DESCRIPTION OF CURRENT CONDITIONS
TASK 1 OF THE RCRA FACILITY INVESTIGATION FOR
HARRISON RADIATOR DIVISION-GMC
MORAINE, OHIO

Submitted To:

Harrison Radiator Division - GMC
Moraine, Ohio

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1.0 INTRODUCTION

1.1 Overview of the RFI/CMS Process

The Harrison Radiator Division of General Motors Corporation (Harrison) received an Administrative Order on December 31, 1990, from the U.S. Environmental Protection Agency (USEPA) Region V. The Order issued under Section 3008 (h) of the Resource Conservation and Recovery Act (RCRA), as amended, 42 U.S.C. 6928 (h) requires Harrison to 1) perform Interim Measures; 2) conduct a RCRA Facility Investigation (RFI); and 3) conduct a RCRA Corrective Measures Study (if deemed necessary). In a letter dated September 26, 1991, USEPA waived the requirement for an Interim Measures Work Plan for the Harrison site. Data collected during the RFI will now be used to determine if interim corrective measures are required at the site.

To meet the RFI objectives, Harrison is required to implement a formal investigative process, as described in the Unilateral Order. The process begins with the preparation of a Description of Current Conditions Report, which is represented by this document. This report presents the current state of knowledge regarding the environmental setting at the facility, existing information from previous investigations conducted at the site and the extent of contamination.

The next step in the RFI process, as outlined in the Unilateral Order, is to conduct a Pre-Investigation Evaluation of Corrective Measure Technologies (PIECMT). The PIECMT will identify the potential corrective measure technologies that may be used to address contamination. Both the PIECMT and the DOCC will aid in identifying information and data deficiencies to be addressed during the RFI.

A RFI Work Plan will also be prepared as part of the process. The Work Plan will be designed to collect site-characterization data to address deficiencies outlined in the DOCC report and to collect necessary data to further evaluate the corrective measures technologies identified in the PIECMT report. The Work Plan will be implemented through a field data-collection program and a report of findings will be prepared and submitted to the USEPA.

The CMS, if needed, will be conducted following the completion of the RFI. The CMS will use the information in this report, the PIECMT report and the RFI report to evaluate corrective measures. The CMS culminates in a report which describes the recommended corrective measure(s).

It is Harrison's intention to conduct the RFI/CMS in a manner consistent with their overall strategy of: (1) identifying contaminant sources on the property; (2) investigating and remediating ground-water contamination in the upper aquifer resulting from Harrison's operations. In addition, Harrison will participate with other responsible parties to investigate and further define off-site sources of contamination in both the upper and lower aquifer.

1.2 Scope of the DOCC Report

This Description of Current Conditions (DOCC) report was prepared according to Attachment 2, Task 1 of the Unilateral Order and generally follows the guidelines outlined in the USEPA report, "Interim Final RCRA Facility Investigation Guidance" (OSWER Directive 9402.00-62), dated May 1989. It is based on information and data previously collected at the Harrison site. As is described in the next section (Summary of Previous Investigations) and is evident throughout the DOCC report, Harrison has conducted numerous investigations over the years to identify and understand the sources and extent of contamination at the facility.

Section 2.0 of this report presents a description of the site location, plant ownership and operations, physiographic and demographic settings. Section 3.0 summarizes the current and historical solid and hazardous waste management operations at the Harrison site. Section 4.0 discusses the nature and extent of contamination. A general description of additional data requirements during the RFI process are presented in Section 5.0.

1.3 Summary of Previous Investigations

Figure 1-1 provides a summary of the activities carried out by Harrison since 1981. Harrison intends to build on the information collected in these previous investigations and to gather other such data as necessary to meet the objectives of the RFI Work Plan. The following text briefly outlines the investigations and reports completed over the past few years. Sections 2.0, 3.0 and 4.0 of this report give a more complete summary of these investigations.

- North and South Settling Lagoons

Harrison has carried out several activities in dealing with two RCRA solid waste management units, the North and South Settling Lagoons. These activities began in 1981 with the installation of the detection monitoring system at each Lagoon. In response to a statistical difference (pursuant to 40 CFR Part 264 Subpart F) in quality between the upgradient and downgradient ground water, an assessment of the impact of the North Settling Lagoon on ground-water quality was conducted in 1983. Since then (1984 to the Present) quarterly RCRA ground-water assessment monitoring has been conducted. In addition, RCRA ground-water detection monitoring of the South Settling Lagoon has continued since 1981. Wastewater previously routed through these lagoons is now being treated at the on-site wastewater treatment facility. Storm-water runoff previously captured by these lagoons is now directed to the newly constructed north and south concrete storm-water retention basins.

The sludge and subsoils in the two lagoons has been fully characterized and Closure Plans have been submitted to the Ohio

Environmental Protection Agency (OEPA). These proposed Closure Plans call for "clean" closure of the South Settling Lagoons by excavation, removal, and stabilization of all sludge and contaminated subsoil. The proposed Closure/Post Closure of the North Settling Lagoons calls for excavation of all the sludge and contaminated soil, construction of a state-of-the-art minimum technology landfill, and replacement of all the stabilized sludge and contaminated soil from the North and South Settling Lagoons into the newly constructed landfill.

- <u>Inactive Landfill</u>

An assessment of ground-water conditions near the south inactive landfill (Landfill L-1) was conducted in 1982 and 1983. This assessment evaluated the impact of the inactive landfill on ground-water conditions near Montgomery County's Dryden Road North well field. Ongoing ground-water monitoring (semi-annually sampling, quarterly water levels since 1983) has allowed for evaluation of trends in ground-water flow and water quality.

- <u>Underground Storage Tanks</u>

Following the completion of the on-site wastewater treatment facility, active storage of waste oils and oily wastewater in underground storage tanks (USTs) was largely eliminated. Fifteen USTs were completely removed between 1986 and 1989. Soil sampling during the removal of former solvent and waste solvent storage tanks detected soil contamination. Subsequently, approximately 1000 tons of contaminated soil was removed and disposed of off site.

- <u>Ground-Water Remediation Evaluation</u>

Much of the focus of recent investigations at the Harrison site has been related to determining the need for controlling contaminated ground water at the site. Three pumping tests have been conducted to better define the aquifer parameters affecting ground-water flow. Three-dimensional steady-state ground-water flow modeling has been conducted to gain a better understanding of ground-water conditions beneath the site.

Additional 3-D flow modeling was conducted using a particle tracker to evaluate capture zones. Two-dimensional contaminant transport modeling was conducted to further define capture zones and estimate contaminant recovery time. This combined analysis provided estimates of pumping rates required for capture. Following these modeling efforts an engineering evaluation of various extraction, treatment and discharge options was completed. Additional modeling was conducted to analyze the effects of the Dryden Road North well field's recent ground-water pump-to-waste activity. This modeling effort and additional engineering evaluations focus on refining the pump and treat options while considering the additional stress of the Dryden Road North pumping on the hydrologic system.

- <u>Regional Aquifer Concerns</u>

Discussions were held with Montgomery County during 1989 to evaluate various ground-water remediation strategies to protect ground-water resources at the Miami Shores well field. Agreements were made to exchange water level data to support regional ground-water modeling efforts being conducted by both Harrison and Wright State University (for Montgomery County). Harrison also presented the results of the three-dimensional ground water flow model.

2.0 SITE CHARACTERIZATION

The successful planning and implementation of a RCRA Facility Investigation/Corrective Measures Study requires a comprehensive understanding of the facility's physical and geographic setting. The following sections present a summary of the current site conditions at the Harrison facility and some important background information. Current information presented includes the location and description of the facility's operations, local demography and land use. The physiographic setting will be presented including a description of topography, surficial soils, climate, surface water and drainage features, and hydrogeology.

2.1 Location

The Harrison facility is located approximately one mile south of Dayton at 3600 Dryden Road in Moraine, Ohio (Figure 2-1). The facility is bounded by the following USGS coordinates: latitude 39°41'14"N to 39°42'16"N; longitude 84°13'11"E to 84°13'45"E. Figure 2-2 presents a layout of the facility and the surrounding area. The Harrison facility encompasses 165 acres and is bounded to the north by Northlawn Avenue, to the west by Dryden Road and Interstate-75, to the east by the Penn Central Railroad tracks, and to the south by Sellars Road.

2.2 Description of Plant Ownership and Operations

The Harrison Radiator Division-GMC facility is the location of former operations by the Frigidaire Division, GMC. The oldest structure on the site shown as Building 1 on Plate 1 was constructed in 1916 and served as a powerhouse for Frigidaire operations. Building 14, currently the main manufacturing building at the Harrison facility, was constructed for Frigidaire in 8 stages starting with the first structure in 1941 and the last addition completed in 1976. In 1975 the automotive and appliance operations were split and Delco Air Division GMC was formed to manufacture the automotive air conditioning compressors. In 1979 the Frigidaire home appliance operations were discontinued. In 1981 Delco Air was merged into the Harrison Radiator Division GMC.

The Harrison facility's major operations are the machining and assembly of automotive air conditioning compressors, accumulator dehydrators, and miscellaneous air conditioning valves. A description and history of solid and hazardous waste management operations is presented in Section 3.0.

2.3 Physiographic Setting

2.3.1 Topography

The Moraine Complex is located in the Great Miami River valley and is bounded by bedrock valley walls and various glacial features. The surrounding topography can be seen on the Dayton South Quadrangle and Miamisburg Quadrangle U.S.G.S. topographic maps. The valley walls and overlying glacial features, approximately one mile east and west of the complex exhibit elevations ranging between 900 and 1000 feet msl (see Figure 2-2).

Topographically, the Harrison facility lies on the valley flats. Plate 1 illustrates the topography of Harrison facility. The site has little relief, with elevations ranging from 725 to 740 feet above mean sea level (msl).

2.3.2 Climate

The area's climate is continental, which is denoted by large annual and daily temperature changes. Summers are moderately warm and humid with an average July temperature range of 96°F (maximum) and 55°F (minimum). Winters are cold and cloudy with an average January temperature range of 60°F (maximum) and 2°F (minimum).

Precipitation for the area varies widely from year to year, although it is well distributed and abundant throughout the year. The average annual precipitation for the area is 40 inches, with an average annual evapotranspiration of 32 inches (National Weather Service). The estimated average for high rates of precipitation over short durations is two inches, based on a ten-year, one-hour rainfall (U.S. Weather Bureau). Precipitation is lowest in the fall, with the abundance of rainfall during the growing season.

Prevailing winds are 8 miles per hour (mph) in the summer and 12 mph in the winter, although severe winds are commonly associated with summer thunderstorms.

2.3.3 Surficial Soils

The Facility is underlain by soils belonging to the Fox Series, specifically the Fox silt loam soil type, consisting of well drained soils formed in loamy glacial outwash material (Powell and Mecker, 1970). This series has a substratum of calcareous sand and gravel at a depth of 24 to 42 inches and commonly occupies areas on the terraces along major streams.

The Fox Series profile exhibits a dark yellowish-brown silt loam layer approximately 8 inches thick. Underlying subsoil layers consist of brown loam, dark-brown clay loam, and reddish-brown and brown sand clay loam extending to the substratum.

Permeability is moderate in the subsoil and rapid in the substratum. Surface runoff is medium to rapid resulting in a moderate erosion hazard. Shrink-swell potential is low therefore damage from heave or settlement is not a major concern.

2.3.4 Surface Water and Drainage Features

Moraine and the surrounding region are drained by the Great Miami River. This river flows from north to south and lies approximately 3,600 feet west of the northern end of the site and bends to as close as 700 feet near the South Settling Lagoons at the southern end of the site. No major tributaries to the Great Miami River pass through the Harrison Facility. Stream gauges on the Great Miami River (Dayton gauge and Miamisburg gauge) indicate a low flow discharge ranging from 300 to 400 cfs, and velocities ranging from 1 to 1.5 fps. The Flood Insurance Rate Map (FIRM), Figure 2-3, for Moraine shows the area affected by the 100-year flood does not include the Harrison facility or any of the SWMUs (Federal Emergency Management Agency (FEMA), 1981). The flood insurance study gives 100-year flood discharges of 86,000 cfs and a mean velocity of 7.2 fps (FEMA, 1981) for a point on the Great Miami River approximately two miles downstream from the Harrison Plant.

Surface water run-off from rainfall to most paved areas and roofs at the Harrison site is collected in two concrete lined storm-water Retention Basins. This water is then discharged to the Great Miami River under NPDES permits. An unnamed drainage ditch flows east to west several hundred feet north of the North Settling Lagoon, then north to south along the western side of the lagoon (see Plate 1). This ditch originates in west Kettering, drains most of that area and eventually discharges to the Great Miami River. This ditch probably receives a small amount of runoff from areas immediately adjacent to it at the Harrison site.

2.3.5 Hydrogeology

As mentioned in the Introduction, much data has been collected over the past ten years on the hydrogeologic conditions at the Harrison site. Plate 1 illustrates the location of the more than

40 monitor and production wells used to collect subsurface and hydrogeologic data. Appendix A contains all the currently available geologic and well construction logs for the area, as well as soil boring logs. Plates 2 and 3 illustrate generalized geologic cross-sections for the site.

Hydrogeologic Units. The Harrison facility lies within the Great Miami River buried valley aquifer. Ordovician shales and limestones of the Richmond Group comprise the dominant bedrock units forming the valleys in the Dayton area. The Richmond Group is overlain by the Silurian Brassfield Limestone in upland areas. Prior to the onset of the Illinoisan and Wisconsin glacial stages, the bedrock valleys were as much as 190 to 225 feet deep (Norris and Spieker, 1966). Figure 2-4, taken from Norris & Spieker (1966), illustrates the configuration of the valley floor in the vicinity of the Harrison plant. The bedrock units are not considered important sources of ground water because they have significantly lower transmissivity values relative to the buried valley aquifer.

Valley fill deposits in the Dayton area are predominantly composed of sand and gravel outwash separated by locally discontinuous silt and clay units, frequently referred to as till zones. Beneath the plant these glacial deposits have been divided into the following hydrogeologic units: the upper sand and gravel unit, the till zone, and the lower sand and gravel unit.

Plates 2 and 3 illustrate generalized cross sections of the geologic units described above as they underlie the GMC-Harrison Radiator plant. The location of wells and cross sections at the facility are illustrated in Figure 2-5. The geology shown has been generalized to illustrate the three main hydrogeologic units beneath the site. Boring logs describe a significant amount of variability in the lithology within each of the three units. This lithologic variability within units has been omitted for the purpose of presenting an uncomplicated illustration.

The upper unit is generally 30 to 70 feet thick and contains minor, shallow till lenses. This unit is considered a water-table aquifer with saturated thicknesses ranging from 10 to 40 feet. There appears to be no known users of ground water from this shallow water-table aquifer in the immediate vicinity of the Harrison site.

The till zone is of varied thickness and continuity, but appears to be discernable throughout the region, ranging from 2- to 20-feet thick beneath the Harrison site. Although the till deposit constitutes a relatively small portion of the valley fill deposits, it is a major hydrologic factor because it can retard recharge to the underlying sand and gravel units. These glacial till deposits are, therefore, referred to as an aquitard. Clay and silt tills have a very low permeability (10^{-7} cm/sec or less); a very high unit weight (on the order of 140 pcf); and a very low void ratio, yielding a porosity of less than 20 percent (Norris and Spieker, 1966). Low porosities result in the transmission of very little water through such a unit. Therefore, the till layers divide the sand and gravel deposits into two or more aquifers. Locally recharge from the upper aquifer to the lower aquifer can be relatively rapid where the till layer is absent, but regionally the till layer provides an effective barrier resulting in the lower semi-confined aquifer.

The till zone overlies 50 to 100 feet of sand and gravel that comprise the lower unit. The lower unit is a fully-saturated semi-confined aquifer throughout most of the Dayton area. However, there are locations where the till is thin and discontinuous. In areas where the till is absent, the upper and lower aquifers respond as one hydrogeologic unit. Consequently, aquifer parameters vary with the thickness and distribution of the till layer. The lower unit is the principle water source for industry in the area. Aquifer yields range from 500 to 2000 gallons per minute for the typical industrial water supply well (Norris and Spieker, 1966). The lower aquifer is underlain by a basal till that ranges in thickness from 0 to 20 feet.

<u>Water Levels & Hydraulic Gradients</u>. Water levels in accessible wells are taken on a quarterly basis at the Harrison facility. These measurements indicate that the direction of ground-water flow in both aquifers at the site is generally from north to south, with a westerly bend at the southern portion of the site. This bend in the flow pattern corresponds to the trend of the buried bedrock valley. Ground-water pumping at the Dryden Road North well field and the GMC-Truck and Bus facility appear to have localized influence on the flow direction in the lower aquifer. Figure 2-6 illustrates the upper water table surface in November 1990. Figure 2-7 illustrates the potentiometric surface of the lower aquifer for the same time period.

Historical pumping of the lower aquifer has influenced the flow regime substantially. Until late 1986, the flow of ground water beneath the Harrison site was influenced primarily by the Montgomery County water-supply wells (North and South Dryden Road and Miami Shores well fields) and the Harrison process-water supply wells, all completed in the lower aquifer. During the later part of 1986, the County well fields were shut down and none have pumped on a continuous basis until the start-up in March 1990 of one well in the Dryden Road North well field. The Miami Shores well field has been pumped occasionally to help meet peak demand during dry periods. Pumping at the Harrison facility was also discontinued in late January 1987, when Harrison tied into the municipal water supply. In response to this termination of pumping in the County well field and at the Harrison facility, water levels in both the upper and lower aquifers have risen approximately 9 feet in the central and northern end of the site and as much as 2 feet of the southern end of the site.

Historically, when supply wells are active in the lower aquifer as they were prior to 1986, potentiometric elevations are lowered and a vertical gradient from the upper to aquifer lower is created as shown on Figure 2-8. Sustained pumping has had the effect of lowering water levels in both aquifers as the upper aquifer recharges the lower aquifer through the semi-confining till zone. As municipal and industrial pumping slowed in 1986 water levels began to rise in both aquifers. With the higher water levels seen in the last few years, very little difference is seen in the elevations from the water table and the potentiometric surface of the lower aquifer. Another result of the high water levels is the decrease in the hydraulic gradient. Gradients have decreased from approximately 0.0017 feet per foot (ft/ft) in 1986 to the 1989 average of 0.0005 ft/ft in both aquifers. The recent start up of pumping (March 1990) at the Dryden Road North well field has began to show some lowering of the deep aquifer and an increase in vertical gradients near the well field as illustrated in Figure 2-8.

Hydraulic Conductivities. To determine the hydraulic characteristics of the water-table aquifer, the deep aquifer, and the till zone in the vicinity of the GMC-Harrison Radiator site, Geraghty & Miller analyzed time-drawdown data collected during three pumping tests (G&M, 1990). The data was analyzed using AQTESOLV, an aquifer-test analysis software package (Duffield and Rumbaugh, 1989). Shallow aquifer tests were performed in June 1985 and August 1989, at the southern end of the North Settling Lagoon (Test Well #1), and south of Landfill L-1 (Test Well #2) respectively. The deep aquifer test was performed just north of Landfill L-1 (Production Well #45) in November 1989.

All of the shallow aquifer data were analyzed using the Neuman (1975) method for partially penetrating pumping and observation wells. Partially penetrating solutions were necessary because the pumping wells are not fully screened throughout the thickness of the aquifer. The Neuman (1975) method is applied to pumping test data in anisotropic unconfined aquifers, taking into consideration the effects of delayed gravity response. The Neuman method assumes an initial, horizontal water table, a constant pumping rate, negligible well-bore storage, unsteady flow in the aquifer, and that the aquifer is homogenous, of uniform thickness, and of infinite areal extent.

Table 2-1 summarizes the statistics for the shallow aquifer test analyses. The median hydraulic conductivity determined from the shallow aquifer tests is 1646 ft/day. This hydraulic conductivity value is greater than published values for the shallow aquifer in the Great Miami River valley. This suggests the presence of a highly localized permeable feature, such as a river point bar deposit. Point bar deposits consist of river-washed sediments which generally have high hydraulic conductivities.

The median specific yield determined from the shallow aquifer tests is 7.0 x 10^{-2}. Water-table aquifers typically have specific yields of 0.10 to 0.20 (Kruseman and de Ridder, 1983). The drawdown response recorded in Well W-3-N may suggest a localized, semi-confined aquifer setting in the shallow aquifer. However, the median value for storage determined from the shallow aquifer test of 1.1 x 10^{-2} is well above the range for semi-confined aquifers of 1 x 10^{-4} to 1 x 10^{-6} given by Kruseman and de Ridder (1983). This suggests that the shallow aquifer in the vicinity of the Harrison site responds as a water-table aquifer with localized semi-confined character. The results of the shallow aquifer tests suggest the presence of small areas of interspersed clay layers within the shallow aquifer resulting in localized, semi-confined conditions.

The deep aquifer test data were analyzed separately for the pumping period and the recovery period after pumping. Therefore, in addition to a spatial comparison, hydraulic parameters can be estimated by different methods of analyses, and again compared for consistency. Aquifer transmissivity, leakance and storage were estimated using the following methods of aquifer analysis: (1) the Cooper-Jacob (1946) method, (2) the Hantush-Jacob (1955) method, (3) the Moench (1985) method, and (4) the Theis recovery (1935) method.

AQTESOLV automatically provides solutions to the Cooper-Jacob, Hantush-Jacob, Moench, and Theis recovery methods for all parameters, and numerically fits a type curve for each method to time-drawdown data recorded in the field.

Table 2-1 also summarizes the statistics for the hydraulic parameters in the deep aquifer. The median hydraulic conductivity calculated from all of the deep aquifer test analyses is 398 ft/day. This value is within the 125 to 400 ft/day range reported by Spieker and Norris (1966) for the Dayton area. The minimum and maximum estimated hydraulic conductivity values of 261 and 463 ft/day were estimated at GM-19D and Well 45, respectively. The values of hydraulic parameters estimated by the drawdown data correlate very well with those estimated from the recovery data, and both sets of parameter values are consistent with published values for the Great Miami River Valley.

The median value of estimated vertical conductivities is 2.0 x 10^{-2} ft/day. This median value is within the range of vertical conductivities cited by Norris (1959) of 3.9 x 10^{-3} to 1.7 x 10^{-2} ft/day for till beds in the Dayton area. Fidler (1971) has also used similar values in a numerical model of the Dayton area. The most reliable estimates of vertical conductivity from the tests are consistent with the estimates for till and clays in the study area listed by Norris (1959).

The aquifer storage values determined from the deep test are indicative of a semi-confined aquifer. The median value of storage is 6.65 x 10^{-4}. Kruseman and de Ridder (1983) describe confined aquifers as having a storage coefficient of 1 x 10^{-4} to 1 x 10^{-6} and unconfined aquifer storage (specific yield) values of 0.10 to 0.20. Therefore, the median value estimated from the deep aquifer test data is at the upper limits of the range of values for a confined aquifer and is consistent with the values expected for a semi-confined aquifer. Well 46 is a production well and the high storativity of 1.78 x 10^{-1} may be due to the influence of the disturbed aquifer sediment around the large 10-inch diameter well bore. The storage values determined from the deep aquifer test are consistent with values listed in studies conducted in the Dayton area (Norris and Spieker, 1966; Fidler, 1975; Dove, 1961). In addition, the median storage values are characteristic of those values obtained for a semi-confined aquifer.

Ground-Water Modeling. In order to gain a better understanding of the regional and local ground-water flow system and to aid in developing remedial action plans, a three-dimensional steady-state flow model was developed for the Harrison site (G&M 1989). The public domain, U.S. Geological Survey three-dimensional finite difference flow model (Modflow) was used.

The flow model was set up horizontally according to the finite-difference grid shown in Figure 2-9. Vertically the model was divided into three layers representing the three hydrogeologic units observed both locally and regionally. Initial parameter estimates, layer thicknesses and boundary conditions for the model were based on both site specific data and published reports on regional flow.

The model was calibrated to 1985 water levels and pumping conditions. It was assumed that water levels on this date represented near steady-state conditions since pumpage was relatively constant prior to November 1985. The average total pumping rate was 26.5 MGD for eight pumping centers in the region (Lamme Road 3.5 mgd, North Dryden 5.5 mgd, Appleton Paper 4 mgd, West Carrollton 1.7 mgd, Harrison Radiator 1.8 mgd, and GMC-Truck and Bus 1 mgd).

Model calibration was assisted by MODEST, a parameter estimation package developed by the Geraghty & Miller Modeling Group (Duffield, 1988). A sensitivity analysis was done to evaluate the uncertainty of the model calculation given the available water-level measurements, the field determined aquifer parameters, and the pumping rates used in the calibration. This analysis indicated that streambed leakance and vertical leakance through the confining layer are the most sensitive model parameters. The match between observed and model calculated water levels and the agreement between field determined and model estimated parameters indicates the model is a realistic mathematical representation of the aquifer system.

The model has been used to evaluate various ground-water extraction alternatives for remedial action to capture and contain impacted ground water at the Harrison site. In addition, the model is designed such that it could be used to support the evaluation of a variety of regional ground-water management issues.

2.4 Local Demography and Land Use

The Harrison facility is located within an area zoned for general industry. Adjacent areas are zoned for heavy industry, light industry, single-family dwellings, and conservation districts. Areas zoned for single-family dwellings are in the immediate vicinity of Harrison, northwest of the North Settling Lagoon and south of the South Settling Lagoon. This information is presented in Figure 2-10.

3.0 SUMMARY OF SOLID AND HAZARDOUS WASTE MANAGEMENT OPERATIONS

The purpose of this section is to provide a history and description of the various solid and hazardous waste management operations at the Harrison facility. Section 3.1 presents a summary of each solid waste management unit, including its location, dimensions, current and historical use, investigations or reports describing the unit, solid or hazardous wastes associated, and any activities undertaken or in progress. A summary of all known spills is presented in Section 3.2. Finally, a historical record of the facility's permits for the treatment, storage and disposal of solid and hazardous waste are presented in Section 3.3.

3.1 Solid Waste Management Units (SWMU)

The SWMUs discussed in this section include landfills, surface impoundments, waste pile and staging area, underground storage tanks, incinerator, and a drum storage area. The location of SWMUs are illustrated on Plate 1 and on Figure 3-1. Table 3-1 provides a description of each SWMU by unit number, site location, current status and a notation regarding the presence of solid waste.

3.1.1 Landfills

There are three landfilled areas on the Harrison facility which are pre-RCRA, unlined, uncapped disposal areas (see Figure 3-1). Landfill L-1, located at the southern end of the facility has been designated in previous reports as the South Inactive Waste-Disposal Facility. Landfill L-2 is located north of Building 14 and east of the wastewater treatment facility. Landfill L-3 is located immediately northeast of the North Settling Lagoon and northwest of Landfill L-2.

3.1.1.1 Landfill L-1

This inactive waste-disposal facility is located at the southern boundary of the Harrison facility on the northeast corner of the intersection of Dryden and Sellars Roads (see Plate 1 and Figure 3-1). This landfill covers an area of approximately eight acres and was used for the collection and disposal of wastes generated by the previous plant operator, Frigidaire, during a period of more than 20 years. Operation of L-1 began prior to 1950 and was terminated around 1973.

Previous investigations have been conducted at this landfill site. Bowser-Morner Testing Laboratories installed ten soil borings into the landfill in 1979 to physically describe the fill and natural soil below the fill (Bowser-Morner, 1981). Geraghty & Miller, Inc. conducted an investigation in 1982 and 1983 to determine ground-water conditions near this inactive landfill (G&M, Inc., 1983). Other reports on the impact of waste-disposal activities on the ground-water resources of the south Dayton area include Plummer (1973), Schmidt (1982), and Schmidt (1983). Montgomery County with assistance from Wright State University has been conducting ongoing studies to determine the quality of ground water in the vicinity of Montgomery County's Dryden Road North well field. Some results of these studies are contained in these progress reports (Wright State University, 1984, 1985, 1986).

Based on soil borings (Bowser-Morner, 1981) the fill depth ranges from as little as 4 feet to as much as 37 feet below the surface. Figure 3-2 identifies the location of these borings and lists the associated fill depth. Copies of the boring logs are contained in Appendix A.

The types of waste disposed of in Landfill L-1 are unknown. Frigidaire operations generated various wastes, listed in Table 3-2, which may have been disposed of in L-1. Waste material identified in the Bowser Morner, 1979 boring logs include glass, cinders, metal, wood chips, wire, paper, oil, crushed stone, flyash, slag, plastic fibers, concrete, brick, hydrated lime (chalk-like), black tar and fiberglass insulation.

Landfill L-1 is a suspected source of ground-water contamination. Geraghty & Miller (1983) concluded that chlorinated organic hydrocarbons were releasing from this landfill into the ground water. Further details on this potential release and the nature and extent of ground-water contamination will be presented in Section 4.0.

3.1.1.2 Landfill L-2

This landfill is thought to occupy an area north of building 14 and east of the wastewater treatment facility as shown by dashed lines on Plate 1 and Figure 3-1. The actual lateral and vertical extent of the waste disposal here is unknown. As with Landfill L-1, this landfill was used for the collection and disposal of waste generated by Frigidaire from a period prior to 1950 and terminating around 1975.

The actual waste types disposed of in Landfill L-2 are unknown, although it is speculated they are similar to those disposed of in Landfill L-1 and generated by Frigidaire during the period of operation of L-2. Table 3-2 lists the waste types generated by Frigidaire. A 1968 topographic map (Williams and Assoc., 1968) and 1979 foundation borings (Bowser Morner, 1979) for the wastewater treatment facility offer some evidence concerning the lateral and vertical extent of this landfill.

The 1968 topographic map attached as Plate 4, part of a series of maps of the City of Moraine, Ohio, illustrates a local topographic depression and ponded water area that does not exist today. This area may represent the approximate lateral dimension of Landfill L-2 and may also indicate the approximate vertical extent of the fill when compared to the existing elevations for this area as shown on Plate 1. The water elevation of 721.9 feet (msl) for the ponded area shown on Plate 4, when compared with existing elevations of 735 to 740 feet (msl) shown on Plate 1, suggest the existence of at least 15 to 20 feet of fill in an area of approximately 2 acres. The fill would be shallower in other areas.

Borings conducted by Bowser Morner in 1979 (attached in Appendix B) as part of a geotechnical investigation prior to the construction of the Harrison wastewater treatment facility show evidence of the existence and depth of this landfill. Fill in borings extends to depths ranging from 0 to 23 1/2 feet. This fill was described in the boring logs (Borings 5, 10, and 26) as having a matrix consisting of a fine grey and black organic rich silty sand with minor components consisting of wood, concrete and miscellaneous rubbish or debris. "Swamp bottom clay", as described in the boring logs, was identified in several borings below the fill.

There have been no previous investigations directly concerned with Landfill L-2, although ground-water monitoring wells that have been placed upgradient and downgradient may reveal some information concerning the impact of Landfill L-2 on ground-water quality. Further investigation is necessary to determine the actual dimensions of this landfill, the types of waste and hazardous constituents present and the potential for this landfill to impact ground water.

3.1.1.3 Landfill L-3

This landfill is located immediately northwest of the North Settling Lagoon and directly north of the wastewater treatment facility. Although a precise location and dimensions are unknown, the landfill is thought to occupy an area of approximately 1.1 acres in size as shown on Plate 1 and Figure 3-1. It was used for the collection and disposal of sludge from the adjacent North Settling Lagoon system. An estimated 25,000 cubic yards of sludge were placed in this unit from 1972 to 1979. This landfill has been inactive since 1979.

The exact composition of the lagoon sludge is unknown. During the seven years (1972-1979) that the North Lagoon sludge was placed in Landfill L-3, this lagoon received industrial wastewater which contained metal plating waste (zinc, nickel, and chrome), cutting fluids, pickling waste, oils, porcelain sludges, electrodeposition paint rinse waters, and other industrial waste waters. Recent investigations to determine the chemical makeup of the North Settling Lagoon sludge have been conducted by G&M Engineers, 1989, to acquire information for a Post-Closure Permit for the North Lagoon. The G&M Engineers findings are discussed extensively in the Draft North Settling Lagoon Revised Closure/Post-Closure Plan, November 1989, and summarized in Section 3.1.2 of this report. This recent data may not be truly representative of the sludge placed in Landfill L-3 since the North Settling Lagoons received a different waste stream in the 1970's than in the 1980's.

There have been no previous investigations directly concerned with Landfill L-3. An aerial photograph, Figure 3-3, taken in the Fall of 1976 does reveal somewhat the dimensions of this landfill and suggest a methodology of sludge disposal. The location of the landfill appears on the photo to be as described previously and outlined in Plate 1 and Figure 3-1. Ramps, probably for truck and bulldozers, were located in both the southeast and southwest corners of what was then an open pit.

The potential impact of this unit on ground-water will be discussed briefly in Section 4.2. Further investigation may be necessary to determine the location, dimensions, and chemical composition of materials in this landfill.

3.1.2 Surface Impoundments

The solid waste management units discussed in this section consist of two former wastewater/storm-water settling lagoon systems that are in the process of being closed under RCRA. Details concerning these lagoons can be found in the Draft South Settling Lagoon Revised Closure Plan, November 3, 1989 and the Draft North Settling Lagoon Revised Closure/Post-Closure Plan, November 3, 1989 which are currently under review by the Ohio Environmental Protection Agency. Discussed below will be a summary of the information presented in more detail in the Closure Plans.

3.1.2.1 North Settling Lagoon System

The North Settling Lagoon system is located east of Dryden Road, west of the wastewater treatment facility, north of Building 14 and south of Northlawn Avenue as shown on Figure 3-1. The system consists of a Primary and Secondary Basin separated by an earthen dike. In addition, the North Secondary Basin is partially divided by an earthen dike placed to increase the flow length between the influent and effluent. Figure 3-4 shows a plan view of existing conditions at the North Settling Lagoon system. The entire lagoon system covers approximately 4.6 acres and is a maximum of 28 feet deep from dike crest to the bottom of the sludge. The lagoon water and sludge levels range from 10 to 12 feet above the bottom. The lagoon bottom consists of natural sand and gravel.

During its active life, flow from various sources entered the system through the smaller lagoon, the North Primary Basin. After initial settling of solids, the water was diverted to the North Secondary Basin where additional settling occurs. Water from the north secondary basin was discharged through overflow pipes located at the southwest corner. The discharge flows underground, entering a man-made ditch east of Dryden Road. The ditch eventually discharges into the Great Miami River. The discharge was subject to a National Pollutant Discharge Elimination System (NPDES) permit.

The North Settling Lagoon system was originally opened in 1972 by Frigidaire Division GMC, South Plant. Prior to the effective date of the hazardous waste regulations in 1980, the lagoons received wastes of different chemical composition. During the first seven years of operations (1972-1979), the lagoons received industrial wastewater related to the Frigidaire Home Appliance manufacturing operations. The Frigidaire operations were phased out in 1979 and those facilities converted for the assembly of small trucks. The wastewater during the 1972 to 1979 period contained metal plating wastes (zinc, nickel, and chrome), cutting fluids, pickling wastes, oils, porcelain sludges, electro-deposition paint rinse waters, and other industrial wastewaters.

Liquids received during the period from May 1980 to September 1984 consisted primarily of non-contact cooling water and stormwater runoff from the Harrison Facility and the GMC-Truck and Bus Assembly Plant located east of the lagoon on Springboro Pike. The majority of the wastewater was single-pass (once through) cooling water. The remaining wastewater was dilute process rinse water, blowdown from a recirculated cooling tower, and stormwater runoff from the parking lots and roof drains located at the northern end of the Harrison Facility and GMC-Truck and Bus Facilities. In September 1984 all process wastewaters were diverted to the on-site pretreatment facility.

In anticipation of closure, the North Lagoon System was permanently taken out of service during October 1989. At that time all stormwater and non-contact cooling water flows were diverted into a new concrete stormwater retention facility.

Waste sludges currently contained within the North and South Settling Lagoons resulted from the treatment of wastewaters generated as a result of past manufacturing process at the GMC complex as previously described. Sludges deposited in the lagoons include wastes defined as listed hazardous wastes from non-specific sources as provided in OAC Rule 3745-51-31. The following list presents a summary description of USEPA hazardous wastes contained in the North Lagoon as listed on the latest Part A permit revision for the GMC-Harrison Radiator plant dated June 13, 1988:

1. F006 - Wastewater treatment sludges from electroplating operations;
2. F007 - Spent cyanide plating bath solutions from electroplating operations;
3. F009 - Spent stripping and cleaning bath solutions from electroplating operations;
4. F012 - Quenching wastewater treatment sludges from metal heat treating operations; and,
5. F019 - Wastewater treatment sludges from the chemical conversion coating of aluminum.

In preparation for the closure of the North Lagoon System, G&M conducted an investigation in 1988 that consisted of a survey of the lagoon and surrounding area, sludge and water depth measurements, sludge core sampling, subsoil sampling, and physical/chemical analysis of the sludge and subsoil. Details of this investigation are presented in the 1989 Draft Closure Plans. Figure 3-5 presents the sampling locations. Table 3-3 presents the average depths of the lagoon water and sludge. A summary of calculated waste volumes (water, sludge, and contaminated subsoils) is presented in Table 3-4.

Chemical analysis of the raw sludge and subsoil were performed according to USEPA approved methods and included analyses for total priority pollutants, priority pollutant analysis for volatile organic compounds (VOC) only; selected metals and cyanide analysis; full RCRA Appendix IX analysis; oil and grease analysis; and percent solids and bulk density.

Analytical results for the raw sludge from the lagoon sampling program have been consolidated and summarized in Table 3-5 for the North Settling Lagoon. Only constituents which were detected at least once are included in these tables. Constituents were grouped by related analytical methodology into inorganic, volatile organic, semivolatile organic, and pesticide and PCB compounds to clarify identification of the major constituents found within the sludge. These tables summarize the frequency of detection, the range of detected concentrations, the median concentration, and the location of the maximum detected concentration for each constituent. Table 3-6 summarizes the average dry weight and oil and grease contents determined for each basin.

Fifteen metals (antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, tin, vanadium, and zinc) were identified in samples from the North Settling Lagoon. Six volatile organics were identified in samples taken from the North Settling Lagoon system (1,2-dichlorobenzene, ethylbenzene, tetrachloroethene, toluene, trichloroethene, and xylene). Six extractable organics were identified in samples from the North Settling Lagoon system (bis[2-ethylhexyl]phthalate, fluoranthene, fluorene, 2-methyl-napthalene, phenanthrene, and pyrene). Cyanide, sulfide, PCB 1242, and PCB 1260 were also identified in samples of the North Settling Lagoon sludges.

Analytical results for the subsoil samples were intended to provide an initial screening to gauge the presence and extent of subsoil contamination. Sludge particles were observed in the top 8-12 inches of the subsoil only. The subsoil analytical results show that volatile organic compounds are not present and that cadmium, chromium, and lead are present in the subsoils at concentrations typically less than the upper limit of the range for Ohio farm soils (Logan and Miller, 1983). A supplemental investigation of soils along the northern and eastern perimeter of the North Secondary Basin revealed a similar absence of subsoil contamination.

This unit is currently the subject of a ground-water release assessment according to the Interim Status Provisions of RCRA. Details concerning the ground-water assessment and the nature and extent of contamination are presented in Section 4.0.

3.1.2.2 South Settling Lagoon System

The South Settling Lagoon system is located east of Interstate 75, west of Dryden Road, north of Sellars Road, and south of East River Road as shown on Plate 1 and Figure 3-1. The South Settling Lagoon system consists of three distinct basins bounded by earthen dikes: the South Primary Basin, the South Secondary Basin, and the South Sludge Basin. Figure 3-6 shows a plan view of existing conditions at the South Settling Lagoon system. Together, the three basins cover an estimated area of 7.9 acres and are approximately 22 feet deep. The basins are below-grade impoundments and the sides and bottom consist of natural sand and gravel strata. Water levels in the South Primary and South Secondary Basins are maintained at approximately 10 feet above the bottom. When it was active, flow entered the system through the South Primary Basin at its north end and exited through overflow pipes at the south end. The discharge then entered the South Secondary Basin at the southeast corner and exited at the northwest corner, traveling underground and discharging to a man-made ditch which eventually outfalls in the Great Miami River. The discharge was subject to an NPDES permit.

The South Settling Lagoon system was originally constructed by the Frigidaire Division of GMC in 1965. Initially, the South Settling Lagoon system consisted of a single rectangular basin covering approximately 5.3 acres. In 1967 a sludge drying basin was added and in 1975 a primary basin was constructed and added to the South Settling Lagoon System.

On November 7, 1985 all process wastewater flow was diverted to the on-site pretreatment facility. Prior to the effective date of the hazardous waste regulations in 1980, the lagoons received wastes of different chemical composition. During the first years of operation (1965-1979), the lagoons received industrial wastewater related to the Frigidaire Home Appliance manufacturing operations. The Frigidaire operations were phased out in 1979. The wastewater during the 1965 to 1979 period contained zinc plating wastes, anodizing wastes, pickling waste, oils, porcelain sludges and other industrial wastewaters.

Liquids received during the period 1980 through November 7, 1985 were comprised of the following:

- Dilute acid and alkali rinses from small cleaning and non-cyanodic electroplating processes of GMC-Harrison Radiator;
- Water softening sludges;
- Non-contact cooling water from the GMC-Harrison Radiator and CPC production facilities;
- Stormwater runoff from the south half of the Moraine Complex; and
- Fly ash dewatering filtrate.

In anticipation of closure, the South Lagoon System was permanently taken out of service during October 1989. At that time, all stormwater and non contact cooling water flows were diverted into a new concrete stormwater retention facility. As previously discussed, waste sludges currently contained within the North and South Settling Lagoons resulted from the treatment of wastewaters generated as a result of past manufacturing processes at the GMC Moraine Complex. Sludges deposited in the lagoons include wastes defined as listed hazardous wastes from non-specific sources as provided in OAC 3745-51-31. The following list presents a summary description of U.S. EPA hazardous wastes contained in the North Lagoon as listed on the latest Part A permit revision for the GMC-Harrison Radiator plant dated June 13, 1988:

1. F006 - Wastewater treatment sludges from electroplating operations;
2. F007 - Spent cyanide plating bath solutions from electroplating operations;
3. F009 - Spent stripping and cleaning bath solutions from electroplating operations;
4. F012 - Quenching wastewater treatment sludges from metal heat treating operations; and
5. F019 - Wastewater treatment sludges from the chemical conversion coating of aluminum.

To characterize the physical and chemical properties of the lagoon sludges, and to define engineering parameters pertinent to the selection, planning and design of the lagoon closure, Harrison implemented a lagoon sampling program in the fall of 1988. The sampling program and investigation is similar to that conducted for the North Settling Lagoon system. This investigation for the South Settling Lagoon system consisted of a survey and measurements to determine waste (liquid, sludge and soil) volumes and a visual description and chemical analysis of sludge and subsoil samples. Details on the procedures used and results of this investigation can be found in the November, 1989 Draft South Settling Lagoon Revised Closure Plan. A brief summary of the results is presented below.

Sampling was initiated by first obtaining field measurement of the basic dimensions and configuration of each basin and then subdividing each basin into segments or quadrants and grid blocks as shown on Figure 3-7. An initial survey of water and sludge depths was then completed by probing, from a skiff, with a metal rod at each sample location to measure water and total depths. Water level elevations at each basin were obtained to allow calculation of bottom elevations across each basin. Depths were verified during actual core sampling activities and Table 3-7 summarizes the averaged depth data obtained from these two measuring events. This data was subsequently used to calculate sludge and water volumes contained within the basins. Table 3-8 presents the calculated waste (sludge and contaminated subsoil) inventories contained within the South Settling Lagoon.

Chemical analyses were conducted in accordance with U.S. EPA approved methods and included analysis for total priority pollutants, priority pollutant for volatile organic compounds (VOC) only; selected metals and cyanide; full RCRA Appendix IX; oil and grease; and percent solids and bulk density.

Analytical results for the raw sludge from the lagoon sampling program have been consolidated and summarized in Table 3-9 for the South Settling Lagoon. Only constituents which were detected at least once are included in these tables. Constituents were grouped by related analytical methodology into inorganic, volatile organic, semivolatile organic, pesticide and PCB compounds to clarify identification of the major constituents found within the sludge. This table summarizes the frequency of detection, the range of detected concentrations, the median concentration, and the location of the maximum detected concentration for each constituent. Table

3-10 summarizes the average dry weight and oil and grease contents determined for each basin.

Fourteen metals (antimony, arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, tin, and zinc) were identified in samples from the South Settling Lagoon. No volatile organics were found in the South Settling Lagoon system; but two extractable organics were identified in samples taken from the South Settling Lagoon system (bis[2-ethylhexyl]phthalate and di-n-butylphthalate). Cyanide, PCB 1254, and PCB 1260 were also found in the South Settling Lagoon system.

Only two samples from the South Settling Lagoon showed PCB 1254 concentrations above the 50 parts per million (ppm). Additional sludge characterization work (GMCE, December 1990) shows that this sludge would not be regulated by the Toxic Substance Control Act (TSCA).

Analytical results for the subsoil samples were intended to provide an initial screening to gauge the presence and extent of subsoil contamination. Boring observations suggest the penetration of sludge particles into the subsoils is limited to the top 8 to 12 inches. The subsoil results show that volatile organic compounds are not present and that cadmium, chromium, and lead are present in the subsoils at concentrations typically less than upper limit of the range for Ohio farm soils (Logan and Miller, 1983).

The South Settling Lagoon is the subject of ground-water detection monitoring in compliance with the Interim Status Standards of RCRA. No statistically significant contaminant contribution to the ground water has been identified to date. In the fall of 1989 changes were made to ground-water monitoring program. The current monitoring procedures are outlined in the revised monitoring plan (G&M, June 1989) and are part of a Consent Decree with the State of Ohio (State of Ohio, October, 1988).

Various summary tables of analytical data of ground-water samples from monitor wells in the vicinity of the South Settling Lagoon are contained in Appendix B. Additional discussions of ground-water quality in the vicinity of the South Settling Lagoon are included in Section 4.1.

3.1.3 Waste Pile and Staging Area

This waste pile and staging area is located just north of Landfill L-1 and east of Building 21 as shown on Figure 3-1. This SWMU consists of a three-side sludge bunker, a concrete staging area and the sump and oily waste drainage system associated with the sludge bunker and staging area. Figure 3-8 presents a layout of this SWMU. This sludge bunker and staging area pad were originally constructed in 1976. The staging area was expanded later.

The sludge bunker is a three-sided concrete above-ground structure of the approximate dimensions of 90 by 30 feet by 5 feet high. The bunker is open on the north end where grinding sludge from aluminum, steel, and cast iron machinery operations are loaded. The floor of the bunker is sloped to allow drainage of machine coolants to a sump. Sludge buggies, small liquid tight dump type vehicles, carry the grinding sludge from the manufacturing area in Building 14 to the sludge bunker. A truck at the sludge bunker lifts and dumps the sludge buggies into the bunker with a dumping mechanism. A front end loader then removes the drained sludge and places it into lugger boxes for off-site disposal as a non-hazardous waste. Currently, Harrison disposes of approximately 25 cubic yards per week of grinding sludge. The machine coolants flow from the sump to the local oily waste system and eventually into a holding tank. This holding tank will be addressed separately (SWMU T11). From this holding tank the fluid is pumped to the onsite wastewater treatment facility.

The staging area consists approximately of a half acre of concrete pad with a contained drainage system. Empty drums (containing less than 1 inch of liquid) are drained on this pad. The drums contain residual oils and residual processing materials. In addition, steel and aluminum turnings (shavings) are staged on this concrete pad prior to being hauled off site to be recycled. Residual oils, mostly cutting oils, from the turnings may drain onto the pad. The residual liquids then enter the local oily water sewer system which, along with the sludge bunker liquid, eventually drain into the holding tank (SWMU T11) referenced above.

The underground oily waste sewer system associated with this staging area consists of six grated pad drains, an empty drum drainage sump, the sludge bunker sump and approximately 1000 feet of underground piping. In addition to the waste coolants and residual drum fluids, storm water run-off from the entire staging area enters this sewer system.

In the fall of 1989, modification to the underground piping and repairs to the concrete pad were made. Approximately 200 cubic yards of soil were excavated during this work. Initial characterization for disposal indicates that PCBs are present in the soil. Ten discrete samples were taken and analyzed. Concentrations of PCB 1254 ranged from less than 5.74 to 484 parts per million (ppm) with a mean value of less than 94.7 ppm.

3.1.4 Underground Storage Tanks

The location of all 19 underground storage tanks (USTs) listed in the Unilateral Order (T1 through T12) are shown on Plate 1 and Figure 3-1. A summary of the history and use of these tanks (as documented in the facility's site specific Spill Prevention, Control, and Countermeasure Plans for 1974, 1978, 1982, 1984, 1986, and 1989) is presented on Table 3-11 and discussed below. In addition, Table 3-11 summarizes the history and use of all other

USTs (USTs that are not listed in the Unilateral Order and are not SWMUs) at the associated with the South and West Tank Farms. These were included due to their location with respect to the SWMU tanks in an effort to provide details on the current condition of the SWMUs.

Fifteen of the nineteen waste tanks have been removed from the ground. Of the four remaining in place (T1, T4, T12, and T11), only T11 is still in use. UST T11 is used as part of the oily waste collection system associated with the waste pile and staging area discussed in Section 3.1.3. Additional details on T11 will be presented in this section. USTs T1, T4, and T12 were used to hold a similar waste fluid consisting of wash water or spent detergent solution from a process using polyester resins or potting compounds. The three tanks are considered empty, although each contains some residual sludge. A partial closure process has been initiated for the four T8 USTs that were associated with a solvent recovery system. UST T6, which contained coolant oil has been closed under the regulations administered by the Ohio State Fire Marshal. Some test sampling was conducted during the removal of the 10 other tanks. Further details on these closures and the analytical results of soil sampling are discussed later in this section.

Other USTs not listed on the Unilateral Order, nor regulated under RCRA Subtitle C, include five product tanks in the West Tank Farm and five in the South Tank Farm. The West Tank Farm currently has five active product tanks designated as Tank number 6, 7, 8, 9, and 10 on the 1989 SPCC Plan as shown of Figure 3-9. Tank #7 has a 6,000 gallon capacity while the other four are 10,000 gallon capacity tanks. The products contained in these West Tank Farm tanks include non-leaded gasoline, diesel fuel, cutting oil, Quaker 568 and Cimcool S-2 for Tank number 6, 7, 8, 9, and 10 respectively. The South Tank Farm currently maintains five 10,000 gallon products USTs. These tanks are labeled numbers 1, 2, 3, 4 and 5 in the 1989 SPCC Plan and contain washing oil, lube gear oil, Bruko D-332 drawing oil, 215 sec. hydraulic oil and Cimtech 3900 (coolant) respectively. The existing layout of the South Tank Farm is shown on Figure 3-10.

The following paragraphs describe each of the underground storage tanks that received waste and were listed as SWMUs T1 through T12 on the Draft Unilateral Order (USEPA, 1990).

- <u>T-1</u>

In 1974, a 10,000 gallon steel tank was installed at location identified as Tank number 27 and T-1 on attached Figure 3-10 which depicts the existing layout of the South Tank Farm (see Plate 1 and Figure 3-1). This tank is equipped with cathodic protection to minimize the rate of wall corrosion. Starting in March 1975, this tank was used for the collection of spent detergent solution from an impregnation process used to leak-proof aluminum castings. The impregnation process used a catalyzed polyester resin which was forced into the aluminum casting through a vacuum/pressure cycle. Excess resin was removed from the surface of the castings by washing in an alkaline detergent solution. When the detergent bath no longer effectively removed the excess resin, it was discharged to this collection tank and subsequently hauled off site for disposal. The use of this tank was discontinued in 1979. At that time, the liquid portion of the waste was removed and the sludge left in place. No tank tightness or leak tests have been conducted on this tank.

- <u>T-2</u>

In 1975, a 11,000 gallon steel tank was installed at location identified as Tank number 7 and T-2 on Figure 3-11. Figure 3-11 depicts the South Tank Farm prior to 1986. The location of the South Tank Farm is identified on Plate 1 and Figure 3-1. Starting in 1976, this tank was used for the collection of dirty hydraulic, drawing, and lubricating oils. These oils were then sent off site to an oil reclaimer. In 1981, the bulk of these oils were rerouted to the Harrison wastewater pretreatment facility. The waste oils did not meet the definition of a hazardous waste. This tank was removed in May 1986.

- <u>T-3</u>

This former South Tank Farm 11,000 gallon capacity steel tank was installed in 1975 at a location identified as Tank number 8 and T-3 on Figure 3-11. The South Tank Farm location is identified on Plate 1 and Figure 3-1. Starting in 1975, this tank was initially used for the collection of dirty cutting oil and later as additional storage for the collection of dirty oils described in T-2 above. In 1981, all waste oils were removed from this tank and it was cleaned using a detergent solution. In 1984 this tank was used for the storage of a virgin machine coolant used in the manufacturing operations. T-3 was removed in May 1986.

- <u>T-4</u>

This 10,000 gallon steel tank was installed in 1976 near the southwest corner of Building 14. The location of T4 is identified on Plate 1 and Figure 3-1. This tank was used for the collection of contaminated wash solution generated during the pot cleaning step of the polyester potting process. The solution was then hauled off site for disposal. The potting material was made up of a mixture of 34 percent catalyzed polyester resins and 66 percent inert filler (limestone). In 1982, this wastewater was redirected to the Harrison wastewater pretreatment facility. At that time, the remaining water was removed from the tank and the sludge left in place. No tank tightness or leak detection testing has been conducted on this tank.

- T-5

In 1964, a 30,000 gallon concrete open top tank was installed with surface exposure just above ground level. The former location of this tank is shown as T-5 on Plate 1 and Figure 3-1. This tank was removed in December 1989. It was used for the collection and neutralization of wastewater from various acid/alkali processes prior to discharge to South Settling Lagoon. In 1981, wastewater flows to this tank were diverted to the Harrison wastewater pretreatment facility. When the flow was diverted from this tank in 1981, the remaining liquid and sludge were pumped out and taken to the Harrison wastewater pretreatment facility for treatment and disposal. Figure 3-12 depicts the layout of T-5 and T-6 and identifies the approximate location of soil samples taken during the removal process. Table 3-12 presents the analytical results of this soil sampling.

- T-6

In 1972, a second 30,000 gallon concrete open top in-ground tank was installed to provide additional storage capacity to T-5, described above. It was removed in December 1989. Its former location is shown on Plate 1 and Figure 3-1. In 1976, it was isolated from T-5. It was then used for the collection of spent machinery coolants from central filtrations systems for off-site disposal. In 1980, the coolant dumps were diverted to the Harrison oily waste pretreatment facility. The remaining spent coolant was pumped out and treated at the Harrison wastewater pretreatment facility. The waste was a 3-8% solution of soluble oils or semi-synthetics in water. Figure 3-12 depicts the layout of former tanks T-5 and T-6 and identifies the approximate location of soil samples taken during the removal process. The sampling results associated with T-6 were reported to the State Fire Marshal's office and are summarized in Table 3-12.

- T-7

Three former USTs in the West Tank Farm are considered SWMU T-7, due to their similar use and waste stream. In 1964, two 10,000 gallon steel tanks were installed in the West Tank Farm for the collection of oily waste prior to direct discharge. The location of the West Tank Farm is shown on Plate 1 and Figure 3-1. The oily waste consisted of machine coolants, parts washer waters, and mop water. In 1971, a third 10,000 gallon tank was hooked in series to the above tanks. Figure 3-13 shows the location of the three USTs in the West Tank Farm prior to their removal. In 1979, flow from these tanks was removed from the North Settling Lagoon and the oily waste was hauled off site for disposal. In April 1980, the oily waste flow was diverted to the Harrison oily waste pretreatment facility. Two of the tanks were removed in May 1986. The third tank was removed in October 1988.

- T-8

This SWMU includes two former tanks in the West Tank Farm and two former tanks located inside Building 14. All four tanks were used to store solvents and were associated with a former solvent recovery system. In 1972, a system was installed for the distillation and reuse of trichloroethylene in the manufacturing operation. The location of the former solvent recovery system and the West Tank Farm is identified on Plate 1 and Figure 3-1. The system consisted of two stills, two 10,000 gallon outside underground storage tanks in the West Tank Farm, one 3,000 gallon inside UST, one 1,500 gallon inside UST, four 200 gallon inside above ground tanks, and one 1,500 gallon above ground storage tank. In 1973, perchloroethylene was substituted for trichloroethylene. The closure of this system is covered by a closure plan submitted to the Ohio EPA on April 25, 1985.

The former location of the two 10,000 gallon capacity solvent tanks in the West Tank Farm is shown on Figure 3-13. These tanks were removed along with approximately 1,000 tons of contaminated soil in 1988. Detail concerning this soil removal and contamination release are discussed in Section 4.0. The two former USTs located inside Building 14 were removed in December 1989. Their former location and the location of post-removal soil sampling is shown on Figure 3-14. The analytical results will be discussed in Section 4.

- T-9

In 1964, a 10,000 gallon capacity steel tank was installed to store dirty napthalite prior to its distillation and reuse in the Frigidaire Division GMC Manufacturing operations. At the same time a 10,000 gallon tank was installed to hold clean napthalite. The locations of these two former tanks in the West Tank Farm is shown on Figure 3-13. The former napthalite tanks are labeled as Tank numbers 13 and 14 and T9 on Figure 3-13. The location of West Tank Farm is identified on Plate 1 and Figure 3-1. In 1979, the Frigidaire Division GMC was sold and at that time, the napthalite was removed from these tanks and sold to a solvent reclaimer. These two tanks were removed in May 1986.

- T-10

In 1964, a 10,000 gallon capacity steel tank was installed to store dirty stoddard solvent prior to its distillation and reuse in the Frigidaire Division GMC Manufacturing operations. At the same time a 10,000 gallon tank was installed to hold clean stoddard solvent. The location of these two former tanks in the West Tank Farm is shown on Figure 3-13. The tanks are labeled as T10 and Tank numbers 11 and 12 on Figure 3-13. The location of the West Tank Farm is identified on Plate 1 and Figure 3-1. In 1979, the Frigidaire Division-GMC was sold and at that time, the solvent was removed from these tanks and sold to a solvent reclaimer. These two tanks were removed in May 1986.

- T-11

The location of T11 near the southeast corner of Building 14 is shown on Plate 1 and Figure 3-1. Frigidaire Division GMC installed a 38,000 gallon holding tank in 1951. It was originally used to hold a dilute sodium cyanide solution used as a neutralizing bath in their porcelain pickling operation. In approximately 1969, Frigidaire eliminated the cyanide bath and discontinued use of this holding tank. In 1976, a chip pad and empty barrel pad (waste pile and staging area) were constructed to drain to this tank. This system is shown on Figure 3-8. Fluids draining from the chip and empty barrel pad included drawing oils from punch press offal, machine coolants from grinding sludge, residual oil from "empty" oil drums, and residual processing materials from "empty" drums.

The oil was sent off site to an oil reclaimer. In 1982, this tank was tied in to the Harrison wastewater pretreatment facility. Details concerning the chip pad and empty barrel pad are discussed in Section 3.1.3.

- T-12

In 1979, a 50,000 gallon concrete tank identified as T-12 on Plate 1 and Figure 3-1 was constructed for the storage of spent detergent solution from an impregnation process used to leak proof aluminum castings. The solution stored in this tank was identical to that described in tank T-1. In 1983, this process was discontinued and at that time all liquid was removed from the tank. Some sludge was left in place. No tank tightness or tank leak detection tests have been conducted on this tank. Recently washings from cement trucks were placed in this tank.

3.1.5 Incinerator I-1

In 1950, Frigidaire built and operated two box-type incinerators which burned combustible solid waste (wood, paper, cardboard, etc.). In 1957 two larger top loading incinerators were built to replace the above mentioned units. At the same time, a liquid waste burner was also placed in operation to burn waste oils and solvents that could not be reclaimed. Incinerator operations were discontinued in December 1970.

3.1.6 Drum Storage Area C-1

A paved area, 50 feet by 100 feet was used between 1980 and 1985 to store drummed polyester potting compound prior to its disposal. The potting compound was a non-hazardous waste.

3.2 Spill History

A summary of all known spills and/or releases are listed chronologically in Table 3-13. The majority of spills were captured in the plant or were contained by or associated with the North and South Settling Lagoons. Therefore, a review of this list indicates that none of these spills resulted in additional source areas of contamination.

3.3 RCRA Interim Status and Closure Summary

This section chronologically lists significant documents, correspondence and associated dates concerned with the operation of the Harrison Facility under RCRA Interim Status. The list is divided into four subgroups: RCRA Part A Permit, RCRA Closure Plans and Permits, and Ground-Water Monitoring.

- <u>RCRA Part A Permit</u>

  - November 1980. RCRA Part A Permit Application for Harrison forwarded to OEPA.

  - March 11, 1981. Harrison submitted to USEPA a revised Part A Permit Application to request elimination of a hazardous waste storage cage and addition of a larger cage.

  - July 1, 1981. Harrison notified the USEPA of a divisional name change from Delco Air Conditioning Division to Harrison Radiator Division.

  - December 17, 1981. Harrison received approval of their Hazardous Waste Facility Installation and Operation Permit (Part A Application) from the OEPA. Revised on January 21, 1982 to incorporate the correction of a typographical error.

  - March 8, 1982. Received USEPA reacknowledgement of name change.

  - May 14, 1982. Harrison received Interim Status Acknowledgement from the USEPA to operate under their November, 1980 Part A Permit.

  - April 2, 1985. Harrison submitted to Ohio EPA a request for revision to Part A Permit Application including: elimination of the north sludge drying basin, a paint stripping sump, and a powerhouse tank (#12), since Harrison had determined that RCRA is not applicable to these units.

  - October 10, 1985. Harrison submitted to OEPA a revised Part A Permit Application reflecting changes requested in April 2, 1985 submittal.

  - November 8, 1985. Harrison requested conversion to 90-day generator status on a hazardous waste storage cage (requested in conjunction with submittal of lagoon closure plans to USEPA).

  - December, 1985. Harrison submitted to OEPA a Revised Part A Application. This revision reflects the removal of the north sludge basin, a paint stripping sump, and powerhouse tank #12 since Harrison has determined that the Part A is not applicable to these units.

- January 6, 1986. Received USEPA letter requesting completion of a "Request for Change in Status" regarding hazardous waste storage cage.

- January 13, 1986. Harrison submitted "Request for Change in Status" per January 6, 1986 USEPA letter.

- February 19, 1986. OEPA issue the Revised Part A Application to Harrison after the required public comment period. Incorporates changes outlined in the December 1985 Harrison submittal.

- November 25, 1987. Submitted request for revised Part A Permit to OEPA and USEPA: Removal of "clean" perchlor tanks (3,000 gal. underground, and 4 - 200 gal. above ground sample tanks); and removal of an acid/alkali tank (SWMU T6).

- January 22, 1988. Received OEPA notification that classification was in process; request to delete process code T02 from permit application; and request for certification statement that "clean" perchlor tanks never contained hazardous waste.

- April 7, 1988. Harrison submitted revised Part A to OEPA and U.S. EPA with requested certification statement and deletion of T02 process code.

- May 3, 1988. Received OEPA request to reinstate the 4 - 200 gal. sample tanks on the permit application.

- June 13, 1988. Submitted request for revised part A Permit to OEPA and USEPA: Reinstatement of 4 - 200 gal. sample tanks; reinstatement of F006 waste code for waste treatment sludge, which had been removed by OEPA under an initial temporary exclusion; and revision of hazardous waste codes to reflect regulatory changes associated with redefinition and reinterpretation of the hazardous waste numbers.

- November 6, 1989. Received Ohio EPA notification that June 13, 1988 request has been classified as a revision.

- <u>RCRA Closure Plans and Permits</u>

1) North and South Settling Lagoon Systems Closure

- October, 1985. Closure Plans for the North and South Settling Lagoons submitted to the OEPA.

- November 8, 1985. Revised Closure Plans for the North and South Settling Lagoons are submitted to the USEPA and OEPA by Harrison.

- November 14 & 15, 1988. OEPA Closure Plan Disapproval issued for the Revised North and South Settling Lagoons partial Closure/Post-Closure Plans. Disapproval gives Harrison two closure options for each Lagoon system, (1) attempt to clean close or (2) close as a hazardous waste landfill. Disapproval required Harrison to submit Revised Closure Plans addressing the deficiencies.

- November 3, 1989. Draft Revised North Settling Lagoon Closure/Post-Closure Plan and the Draft Revised South Settling Lagoon Closure Plan submitted to the U.S. EPA and OEPA. These revised plans outline a plan for clean closure of the South Lagoons and Closure/Post-Closure of the North Lagoons as a landfill. Plan calls for the construction of a minimum technology landfill facility to replace the North Lagoon incorporating the contaminated sediment and soil from the North and South Lagoons.

2) Tank Systems Closure

- April 29, 1985. Harrison submits a Partial Closure Plan for the Perchloroethylene system (includes four USTs listed as T8 on the SWMU list).

- March 2, 1988. OEPA sends an approval and modification of the Partial Closure Plan for the Perchloroethylene System. The listed modification are significant.

- March, 1988. Harrison submits a Notice of Appeal to the OEPA for the March 2, 1988 approval and modification of the Perchloroethylene System Partial Closure Plan.

- October 25 through November 7, 1988. Two outside underground storage tanks (designated as T8 on the list of SWMUs in Section 3.1.4) which were part of the solvent recovery system were removed along with approximately 1000 tons of contaminated soil.

- April 3, 1989. Harrison submits results of sampling related to the outside perchloroethylene underground storage tank excavation and proposes the immediate backfilling of the excavation because of safety concerns related to continuing sidewalk collapse.

- May 12, 1989. At a negotiation meeting between Harrison and the OEPA, the OEPA agrees conceptually to an interim closure plan of the removed perchloroethylene tanks which includes backfilling with clean soil, installation of an alternative cap and a commitment by Harrison to evaluating final closure action after completion of an RFI/CMS. No formal approval was given by OEPA without a signed Consent Order for the RFI/CMS.

- June 5, 1989. Notification by Harrison to OEPA of intent to proceed with backfilling and capping of the underground perchloroethylene storage tank excavation.
- June, 1989. Backfilling of underground perchloroethylene storage tank excavation completed.
- December, 1989. All solvent recovery facilities inside the Still Room in Building 14 were decontaminated and removed (above ground tanks and two underground tanks).
- May, 1990. Completed sampling of soil from excavation of the two inside underground tanks inside Building 14.

- <u>Ground-Water Monitoring Under RCRA</u>

- June, 1983. Harrison submits report "Groundwater Quality Assessment Plan for the Harrison Radiator North Lagoon".
- March, 1987. Harrison submits report "Groundwater Sampling and Analysis Plan for the Harrison Radiator North and South Lagoons" which outlines the procedures for sampling and analysis for the RCRA ground-water monitoring.
- March 11, 1987. Field inspection conducted by the OEPA as part of a Comprehensive Ground-Water Monitoring Evaluation (CME) at Harrison.
- May 6, 1987. OEPA submits the Final CME report to Harrison. The report outlined several deficiencies in the ground-water monitoring program.
- October 28, 1988. Consent Decree issued by the OEPA requiring Harrison to revise their Ground-Water Monitoring Assessment Plan for the North Lagoon System and to revise the Detection Monitoring Plan for the South Lagoon System.
- December 1988/June 1989. "Revised Ground-Water Monitoring Detection Program for the Harrison Radiator South Lagoon" and the "Revised Ground-Water Quality Assessment plan for the Harrison Radiator North Lagoon," were submitted to OEPA.

- August, 1989. The Revised Ground-Water Assessment Plan for the North Lagoon and the Revised Ground-Water Monitoring Detection Plan for the South Lagoon were approved by the OEPA.

- October/November 1989. Additional monitoring wells were installed at the North and South Lagoon areas as agreed to in the October 1988 Consent Decree and outlined in the revised assessment and detection plans.

- December 1989. Ground-water monitoring, under the revised assessment plan and detection plan for the North and South Lagoons respectively, had begun.

4.0 NATURE AND EXTENT OF CONTAMINATION

This section describes the existing data and information on the nature and extent of contamination from solid waste management units at the Harrison facility which are suspected to have had releases. This data will be used later along with the hydrogeologic information to identify any data deficiencies which can be addressed in subsequent investigations during the RFI. Sections 4.2 through 4.5 describe, to the extent known, the location, quantity and types of hazardous waste associated with four possible source areas. These sections will also summarize the available monitoring data that defines the known extent of contamination. Section 4.6 describes the contaminant migration pathways from the suspected source area(s) at Harrison. Section 4.7 describes the potential for human exposure to contamination based on these migration pathways.

4.1 Overview of Site-Wide Contamination

Ground-water monitoring and soil sampling data suggest contamination source areas upgradient of Harrison and at the Harrison facility including the North Lagoon, Landfill L-1, the West Tank Farm and the waste pile and staging area. Ground-water monitoring has detected contamination moving onto the Harrison property from off-site sources. The description of the off-site contamination is presented in Section 4.2. Monitoring of the ground water upgradient and downgradient of the North Settling Lagoon has detected a statistically significant increase in total organic halogens (TOX). An investigation of ground-water conditions near Landfill L-1 (South Inactive Site) (G&M, 1983) determined that hazardous constituents were present in the ground water. Soil sampling conducted after the removal of two underground storage tanks in the West Tank Farm identified soil contamination and prompted contaminated-soil removal in 1988. PCBs have been detected in soil samples under the concrete pad of the waste pile and staging area. Little is known about the source and extent of PCB contamination at the staging area. Previous investigations have been conducted on the three other potential on-site source areas. These areas are the subject of Sections 4.3 through 4.5.

The predominant waste constituents detected in groundwater at the Harrison site include cis-1,2-dichloroethene, trichloroethene and 1,1,1-trichloroethane. Perchloroethene has been detected in soil samples during the removal of underground storage tanks in the West Tank Farm (see Section 4.5). Other similar organic compounds have been detected in the ground water at or near analytical detection limits (1-5 parts per billion). For the purpose of illustrating the distribution of these compounds in the ground water in a concise manner and to provide a means of evaluating the ground-water quality on a site-wide basis, much of the discussion in this section will focus on total volatile organic compound (VOC) concentrations. Other compounds (semivolatile and inorganics) have been detected at low concentrations in localized areas. For a list of specific compounds analyzed and/or analytical methods used, see Tables B-1 through B-3 in Appendix B.

Ground-water monitoring has been conducted since 1982 at the Harrison site. Figures 4-1 and 4-2 present total VOCs concentrations detected in shallow and deep monitor wells, respectively, on a site-wide basis in November 1990; the most recent, comprehensive analytical results. In addition, as a means of evaluating trends in the concentration of total VOCs across the site, eleven bar graphs (Figures 4-3 through 4-13) have been provided which present the available monitoring data collected since 1982. The bar graphs are organized such that they present data from wells in different subsections of the plant starting with the shallow aquifer wells at the north end of the site, and moving south following the ground-water flow directions. The data from the deep aquifer wells are presented in a similar fashion. The site-wide total VOCs maps (Figures 4-1 through 4-2) and the bar graphs (Figures 4-3 through 4-13) provide an overview of the ground-water quality at the site. These figures will be the focus of discussions of ground-water quality in Sections 4.2 through 4.5 and the pathways of migration in Section 4.6.

The analytical data illustrated in Figures 4-3 through 4-13 is listed on tables in Appendix B. It should be noted that the total VOC values, illustrated on these figures prior to March 1990 are total organic halogenated (TOX) compounds determined by volatile organic compound scan using EPA gas chromatograph (GC) Method 624 (40 CFR Part 136). The total VOC data from March 1990 to the present for the north Lagoon and Landfill L-1 wells was obtained using EPA gas chromatograph/mass spectrometer (GC/MS) Method 8240 for volatile organic compound analysis. Method 8240 analysis is not conducted on samples from the South Lagoon wells. However, TOX analysis has continued at the South Lagoon under SW-846 Method 9020. Although the GC and GC/MS methods analyze different sets of parameters, the results are generally consistent and comparable. In some cases, however, the additional compounds detected by Method 8240 have raised the total VOC concentrations reported for 1990.

Although the distribution of total VOCs in the ground-water can be determined (Figure 4-1 through 4-13) it will be evident throughout this discussion that local source identification and precise plume delineation from specific source areas has been difficult at the Harrison site for several reasons. Local ground-water flow conditions have varied during the time since monitoring began. When local pumping was at its peak in the early 1980s, ground-water directions were effected by the extraction wells. Vertical and horizontal hydraulic gradients were at their peak. As pumping ceased gradually, starting in 1985, vertical and horizontal gradients decreased and ground-water moved at slower rates. Since pumping ceased water levels have risen more than fifteen feet in some areas in the shallow aquifer (see Figure 2-7). This water level rise increased the saturated thickness of the shallow aquifer and decreased hydraulic gradients, resulting in decreased flow velocities. The increase in saturated thickness increases the volume of water in the aquifer which could have the effect of diluting the existing dissolved contamination. On the other side, one possible effect of a higher water table would be to saturate contaminated soil, landfills or lagoon sediment that had previously remained in the unsaturated zone, thus increasing the dissolved contaminant concentration. Other potential influences on water quality and contamination plume tracking would be the seasonal water level fluctuations, the 1987 drought, and local heterogeneities in the hydrogeologic regime.

Another complication to plume tracking is the existence of contamination from off-site sources moving through the aquifers beneath the Harrison site. This issue is discussed further in following Section.

4.2 Potential Off-Site Sources of Ground-Water Contamination

The existence of ground-water contamination sources in the vicinity of the Harrison site has been well documented. Studies by the Miami Conservancy District (Plummer, 1973) and Wright State University (1982) have documented over 50 potential sources in the area. The location of some of the more significant potential sources relative to the Harrison site and the County well fields, are shown on Figure 4-14. In addition to these numerous potential point sources, there is likely a significant contribution of non-point source pollutants common in industrial/urban areas.

Several monitoring wells located near the northern boundary of the Harrison site are representative of background conditions due to their location with respect to ground-water flow directions (north to south) and potential source areas at the Harrison site (all are further south). These wells and the concentrations of total VOCs in November 1990 are shown in Figure 4-1 (wells HR-9, HR-11, HR-8, W-1-N, and HR-4) and Figure 4-2 (HR-10, and HR-12) for the shallow and deep aquifers, respectively. Figure 4-3 and 4-9 presents bar graphs of the total VOCs detected in these monitoring wells.

VOCs have been detected in both the shallow and deep aquifers, with the shallow aquifer having higher concentrations. Water samples from two shallow wells, HR-8 and HR-11, have contained total VOC concentrations in excess of 100 parts per billion. Total VOC concentrations in HR-8, at their highest between April, 1984 and June, 1985, have gradually decreased to approximately 20 ppb in 1989 (Figure 4-3)and have remained consistently at that level through 1990. Water samples from shallow monitor well HR-11, installed and first sampled in 1988, have contained total VOC concentrations of over 650 ppb. Historical sample results from monitor wells HR-8 and HR-11 appear to indicate two "slugs" of contamination moving through the area. Since the concentrations have diminished somewhat in HR-8, the main portion of that slug has most likely moved downgradient. Ground-water flow velocities are estimated to be between 1 and 3.8 ft/day. Assuming that the VOCs behave as a conservative dissolved species in the ground water and a middle-range flow velocity of 2-feet per day, the slug of contamination observed in 1984 and 1985 in monitor wells HR-8 could have moved at least 1800 feet downgradient. In reality the movement downgradient of VOCs can be significantly slowed through dispersion and retardation (Freeze and Cherry, 1979). Nevertheless, it is apparent that ground-water contamination from off-site sources is present in the shallow aquifer both upgradient and downgradient of the North Settling Lagoons and other potential on-site sources.

The deep aquifer wells (HR-10 and HR-12) near the upgradient boundary of the Harrison site have been sampled quarterly since September 1988. Although a 4-foot thick silt and clay lense was detected in HR-10 at 706 feet MSL, the semi-confining till layer seen elsewhere on the site between 665 and 680 feet MSL appears to be absent in both locations. VOCs have been detected once in HR-10 (8.8 ppb) and consistently between 5 and 10 ppb in HR-12 since September 1989. This data identifies ground-water contamination in the deep aquifer upgradient of any potential source areas at the Harrison site. When compared to water quality in the shallow aquifer (wells HR-9 and HR-11) it also suggest that significant water quality differences can exist between the deep and shallow aquifer zones even when the semi-confining till zone is absent.

4.3 North Settling Lagoon

The North Settling Lagoon system is located east of Dryden Road, west of Penn Central Railroad, north of Building 14, and south of Northlawn Avenue as shown on Figure 3-1 and Plate 1. Ground-water monitoring of this surface impoundment has documented a statistically significant downgradient increase in total organic halogens (TOX). The following describes the known quantities and types of hazardous waste associated with this SWMU. Details on the history and operation of the North Settling Lagoon system are presented in Section 3.1.2.1.

Sludge Volume and Composition. In preparation for the closure of the North Lagoon System, G&M conducted an investigation in 1988 that consisted of a topographic survey of the lagoon and surrounding area, sludge and water depth measurements, sludge core sampling, subsoil sampling, and physical/chemical analysis of the sludge and subsoil. Details of this investigation are presented in the 1989 Draft Closure Plans and Section 3.1.2.1 of this report. Figure 3-4 illustrates the existing site conditions. Figure 3-5 presents the sampling locations. Table 3-3 presents the average depths of the lagoon water and sludge. A summary of calculated waste volumes (water sludge, and contaminated subsoils) is presented in Table 3-4. The analytical results of soil/sludge sampling are presented in Tables 3-5 and 3-6.

Ground-Water Quality. This unit has been the subject of a ground-water quality assessment program since 1984. The assessment monitoring has been conducted according to the Interim Status Standards of RCRA and Rule 3745-65-93 of the Ohio Administrative Code. This assessment program was modified in 1989 in accordance with a Consent Decree between the Ohio EPA and Harrison. The modifications included the installation of two new monitor wells (HR-14, HR-15) directly downgradient of the lagoon in the lower aquifer. In addition, the assessments' analytical program was revised to reflect those Appendix IX (40 CFR 261) compounds found in the sludge samples that were taken in the fall of 1988. The changes were implemented during the fourth quarter 1989. The analytical data from the North Lagoon ground-water monitoring is presented in Appendix B.

A comparison of the semi-volatile organic compounds detected in the North Settling Lagoon sludge samples and the Appendix IX semi-volatile organic compounds analyzed for in the ground water from November 1989 through 1990 indicate that no semi-volatile compounds have migrated from the sludge to the ground water in detectable quantities. Similarly, November 1989 through 1990 water-quality data indicates that the 15 Appendix IX metals and cyanide detected in the North Settling Lagoon sludge samples are not migrating to the ground water.

A comparison of the results of the lagoon sludge samples and the fourth quarter 1989 water-quality analysis indicates that two volatile organic compounds (trichloroethene and tetrachloroethene) are present in both the lagoon sludges and the upper aquifer ground-water system. The distribution and concentration of those constituents in the upper aquifer in the vicinity of the North Lagoon are typically highest immediately downgradient of the lagoon and generally decrease rapidly with distance from the lagoon (west, east and south). This "plume" configuration is complicated by the existence of other sources both upgradient and downgradient. Therefore, a precise contaminant plume boundary resulting from the North Settling Lagoon cannot be determined.

The concentration of VOCs in the shallow aquifer upgradient of the North Settling Lagoon are summarized in Figure 4-3 and discussed extensively in Section 4.1. In short, shallow groundwater contamination has been detected upgradient at concentrations in excess of 650 ppb.

The concentration of VOCs in the shallow aquifer downgradient of the lagoon are summarized in Figure 4-4. A profile view of these wells can be seen in the generalized geologic cross-section C-C' (Plate 2). The concentration of VOCs in monitor well W-3-N has steadily declined from a peak of over 600 ppb in June 1988 to below 200 ppb in all four sampling events in 1990. The VOC concentrations in the other four downgradient monitor wells (W-2-N, W-4-N, HR-2 and HR-3) have remained below 100 ppb since 1984. Monitor wells W-3-N and W-4-N have shown the highest VOC concentration and are positioned directly downgradient of the Lagoon. Monitor wells HR-2 and HR-3 are not directly downgradient of the lagoon but may be representative of water quality downgradient of Landfill L-2.

An assessment of the potential effect of the North Settling Lagoon on the water quality of the lower aquifer immediately downgradient was begun in the fourth quarter of 1989 with the installation and sampling of two deep downgradient monitor wells (HR-14 and HR-15). Water samples from HR-14 and HR-15 have contained VOCs between 0 and 30 ppb. Water samples from deep monitor well HR-13 contained between 20 and 60 ppb VOCs, since

September 1988, when it was first sampled. As with shallow wells HR-2 and HR-3, deep well HR-13 is downgradient of Landfill L-2. Deep monitor well HR-12, located upgradient of the North Lagoon, has consistently detected volatile organic compounds. A total VOC concentration of 8.5 ppb was detected once (March, 1989) in the other deep upgradient monitor well (HR-10). In summary, VOC concentrations detected in lower aquifer samples are very similar in upgradient and downgradient wells.

4.4 Landfill L-1 (South Inactive Site)

This inactive waste-disposal facility is located in the southwest corner of the Harrison site on the northeast corner of the intersections of Dryden and Sellars Roads as shown on Plate 1 and Figure 3-1. Available information on the history and operation of this landfill is presented in Section 3.1.1.

The extent of contamination near Landfill L-1 has been monitored for over 10 years. A 1983 report by Geraghty & Miller, "Investigation of Groundwater Conditions Near the Harrison Radiator Inactive Waste-Disposal Facility" and semi-annual ground-water monitoring provide data on the types of contaminants detected in ground water near Landfill L-1. Nineteen monitor wells and three municipal supply wells were sampled for analysis in 1983. The locations of these wells are shown on Figures 4-1 and 4-2 and include all wells labeled with the prefix GM and monitor well 4S at southern edge of the landfill. In addition, total organic vapor was analyzed using a Foxboro Model-128 OVA flame ionization detector (calibrated to methane) on soil samples from several borings.

The OVA measurements taken and summarized in the 1983 report (listed on Table 4-1) suggest some residual contamination existed in the fill material and the till zone beneath the landfill. OVA measurements within the fill material varied depending on the location, but ranged from near zero to greater than 1000 parts per million. The OVA readings decreased below the fill but increased again in the till zone encountered at the bottom of the water table aquifer. Readings in the deep aquifer below the till were generally lower than those above the till, but are higher toward the top of the aquifer. The boring for GM-12 had a peak OVA reading associated with a clay silt layer 20-feet below the till. Well boring GM-9 had higher OVA readings in the samples below the till zone than above.

These OVA measurements and ground-water quality data suggest the presence of another contamination source south and east of the Harrison facility since well GM-9 is located out of the ground-water flow path between Landfill L-1 and the Dryden Road North well field.

Ground-water quality data collected in 1982 and reported in the 1983 G&M report are presented in Appendix B and summarized below. Fluoride, boron and total dissolved solids (TDS) were the major inorganic species detected at elevated concentrations in the shallow aquifer in the vicinity of the landfill. Table B-20 presents a summary of the volatile and semi-volatile organic priority pollutants detected in the upper aquifer. The volatile organic compounds 1,1-dichloroethane; trans-1,2-dichloroethene; and trichloroethene were detected in all of the shallow aquifer wells sampled. Of the five acid-extractable compounds detected in the shallow wells, p-chloro-m-cresol was the most prominent with a maximum concentration detected in well GM-6 located at the southwest corner of the landfill at 69.3 parts per billion.

The 1983 investigation sampled 14 wells screened in the lower semi-confined aquifer including GM-series wells 1, 3, 4, 5, 7, 9, 11, 12, 13, 14, 15, and Montgomery County, Dryden North wells DN-11, DN-12, and DN-13. Ground-water contamination in the lower aquifer is quantified at lower concentrations compared to the upper aquifer. Table B-15 lists the volatile and acid extractable organic priority pollutants quantified in the lower aquifer. Similar to the upper aquifer samples, the compounds 1,1-dichloroethane; trans-1,2-dichloroethene; trichloroethene and chloro-m-cresol were the most prominent organic species detected in the lower aquifer.

Ground-water quality data has been collected for most of these same wells on a semi-annual basis since 1985. Tables B-16 through B-20 present the analytical concentrations detected at each sampling event for specific conductance, total VOCs, TOX, trichloroethene, 1,1,1-trichloroethane and cis-1,2-dichloroethene respectively. The total volatile organics for the water table aquifer in November 1990 is shown on Figure 4-1.

The concentration range of total VOCs from 1982 through 1990 in the shallow aquifer at Landfill L-1 and downgradient of Landfill L-1 is illustrated in Figure 4-6 and 4-7, respectively. Similarly, the concentration range of total VOCs from 1982 through 1990 in the deep aquifer at Landfill L-1 and downgradient of Landfill L-1 are illustrated in Figures 4-11 and 4-12, respectively.

In the shallow aquifer wells at Landfill L-1 (including wells GM-8, GM-6, and GM-2), total VOC concentrations have consistently ranged from 100 to 1000 and have occasionally been above 1000 ppb. VOC concentrations have been below 350 ppb in all three wells in 1990. These values exceed the average concentrations detected in wells some distance upgradient of Landfill L-1 (HR-1 and W-3-N), suggesting that Landfill L-1 is in part the likely source for the elevated concentrations in GM-8, GM-6, and GM-2.

The concentration ranges of total VOCs in shallow monitor wells downgradient of Landfill L-1 (wells GM-16, GM-17,GM-18, and GM-10) as shown on Figure 4-7, have been significantly less than those detected at the Landfill site. The December 1989 data marks the first time the two areas (Landfill L-1 and the downgradient area) have shown such similar concentrations due to the drop of total VOC concentration at Landfill L-1.

The concentration of VOCs in the deep aquifer at Landfill L-1 (includes well GM-7, GM-3, GM-5 and GM-1) as shown on Figure 4-11 have been consistently low (at or below background levels) with the exception of monitor well GM-7 (at or above 200 ppb) which is located on the western side of the Landfill. The total VOC concentrations in GM-7 peaked in June 1988 at 1440 ppb and declined to levels near 130 ppb in 1990.

Elevated VOC concentrations relative to other deep monitor wells have been observed in well GM-7. As shown on the generalized geologic cross section A-A′ (Plate 2) and on the boring log (Appendix A), GM-7 is a 100 foot deep monitor well with a 10-foot-long screen from 90 to 100 feet and is completed in the deep aquifer below approximately 20 feet of dense till. It is possible that the integrity of this well was damaged at some time during or after installation and leakage of upper aquifer ground water is occurring. This possibility is being investigated.

The concentration of total VOCs in the deep aquifer further downgradient of Landfill L-1 (GM-11, GM-13, GM-9 and GM-15) as shown on Figure 4-12, have been consistently at or below 10 ppb in three of the four wells with the exception of one sampling event in June 1987. In June 1987 the average total VOC concentration of the four deep wells downgradient of Landfill L-1 was approximately 46 ppb and a concentration over 100 ppb was recorded in monitor well GM-11. Monitor well GM-9 has consistently shown VOCs concentrations greater than 20 ppb. Since the peak VOC concentrations were detected in June 1987, concentrations have declined to the point that VOCs were not detected in GM-11, GM-13, and GM-15 during the December 1989 sampling event. VOC concentrations have risen again in 1990. The recent start up of pump-to-waste activity (March 1990) at the Dryden Road North well field may be the reason for the recent increases and will continue to effect ground-water flow conditions and water quality.

Harrison will continue to sample these wells on a semi-annual basis. A ground-water mass balance evaluation of the effect of the pump-to-waste activity using the calibrated 3-D flow model is presented in Section 4.6 of this report.

4.5 Former Underground Solvent Storage Tanks

The West UST Farm is located west of Building 14 as shown on Plate 1 and Figure 3-1. A more complete discussion of the history and use of the West UST Farm is presented in Section 3.1.4. Table 3-11 contains a history and use of underground storage tanks (USTs) in the West UST Farm. Prior to May 1986 the West UST Farm contained 14 tanks. Six tanks in May 1986 and three in October 1988 were removed. This section is concerned with the soil contamination found after the removal of two of these tanks. Currently, five product tanks remain in the ground and active in the West UST Farm. This section will also discuss the removal of two USTs formerly located in Building 14. These two tanks were part of a solvent recovery system and were connected to tanks in the West UST Farm.

As part of a Partial Closure Plan for four USTs (identified at SWMU T8 in Section 3.1.4) that were part of a solvent storage and recovery system, Petro-Tite tank testing was conducted on November 30 and December 1, 1987 (O.H. Materials, 1987). The Petro-Tite method is the most widely accepted for tank tightness testing and leak detection.

The two 10,000 gallon capacity USTs located in the West UST Farm were interconnected and therefore tested as one tank system. Water was used to fill the tanks for the precision leak test. The technicians were unable to completely fill the system due to what they discovered was a leaking 4" pipeline associated with the tank system. Water was found running into an old electrical vault located about 100 feet away from the tanks. Apparently a 4-inch pipe associated with the tank system crossed an abandoned conduit near this old electrical vault and was leaking into it during the test. Although the pipe failed the 1987 leak test, this does not necessarily indicate that the piping leaked during its active life as it had not been used in the previous 6 years.

The two tanks along with 1,000 tons of soil were removed from the ground on October 28 through November 7, 1988. Figure 4-15 shows the location and dimensions of this excavation. Sheet piling was installed which defines the extent of the primary excavation as approximately 21 by 21 feet. The piling was driven to a depth of approximately 34 feet and within this area soil was removed with a clam bucket to a depth where ground-water was encountered, which corresponds to approximately 27.5 feet below grade. Outside of the sheet piling, soil was excavated to an average depth of 14 feet, which corresponds to the original tank excavation depth. The contaminated soil was transported to a hazardous waste facility for disposal.

On January 5, 18, and 19, 1989, a soil sampling program was implemented at the excavation site as shown on Figure 4-14. The 9 composite soil samples were collected to determine the existence of any residual contamination and/or the verification that all contamination had been removed. Details on how this sampling program was implemented are contained in a G&M report, "Field Methods, Perchlor Tanks Soil Investigation, Harrison Radiator Division, Moraine, Ohio" submitted by Geraghty & Miller to Harrison on February 27, 1989. The samples were analyzed for the following parameters: barium, cadmium, chromium and lead (total metals) and tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene and vinyl chloride. The parameters were selected based on the analysis of residual sludge previously contained within the tanks. The analytical results of the soil sampling are presented on Table 4-2. Tetrachloroethene (Perchlor) was detected in all samples at an average concentration of approximately 0.7 parts per million. Trichloroethene and Cis-1,2-dichloroethene were detected in four and one sample, respectively. These analytical results were reported in a letter to the Ohio EPA dated April 3, 1989 by Harrison Radiator. In accordance with discussions with OEPA, the excavation area was filled in with a clean soil with the intention to pursue final closure after the completion of the RFI/CMS.

The 3,000 gallon capacity clean perchloroethene UST located inside Building 14 was certified tight by the 1987 Petro-Tite testing. The Petro-Tite testing on the 1,500 gallon waste solvent tank was determined inconclusive because the technicians could not hold the water level in the tank when filling to perform the pressure test. Water was apparently escaping. These tanks were removed in December 1989 according to the procedures outlined in a letter on November 20, 1989 from John Ridd of Harrison to Harold O'Connell of the Ohio EPA. Soil sampling/verification was conducted on April 24, 1990. The area had to be resampled on May 30, 1990 because the laboratory holding times were exceeded on the original samples from the April 24 sampling event. Soil screening with an HNU photoionization detector (see Table 4-3) during sampling suggests the presence of contamination. The analytical data is presented on Table 4-4. The samples were analyzed for barium, cadmium, chromium, lead, tetrachloroethene, trichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, and vinyl chloride. Tetrachloroethene was the only organic compound detected. It was detected in four of the six samples at a concentration ranging from 290 to 500 parts per billion.

There are no shallow or deep monitor wells immediately downgradient of the west tank farm or the former solvent recovery process area. It is likely that some contamination has reached the shallow aquifer in the area where the contaminated soil removal occurred. The amount of contamination reaching the ground water should be minimal since the area is capped with pavement and rainwater percolating through the soil would be limited. The concentration of total VOCs in the shallow aquifer in the mid-plant area is shown on Figure 4-1 for November 1990 values and a historical bar graph is presented on Figure 4-5. Shallow monitor well HR-1, immediately upgradient of the west tank farm, has detected total VOC concentrations in excess of 1200 ppb in October 1984 declining to concentrations under 200 ppb in September and December 1990. Monitor well W-1-S is somewhat downgradient of the West UST farm. The September 1989 sample (last time this well was sampled) from W-1-S recorded the highest total VOC concentration obtained to date (237 ppb) for this well.

4.6 Expected Pathways of Migration

The expected pathways of contaminant migration from source areas at Harrison are through soils and ground water. Less likely pathways are through surface water and air. This section discusses these routes of migration by providing the migration characteristics in the expected pathways and the rationale for minimizing the other pathways. Details on the physical nature of these media are discussed in Section 2.3. Chemical quality data for these media is presented in Sections 4.1 through 4.4 and Appendix B.

4.6.1 Soils and Ground Water

Contaminants released from source areas such as underground storage tanks, surface impoundments, landfills, contaminated soils, sumps and drainage tiles will infiltrate the near surface and migrate vertically downward to the water table under gravity flow as dissolved constituents in infiltrating rain water or as a separate phase liquid. This process results in residual contamination of the soils above the water table as a portion of the contaminants are chemically or physically retained in the soils. Continual flushing of these soils by infiltrating rain water results in movement of residual contamination from the soil zone (unsaturated zone) to ground water. Over time, unless a continuous source exists, the volume and concentration of the contaminants in the soil zone will diminish and the concentration of contaminants reaching ground water will be reduced.

Once having reached the water table, constituents will migrate either as a separate phase liquid or in a dissolved phase with ground-water flow. Monitoring information to date has indicated volatile organic concentrations mostly in the 2- to 3-digit parts per billion range which is well below the solubility limit (3- to 4-digit parts per million) for these compounds in water. Consequently, based on water quality results, the majority of organic constituents at the Harrison site are expected to be migrating in the dissolved phase with ground-water flow.

As described in Section 2.3.5, ground water flows to the south at the Harrison site. As contaminants move toward the south with ground water off of the Harrison property, the pathway tends to be influenced by local county pumpage and the shape of the buried valley. Ground-water flow maps generated from recently collected water level data (Figures 2-5 and 2-6) indicate that ground-water in the lower aquifer from beneath the Harrison facility is moving toward Dryden Road North Well 13 which is currently pumping at approximately 2.6 million gallons per day. Contaminants not captured by well number 13 will continue to migrate south-southwest with ground-water flow generally following the trend of the buried valley aquifer.

To determine what percentage of ground water flowing from beneath the Harrison site eventually migrates to and is discharged from the Dryden Road North well field under current conditions, G&M conducted a steady-state mass-balance analysis of ground water at the Harrison site. The calibrated 3-D ground-water flow model (G&M, 1989), described in Section 2.3.5, has the ability to keep track of and inventory the volume of water moving from cell to cell and layer to layer within the model. Under steady-state conditions the volume of water in storage and the head (water table and potentiometric surface for the shallow and deep aquifers respectively) remain constant. Therefore, the water volume (<u>mass</u>) entering the system through precipitation recharge and from upgradient flow must be equal to (<u>balance</u>) the volume of water (<u>mass</u>) leaving the system through extraction wells or by flow downgradient out of the system. This "steady state" mass balance is valid for not only the entire model but also for individual grid blocks or isolated sets of grid blocks.

The mass balance analysis described here was conducted over the area outlined in Figure 4-16. The area includes one active production well located on the CPC property and one at the Dryden Road North well field. Current pumpage from the one well at CPC was assumed to be 0.67 mgd. Based on flow measurements taken by Montgomery County personnel pumpage from Dryden North was estimated at 2.6 mgd. The analysis was conducted under three scenarios: Miami Shores pumping at 0.0 mgd, 5.0 mgd, and 10.0 mgd. Figures 4-17, 4-18 and 4-19 illustrate the movement of ground water through the mass-balance area under the three pumping scenarios.

With Miami Shores not pumping, all ground water in the lower aquifer is captured by pumpage at Dryden Road North and CPC. Downgradient discharge from layer three of the mass balance area is zero in this scenario. When Miami Shores pumps 5.0 mgd, approximately 7100 cubic feet per day leaves the mass-balance area and is not captured by the Dryden Road North Well field pump-to-waste activity. When Miami Shores pumps 10.0 mgd, approximately 58,300 cubic feet per day leave the area.

The mass balance analysis does show that ground water in the shallow aquifer in all three scenarios would not be completely captured by the Dryden Road North well field. This ground-water will migrate downgradient, following natural flow lines.

Historical ground-water quality data indicates that the bulk of contaminants have remained in the upper unit of the two-aquifer system. The extent to which the contaminant pathway in the ground-water system involves movement from the upper unit to the lower unit is unclear. The majority of data collected to date indicates that there is some degree of hydraulic connection between the upper and lower unit. This information includes long-term water-level monitoring data, pumping test data, ground-water modeling, and till thickness maps. The water-quality data suggests that, while there may exist hydraulic connection, organic contamination is not spreading to the lower aquifer at the same concentrations that are occurring in the upper aquifer.

The concentrations in the lower aquifer found directly downgradient of this facility are typically one to two orders of magnitude lower than in the upper aquifer. The contaminants in the lower aquifer could have their source either from upgradient of the facility as indicated by water quality from upgradient wells, or from sources within the facility boundaries that reach the upper aquifer beneath the property. Concentrations from on-site sources would be reduced substantially by attenuation and adsorption of organics as they pass through the low permeability clay confining unit.

4.6.2 Surface Water and Air

With the exception of the Landfill L-1, all surface-water runoff from the property is diverted to the on-site storm-water retention basins. These basins in turn discharge to the Great Miami River under the control of an NPDES Permit. Historical monitoring of the NPDES discharge indicates that surface water from the plant is not a significant pathway of contaminant migration. At Landfill L-1, storm-water runoff tends to pool within the site boundaries and does not discharge off-site.

There are no indications that suggest Harrison's solid waste management units involve discharges to the air. Approximately 50% of the entire plant property is covered by building structures or paved roadways and parking lots. The remaining areas are covered with fill dirt and vegetation. Thus, dust particles are controlled throughout the plant property. In addition, the type of materials that may have been placed in the on-site landfills (Table 3-2) should not be significant generators of methane or other off gases.

4.7 Potential For Human Exposure to Contamination

Based on local demography, ground-water, surface-water and land use the potential for humans to be exposed to contaminants emanating from Harrison's solid waste management units appears minimal. The two environmental media containing contamination are the subsurface soils and sediments in the unsaturated zone and ground water. With respect to the subsurface soils,, human and environmental exposure to this media is only of concern during excavation activities at the plant. In these instances precautions can be taken through implementation of proper health and safety protocols to eliminate potential exposure. Therefore human exposure to contaminants from soil contamination beneath the plant is unlikely as long as the facility is maintained as an industrial site.

With respect to ground water, human and environmental exposure to contaminants in this media is also unlikely. A review of Ohio Department of Natural Resources' (ODNR) records east of the Great Miami River and three-quarters of a mile distance downgradient of Harrison's SWMUs indicate that two wells had been completed in the upper aquifer. Both owners were contacted by phone and it was determined one well was nonexistent and the second had been inoperative for 18 years with no plans to reactivate. Ground-water usage is limited to wells completed in the lower aquifer. Of those wells currently pumping from the lower aquifer (GMC Truck & Bus, Dryden Road North, Appleton Paper and periodically Miami Shores) only Miami Shores is being used for potable water-supply purposes. Water quality at Miami Shores is within U.S. EPA drinking water standards (Appendix B Tables B-34 through B-42). Since this well field is located 3000 feet from the southern boundary of the Harrison facility, contamination from beneath the Harrison property would be significantly diluted and retarded prior to reaching this well field.

The current discharge point for contaminants in the lower aquifer, downgradient from the Harrison facility, is the Great Miami River via the Dryden Road North Well #13. Montgomery County has an NPDES permit to pump this water directly to the Great Miami River without treatment. Recent sampling has determined that the water quality is within the strict guidelines established in the NPDES permit (Montgomery County, July 1990). The concentration of these organics in the Great Miami River immediately downgradient of the well 13 discharge point have not been monitored. Given the flow volume of the Great Miami River and the low concentrations of contaminants in the discharge, it is likely that these organics would not be detected in the River.

5.0 ADDITIONAL DATA

The Description of Current Conditions report was prepared primarily to organize and consolidate the existing information about SWMUs at the Harrison facility in Moraine, Ohio. The objective was to evaluate the currently available data and develop an integrated report detailing site conditions relevant to solid and hazardous waste management and the nature and extent of contamination at the Harrison facility. As discussed in this report, numerous investigations have been completed in the past providing information on the location and description of solid and hazardous waste and the nature and extent of contamination at the Harrison facility. Some of these previous investigations are detailed and provide sufficient information to adequately describe selected SWMUs, while other investigations are preliminary.

Based on the available data and information reviewed for this report, supplemental information is needed in certain areas to fulfill both the objectives of the RFI and Harrison's overall assessment and remediation strategy. The additional information requirements will be described here in general terms. A detailed discussion of proposed additional work will be provided in a separate document, the RFI Work Plan.

In general, the primary information need is the additional characterization of specific source areas. Further investigation of selected source areas would be designed to define the extent of contamination in the vicinity of, and emanating from specific sources. Many of the previous investigations have been concerned with the effects of potential source areas on ground-water quality, focusing data collection and characterization in the ground-water regime. Additional data collection and characterization is needed at the surface and in the unsaturated zone where residual contamination may represent a present and future contamination source. For example, characterization of the three pre-RCRA landfills is needed to evaluate their potential contamination contribution.

A detailed Scope of Work describing the investigation techniques proposed for further source specific and site-wide characterization will be provided as part of an RFI Work Plan.

Respectfully Submitted,

GERAGHTY & MILLER, INC.

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Project Scientist

Lawrence S. Graves, CPG
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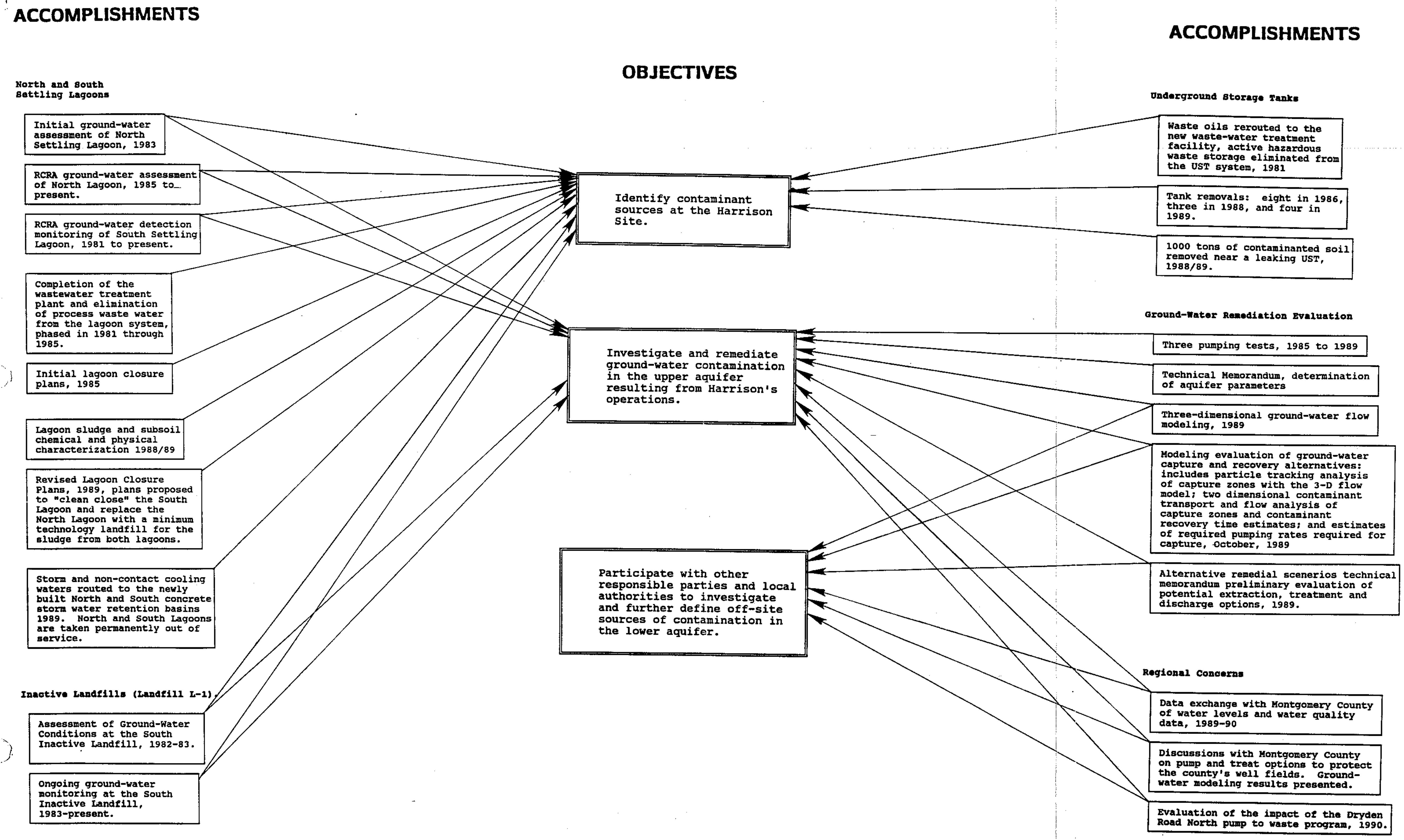
FIGURE 1.1 SUMMARY OF ENVIRONMENTAL ACTIVITIES 1981 TO PRESENT



ACCOMPLISHMENTS

North and South Settling Lagoons

Initial ground-water assessment of North Settling Lagoon, 1983

RCRA ground-water assessment of North Lagoon, 1985 to present.

RCRA ground-water detection monitoring of South Settling Lagoon, 1981 to present.

Completion of the wastewater treatment plant and elimination of process waste water from the lagoon system, phased in 1981 through 1985.

Initial lagoon closure plans, 1985

Lagoon sludge and subsoil chemical and physical characterization 1988/89

Revised Lagoon Closure Plans, 1989, plans proposed to "clean close" the South Lagoon and replace the North Lagoon with a minimum technology landfill for the sludge from both lagoons.

Storm and non-contact cooling waters routed to the newly built North and South concrete storm water retention basins 1989. North and South Lagoons are taken permanently out of service.

Inactive Landfills (Landfill L-1)

Assessment of Ground-Water Conditions at the South Inactive Landfill, 1982-83.

Ongoing ground-water monitoring at the South Inactive Landfill, 1983-present.

OBJECTIVES

Identify contaminant sources at the Harrison Site.

Investigate and remediate ground-water contamination in the upper aquifer resulting from Harrison's operations.

Participate with other responsible parties and local authorities to investigate and further define off-site sources of contamination in the lower aquifer.

ACCOMPLISHMENTS

Underground Storage Tanks

Waste oils rerouted to the new waste-water treatment facility, active hazardous waste storage eliminated from the UST system, 1981

Tank removals: eight in 1986, three in 1988, and four in 1989.

1000 tons of contaminated soil removed near a leaking UST, 1988/89.

Ground-Water Remediation Evaluation

Three pumping tests, 1985 to 1989

Technical Memorandum, determination of aquifer parameters

Three-dimensional ground-water flow modeling, 1989

Modeling evaluation of ground-water capture and recovery alternatives: includes particle tracking analysis of capture zones with the 3-D flow model; two dimensional contaminant transport and flow analysis of capture zones and contaminant recovery time estimates; and estimates of required pumping rates required for capture, October, 1989

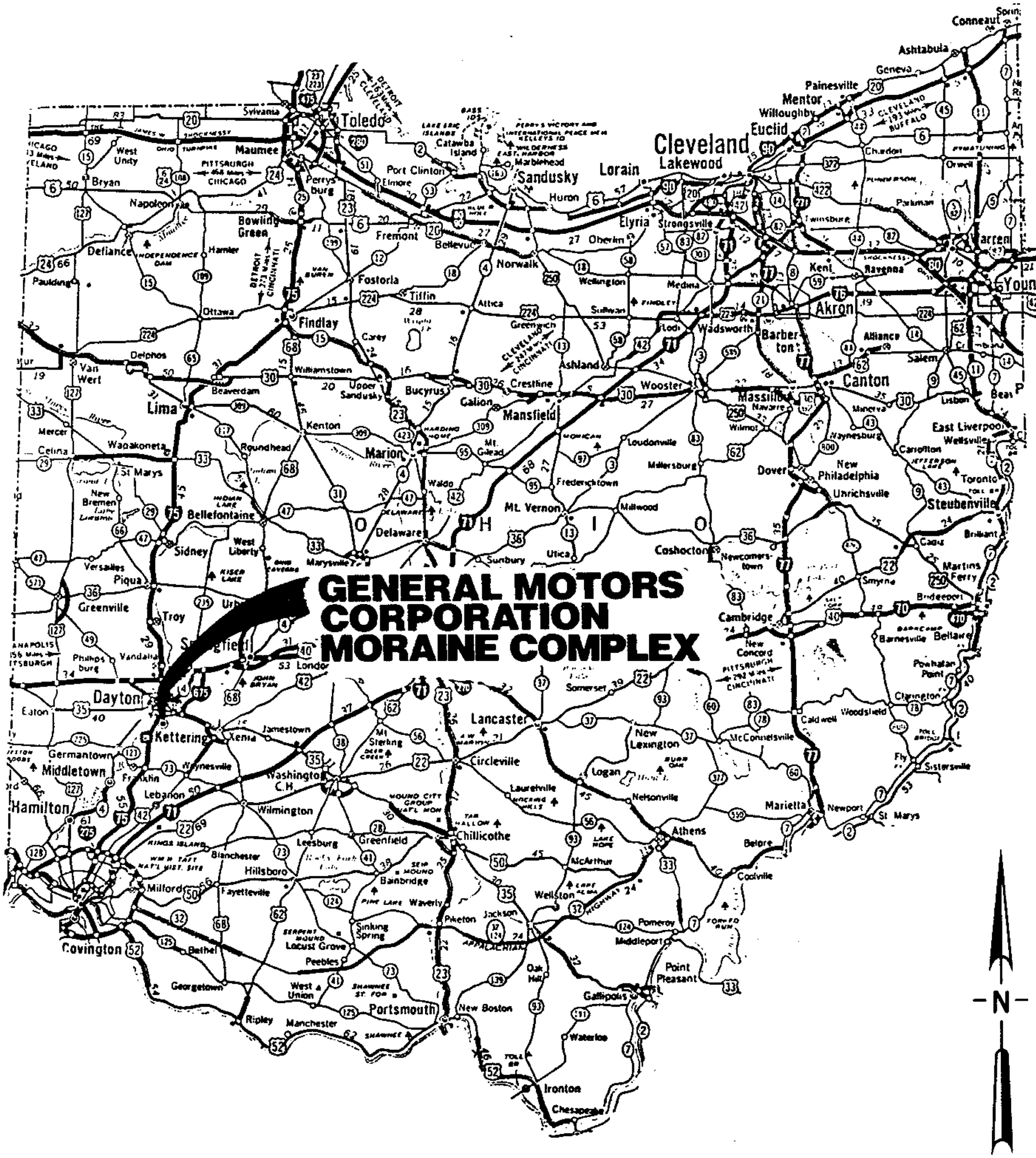
Alternative remedial scenerios technical memorandum preliminary evaluation of potential extraction, treatment and discharge options, 1989.

Regional Concerns

Data exchange with Montgomery County of water levels and water quality data, 1989-90

Discussions with Montgomery County on pump and treat options to protect the county's well fields. Ground-water modeling results presented.

Evaluation of the impact of the Dryden Road North pump to waste program, 1990.



SOURCE: GEOUSHA/CHEK-CHART-UNITED STATES. CANADA, MEXICO ROAD ATLAS.

0 33 MILES

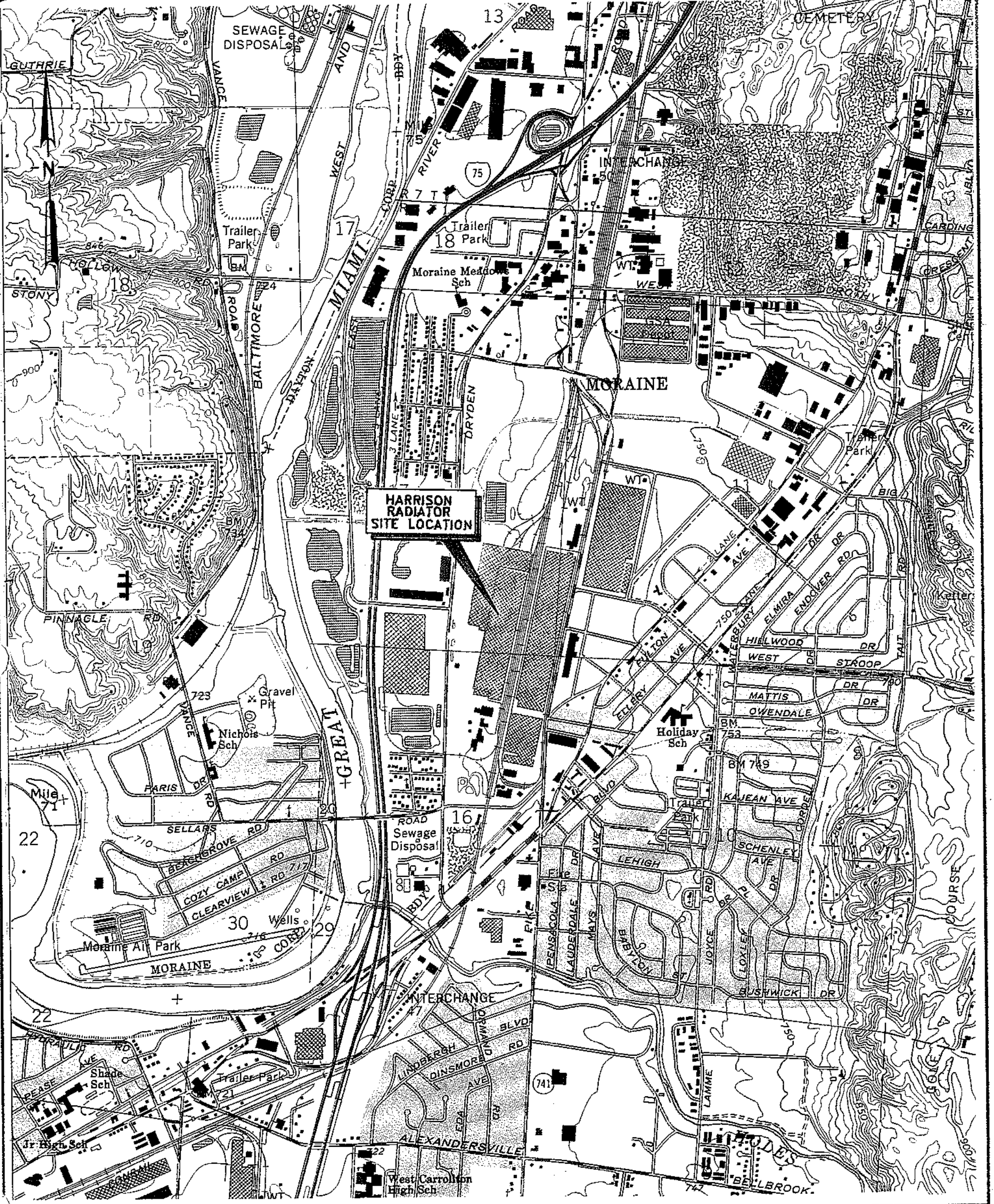
APPROX. SCALE

GERAGHTY & MILLER, INC.
Environmental Services

SITE LOCATION MAP

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE
2–1



SCALE
0 1/4 1/2 MILE

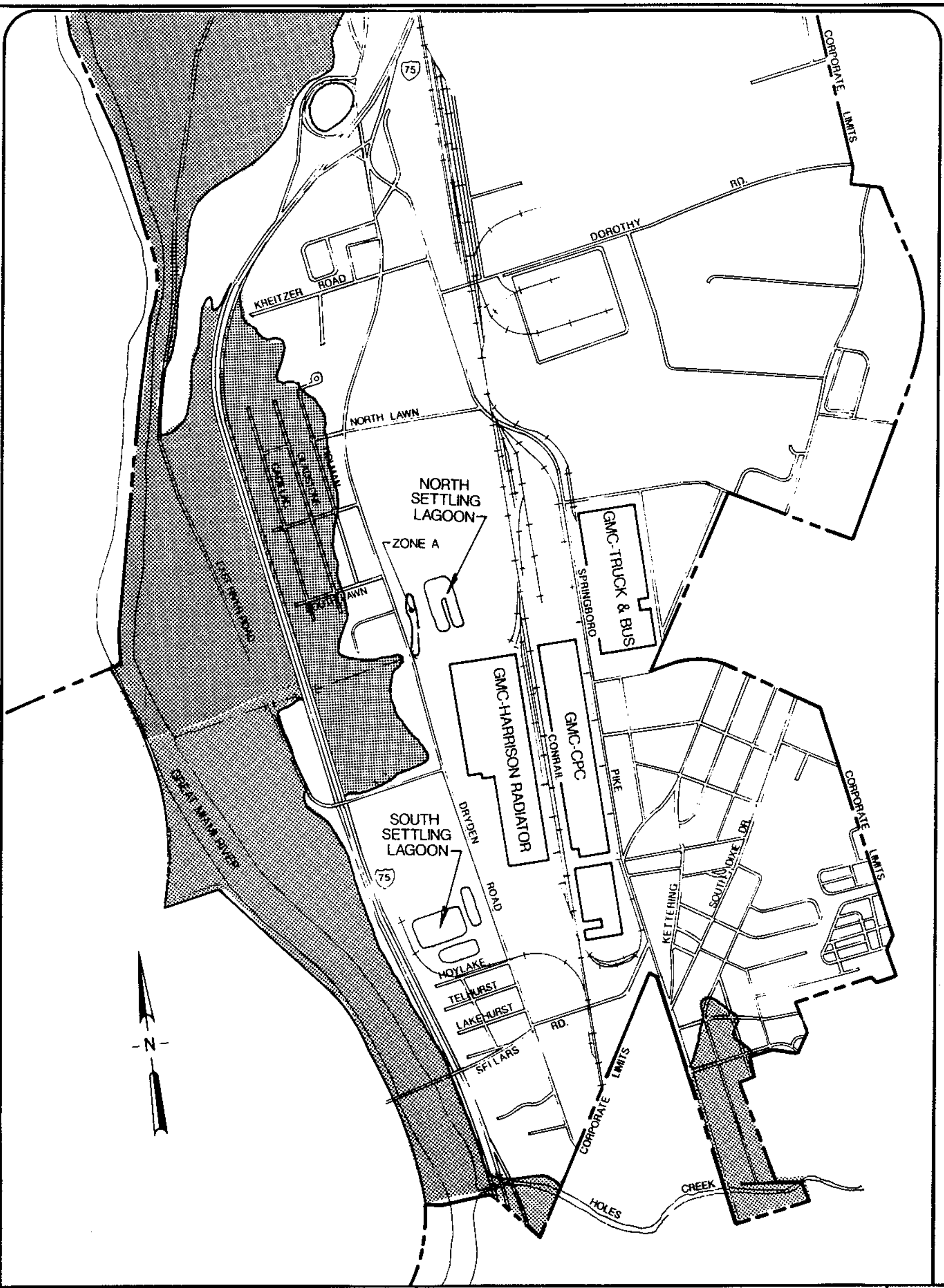
GERAGHTY
& MILLER, INC.
Environmental Services

SITE VICINITY MAP
(USGS BASE)

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE

2-2



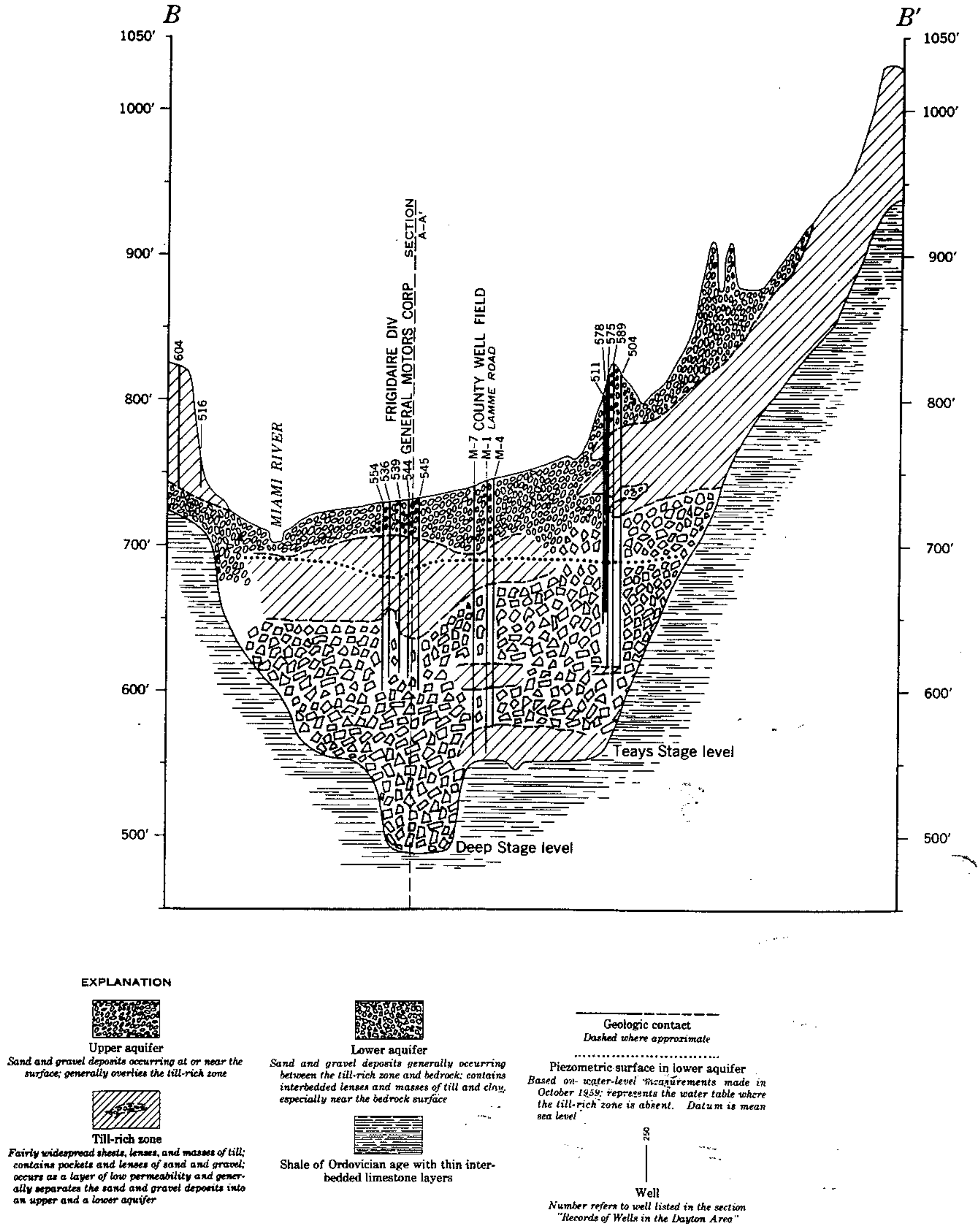
SCALE
0 24,000 FT

GERAGHTY & MILLER, INC.
Environmental Services

100 YEAR FLOOD ZONE FOR MORAINE, OHIO

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE
2–3



EXPLANATION

Upper aquifer
Sand and gravel deposits occurring at or near the surface; generally overlies the till-rich zone

Till-rich zone
Fairly widespread sheets, lenses, and masses of till; contains pockets and lenses of sand and gravel; occurs as a layer of low permeability and generally separates the sand and gravel deposits into an upper and a lower aquifer

Lower aquifer
Sand and gravel deposits generally occurring between the till-rich zone and bedrock; contains interbedded lenses and masses of till and clay, especially near the bedrock surface

Shale of Ordovician age with thin interbedded limestone layers

Geologic contact
Dashed where approximate

Piezometric surface in lower aquifer
Based on water-level measurements made in October 1959; represents the water table where the till-rich zone is absent. Datum is mean sea level

250

Well
Number refers to well listed in the section "Records of Wells in the Dayton Area"

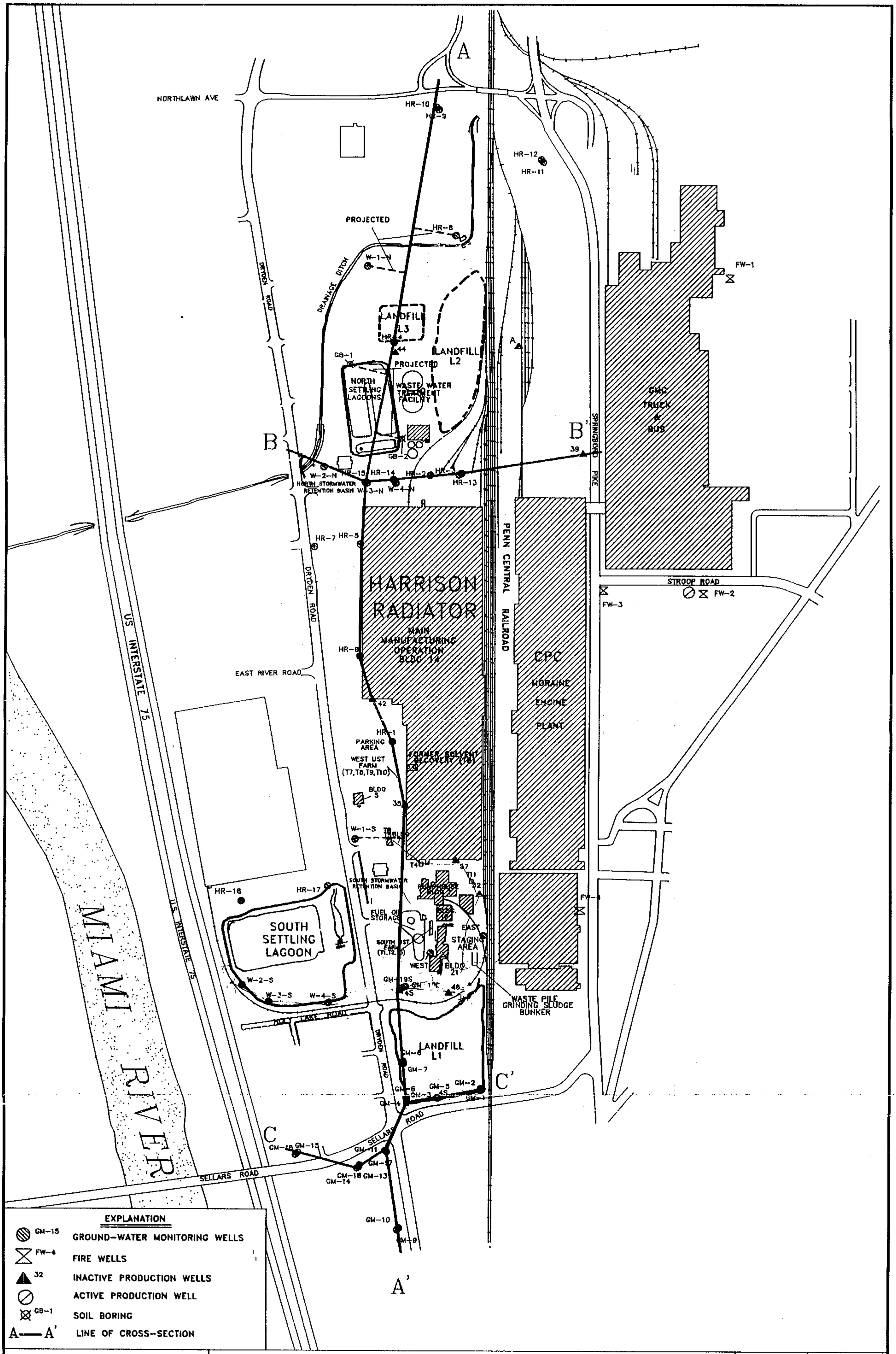
0 1 mile

GERAGHTY
& MILLER, INC.
Environmental Services

GEOLOGIC CROSS–SECTION OF BURRIED VALLEY AQUIFER NEAR THE HARRISON FACILITY

GMC HARRISON RADIATOR
MORAINE, OHIO

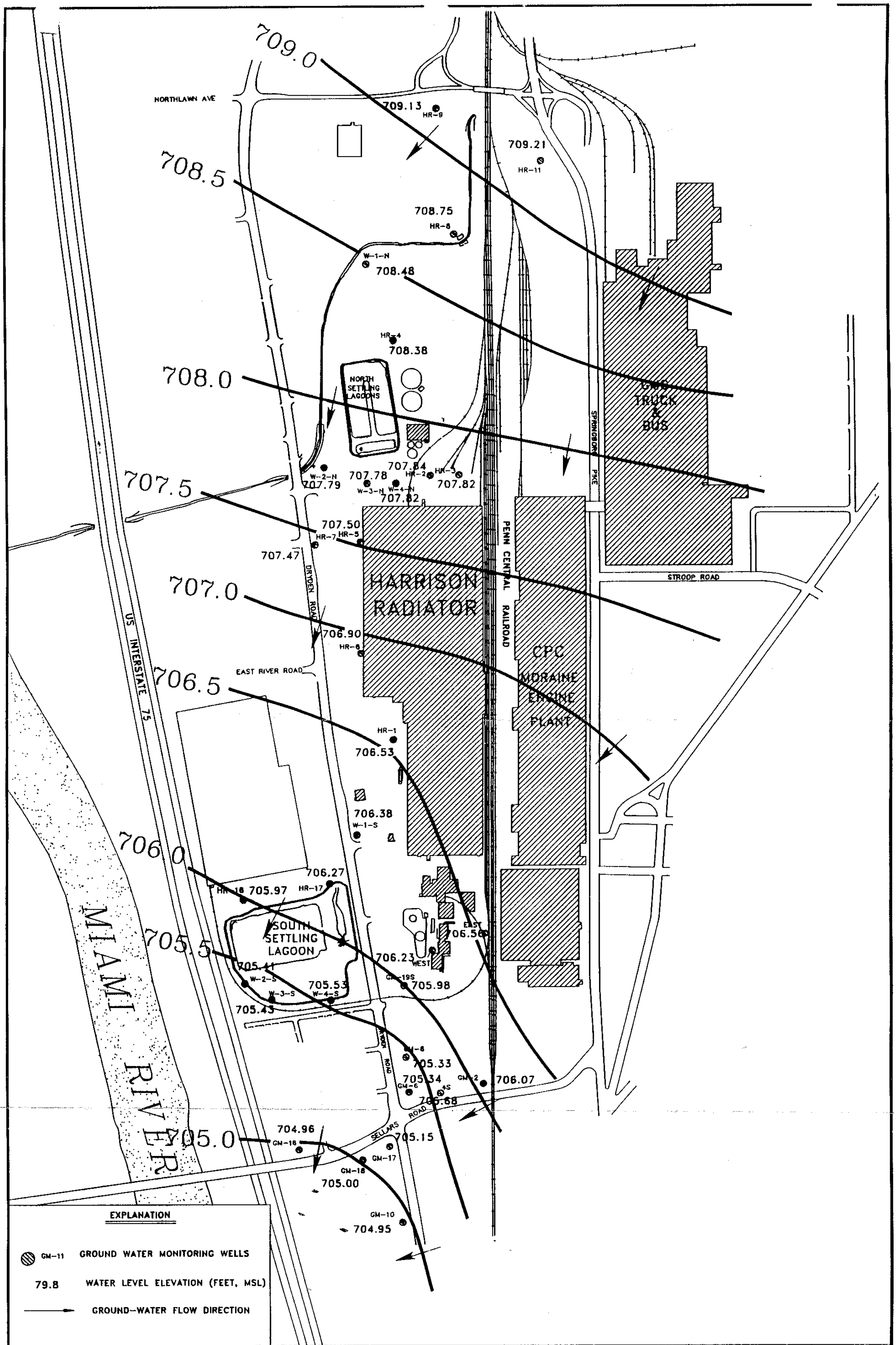
FIGURE
2–4



LOCATION OF LINES OF GEOLOGIC CROSS-SECTION
AT
GENERAL MOTORS CORPORATION
HARRISON RADIATOR DIVISION
MORAINE, OHIO

FIGURE
2-5

GERAGHTY
& MILLER, INC.
Environmental Services



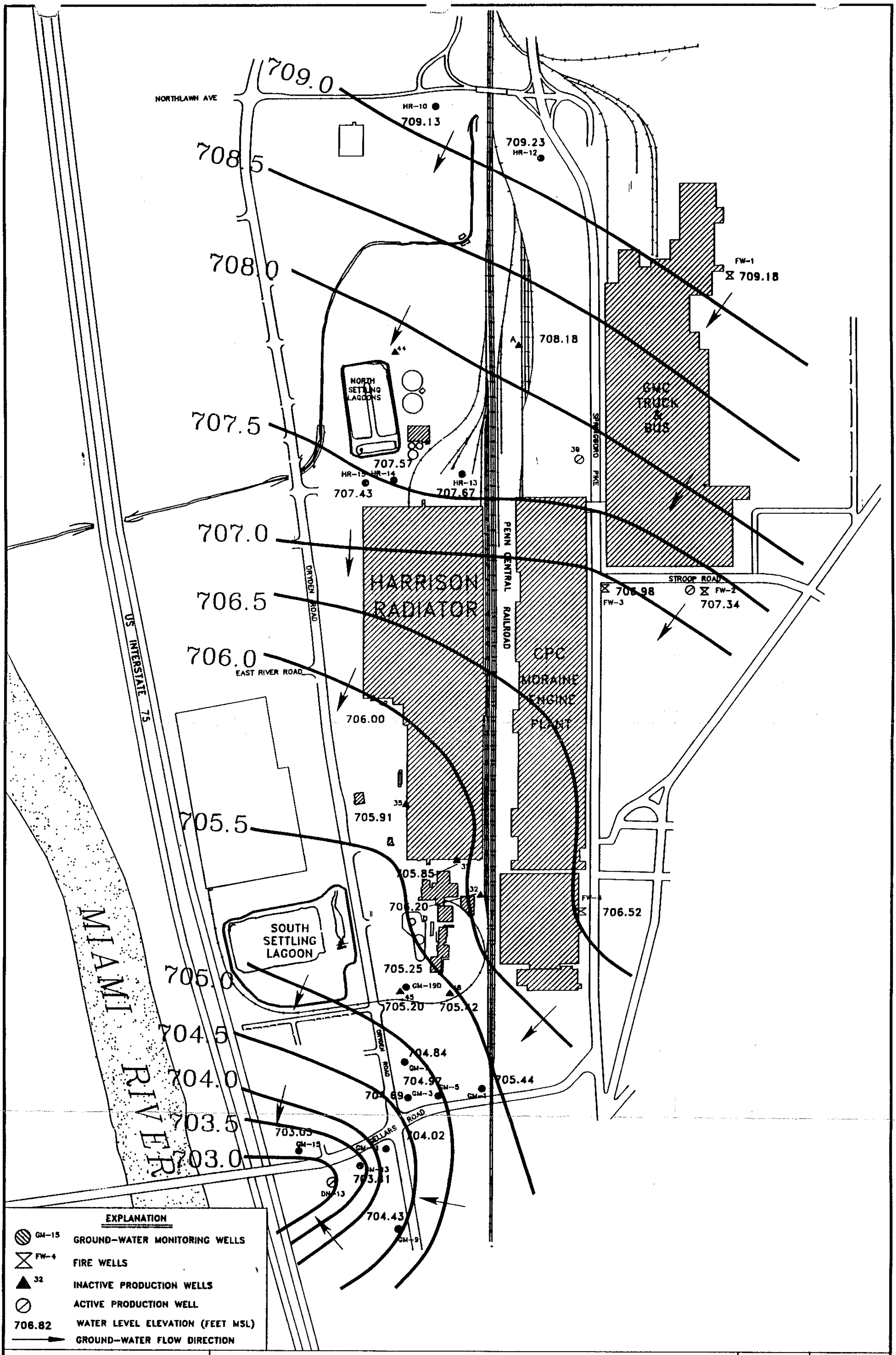
SCALE
200 0 200 400 600 FT

GERAGHTY & MILLER, INC.
Environmental Services

WATER TABLE SURFACE ON NOVEMBER 12, 1990
AT
GENERAL MOTORS CORPORATION
HARRISON RADIATOR DIVISION
MORAINE, OHIO

FIGURE
2-6

MAGNETIC NORTH
PLANT NORTH
N



SCALE
200 0 200 400 600 FT

GERAGHTY
& MILLER, INC.
Environmental Services

POTENTIOMETRIC SURFACE ON NOVEMBER 12, 1990
AT
GENERAL MOTORS CORPORATION
HARRISON RADIATOR DIVISION
MORAINE, OHIO

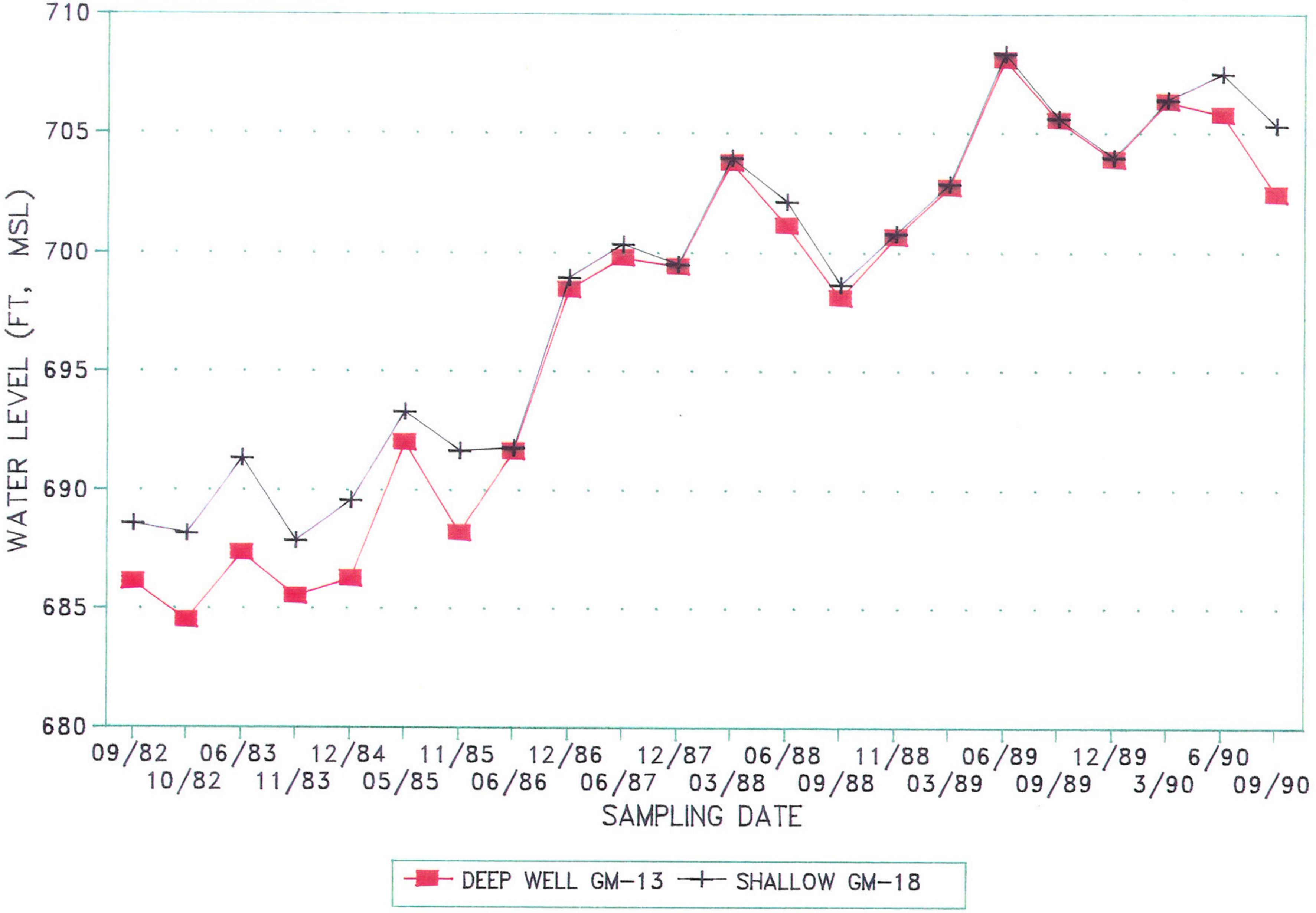
FIGURE.
2–7

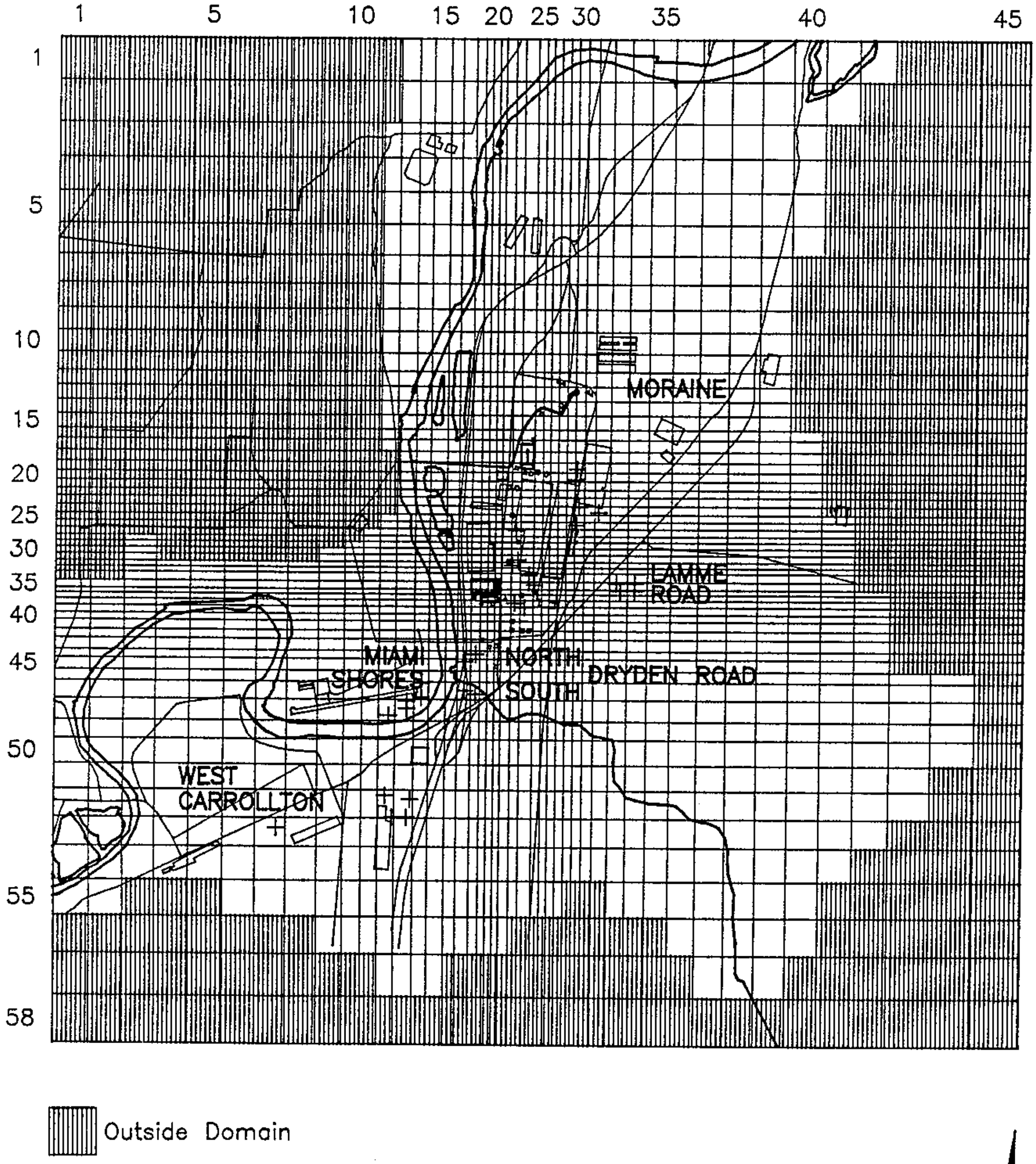
MAGNETIC NORTH
PLANT NORTH

FIGURE
2-8

WELL PAIR HYDROGRAPHS
WELLS GM-13 & GM-18

GERAGHTY & MILLER, INC.
Environmental Services



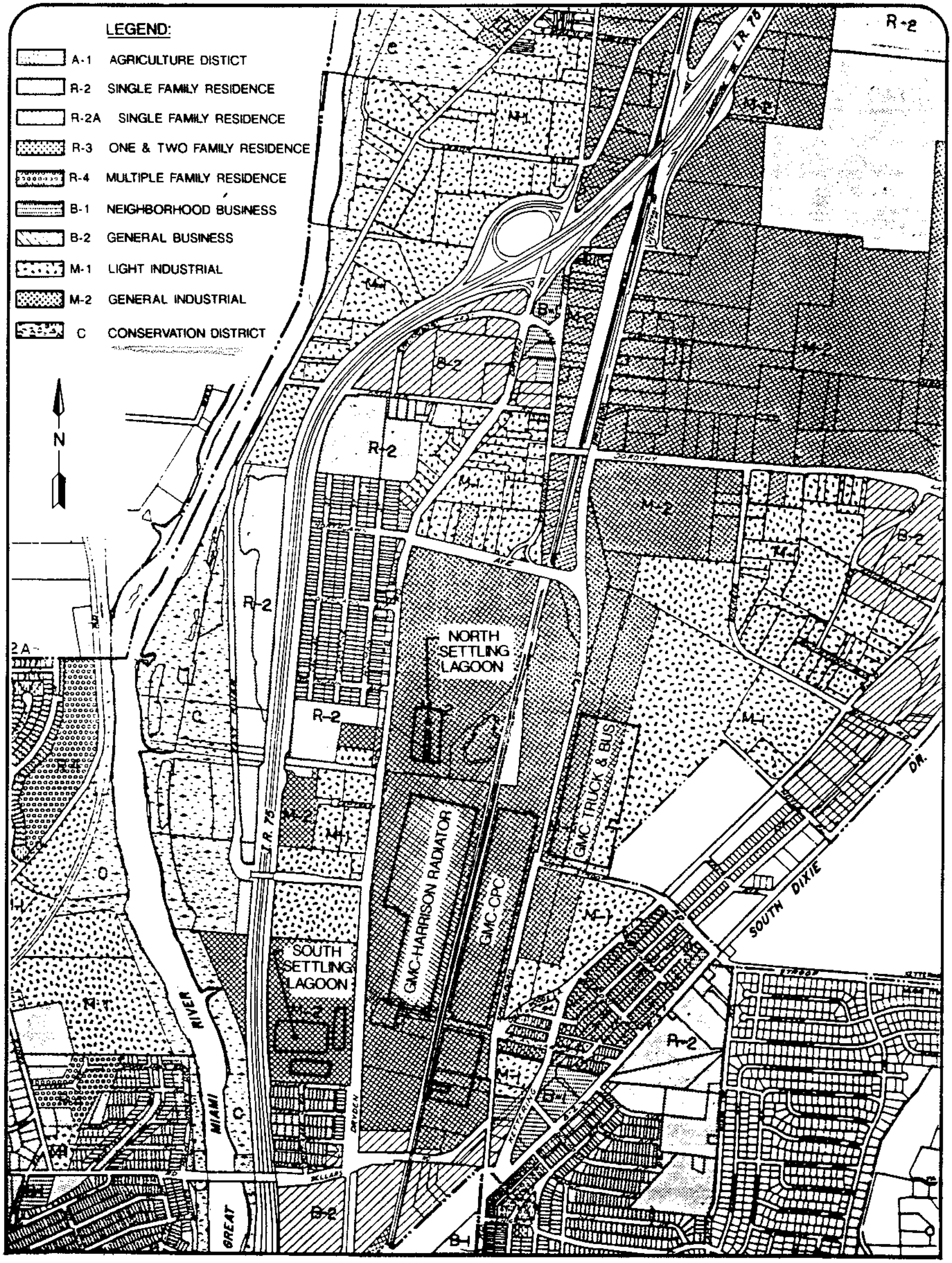


GERAGHTY & MILLER, INC.
Environmental Services

HARRISON FINITE-DIFFERENCE GROUND-WATER MODEL GRID

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE
2-9



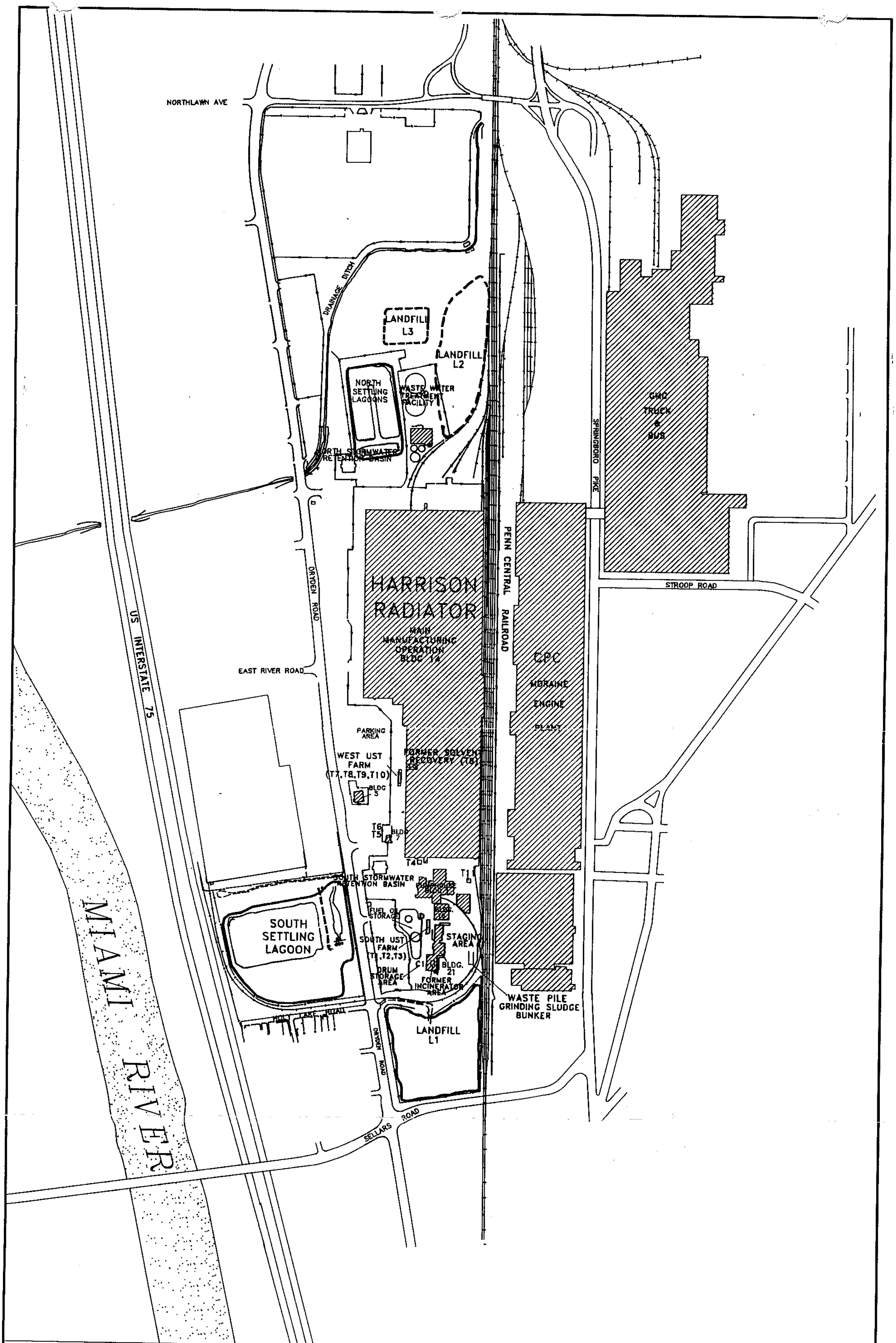
SCALE
0 24,000 FT

GERAGHTY
& MILLER, INC.
Environmental Services

LOCAL ZONING — HARRISON RADIATOR AREA

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE
2–10



SCALE

200 0 200 400 600 FT

GERAGHTY & MILLER, INC.

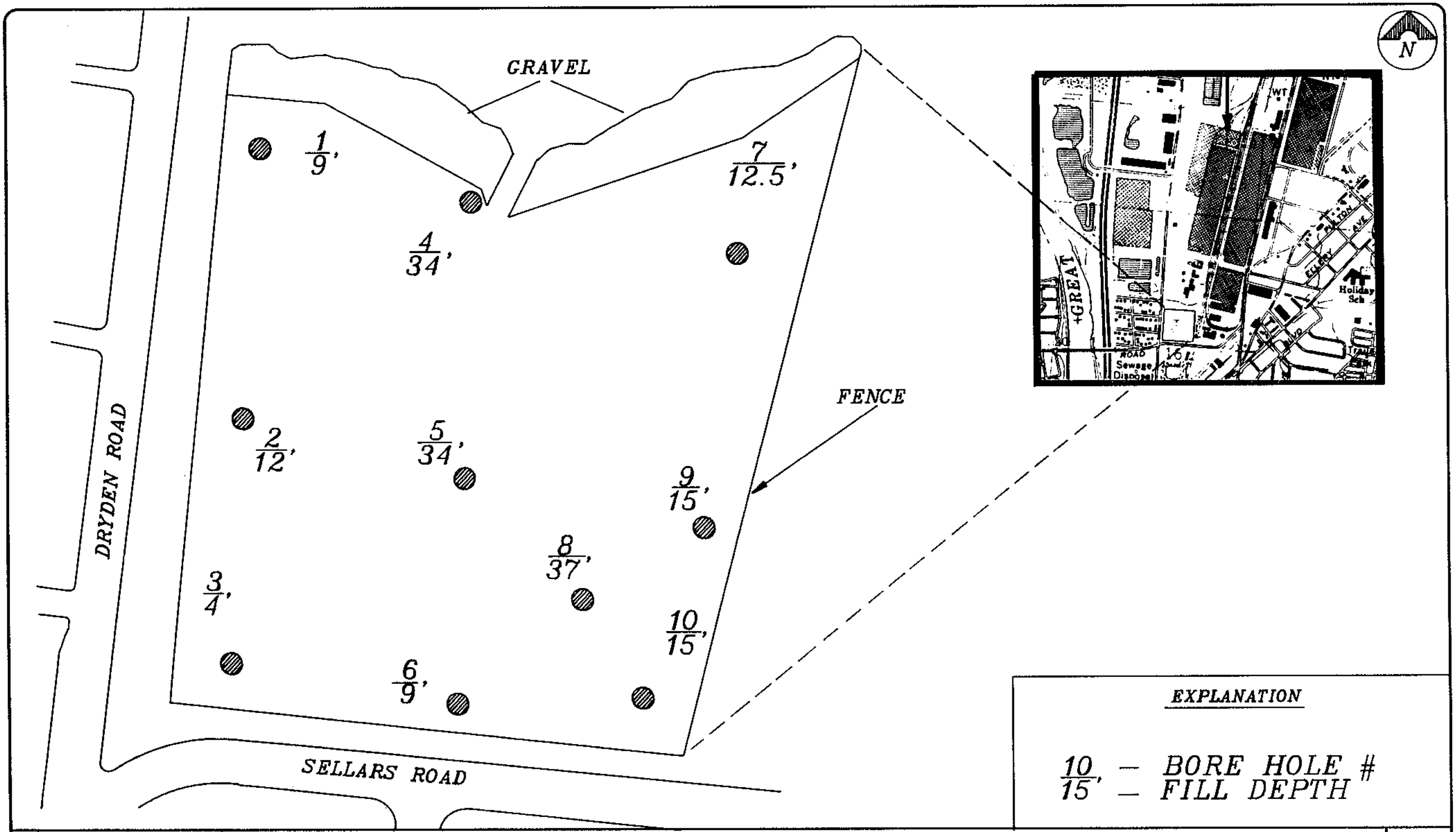
Environmental Services

SITE LAYOUT
OF

GENERAL MOTORS CORPORATION
HARRISON RADIATOR DIVISION
MORAINE, OHIO

FIGURE.
3—1

MAGNETIC NORTH
PLANT NORTH
N



0 100 200 FT

GERAGHTY & MILLER, INC.
Environmental Services

SOIL BORING LOCATIONS AND FILL DEPTH AT LANDFILL L-1
(MODIFIED FROM BOWSER-MORNER, 1981)

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE
3-2

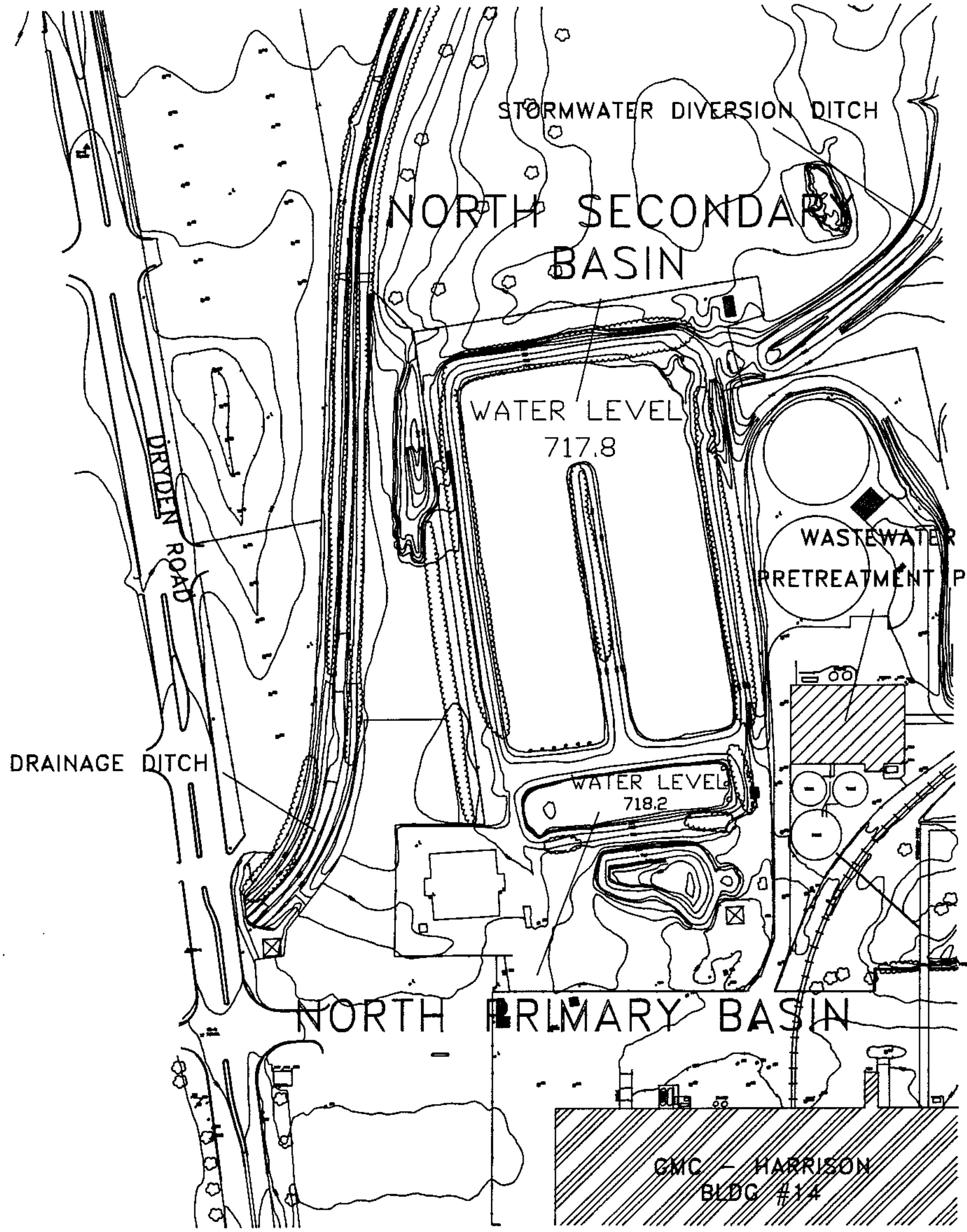
1976 AERIAL PHOTOGRAPH OF LANDFILL L3

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE

3-3

GERAGHTY
& MILLER, INC.
Environmental Services



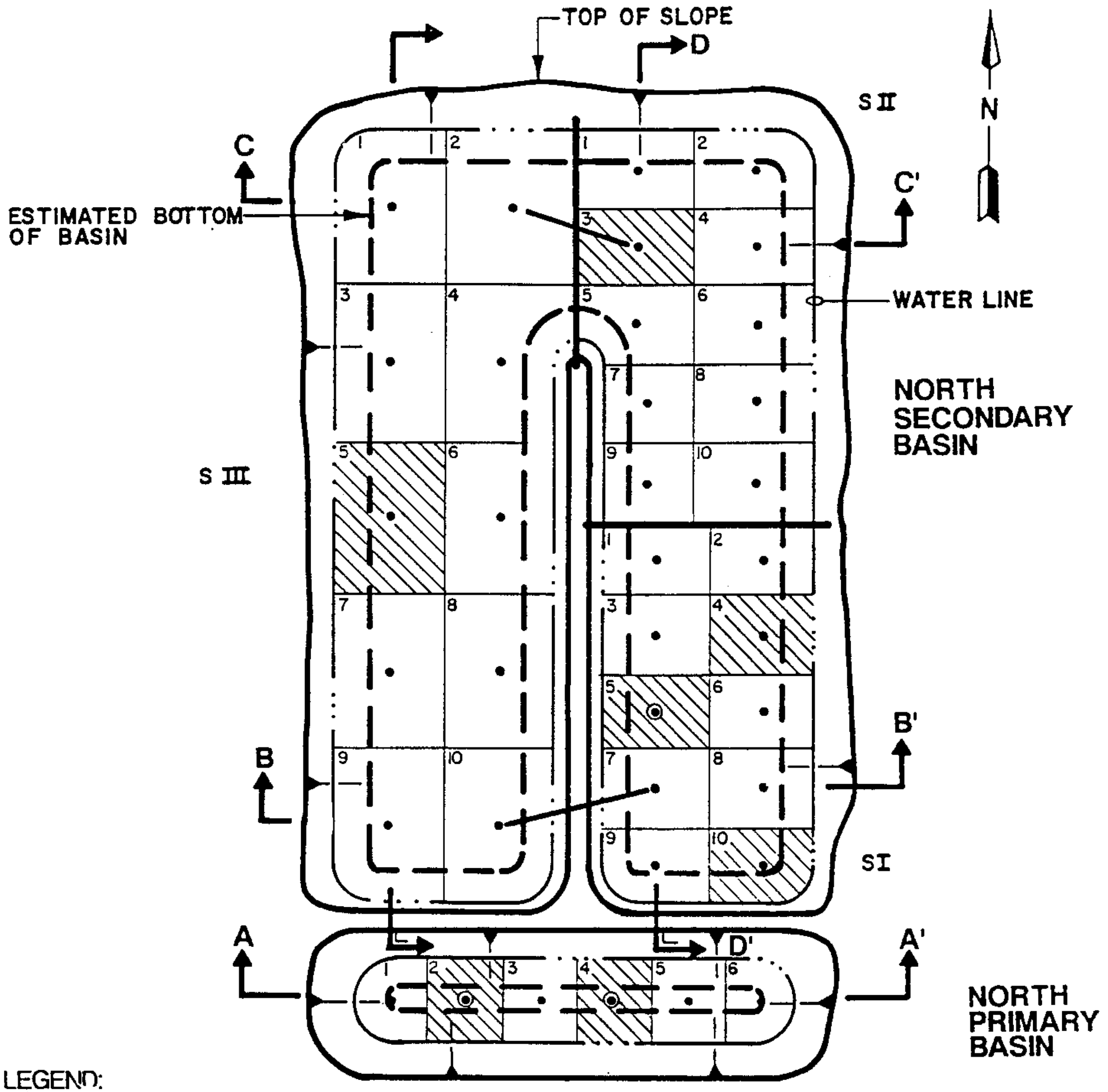
CONTOUR INTERVAL 1'
DATE OF PHOTOGRAPHY APRIL 12, 1989

GERAGHTY & MILLER, INC.
Environmental Services

NORTH LAGOON SYSTEM EXISTING SITE CONDITIONS

GMC – HARRISON RADIATOR
MORAINE, OHIO

FIGURE
3–4



LEGEND:

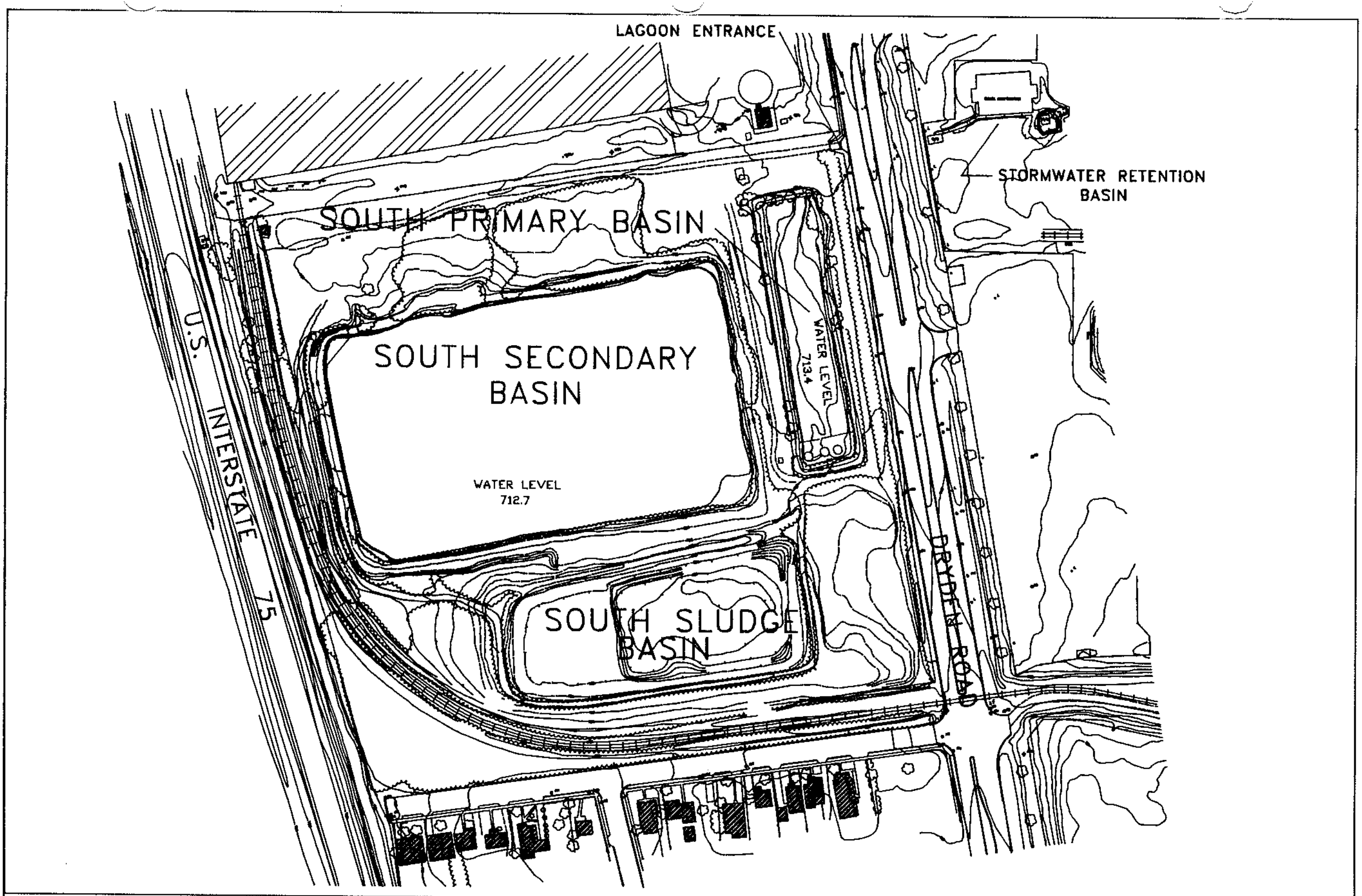
- ● SLUDGE CORE LOCATION
- ◉ COMBINED SLUDGE CORE/SUBSOIL SAMPLING LOCATION
- ▨ RANDOM SAMPLE LOCATION
- A ⌞ ⌟ A' CROSS SECTION LOCATION

GERAGHTY & MILLER, INC.
Environmental Services

NORTH SETTLING LAGOON SAMPLE LOCATIONS

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE
3–5



GERAGHTY
& MILLER, INC.
Environmental Services

SOUTH SETTLING LAGOON EXISTING
SITE CONDITIONS

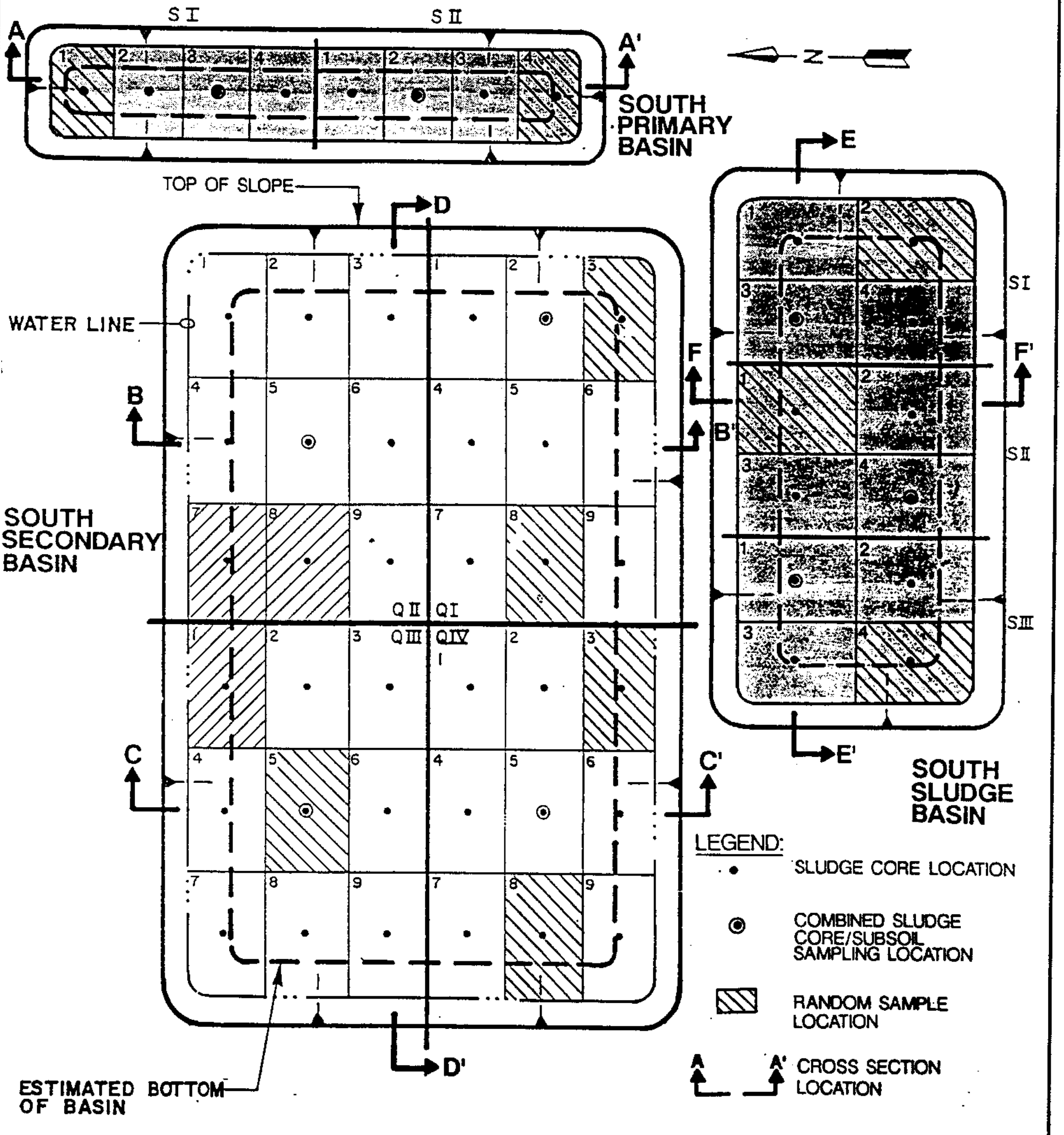
GMC – HARRISON RADIATOR
MORAINE, OHIO

FIGURE
3–6

0 40 80

CONTOUR INTERVAL 1'
DATE OF PHOTOGRAPHY APRIL 12, 1989

N

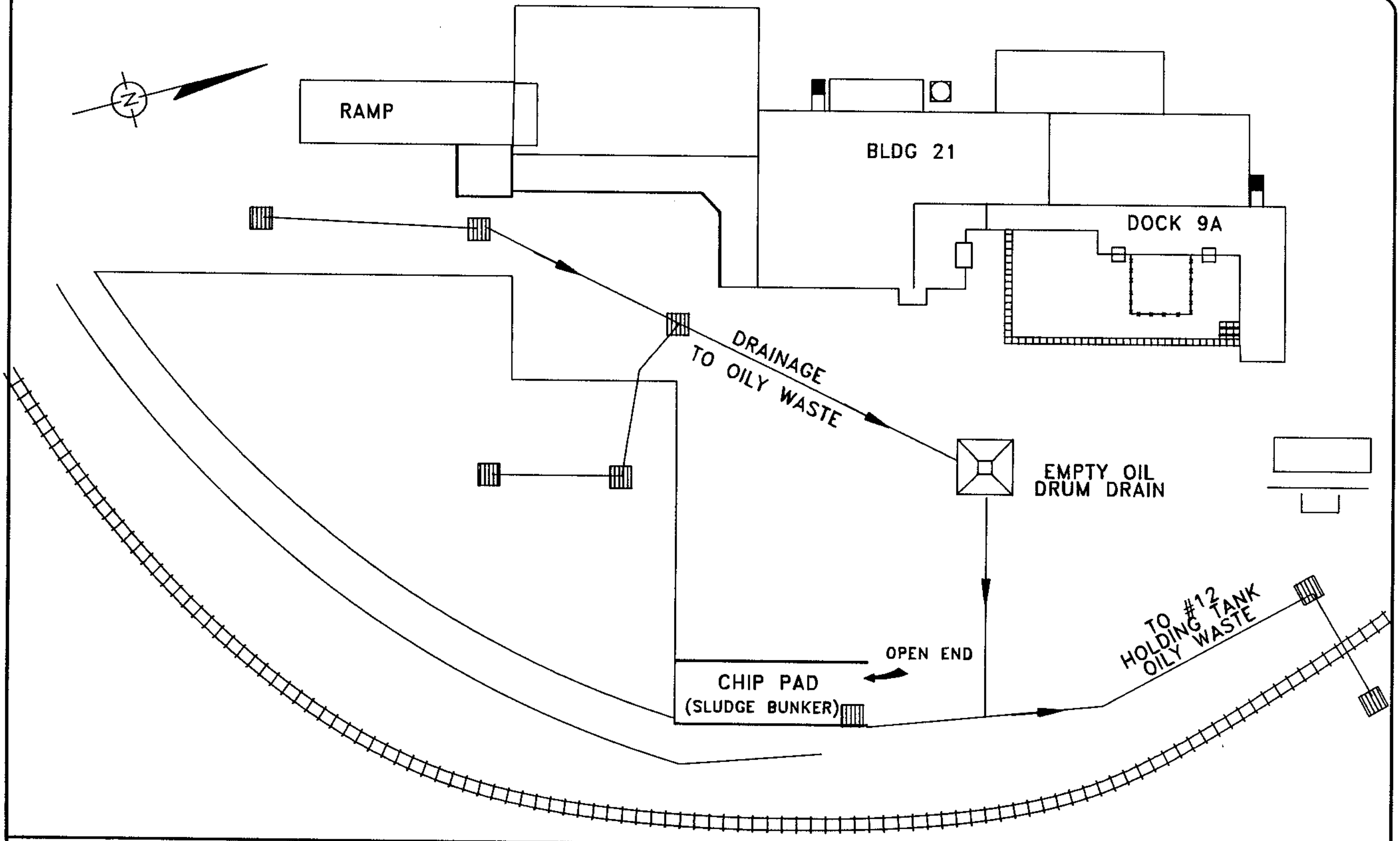


GERAGHTY
& MILLER, INC.
Environmental Services

SOUTH SETTLING LAGOON SAMPLE LOCATIONS

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE
3–7



SCALE
0 50 100 FT

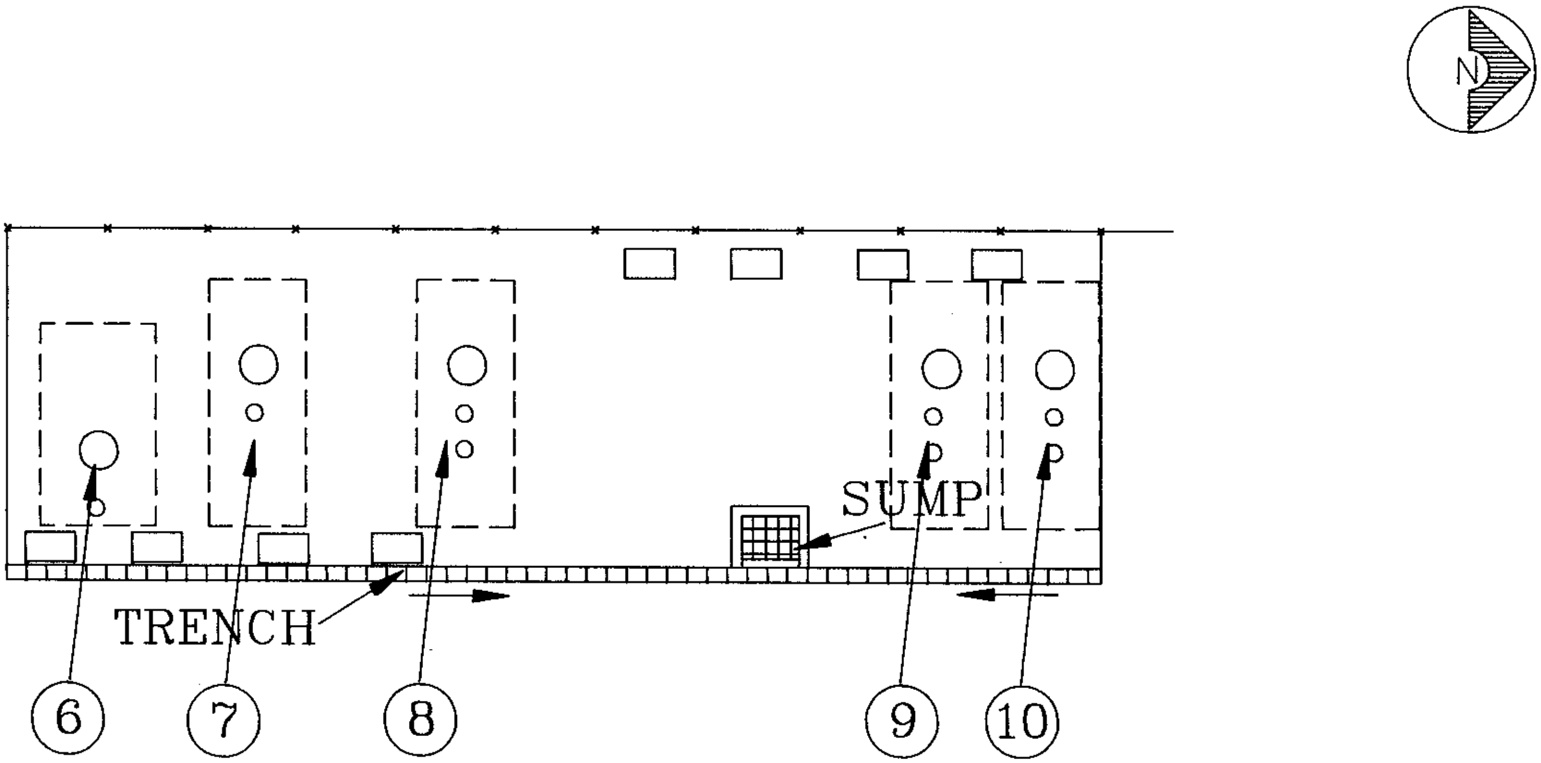
GERAGHTY
& MILLER, INC.
Environmental Services

STAGING AREA LAYOUT
(ADAPTED FROM HARRISON RADIATOR 1989 SPCC PLAN)

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE
3–8

DATE: 01079 | PRJCT. NO.: OH01908 | FILE NO.: B1WEST2 | CAD FILE: HARRISON | MPILER: COMPILER | MGR.: T.ANDERSON | DRAFTER: MAJ



TANK MATERIAL

6	NON-LEADED GASOLINE
7	DIESEL FUEL
8	CUTTING OIL
9	QUAKER 568
10	CIMCOOL S-2

APPROXIMATE SCALE
0 20 FT

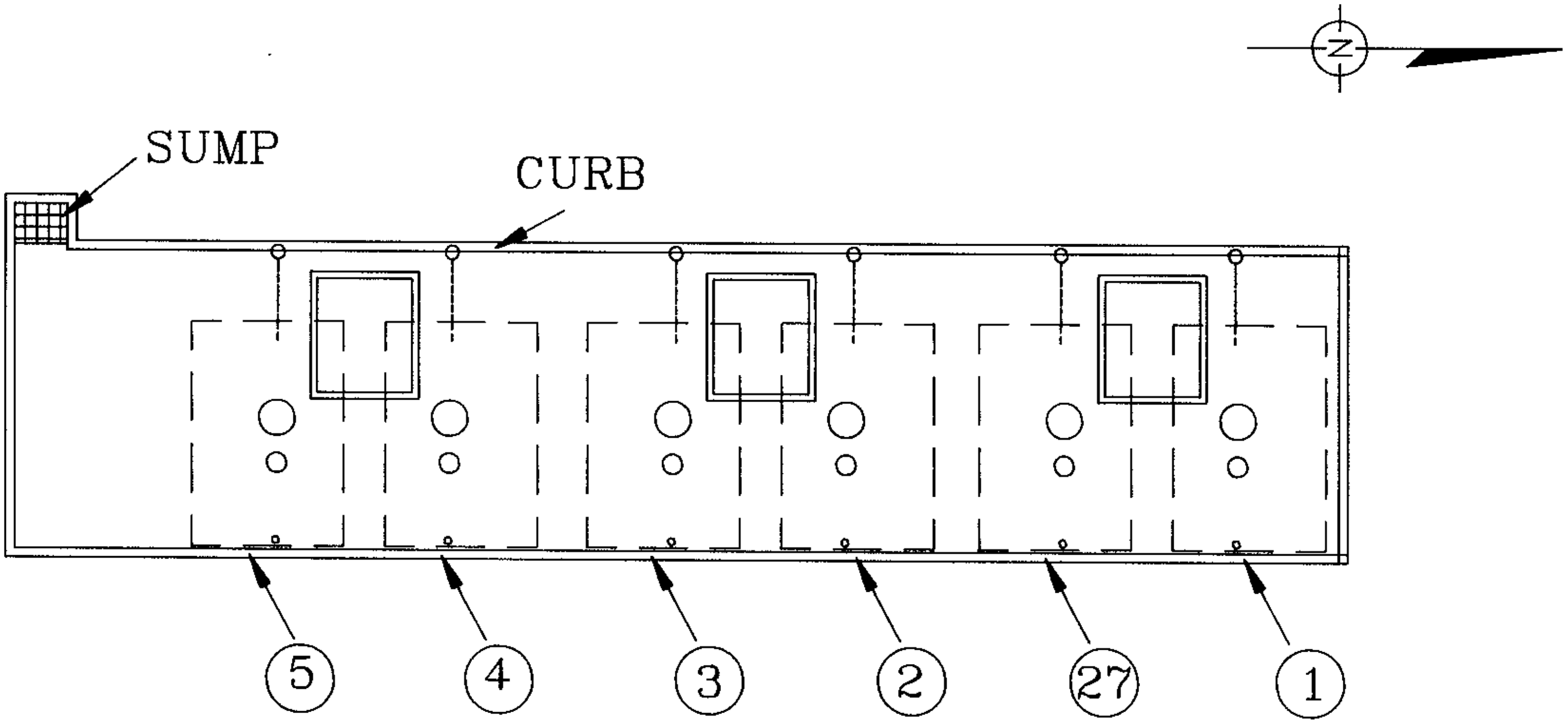
GERAGHTY
& MILLER, INC.
Environmental Services

WEST TANK FARM

WEST OF BLDG 14, SOUTH END (ADAPTED FROM 1989 SPCC PLAN)

GMC HARRISON RADIATOR

FIGURE
3-9



TANK MATERIAL

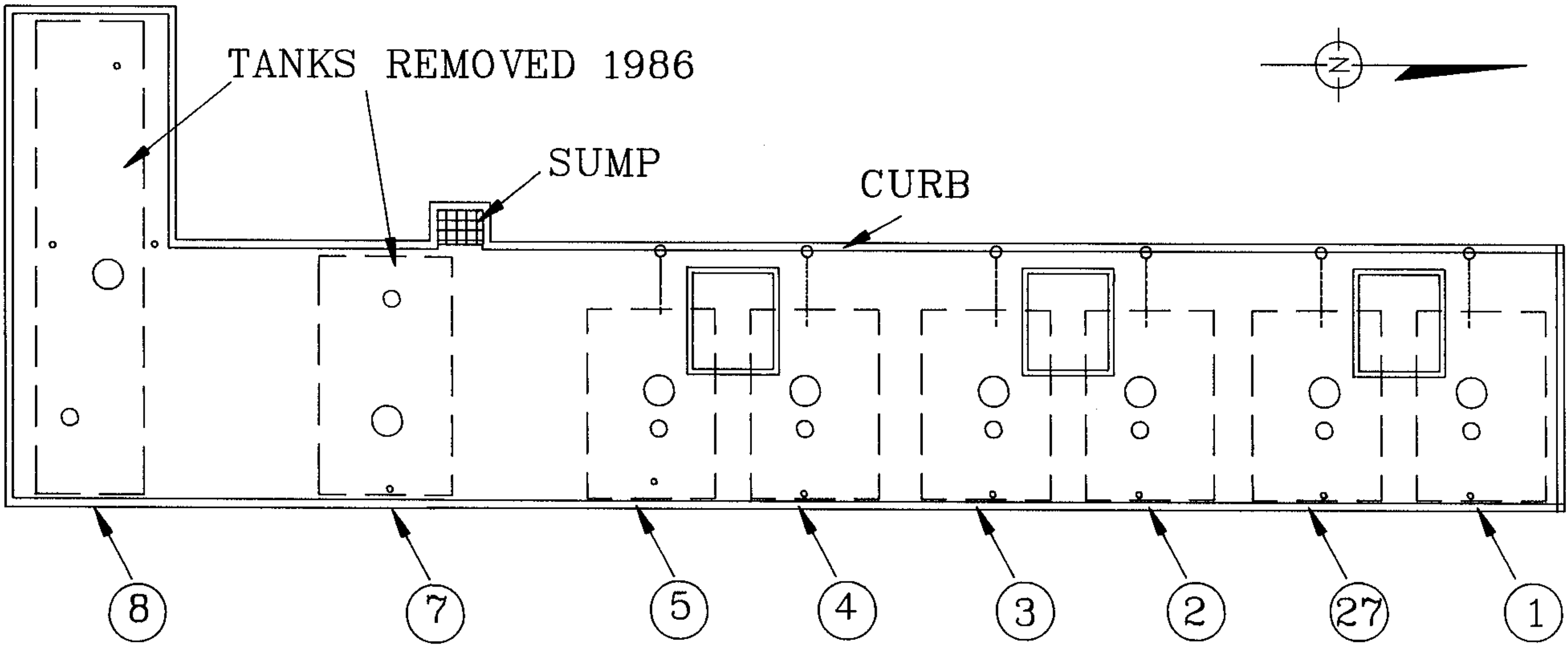
1	WASHING OIL
2	LUB. GEAR OIL
3	BRUKO D-332
4	HYDROLIC OIL - 215 SEC
5	CIMTECH 3900
27	(SWMU T1)

0 10 20ft

GERAGHTY
& MILLER, INC.
Environmental Services

SOUTH TANK FARM
WEST OF OIL HOUSE (ADAPTED FROM 1989 SPCC PLAN)
GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE
3-10



TANK MATERIAL

1	WASHING OIL
2	LUB. GEAR OIL
3	BRUKO D-332
4	HYDROLIC OIL - 215 SEC
5	CIMTECH 3900
27	(SWMU T1)
7	(SWMU T2)
8	(SWMU T3)

0 10 20ft

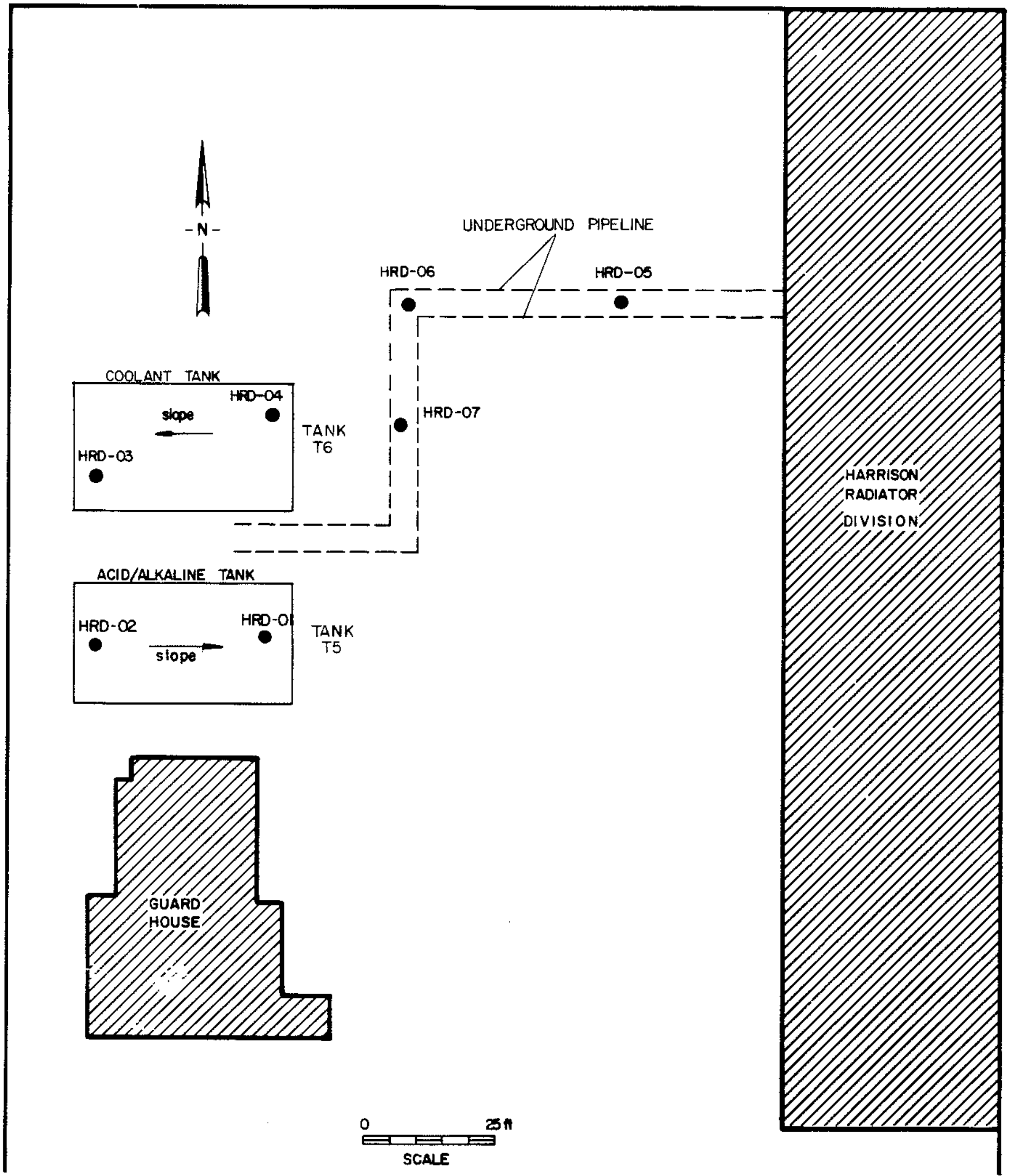
GERAGHTY
& MILLER, INC.
Environmental Services

SOUTH TANK FARM

WEST OF OIL HOUSE (ADAPTED FROM 1989 SPCC PLAN)

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE
3-11

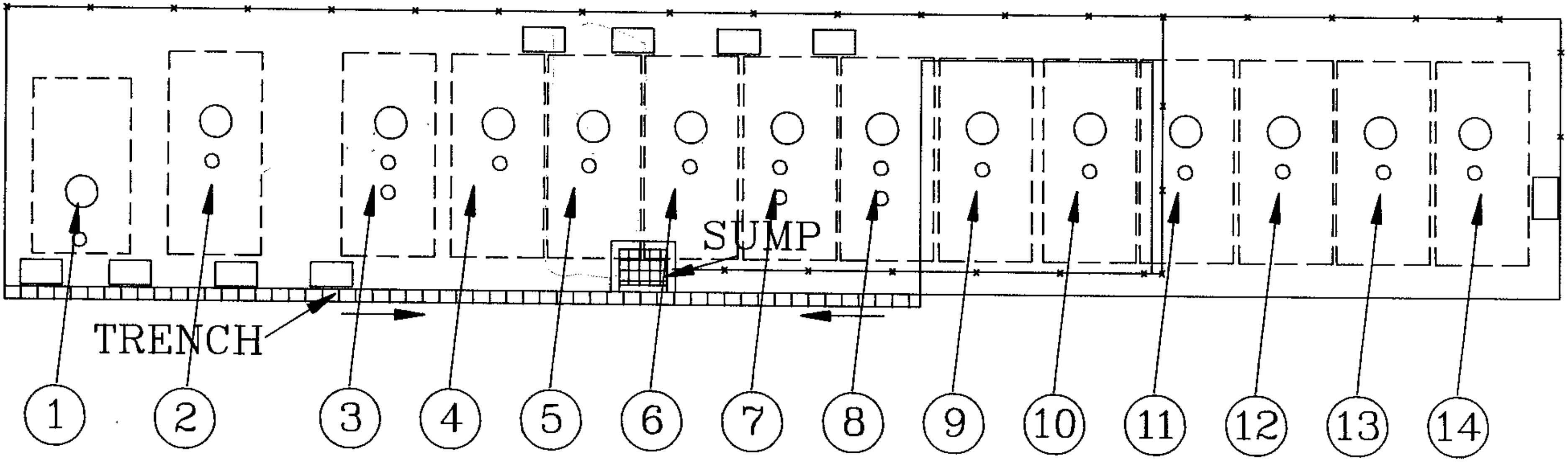


GERAGHTY & MILLER, INC.
Environmental Services

FORMER OUTSIDE CONCRETE UST'S AND SAMPLING LOCATIONS

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE 3-12



TANK MATERIAL

1	NON-LEADED GASOLINE
2	DIESEL FUEL
3	CINDOL COOLANT
4	(SWMU T8)
5	(SWMU T8)
6	(SWMU T7)
7	QUAKER 568
8	CIMCOOL S-2
9	(SWMU T7)
10	(SWMU T7)
11	(SWMU T10)
12	(SWMU T10)
13	(SWMU T9)
14	(SWMU T9)

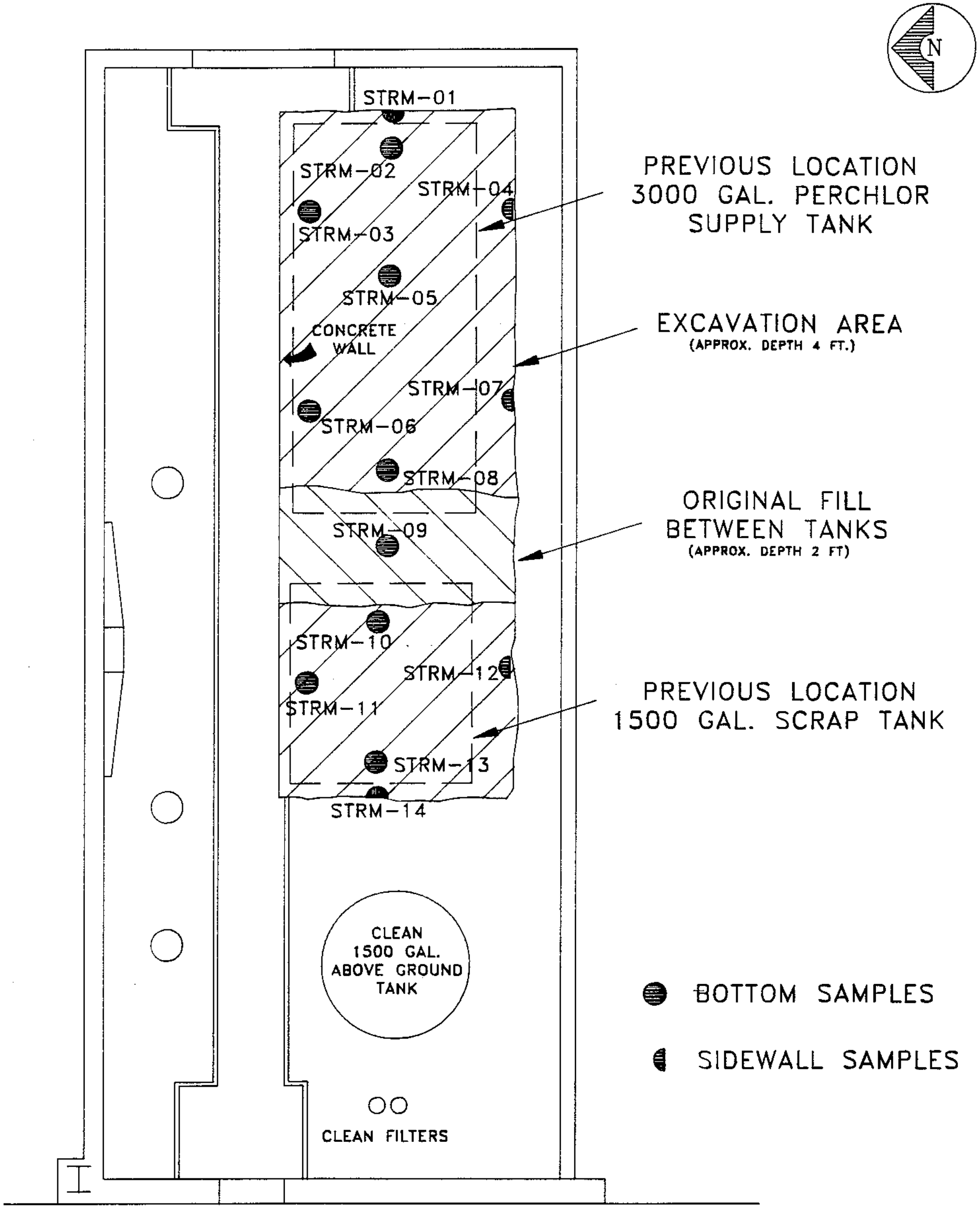
APPROXIMATE SCALE
0 10 20 FT

GERAGHTY
& MILLER, INC.
Environmental Services

WEST TANK FARM

WEST OF BLDG 14, SOUTH END (ADAPTED FROM 1984 SPCC PLAN)
(PRIOR TO 1986)
GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE
3–13



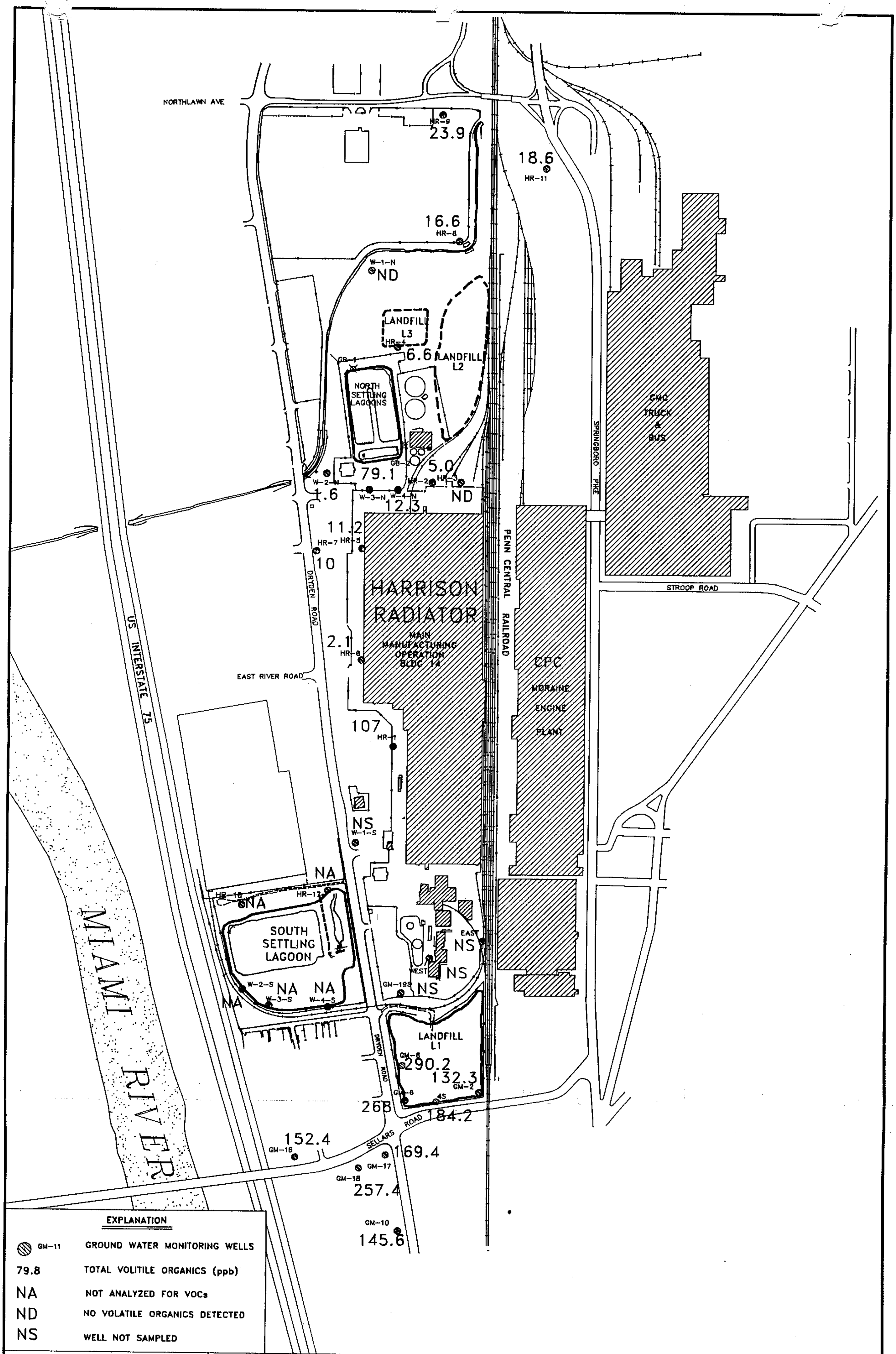
SCALE
0 5 10 FT

GERAGHTY & MILLER, INC.
Environmental Services

FORMER INSIDE SOLVENT UST'S AND SAMPLING LOCATIONS

GMC HARRISON RADIATOR
MORAIN, OHIO

FIGURE
3-14



SCALE
200 0 200 400 600 FT

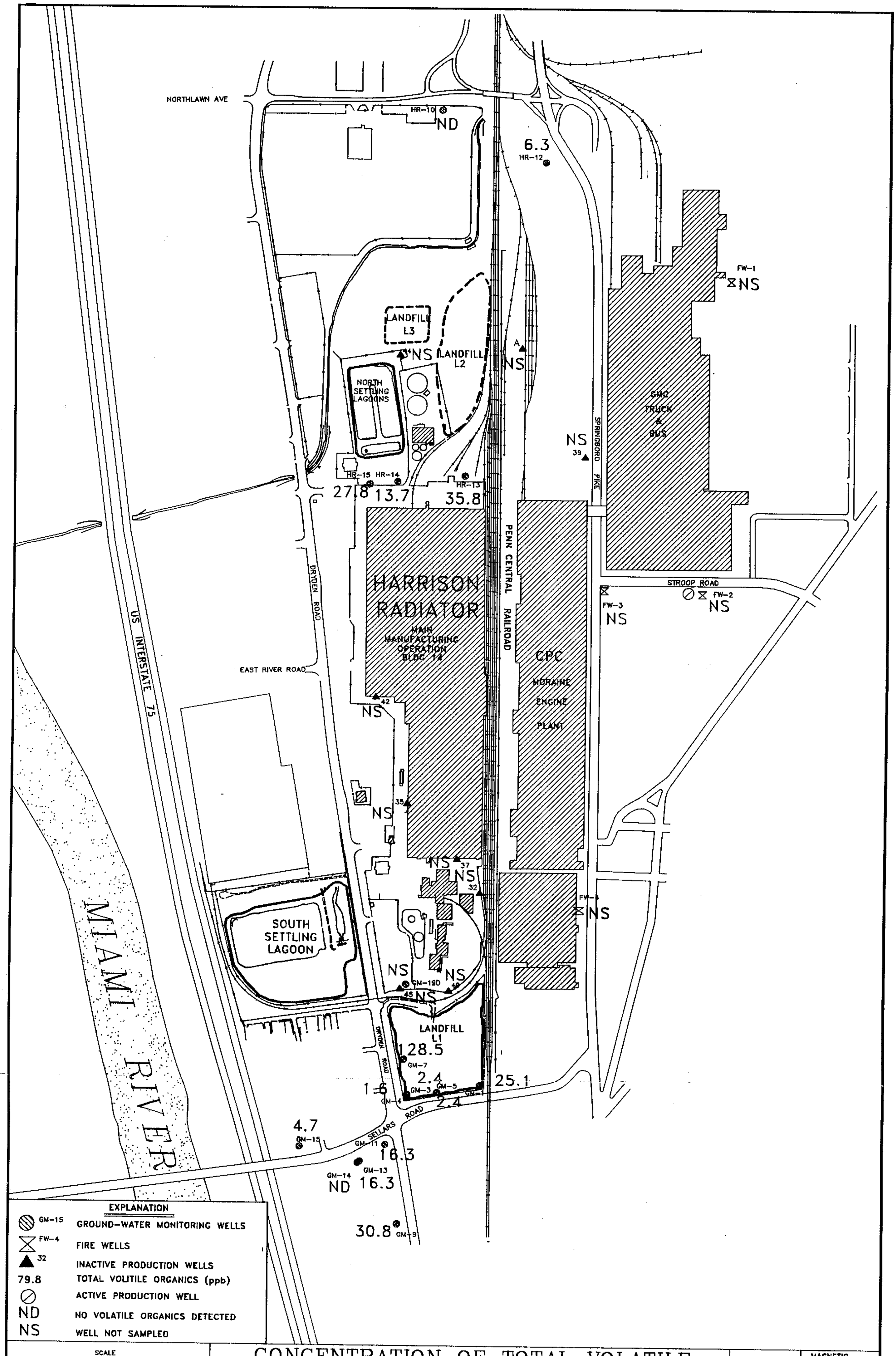
GERAGHTY
& MILLER, INC.
Environmental Services

CONCENTRATIONS OF TOTAL VOLATILE ORGANICS DETECTED IN SHALLOW MONITOR WELLS IN NOVEMBER, 1990

GENERAL MOTORS CORPORATION
HARRISON RADIATOR DIVISION
MORAINE, OHIO

FIGURE.
4—1

MAGNETIC NORTH
PLANT NORTH
N



SCALE

200 0 200 400 600 FT

GERAGHTY & MILLER, INC.
Environmental Services

CONCENTRATION OF TOTAL VOLATILE ORGANICS DETECTED IN DEEP MONITOR WELLS IN NOVEMBER, 1990

GENERAL MOTORS CORPORATION
HARRISON RADIATOR DIVISION
MORAINE, OHIO

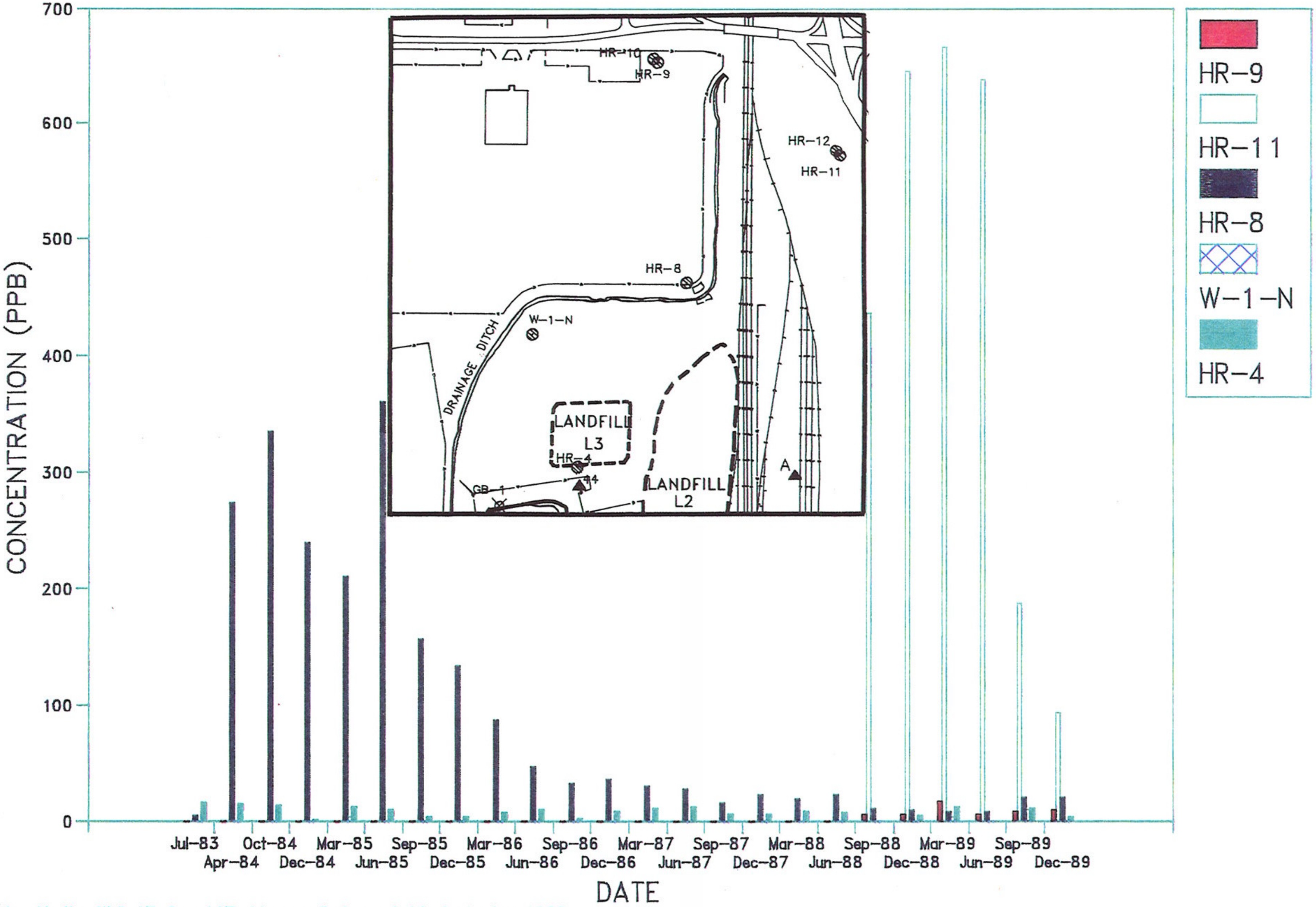
FIGURE.
4-2

MAGNETIC NORTH
PLANT NORTH

GERAGHTY
& MILLER, INC.
Environmental Services

FIGURE.
4-3

Total Volatile Organics Detected in Shallow Monitor Wells Upgradient of the North Settling Lagoon, 1983 through 1989.



Note: Monitor Wells HR-9 and HR-11 were first sampled in September 1988.

GERAGHTY
& MILLER, INC.
Environmental Services

FIGURE.
4–4

Total Volatile Organics Detected in Shallow Monitor Wells Downgradient of the North Lagoon and Landfills L–2 and L–3, July 1983 through November 1990.

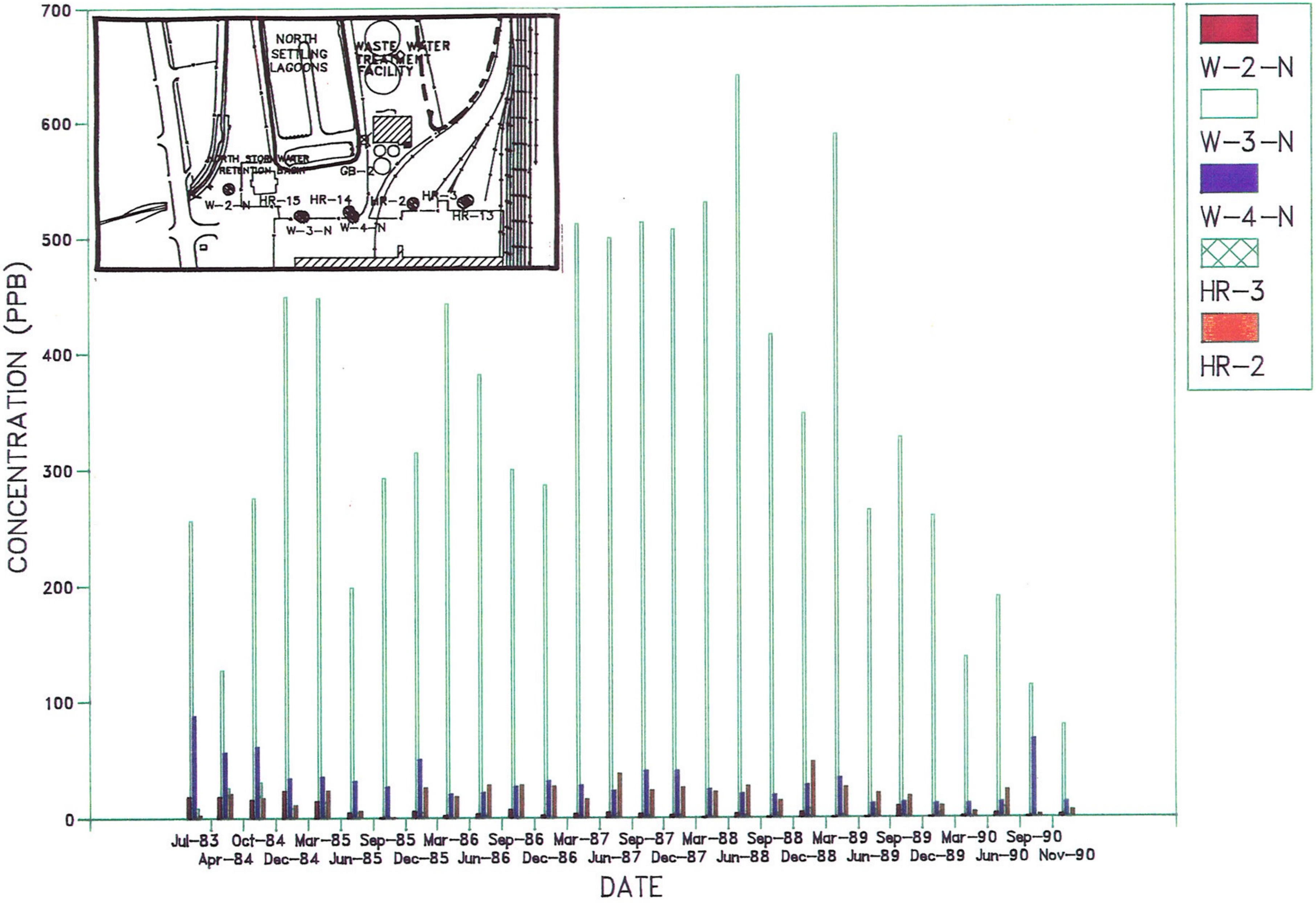
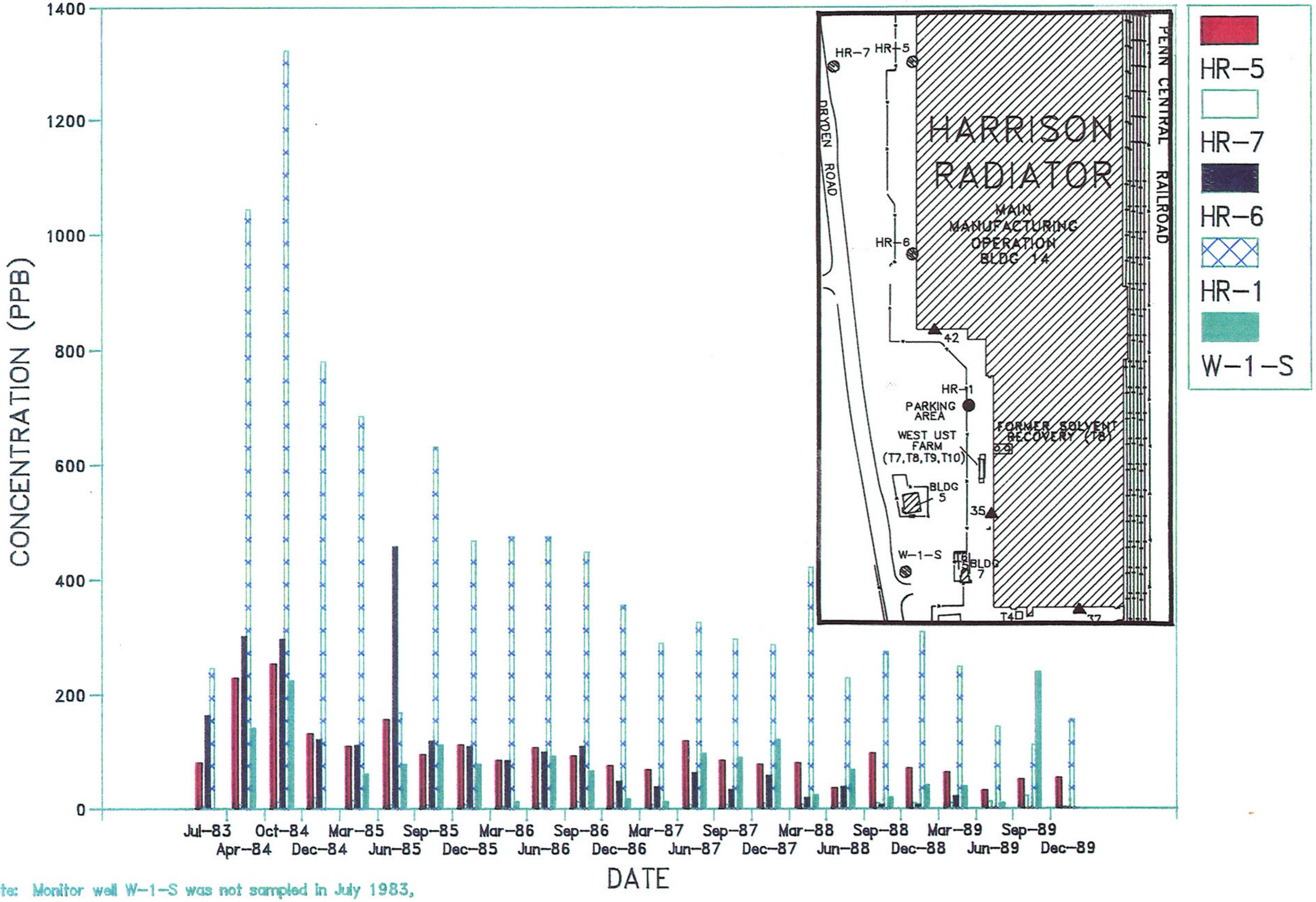


FIGURE.
4–5

Total Volatile Organics Detected in Shallow Monitor Wells in the Mid–Plant Area, 1983 through 1989.

GERAGHTY
& MILLER, INC.
Environmental Services

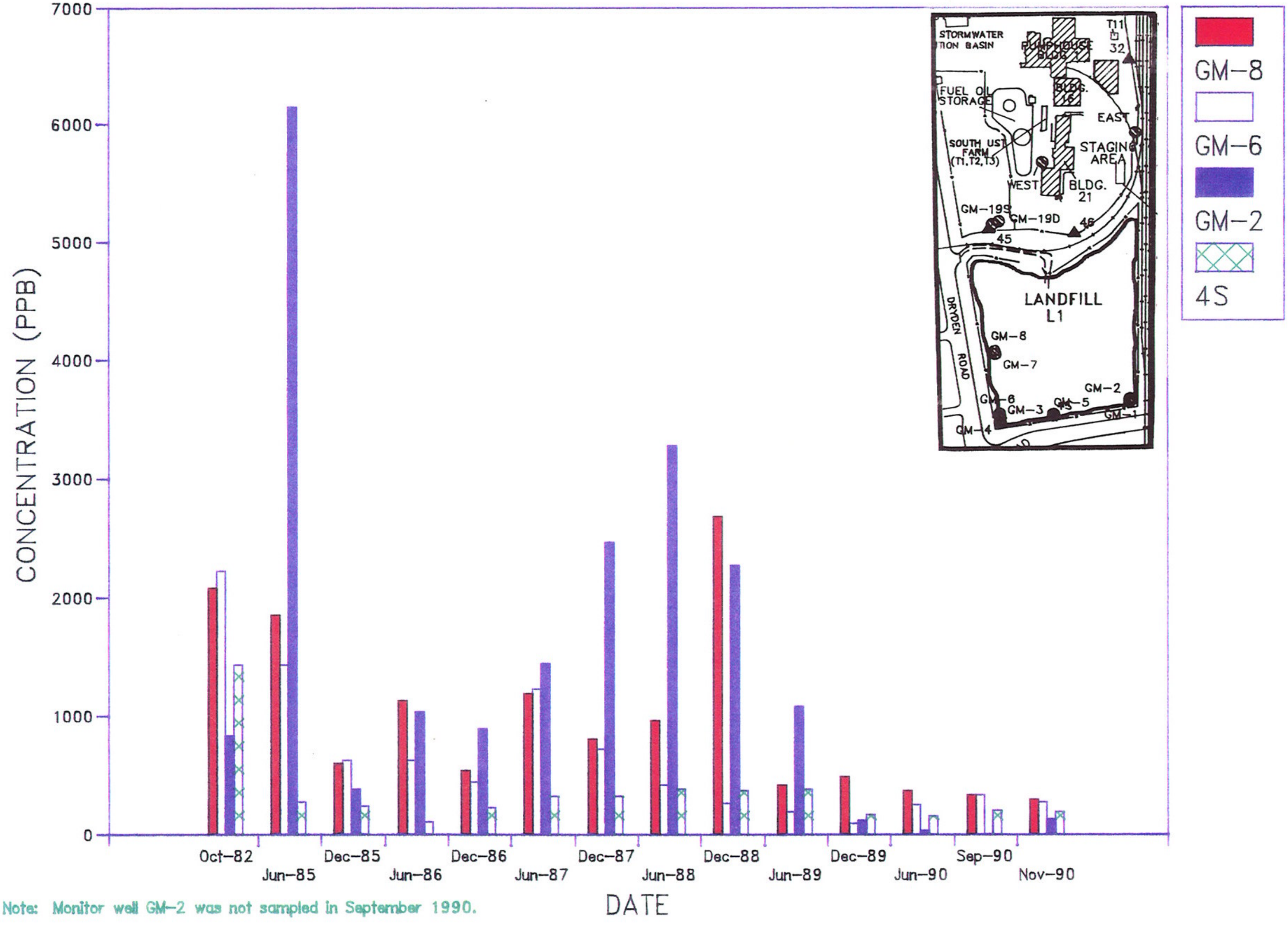


Note: Monitor well W–1–S was not sampled in July 1983, December 1984 and December 1989.

GERAGHTY
& MILLER, INC.
Environmental Services

FIGURE.
4–6

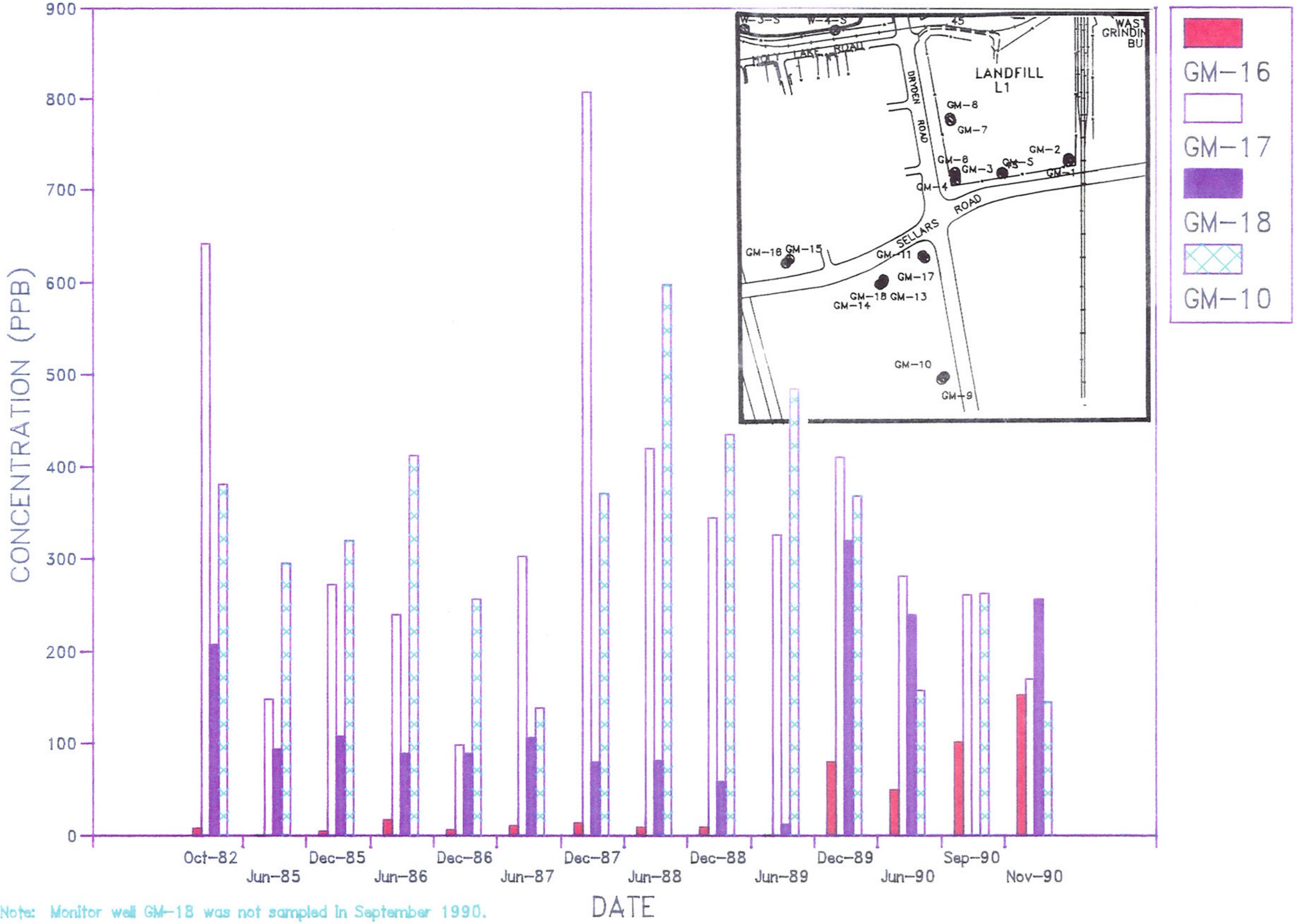
Total Volatile Organics Detected in Shallow Monitor Wells at Landfill L–1, October 1982 through November 1990.



Note: Monitor well GM–2 was not sampled in September 1990.

FIGURE.
4-7

Total Volatile Organics Detected in Shallow Monitor Wells Downgradient of Landfill L-1, October 1982 through November 1990.

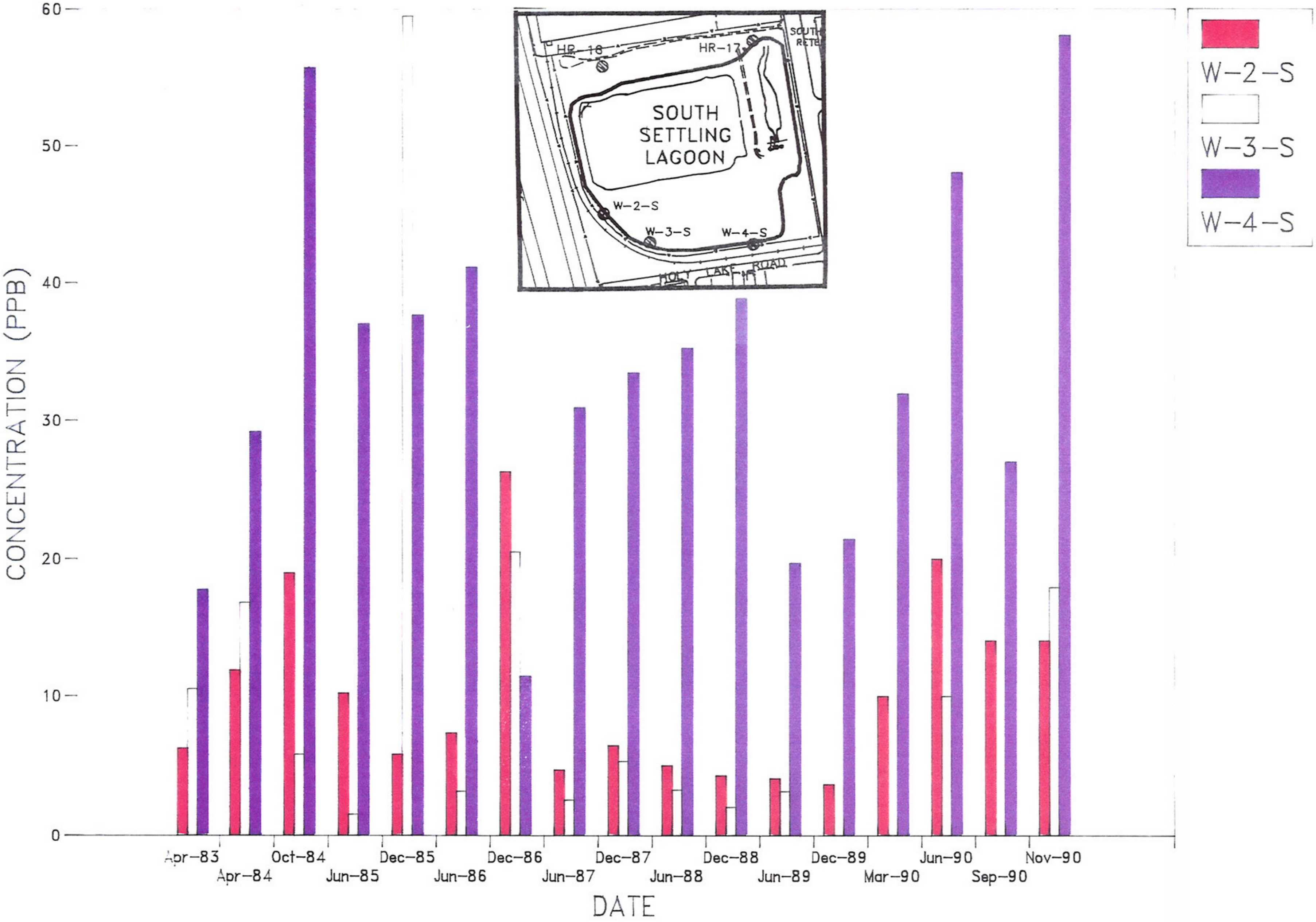


Note: Monitor well GM-18 was not sampled in September 1990.

GERAGHTY & MILLER, INC.
Environmental Services

FIGURE. 4—8

Total Volatile Organics Detected in Shallow Monitor Wells Downgradient of the South Settling Lagoon, 1983 through 1990.



GERAGHTY
& MILLER, INC.
Environmental Services

FIGURE
4–9

Total Volatile Organics Detected in Deep Monitor Wells Upgradient of North Lagoon, September 1988 through November 1990.

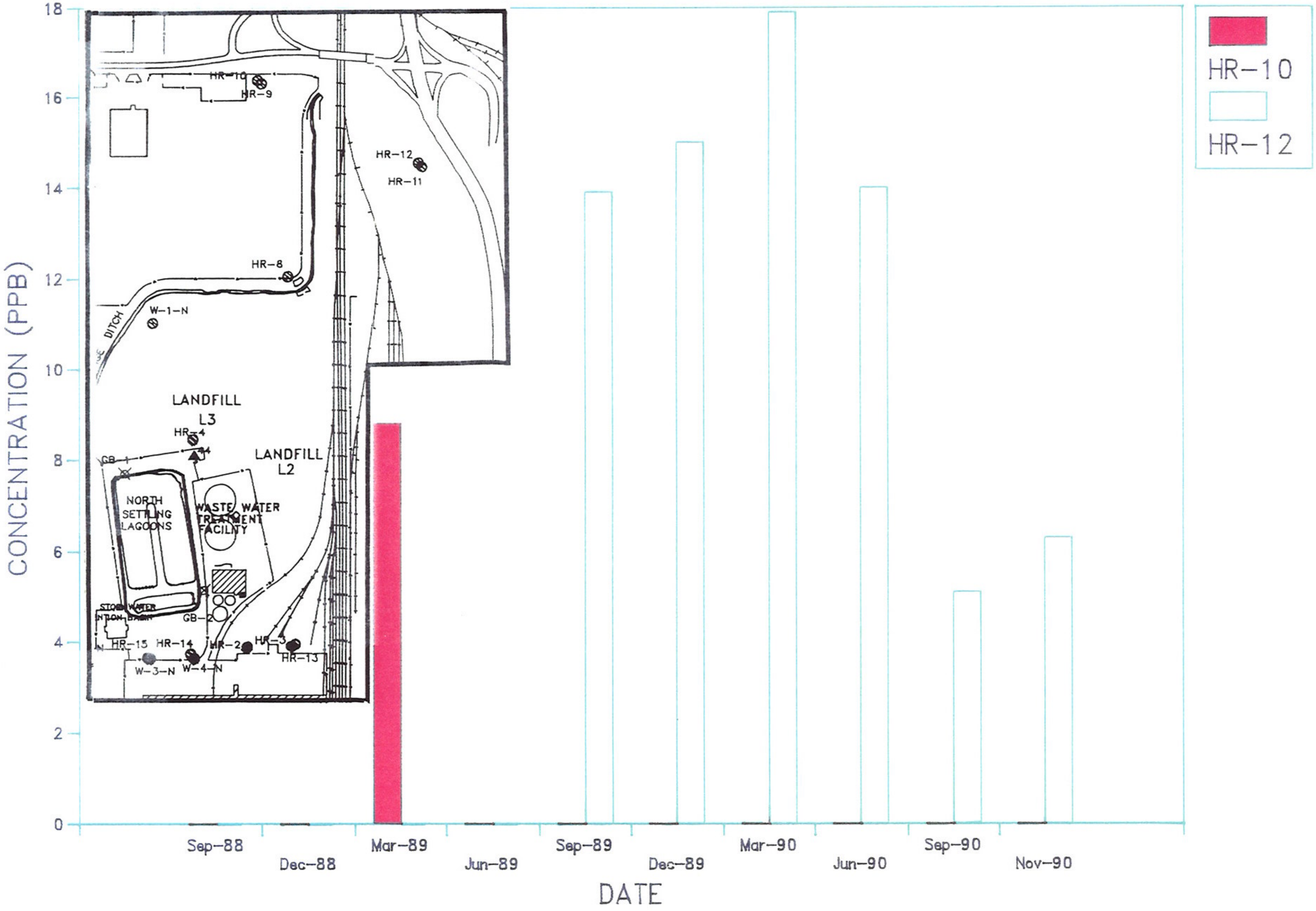
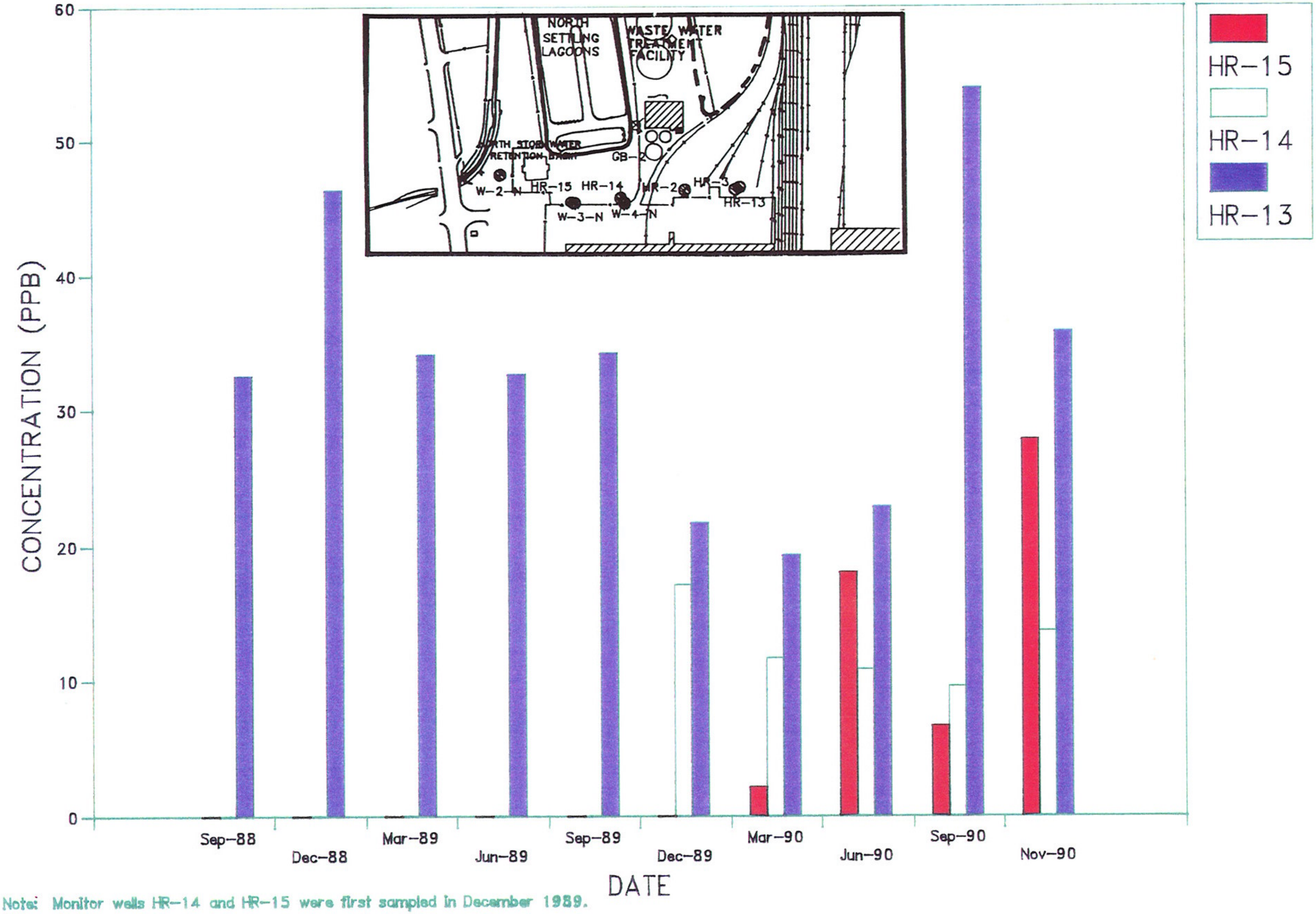


FIGURE.
4–10

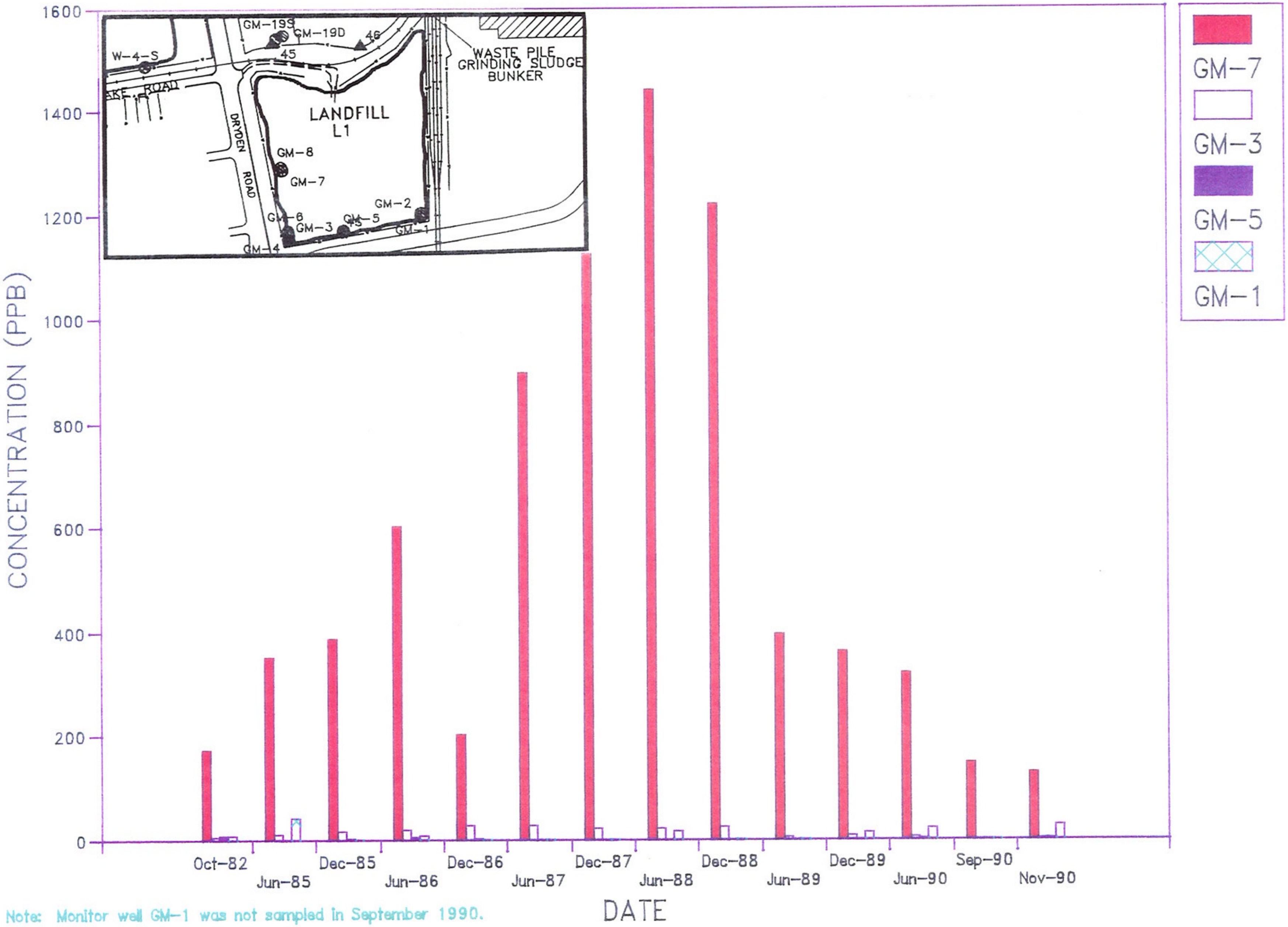
Total Volatile Organics Detected in Deep Monitor Wells Downgradient of the North Settling Lagoon and Landfills L–2, and L–3, September 1988 through November 1990.



Note: Monitor wells HR–14 and HR–15 were first sampled in December 1989.

FIGURE.
4–11

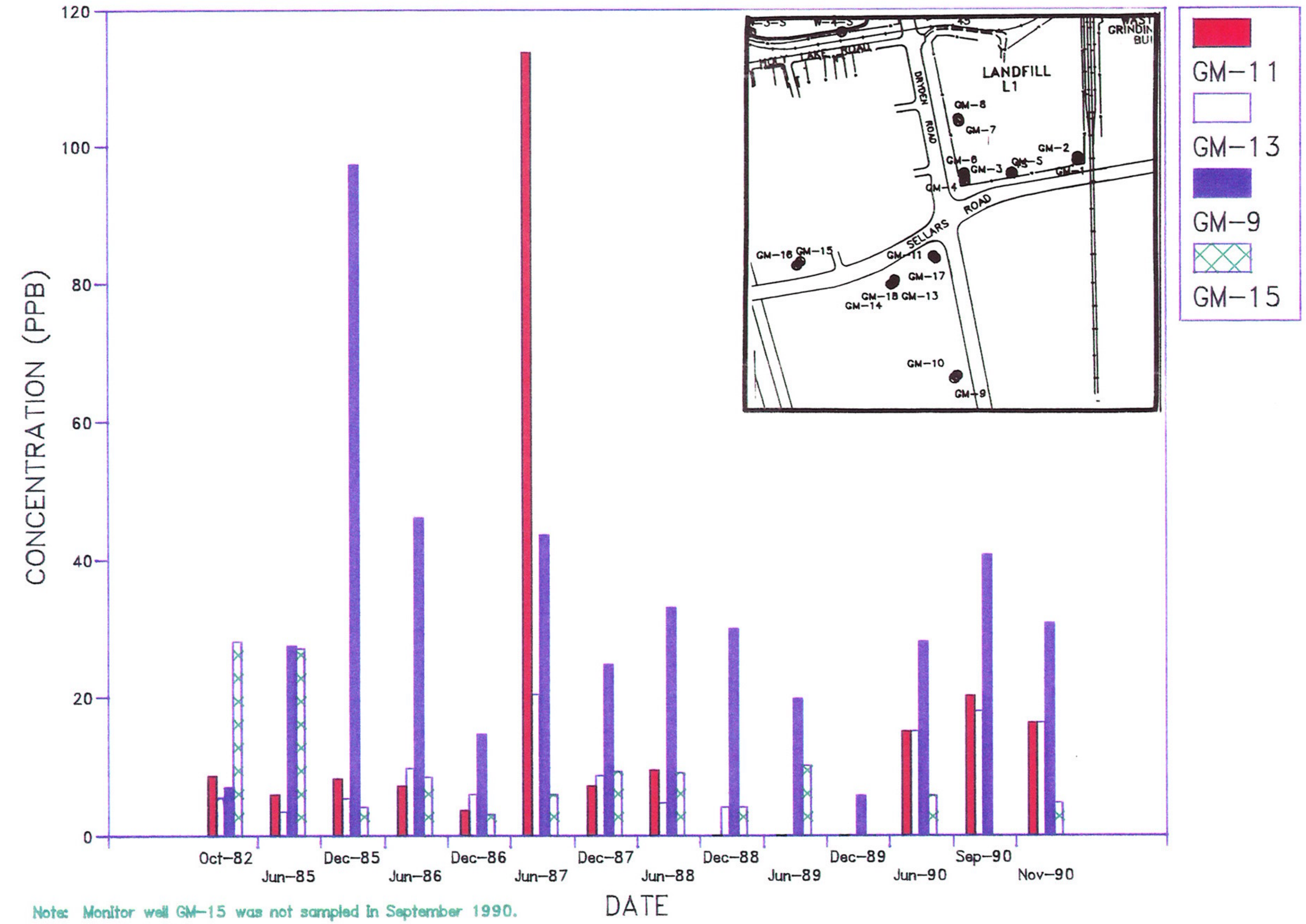
Total Volatile Organics Detected in Deep Monitor Wells at Landfill L–1, October 1982 through November 1990.



Note: Monitor well GM–1 was not sampled in September 1990.

FIGURE.
4-12

Total Volatile Organics Detected in Deep Monitor Wells Downgradient of Landfill L-1 and the South Settling Lagoon, October 1982 through November 1990.

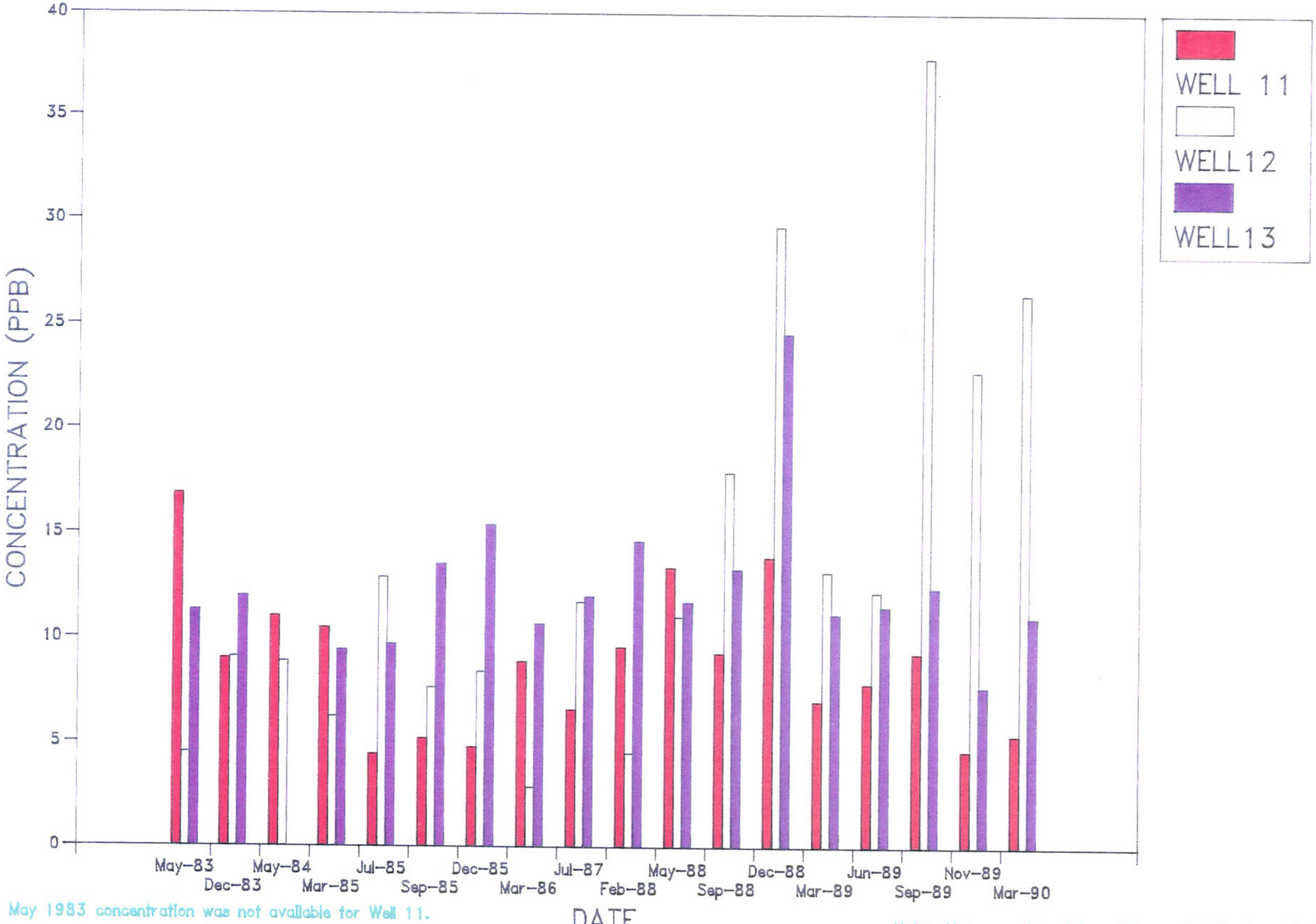


Note: Monitor well GM-15 was not sampled in September 1990.

FIGURE.
4–13

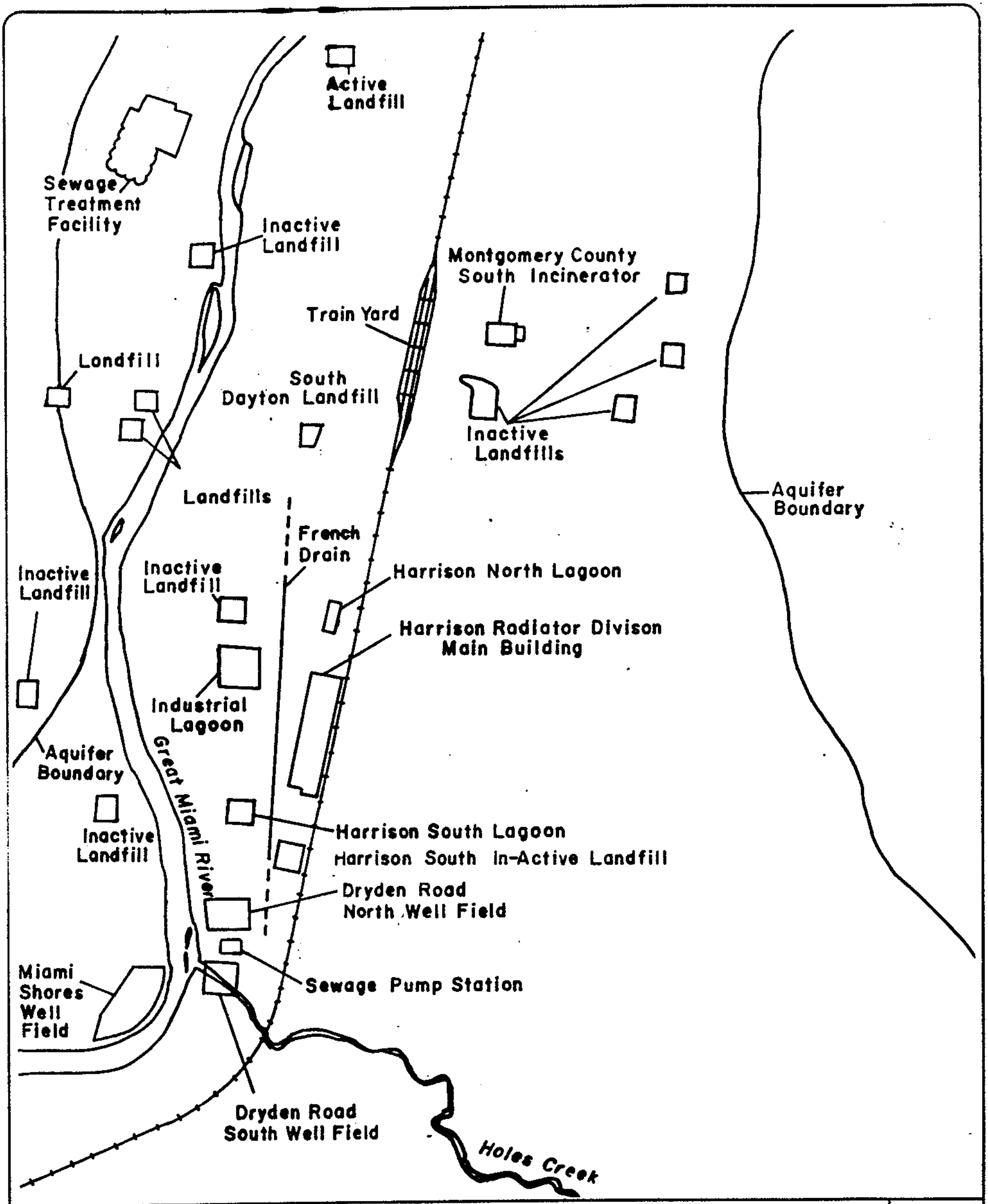
Total Volatile Organics Detected at the Dryden Road North Well Field, 1983 through 1990.

GERAGHTY & MILLER, INC.
Environmental Services



Note: May 1983 concentration was not available for Well 11. February, 1983 value was used for this graph.

Note: More complete data set is provided in Appendix B.



GERAGHTY & MILLER, INC.
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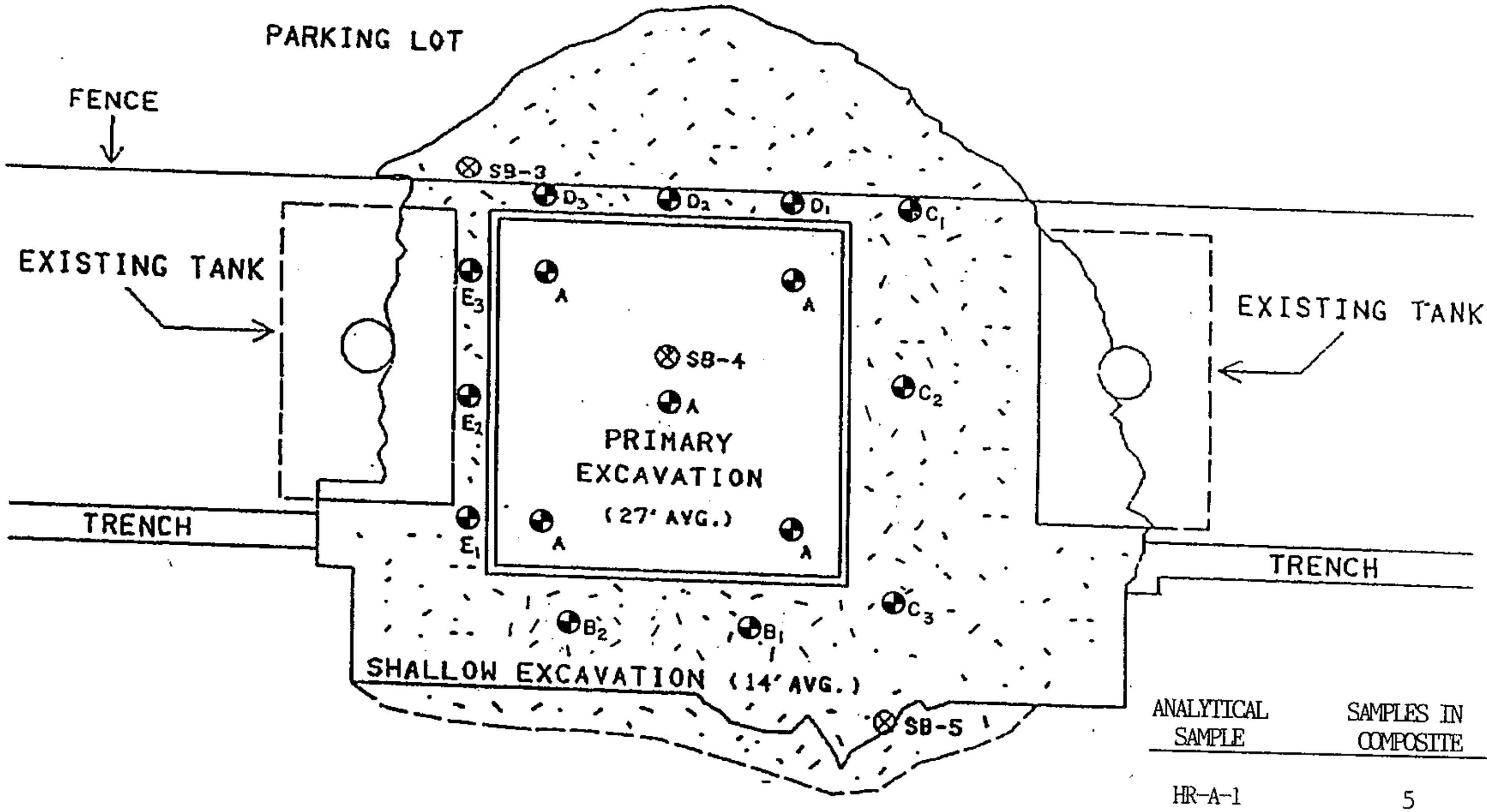
POTENTIAL SOURCES OF GROUND-WATER CONTAMINATION

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE 4-14



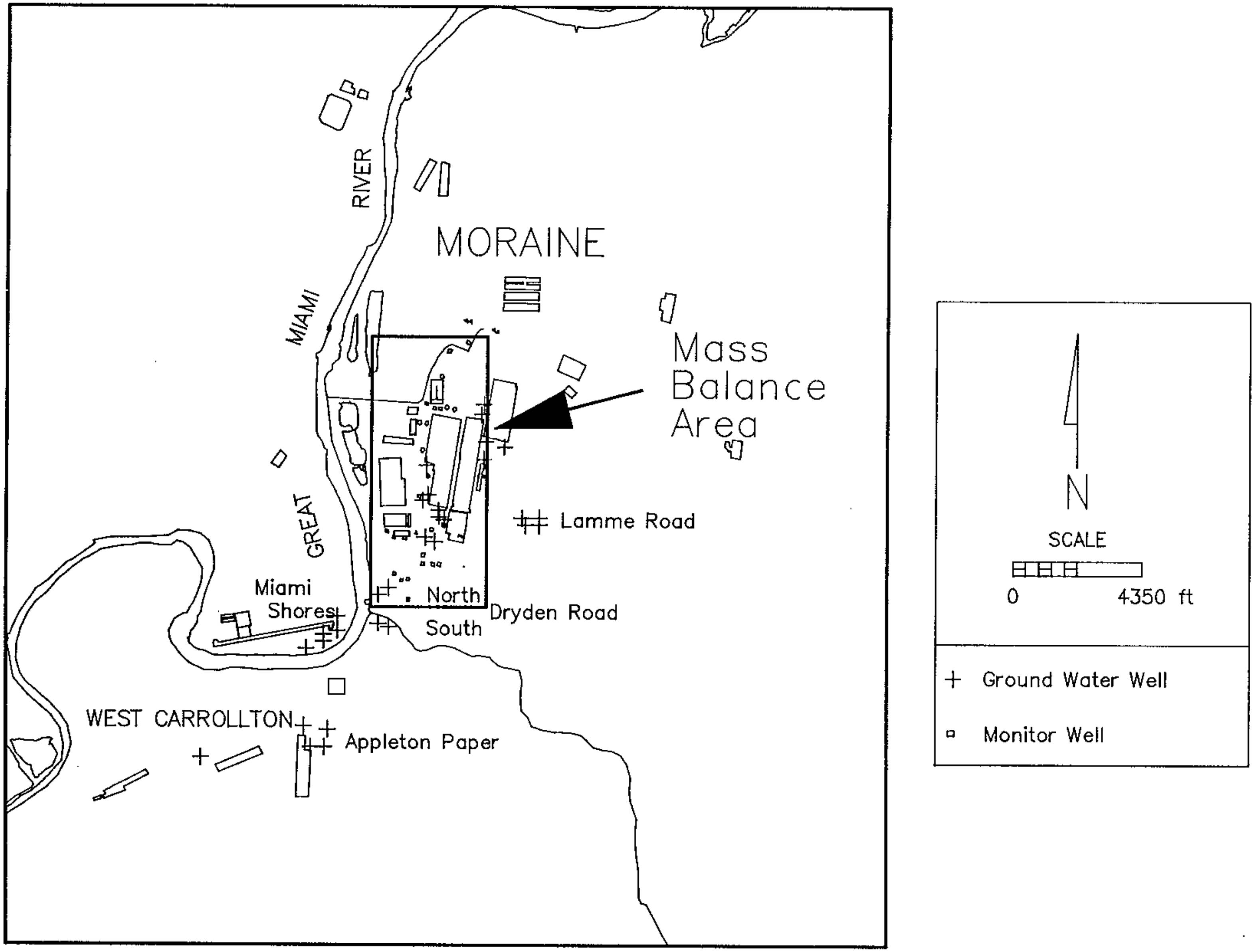
ANALYTICAL SAMPLE	SAMPLES IN COMPOSITE	DEPTH (FEET)
HR-A-1	5	26-28
B12A	2	14-16
B12B	2	16-18
C123A	3	14-16
C123B	3	16-18
D123A	3	14-16
D123B	3	16-18
E123A	3	14-16
E123B	3	16-18

GERAGHTY
& MILLER, INC.
Environmental Services

SOIL EXCAVATION DIMENSIONS AND SOIL SAMPLE LOCATION, WEST TANK FARM SOIL REMOVAL, 1989

GMC HARRISON RADIATOR
MORAIN, OHIO

FIGURE
4-15



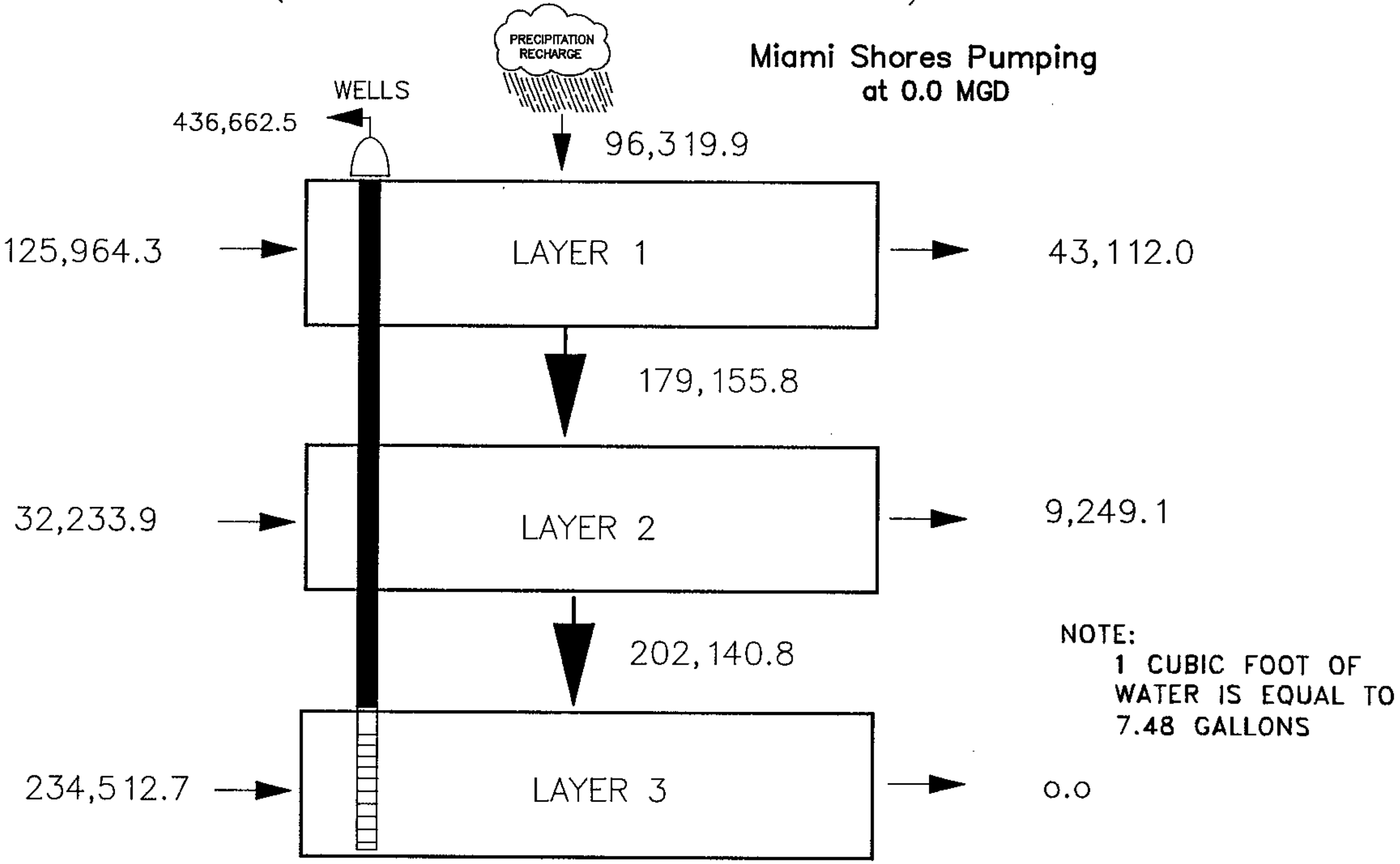
GERAGHTY & MILLER, INC.
Environmental Services

LOCATION OF MASS BALANCE EVALUATION AREA

GMC HARRISON RADIATOR
MORAIN, OHIO

FIGURE
4–16

STEADY-STATE MASS BALANCE
OVER THE HARRISON RADIATOR SITE
(TOTALS IN CUBIC FEET PER DAY)



GERAGHTY
& MILLER, INC.
Environmental Services

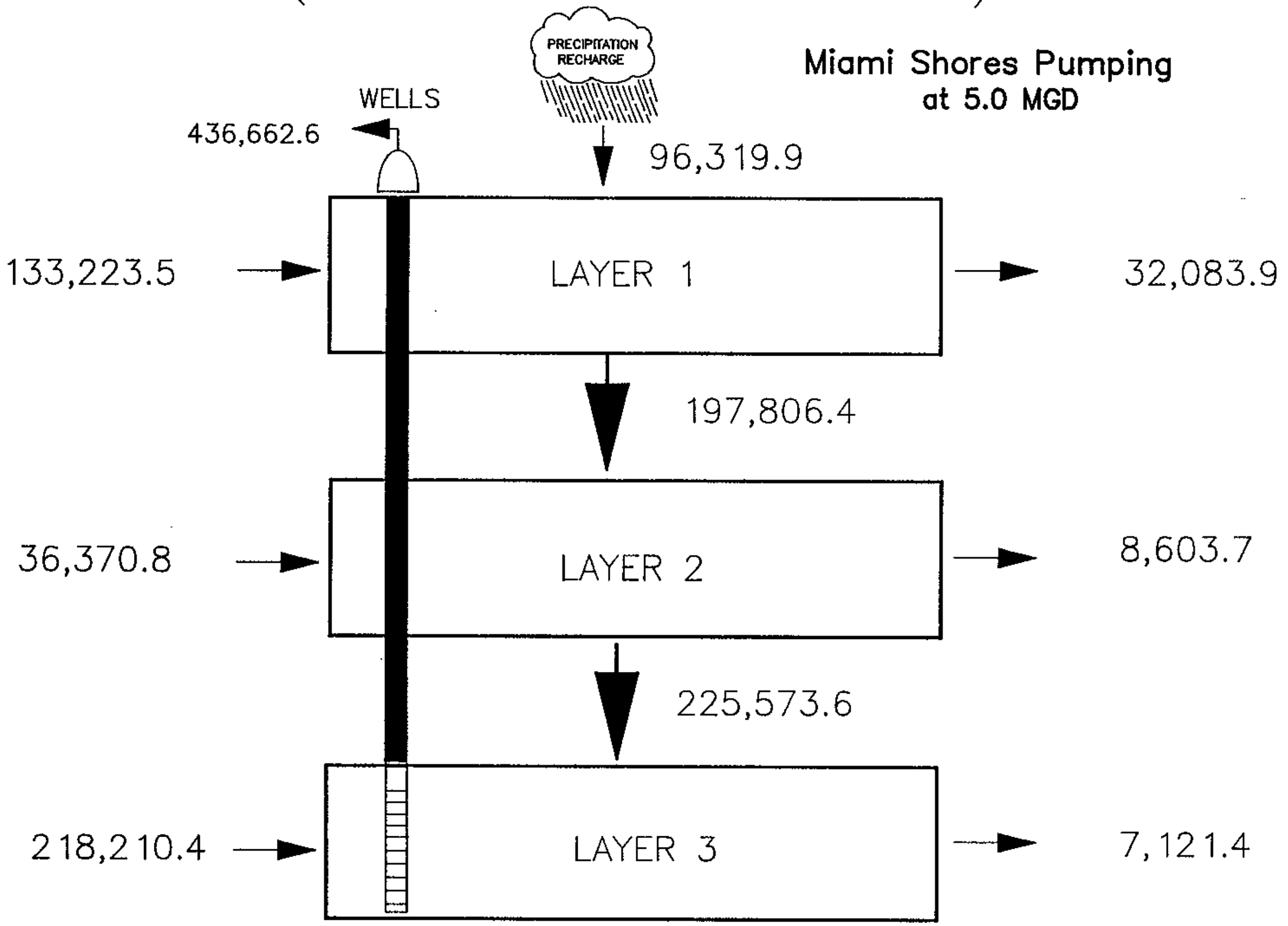
MASS BALANCE EVALUATION SCENARIO 1:
MIAMI SHORES NOT PUMPING

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE
4–17

STEADY-STATE MASS BALANCE
OVER THE HARRISON RADIATOR SITE
(TOTALS IN CUBIC FEET PER DAY)

Miami Shores Pumping
at 5.0 MGD



NOTE:
1 CUBIC FOOT OF WATER IS EQUAL TO 7.48 GALLONS

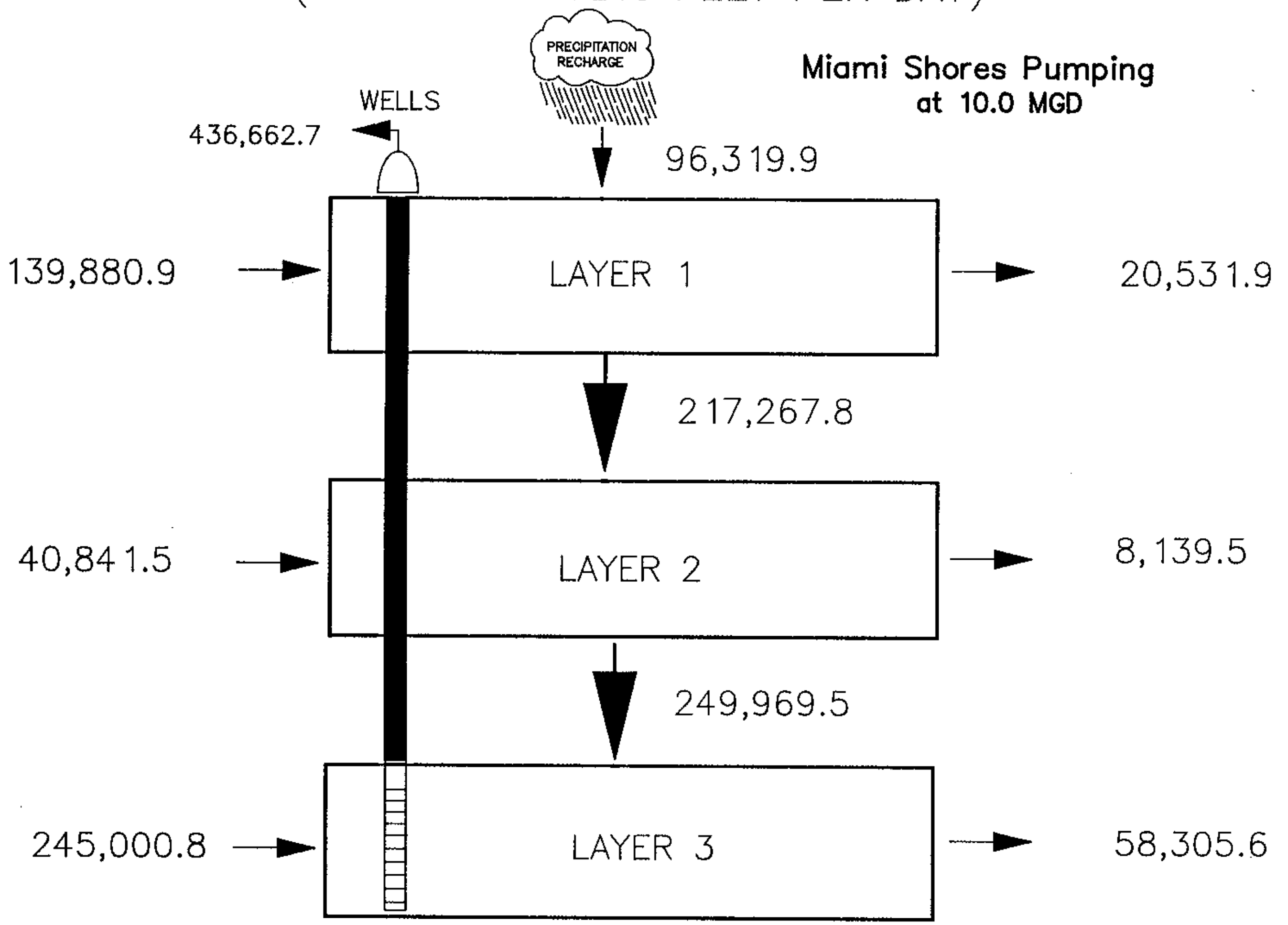
GERAGHTY
& MILLER, INC.
Environmental Services

MASS BALANCE EVALUATION SCENARIO 2:
MIAMI SHORES PUMPING 5 MGD

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE
4–18

STEADY-STATE MASS BALANCE
OVER THE HARRISON RADIATOR SITE
(TOTALS IN CUBIC FEET PER DAY)



NOTE:
1 CUBIC FOOT OF
WATER IS EQUAL TO
7.48 GALLONS

GERAGHTY
& MILLER, INC.
Environmental Services

MASS BALANCE EVALUATION SCENARIO 3:
MIAMI SHORES PUMPING 10 MGD

GMC HARRISON RADIATOR
MORAINE, OHIO

FIGURE
4–19

TABLE 2-1 SUMMARY OF HYDRAULIC PARAMETERS FOR THE UPPER AND LOWER AQUIFERS

UPPER AQUIFER

	Hydraulic Conductivity ft/d	Specific Yield	Storativity	Delayed Gravity Response Factor
Average	1701	0.089	0.0176	0.4725
Median	1646	0.07	0.11	0.435
Variance	51073.3	0.007	0.00035	0.165
Standard Deviation	225.99	0.086	0.0186	0.406
Standard Error	112.99	0.04311	0.0093	0.2029
Minimum	1504	0.006	0.0035	0.02
Maximum	2008	0.21	0.045	1

LOWER AQUIFER

	Hydraulic Conductivity (ft/d)	Leakance ($days^{-1}$)	Storativity
Average	381	0.05266	0.02059
Median	398	0.00245	0.00121
Variance	2968.57	0.0163	0.00308
Standard Deviation	54.48	0.1277	0.05549
Standard Error	14.068	0.04517	0.01755
Minimum	262	0.0012	0.0000045
Maximum	463	0.368	0.0178

NOTE:

Specific yield, storativity and delayed gravity response factor are dimensionless.

TABLE 3-1

SUMMARY OF SWMUs

SWMU	DESCRIPTION AND WASTE TYPE	CURRENT CONDITIONS
LANDFILLS		
L-1	Non-specified industrial waste from Frigidaire operations.	Inactive since 1973.
L-2	Non-specified industrial waste from Frigidaire operations.	Inactive since 1975.
L-3	Sludge from North Settling Lagoons.	Inactive since 1979, unlined and uncapped.
SURFACE IMPOUNDMENTS		
North Settling Lagoons	Industrial Wastewater, non contact cooling water and storm runoff.	Inactive since October 1989.
South Settling Lagoons	Industrial Wastewater, non contact cooling water and storm runoff.	Inactive since October 1989.
WASTE PILE AND STAGING AREA	Coolants from grinding sludge drainage bunker, residual oils from empty drums.	Active, wastes contained in concrete bunker, concrete pad, sump and drainage system.
UNDERGROUND STORAGE TANKS		
T1	10,000 Gal. capacity, spent detergent solution from polyester resin impregnation process.	Inactive and empty since 1979, some residual sludge.
T2	10,000 gal. capacity, Dirty oils.	Removed 5/86
T3	10,000 gal. capacity, Dirty oils, then virgin machine coolant.	Removed 5/86
T4	10,000 gal. capacity, polyester potting wash water.	Inactive since 1982, some residual sludge remains.
T5	30,000 gal. capacity, concrete open top tank. Wastewater neutralization from Acid/Alkali processes.	Removed 12/89

TABLE 3-1
(continued)

SWMU	DESCRIPTION AND WASTE TYPE	CURRENT CONDITIONS
T6	30,000 gal. capacity concrete open top tank. Spent machinery coolants.	Removed 12/89
USTs (continued) T7	3-10,000 gal. capacity tanks, waste oil from machine coolants, parts washer waters and mop water.	Two removed 5/86 Third removed 10/88
T8	Four USTs containing clean and dirty perchloroethene (solvents), two 10,000 gal. capacity, one 3,000 and one 1,500 gal. capacity.	Two 10,000 gal. capacity tanks removed 10/88, residual soil contamination from leak. Other two tanks removed 12/89.
T9	Two 10,000 gal. capacity tanks containing clean and dirty napthalite (solvent).	Removed 5/86
T10	Two 10,000 gal. capacity tanks containing clean and dirty stoddard solvent.	Removed 5/86
T11	38,000 gal. capacity concrete UST containing grinding sludge oil, residual oil from drums, storm runoff.	Active
T12	50,000 gal. concrete UST containing spent detergent solution from polyester resin impregnation process.	Inactive since 1983, some residual sludge remains.
INCINERATOR I-1	Two incinerators burned combustible solid waste (wood, paper, cardboard, etc.). A liquid waste burner incinerated waste oils and solvents that could not be reclaimed.	Incinerator operations discontinued in December 1970.
DRUM STORAGE AREA	A paved area used to store drummed polyestor potting compound prior to its disposal as a non-hazardous waste	Area was used between 1980 and 1985

TABLE 3-2

WASTES GENERATED BY FRIGIDAIRE

WASTE DESCRIPTION	CONSTITUENT
Sludge from Zinc and Copper electroplating baths	Cyanide
Sludges from Chrome electroplating baths	Chrome
Sludges from Nickel electroplating baths	-----
Sludges from stripping and cleaning baths from electroplating, pickling, phosphatizing, and anodizing operations	Cyanide, Chrome
Sludges from Zinc and Iron phosphatizing baths	-----
Sludges from Nickel baths from porcelain pickling operations	-----
Paint sludges from electrostatic painting	Lead, Chrome
Porcelain sludges	-----
Paint thinner from painting operations	Toluene, Xylene, MEK
Spent halogenated solvents used in degreasing	Trichloroethylene, Tetrachloroethylene
Fly ash	-----
Incinerator ash	-----
Water softening sludges	-----
Steel and cast iron grinding sludge	-----

TABLE 3-3

NORTH SETTLING LAGOON SLUDGE & WATER DEPTHS[1]
HARRISON RADIATOR
MORAINE, OHIO

LAGOON LOCATION/ DESIGNATION	TOTAL DEPTH (SLUDGE & WATER) (FEET)	DEPTH OF SLUDGE (FEET)	PERCENT CORE RECOVERY (%)	DEPTH OF WATER (FEET)	SLUDGE BOTTOM[2] ELEVATION (FEET, MSL)
<u>NORTH PRIMARY BASIN:</u>					
NPI - 1	10.0	9.3	98.2	0.7	708.2
NPI - 2	10.9	8.0	91.5	2.9	707.3
NPI - 3	11.5	5.7	100.0	5.8	706.7
NPI - 4	11.5	9.2	84.0	2.3	706.7
NPI - 5	11.3	7.4	99.4	3.9	706.9
NPI - 6	9.0	5.0	92.1	4.0	709.2
AVERAGE	10.7	7.4	94.2	3.3	707.5
<u>NORTH SECONDARY BASIN:</u>					
NSI - 1	11.0	3.7	77.8	7.3	706.7
NSI - 2	10.9	3.1	71.2	7.8	706.8
NSI - 3	10.8	3.1	80.0	4.9	706.9
NSI - 4	10.9	5.9	100.0	5.2	706.8
NSI - 5	10.8	5.7	92.3	3.3	706.9
NSI - 6	10.5	6.7	70.5	3.8	707.2
NSI - 7	10.7	9.0	96.9	1.7	707.0
NSI - 8	10.7	8.4	86.4	2.3	707.0
NSI - 9	10.2	7.9	96.9	2.3	707.5
NSI - 10	6.0	5.3	99.1	0.7	711.7
NSII - 1	17.0	1.89	100.0	15.2	700.7
NSII - 2	12.9	2.4	73.5	10.5	704.8
NSII - 3	21.3	4.0	76.6	17.2	696.4
NSII - 4	14.3	2.3	100.0	12.0	703.4
NSII - 5	9.8	1.5	100.0	8.3	707.9
NSII - 6	12.9	2.2	100.0	10.7	704.8

TABLE 3-3
(continued)

LAGOON LOCATION/ DESIGNATION	TOTAL DEPTH (SLUDGE & WATER) (FEET)	DEPTH OF SLUDGE (FEET)	PERCENT CORE RECOVERY (%)	DEPTH OF WATER (FEET)	SLUDGE BOTTOM[2] ELEVATION (FEET, MSL)
NSII - 7	10.5	1.8	100.0	8.7	707.2
NSII - 8	12.6	3.3	100.0	9.3	705.1
NSII - 9	10.3	2.8	82.9	7.5	707.4
NSII - 10	10.6	2.1	97.6	8.5	707.1
NSIII - 1	10.0	0.9	100.0	9.1	707.7
NSIII - 2	11.8	4.7	-----	7.1	705.9
GNSIII - 3	10.1	0.9	94.1	9.2	705.6
NSIII - 4	9.8	0.3	80.0	9.5	707.9
NSIII - 5	10.3	1.1	77.8	9.2	707.4
NSIII - 6	10.8	0.8	60.0	10.0	706.9
NSIII - 7	10.6	1.8	77.8	8.8	707.1
NSIII - 8	10.4	0.6	75.0	9.8	707.3
NSIII - 9	11.2	2.8	78.6	8.4	706.5
NSIII - 10	10.6	1.9	100.0	8.7	707.1
AVERAGE-SECTION NSI	10.3	6.0	87.1	4.2	707.5
AVERAGE-SECTION NSII	12.8	2.5	83.1	10.2	704.9
AVERAGE-SECTION NSIII	10.6	1.6	82.6	9.0	707.1

NOTES:

1. Sludge and water depth are averaged measurements from separate measuring events during the lagoon sampling program implemented in August and September of 1988.

2. Bottom elevations referenced to mean sea level and are calculated from the following measured water elevations:

   o Primary -- 718.2
   o N. Secondary -- 717.7

TABLE 3-4

SUMMARY OF CALCULATED WASTE VOLUMES
NORTH SETTLING LAGOON
HARRISON RADIATOR
MORAINE, OHIO

BASIN	EXISTING WASTES[1]		SUBSOILS[2]
	SLUDGE (cy)	WATER (Mgal)	VOLUME (cy)
N. Primary	2,600	0.34	820
N. Secondary	10,200	7.73	6,040
TOTALS	12,800	8.07	6,860

NOTES:

1. Existing waste volumes calculated using May 1989 topographic maps; August/September 1988 pond survey data; and the average end area method.

2. Subsoil volumes calculated assuming removal of soils to the historic high ground-water table elevation or to a maximum of 12 inches below the bottom of sludge elevation.

TABLE 3-5

SUMMARY OF NORTH SETTLING LAGOON ANALYTICAL RESULTS
HARRISON RADIATOR
MORAINE, OHIO

CONSTITUENT[1]	FREQUENCY OF DETECTION[2]	RANGE OF DETECTED CONCENTRATIONS[3]	MEDIAN CONCENTRATIONS	LOCATION OF MAXIMUM[4]
METALS				
Antimony	15/18	8.93 - 54.8	18.2	NPI-COMPL
Arsenic	18/18	8.58 - 158.0	94.6	NPI-2/3M
Barium	18/18	330.0 - 2550.0	1190.0	NPI-COMPL
Cadmium	18/18	6.57 - 1430.0	265.0	NSI-10L
Chromium	18/18	244.0 - 3630.0	562.0	NSIII-5
Cobalt	9/9	72.7 - 1210.0	469.0	NPI-2/3M
Copper	18/18	54.2 - 969.0	221.0	NSI-COMPL
Lead	18/18	160.0 - 5970.0	881.0	NSI-10L
Mercury	18/18	0.270- 1.87	0.864	NPI-COMPL
Nickel	18/18	218.0 - 3250.0	1575.0	NSIII-COMPU
Selenium	5/18	2.78 - 76.6	14.5	NSI-10L
Silver	17/18	0.492- ~~1.33~~ 2.12	0.824	NPI-2U
Tin	4/9	213.0 - 741.0	313.5	NSI-10U
Vanadium	5/9	19.1 - 30.7	24.4	NSII-3U
Zinc	18/18	920.0 -10501.0	7830.0	NSI-COMPM
VOLATILE ORGANICS				
1,2-Dichlorobenzene	2/18	0.57 - 1.52	1.05	NPI-2L
Ethylbenzene	7/18	0.153- 3.4	1.3	NSI-10L
Tetrachloroethene	2/18	2.05 - 4.7	3.38	NSI-COMPM
Toluene	7/18	0.87 - 10.1	3.9	NPI-2/3M
Trichloroethylene	3/18	0.55 - 6.66	3.3	NPI-COMPL
Xylene	6/9	0.150- 9.25	5.0	NSI-~~10L~~ COMPL

TABLE 3-5
(continued)

CONSTITUENT[1]	FREQUENCY OF DETECTION[2]	RANGE OF DETECTED CONCENTRATIONS[3]	MEDIAN CONCENTRATIONS	LOCATION OF MAXIMUM[4]
EXTRACTABLE ORGANICS				
Bis(2-ethylhexyl)Phthalate	4/9	17.4 - 31.2	21.8	NSII-3U
Fluoranthene	5/9	6.18 - 104.0	10.3	NPI-2U
Fluorene	4/9	1.6 - 18.5	7.15	NSII-3L
2-Methylnaphthalene	6/9	1.2 - 9.54	5.36	NSII-3L
Phenanthrene	7/9	2.46 - 41.7	5.4	NPI-2U
Pyrene	5/9	5.58 - 81.5	8.86	NPI-2U
MISCELLANEOUS				
Cyanide	15/18	0.65 - 5.32	2.47	NSI-COMPL
PCB 1242	1/9	3.1 -	3.1	NSI-10L
PCB 1260	6/9	5.1 - 27.4	7.7	NSIII-5
Sulfide	9/9	110.0 -39000.0	1790.0	NSIII-5

NOTES:

1 Included only detected constituents from the Primary and Secondary Basins which have been grouped together.

2 Calculated by number of times constituent was detected divided by number of times constituent was tested for.

3 Units in mg/kg (dry weight).

4 NP -- North Primary Basin
NS -- North Secondary Basin

TABLE 3-6

AVERAGE DRY WEIGHT AND OIL & GREASE CONTENTS[1]
NORTH SETTLING LAGOON
HARRISON RADIATOR
MORAINE, OHIO

BASIN	DRY WEIGHT (%)	OIL & GREASE (%)
North Primary	43.42	8.37
North Secondary		
SE Segment	31.18	8.04
NE Segment	41.65	13.95
West Segment	29.73	4.33

NOTE:

1. Averaged values for the lagoon sludges calculated from laboratory data for the August/September 1988 sampling program.

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TABLE 3-7

SOUTH SETTLING LAGOON SLUDGE & WATER DEPTHS[1]
HARRISON RADIATOR
MORAINE, OHIO

LAGOON LOCATION/ DESIGNATION	TOTAL DEPTH (SLUDGE & WATER) (FEET)	DEPTH OF SLUDGE (FEET)	PERCENT CORE RECOVERY (%)	DEPTH OF WATER (FEET)	SLUDGE BOTTOM[2] ELEVATION (FEET, MSL)
SOUTH PRIMARY BASIN:					
SPI - 1	11.9	11.2	61.9	0.7	701.5
SPI - 2	11.4	10.9	67.2	0.5	702.0
SPI - 3	11.5	11.0	100.0	0.5	701.9
SPI - 4	11.8	11.4	73.3	0.4	701.6
SPII - 1	11.8	11.3	76.9	0.5	701.6
SPII - 2	11.1	11.0	82.4	0.1	702.3
SPII - 3	11.2	9.3	93.3	1.8	702.2
SPII - 4	11.7	11.7	57.7	0.0	701.7
AVERAGE	11.6	11.1	76.6	0.6	701.8
SOUTH SECONDARY BASIN:					
SSQI - 1	8.5	6.2	98.8	2.3	703.5
SSQI - 2	8.5	7.7	83.3	0.8	703.5
SSQI - 3	8.0	7.6	92.6	0.4	704.0
SSQI - 4	11.0	9.8	91.7	1.2	701.0
SSQI - 5	10.9	10.1	90.0	0.8	701.1
SSQI - 6	10.3	9.8	--[4]	0.5	701.7
SSQI - 7	10.7	9.0	94.0	1.7	701.3
SSQI - 8	10.7	9.9	89.4	0.8	701.5
SSQI - 9	10.5	9.7	91.0	0.8	701.5
SSQII - 1	11.7	8.7	100.0	3.0	700.3
SSQII - 2	10.8	6.5	100.0	4.3	701.2
SSQII - 3	10.3	6.6	96.2	3.7	701.7
SSQII - 4	11.0	9.6	88.8	1.4	701.0
SSQII - 5	11.2	6.0	97.5	5.2	700.8
SSQII - 6	11.4	8.0	92.0	3.4	700.6
SSQII - 7	13.6	8.7	92.3	4.9	698.4

TABLE 3-8

SUMMARY OF CALCULATED WASTE VOLUMES
SOUTH SETTLING LAGOON
HARRISON RADIATOR
MORAINE, OHIO

BASIN	EXISTING WASTES[1]		SUBSOILS[2]
	SLUDGE (cy)	WATER (Mgal)	VOLUME (cy)
S. Primary	7,400	0.05	540
S. Secondary	53,800	4.94	11,120
S. Sludge	6,000	0	1,960
TOTALS	67,200	4.99	13,620

NOTES:

1. Existing waste volumes calculated using May 1989 topographic maps; August/September 1988 pond survey data; and the average end area method.

2. Subsoil volumes calculated assuming removal of soils to the historic high ground-water table elevation or to a maximum of 12 inches below the bottom of sludge elevation.

TABLE 3-9

SUMMARY OF SOUTH SETTLING LAGOON ANALYTICAL RESULTS
SOUTH SETTLING LAGOON
HARRISON RADIATOR
MORAINE, OHIO

CONSTITUENT[1]	FREQUENCY OF DETECTION[2]	RANGE OF DETECTED CONCENTRATIONS[3]	MEDIAN CONCENTRATIONS	LOCATION OF MAXIMUM[4]
METALS				
Antimony	14/36	5.03 - 52.8	12.6	SSI-8L
Arsenic	36/36	3.4 - 157.0	33.3	SSII-7L
Barium	36/36	713.0 - 6740.0	2170.0	SSII-7L
Cadmium	36/36	0.721- 26.9	12.2	SSIII-1U
Chromium	36/36	55.3 - 2020.0	1055.0	SSIII-5L
Cobalt	5/6	17.8 - 222.0	30.5	SSIII-5L
Copper	36/36	37.2 -16900.0	480.0	SSIII-5L
Lead	36/36	87.1 - 398.0	252.0	SSI-8L
Mercury	34/36	0.081- 4.03	0.41	SSII-8U
Nickel	36/36	26.3 - 1490.0	535.0	SSII-COMPL
Selenium	1/36	0.78 -	0.78	SSII-COMPU
Silver	34/36	0.317- 2.45	0.54	SSIII-5U
Tin	1/6	28.3 -	28.3	SPI-1U
Zinc	36/36	157.0 - 2190.0	1351.0	SSIV-8U
EXTRACTABLE ORGANICS				
Bis(2-ethylhexyl)Phthalate	4/13	1.33 - 2.76	1.7	SPII-4L
Di-n-butyl phthalate	1/13	1.99 -	1.99	SPI-1U

TABLE 3-9
(continued)

CONSTITUENT[1]	FREQUENCY OF DETECTION[2]	RANGE OF DETECTED CONCENTRATIONS[3]	MEDIAN CONCENTRATIONS	LOCATION OF MAXIMUM[4]
MISCELLANEOUS				
Cyanide	36/36	0.562- 18.9	7.0	SSIII-5L
PCB 1254	8/13	1.6 - 206.0	10.4	SSIII-5L
PCB 1260	2/13	1.5 - 4.6	3.0	SPI-1U

NOTES:

[1] Includes only detected constituents from the Primary and Secondary, and Sludge Basins which have been grouped together.

[2] Calculated by number of times constituent was detected divided by number of times constituent was tested for.

[3] Units in mg/kg (dry weight).

[4] SP -- South Primary Basin
SS -- South Secondary Basin

TABLE 3-10

AVERAGE DRY WEIGHT AND OIL & GREASE CONTENTS[1]
SOUTH SETTLING LAGOON
HARRISON RADIATOR
MORAINE, OHIO

BASIN	DRY WEIGHT (%)	OIL & GREASE (%)
South Primary	30.03	6.64
South Secondary		
SE Quadrant	27.17	5.80
NE Quadrant	23.23	6.16
NW Quadrant	22.78	4.42
SW Quadrant	24.10	4.84
South Sludge	48.63	5.57

NOTE:

1. Averaged values for the lagoon sludges calculated from laboratory data for the August/September 1988 sampling program.

TABLE 3-11
HISTORY AND USE OF UNDERGROUND STORAGE TANKS
HARRISON RADIATOR DIVISION-GMC
MORAINE, OHIO

CONSENT ORDER SWMU#	SPCC TANK #	CAPACITY GALLONS	USE, STATUS 1974	USE, STATUS 1978	USE, STATUS 1982	USE, STATUS 1984	USE, STATUS 1986	USE, STATUS 1990
WEST TANK FARM								
NONE	1 (#6 1990 PLAN)	10,000	NOT INSTALLED	NON LEADED GASOLINE	NON LEADED GASOLINE	NON LEADED GASOLINE	NON LEADED GASOLINE	NON LEADED GASOLINE
NONE	2 (#7 1990 PLAN)	5,000	GASOLINE	GASOLINE	DIESEL FUEL	DIESEL FUEL	DIESEL FUEL	DIESEL FUEL
NONE	3 (#8 1990 PLAN)	10,000	CINDOL	CINDOL	CINDOL	CINDOL	CUTTING OIL	CUTTING OIL
T8	4	10,000	PERCHLOR TRICHLOROETHE BEFORE 1973	PERCHLOR (DIRTY)	EMPTY (DIRTY)	EMPTY (DIRTY)	EMPTY (DIRTY)	REMOVED 10/88
T8	5	10,000	PERCHLOR TRICHLOROETHE BEFORE 1973	PERCHLOR (CLEAN)	EMPTY (DIRTY)	EMPTY (DIRTY)	EMPTY (DIRTY)	REMOVED 10/88
T7	6	10,000	OILY WASTE	OILY WASTE	EMPTY (DIRTY)	EMPTY (DIRTY)	EMPTY (DIRTY)	REMOVED 5/86
NONE	7 (#9 1990)	10,000	(COOLANT) QUAKER	QUAKER	QUAKER 568	QUAKER 568	QUAKER 568	QUAKER 568
NONE	8(#10 1990)	10,000	(COOLANT) CIMCOOL	CIMCOOL	CIMCOOL	CIMCOOL S-2	CIMCOOL S-2	CIMCOOL S-2
T7	9	10,000	OILY WASTE	OILY WASTE	EMPTY	EMPTY	EMPTY	REMOVED 5/86
T7	10	10,000	OILY WASTE	OILY WASTE	EMPTY	EMPTY	EMPTY	REMOVED 10/88
T10	11	10,000	STODDARD SOLVENT	STODDARD (DIRTY) SOLVENT	EMPTY	EMPTY	EMPTY	REMOVED 5/86
T10	12	10,000	STODDARD SOLVENT	STODDARD (CLEAN) SOLVENT	EMPTY	EMPTY	EMPTY	REMOVED 5/86
T9	13	10,000	NAPTHALITE	NAPTHALITE (DIRTY)	EMPTY	EMPTY	EMPTY	REMOVED 5/86
T9	14	10,000	NAPTHALITE	NAPTHALITE (CLEAN)	EMPTY	EMPTY	EMPTY	REMOVED 5/86

TABLE 3-11
(CONTINUED)

CONSENT ORDER SWMU#	SPCC TANK # LOCATION	CAPACITY GALLONS	USE, STATUS 1974	USE, STATUS 1978	USE, STATUS 1982	USE, STATUS 1984	USE, STATUS 1986	USE, STATUS 1990
MISCELLANEOUS OTHER USTs								
T4	SOUTHWESTERN CORNER OF BUILDING 14	10,000	NOT INSTALLED	POLYESTER POTTING WASH WATER	POLYESTER POTTING WASH WATER	NOT IN USE (EMPTY)	NOT IN USE (EMPTY)	NOT IN USE (EMPTY)
T12	NEAR NORTHWEST TANK FARM	50,000	NOT INSTALLED	NOT INSTALLED	STYRENE WATER	NOT IN USE (EMPTY)	NOT IN USE (EMPTY)	NOT IN USE (EMPTY)
T6 NORTH TANK	SOUTHWEST CORNER OF BUILDING 14	30,000	ACID/ALKALI PROCESS DISCHARGE	OIL FOR COOLANT SYSTEM	NOT IN USE	NOT IN USE (EMPTY)	NOT IN USE (EMPTY)	REMOVED 12/89
T5 SOUTH TANK	SOUTHWEST CORNER OF BUILDING 14	30,000	ACID/ALKALI PROCESS DISCHARGE	ACID/ALKALI PROCESS DISCHARGE	ACID/ALKALI PROCESS DISCHARGE	NOT IN USE (EMPTY)	NOT IN USE (EMPTY)	REMOVED 12/89
T8	JUST INSIDE BUILDING 14 NEAR WEST TANK FARM	3,000	PERCHLOR TRICHLOR-1973	PERCHLOR	NOT IN USE (EMPTY)	NOT IN USE (EMPTY)	NOT IN USE (EMPTY)	REMOVED 12/89
T8	JUST INSIDE BUILDING 14 NEAR WEST TANK FARM	1,500	PERCHLOR STILL BOTTOMS TRICHLOR-1972	PERCHLOR STILL BOTTOMS TRICHLOR-1972	NOT IN USE (EMPTY)	NOT IN USE (EMPTY)	NOT IN USE (EMPTY)	REMOVED 12/89
T11	#12 HOLDING TANK SOUTHEAST CORNER OF BUILDING 14	38,000	GRINDING SLUDGE OIL, RESIDUAL OIL FROM DRUMS, LOCAL STORM RUNOFF	GRINDING SLUDGE OIL, RESIDUAL OIL FROM DRUMS, LOCAL STORM RUNOFF	GRINDING SLUDGE OIL, RESIDUAL OIL FROM DRUMS, LOCAL STORM RUNOFF	GRINDING SLUDGE OIL, RESIDUAL OIL FROM DRUMS, LOCAL STORM RUNOFF	GRINDING SLUDGE OIL, RESIDUAL OIL FROM DRUMS, LOCAL STORM RUNOFF	GRINDING SLUDGE OIL, RESIDUAL OIL FROM DRUMS, LOCAL STORM RUNOFF

SOURCE:

1. Harrison Radiator Division Spill Prevention Control and Countermeasure Plans for 1974, 1978, 1982, 1984, 1986 and 1989.
2. Draft Consent Order, January 30, 1990

TABLE 3-11
(CONTINUED)

CONSENT ORDER SWMU#	SPCC TANK #	CAPACITY GALLONS	USE, STATUS 1974	USE, STATUS 1978	USE, STATUS 1982	USE, STATUS 1984	USE, STATUS 1986	USE, STATUS 1990
SOUTH TANK FARM								
NONE	1	10,000	WASTE OIL	WASHING OIL	WASHING OIL	WASHING OIL	WASHING OIL	WASHING OIL
T1	2 (#27 1989 PLAN)	10,000	MINERAL OIL	STYRENE WATER	EMPTY	EMPTY	EMPTY	(OUT OF SERVIC EMPTY
NONE	3 (#2 1989 PLAN)	10,000	OIL	OIL	EMPTY	HYDRAULIC OIL	EMPTY	LUBE GEAR OIL
NONE	4 (3 1989 PLAN)	10,000	MICROCUT	MICROCUT	MICROCUT	EMPTY	BRUKO D-332	BRUKO D-332 (DRAWING OIL)
NONE	5 (#4 1989 PLAN)	10,000	OIL	OIL	215 SEC. HYDRAULIC OIL	215 SEC. HYDRAULIC OIL	215 SEC. HYDRAULIC OIL	215 SEC. HYDRAULIC OIL
NONE	6 (#5 1989 PLAN)	10,000	OIL	OIL	EMPTY	EMPTY	CIMPERIAL 10K	CIMTECH 3900 (COOLANT)
T2	7	11,000	NOT INSTALLED	DIRTY OIL	DIRTY OIL	DIRTY OIL	REMOVED 5/86	
T3	8	11,000	NOT INSTALLED	DIRTY OIL	EMPTY	MICROLUBIC 540	REMOVED 5/86	

TABLE 3-12

SUMMARY OF SOIL ANALYSES, TANK REMOVALS OF T5 AND T6
HARRISON RADIATOR
MORAINE, OHIO
DECEMBER 6, 1989

	SAMPLE NUMBER	pH	TPH CONCENTRATION (mg/kg)(1)
Tank T5			
	HRD-01	9.63	440
	HRD-02	9.38	680
Tank T6	HRD-03	NA	1500
	HRD-04	NA	450
	HRD-05	NA	650
	HRD-06	NA	760
	HRD-07	NA	1600

Notes:

1. Total petroleum hydrocarbon, test method 418.1.
2. Not analyzed, pH was analyzed on Tank T5 soil sample only.

TABLE 3-13

HARRISON SPILL AND RELEASE HISTORY

DATE	MATERIAL	AMOUNT	LOCATION/ DISCHARGE POINT
March 1, 1976	Water Soluble Coolant	~33 Gal. of Oil & Grease, Exceeded NPDES Discharge Limits	North Lagoon
October 10, 1978	Hydrochloric Acid	?	North Lagoon
October 13, 1978	Impregnation Wash Solution	150 Gals.	South Tank Farm
February 6, 1979	RC-2 Resin	<100 Gals.	Contained In-Plant Spill
February 23, 1979	RC-2	<55 Gals.	Contained In-Plant Spill
July 25-29, 1979	Chrome Solution	10 Gals.	South Lagoon
July 14, 1980	Hydrochloric Acid	?	South Lagoon
October 8-9, 1981	Chrome Solution	?	South Lagoon
January 4, 1985	Water Soluble Coolant	35 Gals.	South Lagoon
May 30, 1985	Dilute Process Rinse Water, Tin Plating/Rotofinish	?	North Lagoon
March 21, 1986	Dilute Process Rinse Water, Tin Plating/Rotofinish	2250 Gals.	North Lagoon
May 8 & 12, 1986	Water Soluble Oil	?	South Lagoon
June 23, 1986	Hydrochloric Acid	25 Gals.	South Lagoon
July 25, 1986	Spent Lime Backwash	750 Gals.	South Lagoon

TABLE 3-13
(continued)

DATE	MATERIAL	AMOUNT	LOCATION/ DISCHARGE POINT
September 9, 1986	Truck & Bus Solvent Waste	?	On-Site Wastewater Pretreatment Facility
November 5-6, 1986	Oily Wastewater	20,000 gallons	North Lagoon
December 22, 1986	Water Soluble Coolant	10 Gals.	North Lagoon
May 15, 1987	Acid Solution	?	On-Site Wastewater Pretreatment Facility
November 12, 1987	General Wastewater	38,000 Gals.	North Lagoon
February 2, 1988	Water Soluble Coolant	15 Gals.	North Lagoon
February 3, 1988	Calgon H-130 Microbiocide	2 Ounces	North Lagoon
February 20-21, 1988	Oily Wastewater	<100 Gals.	North Lagoon
March 24, 1988	Oily Wastewater	150 Gals.	North Lagoon
June 28, 1988	7% Hydrochloric Acid Solution	200 Gals.	North Lagoon
Oct. 21-Nov.8, 1988	Storm and Non-Contact Cooling Water	4,000,000 Gals.	Pipe-Break North Lagoon Discharge
January 1, 1989	Kerosene	55 Gals.	North Lagoon
June 10, 1989	4% Brine Solution	4000 Gals.	North Lagoon
June 21, 1989 Freon TF	1,1,1 Trichloroethane 100 Gals.	220 Gals. Holding Tank	Contained in (SWMU #T-11)

TABLE 3-13
(continued)

DATE	MATERIAL	AMOUNT	LOCATION/ DISCHARGE POINT
June 28, 1989	5% Solids Clarifier Solution from Wastewater Pretreatment Facility	100 Gals.	North Lagoon
August 14, 1989	Electrocleaner Scrubber Water	?	North Lagoon
August 24, 1989	Deoxide NC-11 17% Sulfuric Acid 32% Ferrec Sulfate 51% Water	4 Gals.	South Lagoon

TABLE 4-1

OVA READINGS FOR MONITOR WELL CORE SAMPLES AT THE SOUTH INACTIVE SITE (LANDFILL L-1) 1982

CORE SAMPLE DEPTH (FT BELOW GROUND SURFACE)	WELL SITE								
	1 (GM-1)	2 (GM-5)	3 (GM-6)	3 (GM-4)	4 (GM-7)	5 (GM-15)	6 (GM-14)	7 (GM-12)	8 (GM-9)
0 - 1.5	0.0	6.6	NS	0.0	0.6	0.0	0.4	0.0	0.2
5 - 6.5	0.2	>1000	0.9	0.2	580.0	0.0	3.0	0.9	0.1
10 - 11.5	>50.0	56.0	1.4	0.7	740.0	0.0	1.8	1.9	1.8
15 - 16.5	0.4	26.0	1.9	2.0	3.4	0.6	2.6	1.6	0.4
20 - 21.5	0.2	12.0	NS	0.0	1.2	0.6	1.6	2.0	1.4
25 - 26.5	0.4	8.4	NS	0.0	0.9	0.4	0.8	2.7	1.2
30 - 31.5	0.4	2.6	NS	1.0	1.6	0.3	1.0	2.2	1.8
35 - 36.5	1.1	2.8	1.9	0.5	0.6	0.2	0.5	8.2	0.5
40 - 41.5	0.6	280.0	3.0	0.2	1.8	1.0	4.0	2.8	0.9
45 - 46.5	1.4	80.0	2.3	2.5	3.9	0.2	0.9	6.0	22.0
50 - 51.5	0.6	680.0	0.9	10.2	3.9	2.5	0.4	7.2	1.0
55 - 56.5	2.5	4.0	0.4	NS	34.0	0.6	2.1	3.4	0.8
60 - 61.5	2.0	260.0	3.0	4.4	59.0	0.1	2.0	5.4	0.9
65 - 66.5	26.0	9.0	2.2	7.6	20.0	4.5	1.8	1.3	14.0
70 - 71.5	11.0	NS		2.8	23.0	0.4	2.0	7.1	6.0
75 - 76.5	0.0	0.6		4.0	0.6	0.2	1.5	1.8	0.8
80 - 81.5	1.2	0.4		4.4	1.3	0.3	1.4	0.4	46.0
85 - 86.5	0.5	0.4		28.0	18.0	0.9	1.0	42.0	15.0
90 - 91.5	0.2	6.2		4.0	2.8	0.5	2.5	18.0	16.0
95 - 96.5	0.9	5.3		14.0	1.5	0.3	7.5	18.0	8.0
100 - 101.5	0.4	NS		0.5	0.3	NS	2.1	1.8	16.0
105				16.0			0.0	0.0	
110				0.6			2.0	0.0	
115				0.4			0.5	0.0	
120				0.0			0.0	0.1	
125				0.8			0.7	0.0	
130				1.6			0.6	0.0	
135				0.6			2.6	0.0	
140				0.8			3.3	0.0	
145				1.7			0.0	3.8	

NOTES:

NS - No Sample
Vertical Line Represents Location of Clay Till

TABLE 4-2
SOIL SAMPLING RESULTS FROM PERCHLOR TANK EXCAVATION
HARRISON RADIATOR-MORAINE PLANT
JANUARY 1989

(mg/kg-Dry Wt.)

SAMPLE	LAB I.D.	DRY WT.	BARIUM	CADMIUM	CHROMIUM	LEAD	PERCHLOR*	TRICHLOR*	CIS-1,2-*
A: 27'	HR-A-1	94.2	<46.9	<0.234	9.47	3.91	0.672	<0.004	<0.004
B: 14-16'	B12A	96.2	34.20	<0.096	6.13	2.36	0.878	<0.011	<0.011
B: 16-18'	B12B	95.6	22.70	0.102	6.59	2.56	0.430	<0.006	<0.006
C: 14-16'	C123A	92.9	45.20	0.131	9.74	5.09	1.590	0.134	<0.011
C: 16-18'	C123B	95.6	45.20	0.251	7.48	8.43	0.905	0.019	0.010
D: 14-16'	D123A	98.7	47.70	<0.077	6.56	2.50	0.184	<0.009	<0.009
D: 16-18'	D123B	93.8	16.40	<0.105	6.44	2.20	0.079	<0.010	<0.010
E: 14-16'	E123A	94.5	36.10	0.107	6.34	6.58	1.180	0.021	<0.014
E: 16-18'	E123B	95.6	46.50	<0.102	10.80	2.37	0.374	0.248	0.325
E: TEST**	TEST	98.4	40.10	0.170	7.12	15.10	0.635	0.016	0.016

Sample Dates - A: 1/05/89; B, C, D, & E: 1/19/89

*Perchlor: Tetrachloroethene (Perchloroethylene)
Trichlor: Trichloroethene
Cis-1,2-: Cis-1,2-dichloroethene

**TEST: Sample of clean soil spiked with drill lubricating oil used during collection of south samples (designated "E").

Note: Trans-1,2-dichloroethene and vinyl chloride were not detected.

TABLE 4-3

SUMMARY OF HEADSPACE ORGANIC VAPORS DETECTED
STILL ROOM UST EXCAVATION
THE HARRISON RADIATOR DIVISION - MORAINE, OHIO
April 24, 1990 AND May 30, 1990

SAMPLE NUMBER	HNU (PI-101)*VALUE (ppm)	
	April 24, 1990	Resample May 30, 1990
STRM-01	0.8	1.2
STRM-02	16.8	0.6
STRM-03	4.0	6.1
STRM-04	0.2	---
STRM-05	0.4	---
STRM-06	12.4	1.6
STRM-07	11.1	0.8
STRM-08	30.0	1.2
STRM-09	340.0	1.4
STRM-10	400.0	0.4
STRM-11	0.8	---
STRM-12	0.2	---
STRM-13	0	0.2
STRM-14	0.4	---

Note:

* A 10.2 eV lamp was used in the HNU PI-101 for organic vapor detection. All values expressed in parts per million (ppm) as calibrated to isobutylene.

TABLE 4-4
SUMMARY OF ANALYTICAL DATA,
STILL ROOM UST EXCAVATION,
APRIL 24 AND MAY 30, 1990
THE HARRISON RADIATOR DIVISION - MORAINE, OHIO

PARAMETER	STRM-02	STRM-07	STRM-08	STRM-09	STRM-10	STRM-13
VOLATILE ORGANIC COMPOUNDS (MAY 30, 1990)						
cis-1,2-dichloroethene	<0.22	<0.25	<0.25	<0.16	<0.20	<0.16
trans-1,2-dichloroethene	<0.22	<0.25	<0.25	<0.16	<0.20	<0.16
Tetrachloroethene	0.50	0.27	0.29	0.40	<0.20	<0.16
Trichloroethene	<0.22	<0.25	<0.25	<0.16	<0.20	<0.16
Vinyl chloride	<0.22	<0.25	<0.25	<0.16	<0.20	<0.16
TOTAL METALS (April 24, 1990)						
Barium	48.40	70.60	123.00	87.10	53.40	<18.70
Cadmium	0.146	0.171	0.360	0.213	0.114	0.306
Chromium, Total	8.29	8.28	16.20	9.62	10.60	9.34
Lead	3.88	10.50	10.70	16.80	12.40	16.20

Note: All values expressed in mg/kg on a dry weight basis.

APPENDIX A

WELL AND SOIL BORING GEOLOGIC LOGS AND WELL CONSTRUCTION LOGS

- HR-1 through HR-17
- GM-1 through GM-19D
- W-1-N to W-4-N
- W-1-S to W-4-S
- North Lagoon Investigation Soil Borings
- Production Wells
- Test Wells TW-1 and TW-2
- Soil Borings at Landfill L-1, Bowser-Morner, 1979
- Wastewater Treatment Facility Foundation Boring

HR-1 through HR-17

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TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.002
PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. HR-1
LOCATION As directed
DRILLER Willard Martin DRILL No. 36 DATE STARTED 7-11-83
ELEVATION REFERENCE DATE COMPLETED 7-11-83
CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL
SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon HAMMER WT. 140# FALL 30"
DEPTH TO WATER: IMMEDIATE 35.5 UPON COMPLETION
DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION	DEPTH 0'	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
		4" Asphalt					
		Sand, medium to coarse and gravel to 3", little fine sand and silt occasional clay "chunks" fill, light brown dry		0.5-2	SS	13-15-20	
		Sand medium to coarse and gravel, little fine sand and silt, probable fill, light grown, dry		5-6.5	SS	14-16-23	
		Sand, medium, trace silt and sand fine to coarse gravelly with coarse sand in tip, brown, dry		10-11.5	SS	8-14-23	
		Sand, medium, trace silt, some gravel at top of interval, brown, dry		15-16.5	SS	10-7-10	
		Sand, medium to coarse and gravel, little silt and fine sand, brown, dry		20-21.5	SS	20-38-50	

Respectfully submitted,
THE H. C. NUTTING CO.

By

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** HR-1

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
		Sand, coarse and gravel little silt and fine to medium sand, brown, trace clay, moist		25-26.5	SS	16-35-54	
		Sand, coarse and gravel trace silt and fine to medium sand, brown, dry		30-31.5	SS	16-43-30	
		Gravel, some coarse sand, little medium to fine sand and silt, brown, wet		35-36.5	SS	21-20-16	
		Sand, coarse and gravel, little fine - medium sand and silt, brown wet		40-41.5	SS	13-14-16	
	44.0'						
		Till - silt and clay some gravel little coarse sand gray at top of spoon, brown at bottom, medium sand in tip, moist		45-46.5	SS	20-41-63	
	46.4'						
		Sand coarse, little gravel, silt and fine sand, brown, wet		50-51.5	SS	21-35-40	
		Sand with clay, gray, minor fraction of probable sized rock		55-56.5	SS	22-26-38	
		Sandy clay, gray, sand fraction is fine grained where incorporated with clay; sand lenses, fine to medium grained		60-61.0	SS	41-112/6	
	61.0'						
		Set well at 57.7'; See monitor well details					
		BORING COMPLETED					

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TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.002
PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. HR-2
LOCATION As directed
DRILLER Willard Martin DRILL No. 36 DATE STARTED 7-12-83
ELEVATION REFERENCE DATE COMPLETED 7-13-83
CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL
SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon HAMMER WT. 140# FALL 30"
DEPTH TO WATER: IMMEDIATE 35.0' UPON COMPLETION
DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
	0'	Sand, fine to coarse and silt, some gravel, trace organics and clay, brown, dry to moist, fill		0-1.5	SS	14-15-12	
		Sand, fine to coarse and silt, some gravel, trace organics and clay, brown, dry to moist, fill		5-5.5	SS	10	
	5.5'	Silt, some clay, trace fine - medium sand and organics, dark brown, moist		5.5-6.5	SS	10-8-4	
		Gravel in end of spoon prevented recovery		10-11.5	SS	12-14-12	
		Sand, coarse and gravel, trace silt and fine to medium sand, brown, moist		15-16.5	SS	6-14-20	
		Sand, medium to coarse and gravel, little to trace fine sand and silt and clay, brown, moist		20-21.5	SS	12-20-28	

Respectfully submitted,
THE H. C. NUTTING CO.

By

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** HR-2

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recover
		Sand, medium to coarse and gravel, little to trace fine sand and silt and clay, brown, moist		25-25.5	SS	16	
		Sand medium, little fine and coarse sand and silt, dry light brown		25.5-26.5	SS	42-30	
		Sand coarse and gravel, little fine to medium sand, trace silt, dry brown		30-31.5	SS	17-38-50	
	35.0'	Till, silt, some clay, little gravel, brown at contact with overlying outwash to gray through out spoon, moist		35-36.5	SS	20-13-13	
	37.0'	Sand, coarse sand gravel, little fine to medium sand, silt and clay, wet - (possible dry spots)		37-38	SS	34-56	
		Sand, coarse and gravel, trace silt and fine to medium sand, brown, wet		40-41.5	SS	36-62	
		Gravel and coarse sand, trace silt, brown, wet		45-46.5	SS	41-84	
		Sand coarse and gravel, some medium sand little silt and clay lense of dense higher clay content, brown, wet		50-51.5	SS	41-47-41	
		Gravel and coarse sand little to trace silt and fine to medium sand light brown, wet		55-56.5	SS	44-63	
	57.0'						

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PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** HR-2

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
	57.0'						
		Till, silt, some gravel little fine to medium sand, gray, moist		57-58.5	SS	24-42-56	
	58.5						
		Set well at 56.6'; See monitor well details					
		BORING COMPLETED					

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TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.002

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. HR-3

LOCATION As directed

DRILLER Willard Martin DRILL No. 36 DATE STARTED 7-13-83

ELEVATION REFERENCE DATE COMPLETED 7-14-83

CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL

SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE 38.0' UPON COMPLETION

DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION	DEPTH 0'	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
		Sand, fine to coarse and gravel, some silt and organics, brown to dark brown, dry to moist		0-1.5	SS	6-9-12	
		Sand, medium, little gravel, trace silt fine to medium sand light brown, dry		5-6.5	SS	9-14-15	
		Sand, medium to coarse and gravel trace silt and fine sand, light brown, dry		10-11.5	SS	14-18-26	
		Sand medium to coarse and gravel trace silt and fine sand, brown, moist		15-16.5	SS	16-22-28	
		Sand medium to coarse and gravel trace silt and fine sand, brown, moist		20-21.5	SS	17-38-52	
		Sand medium to coarse, some gravel, trace silt and fine sand, brown, moist		25-26.5	SS	18-28-34	

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical

Respectfully submitted,
THE H. C. NUTTING CO.

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PROJECT GMC, Harrison Radiator Division, Monitoring Wells
Moraine, Ohio
HOLE No. HR-3

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recover
		Sand medium to coarse, some gravel moist brown		30-31.5	SS	34-68	
		Sand, coarse and gravel, little fine to medium sand and silt, moist brown		35-36.5			
		Sand coarse and gravel, trace silt and fine to medium sand, brown, wet		40-41.5	SS	34-62	
		Gravel and coarse sand, trace silt brown, wet		45-46.5	SS	48-72	
		Sand, coarse and gravel, little silt and clay, brown wet		50-51.5	SS	36-74	
		Sand, coarse and gravel, little silt and clay, brown wet		55-56.5	SS	42-54	
	60.5'			60-60.5	SS	22	
		Silt, some gravel and clay, trace fine - coarse sand, gray, moist		60.5-61.5	SS	34-46	
	61.5'						
		Set well at 59.6'; See monitor well details					
		BORING COMPLETED					

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TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.002
PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. HR-4
LOCATION As directed
DRILLER Willard Martin DRILL No. 36 DATE STARTED 7-14-83
ELEVATION REFERENCE DATE COMPLETED 7-14-83
CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL
SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon HAMMER WT. FALL
DEPTH TO WATER: IMMEDIATE 41.0' UPON COMPLETION
DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
	0'						
		Sand, fine to coarse and gravel silt, little clay, brown dry		0-0.5	SS	21	
		Silt and fine to medium sand little clay, brown dry - moist		0.5-1.5	SS	22-12	
		Sand fine to coarse, and gravel, little silt, light brown, dry		5-6.5	SS	12-14-20	
		Sand fine to coarse, some to little gravel, little silt, light brown, dry		10-11.5	SS	11-15-16	
		Sand fine to coarse and gravel little silt, light brown, dry		15-16.5	SS	14-34-44	
		Sand fine to coarse and gravel little silt, light brown, dry		20-21.5	SS	13-22-24	
		Sand fine to coarse and gravel little to trace silt, light brown, dry		25-26.5	SS	12-23-34	

Respectfully submitted,
THE H. C. NUTTING CO.

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical

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PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** HR-4

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
		Sand medium sand and gravel, some fine to coarse sand little silt light brown, dry		30-31.5	SS	31-37-41	
		Large gravel prevented recovery		35-36.5	SS	94-64	
		Gravel and coarse sand, little fine to medium sand brown Wet at tip		40-41.5	SS	40-44-41	
		Gravel, little sand fine to coarse, wet		45-46.5	SS	25-55	
		Sand coarse and gravel, little fine to medium sand trace silt, brown, wet		50-51.5	SS	74-82	
		Sand coarse and gravel, little fine to medium sand trace silt, brown, wet		55-56.5	SS	72-94	
		Sand medium to coarse, some gravel little fine sand and silt, brown wet		60-61.5	SS	45-76	
	65.5'	Silt and fine sand little clay, orange brown, moist - till		65.5-66	SS	112	
		Silt, some fine sand and gravel gray, moist possible coarse sandy layer on top - till		66-67	SS	44-65	
	67.0'	Set well at 65.0'; See monitor well details					
		BORING COMPLETED					

HCN THE H. C. NUTTING COMPANY
GEOTECHNICAL AND TESTING ENGINEERS SINCE 1921
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BOX NUMBER 11 • HIGHLAND HEIGHTS, KENTUCKY 41076 • 606-261-2043

8-10-83 vf
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TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.002
PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. HR-5
LOCATION As directed
DRILLER Willard Martin DRILL No. 36 DATE STARTED 7-15-83
ELEVATION REFERENCE DATE COMPLETED 7-15-83
CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL
SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon HAMMER WT. 140# FALL 30"
DEPTH TO WATER: IMMEDIATE 33.0' UPON COMPLETION
DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
	0'	Approximately 4" asphalt					
		Silt, clay and gravel, little fine to coarse sand, dark brown, moist fill		4"-1.5	SS	5-6-7	
		Sand, fine to coarse and gravel little silt, brown, dry		5-6.5	SS	6-8-11	
		Sand, medium to coarse and gravel little fine sand and silt, light brown, dry		10-11.5	SS	15-21-31	
		Sand medium to coarse and gravel, trace fine sand and silt, light brown, dry		15-16.5	SS	11-16-30	
		Sand medium to coarse and gravel, trace fine sand, light brown, dry		20-21.5	SS	12-25-32	
		Sand medium to coarse and gravel, trace fine sand, light brown, dry		25-26.5	SS	35-51	
		Sand medium to coarse and gravel, trace fine sand with zone of higher fine sand content, light brown dry to moist		30-31.5	SS	21-42-60	

Respectfully submitted,
THE H. C. NUTTING CO.

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical

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PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** HR-5

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recover
		Sand coarse, little gravel, trace fine to medium sand and silt, brown, wet		35-36.5	SS	16-21-31	
	38.0'						
		Till, silt, some gravel and coarse sand, little fine sand, gray moist		40-41.5	SS	10-18-24	
		Till, silt, some gravel and coarse sand, little fine sand, gray moist		45-46.5	SS	10-17-27	
	47.5'						
		Sand coarse and gravel, some silt and clay, gray, wet		50-51.5	SS	21-38-56	
		Sand medium to coarse, trace silt and fine sand, gray, brown, wet sand		52-53.5	SS	28-51	
		Sand coarse and gravel, some silt and clay, gray, wet, sand medium to coarse, trace silt and fine sand, gray - brown, wet		55.5-56		35	
	56.0'	Till, silt and clay, some gravel and coarse sand, trace fine to medium sand, gray, wet		56-56.5	SS	52	
		Till, silt and clay, some gravel and coarse sand, trace fine to medium sand, gray, wet		57.5-59	SS	30-41-60	
	59.0'						
		Set well at 53.6'; See monitoring weel details					
		BORING COMPLETED					

HCN THE H. C. NUTTING COMPANY
GEOTECHNICAL AND TESTING ENGINEERS
SINCE 1921

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TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.002
PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. HR-6
LOCATION As directed
DRILLER Willard Martin DRILL No. 36 DATE STARTED 7-15-83
ELEVATION REFERENCE DATE COMPLETED 7-16-83
CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL
SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon HAMMER WT. 140# FALL 30"
DEPTH TO WATER: IMMEDIATE 43.5' UPON COMPLETION
DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
	0'	2" of asphalt					
		Silt, fine to coarse sand and gravel, brown, moist, fill		2"-1.5	SS	6-8-10	
		Silt, fine to coarse sand and gravel, brown, moist, fill, very moist		5-6.5	SS	2-3-3	
		Sand medium to coarse and gravel, trace silt, brown, moist		10-11.5	SS	6-8-11	
		Sand medium to coarse and gravel, grace silt, brown, moist		15-16.5	SS	8-14-17	
		Sand fine to medium, trace silt, brown, moist		20-21	SS	10-14	
		Sand coarse and gravel, little fine to medium sand, trace silt very moist to wet		21-21.5	SS	19	
		Very hard drilling, boulder ? 24.0'					
		Sand medium to coarse, and gravel, brown moist		25-26.5	SS	11-15-21	
	30.0'						

Respectfully submitted,
THE H. C. NUTTING CO.

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** HR-6

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
	30.0'	Silt and clay, some coarse sand and gravel, brown for 6" then gray, moist		30-31.5	SS	14-18-28	
		Silt, some clay, gravel, little fine to coarse sand, gray, moist		35-36.5	SS	10-12-16	
		Silt, some clay,gravel, little fine to coarse sand, gray, moist		40-41.5	SS	11-14-23	
	43.5'						
		Sand, medium to coarse, some gravel, little silt and clay, light brown, wet		45-46.5	SS	21-42-70	
		Sand coarse sand gravel, brown, wet - may be slough much of sample lost		50-51.5	SS	31-64	
		Sand medium to coarse and gravel, little, silt, brown, wet		55-56.5	SS	25-36-38	
	57.5'	Till - silt, some clay, little gravel and fine to coarse sand, brown first 2", gray, moist		57.5-59	SS	28-62	
	59.0'						
		Set well at 53.0'; See monitoring well details					
		BORING COMPLETED					

THE H. C. NUTTING COMPANY
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8-10-83 vf
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TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.002
PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. HR-7
LOCATION As directed
DRILLER Willard Martin DRILL No. 36 DATE STARTED 7-16-83
ELEVATION REFERENCE DATE COMPLETED 7-17-83
CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL
SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon HAMMER WT. 140# FALL 30"
DEPTH TO WATER: IMMEDIATE 36.5' UPON COMPLETION
DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION	DEPTH 0'	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recover
		Silt, little fine to coarse sand and gravel, brown, trace roots and organics, moist		0-1.5	SS		
		Silt and fine to medium sand, little clay, brown, moist		5-6.5	SS		
		Sand fine to coarse and gravel, trace silt, light brown dry		10-11.5	SS		
		Sand, coarse and gravel little fine to medium sand and silt, light brown, dry		15-16.5	SS		
		Sand, medium to coarse, some gravel, trace fine sand and silt brown dry to moist		20-21.5	SS		
		Sand, coarse and gravel, trace fine to medium sand, brown, moist		25-26.5	SS		
		Sand, medium, brown, moist trace trace coarse sand		30-31.5	SS		
	32.5' 35.0'	Till					

Respectfully submitted,
THE H. C. NUTTING CO.

8-10-83 vf
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PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** HR-7

ELEVATION	DEPTH 35.0'	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
		Sand coarse and gravel, little silt and fine to medium sand, brown wet to very moist		35-36.5	SS		
		Sand coarse and gravel, little silt and fine to medium sand, brown wet to very moist		40-41.5	SS		
		Sand, medium to coarse, trace silt, brown, wet		45-46.5	SS		
	51.0'	Sand, medium to coarse, trace silt, brown, wet		50-51	SS		
		Sand medium to coarse, some gravel brown, wet		51-51.5	SS		
		Sand medium to coarse, and gravel little silt and fine sand, brown wet		55-56	SS		
		Sand medium to coarse and gravel trace fine sand and silt, gray wet		56-56.5	SS		
	57.0'						
		Silt, little fine to coarse sand and gravel and clay, gray, moist		57-58.5	SS		
	58.5						
		Set well at 57.0'; See monitoring well details					
		BORING COMPLETED					

THE H. C. NUTTING COMPANY
GEOTECHNICAL AND TESTING ENGINEERS SINCE 1921
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TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.002
PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. HR-8
LOCATION As directed
DRILLER Willard Martin DRILL No. 36 DATE STARTED 7-18-83
ELEVATION REFERENCE DATE COMPLETED 7-18-83
CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL
SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon HAMMER WT. 140# FALL 30"
DEPTH TO WATER: IMMEDIATE 41.0' UPON COMPLETION
DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
	0'	5"-6" of asphalt					
	0.5'	Crushed stone		0.5-1.5	SS		
	1.5'	Silt, and fine to coarse sand, some gravel, dark brown moist little clay, fill, trace organics		1.5-2	SS		
		Silt, some fine to coarse sand and gravel, little clay, roots, trace organics, dark brown, moist, fill ?		5-6.5	SS		
		Sand fine to medium, with some gravel in lenses near beginning and end of interval, trace silt, light brown, dry		10-11.5	SS		
		Sand medium to coarse and gravel trace fine sand and silt, light brown, dry		15-16.5	SS		
		Sand coarse and gravel, trace medium fine sand and silt, brown moist		20-21.5	SS		

Respectfully submitted,
THE H. C. NUTTING CO.

By

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical

8-10-83 vf
Page 2 of 2

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** HR-8

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
		Sand coarse and gravel, trace medium to fine sand and silt, brown, moist, (only driven 6" refusal on large cobble?)		25-26.5	SS		
		Sand, coarse, some gravel trace fine to medium sand, light brown, moist		30-31.5	SS		
	35.0'						
		Large gravel, cobbles, boulders ? could not drive spoon, hard drilling					
	38.0'						
		Sand coarse and gravel, wet		40-41.5	SS		
		Sand coarse and gravel, wet		45-46.5	SS		
		Sand, medium to coarse and gravel, trace silt and fine sand, brown, wet		50-51.5	SS		
		Sand, medium to coarse and gravel, trace silt and fine sand, brown, wet		55-56.5	SS		
		Sand coarse and gravel, little silt and fine sand, brown, wet		60-61.5 65-66	SS SS		
	66.0'						
		Sand fine to coarse and silt, trace gravel, orange brown, very moist to wet		66-66.5	SS		
		Sand medium, trace small gravel and silt, wet, brown		70-71.5	SS		
		Silt, trace clay, gray, wet		75-76.5			
	76.0'	Set well at 64.2'; See monitoring well details					
		BORING COMPLETED					

GERAGHTY & MILLER, INC.
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PAGE 1 OF 2

PROJECT NO. OH0610DY05

BORE HOLE NO. HR-9

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

DRILLING CONTRACTOR Moody's of Dayton, Inc.

DRILLING EQUIPMENT CME 75 Hollow Stem Auger

HYDROGEOLOGIST John Elrod

DRILLER Herb Williams

DATE START / TIME 8/22/88 4:00 PM

DATE FINISH / TIME 8/24/88 3:00 PM

SURFACE ELEVATION 741.0'

TOTAL DEPTH 76.5'

WELL CASING 2" PVC, sch 40

SCREEN TYPE 2" PVC

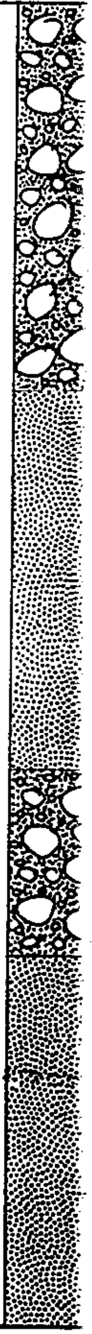
LENGTH 10'

SLOT 10

REMARKS

BORE HOLE LOG

DEPTH (FT.)	SAMPLE (NO.)	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
				Asphalt			
	S-1	7-8-19	12	Med-cs GRAVEL and SILT, tr fine sand, brown			
5	S-2	8-14-13	7	Med-cs GRAVEL, little med-cs sand, tr silt, tr clay, dk brown (fill?)	Asphalt remnants from surface		
10	S-3	11-13--30	8	Cs SAND, some med-cs gravel, some silt, tr fine-med sand, med brown			
15	S-4	13-22-27	7	Med-cs SAND, some gravel, tr silt, med brown, moist			
20	S-5	17-9-12	7	GRAVEL, some med-cs sand, tr silt, grayish brown, moist			
25	S-6	8-8-9	12	Med SAND, little gravel, gray, moist			
30	S-7	28-32-45	18	Med-cs SAND, little med-cs gravel, gray, moist	Most gravel is limestone		



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PROJECT NO. OH0610DY05

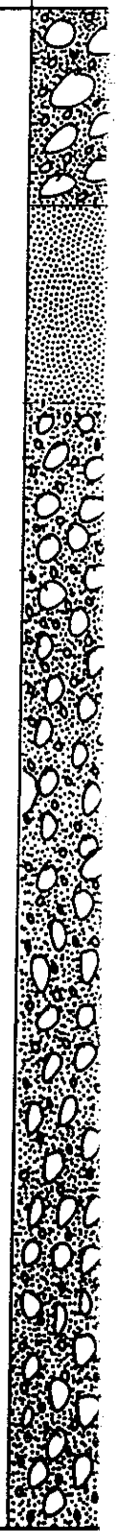
BORE HOLE NO. HR-9

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

REMARKS

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
	S-8	45-100	6	Med-cs SAND and GRAVEL, little silt, moist	Hit large cobble after 6" penetration		
40	S-9	32-26-27	18	Med-cs SAND, some silt, little med-cs gravel, tr fine sand, brown, wet			
45	S-10	24-30-46	18	Med-cs SAND and GRAVEL, some silt, little fine-med sand, brown, wet			
50	S-11	41-32-37	18	Med-cs SAND and GRAVEL, brown, wet			
55	S-12	25-24-26	18	Med-cs SAND and GRAVEL, some silt, some clay, brown, wet			
60	S-13	36-19-23	18	GRAVEL and med-cs SAND, brown, wet			
65	S-14	32-46-33	18	Med SAND and GRAVEL, little cs sand, little silt, brown, wet			
70	S-15	45-78-45	18	GRAVEL and fine-med SAND, brown, wet			
75	S-16	23-25-52	18	Fine-med SAND, some silt, some clay, tr gravel, brown, wet			



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PROJECT NO. OH0610DY05

BORE HOLE NO. HR-10

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

DRILLING CONTRACTOR Reynolds Supply, Inc.

DRILLING EQUIPMENT Bucyrus Erie 6TL

HYDROGEOLOGIST John Elrod

DRILLER Steve Back

DATE START / TIME 9/12/88

DATE FINISH / TIME 9/15/88

SURFACE ELEVATION 740.9'

TOTAL DEPTH 125'

WELL CASING 4" PVC, sch 40

SCREEN TYPE 4" PVC

LENGTH 10'

SLOT 10

REMARKS

BORE HOLE LOG

DEPTH (FT.)	SAMPLE (NO.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)
	1	SILT and CLAY and med-cs SAND, med brown	strong diesel aroma @ 1.5-3.0	
5	2	Med-cs SAND, some gravel, tr fine sand, grayish brown		
10	3	Fine-cs SAND, some cs sand, grayish brown		
15	4	GRAVEL, some cs sand, tr fine-med sand, grayish brown		
20	5	GRAVEL, some cs sand, tr fine-med sand, grayish brown		
25	6	GRAVEL, some cs sand, grayish brown		
30	7	GRAVEL and med SAND, grayish brown		
35	8	GRAVEL and med-cs SAND, grayish brown		
40	9	Fine-med GRAVEL, some med-cs sand, tr fine sand, grayish brown		
45	10	Fine-med GRAVEL, some med-cs sand, tr fine sand, grayish brown		
50	11	Med-cs SAND, some gravel, tr fine sand, grayish brown		
55	12	Med-cs SAND, some fine sand, tr gravel, tr silt, grayish brown		
60	13	Med-cs SAND, some fine sand, tr gravel, tr silt		
65	14	Fine-cs SAND and silt, tr gravel grayish green, GRAVEL, little fine-cs sand, little silt, grayish green		

GRAPHIC LOG

GERAGHTY & MILLER, INC.
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PAGE 2 OF 2

PROJECT NO. OH0610DY05	BORE HOLE NO. HR-10
PROJECT Harrison Radiator	LOCATION Moraine, Ohio
REMARKS	

DEPTH (FT.)	SAMPLE NO.	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)
	15	GRAVEL, some med-cs sand, gray		
75	16	Med-cs SAND, tr gravel, tr silt, gray		
80	17	Med-cs SAND, tr gravel, tr silt, gray		
85	18	Med-cs SAND, tr gravel, tr silt, grayish green		
90	19	GRAVEL, some cs sand, tr fine-med sand, grayish brown	Very hard bailing	
95	20	GRAVEL and fine-med SAND, tr silt, grayish brown		
100	21	Fine-med SAND, some cs sand, some gravel, little silt, grayish brown		
105	22	Fine-med SAND, some cs sand, some gravel, little silt, grayish brown		
110	23	Fine-med GRAVEL, tr fine-cs sand, grayish brown		
115	24	Fine-med GRAVEL, little fine-cs sand, grayish brown		
120	25	Med-cs GRAVEL, tr cs sand, tr fine gravel, grayish brown		
125				
130				
135				
140				
145				

GRAPHIC LOG

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PROJECT NO. 0H0610DY05

BORE HOLE NO. HR-11

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

DRILLING CONTRACTOR Moody's of Dayton, Inc.

DRILLING EQUIPMENT CME 75 Hollow Stem

HYDROGEOLOGIST John Elrod

DRILLER Herb Williams

DATE START / TIME 8/26/88 4:30 PM

DATE FINISH / TIME 8/27/88 12 Noon

SURFACE ELEVATION 740.9'

TOTAL DEPTH 76.5'

WELL CASING 2" PVC, sch 40

SCREEN TYPE 2" PVC

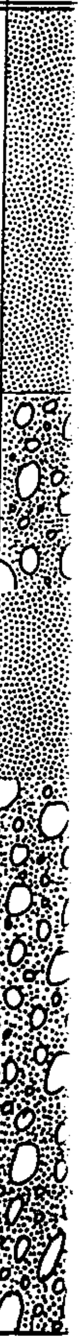
LENGTH 10'

SLOT 10

REMARKS

BORE HOLE LOG

DEPTH (FT.)	SAMPLE (NO.)	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
5	S-1	7-5-10	12	Med SAND, some silt, some clay, tr gravel, dk brown			
10	S-2	7-12-19	6	GRAVEL and med SAND, some silt, med brown			
15	S-3	3-14-19	3	Med-cs SAND, some gravel, greenish brown			
20	S-4	6-51-53	5	Fine-med GRAVEL, some fine-med sand, lt brown			
25	S-5	36-36-34	12	GRAVEL and fine-med SAND, some silt, little cs sand, med brown to green			
30	S-6	20-51-53	15	Fine-cs SAND and GRAVEL, some silt	Limonitic		



PROJECT NO. OH0610DY02

BORE HOLE NO. HR-11

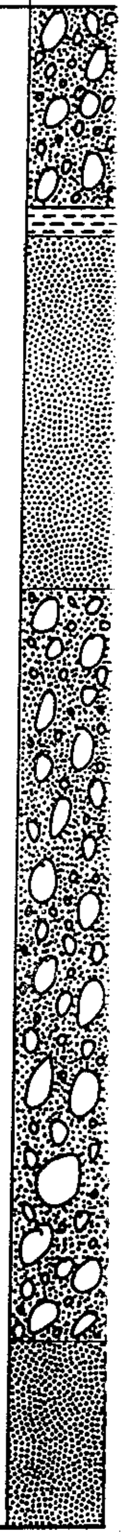
PROJECT Harrison Radiator

LOCATION Moraine, Ohio

REMARKS

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)
	S-7	40-105 -67	12	GRAVEL, some fine-med sand, silt, tr cs sand, brown	Limonitic	
40	S-8	42-97 -68	18	Top 1.0' = SILT and CLAY, little gravel, grayish green, dry. Btm.5' = Cs SAND, some silt, little med sand, wet	Limonitic	
45	S-9	9-18- 41	18	Med-cs SAND, tr gravel, brown, wet		
50	S-10	18-40 -48	18	Med-cs SAND and GRAVEL, little silt, tr fine sand, brown, wet		
55	S-11	23-41 -45	18	Cs SAND and GRAVEL, some silt, little fine-med sand, med brown, wet		
60	S-12	27-27 -35	18	Cs SAND and GRAVEL, some silt, little fine-med sand, brown, wet		
65	S-13	39-42 -50	15	Cs SAND and GRAVEL, some med sand, little silt, little clay, brown, wet	Stopped hammer @ 50 blows - no penetration	
70	S-14	32-34 -58	18	Med-cs SAND, little fine sand, little silt, tr gravel, brown, wet		
75	S-15	33-44 -39	18	Med-cs SAND, some fine sand, tr clay, tr gravel, brown, wet		

GRAPHIC LOG



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PROJECT NO. 0H0610DY05

BORE HOLE NO. HR-12

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

DRILLING CONTRACTOR Reynolds Supply, Inc.

DRILLING EQUIPMENT Bucyrus Erie 6TL

HYDROGEOLOGIST John Elrod

DRILLER Steve Back

DATE START / TIME 8/31/88

DATE FINISH / TIME 9/8/88

SURFACE ELEVATION 741.0'

TOTAL DEPTH 130'

WELL CASING 4" PVC, sch 40

SCREEN TYPE 4" PVC

LENGTH 10'

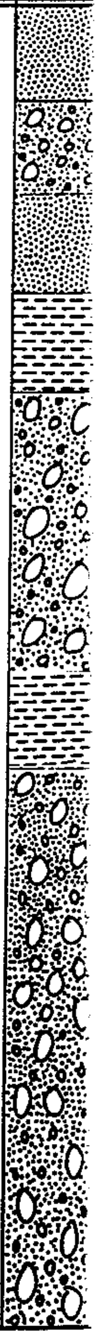
SLOT 10

REMARKS

BORE HOLE LOG

DEPTH (FT.)	SAMPLE (NO.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)
	1	Fine-med SAND, little silt, tr clay, dk brown		
5	2	Cs SAND and GRAVEL, med brown		
10	3	Fine-cs SAND, some silt, tr gravel, med brown		
15	4	SILT and CLAY, some fine-cs sand, lt brown		
20	5	Med-cs SAND, little gravel, tr fine sand, tr clay, lt brown		
25	6	Cs SAND and GRAVEL, little fine-med sand, tr gravel, med brown		
30	7	Fine-med SAND, little cs sand, little gravel, med brown		
35	8	SILT and CLAY, little med-cs sand, tr gravel, grayish green		
40	9	Cs SAND and GRAVEL, med brown		
45	10	Cs SAND and GRAVEL, med brown		
50	11	Fine-med SAND and GRAVEL, med brown		
55	12	Fine-med SAND and GRAVEL, tr silt, med brown		
60	13	Cs SAND, little gravel, med brown		
65	14	Cs SAND, some gravel, tr fine sand, med brown		

GRAPHIC LOG



PAGE 2 OF 2

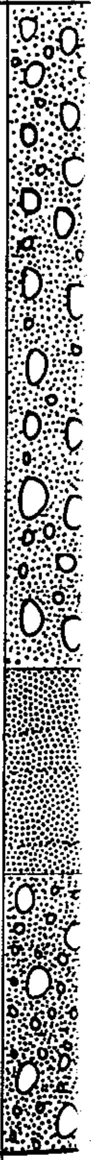
PROJECT NO. OH0610DY05

BORE HOLE NO. HR-12

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

REMARKS

DEPTH (FT.)	SAMPLE NO.	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
	15	Med SAND, some gravel, trace fine sand, tr silt, reddish brown			
75	16	Fine-med GRAVEL, some cs sand, reddish brown			
80	17	Fine-med GRAVEL, some cs sand, tr fine sand, tr silt, grayish brown			
85	18	Fine-med GRAVEL, some cs sand, tr fine sand, grayish brown			
90	19	Fine-med SAND, tr silt, grayish brown			
95	20	Fine-cs SAND and GRAVEL, little silt, grayish brown			
100	21	Cs SAND, little gravel, tr fine sand, tr silt, grayish brown			
105	22	Fine-med SAND, grayish brown			
110	23	Fine-med SAND, grayish brown			
115	24	GRAVEL and cs SAND, grayish brown			
120	25	GRAVEL, some cs sand, grayish brown			
125					
	26	Med-cs SAND, some gravel, grayish brown			
130					
135					
140					
145					

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PAGE 1 OF 2

PROJECT NO. OH0610DY05		BORE HOLE NO. HR-13	
PROJECT Harrison Radiator		LOCATION Moraine, Ohio	
DRILLING CONTRACTOR Reynolds Supply, Inc.		DRILLING EQUIPMENT Bucyrus Erie 6TL	
HYDROGEOLOGIST John Elrod		DRILLER Steve Back	
DATE START / TIME 8/22/88	DATE FINISH/ TIME 8/29/88	SURFACE ELEVATION 733.2'	TOTAL DEPTH 85'
WELL CASING 4" PVC, sch 40	SCREEN TYPE 4" PVC	LENGTH 10'	SLOT 10
REMARKS			

BORE HOLE LOG

DEPTH (FT.)	SAMPLE (NO.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
	1	Fine-cs GRAVEL and cs SAND, some silt, some clay, brown			
5	2	Fine-cs GRAVEL and cs SAND, tr silt, tr clay, brown			
10	3	SILT and CLAY, some fine-med gravel, some med-cs sand, brown			
15	4	Med-cs SAND and GRAVEL, some silt, brown			
20	5	Med-cs SAND, some gravel, brown			
25	6	Cs SAND and GRAVEL, brown			
30	7	Cs SAND and GRAVEL, lt brown			
35	8	Cs SAND and GRAVEL, tr clay, tr silt, med brown			
40	9	Cs SAND and GRAVEL, little silt, little clay, lt brown			
45	10	Cs SAND and GRAVEL, some silt, lt brown			
50	11	Med-cs SAND, little fine sand, little gravel, tr silt, brown			
55	12	GRAVEL and med-cs SAND, tr silt, brown			
60	13	SILT and CLAY, little cs sand, grayish green			
65	14	SILT and CLAY, little cs sand, grayish green			

PAGE 2 **OF** 2

PROJECT NO. 0H0610DY05

BORE HOLE NO. HR-13

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

REMARKS

DEPTH (FT.)	SAMPLE NO.	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC
	15	GRAVEL, little med-cs sand, tr silt, tr clay			
75	16	Med-cs SAND, some gravel, brown			
80	17	Med-cs SAND and GRAVEL			
85					
90					
95					
100					
105					
110					
115					
120					
125					
130					
135					
140					
145					

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PAGE 1 OF 3

PROJECT NO. OH019.05

BORE HOLE NO. HR-14

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

DRILLING CONTRACTOR Reynolds Supply, Inc.

DRILLING EQUIPMENT Cable Tool Bucyrus Erie 60

HYDROGEOLOGIST S. K. Ackers

DRILLER R. Wilmot

DATE START / TIME 10/25/89 12:45 p.m.

DATE FINISH / TIME 10/27/89 1:00 p.m.

SURFACE ELEVATION

TOTAL DEPTH 88'

WELL CASING 4-inch PVC, sch 40

SCREEN TYPE 4-inch PVC, sch 40

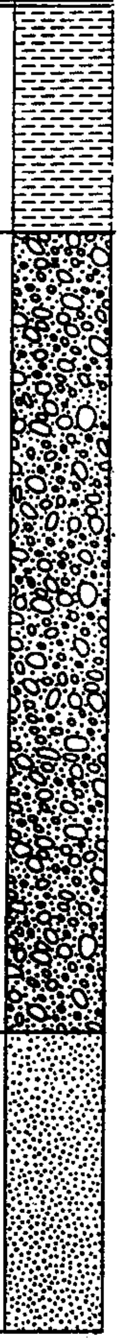
LENGTH 10 feet

SLOT 0.010 inch

REMARKS

BORE HOLE LOG

DEPTH (FT.)	SAMPLE (NO.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
5		CLAY (50%); Some fine-cs sand (30%); tr fine-cs gravel (10%); tr pebbles (10%); dk olive brn; damp, loose	3' tr cobbles 5' color change to light olive brn		
10		Med-cs SAND (30%); some fine-med gravel (30%); little fine sand (20%); little silt & clay (20%); light olive brn, subangular			
		Fine-med GRAVEL (30%); some med-cs sand (30%); little vf-f sand (15%); little cs gravel (15%); tr silt & clay (10%)			
15 20		PEBBLES & COBBLES (60%); little cs sand (20%); little fine-med sand (15%); tr fine sand (5%); angular to subangular, light olive brn			
25		Med-cs SAND (60%); little cs gravel (15%); tr vf-f sand (10%); tr silt & clay (10%); tr pebbles & cobbles (5%); subangular to subrounded, light olive brn	unit becoming dirtier 25' drilling easier, 27' color change Fe staining reddish brn		
30		Med SAND (80%); tr fine sand (10%); tr fine-cs gravel & pebbles (5%); reddish brn; subangular subrounded, WATER BEARING	Tr drk brn organic film on water		



PROJECT NO. OH019.05

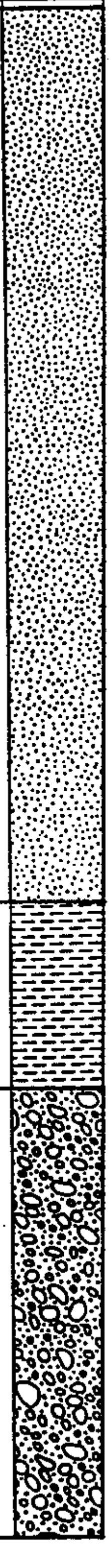
BORE HOLE NO. HR-14

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

REMARKS

DEPTH (FT.)	SAMPLE NO.	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
		No significant change from above	Color change: light Tan at 35'		
40			41' some drk brn organic film		
45		Med SAND (65%); little silt & clay (20%); tr fine sand (10%); tr fine-cs gravel & pebbles (5%); reddish brn; subangular-subrounded	47' less organic residue		
50		Fine-med SAND (85%); tr Clay-silt (10%); tr med-fine gravel (5%); angular to subrounded; light brn color	56' tr Cobbles (5%)		
55					
60		CLAY (50%); Some cs-med sand (30%); little cs-med gravel (20%); clay is olive grey; damp-moist	62' tr f sand (10%); tr f-med gravel (5%)		
65		Cs-med GRAVEL (50%); Some cs-med sand (30%); tr clay & silt (10%); tr med-med f sand (5%); olive grey Cs-med SAND (80%); tr f-med sand (10%); tr med-f gravel (5%); tr clay & silt (5%); angular to subangular			
70		Cs-med SAND (40%); Some cs-med gravel (25%); little cs-med pebbles (20%); tr cs-f cobbles (10%); tr cs-f sand (5%); rounded to subrounded			



PROJECT NO. OH019.05

BORE HOLE NO. HR-14

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

REMARKS

DEPTH (FT.)	SAMPLE NO.	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
		Cs-med SAND (75%); Little med-f gravel (15%); tr f-vf sand (5%); tr clay & silt (5%); rounded-subrounded			
80		Cs-med SAND (85%); tr f sand; tr med-f gravel (5%); tr clay & silt (5%); rounded-subrounded; light brn			
		Med-f SAND (60%); little cs sand (20%); tr med-f gravel (10%); tr cobbles (7%)			
85		Med-cs GRAVEL (40%); little med-f pebbles (20%); tr cobbles (10%); tr cs-med sand (15%); tr f-vf sand (15%); rounded-subrounded	dirty boring fluid		
		Cs-med SAND (70%); little med-f gravel (20%); tr f-vf sand (10%); angular-subangular			
		END OF BORING 88'			
90					
95					
100					
105					
110					

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PROJECT NO. OH019.05

BORE HOLE NO. HR-15

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

DRILLING CONTRACTOR Reynolds Supply, Inc.

DRILLING EQUIPMENT Cable Tool Bucyrus Erie 60

HYDROGEOLOGIST A. G. McCorkle

DRILLER R. Wilmot

DATE START/TIME 10/17/89 9:00 a.m.

DATE FINISH/TIME 10/23/89 1:00 p.m.

SURFACE ELEVATION .

TOTAL DEPTH 110'

WELL CASING 4-inch PVC

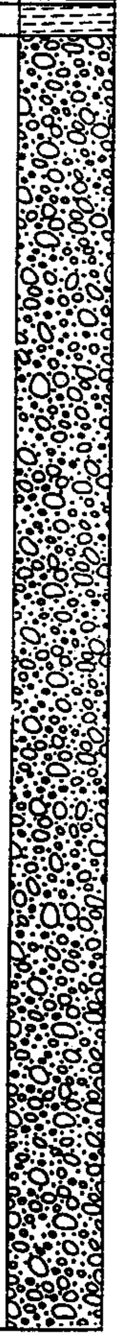
SCREEN TYPE 4-inch PVC

LENGTH 10 feet

SLOT 0.010 inch

REMARKS Bottom of well set at 98 feet below ground

BORE HOLE LOG

DEPTH (FT.)	SAMPLE (NO.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
		CLAY (40%); Some f-cs sand (30%); Some f-cs gravel (30%); tr cobble & pebbles, dk olive brn, damp, med stiff			
		Fine-cs GRAVEL (40%); Some f-cs sand (30%); Some silt & clay (30%); tr pebbles & cobbles; med olive brn, damp			
5					
		Med-cs SAND (50%); Some vf-med gravel (30%); tr cs gravel & pebbles (10%); tr clay (10%); tr vf-f sand (10%); med olive brn			
10					
15		PEBBLES & COBBLES (40%); Some f-cs gravel (30%); Some f-cs sand (30%); well rounded gravel, med brn grey	tr pebbles & cobbles, slight HC odor		
20					
25					
		Fine-cs SAND (50%); Some f-cs gravel; little pebbles & cobbles (20%); well rounded gravel, med olive grey, water bearing			
30					

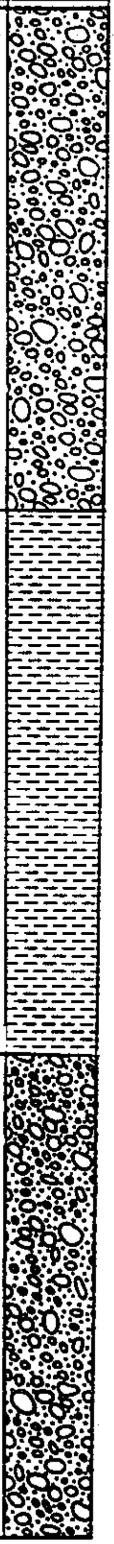
PROJECT NO. OH019.05

BORE HOLE NO. HR-15

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

REMARKS

DEPTH (FT.)	SAMPLE NO.	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
		Fine-med SAND (60%); little pebbles (20%); little cs sand-cs gravel (20%); greyish tan			
			No evidence of clay		
40		Fine-med SAND (60%); Some cs sand & f gravel (30%); tr pebbles (10%); tr med-cs gravel, tannish grey subangular to subrounded	Hard to drill through		
45					
50					
		CLAY (70-80%); Little fine-med. gravel (10-20%); little fine-cs sand (10-20%); med olive grey; dense; damp to moist	CLAY w/Gravel		
55					
60					
65					
70					

PROJECT NO. OH019.05

BORE HOLE NO. HR-15

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

REMARKS

DEPTH (FT.)	SAMPLE NO.	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
80 85		Med-cs SAND, fine-med gravel; tr cs gravel & pebbles; med olive grey			
90		Med-cs SAND (70-80%); Little vf-f sand (10-20%); tr fine-med gravel (0-10%); med olive grey, subangular			
95 100 105		PEBBLES & COBBLES (40%); little med-cs gravel (20%); little cs sand & fine gravel (20%); little fine-med sand (20%); brownish grey, well rounded			
110		END OF BOREHOLE LOG			

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PROJECT NO. OH019.05

BORE HOLE NO. HR-16

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

DRILLING CONTRACTOR Reynolds Supply, Inc.

DRILLING EQUIPMENT Cable Tool Bucyrus Erie 60

HYDROGEOLOGIST S. Ackers

DRILLER Rick Wilmot

DATE START / TIME 11/2/89 9:40 a.m.

DATE FINISH / TIME 11/6/89 10:15 a.m.

SURFACE ELEVATION

TOTAL DEPTH 70'

WELL CASING 4-inch, sch 40 PVC

SCREEN TYPE 4-inch PVC

LENGTH 20 feet

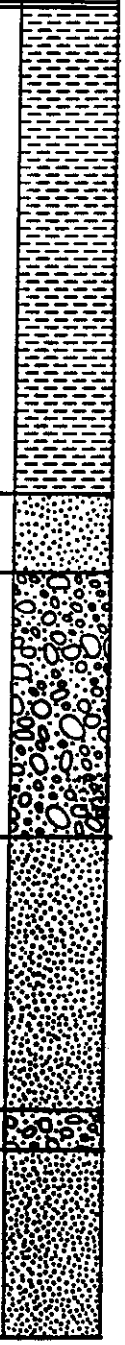
SLOT .010 inch

REMARKS Bottom of well set at 62.5 feet below ground

BORE HOLE LOG

DEPTH (FT.)	SAMPLE (NO.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/HNU (PPM)
		CLAY - silt (75%); tr cs-med sand(10%); tr f-vf sand (10%); tr cs gravel (5%)	2' little cs-f sand tr med cobble tr cs gravel	
5		CLAY - silt (60%); some cs-md gravel (20%); some cs-f sand (20%); yellowish brown	8' tr cs-f cobbles (5%)	
10		No change		
		CS-md SAND (50%); Some f-vf sand(30%); tr silt-clay(10%); tr med-f gravel(5%); tr f-md cobbles(5%); greyish orange	Clay-silt lessening	
15		CS-med GRAVEL (50%); Some Cs-md sand (35%); tr f-vf sand(10%);tr med-f cobbles (5%)	16' noticed tile in bailer sample	
20				
		Med-f SAND (85%); tr silt & clay (10%); tr cs sand (5%) Greyish orange; angular-subangular	24' tr cs gravel tr cs sand	
25				
		Med-f GRAVEL (60%); Some cs-md sand (30%); tr f-vf sand (5%) angular-subangular		
30		Med-vf SAND (85%); tr cs sand (5%) silty clay (10%)		
		Cs-med SAND (60%); Some f-vf sand (30%); tr silty clay (10%), greyish orange		

GRAPHIC LOG



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PROJECT NO. OH019.05

BORE HOLE NO. HR-16

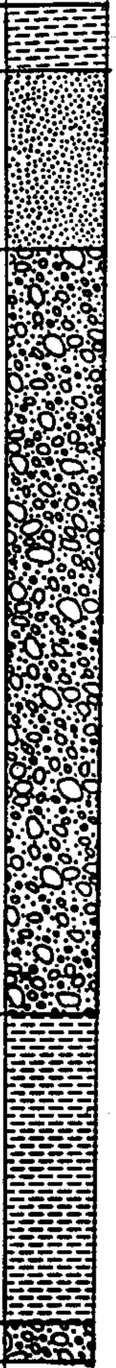
PROJECT Harrison Radiator

LOCATION Moraine,Ohio

REMARKS

DEPTH (FT.)	SAMPLE NO.	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)
		CLAY (85%); tr f-vf sand(10%);trf-vf gravel (5%)	Grey to olive grey in color	
40		F-vf SAND(75%); little cs sand (15%); tr md-f gravel (5%); tr silt clay(10%); color greyish orange No clay nodules		
45 50 55		Cs-md SAND (50%); Some cs-md gravel (30%); tr f-vf sand (10%); tr med-f cobbles (10%) tr clay nodules; greyish orange, wet-moist		
60		Cs-f GRAVEL (60%); some cs-med sand (30%) tr f-med sand (10%)	Iron staining on on gravel	
65		CLAY (80%); tr f-vf sand (10%); tr cs-md sand (5%) tr med-f gravel (5%); olive grey; moist-damp	65' dark oil residue on sample (organic)	
70		Cs-md SAND (85%); tr f-vf gravel (10%); tr cs gravel (5%) End of Boring 70'		

GRAPHIC LOG



PAGE 1 OF 2

PROJECT NO. OH019.05

BORE HOLE NO. HR-17

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

DRILLING CONTRACTOR Reynolds Supply, Inc.

DRILLING EQUIPMENT Cable Tool Bucyrus Erie 60

HYDROGEOLOGIST S. Ackers

DRILLER Rick Wilmot

DATE START / TIME 11/9/89 9:30 am

DATE FINISH / TIME 11/10/89 4:00 pm

SURFACE ELEVATION

TOTAL DEPTH 56'

WELL CASING 4-inch, sch 40 PVC

SCREEN TYPE 4-inch PVC

LENGTH 20 feet

SLOT .010 inch

REMARKS Bottom of well set at 47 feet below ground

BORE HOLE LOG

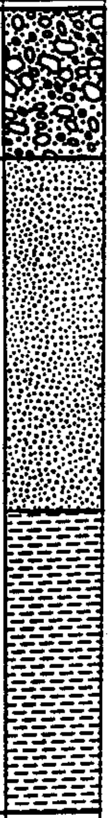
DEPTH (FT.)	SAMPLE (NO.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)
		SANDY LOAM (top soil); clay (60%); some f-md sand (30%) tr Cs-md sand (5%); tr f-md pebbles (5%); yellowish brown; rounded- sub-rounded		
5				
			7' tr md-f cobbles	
		Cs-VCS SAND (60%); little f-vf sand (15%);clay & silt (15%) tr md-f pebbles (5%)	9' cobble 10" in diameter	
10		VCS-md SAND (60%); little md-f gravel (20%); tr md-f sand (10%); tr clay-silt (10%); angular- sub-angular; light yellowish brown	13' drilling becomes difficult	
		Cs-md SAND (65%); tr VC sand (10%); tr silt and clay (10%); tr f-vf pebbles (10%); tr md gravel (5%); sub-angular to rounded; greyish orange		
15				
20			20' no significant change	
25			23' drilling is difficult	
			28' drilling becomes softer	
30		md-f GRAVEL (50%); some Cs-md sand (30%); tr f-vf pebbles (10%); tr silty-clay (10%); angular to sub-rounded; greyish orange	31-32' tr md-f cobbles	
			34' no signif.change	

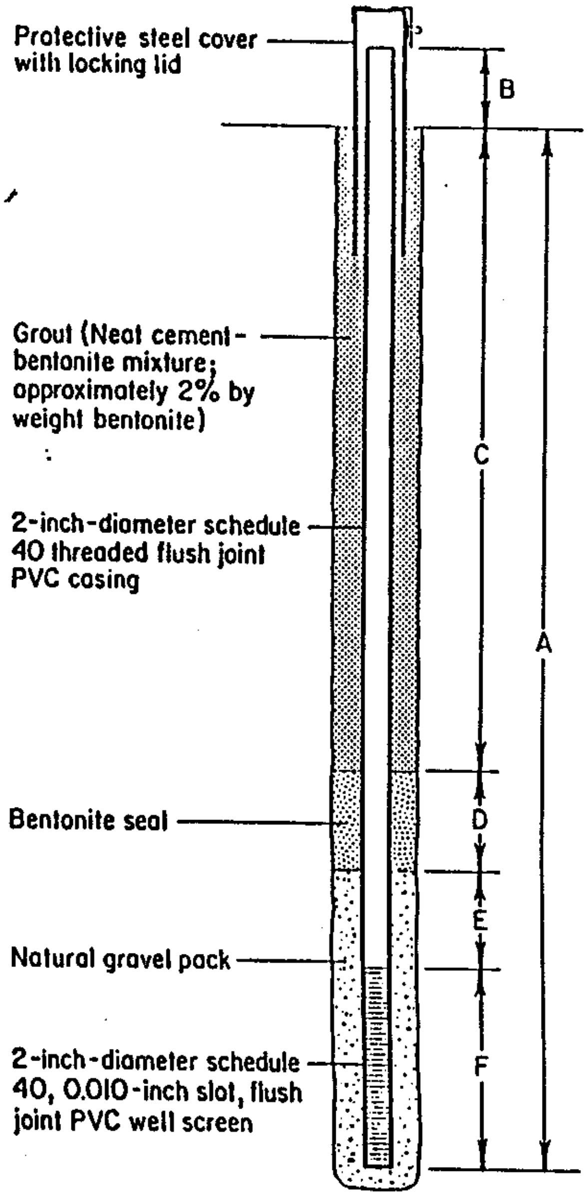
GRAPHIC LOG

PAGE 2 **OF** 2

PROJECT NO. OH019.05	**BORE HOLE NO.** HR-17
PROJECT Harrison Radiator	**LOCATION** Moraine, Ohio
REMARKS	

DEPTH (FT.)	SAMPLE NO.	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
40		VCS-md SAND (60%); little f-md sand (20%); some silty clay (15%); tr f gravel (5%)	38'-40' color change moderate yellowish brown 41' color change: greyish orange. 40' drilling is difficult		
		44' SAND & gravel shows sign of oxidation	43' oil sheen on drilling fluid		
45		VC-Cs SAND (80%); tr clay nodules (10%); tr-f gravel (5%); tr f-vf sand (5%); dusky yellow-light olive; damp-moist			
50			48' CLAY (90%)tr VCS-CS sand (10%) yellowish grey-light olive; organic brown residue		
		53' CLAY (as above); damp, bailing difficult			
55		End of Boring 56'			
60					
65					
70					





Well No.	A	B	C	D	E	F	Top of Casing Elevation
HR-1	56.7′	0.1′	36.7′	5′	5′	10′	730.20
HR-2	56.6′	2.1′	36.6′	5′	5′	10′	734.72
HR-3	59.6′	2.4′	39.6′	5′	5′	10′	736.71
HR-4	65.0′	2.0′	45.0′	5′	5′	10′	742.61
HR-5	53.6′	0.1′	25.6′	5′	13′	10′	731.05
HR-6	53.0′	0.1′	33.0′	5′	5′	10′	730.28
HR-7	56.8′	0.8′	36.8′	5′	5′	10′	731.80
HR-8	64.2′	0.1′	44.2′	5′	5′	10′	740.94

Figure 3. Construction Details for Wells Installed at the Harrison Facility.

GERAGHTY & MILLER, INC.
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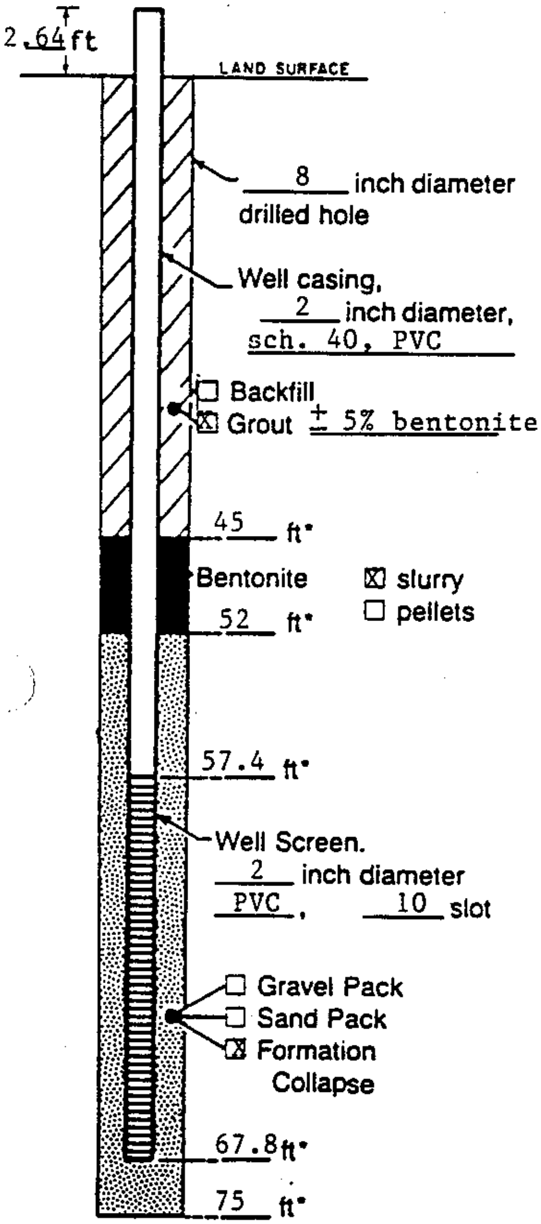
WELL CONSTRUCTION LOG



8 inch diameter drilled hole

Well casing, 2 inch diameter, sch. 40, PVC

☐ Backfill
☒ Grout ± 5% bentonite

45 ft*

Bentonite ☒ slurry ☐ pellets

52 ft*

57.4 ft*

Well Screen. 2 inch diameter PVC, 10 slot

☐ Gravel Pack
☐ Sand Pack
☒ Formation Collapse

67.8 ft*

75 ft*

Measuring Point is Top of PVC Well Casing Unless Otherwise Noted.

***Depth Below Land Surface**

Project Harrison Radiator Well HR-9
Town/City Moraine
County Montgomery State Ohio
Permit No.
Land-Surface Elevation =741.0
and Datum ________ feet ☒ surveyed
MP=743.64 ☐ estimated
Installation Dates(s) 8/22/88 - 8/24/88
Drilling Method 4" ID Hollow-Stem Auger
Drilling Contractor Moody's of Dayton, Inc.
Drilling Fluid None

Development Techniques(s) and Date(s)
Brainard-Kilman Hand Pump, 9/23/88

Fluid Loss During Drilling ________ gallons
Water Removed During Development 250 gallons
Static Depth to Water 38.97 (9/23/88) feet below M.P.
Pumping Depth to Water ________ feet below M.P.
Pumping Duration ________ hours
Yield ________ gpm Date ________
Specific Capacity ________ gpm/ft
Well Purpose Ground-Water Quality and Elevation Monitoring

Remarks MP=Top of PVC well casing

Prepared by John Elrod, Kathy Shannon

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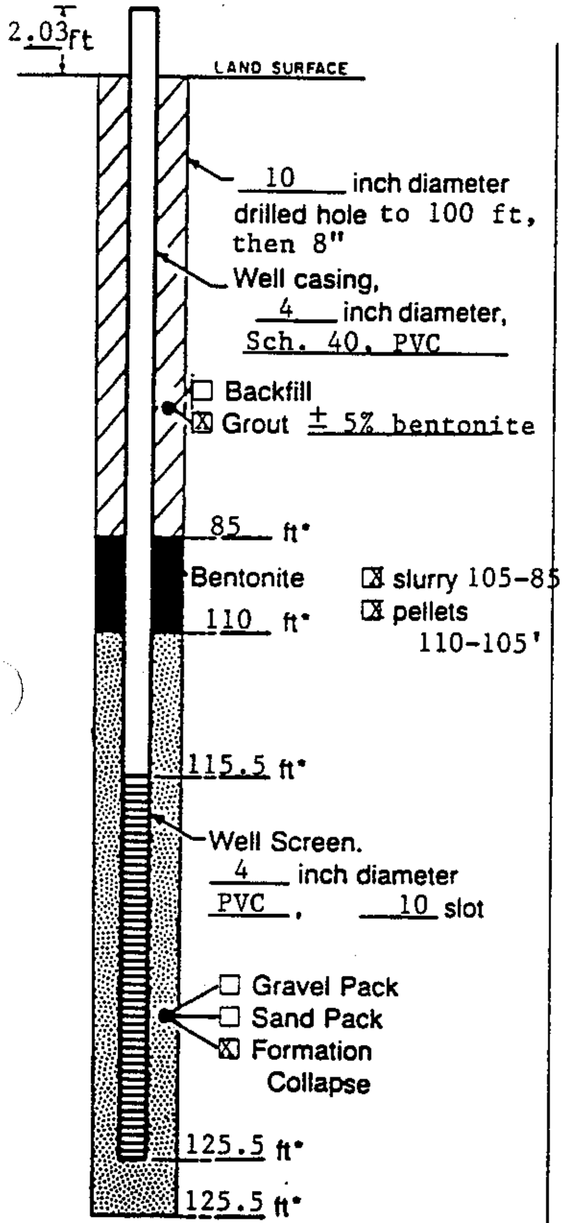
WELL CONSTRUCTION LOG



10 inch diameter drilled hole to 100 ft, then 8"

Well casing, 4 inch diameter, Sch. 40, PVC

☐ Backfill
☒ Grout ± 5% bentonite

85 ft*

Bentonite ☒ slurry 105–85 ☒ pellets 110–105'

110 ft*

115.5 ft*

Well Screen. 4 inch diameter PVC, 10 slot

☐ Gravel Pack
☐ Sand Pack
☒ Formation Collapse

125.5 ft*

125.5 ft*

Project Harrison Radiator Well HR-10

Town/City Moraine

County Montgomery State Ohio

Permit No.

Land-Surface Elevation =740.9 feet

and Datum feet ☒ surveyed

MP=742.93 feet ☐ estimated

Installation Dates(s) 9/12/88 - 9/15/88

Drilling Method Cable Tool

Drilling Contractor Reynolds Supply, Inc.

Drilling Fluid City of Dayton Water Supply

Development Techniques(s) and Date(s)

Submersible pump, 9/23/88

Fluid Loss During Drilling gallons

Water Removed During Development 780 gallons

Static Depth to Water 38.24 (9/23/88) feet below M.P.

Pumping Depth to Water feet below M.P.

Pumping Duration hours

Yield gpm Date

Specific Capacity gpm/ft

Well Purpose Ground-Water Quality and Elevation Monitoring

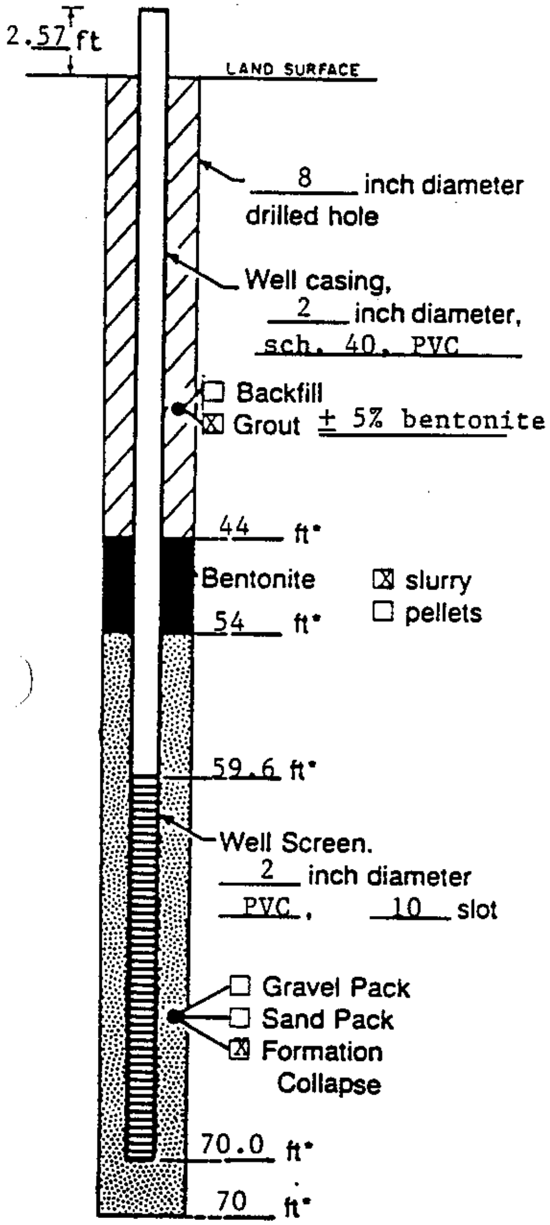
Remarks MP=Top of PVC well casing

Measuring Point is Top of PVC **Well Casing Unless Otherwise Noted.**

***Depth Below Land Surface**

Prepared by John Elrod, Kathy Shannon

WELL CONSTRUCTION LOG



2.57 ft

8 inch diameter drilled hole

Well casing, 2 inch diameter, sch. 40, PVC

☐ Backfill
☒ Grout ± 5% bentonite

44 ft*

Bentonite ☒ slurry ☐ pellets

54 ft*

59.6 ft*

Well Screen. 2 inch diameter PVC, 10 slot

☐ Gravel Pack
☐ Sand Pack
☒ Formation Collapse

70.0 ft*

70 ft*

Measuring Point is Top of PVC Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Harrison Radiator Well HR-11

Town/City Moraine

County Montgomery State Ohio

Permit No.

Land-Surface Elevation =740.9 feet

and Datum feet ☒ surveyed

MP=743.47 feet ☐ estimated

Installation Dates(s) 8/29/88

Drilling Method 4" ID Hollow-Stem Auger

Drilling Contractor Moody's of Dayton, Inc.

Drilling Fluid None

Development Techniques(s) and Date(s)

Brainard-Kilman Hand Pump, 9/23/88

Fluid Loss During Drilling gallons

Water Removed During Development 280 gallons

Static Depth to Water 38.94 (9/23/88) feet below M.P.

Pumping Depth to Water feet below M.P.

Pumping Duration hours

Yield gpm Date

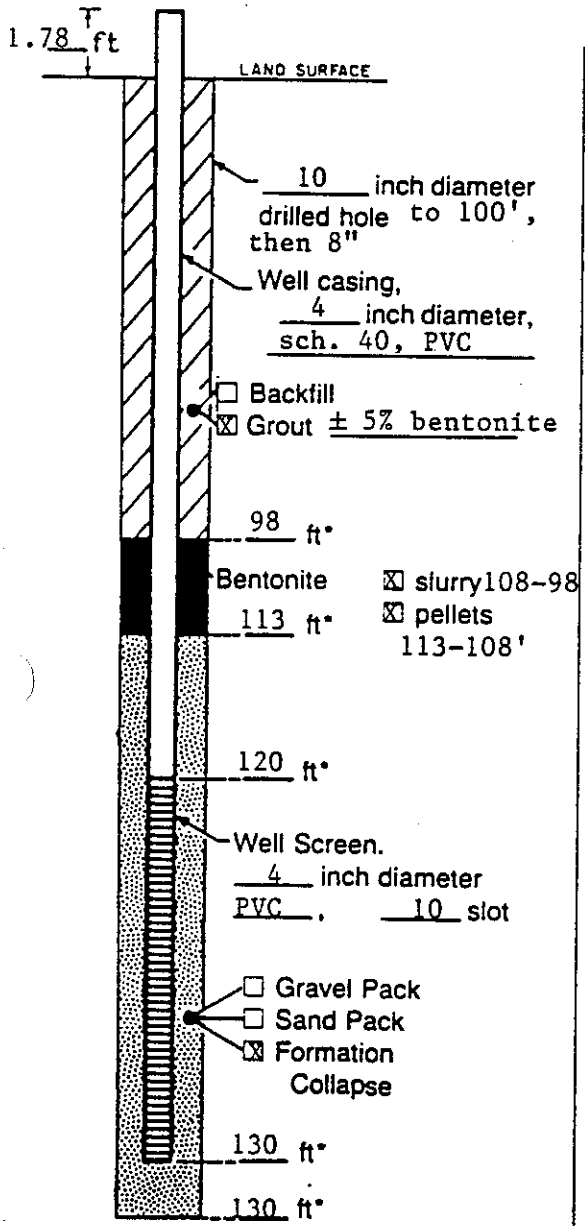
Specific Capacity gpm/ft

Well Purpose Ground-Water Quality and Elevation Monitoring

Remarks MP=Top of PVC well casing

Prepared by John Elrod, Kathy Shannon

WELL CONSTRUCTION LOG



1.78 ft

10 inch diameter drilled hole to 100', then 8"

Well casing, 4 inch diameter, sch. 40, PVC

☐ Backfill
☒ Grout ± 5% bentonite

98 ft*

Bentonite ☒ slurry 108–98' ☒ pellets 113–108'

113 ft*

120 ft*

Well Screen. 4 inch diameter PVC, 10 slot

☐ Gravel Pack
☐ Sand Pack
☒ Formation Collapse

130 ft*

130 ft*

Measuring Point is Top of PVC Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Harrison Radiator Well HR-12

Town/City Moraine

County Montgomery State Ohio

Permit No.

Land-Surface Elevation =741.0

and Datum feet ☒ surveyed

MP=742.78 feet ☐ estimated

Installation Dates(s) 8/31/88 - 9/8/88

Drilling Method Cable Tool

Drilling Contractor Reynolds Supply, Inc.

Drilling Fluid City of Dayton Water Supply

Development Techniques(s) and Date(s)

Submersible pump, 9/23/88

Fluid Loss During Drilling gallons

Water Removed During Development 760 gallons

Static Depth to Water 38.21 (9/23/88) feet below M.P.

Pumping Depth to Water feet below M.P.

Pumping Duration hours

Yield gpm Date

Specific Capacity gpm/ft

Well Purpose Ground-Water Quality and Elevation Monitoring

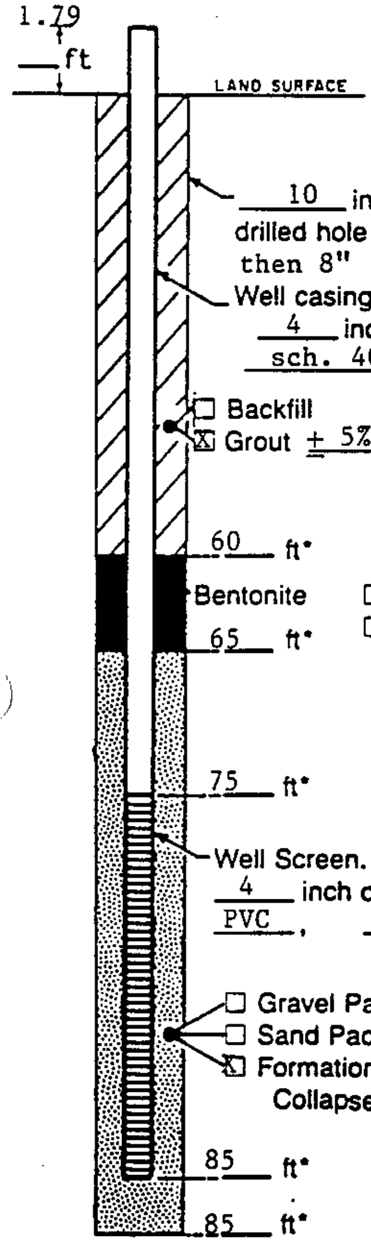
Remarks MP=Top of PVC well casing

Ten-inch diameter steel casing left in place to 100'.

Prepared by John Elrod, Kathy Shannon

GERAGHTY
& MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG



10 inch diameter drilled hole to 62' then 8"

Well casing, 4 inch diameter, sch. 40, PVC

☐ Backfill
☒ Grout ± 5% bentonite

60 ft*

Bentonite ☐ slurry ☒ pellets

65 ft*

75 ft*

Well Screen. 4 inch diameter PVC, 10 slot

☐ Gravel Pack
☐ Sand Pack
☒ Formation Collapse

85 ft*

85 ft*

Measuring Point is Top of PVC Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Harrison Radiator Well HR-13
Town/City Moraine
County Montgomery State Ohio
Permit No.
Land-Surface Elevation = 733.2
and Datum feet ☒ surveyed
MP=734.99 feet ☐ estimated
Installation Dates(s) 8/22/88 - 8/30/88
Drilling Method Cable Tool
Drilling Contractor Reynolds Supply, Inc.
Drilling Fluid City of Dayton Water Supply

Development Techniques(s) and Date(s)
Submersible pump, 9/26/88

Fluid Loss During Drilling gallons
Water Removed During Development 675 gallons
Static Depth to Water 32.18 (9/26/88) feet below M.P.
Pumping Depth to Water feet below M.P.
Pumping Duration hours
Yield gpm Date
Specific Capacity gpm/ft
Well Purpose Ground-Water Quality and Elevation Monitoring

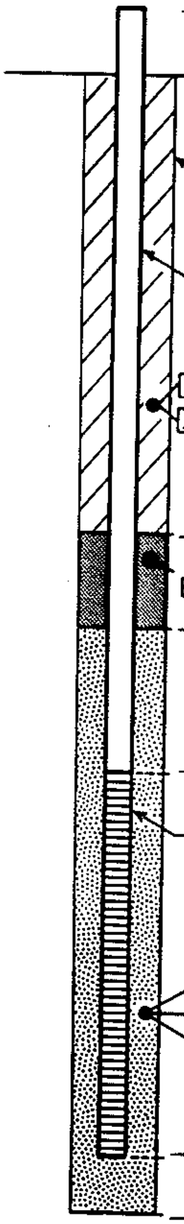
Remarks MP=Top of PVC well casing

Ten-inch diameter steel casing left in place to 62'.

Prepared by John Elrod, Kathy Shannon

GERAGHTY
& MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



10 inch diameter drilled hole to 61', then 8"

Well casing, 4 inch diameter, sch. 40, PVC

☐ Backfill
☒ Grout + 5% bentonite

57 ft*

Bentonite ☒ slurry ☐ pellets

73 ft*

78 ft*

Well Screen. 4 inch diameter
PVC, 10 slot

☐ Gravel Pack
☐ Sand Pack
☒ Formation Collapse

88 ft*

88 ft*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Harrison Radiator Well HR-14

Town/City Moraine

County Montgomery State Ohio

Permit No.

Land-Surface Elevation= 729.9 ft.

and Datum ______ feet ☒ Surveyed

MP= 731.63 ft. msl ☐ Estimated

Installation Date(s) 10/27/89

Drilling Method Cable Tool

Drilling Contractor Reynolds Supply, Inc.

Drilling Fluid City of Dayton Water Supply

Development Technique(s) and Date(s)
Submersible pump, 11/22/89

Fluid Loss During Drilling ______ gallon

Water Removed During Development 751 gallon

Static Depth to Water 24.81' (11/22/89) feet below M.P

Pumping Depth to Water ______ feet below M.P

Pumping Duration 1.3 hours

Yield 9.5 gpm Date 11/22/89

Specific Capacity ______ gpm/ft

Well Purpose Ground-Water Quality and Elevation Monitoring

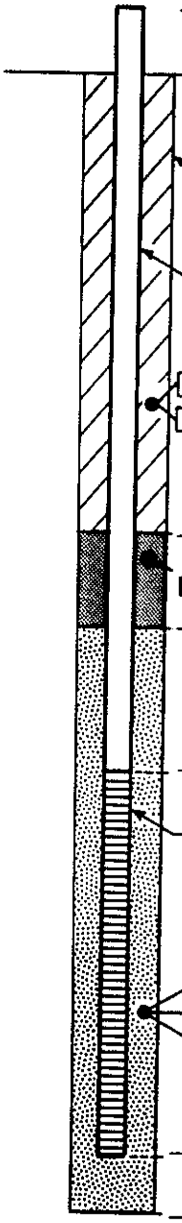
Remarks MP=Top of PVC well casing

Ten-inch diameter steel casing left in place to 61' bg

Prepared by Scott K. Ackers

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



10 inch diameter drilled hole to 60.1', then 8"

Well casing, 4 inch diameter, sch. 40, PVC

☐ Backfill
☒ Grout +5% Bentonite

58.1 ft*

Bentonite ☒ slurry ☐ pellets
70.5 ft*

88 ft*

Well Screen. 4 inch diameter
PVC, 10 slot

☐ Gravel Pack
☐ Sand Pack
☒ Formation Collapse

98 ft*

110 ft*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Harrison Radiator Well HR-15
Town/City Moraine
County Montgomery State Ohio
Permit No.
Land-Surface Elevation = 732.1 ft.
and Datum ______ feet ☒ Surveyed
MP= 733.74 ft. msl ☐ Estimated
Installation Date(s) 10/23/89
Drilling Method Cable Tool
Drilling Contractor Reynolds Supply, Inc.
Drilling Fluid City of Dayton Water Supply

Development Technique(s) and Date(s)
Submersible pump, 11/22/89

Fluid Loss During Drilling ______ gallons
Water Removed During Development 788 gallons
Static Depth to Water 27.04 (11/22/89) feet below M.P
Pumping Depth to Water ______ feet below M.P
Pumping Duration 1.75 hours
Yield 7.5 gpm Date 11/22/89
Specific Capacity ______ gpm/ft
Well Purpose Ground-Water Quality and Elevation Monitoring

Remarks MP=Top of PVC well casing

Ten-inch diameter steel casing left in place to 60.1' bg

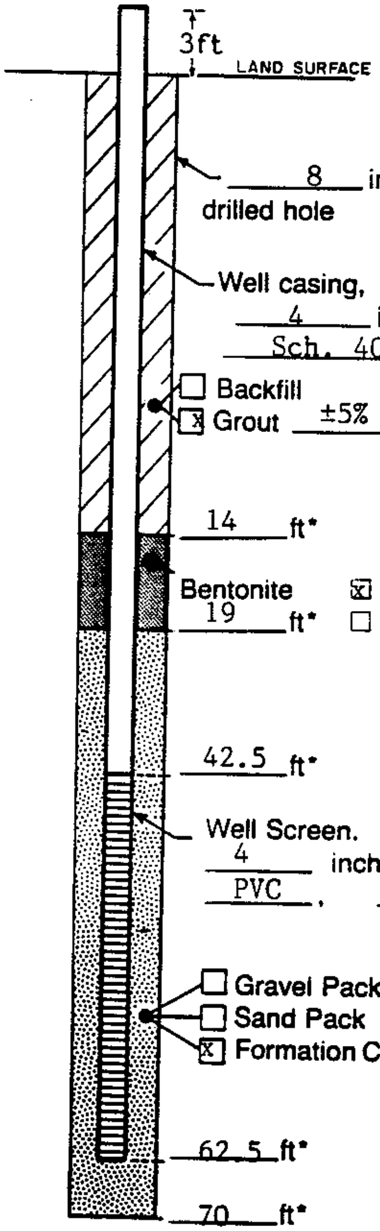
Prepared by Scott K. Ackers

G&M Form 05 5-87

Southprint 87-1776

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



8 inch diameter drilled hole

Well casing, 4 inch diameter, Sch. 40, PVC

☐ Backfill
☒ Grout ±5% Bentonite

14 ft*

Bentonite 19 ft* ☒ slurry ☐ pellets

42.5 ft*

Well Screen. 4 inch diameter
PVC, 10 slot

☐ Gravel Pack
☐ Sand Pack
☒ Formation Collapse

62.5 ft*

70 ft*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

***Depth Below Land Surface**

Project Harrison Radiator Well HR-16
Town/City Moraine
County Montgomery State Ohio
Permit No.
Land-Surface Elevation
and Datum ______ feet ☐ Surveyed
☐ Estimated
Installation Date(s) 11/6/89
Drilling Method Cable Tool
Drilling Contractor Reynolds Supply, Inc.
Drilling Fluid City of Dayton Water Supply

Development Technique(s) and Date(s)
Submersible pump, 11/21/89

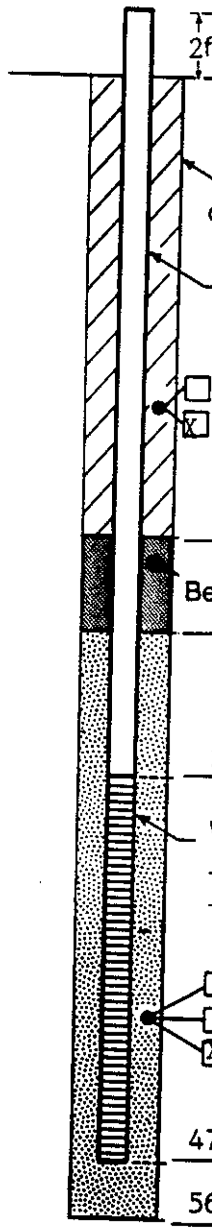
Fluid Loss During Drilling ______ gallons
Water Removed During Development 902 gallons
Static Depth to Water 21.67' (11/21/89) feet below M.P
Pumping Depth to Water ______ feet below M.P
Pumping Duration 1.4 hours
Yield 11 gpm Date 11/21/89
Specific Capacity ______ gpm/ft
Well Purpose Ground-Water Quality and Elevation Monitoring

Remarks MP=Top of PVC well casing
Eight inch casing left in ground to 19' below ground surface (because grout being absorbed)

Prepared by Scott Ackers

GERAGHTY
& MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



8 inch diameter drilled hole

Well casing, 4 inch diameter, Sch. 40, PVC

☐ Backfill
☒ Grout ±5% Bentonite

15 ft*

Bentonite ☐ slurry
18 ft* ☒ pellets

27 ft*

Well Screen.
4 inch diameter
PVC, 10 slot

☐ Gravel Pack
☐ Sand Pack
☒ Formation Collapse

47 ft*

56 ft*

Measuring Point is Top of Well Casing Unless Otherwise Noted.

***Depth Below Land Surface**

Project Harrison Radiator Well HR-17
Town/City Moraine
County Montgomery State Ohio
Permit No.
Land-Surface Elevation and Datum ______ feet ☐ Surveyed
☐ Estimated
Installation Date(s) 11/10/89 - 11/13/89
Drilling Method Cable Tool
Drilling Contractor Reynolds Supply, Inc.
Drilling Fluid City of Dayton Water Supply

Development Technique(s) and Date(s)
Submersible pump, 11/21/89

Fluid Loss During Drilling ______ gallon
Water Removed During Development 670 gallon
Static Depth to Water 20.87' (11/21/89) feet below M.P
Pumping Depth to Water ______ feet below M.P
Pumping Duration 1.1 hours
Yield 10 gpm Date 11/21/89
Specific Capacity ______ gpm/ft
Well Purpose Ground-Water Quality and Elevation Monitoring

Remarks MP=Top of PVC well casing

Prepared by Scott K. Akers

GM-1 through GM-19D

REC'D OCT 25 1982

THE H. C. NUTTING COMPANY
GEOTECHNICAL AND TESTING ENGINEERS
SINCE 1921

912 MORRIS STREET
CHARLESTON, W. VA 25301
304-344-0821

4120 AIRPORT ROAD
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CINCINNATI, OHIO 45226
513-321-5816

BOX NUMBER 11
HIGHLAND HEIGHTS, KY 41076
606-261-2043

10-18-82 vf
Page 1 of 3

FIELD TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.001
PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. GM-1
LOCATION As shown on well location plan
DRILLER Willard Martin DRILL No. 36 DATE STARTED 9-1-82
ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5; with cap off (see well location plan) Elev. 731.48 DATE COMPLETED 9-2-82
CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL
SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon HAMMER WT. 140# FALL 30"
DEPTH TO WATER: IMMEDIATE 45.0' UPON COMPLETION below 73.5'(150 gal.)
DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
733.0	0'						
		Gravel with sand, silt and possibly some clay, brown, gravel is small to large	1	0-1.5	SS	6-12-17	15"
		Fill, silt, clay, piece of wood, gravel a damp zone (1") of clayey material, white	2	5-6.5	SS	5-17-37	15"
		Silt, fine sand, some clay, gray, some vegetation, moist to wet	3	10-11.5	SS	1-1-2	18"
		Sand, medium, some gravel, well sorted, brown could be natural	4	15-16.5	SS	5-5-5	6"
		Sand medium gravel, poorly sorted, brown some other colors, somewhat of a smell that may be natural	5	20-21.5	SS	10-15-17	12"
		Sand and gravel, poorly sorted, light brown, some other colors, slight oily smell	6	25-26.5	SS	8-13-16	18"
		Sand and gravel, poorly sorted, mostly brown, gravel is angular	7	30-31	SS	26-52	10"

Respectfully submitted,
THE H. C. NUTTING CO.

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpreta-

10-18-82 vf
Page 2 of 3

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. GM-1

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recov
		Sand and gravel, poorly sorted, mostly brown, gravel is angular	8	35-36.5	SS	21-40-41	14"
		Sand and gravel, varying color, poorly sorted, damp to moist toward bottom	9	40-41.5	SS	49-40-52	15"
		Gravel, little sand, varying size and color, wet	10	45-46	SS	31-88	17"
		Sand, medium well sorted, mostly brown, wet 6" gravel and sand, poorly sorted, wet	11	50-51.5	SS	14-23-30	
		Gravel, poorly sorted, some sand	12	55-56.6	SS	22-32-42	18"
		Till zone, silt and clay with gravel throughout, gray	13	60-61.5	SS	21-34-50	18"
		Till zone, silt and clay with gravel throughout, gray hard	14	65-66	SS	34-53	15"
		Till zone, silt and clay with gravel throughout, gray hard	15	70-71.5	SS	24-40-70	15"
		Sand and gravel, poorly sorted, varying color, varying size from small to large	16	75-75.8	SS	55-70/4	18"
		Silt and sand layers, brown to gray sand is fine to medium and more towards bottom, well sorted, clean, silt is swirled, maybe some clay, silt is also sandy	17	80-81.5	SS	17-35-60	18"
		Sandy, medium, well sorted, little fine and coarse, mostly brown with lot of other colors	18	85-86.5	SS	15-29-40	16"
		Sand, fine to medium, some coarse and small gravel, mostly brown, poorly sorted	19	90-91	SS	32-55	16"

10-18-82 vf
Page 3 of 3

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** GM-1

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Rec
		Sand, fine to medium, some coarse and small gravel, mostly brown, poorly sorted	20	95-96.5	SS	31-42-55	18
		Sand top 12" fine to medium, some coarse and small gravel, mostly brown poorly sorted, gravel in bottom	21	100-101	SS	34-51	12'

BORING COMPLETED

REMARKS:

1. Logged by G.F. Schank (G & M)
2. Monitoring well set at 100.0' (see well detail table)
3. Till layer 58.0' to 73.5'
4. 2-3 ft. of heave inside augers. Added water.

THE H. C. NUTTING COMPANY
GEOTECHNICAL AND TESTING ENGINEERS
SINCE 1921

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CINCINNATI, OHIO 45226
513-321-5816

BOX NUMBER 11
HIGHLAND HEIGHTS, KY 41076
606-261-2043

FIELD TEST BORING REPORT

10-18-82 vf

CLIENT Geraghy & Miller, Inc. ORDER No. 10191.001

PROJECT GMC, Harrison Radiator Divsion, Monitoring Wells, Moraine, Ohio HOLE No. GM-2

LOCATION As shown on well location plan

DRILLER Willard Martin DRILL No. 36 DATE STARTED 9-2-82

ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5; with cap off (see well location plan) Elev. 731.48 DATE COMPLETED 9-2-82

CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL

SAMPLER: DIAMETER & TYPE None HAMMER WT. FALL

DEPTH TO WATER: IMMEDIATE UPON COMPLETION

DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
733.2	0'						
		55.0' No samples - see log for GM-1					
	55.0'						
		BORING COMPLETED REMARKS: 1. Monitoring well set at 55.0' (See well detail table)					

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for

Respectfully submitted,
THE H. C. NUTTING CO.

THE H. C. NUTTING COMPANY
GEOTECHNICAL AND TESTING ENGINEERS
SINCE 1921

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606-261-2043

10-18-82 vf
Page 1 of 2

FIELD TEST BORING REPORT

CLIENT Geraghty & Miller, Inc.
ORDER No. 10191.001
PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio
HOLE No. GM-3
LOCATION As shown on well location plan
DRILLER Willard Martin
DRILL No. 36
DATE STARTED 9-15-82
ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5; with cap off (see well location plan) Elev. 731.48
DATE COMPLETED 9-15-82
CASING: DIAMETER 3.5" I. D. Hollow Stem Auger
HAMMER WT.
FALL
SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon
HAMMER WT. 140#
FALL 30"
DEPTH TO WATER: IMMEDIATE 36.0'
UPON COMPLETION
DEPTH TO WATER DAYS AFTER COMPLETION
WATER USED IN DRILLING

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
728.6	0'						
		Sand, gravel and clay, mixed, dark brown to light brown, gray zones, oil odor - fill	1	5-6.5	SS	6-8-11	18"
		Sand with gravel, poorly sorted, fine to coarse, moistly light brown and white	2	10-11.5	SS	7-22-40	16"
		Sand with gravel, poorly sorted, fine to coarse, mostly light brown and white	3	15-16.5	SS	12-14-29	16"
		Sand and gravel, poorly sorted, wet	4	35-36	SS	16-54	6"
		Sand and gravel, poorly sorted, wet	5	40-41	SS	16-75	8"
		Till - top 3" sand lense, medium gray, wet bottom 7" silt, with gravel interbedded, clayey hard gray	6	45-46	SS	30-52	10"
		Silt, clayey, sand lenses (moist); gravel throughout, dark gray	7	50-51.5	SS	27-37-50	18"

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpreta-

Respectfully submitted,
THE H. C. NUTTING CO.

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** GM-3

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recov
		Silt, clayey, sand lenses, (moist); gravel throughout, dark gray, sandier, does not appear as competent as all previous till zones found. Sandier, damper	8	55-56.5 58-58	SS ST	12-22-26	18" 0"
		Silt, clayey, sand lenses (moist); gravel throughout, dark gray	9	60-61	SS	30-51	18"
		Silt, clayey, sand lenses (moist); gravel throughout, dark gray	10	65-66.5	SS	16-25-43	18"

BORING COMPLETED

REMARKS:

1. Logged by G. F. Schank, (G&M)
2. Set well at 100.0' (see well detail table)
3. See log for GM-4
4. Till layer 44 to 68'

THE H. C. NUTTING COMPANY
GEOTECHNICAL AND TESTING ENGINEERS
SINCE 1921

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606-261-2043

FIELD TEST BORING REPORT

10-18-82 vf
Page 1 of 3

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.001

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. GM-4

LOCATION As shown on well location plan

DRILLER Russel Fields (Moody's) DRILL No. Cable tool #1 DATE STARTED 9-1-82

ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5; with cap off (see well location plan) Elev. 731.48 DATE COMPLETED 9-14-82

CASING: DIAMETER 8"

SAMPLER: DIAMETER & TYPE Bailer HAMMER WT. FALL

DEPTH TO WATER: IMMEDIATE HAMMER WT. FALL

DEPTH TO WATER DAYS AFTER COMPLETION UPON COMPLETION

WATER USED IN DRILLING Full depth

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
728.9	0'						
		Silt, little fine sand and organics, dark brown	1	0-1			
		Sand, fine to coarse, some gravel, silt and clay, brown, hard	2	5-10			
		Sand, fine to coarse, some gravel, silt and clay, brown, hard	3	10-15			
		Sand, medium to coarse and gravel, some fine sand, silt and clay, gravel, cobbles and pebbles, little fine to coarse sand, silt and clay, brown (may contain water)	4	15-20			
		Gravel, cobbles and pebbles and coarse sand, trace fine sand, silt and clay	5	20-25			
		Gravel, cobbles and pebbles and coarse sand, trace fine sand, silt and clay	6	25-30			
		Gravel, cobbles and pebbles and corase sand, trace fine sand, silt and clay	7	30-35			

Respectfully submitted,
THE H. C. NUTTING CO.

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing

10-18-82 vf
Page 2 of 3

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** GM-4

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recov.
		Gravel, cobbles and pebbles and coarse sand, trace fine sand, silt and clay	8	35-40			
		Gravel, cobbles and pebbles and coarse sand, trace fine sand, silt and clay, some fine to coarse sand and pebble gray (fill) (oil film maybe from rods)	9	40-45			
		Gravel, cobbles and pebbles and coarse sand, trace fine sand, silt and clay	10	45-50			
		Gravel, cobbles and pebbles and coarse sand, trace fine sand, silt and clay	11	50-55			
		Gravel, cobbles and pebbles and coarse sand, trace fine sand, silt and clay	12	55-60			
		Silt and clay, some fine to coarse sand and pebble, gray (till)	13	60-65			
		Silt and clay, some fine to coarse sand and pebble, gray (till), with larger gravel	14	65-70			
		Gravel, cobbles, pebbles, coarse sand	15	70-75			
		Sand, medium to coarse, poorly sorted, some gravel, mostly brown	16	75-80			
		Sand, medium, well sorted, trace fine brown	17	80-85			
		Sand, medium, well sorted, trace fine brown, trace coarse	18	85-90			
		Sand and gravel, poorly sorted, trace fines, 1 foot clay lense from 91 to 92 feet.	19	90-95			
		Gravel and sand poorly sorted	20	95-100			
		Gravel and sand, coarse, changing to sand with gravel, silty, trace clay, poorly sorted	21	100-105			

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** GM-4

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Reco
		Sand, medium, well sorted, trace fine, trace coarse brown	22	105-110			
		Gravel with sand, coarse, poorly sorted	23	110-115			
		Gravel with sand, coarse, poorly sorted	24	115-120			
		Gravel with sand, coarse, poorly sorted sandier	25	120-125			
		Gravel with sand, coarse, poorly sorted sandier	26	125-130			
		Sand, medium to coarse, poorly sorted; gravel	27	130-135			
		Gravel, coarse, some sand, some larger than gravel	28	135-140			
		Gravel, very coarse and larger than gravel	29	140-145			
		Very coarse sand and gravel	30	145-150			
		BORING COMPLETED					

REMARKS:

1. Logged by J. R. Mildenberger & G. F. Schank (G & M)
2. Monitoring well set at 150.0', (see well detail table)
3. Till layer 43' to 7'±

THE H. C. NUTTING COMPANY
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BOX NUMBER 11
HIGHLAND HEIGHTS, KY 41076
606-261-2043

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FIELD TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. **ORDER No.** 10191.001

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** GM-5

LOCATION As shown on well location plan

DRILLER Willard Martin **DRILL No.** 36 **DATE STARTED** 9-7-82

ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5; with cap off (see well location plan) Elev. 731.48 **DATE COMPLETED** 9-7-82

CASING: DIAMETER 3.5" I. D. Hollow Stem Auger **HAMMER WT.** **FALL**

SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon **HAMMER WT.** 140# **FALL** 35"

DEPTH TO WATER: IMMEDIATE 38.0' **UPON COMPLETION**

DEPTH TO WATER **DAYS AFTER COMPLETION** **WATER USED IN DRILLING**

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
729.6	0'						
		Silt, and sand and gravel, (fill), moist, brown	1	0-1.5	SS	9-17-17	12"
		Sand, fine to medium and silt some gravel, little metal debris, black to brown sweet odor, (fill)	2	5-6.5	SS	10-10-5	6"
		Sand, fine, light brown, moist, trace silt, sand fine to coarse and gravel, trace silt, moist (slight oil odor) light brown	3	10-11	SS	12-52	8"
		Sand fine to coarse and gravel, trace silt, moist (oil odor), light brown	4	15-16.5	SS	6-16-27	10"
		Sand fine to coarse and gravel - pebble, trace silt, moist (slight oil odor), light brown	5	20-21.5	SS	13-30-30	12"
		Sand fine to coarse, and gravel, little silt and clay, moist, light brown	6	25-26.5	SS	13-30-3	16"

Respectfully submitted,
THE H. C. NUTTING CO.

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PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Morain, Ohio **HOLE No.** GM-5

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recov
		Sand, fine to coarse, and gravel, little silt and clay, moist, light brown	7	30-31.5	SS	15-30-3	16"
		Sand fine to coarse, little gravel, pebble, moist, light brown (slight oil odor)	8	35-36.5	SS	14-31-40	14"
		Sand fine to coarse and gravel, wet, brown (slight oil odor)	9	40-41.5	SS	16-21-28	16"
		Gravel and fine to coarse sand, trace silt and clay with 3" silty clay lense, brown, wet (slight oil odor)	10	45-46.5	SS	10-24-31	16"
		Silt, trace clay, light orange brown grading down to gray very moist	11	50-51.5	SS	17-34-4	16"
		Silt, some clay and fine sand, little medium to coarse sand and gravel, gray, moist (till)	12	55-56	SS	30-60	12"
		Silt, some clay and fine sand and gravel, pebble, little medium to coarse sand with fine to coarse sand lenses, gray moist, (till)	13	60-61	SS	21-53	12"
		Silt, some clay and sand and gravel, pebble little medium to coarse sand, with fine to medium sand stringers, gray, moist (till)	14	65-66	SS	35-72	12"
		Sand and gravel - no sample	15	70-71	SS	25-54	0"
		Sand fine to coarse, little gravel, pebble, trace silt orange brown, wet, silt, some clay and fine sand, gray, moist	16	75-76.5	SS	20-38-44	10"
		Sand fine to medium, little coarse sand and gravel, pebble, trace silt, wet, brown	17	80-81.5	SS	24-48-60	14"

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** GM-5

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Rec
		Sand, fine trace medium sand and silt brown, wet	18	85-86	SS	22-58	12
		Sand, fine trace medium sand and silt brown, wet	19	90-91	SS	41-70	12
		Sand, fine to coarse and gravel, little silt and clay, brown, wet	20	95-96.5	SS	21-44-65	18
		Sand and gravel, - no sample -	21	100-101	SS	38-55	0

BORING COMPLETED

REMARKS:

1. Logged by J. R. Mildenberger
2. Monitoring well set at 100.0' (see well detail table)

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FIELD TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.001
PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. GM-6
LOCATION As shown on well location plan
DRILLER Willard Martin DRILL No. 36 DATE STARTED 9-16-82
ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5; with cap off (see well location plan) Elev. 731.48 DATE COMPLETED 9-16-82
CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. ____ FALL ____
SAMPLER: DIAMETER & TYPE None HAMMER WT. ____ FALL ____
DEPTH TO WATER: IMMEDIATE ____ UPON COMPLETION ____
DEPTH TO WATER ____ DAYS AFTER COMPLETION ____ WATER USED IN DRILLING ____

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
728.4	0'						
		45.0' No samples - see log for GM-3 and 4					
683.4'	45.0'						
		BORING COMPLETED					
		REMARKS: 1. Monitoring well set at 45' (see well detail table)					

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpreta-

Respectfully submitted,
THE H. C. NUTTING CO.

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FIELD TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.001

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. GM-7

LOCATION As shown on well location plan

DRILLER Willard Martin DRILL No. 36 DATE STARTED 9-8-82

ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5; with cap off (see well location plan) Elev. 731.48 DATE COMPLETED 9-8-82

CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL

SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE 44' UPON COMPLETION

DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION 732.7	DEPTH 0'	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
		Silt, some sand gravel and debris, black to brown, moist (fill)	1	0-1.5	SS	10-19-20	14"
		Silt, little sand, gravel and wood debris, black, moist (fill), (slight odor)	2	5-6.5	SS	10-11-10	16"
		Silt and fine sand, some gravel and debris, black, very wet, (fill), (slight odor) (3 tries for spoon rec'y)	3	10-11.5	SS	9-6-6	
		Sand, fine to coarse and gravel, little silt, light orange brown moist	4	15-16.5	SS	10-14-16	10"
		Sand, fine to coarse and gravel, little silt, light orange brown moist	5	20-21.5	SS	7-13-22	10"
		Sand, fine to coarse and gravel, little silt, light orange brown moist	6	25-26.5	SS	21-38-42	12"
		Gravel and fine to coarse sand, trace silt	7	30-31	SS	22-51	5"

Respectfully submitted,
THE H. C. NUTTING CO.

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpreta

10-18-82 vf
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PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** GM-7

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Reco
		Clay, silty, some gravel little fine to medium sand, brown, moist, gravel little silty clay and sand, brown moist	8	35-36.5	SS	12-21-21	
		Sand, fine to coarse and gravel, trace silt, light brown, moist	9	40-41	SS	26-52	8"
		Sand, fine to coarse and gravel, trace silt, light brown, wet	10	45-46	SS	26-62	8"
		Sand, fine to coarse and gravel, little silt, brown, wet	11	50-51	SS	54-64	8"
		Silt, trace fine sand and clay, gray very moist (till)	12	55-56	SS	34-56	12"
		Silt, some fine sand and clay little medium to coarse sand and gravel, pebble, gray, moist (till)	13	60-61.5	SS	16-31-4	18"
		Sand, fine to coarse and gravel, some silt gray wet (till)	14	65-66	SS	44-60	12"
		Silt, some fine sand and clay, little medium to coarse sand and gravel, pebble (till)	15	70-71	SS	28-60	12"
		Sand fine to coarse and gravel, trace to little silt, brown wet	16	75-76	SS	41-64	10"
		Sand fine to coarse and gravel, trace to little silt, brown wet	17	80-81	SS	44-54	12"
		Sand fine to coarse, some gravel, trace silt, brown, wet	18	85-86	SS	36-52	12"
		Sand, fine to coarse, little gravel, trace silt, brown, wet	19	90-91	SS	34-60	10"

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** GM-7

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Reco
		Sand, fine little medium - coarse sand brown, wet	20	95-96	SS	31-52	10'
		Sand, medium to coarse and gravel, trace fine sand and silt, brown wet	21	100-101	SS	38-64	8'
		BORING COMPLETED					
		REMARKS: 1. Logged by J. R. Mildenberger (G&M) 2. Monitoring well set at 100.0' (see well detail tables)					

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FIELD TEST BORING REPORT

10-18-82 vf

CLIENT Geraghty & Miller, Inc.
ORDER No. 10191.001
PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio
HOLE No. GM-8
LOCATION As shown on well location plan
DRILLER Willard Martin
DRILL No. 36
DATE STARTED 9-9-82
ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5; with cap off (see well location plan) Elev. 731.48
DATE COMPLETED 9-9-82
CASING: DIAMETER 3.5" I. D. Hollow Stem Auger
SAMPLER: DIAMETER & TYPE None
HAMMER WT. ____ FALL ____
DEPTH TO WATER: IMMEDIATE ____
HAMMER WT. ____ FALL ____
DEPTH TO WATER ____ DAYS AFTER COMPLETION ____
UPON COMPLETION ____
WATER USED IN DRILLING ____

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
732.8	0'						
		No samples - see log for GM-7					
	50.0'						
		BORING COMPLETED					
		REMARKS:					
		1. Monitoring well set at 50.0'					

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others

Respectfully submitted,
THE H. C. NUTTING CO.

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FIELD TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.001

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. GM-9

LOCATION As shown on well location plan

DRILLER Willard Martin DRILL No. 36 DATE STARTED 9-10-82

ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5; with cap off (see well location plan) Elev731.48 DATE COMPLETED 9-10-82

CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL

SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE 35.0' UPON COMPLETION

DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
723.6'	0'						
		Silt, some fine sand, trace clay, roots, brown, crumbly, dry	1	0-1.5	SS	4-7-7	18"
		Sand, medium, silty, trace clay, trace gravel, well sorted, brown	2	5-6.5	SS	2-2-2	16"
		Gravel and sand, poorly sorted, oil odor	3	10-11.5	SS	18-22-22	14"
		Gravel and sand, poorly sorted, no oil smell	4	15-16.5	SS	11-24-25	16"
		Sand with gravel, poorly sorted, sand is tan to off white, gravel is small to coarse (chert)	5	20-21.5	SS	7-28-26	16"
		Sand with gravel, poorly sorted, sand is tan to off white, gravel is small to coarse (chert), wet zones	6	25-26.5	SS	11-16-22	12"
		Gravel and sand, iron stains, wet zones, oil smell, poorly sorted	7	30-31.5	SS	7-26-38	16"
		Sand and gravel, poorly sorted, wet, very slight oil odor	8	35-36.5	SS	22-28-35	16"

Respectfully submitted,
THE H. C. NUTTING CO.

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpreta-

10-18-82 vf

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PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** GM-9

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recov
		Sand and gravel, poorly sorted, wet, no oil odor	9	40-41	SS	25-51	16"
		sand and gravel, poorly sorted, wet, very slightly oil odor, trace clay	10	45-46.5	SS	28-32-42	14"
		Clay, gray, gravel interbedded, some sand lenses, hard	11	50-51	SS	28-60	10"
		Silt, clayey, trace fine sand, gravel throughout, hard, some vegetation, gray, some large gravel	12	55-56.5	SS	17-36-44	15"
		Silt, clayey, trace fine sand, gravel throughout, hard, some vegetation, gray some large gravel	13	60-61.5	SS	21-35-51	18"
		Silt, clayey, trace fine sand, gravel throughout, hard, some vegetation, gray, some large gravel, some sand lenses, brown and gray	14	65-66.5	SS	21-35-50	18"
		Sand with gravel, poorly sorted	15	70-71.5	SS	19-31-42	16"
		Sand, medium to coarse, with gravel, poorly sorted, brown	16	75-76	SS	31-54	8"
		Sand and gravel, poorly sorted	17	80-81	SS	61-75	12"
		Sand and gravel, poorly sorted	18	85-86.5	SS	25-28-33	15"
		Sand and gravel, poorly sorted	19	90-91	SS	41-61	12"
		Sand and gravel, poorly sorted	20	95-96.5	SS	19-20-21	14"
		Sand and gravel, poorly sorted	21	100-101.5	SS	32-40-40	14"

BORING COMPLETED

REMARKS: .

1. Logged by G.F. Schank (G&M)
2. Monitoting well set at 100' (see well detail table)
3. Till layer 50 to 69'

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FIELD TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.001
PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. GM-10
LOCATION As shown on well location plan
DRILLER Willard Martin DRILL No. 36 DATE STARTED 9-11-82
ELEVATION REFERENCE Top of ex-weel guard pipe adj. to GM-5; with cap off (see well location plan) Elev. 731.48 DATE COMPLETED 9-11-82
CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL
SAMPLER: DIAMETER & TYPE none HAMMER WT. FALL
DEPTH TO WATER: IMMEDIATE UPON COMPLETION
DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
723.5	0'						
		50.0' No samples - see log for GM-9					
	50.0'						
		BORING COMPLETED					
		REMARKS:					
		1. Monitoring well set at 50.0' (see well detail table)					

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability

Respectfully submitted,
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FIELD **TEST BORING REPORT**

CLIENT Geraghty & Miller, Inc.
ORDER No. 10191.001
PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio
HOLE No. GM-11
LOCATION As shown on well location plan
DRILLER Willard Martin
DRILL No. 36
DATE STARTED 9-5-82
ELEVATION REFERENCE Top of ex-well guard pipe to GM-5; with cap off (see well location plan) Elev. 731.48
DATE COMPLETED 9-5-82
CASING: DIAMETER 3.5" I. D. Hollow Stem Auger
HAMMER WT.
FALL
SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon
HAMMER WT. 140#
FALL 30"
DEPTH TO WATER: IMMEDIATE 35'
UPON COMPLETION
DEPTH TO WATER
DAYS AFTER COMPLETION
WATER USED IN DRILLING below 64'(150gal.

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
723.6	0'						
		Sand and silt, fine, trace clay, some vegetation, reddish brown	1	0-1.5	SS	3-8-9	18"
		Sand and gravel, medium to coarse, gravel is small, trace silt, brown	2	5-6.5	SS	6-13-15	18"
		Gravel with sand, small to large, mostly brown, slight oil smell	3	10-11.5	SS	20-28-28	16"
		Gravel with sand, small to large, mostly borwn, slight oil smell, some dampness	4	15-16.5	SS	13-18-20	14"
		Gravel and sand, poorly sorted, sand is brown, very slight oil odor, some dampness	5	20-21.5	SS	12-27-27	16"
		Gravel and sand, poorly sorted, sand is brown, very light oil odor, some dampness	6	25-26.5	SS	16-33-41	14"
		Gravel and sand, poorly sorted, sand is brown, no odor, 3 inches in top are wet, dry in bottom	7	30-31.5	SS	11-21-54	12"

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpreta-

Respectfully submitted,
THE H. C. NUTTING CO.

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** GM-11

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recov
		Sand and gravel, poorly sorted, wet, sand is brown (approx. 9"run-up in augers)	8	35-36.5	SS	150-21-22	16"
		Gravel and sand, poorly sorted, 3"sand lenses in top, wet	9	40-41.5	SS	23-33-48	16"
		Gravel and sand, poorly sorted, sandier toward bottom	10	45-46	SS	36-54	10"
		Till, clay and silt, trace sand, interbedded gravel, grayish green, hard	11	50-51	SS	27-54	14"
		Till, clay and silt, trace sand, interbedded gravel, grayish green, hard, piece of wood in tip, siltier	12	55-56	SS	24-51	16"
		Till,clay and ilst, trace sand, interbedded gravel, grayish green, hard, trace of vegetation	13	60-61	SS	22-62	16"
		Sand with gravel, medium to coarse, poorly sorted, mostly brown	14	65-66.5	SS	17-34-53	16"
		Sand with gravel, medium to coarse poorly sorted, mostly brown	15	70-71.5	SS	16-38-48	10"
		Sand, medium, well sorted, brown, some coarse	16	75-76	SS	22-70	10"
		Sand, fine to medium, fairly well sorted, brown, trace coarse, trace silt	17	80-81	SS	45-75	10"
		Silt, clayey, trace fine sand, plastic gray, (driller said felt like clay from 84-86 ft.)	18	85-86.	SS	51-72	10"
		Gravel with some sand, poorly sorted	19	90-91.5	SS	13-24-40	12"

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** GM-11

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recov
		Gravel with some sand, poorly sorted very coarse	20	95-96.5	SS	13-24-40	12"
		Sand and gravel, poorly sorted	21	100-101	SS	28-55	10"

BORING COMPLETED

REMARKS:

1. Logged by G. F. Schank (G&M)
2. Monitoring well set at 100.0' (see well detail table)
3. Till layer 49 to 64'
4. 2 ft. run-up in augers at 64'

THE H. C. NUTTING COMPANY
GEOTECHNICAL AND TESTING ENGINEERS
SINCE 1921

912 MORRIS STREET
CHARLESTON, W. VA 25301
304-344-0821

4120 AIRPORT ROAD
P.O. BOX C
CINCINNATI, OHIO 45226
513-321-5816

BOX NUMBER 11
HIGHLAND HEIGHTS, KY 41076
606-261-2043

10-18-82 vf

FIELD TEST BORING REPORT

Page 1 of 2

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.001
PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. GM-12
LOCATION As shown on well location plan
DRILLER Siebert Hill (Moody's) DRILL No. Cable tool #2 DATE STARTED 9-7-82
ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5: with cap off (see well location plan) Elev. 731.48 DATE COMPLETED 9-18-82
CASING: DIAMETER 8" HAMMER WT. FALL
SAMPLER: DIAMETER & TYPE Bailer HAMMER WT. FALL
DEPTH TO WATER: IMMEDIATE UPON COMPLETION
DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING below 20'

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
723.8	0'						
		0-100' No samples - see log for GM-11					
		Sand, fine to coarse and gravel, trace silt, brown	1	100-105			
		Gravel and coarse sand, little medium fine sand, trace silt, brown	2	105-110			
		Sand fine to coarse and gravel, trace silt, brown	3	110-115			
		Sand, fine to coarse, little gravel, trace silt, brown	4	115-120			
		Sand, fine to coarse, little gravel, trace silt, brown	5	120-125			
		Sand, fine to coarse and gravel, trace silt, brown	6	125-130			
		Sand, fine to coarse and gravel, little silt, brown	7	130-135			
		Sand fine to coarse, some gravel, little silt, brown	8	135-140			

Respectfully submitted,
THE H. C. NUTTING CO.

PROJECT GMC, Harrison Radiator Division, Monitoring Wells
Moraine, Ohio **HOLE No.** GM-12

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Reco
		Sand, fine to coarse and gravel, little silt, brown	9	140-145			
		Sand, fine to coarse and gravel, little silt, brown	10	145-150			

BORING COMPLETED

REMARKS:

1. Auger rig drilled 20' hole for starting casing
2. Logged by J. R. Mildenberger (G&M)
3. Monitoring well set at 150.0' (see well detail table)

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FIELD TEST BORING REPORT

10-18-82 vf
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CLIENT Geraghty & Miller, Inc. **ORDER No.** 10191.001
PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** GM-13
LOCATION As shown on well location plan
DRILLER Willard Martin **DRILL No.** 36 **DATE STARTED** 9-3-82
ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5; with cap off (see well location plan) Elev. 731.48 **DATE COMPLETED** 9-4-82
CASING: DIAMETER 3.5" I. D. Hollow Stem Auger **HAMMER WT.** **FALL**
SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon **HAMMER WT.** 140# **FALL** 30"
DEPTH TO WATER: IMMEDIATE 34' **UPON COMPLETION**
DEPTH TO WATER **DAYS AFTER COMPLETION** **WATER USED IN DRILLING** below 64'(150 gal

ELEVATION 723.7	DEPTH 0'	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recov
		Silt, some fine to medium sand, trace clay and organics, dark reddish brown, moist (6" topsoil)	1	0-1.5	SS	3-5-6	18"
		Sand, fine to coarse, some gravel, little silt, brown, moist	2	5-6.5	SS	5-15-32	18"
		Sand, fine to coarse and gravel, trace, silt, light brown, moist	3	10-11.5	SS	10-22-30	14"
		Sand medium to coarse some gravel, light brown, moist	4	15-16.5	SS	6-10-22	16"
		Sand, medium to coarse and gravel, little fine sand, trace silt, light brown, moist	5	20-21.5	SS	16-24-20	16"
		Sand, fine to coarse and gravel, little silt and clay, light brown, moist (slight oil odor)	6	25-26	SS	36-52	10"
		28ft. - very hard drilling, boulder or large cobble 29'					

Respectfully submitted,
THE H. C. NUTTING CO.

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability

PROJECT GMC, Harrison Radiator Divison, Monitoring Wells, Moraine, Ohio **HOLE No.** GM-13

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Rec
		Sand, fine to coarse and gravel, little silt and clay, moist to very moist, some F_e stained lenses, (slight oil odor)	7	30-31.5	SS	13-19-35	14
		Gravel, some fine to coarse sand, little silt and clay, wet, brown (slight oil odor)	8	35-36.5	SS	11-17-20	12
		Sand, medium to coarse (with lenses of fine to medium) and gravel - pebbles trace silt, brown, wet, (slight oil odor)	9	40-41.5	SS	17-27-34	14
		Sand, medium to coarse (with lenses of fine to medium) and gravel-pebbles trace silt, brown, wet (slight oil odor)	10	45-46	SS	16-53	10
		Sand, fine to coarse some gravel, little silt and clay, brown, wet (slight oil odor)	11	50-51.5	SS	36-38-37	14
		Sand, fine to coarse some gravel, little silt and clay, brown, wet, (slight oil odor)	12	55-56	SS	27-57	10'
		Silt and clay, some fine sand, little medium to coarse sand and gravel, dark gray moist (till)	13	60-61	SS	27-70	12'
		Sand, fine to coarse, some gravel, little silt, brown, wet	14	65-66	SS	32-52	10'
		Sand, fine to medium, uniform, little coarse sand and gravel, pebble, light brown, wet	15	70-71	SS	30-54	10'
		Sand, fine uniform, trace medium sand and silt, some zones of F_e staining, brown, wet	16	75-76.5	SS	17-34-42	16'

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Morain, Ohio **HOLE No.** GM-13

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Rec
		Sand. fine, little medium to coarse sand and gravel, trace silt, brown, wet	17	80-81	SS	42-74	12
		Gravel, some fine to coarse sand, little silt, light brown, wet, (slight oil odor)	18	85-86	SS	32-104	12'
		Sand, fine to coarse, little gravel and silt, brown, wet	19	90-91	SS	38-57	8'
		Sand, fine to coarse, and gravel, little silt, brown, wet	20	95-96.5	SS	14-23-30	12'
		Sand, fine to coarse, and gravel, little silt, brown, wet (cobble blocked spoon)	21	100-101.5	SS	28-31-30	3'

BORING COMPLETED

REMARKS:

1. Logged by J. R. Mildenberger (G&M)
2. Monitoring well set at 100.0' (see well detail table)
3. Till layer 57-64'

HCN THE H. C. NUTTING COMPANY
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Page 1 of 2

FIELD TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.001

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. GM-14

LOCATION As shown on well location plan

DRILLER Bob Myers (Moody's) DRILL No. Cable tool #1 DATE STARTED

ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5; with cap off (see well location plan) Elev. 731.48 DATE COMPLETED

CASING: DIAMETER 8" HAMMER WT. FALL

SAMPLER: DIAMETER & TYPE Bailer HAMMER WT. FALL

DEPTH TO WATER: IMMEDIATE UPON COMPLETION

DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING Full depth

ELEVATION 723.4	DEPTH 0'	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
		100.0' See GM-13					
		Gravel and sand, poorly sorted, fossiliferous, small to large	1	100-105			
		Gravel and sand, poorly sorted, fossiliferous, small to large	2	105-110			
		Gravel and sand, poorly sorted, fossiliferous, small to large, trace white clay	3	110-115			
		Gravel and sand, poorly sorted, fossiliferous, small to large	4	115-120			
		Gravel and sand, poorly sorted, fossiliferous, small to large	5	120-125			
		Gravel and sand, poorly sorted, fossiliferous, small to large	6	125-130			
		Gravel and sand poorly sorted, fossiliferous, small to large, gravel is coarser	7	130-135			

Respectfully submitted,
THE H. C. NUTTING CO.

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavating or other physical

10-18-82 vf
Page 2 of 2

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** GM-14

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Reco
		Coarse gravel with sand	8	135-140			
		Coarse gravel with sand, sandier	9	140-145			
		Coarse gravel with sand, gravel not as coarse	10	145-150			
		BORING COMPLETED					
		REMARKS: 1. Logged by G.F. Schank (G&M) 2. Monitoring well set at 150.0' (see well detail table)					

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FIELD TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.001

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. GM-15

LOCATION As shown on well location plan

DRILLER Willard Martin DRILL No. 36 DATE STARTED 9-13-82

ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5; with cap off (see well location plan) Elev. 731.48 DATE COMPLETED 9-13-82

CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL

SAMPLER: DIAMETER & TYPE 2" O. D. Split Spoon HAMMER WT. 140# FALL 30"

DEPTH TO WATER: IMMEDIATE 35.0' UPON COMPLETION

DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
724.6	0'						
		Silt, topsoil, roots, some fine sand, brown	1	0-1.5	SS	6-14-15	18"
		Sand and gravel, poorly sorted, brown sand is fine to medium, gravel is coarse	2	5-6.5	SS	10-13-9	18"
		Sand and gravel, poorly sorted, brown, sand is fine to medium, gravel is fine to coarse, 1" of sand was damp	3	10-11.5	SS	13-25-25	10"
		Gravel and sand, poorly sorted, very slight oil odor	4	15-16.5	SS	16-30-4	12"
		Sand and gravel, poorly sorted, oil odor, some damp spots	5	20-21.5	SS	15-26-27	15"
		Sand and gravel, poorly sorted, no odor, iron stains	6	25-26	SS	12-60	10"
		Sand and gravel, fine to coarse, brown, iron stains, moist to wet in top of spoon	7	30-31.5	SS	16-32-48	18"
		Encountered water at 35.0'					

Respectfully submitted,
THE H. C. NUTTING CO.

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability, excavation or

10-18-82 vf
Page 2 of 2

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio **HOLE No.** GM-15

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recov
		Sand, medium to coarse and gravel, little silt and fine sand, wet, brown	8	35-36.5	SS	12-50-26	10"
		Sand, medium to coarse and gravel, little silt and fine sand, wet, brown	9	40-41.5	SS	21-28-38	8"
		Sand, medium to coarse some gravel, little silt and fine sand, wet, brown	10	45-46.5	SS	16-31-40	10"
		Gravel, some fine to coarse sand, trace silt, brown, wet	11	50-51.5	SS	15-18-36	8"
		Sand, fine to coarse, some gravel, little silt, brown, wet	12	55-56.5	SS	21-28-4	14"
		Sand, fine to coarse, some gravel, little silt, brown, wet, silt, some fine sand and gravel - pebble, gray	13	60-61	SS	41-60	
		Silt, some fine to coarse sand and gravel, gray, moist, little clay	14	65-66	SS	21-62	12"
		Silt and fine sand, little medium to coarse sand and gravel and clay, gray, moist	15	70-71.5	SS	12-21-33	18"
		Sand, fine, some silt, gray, wet	16	75-76	SS	38-55	16"
		Sand, fine, some silt, gray, wet	17	80-81	SS	47-62	12"
		Sand, fine, some silt, gray, wet	18	85-86	SS	37-56	
		Sand, fine to coarse, little gravel and silt, brown, wet	19	90-91	SS	36-58	
		Sand, fine to coarse and gravel, trace silt, brown, wet	20	95-96	SS	50-62	
		No sample	21	100-101.5	SS	23-25-37	

BORING COMPLETED

REMARKS:

1. Logged by G.F. Schank (G&M)
2. Monitoring well set at 100.0' (see well detail table)

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FIELD TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.001

PROJECT GMC, Harrison Radiator Division, Monitoring Wells HOLE No. GM-16
Moraine, Ohio

LOCATION As shown on well location plan

DRILLER Willard Martin DRILL No. 36 DATE STARTED 9-14-82

ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5; with cap off (see well location plan) Elev. 731.48 DATE COMPLETED 9-14-82

CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL

SAMPLER: DIAMETER & TYPE None HAMMER WT. FALL

DEPTH TO WATER: IMMEDIATE UPON COMPLETION

DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
724.6'	0'						
		60.0' No samples, see GM-15					
664.6	60.0'						
		BORING COMPLETED					
		REMARKS:					
		1. Monitoring well set at 58.0' (see well detail table)					

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing, stability,

Respectfully submitted,
THE H. C. NUTTING CO.

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FIELD TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.001

PROJECT GMC, Harrison Radiator Division, Monitoring Wells, Moraine, Ohio HOLE No. GM-17

LOCATION As shown on well location plan

DRILLER Willard Martin DRILL No. 36 DATE STARTED 9-11-82

ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5; with cap off (see well location plan) Elev. 731.48 DATE COMPLETED 9-12-82

CASING: DIAMETER 3.5" I. D. Hollow Stem Auger HAMMER WT. FALL

SAMPLER: DIAMETER & TYPE HAMMER WT. FALL

DEPTH TO WATER: IMMEDIATE UPON COMPLETION

DEPTH TO WATER DAYS AFTER COMPLETION WATER USED IN DRILLING

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recover.
723.6	0'						
		No samples, see GM-11 and GM-12					
673.6	50.0'						
		BORING COMPLETED					
		REMARKS: 1. Monitoring well set at 50.0' (see well detail table)					

Respectfully submitted,
THE H. C. NUTTING CO.

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for

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TEST BORING REPORT

CLIENT Geraghty & Miller, Inc. ORDER No. 10191.001
PROJECT GMC, Harrison Radiator Division, Monitoring Wells Moraine, Ohio HOLE No. GM-18
LOCATION As shown on well location plan
DRILLER Willard Martin DRILL No. 36 DATE STARTED 9-9-82
ELEVATION REFERENCE Top of ex-well guard pipe adj. to GM-5; with cap off (see well location plan) Elev. 731.48 DATE COMPLETED 9-9-82
CASING: DIAMETER 3.5" I. D. Hollow Stem Auger
SAMPLER: DIAMETER & TYPE None HAMMER WT. FALL
DEPTH TO WATER: IMMEDIATE HAMMER WT. FALL
DEPTH TO WATER DAYS AFTER COMPLETION UPON COMPLETION
WATER USED IN DRILLING

ELEVATION	DEPTH	DESCRIPTION OF MATERIALS	SAMPLE No.	SAMPLE DEPTH	TYPE OF SAMPLE	BLOWS PER 6" ON SAMPLER or % Core Rec.	Recovery
723.6	0'						
		No samples, see GM-13, GM-14					
	55.0'						
		BORING COMPLETED					
		REMARKS:					
		1. Monitoring well set at 55.0' (see well detail table)					

Respectfully submitted,
THE H. C. NUTTING CO.

Samples recovered from this test boring are available for inspection, which is strongly recommended. The company assumes no responsibility for interpretations made by others of load bearing

GERAGHTY
& MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well GM-19D Project/No. OH019.05 Page 1 of 1

Site Location Moraine, Ohio (G.M.) Drilling Started 10/2/89 Drilling Completed 10/6/89

Total Depth Drilled 150.2 feet Hole Diameter 10" inches Type of Sample/Coring Device Grab Catch

Length and Diameter of Coring Device ______ Sampling Interval approx. 5 feet

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

Drilling Fluid Used ______ Drilling Method Cable Tool with Catcher

Drilling Contractor Reynold's Driller Ken Helper Steve

Prepared By G. Barrientes Hammer Weight N/A Hammer Drop ______ inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	5	–	–	Topfill/gravel top like pieces; large gravel stones.
5	10	–	–	Large gravel stones and pebbles.
10	15	–	–	Hard, stones and gravel; wet
15	20	–	–	Hard, stones and gravel; wet
20	25	–	–	Hard, stones and gravel; wet
25	30	–	–	Hard, stones and gravel; wet
30	40	–	–	Stones, hard material and some large pieces; still wet
40	60	–	–	Stones, hard material and some large pieces; still wet
60	74	–	–	Hard pan, wet, stones with large to med. sizes
74	82	–	–	Clayey material, brownish-grey colors with med. size stones
82	100	–	–	Silty material, still has hard consistency, wet with med. to
				small size pebbles
100	150	–	–	Silty material, still has hard consistency, wet with med. to
				small size pebbles

GERAGHTY
& MILLER, INC.
Ground-Water Consultants

PAGE 1 OF 2

PROJECT NO. 0H019.05

BORE HOLE NO. GM-19S

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

DRILLING CONTRACTOR Reynolds Supply, Inc.

DRILLING EQUIPMENT Moble Drill B-61 4¼" IDHSA

HYDROGEOLOGIST A.G. McCorkle

DRILLER Chuck McDonald

DATE START / TIME 10/20/89

DATE FINISH / TIME 10/20/89

SURFACE ELEVATION

TOTAL DEPTH 58.0 ft

WELL CASING 2" sch 40 PVC

SCREEN TYPE 2" sch 40 PVC

LENGTH 10 ft

SLOT 0.010 inch

REMARKS

BORE HOLE LOG

DEPTH (FT.)	SAMPLE (NO.)	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
				0.5' ASPHALT AND GRAVEL BASE FILL: SAND (80%); gravel and pebbles (10%); clay (10%); trace metal shards; black, damp, loose			
5							
10				FILL: silty, sandy CLAY with metal shards; black, damp, loose.			
15				silty CLAY, little sand, little pebbles, dk. olive brown, damp to moist, loose	(former soil Horison - ?)		
20				Med-cs. GRAVEL (70-80%), fine-cs. sand (10-20%); tr. pebbles; tr. clay, med. olive brown, damp.			
25					water @ 25.7'		
				fine-med. GRAVEL (30%); med-cs. sand (30%); v. fine-fine sand (30%); tr.cs.gravel (10%); reddish brown (Fe staining); water bearing, subrounded, poorly sorted.			
30							

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Ground-Water Consultants

PAGE 2 OF 2

PROJECT NO. OH019.05

BORE HOLE NO. GM-20S

PROJECT Harrison Radiator

LOCATION Moraine, Ohio

REMARKS

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
				SAND & GRAVEL (as above)			
40							
45							
				fine-med. SAND (80%); fine gravel (10%); med-cs. gravel (10%); med. olive brown, water bearing, subrounded.			
50							
				fine-med. SAND (80-90%); cs.sand (10%); v. fine sand (0-10%); med. olive brown, water bearing, subangular.	sorted (?)		
55							
				CLAY @ 58' (no sample recovered) Till			
60							
65							
70							

THE H. C. NUTTING COMPANY
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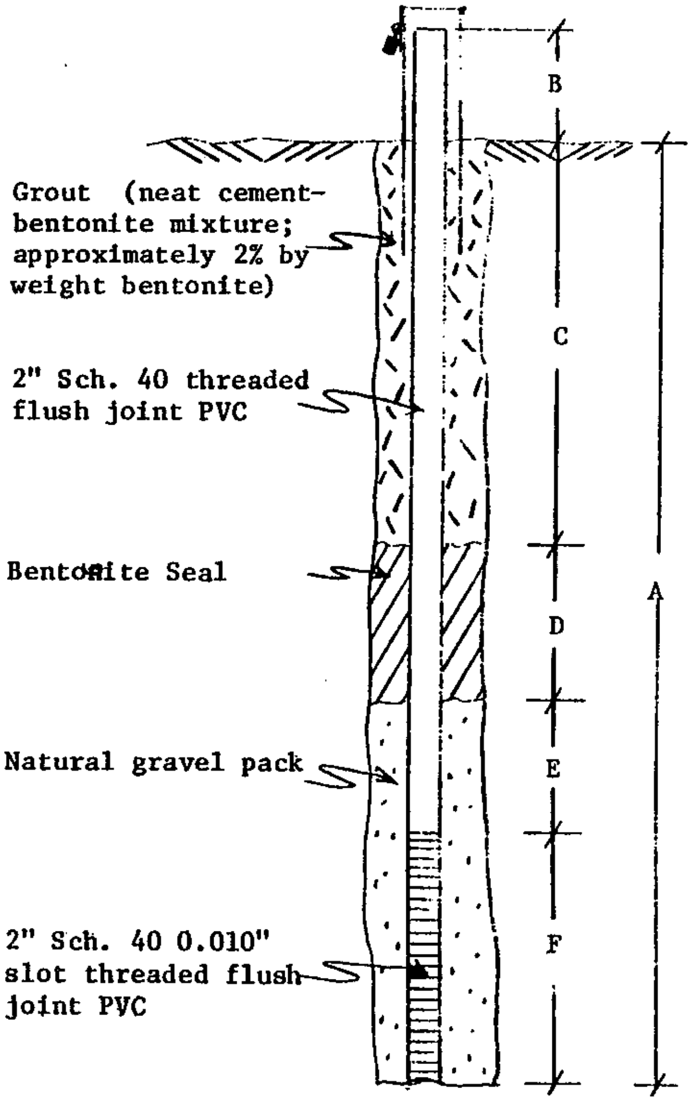
MONITOR WELL DETAILS

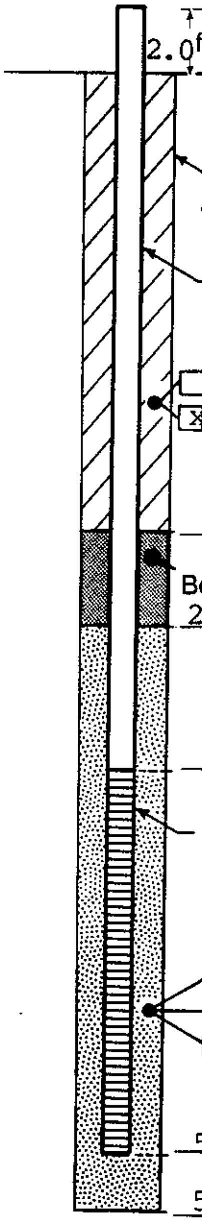
GERAGHTY AND MILLER
HARRISON RADIATOR DIV. (GMC)
MORAINE, OHIO



Well No	A	B	C	D	E	F
1	100'	2.04'	78'	5'	7'	10'
2	55'	2.07'	33'	5'	7'	10'
3	100'	1.86'	78'	5'	7'	10'
4	150'	2.76'	130'	5'	5'	10'
5	100'	1.58'	78'	5'	7'	10'
6	45'	1.78'	23'	5'	7'	10'
7	100'	2.32'	78'	5'	7'	10'
8	50'	1.85'	28'	5'	7'	10'
9	100'	0'	78'	5'	7'	10'
10	50'	0'	28'	5'	7'	10'
11	100'	0'	78'	5'	7'	10'
12	150'	0'	130'	5'	5'	10'
13	100'	0'	78'	5'	7'	10'
14	150'	0'	130'	5'	5'	10'
15	100'	0'	78'	5'	7'	10'
16	58'	0'	35'	5'	8'	10'
17	50'	0'	28'	5'	7'	10'
18	55'	0'	33'	5'	7'	10'

GERAGHTY
& MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



8 inch diameter drilled hole

Well casing, 2 inch diameter, schedule 40 PVC

☐ Backfill
☒ Grout 5% Bentonite/ cement

19.0 ft*

Bentonite ☐ slurry
26.0 ft* ☒ pellets

47.0 ft*

Well Screen. 2 inch diameter
PVC , 0.010" slot

☐ Gravel Pack
☐ Sand Pack
☒ Formation Collapse

57.0 ft*

58.0 ft*

Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Harrison Radiator/ OH019.05 Well GM-19S

Town/City Moraine

County Montgomery State Ohio

Permit No. ____

Land-Surface Elevation

and Datum ____ feet ☐ Surveyed

☐ Estimated

Installation Date(s) 10/20/89

Drilling Method 4¼ I.D. Hollow - Stem Auger

Drilling Contractor Reynolds Supply, Inc.

Drilling Fluid none

Development Technique(s) and Date(s)

11/3/89 - Centrifugel pump

Fluid Loss During Drilling none gallon

Water Removed During Development approx. 200 gallon

Static Depth to Water ____ feet below M.P

Pumping Depth to Water ____ feet below M.P

Pumping Duration ____ hours

Yield ____ gpm Date ____

Specific Capacity ____ gpm/ft

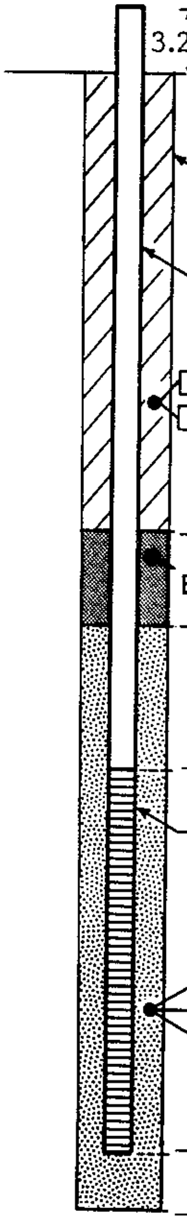
Well Purpose ____

Remarks ____

Prepared by A.G. McCorkle

GERAGHTY & MILLER, INC.
Ground-Water Consultants

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



3.2ft
LAND SURFACE

10 inch diameter drilled hole

Well casing, 4 inch diameter, PVC

☐ Backfill
☒ Grout with some backfill

140 ft*

Bentonite ☒ slurry ☒ pellets

143 ft*

145 ft*

Well Screen. 4 inch diameter PVC, Sch 10 slot

☐ Gravel Pack
☐ Sand Pack
☒ Formation Collapse

150.0ft*

150.2ft*

Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project OH019.05 Well GM-19D

Town/City Moraine

County Montgomery State Ohio

Permit No.

Land-Surface Elevation and Datum feet ☐ Surveyed ☐ Estimated

Installation Date(s) 10/2 through 10/7 of 1989

Drilling Method Cable-Tool

Drilling Contractor Reynold's

Drilling Fluid

Development Technique(s) and Date(s)

Fluid Loss During Drilling gallons

Water Removed During Development gallons

Static Depth to Water feet below M.P.

Pumping Depth to Water feet below M.P.

Pumping Duration hours

Yield gpm Date

Specific Capacity gpm/ft

Well Purpose Monitoring; pumping test

Remarks Hardpan/gravel present down to depth @ 74'; clayey gravel to depth @ 82'; silty gravel to depth @ 150'.

Prepared by G. Barrientes

G&M Form 05 5-87

Southprint 87-1776

W-1-N to W-4-N
W-1-S to W-4-S

LOG OF BORING NO. W-1-N

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR, DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 9-16-81

SURFACE ELEVATION: 737.61'

DATE COMPLETED: 9-21-81

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	Brown clay, trace of sand, trace of gravel				
2.0'	Brown sand and gravel - damp				
10'					
20'					
30'					
	(Becomes wet at 35.0')				
40'					
50'					
60'					
	(continued on next page)				

METHOD: DRIVE CASING

TECHNICIAN: BARRETT

JOB NO.: 26418 (kab)

WATER OBSERVATIONS

INITIAL DEPTH: 35.0'

COMPLETION DEPTH: 37.5'

DEPTH AFTER: 72 HRS. 37.5'

TYPE SAMPLER:

____ A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. W-1-N (second page)

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR, DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 9-16-81

SURFACE ELEVATION: 737.61'

DATE COMPLETED: 9-21-81

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
60'	(continued)				
65.0'	Gray silt and clay - damp				
66.0'	Brown sand and gravel - wet				
70'					
	Bottom of boring at 70.0'				
80'					
90'					
100'					
110'					
120'					

METHOD: DRIVE CASING

TECHNICIAN: BARRETT

JOB NO.: 26418 (kab)

WATER OBSERVATIONS

INITIAL DEPTH: 35.0'

COMPLETION DEPTH: 37.5'

DEPTH AFTER: 72 HRS. 37.5'

TYPE SAMPLER:

____ A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. W-2-N

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR, DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 9-22-81

SURFACE ELEVATION: 729.68'

DATE COMPLETED: 9-22-81

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Asphalt and base				
1.0'	(FILL) Brown silt and sand, some gravel - moist				
7.0'	(ORIGINAL) Brown sand and gravel - moist				
10'					
20'					
30'	(Becomes wet at 32.0')				
40'					
50'					
60'	(continued on next page)				

METHOD: DRIVE CASING

TECHNICIAN: BARRETT

JOB NO.: 26418 (kab)

WATER OBSERVATIONS

INITIAL DEPTH: 32.0'

COMPLETION DEPTH: 32.0'

DEPTH AFTER: 24 HRS. 32.0'

TYPE SAMPLER:

_____ A. SPLIT SPOON

_____ B.

_____ C. SHELBY TUBE

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. W-2-N (second page)

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR, DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION As shown on boring location paln

DATE STARTED: 9-22-81

SURFACE ELEVATION: 729.68'

DATE COMPLETED: 9-22-81

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
60'	(continued)				
	Bottom of borin at 60.0'				
70'					
80'					
90'					
100'					
110'					
120'					

METHOD: DRIVE CASING

TECHNICIAN: BARRETT

JOB NO.: 26418 (kab)

WATER OBSERVATIONS

INITIAL DEPTH: 32.0'

COMPLETION DEPTH: 32.0'

DEPTH AFTER: 24 HRS. 32.0'

TYPE SAMPLER:

____ A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. W-3-N

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR, DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 9-8-81

SURFACE ELEVATION: 731.98'

DATE COMPLETED: 9-9-81

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	Brown silt, trace of sand, trace of gravel - damp				
2.0'	Brown sand and gravel, trace of silt - damp				
10'					
20'					
	(Becomes wet at 25.5')				
30'					
40'					
50'					
60'	Bottom of boring at 57.0'				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: CHRISTY

JOB NO.: 26418 (kab)

WATER OBSERVATIONS

INITIAL DEPTH: 25.5'

COMPLETION DEPTH: 25.5'

DEPTH AFTER: 24 HRS. 26.0'

TYPE SAMPLER:

A. SPLIT SPOON

B.

C. SHELBY TUBE

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. W-4-N

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR, DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 9-10-81

SURFACE ELEVATION: 729.88'

DATE COMPLETED: 9-10-81

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 silt				
2.0'	(FILL) Brown clay, trace of sand, trace of gravel				
3.0'	(ORIGINAL) Brown sand and gravel, some cobbles, trace of silt				
10'					
20'					
30'	(Becomes wet at 32.0')				
40'					
50'					
60'	(continued on next page)				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: CHRISTY

JOB NO.: 26418 (kab)

WATER OBSERVATIONS

INITIAL DEPTH: 32.0'

COMPLETION DEPTH: 26.5'

DEPTH AFTER: 24 HRS. 32.3'

TYPE SAMPLER:

____ A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. W-4-N (second page)

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR, DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 9-10-81

SURFACE ELEVATION: 729.88'

DATE COMPLETED: 9-10-81

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
60'	(continued)				
61.0'	Gray silt and clay - moist				
62.0'	Brown sand and gravel, trace of silt				
	Bottom of boring at 65.0'				
70'					
80'					
90'					
100'					
110'					
120'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: CHRISTY

JOB NO.: 26418 (kab)

WATER OBSERVATIONS

INITIAL DEPTH: 32.0'

COMPLETION DEPTH: 26.5'

DEPTH AFTER: 24 HRS. 32.3'

TYPE SAMPLER:

____ A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. W-1-S

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR, DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 9-23-81

SURFACE ELEVATION: 728.23'

DATE COMPLETED: 9-25-81

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Brown silt and concrete fragments, trace of bricks - moist				
10'					
15.0'	(ORIGINAL) Brown clay, some silt, trace of sand - moist				
17.0'	Brown sand and gravel - moist				
20'					
30'					
	(Becomes wet at 36.6')				
40'					
50'					
60'					
	(continued on next page)				

METHOD: DRIVE CASING

TECHNICIAN: BARRETT

JOB NO.: 26418 (kab)

WATER OBSERVATIONS

INITIAL DEPTH: 36.6'

COMPLETION DEPTH: 36.6'

DEPTH AFTER: 24 HRS. 36.5'

TYPE SAMPLER:

_____ A. SPLIT SPOON

_____ B.

_____ C. SHELBY TUBE

BOWSER - MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. W-1-S (second page)

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR, DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan
DATE STARTED: 9-23-81
SURFACE ELEVATION: 728.23'
DATE COMPLETED: 9-25-81

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
60'	(continued)				
	Gray silt, some sand, trace of gravel - moist				
	Bottom of boring at 60.0'				
70'					
80'					
90'					
100'					
105'					
110'					

METHOD: DRIVE CASING
TECHNICIAN: BARRETT
JOB NO.: 26418 (kab)

WATER OBSERVATIONS
INITIAL DEPTH: 36.6'
COMPLETION DEPTH: 36.6'
DEPTH AFTER: 24 HRS. 36.5'

TYPE SAMPLER:
A. SPLIT SPOON
B.
C. SHELBY TUBE

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. W-2-S

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR, DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 9-18-81

SURFACE ELEVATION: 725.01'

DATE COMPLETED: 9-21-81

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	Brown clay, trace of sand, trace of gravel				
3.0'	Brown sand and gravel - damp				
10'					
20'					
30'					
	(Becomes wet at 35.5')				
40'					
50'					
60'					

(continued on next page)

METHOD: DRIVE CASING

TECHNICIAN: PATTERSON

JOB NO.: 26418 (kab)

WATER OBSERVATIONS

INITIAL DEPTH: 35.0'

COMPLETION DEPTH: 34.5'

DEPTH AFTER: 24 HRS. 35.3'

TYPE SAMPLER:

____ A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. W-2-S

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR, DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 9-18-81

SURFACE ELEVATION: 725.01'

DATE COMPLETED: 9-21-81

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
60'	(continued)				
63.0'	Gray silt, trace of clay - moist				
64.0'	Brown sand and gravel - wet				
	Bottom of boring at 65.0'				
70'					
80'					
90'					
100'					
110'					
120'					

METHOD: DRIVE CASING

TECHNICIAN: PATTERSON

JOB NO.: 26418 (kab)

WATER OBSERVATIONS

INITIAL DEPTH: 35.0'

COMPLETION DEPTH: 34.5'

DEPTH AFTER: 24 HRS. 35.3'

TYPE SAMPLER:

____ A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. W-3-S

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR, DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 9-23-81

SURFACE ELEVATION: 731.47'

DATE COMPLETED: 9-23-81

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Topsoil and sand and gravel - moist				
6.0'	(ORIGINAL) brown sand and gravel - moist				
10'					
20'					
30'					
40'					
	(Becomes wet at 41.0')				
50'					
60'					
	(continued on next page)				

METHOD: DRIVE CASING

TECHNICIAN: PATTERSON

JOB NO.: 26418 (kab)

WATER OBSERVATIONS

INITIAL DEPTH: 41.0'

COMPLETION DEPTH: 41.0'

DEPTH AFTER: 24 HRS. 41.0'

TYPE SAMPLER:

____ A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. W-3-S (second page)

GROUNDWATER MONITORING WELL, HARRISON RADIATOR, DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 9-23-81

SURFACE ELEVATION: 731.47'

DATE COMPLETED: 9-23-81

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
60'	(continued)				
70'					
	Bottom of boring at 76.0'				
80'					
90'					
100'					
110'					
120'					

METHOD: DRIVE CASING

TECHNICIAN: PATTERSON

JOB NO.: 26418 (kab)

WATER OBSERVATIONS

INITIAL DEPTH: 41.0'

COMPLETION DEPTH: 41.0'

DEPTH AFTER: 24 HRS. 41.0'

TYPE SAMPLER:

____ A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. W-4-S

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR, DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 9-25-81

SURFACE ELEVATION: 726.66'

DATE COMPLETED: 9-28-81

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	Brown sand and gravel, some silt, trace of cobbles				
10'					
20'					
30'					
	(Becomes wet at 37.5')				
40'					
50'					
60'					

(continued on next page

METHOD: DRIVE CASING

TECHNICIAN: PATTERSON

JOB NO.: 26418 (kab)

WATER OBSERVATIONS

INITIAL DEPTH: 37.5'

COMPLETION DEPTH: 37.5'

DEPTH AFTER: 24 HRS. 37.5'

TYPE SAMPLER:

- ____ A. SPLIT SPOON
- ____ B.
- ____ C. SHELBY TUBE

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. W-4-S (second page)

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR, DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 9-25-81

SURFACE ELEVATION: 726.66'

DATE COMPLETED: 9-28-81

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
60'	(continued)				
70'					
	Bottom of boring at 70.0'				
80'					
90'					
100'					
110'					
120'					

METHOD: DRIVE CASING

TECHNICIAN: PATTERSON

JOB NO.: 26418 (kab)

WATER OBSERVATIONS

INITIAL DEPTH: 37.5'

COMPLETION DEPTH: 37.5'

DEPTH AFTER: 24 HRS. 37.5'

TYPE SAMPLER:

____ A. SPLIT SPOON

____ B.

____ C. SHELBY TUBE

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF WELL NO. W-1-N

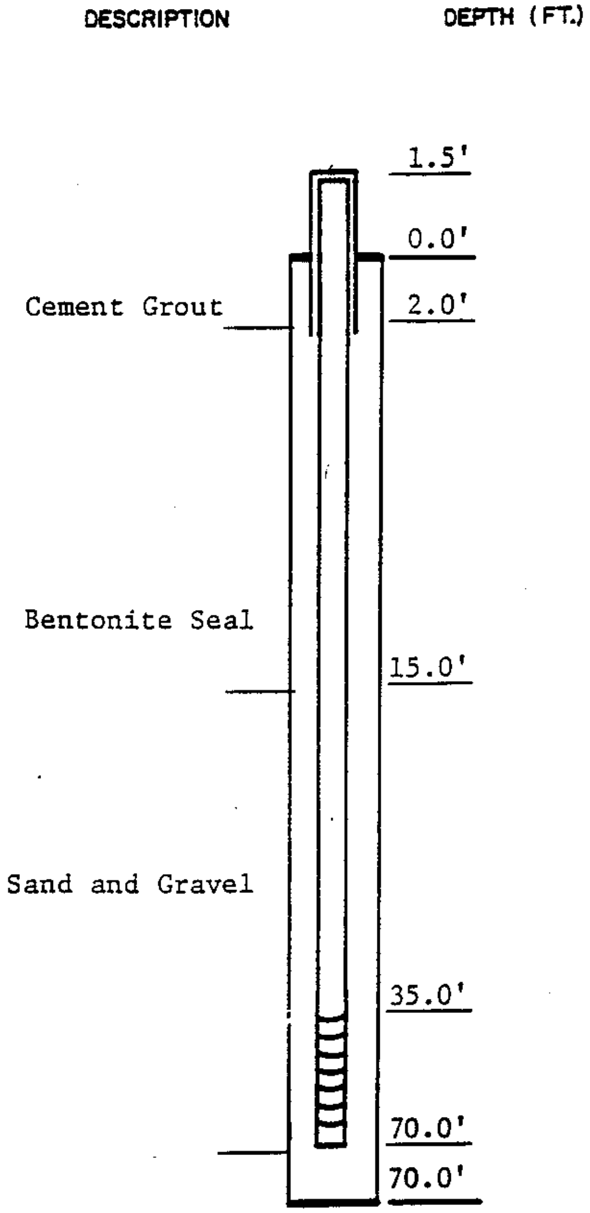
GROUNDWATER MONITORING WELLS, HARRISON RADIATOR,
DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan
DATE INSTALLED: 9-21-81
SURFACE ELEVATION: 737.61'
TOP OF PIPE ELEVATION: 739.16'*

TYPE OF PIEZOMETER: Monitoring Well - 4" Schedule 40 PVC Casing

DATE	WATER SURFACE DEPTH (FT.)	WATER SURFACE ELEV. (FT.)	
9-21-81	37.5	700.1	
9-24-81	37.5	700.1	
10-5-81	38.4	699.2	

INSTALLATION DESCRIPTION



TECHNICIAN BARRETT

JOB NO. 26418

NOTES: PVC screen length - 35 feet
Screen slot size - 0.010 inches
Guard pipe - 5" x 4' 2" black iron with locking cap
*Elevation given is top of guard pipe without cap

LOG OF WELL NO. W-2-N

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR,
DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE INSTALLED: 9-22-81

SURFACE ELEVATION: 729.68'

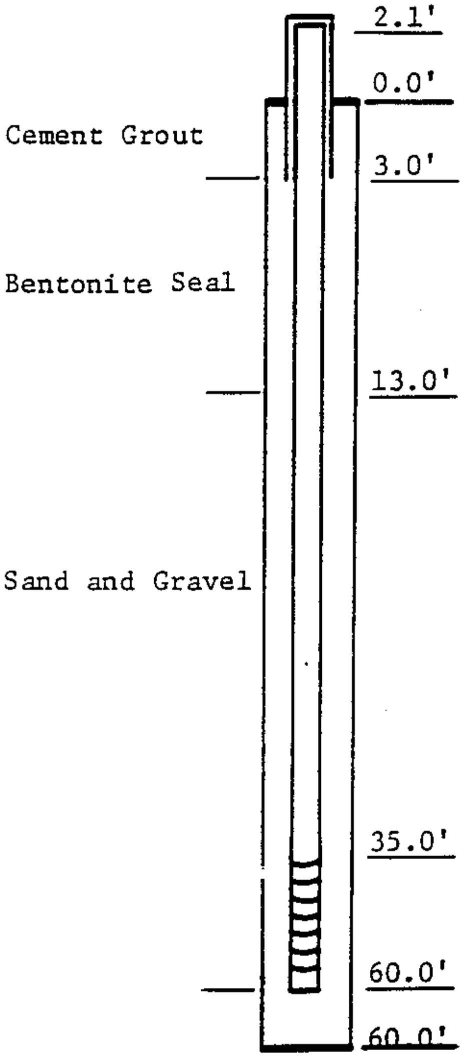
TOP OF PIPE ELEVATION: 731.77'*

TYPE OF PIEZOMETER: Monitoring Well - 4" Schedule 40 PVC Casing

DATE	WATER SURFACE DEPTH (FT.)	WATER SURFACE ELEV. (FT.)	
9-28-81	32.0	697.7	
10-5-81	32.7	697.0	

INSTALLATION DESCRIPTION

DESCRIPTION DEPTH (FT.)



TECHNICIAN BARRETT

JOB NO. 26418

NOTES: PVC screen length - 25 feet

Screen slot size - 0.010 inches

Guard pipe - 5" x 4' 2" black iron with locking cap

*Elevation given is top of guard pipe without cap

LOG OF WELL NO. W-3-N

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR,
DAYTON OPERATIONS, MORAINE, OHIO

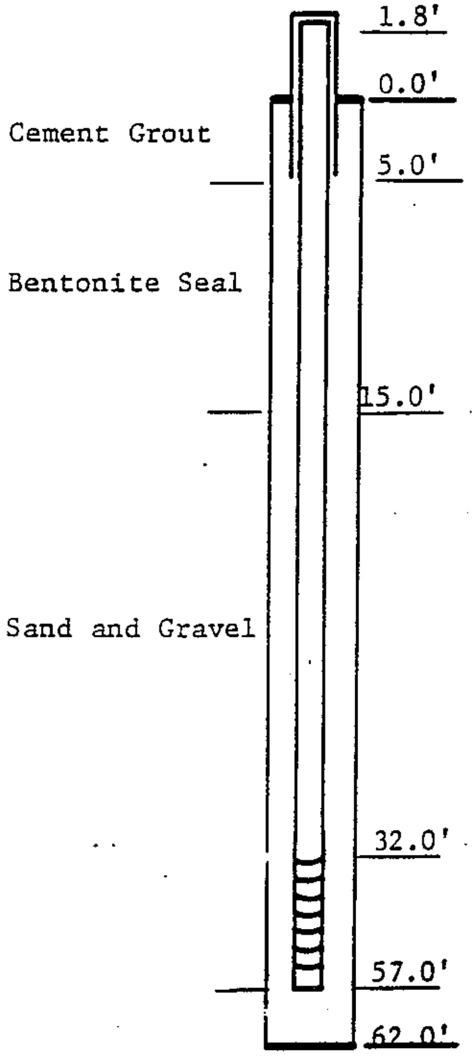
BORING LOCATION: As shown on boring location plan
DATE INSTALLED: 9-9-81
SURFACE ELEVATION: 731.98'
TOP OF PIPE ELEVATION: 733.82' *

TYPE OF PIEZOMETER:

DATE	WATER SURFACE DEPTH (FT.)	WATER SURFACE ELEV. (FT.)	
9-9-81	25.5	706.5	
9-10-81	26.0	706.0	
10-5-81	35.1	696.9	

INSTALLATION DESCRIPTION

DESCRIPTION — DEPTH (FT.)



TECHNICIAN CHRISTY

JOB NO. 26418

NOTES: PVC screen length - 25 feet
Screen slot size - 0.010 inches
Guard pipe - 5" x 4' 2" black iron with locking cap
*Elevation given in top of guard pipe without cap

LOG OF WELL NO. W-4-N

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR,
DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE INSTALLED: 9-24-81

SURFACE ELEVATION: 729.88'

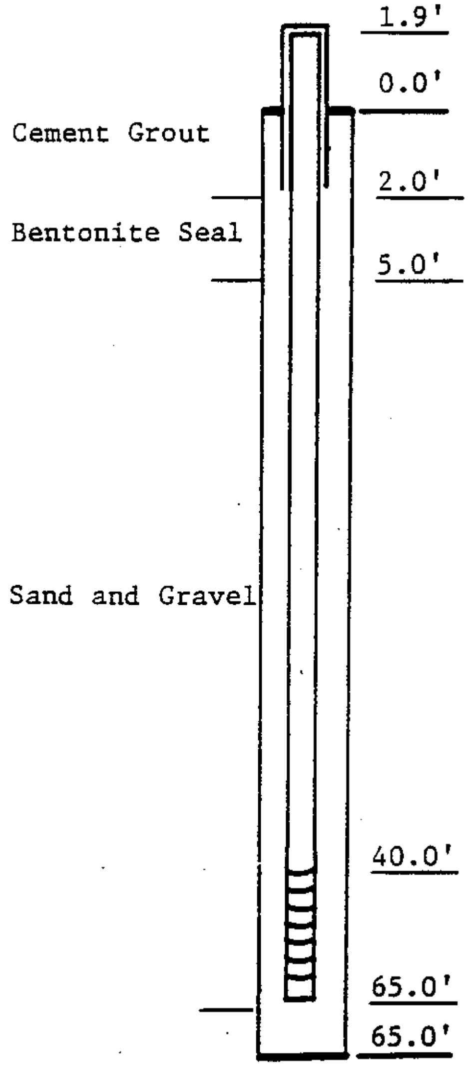
TOP OF PIPE ELEVATION: 731.78'*

TYPE OF PIEZOMETER: Monitor Well - 4" Schedule 40 PVC Casing

DATE	WATER SURFACE DEPTH (FT.)	WATER SURFACE ELEV. (FT.)	
9-10-81	26.5	703.4	
9-25-81	32.3	697.6	
9-28-81	33.5	696.4	
10-5-81	32.8	697.1	

INSTALLATION DESCRIPTION

DESCRIPTION **DEPTH (FT.)**



TECHNICIAN PATTERSON

JOB NO. 26418

NOTES: PVC screen length - 25 feet

Screen slot size - 0.010 inches

Guard pipe - 5" x 4' 2" black iron with locking cap

* Elevation given is top of guard pipe without cap

LOG OF WELL NO. W-1-S

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR,
DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE INSTALLED: 9-25-81

SURFACE ELEVATION: 728.23'

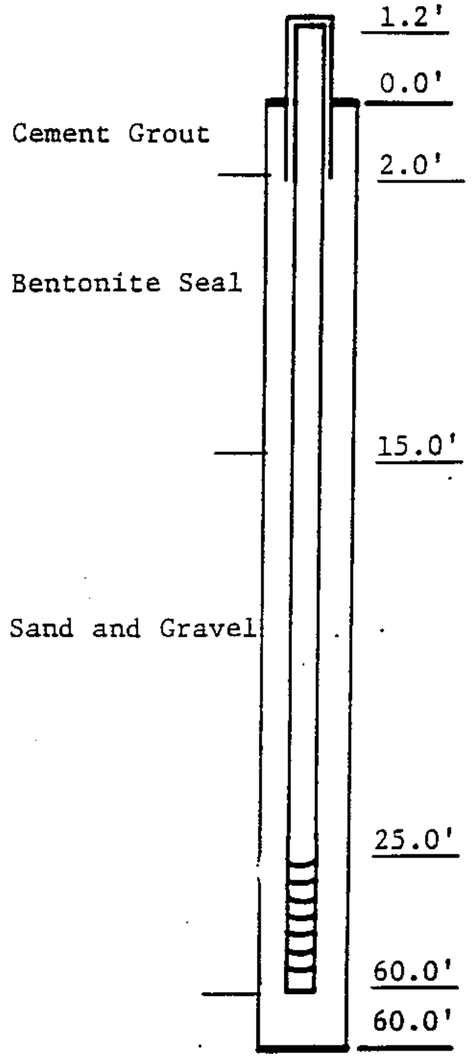
TOP OF PIPE ELEVATION: 729.39'*

TYPE OF PIEZOMETER:

DATE	WATER SURFACE DEPTH (FT.)	WATER SURFACE ELEV. (FT.)	
9-24-81	36.6	691.1	
9-25-81	36.6	691.6	
10-5-81	36.0	692.2	

INSTALLATION DESCRIPTION

DESCRIPTION **DEPTH (FT.)**



TECHNICIAN BARRETT

JOB NO. 26418

NOTES: PVC screen length - 35 feet
Screen slot size - 0.010 inches
Guard pipe - 5" x 4' 2" black iron with locking cap
*Elevation given is top of guard pipe without cap

LOG OF WELL NO. W-2-S

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR,
DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE INSTALLED: 9-21-81

SURFACE ELEVATION: 725.01'

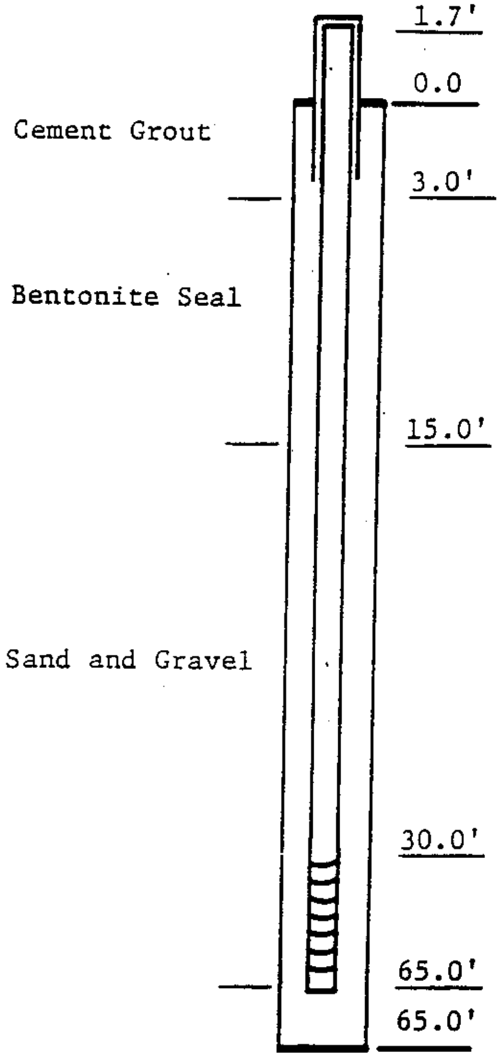
TOP OF PIPE ELEVATION: 726.75'*

TYPE OF PIEZOMETER: Monitor Well - 4" Schedule 40 PVC Casing

DATE	WATER SURFACE DEPTH (FT.)	WATER SURFACE ELEV. (FT.)	
9-21-81	34.5	690.5	
9-22-81	35.3	689.7	
10-5-81	35.3	689.7	

INSTALLATION DESCRIPTION

DESCRIPTION **DEPTH (FT.)**



TECHNICIAN PATTERSON

JOB NO. 26418

NOTES: PVC screen length - 35 feet
Screen slot size - 0.010 inches
Guard pipe - 5" x 4' 2" black iron with locking cap
* Elevation given is top of guard pipe without cap

LOG OF WELL NO. W-3-S

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR,
DAYTON OPERATIONS, MORAINE, OHIO

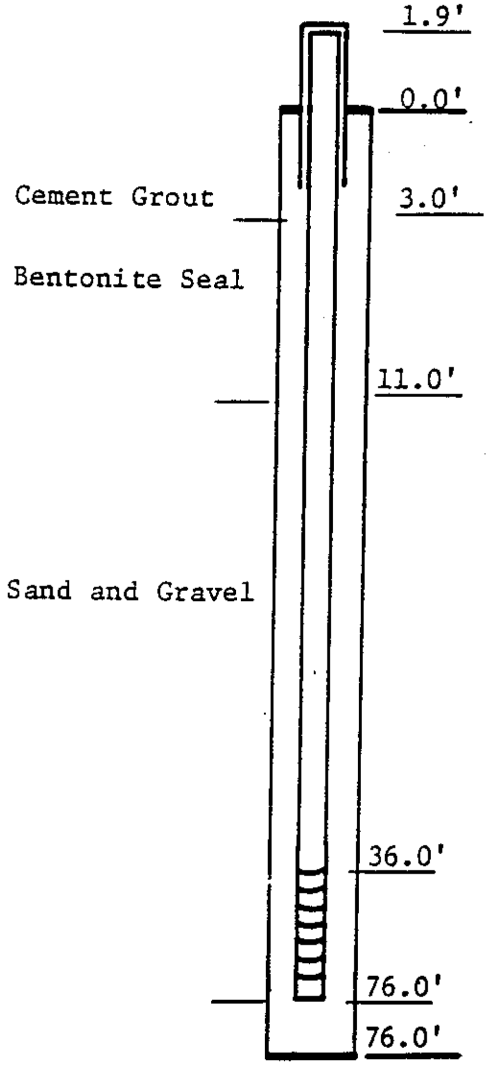
BORING LOCATION: As shown on boring location plan
DATE INSTALLED: 9-23-81
SURFACE ELEVATION: 731.47'
TOP OF PIPE ELEVATION: 733.39'*

TYPE OF PIEZOMETER: Monitoring Well - 4" Schedule 40 PVC Casing

DATE	WATER SURFACE DEPTH (FT.)	WATER SURFACE ELEV. (FT.)	
9-23-81	41.0	690.5	
9-24-81	41.0	690.5	
10-5-81	42.0	689.5	

INSTALLATION DESCRIPTION

DESCRIPTION DEPTH (FT.)



TECHNICIAN PATTERSON

JOB NO. 26418

NOTES: PVC screen length - 40 feet
Screen slot size - 0.010 inches
Guard pipe - 5" x 4' 2" black iron with locking cap
*Elevation given is top of guard pipe without cap

LOG OF WELL NO. W-4-S

GROUNDWATER MONITORING WELLS, HARRISON RADIATOR,
DAYTON OPERATIONS, MORAINE, OHIO

BORING LOCATION: As shown on boring location plan

DATE INSTALLED: 9-28-81

SURFACE ELEVATION: 726.66'

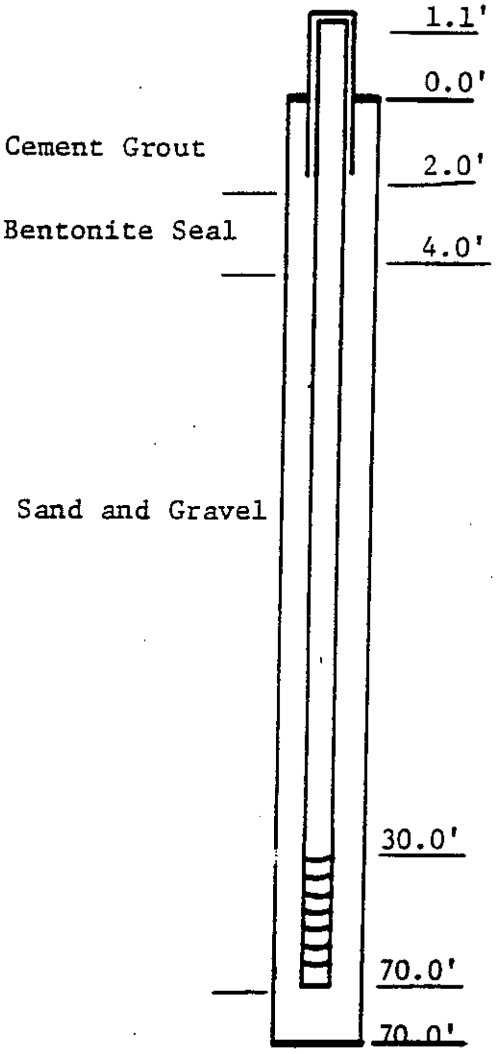
TOP OF PIPE ELEVATION: 727.80'*

TYPE OF PIEZOMETER: Monitoring Well - 4" Schedule 40 PVC Casing

DATE	WATER SURFACE DEPTH (FT.)	WATER SURFACE ELEV. (FT.)	
9-28-81	37.6	689.1	
9-29-81	37.6	689.1	
10-5-81	37.3	689.4	

INSTALLATION DESCRIPTION

DESCRIPTION	DEPTH (FT.)



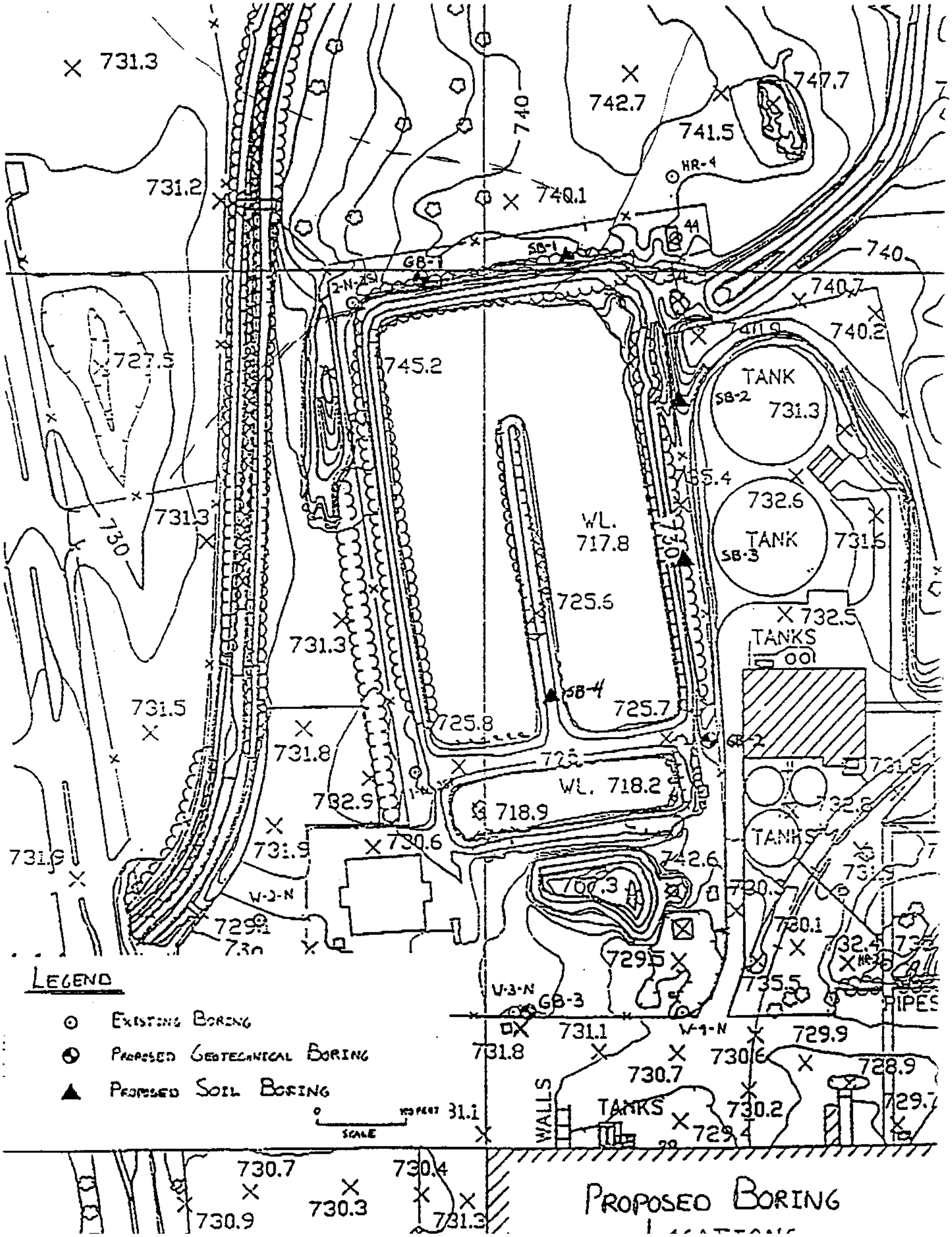
TECHNICIAN PATTERSON

JOB NO. 26418

NOTES: PVC screen length - 40 feet
Screen slot size - 0.010 inches
Guard pipe - 5" x 4'- 2" black iron with locking cap
* Elevation given is top of guard pipe without cap

North Lagoon Investigation Soil Borings

GERAGHTY & MILLER
ENGINEERS, INC.



PROJECT NO. CHD19.07

BORE HOLE NO. GB-1

PROJECT Harrison Radiator Soil Boring Program

LOCATION Moraine, Ohio

DRILLING CONTRACTOR Bowser-Morner

DRILLING EQUIPMENT Mobile Drill B-61 $3\frac{1}{4}$" H.S.A.

HYDROGEOLOGIST A. G. McCorkle

DRILLER T. Boehmer / K. Boehmer

DATE START / TIME 8/28/89 10:00 am

DATE FINISH / TIME 8/29/89 11:00 am

SURFACE ELEVATION approx. 739.5

TOTAL DEPTH 100.5'

WELL CASING

SCREEN TYPE

LENGTH

SLOT

REMARKS Borehole abandoned

BORE HOLE LOG

DEPTH (FT.)	SAMPLE (NO.)	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)
	1	3-4-12	0.5	TOPSOIL: clay (70-80%); fine-med sand (20-30%); tr. gravel (0-10%); dk. brn. to blk., damp, loose, cohesive		0.0
5	2	10-9-7	0.5	COBBLES (60%); cs gravel (20%); med-cs sand (20%); tr. fine sand (0-10%); lt. brn., damp, loose, cohesionless, rounded, calcareous		0.1
10	3	10-10-14	0.6	cs. SAND (40-50%); fine-med sand (30%); fine gravel (20-30%); pebbles (0-10%); silt and v. fine sand (0-10%); med to dk. brwn., damp, slightly cohesive, subrounded, calcareous		0.1
15	4	30-70/6"	0.8	cs. GRAVEL and PEBBLES (50-60%); fine-med. gravel (20-30%); med. - cs. sand (20-30%); fine sand (0-10%); lt. brn., damp to moist, cohesionless, rounded, calcareous		0.0
20	5	19-44-50	1.5	med-cs GRAVEL (40-50%); cs. sand and fine gravel (20-30%); fine-med sand (20-30%); pebbles (10-20%); v. fine sand and silt (0-10%); lt. brn. to grey, moist, stiff, cohesionless, rounded, calcareous		0.3
25	6	25-160-44	1.0	med-cs. GRAVEL (as above).	sample collected with 3-inch split-spoon; analytical sample: VOC, Cd, Cr, Pb.	N/A
30	7	25-27-44	1.2	med-cs GRAVEL (50-60%); med-cs sand (20-30%); v. fine - fine sand (10-20%); pebbles (10-20%); lt. olive grey, moist, slightly cohesive, rounded, calcareous	water at 31'	0.4
	8	36-90-97	1.5	cs. GRAVEL and PEBBLES (40-50%); med-cs sand (20-30%); fine-med gravel (20-30%); cobbles (10-20%); fine-med sand (0-10%); v. fine sand (0-10%); lt. grey, water bearing, stiff, cohesionless, well rounded, calcareous	sample collected with 3-inch split-spoon; analytical sample: VOC, Cd., Cr Pb.	N/A

GRAPHIC LOG

PROJECT NO. OH019.07

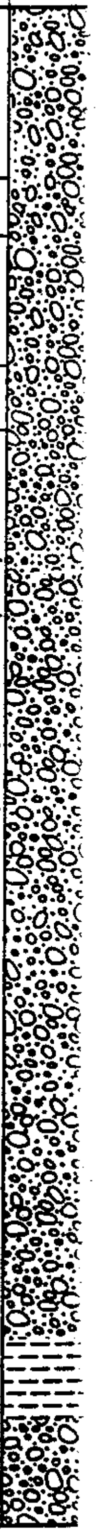
BORE HOLE NO. GB-1

PROJECT Harrison Radioator Soil Boring Program

LOCATION Moraine, Ohio

REMARKS Borehole abandoned

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
40	9	156-57-72	0.5	CS. GRAVEL and PEBBLES (40-50%); med-cs sand (20-30%); fine-med gravel (20-30%); cobbles (10-20%); fine-med sand (0-10%); v. fine sand (0-10%); lt. grey, water bearing, stiff, cohesionless, well rounded; calcareous		5.4	
45	10	76-94-106	1.0	cs. GRAVEL and PEBBLES (as above)		0.2	
50	11	36-124-138	1.5	cs. SAND (60-70%); pebbles (10-20%); fine-med sand (10-20%); fine-cs. gravel (10-20%); lt. olive grey, water bearing, v.stiff, cohesionless, rounded, calcareous		0.4	
55	12	44-74-78	1.5	cs. SAND (70-80%); med-cs. gravel (10-20%); fine-med. sand (10-20%); orange-brn. (54'-55')/ med-olive grey (55'-55.5'); water bearing, stiff, cohesionless, well rounded, calcareous		0.6	
60	13	89-167-44	1.5	cs. SAND (as above) tr. CLAY at 60.5'; grey, moist, loose		0.8	
65	14	31-69-75	1.0	med-cs. SAND (70-80%); pebbles (10-20%); fine sand (10-20%); med. olive grey, water bearing, stiff, slightly cohesive, well rounded, calcareous	CLAY layer at 67.5'	0.8	
70	15	89-116/5"	1.0	med-cs SAND (as above) 70.0'-CLAY w/much cs. sand, olive grey, dense, damp. 70.2'-cs. GRAVEL (60-70%); med sand-med gravel (20-30%); tr. silt and clay (10-20%); olive grey, slightly cohesive	penetrometer on clay:>4.5tsf for 3 trials.	0.6	
	16	107-64-84	1.5	sample description next page		0.8	



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PAGE 3 OF 3

PROJECT NO.	OH019.07
BORE HOLE NO.	GB-1
PROJECT	Harrison Radiator Soil Boring Program
LOCATION	Moraine, Ohio
REMARKS	Borehole abandoned

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
80	17	38-42-57	1.5	74-74.5': cs GRAVEL (80-90%); fine-cs. sand (10-20%); silt and v. fine sand (0-10%); lt. olive grey, well rounded, slightly cohesive 74.5-75.5': fine-med SAND (70-80%); cs. sand and olive gravel (10-20%); pebbles and cobbles (10-20%); lt. olive grey, water bearing, well rounded, cohesionless.		0.6	
85	18	3-4-7	1.5	fine-med SAND (as above)		0.1	
90	19	13-42-67	1.5	med-cs. SAND (50-60%); fine-med gravel (10-20%); cs. gravel and pebbles (10-20%); v. fine-fine sand (10-15%); tr clay (0-5%); med olive grey, water bearing, slightly cohesive, subrounded to subangular, calcareous		0.1	
95	20	98-49-56	1.1	med-cs SAND (as above) tr. cobbles		0.3	
100	21 -	43-39-58	0.0	NO SAMPLE RECOVERED (SAND)		N/A	
				100.5' END OF LOG BOREHOLE GROUTED TO SURFACE WITH 5% BENTONITE-CEMENT GROUT			
105							
110							

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PAGE 1 OF 3

PROJECT NO. OH019.07

BORE HOLE NO. GB-2

PROJECT Harrison Radiator Soil Boring Program

LOCATION Moraine, Ohio

DRILLING CONTRACTOR Bowser-Morner

DRILLING EQUIPMENT Mobile Drill B-61, 3¼-inch H.S.A.

HYDROGEOLOGIST A. G. McCorkle

DRILLER T. Boehmer

DATE START / TIME 8/29/89 3:30 pm

DATE FINISH / TIME 8/30/89 6:30 pm

SURFACE ELEVATION approx. 733.0

TOTAL DEPTH 100.5 feet

WELL CASING

SCREEN TYPE

LENGTH

SLOT

REMARKS Borehole abandoned

BORE HOLE LOG

DEPTH (FT.)	SAMPLE (NO.)	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
	1	4-6-21	1.0	5" TOPSOIL, then: med-cs GRAVEL (50-60%); fine-med sand (20-30%); cs sand (10-20%); tr cobbles (0-10%); dk olive brn, damp to dry, slightly cohesive, rounded, calcareous (90%)		0.0	
5	2	5-8-5	0.6	CLAY (60-70%); fine-cs sand (10-20%); cs gravel and pebbles (10-20%); tr fine-med gravel (0-10%); tr silt (0-10%); dk olive brn, damp, loose cohesive		0.1	
10	3	5-6-10	0.5	CLAY (as above) except: mottled lt olive grey and brn		0.8	
15	4	20-12-14	0.8	fine-med SAND (40-50%); fine-med gravel (20-30%); cs sand (10-20%); silt and clay (0-10%); mottled lt grey and brn, damp, slightly cohesive, subrounded, calcareous (90%)		1.4	
	5	33-90-104	1.2		sample collected at 17.5' with 3-inch split spoons; analytical sample: VOC, Cr, Cd, Pb.	N/A	
20	6	28-48-44	0.9	fine-med SAND (30-40%); cobbles (20-30%); fine-med gravel (10-20%); cs sand (10-20%); tr silt and clay (0-10%); mottled orange-brn (Fe staining) and grey, damp, slightly cohesive, rounded, calcareous (90%)	water at 24.0 feet	2.6	
25	7	20-30-34	1.5	med-cs SAND (30-40%); cs gravel (30-40%); fine sand (10-20%); pebbles (0-10%); silt and v. fine sand (10-20%); fine-med gravel (0-10%); med brn, water bearing, still, cohesionless, sub to well rounded, calcareous (90%)		1.2	
	8	9-15-31	1.2		Analytical sample at 25.5': VOC, Cr, Cd, Pb.	N/A	
30	9	18-32-38	1.5	med-cs SAND (as above)		0.7	
	10	16-32-38	1.5	sample description next page		1.2	

PROJECT NO. OH019.07

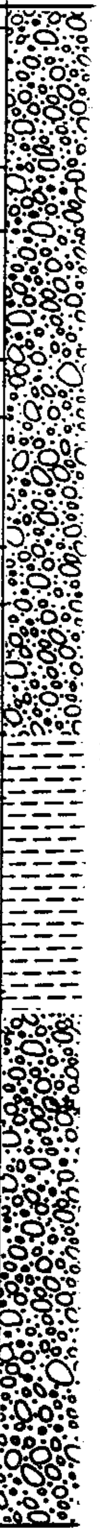
BORE HOLE NO. GB-2

PROJECT Harrison Radiator Soil Boring Program

LOCATION Moraine, Ohio

REMARKS Borehole abandoned

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
				fine-med SAND (60-70%); cs sand and fine gravel (30-40%); med-gravel (0-10%); silt and v. fine sand (0-10%); med olive brn, water bearing, stiff, subrounded, calcareous (90%)			
40	11	37-43-43	1.5	fine-med SAND (50-60%); cs sand and fine gravel (20-30%); med-cs gravel (10-20%); v. fine sand and silt (0-10%); orange brn (Fe staining), water bearing, stiff, subrounded, calcareous (90%)		0.4	
45	12	29-44-59	1.5	cs GRAVEL and PEBBLES (30-40%); fine-med sand (30-40%); cs sand (10-20%) fine-med gravel (0-10%); silt and v. fine sand (0-10%); med- olive gray, water bearing, stiff, subangular to subrounded, calcareous (90%)		0.6	
50	13	17-38-30	1.2	GRAVEL and PEBBLES (as above)		0.2	
55	14	48-68-118	1.5	CLAY (70-80%); cs sand (20%); fine gravel (10%); silt (0-10%); med olive grey, v. stiff, damp	penetrometer >4.5 tsf, 3 trials ATTEMPT TO RECOVER SHELBY TUBE SAMPLES FROM 55.5' and 59.0' FAILED, TUBES CRUSHED	0.4	
60	17	109-200/4"	0.9	CLAY (as above)		N/A	
	18	95-150/4"	1.0	med-cs SAND (50-60%); fine-cs gravel (20-30%); pebbles and cobbles (10-20%); silt and v fine sand (10-20%); med olive grey, v. stiff, wet, slightly cohesive	Samples saved for geotechnical tests. Penetrometer: >4.5 tsf, 3 trials	N/A	
65	19	50-75-107	1.5	med-cs SAND (as above)		0.9	
70	20	38-34-54	1.5	med-cs SAND (40-50%); fine-cs gravel (20-30%); pebbles and cobbles (20-30%); silt and v. fine sand (0-10%); med olive grey, water bearing, stiff, cohesionless, culcareous (90%)		0.3	
	21	7-22-44	1.5	sample description next page		0.7	



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PROJECT NO. OH019.07

BORE HOLE NO. GB-2

PROJECT Harrison Radiator Soil Boring Program

LOCATION Moraine, Ohio

REMARKS Borehole Abandoned

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
				fine-med SAND (80%); v. fine sand (15%); med-cs gravel (5%); med olive grey, water bearing, stiff, cohesionless, calcareous (30%); crystalline (50%)			
80	22	5-21-33	1.2	fine-med SAND (as above)		1.0	
85	23	25-48-72	1.5	fine-med SAND (as above)		1.0	
90	24	11-42-50	1.5	fine-med GRAVEL (30-40%); med-cs sand (20-30%); pebbles (10-20%); v. fine-fine sand (10-20%); med olive grey, water bearing, stiff, cohesionless, rounded, calcareous (90%)		0.4	
95	25	20-72-89	1.5	fine-med GRAVEL (as above)		0.5	
100	26	22-44-45	1.5	fine-med GRAVEL (as above)		0.1	
				100.5 feet END OF LOG BOREHOLE GROUTED TO SURFACE WITH 5% BENTONITE - CEMENT GROUT			
105							
110							

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PAGE 1 OF 2

PROJECT NO. OH019.07

BORE HOLE NO. SB-1

PROJECT Harrison Radiator Soil Boring Program

LOCATION Moraine, Ohio

DRILLING CONTRACTOR Bowser-Morner

DRILLING EQUIPMENT Mobile Drll B-61; 3¼" H.S.A.

HYDROGEOLOGIST A. G. McCorkle

DRILLER T. Boehmer

DATE START / TIME 8/25/89 10:00 am

DATE FINISH / TIME 8/25/89 3:00 pm

SURFACE ELEVATION approx. 739.5

TOTAL DEPTH 40.5 ft

WELL CASING

SCREEN TYPE

LENGTH

SLOT

REMARKS Borehole abandoned

DEPTH (FT.)	SAMPLE (NO.)	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	BORE HOLE LOG LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
	1	4-6-9	1.0	3" TOPSOIL, then: CLAY (70-80%); med-cs sand (10-20%); silt (10-20%); tr fine sand (0-10%); reddish brown, damp, loose	change at 2 feet	0.0	
5	2	7-13-39	1.2	fine-med SAND (80-90%); cs sand to med gravel (10-20%); lt grey ("salt and pepper") with iron staining, damp, loose		0.0	
10	3	24-24-30	0.6	cs SAND (80%); fine-med sand (10%); cs gravel (0-10%); fine-med gravel (0-10%); lt grey with iron staining, damp, cohesionless, sub to well rounded	pebbles and cobbles come up with augers	0.1	
15	4	19-40-50	0.9	cs GRAVEL (50%); fine-med sand (30%); silt and v. fine sand (10%); tr cobbles (0-10%); tr clay (0-5%); lt grey and brown (clay), moist, slightly adhesive, sub to well rounded	majority of gravel is calcareous	0.4	
20	5	44-26 36	1.0	PEBBLES and COBBLES (40-50%); med-cs sand (20-30%); med-cs gravel (10-20%); v. fine-fine sand (0-10%); lt grey, moist, slightly cohesive, well rounded	majority of gravel is calcareous		
25	6	54-56-56	1.5	cs GRAVEL (50-60%); pebbles and cobbles (20-30%); fine-cs sand (10-20%); tr fine sand (0-10%); lt grey with Fe staining, damp, cohesionless	collected with 3-inch split-spoon, analytical sample: VOC, Cd, Cr, Pb		
30	7	32-48-36	0.9	cs GRAVEL (as above)	water between 31' and 34'	0.4	
	8	30-54-100	1.5	sample description next page (34-35.5')		0.1	

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PAGE 2 **OF** 2

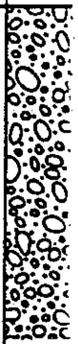
PROJECT NO. OH019.07

BORE HOLE NO. SB-1

PROJECT Harrison Radiator Soil Boring Program

LOCATION Moraine, Ohio

REMARKS Borehole abandoned

DEPTH (FT.)	SAMPLE NO.	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
				cs GRAVEL (50-60%); pebbles and cobbles (10-20%); fine-cs sand (10-20%); v. fine sand and silt (10-20%); tr clay (0-10%); lt brn, water bearing, slightly cohesive, well rounded	sample collected from 34' to 35.5' interval		
40	9	30-54-100	1.5	COBBLES (30%); cs sand (30%); fine-med gravel (20%); cs gravel and pebbles (20% ; v. fine sand (0-10%); lt brn, cohesionless, water bearing, well rounded	sample collected with 3-inch split-spoon; analytical sample: VOC, Cd., Cr, Pb		
				40.5 feet END OF LOG BOREHOLE GROUTED TO SURFACE WITH 10% BENTONITE - CEMENT GROUT			
45							
50							
55							
60							
65							
70							

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PAGE 1 OF 1

PROJECT NO. OH019.07

BORE HOLE NO. SB-2

PROJECT Harrison Radiator Soil Boring Program

LOCATION Moraine, Ohio

DRILLING CONTRACTOR Bowser-Morner

DRILLING EQUIPMENT Mobile Drill B-61, $3\frac{1}{2}$-inch H.S.A.

HYDROGEOLOGIST A. G. McCorkle

DRILLER T. Boehmer

DATE START / TIME 8/31/89 7:00 am

DATE FINISH / TIME 8/31/89 10:00 am

SURFACE ELEVATION approx. 736.0

TOTAL DEPTH 33.5'

WELL CASING

SCREEN TYPE

LENGTH

SLOT

REMARKS Borehole abandoned

DEPTH (FT.)	SAMPLE (NO.)	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	BORE HOLE LOG		OVA/PID (PPM)	GRAPHIC LOG
				LITHOLOGIC DESCRIPTION	REMARKS		
	1	5-18-15	0.5	2" TOPSOIL, then; PEBBLES and COBBLES (50-60%); fine-cs sand (20%); fine-cs gravel (20%); silt and clay (0-10%); dk brn, damp, slightly cohesive		0.0	
5	2	9-15-16	0.0	COBBLE (NO SAMPLE RECOVERED)		N/A	
10	3	6-9-12	1.2	fine-med SAND (70%); silt and clay (20%); v. fine sand (5%); cs gravel and pebbles (5%); dk olive brn, slightly cohesive, well rounded, damp		0.1	
15	4	17-21-15	1.2	med-cs SAND (40%); cs gravel and pebbles (30%); v. fine sand (20%); silt and clay (10%); med grey with Fe staining, damp, stiff, rounded, calcareous (90%)		0.6	
20	5	109-99-37	1.5	PEBBLES and COBBLES to 21.0' then: med-cs SAND (as above)	sample collected with 3-inch split-spoon; analytical sample: VOC, Cd, Cr, Pb	N/A	
25	6	12-15-12	1.5	med-cs SAND (40%); fine-med gravel (30%); cs gravel (10%); silt and v. fine sand (10%); tr fine sand (0-10%); tr pebbles (0-10%); med olive grey with Fe staining, moist to wet, stiff, slightly cohesive, SA - SR, 70% calc, 30% cryst.	wet at 25.0'	0.3	
30	7	20-43-31	1.5	SAND and GRAVEL (as above)		0.4	
	8	18-35-46	1.0	med-cs SAND (50%); pebbles (20%); fine-cs gravel (20%); v. fine sand and silt (10%); lt brn, water bearing, stiff, well rounded, calcareous (90%)	sample collected with 3-inch split-spoon; analytical sample: VOC, Cd, Cr, Pb.	N/A	
				33.5 feet END OF LOG BOREHOLE GROUTED TO SURFACE WITH 5% BENTONITE - CEMENT GROUT			

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PAGE 1 OF 1

PROJECT NO. CH019.07

BORE HOLE NO. SB-3

PROJECT Harrison Radiator Soil Boring Program

LOCATION Moraine, Ohio

DRILLING CONTRACTOR Bowser-Morner

DRILLING EQUIPMENT Mobile Drill B-61, 3¼ inch H.S.A.

HYDROGEOLOGIST A. G. McCorkle

DRILLER T. Boehmer

DATE START / TIME 8/31/89 10:30 am

DATE FINISH / TIME 8/31/89 2:30 pm

SURFACE ELEVATION approx. 735.5

TOTAL DEPTH 30.5'

WELL CASING

SCREEN TYPE

LENGTH

SLOT

REMARKS Borehole abandoned

BORE HOLE LOG

DEPTH (FT.)	SAMPLE (NO.)	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)
	1	7-11-14	1.0	TOPSOIL: CLAY (80%); silt (10-20%); cs gravel and pebbles (0-10%); dk brn, cohesive, damp		0.3
5	2	18-18-27	1.4	med-cs SAND (60%); fine-cs gravel (30%); v. fine-fine sand (0-10%); pebbles (0-10%); lt grey with Fe staining, damp, slightly cohesive, well rounded		0.0
10	3	44-34-37	1.5	SAND and GRAVEL (as above)		1.3
15	4	40-37-43	1.5	SAND and GRAVEL (as above)		0.6
20	5	70-84-100	1.2	cs SAND (40%); fine-med sand (20%); pebbles (20%); cobbles (0-10%); fine-cs gravel (0-10%); med olive grey, moist to wet, v. stiff, cohesionless, rounded, calcareous (90%)	sample collected with 3-inch split-spoons; analytical sample: VOC, Cd Cr, Pb	N/A
25	6	20-44-27	1.5	fine-med SAND (30-40%); cs sand and fine gravel (20-30%); v. fine sand (10-20%); pebbles (10-20%); med-cs gravel (0-10%); med olive grey with Fe staining, moist to wet, stiff, slightly cohesive, SA - SR, calcareous (80%)		1.2
30	7	20-39-27	1.5	SAND and GRAVEL (as above)	sample collected with 3-inch split-spoon; analytical sample: VOC, Cd , Cr, Pb	
				30.5 feet END OF LOG BOREHOLE GROUTED TO SURFACE WITH 5% BENTONITE - CEMENT GROUT		

GRAPHIC LOG

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PAGE 1 OF 1

PROJECT NO. OH019.07

BORE HOLE NO. SB-4

PROJECT Harrison Radiator Soil Boring Program

LOCATION Moraine, Ohio

DRILLING CONTRACTOR Bowser-Morner

DRILLING EQUIPMENT Mobile Drill B-61, 3½ inch H.S.A.

HYDROGEOLOGIST A. G. McCorkle

DRILLER T. Boehmer

DATE START/TIME 8/31/89 3:00 pm

DATE FINISH/TIME 9/1/89 9:00 am

SURFACE ELEVATION approx. 725.6

TOTAL DEPTH 26.5'

WELL CASING

SCREEN TYPE

LENGTH

SLOT

REMARKS Borehole abandoned

BORE HOLE LOG

DEPTH (FT.)	SAMPLE (NO.)	BLOW COUNT PER 6 IN.	RECOVERY (FT.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
	1	4-5-10	1.0	1" TOPSOIL, then: CLAY (80%); silt (10-20%); tr gravel (0-10%); dk brn, damp, loose		0.0	
5	2	20-29-29	0.8	PEBBLES (40%); fine-med sand (30%); cs sand and fine gravel (10%); med-cs gravel (10%); silt (0-10%); lt olive grey with Fe staining, damp, slightly cohesive, calcareous (90%)		1.0	
10	3	4-6-10	1.5	fine-med SAND (80-90%); cs sand (10-20%); med olive brn, loose, moist, subrounded, well sorted, calcareous (?), cohesionless		0.0	
15	4	12-20-15	1.5	med-cs SAND (50%); med-cs gravel (20%); pebbles (20%); v. fine-fine sand (0-10%); silt (0-10%); med olive grey with Fe staining, wet, stiff, well rounded, calcareous (90%)		0.2	
20	5	19-21-26	1.5	SAND and GRAVEL (as above)		0.2	
25	6	36-34-56	1.5	SAND and GRAVEL (as above)	sample collected with 3-inch split-spoon; analytical sample: VOC, Cd, Cr, Pb.	N/A	
				26.5 feet END OF LOG BOREHOLE GROUTED TO SURFACE WITH 5% BENTONITE - CEMENT GROUT			
30							

Production Wells

Production Well 31

Reynolds
Supply, Inc.

December 31, 1982

Harrison Radiator
P.O. Box 824
Dayton, Ohio 45401

Attention: Mr, Mike Hrosso

Reference: Well 31 - Compressor Building

Dear Mr. Hrosso:

In accordance with Harrison Radiator's Purchase Order MN-34518-D, Reynolds Supply, Inc. (Reynolds) has completed rehabilitation of Harrison's Well 31. Because of Leakage noticed in the immediate vicinity of the well head when the pump was operating, it was decided to televise the well to inspect the casing and well screen for damage. No structural failures were observed. The video tape of the well is on file with Harrison.

The well was rehabilitated using a double disc surge block with high volume compressed air. The discharge was conveyed around the building to the sump pit. Following initial surging, the well was chemically treated with 1000 gallons of inhibited muratic acid. The acid was installed through Reynolds blow-off head to prevent spray on the building and equipment. Following approximately an 18-hour contact period, the well was surged and discharged to waste. The process continued until the well returned to its maximum efficiency.

A new pump was installed using the existing discharge head and motor. The information including pump curve is attached. To meet low volume water requirements and avoid operating the large pump, a small submersible booster pump was installed. The pump information is attached. Because of all the equipment in the well, it was not possible to get water level measurements. However, the large pump was operated to check well performance. Thus, the following is presented in Table 1.

Table 1 Pump Performance - Well 31 Harrison Radiator

Step	Qgpm	Discharge (pounds)
1	360	135
2	775	125
3	975	120
4	1182	100
5	1295+	80

- Rate well pumped at 1182 gpm for 2 hours.

The well responded very favorably to the rehabilitation efforts employed and should be more than capable of providing the required 1200 gpm the pump is designed for.

If you have any questions or desire clarification please feel free to call.

Respectfully submitted,

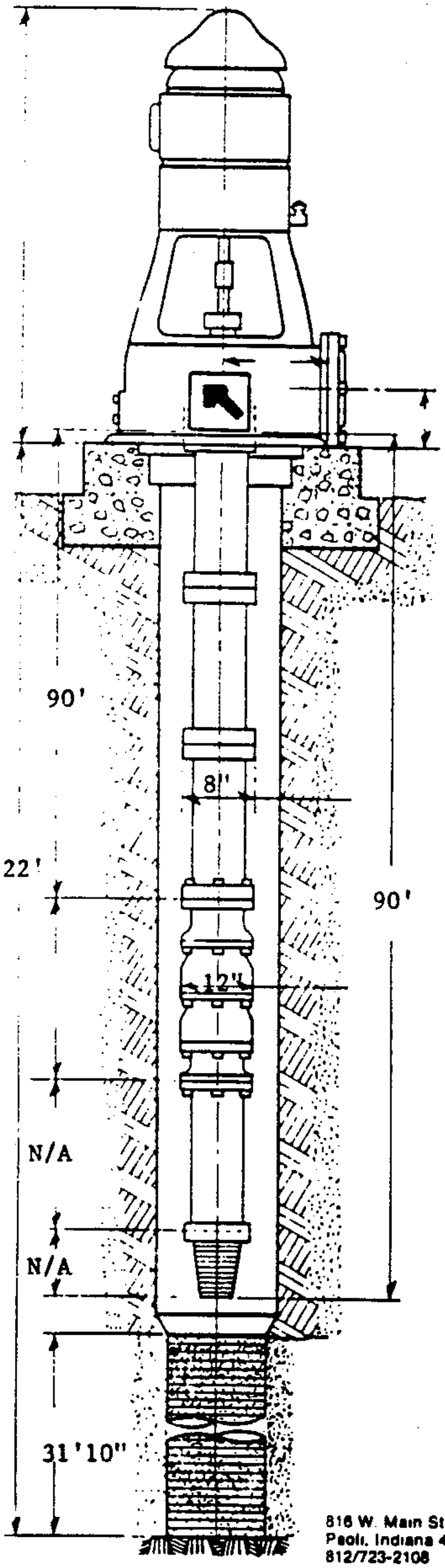
Leon Simpson
Ohio District Manager

Enc. Well log form
2- pump curves

LS/ct

Reynolds Supply, Inc.

urve



TURBINE PUMP INSTALLATION FOR:
Harrison Radiator
Compressor Building

WELL DESIGNATION NO. 31

12-H-135-5 SERIAL NUMBER
1200 GALLONS PER MINUTE
270 TOTAL HEAD IN FEET
5 ____ STAGES
1760 MOTOR SPEED
90 FEET OF SETTING
8" SIZE COLUMN
OIL TUBE
1 11/16" LINE SHAFT
____ SUCTION PIPE
100 H.P. 460 VOLT 34 CURRENT 60 cycle
water LUBRICATION
90 FEET OF AIRLINE
6/82 DATE INSTALLED

20" I.D. OF WELL
122 FEET DEEP FROM FOUNDATION
120 FEET DEEP FROM GRADE
30 STRAINER LENGTH — SLOT ____
____ STATIC LEVEL — DATE ____
____ " " — " ____
____ " " — " ____
____ " " — " ____
6-1-60 DATE DRILLED

PUMP REPAIRED — DATE ____
" " — " ____
" " — " ____

WELL ACID TREATED — DATE ____
" " " — " ____

COMMENTS —

Screen slot size top to bottom 2' - 70
8' = 125
7' - 40
13' - 125

Booster pump set to 50' on 2" plastic
Standard pump N-70-13 5 Hp

N.P.S.H. - FEET

13 Dia.

816 W. Main Street
Paoli, Indiana 47454
812/723-2108

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

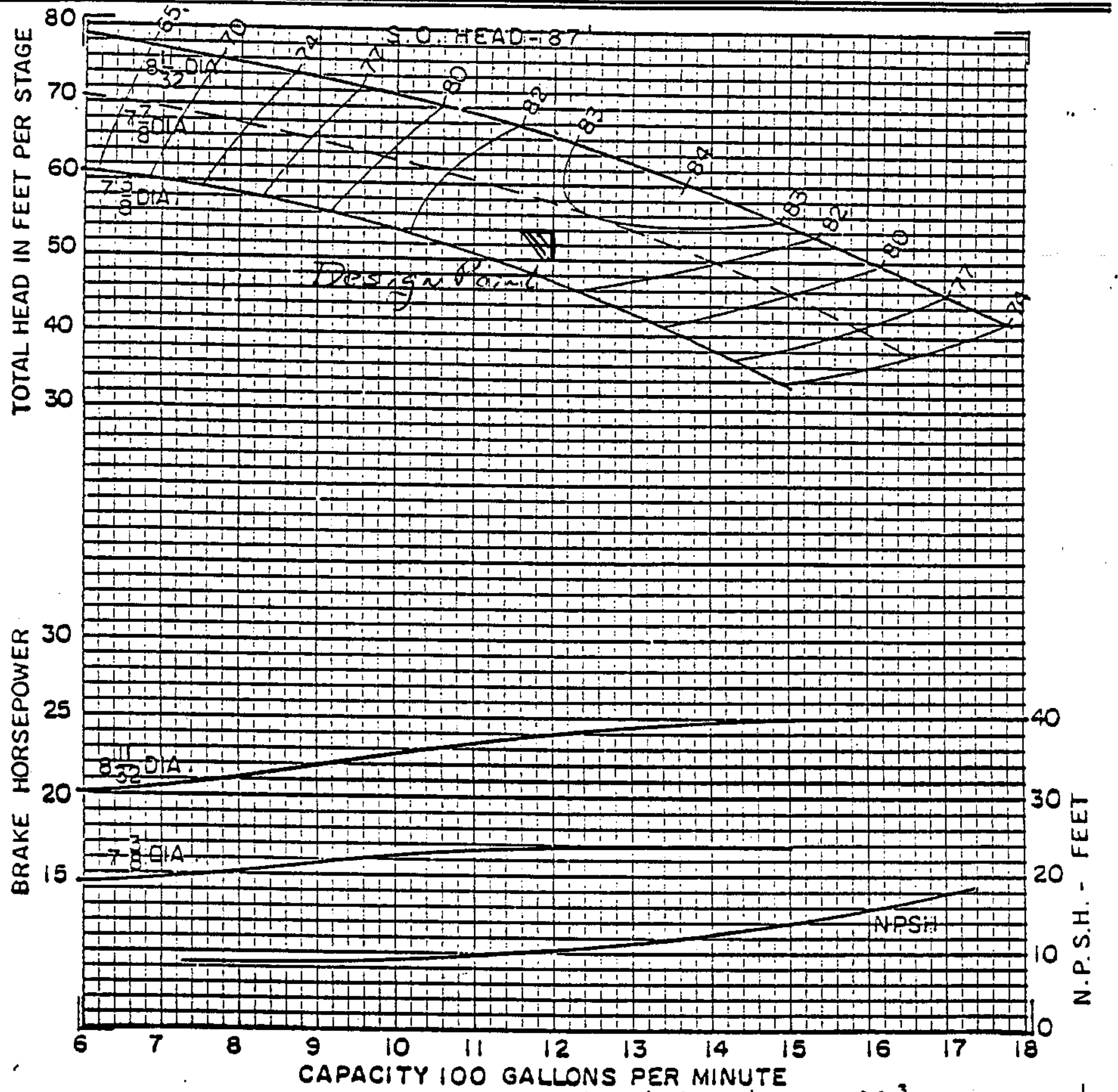
1421 Mellwood Ave.
Louisville, Ky. 40206
502/585-1241

6451 Germantown Road
Middletown, Ohio 4504
513-424-7287

12H-135
1760 RPM

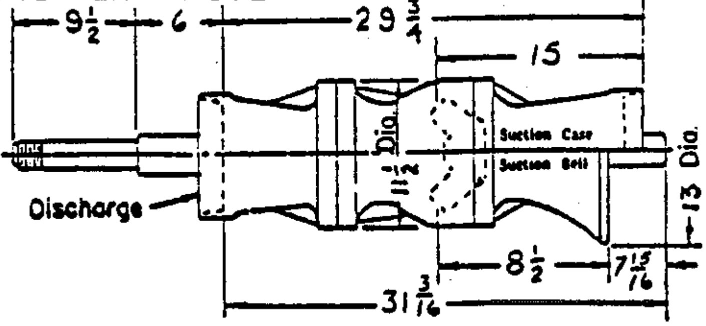
RATING CURVES
(60 CYCLES)

Harrison Radiator
Pump Performance Curve
Well 31



Efficiency shown is for 3 stages or more, with standard materials. For fewer stages or other materials change efficiency as shown.

No. of stages	Eff. change	MATERIAL	Eff. change	Standard materials Impeller — bronze Bowl — cast iron / enamelled						
6	—	Impeller-bronze	—	Thrust factor	9.8					
5	—	Impeller-c.i.	-1	Rotor wt. per stage (lbs.)	27					
4	—	Impeller-c.i. enm.	+1.5	Bowl wt. 1st stage (lbs.)	269					
3	—	Bowl-c.i. enm.	—	Bowl wt. add'l. stage (lbs.)	97					
2	-1	Bowl-cast iron	-2	Max. bowl horsepower	240	Impeller shaft diameter	1.75	Column pipe	8	10
1	-2	Bowl-bronze	-1.5	Impeller eye area (sq. in.)	21.3	Minimum impeller shaft end play	.53	Suction pipe	10	



For additional stages add $10\frac{1}{2}$ per stage.

WORTHINGTON

Litho'd in U.S.A.

SELECTION CHART

	DIS-CHARGE PRESSURE	HEAD IN FEET																								
	0	45	50	60	70	80	90	100	120	140	160	170	180	200	225	250	275	300	400	450	500	600	700	800	900	1000
PUMP TYPE	HP	GALLONS PER MINUTE																								
N70-4	1½	83	79	70	62	52	40																			
N70-5	2			84	77	71	64	57	40																	
N70-8	3							81	73	65	55	49	42													
→ N70-13	5										83	81	79	73	67	60	50	42								

THREE PHASE
60 CYCLE

2 POLE & 4 POLE

12-3 Cable

*MAX. LENGTH CABLE—MOTOR TO STARTER—FEET																		
WIRE SIZE A.W.G.	5 H.P.			7½ H.P.			10 H.P.			15 H.P.			20 H.P.			25 H.P.		
	230V	460V	575V	230V	460V	575V	230V	460V	575V	230V	460V	575V	230V	460V	575V	230V	460V	575V
NO. 14		620	956		434	694		331	518									
12	246	960	1470		687	1095		511	800		351	532						
10	390	1560	2400	270	1083	1730	208	830	1300		554	865		430	677			
8	685	2740		477	1910	3045	365	1460	2280	244	975	1520		756	1190		565	895
6	953			663	2650		508	2030		339	1350	2110	258	1050	1655		885	1390
4	1465			1020			781			521	2080		398	1615	2545	325	1350	2125
2				1550			1180			790			602			520	2050	3240
1							1450			965			736			640	2775	
0										1070			816			700		
00										1280			975			860		
000										1500			1145			1000		
0000													1348			1180		

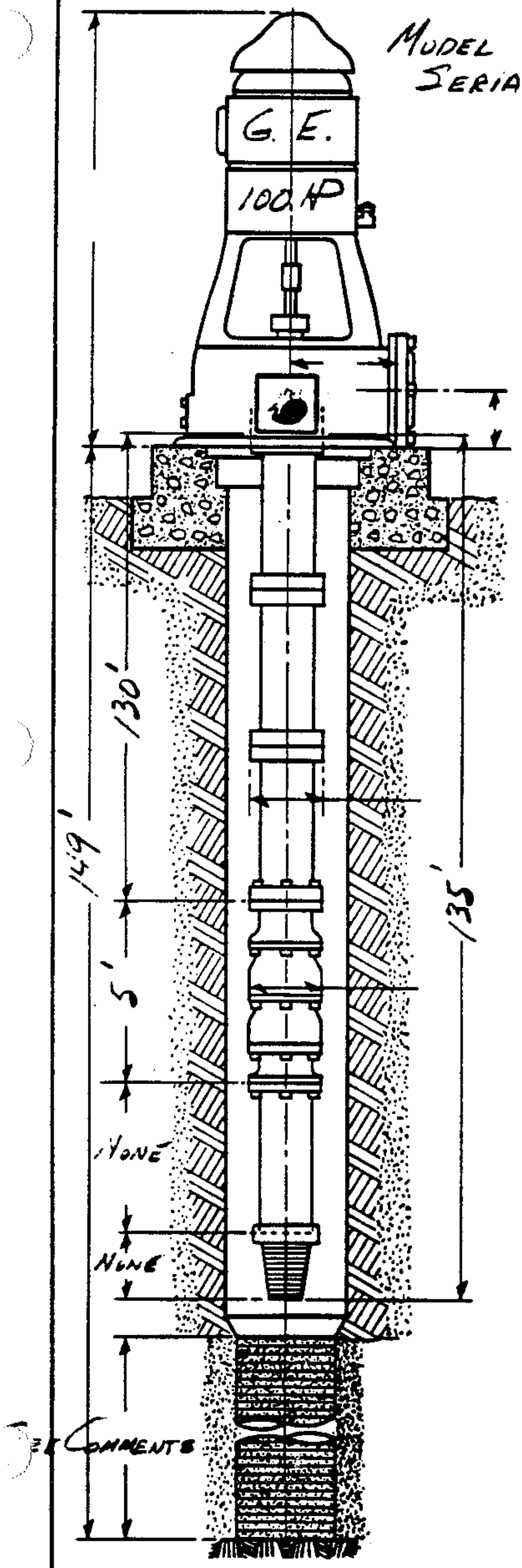
*MAX. LENGTH CABLE—MOTOR TO STARTER—FEET																		
WIRE SIZE A.W.G.	30 H.P.			40 H.P.			50 H.P.			60 H.P.			75 H.P.			90 H.P.		
	230V	460V	575V	230V	460V	575V	230V	460V	575V	230V	460V	575V	230V	460V	575V	230V	460V	575V
No. 14																		
12																		
10																		
8		476	740			625			927									
6		662	1030		555	865		680	1288		530	935			745			
4		1020	1584		855	1335	670	1045	1980	525	820	1520		655	1210			
2	386	1543	2400	285	1295	2025	1015	1585	3050	800	1250	2320	640	1000	1850		840	1550
1	472	1890	2940	347	1580	2470	1240	1935		975	1520	2825	780	1220	2260	650	1020	1885
0	524			386	1750	2735	1377	2151		1080	1685	3130	870	1360	2525	730	1140	2115
00	625			460	2090		1640	2560		1280	2000		1020	1600	2960	875	1365	2540
000	735			540	2460		1932	3020		1520	2375		1200	1875	3480	1025	1600	2970
0000	863			636	2890		2270			1790	2800		1430	2235	4150	1200	1875	3480

Based on a 5% voltage drop at motor whjile motor is running assuming full rated voltage at control terminals @ 75°C.

Production Well 32

MOODY'S, INC.

VANDALIA, OHIO MEADVILLE, PA.



Model SK 4444 XG 2E11
Serial # KSJ-1016112

TURBINE PUMP INSTALLATION FOR:

Frigidaire Div - G.M.C.

WELL DESIGNATION NO. 32

106041 SERIAL NUMBER Peerless
1000 GALLONS PER MINUTE
183 TOTAL HEAD IN FEET
12" - 5 STAGES
1750 MOTOR SPEED RPM
130 FEET OF SETTING
10" SIZE COLUMN Flanged
None OIL TUBE
1 13/16" LINE SHAFT
None ______ SUCTION PIPE
100 H.P. 460 VOLT. 3 CURRENT 60
Water LUBRICATION
______ FEET OF AIRLINE
12/5/60 DATE INSTALLED

20" O.D. ~~I.D.~~ OF WELL
149 FEET DEEP FROM FOUNDATION
147 FEET DEEP FROM GRADE
25' STRAINER LENGTH — ~~SLOT~~ See Below
44' STATIC LEVEL — DATE 12/8/1960
60' " " — " 9/66
71' " " — " 4/21/71
______ " " — " ______
12/5/60 DATE DRILLED

PUMP REPAIRED — DATE 5/9/66
" " — " 4/21/71
" " — " ______

WELL ACID TREATED — DATE 5/9/66
" " " — " 4/21/71

COMMENTS — Top of Screen 94'
15' Screen at Top.
30' 18" Pipe
10' Screen at Bottom.

MOODY'S, INC.

Phones
VANDALIA, OHIO: 898-4514
MEADVILLE, PA.: 6-1128

FORM TPI-762

LITHO IN U.S.A.

MOODY'S of Dayton, Inc.

ADDRESS REPLY TO:
P.O. BOX 155
VANDALIA, OHIO 45377
AC 513-898-3969

COPY

January 25, 1972

Frigidaire Division
General Motors Corporation
Dayton, Ohio 45401
ATTN: Mr. Ed Oda

Subject: Well Repairs # 32
P.O. # FKD-06907-B

Gentlemen:

We are sorry for the delay in forwarding the attached information pertaining to the subject job. Enclosed are two (2) copies of our pump and well data sheets giving pertinent dimensions and details on the well and pump. This information is for your files and future reference.

A short pumping test was conducted prior to hooking the pump into your system. Results were as follows.

Capacity	Disc Press.	Pumping Level
600 GPM	95 psi	78'-6"
1200 GPM	78 psi	87'

The pump produced 1600 GPM with an open valve and the recorded static level was 71 feet below the base. If you have any questions, or need more information, please advise.

Very truly yours,

MOODY'S OF DAYTON, INC.

Ed Wagner

Edward B. Wagner
President

EBW/jld

Specialists in Geophysical Surveys
GAMMA RAY AND ELECTRIC LOGS
RESISTIVITY SURVEYS
AERIAL PHOTOGRAPHY STUDIES

PUMP SALES AND REPAI
WELL DRILLI
WELL CLEANI

Production Well 35

MOODY'S of Dayton, Inc.
Since 1891
SUCCESSOR TO THE DON ROE CO.

ADDRESS REPLY TO
150 NORTH DIXIE DRIVE
P.O. BOX 155
VANDALIA, OHIO 45377
PHONE 898-4514 — 898-4971

June 29, 1966

Well #35

Frigidaire Division
General Motors Corporation
Dayton, Ohio 45401

Subject: 8-inch Test Well, Bldg. 14
P. O. # FKD-82618B

Attention: Mr. Charles Denning

Gentlemen

We are pleased to submit our report concerning the subject job. Drilling is completed, the casing has been removed from the ground, and the log is as follows:

DRILLER'S LOG -- Drilled by Herman Rush
Static Level - approximately 60 ft.

	0 - 5 ft.	Fill
	5 - 20 ft.	Gravel
	20 - 40 ft.	Gravel
	40 - 65 ft.	Sand and gravel
	65 - 70 ft.	Clay
	70 - 85 ft.	Sand and gravel
	85 - 105 ft.	Sand and gravel
	105 - 115 ft.	Coarse gravel, fine sand
	115 - 125 ft.	Gravel and sand
	125 - 135 ft.	Gravel and sand
	135 - 140 ft.	Sand
Screen.	140 - 150 ft.	Gravel and sand
	150 - 160 ft.	Gravel and Sand
	160 - 190 ft.	Gravel and sand
	190 - 192 ft.	Clay
	192 - 200 ft.	Blue clay

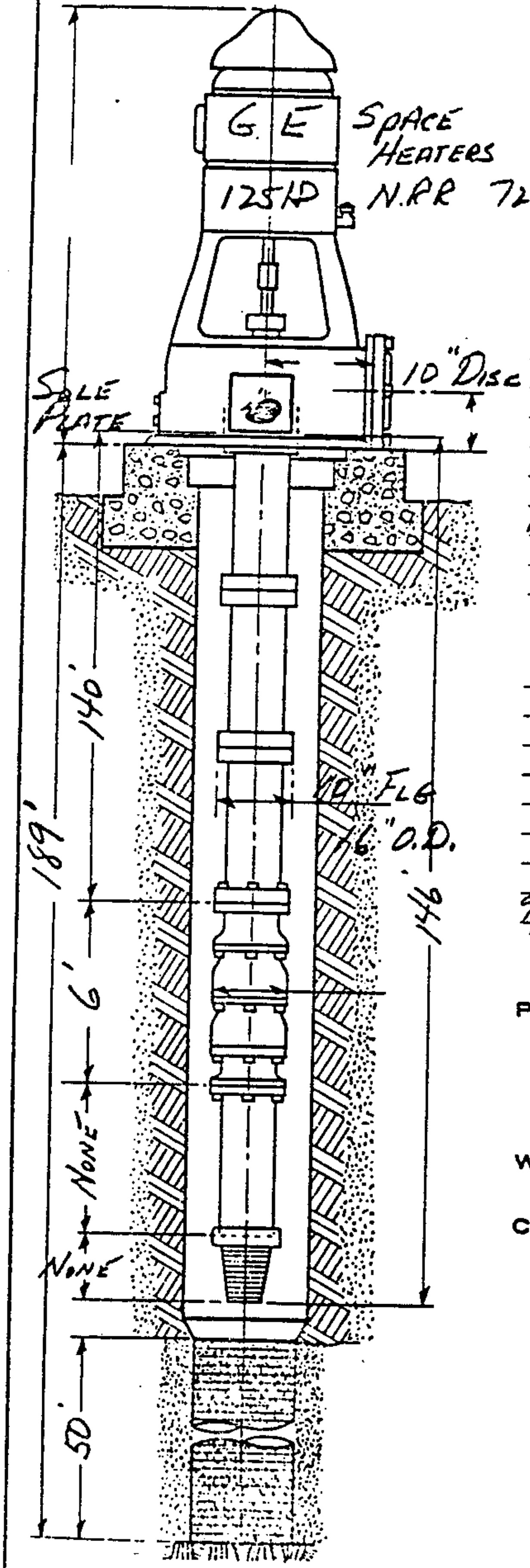
Enclosed are three (3) copies of the Gamma Ray Log for your future reference. The samples and log indicate excellent water bearing sand and gravel from 140 to 190 ft. The material between 140 and 155 ft. is somewhat cleaner than the area between 155 and 190 ft. This bottom area will require more development and surging in order to properly develope and clean. There is a medium sand streak between 130 and 140 ft. The sand is clean and can be screened but the slot size will be smaller in this area.

Specialists in Geophysical Surveys
GAMMA RAY AND ELECTRIC LOGS
RESISTIVITY SURVEYS
AERIAL PHOTOGRAPHY STUDIES

PUMP SALES AND REPAIRS
WELL DRILLING
WELL CLEANING

MOODY'S OF DAYTON, INC.

VANDALIA, OHIO



TURBINE PUMP INSTALLATION FOR:

Date - August 1st, 1972

WELL DESIGNATION NO. 35

Frigidaire Div. - GMC, Plant #2

N.RR 721-C-1705 SERIAL NUMBER

1200 GALLONS PER MINUTE

335 TOTAL HEAD IN FEET

13-MQH- 5 STAGES

1760 MOTOR SPEED

140' FEET OF SETTING

10" SIZE COLUMN (Flanged)

None OIL TUBE

1" 11/16 LINE SHAFT

None ______ SUCTION PIPE

125 H.P. 440 VOLT. 3 CURRENT 60

Water LUBRICATION

144' FEET OF AIRLINE

8/1/72 DATE INSTALLED

20" O.D. ~~I.D.~~ OF WELL

189 FEET DEEP FROM FOUNDATION

185' FEET DEEP FROM GRADE

50' STRAINER LENGTH — SLOT See Letter

80' STATIC LEVEL — DATE 8/1/72 9/26/66

66' " " — " 8/69

60' " " — " 9/23/66

______ " " — " ______

9/26/66 DATE DRILLED

PUMP REPAIRED — DATE 9/1966

" " — " 7/1972

" " — " ______

WELL ACID TREATED — DATE 7/1972

" " " — " ______

COMMENTS — Impellers Cut to 8 7/16"

FORM TPI-762

LITHO IN U.S.A.

MOODY'S of Dayton, Inc.

ADDRESS REPLY TO:
P.O. BOX 155
VANDALIA, OHIO 45377
AC 513-898-3969

August 10, 1972

Frigidaire Division
General Motors Corporation
Dayton, Ohio 45401

Attention: Mr. Ed Oda

Subject: P.O. # 329904-D
Well # 35

Gentlemen:

Work has been completed with regard to the subject job. Our final report is submitted for your files and information.

This well was drilled and tested in September 1966. The pump was pulled and repaired in September 1969 but the well was not chemically treated or revitalized at that time.

We pulled the pump in July 1972 and found several holes in two columns and the bowl assembly had deteriorated to the extent that it had to be replaced. Other pump repairs were effected at the same time. The well was throughly air surged and treated with chemicals while repairing the pump. A final pumping test was conducted upon placing the installation back into operation.

Final Pumping Test after Treatment

August 1, 1972 By - Walter Fields
Readings taken 4' above grade - 144' Airline Installed.

Time	Capacity	Airline Reading	Pumping Level	Draw Down	Disc. Press.
12:00	0	60'	84' (static)	0	167 psi
12:03	692 GPM	55'	89'	5'	140 psi
12:05	692 GPM	55'	89'	5'	140 psi
12:08	938 GPM	53'	91'	7'	120 psi
12:10	938 GPM	53'	91'	7'	120 psi
12:15	1148 GPM	50'-6"	93'-6"	9'-6"	100 psi
12:20	1148 GPM	50'-6"	93'-6"	9'-6"	100 psi
12:25	1452 GPM	48'-6"	95'-6"	11'-6"	80 psi
12:27	1452 GPM	48'-6"	95'-6"	11'-6"	80 psi
12:30	1598 GPM	47'	97'	13'	60 psi

MOODY'S INC.

Specialists in Geophysical Surveys
GAMMA RAY AND ELECTRIC LOGS
RESISTIVITY SURVEYS
AERIAL PHOTOGRAPHY STUDIES

PUMP SALES AND REPAIRS
WELL DRILLING
WELL CLEANING

Time	Capacity	Airline Reading	Pumping Level	Draw Down	Disc. Press.
12:35	1598 GPM	47'	97'	13'	60 psi
12:40	1598 GPM	47'	97'	13'	60 psi
12:45	1921 GPM	44'	100'	16'	20 psi

Pump shut down and hooked into system.

Based upon the above the well responded perfectly to the chemical treatment. Enclosed are two (2) copies of our pump and well data charts giving details on this installation. If you have any questions, or need more information, please advise.

Very truly yours,

MOODY'S OF DAYTON, INC.

Ed. Wagner

EDWARD B. WAGNER
President

EBW/jd

Production Well 36

Denning

36

MOODY'S of Dayton, Inc. *Since 1891*

SUCCESSOR TO THE DON ROE CO.

ADDRESS REPLY TO
150 NORTH DIXIE DRIVE
P.O. BOX 155
VANDALIA, OHIO 45377
PHONE 898-4514 — 898-4971

August 29, 1966

Frigidaire Division
General Motors Corporation
Dayton, Ohio 45401

Subject: PO # FKD-83234C

Attention: Charles Denning

Gentlemen

We are pleased to submit our report in connection with the subject job. The drilling is completed, the casing removed from the ground and the log is as follows:

DRILLER'S LOG - Herman Rush

Static Level - Approximately 61 Feet

0 - 8 ft.	Clay
8 - 18 ft.	Gravel
18 - 40 ft.	Clay, gravel & sand
40 - 60 ft.	Clay, gravel & sand
60 - 110 ft.	Sand & gravel
110 - 130 ft.	Fine sand
130 - 167 ft.	Clean sand & gravel
167 - 188 ft.	Clay & layer of shale
188 - 190 ft.	Clay
190 - 198 ft.	Sand & gravel
198 - 204 ft.	Blue shale

Enclosed are three (3) copies of the Gamma Ray Log for your future reference. The samples and log indicate excellent water bearing sand and gravel from 130 to 170 feet. However, the material from 130 to 155 ft. contains more silt and clay than the area below. This section of the formation will require more development and attention. The samples between 155 and 170 ft. were clean, loose and active formation and should produce large quantities of water efficiently.

We were disappointed that a clay layer was prevalent between 170 and 190 ft. This material is not water bearing and cannot be screened. The material from 190 to 200 ft. again is clean, active material and has good water bearing potential. It lies on top of bedrock shale and in our opinion should be screened. Our recommendations for well construction would be as follows:

The well should be approximately 200 ft. deep with 10 ft. of strainer installed from 190 to 200 ft. A twenty (20) foot section of 18-inch O.D. blank pipe installed from 170 to 190 ft. We would again screen from 135 to 170 ft.

with 35 feet of strainer openings.

By designing the well in this manner it will give you approximately 85 feet of available water to pump above the top of the screen. We feel the drawdown on this well will be greater than on Well #35 presently under construction, but feel the drawdown will be less than on many of your existing wells.

If you have any questions concerning our recommendations please contact us at your convenience. Thank you very much for your most valued business.

Very truly yours

MOODY'S of Dayton, Inc.

Ed Wagner

ED WAGNER
President

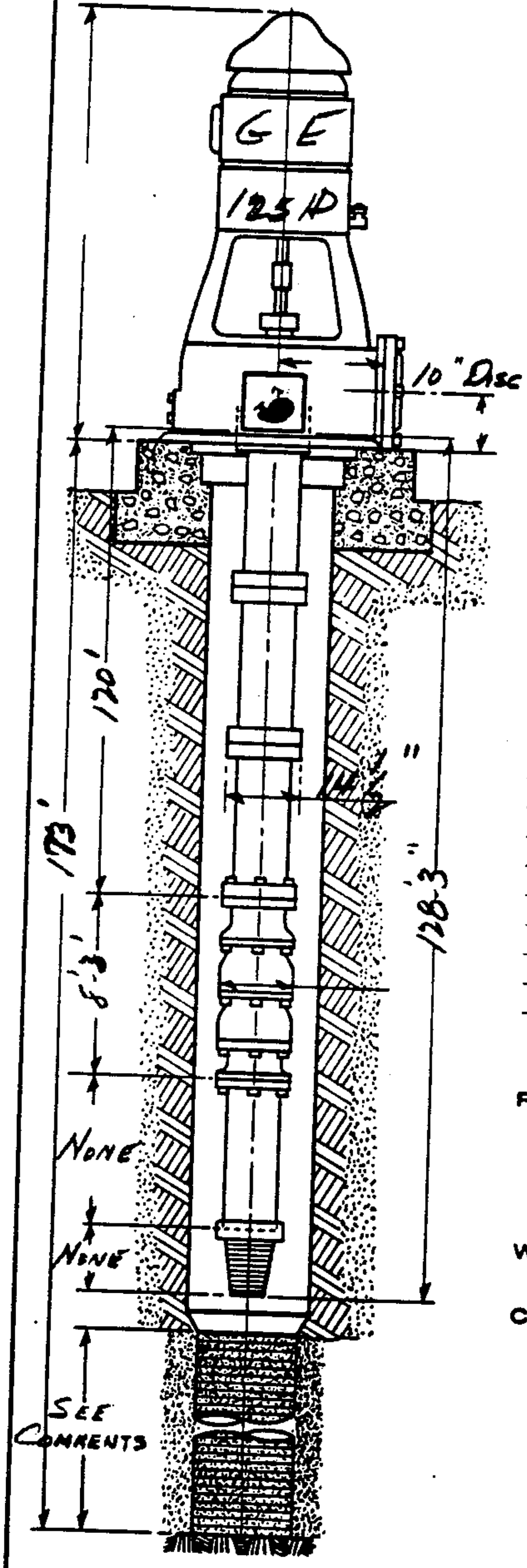
EW:djp

Enclosures

VANDALIA, OHIO

MOODY'S, INC.

MEADVILLE, PA.



TURBINE PUMP INSTALLATION FOR: Frigidaire Div. - G.M.C.

WELL DESIGNATION NO. 36

55717 SERIAL NUMBER Layne
1200 GALLONS PER MINUTE
310 TOTAL HEAD IN FEET
12-WMC-8 STAGES
1760 MOTOR SPEED
120 FEET OF SETTING
10" SIZE COLUMN
None OIL TUBE
1 11/16 LINE SHAFT
None SUCTION PIPE
125 H.P. 460 VOLT. 3 CURRENT 60
Water LUBRICATION
126 FEET OF AIRLINE
1/30/67 DATE INSTALLED

20 ~~I.D.~~ O.D. OF WELL
172 FEET DEEP FROM FOUNDATION
170 FEET DEEP FROM GRADE 25'- 95'-120
40' STRAINER LENGTH — SLOT 15'- 155'-170
65' STATIC LEVEL — DATE 1/30/67
73' " " — " 2/22/71
" " — "
" " — "
1/30/67 DATE DRILLED

PUMP REPAIRED — DATE 2/71
" " — "
" " — "

WELL ACID TREATED — DATE 2/22/71
" " " — "

COMMENTS — Split Screen 25' - 95' - 120'
15' - 155' - 170'

MOODY'S, INC.

Phones
VANDALIA, OHIO: 898-4514
MEADVILLE, PA.: 6-1128

FORM TPI-762

LITHO IN U.S.A.

Production Well 39

MOODY'S of Dayton, Inc.

SUCCESSOR TO THE DON ROE CO.

ADDRESS REPLY TO:
150 NORTH DIXIE DRIVE
P.O. BOX 155
VANDALIA, OHIO 45377
PHONE 898-4514 — 898-4971

9 January 1970

Frigidaire Division
General Motors Corporation
Dayton, Ohio 45401
Attn: Ed Oda

Subject: Well #39

Gentlemen:

Work on the subject job has been completed and we are pleased to submit our report for your files and future reference. The driller's log is as follows:

Driller's Log - by George Barker

0 - 28' - Top Soil & Gravel
28' - 38' - Clay
38' - 55' - Coarse Sand & Gravel (Cobbles)
55' - 70' - Good Coarse Sand & Gravel
70' - 90' - Dirth Sand & Gravel
90' - 115' - Good Coarse Sand & Coarse Gravel
115' - 145' - Blue Shale (Bedrock)

We installed twenty-five (25) feet of Cook red brass screen with lead packer and bail plug. The screen was 18 3/4" O.D. with slots comprised as follows:

90' - 95' - 5' - 80 Slot
95' - 115' - 20' - 100 Slot

Also enclosed are three (3) copies of the Gamma Ray log conducted on the 20" Well. The log is complete with notations and our interpretation.

Three (3) copies of our pump and well data charts are enclosed showing dimensions and other pertinent data about the well and the pump installed.

The pumping test was conducted on October 22nd, 1969 with the results tabulated below. All readings were taken approximately 1' 6" above grade.

Specialists in Geophysical Surveys
GAMMA RAY AND ELECTRIC LOGS
RESISTIVITY SURVEYS
AERIAL PHOTOGRAPHY STUDIES

PUMP SALES AND REPAIRS
WELL DRILLING
WELL CLEANING

Pumping Test Results

Time	Pumping Level	Draw Down	Capacity GPM	Orifice
9:25	62' (Static)	-	-	-
9:30	73' 7"	11' 7"	2,246	57½"
9:35	73' 8"	11' 8"	2,246	57½"
9:40	73' 8"	11' 8"	2,246	57½"
9:45	73' 8½"	11' 8½"	2,246	57½"
9:50	74' 0"	12'	2,253	58"
9:55	74' 1"	12' 1"	2,253	58"
10:00	74' 1"	12' 1"	2,253	58"
10:15	74' 1"	12' 1"	2,253	58"
10:30	74' 2"	12' 2"	2,253	58"
10:45	74' 2"	12' 2"	2,253	58"
11:00	74' 2"	12' 2"	2,253	58"
11:15	74' 3"	12' 3"	2,253	58"
11:30	74' 3"	12' 3"	2,253	58"
11:45	74' 3"	12' 3"	2,253	58"
12:00	74' 3"	12' 3"	2,253	58"
1:00	74' 3"	12' 3"	2,253	58"
2:00	74' 3"	12' 3"	2,253	58"
2:50	74' 3"	12' 3"	2,253	58"
2:55	67' 7"	7' 7"	1,027	12"
3:00	62' 6" (Shut Off)			
3:10	62' 0"			
3:15				

The specific yield on this well at the 2,246 GPM pumping rate is 188 GPM/ft. of draw down. This is an excellent well and if pumped at the rated 800 GPM, it should provide you with many years of trouble free service.

If you have any questions, or desire additional information, please contact us at your convenience.

Very truly yours,

MOODY'S OF DAYTON, INC.

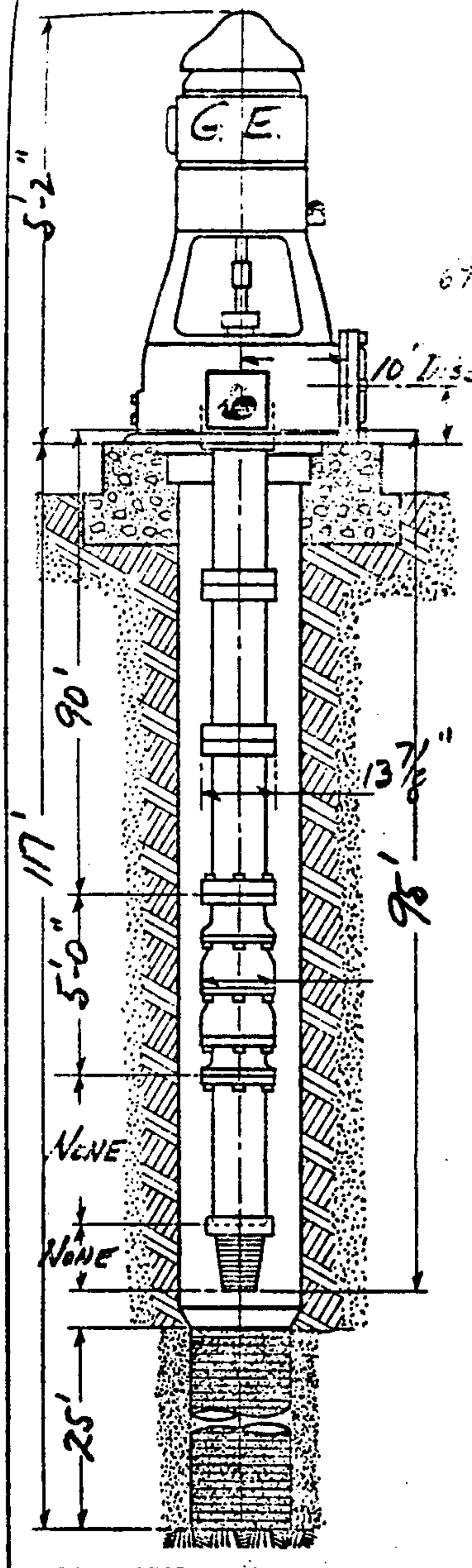
Ed C. Wagner

Ed Wagner
President

EW:bac
Enclosure

MOODY'S, INC.

VANDALIA, OHIO MEADVILLE,



TURBINE PUMP INSTALLATION FOR: *FRIGIDAIRE DIV. - PLANT #2*

WELL DESIGNATION NO. *39*

671-C-1684 SERIAL NUMBER

800 GALLONS PER MINUTE

29[illegible] TOTAL HEAD IN FEET

10" Dis. 12-C[illegible] - 5 STAGES *BYRON JACKSON*

11[illegible] MOTOR SPEED

9[illegible]' FEET OF SETTING

12" SIZE COLUMN *FLANGED*

NONE OIL TUBE

1[illegible]" LINE SHAFT *S.S. COUPLINGS*

NONE ______ SUCTION PIPE

125 H.P. *440* VOLT. *3* CURRENT *60*

WATER LUBRICATION

93' FEET OF AIRLINE

______ DATE INSTALLED

20 ~~I.D.~~ *O.D.* OF WELL

117' FEET DEEP FROM FOUNDATION

115' FEET DEEP FROM GRADE *5'-80 SLOT*

25' STRAINER LENGTH — SLOT *20'-100 SLOT*

62' STATIC LEVEL — DATE *10/22/69*

______ " " — " ______

______ " " — " ______

______ " " — " ______

10/15/69 DATE DRILLED

PUMP REPAIRED — DATE ______

" " — " ______

" " — " ______

WELL ACID TREATED — DATE ______

" " " — " ______

COMMENTS — *STATIC READING TAKEN TOP OF CASING 1'-6" ABOVE GRADE.*

MOODY'S, INC.

Phones

VANDALIA, OHIO: 898-4514

MEADVILLE, PA.: 6-1128

FORM TPI-762

LITHO IN U.S.A.

Production Well 41

MOODY'S of Dayton, Inc.

ADDRESS REPLY TO:
P.O. BOX 155
VANDALIA, OHIO 45377
AC 513-898-3969

January 25, 1972

Frigidaire Division
General Motors Corporation
Dayton, Ohio 45401
ATTN: Mr. Ed Oda

Subject: Well # 41
P.O. # FKD-05982-B

Gentlemen:

Following up our letter of February 4, 1971 and with the attached information, we are bringing this job file up to date.

Enclosed are two (2) copies of our pump and well data charts depicting pertinant information concerning the well and pump dimensions. This information is for your files and future reference.

After the pump was installed a short pumping test was conducted by Walter Fields. Results of this test were as follows.

Capacity	Disc Press.	Draw Down
1069 GPM	90 psi.	10'
1258 GPM	80 psi.	12'
1359 GPM	70 psi.	14'

Shut-off pressure was 160 psi at no flow.

After checking the attached information, if you have any questions, or need more information, please advise.

Very truly yours,

MOODY'S OF DAYTON, INC.

Ed Wagner

Edward B. Wagner
President

EDW/jld

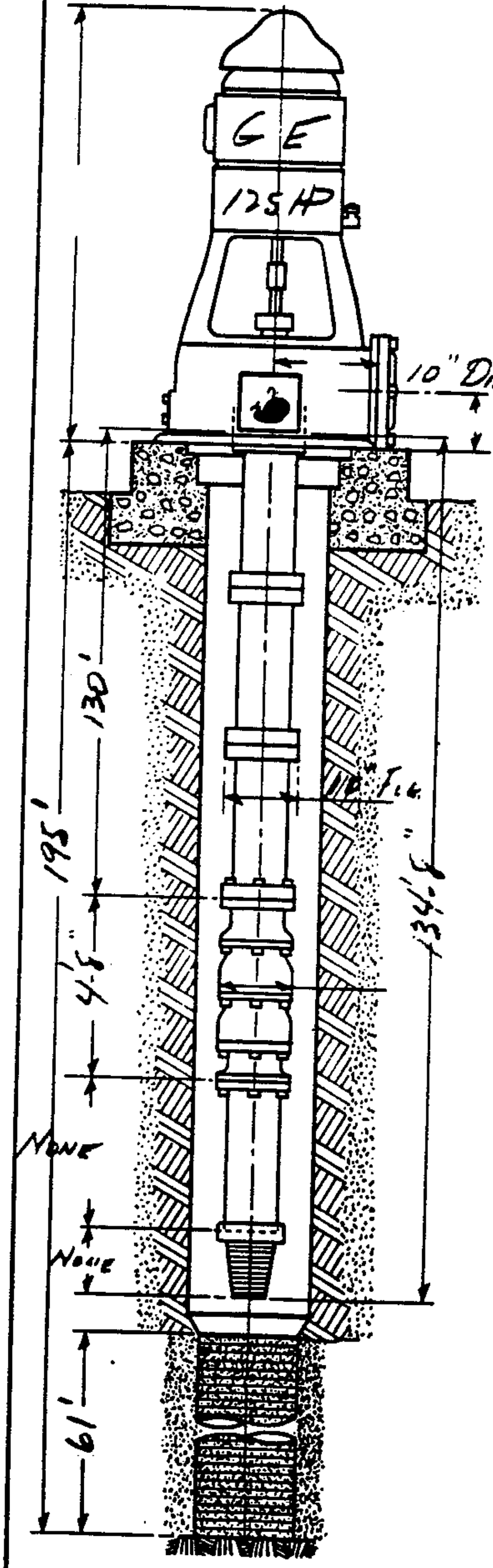
Specialists in Geophysical Surveys
GAMMA RAY AND ELECTRIC LOGS
RESISTIVITY SURVEYS

PUMP SALES AND REPAIRS

VANDALIA, OHIO

MOODY'S, INC.

MEADVILLE, PA.



TURBINE PUMP INSTALLATION FOR:
Frigidaire Div. - G M C.

WELL DESIGNATION NO. 41

701-C-1710 SERIAL NUMBER
1200 GALLONS PER MINUTE
310 TOTAL HEAD IN FEET
10" Disc 12GH$_2$ M$_2$ - 5 STAGES
1760 MOTOR SPEED
130' FEET OF SETTING
10" SIZE COLUMN FLANGED
NONE OIL TUBE
1 11/16" LINE SHAFT
None SUCTION PIPE
125 H.P. 460 VOLT. 3 CURRENT 60
WATER LUBRICATION
134'-6" FEET OF AIRLINE
5/4/71 DATE INSTALLED

20" ~~I.D.~~ O.D. OF WELL
195' FEET DEEP FROM FOUNDATION
193' FEET DEEP FROM GRADE
58' STRAINER LENGTH — SLOT See Letter 5/4/
68' STATIC LEVEL — DATE 5/4/71
" " — "
" " — "
" " — "
2/4/71 DATE DRILLED

PUMP REPAIRED — DATE
" " — "
" " — "

WELL ACID TREATED — DATE
" " " — "

COMMENTS —

MOODY'S, INC.
Phones
VANDALIA, OHIO: 898-4514
MEADVILLE, PA.: 6-1128

FORM TPI-762

LITHO IN U.S.A.

Production Well 42

MOODY'S of Dayton, Inc.

ADDRESS REPLY TO:
P.O. BOX 155
VANDALIA, OHIO 45377
AC 513-898-3969

February 4, 1971

Frigidaire Division
General Motors Corporation
Dayton, Ohio 45401

Attention: Mr. Ed Oda

SUBJECT: Well #42
P.O. # FKD-05983-B

Gentlemen

Work is progressing satisfactorily on the subject job and we are pleased to submit our report on work completed to date.

DRILLER'S LOG - By Everett Wheeler
Approximate Static Level - 68 ft.

0 - 1 ft.	Top soil
1 - 4 ft.	Yellow clay
4 - 32 ft.	Dry sand & gravel
32 - 36 ft.	Yellow clay
36 - 49 ft.	Dry sand & gravel
49 - 60 ft.	Till
60 - 64 ft.	Blue clay
64 - 72 ft.	Medium sand & coarse gravel
72 - 85 ft.	Muddy blue clay
83 - 139 ft.	Coarse sand & coarse gravel
139 - 147 ft.	Boulders - coarse sand & coarse gravel
147 - 174 ft.	Coarse sand & coarse gravel
174 - 185 ft.	Coarse sand & medium gravel
185 - 193 ft.	Blue shale (bedrock)

We are enclosing three (3) copies of the sand sample analysis conducted on the formation samples. Also enclosed, are three (3) copies of the Gamma Ray Log conducted by Roger Rogers on November 27, 1970. This information was utilized to select the strainer installed in the well.

We furnished a Cook Well Strainer size 18-19/32" O.D. red brass material, with lead packer and bail plug, screwed strainer fittings and slots comprised as follows:

135 ft. - 137 ft. - 2 ft. - 90 Slot
137 ft. - 155 ft. - 18 ft. - 125 Slot
155 ft. - 160 ft. - 5 ft. - 100 Slot
160 ft. - 167 ft. - 7 ft. - 70 Slot
167 ft. - 175 ft. - 8 ft. - 90 Slot
175 ft. - 185 ft. - 10 ft. - 40 Slot

We installed fifty (50) feet of screen. Some of the samples were slightly dirty, but generally speaking the material was coarse grained and of good quality.

The well was surged with our 28L rig by the straight surge method and combination air and surge method for a total of seventy-three (73) hours.

A short pumping test was conducted after the straight surging was completed. Another pumping test will be conducted after surging with the combination air and surge method. This information will be furnished prior to completion of this project and after the permanent pump is installed.

If you have any questions, or need more information, please contact us at your convenience.

Very truly yours

MOODY'S of Dayton, Inc.

Ed Wagner

EDWARD B. WAGNER
President

EBW/dw
Encls

ze	WT.	%	WT.	%
.187	206	30.5		
.132	68	40.6		
.094	65	50.2		
.079	29	54.5		
.066	30	59.0		
.047	48	66.1		
.033	44	72.6		
.023	51	80.1		
.017	57	88.6		
.012	34	93.6		
.008	20	96.6		
006	12	98.4		
Pan	11	100.0		
Total	675			

Name: E. WHEELER

Job: FRIGIDAIRE # 42

Notes:

Sieve Size	WT.	%	WT.	%
.187				
.132				
.094				
.079				
.066				
.047				
.033				
.023				
.017				
.012				
.008				
.006				
Pan				
Total				

Name:

Job:

Notes:

Size				
	WT.	%	WT.	%
.187	177	25.0	173	23.6
.132	68	34.5	113	39.0
.094	67	44.0	117	55.0
.079	33	48.7	49	61.7
.066	34	53.4	48	68.2
.047	56	61.3	73	78.2
.033	41	67.1	53	85.4
.023	41	72.9	40	90.8
.017	60	81.4	23	94.0
.012	64	90.4	18	96.4
.008	38	95.8	10	97.8
.006	13	97.6	6	98.6
Pan	17	100.0	10	100.0
Total	709		733	

Name: E. Wheeler Driller

Job: FRIGIDAIRE #42

Notes:

Sieve Size	130'-155		145 TO 150	
	WT.	%	WT.	%
.187	276	37.4	325	46.4
.132	108	52.1	92	59.6
.094	95	65.0	79	70.8
.079	40	70.4	36	76.0
.066	38	75.6	33	80.7
.047	61	83.8	47	87.4
.033	43	89.7	30	91.7
.023	29	93.6	20	94.6
.017	19	96.2	13	96.4
.012	10	97.5	8	97.6
.008	6	98.4	5	98.3
.006	4	98.9	3	98.7
Pan	8	100.0	9	100.0
Total	737		700	

Name: E. Wheeler (DRILLER

Job: FRIGIDAIRE #42

Notes:

Production Well 44

File copy

August 6, 1974

Frigidaire Division
General Motors Corporation
Dayton, Ohio 45401

Attention: Mr. James Courtright

Subject: P.O.#HM017629
Fire Pump Installation
Well Pumping Test

Gentlemen:

Well work on the subject job has been completed and we are pleased to submit our report more fully described as follows.

The total well depth is 166 ft. from grade and complete with 128' of 24" O.D. casing. The bottom of the screens is set at 166' below grade. We installed fifty feet of Cook 24" nominal strainer with 20' of 60 slot openings and 30 ft. of 125 slot openings. The well was deeeloped by the surge block method and a pumping test was conducted during the weel of July 22, 1974.

Pumping Test - By Paul Cossins
Approx. Static Level - 75'10" from grade
Pumping Test readings taken 6'2" above grade.
Orifice Size 10" x 8"

Time	Orifice	Capacity	Pumping Level	Draw Down	Specific Yield
9:00 AM	6½"	756 GPM	91'	9'	83 GPM/ft DD.
9:15	"	"	"	"	"
9:30	"	"	"	"	"
9:45	"	"	"	"	"
9:55	"	"	"	"	"
10:00	11½"	1005 GPM	93'	11'	91 GPM/ft DD.
10:15	11½"	1005 GPM	93'	11'	"
10:30	"	"	"	"	"
10:45	"	"	"	"	"
10:55	"	"	"	"	"
11:00	28½"	1583 GPM	96'	14'	111 GPM/ft DD.
11:15	"	"	"	"	"

Time	Orifice	Capacity	Pumping Level	Draw Down	Specific Yield
11:30 AM	28½"	1553 GPM	96'	14'	111 GPM/ft. DD.
11:45	"	"	"	"	"
11:55	"	"	"	"	"
12:00 Noon	45"	1987 GPM	100'	18'	110 GPM/ft DD.
12:15	"	"	"	"	"
12:30	"	"	"	"	"
12:45	"	"	"	"	"
12:55	"	"	"	"	"
1:00 PM	72"	2518 GPM	107'	25'	100 GPM/ft DD.
1:30	"	"	"	"	"
2:00	"	"	"	"	"
2:30	"	"	"	"	"
3:00	"	"	"	"	"
3:30	"	"	"	"	"
4:00	"	"	"	"	"
4:30	"	"	"	"	"
5:00	"	"	"	"	"
5:30	"	"	"	"	"

TEST PUMP SHUT DOWN

This is an excellent well and should pass the final F.I.A. test with no difficulties. If you have any questions or need more information, please contact us at your convenience.

Very truly yours,

WOODY'S OF DAYTON, INC.

EDWARD B. WAGNER
President

EBW/jd

Fire Well

WELL LOG

0 Ft. to 3 Ft. Formation Fill
3 Ft. to 61 Ft. Formation Dry Gravel
61 Ft. to 67 Ft. Formation Clay and gravel
67 Ft. to 95 Ft. Formation Hard pan
95 Ft. to 93 Ft. Formation Muddy gravel
93 Ft. to 143 Ft. Formation Clean gravel
143 Ft. to 143½ Ft. Formation Clay streak
143½ Ft. go 165 Ft. Formation Fine sand and gravel
___ Ft. to ___ Ft. Formation ___
___ Ft. to ___ Ft. Formation ___
___ Ft. to ___ Ft. Formation ___
___ Ft. to ___ Ft. Formation ___
___ Ft. to ___ Ft. Formation ___
___ Ft. to ___ Ft. Formation ___
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___ Ft. to ___ Ft. Formation ___
___ Ft. to ___ Ft. Formation ___
___ Ft. to ___ Ft. Formation ___
___ Ft. to ___ Ft. Formation ___
___ Ft. to ___ Ft. Formation ___

IF ROCK WELL AT DEPTH WAS ROCK ENCOUNTERED ___

Reynolds
Supply, Inc.

January 14, 1987

Harrison Radiator
Dryden Road
Dayton, OH 45439

Re: North Fire Pump Well
Rehabilitation

Attention: Mr. Mike Hrosso

Dear Mr. Hrosso:

In accordance with Reynolds Supply. Inc. (Reynolds) authorization, we are pleased to report the successful repair of the North Fire Pump Well. The submission of this report constitutes completion of the above referenced authorization.

Technical Discussion

During the last inspection and testing, the pump failed to deliver the required pressure and flow. Upon inspection by the writer, it was noted that the strainer on the control line contained considerable amount of sand. Thus, it was apparant that the pump was off its performance curve.

Reynolds field personnel pulled the pump on November 17, 1986. Upon removal of the pump, two full diameter centering devices were noted on the pump column. Our hydropneaumatic developing tool was installed in the well to commerce surging. Difficulty was encountered in entering the screen. Agitation in the upper part of the screen produced considerable amounts of sand and gravel. Access to the lower part of the screen was obstructed. After reviewing the original bill of materials, it appeared the tail pipe from the pump was missing. Before attempting to "fish" the pipe out, a closed circuit inspection of the well was preformed to evaluate well structure and the position of the pipe.

Following sufficient settling time, the camera was lower in the well. The water was extremely cloudy and worsen near the top of the well screen. The misalignment with depth was very apparent. Upon reaching the packer difficulty was encountered in entering the well screen. After entering the screen, the visibility was poor so it was decided to stop and remove the camera. In doing so, it became fast at the packer.

P.O. Box 230
816 W. Main Street
Paoli, Indiana 47454
812/723-2108

P.O. Box 120
Highway 60 East
Owensboro, Ky. 42301
502/684-5075

1421 Mellwood Ave.
Louisville, Ky. 40206
502/585-1241

6451 Germantown Road
Middletown, Ohio 45042
513/424-7287

1730 South Harding St.
Indianapolis, Ind. 46221
317/636-1996

Thus, it was apparent that the packer was damaged and not sealing the well screen to the casing which would account for the gravel.

It was necessary to remove the packer before going any further. Therefore, a rig was placed over the well, and a "Fishing Tool" used to remove the packer. The magnitude of this problem was greatly increased due to the misalignment of the well. The packer was finally pulled up and it was possible to televise, and remove the tail pipe. During this process, it was discovered that the screen is fabricated of bronze.

The surge was again installed in the well and the agitation continued. Following initial surging, sulfamic acid and chlorine were introduced directly into the well screen and forced laterally into the aquifer. After sufficient contact time the well was surged to waste until the formation had stablized, and the well had returned to its maximum effeciency. A repair packer and sleeve was installed to seal the screen and the well casing, and a grout plug poured in the bottom.

Following repair of the pump, it was installed in the well and a step drawdown test conducted. The results of the test are summarily presented in Table 1.

Harrison Radiator

North Fire Pump Fire Well

Step Drawdown Test After Cleaning

Step	Q	Pumping Level	Drawdown	Specific Capacity	Dis. Press. \#
1	1524 gpm	48.33 ft.	17.25	88.33 gpm/ft	130
2	1803	51.40	20.42	88.33	110
3	2044	55.25	24.17	84.6	100
4	2458	58.25	27.17	90.5	70

- Static Water level 31.08' below top of casing
- Discharge pressure does not include water lift or fitting losses

The well responsed quite favorable to the repair and rehabilitation efforts employed. Thus, the unit should be ready to be placed back into service. Should you have any questions or desire clarification please feel free to call.

Yours truly,

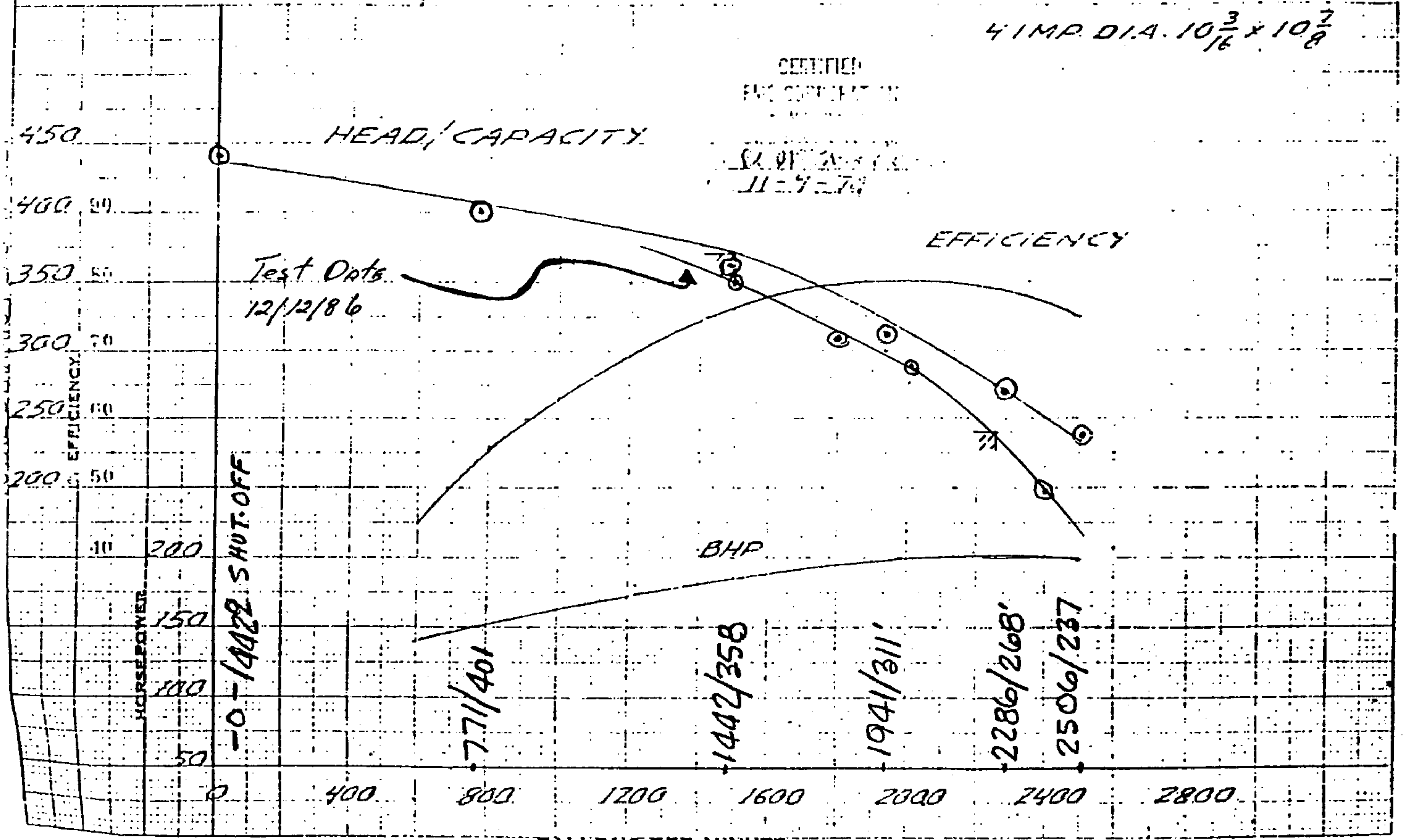
REYNOLDS SUPPLY, INC.

Leon Simpson

Leon Simpson
Ohio District Manager

PEERLESS PUMP DIVISION
FMC CORPORATION

C145163
14MCF
10 x 1 1/2 OLS
2626067 CIE 4
1760 2626083
367147 4VF81073
4 IMP. DIA. 10 3/16 x 10 7/8



CERTIFIED
FMC CORPORATION
11-7-74

PLOTTED BY A.B. FROM TEST NO. 145163 DATE 11-1-74

Production Well 45

WELL LOG AND DRILLING REPORT

ORIGINA

CARBON PAPER
NECESSARY –
TRANSCRIBING

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Geological Survey
Fountain Square
Columbus, Ohio 43224 Phone (614) 466-5344

472232

COUNTY MONTGOMERY TOWNSHIP SECTION OF TOWNSHIP OR LOT NUMBER

OWNER DELCO AIR CONDITIONING DIV. GMC ADDRESS MORAINE CITY, OHIO

LOCATION OF PROPERTY

CONSTRUCTION DETAILS

diameter 20" Length of casing 139 ft.

of screen Stainless Steel Length of screen 50 ft.

of pump BJ 12MQL submersible turbine

acity of pump 1200 GPM

th of pump setting 124 ft.

ate of completion 7-19-76

BAILING OR PUMPING TEST
(specify one by circling)

Test rate 1700 gpm Duration of test 8

Drawdown 13.5 ft Date 9-29-76

Static level (depth to water) 72 ft.

Quality (clear, cloudy, taste, odor) Clear

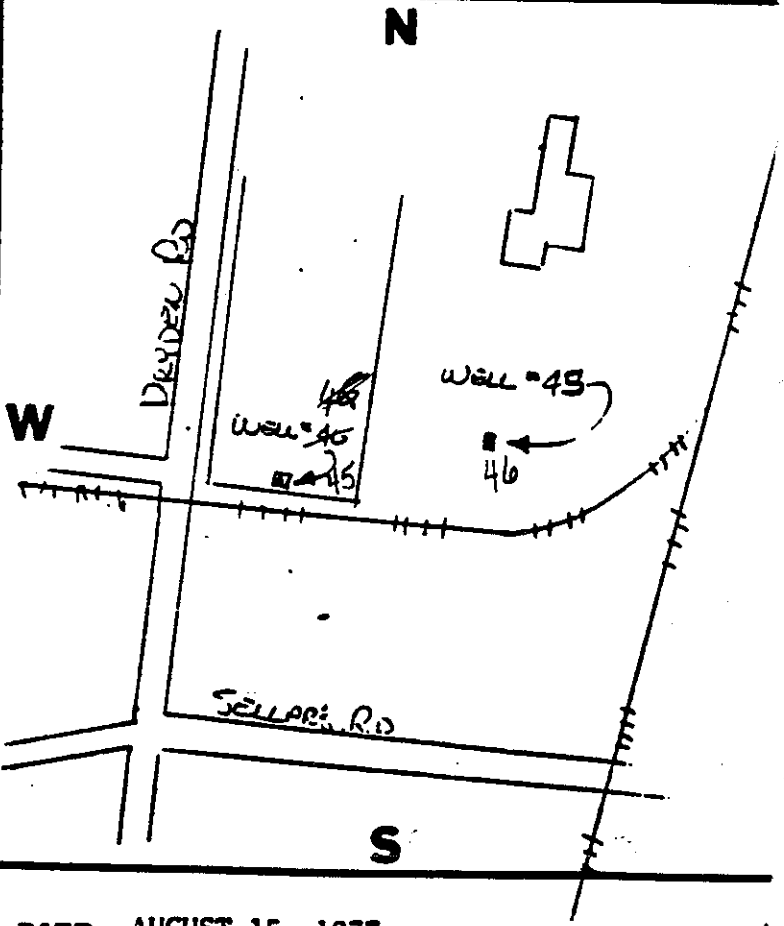
Pump installed by Moody's of Dayton, Inc.

WELL LOG* WELL # ~~46~~45

Formations: sandstone, shale, limestone, gravel, clay	From	To
ack top & fill	0 ft	3 ft
ump fill	3	12
Clay	12	21
ry gravel	21	58
Hard pan	58	74
Brown Gravel	74	90
rey Gravel, big	90	189

SKETCH SHOWING LOCATION

Locate in reference to numbered state highways, street intersections, county roads, etc.



DRILLING FIRM MOODY'S OF DAYTON, INC.

ADDRESS 4359 INFIRMARY RD., MIAMISBURG, OHIO
P.O. BOX 123 45342

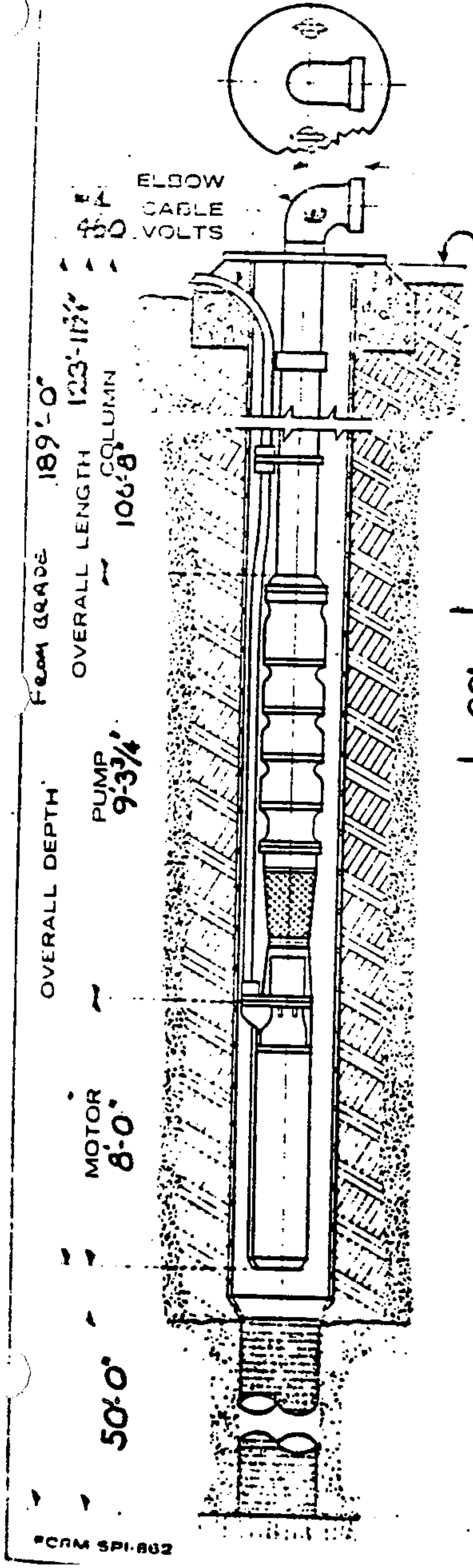
DATE AUGUST 15, 1977

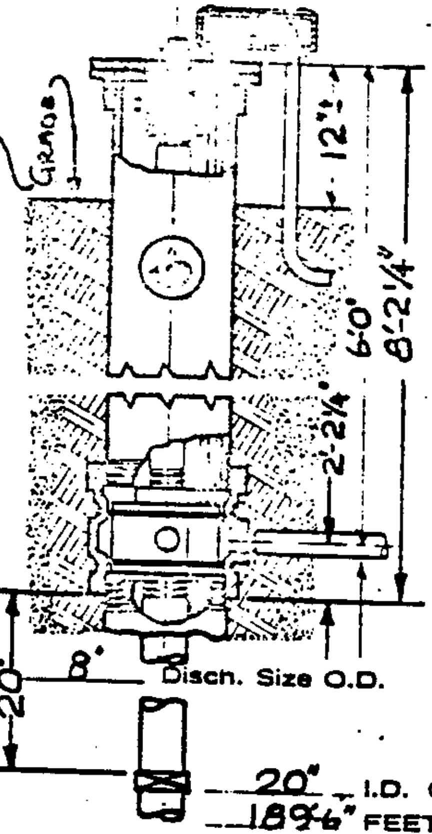
SIGNED Charlie Buck

*If additional space is needed

[illegible], INC.
VANDALIA, OHIO

SUBMERSIBLE PUMP INSTALLATION FOR:
Delco Air Conditioning Div.





WELL DESIGNATION
NO. 46 15

Byron Jackson
[illegible] SERIAL NUMBER
1200 GALLONS PER MINUTE
310 TOTAL HEAD IN FEET
12MQL 6 STAGES
1770 MOTOR SPEED
123'-11½" FEET OF SETTING
8" SIZE COLUMN
— WELL SEAL
8" COLUMN CHECK VALVE
— SURFACE PLATE
20" PITLESS ADAPTOR
125 H.P. 460 VOLTAGE
135 3 amps CURRENT
OIL MOTOR LUBRICATION
— FEET OF AIRLINE
5-18-77 DATE INSTALLED

20" I.D. OF WELL
189'-6" FEET DEEP FROM FOUNDATION
189'-0" FEET DEEP FROM GRADE
50'-0" STRAINER LENGTH — SLOT SEE BELOW
70'-0" STATIC LEVEL — DATE 7-29-76
______ " " — " ______
______ " " — " ______
______ " " — " ______
7-19-76 DATE DRILLED

PUMP REPAIRED — DATE ______
" " — " ______
" " — " ______

WELL ACID TREATED — DATE ______
" " " — " ______

COMMENTS —

Low WATER PROBE AT 119'-7"
SCREEN:
135'–160': 25' OF 125 SLOT
160'–172': 12' " 60 "
172'–189': 17' " 100 "

FORM SPI-802

Date September 20, 19 76

PRODUCTION TEST OF WELL

Job No. ____________

ner DELCO AIR CONDITIONING DIV. City MORAINE State OHIO

No. 4545 Location SOUTH END OF PARKING LOT, DRYDEN ROAD

ured from ground level: Total depth ____ Inside Dia. 20" Standing water level 70'0"

well: Gravel Wall __ Tubular X Rock __ New X Old __ Cleaned __ Gravel Wall Dia. ____

reen: Length 50' Dia. 20" Slot size Var. Type s.s. Depth to top ____

rifice size 8" by 10" Water discharged ____ feet from well into ____

DATE	TIME	INCHES ON ORIFICE	GALLONS PER MINUTE	AIR LINE READING	GROUND TO WATER LEVEL	DISCHARGE PRESSURE	REMARKS
9-20-76	10:00	5	739		74'4"		Measurement of
	10:30	5	739		74'4"		depth made with
	10:45	7	876		76'5"		electric tape.
	11:00	7	876		76'5"		
	11:15	9	1016		77'3"		
	11:30	9	1016		77'3"		
	12:00	9	1016		77'5"		
	12:30	22	1471		79'5"		
	1:00	22	1471		79'5"		
	1:30	22	1471		79'6"		
	1:45	31.5	1739		85'2"		
	2:00	31.5	1739		85'6"		
	3:00	31.5	1739		85'6"		
	4:00	31.5	1739		85'6"		
	5:00	31.5	1739		85'6"		
	6:00	31.5	1739		85'6"		
	----	RECOVERY	----				
	6:00				70'6"		
	6:05				70'4"		
	6:10				70'3"		
	6:15				70'3"		

Production Well 46

CUSTOMER'S COPY

WELL LOG AND DRILLING REPORT

NO CARBON PAPER
NECESSARY—
SELF-TRANSCRIBING

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Geological Survey
Fountain Square
Columbus, Ohio 43224 Phone (614) 466-5344

46
472[illegible]

COUNTY ______ TOWNSHIP ______ SECTION OF TOWNSHIP OR LOT NUMBER ______

OWNER [illegible] ADDRESS [illegible]

LOCATION OF PROPERTY ______

CONSTRUCTION DETAILS

Casing diameter ______ Length of casing [illegible]

Type of screen [illegible] Length of screen [illegible]

Type of pump [illegible]

Capacity of pump [illegible]

Depth of pump setting 165 ft.

Date of completion 5-13-77

BAILING OR PUMPING TEST

(specify one by circling)

Test rate ______ gpm Duration of test ______

Drawdown [illegible] ft Date 12-[illegible]

Static level (depth to water) [illegible]3 ft.

Quality (clear, cloudy, taste, odor) Cl[illegible]

Pump installed by [illegible]ody's of [illegible]ayton, Inc.

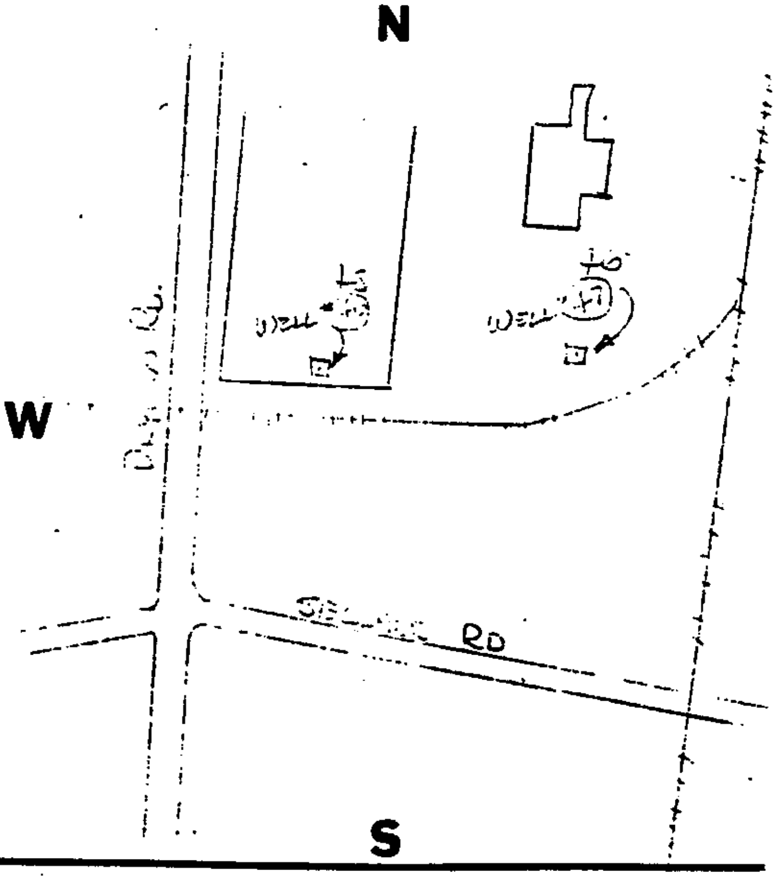
WELL LOG*

[illegible]ELL # 47 #46

Formations: sandstone, shale, limestone, gravel, clay	From	To
[illegible]ill, wood ash, etc.	0 ft	17 ft
[illegible]ay and gravel	17	32
Dry Gravel	32	55
Hard Pan	55	75
Brown Gravel	75	115
Boulders	115	130
Grey Gravel	130	135
Clay and Gravel	135	142
Gravel, water bearing	142	1[illegible]

SKETCH SHOWING LOCATION

Locate in reference to numbered state highways, street intersections, county roads, etc.



DRILLING FIRM [illegible], INC.

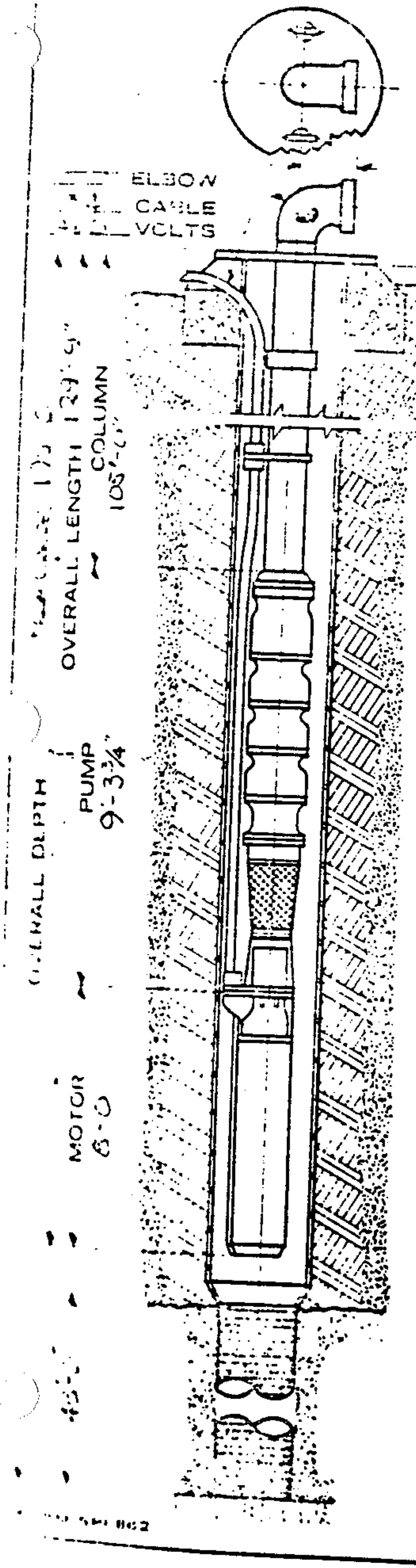
ADDRESS [illegible]

DATE [illegible] 13, 1977

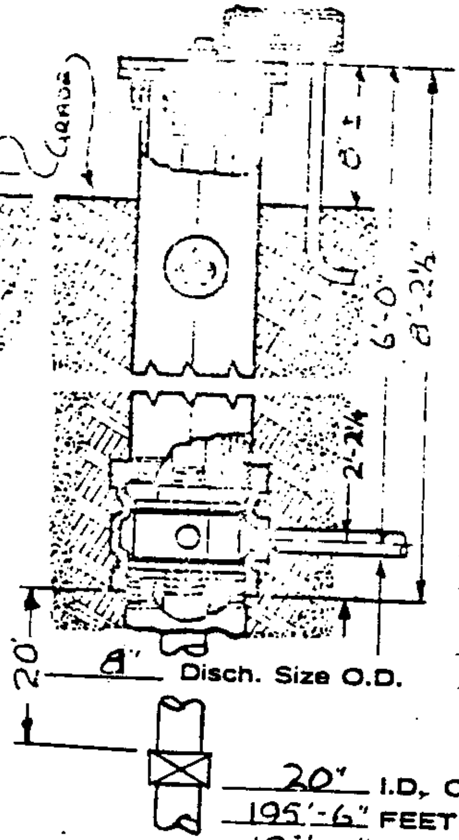
SIGNED Charles R. Buck.

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

[illegible] INC.
VANDALIA, OHIO



SUBMERSIBLE PUMP INSTALLATION FOR:
[illegible]



WELL DESIGNATION NO. 4746

Byron Jackson
74-C-1651 SERIAL NUMBER
1200 GALLONS PER MINUTE
310 TOTAL HEAD IN FEET
12MQ"L" 6 STAGES
1770 MOTOR SPEED
129'-6" FEET OF SETTING
8" SIZE COLUMN
——— WELL SEAL
8" COLUMN CHECK VALVE
——— SURFACE PLATE
20" PITLESS ADAPTOR
125 H.P. 460 VOLTAGE
135A CURRENT
Oil MOTOR LUBRICATION
——— FEET OF AIRLINE
6-15-77 DATE INSTALLED

20" I.D. OF WELL
195'-6" FEET DEEP FROM FOUNDATION
195'-0" FEET DEEP FROM GRADE
48'-0" STRAINER LENGTH — SLOT See Below
66'-0" STATIC LEVEL — DATE 6-15-77.
______ " " — " ______
______ " " — " ______
______ " " — " ______
______ DATE DRILLED

PUMP REPAIRED — DATE ______
" " — " ______
" " — " ______

WELL ACID TREATED — DATE ______
" " " — " ______

COMMENTS —

LOW WATER PROBE AT 106'-8"

SCREEN:

145' to 160': 15 of 125 slot
160' " 165: 5' " 80 "
165' " 188': 23' " 30 "
188' 193: 5' " 80 "

SPI 862

LITHO IN U.S.A.

Date December 15, 1976

PRODUCTION TEST OF WELL

Job No.

Owner DELCO AIR CONDITIONING DIV. City MORAINE State OHIO

Well No. 47-46 Location SOUTH OF POWERHOUSE

Measured from ground level: Total depth ___ Inside Dia. 20" Standing water level 75 ft.

Type well: Gravel Wall __ Tubular X Rock __ New X Old __ Cleaned __ Gravel Wall Dia. ___

Screen: Length 43" Dia. 20" Slot size Var. Type s.s. Depth to top ___

Orifice size 8" by 10" Water discharged ___ feet from well into ___

DATE	TIME	INCHES ON ORIFICE	GALLONS PER MINUTE	AIR LINE READING	GROUND TO WATER LEVEL	DISCHARGE PRESSURE	REMARKS
12-15-76	10:00 AM	5	739		75'		Water level
	10:05	5	739		85'		measured with
	10:10	5	739		85'		electric tape
	10:15	5	739		85'		
	10:20	5	739		85'		
	10:25	5	739		85'		
	10:30	5	739		85'		
	10:35	5	739		85'		
	10:40	5	739		85'		
	10:45	5	739		85'		
	10:50	5	739		85'		
	10:55	5	739		85'		
	11:00	7	876		89'		
	11:05	7	876		89'		
	11:10	7	876		89'		
	11:15	7	876		89'		
	11:20	7	876		89'		
	11:25	7	876		89'		
	11:30	7	876		89'		
	11:35	7	876		89'		
	11:40	7	876		89'		
	11:45	7	876		89'		
	11:50	7	876		89'		
	11:55	7	876		89'		
	12:00	20	1404		94'6"		
	12:05	20	1404		94'6"		
	12:10	20	1404		94'6"		

Date December 15, 1976

PRODUCTION TEST OF WELL

Job No. ______

Owner DELCO AIR CONDITIONING DIV. City MORAINE State OHIO

Well No. 47 46 Location ______

Measured from ground level: Total depth ____ Inside Dia. ____ Standing water level ______

Type well: Gravel Wall __ Tubular __ Rock __ New __ Old __ Cleaned __ Gravel Wall Dia. ______

Screen: Length ____ Dia. ____ Slot size ____ Type ______ Depth to top ______

Orifice size ____ by ____ Water discharged ______ feet from well into ______

DATE	TIME	INCHES ON ORIFICE	GALLONS PER MINUTE	AIR LINE READING	GROUND TO WATER LEVEL	DISCHARGE PRESSURE	REMARKS
12-15-76	12:15	20"	1404		94'9"		
	12:20	20"	1404		94'9"		
	12:30	20"	1404		94'9"		
	12:35	20"	1404		94'9"		
	12:40	20"	1404		94'9"		
	12:45	20"	1404		94'9"		
	12:50	20"	1404		94'9"		
	12:55	20"	1404		94'9"		
	1:00	20"	1404		94'9"		
	1:15	20"	1404		94'9"		
	1:30	20"	1404		94'9"		
	2:00	20"	1404		94'9"		
	2:30	20"	1404		94'9"		
	3:00	20"	1404		94'9"		
	3:30	20"	1404		94'9"		
	4;00	20"	1404		94'9"		
	4:30	20"	1404		94'9"		
	5:00	20"	1404		94'9"		
	5:30	20"	1404		94'9"		
	6:00	20"	1404		94'9"		

Fire Wells
FW-1 through FW-4

Reynolds Supply, Inc.

COMPLETE MUNICIPAL & INDUSTRIAL WATER SYSTEMS

FORMATION LOG OF WELL

Starting Date ______ Finished ______ Well Number Test Well #3-80 (Fire Well #3)

Owner General Motors Location ______

TOTAL DEPTH	THICKNESS EACH STRATUM	FORMATION
0-3'	3'	Clay, Topsoil.
3'-31'	28'	Sand and gravel with some large rock. (NC)
31'-79'	48'	Sand and gravel with some large rock and some clay.
		(NC) with (C) at 54' and 74'.
79'-102'	23'	Sandy clay and some gravel. (C) at 88'
102'-125'	23'	Sand and gravel with some large rock. (NC)
125'-127'	2'	Sand and gravel with some large rock and some clay. (C)
127'-138'	11'	Sand and gravel. (NC)
3'-140'	2'	Sand and gravel with some clay. (C)
140'-154'	14'	Sand and gravel with some large rocks and some clay. (NC)
154'-200'	46'	Gray soft shale. (Hardpan clay)

Static Water Level ______ Draw Down ______

Buddy Rogers

Test Wells

TW-1 and TW-2

TEST WELL #1
(Installed 6/10 - 6/14/89)

Sample Interval Depth (feet)	Description
0-5	Fine grained till, greasy texture, high percentage of clay and silt sized grains, brown to dark brown color. Mud-like texture upon contact with water
5-7	Sand and gravel outwash, varying in size from medium-grain sand to large gravel cobbles (2-3 inches in diameter). 50-70 percent of the outwash appears to be calcareous in composition and quite angular and fragmented in shape. The remaining 30-50 percent of the sand and gravel outwash is composed of grains showing various degrees of roundedness. Overall, the outwash is dull gray.
7-12	Poorly sorted glacial outwash similar to previous sample. Fewer cobble-sized gravel, grains as a whole are less angular and fragmented and depict a greater degree of roundedness. There is also a corresponding decrease in the amount of calcareous grains and an increase in the percentage of medium-sized sand grains. Outwash is still a dull gray color.
12-27	Very similar to sand and gravel outwash previously described. The only significant change is the appearance of very large cobbles (up to 6 inches in diameter) and large fragments of limestone "flatrock". the limestone fragments are very competent and fossiliferous. There is also an increase in the abundance of medium-sized sand grains (the smallest grains yet encountered). The majority of the sand and gravel grains are rounded to some degree with a small percentage of grains having an angular shape. Sand and gravel of metamorphic and volcanic

Sample Interval Depth (feet)	Description
	origin are increasingly common. The outwash is still dull gray in color.
27-38	Sand and gravel outwash with characteristics very similar to previous sediments with two significant differences. First, there is a noticeable decrease in the overall grain size. There are very few large cobbles and limestone flatrock fragments, and there is an increase in the amount of sand grains. The majority of the sand grains are medium-sized. Fine grained sands are also evident for the first time. Large clumps of fine and medium grained sands were observed indicating a higher cohesiveness and an increase in finer-grained sands and, perhaps, even silt sized grains. Secondly, iron staining was observed for the first time on a majority of the sand and gravel grains indicating either the seasonal high water mark, the unsaturated capillary fringe zone or, perhaps, even the present water table (another less likely possibility is that the iron staining indicates water levels of a Paleo-environment). The outwash is dull gray in places, but is primarily an orange-rust color due to the iron staining.
38-43	Primarily a well sorted-coarse sand and fine gravel outwash with no cobbles nor fragments of limestone flatrock. There is nothing finer than the coarse sand except a trace amount of medium grained sands. This outwash also has a rich brownish color to it and, as a whole, is quite different from the previous sand and gravel outwash.

Sample Interval Depth (feet)	Description
43-45	Poorly sorted, dull gray sand and gravel outwash with large cobbles up to 7-8 inches in diameter. There is an increase in medium sized sand grains. This outwash is similar to the outwash encountered above the 27-foot level.
45-46	Moderately-poorly sorted clay, silt, and fine sand clumps. Gravel grains up to 3/4-inches in diameter were observed in the clay matrix. This sediment was very cohesive and had a greasy texture. The clay and silt was a silvery-gray and violet color with rust colored stipples.
46-48	The same as from 45-46 but intermixed with sand and gravel outwash similar to that encountered from 43-45 feet.
48-50	Even less clay, silt and fine sand, primarily a sand and gravel outwash with cobbles up to 2-3 inches in diameter. The sand and gravel is a gray-tan color.
50-53	Sand and gravel outwash with an increase in the clay and silt content. Outwash varies in size from fine-grained sand to medium-grained gravel (cobbles 2-3 inches in diameter). Outwash is gray-tan color.
53-56	Same as above with less clay and silt and an increase in grain size. Still an abundance of fine-grained sands, but also an increase in the size of the cobbles and the gravel. Some fragments of fossiliferous limestone flatrock (3-3-1/2 inches in diameter) were also observed.

Sample Interval Depth (feet)	Description
56-58	Tan colored clay and silt till. Some large grained sands and fine gravels are observed as inclusions in the clay and silt matrix. This is the unit on which the recovery well is to be placed.

Total Well Depth: 54' 4"
Screened Interval: 44' 4" - 54' 4"
Total Length of Steel Casing: 50 feet, with approximately 2 feet above ground and 4 feet of overlap surrounding the screen
Pump Depth: 51 feet below ground
Comments: There is 50 feet of steel casing with an inside diameter of 23 inches. 48 feet is below ground surface and (approximately) 2 feet above ground surface. The casing consists of 10-foot sections which were welded together on the site prior to being driven into the ground. The screen is 0.04 slot wire wrapped stainless steel with an inside diameter of 10 inches. The annulus between the screen and the casing was sealed by compressing a lead ring located on top of the screen expanding the lead in a horizontal direction until in contact with the inside of the casing (see diagram). The bottom of the screen is at 54' 4". The steel casing overlaps the screen by about 4 feet so that a clay lense encountered between 45-48 feet will not be in direct contact with the screen. The well was installed using the Cable Tool Drilling Method.

GERAGHTY & MILLER, INC.
Ground-Water Consultants

PAGE 1 OF 2

PROJECT NO. OHO610DY05

BORE HOLE NO. Test Well #2

PROJECT Harrison Radiator

LOCATION Dayton, Ohio

DRILLING CONTRACTOR Reynolds Supply, Inc.

DRILLING EQUIPMENT Cable Tool

HYDROGEOLOGIST J.B. Naser/G.H. Colvin

DRILLER Rick Wilmot

DATE START/TIME 5-5-89

DATE FINISH/TIME

SURFACE ELEVATION

TOTAL DEPTH 48 feet

WELL CASING 10 inch

SCREEN TYPE Stainless Steel

LENGTH 10 foot

SLOT .070 and .090

REMARKS

BORE HOLE LOG

DEPTH (FT)	SAMPLE (NO.)	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
5		Fill: SILT (50%); Clay (20%); med. gravel (10%); sand (20%); med. brown		0.0	
10		Fill: CLAY (40%); sand (40%); gravel (20%); dk. gray		0.0	
		GRAVEL (40%); cs. sand (30%); med. sand (15%); tr. fine sand; tr. silt, gray			
15		GRAVEL (35%); v. cs. sand (30%); cobbles (20%); cs. sand (10%); tr. med. sand; tr. fine sand, gray			
20		GRAVEL (40%); cobbles (30%); v. cs. sand (20%); tr. cs. sand (20%); tr. cs. sand; tr. med. sand, gray, cobbles and gravel is nearly equant and rounded		0.0	
25			color change		
30		GRAVEL (40%); cobbles (25%); v. cs. sand (20%); cs. sand (10%); tr. med. sand; reddish brown		0.2	

PAGE 2 **OF** 2

PROJECT NO. OH0610DY05

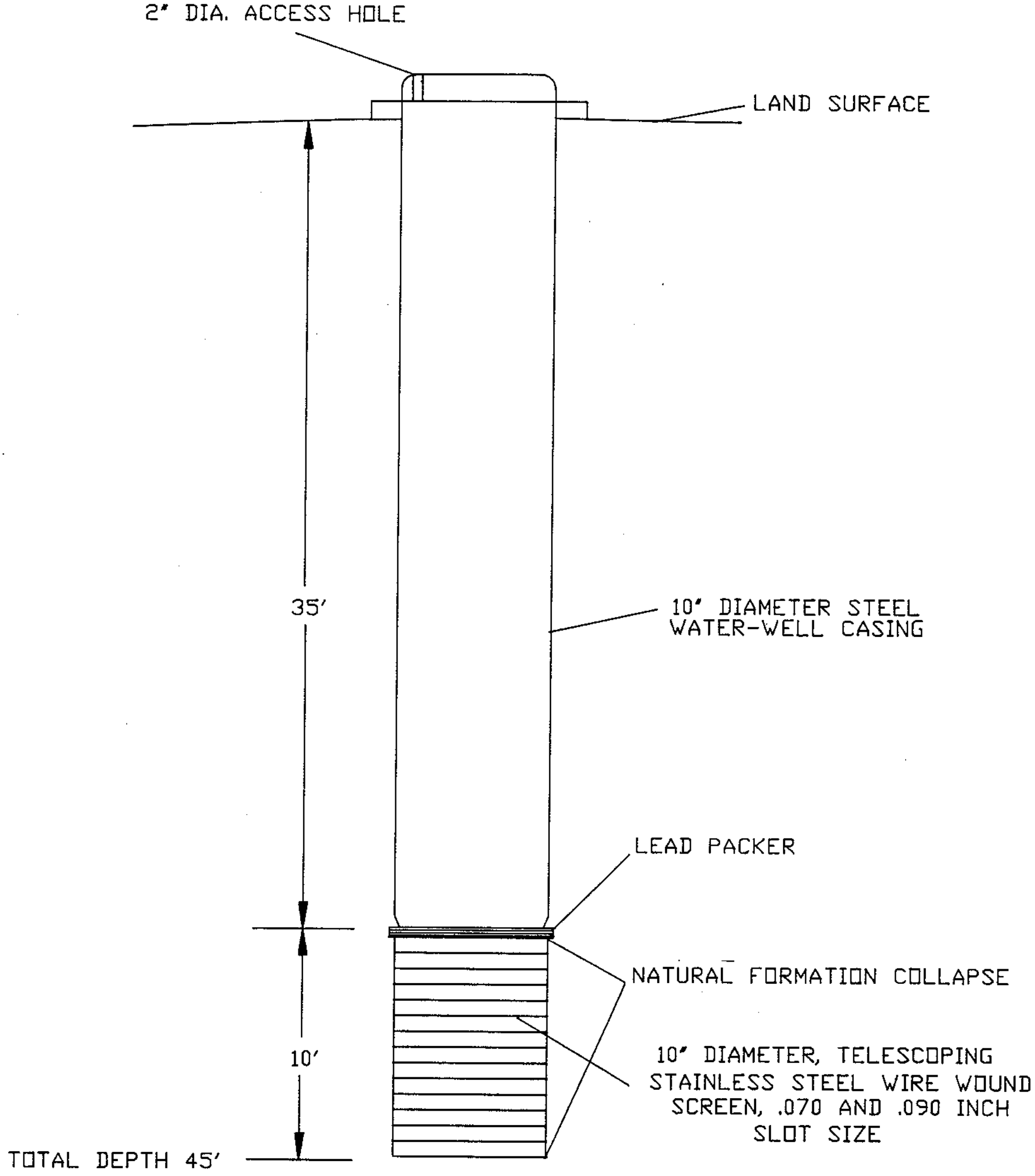
BORE HOLE NO. Test Well #2

PROJECT Harrison Radiator

LOCATION Dayton, Ohio

REMARKS

DEPTH (FT.)	SAMPLE NO.	LITHOLOGIC DESCRIPTION	REMARKS	OVA/PID (PPM)	GRAPHIC LOG
		GRAVEL (30%); v. cs. sand (35%); cobbles (10%); cs. sand (15%); med. & fine sand; gray brown; sand fraction is angular, gravel fraction is rounded			
40				0.3	
		same as above but contains significantly more silt			
45		Till: CLAY (50%); gravel (30%); v. cs. sand (15%); cs. sand (tr.); brn. Bottom of boring = 48 feet			
50					
55					
60					
65					
70					

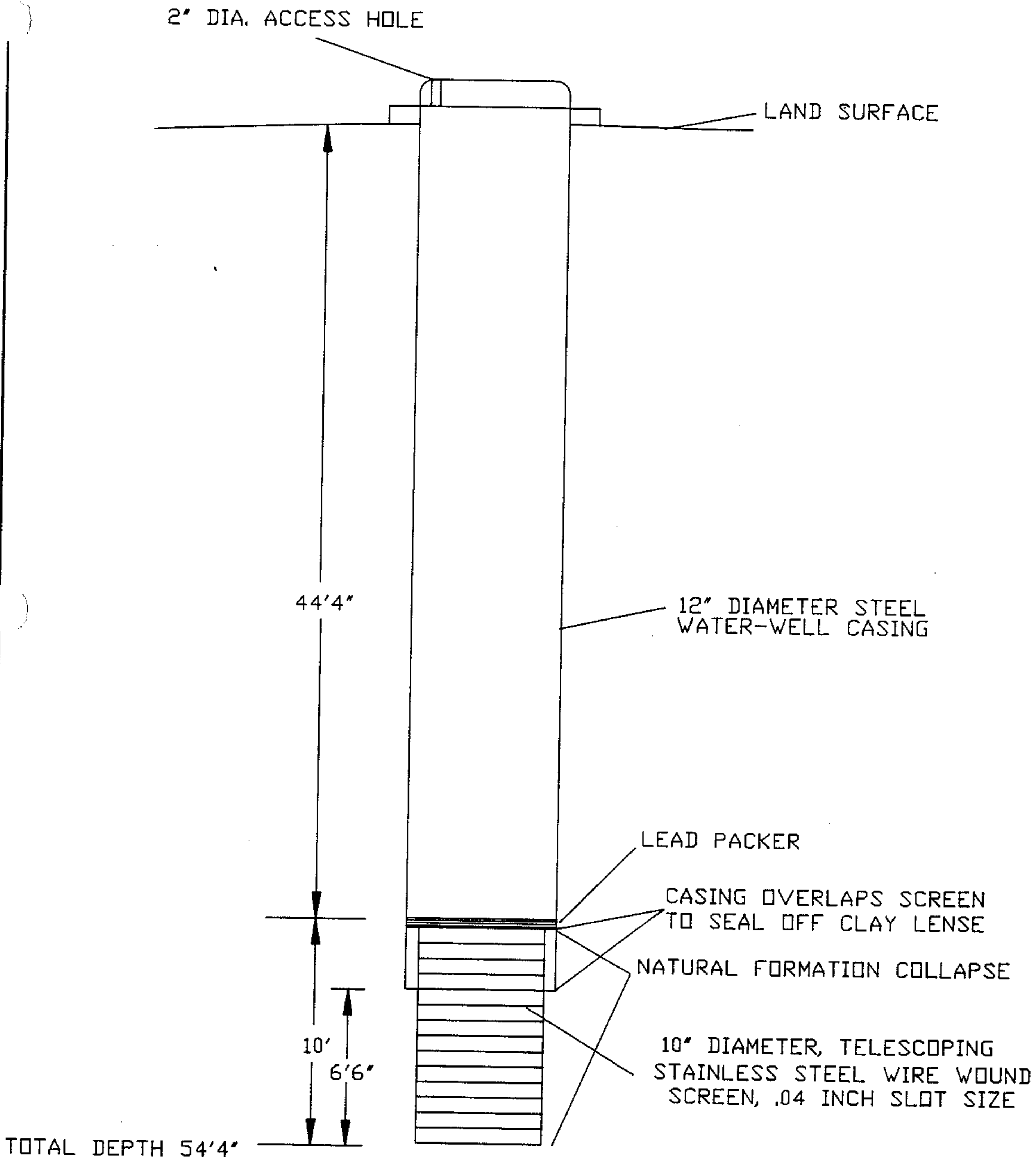


SCALE
NOT TO SCALE

GERAGHTY
& MILLER, INC.
Environmental Services

WELL CONSTRUCTION DETAILS OF TEST WELL #2 INSTALLED MAY 8, 1989

FIGURE



SCALE
NOT TO SCALE

GERAGHTY
& MILLER, INC.
Environmental Services

WELL CONSTRUCTION DETAILS OF TEST WELL #1 INSTALLED JUNE 14, 1985

FIGURE

LOG OF BORING NO. 1

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-17-79

SURFACE ELEVATION: 98.6'*

DATE COMPLETED: 7-17-79

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 and black silt, some sand, trace of gravel, trace of clay, trace of glass, trace of cinders, trace of metal, trace of wood - moist	1A	1.0- 2.5	8-15-13	28
5'	(Becomes medium stiff with wood chips from 4.0' to 5.0')	2A	4.0- 5.5	11- 3- 3	6
9.0' 10'	(ORIGINAL) Dense brown sand and gravel, trace of silt, trace of cobbles - damp	3A	9.0-10.5	13-14-21	35
15'	(Becomes very dense at 14.0')	4A	14.0-15.5	27-39-30	69
20'		5A	19.0-20.5	18-38-40	78
25'		6A	24.0-25.5	19-37-45	82
30'		7A	29.0-29.5	75/3"	75+
	(Continued on next page)				

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 43.0' (heavy)

COMPLETION DEPTH: 47.5'

DEPTH AFTER: ______ HRS. ______

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 1 (Second sheet)

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-17-79

SURFACE ELEVATION: 98.6'*

DATE COMPLETED: 7-17-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
30'	(Continued)				
35'		8A	34.0-35.5	38-52-10/1"	62+
40'		9A	39.0-39.5	100/2"	100+
45'	(Becomes wet at 44.0')	10A	44.0-45.5	30-34-36	70
50' 49.0'	Very dense brown sand, some silt - wet	11A	49.0-50.5	38-30-32	62
	Bottom of boring at 50.5'				
55'					
60'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 43.0' (heavy)

COMPLETION DEPTH: 47.5'

DEPTH AFTER: ______ HRS. ______

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 2 (Second sheet)

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-17-79

SURFACE ELEVATION: 102.3'*

DATE COMPLETED: 7-17-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
30'	(Continued)				
34.0' 35'	Hard brown and gray silt, some clay, some sand, trace of gravel - damp	8A	34.0-35.5	26-64-10/1"	74+
37.5' 40'	Very dense brown sand and gravel, trace of silt - damp	9A	39.0-39.5	100	100+
45'		10A	44.0-45.0	75-25/2"	100+
49.0' 50'	Hard brown silt and sand, some gravel - moist	11A	49.0-50.0	70-30/3"	100+
	Bottom of boring at 50.0'				
55'					
60'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 9.0' (trace)

COMPLETION DEPTH: 49.0'

DEPTH AFTER: ______ HRS. ______

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 3

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-17-79

SURFACE ELEVATION: 97.6'*

DATE COMPLETED: 7-17-79

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, some gravel, wood, wire, glass, crushed stone				
1.0'	(FILL) Medium dense brown sand and gravel, some silt - moist	1A	1.0- 2.5	11-12-10	22
4.0' 5'	(ORIGINAL) Stiff brown and gray silt and clay, some sand, trace of gravel - moist	2A	4.0- 5.5	4- 4-10	14
8.0' 10'	Very dense brown sand and gravel, trace of silt - damp	3A	9.0-10.0	60-40/5"	100+
15'		4A	14.0-15.5	40-45-15/2"	60+
20'	(With trace of cobbles at 19.0')	5A	19.0-20.0	55-45/5"	100+
25'	(With trace of cobbles at 24.0')	6A	24.0-25.0	70-30/3"	100+
30'	(Becomes moist with trace of cobbles at 29.0')	7A	29.0-30.0	60-40/4"	100+

(Continued on next page)

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 34.0' (trace)

COMPLETION DEPTH: 49.5'

DEPTH AFTER: 24 HRS. **

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

**Caved in to 8.0'

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 3 (Second sheet)

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan
DATE STARTED: 7-17-79

SURFACE ELEVATION: 97.6'*
DATE COMPLETED: 7-17-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
30'	(Continued)				
35'		8A	34.0-35.0	45-55	100
40'	(With trace of large cobbles at 39.0')	9A	39.0-40.0	80-20/1"	100+
45'		10A	44.0-45.0	75-25/1"	100+
50' 49.0'	Very dense fine sand and silt, trace of gravel.- wet	11A	49.0-50.0	45-55	100
	Bottom of boring at 50.0'				
55'					
60'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 34.0' (trace)

COMPLETION DEPTH: 49.5'

DEPTH AFTER: 24 HRS. **

TYPE SAMPLER:

X A. SPLIT SPOON

B.

C. SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

**Caved in to 8.0'

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 4

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-16-79

SURFACE ELEVATION: 102.4'*

DATE COMPLETED: 7-16-79

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 sand and silt, some gravel, metal, glass, wire - moist				
1.0'	(FILL) Very stiff dark brown silt, some clay, some sand, trace of gravel, trace of cinders - moist	1A	1.0- 2.5	10- 7-12	19
5' 4.0'	(FILL) Black flyash, wood and slag and trace of silt, trace of cinders - moist	2A	4.0- 5.5	12- 8-11	19
10' 9.0'	(FILL) Stiff gray silt and sand, some clay, trace of gravel, trace of roots - moist	3A	9.0-10.5	4- 5- 8	13
15'	(Becomes hard, with plastic fibers at 14.0')	4A	14.0-15.5	23-33-18	51
20' 19.0'	(FILL) Dense gray sand and gravel, some slag, some concrete fragments - dry	5A	19.0-20.5	14-18-21	39
25' 24.0'	(FILL) Hard gray silt, some gravel, some slag, flyash, and brick	6A	24.0-25.5	6-13-18	31
30' 29.0'	(FILL) Very stiff gray and black silt and sand, some gravel - wet (Continued on next page)	7A	29.0-30.5	11-12-17	29

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 27.0' (medium)

COMPLETION DEPTH: 46.5'

DEPTH AFTER: _____ HRS. _____

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

BOWSER – MORNER
TESTING LABORATORIES, INC.

2B15

LOG OF BORING NO. 4 (Second sheet)

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-16-79

SURFACE ELEVATION: 102.4'*

DATE COMPLETED: 7-16-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
30'	(Continued)				
34.0' 35'	(ORIGINAL) Very dense gray sand and gravel, some silt - wet (With some leachate from the fill layer above)	8A	34.0-35.5	9-19-38	57
40'	(Becomes moist with trace of silt from 39.0')	9A	39.0-40.0	45-55	100
		10A	44.0-44.5	100	100+
45'					
49.0' 50'	Very dense brown and gray sand and silt, some gravel - moist	11A	49.0-50.0	85-15/2"	100+
	Bottom of boring at 50.0'				
55'					
60'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 27.0' (medium)

COMPLETION DEPTH: 46.5'

DEPTH AFTER: ______ **HRS.** ______

TYPE SAMPLER:

X **A.** **SPLIT SPOON**

___ **B.**

___ **C.** **SHELBY TUBE**

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 5

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-12-79

SURFACE ELEVATION: 100.2'*

DATE COMPLETED: 7-12-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Cinders, wood, glass, steel				
1.0'	(FILL) Hard brown and black silt and cinders, some sand, some gravel, trace of wood - damp	1A	1.0- 2.0	60-40	100
4.0' 5'	(FILL) Stiff light gray silt, some sand, hydrated lime (chalk-like)-moist	2A	4.0- 5.5	4- 6- 5	11
6.0'	(FILL) Stiff brown and black silt, some sand, some cinders, trace of clay - moist				
10'		3A	9.0-10.5	18- 5- 6	11
	(Becomes medium stiff at 14.0')				
15'		4A	14.0-15.5	5- 4- 6	10
17.0'	(FILL) Black tar with tri-chlorethelene solution in liquid form				
20'		5A	19.0-20.5	15- 0- 1	1
24.0' 25'	(FILL) Medium dense brown and black fine sand and silt, trace of cinders - moist	6A	24.0-25.5	6- 9- 6	15
29.0' 30'	(FILL) Stiff gray silt, some sand, trace of gravel, trace of roots-moist (Continued on next page)	7A	29.0-30.5	14- 4- 7	11

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: **

COMPLETION DEPTH: 34.0'

DEPTH AFTER: 24 HRS. 15.0'

TYPE SAMPLER:

X A. SPLIT SPOON

B.

C. SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

**4.0' (trace); 34.0' (medium)

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 5 (Second sheet)

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-12-79

SURFACE ELEVATION: 100.2'*

DATE COMPLETED: 7-12-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
30'	(Continued)				
35' 34.0'	(ORIGINAL) Very dense brown sand and gravel, trace of silt - moist	8A	34.0-35.0	32-68	100
40'		9A	39.0-40.0	60-40	100
45'	(With petroleum residual at 44.0')	10A	44.0-45.0	63-37	100
50'		11A	49.0-49.5	100	100+
	Bottom of boring at 49.5'				
55'					
60'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: **

COMPLETION DEPTH: 34.0'

DEPTH AFTER: 24 HRS. 15.0'

TYPE SAMPLER:

X A. SPLIT SPOON

B.

C. SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

**4.0' (trace); 34.0' (medium)

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 6

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-12-79

SURFACE ELEVATION: 98.6'*

DATE COMPLETED: 7-13-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Brown silt, cinders, wood, glass and steel				
1.0'	(FILL) Hard brown and black silt, with wood, wire, gravel, trace of sand - moist	1A	1.0- 2.5	14-21-15	36
5'		2A	4.0- 5.5	13-35-19	54
10' 9.0'	(ORIGINAL) Medium dense brown fine sand, trace of silt - moist	3A	9.0-10.5	8-11-15	26
15'	(Becomes very dense at 14.0')	4A	14.0-15.5	25-53-22	75
20' 19.0'	Very dense brown sand and gravel, some silt, with rock fragments - moist	5A	19.0-20.5	21-49-30	79
25'		6A	24.0-25.5	24-56-20	76
30'	(Becomes wet at 29.0') (Continued on next page)	7A	29.0-30.5	15-49-36	85

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 47.0' (heavy)

COMPLETION DEPTH: 47.0'

DEPTH AFTER: 24 **HRS.** **

TYPE SAMPLER:

X A. SPLIT SPOON

B.

C. SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

**caved in to 17.0'

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 6 (Second sheet)

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-12-79

SURFACE ELEVATION: 98.6'*

DATE COMPLETED: 7-12-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
30'	(Continued)				
35'	(With trace of silt from 34.0')	8A	34.0-34.5	100	100+
40'		9A	39.0-39.5	100	100+
44.0' 45'	Hard brown silt and sand, some gravel - moist	10A	44.0-44.5	100/4"	100+
47.0'	Very dense brown sand and gravel, some silt - wet				
50'		11A	49.0-50.5	22-46-32	78
	Bottom of boring at 50.5'				
55'					
60'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 47.0' (heavy)

COMPLETION DEPTH: 47.0

DEPTH AFTER: 24 HRS. **

TYPE SAMPLER:

X A. SPLIT SPOON

B.

C. SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

**Caved in to 17.0'

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 7

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-16-79

SURFACE ELEVATION: 99.9'*

DATE COMPLETED: 7-16-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Brown silt and sand and gravel, steel, wire - moist				
1.0'	(FILL) Hard brown silt and sand, some clay, trace of gravel - wet	1A	1.0- 2.5	10-22-18	40
5'	(Becomes stiff and moist at 4.0')	2A	4.0- 5.5	4- 6- 8	14
10'	(Becomes soft at 9.0')	3A	9.0-10.5	2- 2- 2	4
12.5' 15'	(ORIGINAL) Dense brown sand and gravel, trace of silt - damp	4A	14.0-15.5	12-24-23	47
20'	(Becomes medium dense at 19.0')	5A	19.0-20.5	8- 9-14	23
25'	(Becomes very dense at 24.0')	6A	24.0-25.0	72-28/2"	100+
30'	(Becomes dense and moist at 29.0') (Continued on next page)	7A	29.0-30.5	28-16-17	33

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: **

COMPLETION DEPTH: 47.0'

DEPTH AFTER: 24 HRS. ***

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

**0.0' (standing water); 1.0' (medium); 12.0'

2815 ***Caved in to 14.5'

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 7 (Second sheet)

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan **DATE STARTED:** 7-16-79

SURFACE ELEVATION: 99.9'* **DATE COMPLETED:** 7-16-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
30'	(Continued)				
35'	(Becomes very dense at 34.0')	8A	34.0-35.5	22-34-46	80
40'		9A	39.0-40.5	25-34-34	68
45'	(Becomes wet at 44.0')	10A	44.0-45.0	70-30/2"	100+
50'		11A	49.0-50.0	72-28/2"	100+
	Bottom of boring at 50.0'				
55'					
60'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: **

COMPLETION DEPTH: 47.0'

DEPTH AFTER: 24 HRS. ***

TYPE SAMPLER:

X A. SPLIT SPOON

B.

C. SHELBY TUBE

BOWSER – MORNER
TESTING LABORATORIES, INC.

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

**0.0' (standing water); 1.0' (medium); 12.0'

***Caved in to 14.5'

LOG OF BORING NO. 8

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-16-79

SURFACE ELEVATION: 101.1'*

DATE COMPLETED: 7-16-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0' 1.0'	(FILL) Brown silt, trace of sand and gravel, with wire, paper, glass and topsoil	1A	1.0- 2.5	14- 6-16	22
	(FILL) Medium dense black flyash, some silt - moist				
5' 4.0'	(FILL) Very stiff gray and brown silt, some clay, some bricks, some sand, trace of slag and wire - damp	2A	4.0- 5.5	14- 6-12	18
10' 9.0'	(FILL) Medium dense black cinders, some slag	3A	9.0-10.5	10- 6-14	20
15' 14.0'	(FILL) Very soft gray silt, some fine sand, hydrated lime (chalk-like)-wet	4A	14.0-15.5	1- 0- 1	1
20' 19.0'	(FILL) Medium dense black sand and silt, trace of gravel, trace of cinders - moist	5A	19.0-20.5	4- 8- 6	14
25' 24.0'	(FILL) Fiberglass insulation and some black tar - moist	6A	24.0-25.0	15-50/2"	65+
30' 29.0'	(FILL) Hard gray silt and sand, and gravel - wet (Continued on next page)	7A	29.0-29.5	75/3"	75+

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 22.0' (heavy)

COMPLETION DEPTH: 48.0'

DEPTH AFTER: 24 HRS. 47.0'

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 8 (Second sheet)

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-16-79

SURFACE ELEVATION: 101.1'*

DATE COMPLETED: 7-16-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
30'	(Continued)				
34.0' 35'	(FILL) Very dense gray sand and gravel, some silt, some wood chips - wet	8A	34.0-34.5	100	100+
37.0'	(ORIGINAL) Very dense brown sand and gravel, trace of silt - moist				
40'		9A	39.0-40.0	85-15/2"	100+
45'		10A	44.0-44.5	100	100+
50'	(Becomes wet at 49.0')	11A	49.0-50.0	75-25/2"	100+
	Bottom of boring at 50.0'				
55'					
60'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 22.0' (heavy)

COMPLETION DEPTH: 48.0'

DEPTH AFTER: 24 HRS. 47.0'

TYPE SAMPLER:

X A. SPLIT SPOON

B.

C. SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 9

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-13-79

SURFACE ELEVATION: 102.0'*

DATE COMPLETED: 7-13-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Brown silt, gravel, steel, brick, wire, glass - dry				
1.0'	(FILL) Hard brown and black silt and sand, some steel, some wood chips, trace of concrete, trace of clay - moist	1A	1.0- 2.0	25-50	75
5' 4.0'	(FILL) Very stiff brown and black silt, some sand, some wood, some clay, wire and paper, trace of gravel - moist	2A	4.0- 5.5	2- 8- 8	16
10' 9.0'	(FILL) Stiff blue and gray silt, some wood chips, some paper - moist	3A	9.0-10.5	4- 8- 5	13
		4A	14.0-15.5	7- 9-11	20
15.0	(ORIGINAL) Medium dense brown sand and gravel, some silt - damp				
20'	(Becomes very dense with some cobbles at 19.0')	5A	19.0-20.5	8-28-40	68
25'	(With some cobbles at 24.0')	6A	24.0-25.0	45-55	100
30'	(Continued on next page)	7A	29.0-30.0	38-62	100

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 47.0'

COMPLETION DEPTH: 46.5'

DEPTH AFTER: 24 HRS. 3.0'

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 9 (Second sheet)

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-13-79

SURFACE ELEVATION: 102.0'*

DATE COMPLETED: 7-13-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
30'	(Continued)				
35'		8A	34.0-34.5	100/2"	100+
40'	(Becomes moist with some cobbles at 39.0')	9A	39.0-40.0	70-30/3"	100+
45'		10A	44.0-45.0	70-30/2"	100+
50' 49.0'	Hard brown silt, some clay, some sand trace of gravel - damp	11A	49.0-50.5	28-52-20/2"	72+
	Bottom of boring at 50.5'				
55'					
60'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: 47.0'

COMPLETION DEPTH: 46.5'

DEPTH AFTER: 24 **HRS.** 3.0'

TYPE SAMPLER:

X **A.** SPLIT SPOON

___ **B.**

___ **C.** SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 10

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7-13-79

SURFACE ELEVATION: 100.6'*

DATE COMPLETED: 7-13-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
0.0'	(FILL) Brown silt, gravel, steel, wire, bricks, wood, trace of sand - dry				
1.0'	(FILL) Hard gray silt and sand, some gravel, trace of clay, trace of wood chips, trace of glass	1A	1.0- 1.5	80/4"	80+
4.0' 5'	(FILL) Medium stiff gray silt and sand, trace of paper, trace of wood - wet	2A	4.0- 5.5	4- 3- 3	6
9.0' 10'	(FILL) Very soft brown silt and clay, trace of sand - wet	3A	9.0-10.5	1- 1- 1	2
		4A	14.0-15.5	4- 7- 8	15
15.0	(ORIGINAL) Medium dense brown sand and gravel, trace of silt - moist				
20'	(Becomes dense at 19.0')	5A	19.0-20.5	11-14-16	30
25'	(Becomes very dense at 24.0')	6A	24.0-25.5	20-39-40	79
30'	(Continued on next page)	7A	29.0-29.5	100	100+

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: **

COMPLETION DEPTH: 47.0'

DEPTH AFTER: 24 **HRS.** 16.0'

TYPE SAMPLER:

X **A.** SPLIT SPOON

___ **B.**

___ **C.** SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

**9.0' (trace); 34.0' (trace); 47.0' (medium)

BOWSER – MORNER
TESTING LABORATORIES, INC.

LOG OF BORING NO. 10 (Second sheet)

SOIL STUDY IN AREAS OF OLD FILL, NORTH OF SELLARS
ROAD AND EAST OF DRYDEN ROAD, MORAINE CITY, OHIO

BORING LOCATION: As shown on boring location plan
DATE STARTED: 7-13-79

SURFACE ELEVATION: 100.6'*
DATE COMPLETED: 7-13-79

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6" ON SAMPLER	"N" BLOWS /FT. OR CORE REC.
30'	(Continued)				
35'		8A	34.0035.0	41-59	100
40'		9A	39.0-40.0	50-50	100
45'		10A	44.0-44.5	100	100 +
50'	(Becomes wet at 49.0')	11A	49.0-50.5	25-50-25/3"	75+
	Bottom of boring at 50.5'				
55'					
60'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: BC-BC

JOB NO.: 25278 (smp)

WATER OBSERVATIONS

INITIAL DEPTH: **

COMPLETION DEPTH: 47.0'

DEPTH AFTER: 24 HRS. 16.0'

TYPE SAMPLER:

X A. SPLIT SPOON

___ B.

___ C. SHELBY TUBE

*In reference to assumed elevation of 100.0' for Bench Mark as shown on boring location plan

**9.0' (trace); 34.0' (trace); 47.0' (medium)

BOWSER – MORNER
TESTING LABORATORIES, INC.

WASTEWATER TREATMENT FACILITY FOUNDATION BORING

Note: Includes only those borings which encountered fill material in the area of Landfill L-2

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soil borings *soil evaluation* *foundation investigation* *instrumentation*

BORING NO. 5 JOB NO. 5963
Ground Surface (Elev.) 737.8
Datum

PROJECT DELCO DIVISION-MORAINE WASTE
. TREATMENT PLANT

CLIENT: General Motors Corporation-Delco
Division c/o Hubbell, Roth & Clark

Location: Moraine, Ohio
Started 25 Oct. 1979 Completed 25 Oct. 1979
Driller J. King

HOLLOW STEM AUGERS

ELEV.	DEPTH IN FEET	SAMPLE TYPE	SAMPLE "N"	STRATA CHANGE	SOIL CLASSIFICATION	W. L.	W	γ_d	q_u
				1½'	Firm Moist Brown Clay Gravel & Broken Concrete - FILL		12' 12'	WATER LEVEL AT COMPLETION	
		LS	1 1 1	5'	Very Loose Very Moist Highly Organic Black Sand Clay & Rubbish FILL		21.4	117	-
	5	LS	1 2 1	8½'	Very Loose Moist Fine Grey Silty Sand With Light Vegetation - FILL		52.0	72	-
	10	LS	2 1 1	12'	Very Loose Very Moist Highly Organic Silty Grey Sand With Layers of High Organic Clay-FILL	V	55.2	70	-
	15	LS	1 2 2	18'	Very Loose Grey Wet Highly Organic Silty SAND With Layers of Clay & Traces of Wood		17.8	124	-
	20	LS	2 3 4	21'	Loose Moist Highly Organic Brown Sand Cinders & Wood - FILL		46.2	87	-
	25	LS	3 3 3	26½'	Plastic Moist Brown Silty SWAMP BOTTOM CLAY		38.9	109	1940
	30	LS	34 30 32		Dense Moist Brown SAND & GRAVEL With Layers of Cobblestone & Traces of Clay - continued -		6.4	135	-

"N" - Standard Penetration Resistance
S.S. - 2" O.D. Split Spoon Sample
L.S. - Sectional Liner Sample
S.T. - Shelby Tube Sample
B.S. - Bottle Sample
H.S. - Housel Sample

W - H_2O% of dry weight
γ_d - Natural Density-lbs. cu. ft.
q_u - Unconfined Compression lbs. sq. ft.
W.L. - Water Level

mk

Page 1 of 2

Boring No. 5

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BORING NO. 7 JOB NO. 5963

Ground Surface (Elev.) 738.8

Datum

PROJECT DELCO DIVISION-MORAINE WASTE TREATMENT PLANT

CLIENT: General Motors Corporation-Delco Division c/o Hubbell, Roth & Clark

Location: Moraine, Ohio

Started 24 Oct. 1979 Completed 25 Oct. 1979

Driller J. King

HOLLOW STEM AUGERS

ELEV.	DEPTH IN FEET	SAMPLE TYPE	SAMPLE "N"	STRATA CHANGE	SOIL CLASSIFICATION	W. L.	W	γ_d	q_u
					Loose Moist Highly Organic Brown Sand Gravel & Clay – FILL		12' 16½'	WATER LEVEL AT COMPLETION	
		LS	5 2 2	2'			38.5	77	–
	5			5'	Loose Moist Fine Grey Silty Sand FILL				
		LS	3 5 12		Medium Compact Moist Some Organic Brown Sand & Gravel – FILL		12.3	98	–
	10	LS	12 12 7				6.4	127	–
				12'		V			
	15	LS	2 2 2		Very Loose Wet Highly Organic Black Sand Gravel & Clay – FILL		22.9	116	1260
	20	LS	5 6 5				15.0	129	2520
				22'					
	25	LS	15 29 30		Dense Moist Brown SAND & GRAVEL With Layers of Cobblestone Boulders & Traces of Clay		9.1	151	–
	30	LS	31 36 32				10.1	145	–
					– continued –				

"N" - Standard Penetration Resistance
S.S. - 2" O.D. Split Spoon Sample
L.S. - Sectional Liner Sample
S.T. - Shelby Tube Sample
B.S. - Bottle Sample
H.S. - Housel Sample

W - H_2O% of dry weight
γ_d - Natural Density-lbs. cu. ft.
q_u - Unconfined Compression lbs. sq. ft.
W.L. - Water Level

mk

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BORING NO. 8 JOB NO. 5963

Ground Surface (Elev.) 737.6

Datum

CLIENT: General Motors Corporation-Delco Division c/o Hubbell, Roth & Clark

PROJECT DELCO DIVISION-MORAINE WASTE . TREATMENT PLANT

Location: Moraine, Ohio

Started 22 Oct. 1979 Completed 22 Oct. 1979

Driller J. King

HOLLOW STEM AUGERS

ELEV.	DEPTH IN FEET	SAMPLE TYPE	SAMPLE "N"	STRATA CHANGE	SOIL CLASSIFICATION	W. L.	W	γ_d	q_u
				1'	Loose Moist Brown Sand & Gravel FILL		7½' 14'	WATER LEVEL AT COMPLETION	
		LS	3 4 3	5'	Loose Moist Fine Grey Silty Sand With High Clay Content – FILL		21.7	87	-
	5	LS	10 18 12	7½'	Compact Moist Brown Sand Gravel & Clay – FILL	V	10.2	128	-
	10	LS	3 3 3	12'	Loose Moist Fine Grey Silty Sand FILL With Light Clay Content		48.8	83	-
	15	LS	1 2 1		Very Loose Wet Fine Grey Silty Sand With Traces of Clay – FILL		25.2	125	1650
	20	LS	1 1 1	23½'			31.6	110	970
	25	Ls	10 26 30		Dense Moist Cement Brown SAND & GRAVEL With Traces of Clay		51.6	98	-
	30	LS	18 30 50		– continued –		6.5	99	-

"N" - Standard Penetration Resistance
S.S. - 2" O.D. Split Spoon Sample
L.S. - Sectional Liner Sample
S.T. - Shelby Tube Sample
B.S. - Bottle Sample
H.S. - Housel Sample

W - H_2O% of dry weight
γ_d - Natural Density-lbs. cu. ft.
q_u - Unconfined Compression lbs. sq. ft.
W.L. - Water Level

mk

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Boring No. 8

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BORING NO. 10 JOB NO. 5963

Ground Surface (Elev.) 738.2

Datum

PROJECT DELCO DIVISION-MORAINE WASTE TREATMENT PLANT

CLIENT: General Motors Corporation-Delco Division c/o Hubbell, Roth & Clark

Location: Moraine, Ohio

Started 25 Oct. 1979 Completed 25 Oct. 1979

Driller J. King

HOLLOW STEM AUGERS

ELEV.	DEPTH IN FEET	SAMPLE TYPE	SAMPLE "N"	STRATA CHANGE	SOIL CLASSIFICATION	W. L.	W	γ_d	q_u
					Hole Started 4 times to penetrate fill.		11½' 14'	WATER LEVEL AT COMPLETION	
		LS	4 6 7		Firm Moist Brown Clay Gravel & Concrete - FILL		13.9	111	1460
	5			5'					
		LS	6 10 13	7½'	Stiff Moist Brown Clay & Gravel FILL		17.8	143	3300
	10	LS	2 3 2	11½'	Plastic Moist Highly Organic Brown Clay - FILL With Layers of Sand & Gravel	V	13.3	117	-
	15	LS	2 2 2		Very Loose Moist Highly Organic Black Sand Clay & Gravel - FILL With Layers of Rubbish & Odor of Chemical Waste		20.5	120	-
	20	LS	1 2 1	22½'			52.1	109	2140
	25	LS	2 3 4	27½'	Plastic Moist Highly Organic Blue CLAY With Layers of Vegetation Possible Fill		46.4	108	2720
	30	LS	30 41 50		Dense Moist Brown SAND & GRAVEL		8.7	94	-
					- continued -				

"N" - Standard Penetration Resistance
S.S. - 2" O.D. Split Spoon Sample
L.S. - Sectional Liner Sample
S.T. - Shelby Tube Sample
B.S. - Bottle Sample
H.S. - Housel Sample

W - H_2O% of dry weight
γ_d - Natural Density-lbs. cu. ft.
q_u - Unconfined Compression lbs. sq. ft.
W.L. - Water Level

mk

Page 1 of 2

Boring No. 10

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BORING NO. 26 JOB NO. 5963

PROJECT DELCO DIVISION-MORAINE WASTE TREATMENT PLANT

Ground Surface (Elev.)

Datum

CLIENT: General Motors Corporation-Delco Division c/o Hubbell, Roth & Clark

Location: Moraine, Ohio

Started 8 Nov. 1979 Completed 8 Nov. 1979

Driller J. King

HOLLOW STEM AUGERS

ELEV.	DEPTH IN FEET	SAMPLE TYPE	SAMPLE "N"	STRATA CHANGE	SOIL CLASSIFICATION	W. L.	W	γd	qu
		LS	4 3 2	3'	Plastic Moist Slightly Organic Brn Clay & Gravel FILL		13' WATER LEVEL 15' AT COMPLETION		
	5	LS	13 16 20	6'	Loose Moist Slightly Organic Grey Silty Fine Sand FILL				
				7½'	Compact Moist Brown Sand & Gravel FILL				
	10	LS	8 10 12	12½'	Medium Compact Moist Slightly Organic Brown Sand & Gravel FILL				
	15	LS	3 6 3		Loose Wet Highly Organic Brown Sand With Clay Wood & Misc. Debris FILL	V V			
	20	LS	2 2 2	23'					
	25	LS	8 8 12	27½'	Medium Compact Wet Brown SAND & Gravel				
	30	LS	45 70 79	30'	Dense Moist Cemented Brown SAND & Gravel				
					END OF BORING				

"N" - Standard Penetration Resistance
S.S. - 2" O.D. Split Spoon Sample
L.S. - Sectional Liner Sample
S.T. - Shelby Tube Sample
B.S. - Bottle Sample

W - H_2O% of dry weight
γd - Natural Density-lbs. cu. ft.
q_u - Unconfined Compression lbs. sq. ft.
W.L. - Water Level

Boring No. 26

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soil borings *soil evaluation* *foundation investigation* *instrumentation*

BORING NO. 32 JOB NO. 5963

Ground Surface (Elev.)

Datum

CLIENT: General Motors Corporation-Delco Division c/o Hubbell, Roth & Clark

PROJECT DELCO DIVISION-MORAINE WASTE TREATMENT PLANT

Location: Moraine, Ohio

Started 9 Nov. 1979 Completed 9 Nov. 1979

Driller J. King

HOLLOW STEM AUGERS

ELEV.	DEPTH IN FEET	SAMPLE TYPE	SAMPLE "N"	STRATA CHANGE	SOIL CLASSIFICATION	W. L.	W	γ_d	q_u
		LS	4 4 4	2'	Firm Moist Slightly Organic Brown Clay & Gravel FILL		NO WATER LEVEL		
	5	LS	4 2 2	6'	Loose Moist Slightly Organic Fine Grey Sand FILL				
	10	LS	1 2 2	11'	Very Loose Moist Slightly Organic Fine Gravel Sand FILL				
	15	LS	5 7 8	17½'	Medium Compact Moist Slightly Organic Brown Sand, Cinders & Gravel FILL				
	20	LS	6 10 14	22'	Medium Compact Moist Brown SAND & Gravel				
	25	LS	16 23 40	26'	Dense Moist Cemented Brown SAND & Gravel				
	30				END OF BORING				

"N" - Standard Penetration Resistance
S.S. - 2" O.D. Split Spoon Sample
L.S. - Sectional Liner Sample
S.T. - Shelby Tube Sample
B.S. - Bottle Sample

W - H_2O% of dry weight
γ_d - Natural Density-lbs. cu. ft.
q_u - Unconfined Compression lbs. sq. ft.
W.L. - Water Level

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BORING NO. 33 JOB NO. 5963

PROJECT DELCO DIVISION-MORAINE WASTE TREATMENT PLANT

Ground Surface (Elev.)

Datum

CLIENT: General Motors Corporation-Delco Division c/o Hubbell, Roth & Clark

Location: Moraine, Ohio

Started 8 Nov. 1979 Completed 8 Nov. 1979

Driller J. King

HOLLOW STEM AUGERS

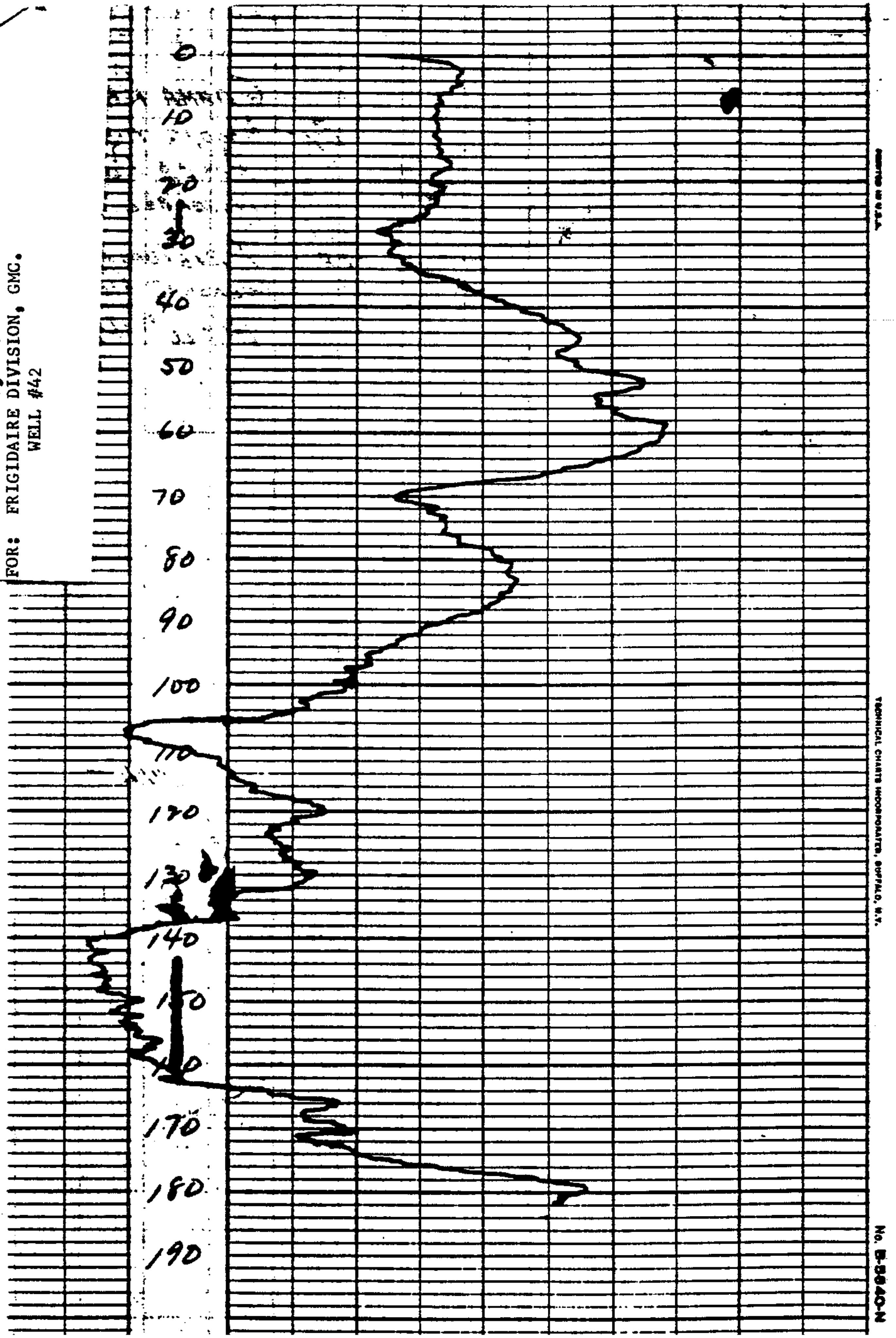
ELEV.	DEPTH IN FEET	SAMPLE TYPE	SAMPLE "N"	STRATA CHANGE	SOIL CLASSIFICATION	W.L.	W	γ_d	q_u
			2	1½'	Firm Moist Slightly Organic Brown Clay & Gravel FILL		12½' WATER LEVEL 14' AT COMPLETION Medium Volume		
		LS	1 1		Very Loose Moist Grey Silty Fine Sand FILL				
	5								
		LS	1 1 2						
	10	LS	1 2 2	10½'					
					Loose Moist Highly Organic Grey Sand & Clay FILL	V V			
	15	LS	8 5 4						
			2	18'					
			3	19½'	Plastic Moist Highly Organ.Swamp Bottom CLAY				
	20	LS	7		Stiff Moist Slightly Organic Blue Silty CLAY				
				23'					
	25	LS	17 21 30	25'	Dense Moist Cemented Brown SAND & Gravel				
					END OF BORING				
	30								

"N" - Standard Penetration Resistance
S.S. - 2" O.D. Split Spoon Sample
L.S. - Sectional Liner Sample
S.T. - Shelby Tube Sample
B.S. - Bottle Sample

W - H_2O% of dry weight
γ_d - Natural Density-lbs. cu. ft.
q_u - Unconfined Compression lbs. sq. ft.
W.L. - Water Level

Boring No. ## 33

GAMMA RAY LOG
BY: MOODY'S OF DAYTON, - Roger Rogers
November 27, 1970
FOR: FRIGIDAIRE DIVISION, GMC.
WELL #42



MOODY'S of Dayton, Inc.

ADDRESS REPLY TO:
P.O. BOX 155
VANDALIA, OHIO 45377
AC 513-898-3969

January 27, 1972

Frigidaire Division
General Motors Corporation
Dayton, Ohio 45401
ATTN: Ed Ode

Subject: Well # 42
P.O.# FID-05983-B

COPY

Gentlemen:

Following up our letter of February 4, 1971 and with the attached information we are bringing this job file up to date.

Enclosed are two (2) copies of our pump and well data charts depicting pertinent information concerning the well and pump dimensions.

A short pumping test was conducted on the well in January of 1971. Results of this test were as follows:

Time	10"Pipe x8" Orifice	Capacity GPM	Pumping Level	Draw Down
10:00 AM	0	0	69'(static)	0
10:20	2"	419 GPM	75'	6'
10:55	5"	692 GPM	76'	7'
11:00	12"	1027 GPM	77'	8'
11:20	13"	1069 GPM	77'	8'
11:22	23"	1421 GPM	84'	15'
11:30	23"	1421 GPM	84'	15'
12:00	23"	1421 GPM	84'	15'
12:05	40½"	1875 GPM	90'	21'
12:35	50"	2095 GPM	93'-6"	24'-6"
12:45	50"	2095 GPM	93'-6"	24'-6"
1:00	54"	2168 GPM	95"	26'
1:30	56"	2219 GPM	96'	27'
2:00	56"	2219 GPM	96'	27'

Pump Shut-Off

After the pump was installed another pumping test was conducted by Jesse Helm on 6/28/71. Results of this test were as follows:

Capacity	Disc Press	Draw Down	Amps
1421 GPM	50 psi	13'	125
1258 GPM	75 psi	12'	125
1186 GPM	90 psi	10'	125

Shut-Off pressure was 150 psi and the motor drew 70 amps.

After checking the attached information, if you have any questions, or need more information, please advise.

Very truly yours,

MOODY'S OF DAYTON, INC.

Ed Wagner

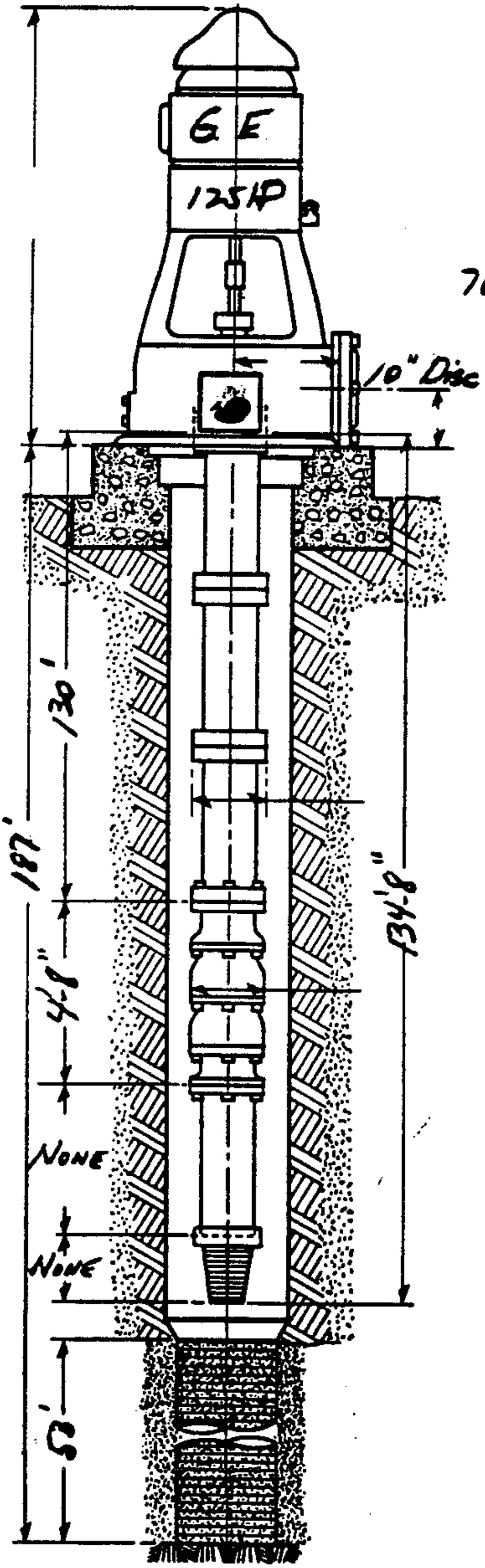
Edward B. Wagner
President

EBW/jld

VANDALIA, OHIO

MOODY'S, INC.

MEADVILLE, PA.



TURBINE PUMP INSTALLATION FOR:

Frigidaire Div. - G.M.C

WELL DESIGNATION NO. 42

701-C-17H SERIAL NUMBER

1200 GALLONS PER MINUTE

210 TOTAL HEAD IN FEET

12-6H_3M_3 - 5 STAGES

1760 MOTOR SPEED

130 FEET OF SETTING

10" SIZE COLUMN Flanged

None OIL TUBE

1 11/16" LINE SHAFT

None ________ SUCTION PIPE

125 H.P. 460 VOLT. 3 CURRENT 60

Water LUBRICATION

136 FEET OF AIRLINE 1/4" Galvanized

6/28/71 DATE INSTALLED

20" O.D ~~I.D.~~ OF WELL

187' FEET DEEP FROM FOUNDATION

185' FEET DEEP FROM GRADE

50' STRAINER LENGTH — SLOT See Letter 2/4/71

69' STATIC LEVEL — DATE 6/28/71

______ " " — " ______

______ " " — " ______

______ " " — " ______

2/4/71 DATE DRILLED

PUMP REPAIRED — DATE ______

" " — " ______

" " — " ______

WELL ACID TREATED — DATE ______

" " " — " ______

COMMENTS —

MOODY'S, INC.

Phones

VANDALIA, OHIO: 898-4514

MEADVILLE, PA.: 6-1128

FORM TPI-762

LITHO IN U.S.A.

APPENDIX B

COMPILATION OF WATER QUALITY DATA

APPENDIX B. COMPILATION OF WATER QUALITY DATA

LIST OF TABLES

LIST OF TABLES
(continued)

LIST OF TABLES
(continued)

TABLE B-1
ANALYTICAL METHODS USED ON GROUND-WATER SAMPLES FROM THE NORTH AND SOUTH LAGOONS AND LANDFILL (L-1) AT HARRISON, 1983 THROUGH 1989

PARAMETER	EPA METHOD	REFERENCE
Arsenic	206.3	A
Barium	208.1 (208.2 if needed)	A
Boron	212.3	A
Cadmium	213.1 (213.2 if needed)	A
Chloride	325.3	A
Chromium	218.1 (218.2 if needed)	A
Fluoride	340.1	A
Iron	236.1	A
Lead	239.1 (239.2 if needed)	A
Manganese	243.1	A
Mercury	245.1	A
Phenols	420.1	A
Selenium	270.3	A
Silver	272.1 (271.2 if needed)	A
Sodium	ASTM D-1248	B
Sulfate	375.4	A
pH	150.1	A
Specific Conductance	120.1	A
TOC	415.1	A
TOX	450.1	C
VOC Scan	624	C

Reference A = Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, March 1979, U.S. EPA, Cincinnati, Ohio, Revised 1983.

Reference B = American Society for Testing and Materials.

Reference C = Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act, U.S. EPA, 1984, Federal Register, 40 CFR Part 136.

TABLE B-2
ANALYTICAL METHODS USED ON GROUND-WATER SAMPLES FOR THE REVISED GROUND-WATER QUALITY ASSESSMENT FOR THE HARRISON RADIATOR NORTH LAGOON, JUNE 1989
(IMPLEMENTED DECEMBER, 1989)

Water Quality Parameter	EPA Method	Method Reference
pH	9040	SW-846
Specific Conductance	9050	SW-846
VOC Scan	8240	SW-846
Semi-Volatile Scan	8270	SW-846
Antimony	7040/7041	SW-846
Arsenic	303E	STM
Barium	7080/7081	SW-846
Cadmium	7130/7131	SW-846
Chromium	7190/7191	SW-846
Cobalt	7200/7201	SW-846
Copper	7210	SW-846
Lead	7420/7421	SW-846
Mercury	7470	SW-846
Nickel	7520	SW-846
Selenium	303E	STM
Silver	7840/7841	SW-846
Tin	7870	SW-846
Vanadium	7910/7911	SW-846
Zinc	7950	SW-846
Cyanide	9012	SW-846

References

SW-846 = Test Methods for Evaluating Solid Waste, U.S. EPA-SW-846, 1986, Third Edition.

STM = Standard Methods for the Examination of Water and Wastewater, 16th Edition, 1985, ALPHA-AWWA-WPCF.

TABLE B-3
ANALYTICAL METHODS USED FOR THE REVISED GROUND-WATER DETECTION MONITORING PROGRAM FOR THE HARRISON RADIATOR SOUTH LAGOON
(IMPLEMENTED MARCH 1990)

WATER QUALITY PARAMETER	ANALYTICAL METHOD	METHOD REFERENCE
Ground-Water Contamination Indicators		
pH	9040	SW-846
Specific Conductance	9050	SW-846
Total Organic Carbon	9060	SW-846
Total Organic Halogen	9010	SW-846
VOC Scan	8240	SW-846
Ground-Water Quality Parameters		
Chloride	9252	SW-846
Iron	7380	SW-846
Manganese	7460	SW-846
Phenols	9065	SW-846
Sodium	D-1428	ASTM
Sulfate	9038	SW-846
Drinking Water Supply Parameters		
Arsenic	303E	STM
Barium	7080/7081	SW-846
Cadmium	7130/7131	SW-846
Chromium	7190/7191	SW-846
Fluoride	413B	STM
Lead	7420/7421	SW-846
Mercury	7470	SW-846
Nitrate (N)	418C	STM
Selenium	303E	STM
Silver	7840/7841	SW-846
Endrin	8080	SW-846
Lindane	8080	SW-846
Methoxychlor	8080	SW-846
Toxaphene	8080	SW-846
2,4-D	509B	STM
2,3,5-TP Silvex	509B	STM
Radium	903/904	EPA 600
Gross Alpha	900	EPA 600
Gross Beta	900	EPA 600
Coliform	*	ODH

References

SW-846 = Test Methods for Evaluating Solid Waste, U.S. EPA-SW-846, 1986, Third Edition.

STM = Standard Methods for the Examination of Water and Wastewater, 16th edition, 1985, ALPHA-AWWA-WPCF.

EPA 600 = Prescribed Procedures for Measurement of Radioactivity in Drinking Water, EPA 600/4-80-032, U.S. EPA, 1980.

ODH = Certification for Bacteriological Water Analysis, Ohio Department of Health, 1985.
(*Method used is as prescribed in this document)

TABLE B-4

WATER LEVEL ELEVATIONS (FT ABOVE SEA LEVEL)
HARRISON RADIATOR NORTH SETTLING LAGOON
MORAINE, OHIO

WELL	Jul-83	Apr-84	Oct-84	Dec-84	Mar-85	Jun-85	Sep-85	Dec-85	Mar-86	Jun-86	Sep-86	Dec-86	Mar-87	Jun-87
W-1-N	699.56	701.51	699.04	699.18	700.50	701.97	699.16	699.86	701.79	701.07	700.40	703.63	704.21	705.42
W-2-N	697.49	700.34	697.10	697.37	699.39	700.53	697.49	698.73	700.77	699.56	699.08	702.92	703.52	704.72
W-3-N	697.41	699.95	696.31	696.66	699.09	700.33	697.18	698.36	700.52	699.33	698.94	702.69	703.41	704.52
W-4-N	697.51	699.81	696.60	696.94	699.05	700.26	697.09	698.24	700.41	699.26	698.92	702.60	703.39	704.41
W-1-S	NM	NM	NM	NM	NM	NM	692.32	694.60	697.48	694.89	695.38	700.66	701.52	702.28
HR-1	694.16	696.99	692.74	693.28	695.92	696.83	693.01	694.77	697.64	695.25	695.61	700.68	701.72	702.55
HR-2	697.54	699.79	696.82	696.91	698.90	700.11	697.04	698.33	700.20	699.11	698.75	702.51	703.32	704.33
HR-3	697.57	699.73	696.88	696.94	698.81	700.06	697.01	697.96	700.12	699.05	698.68	702.45	703.29	704.28
HR-4	698.86	701.05	698.21	698.28	699.99	701.35	698.37	699.24	701.25	700.49	699.90	703.22	703.88	705.03
HR-5	696.66	699.27	695.91	696.31	698.22	699.50	696.34	697.49	699.78	698.32	698.06	701.96	702.74	703.85
	695.27	697.88	694.24	694.61	696.78	698.02	694.69	696.05	698.62	696.64	696.70	701.17	702.09	703.08
HR-7	696.17	699.36	695.76	696.12	698.54	699.40	696.14	697.70	699.85	698.28	698.00	702.22	702.83	704.03
HR-8	699.86	701.59	698.87	699.05	700.59	702.07	699.10	699.81	701.77	701.20	700.55	703.52	704.15	705.30
HR-9	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-10	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-11	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-12	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-13	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-14	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-15	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

NM = Not Measured
NI = Not Installed

[illegible] wq1

TABLE B-4

WATER LEVEL ELEVATIONS (FT ABOVE SEA LEVEL)
HARRISON RADIATOR NORTH SETTLING LAGOON
MORAINE, OHIO
(CONTINUED)

WELL	Sept-87	Dec-87	Mar-88	Jun-88	Sep-88	Dec-88	Mar-89	Jun-89	Sep-89	Dec-89	Mar-90	Jun-90	Sep-90	Dec-90
W-1-N	703.98	703.56	706.73	706.06	704.06	704.52	705.65	710.64	708.89	707.70	708.89	710.07	706.68	708.48
W-2-N	703.30	702.88	706.32	705.60	703.29	703.87	705.97	710.41	708.39	707.02	708.59	709.60	708.10	707.79
W-3-N	703.20	702.76	706.14	705.43	703.08	703.66	705.82	710.29	708.29	706.93	708.40	709.49	707.96	707.78
W-4-N	703.15	702.77	706.04	705.32	702.99	703.59	705.79	710.21	708.27	706.92	708.33	709.48	707.95	707.82
W-1-S	701.05	700.87	705.04	704.05	700.81	702.07	704.21	709.40	707.08	705.35	707.25	708.44	706.68	706.38
HR-1	701.35	701.03	705.06	704.14	701.00	702.12	704.32	709.48	707.21	705.56	707.28	708.48	706.82	706.53
HR-2	703.11	702.72	705.92	705.22	702.90	703.49	705.69	710.13	708.20	706.85	708.30	709.48	707.95	707.84
HR-3	703.05	702.68	705.85	705.16	702.84	703.43	705.66	710.09	708.17	706.82	708.22	709.46	707.92	707.82
HR-4	703.65	703.20	706.37	705.70	703.57	704.08	706.25	710.39	708.60	707.32	708.86	709.98	708.53	708.38
HR-5	702.53	702.08	705.61	704.90	702.36	703.01	705.20	709.89	707.83	706.39	708.07	709.24	707.69	707.50
[illegible]	701.79	701.40	705.36	704.55	701.59	702.50	704.67	709.75	707.53	705.91	707.58	708.78	707.18	706.90
HR-7	702.66	702.17	705.87	705.13	702.57	703.25	705.40	710.06	707.96	706.56	708.18	709.26	707.73	707.47
HR-8	703.94	703.52	706.52	705.91	704.01	704.49	706.61	710.49	709.03	707.83	709.00	710.30	708.91	708.75
HR-9	NI	NI	NI	NI	704.54	704.99	707.05	710.72	709.31	708.19	709.18	710.67	709.30	709.13
HR-10	NI	NI	NI	NI	704.54	705.01	707.04	710.72	709.31	708.19	709.29	710.69	709.30	709.13
HR-11	NI	NI	NI	NI	704.52	704.87	707.14	710.75	709.43	708.28	709.18	710.68	709.36	709.21
HR-12	NI	NI	NI	NI	704.44	704.90	706.97	710.78	709.45	708.29	709.20	710.70	709.37	709.23
HR-13	NI	NI	NI	NI	702.81	703.38	705.64	709.93	708.02	706.76	708.16	709.39	707.79	707.67
HR-14	NI	NI	NI	NI	NI	NI	NI	NI	NI	706.65	708.14	709.33	707.68	707.57
HR-15	NI	NI	NI	NI	NI	NI	NI	NI	NI	706.56	708.10	709.26	707.60	707.43

NM = Not Measured
NI = Not Installed

[illegible] vq1

ND

TABLE B-5
TOX CONCENTRATIONS (PPB)
HARRISON RADIATOR NORTH SETTLING LAGOON
MORAINE, OHIO

WELL	Jul-83	Apr-84	Oct-84	Dec-84	Mar-85	Jun-85	Sep-85	Dec-85	Mar-86	Jun-86	Sep-86	Dec-86	Mar-87	Jun-87	Sep-87	Dec-87	Mar-88	Jun-88	Sep-88	Dec-88	Mar-89	Jun-89	Sep-89	Dec-89
W-1-N	ND	ND	ND	ND	2.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.6	ND	9.3	ND
W-2-N	18.1	17.9	15.5	23.1	13.6	4.0	ND	5.6	2.2	3.1	6.2	2.0	2.5	4.7	2.8	2.0	ND	2.9	ND	4.4	ND	ND	8.6	ND
W-3-N	256.5	126.2	275.0	449.2	448.0	198.5	292.6	314.2	442.3	382.0	300.0	287.0	512.0	500.0	513.5	507.3	530.5	641.0	415.4	348.0	589.0	265.0	327.0	259.1
W-4-N	86.8	55.9	60.8	33.5	34.4	31.0	26.4	49.4	20.7	20.8	26.0	31.4	27.0	23.0	39.1	39.9	24.3	19.8	18.4	27.8	33.6	11.3	12.5	11.5
W-1-S	NM	141.7	224.7	NM	59.4	77.1	110.7	76.5	10.6	92.0	65.4	15.6	12.0	97.2	88.1	120.6	23.8	67.1	17.3	41.5	38.6	9.0	237.0	NS
HR-1	245.7	1044.8	1324.0	780.5	686.5	168.3	632.3	468.1	474.1	474.5	449.0	356.0	289.0	325.9	297.8	287.0	421.3	228.6	274.0	310.0	249.0	144.0	111.0	154.7
HR-2	2.3	19.9	17.0	9.8	23.1	6.1	ND	25.4	18.0	27.2	27.3	25.9	15.2	37.5	22.7	25.1	20.9	26.3	14.1	47.6	24.7	20.3	17.8	9.6
HR-3	8.0	25.1	30.4	8.3	12.3	3.9	ND	3.9	ND	1.4	ND	ND	ND	3.1	1.8	1.9	ND	2.1	2.6	6.4	2.4	4.9	ND	2.6
HR-4	14.8	14.2	13.0	0.9	11.4	9.3	3.6	3.3	6.9	9.6	1.3	7.4	10.4	12.0	5.5	5.5	8.0	7.2	ND	4.5	11.4	ND	10.0	2.7
HR-5	79.6	227.8	254.0	130.0	108.2	156.2	93.1	110.1	85.4	106.5	90.9	74.1	68.2	118.9	84.8	76.1	78.3	36.4	95.5	70.0	62.4	29.4	50.0	53.1
HR-6	162.0	301.2	296.6	120.1	111.1	457.8	118.2	108.6	84.5	98.1	108.0	46.5	37.5	63.5	34.2	57.5	17.9	36.9	6.5	7.2	21.6	ND	ND	ND
HR-7	4.2	6.0	10.7	18.2	13.6	6.4	6.9	7.3	3.1	8.9	11.4	8.3	6.3	5.5	7.1	7.4	6.6	7.4	7.8	7.5	8.6	10.2	19.6	1.1
HR-8	4.5	274.2	335.8	240.6	210.4	360.4	156.7	133.3	87.8	47.3	32.1	35.9	29.7	27.0	15.3	22.3	19.1	22.0	10.3	9.6	7.6	7.4	20.6	19.9
HR-9	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	5.4	5.2	16.8	5.5	8.3	9.7
HR-10	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	ND	ND	8.8	ND	ND	ND
HR-11	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	437.0	646.0	666.0	638.0	188.0	93.6
HR-12	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	ND	ND	ND	ND	13.9	15.0
HR-13	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	32.5	46.3	34.1	32.6	34.2	21.7
HR-14	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	17.1
HR-15	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	ND

ND = Not Detected
NS = Not Sampled

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TABLE B-6
CIS-1,2-DICHLOROETHENE CONCENTRATIONS (PPB)
HARRISON RADIATOR NORTH SETTLING LAGOON
MORAINE, OHIO

WELL	Jul-83	Apr-84	Oct-84	Dec-84	Mar-85	Jun-85	Sep-85	Dec-85	Mar-86	Jun-86	Sep-86	Dec-86	Mar-87
W-1-N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
W-2-N	ND	ND	ND	5.2	6.5	ND	ND	3.2	1.1	1.4	2.6	ND	1.2
W-3-N	ND	ND	ND	ND	ND	99.2	279.5	233.0	304.0	300.9	279.0	176.8	422.8
W-4-N	ND	ND	ND	12.6	16.0	4.2	11.5	21.2	10.2	6.8	11.0	12.6	7.8
W-1-S	NM	ND	ND	NM	6.9	5.2	60.3	39.7	9.1	56.8	45.8	2.7	4.6
HR-1	ND	ND	ND	101.0	116.0	45.6	44.7	72.7	73.2	93.9	84.0	59.0	38.5
HR-2	ND	ND	ND	ND	18.0	1.7	ND	22.9	16.0	23.9	26.0	23.4	14.0
HR-3	ND	ND	ND	ND	ND	ND	ND	1.4	ND	ND	ND	ND	ND
HR-4	ND	ND	ND	ND	1.8	ND	ND	ND	ND	ND	ND	1.0	ND
HR-5	ND	ND	TR	118.5	99.8	134.8	84.9	105.3	77.2	97.4	81.0	64.7	61.6
R-6	ND	99.3	126.5	107.5	101.4	204.0	105.0	85.9	81.1	93.9	106.0	39.4	37.5
HR-7	ND	ND	ND	5.9	4.6	ND	2.8	2.7	ND	1.9	2.5	ND	ND
HR-8	ND	ND	TR	158.8	153.3	267.0	110.2	96.5	69.2	40.3	13.4	22.4	18.3
HR-9	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-10	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-11	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-12	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-13	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-14	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-15	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

ND = Not Detected
NI = Not Installed
NS = Not Sampled
NA = Not Analyzed

After December 1989 ground-water samples from the North Settling Lagoon Area re no longer submitted for analysis of cis-1,2-dichloroethene.

t6lb-6.wq1

TABLE B-6
CIS-1,2-DICHLOROETHENE CONCENTRATIONS (PPB)
HARRISON RADIATOR NORTH SETTLING LAGOON
MORAINE, OHIO
(CONTINUED)

WELL	Jun-87	Sep-87	Dec-87	Mar-88	Jun-88	Sep-88	Dec-88	Mar-89	Jun-89	Sep-89	Dec-89
W-1-N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
W-2-N	2.4	1.4	1.2	ND	1.7	ND	3.3	ND	ND	ND	ND
W-3-N	404.0	406.0	426.0	386.0	438.0	193.0	234.0	394.0	138.0	222.0	141.0
W-4-N	8.9	7.5	10.7	9.1	7.3	3.5	10.3	4.4	3.3	1.8	3.6
W-1-S	66.9	47.8	46.0	2.0	44.7	2.2	1.9	1.4	ND	121.0	NS
HR-1	66.0	40.0	42.4	49.4	28.8	35.7	102.0	36.0	28.3	17.6	ND
HR-2	ND	ND	24.2	20.9	24.3	12.2	43.5	20.4	18.1	17.8	9.6
HR-3	1.7	1.2	1.2	ND	2.1	2.6	6.4	1.5	4.9	ND	2.6
HR-4	1.6	0.5	0.6	1.0	ND	ND	ND	1.0	ND	ND	ND
HR-5	106.0	74.6	66.7	66.8	32.4	84.4	61.8	45.4	23.7	39.9	45.5
HR-6	63.5	33.1	56.2	6.8	36.9	ND	ND	ND	ND	ND	ND
HR-7	ND	0.7	0.8	ND	ND	0.8	ND	ND	ND	ND	ND
HR-8	16.6	7.6	10.3	10.5	12.7	4.0	4.1	2.6	2.6	4.5	5.5
HR-9	NI	NI	NI	NI	NI	ND	ND	ND	ND	ND	ND
HR-10	NI	NI	NI	NI	NI	ND	ND	ND	ND	ND	ND
HR-11	NI	NI	NI	NI	NI	168.0	298.0	259.0	209.0	79.8	33.8
HR-12	NI	NI	NI	NI	NI	ND	ND	ND	ND	ND	15.0
HR-13	NI	NI	NI	NI	NI	20.6	37.0	22.8	25.5	24.5	21.7
HR-14	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	8.1
HR-15	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	ND

ND = Not Detected
NI = Not Installed
NS = Not Sampled
NA = Not Analyzed

After December 1989 ground-water samples from the North Settling Lagoon Area are no longer submitted for analysis of cis-1,2-dichloroethene.

tblb-6.wq1

TABLE B-7
TRICHLOROETHENE CONCENTRATIONS (PPB)
HARRISON RADIATOR NORTH SETTLING LAGOON
MORAINE, OHIO

WELL	Jul-83	Apr-84	Oct-84	Dec-84	Mar-85	Jun-85	Sep-85	Dec-85	Mar-86	Jun-86	Sep-86	Dec-86	Mar-87
W-1-N	ND	ND	ND	ND	2.6	ND	ND	ND	ND	ND	ND	ND	ND
W-2-N	1.5	2.9	3.1	13.1	5.5	2.5	ND	2.5	1.1	1.7	1.6	2.0	1.3
W-3-N	4.5	4.3	ND	ND	ND	20.7	10.0	11.4	27.6	9.9	19.0	24.8	16.1
W-4-N	7.6	5.5	18.9	7.4	11.5	12.6	10.5	11.5	7.1	7.8	9.8	11.7	12.6
W-1-S	NM	5.9	28.5	NM	8.3	6.2	15.9	5.0	1.5	6.3	9.2	3.0	2.2
HR-1	102.2	736.2	1029.0	594.3	519.0	87.4	496.0	318.8	343.3	301.3	329.0	232.2	169.0
HR-2	0.9	ND	0.8	ND	2.4	1.5	ND	ND	ND	1.5	ND	ND	ND
HR-3	6.8	12.6	13.7	8.3	12.3	3.9	ND	3.8	ND	1.4	ND	ND	ND
HR-4	4.3	6.0	5.6	ND	5.6	4.5	3.6	3.3	4.4	4.7	1.3	6.3	1.9
HR-5	4.7	6.4	14.4	9.0	8.4	10.8	8.2	4.8	4.6	9.1	10.0	6.5	5.8
HR-6	1.1	2.1	6.3	6.7	5.5	ND	1.8	2.0	ND	1.7	1.1	1.3	ND
HR-7	ND	1.3	2.6	10.0	9.0	1.5	4.1	2.4	3.1	6.9	9.0	8.3	4.5
HR-8	ND	2.3	3.7	7.4	4.6	1.0	ND	3.3	1.6	2.0	1.0	2.0	1.5
HR-9	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-10	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-11	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-12	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-13	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-14	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-15	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

ND = Not Detected
NM = Not Measured
NI = Not Installed
NS = Not Sampled

tblb-7.wq1

TABLE B-7
TRICHLOROETHENE CONCENTRATIONS (PPB)
HARRISON RADIATOR NORTH SETTLING LAGOON
MORAINE, OHIO
(CONTINUED)

WELL	Jun-87	Sept-87	Dec-87	Mar-88	Jun-88	Sep-88	Dec-88	Mar-89	Jun-89	Sep-89	Dec-89	Mar-90	Jun-90	Sep-90	Nov-90
W-1-N	ND	ND	ND	ND	ND	ND	ND	ND	ND	9.3	ND	ND	ND	ND	ND
W-2-N	2.3	1.4	0.8	ND	1.2	ND	1.1	ND	ND	8.6	ND	1.2	1.3	ND	1.6
W-3-N	18.9	16.9	13.2	32.2	41.2	28.9	23.2	83.4	34.3	19.3	17.3	35.5	41	24.3	8.7
W-4-N	8.7	8.2	13.4	10.4	8.0	7.9	7.8	15.2	8.1	10.7	7.9	7.8	8.1	7.8	8.5
W-1-S	3.8	6.1	15.8	12.6	2.9	1.4	1.9	1.8	ND	76.3	NS	NS	NS	NS	NS
HR-1	232.0	219.0	206.0	290.0	154.0	170.0	154.0	150.0	91.8	66.8	85.6	175.0	150	97.6	49.0
HR-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HR-3	1.4	0.6	0.7	ND	ND	ND	ND	1.0	ND	ND	ND	ND	ND	ND	ND
HR-4	5.7	2.9	2.6	4.2	4.3	ND	2.8	7.6	ND	10.0	2.7	3.6	6.1	3.8	3.5
HR-5	12.9	8.7	8.0	8.5	4.0	11.1	8.2	10.8	5.7	7.8	7.6	10.2	8.2	ND	7.9
HR-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.3	1.4	2.1
HR-7	5.5	6.4	6.6	7.4	7.4	7.0	7.5	8.6	10.2	19.6	11.1	7.3	7.7	ND	10
HR-8	1.6	1.0	1.1	1.4	1.4	1.6	1.3	1.9	2.7	9.7	ND	2.3	1.9	ND	2.2
HR-9	NI	NI	NI	NI	NI	4.5	5.2	16.8	5.5	8.3	9.7	7.7	11.1	5.7	12.3
HR-10	NI	NI	NI	NI	NI	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HR-11	NI	NI	NI	NI	NI	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HR-12	NI	NI	NI	NI	NI	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HR-13	NI	NI	NI	NI	NI	2.4	ND	2.7	ND	ND	ND	2.3	2.1	ND	2.5
HR-14	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	2.8	2.6	3.5	4.7	3.9
HR-15	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	ND	ND	ND	ND	ND

ND = Not Detected
NM = Not Measured
NI = Not Installed
NS = Not Sampled

tblb-7.wq1

TABLE B-8
1,1,1-TRICHLOROETHANE CONCENTRATIONS (PPB)
HARRISON RADIATOR NORTH SETTLING LAGOON
MORAINE, OHIO

WELL	Jul-83	Apr-84	Oct-84	Dec-84	Mar-85	Jun-85	Sep-85	Dec-85	Mar-86	Jun-86	Sep-86	Dec-86	Mar-87
W-1-N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
W-2-N	ND	ND	ND	3.4	1.6	1.6	ND	ND	ND	ND	ND	ND	ND
W-3-N	ND	ND	ND	3.7	1.3	3.0	ND	ND	1.0	ND	ND	2.0	ND
W-4-N	2.0	ND	3.1	ND	3.1	1.9	ND	ND	ND	ND	ND	2.1	1.0
W-1-S	NM	ND	6.0	NM	ND	ND	1.1	ND	ND	ND	ND	ND	ND
HR-1	49.0	97.6	65.2	34.0	27.5	ND	39.8	17.5	25.2	27.7	25.0	21.5	11.0
HR-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HR-3	ND	ND	6.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HR-4	ND	ND	1.9	ND	ND	1.3	ND	ND	ND	ND	ND	ND	ND
HR-5	ND	ND	ND	1.0	ND	9.6	ND	ND	ND	ND	ND	ND	ND
HR-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HR-7	ND	ND	ND	2.3	ND	3.0	ND	2.2	ND	ND	ND	ND	ND
HR-8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HR-9	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-10	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-11	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-12	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-13	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-14	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI
HR-15	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI

ND = Not Detected
NI = Not Installed
NS = Not Sampled

TABLE B-8
1,1,1-TRICHLOROETHANE CONCENTRATIONS (PPB)
HARRISON RADIATOR NORTH SETTLING LAGOON
MORAINE, OHIO
(CONTINUED)

WELL	Jun-87	Sep-87	Dec-87	Mar-88	Jun-88	Sep-88	Dec-88	Mar-89	Jun-89	Sep-89	Dec-89	Mar-90	Jun-90	Sep-90	Nov-90
W-1-N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
W-2-N	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.7	ND	ND
W-3-N	ND	ND	ND	4.6	ND	ND	ND	ND	ND	ND	ND	ND	11	ND	ND
W-4-N	0.5	0.6	1.1	ND	0.6	0.7	ND	ND	ND	ND	ND	ND	4.4	ND	ND
W-1-S	ND	0.5	0.9	ND	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS
HR-1	10.4	8.7	10.3	12.0	6.1	7.0	11.2	4.2	ND	3.1	3.2	13.0	114	ND	1.3
HR-2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	14	ND	ND
HR-3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.5	ND	ND
HR-4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HR-5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HR-6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.8	ND	ND
HR-7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HR-8	ND	ND	0.5	ND	ND	0.6	ND	ND	ND	ND	ND	1.8	ND	2.9	ND
HR-9	NI	NI	NI	NI	NI	0.9	ND	ND	ND	ND	ND	ND	ND	ND	ND
HR-10	NI	NI	NI	NI	NI	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HR-11	NI	NI	NI	NI	NI	ND	4.1	7.1	13.2	2.9	ND	ND	ND	ND	ND
HR-12	NI	NI	NI	NI	NI	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HR-13	NI	NI	NI	NI	NI	ND	ND	ND	ND	ND	ND	ND	5.8	ND	ND
HR-14	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	ND	ND	ND	ND	ND
HR-15	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	ND	ND	7.8	ND	ND

ND = Not Detected
NI = Not Installed
NS = Not Sampled

TABLE B-9
TOX CONCENTRATIONS (PPB)
HARRISON RADIATOR SOUTH LAGOON
MORAINE, OHIO

WELL	Apr-83	Apr-84	Oct-84	Jun-85	Dec-85	Jun-86	Dec-86	Jun-87	Dec-87	Jun-88	Dec-88	Jun-89	Dec-89	Mar-90	Jun-90	Sep-90	Nov-90
W-1-S	56.4	141.6	224.5	77.1	76.5	92.0	15.6	97.2	120.6	67.1	41.5	9.0	NS	NS	NS	NS	NS
W-2-S	6.2	11.9	19.0	10.2	5.8	7.4	26.3	4.7	6.4	5.0	4.3	4.1	3.63	10	20	14	14
W-3-S	10.5	16.8	5.8	1.5	59.4	3.1	20.5	2.5	5.3	3.2	2.0	3.1	ND	ND	10	ND	18
W-4-S	17.8	29.2	55.6	37.0	37.6	41.1	11.5	30.9	33.5	35.2	38.9	19.7	21.5	32	48	27	58
HR-16	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	ND	ND	21	22	ND
HR-17	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	54.2	37	23	74	71

ND = Not Detected
NI = Not Installed
NS = Not Sampled

Analytical methods used to determine TOX concentrations were revised in March 1990. See Tables B-1 and B-2 for specific analytical methods.

Where non-detect values are listed for one or more of the four TOX concentrations reported by the laboratory, they are averaged using one-half the detection limit.

tblb-9

TABLE B-10
CIS-1,2-DICHLOROETHENE CONCENTRATIONS (PPB)
HARRISON RADIATOR SOUTH LAGOON
MORAINE, OHIO

WELL	Apr-83	Apr-84	Oct-84	Jun-85	Dec-85	Jun-86	Dec-86	Jun-87	Dec-87	Jun-88	Dec-88	Jun-89	Dec-89
W-1-S	ND	ND	ND	5.2	39.7	56.8	2.7	66.9	46.0	44.7	1.9	ND	NS
W-2-S	ND	ND	ND	ND	ND	ND	10.0	ND	ND	ND	ND	ND	ND
W-3-S	ND	ND	ND	ND	1.5	ND	10.0	ND	ND	ND	ND	ND	ND
W-4-S	ND	ND	ND	15.4	17.3	14.6	ND	15.8	11.8	7.7	9.8	ND	ND
HR-16	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	ND
HR-17	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	13.7

ND = Not Detected
NI = Not Installed
NS = Not Sampled
NA = Not Analyzed

After December 1989 ground-water samples from the South Lagoon are no longer submitted for analysis of cis-1,2-dichloroethene.

tblb-10.wq1

TABLE B-11
TRICHLOROETHENE CONCENTRATIONS (PPB)
HARRISON RADIATOR SOUTH LAGOON
MORAINE, OHIO

WELL	Apr-83	Apr-84	Oct-84	Jun-85	Dec-85	Jun-86	Dec-86	Jun-87	Dec-87	Jun-88	Dec-88	Jun-89	Dec-89
W-1-S	1.2	5.9	28.5	6.2	5.0	6.3	3.0	3.8	15.8	2.9	1.9	ND	NS
W-2-S	3.4	7.8	12.1	7.7	4.4	5.7	6.5	3.4	4.7	3.6	2.7	4.1	3.6
W-3-S	3.0	6.6	3.2	1.5	12.7	1.2	ND	2.5	3.9	2.5	2.0	3.1	ND
W-4-S	3.4	6.5	6.0	6.5	6.5	7.7	6.2	5.4	6.9	7.6	5.0	7.0	6.3
HR-16	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	ND
HR-17	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	16.8

ND = Not Detected
NI = Not Installed
NA = Not Analyzed
NS = Not Sampled

After December 1989 ground-water samples from the South Lagoon are no longer submitted to the laboratory for volatile organic analysis.

tblb-11

TABLE B-12
1,1,1-TRICHLOROETHANE CONCENTRATIONS (PPB)
HARRISON RADIATOR SOUTH LAGOON
MORAINE, OHIO

WELL	Apr-83	Apr-84	Oct-84	Jun-85	Dec-85	Jun-86	Dec-86	Jun-87	Dec-87	Jun-88	Dec-88	Jun-89	Dec-89
W-1-S	ND	ND	6.0	ND	ND	ND	ND	ND	0.9	ND	ND	ND	NS
W-2-S	2.8	4.1	6.9	2.5	1.3	1.7	ND	1.3	1.7	1.4	1.7	ND	ND
W-3-S	1.9	3.5	ND	ND	2.5	1.9	ND	ND	0.8	ND	ND	ND	ND
W-4-S	6.0	7.3	13.1	7.1	ND	3.8	4.0	2.5	3.2	3.3	4.0	2.8	3.4
HR-16	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	ND
HR-17	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	NI	ND

ND = Not Detected
NI = Not Installed
NA = Not Analyzed
NS = Not Sampled

After December 1989 ground-water samples from the South Lagoon are no longer submitted to the laboratory for volatile organic analysis.

tblb-12

TABLE B-13
SPECIFIC CONDUCTANCE VALUES (UMHOS/CM)
HARRISON RADIATOR SOUTH LAGOON
MORAINE, OHIO

WELL	Jun-85	Dec-85	Jun-86	Dec-86	Jun-87	Dec-87	Jun-88	Dec-88	Jun-89	Dec-89	Mar-90	Jun-90	Sep-90	Nov-90
W-1-S	1000	1000	1200	920	1350	1400	1460	1060	1080	NS	NS	NS	NS	NS
W-2-S	800	875	814	800	889	975	1000	895	1090	976	1030	1110	1020	1020
W-3-S	800	870	910	900	898	913	940	880	1170	979	1100	938	822	937
W-4-S	950	980	988	920	1020	1150	1160	1040	1380	1250	1173	1265	1110	1215
HR-16	NI	NI	NI	NI	NI	NI	NI	NI	NI	1030	929	935	871	906
HR-17	NI	NI	NI	NI	NI	NI	NI	NI	NI	1200	1070	917	1010	1058

NI = Not Installed
NS = Not Sampled

tblb-13.wq1

TABLE B-14

VOLATILE AND ACID EXTRACTABLE ORGANIC PRIORITY POLLUTANTS QUANTIFIED IN WATER-TABLE WELLS AT THE SOUTH INACTIVE SITE (LANDFILL 1-1) 1982

PRIORITY POLLUTANTS*	2	4S	6	8	10	16	17	18
VOLATILE								
Benzene	ND	ND	ND	16.4	ND	T	ND	ND
1,1 Dichloroethane	6.58	200	28.2	149	63.5	4.54	31.64	3.91
1,2-Trans-Dichlorethylene	265	1,225	1,325	1,500	264	1.34	332	16
1,1,1-Trichloroethane	4.49	ND	ND	ND	4.64	4.36	50.22	170
Trichloroethylene	550	ND	874	396	30.08	6.8	222	14.7
Toluene	ND	10.8	T	12	ND	ND	ND	ND
Chloroform	ND	ND	ND	6.39	5.7	9.5	5.54	1.68
Methylene Chloride	ND	T	ND	2.05	ND	ND	T	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	12.9	ND	ND	ND
1,1-Dichlorethylene	ND	ND	ND	ND	ND	1.5	ND	ND
ACID EXTRACTABLE								
2-Chlorophenol	ND	ND	1.9	ND	ND	.3	ND	ND
2,4-Dimethylphenol	ND	7.7	3.6	.3	.34	70.8	ND	ND
2-Nitrophenol	ND	ND	3.7	ND	ND	ND	ND	ND
P-chloro-n-cresol	ND	2.5	69.3	ND	.50	11.6	.6	1.3
Phenol	ND	ND	2.4	ND	1.20	.7	ND	.4

NOTES:

* - Concentration in micrograms per liter.
ND - Not Detected
T - Trace

tblb-14.wq1

TABLE B-15

VOLATILE AND ACID EXTRACTABLE ORGANIC
PRIORITY POLLUTANTS QUANTIFIED IN DEEP AQUIFER WELLS
AT THE SOUTH INACTIVE SITE (LANDFILL L-1) 1982

(expressed in ppb)
WELL NUMBER

PRIORITY POLLUTANTS	1	3	4	5	7	9	11	12	13	14	15	DN11	ND12	DN13
VOLATILE														
Chloroform	.8	ND	.57	ND	ND	1.53	1.63	ND	T	1.42	3.92	1.22	1.08	T
1,1 Dichloroethane	3.24	ND	.52	1.9	15.4	2.57	2.69	7.63	2.76	ND	1.15	1.07	2.23	3.84
1,2-Trans-Dichlorethylene	.96	1.69	1.0	4.4	155.4	ND	1.75	32.8	.51	ND	1.40	6.34	6.32	15.0
1,1,1-Trichloroethane	ND	ND	ND	ND	T	1.21	ND	10.61	.24	8.67	ND	ND	ND	T
Trichloroethylene	.99	.98	ND	ND	1.6	ND	2.60	33.25	1.94	1.67	ND	T	1.76	1.57
1,2-Dichloroethane	ND	1.92	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	1.7	ND	ND	ND	ND	ND	ND	ND	ND
ACID EXTRACTABLE														
2-Chlorophenol	ND	ND	.1	.7	ND	ND	ND	ND	ND	ND	ND	1.2	3.6	1.4
2,4-Dichlorophenol	ND	ND	.2	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.0	.6
2,4-Dimethylphenol	ND	ND	.4	ND	ND	ND	ND	ND	ND	ND	ND	.54	9.4	1.9
P-chloro-m-cresol	.7	ND	5.6	3.4	.5	5.6	1.3	ND	ND	ND	2.0	4.4	93.	27.3
Phenol	ND	ND	.3	.5	ND	.3	ND	.5	ND	ND	ND	1.2	6.10	1.4
4-Nitrophenol	ND	ND	ND	6.6	ND	ND	ND	ND	ND	ND	ND	ND	<5.0	ND
4,6-Dinitro-o-cresol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	6.6	ND
2-Nitrophenol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.4	.8

NOTES:

ND - Not detected
T - Trace

tblb-15.wq1

TABLE B-16

TOX CONCENTRATIONS (PPB)
HARRISON RADIATOR INACTIVE SITE
MORAINE, OHIO

	Oct-82	Jun-85	Dec-85	Jun-86	Dec-86	Jun-87	Dec-87	Jun-88	Dec-88	Jun-89	Dec-89	Jun-90	Sep-90	Nov-90
GM-1	6.0	40.0	ND	6.9	ND	ND	ND	14.2	ND	ND	11.1	21.9	NA	25.1
GM-2	826.1	6144.2	374.7	1027.2	887.0	1440.2	2466.4	3278.7	2280	1080	113	30.6	NA	132.3
GM-3	4.6	8.3	13.8	18.7	26.8	25.3	20.5	20.3	22.6	4.1	5.83	5.5	ND	2.4
GM-4	2.1	1.1	2.3	ND	4.6	6.5	8.7	11.2	6.1	6.9	11.3	2.7	NA	1.6
GM-5	6.3	ND	2.6	4.1	1.1	ND	ND	ND	ND	ND	ND	1.2	ND	2.4
GM-6	2227.2	1427.1	616.1	617.1	444.0	1227.2	720.5	414	263	184	90.9	250	331.4	268
GM-7	172.4	351.2	387.8	602.9	202.7	898.8	1124.2	1440.8	1220	397	364	321.8	147.4	128.5
GM-8	2081.8	1853.6	601.8	1123.8	541.0	1187.9	807.0	955.3	2690	422	486	363	327.9	290.2
GM-9	7.0	27.5	97.3	46.1	14.5	43.6	24.7	32.9	29.8	19.7	5.7	28	40.7	30.8
GM-10	380.8	295.1	320.5	411.8	256.8	138.7	371.8	598.9	435	485	369	158	263.7	145.6
GM-11	8.6	5.9	8.2	7.1	3.6	113.7	7.2	9.5	ND	ND	ND	15	20.1	16.3
GM-12	84.2	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD
GM-13	5.4	3.4	5.2	9.7	6.0	20.3	8.6	4.7	4.1	ND	ND	15	17.9	16.3
GM-14	11.8	ND	ND	1.4	ND	5.6	5.9	4.3	7.6	ND	ND	ND	NA	ND
GM-15	28.0	26.9	4.1	8.4	3.1	5.8	9.3	9.1	4	10	ND	5.7	NA	4.7
GM-16	6.4	ND	3.8	15.6	4.7	10.4	13.9	8.7	8.3	ND	79.8	48.5	102.1	152.4
GM-17	641.3	148.1	273.1	239.1	99.3	304.1	807.6	419.2	346	326	410	282	261.5	169.4
GM-18	207.0	93.3	107.9	88.8	89.5	106.0	79.5	81.3	58.1	11.6	321	239	NA	257.4
4S	1435.8	265.6	231.5	99.4	223.1	323.1	323.4	380.5	368	377	157	152	202.1	184.2

ND = Not Detected
ABD = Abandoned
NA = Not Analyzed

TABLE B-16A

TOTAL VOC CONCENTRATIONS (PPB)
HARRISON RADIATOR INACTIVE SITE
MORAINE, OHIO

	Jun-90	Sep-90	Nov-90
GM-1	21.9	NS	25.1
GM-2	30.6	NS	132.3
GM-3	5.5	ND	2.4
GM-4	2.7	NS	1.6
GM-5	1.2	ND	2.4
GM-6	250	331.4	268
GM-7	321.8	147.4	128.5
GM-8	363	327.9	290.2
GM-9	28	40.7	30.8
GM-10	158	263.7	145.6
GM-11	15	20.1	16.3
GM-12	ABD	ABD	ABD
GM-13	15	17.9	16.3
GM-14	ND	NS	ND
GM-15	5.7	NS	4.7
GM-16	48.5	102.1	152.4
GM-17	282	261.5	169.4
GM-18	239	NS	257.4
4S	152	202.1	184.2

ND = Not Detected
ABD = Abandoned
NS = Not Sampled

tblb-16

TABL[illegible]17

CIS-1,2-DICHLOROETHENE CONCENTRATIONS (PPB)
HARRISON RADIATOR INACTIVE SITE
MORAINE, OHIO

	Oct-82	Jun-85	Dec-85	Jun-86	Dec-86	Jun-87	Dec-87	Jun-88	Dec-88	Jun-89	Dec-89
GM-1	ND	4.1	ND	1.2	ND	ND	ND	10.5	ND	ND	5.3
GM-2	ND	1200.0	252.8	397.2	361.7	739.0	897.0	1820.0	1017.0	548.0	14.5
GM-3	ND	5.1	12.2	13.8	18.0	19.2	14.3	13.8	17.1	4.1	ND
GM-4	ND	ND	2.3	ND	ND	3.8	4.1	4.8	3.4	4.5	ND
GM-5	ND	ND	ND	1.3	1.1	ND	ND	ND	ND	ND	ND
GM-6	ND	253.8	207.0	255.8	129.5	1035.0	345.0	106.0	110.0	42.6	ND
GM-7	ND	233.3	237.0	369.0	121.0	690.0	809.0	1155.0	1057.0	270.0	191.0
GM-8	ND	644.0	215.0	263.6	205.5	542.0	338.0	261.0	536.0	134.0	169.0
GM-9	ND	16.0	80.5	37.3	ND	38.3	21.0	27.7	26.2	19.7	5.7
GM-10	ND	99.2	163.8	239.6	123.0	102.0	156.0	333.0	181.0	297.0	132.0
GM-11	ND	1.5	5.2	5.3	ND	7.5	4.2	6.3	ND	ND	ND
GM-12	ND	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD
GM-13	ND	ND	3.8	6.6	ND	11.2	ND	2.5	2.5	ND	ND
GM-14	ND	ND	ND	ND	ND	2.4	3.1	2.3	4.4	ND	ND
GM-15	ND	ND	2.5	2.8	ND	2.2	4.5	3.4	1.7	ND	ND
GM-16	ND	ND	ND	ND	ND	1.2	3.7	ND	1.9	ND	38.6
GM-17	ND	35.0	126.5	76.5	35.1	120.0	397.0	185.0	151.0	89.7	123.0
GM-18	ND	19.0	26.6	25.9	28.3	38.6	27.9	29.2	21.8	11.6	107.0
4S	ND	ND	57.3	97.2	41.4	54.1	42.4	66.3	29.0	55.3	ND

ND = Not Detected
ABD = Abandoned

After December 1989 ground-water samples from the Inactive Site are no longer submitted for analysis of cis-1,2-dichloroethene.

tblb-17.wq1

TABLE B-18

TRICHLOROETHENE CONCENTRATIONS (PPB)
HARRISON RADIATOR INACTIVE SITE
MORAINE, OHIO

	Oct-82	Jun-85	Dec-85	Jun-86	Dec-86	Jun-87	Dec-87	Jun-88	Dec-88	Jun-89	Dec-89	Jun-90	Sep-90	Nov-90
GM-1	1.0	35.9	ND	1.5	ND	ND	ND	1.0	ND	ND	2.6	7.4	NA	9.3
GM-2	550.0	4600.0	ND	493.4	352.0	564.0	1440.0	ND	961.0	470.0	87.5	ND	NA	112
GM-3	1.0	1.9	ND	2.3	3.6	2.0	2.1	2.3	2.0	ND	ND	2.2	ND	ND
GM-4	ND	ND	ND	ND	1.6	0.7	2.3	3.5	1.4	ND	ND	1.2	NA	ND
GM-5	ND	ND	ND	2.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GM-6	874.0	1087.5	339.0	329.3	225.2	83.6	ND	191.0	67.7	110.0	ND	ND	1.2	ND
GM-7	1.6	39.7	66.3	117.6	45.3	112.0	174.0	165.0	ND	78.8	82.2	235	101	89
GM-8	396.0	990.0	288.3	820.1	230.0	553.0	326.0	584.0	744.0	175.0	73.9	49	25.5	22.6
GM-9	1.2	3.2	2.5	1.9	2.3	1.0	0.6	1.0	0.6	ND	ND	ND	4.7	3.1
GM-10	30.1	121.0	102.6	105.4	ND	24.2	88.9	113.0	84.8	90.9	153.0	122	227	135
GM-11	2.6	2.3	1.3	1.8	1.2	3.9	0.4	0.6	ND	ND	ND	4	5.2	4.3
GM-12	33.2	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD
GM-13	1.9	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.7	4.6	4.6
GM-14	1.7	ND	ND	1.4	ND	ND	0.5	ND	ND	ND	ND	ND	NA	ND
GM-15	ND	1.4	ND	2.7	ND	1.2	1.2	2.8	0.9	ND	ND	3.3	NA	2.2
GM-16	6.8	ND	3.8	13.1	4.7	7.9	6.0	4.8	3.2	ND	10.1	18.5	30	32.1
GM-17	222.0	70.8	71.0	94.8	29.4	109.0	214.0	132.2	134.0	98.3	181.0	251	219	135
GM-18	14.7	18.0	17.1	22.3	20.0	29.4	20.2	18.0	14.3	ND	34.2	78	NA	110
4S	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.8	6.2

ND = Not Detected
ABD = Abandoned
NA = Not Analyzed

tblb-18.wq1

TABLE B-19

1,1,1-TRICHLOROETHANE CONCENTRATIONS (PPB)
HARRISON RADIATOR INACTIVE SITE
MORAINE, OHIO

	Oct-82	Jun-85	Dec-85	Jun-86	Dec-86	Jun-87	Dec-87	Jun-88	Dec-88	Jun-89	Dec-89	Jun-90	Sep-90	Nov-90
GM-1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	1.4
GM-2	4.5	216.0	71.1	93.3	90.5	79.9	63.0	51.9	107.0	30.6	11.3	30.6	NA	5.9
GM-3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GM-4	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND
GM-5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GM-6	ND	16.1	16.0	30.1	55.1	12.7	8.9	ND	ND	ND	ND	ND	ND	ND
GM-7	Tr	6.9	11.4	29.0	10.3	8.4	31.0	18.3	12.2	ND	18.3	34	ND	ND
GM-8	ND	7.6	12.2	35.6	48.2	19.0	12.3	16.9	ND	ND	4.4	ND	ND	ND
GM-9	ND	Tr	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GM-10	4.6	18.9	21.0	23.9	83.0	3.2	26.0	29.0	21.0	13.8	28.9	16	15.4	3.5
GM-11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
GM-12	10.6	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD
GM-13	0.2	ND	ND	ND	ND	0.8	ND	ND	ND	ND	ND	ND	ND	ND
GM-14	8.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND
GM-15	ND	25.5	ND	ND	ND	ND	ND	ND	ND	10.0	ND	ND	NA	ND
GM-16	4.4	ND	ND	ND	ND	0.7	0.9	ND	ND	ND	4.0	6.3	20	36.7
GM-17	50.2	38.6	51.7	59.6	28.1	55.2	67.4	52.0	38.3	9.2	15.5	13	ND	5.6
GM-18	170.0	55.0	51.9	40.6	36.1	33.9	26.7	26.1	22.0	ND	45.0	29	NA	29.5
4S	ND	Tr	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = Not Detected
ABD = Abandoned
NA = Not Analyzed
Tr = Trace

tblb-19

TABLE B-20

SPECIFIC CONDUCTANCE VALUES (UMHOS/CM)
HARRISON RADIATOR INACTIVE SITE
MORAINE, OHIO

	Jun-85	Dec-85	Jun-86	Dec-86	Jun-87	Dec-87	Jun-88	Dec-88	Jun-89	Dec-89	Jun-90	Nov-90
GM-1	900	1000	1160	1130	1160	1270	1250	1230	1330	1435	1230	794
GM-2	1400	1150	1450	2800	1460	1370	1700	1250	1380	1537	1210	771
GM-3	900	1000	1130	1113	1150	1110	1210	1330	1140	1365	1310	1040
GM-4	900	953	1120	1013	1140	1110	1020	1070	1110	1240	1280	871
GM-5	1000	1030	1150	1188	1250	1140	1260	1130	1200	1320	1380	1080
GM-6	1700	1690	1840	1600	2680	2990	3050	2080	3110	2617	2290	1650
GM-7	1000	1150	1260	1250	1280	1360	1350	1270	1390	1580	1540	1080
GM-8	2500	1900	1990	1688	2410	2760	2060	1890	2510	2855	2570	2060
GM-9	1200	1290	1730	1200	1230	1220	1270	1210	1310	1402	1180	708
GM-10	1700	1200	1900	1238	2120	2140	2323	2200	1680	1355	1200	698
GM-11	1000	970	1150	1200	1110	1220	1190	1360	1160	1469	1300	807
GM-12	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD	ABD
GM-13	1000	1000	1200	1200	1150	1230	1220	1210	1210	1450	1270	914
GM-14	900	965	1110	1100	1060	1020	1180	1100	1100	1187	1100	769
GM-15	700	815	998	988	962	1000	970	793	930	997	1100	788
GM-16	800	855	938	963	962	1140	1060	807	1180	1350	1140	1080
GM-17	1150	1150	1440	1200	1660	2400	1800	1360	2300	1730	1580	1120
GM-18	1000	1160	1200	1200	1150	1330	1310	1450	1300	1880	1900	1060
4S	3600	3230	2950	3125	3180	2760	3680	2280	2780	2220	1910	1150

ABD = Abandoned

TABLE B-21

MONTGOMERY COUNTY WELL 11
DRYDEN ROAD NORTH WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)

COMPOUND	MCL	2/28/83	11/10/83	12/14/83	5/9/84	3/11/85	5/7/85	7/9/85	8/6/85	9/3/85	10/8/85	11/5/85	12/11/85	3/11/86	4/23/86	5/6/86
Bromodichloromethane		<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
Bromoform		<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
Chloroform		<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
Dibromochloromethane		<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
Benzene	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
Carbon Tetrachloride	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
p-Dichloroethane	75	<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-Dichloroethane	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
1,2-Dichloroethylene	7	<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
1,1,1-Trichloroethane	200	<0.5	0.8	<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
Trichloroethylene	5	<0.5	0.6	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.5	2.9	<0.5	<0.5	<0.5	1.1	0.6
Vinyl Chloride	2	<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
Cis-1,2-Dichloroethylene		14.6	6.4	7.9	9.6	8.4	4.9	3.1	3.4	4.4	<0.5	1.4	3.3	7.3	5	3.6
1,1-Dichloroethane		2.3	<0.5	1.1	1.4	1.6	1.1	1.3	0.8	0.8	0.9	<0.5	1.5	1.6	1.5	1.2
Tetrachloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.1	<0.5	<0.5	<0.5	<0.5
Trans-1,2-Dichloroethylene		<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
Trichlorofluoromethane		<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
Toluene		<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
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ethylbenzene	5	<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
Total VOCs		16.9	7.8	9	11	10.5	6	4.4	4.2	5.2	3.8	3.5	4.8	8.9	7.6	5.4

MCL - Maximum Contaminant Level (40 CFR Part 141)

TABLE B-21

MONTGOMERY COUNTY WELL 11
DRYDEN ROAD NORTH WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)
(continued)

COMPOUND	MCL	7/9/87	2/26/88	5/19/88	6/24/88	6/20/88	6/20/88	6/28/88	7/15/88	7/15/88	7/22/88	7/29/88	8/4/88	8/4/88	8/12/88	8/31/88
Bromodichloromethane		<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
Bromoform		<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
Chloroform		<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
Dibromochloromethane		<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
Benzene	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
Carbon Tetrachloride	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
p-Dichloroethane	75	<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-Dichloroethane	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
1,2-Dichloroethylene	7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.64	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	200	<0.5	<0.5	0.19	<0.5	<0.5	<0.5	0.23	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	5	<0.5	0.65	1.07	1.04	0.68	<0.5	0.78	0.6	<0.5	0.6	<0.5	0.82	<0.5	0.8	<0.5
Vinyl Chloride	2	1.6	<0.5	2.57	2.03	4.02	1.3	5.15	4	2	5.3	<0.5	1.26	1.3	1.9	<0.5
Cis-1,2-Dichloroethylene		3.2	2.8	1.92	2.41	2.63	1.2	3.51	2	2.63	2.6	0.9	3.76	2.2	2.4	<0.5
1,1-Dichloroethane		1.8	2.2	1.61	2.25	1.97	1.8	<0.5	1.9	1.48	2.8	1.4	2.82	1.5	1.3	<0.5
Tetrachloroethylene		<0.5	3.9	5.8	4.02	1.37	1	0.71	1.2	1.37	1.9	0.9	1.78	0.7	1.37	0.6
Trans-1,2-Dichloroethylene		<0.5	<0.5	0.21	0.26	0.21	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane		<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
Toluene		<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
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ethylbenzene	5	<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
Total VOCs		6.6	9.55	13.37	12.01	10.88	5.3	13.02	9.7	7.48	13.2	3.2	10.44	5.7	7.77	0.6

MCL - Maximum Contaminant Level (40 CFR Part 141)

TABLE B-21

MONTGOMERY COUNTY WELL 11
DRYDEN ROAD NORTH WELL FIELD
VOLATILE ORGANIC COMPOUNDS

(concentrations in parts per billion)
(continued)

Page 3 of 4

COMPOUND	MCL	9/7/88	9/16/88	9/22/88	11/18/88	12/20/88	1/25/89	2/23/89	3/30/89	5/16/89	6/20/89	7/19/89	8/22/89
Bromodichloromethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	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
Carbon Tetrachloride	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
p-Dichloroethane	75	<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-Dichloroethane	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
1,2-Dichloroethylene	7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	200	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	5	0.6	0.7	0.8	<0.5	0.6	<0.5	<0.5	0.7	1.1	0.9	0.8	1.3
Vinyl Chloride	2	2.6	2.1	1.9	2.2	7.3	1.7	<0.5	2	1.6	1.3	1.4	1.2
Cis-1,2-Dichloroethylene		2.3	2.4	2.2	1.8	2.7	2.2	1.9	2	2.4	2.7	2.1	2.4
1,1-Dichloroethane		2	2.3	2.1	1.9	2.4	1.8	<0.5	1.6	1.7	1.8	1.4	1.5
Tetrachloroethylene		1.2	1.1	2.3	1.4	0.9	0.7	0.5	0.7	1.4	1.1	0.8	0.9
Trans-1,2-Dichloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ethylbenzene	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total VOCs		8.7	8.6	9.3	7.3	13.9	6.4	2.4	7	8.2	7.8	6.5	7.3

MCL - Maximum Contaminant Level (40 CFR Part 141)

TABLE B-21

MONTGOMERY COUNTY WELL 11
DRYDEN ROAD NORTH WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)
(continued)

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COMPOUND	MCL	8/22/89	9/28/89	10/25/89	11/29/89	2/13/90	3/27/90	4/24/90
Bromodichloromethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
p-Dichloroethane	75	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethylene	7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	200	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	5	0.69	1.2	0.9	<0.5	<0.5	0.6	<0.5
Vinyl Chloride	2	1.19	1.7	1.1	1.3	<0.5	0.8	<0.5
Cis-1,2-Dichloroethylene		2.52	3.8	2.7	1.9	2.7	2	1
1,1-Dichloroethane		1.37	1.7	1.3	1.4	1.3	1.1	0.7
Tetrachloroethylene		<0.5	0.9	1.1	<0.5	0.9	0.9	<0.5
Trans-1,2-Dichloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene		<0.5						
o+p Xylene		<2.0						
Ethylbenzene	5	<1.0						
Total VOCs		5.77	9.3	7.1	4.6	4.9	5.4	1.7

MCL - Maximum Contaminant Level (40 CFR Part 141)

TABLE B-22

MONTGOMERY COUNTY WELL 12
DRYDEN ROAD NORTH WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)

Page 1 of 4

COMPOUND	MCL	5/11/83	11/10/83	12/14/83	1/6/84	1/9/84	5/9/84	3/11/85	5/7/85	7/9/85	8/5/85	9/3/85	10/8/85	11/5/85	12/11/85	3/11/86
Bromodichloromethane		<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
Bromoform		<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
Chloroform		<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane		<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
Benzene	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
Carbon Tetrachloride	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
p-Dichloroethane	75	<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-Dichloroethane	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
1,2-Dichloroethylene	7	<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
1,1,1-Trichloroethane	200	1.9	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	1	1	0.9	0.5	0.6	<0.5	1.2	<0.5
Trichloroethylene	5	0.7	<0.5	1.3	1.5	1.1	<0.5	1.6	1.5	2.3	2.4	1.6	1.9	1.5	1.8	1
Vinyl Chloride	2	<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
Cis-1,2-Dichloroethylene		1	1.8	6.1	<0.5	7.3	7.2	3.4	7	7.9	6.3	4.5	3.8	3	3.8	1.8
1,1-Dichloroethane		0.9	<0.5	1.7	2.3	1.9	1.7	1.2	1.6	1.7	1.8	1	1.2	0.8	1.6	<0.5
Tetrachloroethylene		<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
Trans-1,2-Dichloroethylene		<0.5	<0.5	<0.5	6.9	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane		<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
Toluene		<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
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ethylbenzene	5	<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
Total VOCs		4.5	1.8	9.1	11.8	10.3	8.9	6.2	11.1	12.9	11.4	7.6	7.5	5.3	8.4	2.8

MCL - Maximum Contaminant Level (40 CFR Part 141)

TABLE B-22

MONTGOMERY COUNTY WELL 12
DRYDEN ROAD NORTH WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)
(continued)

COMPOUND	MCL	4/23/86	5/6/86	8/7/87	8/31/87	2/26/88	5/19/88	6/13/88	6/20/88	6/20/88	6/27/88	7/28/88	8/4/88	8/11/88	8/11/88	8/31/88
Bromodichloromethane		<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
Bromoform		<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
Chloroform		<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
Dibromochloromethane		<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
Benzene	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
Carbon Tetrachloride	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
p-Dichloroethane	75	<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-Dichloroethane	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
1,2-Dichloroethylene	7	<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
1,1,1-Trichloroethane	200	<0.5	0.7	0.8	1.3	<0.5	1.48	1.31	1.9	<0.5	1.8	<0.5	0.7	1.47	1.1	<0.5
Trichloroethylene	5	1.4	1.2	1.7	1.8	1.46	1.6	2.75	3.59	2.4	4.4	2.5	2.2	2.49	3.1	1.1
Vinyl Chloride	2	<0.5	<0.5	1.6	<0.5	<0.5	1.57	1.98	3.41	1.6	2.43	<0.5	<0.5	3.4	3.2	<0.5
Cis-1,2-Dichloroethylene		1.9	1.7	5.2	7.7	<0.5	3.99	4.99	8.45	4.7	12.3	2.9	6	8.84	8	4.2
1,1-Dichloroethane		1.1	0.8	2.4	3.5	3	1.71	2.27	3.7	2.5	5.11	2.3	2.9	4.25	3.6	2.2
Tetrachloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	0.31	0.55	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trans-1,2-Dichloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	0.35	0.32	0.71	<0.5	1.09	<0.5	<0.5	0.78	0.6	<0.5
Trichlorofluoromethane		<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
Toluene		<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
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ethylbenzene	5	<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
Total VOCs		4.4	4.4	11.7	14.3	4.46	11.01	14.17	21.76	11.2	27.13	7.7	11.8	21.23	19.6	7.5

MCL - Maximum Contaminant Level (40 CFR Part 141)

TABLE B-22

MONTGOMERY COUNTY WELL 12
DRYDEN ROAD NORTH WELL FIELD
VOLATILE ORGANIC COMPOUNDS

(concentrations in parts per billion)
(continued)

COMPOUND	MCL	8/31/88	9/7/88	9/16/88	9/22/88	11/18/88	12/20/88	1/26/89	3/30/89	5/16/89	6/20/89	7/19/89	8/22/89	8/22/89	9/28/89	10/25/89
Bromodichloromethane		<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
Bromoform		<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
Chloroform		<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
Dibromochloromethane		<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
Benzene	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
Carbon Tetrachloride	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
p-Dichloroethane	75	<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-Dichloroethane	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
1,2-Dichloroethylene	7	<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
1,1,1-Trichloroethane	200	<0.5	0.8	0.9	<0.5	<0.5	1.8	0.7	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	2.1	1.2
Trichloroethylene	5	1.5	1.9	2.3	2	0.7	2.4	2.1	2	<0.5	1.7	1.3	1.2	0.99	3.7	3.4
Vinyl Chloride	2	<0.5	1.7	1.7	2.3	<0.5	10.1	2.5	2	3.3	1	1	<0.5	0.86	2.8	1.8
Cis-1,2-Dichloroethylene		4.5	6.9	7	8.2	2.2	9.5	7.8	5.7	3.5	5.9	3.8	5	5.63	21.5	16
1,1-Dichloroethane		2.2	3.6	3.7	4.5	1.6	4.9	3.5	2.8	3.4	3.6	2.1	2.6	2.56	6.1	4.6
Tetrachloroethylene		<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
Trans-1,2-Dichloroethylene		<0.5	0.6	<0.5	0.9	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.32	1.6	1.1
Trichlorofluoromethane		<1.0	<1.0	<1.0	<1.0	1.7	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0			
Ethylbenzene	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0			
Total VOCs		8.2	15.5	15.6	17.9	6.2	29.7	16.6	13.2	10.2	12.2	8.2	8.8	10.36	37.8	28.1

MCL - Maximum Contaminant Level (40 CFR Part 141)

TABLE B-22

MONTGOMERY COUNTY WELL 12
DRYDEN ROAD NORTH WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)
(continued)

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COMPOUND	MCL	11/29/89	2/13/90	3/27/90	4/24/90
Bromodichloromethane		<0.5	<0.5	<0.5	<0.5
Bromoform		<1.0	<1.0	<1.0	<1.0
Chloroform		<0.5	<0.5	<0.5	<0.5
Dibromochloromethane		<0.5	<0.5	<0.5	<0.5
Benzene	5	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	5	<0.5	<0.5	<0.5	<0.5
p-Dichloroethane	75	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethylene	7	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	200	1.4	1.3	1.3	1.3
Trichloroethylene	5	1.4	2.6	3	3.1
Vinyl Chloride	2	2.2	1.8	1.9	2
Cis-1,2-Dichloroethylene		10.4	15	14.5	13
1,1-Dichloroethane		4.8	4.3	4.5	4.3
Tetrachloroethylene		<0.5	<0.5	<0.5	<0.5
Trans-1,2-Dichloroethylene		2.6	1.2	1.3	1.2
Trichlorofluoromethane		<1.0	<1.0	<1.0	<1.0
Toluene					
o+p Xylene					
Ethylbenzene	5				
Total VOCs		22.8	26.2	26.5	24.9

MCL - Maximum Contaminant Level (40 CFR Part 141)

TABLE B-23

MONTGOMERY COUNTY WELL 13
DRYDEN ROAD NORTH WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)

COMPOUND	MCL	5/11/83	11/10/83	12/14/83	3/13/85	5/7/85	7/9/85	8/6/85	9/3/85	10/8/85	11/5/85	12/11/85	3/11/86	4/23/86	5/6/86	9/7/87
Bromodichloromethane		<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
Bromoform		<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
Chloroform		<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
Dibromochloromethane		<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
Benzene	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
Carbon Tetrachloride	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
p-Dichloroethane	75	<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-Dichloroethane	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
1,2-Dichloroethylene	7	<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
1,1,1-Trichloroethane	200	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.6	0.6	1.1	1	1.1	1	<0.5
Trichloroethylene	5	1.2	<0.5	1.4	1.6	1.1	1.3	10.6	1.5	2.1	1.9	2.2	1.9	1.8	1.9	0.7
Vinyl Chloride	2	<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	4.1
Cis-1,2-Dichloroethylene		7	5.4	6.1	5.6	5	6.1	5.8	8.7	9.8	8	8.8	5.6	4.8	8.1	4.2
1,1-Dichloroethane		2.6	<0.5	4.5	2.2	2.5	2.3	2.9	2.8	3.2	2.5	3.3	2.2	<0.5	<0.5	3
Tetrachloroethylene		<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
Trans-1,2-Dichloroethylene		<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
Trichlorofluoromethane		<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
Toluene		<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
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ethylbenzene	5	<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
Total VOCs		11.3	5.4	12	9.4	8.6	9.7	19.3	13.5	15.7	13	15.4	10.7	7.7	11	12

MCL-Maximum Contaminant Level (40 CFR Part 141)

TABLE B-23

MONTGOMERY COUNTY WELL 13
DRYDEN ROAD NORTH WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)
(continued)

Page 2 of 3

COMPOUND	MCL	2/26/88	5/19/88	6/13/88	6/20/88	6/20/88	6/28/88	7/22/88	7/28/88	8/12/88	8/31/88	9/7/88	9/7/88	9/16/88	9/22/88	11/17/88
Bromodichloromethane		<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
Bromoform		<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
Chloroform		<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
Dibromochloromethane		<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
Benzene	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
Carbon Tetrachloride	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
p-Dichloroethane	75	<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-Dichloroethane	5	<0.5	<0.5	<0.5	<0.5	<0.5	4.57	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethylene	7	<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
1,1,1-Trichloroethane	200	<0.5	0.26	0.31	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	5	0.84	0.78	1.02	1.07	0.8	1.03	0.7	<0.5	1	2	0.8	0.8	1.2	0.8	<0.5
Vinyl Chloride	2	<0.5	3.55	4.99	6.51	2.7	9.98	11	1.4	6.7	1.1	5.2	3.7	3.9	4.3	2
Cis-1,2-Dichloroethylene		8.32	3.39	5.35	4.25	2.4	5.95	4.6	2.1	4.2	3.1	4.5	3.7	4.2	4.2	3.1
1,1-Dichloroethane		5.25	2.81	4.09	3.52	2.5	<0.5	4.8	3	3.7	2.6	4	3.2	3.8	4	3.2
Tetrachloroethylene		<0.5	0.52	<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
Trans-1,2-Dichloroethylene		0.25	0.18	0.29	0.3	<0.5	0.35	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane		<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
Toluene		<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
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ethylbenzene	5	<1.0	0.24	<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
Total VOCs		14.66	11.73	16.05	15.65	8.4	21.88	21.1	6.5	15.6	8.8	14.5	11.4	13.1	13.3	8.3

MCL-Maximum Contaminant Level (40 CFR Part 141)

TABLE B-23

MONTGOMERY COUNTY WELL 13
DRYDEN ROAD NORTH WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)
(continued)

COMPOUND	MCL	12/20/88	1/26/89	2/23/89	3/30/89	4/18/89	6/20/89	7/19/89	8/22/89	8/22/89	9/28/89	10/25/89	11/29/89	2/13/89	3/27/89	3/27/89	4/24/90	4/24/90
Bromodichloromethane		<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
Bromoform		<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	<1.0
Chloroform		<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
Dibromochloromethane		<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
Benzene	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	<0.5
Carbon Tetrachloride	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	<0.5
p-Dichloroethane	75	<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	<1.0
1,2-Dichloroethane	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	<0.5
1,2-Dichloroethylene	7	<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
1,1,1-Trichloroethane	200	<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
Trichloroethylene	5	0.7	0.8	0.7	0.7	0.6	0.8	<0.5	0.7	0.45	0.9	0.7	<0.5	<0.5	0.8	<0.5	1.4	1.2
Vinyl Chloride	2	14.5	5.6	<0.5	4.4	4.7	2.4	2.7	2.1	1.72	2.6	1.5	1.4	<0.5	2.1	<0.5	2.5	2.7
Cis-1,2-Dichloroethylene		4.7	4.7	2.9	3.2	3.3	4.8	3.4	3.3	3.86	5.1	3.2	2.6	3.9	5.2	0.7	6.8	6.3
1,1-Dichloroethane		4.7	4.3	2.7	2.9	3	3.5	3.2	3.2	3.23	3.8	2.5	3.1	3	2.9	<0.5	3.3	3.2
Tetrachloroethylene		<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
Trans-1,2-Dichloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane		<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	<1.0
Toluene		<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
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ethylbenzene	5	<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	<1.0
Total VOCs		24.6	15.4	6.3	11.2	11.6	11.5	9.3	9.3	9.26	12.4	7.9	7.7	6.9	11	0.7	14	13.4

MCL-Maximum Contaminant Level (40 CFR Part 141)

TABLE B-24

MONTGOMERY COUNTY WELL 14
MIAMI SHORES WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)

COMPOUND	MCL	7/9/85	9/3/85	12/11/85	8/4/86	3/30/89	5/16/89	6/20/89	7/19/89	9/28/89	12/20/89	3/27/90
Bromodichloromethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
p-Dichloroethane	75	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethylene	7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	200	<0.5	<0.5	<0.5	<0.5	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	5	<0.5	<0.5	<0.5	<0.5	<0.5	2.7	<0.5	<0.5	<0.5	<0.5	<0.5
Vinyl Chloride	2	<0.5	<0.5	<0.5	<0.5	<0.5	1.8	<0.5	<0.5	<0.5	<0.5	<0.5
Cis-1,2-Dichloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	7.3	1	0.8	1.4	0.8	0.7
1,1-Dichloroethane		<0.5	<0.5	<0.5	<0.5	<0.5	3.3	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trans-1,2-Dichloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0		<2.0	<2.0
Ethylbenzene	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0		<1.0	<1.0
Total VOCs		0	0	0	0	0	16.8	1	0.8	1.4	0.8	0.7

MCL-Maximum Contaminant Level (40 CFR Part 141)

TABLE B-25

MONTGOMERY COUNTY WELL 15
MIAMI SHORES WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)

COMPOUND	MCL	8/4/86	5/22/87	7/24/87	2/22/88	5/13/88	6/14/88	6/28/88	7/29/88	8/30/88	10/17/88	12/19/88	6/20/89	9/28/89	12/20/89	3/27/90
Bromodichloromethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.7	4.1	2.7	3.8
Bromoform		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.4	<1.0	1.4
Chloroform		<0.5	<0.5	<0.5	<0.5	0.36	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.6	4	2.6	4.3
Dibromochloromethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	2.7	3.4	2.6	3.7
Benzene	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
Carbon Tetrachloride	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
p-Dichloroethane	75	<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-Dichloroethane	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
1,2-Dichloroethylene	7	<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
1,1,1-Trichloroethane	200	<0.5	<0.5	<0.5	0.25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	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
Vinyl Chloride	2	<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
Cis-1,2-Dichloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	0.46	0.64	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane		<0.5	<0.5	<0.5	0.28	0.22	<0.5	0.31	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene		<0.5	<0.5	<0.5	0.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trans-1,2-Dichloroethylene		<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
Trichlorofluoromethane		<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
Toluene		<0.5	<0.5	<0.5	<0.5	0.26	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0			
Ethylbenzene	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0			
Total VOCs		0	0	0	0.83	0.84	0.46	0.95	0	0	0	0	8	12.9	7.9	13.2

MCL-Maximum Contaminant Level (40 CFR Part 141)

TABLE B-26

MONTGOMERY COUNTY WELL 16
MIAMI SHORES WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)

COMPOUND	MCL	8/4/86	5/22/87	7/24/87	2/22/88	5/13/88	6/14/88	6/28/88	12/20/88	6/20/89	7/22/90	8/22/90	9/28/89	10/25/89	11/29/89	12/20/89	2/13/90
Bromodichloromethane		<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
Bromoform		<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
Chloroform		<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
Dibromochloromethane		<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
Benzene	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
Carbon Tetrachloride	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
p-Dichloroethane	75	<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-Dichloroethane	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
1,2-Dichloroethylene	7	<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
1,1,1-Trichloroethane	200	<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
Trichloroethylene	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
Vinyl Chloride	2	<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
Cis-1,2-Dichloroethylene		<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
1,1-Dichloroethane		<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
Tetrachloroethylene		<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
Trans-1,2-Dichloroethylene		<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
Trichlorofluoromethane		<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
Toluene		<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
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ethylbenzene	5	<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
Total VOCs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MCL-Maximum Contaminant Level (40 CFR Part 141)

TABLE B-27

MONTGOMERY COUNTY WELL 17
MIAMI SHORES WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)

COMPOUND	MCL	8/7/87	2/22/88	5/24/88	6/13/88	6/28/88	7/28/88	12/20/88	3/30/89	6/20/89	9/28/89	12/20/89	2/13/90	3/27/90	4/24/90
Bromodichloromethane		<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
Bromoform		<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
Chloroform		<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
Dibromochloromethane		<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
Benzene	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
Carbon Tetrachloride	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
p-Dichloroethane	75	<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-Dichloroethane	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
1,2-Dichloroethylene	7	<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
1,1,1-Trichloroethane	200	<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
Trichloroethylene	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
Vinyl Chloride	2	<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
Cis-1,2-Dichloroethylene		<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
1,1-Dichloroethane		<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
Tetrachloroethylene		<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
Trans-1,2-Dichloroethylene		<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
Trichlorofluoromethane		<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
Toluene		<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
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ethylbenzene	5	<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
Total VOCs		0	0	0	0	0	0	0	0	0	0	0	0	0	0

MCL-Maximum Contaminant Level (40 CFR Part 141)

TABLE B-28

MONTGOMERY COUNTY WELL 18
MIAMI SHORES WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)

COMPOUND	MCL	5/28/87	7/24/87	2/22/88	5/24/88	6/28/88	7/29/88	8/30/88	12/19/88	6/20/89	9/28/89	12/20/89	3/28/90
Bromodichloromethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	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
Carbon Tetrachloride	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
p-Dichloroethane	75	<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-Dichloroethane	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
1,2-Dichloroethylene	7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	200	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	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
Vinyl Chloride	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cis-1,2-Dichloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trans-1,2-Dichloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ethylbenzene	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total VOCs		0	0	0	0	0	0	0	0	0	0	0	0

MCL-Maximum Contaminant Level (40 CFR Part 141)

TABLE B-29

MONTGOMERY COUNTY WELL 19
MIAMI SHORES WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)

Page 1 of 2

COMPOUND	MCL	5/5/84	3/11/86	6/16/86	8/4/86	5/22/87	7/24/87	10/26/87	2/22/88	5/19/88	9/28/89	7/14/88	7/14/88
Bromodichloromethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	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
Carbon Tetrachloride	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
p-Dichloroethane	75	<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-Dichloroethane	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
1,2-Dichloroethylene	7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	200	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	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
Vinyl Chloride	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cis-1,2-Dichloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.77	1.07	0.6	0.8
1,1-Dichloroethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trans-1,2-Dichloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ethylbenzene	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total VOCs		0	0	0	0	0	0	0	0	0.77	1.07	0.6	0.8

MCL-Maximum Contaminant Level (40 CFR Part 141)

TABLE B-29

MONTGOMERY COUNTY WELL 19
MIAMI SHORES WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)
(continued)

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COMPOUND	MCL	7/29/89	8/30/88	12/19/88	1/25/89	3/30/89	5/16/89	6/20/89	6/28/89	9/28/89	11/29/89	12/20/89
Bromodichloromethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
p-Dichloroethane	75	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethylene	7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	200	<0.5	<0.5	<0.5	3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Vinyl Chloride	2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cis-1,2-Dichloroethylene		<0.5	<0.5	0.9	0.8	0.7	0.8	0.9	0.9	1.1	0.7	0.8
1,1-Dichloroethane		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trans-1,2-Dichloroethylene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0			
Ethylbenzene	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0			
Total VOCs		0	0	0.9	3.8	0.7	0.8	0.9	0.9	1.1	0.7	0.8

MCL-Maximum Contaminant Level (40 CFR Part 141)

TABLE B-30

MONTGOMERY COUNTY WELL 20
MIAMI SHORES WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)

COMPOUND	MCL	8/4/86	5/22/87	7/24/87	2/22/88	5/24/88	6/14/88	6/28/88	7/15/88	7/15/88	7/29/88	8/30/88	12/19/88	2/23/89	3/30/89	6/20/89	9/28/89	12/20/89
Bromodichloromethane		<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
Bromoform		<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	<1.0
Chloroform		<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
Dibromochloromethane		<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
Benzene	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	<0.5
Carbon Tetrachloride	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	<0.5
p-Dichloroethane	750	<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	<1.0
1,2-Dichloroethane	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	<0.5
1,2-Dichloroethylene	7	<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
1,1,1-Trichloroethane	200	<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
Trichloroethylene	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	<0.5
Vinyl Chloride	2	<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
Cis-1,2-Dichloroethylene		<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
1,1-Dichloroethane		<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
Tetrachloroethylene		<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
Trans-1,2-Dichloroethylene		<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
Trichlorofluoromethane		<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	<1.0
Toluene		<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
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Ethylbenzene	5	<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	<1.0
Total VOCs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

MCL-Maximum Contaminant Level (40 CFR Part 141)

TABLE B-31

MONTGOMERY COUNTY WELL 21
MIAMI SHORES WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)

COMPOUND	MCL	5/28/87	7/24/87	2/22/88	5/13/88	6/13/88	6/28/88	7/15/88	7/15/88	7/29/88	8/30/89	12/30/89	1/25/89	3/30/89	5/16/89	6/20/89	9/28/89	12/20/89
Bromodichloromethane		<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
Bromoform		<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	<1.0
Chloroform		<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
Dibromochloromethane		<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
Benzene	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	<0.5
Carbon Tetrachloride	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	<0.5
p-Dichloroethane	750	<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	<1.0
1,2-Dichloroethane	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	<0.5
1,2-Dichloroethylene	7	<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
1,1,1-Trichloroethane	200	<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
Trichloroethylene	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	<0.5
Vinyl Chloride	2	<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
Cis-1,2-Dichloroethylene		<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
1,1-Dichloroethane		<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
Tetrachloroethylene		<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
Trans-1,2-Dichloroethylene		<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
Trichlorofluoromethane		<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	<1.0
Toluene		<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		
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0		
Ethylbenzene	5	<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		
Total VOCs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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TABLE B-32

MONTGOMERY COUNTY WELL 22
MIAMI SHORES WELL FIELD
VOLATILE ORGANIC COMPOUNDS
(concentrations in parts per billion)

COMPOUND	MCL	5/28/87	7/24/87	2/22/88	6/13/88	6/28/88	7/15/88	7/15/88	7/29/88	8/30/89	11/17/89	12/19/89	2/23/89	3/30/89	4/18/89	6/20/89	9/28/89
Bromodichloromethane		<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
Bromoform		<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
Chloroform		<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
Dibromochloromethane		<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
Benzene	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
Carbon Tetrachloride	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
p-Dichloroethane	750	<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-Dichloroethane	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
1,2-Dichloroethylene	7	<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
1,1,1-Trichloroethane	200	<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
Trichloroethylene	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
Vinyl Chloride	2	<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
Cis-1,2-Dichloroethylene		<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
1,1-Dichloroethane		<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
Tetrachloroethylene		<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
Trans-1,2-Dichloroethylene		<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
Trichlorofluoromethane		<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
Toluene		<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	
o+p Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	
Ethylbenzene	5	<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	
Total VOCs		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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WELL DESIGNATION	COORDINATES (1) NORTH	EAST	MEASURING POINT ELEVATION (2)	GROUND ELEVATION
W-1-N	6617.81	5038.46	739.02	737.40
W-2-N	5264.36	4745.52	731.68	729.60
W-3-N	5157.44	5033.32	733.66	731.90
W-4-N	5157.66	5226.10	731.63	729.90
HR-1	3422.78	5206.28	732.71	729.97
HR-2	5209.19	5456.33	734.75	732.70
HR-3	5220.49	5666.51	736.75	734.20
HR-4	6110.80	5215.97	742.60	740.50
HR-5	4759.97	4986.25	734.27	730.94
HR-6	4009.01	4986.86	732.66	730.05
HR-7	4743.40	4680.02	731.73	731.00
HR-8	6819.07	5627.78	743.42	740.77
HR-9	7707.86	5511.62	743.51	740.90
HR-10	7708.07	5502.06	742.81	741.00
HR-11	7470.61	6189.64	743.33	741.00
HR-12	7478.56	6178.43	742.64	741.10
HR-13	5211.37	5649.22	735.03	733.20
HR-14	5169.16	5214.26	731.63	729.90
HR-15	5162.82	5024 28	733.74	732.10
HR-16	2367.54	4215.46	727.01	724.60
HR-17	2468.86	4816.92	726.43	725.40
W-1-S	2777.42	4959.90	729.29	728.30
W-2-S	1785.87	4208.38	726.64	725.00
W-3-S	1677.97	4388.17	733.42	731.40
W-4-S	1671.42	4784.46	727.68	726.60
GM-1	1091.08	5804.08	735.74	733.70
GM-2	1101.85	5804.43	735.81	733.80
GM-3	1027.43	5310.06	730.44	728.70
GM-4	1007.85	5310.95	731.46	728.90
GM-5	1040.86	5512.63	731.29	729.90
GM-6	1042.45	5307.31	730.27	728.50
GM-7	1282.86	5286.25	735.10	733.00
GM-8	1271.05	5289.46	735.17	733.40
GM-9	140.17	5249.32	724.07	724.20
GM-10	142.16	5259.43	723.90	723.90
GM-11	678.92	5153.46	723.71	724.00
GM-13	565.45	4996.76	723.82	724.10
GM-14	557.50	4984.35	723.50	723.70
GM-15	661.90	4605.23	725.23	725.40
GM-16	661.73	4593.76	725.30	725.40
GM-17	681.50	5151 96	723.84	724.00
GM-18	559.54	4999.52	723.80	724.00
GM-19-S	1755.23	5228.15	730.85	729.00
GM-19-D	1757.65	5279.06	730.25	729.80
EAST	2106.43	5820.39	730.98	730.00
WEST	1985.35	5463.52	730.90	729.10
4S	1040.00	5512.00	731.36	729.30
32	2399.18	5793.26	732.10	730.40
35	3002.47	5293.78	733.96	730.76
37	2630.69	5634.35	731.24	730.00
42	3715.62	5072.33	731.62	730.00
44	6038.14	5223.29	734.62	733.91
45	1746.94	5259.40	731.03	728.78
46	1733.34	5589.34	733.34	731.72
"A"	6036.15	6063.20	739.00	737.80
FW-1	6541.65	7419.48	740.90	739.83
FW-2	4461.41	7265.43	737.48	736.24
FW-3	4467.35	6598.60	739.26	738.21
FW-4	2307.88	6458.95	731.62	730.87

NOTE 1

ALL ELEVATION REFERENCED TO OHIO DEPARTMENT OF TRANSPORTATION. BENCHMARK IN WING WALL AT NORTHLAWN AVE. AND PENN CENTRAL RAIL ROAD OVERPASS. NATIONAL GEODETIC VERTICAL DATUM. (NGVD) BY USGS.

NOTE 2

PLANT COORDINATE SYSTEM BASED ON NORTH-SOUTH BASE LINE AT WEST EDGE OF BLDG 14, WITH COORDINATES N5000, E5000 AT THE NORTH--WEST CORNER.

⌛ FW-4	FIRE WELLS
● 32	PRODUCTION WELLS
◍ GM-11	GROUND WATER MONITORING WELLS
⊘	ACTIVE PRODUCTION WELL

PLATE 1

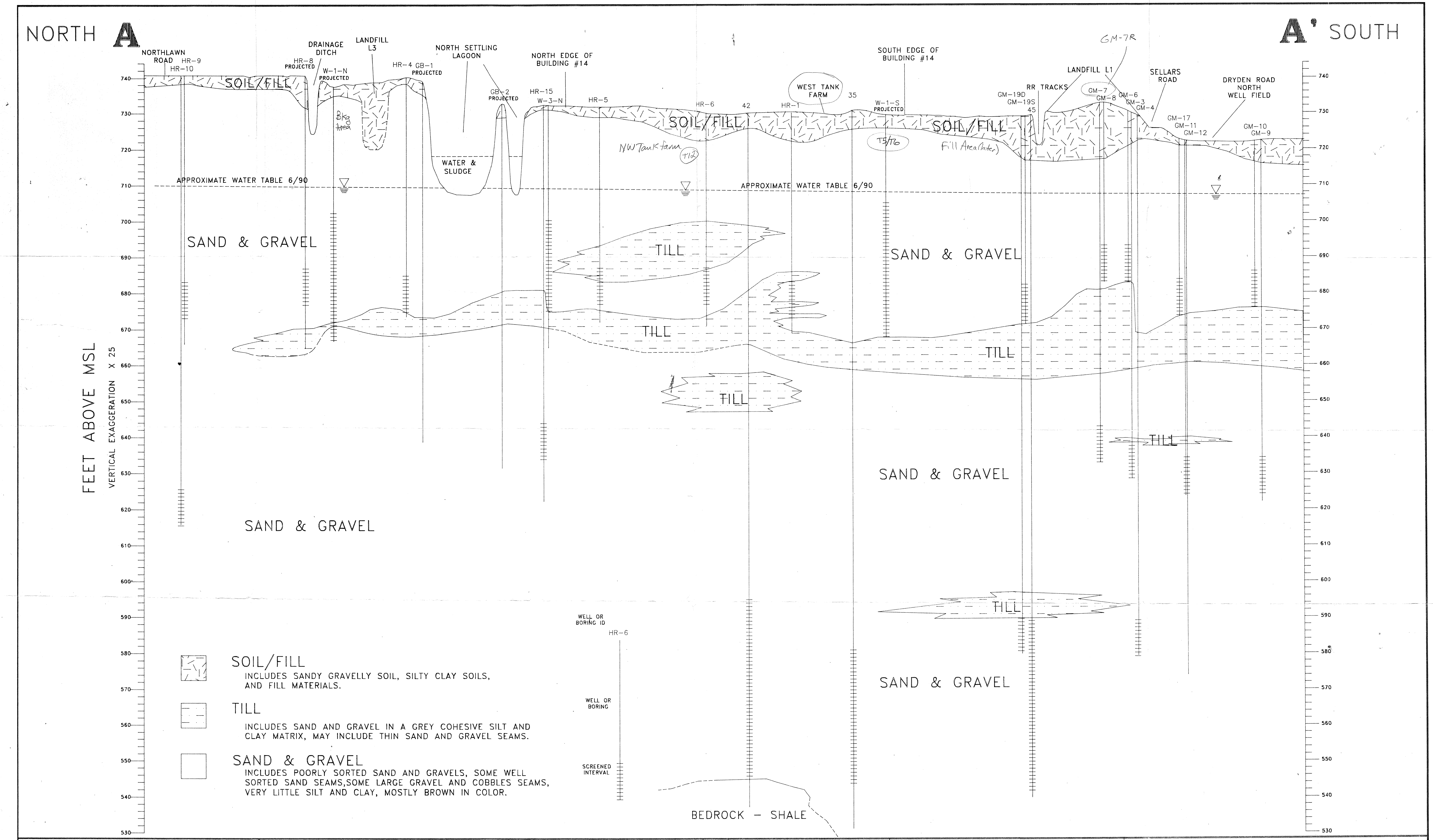
200 0 200 400 600

1" = 200'
CONTOUR INTERVAL 1'
DATE OF PHOTOGRAPHY APRIL 12, 1989

GERAGHTY
& MILLER, INC.
Environmental Services

TOPOGRAPHIC & SITE LOCATION MAP
OF
GENERAL MOTORS CORPORATION
HARRISON RADIATOR DIVISION
MORAINE, OHIO

N



GERAGHTY
& MILLER, INC.
Environmental Services

GENERALIZED GEOLOGIC CROSS-SECTION

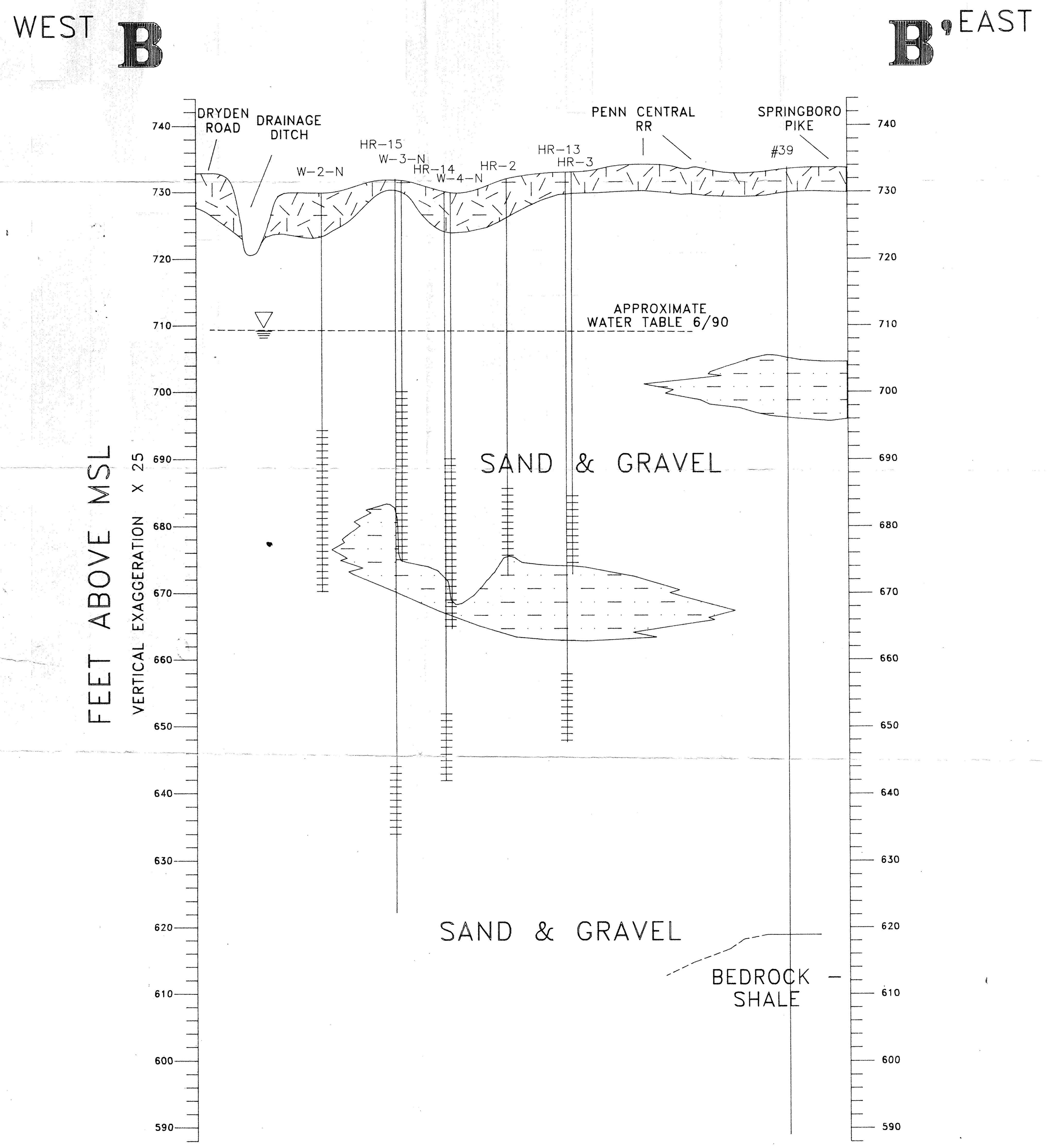
GMC - HARRISON RADIATOR
MORAINE, OHIO

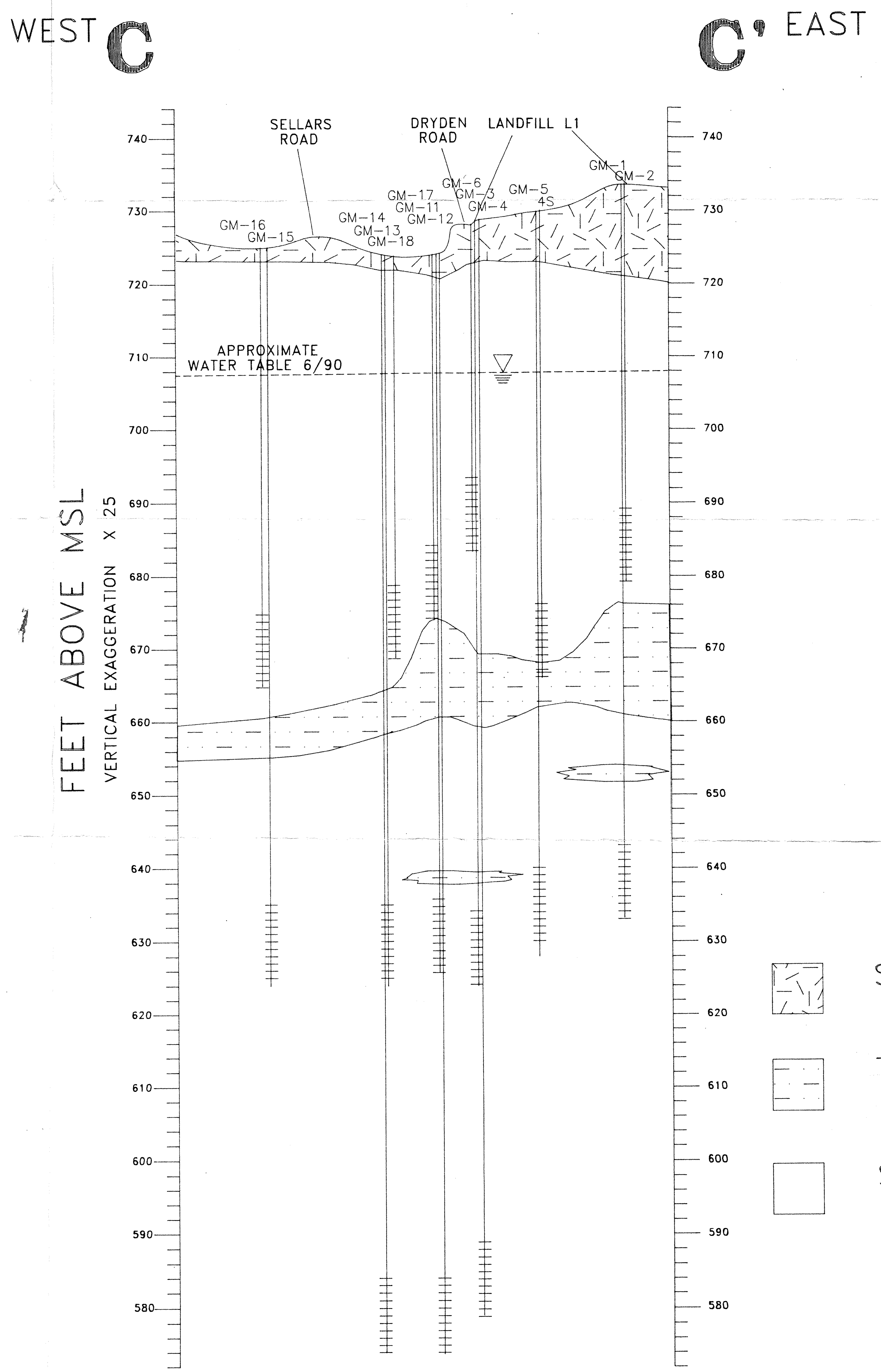
NOTE: THIS CROSS-SECTION DEPICTS SUBSURFACE CONDITIONS AT SPECIFIC LOCATIONS BASED ON BORING LOGS AND OTHER INFORMATION FROM SEVERAL SOURCES. SUBSURFACE CONDITIONS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS OCCURING AT THESE SITES.

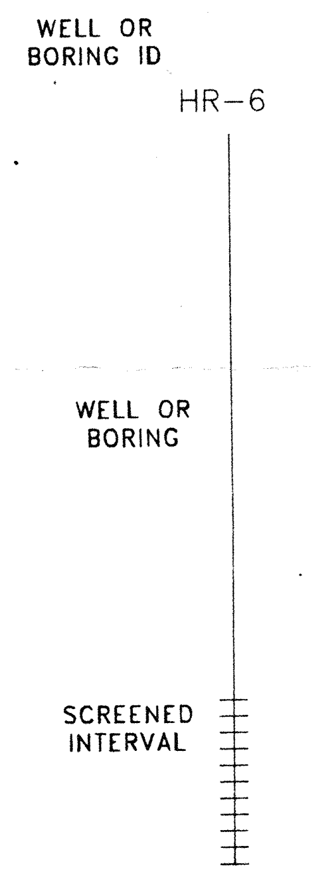
200 0 200 400 600

HORIZONTAL SCALE

PLATE 2







▨ **SOIL/FILL**
INCLUDES SANDY GRAVELLY SOIL, SILTY CLAY SOILS, AND FILL MATERIALS.

▤ **TILL**
INCLUDES SAND AND GRAVEL IN A GREY COHESIVE SILT AND CLAY MATRIX, MAY INCLUDE THIN SAND AND GRAVEL SEAMS.

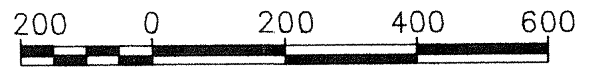
☐ **SAND & GRAVEL**
INCLUDES POORLY SORTED SAND AND GRAVELS, SOME WELL SORTED SAND SEAMS, SOME LARGE GRAVEL AND COBBLES SEAMS, VERY LITTLE SILT AND CLAY, MOSTLY BROWN IN COLOR.

GERAGHTY
& MILLER, INC.
Environmental Services

GENERALIZED GEOLOGIC CROSS-SECTION

GMC - HARRISON RADIATOR
MORAINE, OHIO

NOTE: THIS CROSS-SECTION DEPICTS SUBSURFACE CONDITIONS AT SPECIFIC LOCATIONS BASED ON BORING LOGS AND OTHER INFORMATION FROM SEVERAL SOURCES. SUBSURFACE CONDITIONS AT OTHER LOCATIONS MAY DIFFER FROM CONDITIONS OCCURING AT THESE SITES.



HORIZONTAL SCALE

PLATE 3

AERIAL TOPOGRAPHIC SURVEY

CITY OF MORAINE, OHIO

SCALE 1"=100'
CONTOUR INTERVAL 2' WITH 1' SUPPLEMENTAL
DATE OF PHOTOGRAPHY 3-27-68

COMPILED BY PHOTOGRAMMETRIC METHODS BY
CLYDE E. WILLIAMS & ASSOCIATES, INC.
SOUTH BEND INDIANAPOLIS
INDIANA

PLATE 4

PREPARED FOR
DODSON, KINNEY & LINDBLOM
CONSULTING ENGINEERS
COLUMBUS OHIO

SHEE

69-104