
cis-1,2-Dichloroethene	ug/L	20	21.3	--
Ethylbenzene	ug/L	--	--	2
Tetrachloroethene	ug/L	19.7	24.8	--
Trichloroethene	ug/L	123.6	183	5.4
Xylenes	ug/L	NA	NA	7.5

-- Not detected.
ug/L Micrograms per liter.
VOCs Volatile organic compounds.
NA Not analyzed.

[1] The June 1995 sample was collected while Well 34 was no longer in use. As a result, the well was not purged prior to sampling.

Appendix A-10

Spill Prevention Control and Countermeasure Plan
GMC Frigidaire Division
December 1976

Area A Building 7 and Surrounding Area

This area consists of an oil house and an area located to the north which is used as a storage area for oil, gasoline, thinners, alcohol and acids and bases and drum storage. The paints and chemicals required for production at Frigidaire are mixed in the oil house and pumped or transferred to production areas. Materials are shipped to this area by tank car and truck.

Sketches are provided for a description of the types of materials stored and the volumes and containment provided. We have a numerical designation for the area with the prefix "A".

As shown on the overall layout of the Moraine plants any spills in this zone will be discharged to the Plant Three lagoon system. Losses from transferring or tanks enumerated 1-22 occur outside of the building and tanks enumerated 23-59 are those areas located within the building itself.

Reviewed and approved,

Vincent J. Festa

Vincent J. Festa P.E.
Ohio E033731

MORAINE CITY BULK CHEMICAL STORAGE AREAS

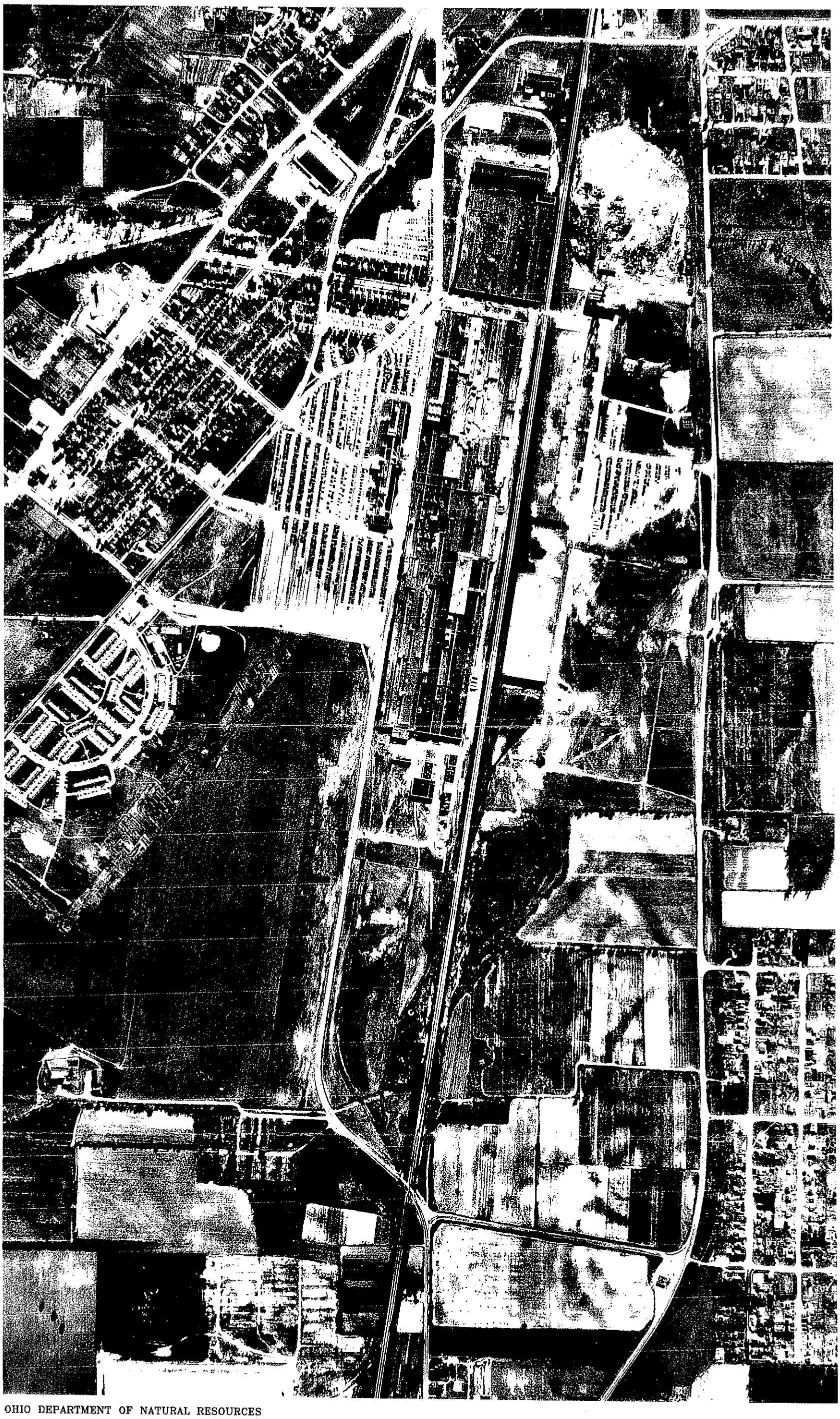
LOCATION	CONTENTS	PAGE NUMBER	CAPACITY	CONTAINMENT
A1	Oil	738450	15000 Gal.	Underground
A2	Oil	738400	15000 Gal.	Underground
A3	Oil	738628	15000 Gal.	Underground
A4	Thinner	840911	8000 Gal.	Gravel Dike
A5	Reducer	840900	8000 Gal.	Gravel Dike
A6	Alcohol	725111	8000 Gal.	Gravel Dike
A7	Kerosene	735850	10000 Gal.	Gravel Dike
A8	Perchlor	741378	10000 Gal.	Gravel Dike
A9	Perchlor	741378	10000 Gal.	Gravel Dike
A10	Alcohol	725111	10000 Gal.	Gravel Dike
A11	Alcohol	725106	10000 Gal.	Gravel Dike
A12	Xylol	840912	10000 Gal.	Gravel Dike
A13	Thinner	748320	10000 Gal.	Gravel Dike
A14	Freon 12	840335	160000 #'s	None
A15	Freon 12	840335	160000 #'s	None
A16	Oil	840552	30000 Gal.	None
A17	Acid - HNO_3	725050	11000 Gal.	Concrete Dike
A18	Acid - HCl	725032	10000 Gal.	Concrete Dike
A19	Acid - H_2SO_4	725095	13000 Gal.	Concrete Dike
A20	Acid - H_3PO_4	725063	11000 Gal.	Concrete Dike
A21	Drums - Oil	———	300 bbl.	None
A22	Acid	———	———	None

AREA A - CHEMICAL STORAGE - Cont'd.

TANK #	CONTENTS	PAGE NUMBER	CAPACITY, GAL.	CONTAINMENT
23	Paint	840676	300	None
24	Paint	840676	300	None
25	Paint	840732E	300	None
26	Paint	840732E	300	None
27	Paint	840730	300	None
28	Paint	840640	300	None
29	Paint	840715	300	None
30	Paint	840715	300	None
31	Paint	840732H	300	None
32	Paint	840732H	300	None
33	Paint	840676	300	None
34	Paint	840676	300	None
35	Paint	840730	300	None
36	Paint	840730	300	None
37	Paint	840707	300	None
38	Paint	840707	300	None
39	Paint	840732	5000	None
40	Paint	840676	5000	None
41	Paint	840732	2000	None
42	Paint	840676	3200	None
43	Paint	840676	3200	None
44	Paint	840730	2000	None

APPENDIX B

Aerial Photographs



SOURCE: OHIO DEPARTMENT OF NATURAL RESOURCES

GERAGHTY & MILLER, INC.
Environmental Services

NOT TO SCALE

1949 AERIAL PHOTOGRAPH, SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
B-1

SOURCE: OHIO DEPARTMENT OF NATURAL RESOURCES

GERAGHTY & MILLER, INC.
Environmental Services

NOT TO SCALE

1956 AERIAL PHOTOGRAPH, SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
B-2

SOURCE: OHIO DEPARTMENT OF NATURAL RESOURCES

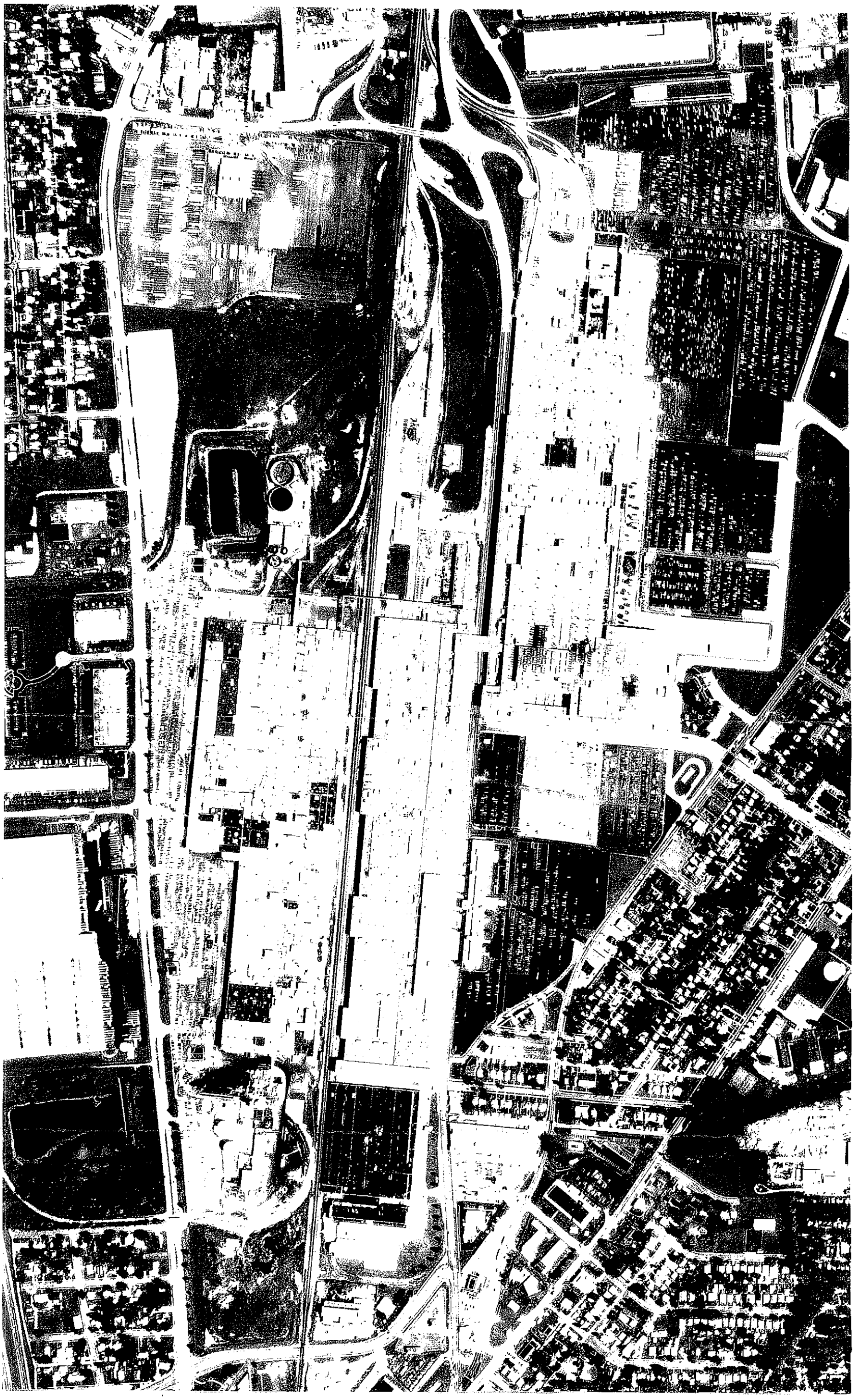
GERAGHTY & MILLER, INC.
Environmental Services

NOT TO SCALE

1975 AERIAL PHOTOGRAPH, SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
B-3



SOURCE: OHIO DEPARTMENT OF NATURAL RESOURCES

GERAGHTY & MILLER, INC.
Environmental Services

NOT TO SCALE

1990 AERIAL PHOTOGRAPH, SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
B-4

APPENDIX C

Soil Boring and Well Construction Logs

MONITORING WELL BORING LOGS

GM-21 through GM-25
ME-1 through ME-6

Geraghty & Miller, Inc.
Environmental Services

Log of Boring: GM-21

MORAINE ENGINE PLANT — Moraine, Ohio

Depth (Feet)	Blows (/6 in.)	Recovery (Feet)	HNU (PPM)	Sample	Graphic Log	Soil Class	Description
0							***TOPSOIL:*** 0-.5 ft.; silt & clay, fine sand; brn, dry-damp, mostly loose becoming dk brown, damp, semi-pliable, semi-cohesive.
							FILL silt & clay, some concrete blocks and gravel (f-cs); some sand (f-cs); brn to light gray, dry-damp, loose to stiff.
5	5-11 29-12	0.5	0.3				
10	8-16 15-16	1.8	0.3				***SAND & GRAVEL:*** sand (50%), f-cs; gravel (50%), f-cobble; brn, dry-damp, loose.
15	12-15 13-8	1.8	0.3				***SAND & GRAVEL:*** same as above, damp.
20	7-11 22-16	1.1	0.3				***SAND & GRAVEL*** same as above.
25	5-6-18-34	1.2	0.3				***SILT, CLAY, SAND & GRAVEL:*** sand (40%), f-cs; gravel (40%), f-cobble, silt & clay (20%); brown, (moist-wet), slightly pliable, slightly cohesive.
30	7-21 24-29	2.0	0.3				***SAND & GRAVEL:*** sand (50%), f-cs; gravel (50%), f-cobble; trace silt and clay, brown, wet, loose.

☒ Composite to Lab ■ VOC to Lab ▥ Split-Spoon Not Analyzed

Drilling Co.: Burlington Environmental
Driller: Dan Fisher
Drilling Method: HSA 4 1/4"
Drilling Fluid: Plant Potable Water
Remarks:

Geologist: R. Astle
Total Depth: 62
Surface Elev.:
Datum: Feet, MSL
West Coor.: 6051

Begin Drilling: 08/01/94
End Drilling: 08/03/94
Converted to Well: Yes
Well Name: GM-21
South Coor.: 1518

OH0258.001

moraine

Geraghty & Miller, Inc.
Environmental Services

Log of Boring: GM-21

MORAINE ENGINE PLANT — Moraine, Ohio

Depth (Feet)	Blows (/6 in.)	Recovery (Feet)	HNU (PPM)	Sample	Graphic Log	Soil Class	Description
33	18-30 38-26	2.5	0.3				***SILT, CLAY, SAND & GRAVEL:*** sand (40%), f-cs; gravel (40%), f-cobble; silt and clay (20%); brn to light brn, wet, loose to slightly cohesive, slightly pliable.
38	50/2	0.5	0.3				***SILT, CLAY, SAND & GRAVEL:*** same as above, hard drilling.
43	50/4	0.5	0.3				***LIMESTONE:*** angular fragments, white-gray, vesicular, microcrystalline, boulder? Bent spoon, auger refusal, pulled augers and redrilled to 50' ~ 15' south of prior location.
48	5-12 20-28	0.5	0.4				***SILT, CLAY, SAND & GRAVEL:*** sand (40%), f-cs; gravel (40%), f-cobble; silt & clay (20%); gray brn with orange staining, wet, slightly tight (stiff). Heaving sands.
53							***NO SAMPLE:*** 6 feet of heaving sands. Drill harder and smoother at 55 feet, possible till or sand.
58	6-8-10-13	1.1	0.3				***TILL:*** gravelly sand silt & clay, silt & clay (60%); gravel (10%), f-med; sand (10%), f-cs; olive gray, damp, pliable, cohesive.
63							End of Boring at 62 Feet.

☒ Composite to Lab ■ VOC to Lab ▥ Split-Spoon Not Analyzed

Drilling Co.: Burlington Environmental
Driller: Dan Fisher
Drilling Method: HSA 4 1/4"
Drilling Fluid: Plant Potable Water
Remarks:

Geologist: R. Astle
Total Depth: 62
Surface Elev.:
Datum: Feet, MSL
West Coor.: 6051

Begin Drilling: 08/01/94
End Drilling: 08/03/94
Converted to Well: Yes
Well Name: GM-21
South Coor.: 1518

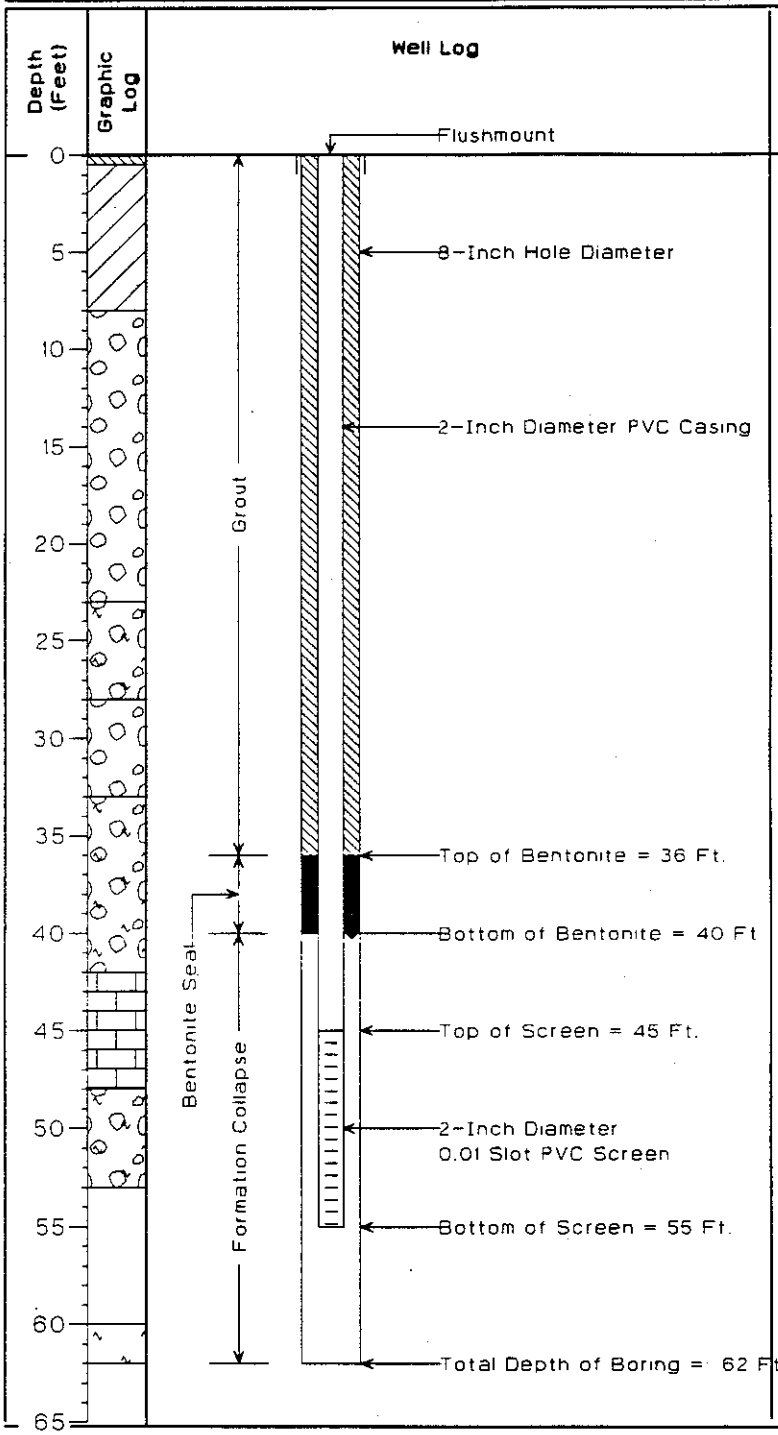
OH0258.001

moraine

Geraghty & Miller, Inc.
Environmental Services

Well Construction Log: GM-21

MORAINE ENGINE PLANT — Moraine, Ohio



Well Construction Details

Well Type: Monitor Well
Total Depth Drilled: 62
Surface Elev.:
Meas. Point Elev.: 723.79
Meas. Point Desc.: Mark on Casing
Datum: Feet, MSL
Drilling Co.: Burlington Environmental
Driller: Dan Fisher
Drilling Method: HSA 4 1/4"
Drilling Fluid: Plant Potable Water
Begin Drilling: 08/01/94
End Drilling: 08/03/94
Begin Well Instal.: 08/03/94
End Well Instal.: 08/03/94
Development Tech.: Submersible Pump
Begin Development: 08/09/94
End Development: 08/09/94
Fluid Loss: 1000 Gallons
Fluid Developed: 620 Gallons
Pumping DTW:
Pumping Duration:
Yield:
Specific Capacity:
Static Water Level: 26'
Fracture Zones:

For Lithologic Descriptions See Log of Boring: *GM-21*

Page 1 of 1

West Coor.: 6051 South Coor.: 1518

Remarks:

Geologist: R. Astle

OH0258.001

moraine

Geraghty & Miller, Inc.
Environmental Services

Log of Boring: GM-22

MORAINE ENGINE PLANT — Moraine, Ohio

Depth (Feet)	Blows (/6 in.)	Recovery (Feet)	HNU (PPM)	Sample	Graphic Log	Soil Class	Description
0							***ASPHALT:*** 0–0.5 ft.
							SILT, CLAY, SAND & GRAVEL: sand (40%), f–cs; gravel (40%), f–cs; silt & clay (20%); brn, damp, slightly pliable, slightly cohesive to loose.
5	3-2-2-2	0.5	0.3				
	8-7-5-5	1.5	0.4				***SAND & GRAVEL:*** sand (50%), f–cs; gravel (50%), f–cobble, tr silt & clay; brn, dry–damp, loose. Drills harder, large cobbles.
10							
15	7-10 11-12	1.0	0.4				***SAND & GRAVEL*** same as above.
20	5-6-5-4	1.6	0.4				***SAND & GRAVEL:*** same as above.
25	26-21 16-11	1.3					***SILT, CLAY, SAND & GRAVEL:*** gravel (50%), fine to mostly large cobbles; sand (30%), f–cs; silt & clay (20%), brn, damp, slightly loose to slight pliable, slight cohesive.
	5-3-2-2	0.3	0.4				***SAND & GRAVEL:*** gravel (50%), f–cobble, sand (50%), f–cs; brn, wet, loose. Hard drilling, cobbles.
30							

☒ Composite to Lab ■ VOC to Lab ▥ Split-Spoon Not Analyzed

Drilling Co.: Burlington Environmental
Geologist: R. Astle
Begin Drilling: 08/03/94

Driller: Dan Fisher
Total Depth: 57
End Drilling: 08/04/94

Drilling Method: HSA 4 1/4"
Surface Elev.:
Converted to Well: Yes

Drilling Fluid: Plant Potable Water
Datum: Feet, MSL
Well Name: GM-22

Remarks:
West Coor.: 6284
South Coor.: 2530

OH0258.001

moraine

Geraghty & Miller, Inc.
Environmental Services

Log of Boring: GM-22

MORAINE ENGINE PLANT — Moraine, Ohio

Depth (Feet)	Blows (/6 in.)	Recovery (Feet)	HNU (PPM)	Sample	Graphic Log	Soil Class	Description
30							
	13-21						***SILT, CLAY, SAND & GRAVEL:*** sand (40%), f-cs; gravel (40%), f-cs; silty & clay (20%); brn, wet, slightly pliable, slightly cohesive, mostly loose.
35	18-15	1.0	0.3				
	22-21						***SILT, CLAY, SAND & GRAVEL:*** same as above.
40	16-14	1.5	1.1				
	10-15						***SILT, CLAY, SAND & GRAVEL:*** same as above.
45	16-17	1.3	0.3				
	10-16						***SILT, CLAY, SAND & GRAVEL:*** same as above.
50	10-14	1.0	0.3				
	10-15						***SILT, CLAY, SAND & GRAVEL:*** same as above, higher silt & clay content (30%), lower sand content (30%), hard drilling.
55	21-24	0.8	0.4				
	10-14						***SAND & GRAVEL:*** 6' heave after plug removal. Hole taking water as fast as it is pumped in, good water bearing unit. Spoon mostly heave, clean sands & gravel.
	16-21	1.6	0.3				
60							End of Boring at 57 Feet. - Auger Refusal.

☒ Composite to Lab ■ VOC to Lab ▥ Split-Spoon Not Analyzed

Drilling Co.: Burlington Environmental
Driller: Dan Fisher
Drilling Method: HSA 4 1/4"
Drilling Fluid: Plant Potable Water
Remarks:

Geologist: R. Astle
Total Depth: 57
Surface Elev.:
Datum: Feet, MSL
West Coor.: 6284

Begin Drilling: 08/03/94
End Drilling: 08/04/94
Converted to Well: Yes
Well Name: GM-22
South Coor.: 2530

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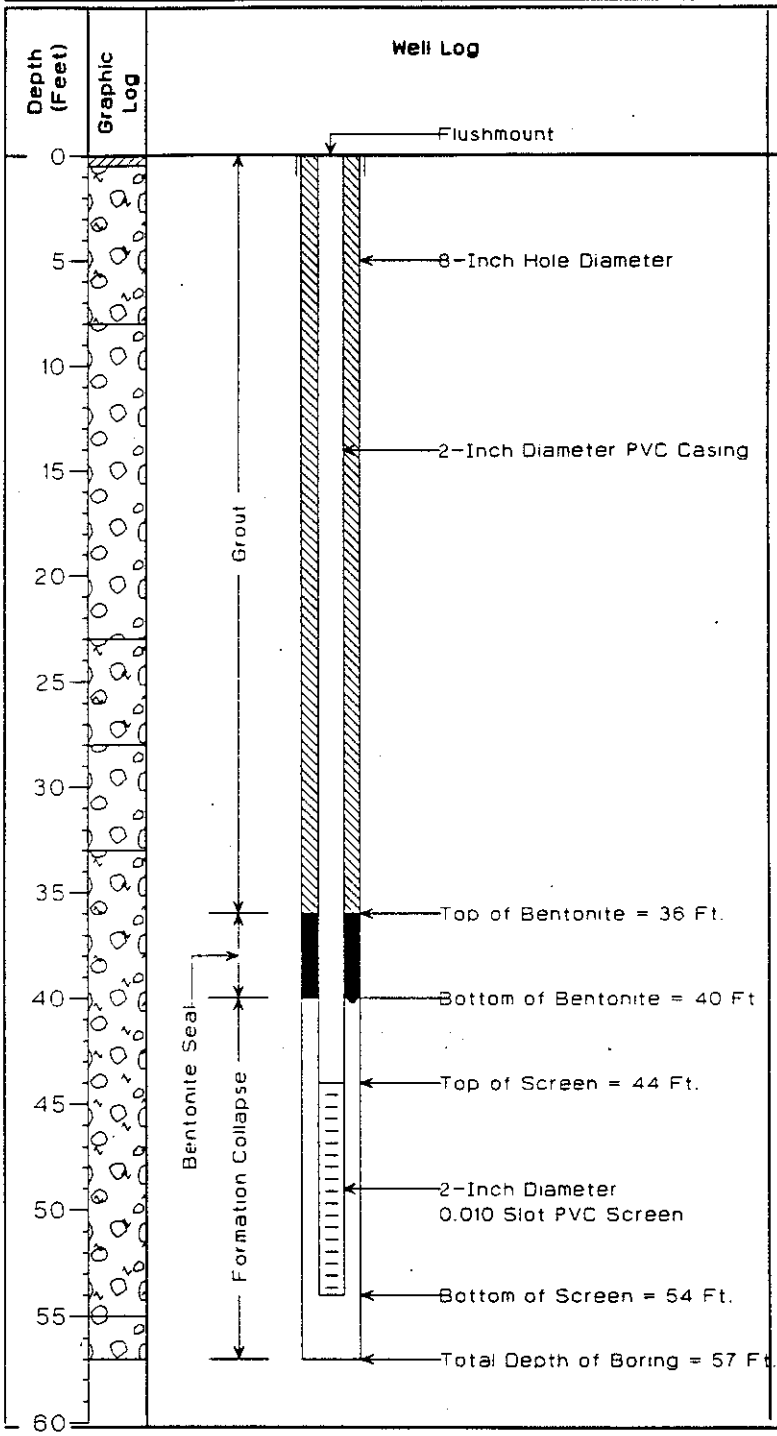
Well Construction Log: GM-22

MORAINE ENGINE PLANT — Moraine, Ohio



Well Construction Details

Well Type: Monitor Well
Total Depth Drilled: 57
Surface Elev.:
Meas. Point Elev.: 728.67
Meas. Point Desc.: Mark on Casing
Datum: Feet, MSL
Drilling Co.: Burlington Environmental
Driller: Dan Fisher
Drilling Method: HSA 4 1/4"
Drilling Fluid: Plant Potable Water
Begin Drilling: 08/03/94
End Drilling: 08/04/94
Begin Well Instal.: 08/04/94
End Well Instal.: 08/04/94
Development Tech.: Submersible Pump
Begin Development: 08/09/94
End Development: 08/09/94
Fluid Loss: 1000 Gallons
Fluid Developed: 260 Gallons
Pumping DTW:
Pumping Duration:
Yield:
Specific Capacity:
Static Water Level: ~ 26'
Fracture Zones:

For Lithologic Descriptions See Log of Boring: *GM-22*

West Coor.: 6284 South Coor.: 2530

Remarks:

OH0258.001

Geologist: R. Astle

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Log of Boring: GM-23

MORAINE ENGINE PLANT — Moraine, Ohio

Depth (Feet)	Blows (/6 in.)	Recovery (Feet)	HNU (PPM)	Sample	Graphic Log	Soil Class	Description
0							***CEMEMT:*** 0-1 ft.
	3-11 14-22	1.6	150				***SAND, GRAVEL, SILT & CLAY:*** silt & clay (40%), gravel (30%), f-cobble; sand (30%), f-cs; brn, dry-damp, stiff to loose, crumbly.
5							
	12-12 15-21	1.7	10				***SAND & GRAVEL:*** sand (50%), f-cs; gravel (50%), f-cobble; brn, dry-damp, loose.
10							
	13-8-6-6	1.5	10				***SAND & GRAVEL:*** same as above.
15							
	10-11 18-24	1.5	30				***SAND & GRAVEL:*** same as above, tr oxidation - orange (rust).
20							
	9-9-18-18	1.8	40				***SILT, CLAY & SAND:*** sand (80%), vfine to med; silt & clay (20%); brn, damp, semi-pliable, slight cohesive.
25							
	14-21 20-21	1.8	20				***SILT, CLAY, SAND & GRAVEL:*** sand (40%), f-cs; gravel (40%), f-cobble; silt & clay (20%); brn, moist, semi-loose to slightly cohesive, slightly pliable.
30							
	24-26 42-45	1.8	70				***SILT, CLAY, SAND & GRAVEL:*** same as above to 34.5 ft.
35							***SILT, CLAY, SAND & GRAVEL:*** Bottom 5" of spoon sand gravelly silt & clay; silt & clay (70%), gravel (20%), fine; sand (10%), vfine; olive grey, dry-damp, very stiff, hard.
							End of Boring at 35 Feet.
40							

☒ Composite to Lab ■ VOC to Lab ▥ Split-Spoon Not Analyzed

Drilling Co.: Burlington Environmental
Driller: Dan Fisher
Drilling Method: HSA 4 1/4"
Drilling Fluid: Plant Potable Water
Remarks:

Geologist: R. Astle
Total Depth: 35
Surface Elev.:
Datum: Feet, MSL
West Coor.: 8018

Begin Drilling: 08/04/94
End Drilling: 08/05/94
Converted to Well: Yes
Well Name: GM-23
South Coor.: 5392

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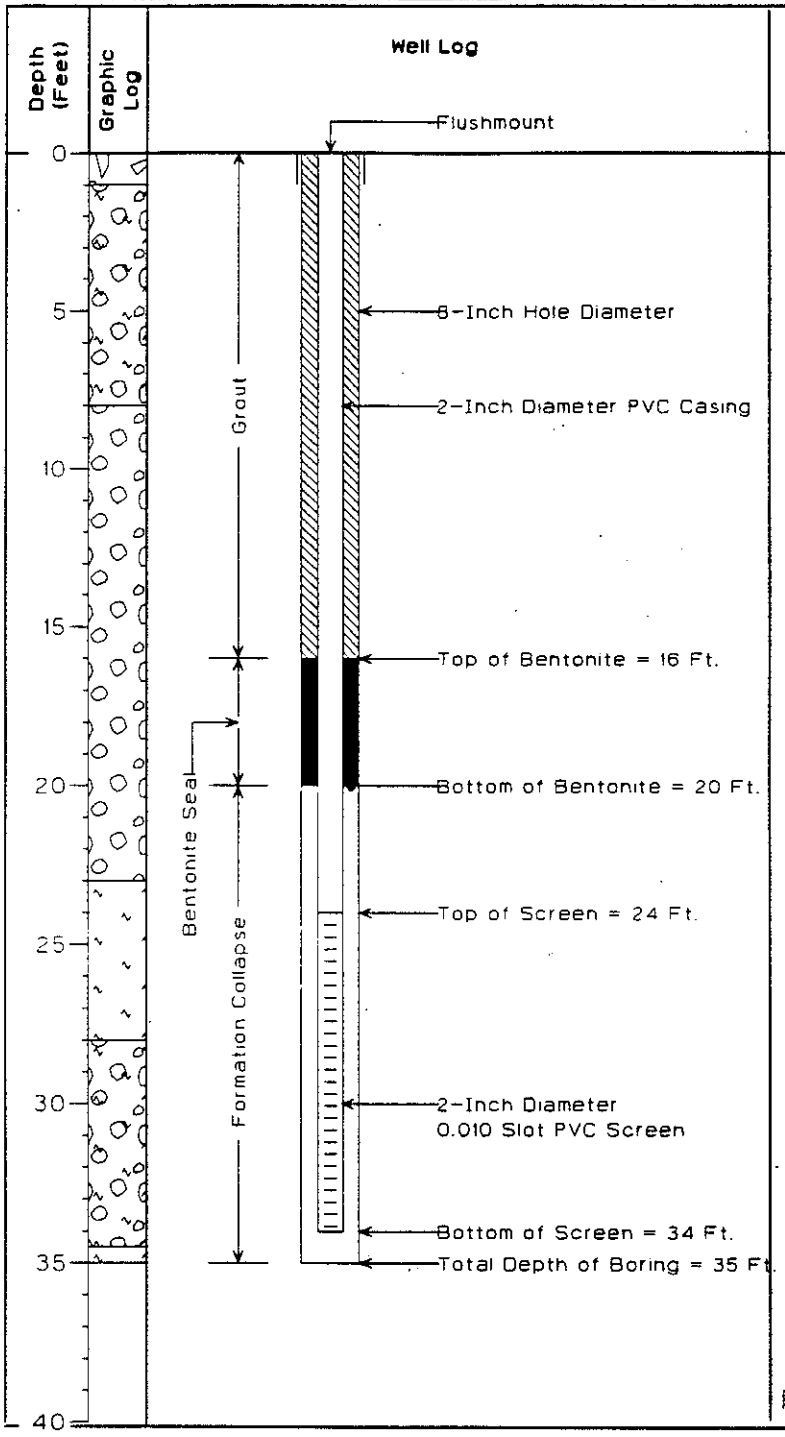
Well Construction Log: GM-23

MORAINE ENGINE PLANT — Moraine, Ohio



Well Construction Details

Well Type: Monitor Well
Total Depth Drilled: 35
Surface Elev.:
Meas. Point Elev.: 731.22
Meas. Point Desc.: Mark on Casing
Datum: Feet, MSL
Drilling Co.: Burlington Environmental
Driller: Dan Fisher
Drilling Method: HSA 4 1/4"
Drilling Fluid: Plant Potable Water
Begin Drilling: 08/04/94
End Drilling: 08/05/94
Begin Well Instal.: 08/05/94
End Well Instal.: 08/05/94
Development Tech.: Submersible Pump
Begin Development: 08/10/94
End Development: 08/10/94
Fluid Loss: 200 Gallons
Fluid Developed: 130 Gallons
Pumping DTW:
Pumping Duration:
Yield:
Specific Capacity:
Static Water Level:
Fracture Zones:

For Lithologic Descriptions See Log of Boring: *GM-23*

West Coor.: 6018 South Coor.: 5392

Remarks:

Geologist: R. Astle

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SOIL/SEDIMENT SAMPLING LOG

Project/No. Moraine Engine Plant / OH0258.001 Page _____ of _____

Site Location Moraine, Ohio

Sample No. GM-23 (3-5) Coded/ Replicate No. _____ Date 08/04/94

Weather _____ Time Sampling Began 9:00 a.m. Time Sampling Completed 9:30 a.m.

Sampling Method and Material 2" Stainless Steel Split Spoon

Grab ____ Composite ____

From	To	Soil/Sediment Description
3.0 Ft.	5.0 Ft.	Gravelly silt & clay; silt & clay (40%); gravel (30%), f-cobble; sand (30%), f-cs; brown, dry-damp, stiff to loose and crumbly.

Other (OVA; HNU; etc.) 150 ppm

Constituents Sampled	Container Description From Lab X or G&M ____	Preservative
TCL VOCs	12 oz. glass jar	Cool

Remarks _____

Sampling Personnel R. Astle

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Log of Boring: GM-24

MORAINE ENGINE PLANT — Moraine, Ohio

Depth (Feet)	Blows (/6 in.)	Recovery (Feet)	HNU (PPM)	Sample	Graphic Log	Soil Class	Description
0							***ASPHALT:*** 0–0.5 ft.
							SAND & GRAVEL: sand (50%), f–cs; gravel (50%), f–cobble; trace of silt & clay; brn, dry–damp, loose.
5	9–14 19–20	1.9	0.2				
							SAND & GRAVEL: same as above.
10	18–18 15–18	1.8	0.4				
							SAND & GRAVEL: same as above, moist from 13–14 ft., tr silt & clay stringer.
15	8–12 21–13	1.8	0.4				
							SAND & GRAVEL: same as above, tr orange (just) colored oxidation.
20	13–17 19–20	1.5	0.4				
							SAND & GRAVEL: same as above, damp.
25	15–14 15–24	1.6	0.4				
							SAND & GRAVEL: same as above, dry–damp.
30	17–18 20–30	1.8	0.4				
	18–27 27–30	1.6	0.4				
35							***SAND & GRAVEL:*** sand (50%), f–cs; gravel (50%), f–cobble, tr silt & clay stringers; brn, dry–damp, loose, cobbles at 36'.
	8–12–12–8	1.5	0.4				***SAND & GRAVEL:*** same as above, tr moisture at tip of spoon, water at ~40 ft.
40							

☒ Composite to Lab ■ VOC to Lab ▥ Split-Spoon Not Analyzed

Drilling Co.: Burlington Environmental
Driller: Dan Fisher
Drilling Method: HSA 4 1/4"
Drilling Fluid: Plant Potable Water
Remarks:

Geologist: R. Astle
Total Depth: 70
Surface Elev.:
Datum: Feet, MSL
West Coor.: 7812

Begin Drilling: 08/05/94
End Drilling: 08/08/94
Converted to Well: Yes
Well Name: GM-24
South Coor.: 8122

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Log of Boring: GM-24

MORAINE ENGINE PLANT — Moraine, Ohio

Depth (Feet)	Blows (/6 in.)	Recovery (Feet)	HNU (PPM)	Sample	Graphic Log	Soil Class	Description
40							
45	8-16 18-18	1.5	0.4				***SILT, CLAY, SAND & GRAVEL:*** silt & clay (30%), gravel (30%), f-cobble; sand (40%), f-cs; brown, wet, mostly loose, slightly pliable, slightly cohesive.
50	19-50/5	0.5	0.4				***SILT, CLAY, SAND & GRAVEL:*** sand (30%), f-cs; silt & clay (30%); gravel (40%), f-mostly cobbley brn, moist-wet, tight, slightly stiff, mostly crumbly.
55	50/6	0.3	0.4				***SILT, CLAY, SAND & GRAVEL:*** same as above.
60	26-40/5	0.5	0.4				***SILT, CLAY, SAND & GRAVEL:*** same as above, tr gravel seams.
65	17-30 30-50	1.5	0.4				***SAND & GRAVEL:*** sand (50%), f-cs; gravel (40%), f-cobble; silt & clay (10%); brn, wet, loose to slightly pliable, slightly cohesive.
70	23-32 36-38	1.5	0.4				***SILT, CLAY, SAND & GRAVEL:*** sand (50%), f-cs; gravel (30%), f-cobble; silt & clay (20%); brn, wet, loose to slightly cohesive, slightly pliable.
75							End of Boring at 70 Feet. - Very Difficult Drilling.
80							

☒ Composite to Lab ■ VOC to Lab ▯▯ Split-Spoon Not Analyzed

Drilling Co.: Burlington Environmental
Driller: Dan Fisher
Drilling Method: HSA 4 1/4"
Drilling Fluid: Plant Potable Water
Remarks:

Geologist: R. Astle
Total Depth: 70
Surface Elev.:
Datum: Feet, MSL
West Coor.: 7812

Begin Drilling: 08/05/94
End Drilling: 08/08/94
Converted to Well: Yes
Well Name: GM-24
South Coor.: 8122

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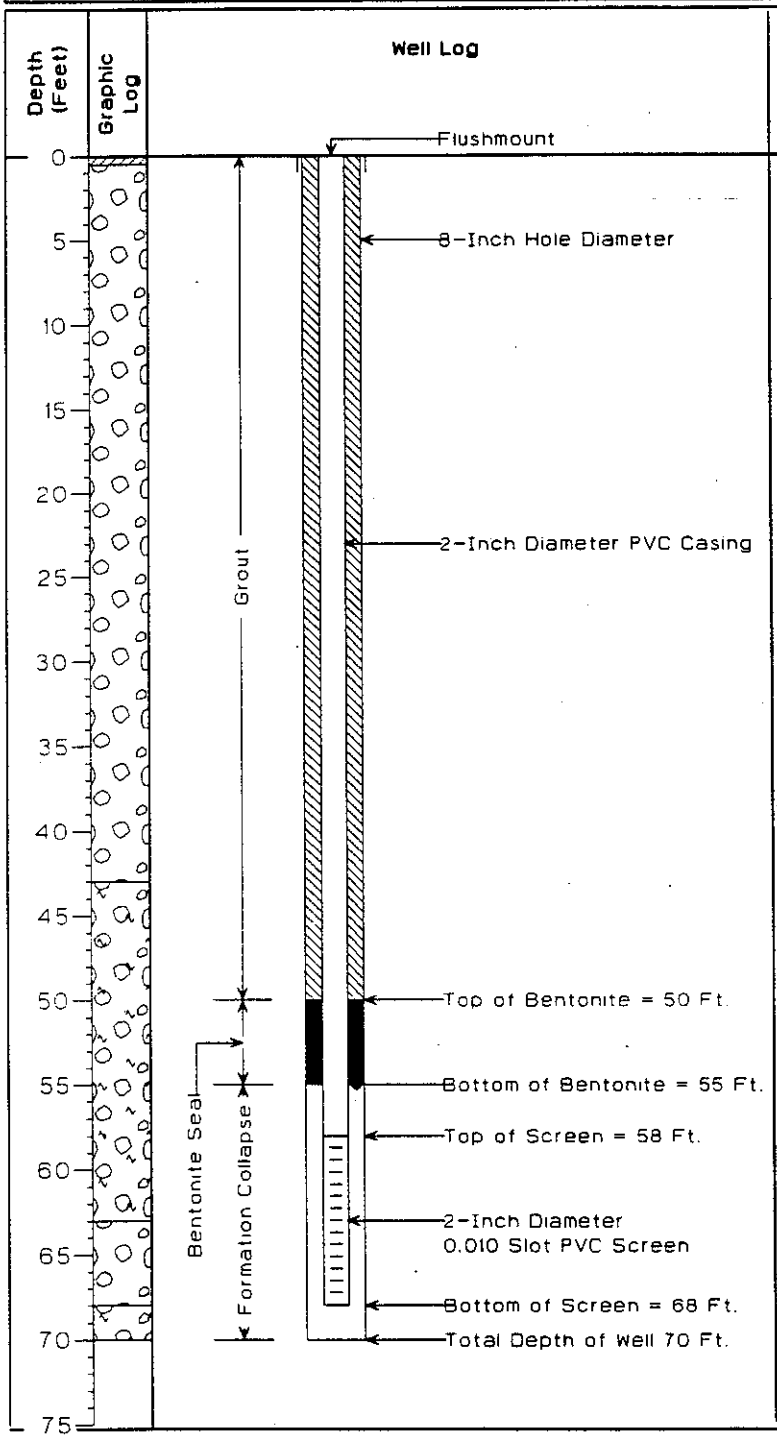
Well Construction Log: GM-24

MORAINE ENGINE PLANT — Moraine, Ohio



Well Construction Details

Well Type: Monitor Well
Total Depth Drilled: 70
Surface Elev.:
Meas. Point Elev.: 747.61
Meas. Point Desc.: Mark on Casing
Datum: Feet, MSL
Drilling Co.: Burlington Environmental
Driller: Dan Fisher
Drilling Method: HSA 4 1/4"
Drilling Fluid: Plant Potable Water
Begin Drilling: 08/05/94
End Drilling: 08/08/94
Begin Well Instal.: 08/08/94
End Well Instal.: 08/08/94
Development Tech.: Submersible Pump
Begin Development: 08/10/94
End Development: 08/10/94
Fluid Loss: 250 Gallons
Fluid Developed: 305 Gallons
Pumping DTW:
Pumping Duration:
Yield:
Specific Capacity:
Static Water Level:
Fracture Zones:

For Lithologic Descriptions See Log of Boring: *GM-24*

West Coor.: 7812 South Coor.: 8122

Remarks:

Geologist: R. Astle

OH0258.001

moraine

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SAMPLE/CORE LOG

Boring/Well ME-1 Project/No. CPC - Moraine Engine Plant / 0H055.01 Page 1 of 2

Site Location Moraine, Ohio Drilling Started 1300 Drilling Completed 1600

Total Depth Drilled 40 feet Hole Diameter 8 inches Type of Sample/ Coring Device Split-spoon

Length and Diameter of Coring Device 24" x 2" diameter Sampling Interval 5 feet

Land-Surface Elev. 728.30 feet ☒ Surveyed ☐ Estimated Datum Mean Sea Level

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Reynolds Driller Chuck McDonald Helper Danny Allen

Prepared By S. Ackers Hammer Weight 130 lbs. Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	HNU Headspace
3	5	1.0	9 -12 13 -12	CLAY - (40-50%); medium to coarse gravel (20-30%);	NR
				sand (10-20%); silt (0-10%); medium brown,	
				damp, medium stiff.	
8	10	.3	10 -6 16 -20	Med.-cs. GRAVEL (50-60%); fine-med sand	0.3
				(20-30%); silt (0-10%); damp.	
13	15	1.5	19 -49 63 -60	Med.-cs GRAVEL (40-50%); fine-med. sand	0.5
				(50%); damp.	
18	20	1.0	14 -20 23 -39	Medium to coarse SAND (60-70%); medium to coarse	0.2
				gravel (20%); silt (10%); moist.	
23	25	1.0	13 -11 12 -21	Coarse to very coarse SAND (70%); silt (30%);	0.1
				very moist to wet.	
				No sample taken in lithology sequence.	
28	30	1.0	45-64 37 -46	Medium to coarse SAND (60%); fine gravel (20%); fine	0.2
				Sand (10%); Silt (10%); saturated.	

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SAMPLE/CORE LOG (Cont.d)

Boring/Well ME-1 Page 2 of 2

Prepared By S. Ackers

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	HNU Headspace (ppm)
33	35	1.3	13 -18 19 -14	fine to medium GRAVEL (60%); fine-medium	0.6
				sand (30%); silt (10%); wet-saturated.	
38	40	1.5	55 -61 91 -29	fine - coarse GRAVEL (40-60%); fine to coarse	0.8
				sand (30%); silt 10%; saturated.	
				40.0 END OF LOG	
				2- inch monitor well installed in borehole	
				Well set at 37.0 ft.	
				NR = No Response	

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SAMPLE/CORE LOG

Boring/Well ME-2 Project/No. CPC - Moraine Engine Plant / OH055.01 Page 1 of 2

Site Location Moraine, Ohio Drilling Started 1646 Drilling Completed 1750

Total Depth Drilled 33.0 feet Hole Diameter 8 inches Type of Sample/ Coring Device Split-spoon

Length and Diameter of Coring Device 24" x 2" Diameter Sampling Interval 5 feet

Land-Surface Elev. 728.63 feet ☒ Surveyed ☐ Estimated Datum

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Reynolds Driller McDonald Chuck Helper Danny Allen

Prepared By S. Ackers Hammer Weight 130 lbs. Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	HNU Headspace (ppm)
3	5	1	6 -8 4 -4	fine to medium SAND (80%); fine-gravel (10%);	0.2
				silt (10%); damp.	
8	10	1.3	1 -2 2 -3	fine to medium SAND (80%); clay (10%); Coarse	0.3
				sand (5%); silt (5%); moist to wet.	
13	15	1	15 -12 18 -31	medium to coarse GRAVEL (limestone (80%);	0.0
				fine to medium (sand) (15%); silt (5%); damp.	
18	20	1	8 -15 18 -21	medium to coarse GRAVEL (limestone) (60%); medium	0.8
				to coarse sand (30%); very fine to fine sand (5%);	
				silt (5%); Damp.	
23	25	1.2	16 -24 32 -37	medium to coarse fine SAND (80%); fine sand (10%);	0.8
				fine - gravel (5%); silt (5%); moist.	
28	30	0		medium to coarse SAND (80%) fine sand (15%);	NS
				Silt (5%); wet.	

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SAMPLE/CORE LOG (Cont.d)

Boring/Well ME-2

Prepared By S. Ackers

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	HNU Headspace (ppm)
	33	0		fine to medium SAND (80%); coarse sand	0.4
				(10%); silt (10%); wet	
				END OF LOG 33'	
				WELL SET AT 33'	
				NS = Not Sampled	

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SAMPLE/CORE LOG

Boring/Well ME-3 Project/No. CPC - Moraine Engine Plant / 0H055.01 Page 1 of 2

Site Location Moraine, Ohio Drilling Started 0800 Drilling Completed 1100

Total Depth Drilled 35 feet Hole Diameter 8 inches Type of Sample/ Coring Device Split-spoon

Length and Diameter of Coring Device 8" Sampling Interval 5' feet

Land-Surface Elev. 728.33 feet ☒ Surveyed ☐ Estimated Datum Mean Sea Level

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Reynolds Driller McDonald Chuck Helper Danny Allen

Prepared By S. Ackers Hammer Weight 135 lbs. Hammer Drop 24 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	HNU Headspace (ppm)
3	5	1.4	15 -61 63 -65	fine to medium SAND; fine to coarse gravel (30%);	0.2
				silt (10%); damp.	
8	10	1.2	3 -24 26 -30	fine to coarse SAND (10%); fine to medium gravel	0.2
				(25%); silt (5%); damp.	
13	15	1.5	17 -15 78 -64	fine to coarse GRAVEL (60%); fine to medium sand	0.2
				(30%); silt (10%); damp.	
18	20	0	100/3"	Split-Spoon Refusal	
23	25	.2	34 -39 46 -32	Pebble/Cobble; almost spoon refusal	0.2
				fine to medium SAND (80%); coarse sand (10%);	
				gravel (5%); silt (5%); wet.	
28	30	.2	26 -10 13 -30	fine to medium SAND (60%); fine to medium gravel	0.2
				(20%); silt (20%); wet.	
33	35	0	Bailer 0-0-0	fine to medium GRAVEL (80%); coarse gravel (5%);	0.2
				fine to coarse (5%); silt (5%); saturated.	

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SAMPLE/CORE LOG (Cont.d)

Boring/Well ME-3 Page 2 of 2

Prepared By S. Ackers

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	HNU Headspace (ppm
34	35	0	Bailer 0-0-0-0	fine to coarse SAND (80%); silt (20%); saturated,	0.4
				END OF LOG 35'	

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SAMPLE/CORE LOG

Boring/Well ME-4 Project/No. CPC - Moraine Engine Plant / 0H055.01 Page 1 of 1

Site Location Moraine, Ohio Drilling Started 0800 Drilling Completed 1059

Total Depth Drilled 35 feet Hole Diameter 8 inches Type of Sample/ Coring Device Split-Spoon

Length and Diameter of Coring Device 8" Sampling Interval 5 feet

Land-Surface Elev. 728.58 feet ☒ Surveyed ☐ Estimated Datum Mean Sea Level

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Reynolds Driller McDonald Chuck Helper Danny Allen

Prepared By S. Ackers Hammer Weight 130 lbs. Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	HNU Headspace (ppm
3	5	1.3	3 -4 5 -3	fine to coarse SAND (80%); Silt (20%);	27
				black, wet.	
8	10	.2	15 -14 11 -10	fine to medium SAND (85%); fine to medium gravel	4.6
				(10%); silt (5%); moist.	
13	15	1.5	4 -16 34 -38	fine to medium SAND (60%); coarse sand (15%);	11
				fine gravel (10%) silt (5%); wet.	
18	20	1.5	4 -20 29 -31	fine to medium GRAVEL (60%); medium to coarse sand	0.4
				(20%); fine sand (10%); silt (10%); saturated.	
23	25	.8	12 -10 17 -19	fine to medium GRAVEL (50%); medium to coarse sand	0.4
				(35%); fine sand (10%); silt (5%); wet.	
28	30	0	0-0 0-0	fine to medium SAND (60%); coarse sand (15%)	0.4
				fine to medium gravel (15%); silt (10%); wet.	
33	35	0	0-0 0-0	Same as above	0.2
				35' END OF LOG 2-inch diameter monitor well installed in Borehole well	

set at 32.1 ft

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Environmental Services

SAMPLE/CORE LOG

Boring/Well ME-5 Project/No. CPC - Moraine Engine Plant / OH055.01 Page 1 of 2

Site Location Moraine, Ohio Drilling Started 5/30/90 Drilling Completed 5/30/90

Total Depth Drilled 34 feet Hole Diameter 10 inches Type of Sample/ Coring Device Split-spoon

Length and Diameter of Coring Device 2 ft. / 2 in. Sampling Interval 5 feet

Land-Surface Elev. 728.64 feet ☒ Surveyed ☐ Estimated Datum Mean Sea Level

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Reynolds Driller McDonald Chuck Helper Danny Allen

Prepared By Dave Frederick Hammer Weight 130 Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	HNU Headspace (ppm)
0	0.5			asphalt	
2	4	0.6	14 -6 3 -6	CLAY: CLAY (90%); pebbles (Tr.), sand (Tr);	0.5
				gray to brown.	
7	9	0.7	14 -21 32 -23	MEDIUM SAND (30%), fine sand (20%),	NR
				coarse sand (20%), cobbles (20%), pebbles (10%);	
				brown.	
12	14	0		no recovery (pebble)	
17	19	1.0	13-24 16 -23	SAND and GRAVEL as above	NR
22	24	1.0	15 -17 37 -24	COARSE SAND (50%), medium sand (20%),	NS
				pebbles (15%), fine sand (10%), cobbles (Tr);	
				gray brown, wet, solvent odor (analytical sample)	
27	29	0.5	9 -16 24 -33	MEDIUM SAND (30%), coarse sand (20%),	NS
				fine sand (20%), pebbles (10%), silt (10%),	
				clay (Tr); gray, solvent odor	

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG (Cont.d)

Boring/Well ME-5 Page 2 of 2

Prepared By D. Frederick

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	HNU Headspace (ppm)
32	34	1.0	7-12 18-26	PEBBLES (30%), COARSE SAND (30%),	NS
				medium sand (20%), fine sand (10%), silt (10%),	
				cobbles (Tr); gray brown, solvent odor.	
				34' END OF LOG	
				WELL SET AT 32'	
				NR = No Response	
				NS = Not Sampled	

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well ME-6 Project/No. CPC - Moraine Engine Plant / OH055.01 Page 1 of 2

Site Location Moraine, Ohio Drilling Started 5/31/90 Drilling Completed 5/31/90

Total Depth Drilled 32 feet Hole Diameter 10 inches Type of Sample/ Coring Device Split-spoon

Length and Diameter of Coring Device 2 ft. / 2 in. Sampling Interval 5 feet

Land-Surface Elev. 728.64 feet ☒ Surveyed ☐ Estimated Datum Mean Sea Level

Drilling Fluid Used None Drilling Method Hollow Stem Auger

Drilling Contractor Reynolds Driller McDonald Chuck Helper Danny Allen

Prepared By D. Frederick Hammer Weight 130 lbs. Hammer Drop 30 inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	HNU Headspace (ppm)
0	0.5			asphalt	
2	4	0.6	21-9 6-6	SILT (40%), fine sand (30%), medium sand (10%), clay (10%), pebbles (Tr), coarse sand (Tr); gray, moist	1.0
7	9	0.7	5-9 11-14	COARSE SAND (30%), medium sand (20%), fine sand (20%), pebbles (10%), silt (Tr), cobbles (Tr); gray brown, damp.	0.5
13	15	1.1	58-27 26-25	COARSE SAND (40%), medium sand (20%), cobbles (10%), pebbles (15%), fine sand (10%); gray brown, dry.	0.5
17	19	1.0	9-15 23-23	Same as above	0.5
22	24	1.1	31-15 28-32	COARSE SAND (40%), pebbles (20%), cobbles (15%), medium sand (10%), fine sand (10%), silt (Tr); gray, wet. (analytical sample)	0.5

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG (Cont.d)

Boring/Well ME-6 Page 2 of 2

Prepared By D. Frederick

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description	HNU Headspace (ppm)
27	29	1.0	15-80 34-74	COARSE SAND (30%), pebbles (20%),	NR
				cobbles (20%), medium sand (10%), fine sand	
				(10%), silt (10%), clay (Tr); gray	
32			Bailed	COARSE SAND (40%), medium sand (20%),	NS
				fine sand (20%), pebbles (10%), cobbles (Tr),	
				silt (Tr); gray.	
				NR = No Response	
				NS = Not Sampled	

Geraghty & Miller, Inc.
Environmental Services

Log of Boring: GM-25

GENERAL MOTORS CORP. – OH0288.001 Moraine, Ohio

Depth (Feet)	Blows (/6 in.)	Recovery (Feet)	HNU (ppm)	Sample	Graphic Log	Description
0						***TOPSOIL & ASPHALT:*** Fill 0–1 ft.
						SAND & GRAVEL: 1–20 ft.; sand (50%), f–cs; gravel (50%), f–cs; brown to buff colored, dry, crumbly.
5	11-13-25-15	0.7	0			
10	15-20-25-15	0.7	0			
15	16-20-25-20	1.0	0			
20	7-10-14-20	1.2	0			***SAND & GRAVEL:*** 20–35 ft.; same as above, damp.
25	12-12-20-14	0.5	0			
30	10-20-25-17	0.7	0			

■ Sample to Lab ▯ Sample Not Analyzed

Drilling Co.: Philips Environmental
Geologist: R. Astle
Begin Drilling: 12/12/95

Driller: Steve Snyder
Total Depth: 58.0
End Drilling: 12/14/95

Drilling Method: HSA 4 1/4
Surface Elev.:
Converted to Well: Yes

Drilling Fluid: Potable Water
Datum: Feet, MSL
Well Name: GM-25

Remarks:
West Coor.:
South Coor.:

OH0288.001

General Motors disk "GM-25" (rev 01/08/98)

Geraghty & Miller, Inc.
Environmental Services

Log of Boring: GM-25

GENERAL MOTORS CORP. – OH0288.001 Moraine, Ohio

Depth (Feet)	Blows (/6 in.)	Recovery (Feet)	HNU (ppm)	Sample	Graphic Log	Description
33						
	20-25-33-34	1.0	N/A			***SAND & GRAVEL:*** 35–40 ft.; same as above, wet, hard drilling.
38						
	18-20-34-16	1.0	N/A			***SAND & GRAVEL:*** 40–45 ft.; same as above, moist.
43						
	16-18-20-23	1.0	N/A			***SAND & GRAVEL:*** 45–50 ft.; same as above, wet.
48						
	16-18-20-22	2.0	N/A			***SAND & GRAVEL:*** 50–55 ft.; same as above, wet.
53						
	16-20-30-32	1.0	N/A			***SAND, GRAVELY SILT & CLAY:*** 55–58 ft.; silt (40%); gravel (30%); and sand (30%); olive-grey, moist, wet, non-pliable (stiff). Till at ~55 feet.
58						BOTTOM OF HOLE
						NOTE: Broke 30' of auger flights in borehole when setting well. Borehole was grouted and re-drilled to 58 feet, approximately 10' from original boring. Till clasts were present on cutting head indicating till at 58 feet.
63						

■ Sample to Lab ▯ Sample Not Analyzed

Drilling Co.: Philips Environmental
Driller: Steve Snyder
Drilling Method: HSA 4 1/4
Drilling Fluid: Potable Water
Remarks:

Geologist: R. Astle
Total Depth: 58.0
Surface Elev.:
Datum: Feet, MSL
West Coor.:

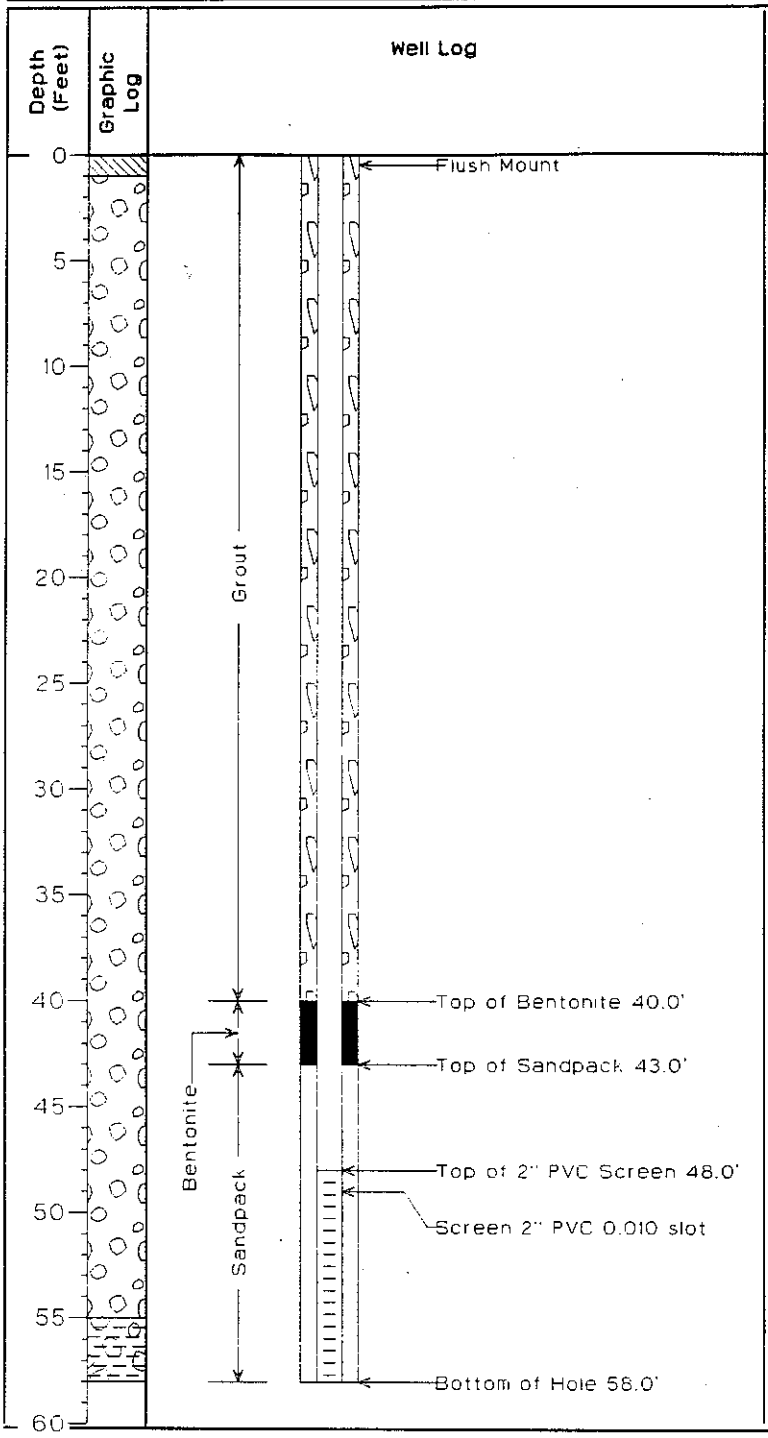
Begin Drilling: 12/12/95
End Drilling: 12/14/95
Converted to Well: Yes
Well Name: GM-25
South Coor.:

General Motors disk "GM-25" (rev 01/08/96)

Geraghty & Miller, Inc.
Environmental Services

Well Construction Log: GM-25

GENERAL MOTORS CORP. - OH0288.001 Moraine, Ohio



Well Construction Details

Well Type: Monitor Well
Total Depth Drilled: 58.0
Surface Elev.:
Meas. Point Elev.:
Meas. Point Desc.: Top of PVC
Datum: Feet, MSL
Drilling Co.: Philips Environmental
Driller: Steve Snyder
Drilling Method: HSA 4 1/4
Drilling Fluid: Potable Water
Begin Drilling: 12/12/95
End Drilling: 12/14/95
Begin Well Instal.: 12/14/95
End Well Instal.: 12/14/95
Development Tech.: bail and pump
Begin Development: 12/18/95
End Development: 12/18/95
Fluid Loss: 50
Fluid Developed: 80
Pumping DTW: 39.35
Pumping Duration: 50 minutes
Yield: 1.5 gpm
Specific Capacity:
Static Water Level: 39.35
Fracture Zones: NA

For Lithologic Descriptions See Log of Boring: *GM-25*

West Coor.: South Coor.:

Remarks:
OH0288.001

Geologist: R. Astle

General Motors disk "GM-25" (rev 01/08/98)

CONSTRUCTION

SOIL BORINGS

SB-1

SURFACE ELEVATION: 724.8'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS PER FT OR CORE REC.
0.0'	(FILL) Asphalt				
0.3'	(FILL) Crushed stone base				
2.0'	(ORIGINAL) Dense brown sand and gravel, trace of silt - moist	1A	3.5- 5.0	17-20-29	49
5'	(Becomes very dense at 6.5')	2A	6.5- 8.0	30-42-51	93
10'		3A	9.0-10.5	18-30-39	69
15'		4A	14.0-15.5	14-25-35	60
	Bottom of boring at 15.5'				
20'					
25'					
30'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RC-JD

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER 24 HRS. none

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

SB-2

SURFACE ELEVATION: 728.3'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT OR CORE REC.
0.0'	(FILL) Asphalt				
0.3'	(FILL) Concrete				
0.8'	(FILL) Medium dense brown sand and gravel, some silt - moist	1A	3.5- 5.0	3- 9-16	25
5' 4.5'	(ORIGINAL) Medium dense brown sand, and gravel, trace of silt - moist (Becomes very dense at 6.5')	2A	6.5- 8.0	19-31-44	75
10'		3A	9.0-10.5	18-21-40	61
15'		4A	14.0-15.5	19-40-42	82
20'		5A	19.0-20.5	22-40-43	83
25'		6A	24.0-25.0	52-52	104
30'		7A	29.0-30.5	40-60/4"	100+
35'		8A	34.0-35.5	45-55	100
40'		9A	39.0-40.5	55-45/5"	100+
	Bottom of boring at 40.5'				
45'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RG-JD

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH: None

DEPTH AFTER 24 HRS. none

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

SB-3

SURFACE ELEVATION: 728.3'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Asphalt				
0.3'	(FILL) Brown sand and gravel, trace of silt - moist				
	(Becomes dense at 3.5')	1A	3.5- 5.0	4- 4-43	47
5'					
	(Becomes loose at 6.5')	2A	6.5- 8.0	2- 3- 2	5
9.0'					
10'	(ORIGINAL) Medium dense brown sand and gravel, trace of silt	3A	9.0-10.5	3- 3-16	19
15'	(Becomes very dense at 14.0')	4A	14.0-15.5	20-29-56	85
20'	(Becomes dense at 19.0')	5A	19.0-20.5	7-12-20	32
25'	(Becomes very dense at 24.0')	6A	24.0-25.5	31-42-51	93
	Bottom of boring at 25.5'				
30'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RG-JD

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER 24 HRS none

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

Proj 4990
SB-1

SB-4

SURFACE ELEVATION: 728.5'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Asphalt				
0.3'	(FILL) Road base				
0.6'	(FILL) Brown and gray clay, some silt, trace of sand, trace of gravel - moist				
3.0'	(ORIGINAL) Medium dense brown sand and gravel, trace of silt	1A	3.5- 5.0	10- 9-13	22
5'	(Becomes dense at 6.5')	2A	6.5- 8.0	15-15-17	32
10'		3A	9.0-10.5	14-17-19	46
15'	(Becomes very dense at 14.0')	4A	14.0-15.5	21-29-39	68
20'		5A	19.0-20.5	18-26-29	55
25'	(Becomes dense at 24.0')	6A	24.0-25.5	21-19-29	48
30'	(Becomes very dense at 29.0')	7A	29.0-30.5	18-27-51	78
35'	(Becomes dense at 34.0')	8A	34.0-35.5	17-19-22	46
	Bottom of boring at 35.5'				
40'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RG-JD

JOB NO.: 25176 (sep)

WATER OBSERVATIONS

INITIAL DEPTH 25.0' (trace)

COMPLETION DEPTH: None

DEPTH AFTER 24 HRS none

TYPE SAMPLER:

X A SPLIT SPOON

____ B

____ C SHELBY TUBE

SB-5

SURFACE ELEVATION: 727.8'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Asphalt				
0.3'	(FILL) Base				
0.6'	(FILL) Brown and gray clay, some silt, trace of sand, trace of gravel - moist	1A	3.5- 5.0	20-14-19	33
3.0'	(FILL) Dense brown sand and gravel, trace of silt - moist				
4.5'	(ORIGINAL) Dense brown sand and gravel, some cobbles, trace of silt - moist				
	(Becomes very dense at 6.5')	2A	6.5- 7.5	45-55/3"	100+
		3A	9.0- 9.5	100/4"	100+
		4A	14.0-15.5	28-32-26	58
		5A	19.0-20.0	40-70/5"	100+
	Bottom of boring at 20.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RG-JD

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH: None

DEPTH AFTER 24 HRS. none

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

Proj 4990
SB-1

SB-6

SURFACE ELEVATION: 727.9'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Asphalt				
0.2'	(FILL) Concrete				
0.8'	(ORIGINAL) Eard brown clay, some silt, some sand, trace of gravel - moist	1A	3.5- 5.0	7-17-20	37
5' 4.5'	Very dense brown sand and gravel, some cobbles, trace of silt - moist	2A	6.5- 8.0	17-23-41	54
		3A	9.0-10.5	13-30-31	61
10'					
		4A	14.0-15.5	22-28-30	58
15'					
		5A	19.0-20.5	19-69-31/2"	100+
20'					
		6A	24.0-25.5	27-38-39	77
25'					
		7A	29.0-30.5	59-21-47	68
30'	Bottom of boring at 30.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RG-JD

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER 24 HRS none

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

Proj 4990
SBT1

SB-6A

SURFACE ELEVATION: 728.1'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS PER FT OR CORE REC.
0.0'	(FILL) Asphalt				
0.2'	(FILL) Crushed stone base (Becomes loose at 1.0')	1A	1.0- 2.5	18-12- 3	15
4.0'	(ORIGINAL) Hard brown silt, some sand, trace of gravel, trace of cobbles - moist	2A	4.0- 5.5	14-21-21	42
6.5'	Very dense brown sand and gravel, trace of silt - moist (With some cobbles at 7.0')	3A	6.5- 7.5	50-56	106
		4A	9.0-10.5	40-34-43	77
		5A	14.0-15.0	53-46/3"	99+
		6A	19.0-20.0	35-65/4"	100+
		7A	24.0-25.5	36-42-50	92
		8A	29.0-29.5	100	100
32.0'	Very dense gray sand, trace of gravel - moist	9A	34.0-34.5	111	111
38.5'	Very dense gray sand and gravel, trace of silt - moist	10A	38.5-39.5	64-39/3"	103+
	Bottom of boring at 40.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-RA-AS

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH 25.0' (trace)

COMPLETION DEPTH: None

DEPTH AFTER 24 HRS none

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

SB-6B

SURFACE ELEVATION: 731.8'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT OR CORE REC.
0.0'	(FILL) Wood floor				
0.2'	(FILL) Concrete				
0.5'	(FILL) Sand and gravel base				
1.0'	(FILL) Very stiff brown silt, some sand, trace of gravel - moist	1A	1.0- 2.5	7- 6-10	16
3.0'	(ORIGINAL) Very dense brown sand and gravel, trace of silt - moist	2A	4.0- 5.5	27-30-38	68
		3A	6.5- 8.0	30-33-34	67
10'		4A	9.0-10.5	15-30-36	66
15'	(Becomes dense at 14.0')	5A	14.0-15.5	21-18-17	35
20'	(Becomes very dense at 19.0')	6A	19.0-20.5	29-38-42	80
25'		7A	24.0-25.0	65-35/5"	100+
30'		8A	28.5-30.0	41-44-41	85
	Bottom of boring at 30.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-RA-AS

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER 24 HRS. none

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

SURFACE ELEVATION: 731.8' SB-6C

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS PER FT. OR CORE REC.
0.0'	(FILL) Wood				
0.2'					
1.0'	(FILL) Concrete				
	(FILL) Dense brown sand and gravel, some silt - moist	1A	1.0- 2.5	21-18-25	43
		2A	3.5- 5.0	10-13-23	36
5'					
		3A	6.0- 7.5	22-23-25	48
8.5'	(FILL) Very dense brown sand and gravel, trace of silt - moist	4A	8.5-9.5	26-58	114
10'					
14.0'	(ORIGINAL) Very dense brown sand and gravel, some cobbles, trace of silt - moist	5A	13.5-15.0	20-32-51	83
		6A	18.5-19.5	39-61/3"	100+
20'					
		7A	23.5-24.0	100/1'	100+
25'					
		8A	28.5-29.5	42-58/5"	100+
30'					
		9A	31.0-32.5	46-35-37	72
	Bottom of boring at 32.5'				
35'					
40'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-RA-AS

JOB NO. 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH 32.5'

COMPLETION DEPTH 32.5'

DEPTH AFTER 24 HRS 32.5'

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

SURFACE ELEVATION: 731.8' SB-GD

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT OR CORE REC.
0.0'	(FILL) Wood floor				
0.2'	(FILL) Concrete				
1.0'	(FILL) Brown sand and gravel base				
1.5'	(ORIGINAL) Very dense brown sand and gravel, some cobbles, trace of silt - moist	1A	1.0- 2.5	30-35-33	68
5'		2A	4.0- 5.5	31-35-52	87
		3A	6.5- 8.0	45-46-47	93
10'		4A	9.0-10.5	26-28-30	58
15'		5A	14.0-15.5	38-42-47	89
20'	(Becomes dense at 19.0')	6A	19.0-20.5	23-18-28	46
25'	(Becomes very dense at 24.0')	7A	24.0-25.0	44-60/5"	104+
29.5'	Hard brown silt, trace of sand, trace of gravel - moist (Continued on next page)	8A	29.0-29.5	100	100
		9A	31.5-33.0	75-80-90	170
35'	Bottom of boring at 33.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-RA-AS

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH: None

DEPTH AFTER 24 HRS none

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

SURFACE ELEVATION: 728.2' SB-7

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Asphalt				
0.3'	(FILL) Brown silt, some sand, some gravel - moist				
3.0'	(FILL) Very loose brown sand and gravel, some silt - wet	1A	3.5- 5.0	3- 3- 2	5
5'		2A	6.5- 8.0	2- 2- 3	5
10'		3A	9.0-10.5	3- 3- 2	5
14.0'	(FILL) Stiff brown clay, some silt, some sand, trace of gravel - moist	4A	14.0-15.5	4- 5- 8	13
15'					
17.0'	(ORIGINAL) Very dense brown sand and gravel, trace of silt - moist				
20'		5A	19.0-20.5	25-31-47	78
25'		6A	24.0-25.5	37-38-42	80
28.0'	Hard gray silt, some sand, trace of gravel, trace of clay - moist				
30'		7A	29.0-30.0	43-82	125
	Bottom of boring at 30.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RG-JD

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH 3.0' (light)

COMPLETION DEPTH None

DEPTH AFTER 24 HRS none

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

SURFACE ELEVATION: 728.2' SB-7A

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT OR CORE REC.
0.0'	(FILL) Asphalt				
0.3'	(FILL) Sand and gravel base				
1.0'	(ORIGINAL) Very dense brown sand and gravel, some silt - moist	1A	1.0- 2.5	18-23-31	54
	(With some cobbles from 3.0')				
5'		2A	4.0- 5.0	50-50/4"	100+
		3A	6.5- 8.0	25-32-40	72
10'		4A	9.0-10.5	20-45-50	95
15'		5A	14.0-15.5	18-30-47	77
20'		6A	19.0-20.5	35-47-50	97
25'		7A	24.0-25.5	29-38-55	93
28.0'	Hard gray silt, some sand, trace of gravel - moist				
30'	(Continued on next page)	8A	29.0-29.5	100/4"	100+
35'		9A	34.0-34.5	100/4"	100+
40'		10A	39.0-40.0	81-19/1"	100+
	Bottom of boring at 40.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-RA-AS

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER 24 HRS none

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C SHELBY TUBE

SB-8

SURFACE ELEVATION: 729.5'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT OR CORE REC.
0.0'	(FILL) Asphalt				
0.2'					
0.6'	(FILL) Concrete				
	(ORIGINAL) Very dense brown sand and gravel, some cobbles, trace of silt - moist	1A	3.5- 5.0	17-28-44	72
5'		2A	6.5- 8.0	24-41-45	86
10'		3A	9.0-10.5	17-28-33	61
15'		4A	14.0-15.0	55-45/5"	100+
20'		5A	19.0-20.0	64-36/2"	100+
24.5'	Hard brown silt, some sand and gravel - moist	6A	24.0-25.5	28-30-41	71
25'					
27.0'	Very dense brown sand and gravel, some cobbles - moist	7A	29.0-30.0	58-43/3"	100+
30'					
32.0'	Hard gray silt, some clay, trace of sand, trace of gravel - moist	8A	34.0-35.0	70-30/3"	100+
35'					
40'		9A	39.0-39.5	100/4"	100+
40.3'	Very dense gray sand and gravel, trace of silt - moist				
	Bottom of boring at 40.5'				
45'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RG-JD

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 29.5' (trace)

COMPLETION DEPTH: 37.0'

DEPTH AFTER 24 HRS 37.0'

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

55-9

SURFACE ELEVATION: 731.8'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Concrete				
4.0'	(ORIGINAL) Very loose brown sand and gravel, some silt, some cobbles - moist	1A	4.0- 5.5	47- 3- 1	4
	(With 1" to 2" silt seams from 6.0')	2A	6.0- 7.5	1- 1- 1	2
8.5'	Medium dense brown sand and gravel, some silt, some cobbles - moist	3A	8.5-10.0	5- 6-13	19
	(Becomes very dense at 14.0')	4A	14.0-14.5	100	100+
		5A	19.0-19.5	100	100+
	(Becomes dense at 24.0')	6A	24.0-25.5	15-15-26	41
		7A	29.0-30.5	12-18-26	44
	(Becomes very dense at 34.0')	8A	34.0-35.5	22-30-36	66
	Bottom of boring at 35.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RG-JD

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH: None

DEPTH AFTER 24 HRS none

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

SB - 9A

SURFACE ELEVATION: 731.8'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Concrete				
0.9'					
1.2'	(FILL) Sand and gravel base				
	(ORIGINAL) Very stiff brown clay, some sand, some gravel, some silt - moist	1A	1.0-2.5	9-8-8	16
5'	Bottom of boring at 2.5'				
10'					

METHOD: HOLLOW STEM AUGER	WATER OBSERVATIONS	TYPE SAMPLER:
TECHNICIAN: JD-WH	INITIAL DEPTH: None	X A. SPLIT SPOON
JOB NO.: 25176 (cls)	COMPLETION DEPTH: None	B.
	DEPTH AFTER 24 HRS. none	C. SHELBY TUBE

SB-10

SURFACE ELEVATION: 731.8'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Concrete				
0.7'	Medium dense brown sand and gravel, some silt, trace of cobbles	1A	3.5- 5.0	7- 7- 6	13
5'	(Becomes dense at 6.5')	2A	6.5- 8.0	12-16-30	46
		3A	9.0-10.5	17-20-24	44
10'					
15'		4A	14.0-15.5	17-21-29	50
20'	(Becomes very dense at 19.0')	5A	19.0-20.5	27-35-43	78
25'	(Becomes dense at 24.0')	6A	24.0-25.5	20-21-27	48
	(Becomes very dense at 28.5')	7A	28.5-30.0	28-50-50/4"	100+
30'	Bottom of boring at 30.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RG-JD

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER 24 HRS none

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

SURFACE ELEVATION: 731.8'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS / FT. OR CORE REC.
0.0'	(FILL) Wood				
0.2'	(FILL) Concrete				
1.0'	(FILL) Brown sand and gravel, some silt, some cobbles - moist				
3.0'	(ORIGINAL) Stiff brown clay, some silt, some sand, trace of gravel - moist	1A	3.5- 5.0	4- 5- 6	11
5' 5.5'	Medium dense brown sand and silt, some gravel - moist	2A	6.5- 8.0	5- 7- 9	16
9.0'	Dense brown sand and gravel, some silt, trace of cobbles - moist	3A	9.0-10.5	15-17-19	36
10'					
15'		4A	14.0-15.5	14-19-26	45
20'	(Becomes very dense at 19.0')	5A	19.0-19.5	100/3"	100+
25'		6A	24.0-25.5	40-50-29	79
30'		7A	29.0-30.5	18-27-30	57
33.0'	Hard gray silt, some sand, some clay, trace of gravel - wet	8A	33.5-35.0	11-17-21	38
35'	Bottom of boring at 35.0'				
40'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BW-JD

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 33.0'

COMPLETION DEPTH: 33.0'

DEPTH AFTER 24 HRS 33.0'

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

SB-11A

SURFACE ELEVATION: 731.8'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS / FT. OR CORE REC.
0.0'	(FILL) Wood	1A	1.0-2.5	20-16-9	25
0.2'	(FILL) Concrete				
0.8'	(FILL) Dense gray sand and gravel base - damp				
2.0'	(ORIGINAL) Very stiff brown clay, some sand, some gravel, trace of silt - moist				
5'	Bottom of boring at 2.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-WH

JOB NO. 25176 (cls)

WATER OBSERVATIONS

INITIAL DEPTH: None

COMPLETION DEPTH: None

DEPTH AFTER 24 HRS. none

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

SB-12

SURFACE ELEVATION: 731.3'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Wood				
0.2'					
1.0'	(FILL) Concrete				
	(FILL) Brown silt, some sand, trace of gravel, trace of clay - moist	1C	3.5- 4.5		12"
5'	(Becomes very stiff at 4.5')	1A	4.5- 6.0	20-13-10	23
		2A	6.5- 8.0	4- 7-12	19
9' 10.0'	(Becomes hard at 9.0')	3A	9.0-10.0	17-100/2"	100+
	(ORIGINAL) Very dense brown sand and gravel, some silt, some cobbles - moist				
15'		4A	14.0-15.5	19-27-41	68
		5A	18.5-20.0	21-34-40	74
20'	Bottom of boring at 20.0'				
25'					
30'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RG-JD

JOB NO.: 25176 (sap)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER 24 HRS none

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

X C. SHELBY TUBE

SB-13

SURFACE ELEVATION: 731.8'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC
0.0'	(FILL) Wood (floor cap)				
0.2'	(FILL) Concrete				
1.0'	(ORIGINAL) Brown sand and gravel, some silt				
2.0'	Brown silt, trace of sand, trace of gravel - moist				
4.0'		1C	3.5- 4.0		0"
5'	Dense brown sand and gravel, some silt - moist	1A	4.0- 5.5	14-16-17	33
		2A	6.5- 8.0	20-21-22	43
		3A	8.5-10.0	15-17-21	38
10'					
15'	(Becomes very dense at 14.0')	4A	14.0-15.5	22-28-30	58
20'		5A	19.0-20.5	22-24-29	53
25'		6A	24.0-25.5	27-50-30	80
30'		7A	29.0-30.0	65-35/2"	100'
	Bottom of boring at 30.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RG-JD

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER 24 HRS none

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

X C. SHELBY TUBE

SB-13A

SURFACE ELEVATION: 731.8'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Wood				
0.2'	(FILL) Concrete				
0.8'	(ORIGINAL) Very stiff brown clay, some sand, some gravel, some silt - moist	1A	1.0-2.5	13-10-10	20
3.5'	(With trace of organic material)	2A	2.5-4.0	10-11-11	22
5'	Medium dense brown sand and gravel - moist				
	Bottom of boring at 4.0'				
10'					
15'					
20'					
25'					
30'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-WH

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: None

COMPLETION DEPTH: None

DEPTH AFTER 24 HRS. none

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

SB-14

SURFACE ELEVATION: 731.8'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.9'	(FILL) Wood				
1.6'	(FILL) Concrete				
	(ORIGINAL) Medium dense brown sand and gravel, some silt - moist				
5'		1A	4.0- 5.5	4- 9-11	20
		2A	6.5- 8.0	10-10-18	28
9'	(Becomes very dense at 9.0')	3A	9.0-10.0	50-50/4"	100+
14'	(Becomes dense at 14.0')	4A	14.0-15.5	19-20-25	45
20'	(Becomes very dense at 19.0')	5A	19.0-20.5	25-36-27	63
25'		6A	24.0-25.5	29-37-40	77
30'		7A	28.5-30.0	17-29-41	70
	Bottom of boring at 30.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RG-JD

JOB NO.: 25176 (sap)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER 24 HRS. none

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

SB-16

SURFACE ELEVATION: 728.6'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Asphalt				
0.3'	(FILL) Road base				
1.3'	(FILL) Black cinders, trace of sand, trace of gravel - moist				
3.0'	(ORIGINAL) Very stiff brown clay, some silt, trace of sand, trace of gravel - moist	1A	3.5- 5.0	5- 8- 9	17
6.5'	Medium dense brown sand and gravel, trace of silt - moist	2A	6.5- 8.0	9-10-14	24
	(Becomes dense at 9.0')	3A	9.0-10.5	9-15-23	38
		4A	14.0-15.5	11-11-11	22
	Bottom of boring at 15.5'				

5' 10' 15' 20' 25' 30'

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RG-JD

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER 24 HRS none

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

SB-24

SURFACE ELEVATION: 737.5'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT OR CORE REC
0.0'	(FILL) Topsoil				
1.0'	(FILL) Very stiff brown silt, some sand, trace of gravel - moist	1A	1.0- 2.5	13-14-13	27
4.0'	(FILL) Medium dense brown sand and gravel, some silt - moist	2A	4.0- 5.5	7- 6-10	16
		3A	6.5- 8.0	6- 7- 6	13
		4A	9.0-10.5	5- 6- 6	12
		5A	14.0-15.5	6-19- 9	28
	(Becomes loose at 19.0')	6A	19.0-20.5	6- 5- 3	8
23.5	(ORIGINAL) Very dense gray sand and gravel, trace of silt, trace of cobbles - moist	7A	24.0-25.0	33-85	118
		8A	29.0-30.5	25-52-50/4"	100+
		9A	34.0-35.0	58-46	104
		10A	38.5-40.0	60-40/4"	100+
	Bottom of boring at 40.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-RA-AS

JOB NO.: 25176 (sap)

WATER OBSERVATIONS

INITIAL DEPTH: *

COMPLETION DEPTH: None

DEPTH AFTER ____ HRS ____

TYPE SAMPLER:

X A SPLIT SPOON

____ B

____ C SHELBY TUBE

SB-25

SURFACE ELEVATION: 735.9'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Asphalt				
0.2'		1A	1.0-2.5	12-13- 6	19
	(ORIGINAL) Brown silt and sand, trace of gravel - moist				
3.0'					
	Loose brown sand and gravel, trace of silt - moist	2A	4.0-5.5	30- 6- 4	10
5'					
	(Becomes medium dense at 6.5')	3A	6.5-8.0	3- 6- 6	12
	(Becomes very dense at 9.0')	4A	9.0-10.5	11-50-40/3"	90+
10'					
		5A	14.0-15.5	28-32-30	62
15'					
	(Trace of cobbles at 17.5')				
		6A	19.0-20.0	35-65	100
20'					
		7A	24.0-25.0	40-60	100
25'					
		8A	29.0-29.5	100/2"	100+
30'	Bottom of boring at 29.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BB-AS

JOB NO.: 25176

WATER OBSERVATIONS

INITIAL DEPTH 12.0'

COMPLETION DEPTH None

DEPTH AFTER 24 HRS None

TYPE SAMPLER:

X A SPLIT SPOON

___ B

___ C SHELBY TUBE

Proj 5026

SB-20

SURFACE ELEVATION: 736.3'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	Topsoil				
0.5'	Medium dense brown sand and gravel, some cobbles, trace of silt - moist	1A	1.5-3.0	10-12-10	22
		2A	4.0-5.5	4- 3- 8	11
5'		3A	6.5-8.0	28-18-13	31
		4A	9.0-10.5	19-22-22	44
10'					
		5A	14.0-15.5	17-19-20	39
15'					
	(Becomes very dense at 19.0')	6A	19.0-20.5	24-36-22	58
20'					
		7A	24.0-25.5	34-44-44	88
25'					
		8A	29.0-30.5	22-42-51	93
30'					
31.0'	Hard gray silt, some clay, some sand, trace of gravel - moist				
		9A	34.0-35.0	44-100	144
35'					
	Bottom of boring at 38.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: MC-AS

JOB NO.: 25176

WATER OBSERVATIONS

INITIAL DEPTH 29.0' (trace)

COMPLETION DEPTH None

DEPTH AFTER ____ HRS ____

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

SB-27

SURFACE ELEVATION: 738.8'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Sand and gravel base	1A	1.0-2.5	6- 7- 7	14
0.5'	(FILL) Medium dense brown sand and gravel, trace of silt - moist				
3.0'	(ORIGINAL) Very dense brown sand and gravel, trace of silt - moist	2A	4.0-5.0	64-50	114
5'		3A	6.5-8.0	22-36-25	61
		4A	9.0-10.5	19-36-39	75
10'		5A	14.0-15.5	24-26-31	57
15'		6A	19.0-20.5	10-22-36	58
20'		7A	24.0-25.5	36-36-42	78
25'	(Some cobbles 27' to 29')	8A	29.0-29.5	100/2"	100"
30'	Bottom of boring at 29.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-LS

JOB NO.: 25176

WATER OBSERVATIONS

INITIAL DEPTH: None

COMPLETION DEPTH: None

DEPTH AFTER 24 HRS: None

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

Proj 5000
Sheet SB1

SB-28

SURFACE ELEVATION: 739.7'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Brown sand and gravel, some cinders - moist				
1.5'	(ORIGINAL) Very dense brown sand and gravel, some silt - moist	1A	1.0-2.5	18-36-40	76
		2A	4.0-5.5	30-33-31	64
5'		3A	6.0-8.5	21-36-39	75
		4A	9.0-10.5	20-22-31	53
10'					
		5A	14.0-15.0	65-35/2"	100
15'					
		6A	19.0-20.0	70-30/2"	100
20'					
	(Trace of cobbles at 22.5')				
		7A	24.0-24.5	100/4"	100+
25'	(Trace of cobbles at 25.0')				
		8A	29.0-29.5	100	100
	Bottom of boring at 29.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BB-RA-AS

JOB NO.: 25176

WATER OBSERVATIONS

INITIAL DEPTH: *

COMPLETION DEPTH: None

DEPTH AFTER 24 HRS: None

TYPE SAMPLER:

X A. SPLIT SPOON

B.

C. SHELBY TUBE

SB-29

SURFACE ELEVATION: 739.3'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Brown sand and gravel, trace of silt				
1.0'	(ORIGINAL) Very stiff brown silt and sand, trace of gravel, trace of clay - moist	1A	1.0- 2.5	8- 8-10	18
3.5'	Dense brown sand and gravel, trace of silt - moist	2A	4.0- 5.5	26-18-27	45
5'	(Becomes very dense at 6.0')	3A	6.0- 8.5	16-28-31	59
10'		4A	9.0-10.5	20-40-40/4"	80+
	(With trace of cobbles at 12.0')				
15'		5A	14.0-15.5	31-27-35	62
20'		6A	19.0-20.5	36-32-32/2"	64+
	(With some cobbles at 23.0')				
25'		7A	24.0-25.5	30-40-30/2"	70+
30'		8A	29.0-30.0	55-45/2"	100+
	Bottom of boring at 30.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BB-RA-AS

JOB NO.: 25176 (cls)

WATER OBSERVATIONS

INITIAL DEPTH **

COMPLETION DEPTH: None

DEPTH AFTER 24 HRS 29.0'

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

Proj 5300
Sheet 38

SB-30

SURFACE ELEVATION: 743.4'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	Topsoil				
0.6'	Very stiff brown clay and silt, some sand, trace of gravel - moist	1A	1.0- 2.5	9-10-10	20
5'		2A	4.0- 5.5	10-10-15	25
5.5'	Medium dense brown sand and gravel, trace of silt - moist (Becomes very dense at 6.5')	3A	6.5- 8.0	22-25-27	52
10'		4A	9.0-10.5	28-30-35	65
15'		5A	14.0-15.5	32-40-45	85
	Bottom of boring at 15.5'				
20'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-LS

JOB NO.: 25176 (cls)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH: None

DEPTH AFTER _____ HRS. _____

TYPE SAMPLER:

X A. SPLIT SPOON

_____ B.

_____ C. SHELBY TUBE

Proj 5000
Sheet SB-1

SB-32

SURFACE ELEVATION: 737.1'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Concrete				
0.5'	(FILL) Base				
1.0'	(FILL) Hard black organic clay and silt, some sand, trace of gravel - moist	1A	1.5- 3.0	25-15-25	40
5'	(ORIGINAL) Dense brown sand and gravel, trace of silt	2A	4.0- 5.5	15-20-21	41
		3A	6.5- 8.0	11-13-19	32
10'		4A	9.0-10.5	8-13-17	30
15'	(Becomes medium dense at 14.0')	5A	14.0-15.5	13-10-12	22
20'	(Becomes very dense at 19.0')	6A	19.0-20.5	24-30-25	55
25'		7A	24.0-25.5	21-46-53	99
30'		8A	29.0-30.5	21-37-35	72
	Bottom of boring at 30.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: MC-LS

JOB NO: 10176 (cls)

WATER OBSERVATIONS

INITIAL DEPTH: None

COMPLETION DEPTH: None

DEPTH AFTER 24 HRS: none

TYPE SAMPLER:

X A SPLIT SPOON

___ B -

___ C SHELBY TUBE

Proj SB-3 SB-4

SB-33

SURFACE ELEVATION: 737.5'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Concrete				
0.4'	(FILL) Brown sand and gravel, some silt - moist				
1.0'	(ORIGINAL) Hard brown clay and silt, some sand, trace of gravel - moist	1A	1.0- 2.5	25-40-50	90
2.0'	Very dense brown sand and gravel, trace of silt - moist	2A	4.0- 5.5	10-25-40	65
5'		3A	6.5- 7.5	35-65	100
10'		4A	9.0-10.0	45-55	100
	(With trace of cobbles at 12.0')				
15'		5A	14.0-15.0	80-20/1"	100+
20'		6A	19.0-20.0	40-60	100
	(With trace of cobbles at 23.0')				
25'		2A	24.0-24.5	100/4"	100+
29.5'	Very dense brown sand, trace of silt - moist	8A	29.0-30.0	30-70/2"	100+
30'	Bottom of boring at 30.0'				

METHOD: HOLLOW STEM AUGUER

TECHNICIAN: JD-BB

JOB NO.: 25176 (cls)

WATER OBSERVATIONS

INITIAL DEPTH: 15.0' (trace)

COMPLETION DEPTH None

DEPTH AFTER _____ HRS. _____

TYPE SAMPLE:

A SPLIT SPOON

C. SHELBY TUBE

Proj 5[illegible]
Sheet 5 Pg 1

SB-34

SURFACE ELEVATION: 740.0'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	Topsoil				
0.3'	Very stiff brown clay and silt, some sand, trace of gravel - moist	1A	1.0- 2.5	8-10-15	25
3.0'	Very dense brown sand and gravel, trace of silt - moist	2A	4.0- 5.5	40-40-20/1"	60+
5'		3A	6.5- 8.0	5-10-45	55
10'		4A	9.0-10.5	25-45-30/2"	75+
15'		5A	14.0-15.0	60-40/3"	100+
20'	(With trace of cobbles at 19.0')	6A	19.0-19.5	100/1"	100+
25'		7A	24.0-25.0	48-52/5"	100+
30'		8A	29.0-30.0	45-55/3"	100+
	Bottom of boring at 30.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-BB

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 14.5' (trace)

COMPLETION DEPTH: None

DEPTH AFTER: ______ HRS. ______

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

Troy SDDD
Sheet 36 1

SB-35

SURFACE ELEVATION: 740.8'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0' 0.3'	Topsoil				
	Very stiff black organic silt and clay, some sand, trace of gravel - moist	1A	1.0- 2.5	10-13-13	26
3.5'	Medium dense brown sand and gravel, trace of silt - moist	2A	4.0- 5.5	13-11-11	22
5'		3A	6.5- 8.0	12-10-13	23
10'	(Becomes very dense at 9.0')	4A	9.0-10.5	13-31-52	83
15'		5A	14.0-15.0	50-50	100
20'	(With trace of cobbles at 18.0')	6A	19.0-20.0	50-50	100
25'		7A	24.0-25.5	35-65	100
	(With some cobbles at 27.0')				
30'		8A	29.0-30.5	40-45-15/1"	60+
35'		9A	34.0-35.0	50-50/1"	100+
40'		10A	38.5-40.0	25-25-50/3"	75+
	Bottom of boring at 40.0'				
45'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BB-AS

JOB NO.: 25176 (sep)

WATER OBSERVATIONS

INITIAL DEPTH: 9.0' (trace)

COMPLETION DEPTH: None

DEPTH AFTER: ____ HRS ____

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

SB-3G

SURFACE ELEVATION: 739.7'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	Topsoil				
0.3'	Medium dense brown sand and gravel, trace of silt - moist	1A	1.0- 2.5	14-11- 7	18
5'	(Becomes dense at 4.0')	2A	4.0- 5.5	22-24-25	49
	(Becomes very dense at 6.0')	3A	6.0- 8.5	32-27-30	57
10'	(Becomes dense at 9.5')	4A	9.0-10.5	13-11-16	27
15'	(With trace of cobbles at 13.0') (Becomes very dense at 14.0')	5A	14.0-15.5	27-43-32	75
20'	(With trace of cobbles at 18.0')	6A	19.0-20.5	25-43-30	73
25'		7A	24.0-25.5	26-24-30	54
	(With trace of cobbles at 27.0')				
30'		8A	29.0-30.5	29-71	100
	Bottom of boring at 30.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BB-RA-AS

JOB NO.: 25176 (sap)

WATER OBSERVATIONS

INITIAL DEPTH: None

COMPLETION DEPTH: None

DEPTH AFTER 72 HRS. none

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

Page 2 of 2

SB-37

SURFACE ELEVATION: 739.8'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	Topsoil				
0.5'	Hard black organic clay and silt, trace of gravel	1A	1.0- 2.5	10-20-29	49
3.5'	Dense brown sand and gravel, trace of silt - moist	2A	4.0- 5.5	18-22-17	39
		3A	6.5- 8.0	15-16-25	41
10'	(Becomes very dense at 9.0')	4A	9.0-10.5	22-23-37	60
	(With trace of cobbles at 13.0')				
15'		5A	14.0-15.0	27-73	100
	(With trace of cobbles at 17.0')				
20'	(Becomes dense at 19.0')	6A	19.0-20.5	27-20-15	35
25'	(Becomes very dense at 24.0')	7A	24.0-24.5	100	100
	(With trace of cobbles at 26.5')				
30'		8A	29.0-30.0	31-69	100
	Bottom of boring at 30.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BB-RA-AS

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: *

COMPLETION DEPTH None

DEPTH AFTER: ____ HRS. ____

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

Proj 2030
SB-2

SB-38

SURFACE ELEVATION: 744.7'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Topsoil				
0.5'	(FILL) Hard brown silt, some sand, some gravel - moist	1A	1.0- 2.5	29-27-30	57
4.0'	(ORIGINAL) Very stiff brown clay and silt, some sand, trace of gravel - moist	2A	4.0- 5.5	4- 8- 8	16
6.5'	Medium dense brown sand and gravel, trace of silt - moist	3A	6.0- 8.5	14-14-14	28
10'	(Becomes very dense at 9.0')	4A	9.0-10.5	32-34-28	62
		5A	13.5-15.0	16-31-54	85
15'	Bottom of boring at 15.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BB-RA-AS

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: None

COMPLETION DEPTH: None

DEPTH AFTER: ____ HRS. ____

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

Proj 5700
SB-2

SB-41

SURFACE ELEVATION: 737.5'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Concrete				
0.5'	(ORIGINAL) Dense brown sand and gravel, trace of silt - moist	1A	1.0- 2.5	26-29-19	48
5'	(Becomes medium dense at 4.0')	2A	4.0- 5.5	10-10-15	25
	(Becomes dense at 7.0')	3A	6.5- 8.0	19-27-23	50
10'		4A	9.0-10.5	15-24-33	57
	(With trace of cobbles at 13.0')				
15'		5A	14.0-14.5	100/2"	100+
	(With trace of cobbles at 17.0')				
20'		6A	19.0-20.0	50-50	100
25'		7A	24.0-25.0	56-44	100
30'		8A	28.5-29.5	63-37/2"	100+
	Bottom of boring at 29.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BB-LS-AS

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: *

COMPLETION DEPTH: None

DEPTH AFTER: 24 HRS. none

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

170 5000
SB-2

SB-43

SURFACE ELEVATION: 739.0'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Crushed stone base				
0.5'	(ORIGINAL) Medium stiff brown clay and silt and sand, trace of gravel - moist	1A	1.0- 2.5	6- 5- 4	9
3.0'	Dense brown sand and gravel, trace of silt - moist				
5'		2A	4.0- 5.5	14-20-15	35
		3A	6.5- 8.0	17-20-22	42
10'	(Becomes medium dense at 9.0')	4A	9.0-10.5	5- 6- 7	13
15'	(Becomes very dense with trace of cobbles at 14.0')	5A	14.0-15.5	17-22-32	54
20'		6A	19.0-20.5	27-42-33	75
25'		7A	24.0-25.5	29-35-50	85
30'		8A	29.0-30.5	26-32-50	82
	Bottom of boring at 30.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-LS

JOB NO.: 25176 (sup)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER 24 HRS. none

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

Proj 25176
SB-2

SB-44

SURFACE ELEVATION: 740.8'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Topsoil				
0.7'	(ORIGINAL) Very stiff black organic silt, some clay, some sand, trace of gravel - moist.	1A	1.0- 2.5	10-10-20	30
5.0'	Dense brown sand and gravel, trace of silt - moist	2A	4.0- 5.5	4-14-36	50
	(Becomes dense at 6.0')	3A	6.0- 8.5	15-19-19	38
10'	(Becomes medium dense at 9.0')	4A	9.0-10.5	8-11-17	28
15'	(Becomes very dense at 14.0')	5A	14.0-15.5	24-36-52	88
	(With trace of cobbles at 16.0')				
	(With some cobbles at 18.0')				
20'		6A	19.0-20.5	18-32-36	68
25'	(With some cobbles at 24.0')	7A	24.0-24.5	100/1"	100+
		8A	28.5-30.0	27-47-26/3"	73+
30'	Bottom of boring at 30.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BB-RA-AS

JOB NO. 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER 72 HRS none

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

Proj 5300
Sht 2

SB-45

SURFACE ELEVATION: 740.7'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	Topsoil				
0.7'	Medium dense brown sand and silt, trace of gravel - moist	1A	1.0- 2.5	10-17-10	27
3.5'	Very dense brown sand and gravel, trace of silt - moist	2A	4.0- 5.5	21-36-35	71
5'	(Becomes medium dense at 6.0')	3A	6.0- 8.5	12-12-14	26
10'	(Becomes dense at 9.0')	4A	9.0-10.5	21-20-18	38
	(With trace of cobbles at 12.0')				
	(Becomes very dense at 13.5')	5A	13.5-15.0	36-42-22/2"	64+
15'	Bottom of boring at 15.0'				
20'					
25'					
30'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BB-RA-AS

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: None

COMPLETION DEPTH: None

DEPTH AFTER _____ HRS. _____

TYPE SAMPLER:

X A. SPLIT SPOON

_____ B.

_____ C. SHELBY TUBE

Proj 5000
SB 2

SB-46

SURFACE ELEVATION: 740.9'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	Topsoil				
0.5'	Very stiff brown clay and silt, some sand, trace of gravel - moist	1A	1.0- 2.5	10- 9-10	19
3.5'	Very dense brown sand and gravel, trace of silt - moist	2A	4.0- 5.5	20-35-50	85
5'		3A	6.0- 8.5	17-29-29	58
10'		4A	9.0-10.5	21-34-38	72
		5A	13.5-15.0	32-36-32/3"	68+
15'	Bottom of boring at 15.0'				
20'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BB-RA-AS

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: None

COMPLETION DEPTH: None

DEPTH AFTER ____ HRS ____

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

SB-49

SURFACE ELEVATION: 735.7'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Asphalt				
0.1'	(FILL) Concrete				
1.0'	(ORIGINAL) Loose brown sand and silt, some gravel - moist	1A	1.5- 3.0	4- 4- 4	8
5'		2A	4.0- 5.5	3- 3- 3	6
6.5'	Very loose brown brown sand, some silt - moist	3A	6.5- 8.0	1- 1- 1	2
10'	(Becomes loose at 9.0')	4A	9.0-10.5	1- 2- 7	9
15'					
15.0	Dense brown sand and gravel, some silt - moist	5A	14.0-15.5	7-11-20	31
19.0	Dense brown sand and gravel, trace of silt - moist	6A	19.0-20.5	15-18-20	38
20'					
25'		7A	24.0025.5	10-15-15	30
30'		8A	29.0-30.5	10-14-16	30
	Bottom of boring at 30.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: MC

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER ____ HRS ____

TYPE SAMPLER:

X A SPLIT SPOON

____ B

____ C SHELBY TUBE

SB-42

SURFACE ELEVATION: 738.9'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	Topsoil				
0.5'	Very stiff brown organic clay and silt, some sand, trace of gravel - moist	1A	1.0- 2.5	10-11-15	26
4.0'	Medium dense brown sand and gravel, some silt - moist	2A	4.0- 5.5	6- 7- 8	15
5'	(Becomes very dense at 6.5')	3A	6.5- 8.0	19-24-36	60
10'		4A	9.0-10.5	14-23-29	52
15'		5A	14.0-15.5	30-40-30/2"	70+
20'	(With trace of cobbles at 18.0') (Becomes dense at 19.5')	6A	19.0-20.5	24-17-30	47
25'	(With trace of cobbles at 23.0')	7A	24.0-25.0	60-40/3"	100+
30'	(With trace of cobbles at 28.0')	8A	29.0-30.0	60-40/1"	100+
35'		9A	34.0-35.0	70-30/3"	100+
40'		10A	39.0-40.0	50-50/3"	100+
	Bottom of boring at 40.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-BB-MC

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 39.0' (trace)

COMPLETION DEPTH: None

DEPTH AFTER: 24 HRS.: none

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

SB-50

SURFACE ELEVATION: 739.1'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	N BLOWS PER FT OR CORE REC
0.0'	Topsoil				
0.5'					
1.0'	Brown silt, some sand - moist				
	Hard black organic silt, some clay, some sand - moist	1A	1.0- 2.5	10-20-25	45
3.0'	Loose brown sand and silt, trace of clay - moist				
5'		2A	4.0- 5.5	5- 5- 5	10
6.5'	Medium dense brown sand and gravel, trace of silt - moist	3A	6.5- 8.0	4- 8- 7	15
10'	(Becomes loose at 9.0')	4A	9.0-10.5	1- 3- 4	7
15'	(Becomes very dense at 15.0')	5A	14.0-15.5	17-26-30	56
20'	(Becomes dense at 19.0')	6A	19.0-20.5	17-15-20	35
25'	(Becomes very dense at 24.0')	7A	24.0-25.5	25-36-40	76
30'		8A	29.0-30.5	25-55-50	105
35'		9A	34.0-34.5	50/4"	50
40'		10A	39.0-39.5	100/1"	100
	Bottom of boring at 39.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: GD-MC-BB

JOB NO.: 25176 (cls)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER ____ HRS ____

TYPE SAMPLER:

X A SPLIT SPOON

____ B

____ C SHELBY TUBE

SB-51

SURFACE ELEVATION: 740.6'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT OR CORE REC.
0.0'	Topsoil				
0.5'	Very stiff brown clay and silt, some sand, trace of gravel - moist	1A	1.0- 2.5	12-13-14	27
3.0'	Very dense brown sand and gravel, trace of silt - moist	2A	4.0- 5.5	32-38-21	59
	(Becomes medium dense at 6.5')	3A	6.5- 8.0	12-10-13	23
10'		4A	9.0-10.5	15-13-13	26
	(With trace of cobbles at 12.0')				
15'	(Becomes very dense at 14.0')	5A	14.0-15.5	32-40-40	80
20'		6A	19.0-20.5	28-35-40	75
	(With trace of cobbles at 22.5')				
25'		7A	24.0-25.0	50-53	103+
30'		8A	29.0-30.5	24-30-50	80
	Bottom of boring at 30.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-LS

JOB NO.: 25176 (cls)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER _____ HRS _____

TYPE SAMPLER:

X A. SPLIT SPOON

_____ B.

_____ C. SHELBY TUBE

SB-52

SURFACE ELEVATION: 740.7'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	Topsoil				
0.5'	Very stiff dark brown clay and silt, some sand, trace of gravel - moist	1A	1.0- 2.5	8- 9-10	19
3.0'	Dense brown sand and gravel, trace of silt	2A	4.0- 5.5	14-22-23	45
5'	(Becomes medium dense at 6.5')	3A	6.5- 8.0	10- 7-13	20
10'		4A	9.0-10.5	14-20-15	35
	(With trace of cobbles at 12.0')				
15'	(Becomes very dense at 14.0')	5A	14.0-14.5	100/1"	100+
	(With trace of cobbles at 18.0')				
20'		6A	19.0-19.5	100/3"	100+
25'		7A	24.0-25.5	30-33-40	73
30'		8A	29.0-30.5	35-40-46	86
	Bottom of boring at 30.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-LS

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH None

COMPLETION DEPTH None

DEPTH AFTER ____ HRS ____

TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C SHELBY TUBE

P...
SB-2

SB-53

SURFACE ELEVATION: 740.3'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS PER FT. OR CORE REC.
0.0'	Topsoil				
0.5'	Very stiff black organic silt, some clay, some sand - moist	1A	1.0- 2.5	9-10-11	21
3.0'	Dense brown sand and gravel, trace of silt - moist	2A	4.0 5.5	14-13-25	38
5'	(Becomes medium dense at 6.5')	3A	6.5- 8.0	16- 9- 7	16
	(With trace of cobbles at 8.5')				
10'	(Becomes dense at 9.0')	4A	9.0-10.5	10-16-17	33
15'		5A	14.0-15.5	15-16-22	38
	Bottom of boring at 15.5'				
20'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-LS

JOB NO.: 25176 (sup)

WATER OBSERVATIONS

INITIAL DEPTH: None

COMPLETION DEPTH: None

DEPTH AFTER _____ HRS. _____

TYPE SAMPLER:

X A. SPLIT SPOON

_____ B

_____ C SHELBY TUBE

SB-54

SURFACE ELEVATION: 740.6'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT OR CORE REC.
0.0'	Topsoil				
0.5'	Very stiff brown silt and clay, some sand, trace of gravel - moist	1A	1.0- 2.5	8- 9-10	19
3.0'	Very dense brown sand and gravel, trace of silt - moist	2A	4.0- 5.5	20-30-42	72
5'		3A	6.5- 8.0	21-27-29	56
10'	(Becomes dense at 9.0')	4A	9.0-10.5	15-18-22	40
15'	(Becomes very dense at 14.0')	5A	14.0-15.5	28-27-36	63
	Bottom of boring at 15.5'				
20'					
25'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-LS

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: None

COMPLETION DEPTH: None

DEPTH AFTER ____ HRS ____

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

SB-57

SURFACE ELEVATION: 738.2'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Topsoil				
1.0'	(FILL) Medium dense brown sand and gravel, some silt - moist	1A	1.0- 2.5	15-13- 9	22
4.0'	(FILL) Very soft brown silt and sand, some gravel - moist	2A	4.0- 5.5	3- 2- 1	3
	(Becomes medium stiff at 6.5')	3A	6.5- 8.0	2- 3- 4	7
8.0'	(ORIGINAL) Very dense gray and brown sand and gravel, trace of silt - moist	4A	9.0-10.5	24-27-30	57
	(With trace of cobbles at 12.0')				
15'		5A	14.0-15.5	30-41-32	73
20'		6A	19.0-20.0	45-56	101
	(With some cobbles at 23.0')				
25'		7A	24.0-25.0	46-54	100
		8A	28.5-30.0	29-36-30	66
30'	Bottom of boring at 30.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-RA-AS

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: *

COMPLETION DEPTH: None

DEPTH AFTER: _____ HRS. _____

TYPE SAMPLER:

X A. SPLIT SPOON

_____ B.

_____ C. SHELBY TUBE

*19.0' (trace); 24.0' (heavy)

SB-58

SURFACE ELEVATION: 737.7'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS FT OR CORE REC.
0.0'	(FILL) Topsoil				
1.0'	(FILL) Dense brown sand and gravel, trace of silt - moist	1A	1.0- 2.5	14-28-17	45
4.0'	(ORIGINAL) Soft brown clay and silt, some sand, trace of gravel - wet	2A	4.0- 5.5	1- 2- 3	5
7.5'	Medium dense brown sand and gravel, trace of silt - damp	3A	6.5- 8.0	5-12-12	24
10'	(Becomes very dense at 9.0')	4A	9.0-10.5	17-30-34	64
15'		5A	14.0-15.5	24-29-24	53
20'		6A	19.0-20.5	17-30-32	62
25'		7A	24.0-25.5	21-29-31	60
30'		8A	28.5-29.5	30-80	110+
	Bottom of boring at 29.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-RA-AS

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH 4.0' (light)

COMPLETION DEPTH: None

DEPTH AFTER: _____ HRS. _____

TYPE SAMPLER:

X A. SPLIT SPOON

_____ B.

_____ C. SHELBY TUBE

SB-59

SURFACE ELEVATION: 738.1'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	N: BLOWS /FT OR CORE REC.
0.0'	(FILL) Brown clay, some silt, some sand, trace of gravel (Becomes medium stiff at 1.0')	1A	1.0- 2.5	6- 4- 3	7
5'		2A	4.0- 5.5	2- 3- 4	7
6.5'	(FILL) Medium dense brown sand and gravel, some silt - moist	3A	6.5- 8.0	4- 4-10	14
8.5' 10'	(ORIGINAL) Dense brown sand and gravel, trace of cobbles, trace of silt - moist	4A	9.0-10.5	18-20-30	50
15'	(Becomes very dense at 14.0')	5A	14.0-15.5	26-28-29	57
20'	(With some cobbles at 17.0')	6A	19.0-20.5	32-37-40	77
25'		7A	24.0-25.0	50-50/4"	100+
30'		8A	29.0-29.5	100	100+
35'	(With boulder at 33.0')	9A	34.0-35.5	28-36-40	76
40'		10A	38.5-39.5	90-16/1"	106+
45'	Bottom of boring at 39.5'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: JD-RA-AS

JOB NO.: 25176 (smp)

WATER OBSERVATIONS

INITIAL DEPTH 19.0' (trace)

COMPLETION DEPTH: None

DEPTH AFTER: ____ HRS ____

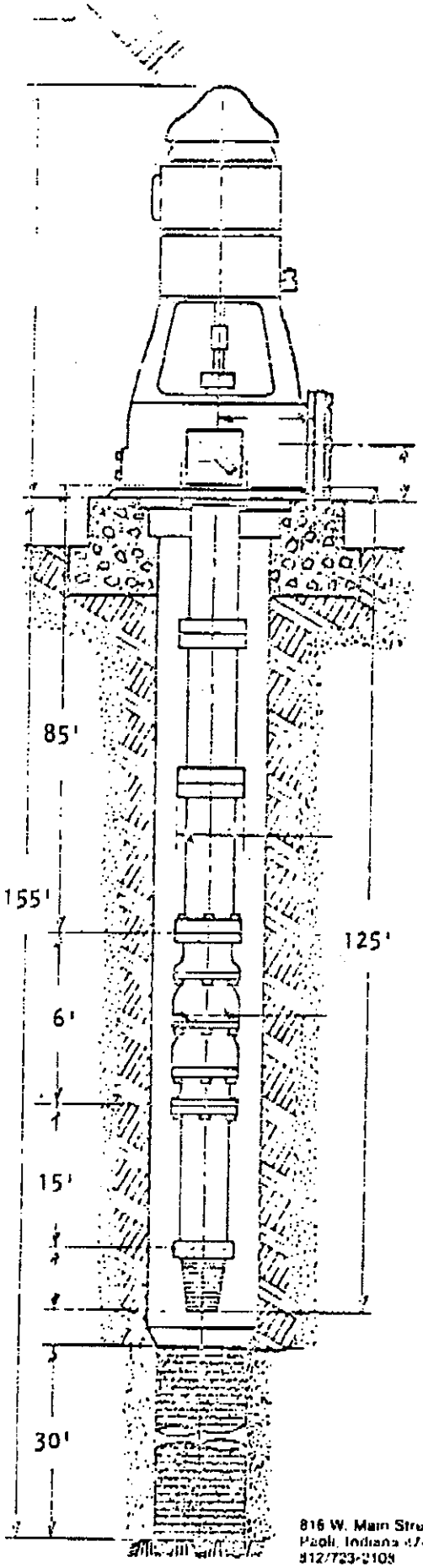
TYPE SAMPLER:

X A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

ODNR WELL LOGS AND DRILLING REPORTS FOR PRODUCTION WELLS WELL NO. 11A, NO. 30, NO. 39, AND NO. 43



TURBINE PUMP INSTALLATION FOR:

GM Truck and Bus Group
Moraine, Ohio

WELL DESIGNATION NO. 11-A

GM Existing Equipment

N/A SERIAL NUMBER
N/A GALLONS PER MINUTE
N/A TOTAL HEAD IN FEET
6 STAGES
1760 MOTOR SPEED
106 OAL FEET OF SETTING
10" SIZE COLUMN
N/A OIL TUBE
1-1/2" LINE SHAFT stainless steel
15' 8" SUCTION PIPE
125 H.P. 460 VOLT. CURRENT
Water LUBRICATION
90 FEET OF AIRLINE
April '86 DATE INSTALLED

18-inch I.D. OF WELL
155 FEET DEEP FROM FOUNDATION
155 FEET DEEP FROM GRADE
30' STRAINER LENGTH — SLOT See Below
45.5' STATIC LEVEL — DATE March '86
" " — "
" " — "
" " — "
DATE DRILLED

PUMP REPAIRED — DATE
" " — "
" " — "

WELL ACID TREATED — DATE
" " — "

COMMENTS —

Well Screen - 18" telescoping
Bottom 5 feet - 50 slot
13 feet - 150 slot
Top 12 feet - 40 slot

816 W. Main Street
Paoli, Indiana 47454
812/723-2109

Highway 60 East
Owensboro, Ky. 42301
502/685-5572

1421 Mellwood Ave.
Louisville, Ky. 40208
502/585-1241

6451 Germantown Road
Middletown, Ohio 45042
513-424-7237

Reynolds Supply, Inc.

COMPLETE MUNICIPAL & INDUSTRIAL WATER SYSTEMS

FORMATION LOG OF WELL

Starting Date _____ Finished _____ Well Number 11-A

Owner General Motors Location General Motors Truck & Bus Group

FROM	TO	FORMATION
0	2	Top soil - fill
2	4	Gravel
4	7	Coarse gravel
7	10	Hard pan
10	35	Gravel and clay - hard drilling
35	71	Gray clay
71	74	Clay and pea gravel
74	80	Gravel and clay
80	86	Sand and clay mix
86	90	Sand and gravel
90	108	Sand and big gravel
108	119	Sand and gravel
119	134	Sand and gravel
134	146	Coarse gravel
146	152	Coarse gravel
152	155	Sand and gravel and trace of clay
155	160	Fine sand with clay balls
160	162	Fine sand with clay balls
162	166	Fine sand with clay balls
166		Shale

Water Level _____ Draw Down

WELL LOG AND DRILLING REPORT

ORIGINAL

NO CARBON PAPER NECESSARY— SELF-TRANSCRIBING

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
65 S. Front St., Rm. 815 Phone (614) 469-2646
Columbus, Ohio 43215

No. 420737

County Montgomery Township ~~City~~ Moraine Section of Township 16 - 7

Owner Frigidaire Div. General Motors Address Dayton, Ohio 45401

Location of property North of Bldg. #14 (A)

CONSTRUCTION DETAILS

Casing diameter 20" Length of casing 205'
Type of screen R.B. Length of screen 50'
Type of pump B.J. 12G Bronze 5 stg.
Capacity of pump 1200
Depth of pump setting 129' 9"
Date of completion May 8, 1973

BAILING OR PUMPING TEST
(Specify one by circling)

Test Rate 1200 G.P.M. Duration of test 3 hrs.
Drawdown 8 ft. Date [redacted] 5-8-73
Static level-depth to water 84' ft.
Quality (clear, cloudy, taste, odor) clear
Pump installed by

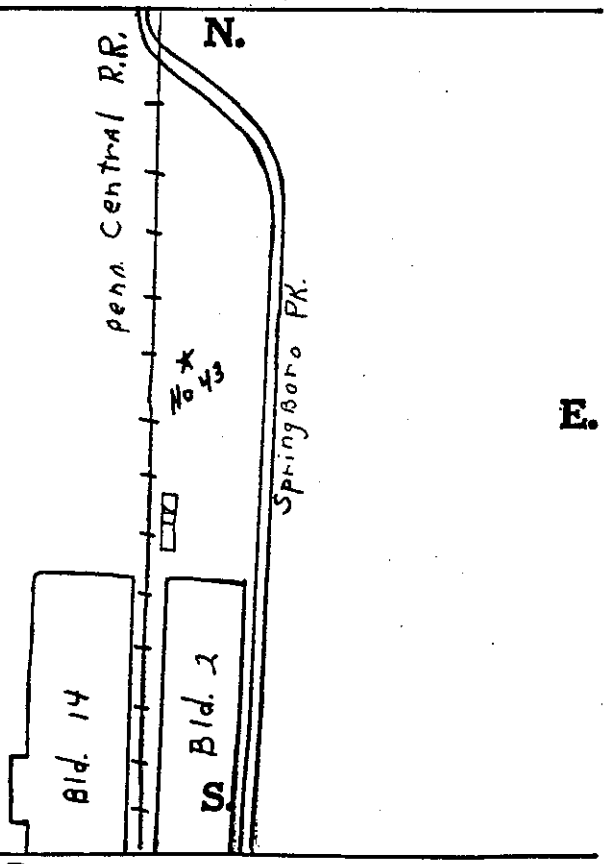
Well #43

WELL LOG*

Formations Sandstone, shale, limestone, gravel and clay	From	To
Top Soil	0 Feet	2 Ft.
Dry Gravel + Boulders	2'	32'
clay + Gravel	32'	57'
Boulders - large gravel	57'	67'
Blue clay + gravel	67'	75'
Large gravel + coarse sand	75'	125'
F. Gravel, fine coarse sand	125'	135'
F. Gravel + coarse sand	135'	158'
Fine Sand	158'	165'
Grey clay (Sandy)	165'	175'
Hardpan - Tough blue clay with gravel	175'	197'
Sand + Fine gravel - Flat	197'	205'
Rock + boulders at 205'		

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



Drilling Firm 5412 MOODY'S OF DAYTON, INC.
Address P. O. BOX 155 VANDALIA, OHIO 45377

Date June 18, 1973
Signed W.C. Caspers Jr.

*If additional space is needed to complete well log, use next consecutive numbered form.

C-6-1

ORIGINAL

Group 3

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1500 Dublin Road
Columbus, Ohio

No. 210162

County Montgomery Township ~~Madison~~ Moraine Section of Township

Owner Frigidaire Div. Gmc Address Dayton, Ohio

Location of property Well # 30 - Moraine Plant

CONSTRUCTION DETAILS

Casing diameter 20" Length of casing 148'
Type of screen Red Brass Length of screen 30'
Type of pump —
Capacity of pump —
Depth of pump setting —
Date of completion —

BAILING OR PUMPING TEST

Pumping rate 1000 G.P.M. Duration of test 1/2 hrs.
Drawdown 41/2' ft. Date 11/7/59
Developed capacity 1000 GPM
Static level—depth to water 32' ft.
Pump installed by —

WELL LOG

Formations Sandstone, shale, limestone, gravel and clay	From	To
Fill	0 Feet	10 Ft.
Gravel	10	36
Till	36	73
Silt - Little gravel	73	86
Gravel & Sandy Silt	86	120
Silt	120	128
Gravel	128	150

4059

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.

N.

Well # 30
Moraine Plant
Frigidaire Div.
Gmc
Dayton, Ohio

W. E.

S.

See reverse side for instructions

Drilling Firm Don Rue

Address Vandalia, Ohio

Date 11/7/59

Signed Don Rue

C62

WELL LOG AND DRILLING REPORT

ORIGINAL

NO CARBON PAPER NECESSARY— SELF-TRANSCRIBING

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
65 S. Front St., Rm. 815 Phone (614) 469-2646
Columbus, Ohio ~~43215~~

No. 407938

County Montgomery Township ~~Madison~~ Moraine Section of Township

Owner Frigidaire Division GMC Address Dayton, Ohio 45401

Location of property North End of Plant #2

~~Well #13~~ CONSTRUCTION DETAILS (Well #39)

Casing diameter 20" Length of casing 117'

Type of screen Red Brass Length of screen 25'

Type of pump Byron Jackson

Capacity of pump 800 GPM

Depth of pump setting 90'

Date of completion 31 July 1970

BAILING OR PUMPING TEST
(Specify one by circling)

Test Rate 2,246 G.P.M. Duration of test 6 hrs.

Drawdown 188 GPM/ft. Date 10-22-69

Static level-depth to water 62 ft.

Quality (clear, cloudy, taste, odor) Clear

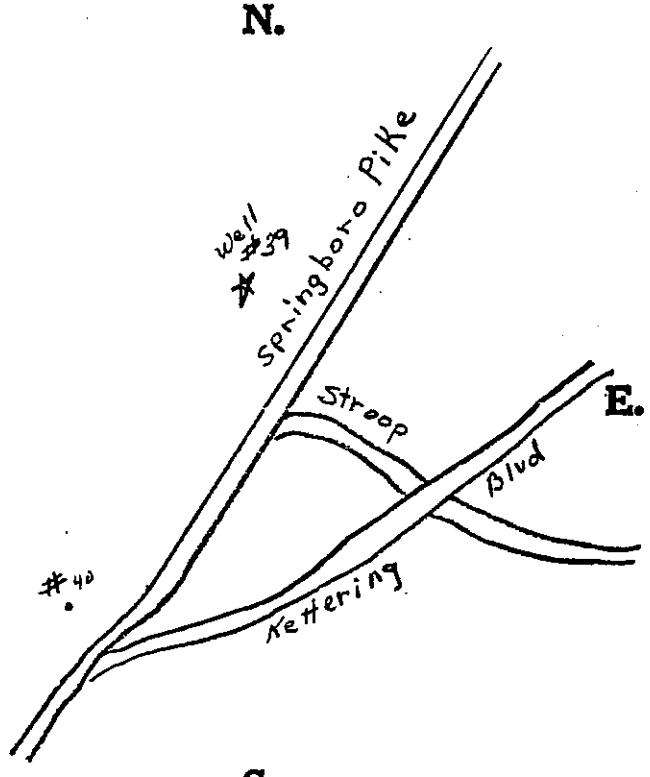
Pump installed by Moody's

WELL LOG*

Formations Sandstone, shale, limestone, gravel and clay	From	To
Soil, Sandy & Some Gravel	0 Feet	28 Ft.
Clay	28	38
Large Gravel, Few Lg. Rock	38	55
Clay & Gravel Mixed	55	90
" " Water at 100'	90	100
Good Gravel	100	115
Blue Shale	115	145
5412		

SKETCH SHOWING LOCATION

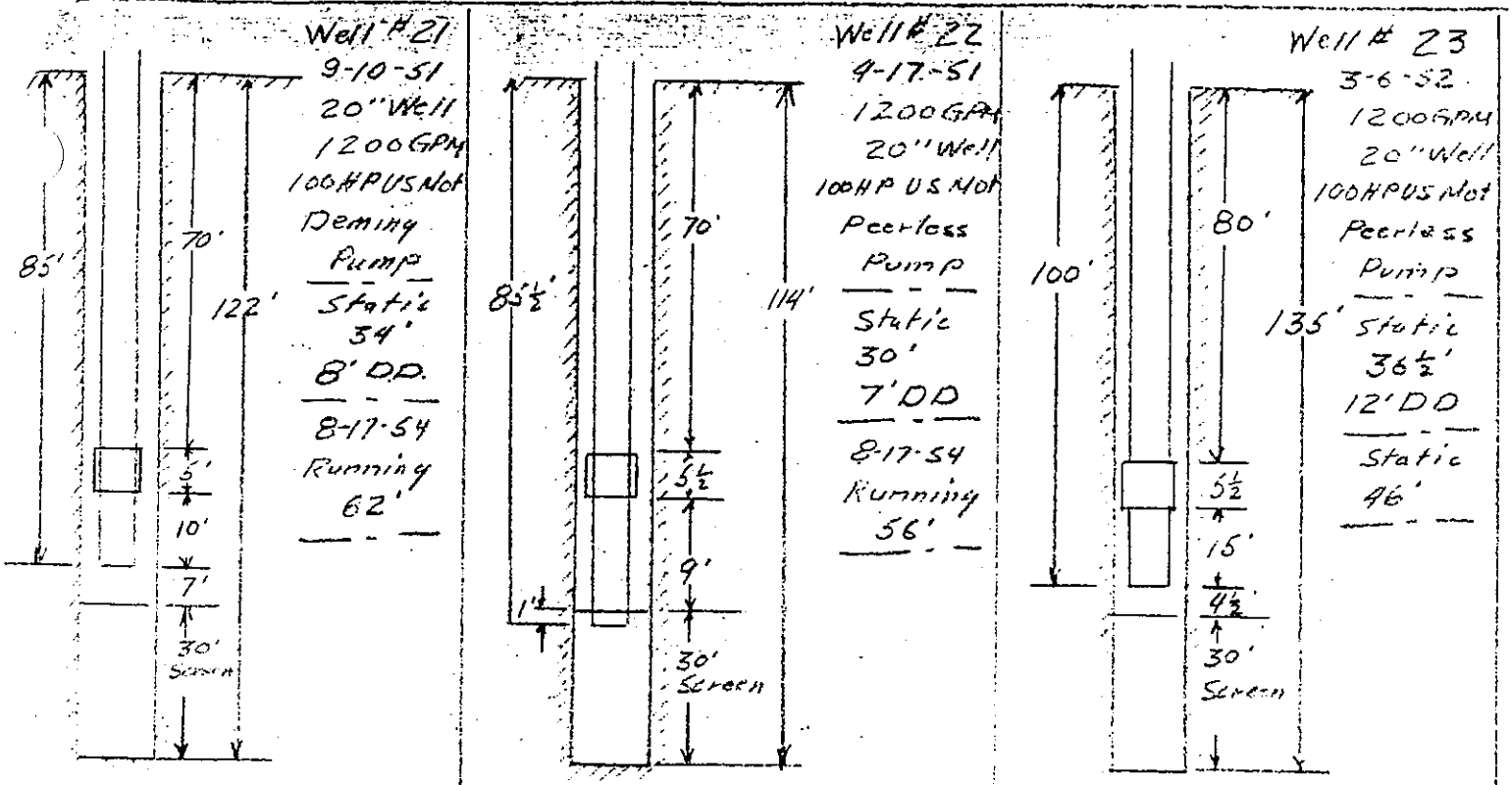
Locate in reference to numbered State Highways, St. Intersections, County roads, etc.

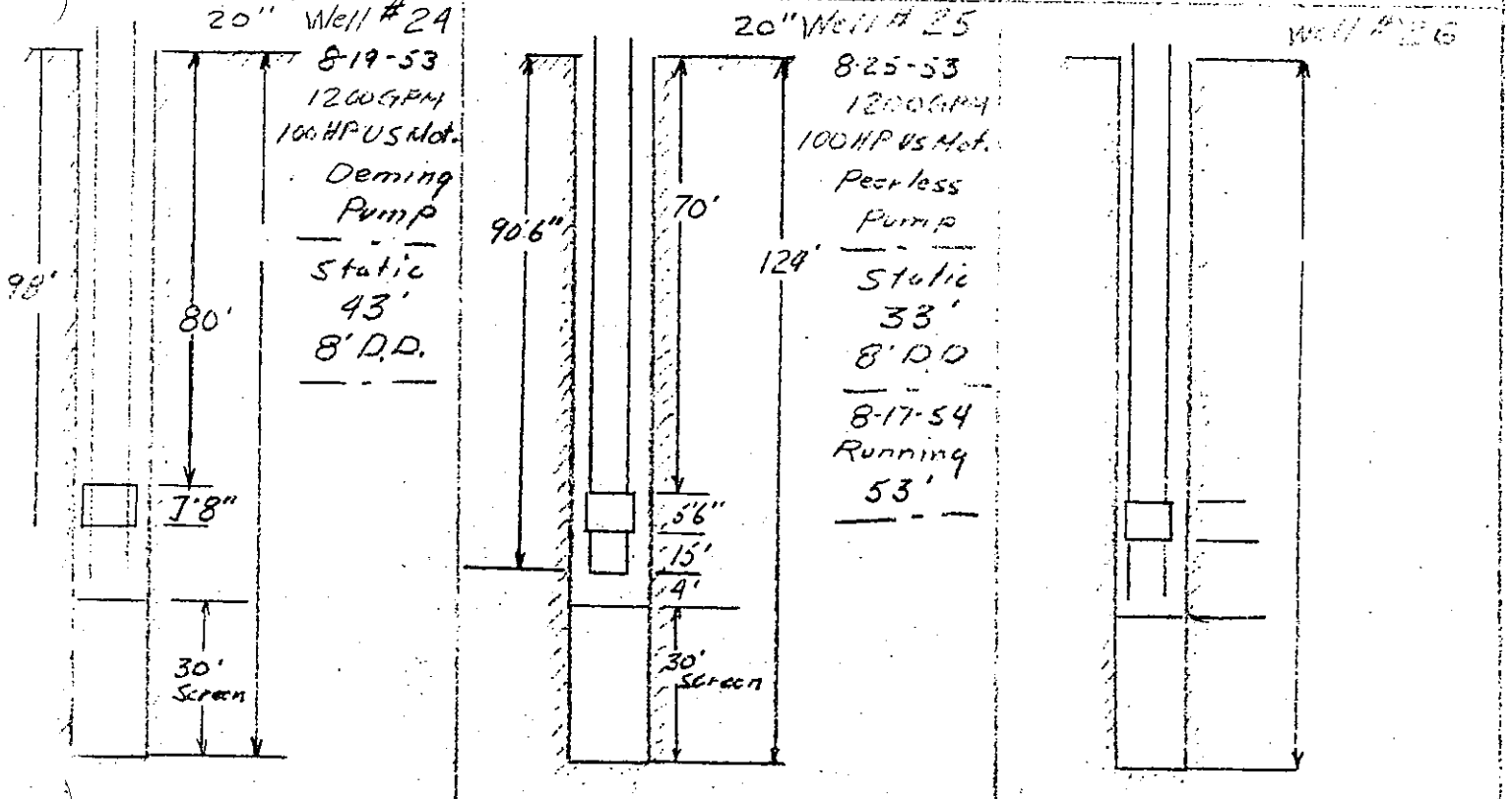


Drilling Firm MOODY'S OF DAYTON, INC. Date March 22, 1973

Address P. O. Box 155, Vandalia, Ohio 45377 Area Code 513 898-3969 Signed V. C. Casper/jd

*If additional space is needed to complete well log, use next consecutive numbered form.


Well #21
9-10-51
20" Well
1200 GPM
100 HP US Mot
Deming
Pump
Static
34'
8' D.D.
8-17-54
Running
62'
85'
70'
122'
5'
10'
7'
30'
Screen
Well #22
9-17-51
1200 GPM
20" Well
100 HP US Mot
Peerless
Pump
Static
30'
7' DD
8-17-54
Running
56'
8 1/2'
70'
114'
5 1/2
9'
1 1/2
30'
Screen
Well # 23
3-6-52
1200 GPM
20" Well
100 HP US Mot
Peerless
Pump
Static
36 1/2'
12' DD
Static
46'
100'
80'
135'
5 1/2
15'
4 1/2
30'
Screen


20" Well #24
8-19-53
1200 GPM
100 HP US Mot.
Deming
Pump
Static
43'
8' D.D.
9.9'
80'
7'8"
30'
Screen
20" Well # 25
8-25-53
1200 GPM
100 HP US Mot.
Peerless
Pump
Static
33'
8' DD
8-17-54
Running
53'
90'6"
70'
124'
5'6"
15'
4'
30'
Screen
Well # 26

APPENDIX D

Groundwater Flow Maps of the Water Table Surface and Potentiometric Surface

DWG DATE: 07JULY97 | PRJCT NO.: OH0288.00B | FILE NO.: HARR\DOCC | DRAWING: FIGHIS1 | CHECKED: – | APPROVED: R.A. | DRAFTER: MS

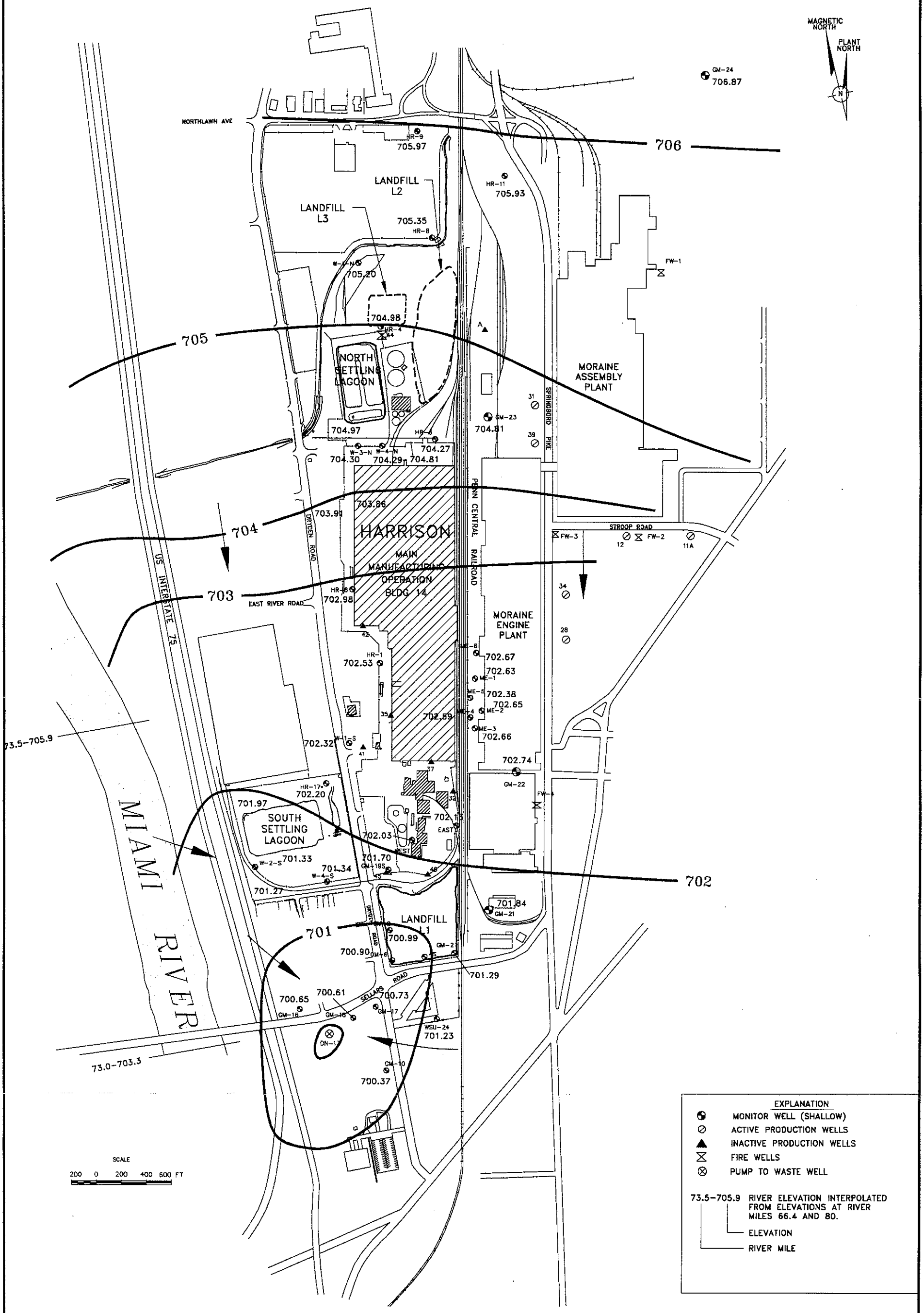
GERAGHTY & MILLER, INC.
Environmental Services

RFI – PHASE 1
WATER TABLE SURFACE ON JANUARY 29, 1993

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
2-4a

DWG DATE: 07JULY97	PRJCT NO.: OH0288.00B	FILE NO.: HARR\DOCC	DRAWING: FLOWHIS1	CHECKED: –	APPROVED: R.A.	DRAFTER: RTS



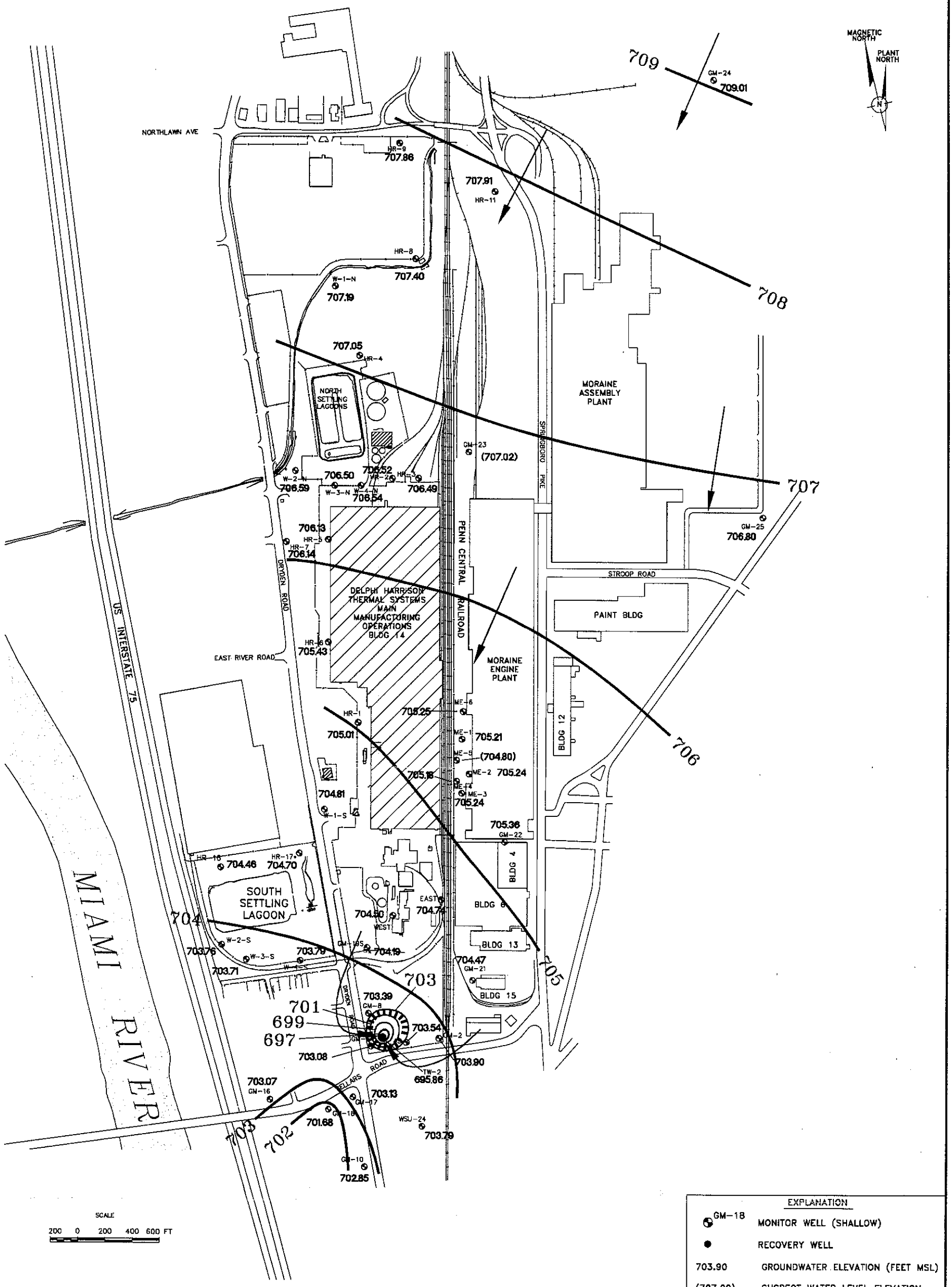
GERAGHTY & MILLER, INC.
Environmental Services

RFI – PHASE 2
WATER TABLE SURFACE ON OCTOBER 20, 1994

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
2-4b

DWG DATE: 07JULY97	PRJCT NO.: OH0288.00B	FILE NO.: HARR\DOCC	DRAWING: FLOWHIS1	CHECKED: –	APPROVED: R.A.	DRAFTER: RTS



EXPLANATION

GM-18	MONITOR WELL (SHALLOW)
●	RECOVERY WELL
703.90	GROUNDWATER ELEVATION (FEET MSL)
(707.02)	SUSPECT WATER LEVEL ELEVATION
709.0	GROUNDWATER CONTOUR (FEET MSL) (DASHED WHERE INFERRED)
→	FLOW DIRECTION
	CONE OF DEPRESSION

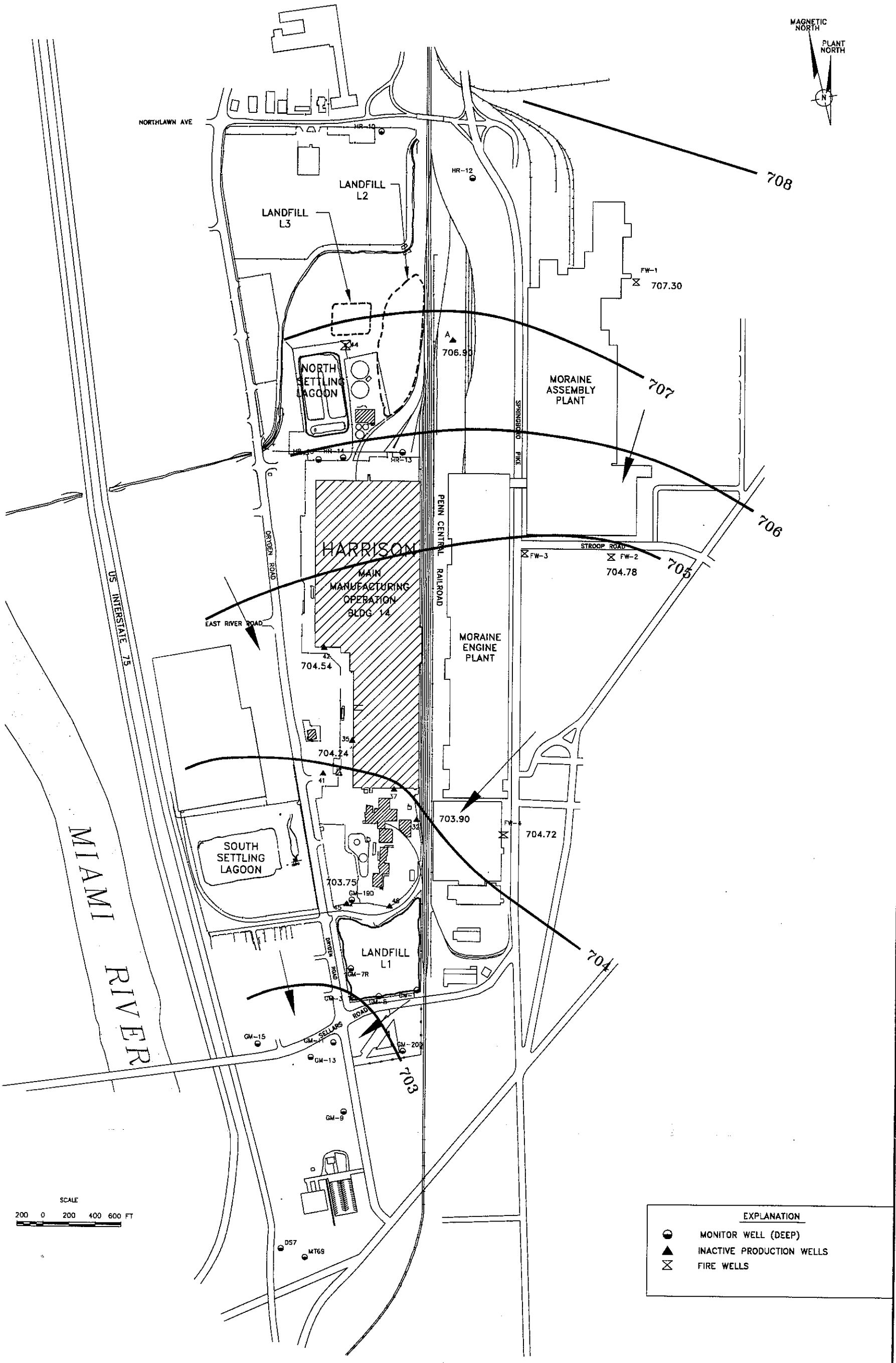
GERAGHTY & MILLER, INC.
Environmental Services

NORTH SETTLING LAGOON
GROUNDWATER QUALITY ASSESSMENT
WATER TABLE SURFACE ON NOVEMBER 11, 1996

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
2-4c

DWG DATE: 07JULY97	PRJCT NO.: 0H0288.00B	FILE NO.: HARR\DOCC	DRAWING: FLOWHIS2	CHECKED: –	APPROVED: R.A.	DRAFTER: RTS



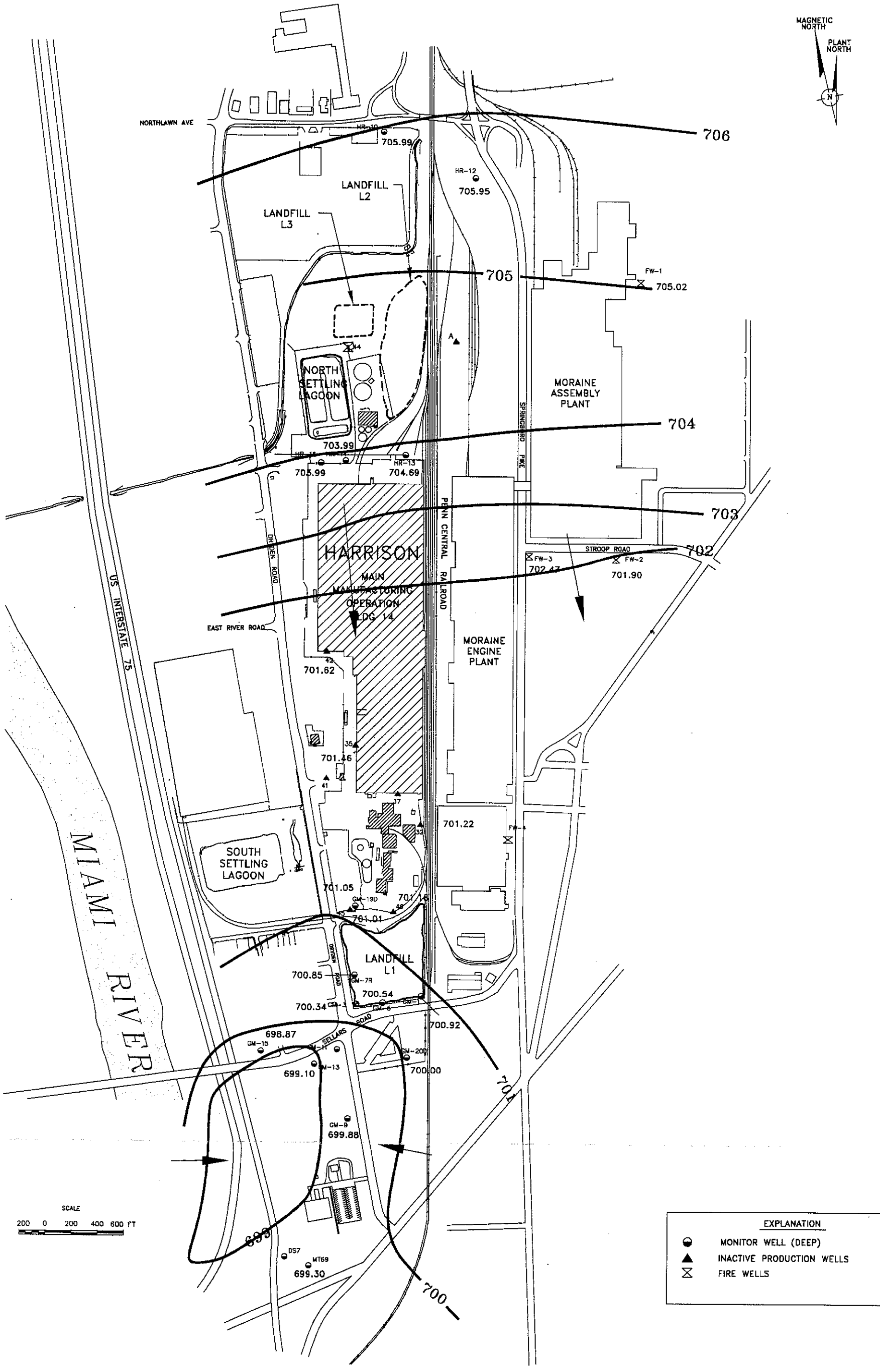
GERAGHTY & MILLER, INC.
Environmental Services

RFI – PHASE 1
POTENTIOMETRIC SURFACE ON JANUARY 29, 1993

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
2-5a

DWG DATE: 07JULY97 | PRJCT NO.: OH0288.00B | FILE NO.: HARR\DOCC | DRAWING: FLOW02 | CHECKED: - | APPROVED: R.A. | DRAFTER: RW



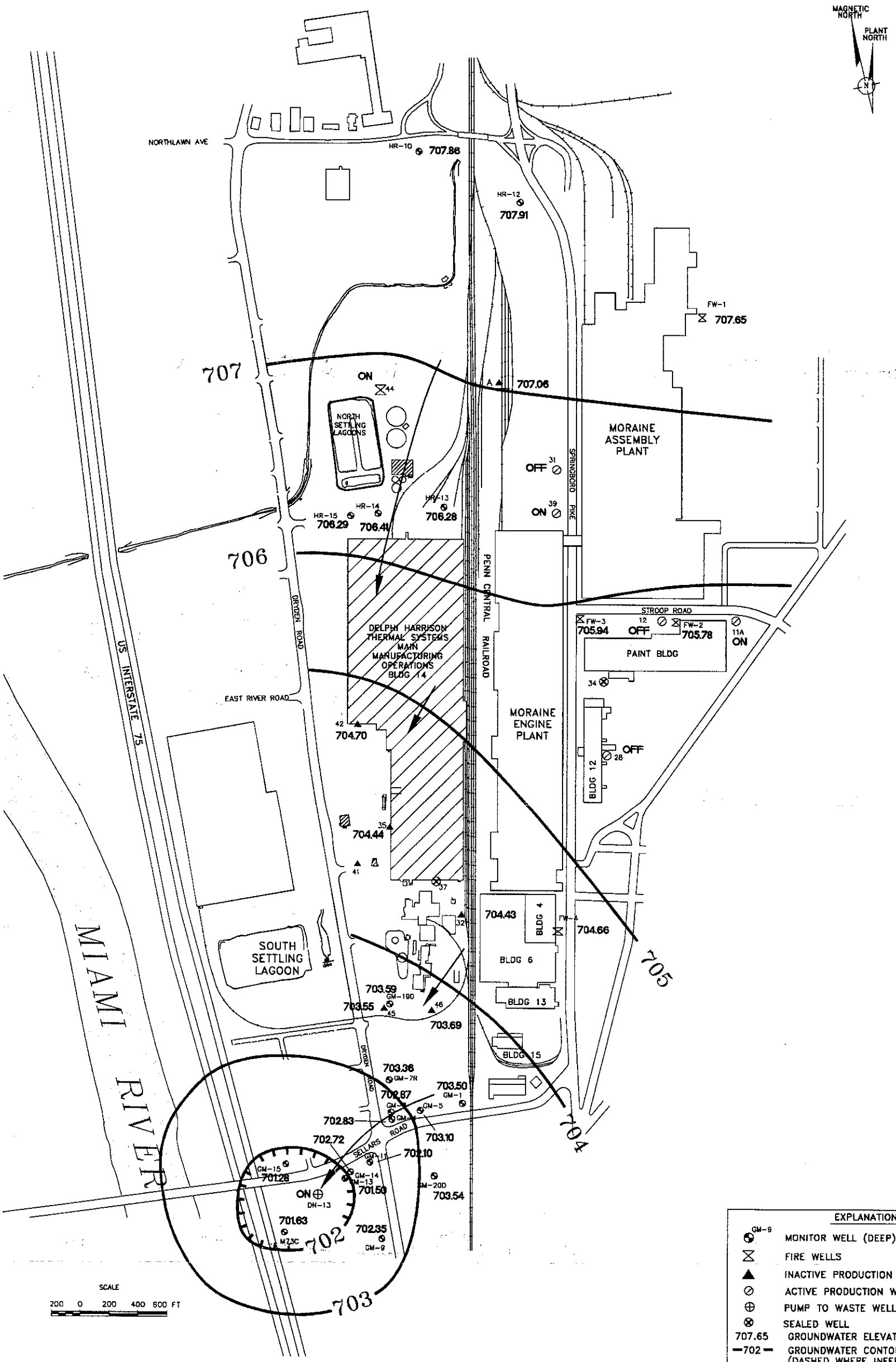
GERAGHTY & MILLER, INC.
Environmental Services

RFI - PHASE 2
POTENTIOMETRIC SURFACE ON OCTOBER 20, 1994

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
2-5b

DWG DATE: 07JULY97	PRJCT NO.: OH0288.008	FILE NO.: HARR\DOCC	DRAWING: FLOWHIS2	CHECKED: –	APPROVED: R.A.	DRAFTER: RTS



EXPLANATION

- GM-9 — MONITOR WELL (DEEP)
- FIRE WELLS
- INACTIVE PRODUCTION WELLS
- ACTIVE PRODUCTION WELLS
- PUMP TO WASTE WELL
- SEALED WELL
- 707.65 — GROUNDWATER ELEVATION (FEET MSL)
- –702– — GROUNDWATER CONTOUR (FEET MSL) (DASHED WHERE INFERRED)
- CONTOUR INTERVAL = 1 FOOT
- GROUNDWATER FLOW DIRECTION
- CAPTURE ZONE

GERAGHTY & MILLER, INC.
Environmental Services

NORTH SETTLING LAGOON
GROUNDWATER QUALITY ASSESSMENT
POTENTIOMETRIC SURFACE ON NOVEMBER 11, 1996

GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
2-5c