



Knowledge, and the Creativity to Use It

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PHASE II ENVIRONMENTAL ASSESSMENT

**160-Acre Parcel, East of
Delphi Energy & Engine Management Systems, Plant 7
Davison Road
Burton, Michigan**

Prepared For:

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	iii
1.0 INTRODUCTION	1
2.0 TECHNICAL APPROACH	7
2.1 Soil Investigation	7
2.2 Groundwater Investigation	8
2.3 Quality Assurance/Quality Control	9
2.4 Location & Elevation Survey	10
2.5 Decontamination & Waste Management	10
3.0 RESULTS	11
3.1 Hydrogeology	11
3.1.1 Geology	11
3.1.2 Groundwater Potentiometric Surface	13
3.2 Results of Chemical Analyses of Soils	13
3.2.1 RCRA Characteristic Metals - Soils	16
3.2.2 Polynuclear Aromatics (PNAs) - Soils	16
3.2.3 Volatile Organic Compounds (VOCs) - Soils	19
3.2.4 Polychlorinated Biphenyls (PCBs) - Soils	19
3.3 Results of Chemical & Physical Analysis of Groundwater	20
3.3.1 RCRA Characteristic Dissolved Metals - Groundwater	20
3.3.2 Semi-Volatile Organic Compounds (SVOCs) - Groundwater	21
3.3.3 Volatile Organic Compounds (VOCs) - Groundwater	21
3.3.4 Polychlorinated Biphenyls (PCBs) - Groundwater	21
3.3.5 Herbicides & Pesticides - Groundwater	21
3.3.6 Physical Analysis Results - Groundwater	23
3.4 Quality Assurance/Quality Control Data	23
4.0 CONCLUSIONS	25
4.1 Hydrogeology	25
4.2 Chemical Analysis	26
4.3 Potential Areas of Concern (PAOC)	27

LIST OF FIGURES

Figure 1	Site Location Map
Figure 2	Site Diagram
Figure 3	Observation Well/Soil Boring Locations
Figure 4	Geologic Cross-Section (W-E)
Figure 5	Groundwater Potentiometric Measurements (03/15/96)

LIST OF TABLES

Table 1	Summary of Elevation & Potentiometric Surface Field Data
Table 2	Summary of Total Metal Laboratory Results - Soil
Table 3	Summary of PNA Laboratory Results - Soil
Table 4	Summary of Metal, VOC, and SVOC Laboratory Results - Groundwater
Table 5	Summary of Physical Groundwater Results

APPENDICES

Appendix A	Soil Boring/Observation Well Logs
Appendix B	Laboratory Reports - Soil
Appendix C	Laboratory Reports - Groundwater
Appendix D	Reported Background Metals Soil Study Tables

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EXECUTIVE SUMMARY

Techna Corporation was retained by General Motors Corporation (GM) to implement Phase II environmental assessment activities for a site located east of the Delphi Energy & Engine Management Systems, Plant 7 in Burton, Michigan. The site, approximately 160-acres, is bounded by Davison Road and commercial development along Davison Road to the north, Genesee Road to the east, the Grand Trunk Railroad to the south, and a Consumers Power right-of-way to the west. The site consists of trees, wooded scrub, grasses, and a former automobile test track. A portion of the site was operated as a permitted landfill in the 1970's for disposal of construction debris, miscellaneous inert solid waste, and foundry sand from the GM Buick Motor Division.

Potential Areas of Concern (PAOC) identified in a recently completed Phase I environmental site assessment were associated with 1) the historical on-site disposal of foundry sand, construction debris, and miscellaneous solid waste generally in the southwestern portion of the site and an apparent low area that was identified as "Fill Area" on a 1966 topographic survey map, and 2) the potential release of petroleum product from three Michigan Leaking Underground Storage Tank (LUST) sites north of the subject site.

Soil and groundwater sampling activities were conducted at 11 locations to evaluate the potential for environmental impact. Selected samples were submitted for laboratory analysis of volatile organic compounds, semi-volatile compounds, polychlorinated biphenyls, RCRA characteristic metals, and herbicides and pesticides. A summary of the findings and conclusions for the Phase II sampling and analysis activities described in this report is presented below.

- The conceptual geologic profile of near-surface fill materials composed of foundry sand and construction debris over native soils in the southwestern portion of the site has been supported and further defined. Native soils beneath the fill material and in the eastern portion of the site consist of interbedded clays, silts, and sands.
- Shallow saturation was encountered within granular fill material and native silt and sand sediments. Groundwater flow direction is inferred to the southwest towards Gilkey Creek in the southwestern portion of the site and to the northwest in the eastern portion of the site. The extent of seasonal potentiometric fluctuations and lateral continuity are unknown.
- No evidence of a potential release to shallow site groundwater of petroleum product from LUST sites reported to the north of the site was identified at the observation well installed along the north-central property boundary during this investigation.
- No significant evidence of impact to native soils in an apparent low area that was identified as "Fill Area" on a 1966 topographic survey map was identified during this investigation.
- Benzo(a)pyrene (1,700 $\mu\text{g/kg}$) was reported only slightly above the MDEQ residential direct contact criterion (1,400 $\mu\text{g/kg}$)²⁰⁰⁰ in one (MW2-A: 3 feet to 5 feet BGL) of four fill sand samples collected from widely distributed locations in the southwestern portion of the site in the area of historical landfill operations. Benzo(a)pyrene has been determined by MDEQ (Operational Memorandum #8) to be a chemical not expected to leach through soils to groundwater (due to its physicochemical properties); therefore, benzo(a)pyrene migration to an aquifer is not likely a relevant exposure pathway. Shallow groundwater in the area is not known to be a source of drinking water. No polynuclear aromatic compounds were reported to be present at levels above the Method Detection Limits in any of the groundwater samples collected on the subject property.

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1.0 INTRODUCTION

Techna Corporation was retained by General Motors Corporation (GM) to implement Phase II environmental assessment activities for the subject site located east of the Delphi Energy & Engine Management Systems, Plant 7 in Burton, Michigan. The site, approximately 160-acres, is located in Section 10, Township 7 North, Range 7 East, Genesee County, Michigan. The location of the site and surrounding properties is presented on Figure 1, a portion of the United States Geological Survey (USGS) 7.5-minute series, Flint North and Davison, Michigan Quadrangle topographic maps. Figure 2 presents a site diagram showing the location of a test track, former housing development roads (dashed), and property boundaries.

The site is bounded by Davison Road and commercial development along Davison Road to the north, Genesee Road to the east, the Grand Trunk Railroad to the south, and a Consumers Power right-of-way to the west. The site consists of trees, wooded scrub, grasses, and a former automobile test track. A portion of the site was operated as a permitted landfill in the 1970's for disposal of construction debris, miscellaneous inert solid waste, and foundry sand from the GM Buick Motor Division.

Potential Areas of Concern (PAOC) identified in a recently completed Phase I environmental site assessment were associated with 1) the historical on-site disposal of foundry sand, construction debris, and miscellaneous inert solid waste generally in the southwestern portion of the site and an apparent low area that was identified as "Fill Area" on a 1966 topographic survey map, and 2) the potential release of petroleum product from three Michigan Leaking Underground Storage Tank (LUST) sites north of the site. Soil and groundwater sampling activities were conducted at 11

locations shown on Figure 3. The following summarizes the scope of work performed at each of these locations.

- An observation well (MW4) was installed along the north-central property boundary to evaluate the potential for on-site migration of groundwater impact from potential LUST site sources located north of the site. No soil samples from this location were retained for chemical analysis.
- Soil borings in the southwestern portion of the site (MW1, MW2, B5, B6 and off-set B11, and B8) were advanced to collect fill soil samples to evaluate the potential for impact from landfill materials and native soil samples to evaluate the vertical extent of impact, if any. Two of these boring were converted to observation wells (MW1 and MW2) to evaluate the potential for groundwater impact, if any, in this area.

No fill materials were encountered at B6 and an additional boring (B11) was off-set approximately 150 feet to the west which did encounter limited fill soils. Except for scattered surface debris, significant fill materials were not encountered at B5.

Fill soil samples at MW1, MW2, B8, and B11 (foundry sand/slag material) and native soil samples from MW1, MW2, B5, B8, and B11 were submitted for chemical analysis.

- A soil boring (B7) was advanced to collect soil samples to evaluate an apparent low area that was identified as "Fill Area" on a 1966 topographic survey map compiled by Gould Engineering, Inc. of Flint, Michigan. Although surface debris suggested a fill area, no significant fill materials were encountered at B7, so an additional boring (B10) was off-set approximately 50 feet to the south on a gravel surfaced road along the south side of the test track fence line. Except for road surface gravel/sand materials, fill materials were not encountered at B10 and a native soil sample was submitted for chemical analysis at this location.

- Soil borings (MW3 and B9) were advanced to collect soil samples in the southeastern portion of the site. Boring MW3 was converted to an observation well to evaluate the potential for groundwater impact, if any, in this area and provide additional hydraulic information to evaluate groundwater flow direction at the site. Boring B9 was located in an apparent low drainage area which appears to receive surface run-off from the southeastern portion of the site based on visual observations and the 1966 Gould topographic survey map.

No fill materials were encountered at either MW3 or B9 and native soil samples were submitted for chemical analysis at these locations.

- Soil samples retained for chemical analysis were submitted for polychlorinated biphenyls (PCBs), polynuclear aromatic compounds (PNAs), volatile organic compounds (VOCs), and RCRA characteristic total metals.
- Groundwater samples from the four observation wells were submitted for PCBs, semi-volatiles (SVOCs), VOCs, and the RCRA characteristic dissolved metals. Groundwater samples from MW3 and MW4 in the eastern portion of the site were additionally submitted for analysis of herbicides and pesticides because of the potential for impact from historic farming practices in this portion of the site.
- Groundwater physical characteristics of pH, temperature, and specific conductivity were measured in the field during groundwater sampling activities.
- Wells were surveyed for elevation, and groundwater levels were measured in the four observation wells to evaluate groundwater flow.

This report presents 1) technical approaches used during soil and groundwater sampling activities, 2) results of these site investigation activities and laboratory analyses, and 3) interpretations of results and conclusions based thereon.

2.0 TECHNICAL APPROACH

Soil and groundwater investigation activities were conducted at the subject site located to the east of Delphi Energy & Engine Management Systems, Plant 7. All field activities were conducted within Techna's Health & Safety Plan guidelines. The technical approaches used in each activity are presented below.

2.1 Soil Investigation

Eleven soil borings designated with "B" and "MW" prefixes were advanced on March 11 and 12, 1996 using 4.25-inch I.D. hollow-stem augers by Carlo Environmental Technologies, Inc. of Clinton Township, Michigan. Soil boring locations are presented on Figure 3. Photographs were taken of each of these soil borings to provide file documentation. Soil borings were installed for the collection of selected soil samples for chemical analysis and the installation of groundwater observation wells (MW) at selected locations.

Soil samples were acquired for description and chemical analysis using 24-inch long, two-inch O.D., split-spoon samplers in general accordance with ASTM Method D-1586. Detailed soil boring logs were maintained to correlate the soil types. Visual descriptions of soils were in general accordance with ASTM Method D-2488. A complete set of logs for all borings is attached in Appendix A.

Soil samples collected during soil boring advancement were field screened using a photoionization detector (PID) calibrated to isobutylene. No PID readings above the instrument detection limit (1 ppm) were reported during field screening of soil samples. Selected soil samples collected for chemical analyses were placed directly from the split-spoon samplers into the appropriate pre-cleaned glass laboratory sample bottles. Sample collection was conducted according to standard procedures established in USEPA SW-846, 3rd Edition. Samples were stored at approximately 4°C until analyzed and were managed under strict chain-of-custody protocols.

Soil samples selected for analyses were submitted to Fire & Environmental Consulting Laboratories, Inc. (FECL) of East Lansing, Michigan. Analytical methods used were USEPA Method 8081 for polychlorinated biphenyls (PCBs); USEPA Method 8270 for polynuclear aromatic compounds (PNAs); USEPA Method 8260 for volatile organic compounds (VOCs); and the RCRA characteristic metals using approved USEPA methods for total metals determination. Results of soil sample analyses are presented in Section 3.2, with complete laboratory reports presented in Appendix B.

2.2 Groundwater Investigation

Shallow observation wells MW1, MW2, MW3, and MW4 were installed in four of the eleven soil borings on March 11, 1996. Well locations are presented on Figure 3. Well screens were generally set within the first encountered saturated, sand/silt soils. Wells MW1 and MW2 were screened in fill materials in the western portion of the site. Based on groundwater levels measured on March 15, 1996, the MW1 and MW2 screens were approximately 2.5 feet to 7.5 feet and 0.5 feet to 5.5 feet below the groundwater table, respectively. Wells MW3 and MW4, located in the eastern portion of the site, were screened beneath moist clay in saturated sand/silt intervals. Based on groundwater levels measured on March 15, 1996, these sand/silt intervals showed a confined response where the groundwater potentiometric surface was above the screened sand/silt intervals.

Wells were constructed of two-inch diameter polyvinyl chloride (PVC) casing fitted with a five-foot length of 0.010-inch slot, PVC screen and plug. An artificial sand pack was used to fill the annular space to a level approximately two feet above the top of the screen. Annular space above the sand pack was filled to within approximately two feet of surface grade with hydrated granular bentonite. A four-inch diameter, locking, above grade steel protective casing was secured in a concrete surface cap over each well casing. Each well casing was fitted with an expandable cap. Well construction diagrams with available boring log information are presented in Appendix A. Well screen depths are included on the soil boring logs and Tables 1, 4 and 5 in Section 3.0.

Observation wells were developed on March 12 and March 13, 1996 using the drill rig pump fitted with new PVC tubing at each well. The wells were developed until the water cleared of sediment (approximately 15 to 20 gallons purged from each well).

Groundwater sampling of observation wells was conducted on March 15, 1996. Groundwater samples (MW1, MW2, MW3, and MW4) were submitted for analysis of PCBs using USEPA Method 8080, SVOCs using USEPA Method 8270, VOCs using USEPA Method 8260, and RCRA characteristic dissolved metals using approved USEPA methods. Groundwater samples MW3 and MW4 collected from the eastern portion of the site were additionally analyzed for herbicides and pesticides using USEPA Method 8270. All groundwater sampling and testing procedures conformed with USEPA SW-846, 3rd Edition protocols. Prior to sampling, groundwater level measurements were taken at each well for use in determining groundwater flow direction and calculating the casing volume of water. A minimum of three casing volumes was purged from each well prior to sampling using disposable high-density polyethylene (HDPE) bailers. Groundwater physical characteristics of pH, specific conductivity, and temperature were measured in the field during sampling activities.

Groundwater samples for analysis were transferred directly from the bailers into the appropriate pre-cleaned laboratory sample bottles. Samples for VOC analysis were preserved with 1:1 hydrochloric acid. Samples for RCRA characteristic dissolved metals analyses were filtered within six hours of sample collection, and preserved with nitric acid. All samples were maintained at approximately 4°C prior to analysis and were managed under strict chain-of-custody protocols. Samples were submitted to FECL. Groundwater chemical and physical analysis are presented in Section 3.3. Complete laboratory analysis reports for groundwater samples are presented in Appendix C.

2.3 Quality Assurance/Quality Control

Quality assurance/quality control (QA/QC) samples included trip blanks (TB). A trip blank was analyzed for VOC analysis at a rate of one per sample package of groundwater or soil samples transferred to the laboratory. Duplicate samples at this phase of the investigation were deemed

unnecessary since the only objective was to evaluate the potential for impact. Data QA/QC results are presented and discussed in Section 3.4.

2.4 Location & Elevation Survey

An elevation and location survey of observation wells was conducted by Hubbell, Roth and Clark, Inc. of Bloomfield Hills, Michigan on March 15, 1996. The survey established top of casing and ground level elevations and relative locations for observation wells. Elevations were surveyed relative to the National Geodetic Vertical Datum (NGVD). The locations of soil borings not converted to observation wells were measured relative to the observation wells and site test track by Techna Corporation personnel.

Relative well elevations are recorded on the soil boring/observation well logs in Appendix A. Hydrogeologic and elevation data are summarized on Table 1 in Section 3.1.

2.5 Decontamination & Waste Management

All equipment used during the drilling, sampling, and testing procedures was decontaminated prior to and between each use. Drilling equipment was decontaminated with high-pressure steam generated from tap water. Split-spoon samplers were decontaminated with a phosphate-free detergent water wash, followed by sequential rinses with isopropyl alcohol and deionized water. The static water level indicator was decontaminated with a phosphate-free detergent water wash followed by sequential rinses with isopropyl alcohol and deionized water. Disposable (HDPE) bailers for each well were fitted with a new nylon retrieval line.

All soil cuttings and aqueous wastes (decontamination, development and purge waters) generated during this investigation were containerized in 55-gallon DOT-approved, steel drums. Nine solid and seven liquid waste drums were stored at the Delphi Energy & Engine Management Systems, Plant 6 hazardous waste storage pad pending disposal. Soil borings not converted to observation wells were backfilled with a cement/bentonite slurry.

3.0 RESULTS

Results of the Phase II soil and groundwater investigation activities are presented in the following subsections. The results of geologic and hydrogeologic studies are presented in Section 3.1, the results of soil analyses are presented in Section 3.2, the results of chemical and physical testing of shallow groundwater are presented in Section 3.3, and the results of QA/QC evaluations are presented in Section 3.4.

3.1 Hydrogeology

3.1.1 Geology

Figure 3 shows the location of a representative, west to east, soil profile cross-section. The generalized cross-section, Figure 4, shows the conceptualized soil stratigraphy of fill material overlying native silt and clay intervals in the western portion of the site. Fill materials encountered during soil boring activities included foundry sand, slag, concrete, brick, gravel, sand, and clay. The eastern portion of the site consists of interbedded clay, silt, and sand intervals. In general, the top of a lower clay interval ranged from 8 feet to 18 feet below ground level (BGL). The cross-section is constructed from soil boring logs (maximum depth of 20 feet BGL) and referenced to the NGVD surveyed at observation wells MW1 and MW3. Soil boring logs are presented in Appendix A.

Near-surface fill materials ranged in thickness from nine feet to 13 feet at southwestern locations MW1, B8, and MW2 and three feet at B11 (Figures 3 and 4). Apparent foundry sands were noted at locations MW1, B8, and B11. Fill sand with apparent slag and concrete debris were noted at MW2. Fill gravels/construction debris were noted at ground surface at B5, B7, and B10. Whole spark plugs were noted on some gravel surfaced, site access roads in the southwestern portion of the site, but were not recovered at depth during boring activities. No significant fill materials were apparent at locations B6, B9, MW3, or MW4.

The groundwater potentiometric surface in the southwestern portion of the site at MW1 and MW2 was measured at approximately six feet and ten feet BGL, respectively, and lies within the fill material indicating water table conditions. Wells MW3 and MW4 in the eastern portion of the site were screened in deeper saturated sand/silt intervals beneath approximately ten feet of moist clay. The groundwater potentiometric surface at these eastern locations was measured within the well casings at approximately one foot and four feet BGL, respectively. These measurements of groundwater from the sand/silt interval, beneath moist clay, indicate a confined groundwater response.

3.1.2 Groundwater Potentiometric Surface

The groundwater potentiometric surface elevations were measured in observation wells on March 15, 1994. Table 1 presents a summary of the measurement results including ground level elevations, top of casing elevations, total well depths, bottom of screen elevations, and groundwater level elevations.

Figure 5 shows the groundwater potentiometric surface elevations measured on March 15, 1996. The inferred flow direction of the groundwater is generally to the southwest towards Gilkey Creek in the southwestern portion of the site and to the northwest in eastern portions of the site.

3.2 Results of Chemical Analyses of Soils

The results of chemical analysis of soils for metal, polynuclear aromatics (PNAs), volatile organic compounds (VOCs), and polychlorinated biphenyls (PCBs) are presented in Sections 3.2.1, 3.2.2, 3.2.3, and 3.2.4, respectively. Four fill sand (ground surface to 10 feet BGL) and eight native clay/silt samples (8 feet to 20 feet BGL) were collected for all the above chemical analyses from eight locations. Fill soil samples included MW1-A, MW2-A, B8-B, and B11-A. Native clay/silt samples included MW1-D, MW2-C, MW3-C, B5-C, B8-D, B9-C, B10-C, and B11-C. Sample locations are presented on Figure 3. Complete laboratory analysis reports for these samples are presented in Appendix B. Soil boring logs showing sample depths are presented in Appendix A.

3.2.1 RCRA Characteristic Metals - Soils

Data from metals analysis are presented in Table 2 along with sample depth, soil type, a range for established area background values, and MDEQ residential direct contact criteria.

Soil background metal studies were conducted at the Delphi Energy & Engine Management Systems, Plants 6 and 7 located to the west of the site. These studies are documented in the December 9, 1993 *Averill Avenue Complex, Plant 6 Hazardous Waste Storage Area Closure Assessment Report, Certification, & Interim Response Program* and the May 5, 1992 *Hazardous Waste Storage Area Partial Closure Report And Certification* reports (closure reports), respectively. Background soil study Table 10 and Table 5-1 from these reports, respectively, showing the mean plus three standard deviation calculations are presented in Appendix D. The range of background metals concentrations based on these two individual studies is presented in Table 2. Although not within the scope of this investigation, the data from both these studies should be combined to determine more representative background values.

Analytical results (Table 2) indicate that concentrations of chromium in native clay samples MW1-D (18.8 mg/kg), B10-C (19.9 mg/kg), and B11-C (23.7 mg/kg) and the fill sand sample MW2-A (90.0 mg/kg) were elevated above reported background values (8.4 mg/kg to 17 mg/kg) as documented in the December 9, 1993 and May 5, 1992 closure reports. The concentration of lead in the fill sand sample MW2-A (172 mg/kg) was also above these reported background values (21 mg/kg to 46 mg/kg). However, the concentrations of both chromium and lead in these samples were below the MDEQ residential direct contact values of 2,000 mg/kg and 400 mg/kg, respectively.

3.2.2 Polynuclear Aromatics (PNAs) - Soils

Data from PNA analysis are presented in Table 3 along with sample depth, soil type, and the MDEQ cleanup criteria. Table 3 presents results only for contaminants present at concentrations above Method Detection Limits (MDLs) reported by the laboratory. The MDLs for the analysis of PNAs

in sample MW2-A increased by a factor of four (1,200 $\mu\text{g/kg}$) as a result of dilution due to matrix effects (Appendix B).

Residual concentrations of PNAs were only reported above the MDLs in two (MW2-A and B8-B) of the twelve soil samples submitted for laboratory analysis. The presence of 2-methylnaphthalene (810 $\mu\text{g/kg}$) was reported above the MDL (330 $\mu\text{g/kg}$) in the foundry sand sample B8-B (8-10 feet BGL). The presence of benzo(a)pyrene (1,700 $\mu\text{g/kg}$), benzo(a)anthracene (1,700 $\mu\text{g/kg}$), benzo(b)fluoranthene (1,800 $\mu\text{g/kg}$), benzo(k)fluoranthene (1,500 $\mu\text{g/kg}$), chrysene (1,700 $\mu\text{g/kg}$), fluoranthene (2,900 $\mu\text{g/kg}$), phenanthrene (1,300 $\mu\text{g/kg}$), and pyrene (2,200 $\mu\text{g/kg}$) were reported above the MDL (1,200 $\mu\text{g/kg}$) in the fill sand sample MW2-A (3-5 feet BGL).

Of the PNA species reported above the MDLs, only benzo(a) pyrene exceeded the direct contact value (1,400 $\mu\text{g/kg}$) and phenanthrene exceeded the 20X drinking water value (520 $\mu\text{g/kg}$) in MW2-A (3-5 feet BGL).

3.2.3 Volatile Organic Compounds (VOCs) - Soils

Residual concentrations of VOCs were only reported above the MDLs (10 $\mu\text{g/kg}$) in two (B8-B and MW2-A) of the twelve soil samples (sample identifications listed in Tables 2 and 3) submitted for laboratory analysis. The presence of 1,2,4-trimethylbenzene (30 $\mu\text{g/kg}$) was reported above the MDL in the foundry sand sample B8-B (8-10 feet BGL). Vinyl chloride (10 $\mu\text{g/kg}$) was reported at the MDL in the fill sand sample MW2-A. Both these residual concentrations of 1,2,4-trimethylbenzene and vinyl chloride were below the MDEQ residential soil criteria: 20X drinking water values (600 $\mu\text{g/kg}$ and 40 $\mu\text{g/kg}$, respectively) and 20X groundwater-surface water interface (GSI) values (440 $\mu\text{g/kg}$ and 62 $\mu\text{g/kg}$, respectively).

3.2.4 Polychlorinated Biphenyls (PCBs) - Soils

No PCB compounds were detected in any of the twelve soil samples (sample identification listed in Table 3) submitted for laboratory analysis. The MDLs for the analysis of PCB compounds in samples

MW2-A and B8-B (Appendix B) were elevated (1,000 $\mu\text{g/kg}$ and 3,000 $\mu\text{g/kg}$, respectively) because of matrix interferences.

3.3 Results of Chemical & Physical Analysis of Groundwater

The results of dissolved metal, semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), and herbicides and pesticides analyses of groundwater samples collected from four observation wells MW1, MW2, MW3, and MW4 are presented in Sections 3.3.1, 3.3.2, 3.3.3, 3.3.4, and 3.3.5, respectively. The results of physical analysis of groundwater samples are presented in Section 3.3.6. Sample locations are presented on Figure 3.

The data in this section is presented in summary Table 4 that include groundwater well screen interval depth, screen interval soil type, and MDEQ residential cleanup criteria. For ease of presentation and interpretation, the chemical analysis table in this section presents results only for contaminants reported at detectable levels above the Method Detection Limits (MDLs). Complete laboratory analysis reports for these samples are presented in Appendix C. Soil boring logs/well construction diagrams showing screen depths are presented in Appendix B.

3.3.1 RCRA Characteristic Dissolved Metals - Groundwater

Data from metals analysis are presented in Table 4 along with the MDEQ residential drinking water and groundwater-surface water interface (GSI) criteria. Analytical results indicate that the only metal concentrations reported above the MDLs (10 $\mu\text{g/l}$) in groundwater samples collected from the four observation wells were barium in MW1 (150 $\mu\text{g/l}$), MW2 (230 $\mu\text{g/l}$), MW3 (60 $\mu\text{g/l}$), and MW4 (40 $\mu\text{g/l}$) and chromium in MW2 (20 $\mu\text{g/l}$). Concentrations of chromium (10 $\mu\text{g/l}$) were reported at the MDL in groundwater collected from MW1, MW3, and MW4. The concentrations of both dissolved barium and chromium in all four groundwater samples were below the MDEQ drinking water criteria (2,000 $\mu\text{g/l}$ and 100 $\mu\text{g/l}$) and GSI criteria (630 $\mu\text{g/l}$ and 77 $\mu\text{g/l}$), respectively.

3.3.2 Semi-Volatile Organic Compounds (SVOCs) - Groundwater

Data from SVOC analysis are presented in Table 4 along with the MDEQ residential drinking water and GSI criteria. No SVOCs were reported at levels above the MDLs ($10 \mu\text{g/l}$) in any of the four groundwater samples collected for analysis. The single SVOC species, di-n-octyl phthalate, was reported at the MDL at MW3. This concentration of di-n-octyl phthalate is below the MDEQ cleanup criteria ($130 \mu\text{g/l}$) and is suspect because phthalates can be a common laboratory contaminant.

3.3.3 Volatile Organic Compounds (VOCs) - Groundwater

Data from VOC analysis are presented in Table 4 along with the MDEQ residential drinking water and GSI criteria. No VOCs were reported at levels above the MDLs ($1 \mu\text{g/l}$) in any of the four groundwater samples collected for analysis, except for p,m-xylene ($2 \mu\text{g/l}$), reported slightly elevated above the MDL ($1 \mu\text{g/l}$) at MW3. This concentration of xylene is below the MDEQ drinking water criteria ($280 \mu\text{g/l}$) and GSI criteria ($59 \mu\text{g/l}$).

3.3.4 Polychlorinated Biphenyls (PCBs) - Groundwater

No PCB compounds were reported at levels above the MDL ($0.1 \mu\text{g/l}$) in any of the four groundwater samples submitted for laboratory analysis.

3.3.5 Herbicides & Pesticides - Groundwater

No chlorinated herbicides or organochlorine pesticides were reported at levels above the MDLs in the two groundwater samples MW3 and MW4 submitted for laboratory analysis that were collected in the eastern portion of the site.

3.3.6 Physical Analysis Results - Groundwater

The results of temperature, pH, and conductivity measurements of groundwater samples conducted in the field at the time of observation well groundwater sampling are presented in Table 5. The temperature readings ranged from 6° - 10° C, the pH ranged from 6.48 - 7.18 S.U., and the conductivity ranged from 810 - 1,570 $\mu\text{S/cm}$.

3.4 Quality Assurance/Quality Control Data

The chemical analysis data was verified through a review of relevant laboratory quality assurance/quality control (QA/QC) data included in Appendices B and C. Analyses of trip blanks showed that no external contamination of soil and groundwater samples by volatile species had occurred during collection, storage, or transportation. Evaluation of results from analyses of laboratory duplicates and matrix spikes show that the laboratory procedures were performed within acceptable QA/QC control limits.

Detection limits for PNAs/PCBs and PCBs in soil samples MW2-A and B8-B, respectively, were elevated above target levels due to the effects of matrix interferences.

4.0 CONCLUSIONS

The Phase II soil and groundwater sampling activities described herein have initially characterized the site. Evaluation of the findings presented in this report has led to the conclusions presented below. Conclusions have been grouped into three categories: 4.1) hydrogeology, 4.2) chemical analysis, and Potential Areas of Concern (PAOC).

4.1 Hydrogeology

- The conceptual geologic profile of near-surface fill materials composed of foundry sand, fill sand, construction debris, and miscellaneous inert solid waste over native soils in the southwestern portion of the site has been supported and further defined. Depth of fill materials in this area of the site ranged from scattered surface debris to 13 feet thick. Native soils beneath the fill material and in the eastern portion of the site consist of interbedded clays, silts, and sands.
- Groundwater potentiometric surface in the southwestern portion of the site lies within the fill material indicating an unconfirmed water table condition. Groundwater in the sand/silt interval beneath moist clay in the eastern portion shows a confined response.
- Groundwater potentiometric surface measurements (03/15/96) suggest a general flow direction to the southwest towards Gilkey Creek in the southwestern portion of the site and to the northwest in the eastern portion of the site. The inferred direction of groundwater flow toward Gilkey Creek suggests that the creek may be a groundwater surface water interface. The extent of seasonal potentiometric fluctuations and lateral continuity are unknown.

4.2 Chemical Analysis

- **RCRA Metals:** The only metals reported above established area background range values in soils were chromium and lead. Reported concentrations of chromium and lead in fill sand material in the southwestern portion of the site at MW2 were above background range values, but below the MDEQ residential direct contact values. Chromium levels within background range levels (8.4 mg/kg to 17 mg/kg) in shallow fill soils at locations MW1 and B11 suggest that the slightly elevated above background chromium levels reported in the deeper native clay at MW1 (18.8 mg/kg), B10 (19.9 mg/kg), or B11 (23.7 mg/kg) are not impacted from former landfill operations.

The only dissolved metals reported in groundwater were barium and chromium. Concentrations of dissolved barium and chromium were below MDEQ residential criteria in all four groundwater samples collected during this investigation. The presence of these metals in groundwater collected upgradient of the fill area in the southwestern portion of the site at MW3 and MW4, suggests these metals may be occurring naturally in site groundwater. No concentrations of dissolved lead were reported in groundwater at MW2, where the concentration of lead in fill sands was reported above the reported background range levels, but below the MDEQ residential direct contact value.

- **PNAs/SVOCs:** No PNAs were reported in any samples of the native clay/silt soils. Several PNAs were reported in two samples of fill sand. Of those, one sample, from MW2 (3-5 feet BGL) showed benzo(a) pyrene and phenanthrene above the MDEQ residential direct contact and 20X drinking water criteria, respectively. Neither were reported in groundwater at MW2, nor were any other SVOCs.
- **VOCs:** Reported VOCs in soils (B8-B: 30 $\mu\text{g/kg}$ 1,2,4-trimethylbenzene and MW2A: vinyl chloride 10 $\mu\text{g/kg}$) in the southwestern portion of the site were below the MDEQ residential soil cleanup criteria. No other VOCs were reported in soils at B8 or MW2 or at any other locations sampled during this investigation.

VOCs in groundwater were non-detect or below the MDEQ cleanup criteria at all locations sampled during this investigation. The only VOC reported in groundwater was p,m-xylene (2 µg/l) at MW3.

PCBs/Herbicides/Pesticides: No concentrations above the MDLs of PCBs were reported in any of the soil or groundwater samples collected for analysis during this investigation. No levels of herbicides or pesticides were reported in groundwater collected from MW3 and MW4 in the eastern portion of the site, the only samples analyzed for these compounds.

4.3 Potential Areas of Concern (PAOC)

- No evidence of a potential release to shallow site groundwater of petroleum product from LUST sites reported to the north of the site was identified at observation well MW4 installed along the north-central property boundary during this investigation. Therefore, the data does not indicate that this is a potential area of concern.
- No significant evidence of impact to native soils in an apparent low area that was identified as "Fill Area" on a 1966 topographic survey map was identified during this investigation.
- Evidence of metals and PNA impacts was identified at only one (MW2) of four fill sand sample locations in the area of historical landfill operations in the southwestern portion of the site.

Metals:

Chromium (90.0 mg/kg) and lead (172 mg/kg) were reported in fill sand above the reported area background range values (8.4-17 mg/kg and 21-46 mg/kg, respectively), but below the MDEQ residential direct contact criteria (2,000 mg/kg and 400 mg/kg, respectively). Thus, the metals impact because of historical landfill operation does not appear to be an area of concern.

PNAs:

Phenanthrene was reported at a concentration (1,300 $\mu\text{g/kg}$) in fill sand collected from 3 to 5 feet BGL at MW2-A in the fill area; that level was above the MDEQ 20X drinking water criteria (520 $\mu\text{g/kg}$), but below the MDEQ residential direct contact criteria (1.5E+6 $\mu\text{g/kg}$). Exposure through drinking water does not appear to be a likely pathway since shallow groundwater in this area is not known to be a source of drinking water. No PNAs were reported to be present at levels above the MDLs in any of the groundwater samples collected on the subject property. Thus, this PNA specie does not appear to represent an environmental concern.

Benzo(a)pyrene (1,700 $\mu\text{g/kg}$) was reported above MDEQ residential direct contact criteria (1,400 $\mu\text{g/kg}$) in fill sand collected from 3 to 5 feet BGL at MW2-A. This PNA specie is the only contaminant measured at levels above residential direct contact criteria. Furthermore, based on the results of the analyses of fill samples from locations widely distributed in the fill material, this is the only sampled location with an elevated benzo(a)pyrene level. Benzo(a)pyrene has been determined by MDEQ (Operational Memorandum #8) to be a chemical not expected to leach through soils to groundwater (due to its physicochemical properties); therefore, benzo(a)pyrene migration to an aquifer is not likely a relevant exposure pathway. No PNAs were reported to be present at levels above the MDLs in any of the groundwater samples collected on the subject property. Shallow groundwater in the area is not known to be a source of drinking water.

The measured concentration of benzo(a)pyrene (1,700 $\mu\text{g/kg}$) in sample MW2-A was only slightly above the respective MDEQ residential direct contact criterion of 1,400 $\mu\text{g/kg}$ and slightly above the reported (*Polycyclic Aromatic Hydrocarbons*, Agency for Toxic Substances and Disease Registry U.S. Public Health Service, February 16, 1990) range of background concentrations of 2 $\mu\text{g/kg}$ to 1,300 $\mu\text{g/kg}$ in rural soils. As a single data point, this exceedence may represent the inherent variability of analysis of material that contains benzo(a)pyrene at levels at or below the criterion.

APPENDIX A
Soil Boring Logs/Well Construction Diagrams

TABLE 1

SUMMARY OF ELEVATION AND POTENTIOMETRIC SURFACE FIELD DATA

Sample Date: March 15, 1996

Well ID	Ground Level Elevation	Top of Casing Elevation	Total Well Depth *	Bottom of Screen Elevation	Date: 3/15/96	
					SWL*	GWE
MW1	760.84	763.13	15.75	747.38	8.33	754.80
MW2	764.23	766.55	17.97	748.58	12.33	754.22
MW3	767.10	768.99	15.21	753.78	2.95	766.04
MW4	763.65	765.62	17.31	748.31	6.35	759.27

Elevations in feet relative to NGVD

SWL - Static Water Level

GWE - Groundwater Elevation

* Measured from top of casing

TABLE 2

SUMMARY OF TOTAL METAL LABORATORY RESULTS - SOIL

Sample Dates: March 11 and 12, 1996

Sample ID	Sample Depth (BGL)	Soil Type	Concentrations (mg/kg) Reported Above Method Detection Limits							
			Arsenic	Barium	Cadmium	Chromium	Lead	Mercury	Selenium	Silver
MW1-A	3-5	Foundry Sand	0.71	6.3	<0.05	6.7	1.9	<0.10	<0.50	<0.20
MW1-D	18-20	Clay	5.57	52.9	0.13	18.8	7.4	<0.10	<0.50	<0.20
MW2-A	3-5	Fill Sand	2.70	94.7	0.81	90.0	172	<0.10	<0.50	0.57
MW2-C	18-20	Clay	6.51	55.4	0.18	10.3	7.6	<0.10	<0.50	0.27
MW3-C	13-15	Clay	3.92	44.8	0.20	11.0	5.8	<0.10	<0.50	<0.20
B5-C	8-10	Clay	3.83	31.0	<0.05	6.1	4.1	<0.10	<0.50	0.31
B8-B	8-10	Foundry Sand	0.92	7.5	0.85	3.4	8.0	<0.10	<0.50	<0.20
B8-D*	18-20	Silt	6.86	8.5	<0.05	3.5	2.6	<0.10	<0.50	<0.20
B9-C*	13-15	Silt	4.09	14.4	<0.05	4.2	3.3	<0.10	<0.50	0.42
B10-C	13-15	Clay	3.87	66.4	<0.05	19.9	8.0	<0.10	<0.50	0.55
B11-A	0-2	Foundry Sand	<0.50	6.7	<0.05	10.7	4.5	<0.10	<0.50	<0.20
B11-C	8-10	Clay	2.29	38.4	0.40	23.7	8.0	<0.10	<0.50	<0.20
Established Area Background Values ¹			3.2-13	55-100	1.2-5.6	8.4-17	21-46	.02-.28	.08-1.4	1.1-2.8
Residential Direct Contact Values ²			5.5	30,000	210	2,000	400	130	2,100	2,000

¹ MDEQ Guidance Document for Verification of Soil Remediation: Mean Plus 3 Standard Deviation Approach. Reference documents: May 5, 1992 *Hazardous Waste Storage Area Partial Closure Report and Certification* (report for Delphi Energy & Engine Management Systems, Plant 7), and December 9, 1993 *Averill Avenue Complex, Plant 6 Hazardous Waste Storage Area Closure Assessment Report, Certification, and Interim Response Program*

² MDEQ Interim Environmental Response Division Operational Memorandum #8, Revision 4 (June 5, 1995)

BGL - Feet Below Grade Level

* Saturated Soil Sample

☐ Above Established Area Background Values, but Below MDEQ Residential Direct Contact Values

TABLE 3

SUMMARY OF PNA LABORATORY RESULTS - SOIL

Sample Dates: March 11 and 12, 1996

Sample ID	Sample Depth (BGL)	Soil Type	Concentrations (µg/kg)								
			Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoranthene	Benzo(k) fluoranthene	Chrysene	Fluoranthene	Phenanthrene	Pyrene	2-Methyl-naphthalene
MW1-A	3-5	Foundry Sand	<330	<330	<330	<330	<330	<330	<330	<330	<330
MW1-D	18-20	Clay	<330	<330	<330	<330	<330	<330	<330	<330	<330
MW2-A	3-5	Fill Sand	1,700	1,700	1,800	1,500	1,700	2,900	1,300	2,200	<1,200
MW2-C	18-20	Clay	<330	<330	<330	<330	<330	<330	<330	<330	<330
MW3-C	13-15	Clay	<330	<330	<330	<330	<330	<330	<330	<330	<330
B5-C	8-10	Clay	<330	<330	<330	<330	<330	<330	<330	<330	<330
B8-B	8-10	Foundry Sand	<330	<330	<330	<330	<330	<330	<330	<330	810
B8-D*	18-20	Silt	<330	<330	<330	<330	<330	<330	<330	<330	<330
B9-C*	13-15	Silt	<330	<330	<330	<330	<330	<330	<330	<330	<330
B10-C	13-15	Clay	<330	<330	<330	<330	<330	<330	<330	<330	<330
B11-A	0-2	Foundry Sand	<330	<330	<330	<330	<330	<330	<330	<330	<330
B11-C	8-10	Clay	<330	<330	<330	<330	<330	<330	<330	<330	<330
20 X Drinking Water Values¹			E	E	E	E	E	18,000	520	11,000	ID
20 X GSI Values¹			E	E	E	E	E	7,400	B	2.2E+5	B
Residential Direct Contact Values¹			14,000	1,400	14,000	1.4E+5	1.4E+6	5.1E+7	1.5E+6	3.2E+7	ID

¹ MDEQ Interim Environmental Response Division Operational Memorandum #8, Revision 4 (June 5, 1995)

B - GSI not developed

E - Not expected to leach to groundwater

ID - Inadequate data to develop criteria

GSI - Groundwater Surface Water Interface

BGL - Feet Below Grade Level

* Saturated Soil Sample

E* Above Direct Contact Criteria

Note: Results presented only for contaminants reported at detectable levels above the Method Detection Limit (MDL).

(0065401M.T13)

TABLE 4

SUMMARY OF METAL, VOC, AND SVOC LABORATORY RESULTS - GROUNDWATER

Concentrations (µg/l)

Sample Date: March 15, 1996

Sample ID	Screen Interval (BGL)	Screen Interval Soil Type	METALS			VOC	SVOC
			Barium MDL = 10 µg/l	Chromium MDL = 10 µg/l	p,m-Xylene MDL = 1 µg/l		
MW1	8.5-13.5	Foundry Sand/Native Silt	150	10	<1	<10	Di-n-octyl phthalate MDL = 10 µg/l
MW2	10.7-15.7	Fill Sand/Native Silt & Sand	230	20	<1	<10	
MW3	8.3-13.3	Native Sand & Silt	60	10	2	10	
MW4	10.3-15.3	Native Sand	40	10	<1	<10	
Drinking Water Values ¹							
GSI Value ¹			2,000	100	280	130	
			630	77	59	B	

¹ MDEQ Interim Environmental Response Division Operational Memorandum #8, Revision 4 (June 5, 1995)
 BGL - Feet Below Grade Level

☒ Above Cleanup Criteria Values

B - GSI value not developed

Note: Results presented only for contaminants reported at detectable levels above the Method Detection Limit (MDL).

TABLE 5

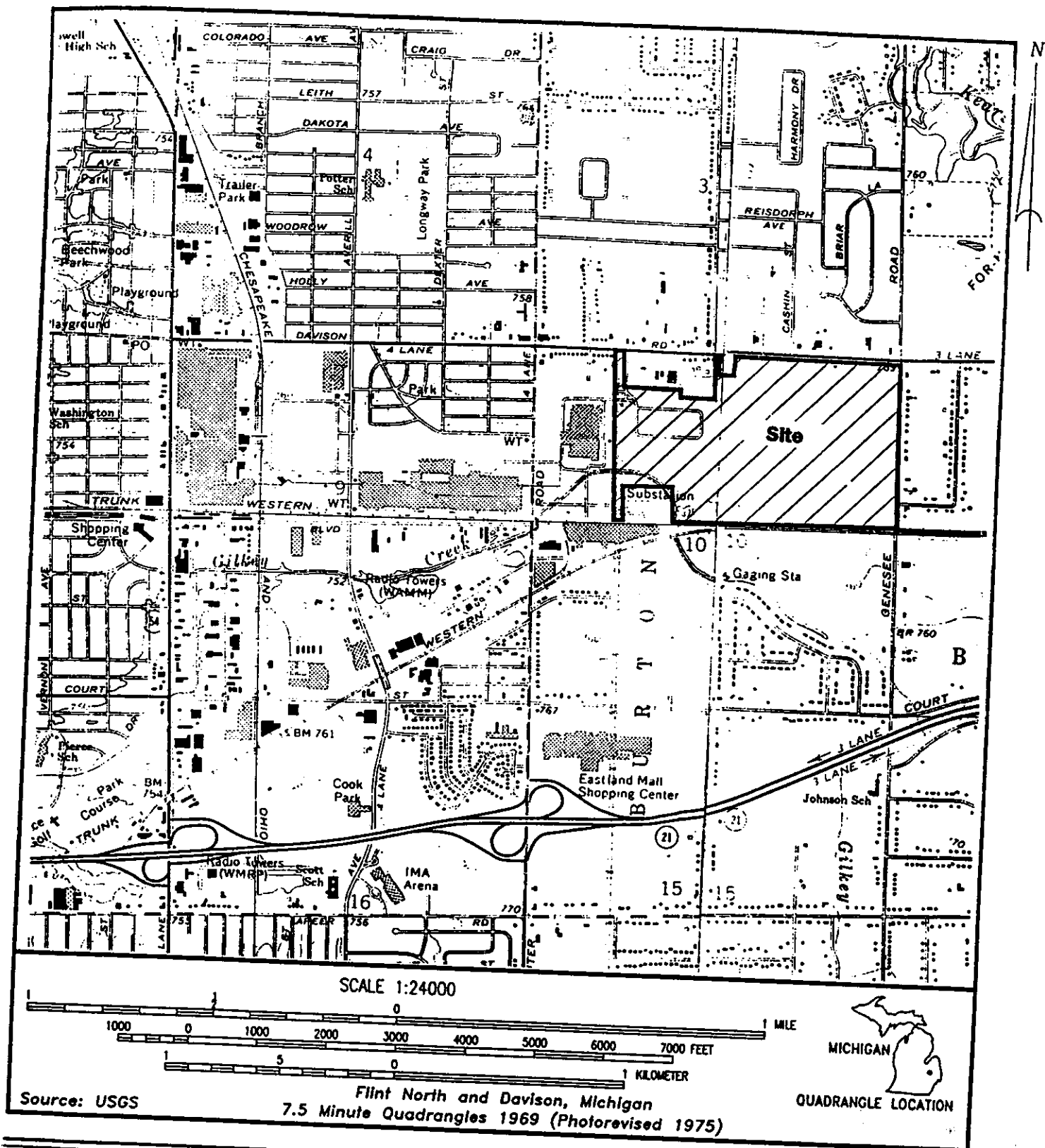
SUMMARY OF PHYSICAL GROUNDWATER RESULTS

Temperature, pH, and Conductivity

Sample Date: March 15, 1996

Sample ID	Screen Interval (BGL)	Screen Interval Soil Type	Temperature (°C)	pH	Conductivity (us/cm)
MW1	8.5-13.5	Foundry Sand/Native Silt	6	7.08	810
MW2	10.7-15.7	Fill Sand/Native Silt & Sand	9	7.18	1570
MW3	8.3-13.3	Native Sand & Silt	6	6.48	970
MW4	10.3-15.3	Native Sand	10	7.12	1350

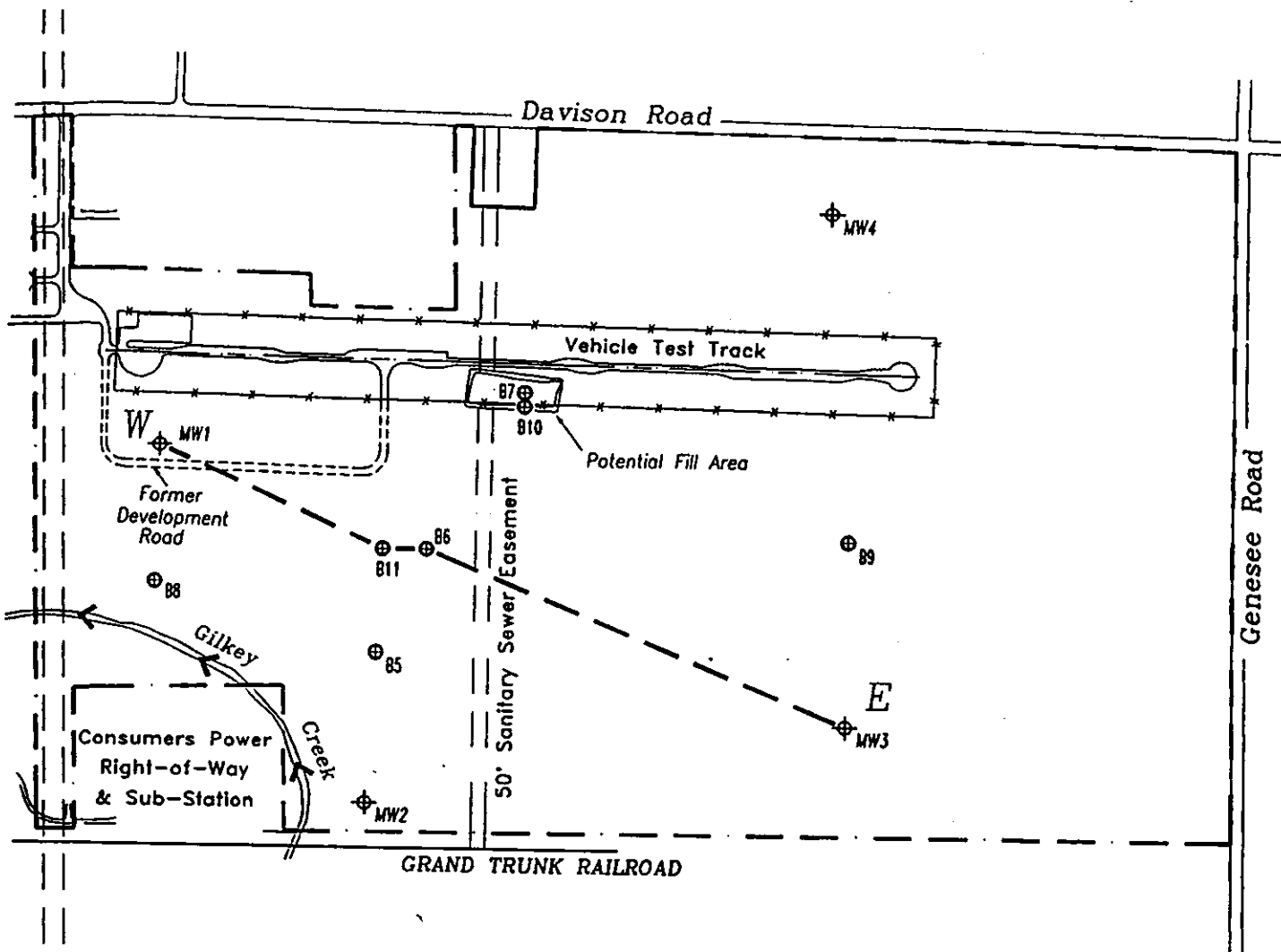
BGL - Feet Below Grade Level



TECHNA CORPORATION
44808 Helm Street
Plymouth, MI 48170
(313) 454-1100

Figure 1
Site Location Map
Delphi Energy & Engine Management Systems - Flint East
Flint, Michigan
Sec 10 T7N R7E

TPN: 00654-01M
Date: 4-4-98
Rev. 060
Ref: 65401M-LDWG



Legend

---	Property Boundary
-*-	Fence
⊕	Observation Well
⊙	Soil Boring



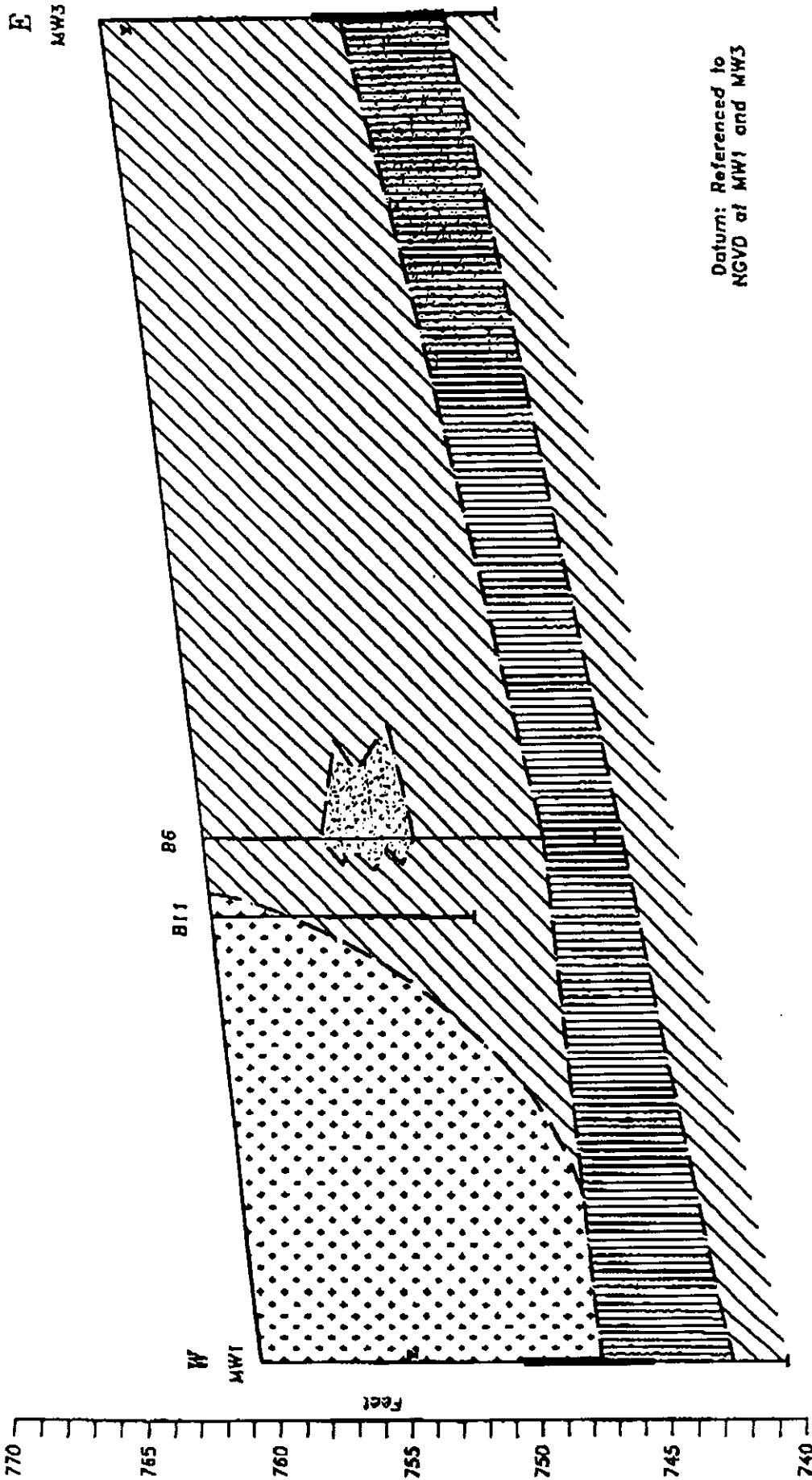
0 600'
APPROX. SCALE

DELPHI
Energy & Engine Management Systems

TECHNA
CORPORATION
44808 Helm Street
Plymouth, MI 48170-6026
(313) 454-1100

Figure 3
Observation Well/Soil Boring Locations
Delphi Energy & Engine Management Systems - Flint East
Flint, Michigan

TPN: 654-01M
Date: 5-6-88
Rev. 060
Ref:
File: 65401M-2.DWG



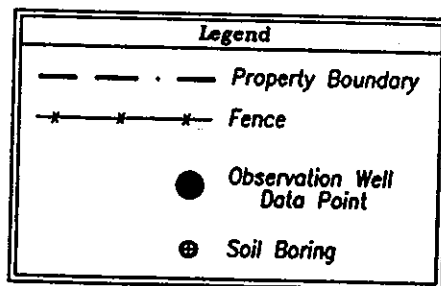
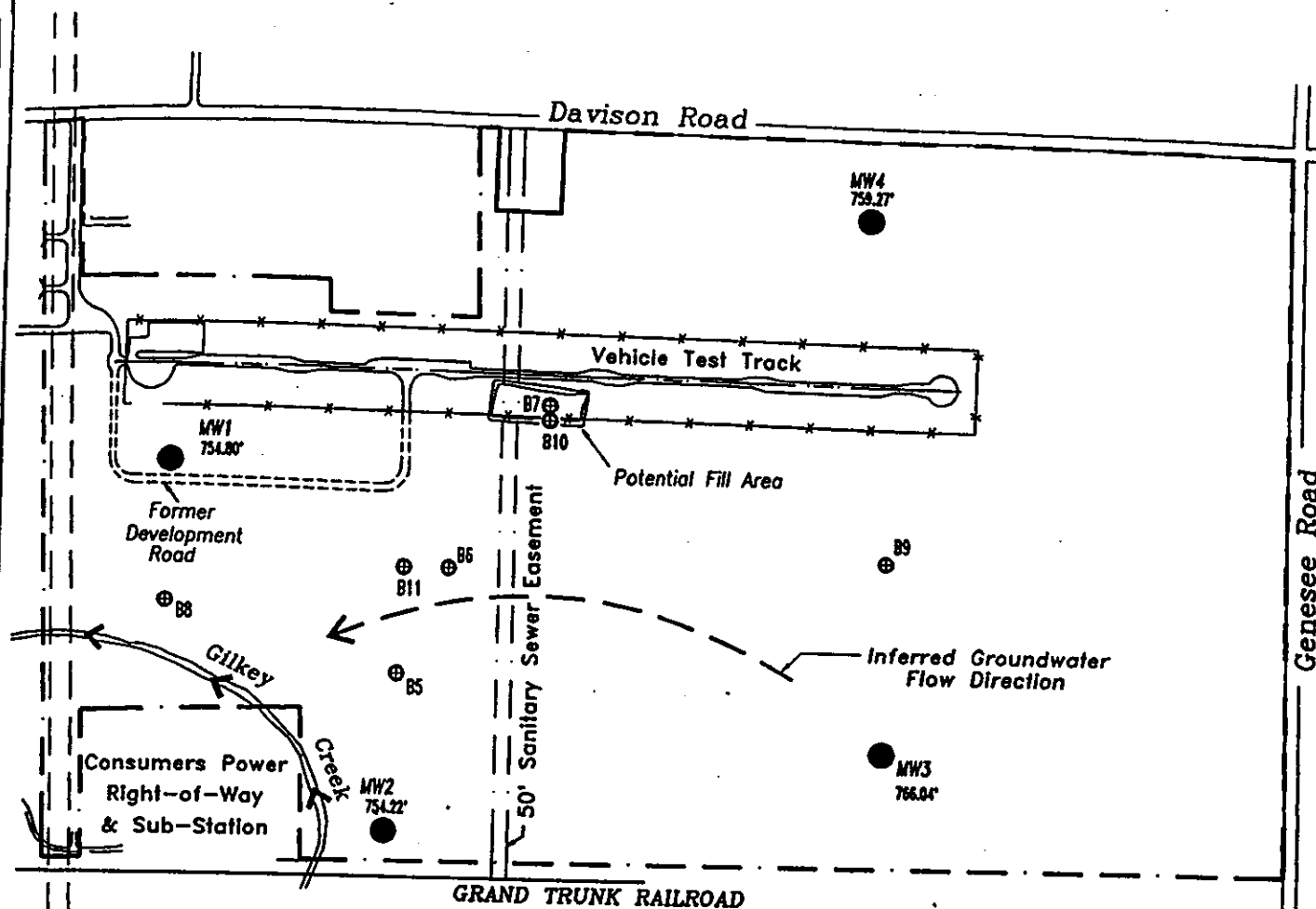
LEGEND	
Fill	Potential/Isometric Measurements (03/15/96)
SAND	Screened Interval
SILT	
SILT and SAND	
CLAY	

Figure 4
Geologic Cross-Section
(W-E)
Delphi Energy & Engine Management Systems
- Flint East, Flint, Michigan

DELPHI
Energy & Engine Management Systems

IPN: 00636-01X
Date: 4-17-96
Per: 060
Dm: 65401X-4.DWG
Rev: 060
TUA: 65401X-4.DWG

TECHNA
CORPORATION
44808 Main Street
Plymouth, MI 48170
(313) 434-1100



0 600'
APPROX. SCALE

DELPHI
Energy & Engine Management Systems

Figure 5
Groundwater Potentiometric Measurements (03/15/96)
Delphi Energy & Engine Management Systems - Flint East
Flint, Michigan

TECHNA CORPORATION
44808 Helm Street
Plymouth, MI 48170-6026
(313) 454-1100

TPN: 654-01M
Date: 6-6-96
Rev. 080
Dwn:
Rft:
File: 65401M-3.DWG

Techna Corporation
Plymouth, Michigan

Log of Boring B5

PROJECT: GM Corporation

LOCATION: Green Parcel East of Delphi Plant 700

PROJECT NO.: 00654-01M-002

SURFACE ELEVATION:

DATE START/FINISH: 3-11-96

INITIAL H2O LEVEL:

DRILLING METHOD: 4.5-inch ID Hollow Stem Auger

STATIC H2O ELEV.:

SAMPLING METHOD: 2 foot by 2-inch Split Barrel Sampler

TOTAL DEPTH: 15 Feet

DRILLING COMPANY: Carlo Environmental

LOGGED BY: (074)

DEPTH feet	LAB SAMPLE NO	BLOWS/0.5 ft.	PID (relative ppm)		GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	REMARKS
			VALUES	PROFILE				
3	B5-A 3-5'	1 3 3 5	<1			CL	CLAY: soft to medium stiff, moist, yellow brown.	Scattered gravels and construction debris noted on ground surface.
6						SM	SAND: some silt, fine to medium, loose, moist, yellow brown.	
9	B5-B 8-10'	3 3 6 10	<1			CL	CLAY: trace fine sand, silts and fine gravels, stiff, moist, yellow brown.	
15	B5-C 13-15'	2 3 4 5	<1			CL	CLAY: trace fine gravels, stiff, moist, gray.	
15							END OF BORING	
18								
21								

Techna Corporation
Plymouth, Michigan

Log of Boring B6

PROJECT: GM Corporation

LOCATION: Green Parcel East of Delphi Plant 700

PROJECT NO.: 00654-01M-002

SURFACE ELEVATION:

DATE START/FINISH: 3-11-96

INITIAL H2O LEVEL: 13 Feet

DRILLING METHOD: 4.5-Inch ID Hollow Stem Auger

STATIC H2O ELEV.:

SAMPLING METHOD: 2 foot by 2-inch Split Barrel Sampler

TOTAL DEPTH: 15 Feet

DRILLING COMPANY: Carlo Environmental

LOGGED BY: (074)

DEPTH feet	LAB SAMPLE NO.	BLOWS/0.5 ft.	PID (relative ppm)		GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	REMARKS
			VALUES	PROFILE				
			0	50				
3	B6-A 3-5'	5 8 7 9	<1			CL	CLAY: some silts, trace fine sands, stiff, damp to moist, yellow brown.	Terminated B6 at 15' because no fill was encountered. Note off-set boring was located to west at B11.
6						SM	SAND: some silt, fine, loose, moist, yellow brown.	
9	B5-B 8-10'	3 4 3 5	<1			CL	CLAY: medium stiff, moist, gray.	
12								
15	B6-C 13-15'	2 3 3 3	<1			ML	SILT: trace clay, soft, with occasional very thin beds of clay, moist to saturated, gray.	
							END OF BORING	
18								
21								

Techna Corporation
Plymouth, Michigan

Log of Boring B7

PROJECT: *GM Corporation*

LOCATION: *Green Parcel East of Delphi Plant 700*

PROJECT NO.: *00654-01M-002*

SURFACE ELEVATION:

DATE START/FINISH: *3-11-96*

INITIAL H2O LEVEL: *8 Feet*

DRILLING METHOD: *4.5-inch ID Hollow Stem Auger*

STATIC H2O ELEV.:

SAMPLING METHOD: *2 foot by 2-inch Split Barrel Sampler*

TOTAL DEPTH: *10 Feet*

DRILLING COMPANY: *Carlo Environmental*

LOGGED BY: *(074)*

DEPTH feet	LAB SAMPLE NO	BLOWS/0.5 ft.	PID (relative ppm)		GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	REMARKS
			VALUES	PROFILE				
			0	50				
3	B7-A 3-5'	5 8 12 10	<1			SM	SAND: trace silt, fine, medium dense, moist, yellow brown.	Terminated B7 at 10' because no fill was encountered. Note off-set boring was located to south at B10. Scattered gravels noted on ground surface.
6								
9	B7-B 8-10'	3 2 5 2	<1			ML	Saturated at 8 feet. SILT: some clay, soft, saturated, gray.	
12							END OF BORING	
15								
18								
21								

Techna Corporation
Plymouth, Michigan

Log of Boring B8

PROJECT: *GM Corporation*

LOCATION: *Green Parcel East of Delphi Plant 700*

PROJECT NO.: *00654-OIM-002*

SURFACE ELEVATION:

DATE START/FINISH: *3-11-96*

INITIAL H2O LEVEL:

DRILLING METHOD: *4.5-inch ID Hollow Stem Auger*

STATIC H2O ELEV.:

SAMPLING METHOD: *2 foot by 2-inch Split Barrel Sampler*

TOTAL DEPTH: *20 Feet*

DRILLING COMPANY: *Carlo Environmental*

LOGGED BY: *(074)*

DEPTH feet	LAB SAMPLE NO.	BLOWS/0.5 ft.	PID (relative ppm)		GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	REMARKS
			VALUES	PROFILE				
3	B8-A 3-5'	2 2 3 4	<1		GP SP	SC	Fill gravel and sand.	
6								
9	B8-B 8-10'	2 2 4 5	<1			SP	Fill Sand and Clay, fine sand, loose sand, soft clay, moist, brown black sand in thin beds throughout sample.	
12								
15	B8-C 13-15'	1 1 1 1	<1			CL	Fill Sand, fine, moist, black (apparent foundry sand).	
18								
21	B8-D 18-20'	6 12 16 18	<1			SM ML	CLAY: trace silt, medium stiff, moist, black gray.	
							Sand with silt, fine, very loose, saturated, gray at 14'5" to 14'8", coarse sand with organics, black gray to gray.	
							SILT: some fine sand, dense, saturated, gray.	
							END OF BORING	

Techna Corporation
Plymouth, Michigan

Log of Boring B9

PROJECT: GM Corporation

LOCATION: Green Parcel East of Delphi Plant 700

PROJECT NO.: 00654-OIM-002

SURFACE ELEVATION:

DATE START/FINISH: 3-11-96

INITIAL H2O LEVEL: 6 Feet

DRILLING METHOD: 4.5-inch ID Hollow Stem Auger

STATIC H2O ELEV.:

SAMPLING METHOD: 2 foot by 2-inch Split Barrel Sampler

TOTAL DEPTH: 15 Feet

DRILLING COMPANY: Carlo Environmental

LOGGED BY: (074)

DEPTH feet	LAB SAMPLE NO	BLOWS/0.5 ft.	PID (relative ppm)		GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	REMARKS
			VALUES	PROFILE				
3	B9-A 3-5'	3 3 8 5	<1			CL	CLAY: trace of fine sand and gravel, medium stiff to stiff, moist, yellow brown.	
6								
9	B9-B 8-10'	3 8 8 10	<1			SM ML	SAND and SILT: fine sands, loose to medium dense, saturated, yellow brown.	
12								
15	B9-C 13-15'	2 5 8 8	<1			ML	SILT: some clay, trace fine sands, stiff, saturated, gray.	
18								
21							END OF BORING	

Techna Corporation
Plymouth, Michigan

Log of Boring B10

PROJECT: *GM Corporation*

LOCATION: *Green Parcel East of Delphi Plant 700*

PROJECT NO.: *00654-OIM-002*

SURFACE ELEVATION:

DATE START/FINISH: *3-11-96*

INITIAL H2O LEVEL: *8 Feet*

DRILLING METHOD: *4.5-inch ID Hollow Stem Auger*

STATIC H2O ELEV.:

SAMPLING METHOD: *2 foot by 2-inch Split Barrel Sampler*

TOTAL DEPTH: *15 Feet*

DRILLING COMPANY: *Carlo Environmental*

LOGGED BY: *(074)*

DEPTH feet	LAB SAMPLE NO.	BLOWS/0.5 ft.	PID (relative ppm)		GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	REMARKS
			VALUES	PROFILE				
			0	50				
3	B10-A 3-5'	3 4 6 2	<1			SP	Gravels and Sand: base coarse.	B10 located in center of gravel road, off-set to south from B7.
6						SM	SAND: trace silt, fine, loose, moist, yellow brown.	
9	B10-B 8-10'	3 4 6 7	<1				Saturated at 8 feet. Silt in thin lamina throughout sample.	
12								
15	B10-C 13-15'	3 5 4 3	<1			CL	CLAY: trace fine gravel, medium stiff, moist, gray.	
18							END OF BORING	
21								

Techna Corporation
Plymouth, Michigan

Log of Boring B11

PROJECT: GM Corporation

LOCATION: Green Parcel East of Delphi Plant 700

PROJECT NO.: 00654-01M-002

SURFACE ELEVATION:

DATE START/FINISH: 3-11-96

INITIAL H2O LEVEL:

DRILLING METHOD: 4.5-inch ID Hollow Stem Auger

STATIC H2O ELEV.:

SAMPLING METHOD: 2 foot by 2-inch Split Barrel Sampler

TOTAL DEPTH: 10 Feet

DRILLING COMPANY: Carlo Environmental

LOGGED BY: (074)

DEPTH feet	LAB SAMPLE NO	BLOWS/0.5 ft.	PID (relative ppm)		GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	REMARKS
			VALUES	PROFILE				
	B11-A 0-2'	N/A	<1			SM	Fill SAND: little silt, fine, damp, yellow brown.	B11 off-set to west from B6.
						SP	Fill SAND: fine, moist, red brown (apparent foundry sand).	
3	B11-B 3-5'	2 4 4 5	<1			CL	CLAY: some fine sand, medium stiff to stiff, moist, yellow brown.	
9	B11-C 8-10'	4 6 8 10	<1					
							Gray color change noted at 10 feet. END OF BORING	
12								
15								
18								
21								

Techna Corporation
Plymouth, Michigan

Log of Monitoring Well MW1

PROJECT: GM Corporation

LOCATION: Green Parcel East of Delphi Plant 700

PROJECT NO.: 00654-01M-002

SURFACE ELEVATION: 760.84 Feet

DATE START/FINISH: 3-11-96

INITIAL H2O LEVEL: 11 Feet

DRILLING METHOD: 4.5-inch ID Hollow Stem Auger

STATIC H2O ELEV.: 754.80 Feet (03/15/96)

SAMPLING METHOD: 2 foot by 2-inch Split Barrel Sampler

TOTAL DEPTH: 20 Feet

DRILLING COMPANY: Carlo Environmental

LOGGED BY: (074)

DEPTH feet	LAB SAMPLE NO.	BLOWS/0.5 ft.	PID (relative ppm)		GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	WELL DIAGRAM
			VALUES	PROFILE				
3	MWI-A 3-5'	3 3 6 7	<1		CL	CL	Fill Clay, some fine sand, damp, yellow brown.	
6					SP	SP	Fill Sand, fine, loose to medium dense, damp, black, apparent foundry sand, red brick in sample.	
9	MWI-B 8-10'	8 8 10 7	<1		SP	SP	Fill Sand, fine, loose to medium dense, traces of silt, very moist, yellow brown, apparent foundry sand.	
12							Saturated at 11 feet.	
15	MWI-C 13-15'	2 5 9 7	<1		SM ML	SM ML	SILT: some fine sand, with occasional very thin beds of clay, medium stiff, saturated, gray.	
18	MWI-D 18-20'	1 2 2 2	<1		CL	CL	CLAY: little silt, very soft to soft, moist, gray.	
21							END OF BORING	

Techna Corporation
Plymouth, Michigan

Log of Monitoring Well MW2

PROJECT: GM Corporation

LOCATION: Green Parcel East of Delphi Plant 700

PROJECT NO.: 00654-OIM-002

SURFACE ELEVATION: 764.23 Feet

DATE START/FINISH: 3-11-96

INITIAL H2O LEVEL: 11 Feet

DRILLING METHOD: 4.5-inch ID Hollow Stem Auger

STATIC H2O ELEV.: 754.22 Feet (03/15/96)

SAMPLING METHOD: 2 foot by 2-inch Split Barrel Sampler

TOTAL DEPTH: 20 Feet

DRILLING COMPANY: Carlo Environmental

LOGGED BY: (074)

DEPTH feet	LAB SAMPLE NO	BLOWS/0.5 ft.	PID (relative ppm)		GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	WELL DIAGRAM
			VALUES	PROFILE				
3	MW2-A 3-5'	10 10 9 11	<1		SP	SP	Fill Sand, some gravels, (apparent slag material) yellow brown, black, red brown.	2" inch dia. PVC Riser Concrete Bentonite Chips Filter Sand 2" inch dia. PVC Screen (0.010-slot)
6								
9		42 24 11 5					No sample return, driving concrete in split barrel sampler. Drilled through concrete from 8-10'.	
12								
15	MW2-B 14-16'	2 2 2 2 2 1 1	<1		ML SM	ML SM	SILT and SAND: fine to medium, trace fine gravels, wood debris, saturated, gray. No sample return from 13 to 15 feet.	Filter Sand Bentonite Chips
18	MW2-C 18-20'	1 3 4 2	<1		CL	CL	CLAY: trace silt, and fine gravels, soft to medium stiff, moist, gray.	
21							END OF BORING	

Techna Corporation
Plymouth, Michigan

Log of Monitoring Well MW3

PROJECT: GM Corporation

LOCATION: Green Parcel East of Delphi Plant 700

PROJECT NO.: 00654-OIM-002

SURFACE ELEVATION: 767.10 Feet

DATE START/FINISH: 3-11-96

INITIAL H2O LEVEL: 9 Feet

DRILLING METHOD: 4.5-inch ID Hollow Stem Auger

STATIC H2O ELEV.: 766.04 Feet (03/15/96)

SAMPLING METHOD: 2 foot by 2-inch Split Barrel Sampler

TOTAL DEPTH: 15 Feet

DRILLING COMPANY: Carlo Environmental

LOGGED BY: (074)

DEPTH feet	LAB SAMPLE NO	BLOWS/0.5 ft.	PID (relative ppm)		GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	WELL DIAGRAM
			VALUES	PROFILE				
3	MW3-A 3-5'	4 8 8 11	<1			CL	CLAY: trace silt and fine sand, stiff to very stiff, moist, yellow brown.	
6								
9	MW3-B 8-10'	3 8 11 12	<1			SM ML	SAND and SILT: fine, medium dense, saturated, yellow brown.	
12								
15	MW3-C 13-15'	2 5 5 10	<1			CL	CLAY and SILT: clay and silt thin beds throughout sample, very moist, gray.	
18								
21							END OF BORING	

Techna Corporation
Plymouth, Michigan

Log of Monitoring Well MW4

PROJECT: GM Corporation

LOCATION: Green Parcel East of Delphi Plant 700

PROJECT NO.: 00654-01M-002

SURFACE ELEVATION: 763.65 Feet

DATE START/FINISH: 3-11-96

INITIAL H2O LEVEL:

DRILLING METHOD: 4.5-inch ID Hollow Stem Auger

STATIC H2O ELEV.: 759.27 Feet (03/15/96)

SAMPLING METHOD: 2 foot by 2-inch Split Barrel Sampler

TOTAL DEPTH: 15 Feet

DRILLING COMPANY: Carlo Environmental

LOGGED BY: (074)

DEPTH feet	LAB SAMPLE NO.	BLOWS/0.5 ft.	PID (relative ppm)		GRAPHIC LOG	SOIL CLASS	GEOLOGIC DESCRIPTION	WELL DIAGRAM
			VALUES	PROFILE				
3						CL	CLAY: some fine sand, moist, yellow brown.	2" inch dia. PVC Riser Bentonite Chips Concrete Filter Sand 2" inch dia. PVC Screen (0.010-slot)
6								
9								
12						SM	SAND: some silt, fine, saturated, gray brown to gray.	
15							END OF BORING	
18							Note: Soil profile logged from soil cuttings and drilling rate changes.	
21								