ARCADIS

Appendix A

RFI/Supplemental RFI Supporting Information

ARCADIS

Attachment A-1

Description of Current Conditions

ARCADIS

Supporting Information: DOCC, Harrison Radiator Division - GMC, January 1991

The information included in this appendix presents the descriptions of Solid Waste Management Units (SWMUs) in an excerpt from Section 3 of the DOCC for Harrison Radiator Division – GMC, January 1991. Also included from this report is Table 3-1 and Figure 3-1.

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).

- T-1

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.

- T-2

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 re-routed 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.

- T-3

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.

- T-4

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.

- RCRA Part A Permit

- 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.

• Ground-Water Monitoring Under RCRA

- 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.

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

NORTHLAWN AVE

DRAINAGE DITCH

LANDFILL L3

LANDFILL L2

NORTH SETTLING LAGOONS

WASTE WATER TREATMENT FACILITY

NORTH STORMWATER RETENTION BASIN

SPRINGBORO PIKE

GMC TRUCK & BUS

PENN CENTRAL RAILROAD

STROOP ROAD

DRYDEN ROAD

US INTERSTATE 75

HARRISON RADIATOR

MAIN MANUFACTURING OPERATION BLDG 14

CPC

MORAINE ENGINE PLANT

EAST RIVER ROAD

PARKING AREA

WEST UST FARM (T7,T8,T9,T10)

FORMER SOLVENT RECOVERY (T8)

BLDG 5

T6

T5

BLDG 7

T4

T1

SOUTH STORMWATER RETENTION BASIN

PUMPHOUSE BLDG 17

FUEL OIL STORAGE

BLDG. 18

SOUTH SETTLING LAGOON

SOUTH UST FARM (T1,T2,T3)

STAGING AREA

C1

BLDG. 21

DRUM STORAGE AREA

FORMER INCINERATOR AREA

WASTE PILE GRINDING SLUDGE BUNKER

HOLT LAKE ROAD

LANDFILL L1

DRYDEN ROAD

SELLARS ROAD

MIAMI RIVER

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

ARCADIS

Attachment A-2

RCRA Facility Investigation

ARCADIS

Supporting Information: RFI Report Volume 1 (Methodologies and Results), Delphi Harrison Thermal Systems, April 2000.

The information included in this appendix presents descriptions of Solid Waste Management Units (SWMUs) for Delphi Harrison Thermal Systems in an exerpt from Section 2.4 of the Resource Conservation and Recovery Act Facility Investigation Final Report Volume I (Methodologies and Results), Delphi Harrison Thermal Systems, Moraine, Ohio, April 2000. Also included from this report are Tables 4-1 through 4-14, Tables 5-1 through 5-24, Figure 4-5 and Figures 5-1 through 5-23.

Solid Waste Management Units Description for Delphi Harrison Thermal Systems

Landfills

Three landfills (Landfill L1, L2, and L3) on the Delphi Thermal site were investigated during the RFI (Figure 1-4); these landfills are pre-RCRA, unlined, and uncapped disposal areas. Landfill L1 is located at the southern end of the facility and covers an area of approximately 7.8 acres; it was used for the collection and disposal of wastes generated by the previous plant operator, Frigidaire, for more than 20 years. Landfill L2 is located north of Building 14 and east of the wastewater treatment facility, and covers an area of approximately 3.7 acres; it was used for the collection and disposal of waste generated by Frigidaire from 1950 to 1975. Landfill L3 is located immediately northeast of the North Settling Lagoon and northwest of Landfill L2, and covers an area of approximately 1.6 acres; 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 Landfill L3 from 1972 to 1979.

Surface Impoundments

Two surface impoundment SWMUs, the North and South Settling Lagoon systems (Figure 1-4), were investigated during the RFI. These SWMUs are also in the process of RCRA closure as required by the Ohio Environmental Protection Agency (Ohio EPA). The North Settling Lagoon is located east of Dryden Road, west of the wastewater treatment facility, north of Building 14, and south of Northlawn Avenue. The North Settling Lagoon covers approximately 4.6 acres. The South Settling Lagoon is located east of Interstate 75, west of Dryden Road, north of Sellars Road, and south of East River Road. This lagoon covers an estimated area of 7.9 acres. Details of the operating history for these two SWMUs are provided in the Description of Current Conditions (Geraghty & Miller, Inc. 1991).

Underground Storage Tanks

The Administrative Order listed 19 underground storage tanks (USTs) to be investigated under the RFI; 15 of the 19 USTs were removed before the RFI. Three of the four remaining USTs (T1 [10,000-gallon tank], T4 [10,000 gallon tank], and T12 [50,000-gallon tank]) were removed during the RFI. Only T11 is still in use. UST T11 is used as part of the oily waste collection system associated with the Waste Pile/Staging Area. USTs T1, T4, and T12 were used to hold a similar waste fluid consisting of wash water or spent detergent solution from a process that used polyester resins or potting compounds. RFI investigative activities were performed at the West Tank Farm, at the South Tank Farm, and at USTs T4, T5/T6, T11, and T12 (Figure 1-4).

Waste Pile/Staging Area

The Waste Pile/Staging Area (Figure 1-4) is located just north of Landfill L1 and east of Building 21. This SWMU consists of a three-sided sludge bunker (90 feet by 30 feet by 5 feet high), a concrete staging area, and drainage system associated with this area. The Waste Pile/Staging Area covers approximately 2 acres. The sludge bunker and staging area were originally constructed in 1976. This SWMU is used to manage grinding sludge from aluminum, steel, and cast iron machinery operations, steel and aluminum turnings and empty drums.

Liquid Waste Burner

The Liquid Waste Burner (LWB) (Figure 1-4) was in operation from approximately 1957 to 1970; its purpose was to incinerate spent solvents and oils. The liquids were transferred from on-site locations to the LWB in 55-gallon drums and emptied into two adjacent underground holding tanks for temporary storage. The liquids were then fed to the LWB and incinerated.

Fill Area

Before the south parking lot was constructed, fill material was used to bring the area up to grade level. The fill material consisted of approximately 75 percent bottom ash (clinkers) from two solid waste incinerators (burned combustible solid waste, such as wood, paper, and cardboard) and approximately 25 percent porcelain sludge from an on-site manufacturing process. Figure 1-4 shows the location and approximate aerial extent of the fill area (approximately 2.9 acres).

Additional Areas of Investigation

Soil samples were collected from 12 borings during Phase I in the Background Area to obtain data concerning background concentrations of metals in soils. Two additional borings were drilled during Phase II of the RFI to collect soil samples for analysis of acetone, which had been detected in the background soil samples collected during Phase I. Surface water/sediment samples were collected to support the risk assessment, to determine background conditions for surface water and sediment, and to determine if further sampling was required. The area south of Landfill L1 was investigated to further define the extent of groundwater contamination in that area by collecting groundwater samples from an existing upper aquifer monitor well, WSU-24, and from a lower aquifer monitor well, GM-20D, that was installed during Phase II of the RFI. Soil samples were collected during the installation of Well GM-20D to determine whether the soil contained hazardous constituents. Figure 1-4 shows the location of these additional areas of investigation.

Table 4-1. Upper Aquifer Monitor Well Water-Level Elevations Measured During Phase I, January 1993, Harrison RFI, Harrison Division - General Motors Corporation Moraine, Ohio

Well	MP (Top of __)	MP Elevation	Depth-to-Water from MP	Water-Level Elevation
W-1-N	PVC	739.02	31.67	707.35
W-2-N	PVC	731.68	24.89	706.79
W-3-N	PVC	733.66	27.05	706.61
W-4-N	PVC	731.63	25.05	706.58
HR-1	PVC	732.71	27.44	705.27
HR-2	PVC	734.75	28.18	706.57
HR-3	PVC	736.75	30.20	706.55
HR-4	PVC	742.60	35.43	707.17
HR-5	PVC	734.27	28.00	706.27
HR-6	PVC	732.66	27.00	705.66
HR-7	PVC	731.73	25.38	706.35
HR-8	PVC	743.42	35.97	707.45
HR-9	PVC	743.51	35.60	707.91
HR-11	PVC	743.33	35.52	707.81
HR-16	PVC	727.01	32.01*	695.00*
HR-17	PVC	726.43	21.30	705.13
W-1-S	PVC	729.29	24.10	705.19
W-2-S	PVC	726.64	22.13	704.51
W-3-S	PVC	733.42	28.96	704.46
W-4-S	PVC	727.68	23.20	704.48
GM-2	PVC	735.81	31.45	704.36
4S	PVC	731.36	27.18	704.18
GM-6	PVC	730.27	26.15	704.12
GM-8	PVC	735.17	30.96	704.21
GM-10	PVC	723.90	20.30	703.60
GM-16	PVC	725.30	21.36	703.94
GM-17	PVC	723.84	19.90	703.94
GM-18	PVC	723.80	19.94	703.86
GM-19S	PVC	730.85	26.14	704.71
EAST	PVC	730.98	26.02	704.96
WEST	PVC	730.90	25.93	704.97

PVC Polyvinyl chloride.
MP Measuring point.
* Probable measurement error.
All elevations and water-level elevations reported in feet above mean sea level (msl).
Depth-to-water measurements reported in feet below MP.
All water-level measurements were collected on January 29, 1993, using an electronic water-level probe.

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Table 4-2. Lower Aquifer Monitor Well Water-Level Elevations Measured During Phase I, January 1993, Harrison RFI, Harrison Division - General Motors Corporation, Moraine, Ohio.

Well	MP (Top of __)	MP Elevation	Depth-to-Water from MP	Water-Level Elevation
GM-1	PVC	735.74	31.95	703.79
GM-3	PVC	730.44	27.17	703.27
GM-4	PVC	731.46	28.20	703.26
GM-5	PVC	731.29	27.84	703.45
GM-7R	PVC	735.61	31.89	703.72
GM-9	PVC	724.07	21.02	703.05
GM-11	PVC	723.71	21.00	702.71
GM-13	PVC	723.82	21.64	702.18
GM-14	PVC	723.50	21.36	702.14
GM-15	PVC	725.23	23.24	701.99
GM-19D	PVC	730.25	26.49	703.76
HR-10	PVC	742.81	34.88	707.93
HR-12	PVC	742.64	34.81	707.83
HR-13	PVC	735.03	28.49	706.54
HR-14	PVC	731.63	25.16	706.47
HR-15	PVC	733.74	27.36	706.38

PCV Polyvinyl chloride.
MP Measuring point.
All elevations and water-level elevations reported in feet above mean sea level (msl).
Depth-to-water measurements reported in feet below MP.
All water-level measurements were collected on January 29, 1993 using an electronic water-level probe.

Table 4-3. Lower Aquifer Production Well Water-Level Elevations Measured During Phase I, January 1993, Harrison RFI, Harrison Division - General Motors Corporation, Moraine, Ohio

Well	MP (Top of __)	MP Elevation	Depth-to-Water from MP	Water-Level Elevation
32	Port Hole	732.10	28.20	703.90
35	Rim	733.96	29.72	704.24
37	W. Port Hole	731.24	NM (bolted shut)	NM
42	Rim	731.62	27.08	704.54
44	Port Hole	734.62	NM (inaccessible)	NM
45	Steel	731.03	27.28	703.75
46	Steel	733.34	29.56	703.78
"A"	Port Hole	739.00	32.10	706.90
FW-1	Airline Hole	740.90	33.60	707.30
FW-2	Airline Hole	737.48	32.70	704.78
FW-3	Airline Hole	739.26	NM (inaccessible)	NM
FW-4	Hole to West of Airline	731.62	26.90	704.72

MP Measuring point.
NM Not measured.
All elevations and water-level elevations reported in feet above mean sea level (msl).
Depth-to-water measurements reported in feet below MP.
All water-level measurements were collected on January 29, 1993 using an electronic water-level probe.

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Table 4-4. Upper Aquifer Monitor Well Water-Level Elevations Measured during Phase II, October 1994, Harrison RFI, Harrison Division - General Motors Corporation, Moraine, Ohio.

Well	MP (Top of __)	MP Elevation	Depth-to-Water from MP	Water-Level Elevation
W-1-N	PVC	739.02	33.82	705.20
W-2-N	PVC	731.68	27.21	704.47
W-3-N	PVC	733.66	29.36	704.30
W-4-N	PVC	731.63	27.34	704.29
HR-1	PVC	732.71	30.18	702.53
HR-2	PVC	734.75	30.44	704.31
HR-3	PVC	736.75	32.48	704.27
HR-4	PVC	742.60	37.62	704.98
HR-5	PVC	734.27	30.41	703.86
HR-6	PVC	732.66	29.68	702.98
HR-7	PVC	731.73	27.82	703.91
HR-8	PVC	743.42	38.07	705.35
HR-9	PVC	743.51	37.54	705.97
HR-11	PVC	742.33	37.40	705.93
HR-16	PVC	727.01	25.04	701.97
HR-17	PVC	726.43	24.23	702.20
W-1-S	PVC	729.29	26.97	702.32
W-2-S	PVC	726.64	25.31	701.33
W-3-S	PVC	733.42	32.15	701.27
W-4-S	PVC	727.68	26.34	701.34
GM-2	PVC	735.81	34.52	701.29
4S	PVC	731.36	30.49	700.87
GM-6	PVC	730.27	29.37	700.90
GM-8	PVC	735.17	34.18	700.99
GM-10	PVC	723.90	23.53	700.37
GM-16	PVC	725.30	24.65	700.65
GM-17	PVC	723.84	23.11	700.73
GM-18	PVC	723.80	23.19	700.61
GM-19S	PVC	730.85	29.15	701.70
EAST	PVC	730.98	28.85	702.13
WEST	PVC	730.90	28.87	702.03
TW-2	Steel Casing	NA	32.49	NA
WSU-24	PVC	725.10	23.87	701.23

PVC Polyvinyl chloride.
MP Measuring point.
All elevations and water-level elevations reported in feet above mean sea level (msl).
Depth-to-water measurements reported in feet below MP.
Water-level measurements were collected on October 20, 1994 using an electronic water-level probe.

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Table 4-5. Additional Upper Aquifer Monitor Well Water-Level Elevations Measured During Phase II, October, 1994, Harrison Division - General Motors Corporation, Moraine, Ohio.

Well	MP (Top of __)	MP Elevation	Depth-to-Water from MP (ft)	Water-Level Elevation
ME-1	PVC	728.20	25.57	702.63
ME-2	PVC	728.60	25.95	702.65
ME-3	PVC	728.33	25.67	702.66
ME-4	PVC	728.56	25.97	702.59
ME-5	PVC	728.65	26.27	702.38
ME-6	PVC	728.60	25.93	702.67
GM-21	PVC	723.79	21.95	701.84
GM-22	PVC	728.67	25.93	702.74
GM-23	PVC	731.22	26.41	704.81
GM-24	PVC	747.61	40.74	706.87

PVC Polyvinyl chloride.
MP Measuring point.
All elevations are reported in feet above mean sea level (msl).
Depth-to-water measurements are reported in feet below MP.
Water-level measurements were collected on October 20, 1994, using an electronic water-level indicator.

Table 4-6. Lower Aquifer Monitor Well Water-Level Elevations Measured During Phase II, October 1994, Harrison RFI, Harrison Division - General Motors Corporation, Moraine, Ohio.

Well	MP (Top of __)	MP Elevation	Depth-to-Water from MP	Water-Level Elevation
GM-1	PVC	735.74	34.82	700.92
GM-3	PVC	730.44	30.10	700.34
GM-4	PVC	731.46	31.12	700.34
GM-5	PVC	731.29	30.75	700.54
GM-7R	PVC	735.61	34.76	700.85
GM-9	PVC	724.07	24.19	699.88
GM-11	PVC	723.71	24.03	699.68
GM-13	PVC	723.82	24.72	699.10
GM-14	PVC	723.50	24.47	699.03
GM-15	PVC	725.23	26.36	698.87
GM-19D	PVC	730.25	29.20	701.05
GM-20D[1]	PVC	727.26	26.26	701.00
MT-69	Steel	722.71	23.40	699.31[2]
HR-10	PVC	742.81	36.82	705.99
HR-12	PVC	742.64	36.69	705.95
HR-13	PVC	735.03	30.34	704.69
HR-14	PVC	731.63	27.64	703.99
HR-15	PVC	733.74	29.75	703.99

PVC Polyvinyl chloride.
MP Measuring point.
All elevations and water-level elevations reported in feet above mean sea level (msl).
Depth-to-water measurements reported in feet below MP.
Water-level measurements were collected on October 20, 1994, using an electronic water-level probe.
(1) Not available during Phase I.
(2) Measured on October 27, 1994.

Table 4-7. Lower Aquifer Production Well Water-Level Elevations Measured During Phase II, October 1994, Harrison RFI, Harrison Division - General Motors Corporation, Moraine, Ohio.

Well	MP (Top of ___)	MP Elevation	Depth-to-Water from MP	Water-Level Elevation
32	Port Hole	732.10	30.88	701.22
35	Rim	733.96	32.50	701.46
37	W. Port Hole	731.24	NM (sealed)	NM
42	Rim	731.62	30.00	701.62
44	Port Hole	734.62	NM	NM
45	Steel	731.03	30.02	701.01
46	Steel	733.34	32.16	701.18
"A"	Port Hole	739.00	34.75	704.25
FW-1	Airline Hole	740.90	35.88	705.02
FW-2	Airline Hole	737.48	35.58	701.90
FW-3	Airline Hole	739.26	36.79	702.47
FW-4	Hole to West of Airline	731.62	30.42	701.20

PVC Polyvinyl choride.
MP Measuring point.
NM Not measured.
All elevations and water-level elevations reported in feet above mean sea level (msl).
Depth-to-water measurement reported in feet below MP.
Water-level measurements were collected on October 20, 1994, using an electronic water-level probe.

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Table 4-8. Detected Volatile Organic Compound Concentrations in the Upper and Lower Aquifers Upgradient from the Harrison Site During the RFI, Harrison Division - GMC.

Parameter	Concentration Units	UPPER AQUIFER				LOWER AQUIFER		
		HR-8 Phase I	HR-9 Phase I	HR-11 Phase I	W-1-N Phase I	HR-10 Phase I	DUP-20 Phase I	HR-12 Phase I
1,1,1-Trichloroethane	ug/L	5.2	5.4	--	--	--	--	--
1,1-Dichloroethane	ug/L	34.6	29.3	10.7	--	--	--	--
Carbon disulfide	ug/L	--	--	--	--	3	--	5.5
Chloroethane	ug/L	--	13.7	--	--	--	--	--
Trichloroethene	ug/L	1.3	16.1	--	--	--	--	--
Vinyl chloride	ug/L	--	--	--	--	--	--	6.6

6.4.5

-- Not detected.
ug/L Micrograms per liter.
DUP-20 is the duplicate sample of HR-10 during Phase I.

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Table 4-9. Detected Dissolved Metal Concentrations in the Upper and Lower Aquifer Upgradient from the Harrison Site During the RFI, Harrison Division - GMC.

		UPPER AQUIFER				LOWER AQUIFER					
Parameter	Concentration Units	HR-8 Phase I	HR-9 Phase I	HR-11 Phase I	W-1-N Phase I	HR-10 Phase I	DUP-20 Phase I	HR-10 Phase II	HR-12 Phase I	HR-12 Phase II	DUP-36 Phase II
Antimony, dissolved	ug/L	NA	55.3 J	NA	NA	NA	NA	NA	51.9	NA	NA
Barium, dissolved	ug/L	97.9	80.8 J	77.8	102	58	58.6	NA	97.7	NA	NA
Cobalt, dissolved	ug/L	--	11.9 J	9.8	6.1	5.6	8.6	NA	10.4	NA	NA
Selenium, dissolved	ug/L	NA	1 J	NA	NA	NA	NA	NA	NA	NA	NA

NA Not analyzed.
-- Not detected.
J Estimated.
ug/L Micrograms per liter.
DUP-20 is the duplicate sample of HR-10 during Phase I.
DUP-36 is the duplicate sample of HR-12 during Phase II.

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Table 4-10. Detected Volatile Organic Compound Concentrations in the Upper Aquifer Downgradient from the Harrison Facility RFI, Harrison Division - GMC

Parameter	Concentration Units	UPPER AQUIFER						
		GM-10 Phase I	GM-16 Phase I	GM-17 Phase I	DUP-21 Phase I	GM-18 Phase I	DUP-22 Phase I	WSU-24 Phase II
1,1,1-Trichloroethane	ug/L	8	3.8	4.3	6.4	17.9	17.4	3.1
1,1-Dichloroethane	ug/L	11.1	--	117	115	144	152	--
Chlorobenzene	ug/L	--	--	5.7	2.5	--	--	--
Chloroethane	ug/L	--	--	12.3	--	10.2	11	--
Tetrachloroethene	ug/L	2.8	57	--	--	1.1	1.3	2.3
Trichloroethene	ug/L	85.2	28.9	25.3	43.3	62.3	63.5	20.7
Vinyl chloride	ug/L	--	--	8.4	6.5	17	17.5	--
trans-1,2-Dichloroethene	ug/L	2.4	--	8.3	9.2	16.7	17.2	--

-- Not detected.
ug/L Micrograms per liter.
DUP-21 is the duplicate sample of GM-17 during Phase I.
DUP-22 is the duplicate sample of GM-18 during Phase I.

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Table 4-11. Detected Volatile Organic Compound Concentrations in the Lower Aquifer Downgradient from the Harrison Facility RFI, Harrison Division - GMC

	LOWER AQUIFER						
Parameter	GM-9 Phase I	GM-11 Phase I	GM-13 Phase I	GM-15 Phase I	GM-20D Phase II	MT-69 Phase II	DUP-33 Phase II
1,1,1-Trichloroethane	--	8.6	4.6	--	--	--	--
1,1-Dichloroethane	14.5	--	--	2.4	--	--	--
Chlorobenzene	--	--	--	--	--	--	--
Chloroethane	--	--	--	--	--	--	--
Tetrachloroethene	--	5.5	5.8	--	6.1	--	--
Trichloroethene	4.9	29.1	15.8	3.7	1.8	--	--
Vinyl chloride	--	--	--	--	--	--	--
trans-1,2-Dichloroethene	4.1	--	--	--	--	--	--

-- Not detected.
DUP-33 is the duplicate sample of MT-69 during Phase II.

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Table 4-12. Detected Dissolved Metals and Cyanide Concentrations in the Upper Aquifer Downgradient from the Harrison Facility RFI, Harrison Division - GMC.

Parameter	Concentration Units	UPPER AQUIFER GM-10 Phase I	GM-16 Phase I	GM-17 Phase I	DUP-21 Phase I	GM-18 Phase I	DUP-22 Phase I	WSU-24 Phase II
Cyanide	mg/L	--	--	--	--	0.021	--	--
Barium, dissolved	ug/L	180 J	142	78.7	80.8	48.8	47.7	115
Cobalt, dissolved	ug/L	7.3	5.4	13.4	14.8	--	--	NA
Copper, dissolved	ug/L	--	--	9.7	5.4	5.7	9.2	--
Selenium, dissolved	ug/L	NA	NA	NA	--	2.8	1.1 J	NA

-- Not detected.
mg/L Milligrams per liter.
ug/L Micrograms per liter.
J Estimated.
NA - Not analyzed.
DUP-21 is the duplicate sample of GM-17 during Phase I.
DUP-22 is the duplicate sample of GM-18 during Phase I.

Table 4-13. Detected Dissolved Metals in the Lower Aquifer Downgradient from the Harrison Facility RFI, Harrison Division - GMC.

Parameter	Concentration Units	LOWER AQUIFER GM-9 Phase I	GM-11 Phase I	GM-13 Phase I	GM-15 Phase I	GM-20D Phase II	MT-69 Phase II	DUP-33 Phase II
Antimony, dissolved	ug/L	53.2 J	66.2 J	--	NA	NA	NA	NA
Barium, dissolved	ug/L	81.4	71.4	75.9	163 J	74.8	113	119
Cobalt, dissolved	ug/L	6.7	9.4	7.2	7.5	--	NA	NA
Copper, dissolved	ug/L	--	--	--	NA	--	--	--
Selenium, dissolved	ug/L	NA	NA	1 J	NA	NA	NA	NA
Zinc, dissolved	ug/L	--	--	--	--	--	17.5	NA

-- Not detected.
ug/L Micrograms per liter.
J Estimated.
NA Not analyzed.
DUP-33 is the duplicate sample of MT-69 during Phase II.

TABLE 4-14. SOIL BACKGROUND ANALYTICAL RESULTS
TOTAL ORGANIC CARBON AND CATION-EXCHANGE CAPACITIES
HARRISON DIVISION - GMC

Sample Name	UNITS	BKG BH03-02SL	BKG BH03-16SL	BKG BH07-02SL	BKG-BH07-16SL	BKG-BH10-02SL	BKG-BH10-16SL	DUP-05
Total Organic Carbon	MG/KG	12000	12000	13000	18000	4800	6500	12000
Cation-Exchange Capacity	UG/G N (Dry wt)	2000	990	2200	1300	2900	1900	2700

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Table 5-1. Detected Volatile Organic Compound Concentrations in the Upper Aquifer Upgradient and Downgradient from Landfill L1 RFI, Harrison Division - GMC.

Parameter	Concentration Units	UPGRADIENT					DOWNGRADIENT		
		GM-2 Phase I	DUP-17 Phase I	EAST-Phase I	EAST-Phase II	DUP-29 Phase II	4S-Phase I	GM-6 Phase II	GM-8 Phase I
1,1,1-Trichloroethane	ug/L	13.7	12.6	18.9	16	16.1	--	--	7.3
1,1-Dichloroethane	ug/L	3.1	2.9	8	10.5	10.8	77.8	218	120
Benzene	ug/L	--	--	--	--	--	--	14.3	6
Chloroethane	ug/L	--	--	--	--	--	--	--	30.8
Ethylbenzene	ug/L	--	--	--	--	--	45.9	459	108
Tetrachloroethene	ug/L	7.6	7.2	79.4	62.4	61.2	--	--	2.2
Toluene	ug/L	--	--	--	--	--	--	75.2	1.1
Trichloroethene	ug/L	108	94.8	83.4	71.4	71.2	--	--	69.4
Vinyl chloride	ug/L	--	--	--	--	--	--	--	28.3
Xylenes, total	ug/L	--	--	--	--	--	24	498	70.6
trans-1,2-Dichloroethene	ug/L	--	--	--	--	--	--	22	13

-- Not detected.
ug/L Micrograms per liter.
DUP-17 is the duplicate sample of GM-2 during Phase I.
DUP-29 is the duplicate sample of East during Phase II.

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Table 5-2. Detected Volatile Organic Compound Concentrations in the Lower Aquifer Upgradient and Downgradient from Landfill L1 RFI, Harrison Division - GMC.

Parameter	Concentration Units	UPGRADIENT	DOWNGRADIENT					
		GM-1 Phase I	GM-3 Phase II	GM-5 Phase I	DUP-18 Phase I	GM-7R Phase I	GM-7R Phase II	DUP-34 Phase II
1,1,1-Trichloroethane	ug/L	8	1.9	--	--	9.4	6	6.7
1,1-Dichloroethane	ug/L	--	1.1	--	2.5	6.9	3.8	4
1,1-Dichloroethene	ug/L	--	--	--	--	--	1.7	1.8
Tetrachloroethene	ug/L	4.7	1.1	--	--	--	--	--
Trichloroethene	ug/L	42.4	4.7	--	--	183	134	147

-- Not detected.
ug/L Micrograms per liter.
DUP-18 is the duplicate sample of GM-5 during Phase I.
DUP-34 is the duplicate sample of GM-7R during Phase II.

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Table 5-3. Detected Cyanide and Dissolved Metal Concentrations in the Upper Aquifer Upgradient and Downgradient from Landfill L1 RFI, Harrison Division - GMC.

Parameter	Concentration Units	UPGRADIENT GM-2 Phase I	UPGRADIENT DUP-17 Phase I	UPGRADIENT EAST- Phase I	DOWNGRADIENT 4S- Phase I	DOWNGRADIENT GM-8 Phase I
Cyanide	mg/L	--	--	0.008	0.014	0.017
Antimony, dissolved	ug/L	NA	NA	56.2	NA	--
Arsenic, dissolved	ug/L		--	--	23.3	--
Barium, dissolved	ug/L	103	96	90.9	237	129
Cobalt, dissolved	ug/L	8.9	8.3	9.9	20.8	12.2
Copper, dissolved	ug/L	--	--	9.4	--	5.6
Nickel, dissolved	ug/L	--	--	15.8	--	NA
Zinc, dissolved	ug/L	--	--	11.7	--	--

NA Not analyzed.
-- Not detected.
mg/L Milligrams per liter.
ug/L Micrograms per liter.
DUP-17 is a duplicate sample of GM-2 during Phase I.

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Table 5-4. Detected Dissolved Metal Concentrations in the Lower Aquifer Upgradient and Downgradient from Landfill L1 RFI, Harrison Division - GMC.

Parameter	Concentration Units	UPGRADIENT GM-1 Phase I	DOWNGRADIENT GM-5 Phase I	DUP-18 Phase I	GM-7R Phase I
Barium, dissolved	ug/L	79.2	84	84.6	80.6
Cobalt, dissolved	ug/L	8.6	9.1	13.1	10.7
Copper, dissolved	ug/L	--	10.2	--	--
Nickel, dissolved	ug/L	--	19.5	--	--

-- Not detected.
ug/L Micrograms per liter.
DUP-18 is the duplicate sample of GM-5 during Phase I.

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Table 5-5. Detected Volatile Organic Compound Concentrations in the Upper and Lower Aquifers Downgradient from Landfills L2 and L3 RFI, Harrison Division - GMC.

Parameter	Concentration Units	LANDFILL - L2 Upper Aquifer HR-3 Phase I	LANDFILL - L2 Lower Aquifer HR-13 Phase I	LANDFILL- L3 Upper Aquifer HR-4 Phase I	LANDFILL- L3 Upper Aquifer DUP-15 Phase I
1,1,1-Trichloroethane	ug/L	--	1.6	--	--
1,1-Dichloroethane	ug/L	--	43.2	--	--
Tetrachloroethene	ug/L	--	--	1.6	2.5
Trichloroethene	ug/L	--	2.4	1.7	2.2
trans-1,2-Dichloroethene	ug/L	--	3.8	--	--

-- Not detected.
ug/L Micrograms per liter.
DUP-15 is the duplicate sample of HR-4 during Phase I.

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Table 5-6. Detected Dissolved Metal Concentrations for Upper and Lower Aquifers Downgradient from Landfill L2 and Upper Aquifer Downgradient from Landfill L3 RFI, Harrison Division - GMC.

		LANDFILL - L2		LANDFILL - L3	
		Upper Aquifer	Lower Aquifer	Upper Aquifer	
Parameter	Concentration Units	HR-3 Phase I	HR-13 Phase I	HR-4 Phase I	DUP-15 Phase I
Barium, dissolved	ug/L	59.1	71.7	67.1	65.6
Cobalt, dissolved	ug/L	13.2	8.9	9.9	7.8
Lead, dissolved	ug/L	2.2 J	4.5 J	--	--

-- Not detected.
J Estimated.
ug/L Micrograms per liter.
DUP-15 is the duplicate sample of HR-4 during Phase I.

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Table 5-7. Summary of North Settling Lagoon Analytical Results, Harrison Division - GMC.

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	0.492-2.12	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-COMPL
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

Table 5-7. Summary of North Settling Lagoon Analytical Results, Harrison Division - GMC.

Constituent[1]	Frequency of Detection[2]	Range of Detected Concentrations[3]	Median Concentrations	Location of Maximum[4]
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

Data from Description of Current Conditions (Geraghty & Miller, Inc. 1991a).

Notes:

1 Included 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 NP --North Primary Basin.
NS--North Secondary Basin.

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Table 5-8. Detected Volatile Organic Compound Concentrations in the Upper and Lower Aquifers Downgradient from the North Settling Lagoon RFI, Harrison Division - GMC.

Parameter	Concentration Units	UPPER AQUIFER W-3-N Phase I	UPPER AQUIFER W-4-N Phase I	LOWER AQUIFER HR-14 Phase I	LOWER AQUIFER HR-15 Phase I	LOWER AQUIFER DUP-14 Phase I
Carbon disulfide	ug/L	--	--	--	--	2.1
Tetrachloroethene	ug/L	41.4	1.6	--	--	--
Trichloroethene	ug/L	9.3	9.1	4.6	--	--
Vinyl chloride	ug/L	--	--	7.7	--	--

-- Not detected.
ug/L Micrograms per liter.
DUP-14 is the duplicate sample of HR-15 during Phase I.

Table 5-9. Detected Dissolved Metal Concentrations in the Upper and Lower Aquifers Downgradient from the North Settling Lagoon RFI, Harrison Division - GMC.

Parameter	Concentration Units	UPPER AQUIFER W-3-N Phase I	UPPER AQUIFER W-4-N Phase I	LOWER AQUIFER HR-14 Phase I	LOWER AQUIFER HR-15 Phase I	LOWER AQUIFER DUP-14 Phase I
Antimony, dissolved	ug/L	57.8 J	58.8	57.6	--	--
Barium, dissolved	ug/L	91.7	122	85.4	94.4	95.2
Cobalt, dissolved	ug/L	9.5	13.1	10.1	6.7	8
Lead, dissolved	ug/L	--	--	4.6	--	--
Nickel, dissolved	ug/L	NA	15.8	--	NA	NA

-- Not detected.
ug/L Micrograms per liter.
J Estimated.
NA - Not analyzed.
DUP-14 is the duplicate sample of HR-15 during Phase I.

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Table 5-10. Summary of South Settling Lagoon Analytical Results, South Settling Lagoon, Harrison Division - GMC.

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	713.0-7310	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
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

Data from the Description of Current Conditions (Geraghty & Miller, Inc. 1991a).

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 5-11. Detected Volatile Organic Compound Concentrations in the Upper Aquifer Upgradient and Downgradient from the South Settling Lagoon RFI, Harrison Division - GMC.

Parameter	Concentration Units	UPGRADIENT HR-17 Phase I	UPGRADIENT DUP-19 Phase I	UPGRADIENT HR-17 Phase II	UPGRADIENT DUP-35 Phase II	DOWNGRADIENT W-2-S Phase I	DOWNGRADIENT W-2-S Phase II	DOWNGRADIENT W-4-S Phase I	DOWNGRADIENT W-4-S Phase II
1,1,1-Trichloroethane	ug/L	2.6	--	--	--	--	1.2	2.5	2.7
Carbon disulfide	ug/L	--	--	--	1.7	--	--	--	1.6
Tetrachloroethene	ug/L	12.2	11.4	10.4	10.4	--	--	166	36.9
Trichloroethene	ug/L	3.1	3.1	4.9	4.9	4.6	3.9	25	12.8
Trichlorofluoromethane	ug/L	--	--	13.4	10.7	--	--	--	6.3

-- Not detected.
ug/L Micrograms per liter.
DUP-19 is the duplicate sample of HR-17 during Phase I.
DUP-35 is the duplicate sample of HR-17 during Phase II.

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Table 5-12. Detected Dissolved Metal Concentrations in the Upper Aquifer Upgradient and Downgradient from the South Settling Lagoon RFI, Harrison Division - GMC.

Parameter	Concentration Units	UPGRADIENT HR-17 Phase I	UPGRADIENT DUP-19 Phase I	DOWNGRADIENT W-2-S Phase I	DOWNGRADIENT W-4-S Phase I
Barium, dissolved	ug/L	118	116	176	74.1
Cobalt, dissolved	ug/L	--	5.6	7.7	7.6

-- Not detected.
ug/L Micrograms per liter.
DUP-19 is the duplicate sample of HR-17 during Phase I.

i:\harrison\95rfi\tables\tbl5-12.wb2

Table 5-13. Detected Volatile Organic Compound Concentrations in Soil Samples Collected at the West Tank Farm RFI, Harrison Division - GMC

Parameters	Units	WTF-GS7-15SL Phase I	WTF-GS8-15SL Phase I	DUP-02 Phase I	WTF-GS10-15SL Phase I	T10-BH01-16SL Phase II	DUP-27 Phase II
1,2-Dichloroethene (Total)	ug/kg	--	--	--	--	1320	530
2-Butanone	ug/kg	--	--	--	--	9940	--
Tetrachloroethene	ug/kg	--	75	1500	--	6200	4,260
Trichloroethene	ug/kg	--	--	--	--	1390	510

-- Not detected.
ug/kg Micrograms per kilogram.

i \harrison\95rfi\wtfslvoc wb2

Table 5-14. Detected Metals in Soil Samples Collected at the West Tank Farm RFI, Harrison Division - GMC.

Parameters	Units	WTF-GS7-15SL Phase I	WTF-GS8-15SL Phase I	DUP-02 Phase I	WTF-GS10-15SL Phase I
Aluminum	mg/kg	2720	2150	2690	3600
Arsenic	mg/kg	2.1 J	3.5 J	4 J	4.6 J
Barium	mg/kg	10.1	11.5	23.6	21.9
Cadmium	mg/kg	1.7 J	2.7 J	1.8 J	2.3 J
Calcium	mg/kg	118000 J	144000 J	125000 J	105000 J
Chromium	mg/kg	2.6 J	5.2 J	5.1 J	9 J
Cobalt	mg/kg	--	2.8	3.6	2.7
Copper	mg/kg	4.9	12.7	10.7	8.8
Iron	mg/kg	5870	8790	6340	6820
Lead	mg/kg	2.5 J	6 J	5.7 J	11.5 J
Magnesium	mg/kg	49100	42600	53000	49600
Manganese	mg/kg	169	175	298	234
Nickel	mg/kg	--	9.1	12.1	11.9
Potassium	mg/kg	418	490	404	601
Silver	mg/kg	1 J	0.65 J	--	--
Sodium	mg/kg	114	146	151	143
Vanadium	mg/kg	8	6.2	8.7	9.7
Zinc	mg/kg	18 J	30.9 J	40.6 J	32.9 J

-- Not detected.
J Estimated value.
mg\kg Milligrams per kilograms.

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Table 5-15. Detected Volatile Organic Compound Concentrations in the Upper Aquifer in the Vicinity of SWMU T12 and the West Tank Farm RFI, Harrison Division - GMC.

Parameter	Concentration Units	SWMU T12 DOWNGRADIENT HR-6 Phase I	WEST TANK FARM UPGRADIENT HR-1 Phase I	WEST TANK FARM UPGRADIENT DUP-13 Phase I	WEST TANK FARM DOWNGRADIENT W-1-S Phase I
1,1,1-Trichloroethane	ug/L	--	4.5	7.7	--
Carbon Disulfide	ug/L	--	3.9	--	--
Tetrachloroethene	ug/L	--	25.6	46.3	34.7
Trichloroethene	ug/L	4.4	55.8	101	5.2
Trichlorofluoromethane	ug/L	--	2	5	29.9
trans-1,2-Dichloroethene	ug/L	--	1.6	2.8	--

-- Not detected.
ug/L Micrograms per liter.
DUP-13 is the duplicate sample of HR-1 during Phase I.

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Table 5-16. Detected Dissolved Metal Concentrations in the Upper Aquifer in the Vicinity of SWMU T12 and the West Tank Farm RFI, Harrison Division - GMC.

		SWMU T12	WEST TANK FARM		
		DOWNGRADIENT	UPGRADIENT		DOWNGRADIENT
	Concentration	HR-6	HR-1	DUP-13	W-1-S
Parameter	Units	Phase I	Phase I	Phase I	Phase I
Antimony, dissolved	ug/L	NA	--	69 J	56.9 J
Barium, dissolved	ug/L	89.1	89.7	96.7	123 J
Cobalt, dissolved	ug/L	7.7	8.7	8	7.3 J
Copper, dissolved	ug/L	--	5.4	--	--
Lead, dissolved	ug/L	--	--	--	2J
Zinc, dissolved	ug/L	--	--	10.1	--

-- Not detected.
J Estimated.
NA - Not analyzed.
ug/L Micrograms per liter.
DUP-13 is the duplicate sample of HR-1 during Phase I.

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Table 5-17. Detected Volatile Organic Compound Concentrations in Soils at SWMU T12 RFI, Harrision Division - GMC.

Parameters	Units	T12-GS1-17SL Phase I	DUP-01 Phase I	T12-GS2-10SL Phase I
Ethylbenzene	ug/kg	6.1	8	--
Styrene	ug/kg	30	31	7.1

-- Not detected.
ug\kg Micrograms per kilograms.

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Table 5-18 . Detected Metals in Soils at SWMU T12 RFI
Harrision Division - GMC.

Parameters	Units	T12-GS1-17SL Phase I	DUP-01 Phase I	T12-GS2-10SL Phase I
Aluminum	mg/kg	1950 J	2000 J	8940 J
Antimony	mg/kg	48.4 J	56.3 J	32.5 J
Arsenic	mg/kg	1.5 J	1.8 J	4 J
Barium	mg/kg	9.6	9.1	139
Beryllium	mg/kg	0 .35 J	0.38 J	0.54
Cadmium	mg/kg	1.1 J	0.68 J	3.4
Calcium	mg/kg	174000	184000	71900
Chromium	mg/kg	--	--	11.2
Cobalt	mg/kg	18.5 J	20 J	23.3
Copper	mg/kg	5.1 J	6.4 J	22 J
Iron	mg/kg	4370 J	4400 J	14000 J
Lead	mg/kg	3.4 J	4 J	14.9 J
Magnesium	mg/kg	58700 J	85400 J	24400 J
Manganese	mg/kg	328 J	204 J	284 J
Sodium	mg/kg	202	254	282
Vanadium	mg/kg	6.2	7.8	25
Zinc	mg/kg	15.8	14.9	80.1

-- Not detected.
J Estimated value.
mg/kg Milligrams per kilogram.

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Table 5-19. Detected Volative Organic Compound Concentrations and Semivolatile Organic Compound Concentrations in Soil Samples Collected at SWMU T5/T6 RFI, Harrision Division - GMC.

Parameters	Units	T5/6-BH01-11SL Phase I	T5/6-BH01-12SL Phase I	DUP-06 Phase I	T5/6-BH02-12SL Phase I
VOCs			NA		
Acetone	ug/kg	280		--	110
Tetrachloroethene	ug/kg	33		55	32
SVOCs			NA		
bis(2-Ethylhexyl)phthalate	ug/kg		350	400	350

-- Not detected.
NA Not analyzed.
ug/kg Micrograms per kilograms.
VOCs Volatile Organic Compound Concentrations.
SVOCs Semivolatile Organic Compound Concentrations.

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Table 5-20. Detected Metals in Soil Samples Collected at SWMU T5/T6 RFI, Harrison Division - GMC.

Parameters	Units	T5/6-BH01-10SL Phase I	DUP-06 Phase I	T5/6-BH02-12SL Phase I
Aluminum	mg/kg	2930	6880	3210
Antimony	mg/kg	31.2	19.4	27.3
Arsenic	mg/kg	4.6	5	11
Barium	mg/kg	17.7	39.4	12.3
Beryllium	mg/kg	0.26 J	0.39	0.3 J
Cadmium	mg/kg	2.8 J	3.9	6.1 J
Calcium	mg/kg	123000	67900	131000
Chromium	mg/kg	6.9	10.9	8.8
Cobalt	mg/kg	10.3 J	9.8	10.6 J
Copper	mg/kg	7.3	17.3	7.4
Iron	mg/kg	7650 J	10800 J	16100 J
Lead	mg/kg	4.2 J	15.1 J	4.2 J
Magnesium	mg/kg	51300	28600	40000
Manganese	mg/kg	246 J	344 J	469 J
Nickel	mg/kg	7.9	13.2	8.4
Potassium	mg/kg	632	898	592
Sodium	mg/kg	207	268	173
Vanadium	mg/kg	9.1	18.3	13.7
Zinc	mg/kg	31.3	70.2	28.1

J Estimated value.
mg/kg Milligrams per kilogram.

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Table 5-21. Detected Volatile Organic Compounds and Semivolatile Organic Compounds in Soils Collected at SWMU T11 RFI, Harrison Division - GMC.

Parameters	Units	T11-BH01-02SL Phase I	DUP-08 Phase I	T11-BH01-16S Phase I	T11-BH02-02SL Phase I	T11-BH02-16SL Phase I	T11-BH03-02SL Phase I	T11-BH03-16SL Phase I
VOCs								
Acetone	ug/kg	1800	1800	1400 J	--	1400 J	8900 J	710 J
Tetrachloroethene	ug/kg	66	120	41	--	--	110	38 J
Toluene	ug/kg	--	--	5.8	--	--	--	--
SVOCs								
2-Methylnaphthalene	ug/kg	--	--	--	7300	--	--	--
Bis(2-ethylhexyl)Phthalate	ug/kg	550	--	580	--	420	--	--
Naphthalene	ug/kg	--	--	--	7500	--	--	--

-- Not detected.
J Estimated value.
ug\kg Micrograms per kilogram.
VOCs Volatile Organic Compounds.
SVOCs Semivolatile Organic Compounds.

i \harrison\95rfi\tables\tbl5-21 wb2

Table 5-22. Detected Volatile Organic Compound Concentrations in the Upper and Lower Aquifers in the Vicinity of the Fill Area, South Tank Farm, T11, and the Waste Pile/Staging Area SWMUs RFI, Harrison Division - GMC.

Parameter	Concentration Units	UPPER AQUIFER GM-19S Phase I	GM-19S Phase II	WEST Phase II	LOWER AQUIFER GM-19D Phase I	DUP-16 Phase I	GM-19D Phase II
1,1,1-Trichloroethane	ug/L	90.1	47.8	196	6.6	8	3.3
1,1-Dichloroethane	ug/L	16.7	20.8	153	2.4	--	--
1,1-Dichloroethene	ug/L	2.5	3.2	1.4	1.7	--	--
Chloroethane	ug/L	--	--	32	--	--	--
Chloroform	ug/L	--	1.2	--	--	--	--
Tetrachloroethene	ug/L	21.1	166	52.5	--	--	--
Trichloroethene	ug/L	157	--	62.4	80.1	91.6	56.7
Vinyl chloride	ug/L	--	--	--	25.8	25.3	37.2
Xylenes, total	ug/L	--	--	--	2.4	2.5	--
trans-1,2-Dichloroethene	ug/L	3.2	3.4	1.5	--	--	--

-- Not detected.
ug/L Micrograms per liter.
DUP-16 is the duplicate sample of GM-19D during Phase I.

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Table 5-23. Detected Total and Dissolved Metals and Cyanide Concentrations in the Upper and Lower Aquifers in the Vicinity of the Fill Area, South Tank Farm, T11, and the Waste Pile/Staging Area SWMUs RFI, Harrison Division - GMC.

Parameter	Concentration Units	UPPER AQUIFER GM-19S Phase I	LOWER AQUIFER GM-19D Phase I	LOWER AQUIFER DUP-16 Phase I
Cyanide	mg/L	0.008	--	--
Barium, dissolved	ug/L	87.7	113 J	129
Cobalt, dissolved	ug/L	--	11.1 J	12.1 J
Nickel, dissolved	ug/L	--	14.4 J	16

-- Not detected.
J Estimated.
DUP-16 is the duplicate sample of GM-19D during Phase I.
ug/L Micrograms per liter.
mg/L Milligrams per liter.

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Table 5-24. Detected VOCs, SVOCs, and PCBs in Soils Collected at the Waste Pile/Staging Area, Harrison Divison - GMC.

Parameters	Units	WPSA-BH01-02SL Phase I	DUP-07 Phase I	WPSA-BH01-08SL Phase I	WPSA-BH02-02SL Phase I	WPSA-BH02-08SL Phase I
VOCs						
1,1,1-Trichloroethane	ug/kg	--	--	180	66	--
1,1-Dichloroethane	ug/kg	--	--	--	--	--
1,2-Dichloroethene (total)	ug/kg	--	--	--	--	--
2-Butanone	ug/kg	--	--	--	--	--
Acetone	ug/kg	--	--	3400 J	1900	--
Benzene	ug/kg	--	--	--	--	--
Carbon disulfide	ug/kg	--	--	--	--	--
Ethylbenzene	ug/kg	--	--	65	--	--
Tetrachloroethene	ug/kg	200	180	84	54	130
Toluene	ug/kg	--	36	52	--	--
Trichloroethene	ug/kg	--	--	--	--	--
Xylenes, total	ug/kg	--	--	130	--	--
SVOCs						
Benzo(a)pyrene	ug/kg	--	--	--	--	--
Benzo(b)fluoranthene(1)	ug/kg	--	--	--	--	--
bis(2-Ethylhexyl)phthalate	ug/kg	--	--	--	390	--
Butyl benzyl phthalate	ug/kg	28000	22000	--	--	--
Chrysene	ug/kg	--	--	--	--	--
Fluoranthene	ug/kg	--	--	--	--	--
Phenanthrene	ug/kg	--	--	--	--	--
Pyrene	ug/kg	--	--	--	--	--
PCBs						
Aroclor-1242	mg/kg	--	--	--	--	--
Aroclor-1260	mg/kg	--	--	--	--	--

VOCs Volatile Organic Compounds.
SVOCs Semivolatile Organic Compounds.
PCBs Polychlorinated Biphenyls.
ug/kg Micrograms per kilogram.
mg/kg Milligrams per kilogram.
(1) Represents a total of benzo(b)fluoranthene and benzo(k)fluoranthene.

Table 5-24. Detected VOCs, SVOCs, and PCBs in Soils Collected at the Waste Pile/Staging Area, Harrison Divison - GMC.

Parameters	Units	WPSA-BH03-02SL Phase I	WPSA-BH03-08SL Phase I	WPSA-BH04-09SL Phase II	WPSA-BH04-21SL Phase II	WPSA-BH05-02SL Phase II
VOCs						
1,1,1-Trichloroethane	ug/kg	130	2100	--	--	--
1,1-Dichloroethane	ug/kg	3000 J	--	--	--	--
1,2-Dichloroethene (total)	ug/kg	--	--	--	--	--
2-Butanone	ug/kg	--	--	--	--	--
Acetone	ug/kg	12000 J	--	--	--	--
Benzene	ug/kg	25	--	--	--	--
Carbon disulfide	ug/kg	--	--	--	--	--
Ethylbenzene	ug/kg	46	1600	--	--	--
Tetrachloroethene	ug/kg	87	--	--	5.7	--
Toluene	ug/kg	520	16000	7.6	--	--
Trichloroethene	ug/kg	--	--	--	--	--
Xylenes, total	ug/kg	230	19000	--	--	--
SVOCs						
Benzo(a)pyrene	ug/kg	--	47000	--	--	--
Benzo(b)fluoranthene(1)	ug/kg	--	90000	--	--	--
bis(2-Ethylhexyl)phthalate	ug/kg	--	--	--	--	1900
Butyl benzyl phthalate	ug/kg	--	--	--	--	--
Chrysene	ug/kg	--	44000	--	--	--
Fluoranthene	ug/kg	--	86000	--	--	--
Phenanthrene	ug/kg	--	84000	--	--	--
Pyrene	ug/kg	--	83000	--	--	--
PCBs						
Aroclor-1242	mg/kg	2.5	--	--	--	--
Aroclor-1260	mg/kg	0.6	--	--	--	--

VOCs Volatile Organic Compounds.
SVOCs Semivolatile Organic Compounds.
PCBs Polychlorinated Biphenyls.
ug/kg Micrograms per kilogram.
mg/kg Milligrams per kilogram.
(1) Represents a total of benzo(b)fluoranthene and benzo(k)fluoranthene.

Table 5-24. Detected VOCs, SVOCs, and PCBs in Soils Collected at the Waste Pile/Staging Area, Harrison Divison - GMC.

Parameters	Units	WPSA-BH05-10SL Phase II	WPSA-BH05-22SL Phase II	DUP-25 Phase II	WPSA-BH06-02SL Phase II	WPSA-BH06-06SL Phase II
VOCs						
1,1,1-Trichloroethane	ug/kg	--	--	--	--	--
1,1-Dichloroethane	ug/kg	--	--	--	--	--
1,2-Dichloroethene (total)	ug/kg	--	--	--	--	--
2-Butanone	ug/kg	--	--	--	--	--
Acetone	ug/kg	--	--	--	297	--
Benzene	ug/kg	--	--	--	12	--
Carbon disulfide	ug/kg	--	--	--	27.7	--
Ethylbenzene	ug/kg	--	--	--	--	--
Tetrachloroethene	ug/kg	--	--	--	--	--
Toluene	ug/kg	--	--	--	15.9	--
Trichloroethene	ug/kg	--	--	--	--	--
Xylenes, total	ug/kg	--	--	--	49.4	332
SVOCs						
Benzo(a)pyrene	ug/kg	--	--	--	--	--
Benzo(b)fluoranthene(1)	ug/kg	--	--	--	6920	--
bis(2-Ethylhexyl)phthalate	ug/kg	710	409	--	--	--
Butyl benzyl phthalate	ug/kg	--	--	--	--	--
Chrysene	ug/kg	--	--	--	--	--
Fluoranthene	ug/kg	--	--	--	5650	--
Phenanthrene	ug/kg	--	--	--	5450	8460
Pyrene	ug/kg	--	--	--	5180	--
PCBs						
Aroclor-1242	mg/kg	--	--	--	--	--
Aroclor-1260	mg/kg	--	--	--	--	--

VOCs Volatile Organic Compounds.
SVOCs Semivolatile Organic Compounds.
PCBs Polychlorinated Biphenyls.
ug/kg Micrograms per kilogram.
mg/kg Milligrams per kilogram.
(1) Represents a total of benzo(b)fluoranthene and benzo(k)fluoranthene.

Table 5-24. Detected VOCs, SVOCs, and PCBs in Soils Collected at the Waste Pile/Staging Area, Harrison Divison - GMC.

Parameters	Units	WPSA-BH06-14SL Phase II	WPSA-BH07-02SL Phase II	WPSA-BH07-06SL Phase II	DUP-26 Phase II	WPSA-BH07-22SL Phase II
VOCs						
1,1,1-Trichloroethane	ug/kg	--	--	549	1200	--
1,1-Dichloroethane	ug/kg	--	187	141	523	--
1,2-Dichloroethene (total)	ug/kg	--	1060	1090	4250	--
2-Butanone	ug/kg	--	--	2470 J	3430 J	--
Acetone	ug/kg	--	--	1950	3630	--
Benzene	ug/kg	--	--	--	--	--
Carbon disulfide	ug/kg	--	--	--	--	--
Ethylbenzene	ug/kg	--	148	543	930	--
Tetrachloroethene	ug/kg	--	237	209	395	--
Toluene	ug/kg	--	116	128	238	--
Trichloroethene	ug/kg	--	120	142	322	--
Xylenes, total	ug/kg	--	--	--	--	--
SVOCs						
Benzo(a)pyrene	ug/kg	--	--	--	--	--
Benzo(b)fluoranthene(1)	ug/kg	--	--	--	--	--
bis(2-Ethylhexyl)phthalate	ug/kg	--	--	--	--	--
Butyl benzyl phthalate	ug/kg	--	--	--	--	--
Chrysene	ug/kg	--	--	--	--	--
Fluoranthene	ug/kg	--	--	--	--	--
Phenanthrene	ug/kg	--	--	--	--	--
Pyrene	ug/kg	--	--	--	--	--
PCBs						
Aroclor-1242	mg/kg	--	--	--	--	--
Aroclor-1260	mg/kg	--	--	--	--	--

VOCs Volatile Organic Compounds.
SVOCs Semivolatile Organic Compounds.
PCBs Polychlorinated Biphenyls.
ug/kg Micrograms per kilogram.
mg/kg Milligrams per kilogram.
(1) Represents a total of benzo(b)fluoranthene and benzo(k)fluoranthene.

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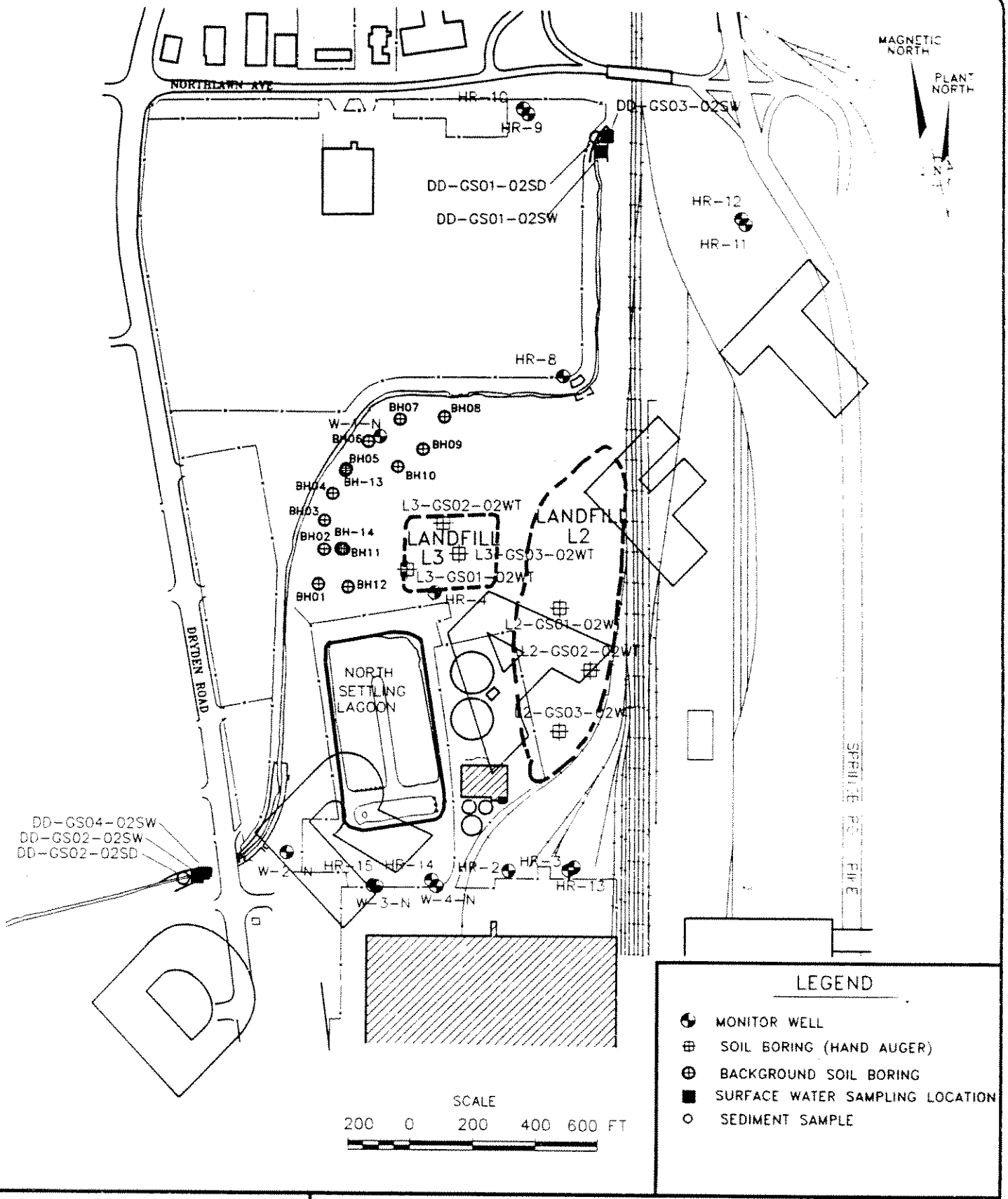


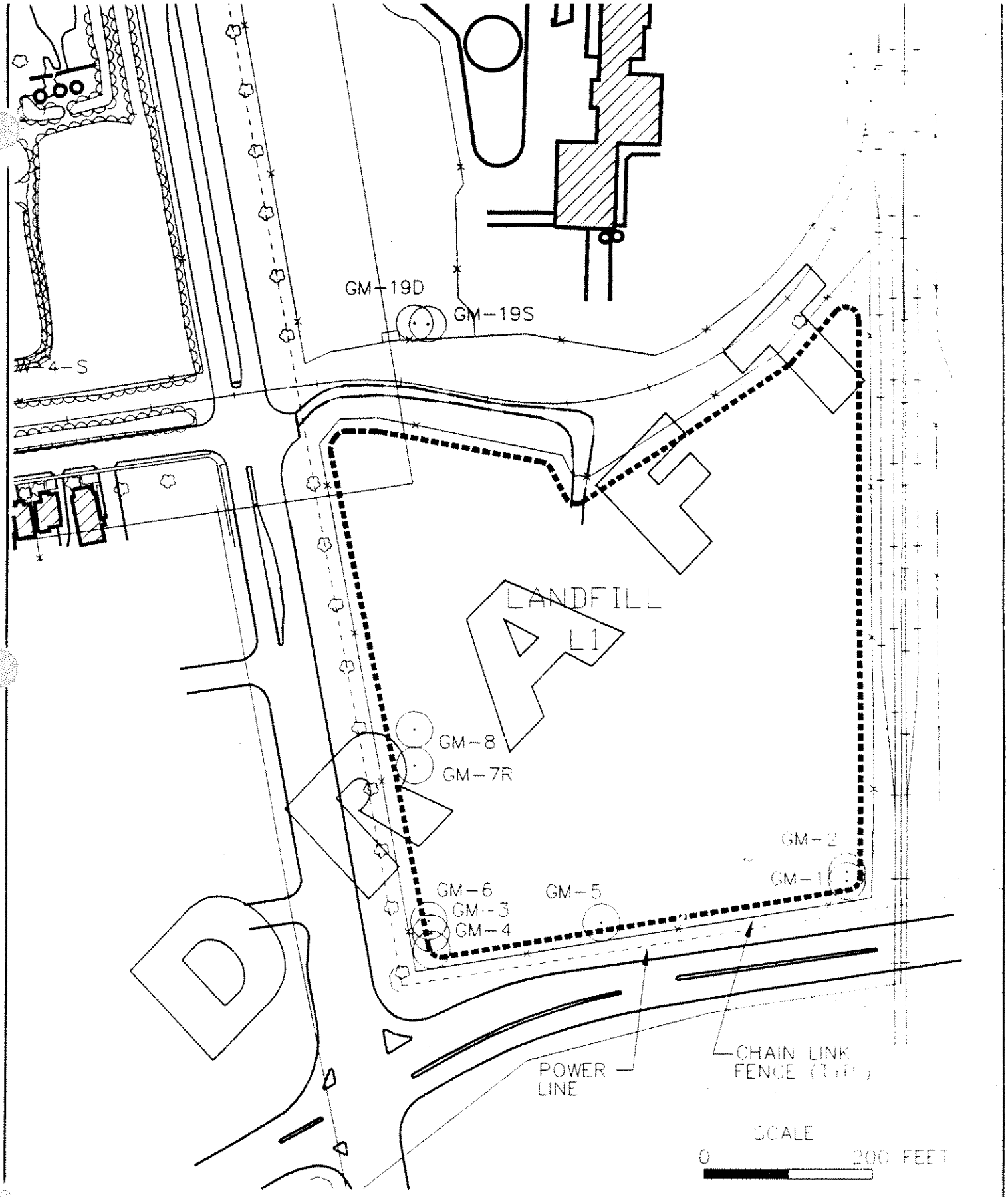
GERAGHTY & MILLER, INC.
Environmental Services

RFI SAMPLE LOCATIONS IN THE NORTH PART OF THE HARRISON SITE

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
4-5

DRAFT | APPROVED: J.R. | CHECKED: J.R. | DRAWING: PISDN | FILE NO: SITE-NCS | PRJCT NO: OH01918 | DWG: 25JAN93



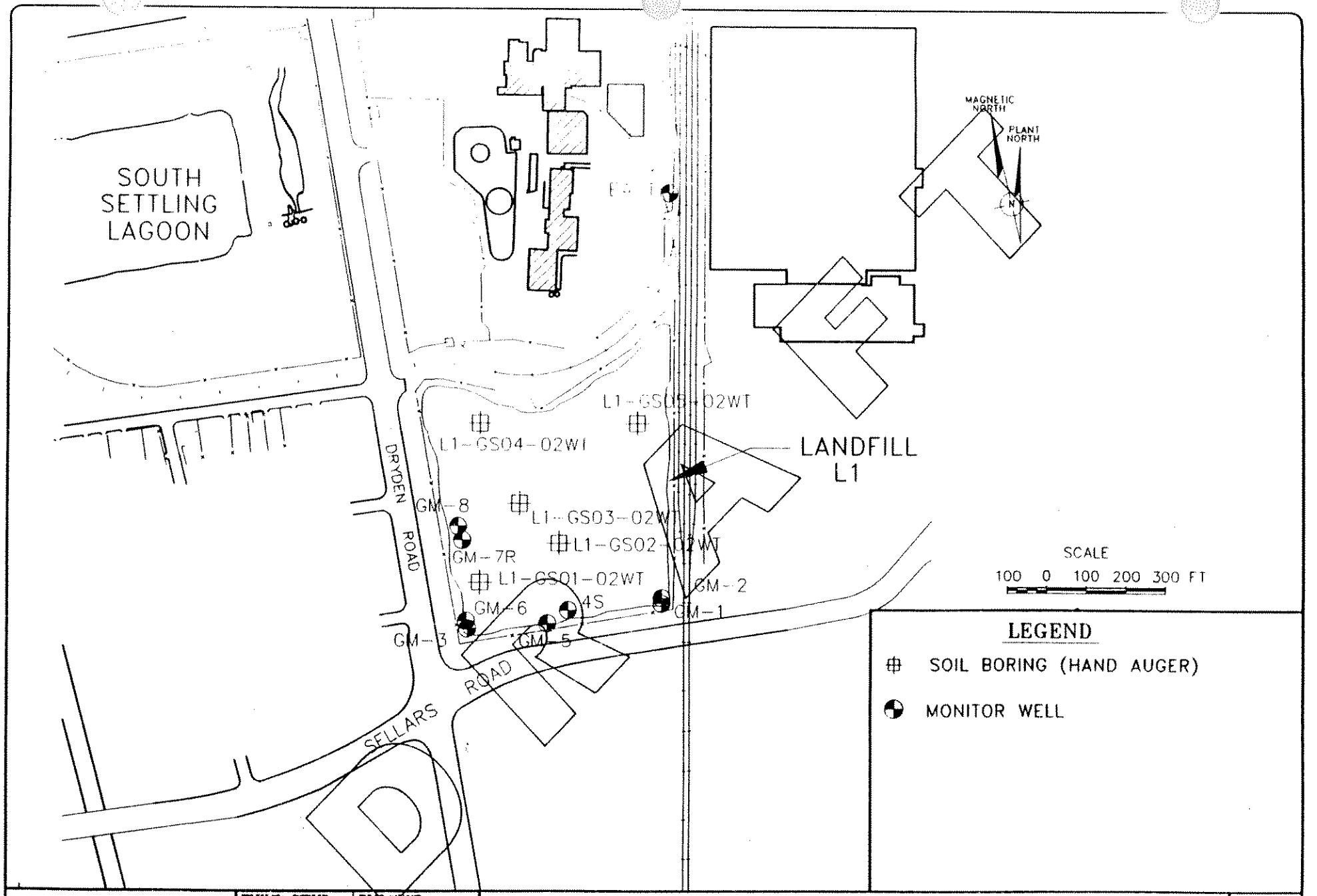
GERAGHTY & MILLER, INC.
Environmental Services

PROJECT NO: 0H01817	FILE NO: HARVDXF
DRAWING: L1	PLOT SIZE: -
DRAFTED BY: RTS	DATE: -
CHECKED BY: B.B	DATE: -
APPROVED BY: B.B	DATE: -
DATE REVISED:	

EM31 SURVEY AT LANDFILL L1

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE 5-1



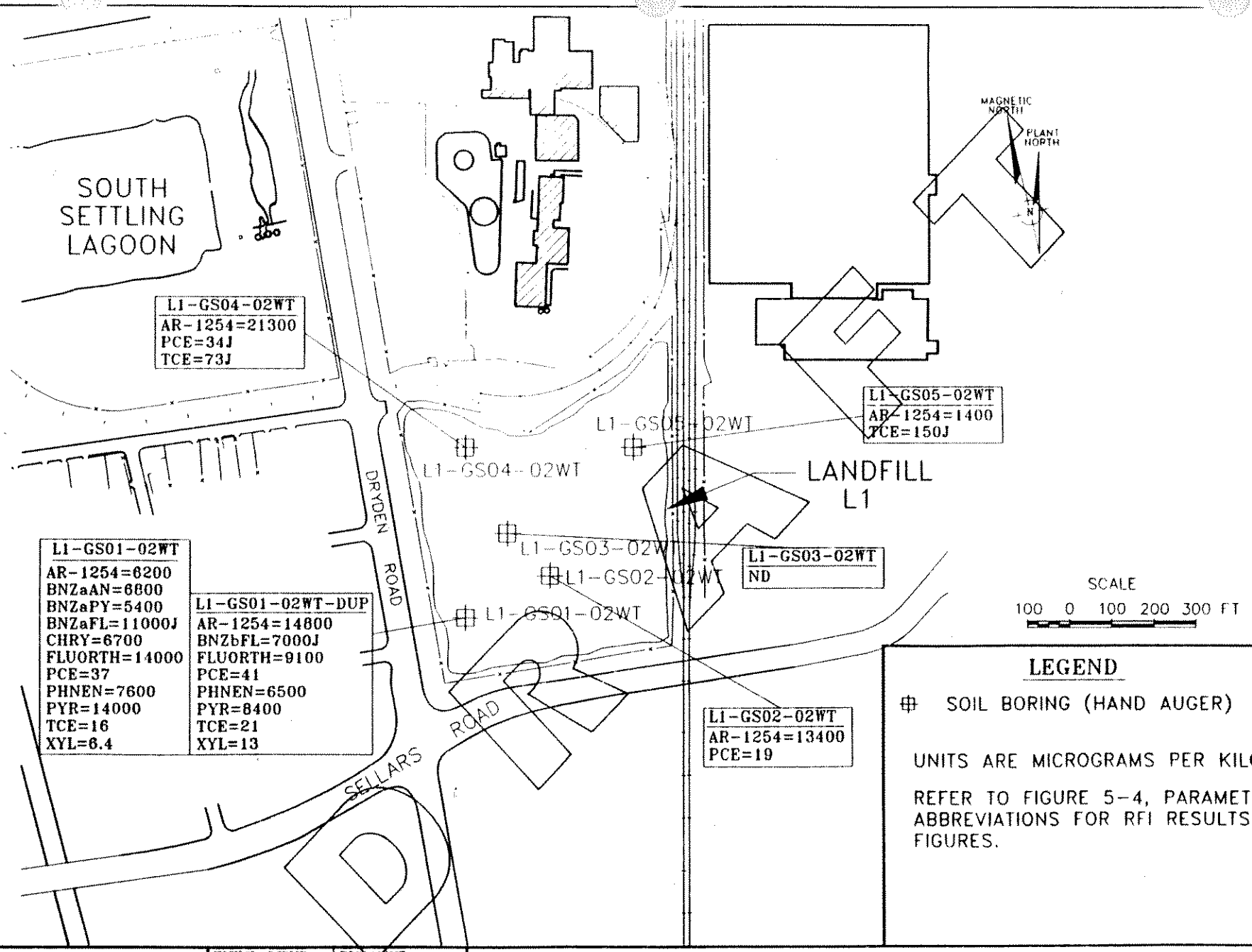
GERAGHTY & MILLER, INC.
Environmental Services

PROJECT NO.: OH0019.021	FILE NO. HARLSHP
DRAWING: L1-TV-2	PLOT SIZE: -
DRAFTED BY: RTS	DATE: 2/26/93
CHECKED BY: HLB	DATE:
APPROVED BY: JR	DATE: -

RFI SAMPLE LOCATIONS AT LANDFILL L1

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE 5-2



GERAGHTY & MILLER, INC.
Environmental Services

PROJECT NO.: DH0016.021 | FILE NO.:
DRAWING: L1-TV-2 | PLOT SIZE: -
DRAFTED BY: KTS | DATE: 22DEC93
CHECKED BY: K.S. | DATE:
APPROVED BY: J.R. | DATE: -

WASTE ORGANIC ANALYTICAL RESULTS FOR LANDFILL L1

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE 5-3

Semivolatile Organic Carbons (SVOCs) and Polychlorinated Biphenyls (PCBs)

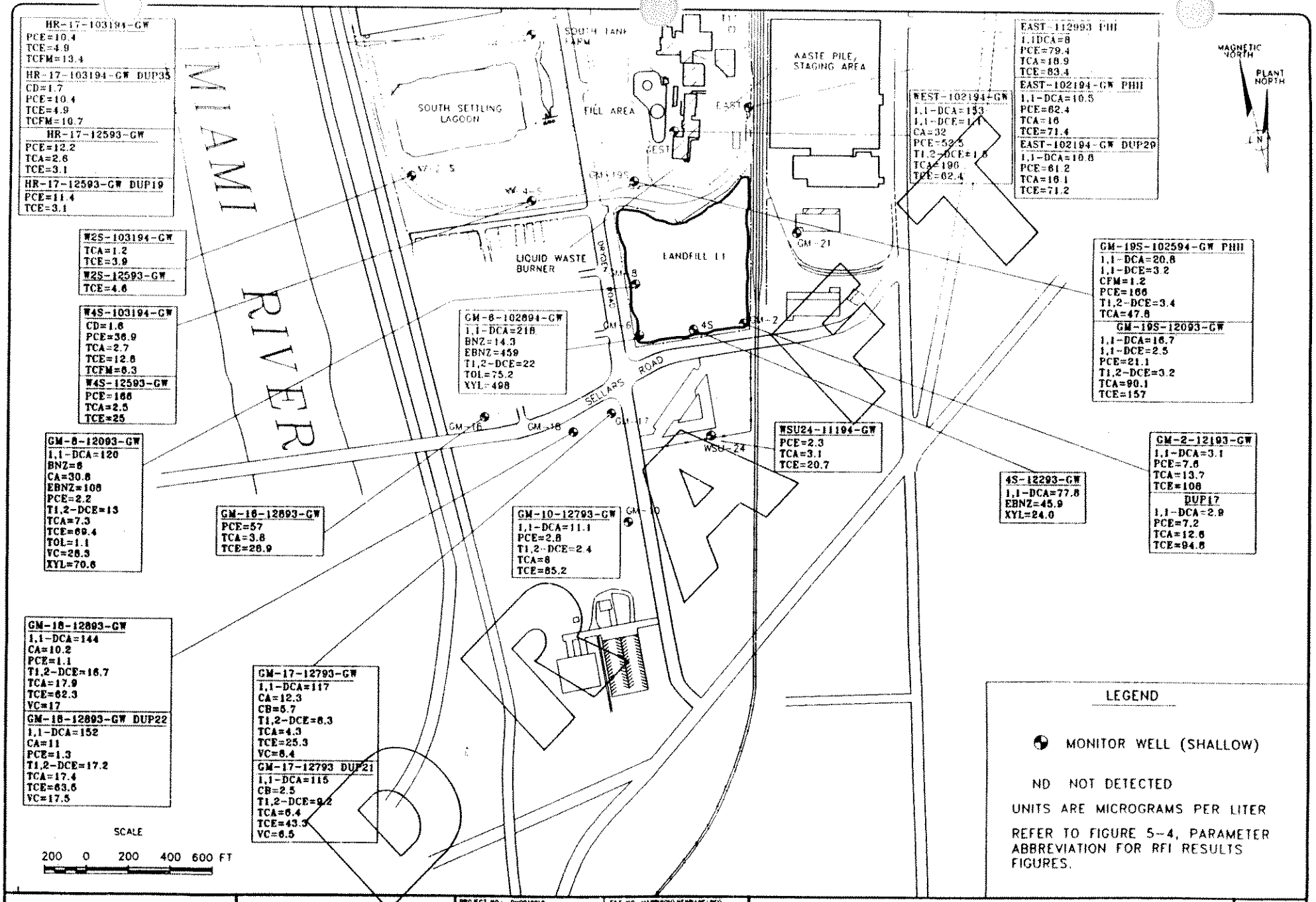
AR-1242 = Aroclor-1242
AR-1254 = Aroclor-1254
AR-1260 = Aroclor-1260
b2EPHT = bis(2-Ethylhexyl)phthalate
BBZPHT = Butylbenzylphthalate
BNZaAN = Benzo(a)Anthracene
BNZaPY = Benzo(a)pyrene
BNZbFL = Benzo(b)fluoranthene (Represents total concentration of Benzo (b) fluoranthene and Benzo (k) fluoranthene)
CHRY = Chrysene
FLUORTH = Fluoranthene
2-MTNPEN = 2-Methylnaphthalene
PHNEN = Phenanthrene
PYR = Pyrene

Volatile Organic Carbons (VOCs)

ACE = Acetone
BNZ = Benzene
CA = Chloroethane
CB = Chlorobenzene
CD = Carbon disulfide
CFM = Chloroform
1,1-DCA = 1,1-Dichloroethane
1,2-DCE = 1,2-Dichloroethene (total)
1,1-DCE = 1,1-Dichloroethene
C1,2-DCE = cis-1,2-Dichloroethene
T1,2-DCE = trans-1,2-Dichloroethene
EBNZ = Ethylbenzene
MEK = 2-Butanone
PCE = Tetrachloroethene
STY = Styrene
TCA = 1,1,1-Trichloroethane
TCE = Trichloroethene
TCFM = Trichlorofluoromethane
TOL = Toluene
VC = Vinyl Chloride
XYL = Xylene (total)

Inorganics (Metals)

Sb = Antimony
As = Arsenic
Ba = Barium
Be = Beryllium
Cd = Cadmium
Cr = Chromium
Co = Cobalt
Cu = Copper
CN = Cyanide
Hg = Mercury
Pb = Lead
Ni = Nickel
Se = Selenium
Ag = Silver
Tl = Thallium
V = Vanadium
Zn = Zinc



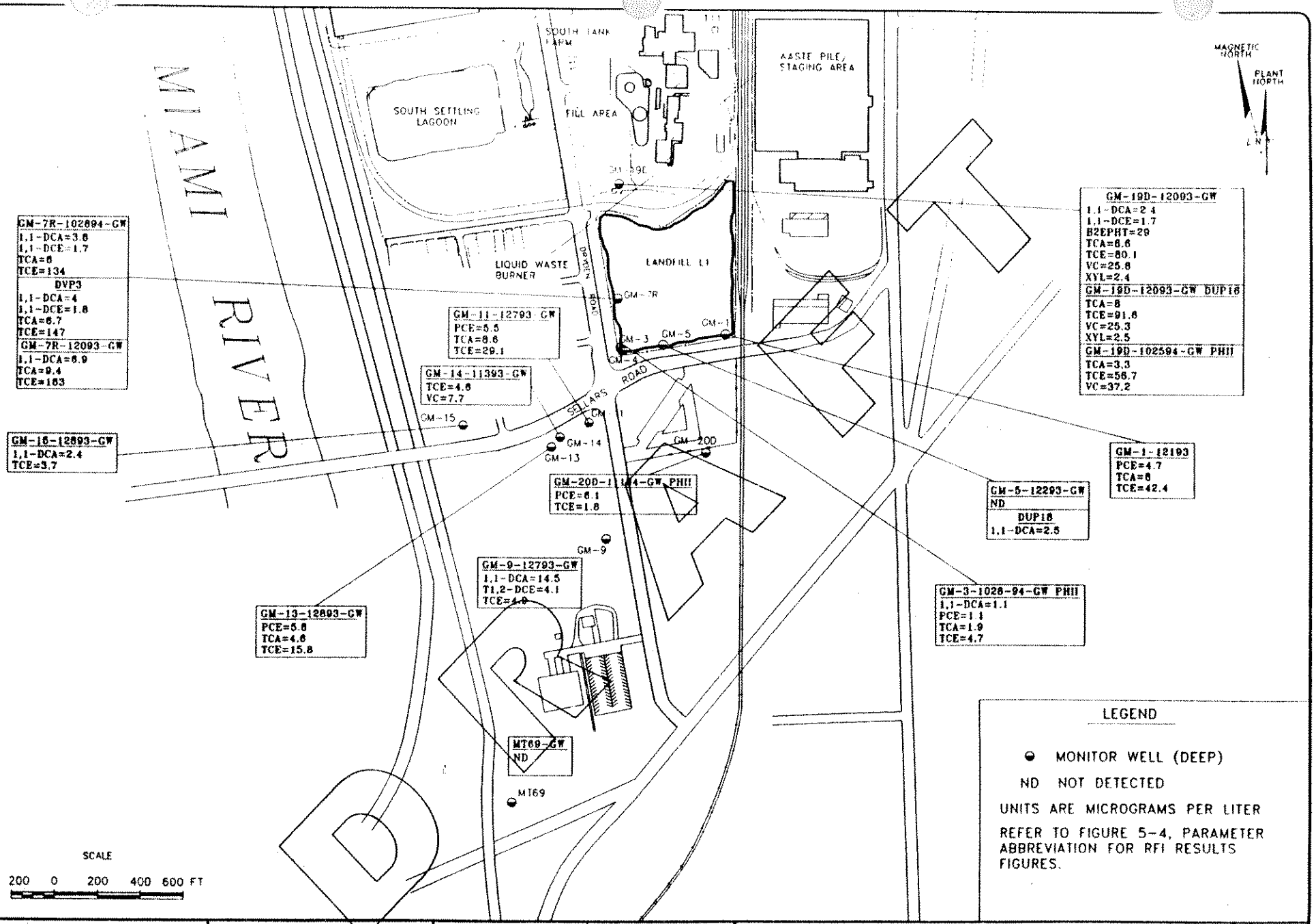
GERAGHTY & MILLER, INC.
Environmental Services

PROJECT NO.: DH0019018	FILE NO: HARRISON\REMEDSC\RFI\
DRAWING: NFIS2UTH	PLOT SIZE: FIT
DRAFTED BY: MAJ	DATE: 11APR95
CHECKED BY: JJR	DATE: 11APR95
APPROVED BY: JJR	DATE: 12APR95

GROUNDWATER ORGANIC ANALYTICAL RESULTS FOR SHALLOW MONITOR WELLS LOCATED IN THE SOUTHERN PART OF THE HARRISON SITE AND AREA SOUTH OF SELLARS ROAD

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE 5-5



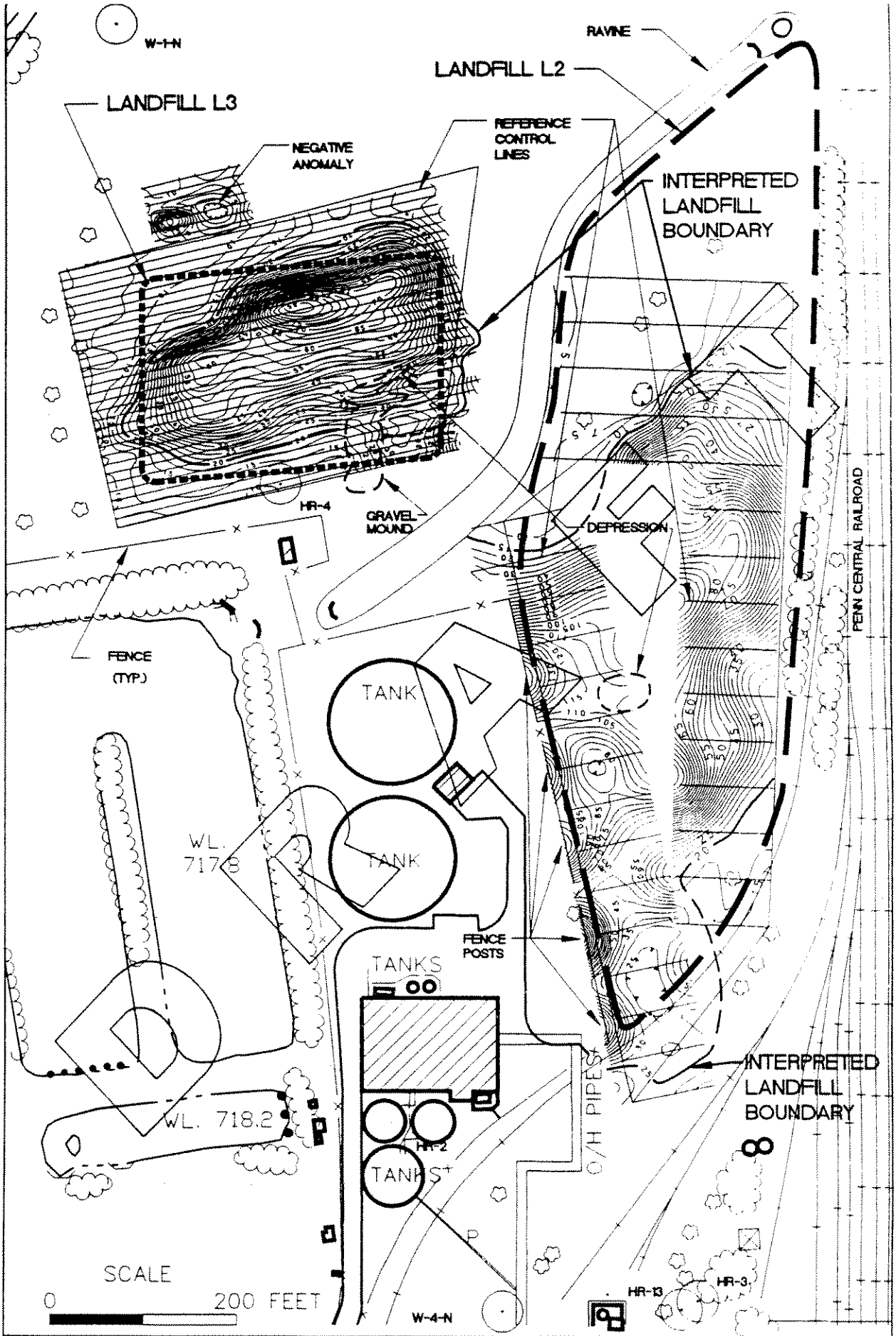
GERAGHTY & MILLER, INC.
Environmental Services

PROJECT NO.: DH0019018	FILE NO: HARRISON\WEMBASE\RFI\
DRAWING: RFISOUTH	PLOT SIZE: FIT
DRAFTED BY: MAJ	DATE: 11APR95
CHECKED BY: JR	DATE: 11APR95
APPROVED BY: JR	DATE: 12APR95

GROUNDWATER ORGANIC ANALYTICAL RESULTS FOR DEEP MONITOR WELLS LOCATED IN THE SOUTHERN PART OF THE HARRISON SITE AND AREA SOUTH OF SELLARS ROAD

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MOPAR [illegible]

FIGURE 5-6



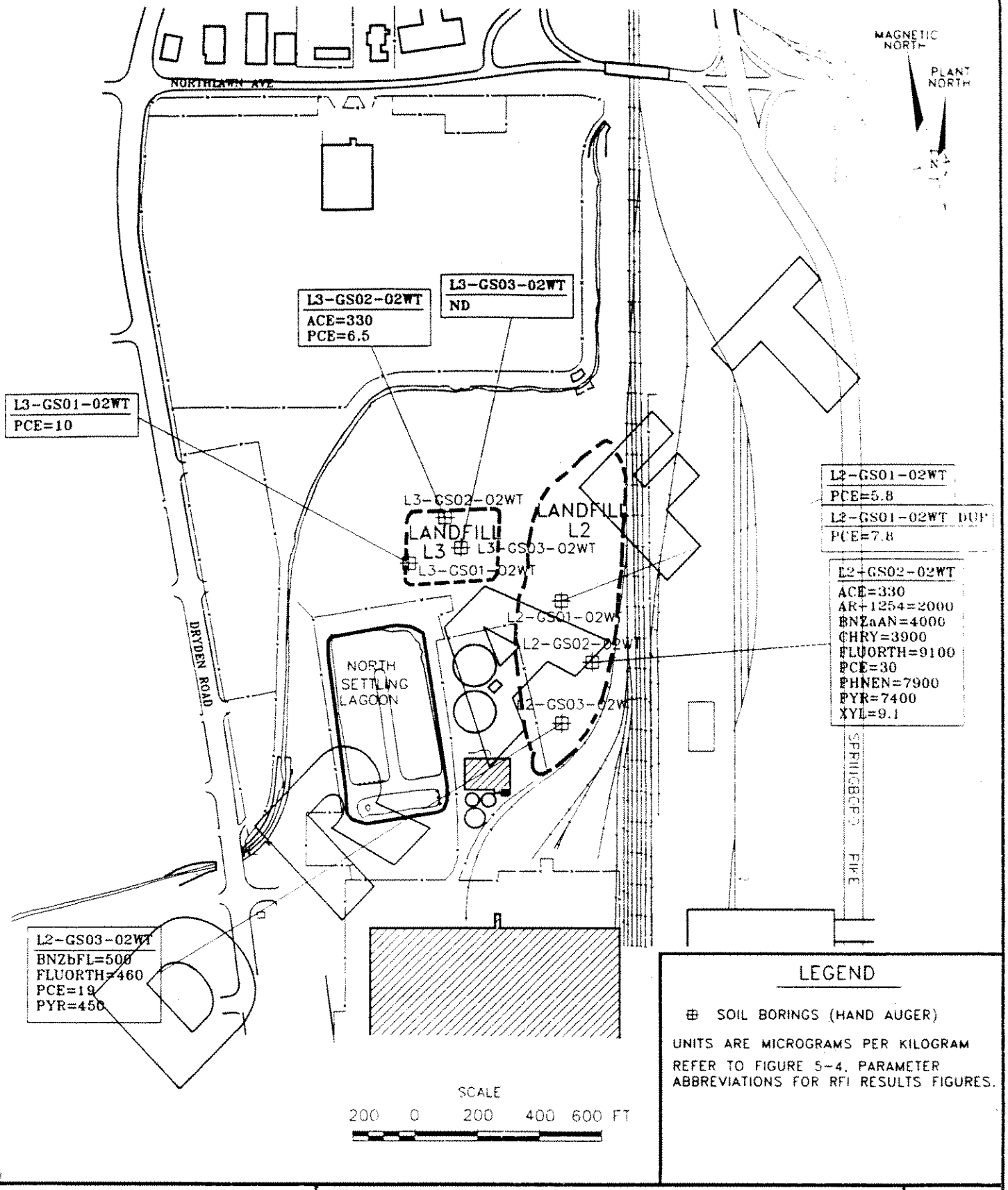
GERAGHTY & MILLER, INC.
Environmental Services

DRAWING CONFIDENTIAL

TERRAIN CONDUCTIVITY MAP. LANDFILLS L2 AND L3

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION

FIGURE 5-7



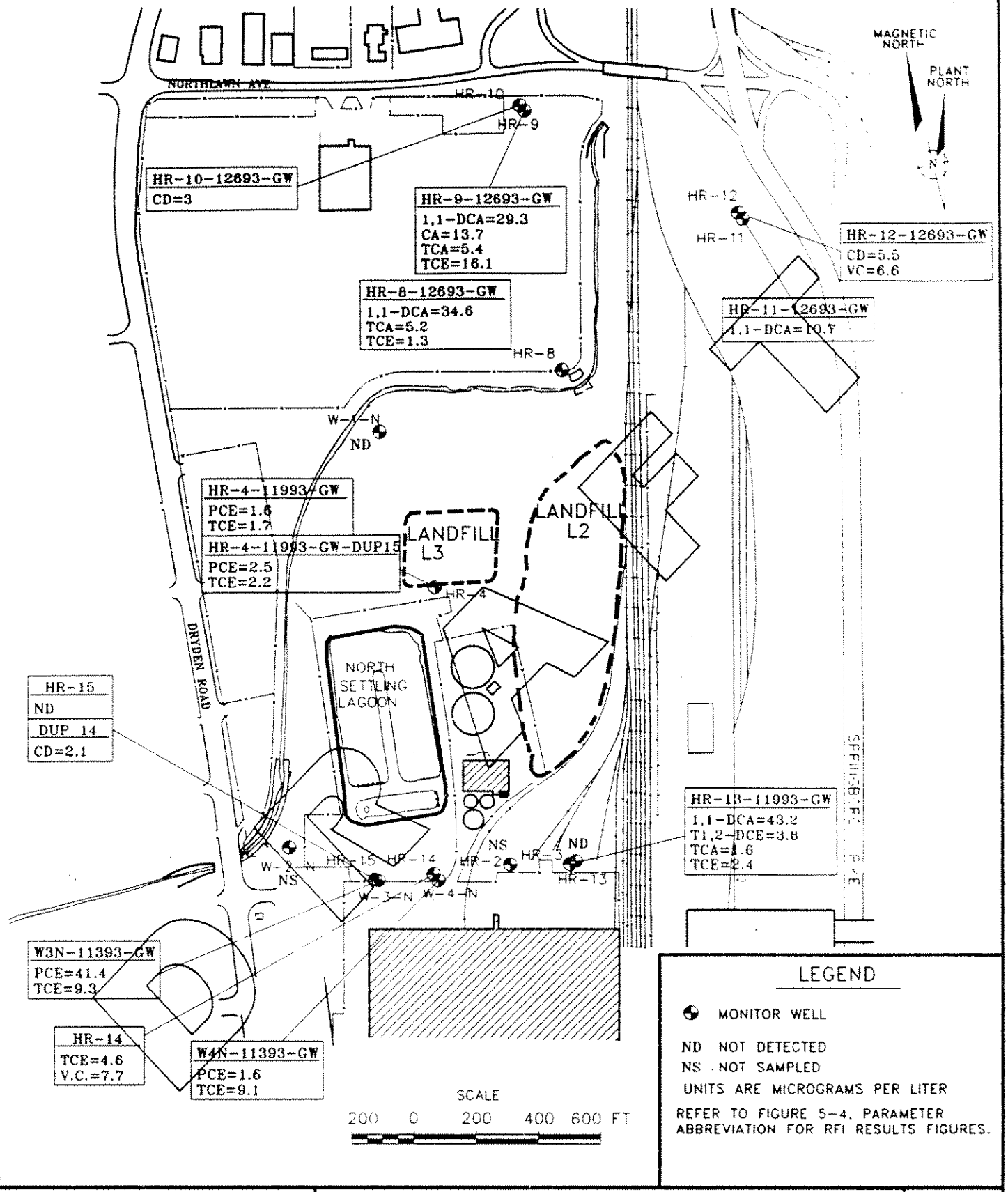
GERAGHTY & MILLER, INC.
Environmental Services

WASTE ORGANIC ANALYTICAL RESULTS FOR LANDFILLS L2 AND L3

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE
5-8

DWG. NO. 25JAN93 | PROJECT NO. OH0191B | FILE NO. SITE-NCS | DRAWING: HARRISON | CHECKED: J.R. | APPROVED: J.R. | DRAFTED: S



GERAGHTY & MILLER, INC.
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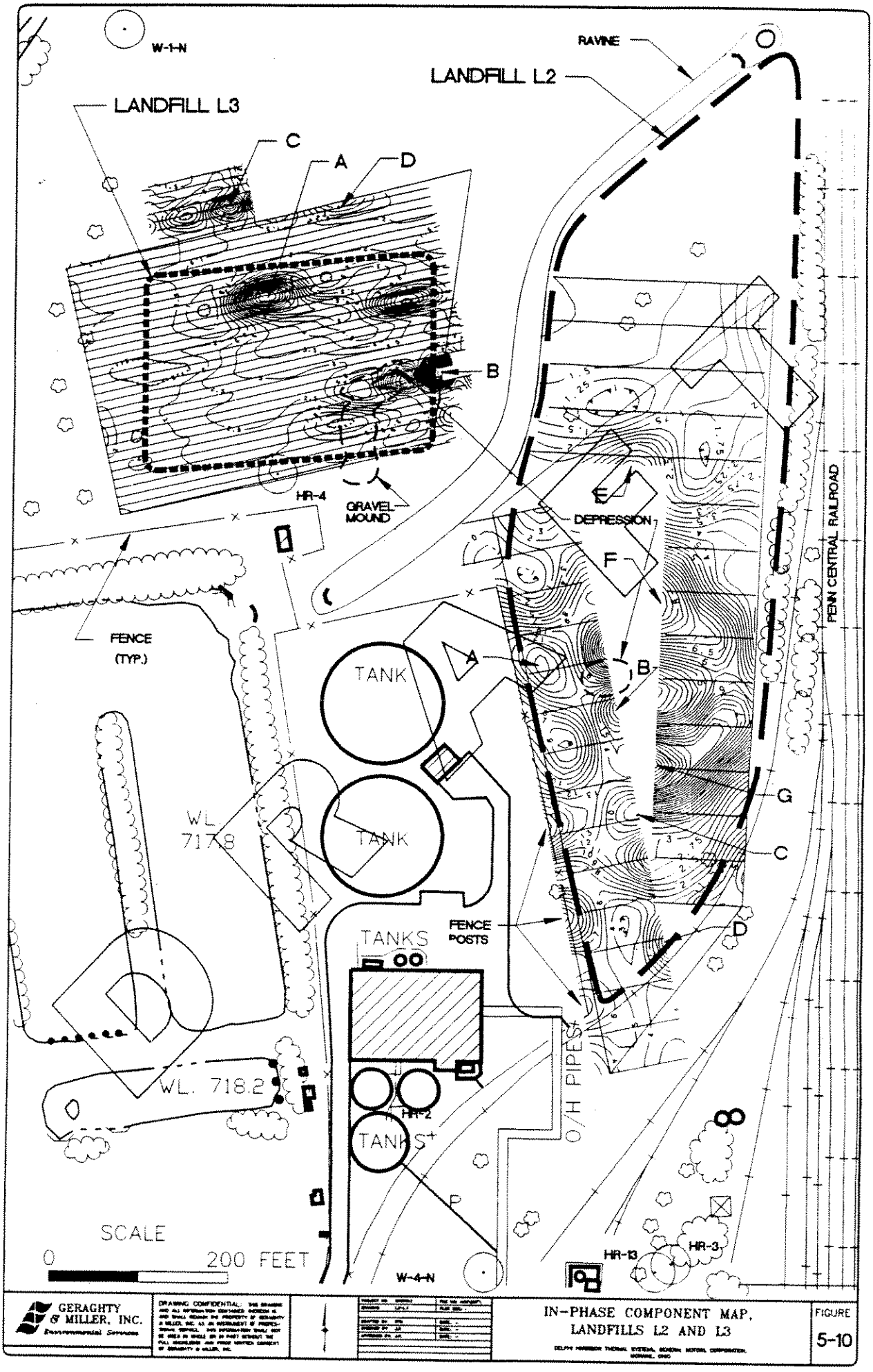
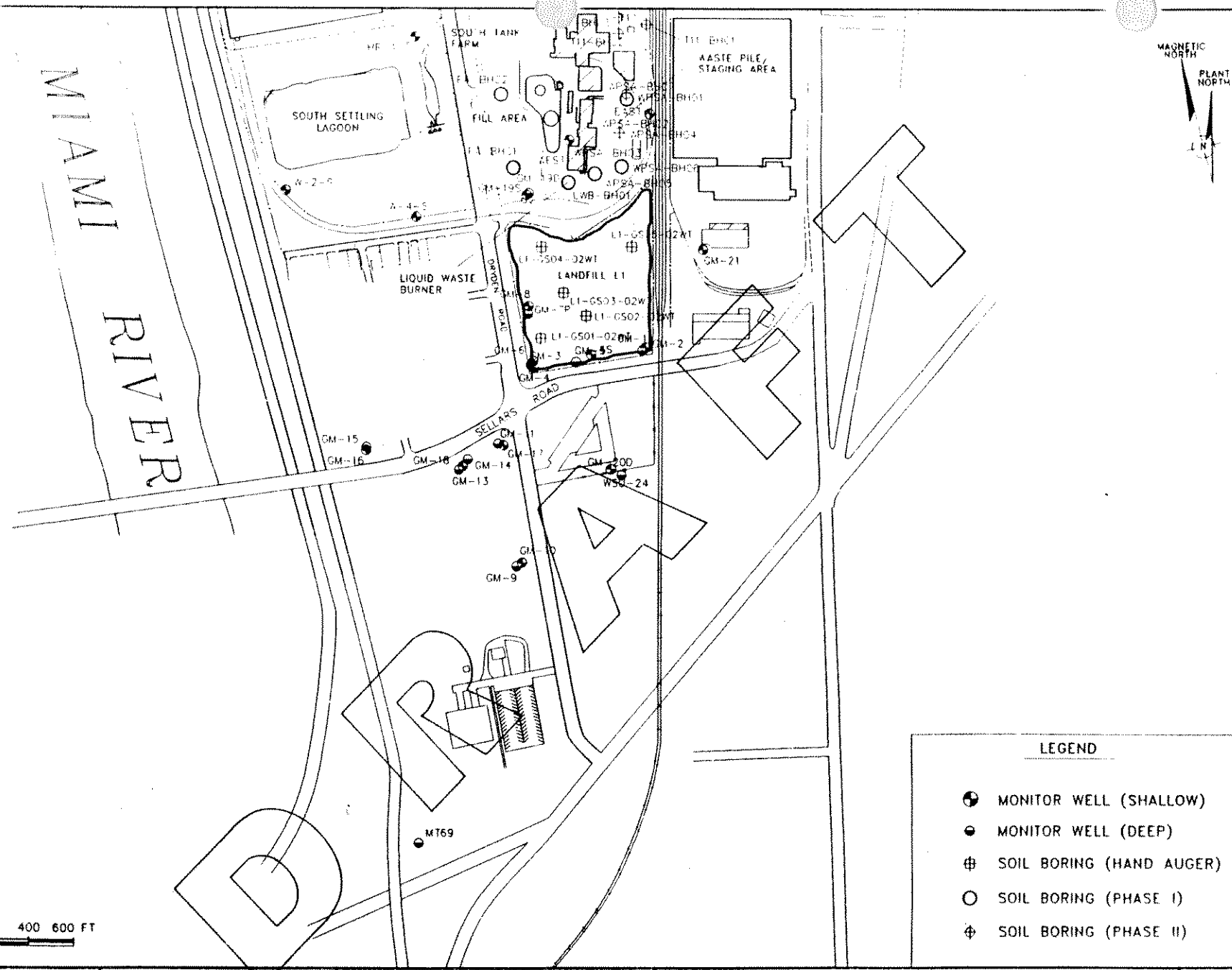
GROUNDWATER ORGANIC ANALYTICAL RESULTS FOR MONITOR WELLS LOCATED IN THE NORTHERN PART OF THE HARRISON SITE

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE 5-9

DWG. 25JAN93 | PROJ NO. OHD1918 | FILE NO. SITE-NCS | DRAWN: HARRISON | CHECKED: J.R. | APPROVED: J.R. | DRAFTS


W-1-N
RAVINE
LANDFILL L2
LANDFILL L3
C
A
D
B
HR-4
GRAVEL MOUND
DEPRESSION
E
F
PENN CENTRAL RAILROAD
FENCE (TYP.)
TANK
A
B
TANK
WL 718
G
C
FENCE POSTS
D
TANKS
O/H PIPES
WL. 718.2
HR-2
TANKS
P
SCALE
0
200 FEET
W-4-N
HR-13
HR-3
GERAGHTY & MILLER, INC.
Environmental Services
IN-PHASE COMPONENT MAP, LANDFILLS L2 AND L3
FIGURE 5-10



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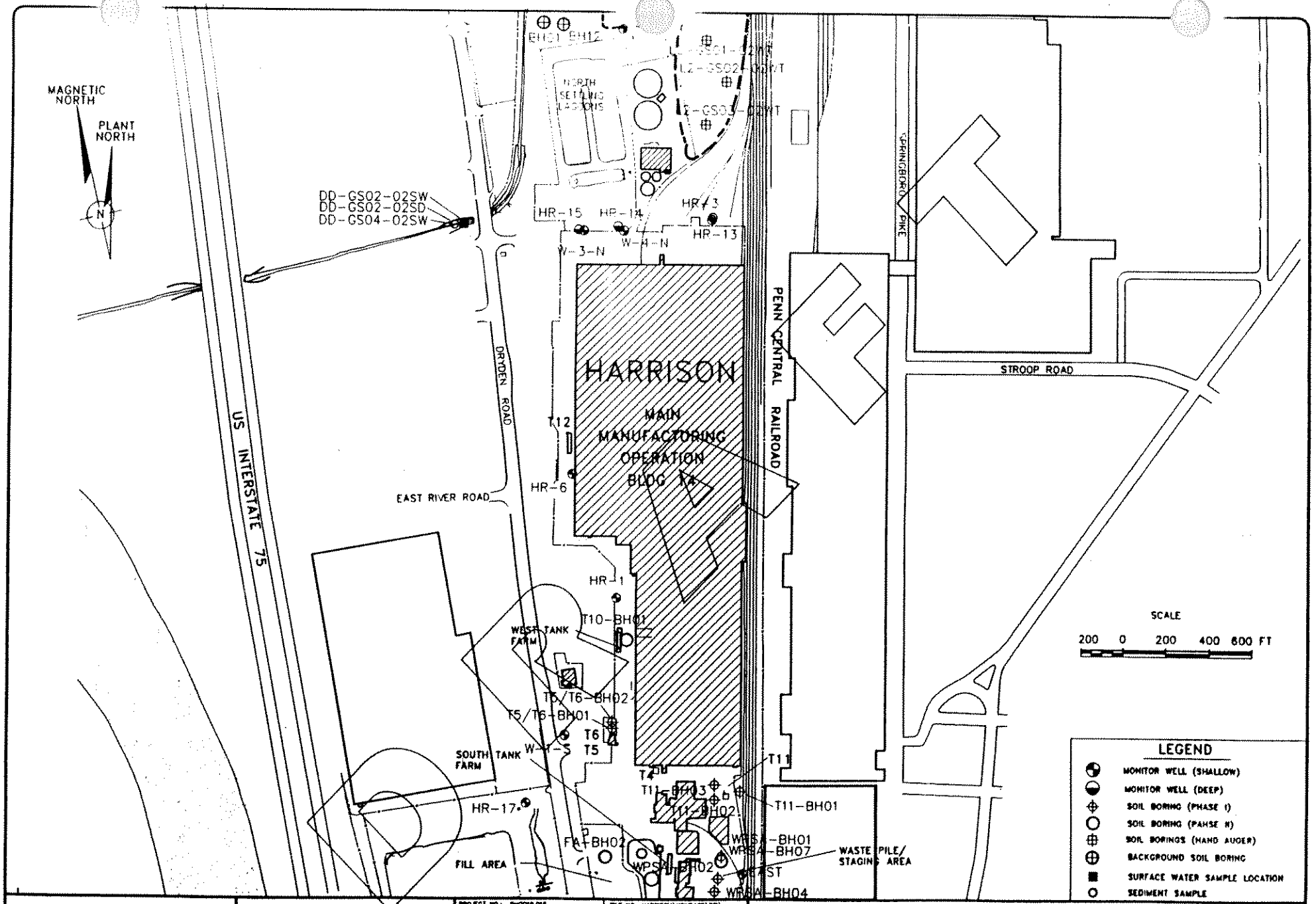
PROJECT NO.: DH0019018	FILE NO: HARRISON\REMBASE\RFI1
DRAWING: RFISOUTH	PLOT SIZE: 11"
DRAFTED BY: MAJ	DATE: 11APR95
CHECKED BY: JR	DATE: 11APR95
APPROVED BY: JR	DATE: 12APR95

RFI SAMPLE LOCATIONS IN THE SOUTHERN PART OF THE HARRISON SITE

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE 5-11



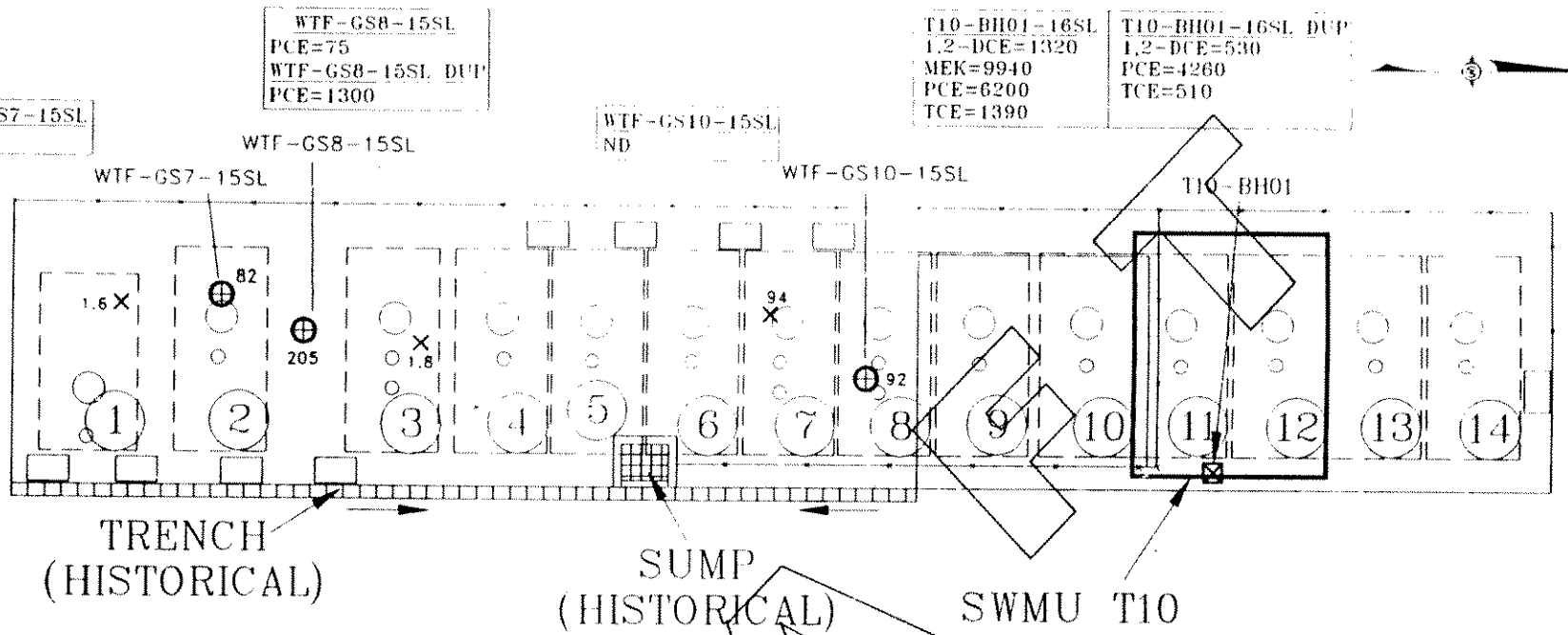
GERAGHTY & MILLER, INC.
Environmental Services

PROJECT NO.: 0H0019.018	FILE NO.: HARRISON\WE98A3E\RFI\
DRAWING: RFICENTRL	PLOT SIZE: FIT
DRAFTED BY: MAJ	DATE: 11APR95
CHECKED BY: J.R.	DATE: 11APR95
APPROVED BY: J.R.	DATE: 13APR95

RFI SAMPLE LOCATIONS IN THE CENTRAL PART OF THE HARRISON SITE

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE 5-12



HISTORICAL TANK CONTENTS

1 NON-LEADED GASOLINE (REMOVED 1992)
2 DIESEL FUEL (REMOVED 1992)
3 CUTTING OIL (REMOVED 1992)
4 SWMU T8-PERCHLOROETHENE; (REMOVED 1988)
5 SWMU T8-PERCHLOROETHENE; (REMOVED 1988)
6 SWMU T7-OILY WASTE; (REMOVED 1988)
7 QUAKER 568 COOLANT; (REMOVED 1992)
8 CIMCOOL S-2 COOLANT; (REMOVED 1992)
9 SWMU T7-OILY WASTE; (REMOVED 1986)
10 SWMU T7-OILY WASTE; (REMOVED 1986)
11 SWMU T10-STODDARD SOLVENT; (REMOVED 1986)
12 SWMU T10-STODDARD SOLVENT; (REMOVED 1986)
13 SWMU T9-NAPTHALITE; (REMOVED 1986)
14 SWMU T9-NAPTHALITE; (REMOVED 1986)

LEGEND

- ⊠ PHASE II BORING LOCATION
- ⊕ PHASE I RFI SOIL SAMPLE LOCATION
- (8) TANK NUMBER
- × HNU GRAB SAMPLE AND HNU READING (ppm HNU UNITS)
- ppm PARTS PER MILLION
- ND NOT DETECTED

UNITS ARE MICROGRAMS PER KILOGRAM

REFER TO FIGURE 5-4, PARAMETER ABBREVIATIONS FOR RFI RESULTS FIGURES.

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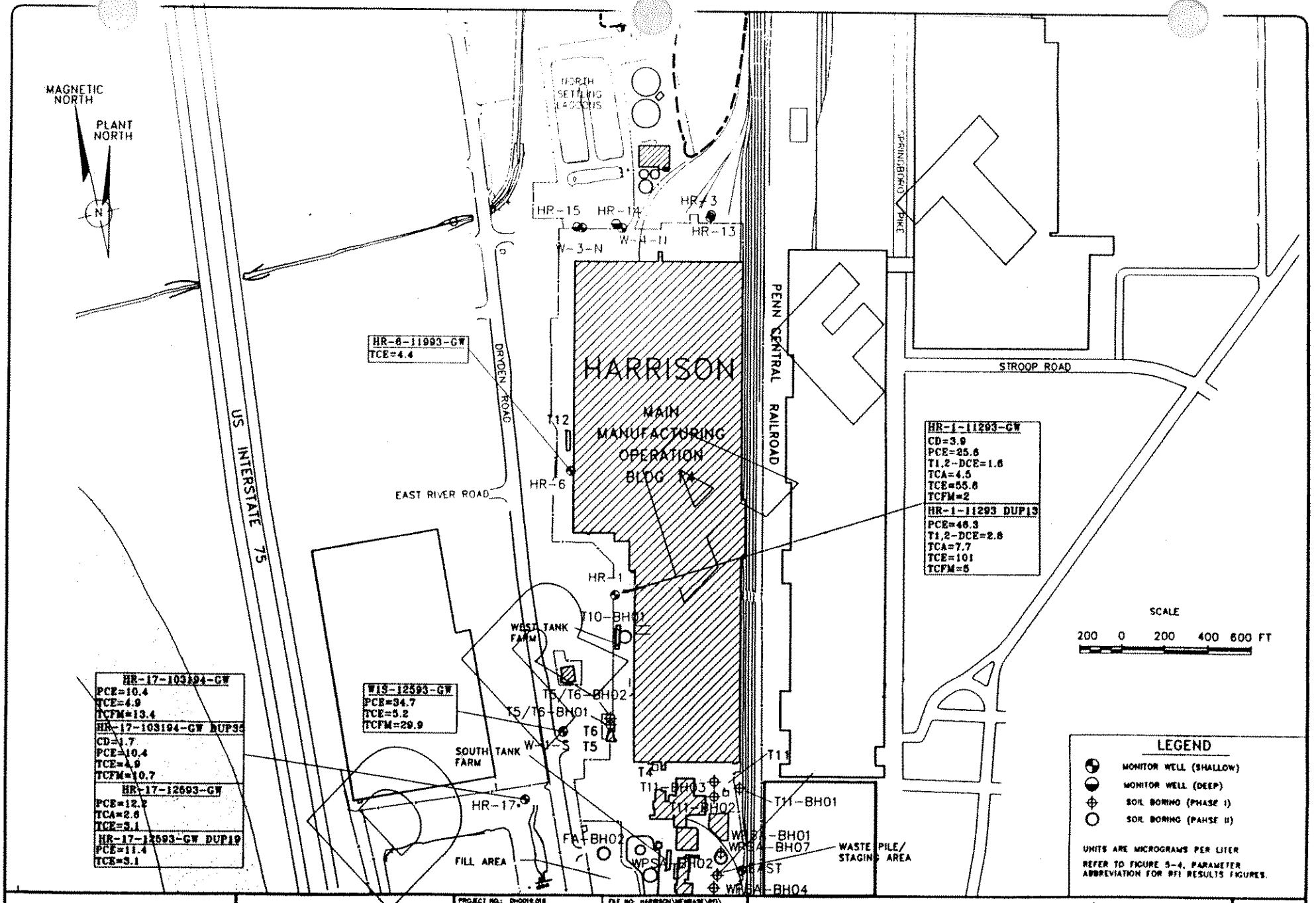
APPROXIMATE SCALE:

RFI SAMPLE LOCATIONS AND SOIL ORGANIC ANALYTICAL RESULTS FOR THE WEST TANK FARM

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE 5-13



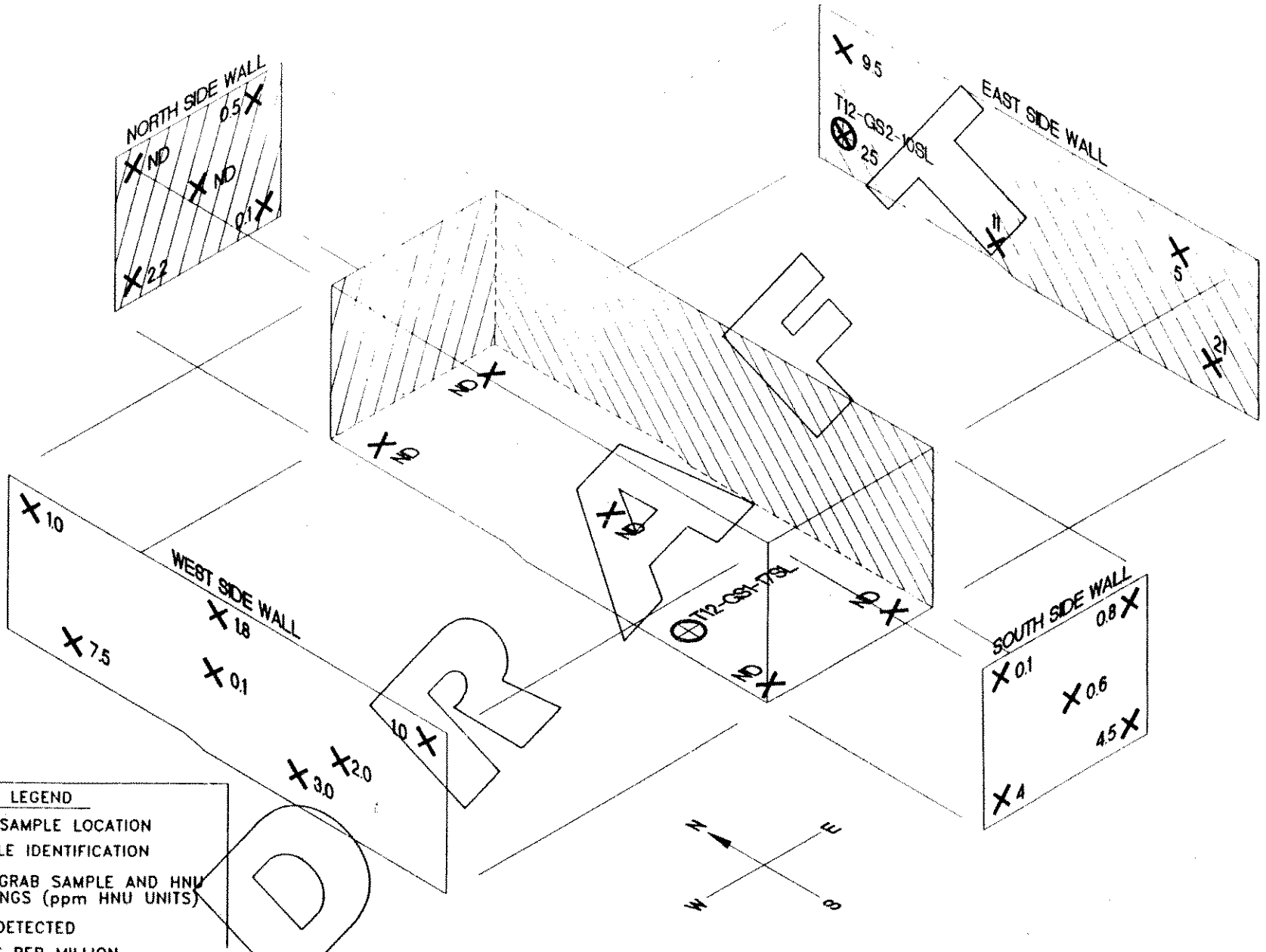
GERAGHTY & MILLER, INC.
Environmental Services

PROJECT NO.: DH0016.018	FILE NO.: HARRISON\NEWBASE\RFI\
DRAWING: RFICENTRL	PLOT SIZE: F1T
DRAFTED BY: MAJ	DATE: 11APR95
CHECKED BY: JR	DATE: 11APR95
APPROVED BY: JR	DATE: 12APR95

GROUNDWATER ORGANIC ANALYTICAL RESULTS FOR MONITOR WELLS LOCATED IN THE CENTRAL PART OF THE HARRISON SITE

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE 5-14



LEGEND

⊕	SOIL SAMPLE LOCATION
T12-GS1-17SL	SAMPLE IDENTIFICATION
X	HNU GRAB SAMPLE AND HNU READINGS (ppm HNU UNITS)
ND	NOT DETECTED
ppm	PARTS PER MILLION

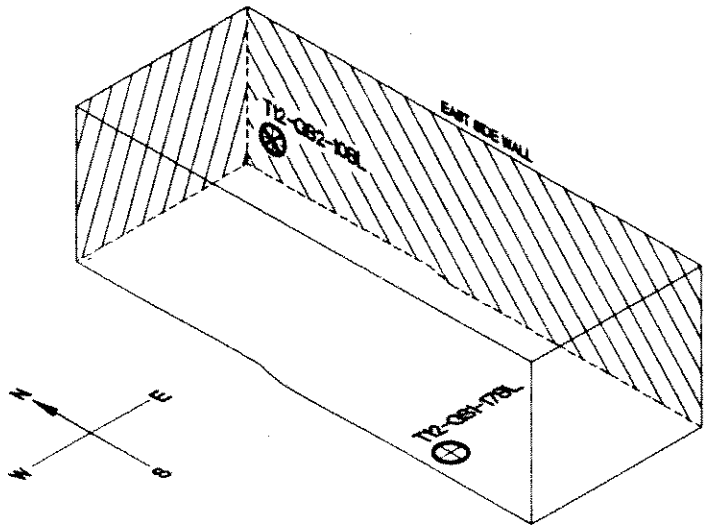
GERAGHTY & MILLER, INC.
Environmental Services

PROJECT NO.: OH01918	FILE NO: H&P.DWG
DRAWING: T-12	PLOT SIZE:
DRAFTED BY: RTS	DATE: 11JAN93
CHECKED BY: AR	DATE: -
APPROVED BY: AR	DATE: -

RFI GRAB-SAMPLE LOCATIONS AND HNU HEADSPACE READINGS AT SWMU T12

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION
MORAINE, OHIO

FIGURE
5-15



ISOMETRIC VIEW OF T12

MAGNETIC NORTH

PLANT NORTH

DRAFT

SURFACE SUMP DRAIN

T12-GS2-10SL
STY=7.1

T12-GS2-10SL

VAULT SUMP DRAIN

T12-GS1-17SL

T12-GS1-17SL
EBNZ=6.1
STY=30

T12-GS1-17SL DUP
EBNZ=8
STY=31

T12

HARRISON

MAIN

MANUFACTURING

OPERATION

BLDG 14

LEGEND

⊕ SOIL SAMPLE LOCATION

T12-GS1-17SL SAMPLE IDENTIFICATION

UNITS ARE MICROGRAMS PER KILOGRAM

REFER TO FIGURE 5-4, PARAMETER ABBREVIATION FOR RFI RESULTS FIGURES.

SCALE 0 20 FT

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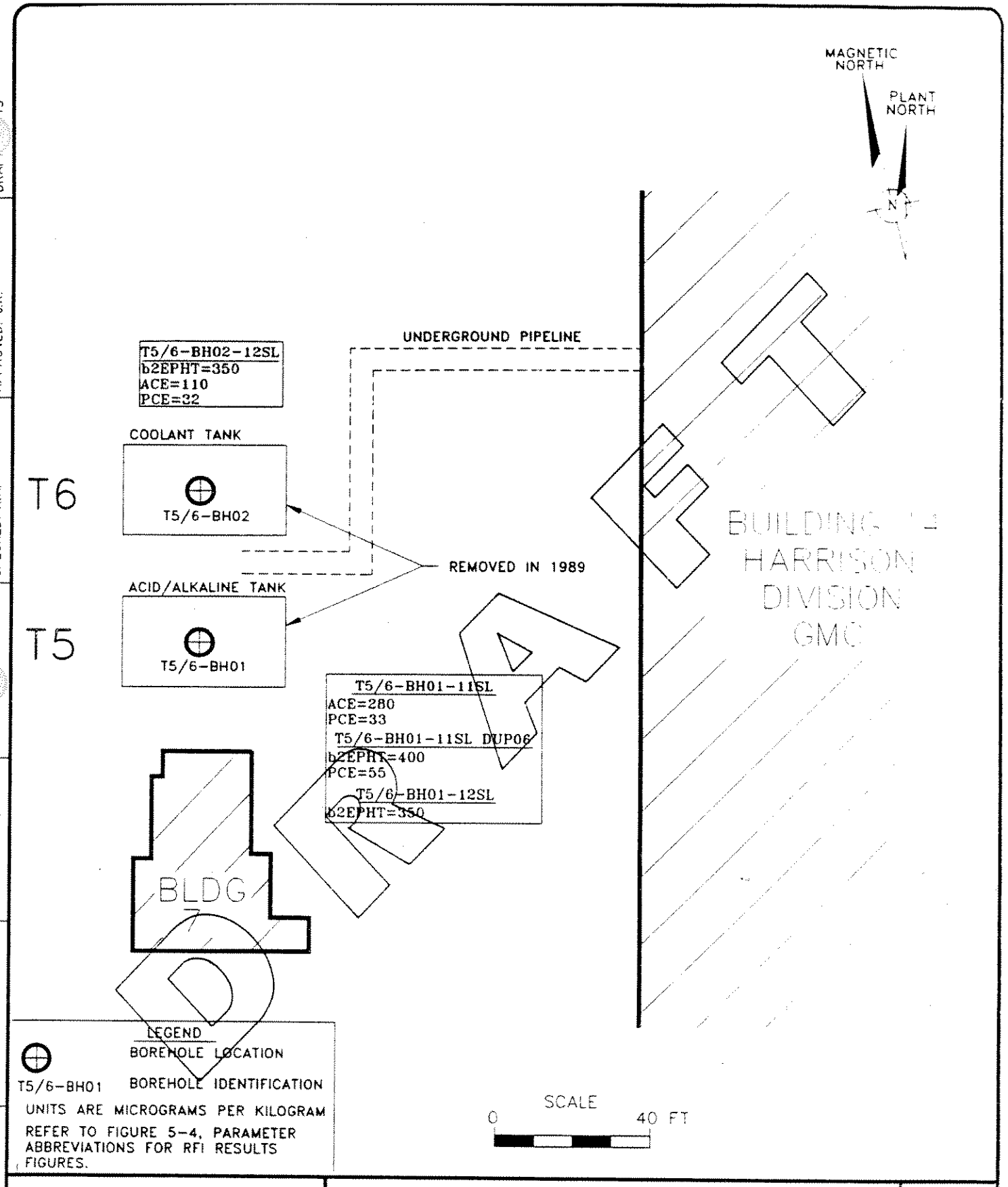
RFI SUBSURFACE SAMPLING LOCATIONS AND SOIL ORGANIC ANALYTICAL RESULTS FOR T12

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE 5-16

DRAFTER: KTS | APPROVED: J.R. | CHECKED: R.A. | DRAWING: T-12 | FILE NO.: HAR\RFI | PROJCT NO.: OH01918 | DWG DATE: 15APR93



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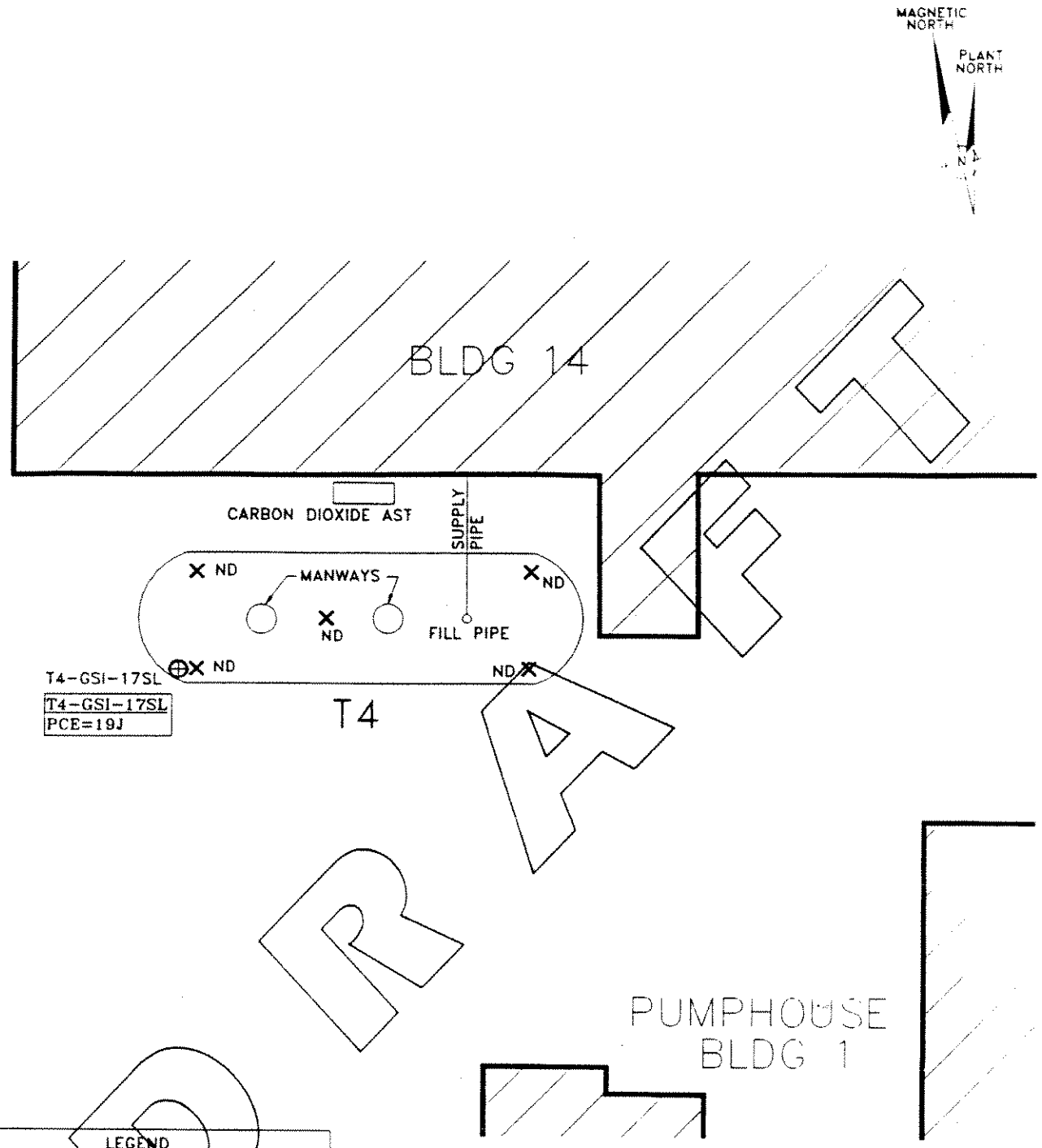
Environmental Services

RFI SAMPLE LOCATIONS AND SOIL ORGANIC ANALYTICAL RESULTS FOR T5/T6

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE 5-17

DRAWN: T6 | CHECKED: R.A. | APPROVED: J.R. | DRAWN: | FILE NO.: HAR\RFI | PRJCT NO.: OH01918 | DWG: 15APR93



LEGEND

⊕ SOIL SAMPLE LOCATION

× HNU GRAB LOCATION AND FIELD HNU READING (ppm HNU UNITS)

ND NOT DETECTED

ppm PARTS PER MILLION

UNITS ARE MICROGRAMS PER KILOGRAM REFER TO FIGURE 5-4, PARAMETER ABBREVIATIONS FOR RFI RESULTS FIGURES.

GERAGHTY & MILLER, INC.
Environmental Services

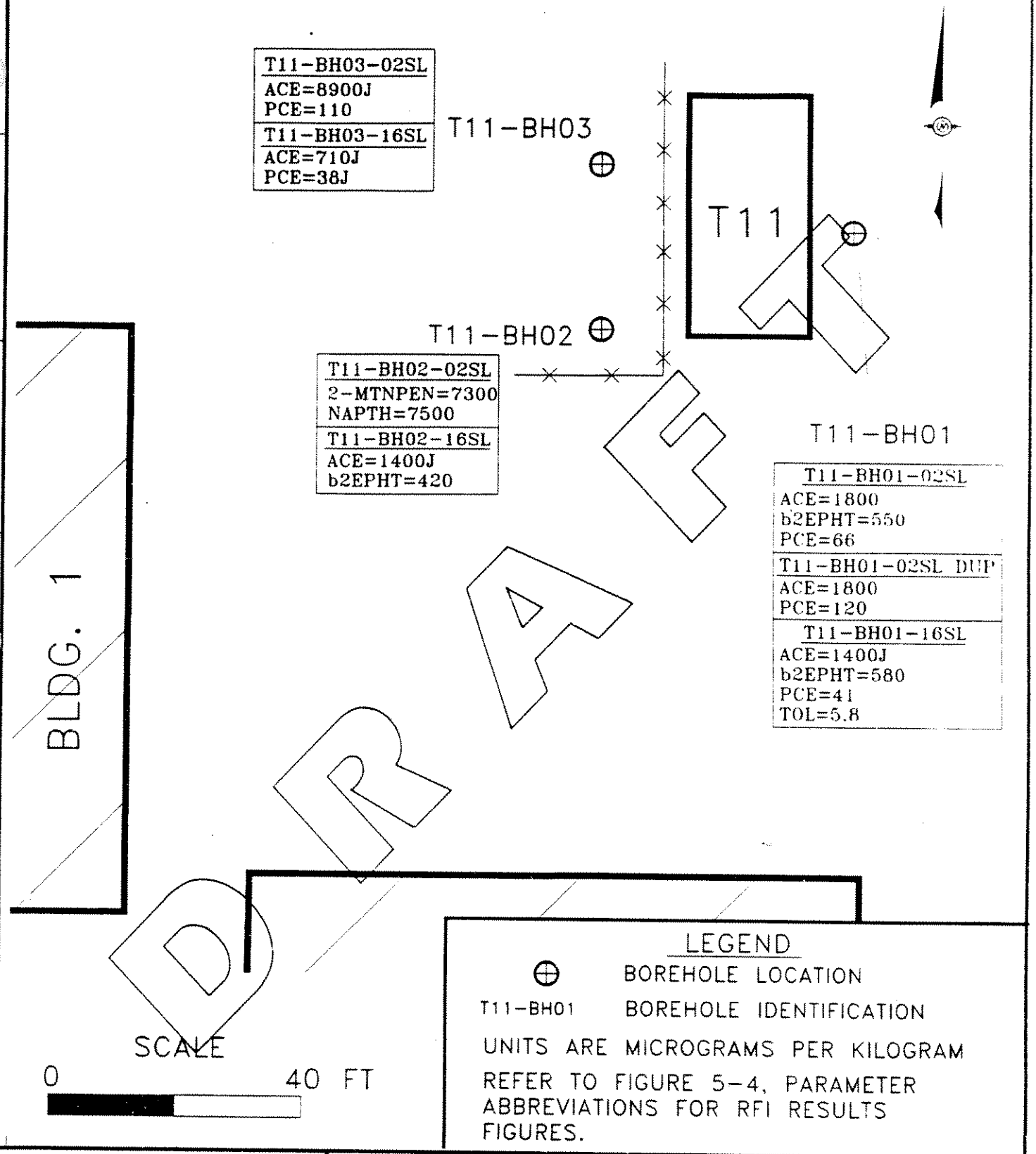
NOT TO SCALE

RFI SAMPLE LOCATIONS AND SOIL ORGANIC ANALYTICAL RESULTS FOR T4

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE 5-18

DRAI S | APPROVED: J.R. | CHECKED: J.R. | DRAWN: | FILE NO. HAR\RFI | PRJCT NO.: OH01918 | DW 15APR93



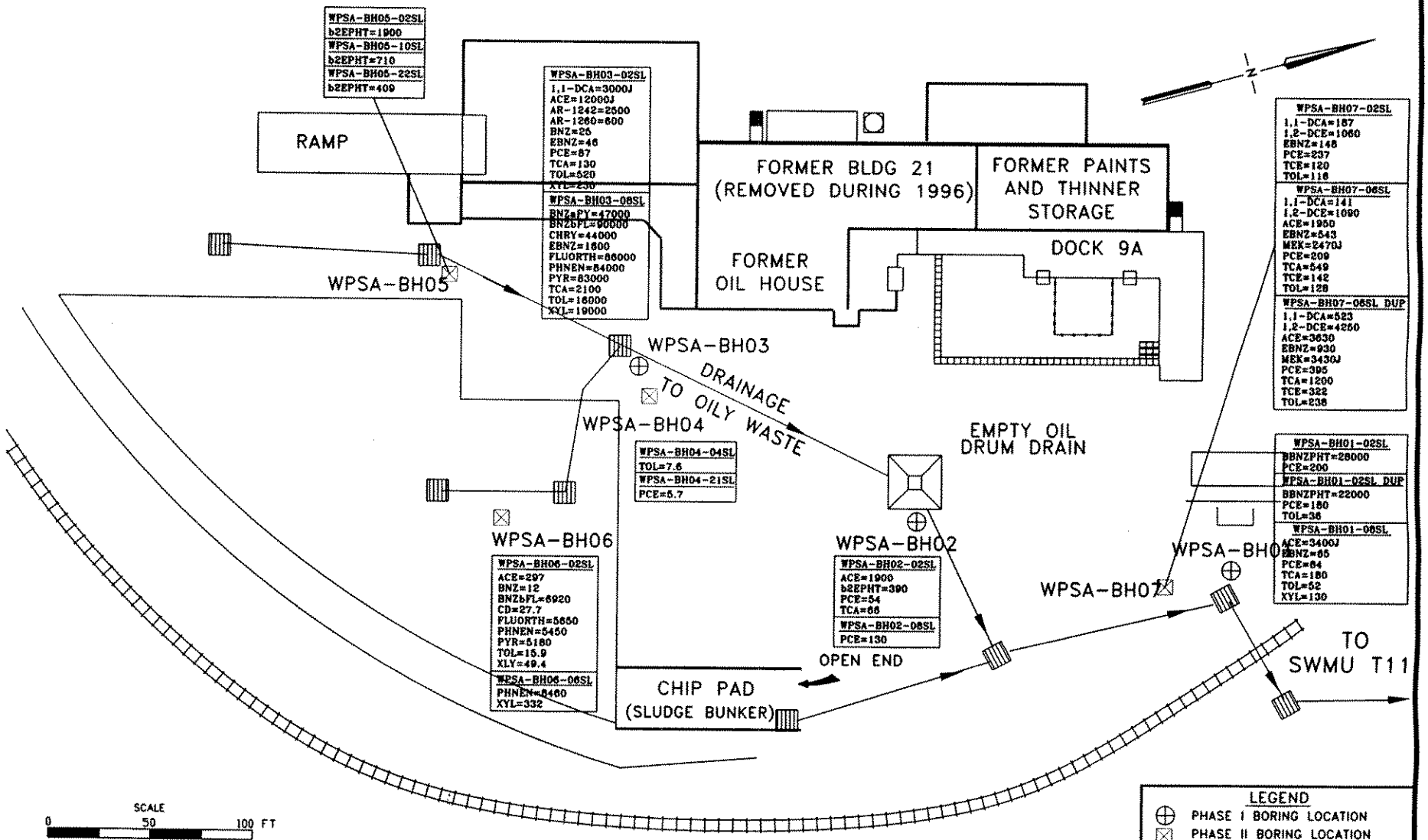
DRAI 15
APPROVED: JR
CHECKED: JR
DRAWIN B
FILE NO.: HARRI½RFI
PRJCT NO.: OHO1912
DW 12NOV92

GERAGHTY & MILLER, INC.
Environmental Services

RFI SAMPLE LOCATIONS AND SOIL ORGANIC ANALYTICAL RESULTS FOR T11

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

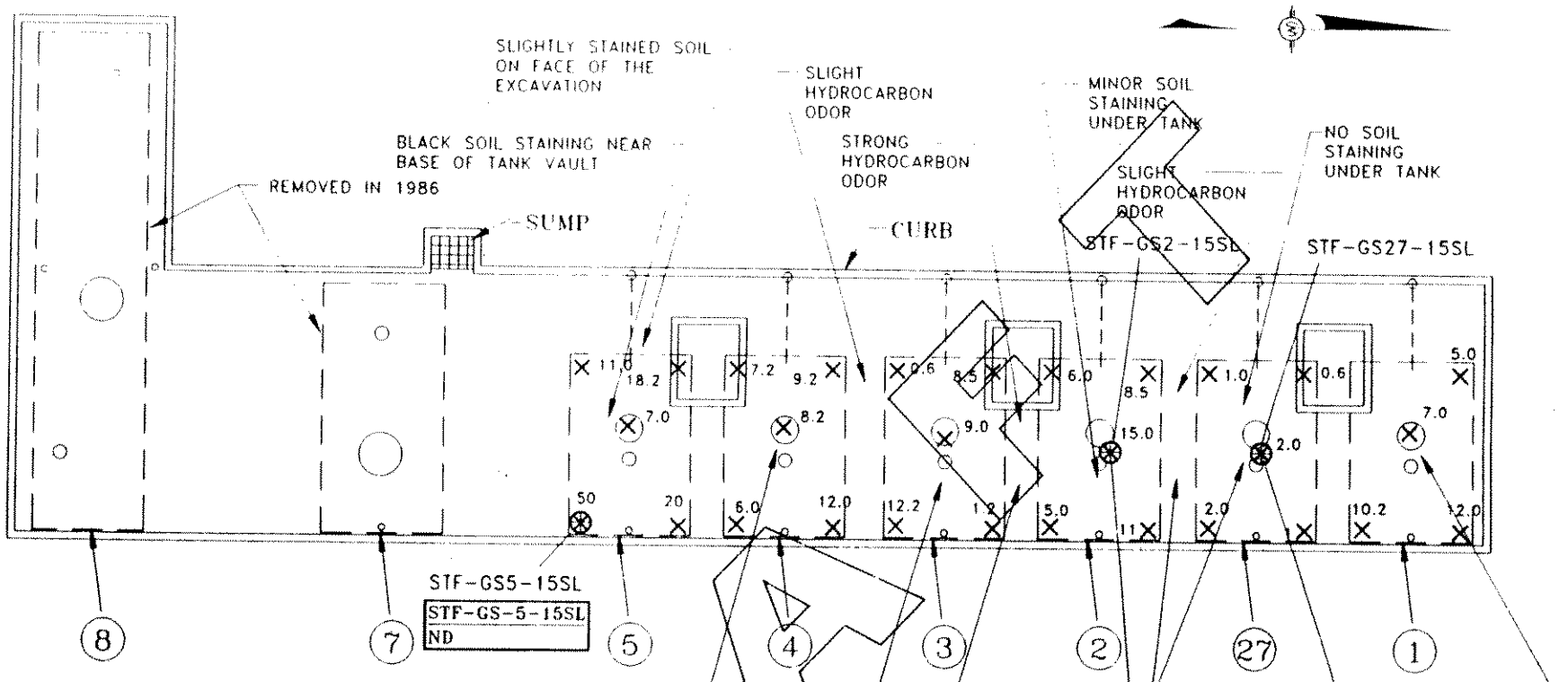
FIGURE
5-19



ARCADIS GERAGHTY & MILLER

RFI SAMPLE LOCATIONS AND SOIL ORGANIC ANALYTICAL RESULTS FOR THE WASTE PILE/STAGING AREA
DELPHI HARRISON THERMAL SYSTEMS, MORAINE, OHIO

DATE OCT91	PROJECT MANAGER R. ASTLE	DRAWING NAME HAR\RFI\STAGING
DRAWN R. SMITH	LEAD DESIGN PROF.	CHECKED R. ASTLE
PROJECT NUMBER 0H000294.001.002		FIGURE NUMBER 5-20



LEGEND

⊕	SOIL SAMPLE LOCATION
STF-GS2-15SL	RFI SAMPLE IDENTIFICATION
(27)	TANK NUMBER
× 9.2	HNU GRAB SAMPLE AND HNU READINGS (ppm HNU UNITS)
ND	NOT DETECTED
ppm	PARTS PER MILLION

UNITS ARE MICROGRAMS PER KILOGRAM
REFER TO FIGURE 5-4, PARAMETER ABBREVIATIONS FOR RFI RESULTS FIGURES.

HISTORICAL TANK CONTENTS

1	WASHING OIL
2	LUB. GEAR OIL
3	BRUKO D-332
4	HYDRAULIC OIL - 215 SEC
5	CIMTECH 3900
7	SWMU T2 - DIRTY OILS
8	SWMU T3 - DIRTY OILS, VIRGIN MACHINE COOLANT
27	SWMU T1 - SPENT ALKALINE DETERGENT SOLUTION

APPROX SCALE
0 20 FT

GERAGHTY & MILLER, INC.
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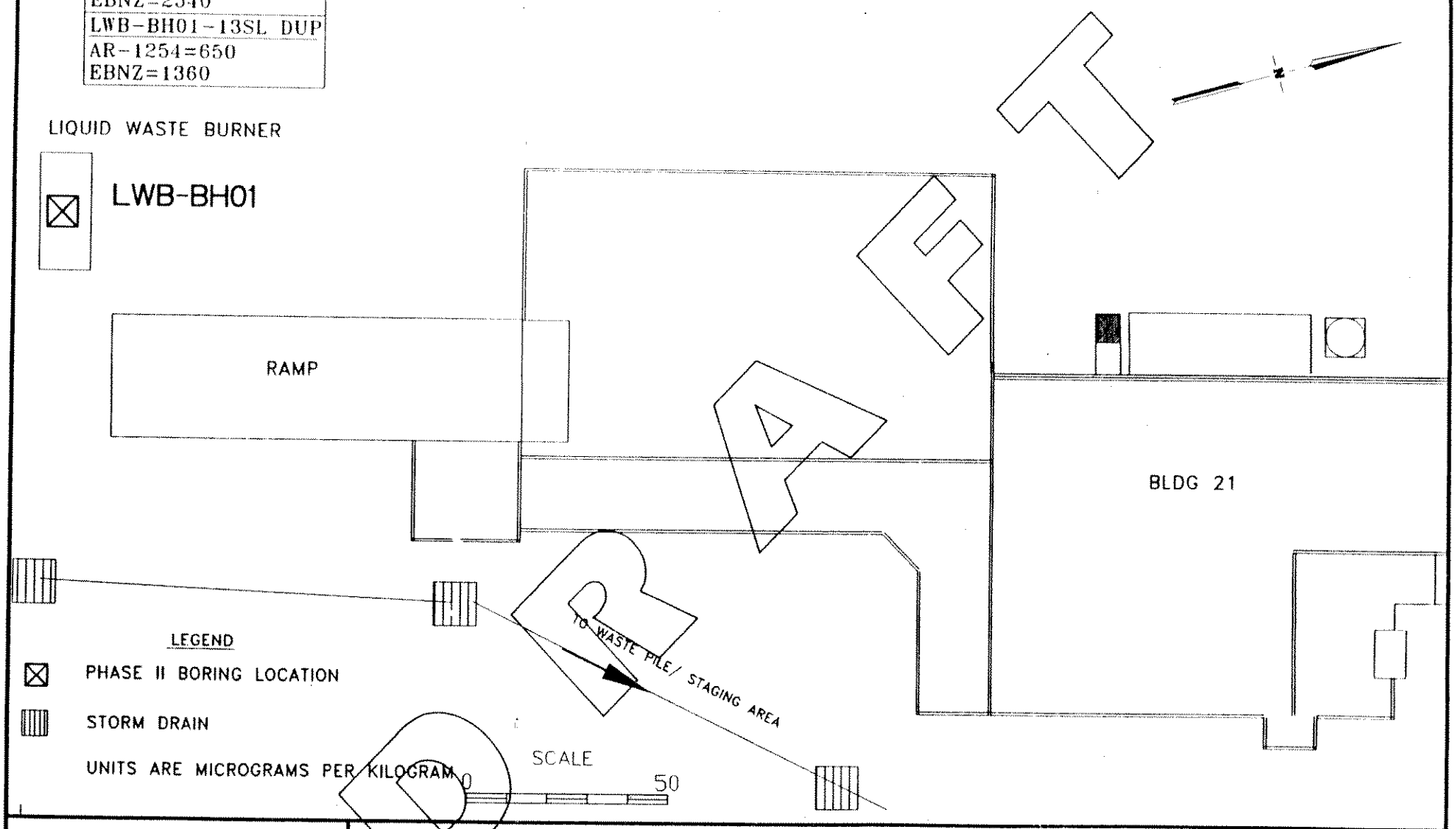
RFI SAMPLE LOCATIONS AND SOIL ORGANIC ANALYTICAL RESULTS FOR THE SOUTH TANK FARM

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE
5-21

LWB-BH01-13SL
EBNZ=2540
LWB-BH01-13SL DUP
AR-1254=650
EBNZ=1360

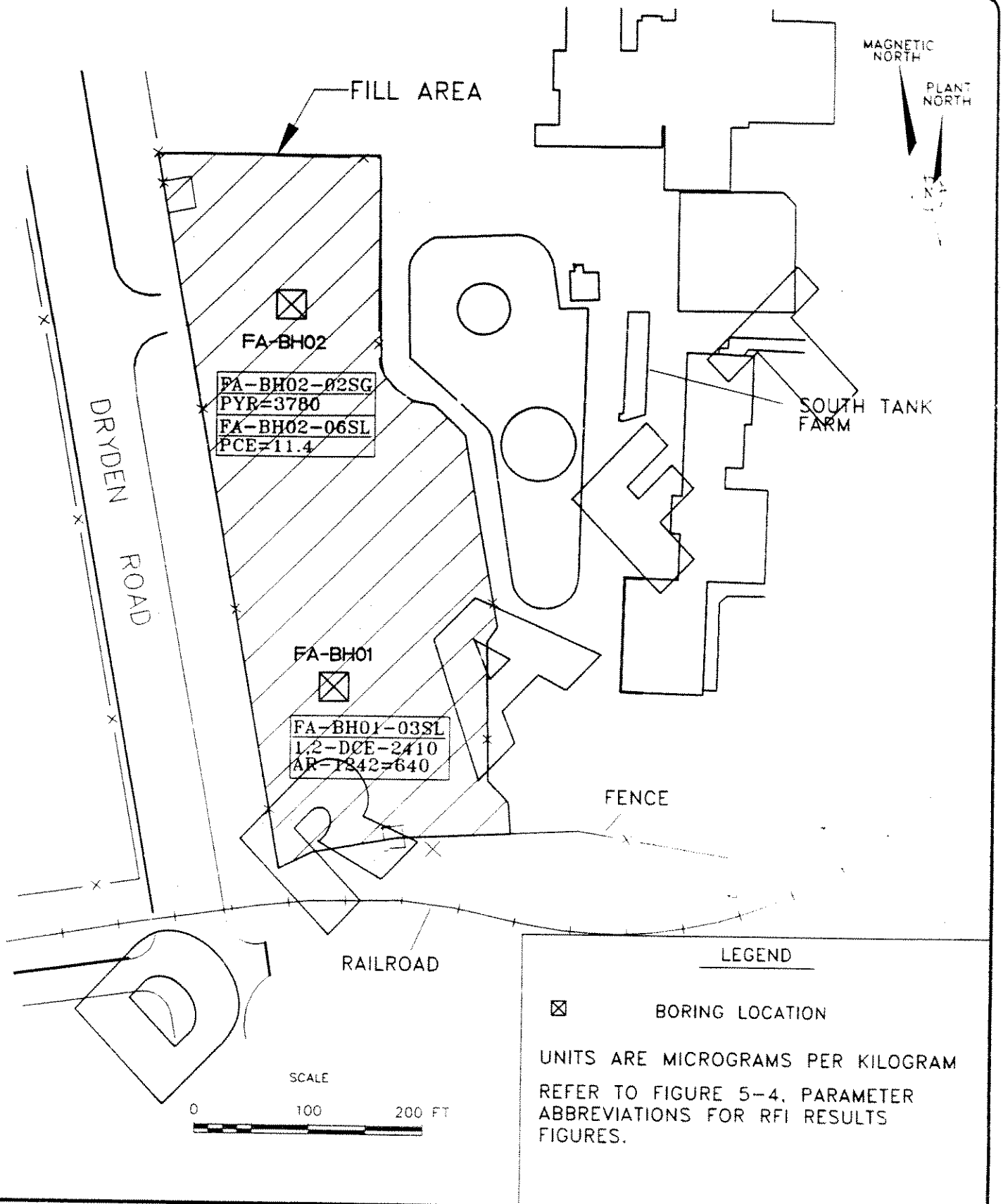


GERAGHTY & MILLER, INC.
Environmental Services

RFI SAMPLE LOCATION AND SOIL ORGANIC ANALYTICAL RESULTS FOR THE LIQUID WASTE BURNER

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE 5-22



GERAGHTY & MILLER, INC.
Environmental Services

RFI SAMPLE LOCATIONS AND SOIL ORGANIC ANALYTICAL RESULTS FOR THE FILL AREA

DELPHI HARRISON THERMAL SYSTEMS, GENERAL MOTORS CORPORATION, MORAINE, OHIO

FIGURE 5-23

DRAI S | APPROVED: J.R. | CHECKED: J.R. | LAREA | DRAWIN | FILE NO.: HARR\NB\ | PRJCT NO.: OH0019.01B | 29JUN93 | DW

ARCADIS

Attachment A-3

Supplemental Description of Current Conditions

ARCADIS

Supporting Information: Supplemental DOCC, Moraine Engine and Moraine Assembly, July 1997.

The information included in this appendix presents descriptions of Areas of Interest (AOIs) for General Motors Moraine Engine and Moraine Assembly in an exerpt from Section 3.2 of the Supplemental DOCC for General Motors Powertrain Group, Moraine Engine Plant and General Motors Truck Group Moraine Assembly Plant, Moraine, Ohio, July 1997. Also included from this report is Figure 3-1.

3.2 SUMMARY OF AOIS

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

FORMER FRIGIDAIRE PLANT 2

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

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

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

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

- Employee Interviews.

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

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

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

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

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

- Employee Interviews.

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

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

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

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

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

- Employee Interviews.

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

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

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

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

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

- Employee Interviews.

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

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

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

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

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

- Employee Interviews.

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

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

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

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

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

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

3.2.7 7 - Former Oil House Area

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

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

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

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

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

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

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

- Employee Interviews.

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

FORMER FRIGIDAIRE PLANT 3

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

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

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

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

- Employee Interviews.

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

3.2.9 9 - Former Cyanide Processing Tank

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

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

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

- Employee Interviews.

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

3.2.10 10 - Former Oil Separator Area

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

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

- Employee Interviews.

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

3.2.11 11 - Former Porcelain Manufacturing Area

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

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

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

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

3.2.12 12 - Former Frigidaire Plant 3 USTs

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

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

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

MORAINE ENGINE (CURRENT FACILITY)

3.2.13 13 - Buildings 4, 6, and 13

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

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

3.2.13.1 Pre-Demolition Activities Buildings 4 and 6

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

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

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

3.2.13.2 Pre-Demolition Activities Building 13

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

3.2.13.3 Demolition Buildings 4 and 6

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

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

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

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

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

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

3.2.13.4 Demolition Building 13

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

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

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

3.2.13.5 Information Sources

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

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

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

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

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

- Employee Interviews.

3.2.13.6 Summary

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

3.2.14 14 - Former Hazardous Waste Storage Pad

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

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

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

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

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

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

- Employee Interviews.

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

3.2.16 16 - Former Frigidaire Plant 2 Tanks - Gasoline Tank

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

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

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

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

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

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

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

- Employee Interviews.

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

3.2.17 17 - Building 15

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

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

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

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

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

3.2.18 18 - Former Moraine Engine Fuel USTs

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

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

- Employee Interviews.

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

3.2.19 19 - Chip Salvage Area

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

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

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

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

- Employee Interviews.

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

3.2.20 20 - Moraine Engine Tank Farm

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

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

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

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

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

- Employee Interviews.

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

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

3.2.21 21 - High Bay Area Storage Pad

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

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

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

- Employee Interviews.

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

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

3.2.22 22 - Satellite Accumulation Areas

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

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

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

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

- Employee Interviews.

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

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

3.2.23 23 - Wastewater Collection System

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

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

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

- Employee Interviews.

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

3.2.24 24 - Non-Hazardous Waste Storage Pad

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

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

- "Preliminary Assessment/Visual Site Inspection," PRC Environmental Management, Inc., August 1991.
- "Oil Spill Prevention Control and Countermeasure Plan," Moraine Engine Plant Powertrain Division, September 1, 1994.
- Employee Interviews.

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

MORAINE ASSEMBLY (CURRENT FACILITY)

3.2.25 25 - Former Paint Shop Sludge Pits

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

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

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

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

- Employee Interviews.

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

3.2.26 26 - Moraine Assembly Process Waste Collection Systems

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

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

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

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

3.2.27 27 - Former Hazardous Waste Container Storage Area

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

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

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

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

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

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

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

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

- Employee Interviews.

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

3.2.28 28 - Moraine Assembly Tank Farm

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

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

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

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

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

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

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

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

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

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

- Employee Interviews.

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

3.2.29 29 - Mix Room Storage Tank

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

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

- Employee Interviews.

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

3.2.30 30 - Moraine Assembly Flammable Collection/Storage Containment Area

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

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

- Employee Interviews.

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

3.2.31 31 - Moraine Assembly West Haulaway Storage Tanks

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

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

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

- Employee Interviews.

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

3.2.32 32 - Moraine Assembly East Haulaway Storage Tank

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

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

- Employee Interviews.

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

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

3.2.33 33 - Moraine Assembly Former Paint Shop Storage Tanks

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

- Employee Interviews

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

HISTORICAL AREAS

3.2.34 34 - Excavation Area 1

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

- 1956 Aerial Photograph, Ohio Department of Natural Resources.

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

3.2.35 35 - Excavation Area 2

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

- 1956 Aerial Photograph, Ohio Department of Natural Resources.

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

3.2.36 36 - Former Southwest ASTs

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

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

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

- Employee Interviews.

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

3.3 FURTHER INVESTIGATION DETERMINATION

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

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

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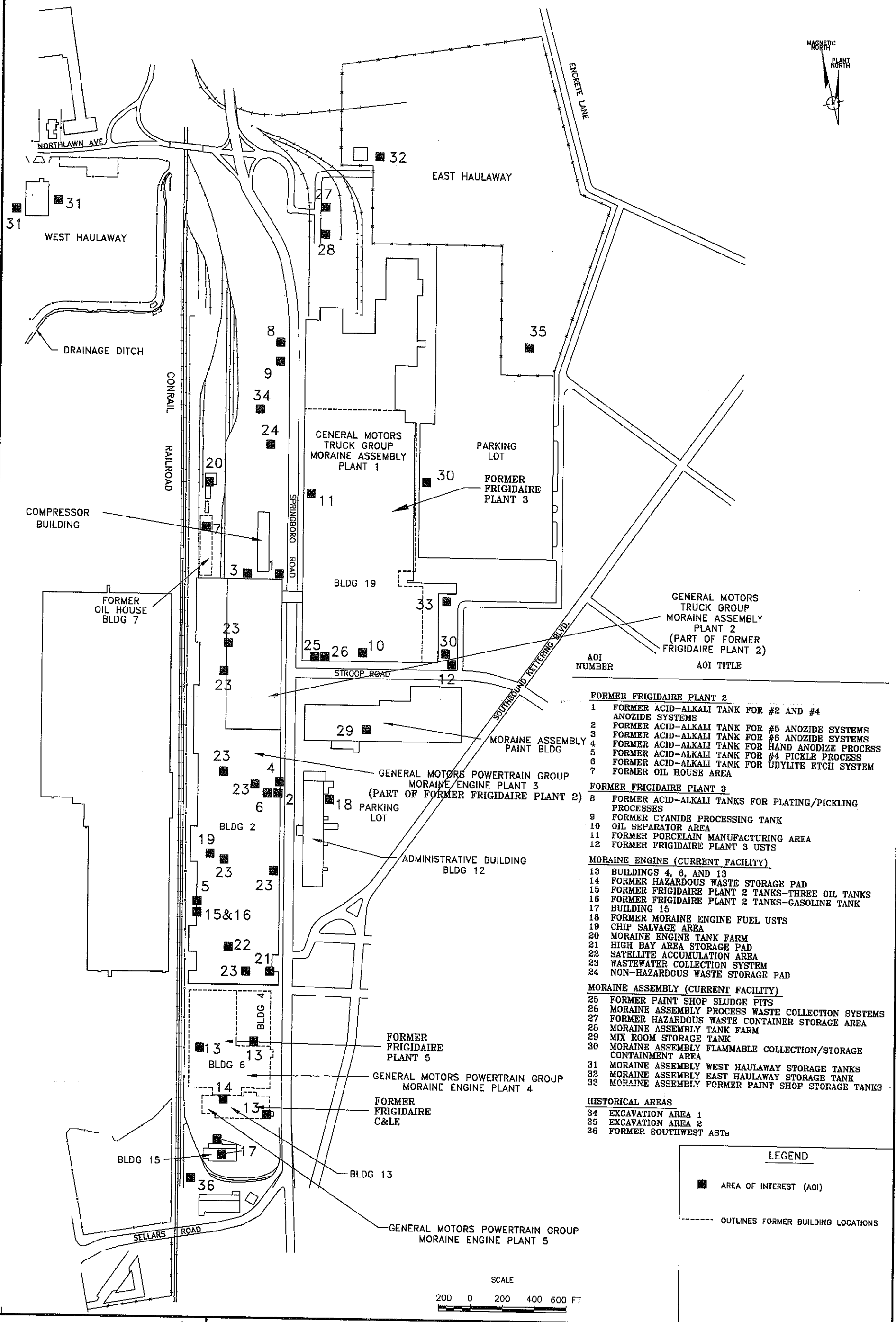

AOI NUMBER	AOI TITLE
	FORMER FRIGIDAIRE PLANT 2
1	FORMER ACID–ALKALI TANK FOR #2 AND #4 ANOZIDE SYSTEMS
2	FORMER ACID–ALKALI TANK FOR #5 ANOZIDE SYSTEMS
3	FORMER ACID–ALKALI TANK FOR #6 ANOZIDE SYSTEMS
4	FORMER ACID–ALKALI TANK FOR HAND ANODIZE PROCESS
5	FORMER ACID–ALKALI TANK FOR #4 PICKLE PROCESS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

LEGEND

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

GERAGHTY & MILLER, INC.
Environmental Services

MORAINE ENGINE AND MORAINE ASSEMBLY AREAS OF INTEREST

SUPPLEMENTAL DOCC

GENERAL MOTORS CORPORATION

MORAINE, OHIO

FIGURE

3-1

ARCADIS

Attachment A-4

Supplemental RCRA Facility Investigation

ARCADIS

Supporting Information: Supplemental RFI Report Volume 1 (Methodologies and Results), Moraine Engine and Moraine Assembly, April 2000.

The information included in this appendix presents descriptions of Areas of Interest (AOIs) for General Motors Moraine Engine and Moraine Assembly in an excerpt from Section 2.1 of the Supplemental RFI- Volume I (Methodologies and Results), General Motors Powertrain Group, Moraine Engine Plant and General Motors Truck Group, Moraine Assembly Plant, Moraine, Ohio, April 2000. Also included from this report are Tables 3-1 through 3-15, Tables 4-1 through 4-5, Figure 3, Figures 3-5 through 3-13, and Figures 4-4 through 4-5.

Areas of Interest Descriptions for Moraine Engine and Moraine Assembly

AOI 7 - Former Oil House Area

The Former Oil House (Building 7) was located north of the Moraine Engine Plant 3 (former Frigidaire Plant 2, Figure 1-5), and was built at least as early as 1949. The Former Oil House Area consisted of the Oil House (Building 7) and an outdoor area that contained underground storage tanks (USTs), ASTs, and a drum storage area. This AOI was removed from service in 1979 when at least three buildings were demolished and all tanks were removed and either replaced or reused. The Oil House Building 7 and associated outside structures covered a total area of approximately 48,000 square ft.

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

The outdoor area just north of the Oil House had seventeen 8,000 to 15,000-gallon ASTs used to store oil, solvents, acids and other production materials, and three 15,000-gallon USTs used to store oil. According to the 1976 Spill Prevention Control and Countermeasure (SPCC) Plan (General Motors Corporation 1976), these tanks

waste storage area was also located just north of the Oil House and was used to store drummed waste oils, thinners, alcohols, still bottoms from the Oil House and sludges containing chromium, nickel, and phosphorus.

Additionally, a May 1979 aerial photograph shows an area north of the Oil House was used for temporary storage of equipment, boxes, and drums during the conversion of Frigidaire Plant 2. As stated in the Supplemental DOCC, GM announced the shut down of all Frigidaire operations in January 1979. During 1980 and 1981, the majority of the former Frigidaire Plant 2 was converted to the Moraine Engine facility. A November 1979 aerial photograph showed that Building 7 had been demolished, and did not show evidence of the equipment, boxes, and drums seen in the May 1979 aerial photograph. Copies of both the aerial photographs were included in the October 16, 1998 letter from Delphi Thermal to U.S. EPA, which is presented in the Supplemental RFI Report.

AOI 7 is currently covered with asphalt, concrete, and the new Moraine Engine Tank Farm. This aboveground tank farm and pump house were constructed in 1980 over the footprint of the former Oil House tank farm. As concluded in the Supplemental DOCC, AOI 7 may be a potentially significant source for soil and groundwater contamination, and further investigation was warranted under the Supplemental RFI.

AOI 13 - Former Buildings 4, 6, And 13

Buildings 4, 6, and 13 of the Frigidaire facilities were located south of the Moraine Engine Plant 3 (Figure 1-5). Buildings 4 and 6 (also known as Moraine Engine Plant 4) consisted of approximately 300,000 square ft. Buildings 4 and 6 were constructed in 1917 and 1926, respectively, and the buildings had many previous uses including manufacturing of service parts, chemical storage, storage for oil recovery, and offices. Frigidaire discontinued operations in 1979, and by late 1981 these buildings were unoccupied without heat.

In 1983, GM removed ten PCB-contaminated electrical transformers from Buildings 4 and 6 and disposed of them off site at a Toxic Substances Control Act (TSCA)-approved facility. Prior to 1985, GM removed asbestos from piping within Buildings 4 and 6 and disposed of this material in an approved off-site facility. In 1990, GM conducted a comprehensive study of the wood floor block in these buildings. The results indicated that PCB's were present in the floor block. The wood floor block was removed, the concrete floor beneath the wood floor block was cleaned and PCB sampling was conducted. Additionally, an area on the south side of Building 4,

formerly used for plating, was impacted by metals (primarily cadmium). Decontamination activities began in 1995 and demolition of Buildings 4 and 6 took place in 1996.

Building 13 (also known as Moraine Engine Plant 5) was built in 1916 by the Cleveland and Lake Erie Railroad Company (C&LE) and was used for railroad maintenance. It covered an area of approximately 60,000 square ft. GM acquired the building in 1941. From 1941 until 1979, the building was used for maintenance purposes and storage. After 1979, part of Building 13 was used as a Hazardous Waste Storage Pad. The concrete storage pad covered an area of 2,400 square ft and had the capacity to store 250 55-gallon drums. It was used for storage of drummed quantities of waste paint thinner and sludges, chlorinated solvents, and non-hazardous waste oil and process fluids prior to removal from the facility. The former Hazardous Waste Storage Pad was clean closed in 1993, and closure was approved by the Ohio Environmental Protection Agency (Ohio EPA). Cleaning and decontamination activities of the remainder of the building began in 1995, and demolition of Building 13 took place in 1996. During demolition, a portion of a UST was found. The partial tank was approximately 5,000 gallons in volume and was determined to previously have contained fuel oil used for heating purposes. The UST was taken out of service prior to 1970. Soil samples were collected from the cavity wall during demolition activities and the results were well below the applicable Bureau of Underground Storage Tank Regulations (BUSTR) standards.

AOI 13 is currently covered with an asphalt parking lot that was constructed in 1998. As concluded in the Supplemental DOCC, there was a potential for AOI 13 to have been a potentially significant source for soil and groundwater contamination, and further investigation was warranted under the Supplemental RFI.

AOI 17 - Building 15

AOI 17 includes Building 15 and a former Frigidaire Plant 2 used-oil UST (Figure 1-5). Building 15 covered an area of approximately 17,000 square ft, and based on a review of aerial photographs, it was constructed prior to 1949. The building was used for maintenance purposes and included a truck maintenance repair area, an equipment steam booth area and a maintenance spray booth area located in the center of the building. The 900-gallon steel UST located south of Building 13 and north of Building 15 was used to store used oil from garage operations. It is unknown when this tank began operation. The used oil present in the UST at closure contained VOCs (ethylbenzene, tetrachloroethene [PCE], toluene, and xylenes), but

no VOCs were detected in the soil tested during closure activities. It was removed and clean closed under the BUSTR in 1994.

AOI 17 is currently covered with an asphalt parking lot that was constructed in 1998 (Building 15 was demolished and removed for off-site disposal as part of the parking lot construction). As concluded in the Supplemental DOCC, there was a potential for AOI 17 to have served as a historical source of chlorinated VOCs detected in monitoring well GM-21, and further investigation was warranted under the Supplemental RFI.

AOI 34 - Excavation Area 1

AOI 34 was located north of the Moraine Engine Plant 3 and west of Springboro Road (Figure 1-5), and was identified from a 1956 aerial photograph. The excavation area was approximately 300 ft long by 40 ft wide, with the southern end containing a depression that was possibly filled with liquid. This area was covered with grass at the time the Supplemental DOCC was completed and during the Supplemental RFI sampling (conducted in August 1997). No information was available regarding the types of materials which may have been handled in this area and their potential for releasing hazardous constituents. As concluded in the Supplemental DOCC, no specific basis existed for further investigation at AOI 34; however, a limited investigation to assess the potential presence of contamination was recommended. AOI 34 is currently covered with an asphalt parking lot that was constructed in 1998.

AOI 35 - Excavation Area 2

AOI 35 was located north of the Moraine Assembly Plant 1 and east of Springboro Road (Figure 1-5), and was identified from a 1956 aerial photograph. The excavation area was approximately 200 ft long by 150 ft wide. This area was covered by a parking lot at the time the Supplemental DOCC was completed and during the Supplemental RFI sampling (conducted in August 1997). No information was available regarding the types of materials which may have been handled in this area and their potential for releasing hazardous constituents. As concluded in the Supplemental DOCC, no specific basis existed for further investigation at AOI 35; however, a limited investigation to assess the potential presence of contamination was recommended. AOI 35 is currently covered by the parking lot associated with the new Moraine Assembly plant. Construction activities began in late 1997 and will be completed in 1999.

AOI 36 - Former Southwest Above Ground Storage Tanks

AOI 36 was located in the southwest corner of the Moraine Engine facility and consisted of four sets of concrete AST saddles (Figure 1-5). The two southern-most sets of saddles consisted of four larger saddles per tank and were contained in an earthen dike area approximately 50 ft by 70 ft. The two northern-most sets of saddles consisted of two saddles per tank and were contained in a separate 40 ft by 55 ft earthen dike area. These tank saddles and earthen berms were identified during a site walkover in June 1997. A review of aerial photographs indicated that the two southern-most tanks were installed prior to 1949. One tank was installed on the northern-most set of saddles between 1949 and 1956. These three tanks were present in the 1975 aerial photograph, but had been removed prior to the 1990 aerial photograph. There was no evidence that the fourth set of saddles was ever used. Use of these tanks was thought to have ceased prior to the early 1970's; however, the tank saddles and earthen berms were still present during the Supplemental RFI investigation. No information was available regarding the types of materials which may have been handled in this area and their potential for releasing hazardous constituents. AOI 36 is currently covered with an asphalt parking lot that was constructed in 1998. As concluded in the Supplemental DOCC, no specific basis existed for further investigation at AOI 36; however, given the probable use of the area for storage of liquid materials, a limited investigation to determine if a release had occurred was recommended under the Supplemental RFI.

Table 3-1. Analytical Results for Soil Samples, AOI - 34 Excavation Area 1 and AOI 35 - Excavation Area 2, General Motors Corporation, Moraine, Ohio.

		EA1-BH01			EA2-BH01	
Constituents	Units	Fill 8/28/97 6 - 8 ft bgs	Fill 8/28/97 Dup-39	Native 8/28/97 12-14 ft bgs	Fill 8/28/97 6 - 8 ft bgs	Native 8/28/97 22-24 ft bgs
VOCs	ug/Kg	ND	ND	ND	ND	ND
SVOCs						
Fluoranthene	ug/Kg	449	<330	<330	402	<330
Pyrene	ug/Kg	450	<330	<330	472	<330
PCBs	mg/Kg	ND	ND	ND	ND	ND
Metals						
Antimony	mg/Kg	<16	<16	<32	<33	<33
Arsenic	mg/Kg	46.5J	124J	3.18	3.16	3.24
Barium	mg/Kg	58.2J	66.9J	22J	53.8J	15J
Beryllium	mg/Kg	0.9	0.8	<2	<2	<2
Cadmium	mg/Kg	<3.9	<4.9	<9.6	<9.9	<9.9
Chromium	mg/Kg	12	15.1	<13	13	<13
Cobalt	mg/Kg	7.6	6.52	<6.4	<6.6	<6.6
Copper	mg/Kg	15.3	15.1	<6.4	<6.6	<6.6
Lead	mg/Kg	18	17.8	3.5	17.4	4.32
Manganese	mg/Kg	331	277	714	299	311
Mercury	mg/Kg	0.025	0.032	<0.01	0.012	<0.01
Nickel	mg/Kg	18.6	15.3	24	7.3	7.6
Selenium	mg/Kg	<1.63J	<1.64J	<1.66J	<1.61J	<1.64J
Silver	mg/Kg	<5.2	<1.3	<13	<13	<13
Thallium	mg/Kg	<0.5	<0.5	0.927	<0.5	0.683
Vanadium	mg/Kg	20.7J	24.9J	<16J	<16J	<17J
Zinc	mg/Kg	104J	141J	20J	49J	28J

EA - Excavation area.
ND - Not detected.
VOCs - Volatile organic compounds.
SVOCs - Semi-volatile organic compounds.
PCBs - Polychlorinated biphenyls.
< - Constituent not detected above laboratory detection limit shown.
mg/Kg - Milligram per kilogram.
ug/Kg - Microgram per kilogram.
ft bgs - Feet below ground surface.
DUP-39 = Duplicate of sample EA1-BH01(6-8).
J - Estimated Concentration.

Table 3-2. Field Screening Results for Soil Samples, AOI 13 - Buildings 4, 6, and 13 and AOI 17 - Building 15, General Motors Corporation, Moraine, Ohio.

Sample Date	Sample Identification	Sample Interval (feet)	PCB Test Kit Results (ppm)	HNu Reading (ppm)	Field GC Results (ppm)		
					TCE	PCE	1,1,1-TCA
AOI 13							
2/17/98	BDG-DP3	4-8	<0.5	0	<0.001	<0.001	<0.001
2/17/98	BDG-DP4	4-8	<0.5	0	<0.001	<0.001	<0.001
2/17/98	BDG-DP6	4-8	<0.5	0	0.011	0.002	<0.001
2/17/98	BDG-DP7	4-8	<0.5	0	<0.001	<0.001	<0.001
2/17/98	BDG-DP10	4-8	<0.5	0	<0.001	<0.001	<0.001
2/17/98	BDG-DP11	4-8	<0.5	0	0.002	0.001	<0.001
2/17/98	BDG-DP12	4-8	<0.5	0	0.001	0.001	<0.001
2/18/98	BDG-DP2	4-8	0.5 - 1.0	0	<0.001	<0.001	<0.001
2/18/98	BDG-DP5	4-8	<0.5	0	0.001	0.001	<0.001
2/18/98	BDG-DP8	4-8	<0.5	0	0.03	0.001	<0.001
2/18/98	BDG-DP8 (DUP)	4-8	<0.5	0	NA	NA	NA
2/18/98	BDG-DP9	4-8	<0.5	0	<0.001	0.048	<0.001
2/18/98	BDG-DP14	4-8	<0.5	0	0.066	0.004	0.002
2/18/98	BDG-DP14 (DUP)	4-8	NA	0	0.07	0.004	0.003
2/18/98	BDG-DP17	4-8	<0.5	0	0.002	0.002	<0.001
2/18/98	BDG-DP18	4-8	<0.5	0	<0.001	<0.001	<0.001
2/18/98	BDG-DP18 (DUP)	4-8	<0.5	0	NA	NA	NA
2/18/98	BDG-DP19	4-8	<0.5	0	<0.001	<0.001	<0.001
2/19/98	BDG-DP1	4-8	>25	0	<0.001	<0.001	<0.001
2/19/98	BDG-DP1 (DUP)	4-8	1.1 - 4	0	NA	NA	NA
2/19/98	BDG-DP13 (0-4)	0-4	<0.5	0	0.003	<0.001	<0.001
2/19/98	BDG-DP13 (4-8)	4-8	<0.5	0	0.002	<0.001	<0.001
2/19/98	BDG-DP15	4-8	<0.5	0	0.028	<0.001	<0.001
2/19/98	BDG-DP16 (0-4)	0-4	<0.5	0	0.008	<0.001	<0.001
2/19/98	BDG-DP16 (4-8)	4-8	<0.5	0	0.001	<0.001	<0.001

Table 3-2. Field Screening Results for Soil Samples, AOI 13 - Buildings 4, 6, and 13 and AOI 17 - Building 15, General Motors Corporation, Moraine, Ohio.

Sample Date	Sample Identification	Sample Interval (feet)	PCB Test Kit Results (ppm)	HNu Reading (ppm)	Field GC Results (ppm)		
					TCE	PCE	1,1,1-TCA
AOI 17							
2/19/98	BD15-DP1	4-8	<0.5	0	0.006	0.065	<0.001
2/19/98	BD15-DP2	4-8	<0.5	0	0.004	0.065	<0.001
2/19/98	BD15-DP2 (DUP)	4-8	NA	0	0.005	0.064	<0.001
2/19/98	BD15-DP3	4-8	<0.5	0	0.009	0.036	<0.001
2/19/98	BD15-DP3 (DUP)	4-8	<0.5	0	NA	NA	NA

A split of BDG-DP1 (4-8) was submitted to NET for analysis of TCL PCBs by Method 8080A.
A split of BDG-DP13 (0-4) was submitted to NET for analysis of TAL Metals by Method 6010A.
PCB Test Kit Results were obtained by using the D-TECH #TK-1002-1, PCB Soil Extraction Pac D-TECH #TK-1002S-1, and the test kit results were interpreted using the DETECHTOR #TK-1001M-1.
Field gas chromatograph results were obtained from Microseeps mobile laboratory.
NA - Not analyzed.
PCB - Polychlorinated biphenyls.
TCE - Trichloroethene.
PCE - Tetrachloroethene.
1,1,1-TCA - 1,1,1-Trichloroethane
ppm - Parts per million.

Table 3-3. Analytical Results for Soil Samples, AOI 13-Buildings 4, 6, and 13, General Motors Corporation, Moraine, Ohio

Constituents	Units	Sample Description		Soil Background Level
		BDG-DP1 2/19/98 4-8 ft bls	BDG-DP13 2/19/98 0-4 ft bls	
Metals				
Antimony	mg/Kg	NA	<7.2UJ	NB
Arsenic	mg/Kg	NA	6.19	28.5
Barium	mg/Kg	NA	103J	229
Beryllium	mg/Kg	NA	0.6	2.41
Cadmium	mg/Kg	NA	<1.1	12.6
Chromium	mg/Kg	NA	9.7	47.4
Cobalt	mg/Kg	NA	4.16	26
Copper	mg/Kg	NA	13.1	41
Lead	mg/Kg	NA	23.1	49.1
Manganese	mg/Kg	NA	611	1,600
Mercury	mg/Kg	NA	0.182J	0.69
Nickel	mg/Kg	NA	10.9	63.7
Selenium	mg/Kg	NA	0.643J	1.5
Silver	mg/Kg	NA	<1.4	0.76
Thallium	mg/Kg	NA	<0.60	NB
Vanadium	mg/Kg	NA	16.5	84.4
Zinc	mg/Kg	NA	82.3J	152
PCBs				
Aroclor 1016	mg/Kg	<0.56	NA	
Aroclor 1221	mg/Kg	<0.56	NA	
Aroclor 1232	mg/Kg	<0.56	NA	
Aroclor 1242	mg/Kg	<0.56	NA	
Aroclor 1248	mg/Kg	<0.56	NA	
Aroclor 1254	mg/Kg	7.86J	NA	
Aroclor 1260	mg/Kg	<0.56	NA	

Background levels from the RFI Final Report Volume II, Baseline Risk Assessment (ENVIRON Corporation 1996).
PCB - Polychlorinated biphenyl.
< - Constituent not detected above laboratory detection limit shown.
mg/Kg - Milligram per kilogram.
NA - Not analyzed.
NB - No background levels were calculated.
J - Estimated value.
UJ - Constituent was not detected above the reporting limit, detection limit is estimated.
ft bls - Feet below land surface.

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Table 3-4. Analytical Results for Selected Groundwater Samples Collected in March 1998, General Motors Corporation, Moraine, Ohio.

Constituents	Units	EAST 3/5/98	GM-2 3/4/98	GM-21 3/10/98	GM-22 3/10/98	DUP-57 3/10/98	GM-23 3/9/98	HR-11 3/9/98
Semi-Volatile Organic Compounds	ug/l	ND	ND	ND	ND	ND	ND	ND
Polychlorinated Biphenyls	ug/l	ND	ND	ND	ND	ND	ND	ND
Metals								
Antimony	mg/l	0.0161	<0.0010	<0.0010	0.0012	0.0012	<0.0050	<0.0050
Antimony, Dissolved	mg/l	0.0078	NA	NA	<0.0010	0.001	NA	NA
Arsenic	mg/l	<0.025	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	<0.025
Barium	mg/l	0.117	0.104	0.0808	0.149	0.161	0.161	0.172
Barium, Dissolved	mg/l	0.086	0.0973	0.0634J	0.106J	0.120J	0.0908	0.0944
Beryllium	mg/l	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050
Cadmium	mg/l	<0.0050	<0.0010	<0.0010	0.0012	0.0021	<0.0050	<0.0050
Cadmium, Dissolved	mg/l	NA	NA	NA	<0.0010	<0.0010	NA	NA
Chromium	mg/l	0.066	0.0027U	0.0069	<0.0020	0.0027U	0.018	0.0160U
Chromium, Dissolved	mg/l	<0.0020	<0.0020	<0.0020	NA	<0.0020	<0.0020	<0.0020
Cobalt	mg/l	<0.025	<0.0050	0.0094	<0.0050	<0.0050	<0.025	<0.025
Cobalt, Dissolved	mg/l	NA	NA	<0.0050	NA	NA	NA	NA
Copper	mg/l	<0.025	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	<0.025
Iron	mg/l	7.77	<0.10	1.65	0.680J	0.910J	15.0	10.5
Iron, Dissolved	mg/l	<0.10	NA	<0.10	<0.10	<0.10	<0.10	<0.10
Lead	mg/l	0.0077	<0.0010	0.0011	0.0021	0.003	0.0129	0.0074
Lead, Dissolved	mg/l	<0.0010	NA	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Manganese	mg/l	1.00	0.048	0.719	0.143J	0.183J	2.63	0.369
Manganese, Dissolved	mg/l	0.122	<0.010	0.181	0.097	0.096	0.242	0.072
Mercury	mg/l	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002
Nickel	mg/l	0.0560J	0.0056J	0.0100J	0.0589J	0.0624J	0.029	0.027
Nickel, Dissolved	mg/l	0.0062	<0.0050	<0.0050	0.043	0.048	<0.0050	0.0064
Selenium	mg/l	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Silver	mg/l	<0.0020	<0.0005	<0.0005	<0.0005	<0.0005	<0.0020	<0.0020
Thallium	mg/l	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0050	<0.0050
Tin	mg/l	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Vanadium	mg/l	<0.025	<0.0050	<0.0050	<0.0050	<0.0050	<0.025	<0.025
Zinc	mg/l	<0.25	<0.050	<0.050	<0.050	<0.050	<0.25	<0.25

NA	Not analyzed.
ND	Not detected.
mg/l	Milligrams per liter.
ug/l	Micrograms per liter.
J	Value is estimated.
U	Sample result has been qualified as a non-detect due to blank contamination.
DUP-57	Duplicate of GM-22.
<	Constituent not detected above laboratory detection limit shown.

Table 3-5. VOC Analytical Results for Groundwater Samples Collected from Upper Aquifer Wells, March 1998, Supplemental RFI, General Motors Corporation, Moraine, Ohio.

Constituents	Units	HR-9 03/06/98	HR-11 03/09/98	GM-24 03/06/98	W-3-N 03/05/98	GM-23 03/09/98	GM-25 03/06/98	HR-1 03/05/98	W-1-S 03/05/98	ME-6 03/09/98	ME-3 03/09/98	HR-17 03/05/98
Volatile Organic Compounds												
1,1,1-Trichloroethane	ug/l	15.0	<1.0	1.1	<1.0	<200J	<1.0	1.5	<1.0	2.4	35.3	1.6J
1,1-Dichloroethane	ug/l	56.2	6.8	<1.0	<1.0	<200J	<1.0	2.1	<1.0	<1.0	13.5	<1.0J
1,1-Dichloroethene	ug/l	<1.0	<1.0	<1.0	<1.0	<200J	<1.0	<1.0	<1.0	<1.0	1.4	<1.0J
1,2-Dichloroethane	ug/l	1.8	<1.0	<1.0	<1.0	<200J	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0J
Benzene	ug/l	<1.0	<1.0	<1.0	<1.0	<200J	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0J
Bromodichloromethane	ug/l	<1.0	<1.0	3.4	<1.0	<200J	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0J
Chloroethane	ug/l	<10	<10	<10	<10	<2000J	<10	<10	<10	<10	<10	<10
Chloroform	ug/l	<1.0	<1.0	15.1	<1.0	<200J	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0J
Ethylbenzene	ug/l	<1.0	<1.0	<1.0	<1.0	<200J	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0J
Fluorotrichloromethane	ug/l	<1.0	<1.0	<1.0	<1.0	<200J	<1.0	3.2	3.7	<1.0	<1.0	<1.0J
Tetrachloroethene	ug/l	<1.0	<1.0	<1.0	2.6	11200J	<1.0	48.8	29.0	193	75.6	7.0J
Trichloroethene	ug/l	14.0	<1.0	<1.0	<1.0	3870J	<1.0	69.8	9.4	456	64.1	4.5J
Vinyl chloride	ug/l	<2.0	<2.0	<2.0	20.4	766J	<2.0	<2.0	<2.0	<2.0	6.2	<2.0J
Xylenes, total	ug/l	<1.0	<1.0	<1.0	<1.0	<200J	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0J
cis-1,2-Dichloroethene	ug/l	20.9	1.4	<1.0	289	3870J	<1.0	10.6	5.0	15.2	36.0	<1.0J
trans-1,2-Dichloroethene	ug/l	2.8	<1.0	<1.0	3.6	<200J	<1.0	2.6	1.2	1.1	<1.0	<1.0J
Total VOCs	ug/l	**110.7**	**8.2**	**19.6**	**315.6**	**19,706**	**0**	**138.6**	**48.3**	**667.7**	**232.1**	**13.1**

ug/l - Micrograms per liter.

J - Value is estimated.

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

DUP-56 - Duplicate of GM-8.

DUP-57 - Duplicate of GM-22.

< - Constituent not detected above laboratory detection limit shown.

Table 3-5. VOC Analytical Results for Groundwater Samples Collected from Upper Aquifer Wells, March 1998, Supplemental RFI, General Motors Corporation, Moraine, Ohio.

Constituents	Units	EAST 03/05/98	GM-22 03/10/98	DUP-57 03/10/98	GM-21 03/10/98	GM-8 03/04/98	DUP-56 03/04/98	GM-6 03/04/98	GM-2 03/04/98	WSU-24 03/03/98	GM-10 03/03/98	GM-26 03/03/98
Volatile Organic Compounds												
1,1,1-Trichloroethane	ug/l	17.5	<1.0J	<1.0J	55.0	6.7	6.8	36.2	5.9J	1.7	2.3	<1.0
1,1-Dichloroethane	ug/l	6.4	1.3	1.3	7.6	49.3	52.6	35.3	1.7J	<1.0	1.5	<1.0
1,1-Dichloroethene	ug/l	1.3	<1.0J	<1.0J	4.5	1.0	1.1	<1.0	<1.0J	<1.0	<1.0	<1.0
1,2-Dichloroethane	ug/l	<1.0	<1.0J	<1.0J	<1.0J	<1.0	<1.0	<1.0	<1.0J	<1.0	<1.0	<1.0
Benzene	ug/l	<1.0	<1.0UJ	<1.0UJ	<1.0UJ	2.3	2.3	<1.0	<1.0UJ	<1.0	<1.0	<1.0
Bromodichloromethane	ug/l	<1.0	<1.0J	<1.0J	<1.0J	<1.0	<1.0	<1.0	<1.0J	<1.0	<1.0	<1.0
Chloroethane	ug/l	<10	<10UJ	<10UJ	<10UJ	16.2	16.8	<10	<10UJ	<10	<10	<10
Chloroform	ug/l	<1.0	<1.0J	<1.0J	<1.0J	<1.0	<1.0	<1.0	<1.0J	<1.0	<1.0	<1.0
Ethylbenzene	ug/l	<1.0	<1.0UJ	<1.0UJ	<1.0UJ	28.9	27.6	<1.0	<1.0UJ	<1.0	<1.0	<1.0
Fluorotrichloromethane	ug/l	<1.0	<1.0J	<1.0J	4.9	<1.0	<1.0	<1.0	<1.0J	<1.0	<1.0	<1.0
Tetrachloroethene	ug/l	66.2	5.1	5.0	<1.0J	20.0	19.7	94.0	8.5J	1.3	1.5	<1.0
Trichloroethene	ug/l	64.0	4.5	4.6	356	95.2	96.8	119	75.1J	14.2	28.0	<1.0
Vinyl chloride	ug/l	<2.0	<2.0J	<2.0J	<2.0J	10.1	10.7	2.3	<2.0J	<2.0	<2.0	<2.0
Xylenes, total	ug/l	<1.0	<1.0UJ	<1.0UJ	<1.0UJ	10.3	10.2	<1.0	<1.0UJ	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/l	13.9	1.6	<1.0J	74.5	56.1	57.1	82.4	10.5J	<1.0	3.6	<1.0
trans-1,2-Dichloroethene	ug/l	6.4	<1.0J	<1.0J	3.6	10.1	10.6	2.4	<1.0J	<1.0	<1.0	<1.0
Total VOCs	ug/l	**175.7**	**12.5**	**10.9**	**506.1**	**306.2**	**312.3**	**371.6**	**101.7**	**17.2**	**36.9**	**0**

ug/l - Micrograms per liter.

J - Value is estimated.

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

DUP-56 - Duplicate of GM-8.

DUP-57 - Duplicate of GM-22.

< - Constituent not detected above laboratory detection limit shown.

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Table 3-6. Analytical Results for Soil Samples, AOI 36-Former Southwest ASTs, February 1998, General Motors Corporation, Moraine, Ohio.

Constituents	Units	AST-BH1 2/19/98 2 ft bls	AST-BH1 2/19/98 22 ft bls	AST-BH2 2/19/98 2 ft bls	AST-BH2 2/19/98 24 ft bls	AST-BH2 2/19/98 DUP-53
Volatile Organic Compounds						
Tetrachloroethene	ug/kg	<6.0	6	<6.1	<5.6	<5.5
Trichloroethene	ug/kg	<6.0	6.5	<6.1	<5.6	5.9
Semi-volatile Organic Compounds						
Bis(2-ethylhexyl)phthalate	ug/kg	<393	1,230	<403	<370	<360
Polychlorinated Biphenyls	mg/kg	ND	ND	ND	ND	ND
Metals						
Antimony	mg/kg	<19J	<17J	<19.8J	<15J	<16J
Arsenic	mg/kg	325	1.57	150	8.19J	0.639J
Barium	mg/kg	86J	11J	65.2J	11J	12J
Beryllium	mg/kg	0.8	<0.9	0.9	0.8	0.9
Cadmium	mg/kg	<1.2	<5.2	<1.2	<4.4	<4.9
Chromium	mg/kg	11	<6.9	11	<5.8	<6.5
Cobalt	mg/kg	7.9	<3.4	6.4	<2.9	<3.3
Copper	mg/kg	25.5	6.9	18.7	6.6	8.9
Lead	mg/kg	17.1	3.27	16.4	5.23	4.77
Manganese	mg/kg	619	123	494	152	192
Mercury	mg/kg	0.033J	<0.011J	0.032J	<0.011J	<0.011J
Nickel	mg/kg	17.4	4.3	13.1	4.4	5.3
Selenium	mg/kg	0.798J	<0.888J	0.808J	0.941J	<0.907J
Silver	mg/kg	<1.5	<6.9	<1.6	<5.8	<6.5
Thallium	mg/kg	<0.60	<0.54	<0.61	0.633	<0.55
Vanadium	mg/kg	20.1	<8.6	14.3	<7.3	<8.2
Zinc	mg/kg	67.9J	17.9J	63.6J	18.3J	20.5J

ug/kg - Micrograms per kilogram.
mg/kg - Milligrams per kilogram.
J - The reported value is estimated.
ND - Not detected.
DUP-53 - Duplicate of AST-BH2-24/SL.
< - Constituent not detected above laboratory detection limit shown.

ft bls - Feet below land surface.

Table 3-7. Analytical Results for Soil Samples Near AOI 36-Former Southwest ASTs, June 1998, General Motors Corporation, Moraine, Ohio.

Constituents	Units	Soil Area A Composite 6/10/98	Soil Area A DUP-59 6/10/98	Soil Area B Composite 6/10/98	Soil Area C Composite 6/10/98	Soil Area D Composite 6/11/98	Berm Area E Composite 6/10/98	Berm Area F Composite 6/10/98	Berm Area G Composite 6/10/98
Arsenic	mg/Kg	20.1J	41.6J	37.3	33.4	10	5.33	64.9	94.6

J - Value is estimated.
mg/Kg - Milligram per kilogram.
DUP-59 - Duplicate of composite sample A.
Soil Area A composite sample consists of A-GS1 through A-GS4.
Soil Area B composite sample consists of B-GS5 through B-GS8.
Soil Area C composite sample consists of C-GS9 through C-GS12.
Soil Area D composite sample consists of D-GS13 through D-GS16.
Berm Area E composite sample consists of E-GS17 through E-GS21.
Berm Area F composite sample consists of F-GS22 through F-GS26.
Berm Area G composite sample consists of G-GS27 through G-GS32.
Soil area samples were collected in the 0-2 foot interval within native soil and berm area samples were collected 1-1.5 feet into the berm.

Table 3-8. Analytical Results for Soil Samples, AOI 7-Former Oil House Area, February 1998, General Motors Corporation, Moraine, Ohio.

Constituents	Units	OH-BH1/SL 2/23/98				OH-BH2/SL 2/20/98			OH-BH3/SL 2/23/98		
		2 ft bls	8 ft bls	30 ft bls	DUP-55	3 ft bls	31 ft bls	DUP-54	2 ft bls	16 ft bls	26 ft bls
Volatile Organic Compounds											
Tetrachloroethene	ug/kg	53.7	125	505	377	56.4	7,690	9,290	41.4	29.3	247
Trichloroethene	ug/kg	<5.2	<5.2	<53	<53	<5.3	<530	<520	<5.4	<5.2	521
Semi-volatile Organic Compounds											
Fluoranthene	ug/kg	<342	<344	<350	<347	4,570	<347	<346	<357	<346	<363
Phenanthrene	ug/kg	<342	<344	<350	<347	3,770	<347	<346	<357	<346	<363
Polychlorinated Biphenyls	mg/kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals											
Antimony	mg/kg	<17J	<17J	<17J	<20J	<18	<16	<17	<16J	<17J	<14J
Arsenic	mg/kg	2.76J	1.93J	1.53J	3.01J	2.09J	1.49	0.561J	10.4J	3.88J	2.51J
Barium	mg/kg	11	8.3	8.1	11	30.2J	11J	9.6J	30.2	14	16
Beryllium	mg/kg	1	<0.8	0.8	<1	1.1	0.9	0.9	1	0.9	0.9
Cadmium	mg/kg	<5.1	<5.1	<5.0	<6.1	<5.3	<4.8	<4.9	<4.9	<5.1	<4.3
Chromium	mg/kg	8.6	<6.9	<6.7	<8.2	<7.0	<6.4	<6.6	<6.5	<6.8	<5.7
Cobalt	mg/kg	<3.4	<3.4	<3.4	<4.1	<3.5	<3.3	<3.2	3.9	4.1	<2.9
Copper	mg/kg	3.9	7	5.5	7.4	6	7.4	7.5	12	13	7.5
Lead	mg/kg	3.67	2.72	3.55J	6.39J	5.47	4.11	4.14	9.39	4.36	4.8
Manganese	mg/kg	142	220	161J	2.88J	227	184	188	302	331	190
Mercury	mg/kg	<0.010	0.012	<0.011	<0.011	0.029	<0.011	<0.010	0.052	0.014	0.014
Nickel	mg/kg	25.2	5.8	4	6	4.3	5.9	4.9	8.5	14	6.6
Selenium	mg/kg	<1.66	<1.62	<0.881	<1.67	<1.57J	<1.67J	<0.780J	<0.805	<0.819	<0.860
Silver	mg/kg	<6.7	<6.9	<6.7	<8.2	<7.0	<6.4	<6.6	<6.5	<6.8	<5.7
Thallium	mg/kg	<0.52	<0.52	<0.53	<0.53	<0.53	<0.53	<0.52	<0.54	<0.52	<0.55
Vanadium	mg/kg	<8.5	<8.5	<8.4	<10	<8.8	<8.0	<8.2	<8.1	<8.5	<7.1
Zinc	mg/kg	16J	17.6J	16J	19J	26.2J	19J	18.6J	42.6J	227J	22.6J

ug/kg - Micrograms per kilogram.
mg/kg - Milligrams per kilogram.
J - The reported value is estimated.
ND - Not detected.
DUP-55 - Duplicate of OH-BH1-30/SL.
DUP-54 - Duplicate of OH-BH2-31/SL.
SL - Soil.
< - Constituent not detected above laboratory detection limit shown.
ft bls - Feet below land surface.

Table 3-8. Analytical Results for Soil Samples, AOI 7-Former Oil House Area, February 1998, General Motors Corporation, Moraine, Ohio.

Constituents	Units	OH-BH4/SL 2/23/98 2 ft bls	8 ft bls	24 ft bls
Volatile Organic Compounds				
Tetrachloroethene	ug/kg	123	113	474
Trichloroethene	ug/kg	20.6	<5.5	<55
Semi-volatile Organic Compounds				
Fluoranthene	ug/kg	<350	<363	<363
Phenanthrene	ug/kg	<350	<363	<363
Polychlorinated Biphenyls	mg/kg	ND	ND	ND
Metals				
Antimony	mg/kg	<17J	<18J	<18J
Arsenic	mg/kg	3.54J	3.91J	2.59J
Barium	mg/kg	13	7.7	24.3
Beryllium	mg/kg	0.8	<0.9	<0.9
Cadmium	mg/kg	<5.0	<5.3	<5.3
Chromium	mg/kg	<6.6	<7.0	<7.0
Cobalt	mg/kg	<3.3	<3.5	<3.5
Copper	mg/kg	6.1	6.8	7
Lead	mg/kg	6.06	4.36	4.56
Manganese	mg/kg	159	151	178
Mercury	mg/kg	0.013	<0.011	0.014
Nickel	mg/kg	5.6	5.6	5.4
Selenium	mg/kg	<0.863	<0.890	<0.786
Silver	mg/kg	<6.6	<7.0	<7.0
Thallium	mg/kg	<0.53	<0.55	<0.55
Vanadium	mg/kg	<8.3	<8.8	<8.7
Zinc	mg/kg	22J	26J	27.8J

ug/kg - Micrograms per kilogram.
mg/kg - Milligrams per kilogram.
J - The reported value is estimated.
ND - Not detected.
DUP-55 - Duplicate of OH-BH1-30/SL.
DUP-54 - Duplicate of OH-BH2-31/SL.
SL - Soil.
< - Constituent not detected above laboratory detection limit shown.
ft bls - Feet below land surface.

Table 3-9. Analytical Results for Soil Samples, AOI 7-Former Oil House Area, August 1998, General Motors Corporation, Moraine, Ohio.

Constituents	Units	OH-BH5/SL 8/14/98			OH-BH6/SL 8/12/98				OH-BH7/SL 8/10/98			OH-BH8/SL 8/18/98		
		2 ft bls	20 ft bls	26 ft bls	2 ft bls	DUP-60	8 ft bls	24 ft bls	2 ft bls	20 ft bls	24 ft bls	2 ft bls	18 ft bls	28 ft bls
Volatile Organic Compounds														
1,1-Dichloroethane	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethene	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,2-Dichloroethene	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	ug/kg	<5.0	135	762J	554	500	38.9	119J	31.4	482	325	16.0	70.0	6,010
1,1,1-Trichloroethane	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Trichloroethene	ug/kg	<5.0	6.1	22.5	12.7	8.3	<5.0	5.8J	<5.0	5.1	<5.0	<5.0	<5.0	73.5
Vinyl Chloride	ug/kg	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Total VOCs	ug/kg	0.0	141.1	784.5	566.7	508.3	38.9	124.8	31.4	487.1	325	16.0	70.0	6,119.8

ug/kg - Micrograms per kilogram.
SL - Soil.
J - The reported value is estimated.
DUP-60 - Duplicate of OH-BH6-2/SL.
DUP-62 - Duplicate of OH-BH9-30/SL.
< - Constituent not detected above laboratory detection limit shown.
ft bls - Feet below land surface.

Table 3-9. Analytical Results for Soil Samples, AOI 7-Former Oil House Area, August 1998, General Motors Corporation, Moraine, Ohio.

Constituents	Units	OH-BH9/SL 8/19/98			OH-BH10/SL 8/18/98			GM-27/SL 8/4/98			GM-28/SL 8/5/98
		2 ft bls	30 ft bls	DUP-62	2 ft bls	16 ft bls	28 ft bls	2 ft bls	20 ft bls	24 ft bls	26 ft bls
Volatile Organic Compounds											
1,1-Dichloroethane	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethene	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,2-Dichloroethene	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	6.0	<5.0
Tetrachloroethene	ug/kg	280	462J	619	548	235J	995	40.3	743	1,510J	27.0J
1,1,1-Trichloroethane	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Trichloroethene	ug/kg	<5.0	<5.0	<5.0	24.7	<5.0	20.0	<5.0	6.9	16.4	<5.0J
Vinyl Chloride	ug/kg	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0J	<10.0	<10.0	<10.0
Total VOCs	ug/kg	280	462	619	572.7	235	1,015	40.3	749.9	1,532.4	27.0

ug/kg - Micrograms per kilogram.
SL - Soil.
J - The reported value is estimated.
DUP-60 - Duplicate of OH-BH6-2/SL.
DUP-62 - Duplicate of OH-BH9-30/SL.
< - Constituent not detected above laboratory detection limit shown.
ft bls - Feet below land surface.

Table 3-10. Hydrophobic Dye Test Results, AOI 7 - Former Oil House Area, General Motors Corporation, Moraine, Ohio.

Boring	Depth Interval (ft bls)	Date	Appearance of Soil After Test	DNAPL Presence/Absence
GM-27	31.5 to 33.5	8/7/98	Sample taken from second attempted borehole. Separation of soil grain sizes. Possible red specs among soil particles floating on water surface.	Possible presence
GM-27	33.5 to 34.5	8/7/98	Sample very silty. Clear sheen containing red specs completely covers water surface.	Possible presence
GM-27	38 to 39	8/13/98	Separation of soil grain sizes. Slightly colored sheen with red specs observed on water surface. Slight odor noted.	Possible presence
GM-27	54 to 55	8/13/98	Very small spot of sheen observed on water surface with few red specs. Sample appeared clean otherwise.	No evidence
GM-28	30 to 32	8/5/98	Separation of soil grain sizes. No sheen, red specs or layers visible.	No evidence
OH-BH5	36.5 to 37.5	8/14/98	Separation of soil grain sizes. No sheen, red specs or layers visible.	No evidence
OH-BH6	30 to 31.5	8/12/98	Separation of soil grain sizes. 2 mm film on water surface containing soil particles and many red specs. Odor noted.	Possible presence
OH-BH7	30 to 30.5	8/10/98	Separation of soil grain sizes. No sheen, red specs or layers visible.	No evidence
OH-BH8	22 to 24	8/18/98	Separation of soil grain sizes. No sheen, red specs or layers visible.	No evidence
OH-BH8	36 to 38	8/18/98	Separation of soil grain sizes. No sheen, red specs or layers visible.	No evidence
OH-BH9	36 to 38	8/19/98	Separation of soil grain sizes. No sheen, red specs or layers visible.	No evidence
OH-BH10	32 to 34	8/18/98	Separation of soil grain sizes. No sheen, red specs or layers visible.	No evidence
OH-BH11	32 to 33.5	11/3/98	Separation of soil grain sizes. No sheen, red specs or layers visible.	No evidence
OH-BH12	32 to 33.5	11/6/98	Separation of soil grain sizes. Very heavy sheen observed on water surface with many red specs. Strong odor noted.	Possible presence
OH-BH13	26 to 27	11/10/98	Separation of soil grain sizes. No sheen, red specs or layers visible.	No evidence
OH-BH14	32 to 32.5	11/10/98	Separation of soil grain sizes. Some specs observed on water surface. No sheen noted.	No evidence
OH-BH15	40 to 42	11/5/98	Separation of soil grain sizes. Slight sheen and few specs observed on water surface.	Possible presence
OH-BH16	60 to 61.75	11/12/98	Separation of soil grain sizes. No sheen, red specs or layers visible.	No evidence
OH-BH17	56 to 57	11/13/98	Separation of soil grain sizes. No sheen, red specs or layers visible.	No evidence
OH-BH18	34 to 35.5	11/4/98	Separation of soil grain sizes. No sheen, red specs or layers visible.	No evidence
OH-BH19	34 to 35	11/9/98	Separation of soil grain sizes. No sheen, red specs or layers visible.	No evidence
OH-BH20	36 to 38	11/11/98	Separation of soil grain sizes. No sheen, red specs or layers visible.	No evidence
OH-BH2A	36 to 37	11/2/98	Separation of soil grain sizes. Heavy sheen and red specs in sheen observed on water surface.	Possible presence
OH-BH3A	28 to 30	11/6/98	Separation of soil grain sizes. No sheen, red specs or layers visible.	No evidence

ft - feet.
bls - below land surface.
mm - Millimeter.
OH - Oil House.
BH - borehole.
DNAPL - Dense nonaqueous phase liquid.

Table 3-11. Analytical Results for Groundwater Samples Collected Using a Hydropunch, AOI 7-Former Oil House Area, August 1998, General Motors Corporation, Moraine, Ohio.

Constituents	Units	OH-BH5/HP 37 ft bls 8/14/98	OH-BH6/HP 31.5 ft bls 8/12/98	OH-BH7/HP 30 ft bls 8/10/98	OH-BH8/HP 38 ft bls 8/18/98	OH-BH9/HP 38 ft bls 8/19/98	DUP-63 38 ft bls 8/19/98
Volatile Organic Compounds							
1,1-Dichloroethane	ug/L	18.5	8.5	2.1	20.6	<1.0	<1.0
1,1-Dichloroethene	ug/L	84.1	8.8	<2.0	3.6	<1.0	<1.0
trans-1,2-Dichloroethene	ug/L	7.6	13.2	11.1	7.0	<1.0	<1.0
cis-1,2-Dichloroethene	ug/L	1,280	1,900	962	226	<1.0	<1.0
Tetrachloroethene	ug/L	1,550	28.5	2,950	77.6	520J	543
1,1,1-Trichloroethane	ug/L	<2.0	<1.0	3.2	<2.0	5.4	6.1
Trichloroethene	ug/L	1,330	52.4	728	246	6.6	7.1
Vinyl Chloride	ug/L	436	503	7.3	2,680	<2.0	<2.0
Total VOCs	ug/L	4,706.2	2,514.4	4,663.7	3,260.8	532	556.2

ug/L - Micrograms per liter.
ft bls - Feet below land surface.
HP - Hydropunch.
J - The reported value is estimated.
DUP-63 - Duplicate of OH-BH9-38/HP.
< - Consituent not detected above laboratory detection limit shown.
TW - Temporary well.

Table 3-11. Analytical Results for Groundwater Samples Collected Using a Hydropunch, AOI 7-Former Oil House Area, August 1998, General Motors Corporation, Moraine, Ohio.

Constituents	Units	OH-BH10/HP 34 ft bls 8/18/98	GM-27/HP 32 ft bls 8/4/98	GM-27/HP 39 ft bls 8/13/98	GM-27/HP 50 ft bls 8/13/98	GM-27/TW 55 ft bls 8/19/98	GM-28/HP 32 ft bls 8/5/98
Volatile Organic Compounds							
1,1-Dichloroethane	ug/L	2.5	54.6	3.0	<2.0	<5.0	2.4
1,1-Dichloroethene	ug/L	1.3	6.8	<2.0	<2.0	<5.0	<2
trans-1,2-Dichloroethene	ug/L	1.4	42.8	6.8	<2.0	<5.0	6.2
cis-1,2-Dichloroethene	ug/L	57.0	3,540	821	17.4	395	187
Tetrachloroethene	ug/L	1,810	484	14.3	3.2	14	242
1,1,1-Trichloroethane	ug/L	6.2	1.5	<2.0	<2.0	<5.0	10.5
Trichloroethene	ug/L	66.6	75.6	113	80.9	69.5	444
Vinyl Chloride	ug/L	3.7	7,320	231	<4.0	110	<4.0
Total VOCs	ug/L	1,948.7	11,525.3	1,189.1	101.5	588.5	892.1

ug/L - Micrograms per liter.
ft bls - Feet below land surface.
HP - Hydropunch.
J - The reported value is estimated.
DUP-63 - Duplicate of OH-BH9-38/HP.
< - Consituent not detected above laboratory detection limit shown.
TW - Temporary well.

Table 3-12. Analytical Results for Groundwater Samples Collected in August 1998, General Motors Corporation, Moraine, Ohio.

Constituents	Units	GM-28/GW 8/17/98	DUP-61 8/17/98	GM-27/GW 8/24/98	ME-6/GW 8/24/98	HR-1/GW 8/24/98	DUP-64 8/24/98	HR-3/GW 8/24/98
Volatile Organic Compounds								
1,1-Dichloroethane	ug/L	<1.0	<1.0	1.7	3.4	1.5	1.6	4.1
1,1-Dichloroethene	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	ug/L	1.3	1.2	<1.0	<1.0	1.6	1.6	<1.0
cis-1,2-Dichloroethene	ug/L	38.2	35.7	48.5	17.2	9.4	9.3	4.6
Tetrachloroethene	ug/L	693	770	6.0	114	47.1	48.2	<1.0
1,1,1-Trichloroethane	ug/L	1.8	1.6	<1.0	26.1	<1.0	<1.0	<1.0
Trichloroethene	ug/L	98.1J	96.0	89.5	312	46.0	47.3	<1.0
Vinyl Chloride	ug/L	<2.0	<2.0	6.9	<2.0	<2.0	<2.0	<2.0
Total VOCs	ug/L	832.4	904.5	152.6	472.7	105.6	108.0	8.7

ug/L - Micrograms per liter.
GW - Groundwater.
LF - Low Flow Groundwater Sample taken as Part of Bioattenuation Study.
J - The reported value is estimated.
DUP-61 - Duplicate of GM-28/GW.
DUP-64 - Duplicate of HR-1/GW.
DUP-65 - Duplicate of GM-27/LF.
< - Constituent not detected above laboratory detection limit shown.

Table 3-12. Analytical Results for Groundwater Samples Collected in August 1998, General Motors Corporation, Moraine, Ohio.

Constituents	Units	GM-26/GW 8/24/98	GM-23/LF 8/26/98	GM-27/LF 8/26/98	DUP-65 8/26/98	GM-28/LF 8/26/98
Volatile Organic Compounds						
1,1-Dichloroethane	ug/L	<1.0	10.9	2.0	2.1	2.0
1,1-Dichloroethene	ug/L	<1.0	7.0	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	ug/L	<1.0	19.4	<1.0	<1.0	5.0
cis-1,2-Dichloroethene	ug/L	<1.0	3,710	54.9J	60.3	127
Tetrachloroethene	ug/L	1.2	8,800	4.2	4.7	500
1,1,1-Trichloroethane	ug/L	<1.0	4.2	<1.0	<1.0	10.0
Trichloroethene	ug/L	<1.0	1,190	104	104	475
Vinyl Chloride	ug/L	<2.0	914	8.5	9.3	<2.0
Total VOCs	ug/L	1.2	14,655.5	173.6	180.4	1,119

ug/L - Micrograms per liter.
GW - Groundwater.
LF - Low Flow Groundwater Sample taken as Part of Bioattenuation Study.
J - The reported value is estimated.
DUP-61 - Duplicate of GM-28/GW.
DUP-64 - Duplicate of HR-1/GW.
DUP-65 - Duplicate of GM-27/LF.
< - Constituent not detected above laboratory detection limit shown.

Table 3-13. Analytical Results for Soil Samples Collected in November 1998, AOI 7-Former Oil House Area, General Motors Corporation, Moraine, Ohio.

Constituents	Units	OH-BH2A/SL 11/2/98		OH-BH3A/SL 11/6/98	GM-23A/SL 11/5/98					OH-BH11/SL 11/3/98		
		14 ft bls	DUP-66	22 ft bls	2 ft bls	4 ft bls	5 ft bls	DUP-68	10 ft bls	2 ft bls	20 ft bls	28 ft bls
Volatile Organic Compounds												
1,1-Dichloroethane	ug/kg	R	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethene	ug/kg	R	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,2-Dichloroethene	ug/kg	R	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene	ug/kg	R	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	ug/kg	1,150J	2,540J	70.7	<5.0	9,440	908J	1,000	772	6.8	517	4,880
1,1,1-Trichloroethane	ug/kg	R	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Trichloroethene	ug/kg	53.9J	<50	14.2	<5.0	6.7J	<5.0	5.1	<5.0	<5.0	10.0	78.1
Vinyl Chloride	ug/kg	R	<20	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total VOCs		1,203.9	2,540	84.9	0.0	9,446.7	908	1,005.1	772	6.8	527.0	5,019.8

ug/kg - Micrograms per kilogram.
SL - Soil.
< - Constituent not detected above laboratory detection limit shown.
J - The reported value is estimated.
R - The data is unusable and the presence or absence of the analyte cannot be verified.
DUP-66 - Duplicate of OH-BH2A-14/SL.
DUP-68 - Duplicate of GM-23A-5/SL.
DUP-69 - Duplicate of OH-BH13-22/SL.
DUP-71 - Duplicate of OH-BH17-2/SL.
ft bls - Feet below land surface.

Table 3-13. Analytical Results for Soil Samples Collected in November 1998, AOI 7-Former Oil House Area, General Motors Corporation, Moraine, Ohio.

Constituents	Units	OH-BH12/SL 11/6/98			OH-BH13/SL 11/10/98				OH-BH14/SL 11/10/98		OH-BH15/SL 11/4/98			OH-BH16/SL 11/12/98	
		2 ft bls	14 ft bls	28 ft bls	2 ft bls	22 ft bls	DUP-69	25 ft bls	2 ft bls	24 ft bls	2 ft bls	18 ft bls	26 ft bls	2 ft bls	30 ft bls
Volatile Organic Compounds															
1,1-Dichloroethane	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethene	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,2-Dichloroethene	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene	ug/kg	<5.0	<5.0	6.3	<5.0	<5.0	<5.0	5.4	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	ug/kg	675	81.2	120	17.6	333J	48.2J	3,300	<5.0	108	118	95.1	367	<5.0	18.2
1,1,1-Trichloroethane	ug/kg	<5.0	<5.0J	<5.0J	<5.0	<5.0	<5.0	6.4J	<5.0J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Trichloroethene	ug/kg	35.8	13.8	25.3	10.0	60.4J	16.8J	1,780	5.2	8.4	30.3	<5.0	9.7	<5.0	<5.0
Vinyl Chloride	ug/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total VOCs		710.8	95.0	151.6	27.6	393.4	65.0	5,091.8	5.2	116.4	148.3	95.1	376.7	0.0	18.2

ug/kg - Micrograms per kilogram.
SL - Soil.
< - Constituent not detected above laboratory detection limit shown.
J - The reported value is estimated.
R - The data is unusable and the presence or absence of the analyte cannot be verified.
DUP-66 - Duplicate of OH-BH2A-14/SL.
DUP-68 - Duplicate of GM-23A-5/SL.
DUP-69 - Duplicate of OH-BH13-22/SL.
DUP-71 - Duplicate of OH-BH17-2/SL.
ft bls - Feet below land surface.

Table 3-13. Analytical Results for Soil Samples Collected in November 1998, AOI 7-Former Oil House Area, General Motors Corporation, Moraine, Ohio.

Constituents	Units	OH-BH17/SL 11/13/98			OH-BH18/SL 11/4/98			OH-BH19/SL 11/9/98		OH-BH20/SL 11/11/98	
		2 ft bls	DUP-71	30 ft bls	2 ft bls	6 ft bls	31 ft bls	2 ft bls	32 ft bls	2 ft bls	35 ft bls
Volatile Organic Compounds											
1,1-Dichloroethane	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethene	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,2-Dichloroethene	ug/kg	<5.0J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	ug/kg	<5.0J	<5.0	91.6	202	140	34.2J	<5.0	11.1	<5.0	<5.0
1,1,1-Trichloroethane	ug/kg	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Trichloroethene	ug/kg	<5.0J	6.8	<5.0	<5.0	<5.0	<5.0	5.8	7.8	8.8	<5.0
Vinyl Chloride	ug/kg	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Total VOCs		0.0	6.8	91.6	202	140	34.2	5.8	18.9	8.8	0.0

ug/kg - Micrograms per kilogram.
SL - Soil.
< - Constituent not detected above laboratory detection limit shown.
J - The reported value is estimated.
R - The data is unusable and the presence or absence of the analyte cannot be verified.
DUP-66 - Duplicate of OH-BH2A-14/SL.
DUP-68 - Duplicate of GM-23A-5/SL.
DUP-69 - Duplicate of OH-BH13-22/SL.
DUP-71 - Duplicate of OH-BH17-2/SL.
ft bls - Feet below land surface.

Table 3-14. Analytical Results for Groundwater Samples Collected Using a Hydropunch, AOI 7-Former Oil House Area, November 1998, General Motors Corporation, Moraine, Ohio.

Constituents	Units	OH-BH2A/HP 37 ft bls 11/3/98	OH-BH2A/HP DUP-67 11/3/98	OH-BH3A/HP 30 ft bls 11/6/98	OH-BH11/HP 33 ft bls 11/3/98	OH-BH12/HP 33.5 ft bls 11/6/98	OH-BH13/HP 27 ft bls 11/10/98	OH-BH14/HP 32 ft bls 11/11/98	OH-BH14/HP DUP-70 11/11/98
Volatile Organic Compounds									
1,1-Dichloroethane	ug/L	231	213	4.3	18.2	29.3	3.6	2.3	2.3
1,1-Dichloroethene	ug/L	<100	<100	<2	6.6	<1	1.4	<2.0	<2.0
trans-1,2-Dichloroethene	ug/L	<100	<100	<2	23.0	3.2	2.7	<2.0	<2.0
cis-1,2-Dichloroethene	ug/L	11,000	10,500	34.1	1,490	131	130	33.9	36.6
Tetrachloroethene	ug/L	1,180J	1,470	238	2,060	254	136	114	112
1,1,1-Trichloroethane	ug/L	<100	<100	24.4	43.5	2.1	12.0	<2.0	<2.0
Trichloroethene	ug/L	1,260J	1,390	1,560	1,680	45.5	3,500	39.0	42.4
Vinyl Chloride	ug/L	4,770J	4,460	4.5	245	113	<2	<4.0	<4.0
Total VOCs		18,441	18,033	1,865.3	5,566.3	578.1	3,785.7	189.2	193.3

ug/L - Micrograms per liter.
ft bls - Feet below land surface.
HP - Hydropunch.
< - Constitutent not detected above laboratory detection limit shown.
J - The reported value is estimated.
DUP-67 - Duplicate of OH-BH2A-37/HP.
DUP-70 - Duplicate of OH-BH14-32/HP.

Table 3-14. Analytical Results for Groundwater Samples Collected Using a Hydropunch, AOI 7-Former Oil House Area, November 1998, General Motors Corporation, Moraine, Ohio.

Constituents	Units	OH-BH15/HP 42 ft bls 11/5/98	OH-BH16/HP 33 ft bls 11/12/98	OH-BH16/HP 61 ft bls 11/12/98	OH-BH17/HP 40 ft bls 11/13/98	OH-BH17/HP 57 ft bls 11/13/98	OH-BH18/HP 35.5 ft bls 11/4/98	OH-BH19/HP 35 ft bls 11/11/98	OH-BH20/HP 38 ft bls 11/11/98
Volatile Organic Compounds									
1,1-Dichloroethane	ug/L	<2.0	<10.0	25.0	11.1	20.7	<2	<2.0	<2.0
1,1-Dichloroethene	ug/L	<2.0	<10.0	<1.0	<1.0	<2.0	<2	<2.0	<2.0
trans-1,2-Dichloroethene	ug/L	<2.0	<10.0	1.4	<1.0	<2.0	<2	<2.0	<2.0
cis-1,2-Dichloroethene	ug/L	281	<10.0	12.0	2.7	12.3	<2	<2.0	<2.0
Tetrachloroethene	ug/L	65.4	<10.0	2.0	82.6	10.0	712	27.3	<2.0
1,1,1-Trichloroethane	ug/L	18.3	<10.0	7.3	5.1	<2.0	88.8	6.3	<2.0
Trichloroethene	ug/L	981	<10.0	1.8	116	24.6	15.1	10.1	<2.0
Vinyl Chloride	ug/L	<4.0	<20.0	<2.0	<2.0	<4.0	<4	<4.0	<4.0
Total VOCs		1,345.7	0.0	49.5	217.5	67.6	815.9	43.7	0.0

ug/L - Micrograms per liter.
ft bls - Feet below land surface.
HP - Hydropunch.
< - Constitutent not detected above laboratory detection limit shown.
J - The reported value is estimated.
DUP-67 - Duplicate of OH-BH2A-37/HP.
DUP-70 - Duplicate of OH-BH14-32/HP.

Table 3-15. Toluene Analytical Results, AOI 7 - Former Oil House Area, General Motors Corporation, Moraine, Ohio.

Sample ID	Units	Analysis Date	Toluene
Groundwater Sample			
OH-BH5-37/HP	ug/L	8/14/98	<2
OH-BH6-31.5/HP	ug/L	8/12/98	11.6
OH-BH7-30/HP	ug/L	8/13/98	4.1
OH-BH8-38/HP	ug/L	8/19/98	6
OH-BH10-34/HP	ug/L	8/19/98	1
GM-27-32/HP	ug/L	8/12/98	17.1
GM-23/LF	ug/L	8/28/98	<1
GM-27/LF	ug/L	8/28/98	<1
GM-28/LF	ug/L	8/28/98	<1
OH-BH11-33/HP	ug/L	11/16/98	10.1
OH-BH12-33.5/HP	ug/L	11/18/98	19.9
OH-BH13-27/HP	ug/L	11/18/98	3.6
OH-BH14-32/HP	ug/L	11/20/98	<2
OH-BH15-42/HP	ug/L	11/17/98	2.6
OH-BH2A-37/HP	ug/L	11/13/98	>444*
DUP-67	ug/L	11/13/98	>465*
OH-BH3A-30/HP	ug/L	11/18/98	25.1
Soil Sample			
OH-BH5-2/SL	ug/Kg	8/17/98	<5
OH-BH5-20/SL	ug/Kg	8/17/98	<5
OH-BH5-26/SL	ug/Kg	8/17/98	<5
OH-BH6-2/SL	ug/Kg	8/17/98	<5
OH-BH6-8/SL	ug/Kg	8/17/98	<5
OH-BH6-24/SL	ug/Kg	8/17/98	<5
OH-BH7-2/SL	ug/Kg	8/17/98	<5
OH-BH7-20/SL	ug/Kg	8/17/98	<5
OH-BH7-24/SL	ug/Kg	8/17/98	<5
OH-BH8-2/SL	ug/Kg	8/20/98	<5
OH-BH8-18/SL	ug/Kg	8/20/98	<5
OH-BH8-28/SL	ug/Kg	8/20/98	29.3
OH-BH10-2/SL	ug/Kg	8/21/98	<5
OH-BH10-16/SL	ug/Kg	8/21/98	<5
OH-BH10-28/SL	ug/Kg	8/21/98	<5
GM-27-2/SL	ug/Kg	8/9/98	<5
GM-27-20/SL	ug/Kg	8/9/98	<5
GM-27-24/SL	ug/Kg	8/9/98	<5
OH-BH11-2/SL	ug/Kg	11/5/98	6.2
OH-BH11-20/SL	ug/Kg	11/4/98	5.7
OH-BH11-28/SL	ug/Kg	11/4/98	<5

Table 3-15. Toluene Analytical Results, AOI 7 - Former Oil House Area, General Motors Corporation, Moraine, Ohio.

Sample ID	Units	Analysis Date	Toluene
Soil Sample (continued)			
OH-BH12-2/SL	ug/Kg	11/16/98	<5
OH-BH12-14/SL	ug/Kg	11/16/98	<5
OH-BH12-28/SL	ug/Kg	11/16/98	<5
OH-BH13-2/SL	ug/Kg	11/17/98	<5
OH-BH13-22/SL	ug/Kg	11/18/98	<5
OH-BH13-25/SL	ug/Kg	11/17/98	<5
GM-23A-2/SL	ug/Kg	11/13/98	<5
GM-23A-4/SL	ug/Kg	11/13/98	13.9
GM-23A-5/SL	ug/Kg	11/13/98	<5
GM-23A-10/SL	ug/Kg	11/13/98	<5

ug/L - Microgram per liter.
ug/Kg - Microgram per kilogram.
SL - Soil.
HP - Hydropunch.
LF - Low flow.
DUP-67 - Duplicate of OH-BH2A-37/HP.
* Due to carryover, the calibration performed by NET on 11/13/98 did not pass the linearity criteria of Method 8260, the RSD exceeded the 30% limit. Results were also reported from a 100x dilution. At this dilution, NET estimated the toluene concentrations to be >24,800 ug/L for OH-BH2A-37/HP and >24,300 ug/L for DUP-67.

Table 4-1. Water-Level Measurements During the Supplemental RFI, March 1998, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Water-Level Elevation
Shallow Aquifer Wells			
W-1-N	739.02	32.72	706.30
W-2-N	731.68	26.02	705.66
W-3-N	733.66	28.17	705.49
W-4-N	731.63	26.15	705.48
HR-1	732.71	28.77	703.94
HR-2	734.75	29.26	705.49
HR-3	736.75	31.29	705.46
HR-4	742.6	36.50	706.10
HR-5	734.27	29.21	705.06
HR-6	732.66	28.31	704.35
HR-7	731.73	26.55	705.18
HR-8	743.42	37.04	706.38
HR-9	743.51	36.58	706.93
HR-11	743.33	36.59	706.74
HR-16	727.01	23.48	703.53
HR-17	726.43	22.72	703.71
W-1-S	729.29	25.50	703.79
W-2-S	726.64	23.72	702.92
W-3-S	733.42	30.60	702.82
W-4-S	727.68	24.81	702.87
GM-2	735.81	33.01	702.80
4S	731.36	28.82	702.54
GM-6	730.27	28.13	702.14
GM-8	735.17	32.71	702.46
GM-10	723.9	21.99	701.91
GM-16	725.3	23.15	702.15
GM-17	723.84	21.62	702.22
GM-18	723.8	21.65	702.15
GM-19S	730.85	27.67	703.18
GM-26	722.29	20.70	701.59
EAST	730.98	27.42	703.56
WEST	731.08	27.62	703.46
WSU-24	725.1	22.35	702.75
TW-2 (1)	733.38	33.25	700.13
GM-21	724.2	20.49	703.71

Table 4-1. Water-Level Measurements During the Supplemental RFI, March 1998, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Water-Level Elevation
GM-22	728.28	24.57	703.71
GM-23	730.99	25.32	705.67
GM-24	747.29	40.06	707.23
GM-25	746.17	40.83	705.34
ME-1	728.06	24.17	703.89
ME-2	728.4	24.56	703.84
ME-3	728.09	24.28	703.81
ME-4	728.31	24.57	703.74
ME-5	728.29	24.87	703.42
ME-6	728.34	24.52	703.82
Deep Aquifer Wells			
GM-1	735.74	33.29	702.45
GM-3	730.44	28.58	701.86
GM-4	731.46	29.62	701.84
GM-5	731.29	29.20	702.09
GM-7R	735.61	33.22	702.39
GM-9	724.07	22.71	701.36
GM-11	723.71	22.61	701.10
GM-13	723.82	23.35	700.47
GM-14	723.5	23.15	700.35
GM-15	725.23	25.10	700.13
GM-19D	730.25	27.85	702.40
GM-20D	727.26	24.80	702.46
HR-10	742.81	35.87	706.94
HR-12	742.64	35.80	706.84
HR-13	735.03	29.58	705.45
HR-14	731.63	26.21	705.42
HR-15	733.74	28.44	705.30
M73C	716.55	16.13	700.43
MT68	746.45	41.80	704.65
MT69	722.71	21.34	701.37
MT576M	751.46	45.13	706.33
MT596M*	757.73	50.20	707.53

Table 4-1. Water-Level Measurements During the Supplemental RFI, March 1998, General Motors Corporation, Moraine, Ohio.

Well	Measuring Point Elevation	Depth-to-Water (feet)	Water-Level Elevation
Production and Fire Wells			
32	732.1	23.79	703.31
35	733.96	(29.54)	704.42
37	731.24	NA (bolted shut)	NA
42	731.62	27.92	703.70
44	734.62	28.57	706.05
45	731.03	28.50	702.53
46	733.34	30.67	702.67
A	739	32.63	706.38
12A	742.35	40.83	701.52
FW-1	740.9	34.42	706.48
FW-2	737.48	32.92	704.56
FW-3	739.26	NA	NA
FW-4	731.62	28.35	703.27

Measuring point is to top of the PVC Casing.

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

Depth-to-water elevations were measured on March 11 and 12, 1998 using an electronic water level indicator except for HR-9 which was collected on March 16, 1998.

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

1. TW-2 is an active recovery well.

NA - Not accessible.

( ) - Probable measurement error.

*Measuring point is top of cement housing.

Table 4-2. Vertical Gradients For Shallow/Deep Well Pairs, March 11-12 1998, General Motors Corporation, Moraine, Ohio

Shallow/Deep Wells Pairs	Vertical Gradient	
	Direction	Magnitude
Upgradient		
HR-9/HR-10	U[1]	0.01
HR-11/HR-12	U	0.10
On-Site		
W-3-N/HR-15	D	-0.19
W-4-N/HR-14	D	-0.06
HR-3/HR-13	D	-0.01
4S/GM-5	D	-0.45
GM-8/GM-7R	D	-0.07
GM-16/GM-15	D	-2.02
GM-2/GM-1	D	-0.35
GM-18/GM-13	D	-1.68
GM-17/GM-11	D	-1.12
GM-6/GM-3	U	2.72
Downgradient		
GM-10/GM-9	D	-0.55
GM-26/MT-69	D	-0.22

D Downward gradient (-).
U Upward gradient (+).
[1]Water-level measurement for HR-9 could not be collected on March 11-12, 1998 therefore, water-level measurements from March 16, 1998 sampling event was used to conduct this evaluation.

Table 4-3. VOC Analytical Results for Groundwater Samples Collected from Lower Aquifer Wells, March 1998, General Motors Corporation, Moraine, Ohio.

Constituents	Units	HR-12 03/09/98	DUP-58 03/09/98	HR-13 03/10/98	GM-1 03/04/98	GM-20D 03/02/98	GM-9 03/03/98	MT-69 03/02/98
Volatile Organic Compounds								
1,1,1-Trichloroethane	ug/l	<1.0	<1.0	1.3	2.1	<1.0	<1.0	<1.0
1,1-Dichloroethane	ug/l	2.5	2.5	48.3	<1.0	<1.0	1.2	<1.0
Tetrachloroethene	ug/l	<1.0	<1.0	<1.0UJ	4.0	<1.0	<1.0	<1.0
Trichloroethene	ug/l	<1.0	<1.0	2.8	52.1	<1.0	7.7	<1.0
Vinyl chloride	ug/l	2.7	2.7	<2.0UJ	<2.0	<2.0	<2.0	<2.0
cis-1,2-Dichloroethene	ug/l	2.4	2.4	23.3	<1.0	<1.0	2.1	<1.0
trans-1,2-Dichloroethene	ug/l	<1.0	<1.0	3.3	<1.0	<1.0	<1.0	<1.0
Total VOCs		7.6	7.6	79	58.2	0	11	0

ug/l - Micrograms per liter.
UJ - Constituent was not detected. Detection limit is estimated.
ND - Not detected.
DUP-58 - Duplicate of HR-12.

Table 4-4. Bioattenuation Parameter Results in Upper Aquifer Monitor Wells March 1998, General Motors Corporation, Moraine, Ohio.

COMPOUND	UNITS	UPGRADIENT WELLS			SIDE-GRADIENT WELL	ON-SITE WELLS						
		HR-9 3/6/98	HR-11 3/9/98	GM-24 3/6/98	GM-25 3/6/98	W-3-N 3/5/98	GM-23 3/9/98	HR-1 3/5/98	ME-6 3/9/98	ME-3 3/9/98	W-1-S 3/5/98	HR-17 3/5/98
Inorganics & TOC												
Nitrate	mg/l	8.8	8.8	13.2	<4.4	<4.4	17.6	13.2	22.0	<4.4	13.2	13.2
Nitrite	mg/l	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033
Nitrogen, Ammonia	mg/l	<0.300	0.940	<0.300	<0.300	<0.300	<0.300	<0.300	<0.300	0.500	<0.300	<0.300
Manganese (Total)	mg/l	0.152	0.369	<0.01	0.310	0.089	2.63	<0.01	0.094	0.237	0.530	<0.01
Manganese (Dissolved)	mg/l	0.107	0.072	ns	0.058	0.083	0.242	ns	<0.01	0.050	0.011	ns
Iron (Total)	mg/l	1.37	10.5	<0.1	18.9	11.1	15.0	0.450	1.45	1.81	0.340	<0.1
Iron (Dissolved)	mg/l	<0.1	<0.1	ns	4.10	4.44	<0.1	<0.1	0.140	<0.1	<0.1	ns
Iron (Ferrous)	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Sulfate	mg/l	49.0	97.0	61.0	80.0	110	77.0	80.0	165	166	105	69.0
Sulfide	mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Organic Carbon	mg/l	1.00	3.00	<1	<1	2.00	8.00	2.00	<1	6.00	2.00	1.00
Chloride	mg/l	103	101	111	82.0	99.0	51.0	104	211	271	164	309
Permanent Gases												
Carbon Dioxide	mg/l	64.1	122.6	5.6	45.4	47.2	72.0	58.9	58.5	72.3	48.0	34.3
Oxygen	mg/l	1.81	1.37	8.15	1.23	3.68	1.24	1.95	2.38	1.12	2.11	4.00
Nitrogen	mg/l	26.4	21.4	18.5	23.4	24.5	19.4	20.1	16.2	16.8	23.5	18.9
Methane	mg/l	0.162931	0.012077	0.000463	0.001478	0.082004	0.079487	0.000380	0.000367	0.151422	0.000793	0.00052
Carbon Monoxide	mg/l	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Light Hydrocarbon Scan												
Ethane	ug/l	22.014	0.750	0.030	0.067	0.073	2.932	0.033	0.011	0.091	0.019	0.007
Ethene	ug/l	<0.005	<0.005	0.006	0.014	0.199	84.070	0.006	0.009	0.030	0.010	0.005
Field Parameters												
pH	S.U.	6.84	6.77	7.52	7.05	7.07	6.98	6.98	6.99	6.93	6.95	7.05
ORP	mV	30.90	121.70	42.50	-198.90	-87.30	92.70	47.40	118.60	119.40	79.30	104.10
Temperature	°C	15.88	16.04	17.18	18.38	15.16	17.77	20.65	22.53	23.46	15.87	14.01
Dissolved Oxygen	mg/L	0.20	0.21	5.15	0.14	0.17	0.42	0.40	1.23	0.27	0.44	2.07
Specific Conductance	umhos/cm	1,281	1,664	851	1,219	1,274	1,069	1,263	1,976	2,244	1,453	1,777

Table 4-4. Bioattenuation Parameter Results in Upper Aquifer Monitor Wells March 1998, General Motors Corporation, Moraine, Ohio.

COMPOUND	UNITS	ON-SITE WELLS								DOWNGRADIENT WELLS		
		EAST 3/5/98	GM-22 3/10/98	DUP-57 3/10/98	GM-21 3/10/98	GM-8 3/4/98	DUP-56 3/4/98	GM-6 3/4/98	GM-2 3/4/98	GM-10 3/3/98	GM-26 3/3/98	WSU-24 3/3/98
Inorganics & TOC												
Nitrate	mg/l	17.6	<4.4	<4.4	17.6	<4.4	<4.4	<4.4	22.0	22.0	17.6	22.0
Nitrite	mg/l	0.066	<0.033	<0.033	0.066	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033	<0.033
Nitrogen, Ammonia	mg/l	<0.300	<0.300	<0.300	<0.300	1.69	1.77	<0.300	<0.300	<0.300	<0.300	<0.300
Manganese (Total)	mg/l	1.00	0.143	0.183	0.719	0.204	0.214	1.07	0.048	0.033	0.056	<0.01
Manganese (Dissolved)	mg/l	0.122	0.097	0.096	0.181	0.229	0.218	1.00	<0.01	0.010	0.032	ns
Iron (Total)	mg/l	7.77	0.680	0.910	1.65	1.01	1.08	1.32	<0.1	<0.1	0.500	<0.1
Iron (Dissolved)	mg/l	<0.1	<0.1	<0.1	<0.1	1.22	1.18	<0.1	ns	ns	<0.1	ns
Iron (Ferrous)	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2	0.8	<0.2	<0.2	<0.2	<0.2	<0.2
Sulfate	mg/l	80.0	84.0	92.0	123	59.0	52.0	93.0	54.0	48.0	44.0	49.0
Sulfide	mg/l	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Organic Carbon	mg/l	2.00	3.00	3.00	2.00	7.00	8.00	3.00	<1	<1	<1	<1
Chloride	mg/l	267	296	280	119	248	246	227	200	140	92.0	106
Permanent Gases												
Carbon Dioxide	mg/l	50.5	41.8	45.6	41.2	15.8	15.9	47.4	41.0	38.2	24.9	38.6
Oxygen	mg/l	1.77	1.10	1.55	1.57	1.10	1.37	1.57	3.12	2.54	5.14	8.12
Nitrogen	mg/l	22.2	19.1	23.2	22.4	19.7	20.9	20.5	21.1	18.4	19.6	18.2
Methane	mg/l	0.007093	0.110000	0.090000	0.003020	1.480000	1.550000	0.008337	0.000255	0.001694	0.001746	0.000241
Carbon Monoxide	mg/l	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Light Hydrocarbon Scan												
Ethane	ug/l	0.027	0.115	0.115	0.054	0.370	0.423	0.047	0.009	0.008	0.017	<0.005
Ethene	ug/l	0.019	0.066	0.075	0.016	12.233	14.483	0.091	0.005	0.008	<0.005	<0.005
Field Parameters												
pH	S.U.	6.96	7.12	7.12	7.13	7.70	7.70	7.00	7.01	7.16	7.32	7.10
ORP	mV	-80.80	150.40	150.40	137.50	-145.00	-145.00	57.60	126.70	143.70	142.10	157.00
Temperature	°C	18.46	18.76	18.76	15.54	17.53	17.53	18.49	14.63	15.69	12.63	14.44
Dissolved Oxygen	mg/L	0.20	0.25	0.25	0.38	0.16	0.16	0.88	1.38	0.96	2.84	3.63
Specific Conductance	umhos/cm	1,777	2,721	2,721	1,884	1,539	1,539	1,422	1,191	1,424	1,144	1,303

ns	Not sampled.
mg/L	Milligrams per liter.
ug/L	Micrograms per liter.
S.U.	Standard units.
mV	Millivolts.
°C	Degrees Celsius.
umhos/cm	Micro-mohs/centimeter.

DUP-56 - Duplicate of GM-8.
DUP-57 - Duplicate of GM-22.
*HR-11 is upgradient and GM-23 is located within the suspected center of AOI-7 Former Oil House.
GM-22 is upgradient and, GM-21 and EAST are downgradient of AOI-13 Buildings 4, 6, and 13.
GM-22 is upgradient and GM-21 is downgradient of AOI-7 Building 15.
GM-21 is upgradient and GM-2 is downgradient of AOI-36 Former Southwest ASTs.

Table 4-5. Bioattenuation Parameter Results in AOI 7 - Former Oil House Area, August 1998, General Motors Corporation, Moraine, Ohio.

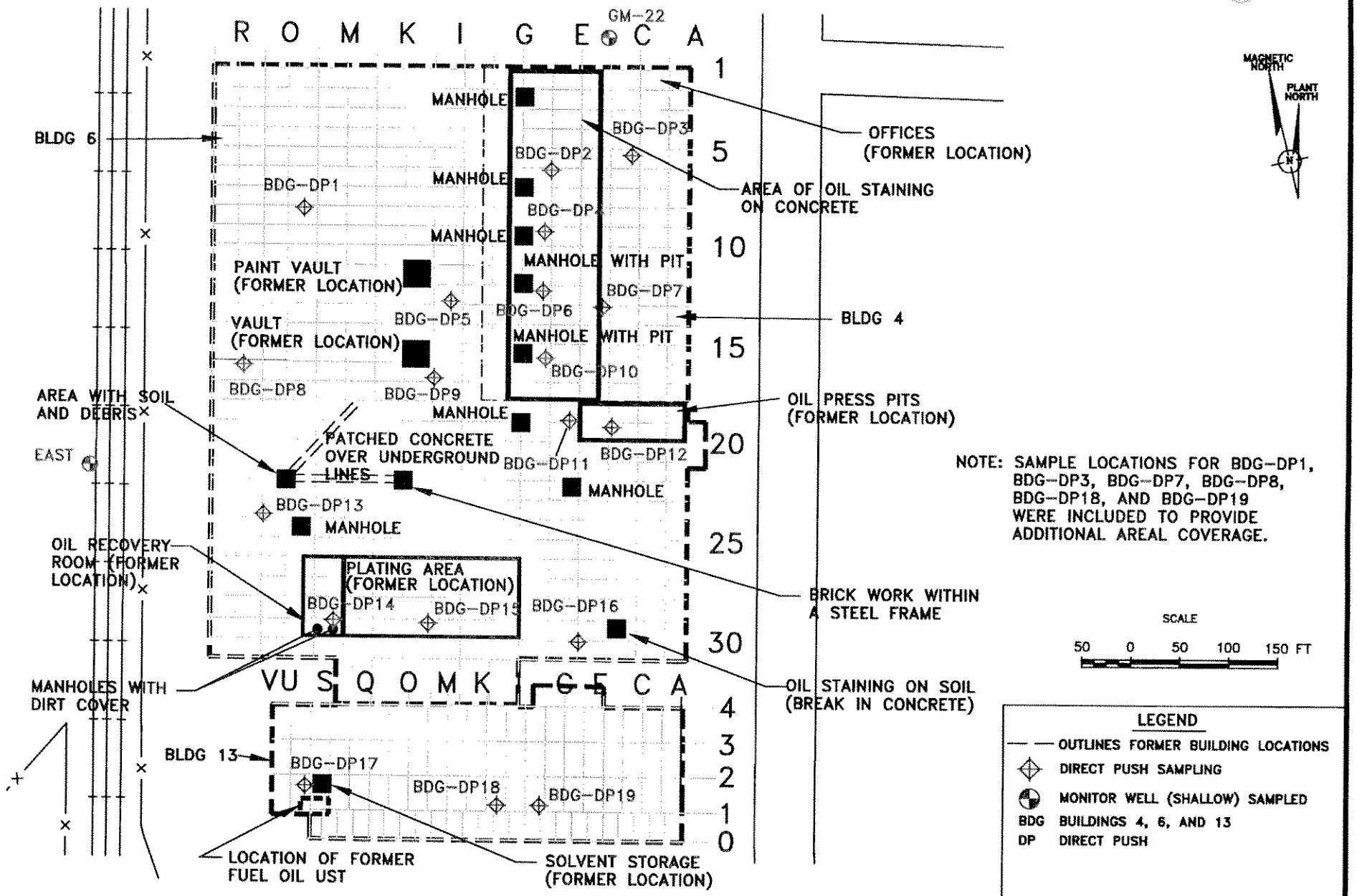
COMPOUND	UNITS	GM-23 8/26/98	GM-27 8/26/98	GM-28 8/26/98
Inorganics & TOC				
Nitrate	mg/l	22	<4.4	<4.4
Nitrite	mg/l	0.17	0.5	<0.033
Nitrogen, Ammonia	mg/l	<0.3	<0.3	<0.3
Manganese (Total)	mg/l	0.343	0.425	0.486
Manganese (Dissolved)	mg/l	0.197	0.17	0.269
Iron (Total)	mg/l	3.41	16	6.16
Iron (Dissolved)	mg/l	<0.10	0.19	<0.10
Iron (Ferrous)	mg/l	<0.2	<0.2	<0.2
Sulfate	mg/l	50	90	144
Sulfide	mg/l	<1	<2	<1
Total Organic Carbon	mg/l	9	2	6
Chloride	mg/l	69	118	163
Permanent Gases				
Carbon Dioxide	mg/l	58.32	63.42	31.50
Oxygen	mg/l	1.65	1.84	2.13
Nitrogen	mg/l	17.27	22.92	17.23
Methane	mg/l	0.063452	0.010517	0.004460
Carbon Monoxide	mg/l	<0.40	<0.40	<0.40
Light Hydrocarbon Scan				
Ethane	ug/l	5.136	4.599	0.990
Ethene	ug/l	75.038	4.700	0.696
Field Parameters				
pH	S.U.	6.57	6.80	7.02
ORP	mV	287.1	191.6	274.7
Temperature	°C	18.31	20.27	19.24
Dissolved Oxygen	mg/L	2.66	1.34	1.25
Specific Conductance	umhos/cm	952	1,271	1,336

mg/L	Milligrams per liter.
ug/L	Micrograms per liter.
S.U.	Standard units.
mV	Millivolts.
°C	Degrees Celsius.
umhos/cm	Micro-mohs/centimeter.

ARCADIS GERAGHTY&MILLER
8397 Emerald Parkway
Suite 150, Dublin, OH 43016
Tel: 614/764-2310 Fax: 614/764-1270

BORING LOCATIONS FOR AOI 34-EXCAVATION AREA 1 AND AOI 35-EXCAVATION AREA 2 GENERAL MOTORS CORPORATION MORAINE, OHIO

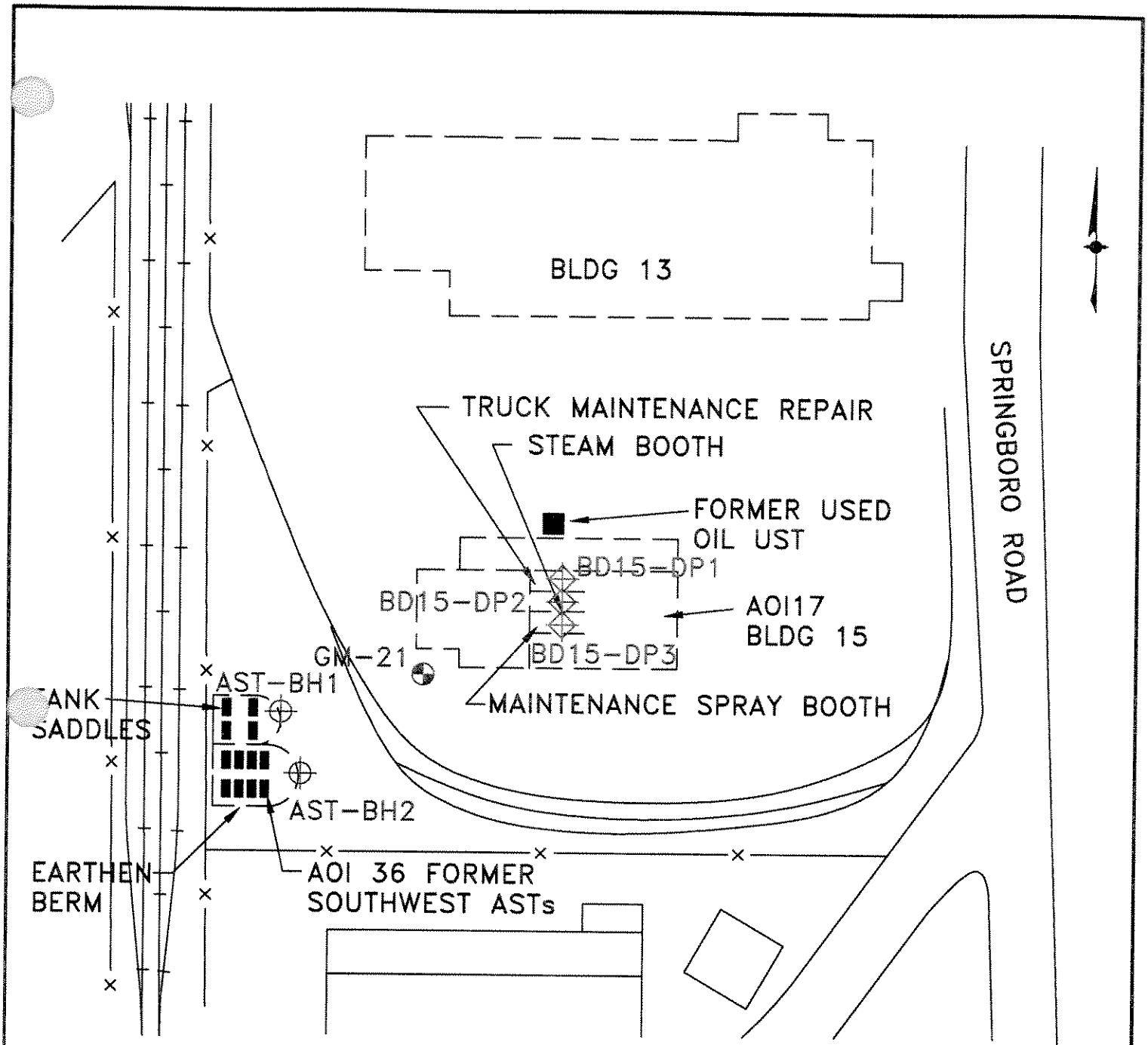
DATE 27APR99	PROJECT MANAGER J. REID	DRAWING NAME HAR\CRA\\OH294-04
DRAWN R. SMITH	LEAD DESIGN PROF.	CHECKED N. GILLOTTI
PROJECT NUMBER OH000294.0001.0002		FIGURE NUMBER 3-1



ARCADIS GERAGHTY&MILLER

DIRECT PUSH SOIL SAMPLE LOCATIONS FOR AOI 13. BUILDINGS 4, 6, AND 13 GENERAL MOTORS CORPORATION MORAINE, OHIO

DATE MAR99	PROJECT MANAGER N. GILLOTTI	DRAWING NAME NB\SUP\X3ARFI
DRAWN R. SMITH	LEAD DESIGN PROF. J. REID	CHECKED B. FERGUSON
PROJECT NUMBER 0H000294.0001.0002		FIGURE NUMBER 3-2



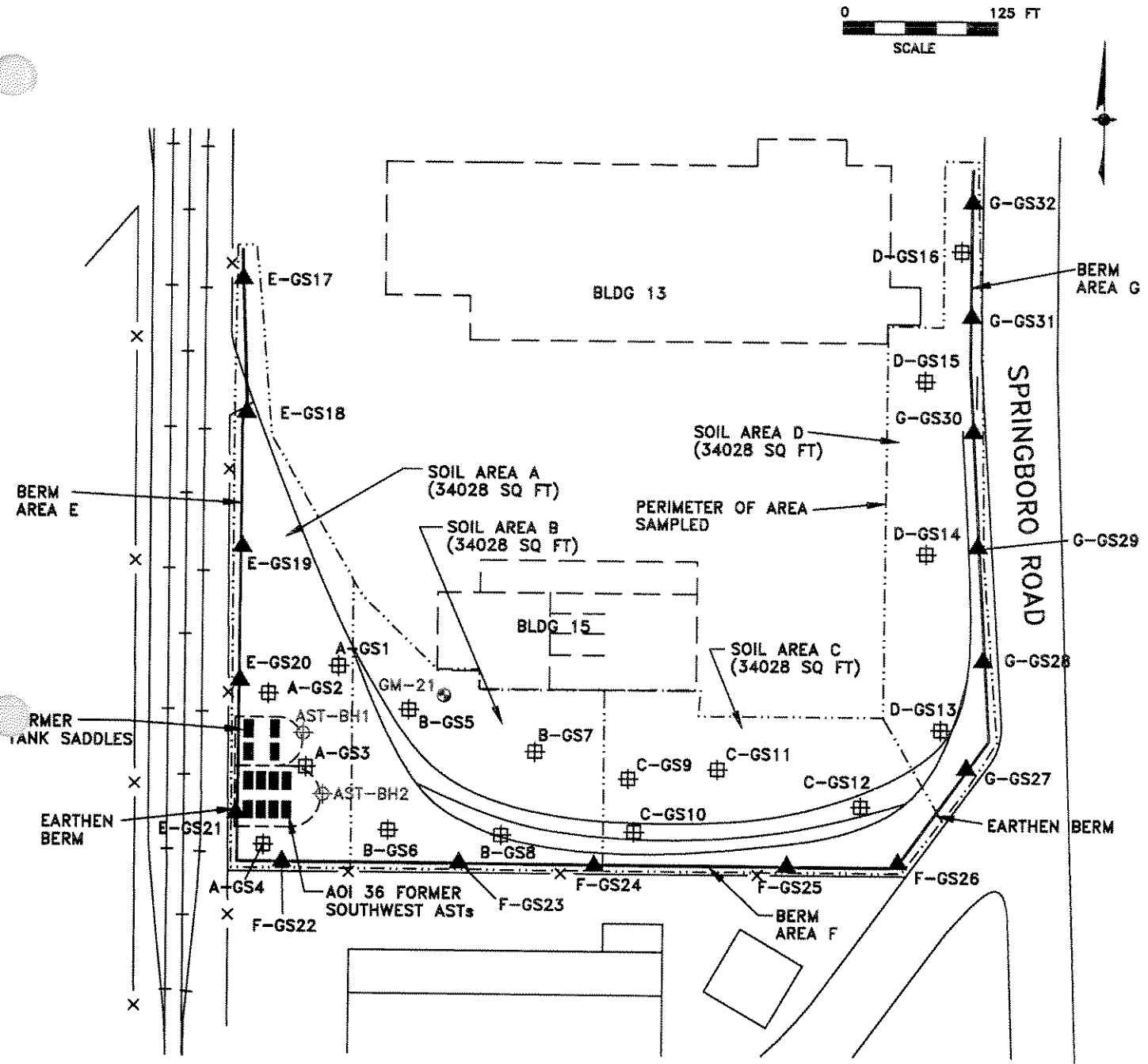
LEGEND

AOI	AREA OF INTEREST
— —	OUTLINES FORMER BUILDING LOCATIONS
	MONITOR WELL (SHALLOW) SAMPLED
	SOIL BORING
	DIRECT PUSH SAMPLING
BD15	BUILDING 15
DP	DIRECT PUSH SAMPLING
AST	FORMER SOUTHWEST ASTs
BH	BORE HOLE

ARCADIS GERAGHTY&MILLER
4700 Lakehurst Court
Suite 100, Dublin, OH 43016
Tel: 614/764-2310 Fax: 614/764-1270

DIRECT PUSH SOIL SAMPLING LOCATIONS
FOR AOI 17 - BUILDING 15 AND SOIL BORING
LOCATIONS FOR AOI 36 - FORMER SOUTHWEST ASTs
GENERAL MOTORS CORPORATION
MORAINE, OHIO

DATE	PROJECT MANAGER	DRAWING NAME
MAR99	N. GILLOTTI	NB\SUP\AOI36RFI
DRAWN	LEAD DESIGN PROF.	CHECKED
R. SMITH		N. GILLOTTI
PROJECT NUMBER		FIGURE NUMBER
0H000294.0001.00002		3-3



SOIL AREA A COMPOSITE SAMPLE CONSISTED OF A-GS1 THROUGH A-GS4.

SOIL AREA B COMPOSITE SAMPLE CONSISTED OF B-GS5 THROUGH B-GS8.

SOIL AREA C COMPOSITE SAMPLE CONSISTED OF C-GS9 THROUGH C-GS12.

SOIL AREA D COMPOSITE SAMPLE CONSISTED OF D-GS13 THROUGH D-GS16.

BERM AREA E COMPOSITE SAMPLE CONSISTED OF E-GS17 THROUGH E-GS21.

BERM AREA F COMPOSITE SAMPLE CONSISTED OF F-GS22 THROUGH F-GS26

BERM AREA G COMPOSITE SAMPLE CONSISTED OF G-GS27 THROUGH G-GS32

LEGEND

AOI	AREA OF INTEREST
— —	OUTLINES FORMER BUILDING LOCATIONS
◔	MONITOR WELL (SHALLOW) SAMPLED
⊕	SUPPLEMENTAL RFI SOIL BORING
⊞	HAND AUGER SAMPLE LOCATION
▲	HAND AUGER BERM SAMPLE LOCATION
GS	GRAB SAMPLE
BH	BORE HOLE

ARCADIS GERAGHTY & MILLER
4700 Lakehurst Court
Suite 100, Dublin, OH 43016
Tel: 614/764-2310 Fax: 614/764-1270

HAND AUGER SOIL SAMPLING LOCATIONS FOR AOI 36 – FORMER SOUTHWEST ASTs GENERAL MOTORS CORPORATION MORAINE, OHIO

DATE	PROJECT MANAGER	DRAWING NAME
MAR99	J. REID	AOI36-9
DRAWN	LEAD DESIGN PROF.	CHECKED
R. SMITH	J. REID	N. GILLOTTI
PROJECT NUMBER		DRAWING NUMBER
0H000294.001.002		3-4

1.

VIEW FACING SOUTH, WITH MORAINE ENGINE TANK FARM IN THE MIDDLE AND MORAINE ENGINE PLANT IN THE BACKGROUND.

2.

VIEW FACING SOUTH, WITH CHIP PAD IN THE FOREGROUND AND MORAINE ENGINE TANK FARM IN THE BACKGROUND.

3.

VIEW FACING NORTH, FROM DRIVEWAY WEST OF MORAINE ENGINE PLANT. MORAINE ENGINE TANK FARM PUMP HOUSE IN THE BACKGROUND.

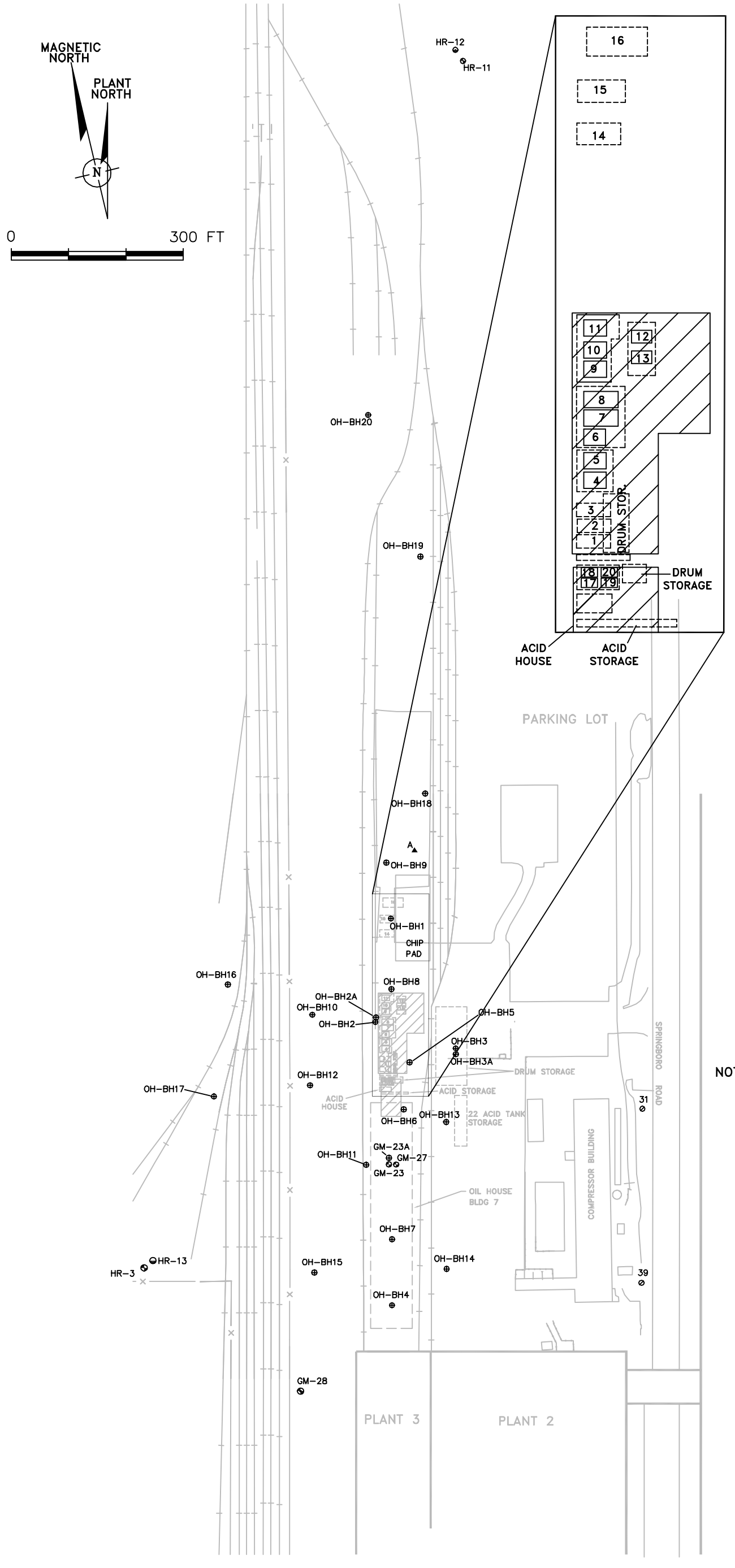
4.

VIEW FACING NORTH, OF THE MORAINE ENGINE TANK FARM PUMP HOUSE.

ARCADIS GERAGHTY&MILLER

AOI 7 - FORMER OIL HOUSE AREA
CURRENT CONDITIONS
GENERAL MOTORS CORPORATION
MORAINE, OHIO

DRAWN R. SMITH	DATE 22JUN99	PROJECT MANAGER J.REID	DRAWING NAME CRA\AOI7JPG
		LEAD DESIGN PROF. J. REID	CHECKED N. GILLOTTI
		PROJECT NUMBER 0H000294.01	FIGURE NUMBER 3



HISTORIC TANK No.	CONTENTS	CAPACITY
1	OIL	15,000 GALLONS
2	OIL	15,000 GALLONS
3	OIL	15,000 GALLONS
4	THINNER	8,000 GALLONS
5	REDUCER	8,000 GALLONS
6	ALCOHOL	8,000 GALLONS
7	KEROSENE	10,000 GALLONS
8	PERCHLOROETHENE	10,000 GALLONS
9	PERCHLOROETHENE	10,000 GALLONS
10	ALCOHOL	10,000 GALLONS
11	ALCOHOL	10,000 GALLONS
12	XYLOL	10,000 GALLONS
13	THINNER	10,000 GALLONS
14	FREON 12	160,000 LBS
15	FREON 12	160,000 LBS
16	OIL	30,000 GALLONS
17	ACID-HNO_3	11,000 GALLONS
18	ACID-HCl	10,000 GALLONS
19	ACID-H_2SO_4	13,000 GALLONS
20	ACID-H_3PO_4	11,000 GALLONS
21	DRUMS-OIL	300 BBL
22	ACID	-----

NOTE:

BORINGS OH-BH1 THROUGH OH-BH4 WERE INSTALLED IN FEBRUARY 1998. BORINGS OH-BH5 THROUGH OH-BH10 AND WELLS GM-27 AND GM-28 WERE INSTALLED IN AUGUST 1998. BORINGS OH-BH11 THROUGH OH-BH20, OH-BH2A, OH-BH3A, AND GM-23A WERE INSTALLED IN NOVEMBER 1998.

LEGEND

- MONITOR WELL (SHALLOW)
- MONITOR WELL (DEEP)
- SOIL BORING
- ACTIVE PRODUCTION WELL
- INACTIVE PRODUCTION WELL
- OH — OIL HOUSE
- BH — BORE HOLE
- FORMER LOCATION OF OIL HOUSE STRUCTURES
- APPROXIMATE LOCATION OF CURRENT MORAINE ENGINE TANK FARM

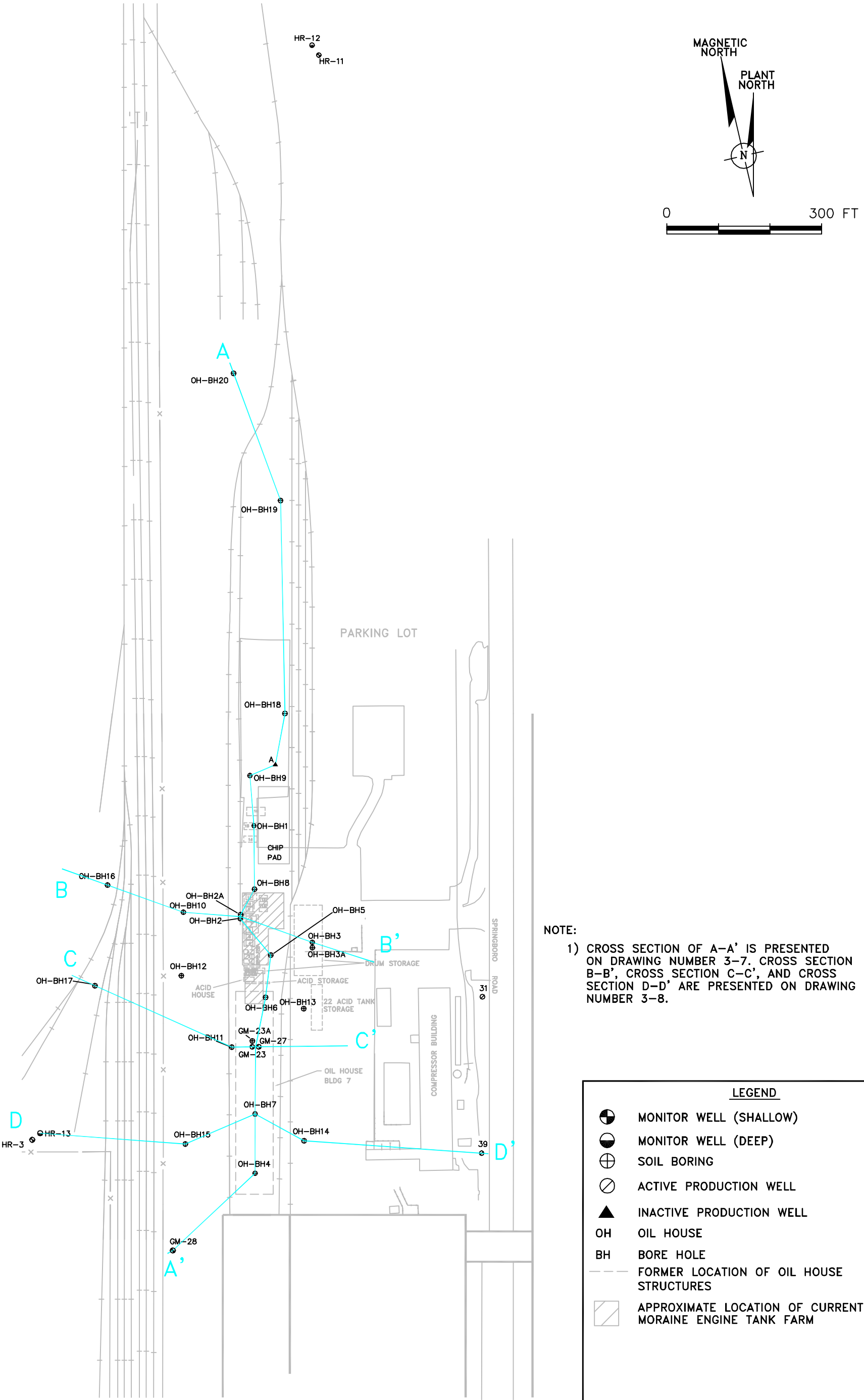
ARCADIS GERAGHTY & MILLER

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

SOIL BORING LOCATIONS FOR AOI 7 - FORMER OIL HOUSE AREA

GENERAL MOTORS CORPORATION
MORAINE, OHIO

DATE	PROJECT MANAGER	DRAWING NAME
MAR99	J. REID	HARR\N-B\RFISUP1D
DRAWN	LEAD DESIGN PROF.	CHECKED
R. SMITH	J. REID	N. GILLOTTI
PROJECT NUMBER		DRAWING NUMBER
0H000294.0001.0002		3-5



NOTE:

1) CROSS SECTION OF A–A' IS PRESENTED ON DRAWING NUMBER 3–7. CROSS SECTION B–B', CROSS SECTION C–C', AND CROSS SECTION D–D' ARE PRESENTED ON DRAWING NUMBER 3–8.

LEGEND

- MONITOR WELL (SHALLOW)
- MONITOR WELL (DEEP)
- SOIL BORING
- ACTIVE PRODUCTION WELL
- INACTIVE PRODUCTION WELL
- OH — OIL HOUSE
- BH — BORE HOLE
- FORMER LOCATION OF OIL HOUSE STRUCTURES
- APPROXIMATE LOCATION OF CURRENT MORAINE ENGINE TANK FARM

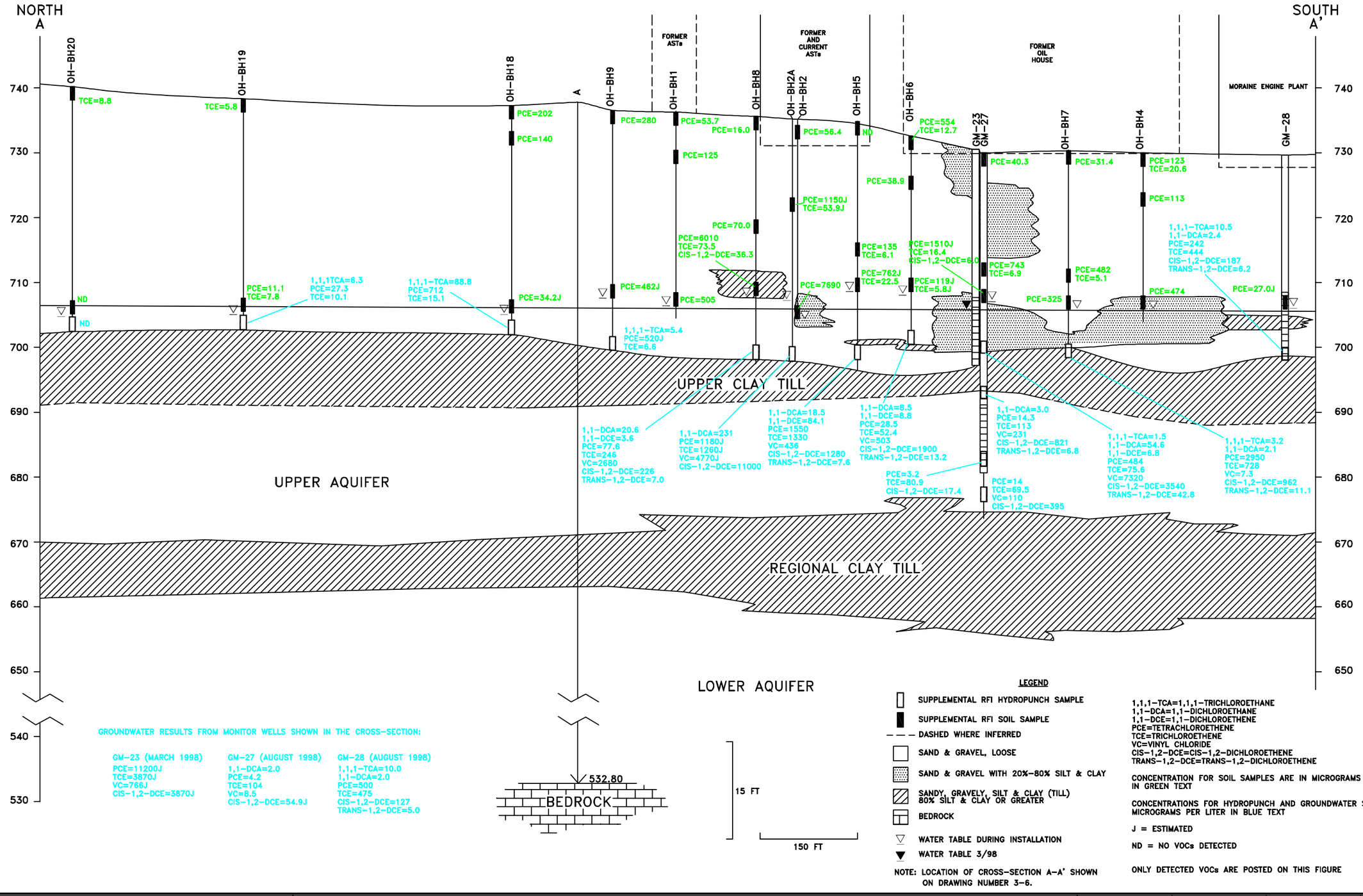
ARCADIS GERAGHTY & MILLER

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

LINES OF CROSS SECTION FOR AOI 7 – FORMER OIL HOUSE AREA

GENERAL MOTORS CORPORATION
MORAINE, OHIO

DATE	PROJECT MANAGER	DRAWING NAME
MAR99	J. REID	HARR\N-B\RFISUP1G
DRAWN	LEAD DESIGN PROF.	CHECKED
R. SMITH	J. REID	N. GILLOTTI
PROJECT NUMBER		DRAWING NUMBER
0H000294.0001.0002		3-6



GROUNDWATER RESULTS FROM MONITOR WELLS SHOWN IN THE CROSS-SECTION:

GM-23 (MARCH 1998)	GM-27 (AUGUST 1998)	GM-28 (AUGUST 1998)
PCE=11200J	1,1-DCA=2.0	1,1,1-TCA=10.0
TCE=3870J	PCE=4.2	1,1-DCA=2.0
VC=766J	TCE=104	PCE=500
CIS-1,2-DCE=3870J	VC=8.5	TCE=475
	CIS-1,2-DCE=54.9J	CIS-1,2-DCE=127
		TRANS-1,2-DCE=5.0

LEGEND

- SUPPLEMENTAL RFI HYDROPUNCH SAMPLE
- SUPPLEMENTAL RFI SOIL SAMPLE
- DASHED WHERE INFERRED
- SAND & GRAVEL, LOOSE
- SAND & GRAVEL WITH 20%-80% SILT & CLAY
- SANDY, GRAVELY, SILT & CLAY (TILL) 80% SILT & CLAY OR GREATER
- BEDROCK
- WATER TABLE DURING INSTALLATION
- WATER TABLE 3/98

NOTE: LOCATION OF CROSS-SECTION A-A' SHOWN ON DRAWING NUMBER 3-6.

1,1,1-TCA=1,1,1-TRICHLOROETHANE
1,1-DCA=1,1-DICHLOROETHANE
1,1-DCE=1,1-DICHLOROETHENE
PCE=TETRACHLOROETHENE
TCE=TRICHLOROETHENE
VC=VINYL CHLORIDE
CIS-1,2-DCE=CIS-1,2-DICHLOROETHENE
TRANS-1,2-DCE=TRANS-1,2-DICHLOROETHENE

CONCENTRATION FOR SOIL SAMPLES ARE IN MICROGRAMS PER KILOGRAM IN GREEN TEXT

CONCENTRATIONS FOR HYDROPUNCH AND GROUNDWATER SAMPLES ARE IN MICROGRAMS PER LITER IN BLUE TEXT

J = ESTIMATED

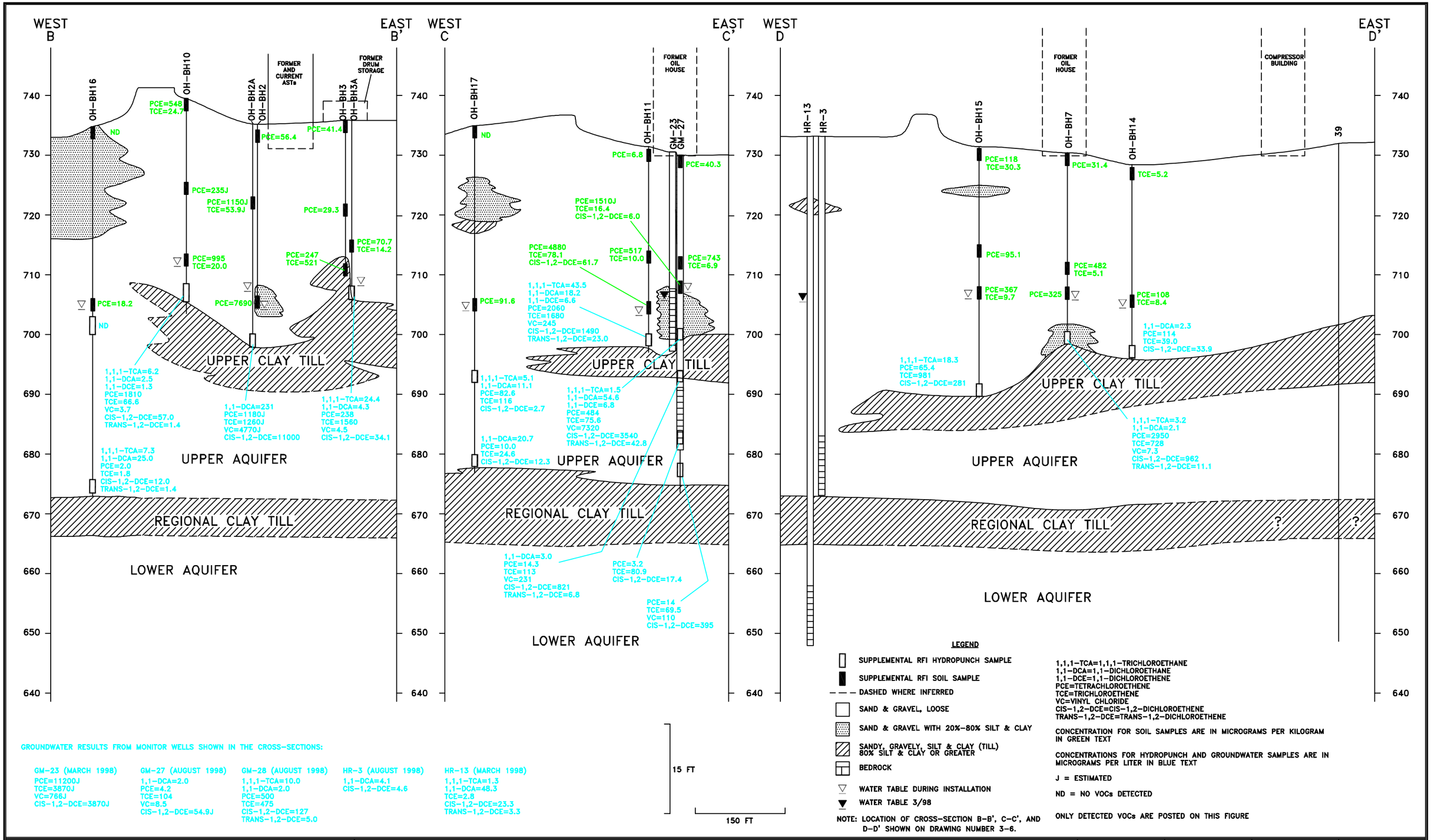
ND = NO VOCs DETECTED

ONLY DETECTED VOCs ARE POSTED ON THIS FIGURE

ARCADIS GERAGHTY & MILLER

CROSS SECTION A-A'
FOR AOI 7 - FORMER OIL HOUSE AREA
GENERAL MOTORS CORPORATION
MORAINE, OHIO

DRAWN	DATE	PROJECT MANAGER	DRAWING NAME
R. SMITH	27MAY99	J. REID	HAR\CRA\RFI\CS-01
		LEAD DESIGN PROF. J. REID	CHECKED N. GILLOTTI
		PROJECT NUMBER 0H0294.01.02	FIGURE NUMBER 3-7



GROUNDWATER RESULTS FROM MONITOR WELLS SHOWN IN THE CROSS-SECTIONS:

GM-23 (MARCH 1998)
PCE=11200J
TCE=3870J
VC=766J
CIS-1,2-DCE=3870J

GM-27 (AUGUST 1998)
1,1-DCA=2.0
PCE=4.2
TCE=104
VC=8.5
CIS-1,2-DCE=54.9J

GM-28 (AUGUST 1998)
1,1,1-TCA=10.0
1,1-DCA=2.0
PCE=500
TCE=475
CIS-1,2-DCE=127
TRANS-1,2-DCE=5.0

HR-3 (AUGUST 1998)
1,1-DCA=4.1
CIS-1,2-DCE=4.6

HR-13 (MARCH 1998)
1,1,1-TCA=1.3
1,1-DCA=48.3
TCE=2.8
CIS-1,2-DCE=23.3
TRANS-1,2-DCE=3.3

15 FT

150 FT

LEGEND

- SUPPLEMENTAL RFI HYDROPUNCH SAMPLE
- SUPPLEMENTAL RFI SOIL SAMPLE
- DASHED WHERE INFERRED
- SAND & GRAVEL, LOOSE
- SAND & GRAVEL WITH 20%-80% SILT & CLAY
- SANDY, GRAVELY, SILT & CLAY (TILL) 80% SILT & CLAY OR GREATER
- BEDROCK
- WATER TABLE DURING INSTALLATION
- WATER TABLE 3/98

NOTE: LOCATION OF CROSS-SECTION B-B', C-C', AND D-D' SHOWN ON DRAWING NUMBER 3-6.

1,1,1-TCA=1,1,1-TRICHLOROETHANE
1,1-DCA=1,1-DICHLOROETHENE
1,1-DCE=1,1-DICHLOROETHENE
PCE=TETRACHLOROETHENE
TCE=TRICHLOROETHENE
VC=VINYL CHLORIDE
CIS-1,2-DCE=CIS-1,2-DICHLOROETHENE
TRANS-1,2-DCE=TRANS-1,2-DICHLOROETHENE

CONCENTRATION FOR SOIL SAMPLES ARE IN MICROGRAMS PER KILOGRAM IN GREEN TEXT

CONCENTRATIONS FOR HYDROPUNCH AND GROUNDWATER SAMPLES ARE IN MICROGRAMS PER LITER IN BLUE TEXT

J = ESTIMATED

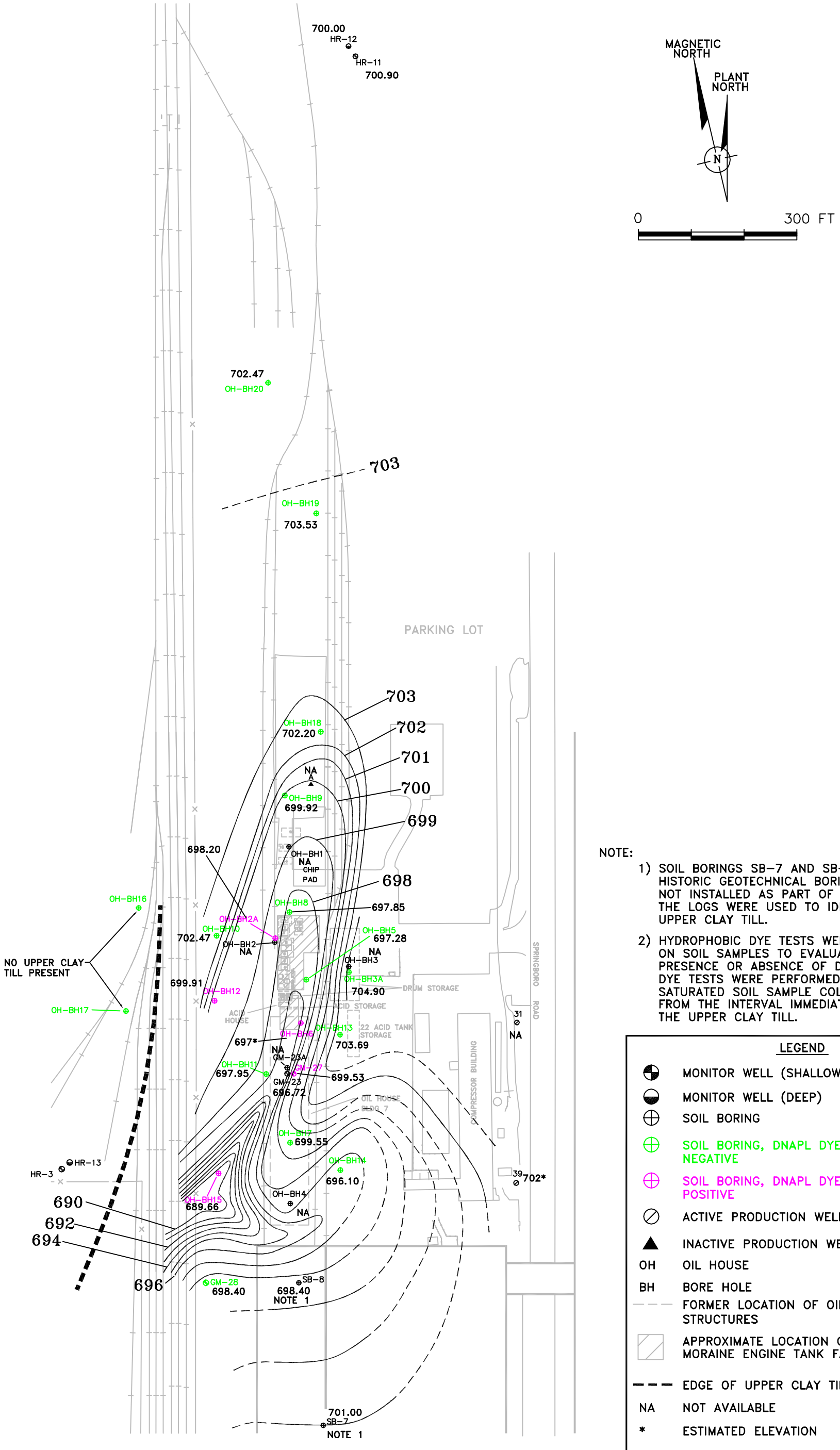
ND = NO VOCs DETECTED

ONLY DETECTED VOCs ARE POSTED ON THIS FIGURE

ARCADIS GERAGHTY&MILLER

CROSS SECTIONS B-B', C-C', AND D-D' FOR AOI 7 - FORMER OIL HOUSE AREA GENERAL MOTORS CORPORATION MORAINE, OHIO

DRAWN	DATE	PROJECT MANAGER	DRAWING NAME
R. SMITH	27MAY99	J. REID	HAR\CRA\RFI\CS-01
		LEAD DESIGN PROF. J. REID	CHECKED N. GILLOTTI
		PROJECT NUMBER 0H0294.01.02	FIGURE NUMBER 3-8



NOTE:

1) SOIL BORINGS SB-7 AND SB-8 WERE HISTORIC GEOTECHNICAL BORINGS AND NOT INSTALLED AS PART OF THE RFI THE LOGS WERE USED TO IDENTIFY THE UPPER CLAY TILL.
2) HYDROPHOBIC DYE TESTS WERE CONDUCTED ON SOIL SAMPLES TO EVALUATE THE PRESENCE OR ABSENCE OF DNAPL. THE DYE TESTS WERE PERFORMED ON A SATURATED SOIL SAMPLE COLLECTED FROM THE INTERVAL IMMEDIATELY ABOVE THE UPPER CLAY TILL.

LEGEND

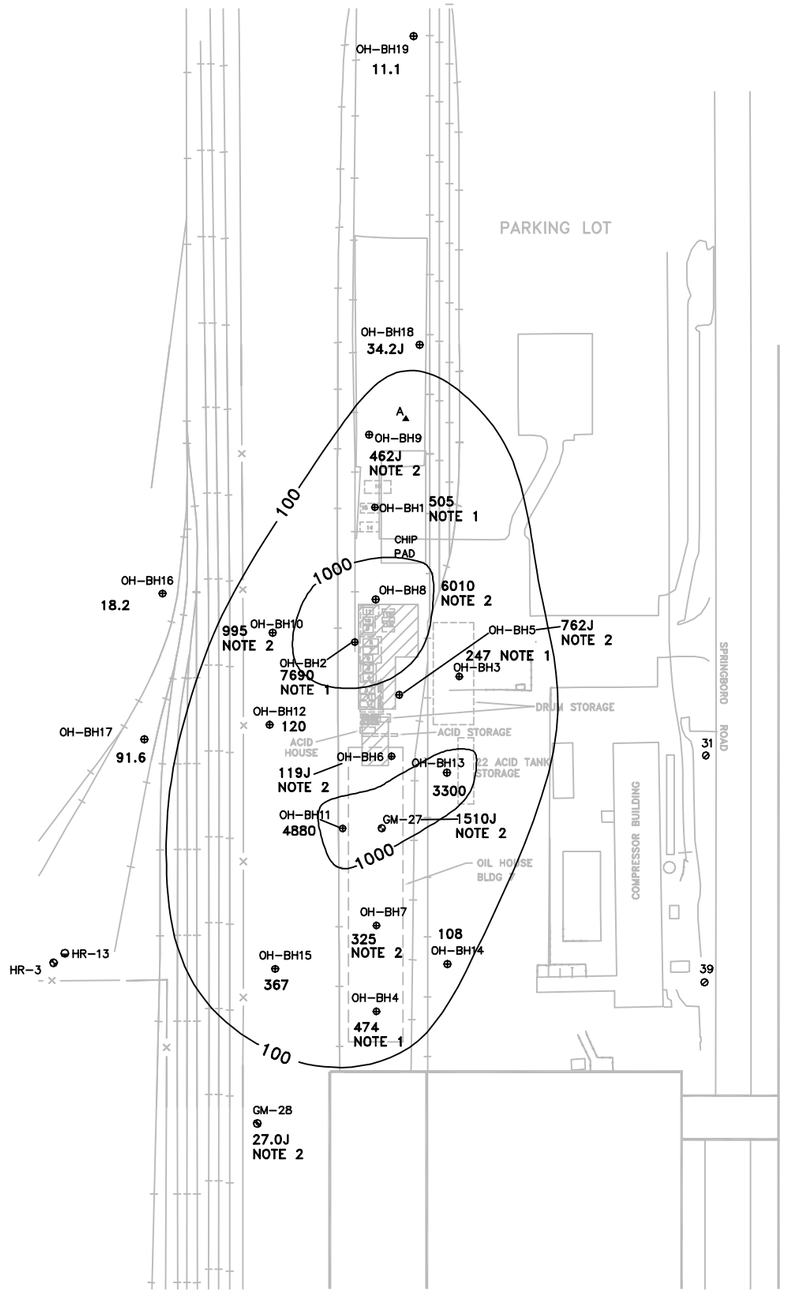
- MONITOR WELL (SHALLOW)
- MONITOR WELL (DEEP)
- SOIL BORING
- SOIL BORING, DNAPL DYE TEST NEGATIVE
- SOIL BORING, DNAPL DYE TEST POSITIVE
- ACTIVE PRODUCTION WELL
- INACTIVE PRODUCTION WELL
- OH — OIL HOUSE
- BH — BORE HOLE
- FORMER LOCATION OF OIL HOUSE STRUCTURES
- APPROXIMATE LOCATION OF CURRENT MORAINE ENGINE TANK FARM
- EDGE OF UPPER CLAY TILL
- NA — NOT AVAILABLE
- * — ESTIMATED ELEVATION

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

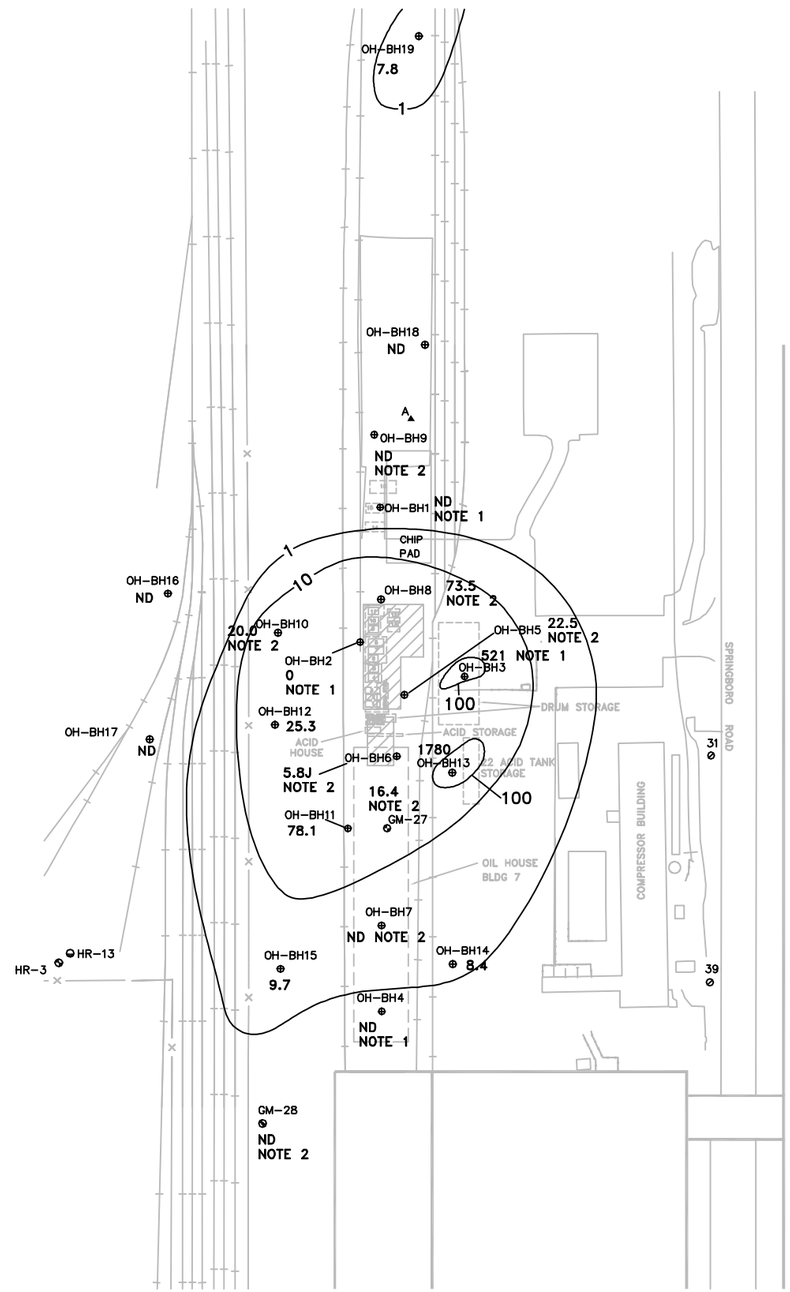
TOP OF UPPER CLAY TILL FOR AOI 7 – FORMER OIL HOUSE AREA

GENERAL MOTORS CORPORATION
MORAINE, OHIO

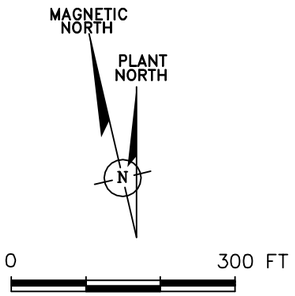
DATE	PROJECT MANAGER	DRAWING NAME
MAR99	J. REID	HARR\N-B\RFISUP1E
DRAWN	LEAD DESIGN PROF.	CHECKED
R. SMITH	J. REID	N. GILLOTTI
PROJECT NUMBER		DRAWING NUMBER
0H000294.0001.0002		3-9



PCE CONCENTRATIONS



TCE CONCENTRATIONS



PCE/TCE CONTOURS HAVE BEEN DEVELOPED TO REPRESENT SOIL CONCENTRATIONS ABOVE THE WATER TABLE DURING NOVEMBER 1998, UNLESS OTHERWISE NOTED.

NOTES

1) DATA FROM MARCH 1998 SUPPLEMENTAL RFI SOIL SAMPLING.
2) DATA FROM AUGUST 1998 SUPPLEMENTAL RFI SOIL SAMPLING.

LEGEND

- MONITOR WELL (SHALLOW)
- MONITOR WELL (DEEP)
- SOIL BORING
- ACTIVE PRODUCTION WELL
- INACTIVE PRODUCTION WELL
- OH — OIL HOUSE
- BH — BORE HOLE
- FORMER LOCATION OF OIL HOUSE STRUCTURES
- APPROXIMATE LOCATION OF CURRENT MORAINE ENGINE TANK FARM

TETRACHLOROETHENE (PCE) AND TRICHLOROETHENE (TCE) CONCENTRATIONS ARE REPRESENTED IN MICROGRAMS PER KILOGRAM

ND — NOT DETECTED

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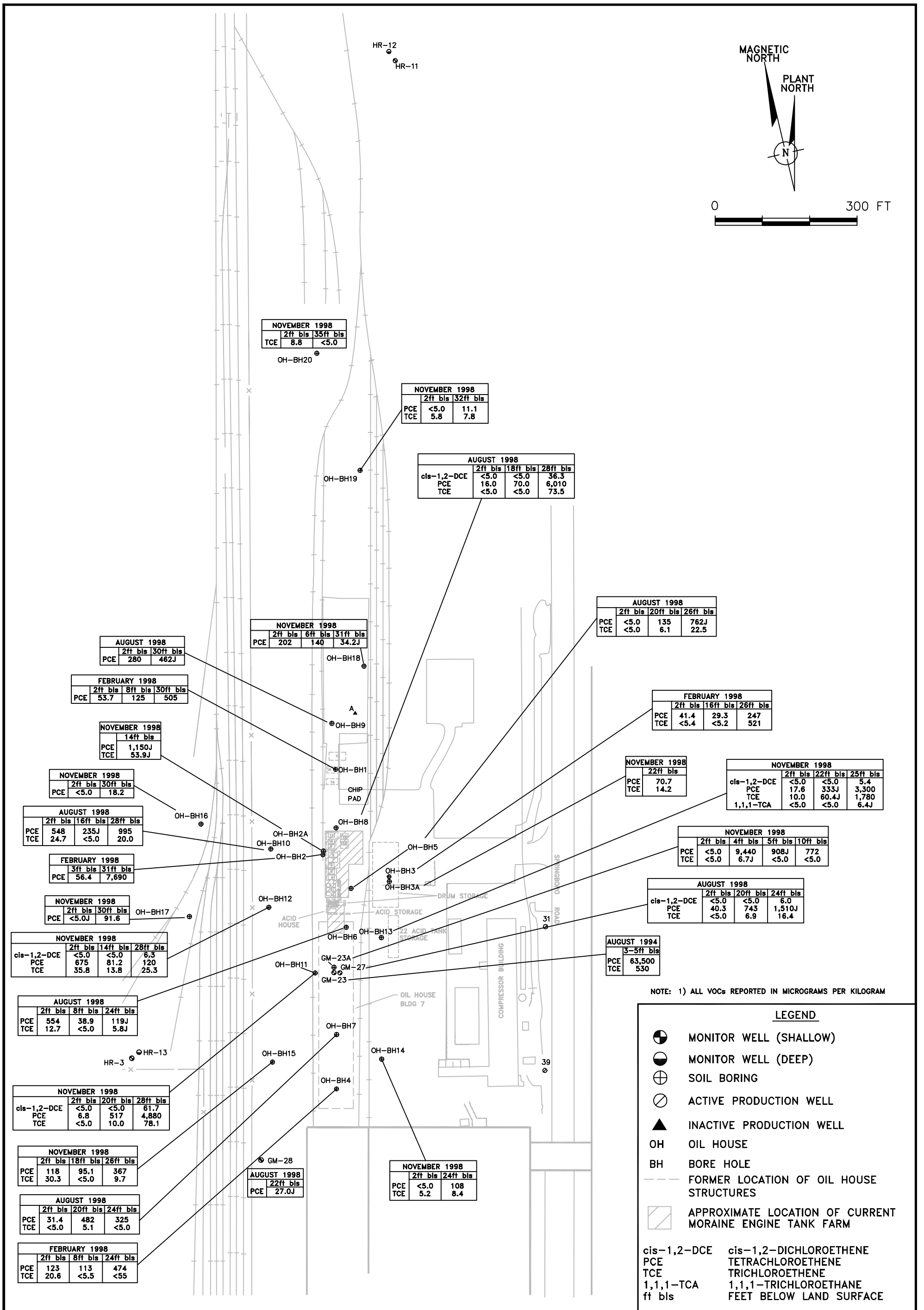
PCE/TCE CONCENTRATIONS IN SOIL ABOVE WATER TABLE FOR AOI 7 – FORMER OIL HOUSE AREA

GENERAL MOTORS CORPORATION
MORAINE, OHIO

DRAWN	DATE	PROJECT MANAGER	DRAWING NAME
R. SMITH	27MAY99	J. REID	HAR\CRA\AOI7-03
		LEAD DESIGN PROF. J. REID	CHECKED N. GILLOTTI
		PROJECT NUMBER	FIGURE NUMBER
		OH0294.01.02	3-10



NOTE: 1) ALL VOCs REPORTED IN MICROGRAMS PER KILOGRAM

LEGEND

- MONITOR WELL (SHALLOW)
- MONITOR WELL (DEEP)
- SOIL BORING
- ACTIVE PRODUCTION WELL
- INACTIVE PRODUCTION WELL
- OH — OIL HOUSE
- BH — BORE HOLE
- FORMER LOCATION OF OIL HOUSE STRUCTURES
- APPROXIMATE LOCATION OF CURRENT MORAINE ENGINE TANK FARM

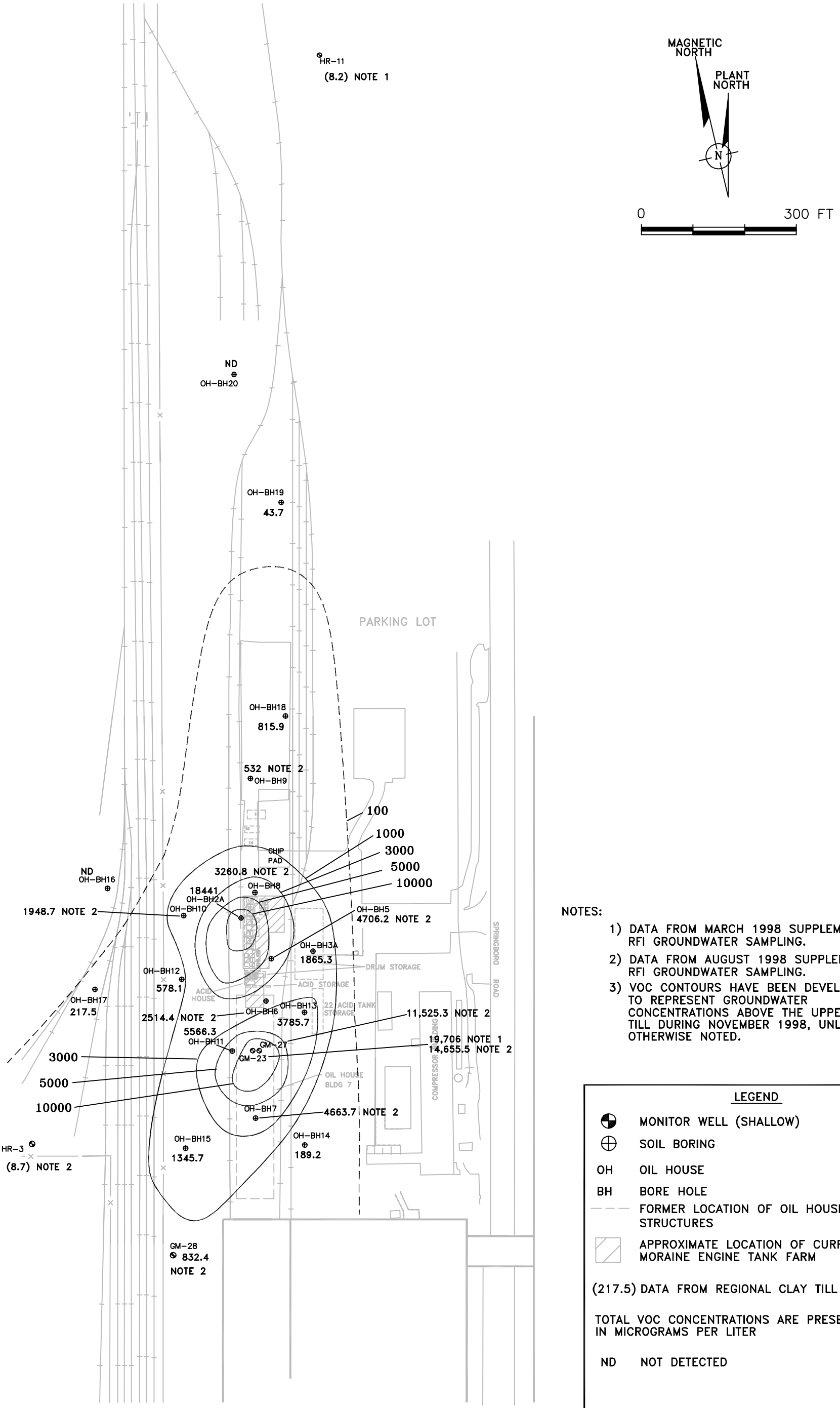
cis-1,2-DCE	cis-1,2-DICHLOROETHENE
PCE	TETRACHLOROETHENE
TCE	TRICHLOROETHENE
1,1,1-TCA	1,1,1-TRICHLOROETHANE
ft bls	FEET BELOW LAND SURFACE

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

VOC CONCENTRATIONS IN SOIL
AOI 7 - FORMER OIL HOUSE AREA

GENERAL MOTORS CORPORATION
MORAINE, OHIO

DATE MAR99	PROJECT MANAGER J. REID	DRAWING NAME HAR\CRA\\OH294-03
DRAWN R. SMITH	LEAD DESIGN PROF. J. REID	CHECKED N. GILLOTTI
PROJECT NUMBER 0H000294.0001.0002		DRAWING NUMBER 3-11



NOTES:

1) DATA FROM MARCH 1998 SUPPLEMENTAL RFI GROUNDWATER SAMPLING.
2) DATA FROM AUGUST 1998 SUPPLEMENTAL RFI GROUNDWATER SAMPLING.
3) VOC CONTOURS HAVE BEEN DEVELOPED TO REPRESENT GROUNDWATER CONCENTRATIONS ABOVE THE UPPER CLAY TILL DURING NOVEMBER 1998, UNLESS OTHERWISE NOTED.

LEGEND

- MONITOR WELL (SHALLOW)
- SOIL BORING
- OH OIL HOUSE
- BH BORE HOLE
- FORMER LOCATION OF OIL HOUSE STRUCTURES
- APPROXIMATE LOCATION OF CURRENT MORAINE ENGINE TANK FARM

(217.5) DATA FROM REGIONAL CLAY TILL

TOTAL VOC CONCENTRATIONS ARE PRESENTED IN MICROGRAMS PER LITER

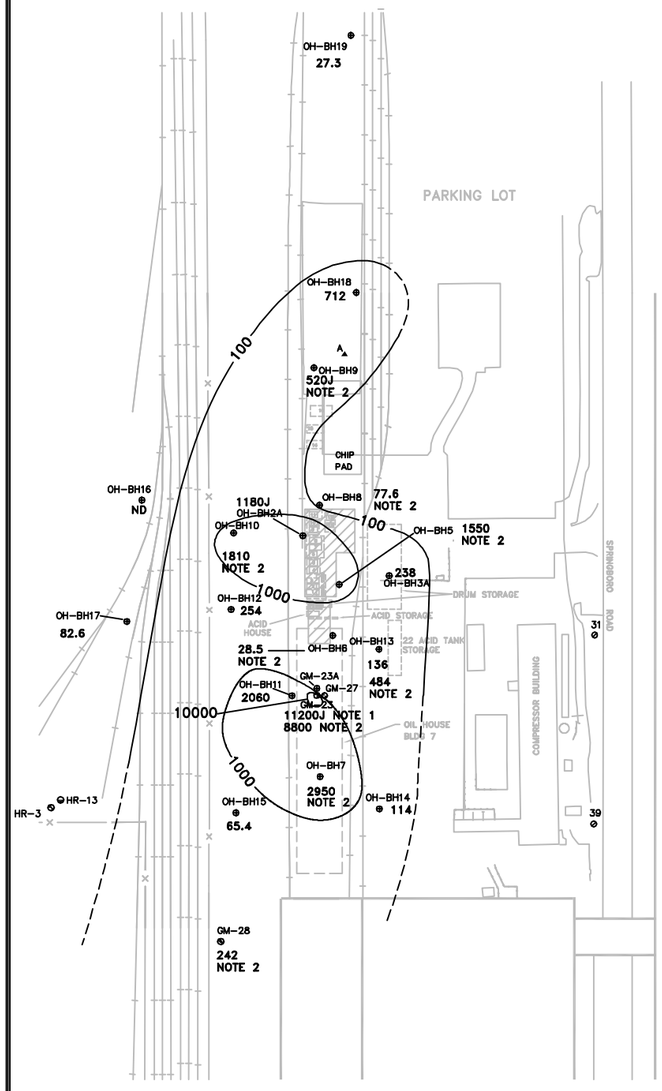
ND NOT DETECTED

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

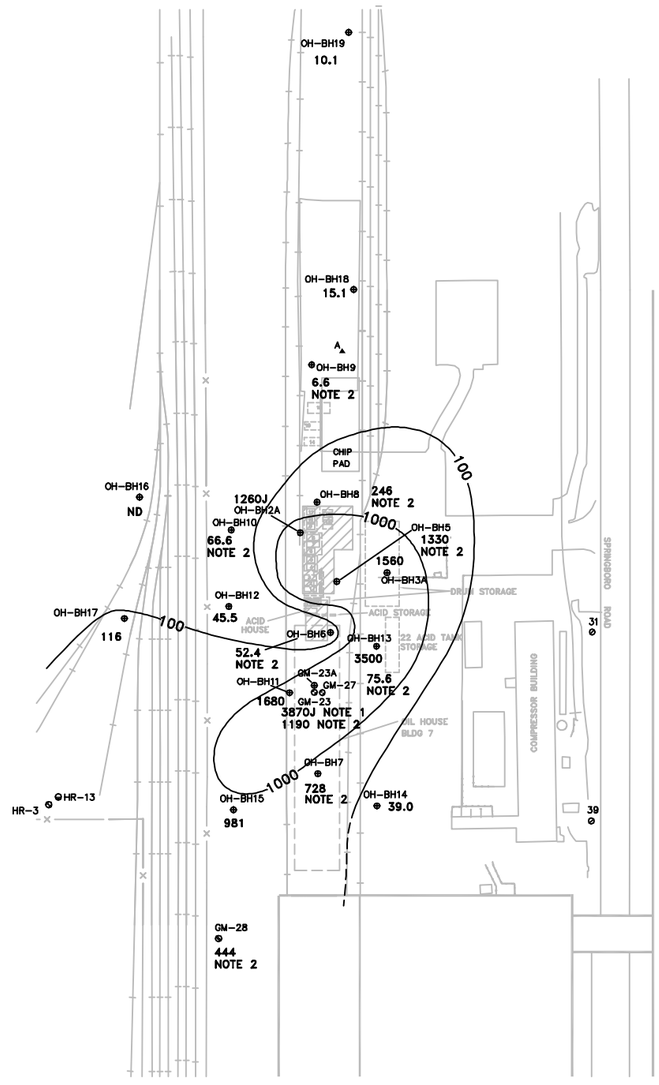
TOTAL VOC CONCENTRATIONS IN SHALLOW GROUNDWATER FOR AOI 7 – FORMER OIL HOUSE AREA

GENERAL MOTORS CORPORATION
MORAINE, OHIO

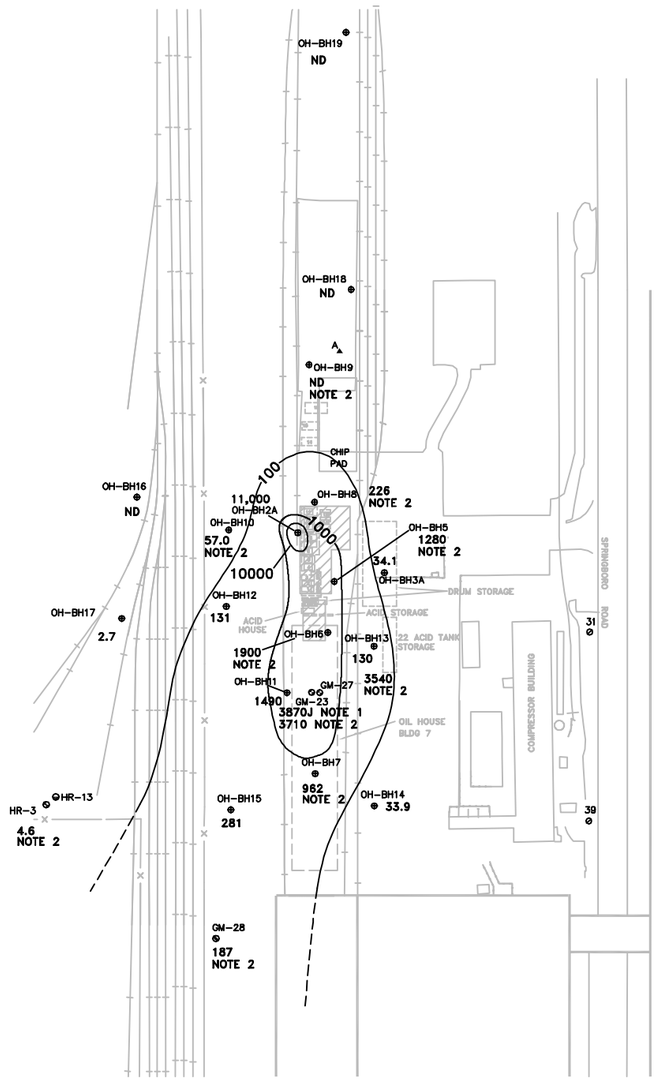
DATE	PROJECT MANAGER	DRAWING NAME
MAR99	J. REID	HARR\N-B\RFISUP1F
DRAWN	LEAD DESIGN PROF.	CHECKED
R. SMITH	J. REID	N. GILLOTTI
PROJECT NUMBER		DRAWING NUMBER
0H000294.0001.0002		3-12



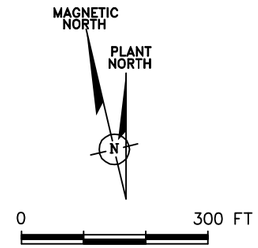
PCE CONCENTRATIONS



TCE CONCENTRATIONS



CIS-1,2-DCE CONCENTRATIONS



PCE/TCE CONTOURS HAVE BEEN DEVELOPED TO REPRESENT GROUNDWATER CONCENTRATIONS ABOVE THE UPPER CLAY TILL DURING NOVEMBER 1998, UNLESS OTHERWISE NOTED.

NOTES

1) DATA FROM MARCH 1998 SUPPLEMENTAL RFI GROUNDWATER SAMPLING.
2) DATA FROM AUGUST 1998 SUPPLEMENTAL RFI GROUNDWATER SAMPLING.

LEGEND

- MONITOR WELL (SHALLOW)
- MONITOR WELL (DEEP)
- SOIL BORING
- ACTIVE PRODUCTION WELL
- INACTIVE PRODUCTION WELL
- OH OIL HOUSE
- BH BORE HOLE
- FORMER LOCATION OF OIL HOUSE STRUCTURES
- APPROXIMATE LOCATION OF CURRENT MORAINE ENGINE TANK FARM

TETRACHLOROETHENE (PCE), TRICHLOROETHENE (TCE), AND CIS-1,2-DICHLOROETHENE (CIS-1,2-DCE) CONCENTRATIONS ARE REPRESENTED IN MICROGRAMS PER LITER

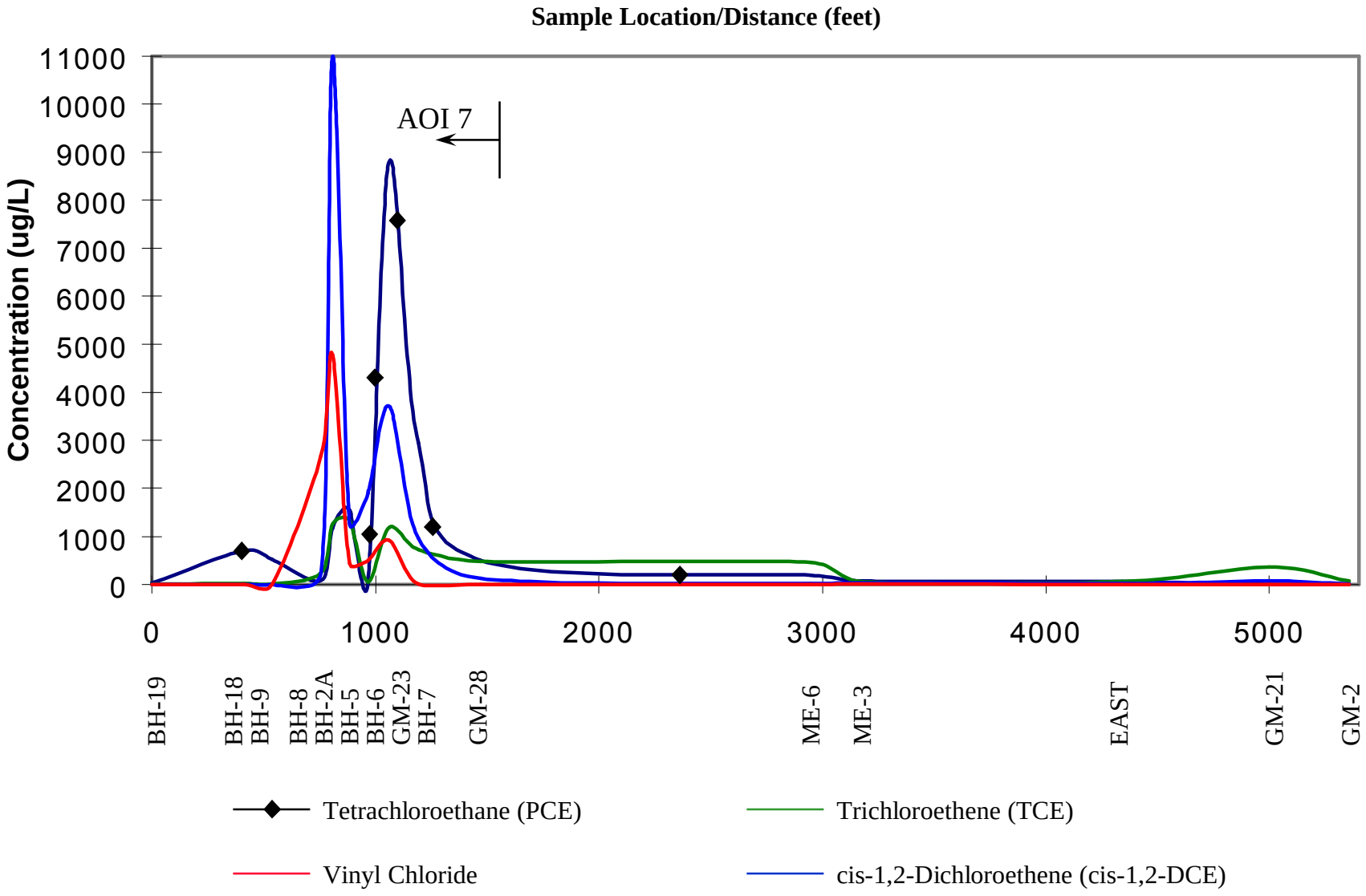
ND NOT DETECTED

ARCADIS GERAGHTY&MILLER

PCE/TCE/CIS-1,2-DCE CONCENTRATIONS IN SHALLOW GROUNDWATER FOR AOI 7 - FORMER OIL HOUSE AREA

GENERAL MOTORS CORPORATION
MORAINE, OHIO

DRAWN	DATE	PROJECT MANAGER	DRAWING NAME
R. SMITH	27MAY99	J. REID	HAR\CRA\AOI7-02
		LEAD DESIGN PROF. J. REID	CHECKED N. GILLOTTI
		PROJECT NUMBER 0H0294.01.02	FIGURE NUMBER 3-13



ARCADIS Geraghty & Miller

Figure 4-4. PCE/TCE/cis-1,2-DCE/VC North South Groundwater Concentration Graph, General Motors Corporation, Moraine, Ohio.

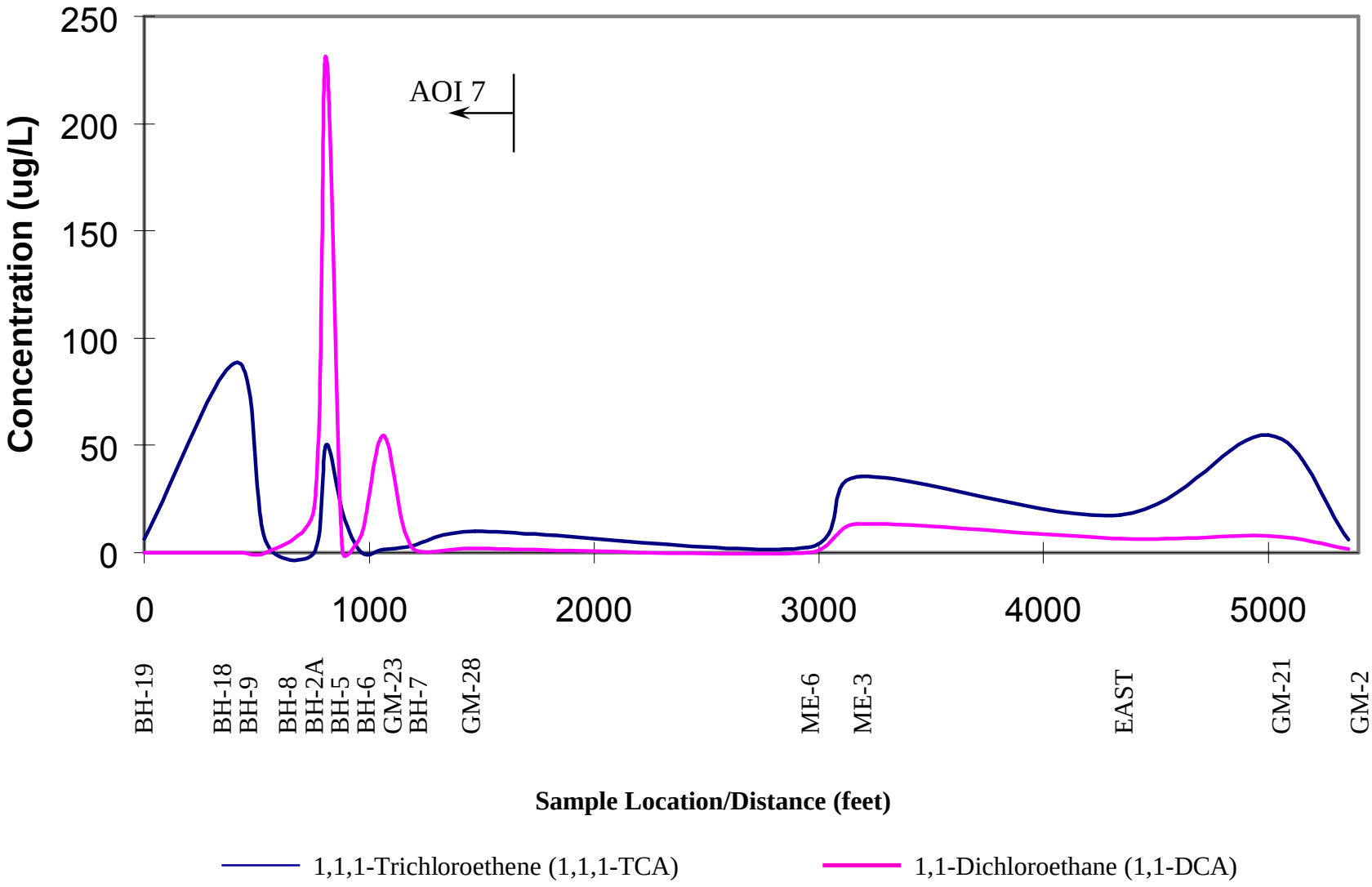


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Figure 4-5. TCA/DCA North South Groundwater Concentration Graph, General Motors Corporation, Moraine, Ohio.