INTERIM MEASURES WORK PLAN FOR LNAPL-IMPACTED SOIL IN IU B (GM SMCO FACILITY)

GENERAL MOTORS CORPORATION
1629 N. WASHINGTON AVENUE
SAGINAW, MICHIGAN 48605-5073

DECEMBER 2004
REF. NO. 17075 (16)

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LIST OF ACRONYMS AND TERMS

amsl	above mean sea level
bgs	below ground surface
CRA	Conestoga-Rovers & Associates
DOT	Department of Transportation
GM	General Motors Corporation
HASP	Health and Safety Plan
IM Work Plan	Interim Measures Work Plan
IU	Investigative Unit
LNAPL	Light Non-Aqueous Phase Liquid
MDEQ	Michigan Department of Environmental Quality
mg/kg	milligrams per kilogram
OSHA	Occupational Safety and Health Administration
POTW	Publicly Owned Treatment Works
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SMCO	Saginaw Metal Casting Operations
sf	square feet
TSCA	Toxic Substance Control Act
U.S. EPA	United States Environmental Protection Agency

1.0 INTRODUCTION

This report presents the Interim Measures Work Plan (IM Work Plan) for Light Non-Aqueous Phase Liquid (LNAPL) impacted soil at Investigative Unit (IU) B at the General Motors Corporation (GM) Saginaw Metal Casting Operations (SMCO) Facility at 2100 Veterans Memorial Parkway in Saginaw, Michigan (Site). The Site has the United States Environmental Protection Agency (U.S. EPA) identification number MID 041 793 340. The Site location is presented on Figure 1.1 and the Site Plan is presented on Figure 1.2. The location of IU B is also presented on Figure 1.2.

The IM Work Plan will address soils, specifically identified as those materials found to be impacted with LNAPL. GM may re-evaluate the cleanup objective and contact the U.S. EPA if the objective cannot practically be met.

1.1 SCOPE OF INTERIM MEASURES WORK PLAN

GM is conducting a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) at the Site. The RFI is being preformed consistent with the Unilateral Administrative Order issued by the U.S. EPA. As part of the RFI investigation, IU B was investigated. LNAPL was observed in soil samples.

This IM Work Plan details full-scale interim measures to address LNAPL soil impacts in IU B. The purpose of this IM Work Plan is to remediate areas to allow for easier redevelopment opportunities.

2.0 DESCRIPTION OF IU B

Currently IU B is a vacant field. IU B is the area of the former parts plant and was formerly used for machining and storage of engine blocks.

3.0 RCRA FACILITY INVESTIGATION

3.1 SOIL INVESTIGATION

Extensive soil investigations have been completed in IU B as part of the RFI. Soil sample locations and the area impacted by LNAPL in IU B are presented on Figure 3.1. Boring logs for samples taken in IU B are presented in Appendix A.

3.2 SITE GEOLOGY AND HYDROGEOLOGY

3.2.1 GEOLOGY

The ground surface typically consists of a layer of fill of varying thickness, over fluvial/marsh deposits composed of silty sand and silty clay, which in turn overlies glaciolacustrine deposits composed of clay with thin discontinuous sand lenses overlying subglacial sand/gravel deposits. Bedrock in this area is encountered approximately 84 to 106 feet below the surface on the property and is composed of hard fine sandstone, part of the Pennsylvanian Saginaw Formation.

3.2.2 HYDROGEOLOGY

Groundwater is presently unconfined in the more permeable surface fill and sand units. There is a confined water-bearing unit in the subglacial sand/gravel deposits, which are connected to the underlying sandstone. The two water bearing units are separated by the silty clay confining layer, which varies in thickness from 15 feet near the Saginaw River to 80 feet on the eastern side and which can have limited quantities of water in discontinuous sand units. The depth to groundwater in the area in IU B where LNAPL product was observed is approximately 4 feet below ground surface (bgs). Flow in the water table groundwater is generally west/northwest toward the river, although the SMCO Plant locally affects flow, by pumping drains around the buildings.

4.0 PROPOSED FULL-SCALE INTERIM MEASURES

Full-scale interim measures will consist of the excavation of LNAPL impacted soil and the backfilling of the excavated area with a clean, inert backfill material.

4.1 RATIONALE FOR PROPOSED INTERIM MEASURES

Soil not impacted by LNAPL will be excavated to a depth of approximately 1 foot above the water table and stored on site to be used as backfill. LNAPL and LNAPL impacted soil will be excavated to a depth of approximately 1-foot below the water table. Verification of remediation will be made visually and by the monitoring of two proposed wells (Figure 3.1). The LNAPL/soil will be removed from the Site by a licensed waste hauler and delivered to an appropriately licensed landfill. GM is proposing to remove LNAPL impacted soil, where source product has been identified, to allow for easier redevelopment of the property.

The extent of the proposed LNAPL excavation was identified using the data from the monitoring wells and geoprobes. The horizontal extent of LNAPL was determined by the presence or absence of LNAPL in the borings/monitoring wells as presented on Figure 3.1. The vertical extent of the excavation for unimpacted soil was selected to be 1 foot above the water table and is based on the observations from the geoprobes and the existing monitoring wells.

Based upon the geoprobe assessment, the zone visually impacted with LNAPL was observed to range from 583.37 to 582.39 feet above mean sea level (ft AMSL). Therefore, conservatively, 1 foot above the water table was selected to ensure that the soil above was free of NAPL. Based on available data, which includes seasonal variation for the monitoring wells, the thickness of in-well accumulations of LNAPL has been less than 1 inch. The proposed excavation termination depth of 1 foot below the water table was, therefore, selected to account for seasonal fluctuations and ensure that all LNAPL is removed. However, if stained soil is observed above this 1 foot above the water table zone during excavation, the stained soil will be assumed to be impacted by LNAPL and disposed of off Site with the other soil for disposal.

No soil samples were analyzed from any of the geoprobe borings. The purpose of the geoprobe borings was to identify the extent of impacts visually. Based on the visual results, two monitoring wells were installed (MW-00004 downgradient and MW-00404 upgradient) and sampled. Antimony was reported in the groundwater sample from MW-00004 above screening criteria. All other parameters were below screening criteria.

As indicated above, if additional soil is found to be impacted during removal activities, it will be disposed of with other LNAPL-impacted soils.

4.2 SCOPE OF WORK

The following sections describe the cleanup activities related to on-Site work to be conducted under this Work Plan:

4.2.1 Prepare Health and Safety Plan
4.2.2 Contractor Procurement
4.2.3 Pre-Mobilization Activities
4.2.4 Mobilization/Site Preparation
4.2.5 Well Abandonment
4.2.6 Soil Excavation
4.2.7 Remediation Verification
4.2.8 Transportation and Off-Site Disposal
4.2.9 Backfilling and Compaction
4.2.10 Decontamination
4.2.11 Site Restoration and Demobilization

4.2.1 PREPARE HEALTH AND SAFETY PLAN

To ensure that all on-Site personnel are properly protected from potential exposure to Site-related constituents, a Site-specific Health and Safety Plan (HASP) will be prepared. A Site health and safety officer will complete a hazard analysis for all activities. The hazard analysis will identify the potential hazards, evaluate the level of personal protective equipment that will be used during the cleanup activities, and describe the personnel decontamination procedures required to control any potential personal exposures during implementation of this Work Plan.

4.2.2 CONTRACTOR PROCUREMENT

A qualified, OSHA-trained remedial contractor will be procured for the removal and disposal of the LNAPL remediation waste. The remedial contractor will be responsible for the construction and removal of all temporary facilities (including a decontamination

area and staging area), LNAPL/soil removal, transportation, disposal, backfilling, and Site restoration.

In addition to the remedial contractor, subcontractors will also be procured to perform analytical laboratory services for waste characterization.

4.2.3 PRE-MOBILIZATION ACTIVITIES

Prior to mobilization, all areas in which removal activities are required will be marked based on previous sampling locations.

4.2.4 MOBILIZATION/SITE PREPARATION

Upon mobilization of the contractor at the Site, the contractor will establish security controls and designate the exclusion, contaminant reduction, and support zones by installing a temporary orange safety fence or caution tape, with warning signs, as necessary.

4.2.5 WELL ABANDONMENT

Currently there are two monitoring wells located within the limits of excavation. These wells are identified as MW-00304 and MW-00305 and are presented on Figure 3.1. These wells will be abandoned before excavation commences. The wells will be abandoned according to the well abandonment procedure ASTM D 5299-99.

4.2.6 SOIL EXCAVATION

The limits of excavation are shown on Figure 3.1. Soils containing LNAPL source product will be excavated using a hydraulic excavator. The limits of the excavation will be marked in the field prior to excavation (see Section 4.2.3).

Approximately 486 cubic yards in IU B will be excavated from zero to 3 feet bgs. This material is expected to be unimpacted and if so will be stored on Site to be used as backfill.

The soil excavated from ground surface to 1 foot above the water table will be stockpiled separately from suspected LNAPL-impacted soil and sampled for TCL VOCs, TCL SVOCs, TAL metals, and PCBs. If the excavated soils are below applicable generic industrial part 201 criteria (Direct Contact, Soil Volatilization to Indoor Air, Ambient Air Particulate Inhalation Criteria, Ambient Air Volatile Soil Inhalation Criteria), then this soil stockpile will be used as backfill; otherwise, the soil stockpile will be disposed of appropriately (i.e., GM on-Site landfill or off-Site landfill) and another source of clean backfill will be sought and used for this excavation. The presence and successful removal of LNAPL will be assessed visually during excavation activities and subsequently verified with proposed monitoring wells.

Approximately 324 cubic yards will be excavated from 3 to 5 feet bgs. All soil excavated between these depths are considered to be impacted with LNAPL.

It is anticipated that additional sloughing soil will be removed in addition to the LNAPL impacted soil. Based on a 1:1 angle of repose of the soil, an estimated 119 cubic yards of additional soil may be removed as slough during excavation.

Excavated soils will be stockpiled on a lined and bermed pad (to prevent liquid runoff), segregated, based upon presumption of no LNAPL impact (top 1 foot) or potential LNAPL impact (soil from greater than 1 foot depth), and characterized for disposal. Liquids collecting in the stockpiled area will also be collected, containerized, and characterized for disposal. Once characterized, solids and liquids will be appropriately disposed. If free product is observed in the excavation, it will be removed from the excavation and collected for characterization and disposal.

Excavated soils that are impacted by LNAPL will be transferred directly into haul trucks or roll-off boxes that will be lined with polyethylene sheeting. The polyethylene sheeting will also be draped over the side of the roll-off box/haul truck to prevent contact with the soil during transfer from the excavation.

GM may re-evaluate the cleanup objective and contact the U.S. EPA if the objective cannot practically be met.

4.2.7 REMEDIATION VERIFICATION

Verification of the remediation of the impacted soil will be done in two ways; through visual inspection for the presence of LNAPL in the excavation and through the installation of two monitoring wells outside the limits of excavation.

The locations of the proposed monitoring wells are presented on Figure 3.1. Their purpose is to confirm the absence of LNAPL impact after remediation is complete.

4.2.8 TRANSPORTATION AND OFF-SITE DISPOSAL

Disposal will be required for two waste streams; LNAPL impacted soil and wastewater.

LNAPL-Impacted Soil

LNAPL-impacted soil that is designated for off-Site disposal at a licensed municipal solid waste landfill will include LNAPL impacted soil excavated between 3 and 5 feet bgs, non-liquid cleaning materials (e.g., rags), and personal protective equipment.

LNAPL impacted soil will be removed from the Site by a licensed waste hauler and delivered to an appropriately licensed landfill. GM is proposing to remove LNAPL impacted soil to allow for easier redevelopment of the property.

Prior to leaving the Site, the haul trucks and roll-off boxes will be securely tarped and manifested.

Wastewater

Water will be generated during decontamination activities. The water will be contained in appropriate containers (e.g., 500-gallon polyethylene tanks or 55-gallon drums), characterized, and appropriately disposed.

4.2.9 BACKFILLING AND COMPACTION

The bottom and sides of the excavation will be surveyed to document the limits of excavation. The excavation will be backfilled with a clean, inert fill. As the fill is placed into the excavations, a dozer or excavator will spread the fill in approximate 1-foot lifts and the fill will be compacted by a roller or other suitable compactor to match adjacent material.

4.2.10 DECONTAMINATION

Decontamination will be required for equipment that potentially comes in contact with soil impacted by LNAPL. This will include the excavator and front-end loader buckets and may include roll-off boxes, haul truck beds, small equipment, and wastewater containers.

4.2.11 SITE RESTORATION AND DEMOBILIZATION

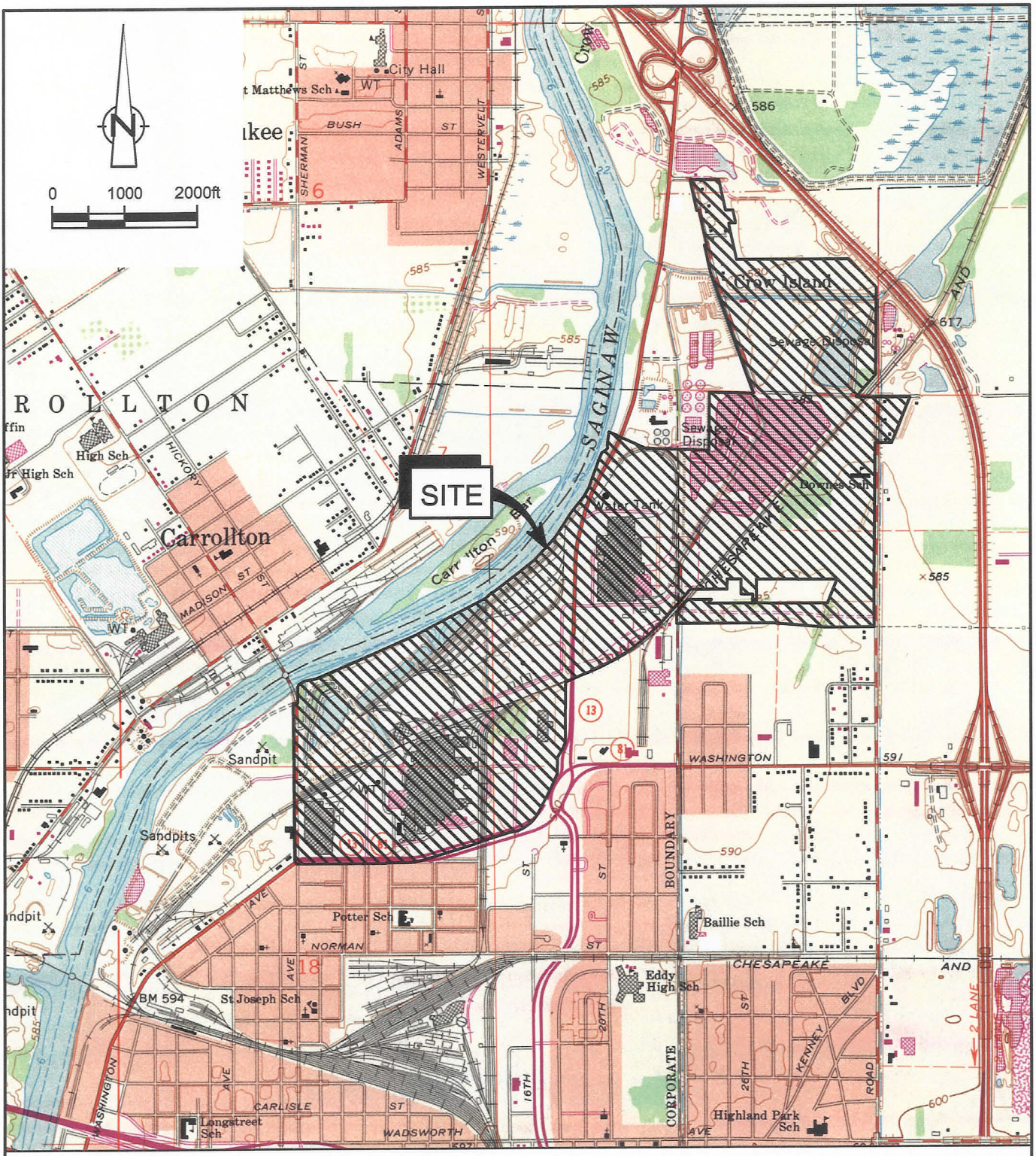
The contractor will remove any remaining temporary fencing, the decontamination pad, equipment, and other materials and supplies brought onto the Site for the cleanup activities. The area effected by the soil excavation activities will be seeded to establish a new vegetative cover.

5.0 REPORTING/DOCUMENT PREPARATION

Upon the completion of the LNAPL cleanup, a LNAPL cleanup report will be prepared to present a summary of the cleanup activities. The report will summarize the work completed, milestone dates, final survey information, a summary of field observations, quantities of materials removed and imported, and the certificates of disposal for the LNAPL remediation waste.

6.0 SCHEDULE

Figure 6.1 presents a proposed schedule for implementation of this IM Work Plan.

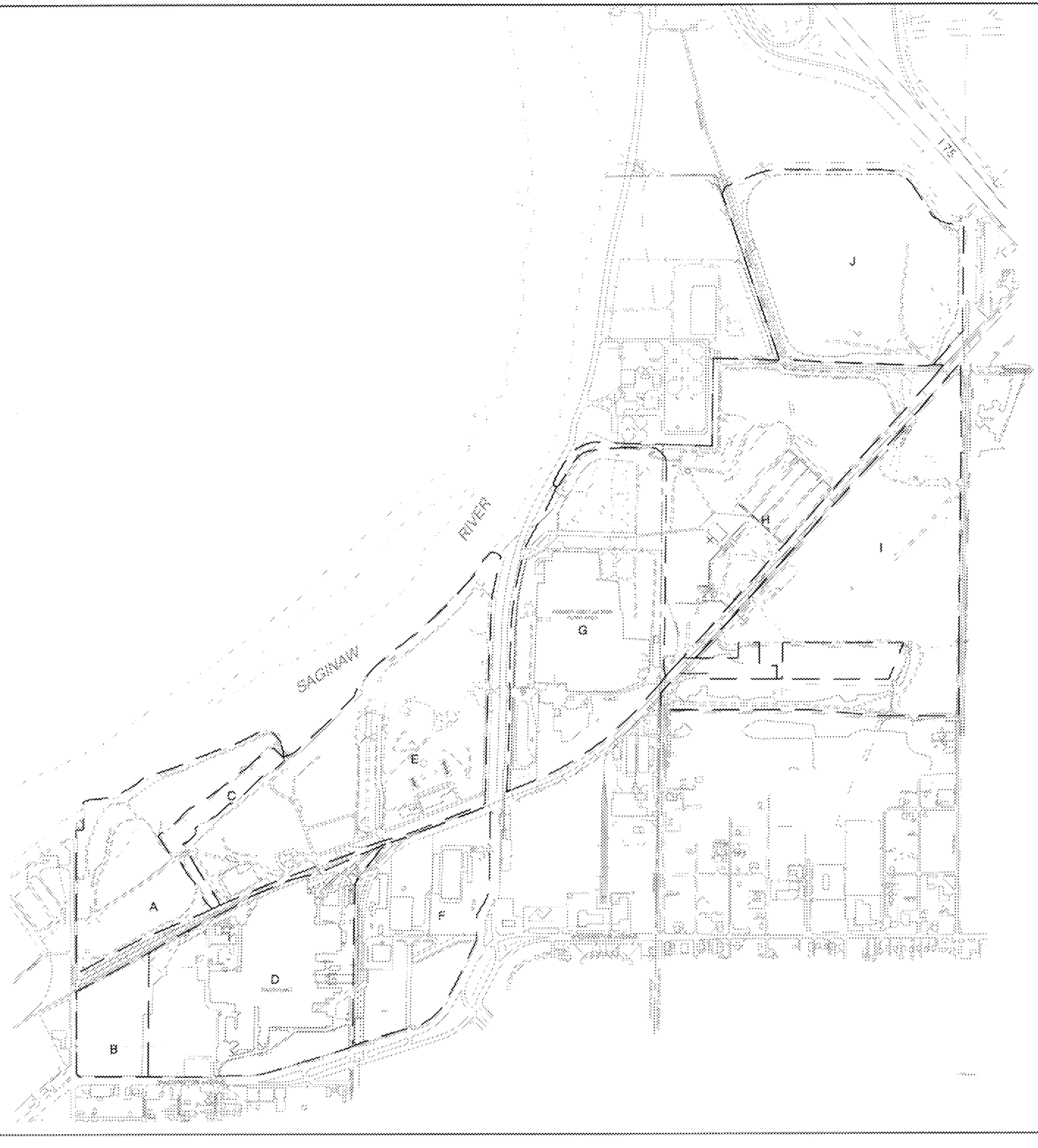


SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE; SAGINAW, MICHIGAN 1967

figure 1.1

SITE LOCATION
GENERAL MOTORS CORPORATION
SAGINAW METAL CASTING OPERATIONS
Saginaw, Michigan

17075-30(016)GN-WA001 SEP 25/2003



N

LEGEND

A – –

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY

GENERAL MOTORS CORPORATION
SAGINAW METAL CASTING OPERATIONS

SAGINAW, MICHIGAN

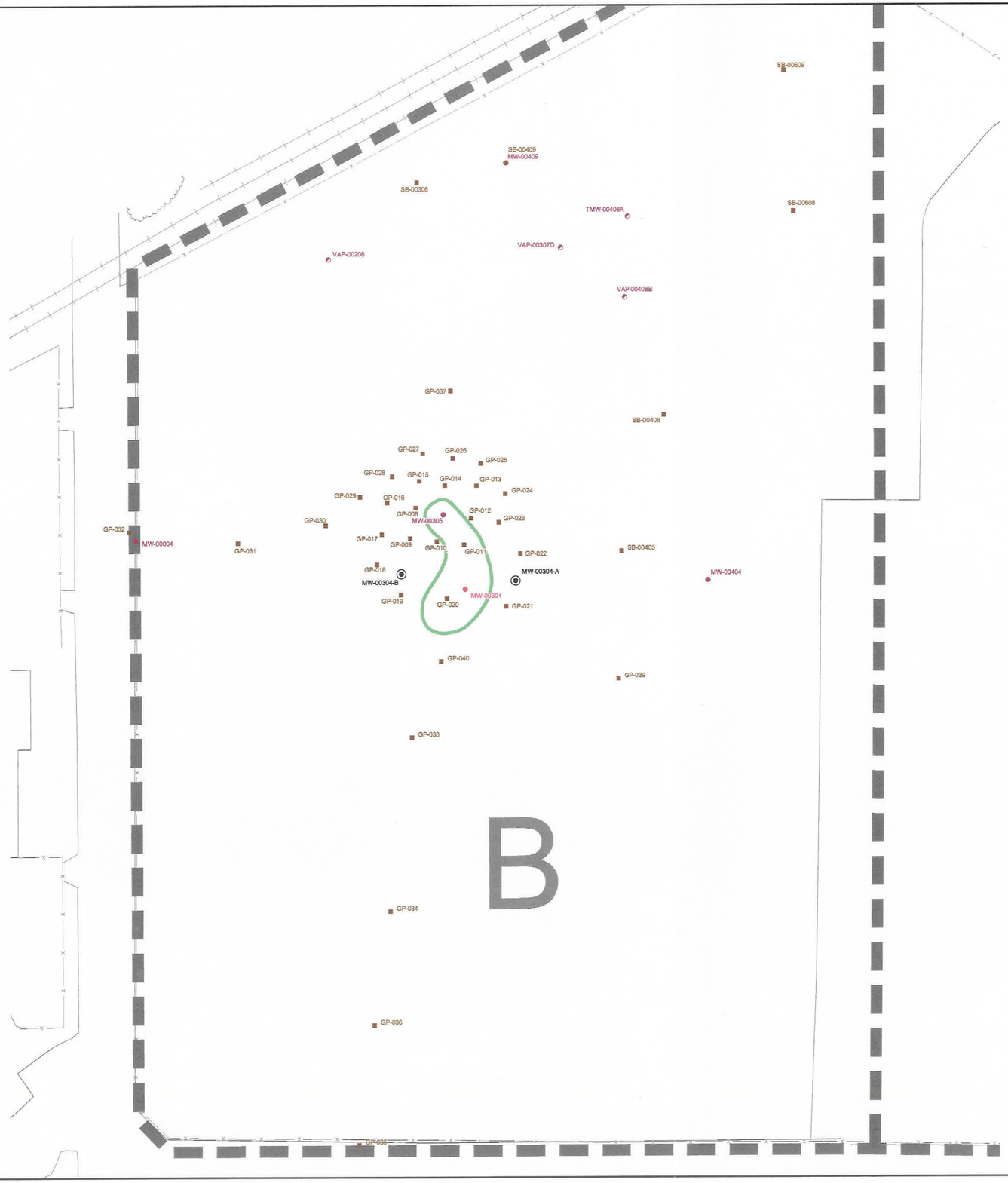
SITE PLAN

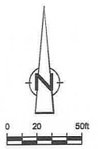
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

MICHIGAN STATE PLANE SOUTH, NAD 83 USING INTERNATIONAL FEET, NGVD 88

Project Manager:	Reviewed By:	Date:
CR	MKT	DECEMBER 2004
Scale:	Project No.	Revision No.	Drawing No.
1" = 600'	17075-30	016	figure 1.2





LEGEND

- A — INVESTIGATIVE UNIT BOUNDARY AND IDENTIFIER
- MW-04835 ● MONITORING WELL - DECEMBER 2001
- SB-05036-B ■ SOIL BORING LOCATION - DECEMBER 2001
- TMW-04936 ◐ TEMPORARY MONITORING WELL - DECEMBER 2001
- GP-036 ■ GEOPROBE LOCATION
- MW-04835 ● MONITORING WELL - DECEMBER 2002
- YELLOW LNAPL OBSERVED
- MW-00304 ◉ PROPOSED MONITORING WELL LOCATION

NOTE:
GROUNDWATER IS REACHED AT APPROXIMATELY 4' bgs.

NOTES:
1) THICK YELLOW LIQUID ENCOUNTERED AT APPROXIMATELY 7 FEET BGS IN BORING GP-011 & GP-020
2) RANGE OF SOIL STAINING: 0.8 - 8.0ft BGS

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

GENERAL MOTORS CORPORATION
SAGINAW METAL CASTING OPERATIONS

SAGINAW, MICHIGAN

INVESTIGATIVE UNIT B
LNAPL - SOIL

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
MICHIGAN STATE PLANE SOUTH, NAD 83 USING INTERNATIONAL FEET, NGVD 88

Project Manager:	Reviewed By:	Date:	
I.R.	M.T.	DECEMBER 2004	
Scale:	Project N°:	Report N°:	Drawing N°:
1" = 50'	17075-30	016	figure 3.1

17075-30(016)GN-WA004 DEC 06/2004

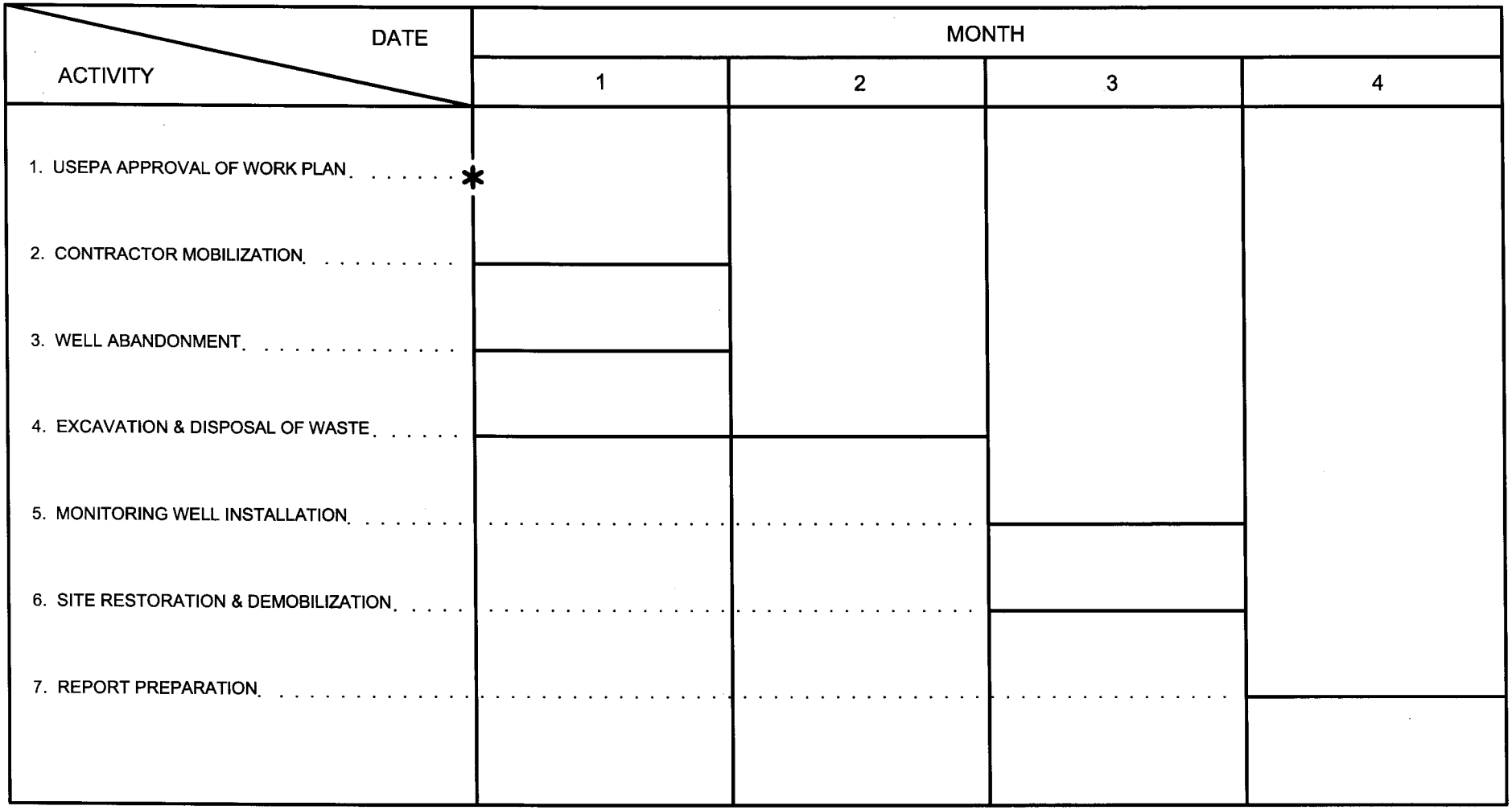


figure 6.1

PROPOSED PROJECT SCHEDULE
GENERAL MOTORS CORPORATION
SAGINAW METAL CASTING OPERATIONS
Saginaw, Michigan

17075-30(016)GN-WA003 SEP 29/2003

APPENDIX A

BORING LOGS

STRATIGRAPHIC LOG
(OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-08
DATE COMPLETED: December 3, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	NORTHING: 710562.38 EASTING: 13240463.8 GROUND SURFACE	590.23					
	GP-SANDY GRAVEL, gray, dry	589.73					
	CH-SANDY CLAY, with gravel, gray, dry, black staining	589.23					0.6
	SP-SAND, with gravel, fine, black, moist	588.56					
2	SW-SAND, coarse, brown, moist		1GP		100		4.7
	SP-SAND, fine, black, wet, odor	586.73					
4	SW-SAND, coarse, blocky, brown with pockets of black stained fine sand, strong odor, wet	586.23					3.2
	SP-CLAYEY SAND, fine, gray, wet, odor	584.83					
6	SP-SAND, with gravel, gray, wet, odor	584.23	2GP		100		
	CL-NATIVE CLAY, trace gravel, light brown, moist to dry	583.73					104
8	END OF BOREHOLE @ 8.0ft BGS	582.23					
10							
12							
14							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/5/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-09
DATE COMPLETED: December 3, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.38						
	GW-SANDY GRAVEL, gray, dry							
		589.63						
	CL-SANDY CLAY, gray, dry	589.46						1.5
	SP-SAND, fine, black, moist	588.96						
2	SP-SAND, with gravel, coarse, dark brown, moist, odor		2" ø BOREHOLE	1GP		100		2.2
4	- wet							7.9
		585.21						
	SP-SAND, trace gravel, fine, black, wet, odor	584.71						
6	CL-NATIVE CLAY, trace gravel, light brown, moist to dry			2GP		100		158
8	END OF BOREHOLE @ 8.0ft BGS	582.38						
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-10
DATE COMPLETED: December 3, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.38						
	GW-SANDY GRAVEL, gray, moist							
	- 1" stone	589.71						
	CL-SANDY CLAY, gray, dry	589.38						2.2
	SP-SAND, with gravel, fine, black, moist							
2	- 1" stone	588.38	2" Ø BOREHOLE	1GP		100		
	SW-GRAVELLY SAND, coarse, brown, moist							
	- wet							
	- staining							1.2
	- stained black (to 4 ft)							
4	SW-SAND, coarse, brown, wet, black staining, odor	586.38	NATURAL COLLAPSE/ BENTONITE					
	SP-CLAYEY SAND, fine, gray, wet, odor	585.21						11.7
6	SP-SAND, with gravel, gray, wet, odor	584.38		2GP		100		
	CL-NATIVE CLAY, trace gravel, light brown, moist to dry	584.13						7.6
8	END OF BOREHOLE @ 8.0ft BGS	582.38						
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-11
DATE COMPLETED: December 3, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.37						
	GW-SANDY GRAVEL, gray, moist to dry	589.87						
	CL-CLAY, sandy, gray, dry	589.70						
	SP-SAND, coarse, black, moist							0
2	SW-SAND, with gravel, brown, moist -clay mold at 2.0 ft - 3/4" stones	588.37	2" Ø BOREHOLE	1GP		100		0
	- clay seam							
4	SP-CLAYEY SAND, gray, wet, black staining, odor	586.37	NATURAL COLLAPSE/ BENTONITE					
	CL-NATIVE CLAY, trace gravel	585.37						10
6				2GP		100		
	- stone covered in thick yellow liquid, strong odor							767
8	END OF BOREHOLE @ 8.0ft BGS	582.37						
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-12
DATE COMPLETED: December 4, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	GROUND SURFACE	590.20
	GW-SANDY GRAVEL, gray, dry	
		589.70
	CL-CLAY, gray, dry to moist	
		589.20
	SP-SAND, with gravel, fine, black, moist - crushed clay mold - crushed stone	
2		
		587.03
	SW-SAND, with gravel, coarse, brown, moist	586.95
	CH-CLAY, gray, moist	586.53
	SW-CLAYEY SAND, gray, moist, odor	586.20
4	SP-SILTY SAND, trace gravel, black, wet	
		585.20
	SW-SAND, with gravel, coarse, gray, wet, black staining, odor	
		584.53
	CH-SANDY CLAY, trace gravel, gray, moist, odor	584.20
6	CL-NATIVE CLAY, with gravel, light brown, moist to dry	
		582.20
8	END OF BOREHOLE @ 8.0ft BGS Note - PID bulb responding to moisture	
10		
12		
14		

MONITOR INSTALLATION: 2" ø BOREHOLE; NATURAL COLLAPSE/ BENTONITE

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1GP		100		420
				1105
				>2000
2GP		100		
				>2000

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-13
DATE COMPLETED: December 4, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	589.98						
	GW-SANDY GRAVEL, gray, dry							
	CONCRETE SLAB, gray, dry	588.98						
	SP-SAND, fine, black, dry	588.81						
	SW-SAND, with gravel, coarse, brown, moist	588.65						
2	- 1" stone, black staining below		2" Ø BOREHOLE	1GP				NR
	CL-CLAY, with gravel, black staining at 3', brown, dry	587.23						
	SP-CLAYEY SAND, fine, black, moist	586.48	NATURAL COLLAPSE/ BENTONITE					
4	SP-CLAYEY SAND, fine, gray, wet, slight odor	585.65						
	CL-NATIVE CLAY, with gravel, gray to light brown, moist to dry	584.98						
6				2GP				NR
8	END OF BOREHOLE @ 8.0ft BGS	581.98						
	Note - PID bulb responding to moisture							
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-14
DATE COMPLETED: December 4, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.16						
	GW-SANDY GRAVEL, gray, dry	590.08						
	CL-SANDY CLAY, with gravel, hard, gray, dry	589.91						
	SW-SAND, coarse, brown, moist							
2			2" Ø BOREHOLE	1GP		100		NR
	- 3/4" stone							
	- 3/4" stone							
4			NATURAL COLLAPSE/ BENTONITE					
	- wet							
		584.83						
	SP-SILTY SAND, fine, black, wet,	584.49						
	-pieces of demolished wood	584.41						
6	SP-CLAYEY SAND, coarse, black, wet, strong chemical odor			2GP		100		NR
	CL-NATIVE CLAY, trace gravel, hard, gray to brown, moist							
8		582.16						
	END OF BOREHOLE @ 8.0ft BGS							
	Note - PID bulb responding to moisture							
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-15
DATE COMPLETED: December 4, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.00						
	GW-SANDY GRAVEL, gray, moist	589.67						
	CL-SANDY CLAY, gray, dry	589.50						
	SW-SAND, coarse, black, moist	589.00						
	SW-SAND, coarse, brown, moist							
2			2" Ø BOREHOLE	1GP		100		NR
	SP-SAND, fine, black, moist, no odor	587.75						
	- crushed brick							
4	SW-SAND, coarse, gray, wet, odor	586.00	NATURAL COLLAPSE/ BENTONITE					
6				2GP		100		NR
	CL-NATIVE CLAY, gray to brown, moist, no odor	583.00						
8	END OF BOREHOLE @ 8.0ft BGS	582.00						
	Note - PID bulb responding to moisture							
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-16
DATE COMPLETED: December 3, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.21						
	SW-SANDY GRAVEL, gray, dry	589.71						
	CL-SANDY CLAY, gray, dry	589.21						0
	SP-SAND, with gravel, coarse, brown, moist							
2	- slight odor		2" Ø BOREHOLE	1GP		100		
	SP-SAND, fine, black, moist	587.21						1.0
4	SP - SAND, with gravel, coarse, brown, moist - wet, black staining	586.21	NATURAL COLLAPSE/ BENTONITE					4.4
	SP-SILTY SAND, fine, black staining, gray, wet	584.71						
6				2GP		100		
	GRAVELLY SAND, wet, gray, odor	583.71						
	SP-CLAYEY SAND, fine, gray, wet, odor	583.21						16.8
		582.29						
8	CL-NATIVE CLAY, gray, moist END OF BOREHOLE @ 8.0ft BGS	582.21						
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-17
DATE COMPLETED: December 3, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.35						
	SW-SANDY GRAVEL, gray, dry	589.85						
	CL-SANDY CLAY, gray, dry - black staining	589.60						0
2	SW-SAND, with gravel, coarse, brown, moist, odor		2" Ø BOREHOLE	1GP		100		
	SP-CLAYEY SAND, with gravel, fine, black, moist, odor	587.35						0
4	SW-SAND, with gravel, coarse, brown, wet	586.35	NATURAL COLLAPSE/ BENTONITE					4.1
	SP-SILTY SAND, fine, black and brown, laminated, wet	585.18						
6	SP-CLAYEY SAND, with gravel, gray, strong odor	584.68		2GP		100		
	CL-NATIVE CLAY, trace gravel	583.60						11.7
8	END OF BOREHOLE @ 8.0ft BGS	582.35						
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-18
DATE COMPLETED: December 3, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.30						
	GW-SANDY GRAVEL, gray, dry	589.63						
	CL-SANDY CLAY, hard, gray, moist	589.30						2.2
	SW-SAND, coarse, brown, moist		2" Ø BOREHOLE	1GP		100		
2								
	SP-CLAYEY SAND, black, no odor	587.30						3.5
4	SW-SAND, coarse, brown, wet	586.30	NATURAL COLLAPSE/ BENTONITE					33
	- 1" stone	584.63						
6	CL-NATIVE CLAY, with trace gravel, gray to brown, laminated with gray, odor			2GP		100		
	- no odor							15.8
8	END OF BOREHOLE @ 8.0ft BGS	582.30						
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-19
DATE COMPLETED: December 4, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.25						
0	SW-SANDY GRAVEL, gray, dry	590.17						
	SP-SAND, coarse, dark brown, moist							0
	SW-SAND, with gravel, coarse, brown, moist	589.08	2" Ø BOREHOLE	1GP		100		
2								
	SW-SAND, with gravel, coarse, gray, moist, strong odor	587.25						4.2
	SP-CLAYEY SAND, fine, black, no odor	586.58						
4	SW-SAND, coarse, wet, chemical odor	586.25	NATURAL COLLAPSE/ BENTONITE					
	CH-SANDY CLAY, moist, no noticeable odor	585.50						9.8
	CL-NATIVE CLAY, hard, brown, moist, black staining, odor	584.58		2GP		100		
6	- no staining, no odor							3.7
8	END OF BOREHOLE @ 8.0ft BGS	582.25						
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-20
DATE COMPLETED: December 4, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.39						
	GW-SANDY GRAVEL, gray, moist							
		589.64						
	CL-CLAY, hard, gray, dry	589.31						0
	SW-SAND, with gravel, coarse, black, moist, no odor	589.14						
		589.06						
	CL-SANDY CLAY, soft, black, moist	588.72						
2	SW-SAND, with gravel, coarse, black, moist		2" Ø BOREHOLE	1GP		100		
	SW-SAND, coarse, brown, black staining, odor							4
4	- wet, no staining		NATURAL COLLAPSE/ BENTONITE					
		585.22						6
	CI-SANDY CLAY, firm, black to gray, staining and odor throughout			2GP		100		
6								
		583.14						7
	CL-NATIVE CLAY, hard, brown, moist, odor, thick yellow liquid present along sleeve							
8	- no odor	582.39						
	END OF BOREHOLE @ 8.0ft BGS							
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-21
DATE COMPLETED: December 4, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.57						
	GW-SANDY GRAVEL, gray, moist							
	SP-SILTY SAND, with gravel, medium, gray, moist	589.90						0
	SP-SAND, fine, grey, black staining	589.15	2" Ø BOREHOLE	1GP		100		
2	- crushed porous rock							
	GP-GRAVEL, with sand, fine, black, odor, wood debris	587.82						0
	SP-CLAYEY SAND, fine, black, moist	586.90						
4	- wet - No recovery from 4.0ft to 6.5ft							0
6	- predominantly crushed porous rock, black, odor, wet		NATURAL COLLAPSE/ BENTONITE	2GP		50		
	CL - NATIVE CLAY, odor	583.57						0
8	CH-SANDY CLAY, soft, gray, wet, odor	582.57						
10				3GP		100		NR
	CL-NATIVE CLAY, with gravel, soft to hard, light brown	579.57						
	- soft pocket							
12	END OF BOREHOLE @ 12.0ft BGS	578.57						
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-22
DATE COMPLETED: December 4, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.28						
	GW-GRAVEL, gray, dry	589.95						
	CL-SANDY CLAY, hard, gray, dry	589.18						0
2	SP-SAND, fine, black, moist - crushed mold - predomiantly crushed porous rock, black, moist	587.08	2" Ø BOREHOLE	1GP		100		0
	CL-CLAY, with gravel, laminated light brown, gray, and black, moist							
4	- stone and crushed rock - black wood debris	586.28	NATURAL COLLAPSE/ BENTONITE					
	SW-SAND, coarse, gray, wet, black	585.78						
	CH-SANDY CLAY, firm, gray, wet	585.28						0
	CL-NATIVE CLAY, trace gravel, hard, moist to dry, sheen on water below clay in sleeve							
6				2GP		100		0
8	END OF BOREHOLE @ 8.0ft BGS	582.28						
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-23
DATE COMPLETED: December 4, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	589.98						
	GW-SANDY GRAVEL, gray, dry	589.90						0
	CL-CLAY, hard, gray, dry	589.48						
	SP-SAND, trace gravel, fine, dark brown	588.81						
	CL-CLAY, hard, light brown	588.65						
2	SP-SAND, with gravel, fine, black, hardened from 2.6ft to 3.0ft		2" Ø BOREHOLE	1GP		100		14
	GW-GRAVEL, with sand, wet	586.98						
	SP-SAND, and crushed brick, coarse, brown, wet	586.73						
	SC-CLAYEY SAND, soft, black	586.56						
4	CH-SANDY CLAY, soft, gray to black, chemical odor	585.98	NATURAL COLLAPSE/ BENTONITE					18
	CL-NATIVE CLAY, hard, brown, moist, odor	584.48						
6	- no odor at 6.0ft			2GP		100		10
	END OF BOREHOLE @ 8.0ft BGS	581.98						
8								
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-24
DATE COMPLETED: December 4, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	589.67						
	GW-SANDY GRAVEL	589.00						
	SW-SAND, with gravel, moist - wood debris and rubble	588.17						0
	GW-GRAVEL, with sand	587.75						
2	SW-SAND, coarse, brown	587.47	2" Ø BOREHOLE	1GP		100		
	CH-SANDY CLAY, with gravel, soft, dry to moist							0
4			NATURAL COLLAPSE/ BENTONITE					
								0
6				2GP		100		
	CL-NATIVE CLAY, hard, light brown, moist to dry	583.37						0
8	END OF BOREHOLE @ 8.0ft BGS	581.67						
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-25
DATE COMPLETED: December 5, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.10						
	GW-SANDY GRAVEL, gray, dry							0
		589.10						
	CL-CLAY, hard, gray, dry	588.60						
	SP-SAND, with fine gravel, fine, black, moist	588.35						
2	SW-SAND, with gravel, coarse, dark brown, moist - 2" concrete slab, staining below concrete - crushed brown porous rock		2" Ø BOREHOLE	1GP		100		
		587.35						
	SP-CLAYEY SAND, fine, black, odor, black staining	587.10						0
	SW-SAND, with gravel, coarse, brown to gray, black staining, wet	586.60						
	SP-CLAYEY SAND, fine, black, wet, black staining	586.27						
4	GP-GRAVEL, fine, black, wet, slight chemical odor	586.10	NATURAL COLLAPSE/ BENTONITE					
	SW-GRAVELLY SAND, coarse, gray to black, wet	585.43						
	SP-CLAYEY SAND, with silt, black to gray, wet, odor	584.90						0
	CL-NATIVE CLAY, hard, gray to light brown, moist to dry			2GP		100		
6								0
		582.10						
8	END OF BOREHOLE @ 8.0ft BGS							
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-26
DATE COMPLETED: December 5, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.26						
	GW-SANDY GRAVEL, gray, dry	589.59						
	CL-CLAY, hard, gray, dry	589.51						0
	SP-SANDY, medium, brown, moist	589.34						
	GW-GRAVEL, with sand and silt, coarse, white, dry	588.46						
2	SW-SAND, with gravel, coarse, brown, moist	587.76	2" Ø BOREHOLE	1GP		100		
	SP-SAND, with gravel, fine, black, moist, crushed brick	587.26						0
	GW-GRAVEL, with sand, brown and gray, moist	587.01						
	SW-GRAVELLY SAND, brown, moist - rock - black staining, strong odor	586.01	NATURAL COLLAPSE/ BENTONITE					
4	SP-CLAYEY SAND, with gravel, gray and black staining, wet, strong odor	585.76						
	GW-SANDY GRAVEL, gray, dry	585.59						2.6
	SP-SAND, medium gray with black staining, wet							
6				2GP		100		
	CL-NATIVE CLAY, soft to hard, gray to brown, moist, chemical odor in clay	583.26						3.9
8	END OF BOREHOLE @ 8.0ft BGS	582.26						
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-27
DATE COMPLETED: December 5, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	GROUND SURFACE	590.14
	GW-GRAVEL, gray, moist	
	- 1/4" concrete slab	589.47
	SW-GRAVELLY SAND, coarse, brown, moist	589.22
	- wood debris	588.74
2	SP-SAND, fine, brown, black staining, moist, no odor	
	SW-SAND, coarse, brown, moist	
	- 1/4" clay lense	587.74
	- 1" thick wood	
	- grey stone, brittle, with white powdery sand and silt	
	SP-SAND, fine, dark brown to light brown, moist, no odor	
4	- black staining	586.44
	SW-GRAVELLY SAND, coarse, grey	
	SP-SAND, with silt and gravel, coarse, brown, with black staining, wet	585.64
		584.64
	SP-SAND, fine, black, sheen on water on sample, wet, chemical odor	
6		584.14
	SP-CLAYEY SAND, trace gravel, gray, wet, chemical odor	
		582.64
	SW-GRAVELLY SAND, coarse, gray, wet, odor	
8	- no odor	
		580.94
	CL-NATIVE CLAY, trace gravel, hard, gray to brown, moist to dry	
10		
12	END OF BOREHOLE @ 12.0ft BGS	578.14
14		

MONITOR INSTALLATION: 2" Ø BOREHOLE; NATURAL COLLAPSE/ BENTONITE

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1GP		100		0
				0
2GP		100		0
				1.3
3GP		100		1.5
				1.6

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-28
DATE COMPLETED: December 5, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	GROUND SURFACE	590.15
	GW-SANDY GRAVEL, gray, moist	
	CL-SANDY CLAY, gray, moist, with roots	589.75
	SW-SAND, with gravel, coarse, dark brown, moist	589.15
2	- 2" cored rock, gray	588.15
	SW-SAND, with gravel, coarse, brown with black staining, no odor, moist	
	- 3" wood debris, stained black, no odor, moist	
	SW-SAND, with gravel, coarse, brown, moist	587.15
	SP-SAND, fine, black, moist, no odor	586.65
4	- wet	
	SP-SAND, fine, gray, wet	585.15
6		
	SW-SAND, coarse, gray, wet, no odor	582.95
8		
10		
	CL-NATIVE CLAY, hard, gray to brown, moist	578.65
12	- pocket of sandy gravel	578.15
	END OF BOREHOLE @ 12.0ft BGS	
14		

MONITOR INSTALLATION: 2" Ø BOREHOLE; NATURAL COLLAPSE/ BENTONITE

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1GP		100		0
				0
2GP		100		0
				0
				0
3GP		100		0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-29
DATE COMPLETED: December 5, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	GROUND SURFACE	590.22
	GW-GRAVEL, sandy, gray, moist	590.12
	CH-SANDY CLAY, firm, gray, moist	589.82
	SW-SAND, with gravel, coarse, brown, moist	
2		
		586.72
	SP-SAND, fine, black, moist	
4	- wet	
		584.72
	SP-SAND, fine, gray, wet	584.62
6	SP-SAND, fine, black, wet	584.22
	- 3" piece of wood	
	SP-CLAYEY SAND, gray, wet, fine	
		583.12
	SW-GRAVELLY SAND, coarse, gray, wet	
8		
10		
12	- sheen, faint odor	
		576.22
14	CL-NATIVE CLAY, trace gravel, gray to brown, moist, no odor	
		574.22
16	END OF BOREHOLE @ 16.0ft BGS	

MONITOR INSTALLATION: 2" Ø BOREHOLE; NATURAL COLLAPSE/ BENTONITE

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
				0
1GP		100		0
				0
				0
2GP		100		0
				0
3GP		100		0
				1.7
4GP		100		0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-30
DATE COMPLETED: December 5, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL
	GROUND SURFACE	590.15
	GW-SANDY GRAVEL, gray, moist	589.65
	SP-CLAYEY SAND, with rootlets, gray, moist	589.32
	SP-SAND, fine, black, moist	588.90
2	SW-SAND, coarse, brown, moist - crushed brick - crushed stone	
	- crushed brick	587.15
4	SP-SAND, fine, black, moist - wet, loose	
	- crushed brick	585.15
6	SP-CLAYEY SAND, with gravel, fine, compact - wood debris	
	SP-CLAYEY SAND, with gravel, gray - wet	583.45
8	SW-GRAVELLY SAND, coarse, gray, wet, sheen on water	582.15
10	CL-NATIVE CLAY, trace gravel, gray to light brown, moist, soft to hard - sand pocket	580.15
12	END OF BOREHOLE @ 12.0ft BGS	578.15
14		

MONITOR INSTALLATION: 2" Ø BOREHOLE; NATURAL COLLAPSE/ BENTONITE

SAMPLE NUMBER	INTERVAL	REC (%)	'N' VALUE	PID (ppm)
1GP		100		0
				0
2GP		100		0
				0
				3.9
3GP		100		0

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-31
DATE COMPLETED: December 5, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	589.01						
	TOPSOIL, brown, moist, roots							
	SW-SAND, coarse, brown, moist	588.01						0
2			2" Ø BOREHOLE	1GP		100		
	CH-SANDY CLAY, dark brown, moist	586.11						0
	SP-SAND, fine, black, moist	585.91						
4	- wet							
	SP-SAND, coarse, gray, wet	584.31						0
6				2GP		100		
	ML-CLAYEY SILT, firm, gray, wet	582.81						
	- seam of coarse sand							0
	- seam of coarse sand							
8	SP-SAND, medium, gray, wet	581.01	NATURAL COLLAPSE/ BENTONITE					
								0
10	- sheen			3GP		100		
	- seam of coarse sand							0
12								
	SW-SAND, coarse, gray, wet	576.01						2
14				4GP		100		
	CL-NATIVE CLAY, firm to hard, gray to light brown, moist	574.51						0
	- pocket of sand							
16	END OF BOREHOLE @ 16.0ft BGS	573.01						

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-33
DATE COMPLETED: December 7, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.80						
	GW-SANDY GRAVEL, gray, moist	590.30						
	SP-SAND, trace gravel, black, moist	589.80						0
2	CL-SANDY CLAY, with gravel, hard, brown with red lamination, black staining, moist		2" Ø BOREHOLE	1GP		100		
	SW-SAND, coarse, gray with black staining	588.30						
	SP-CLAYEY SAND, fine, brown with black lamination	587.97						0.3
	SW-SAND, coarse, brown to gray, moist	587.80						
	SP-SAND, fine, black, moist	587.38						
4	SP-SILTY SAND, fine, soft, brown, wet, sheen on water	586.80	NATURAL COLLAPSE/ BENTONITE					11
	SW-CLAYEY SAND, with gravel, fine to coarse, gray, wet, odor, sheen	585.47						
6	CL-NATIVE CLAY, gray-brown, laminated, moist, odor	584.97		2GP		100		5
8	END OF BOREHOLE @ 8.0ft BGS	582.80						
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-34
DATE COMPLETED: December 7, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	591.09						
	GW-SANDY GRAVEL, gray, moist	590.69						
	CL-SANDY CLAY, with gravel, gray, dry	590.29						
	SP-SAND, trace gravel, fine, black	590.09						0
	SP-SILTY SAND, with gravel, fine, brown, dry	589.39						
2	SC-CLAYEY SAND, with gravel, compact, black, dry - no gravel		2" Ø BOREHOLE	1				0
		587.39	NATURAL COLLAPSE/ BENTONITE					
4	SW-SAND, coarse, gray, moist - silt pocket - wet, sheen on water, odor - black staining	586.09						0
6	CL-NATIVE CLAY, trace gravel, hard, brown and gray laminated, moist to dry - odor			2				0
8	END OF BOREHOLE @ 8.0ft BGS	583.09						
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-35
DATE COMPLETED: December 7, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	588.97						
	TOPSOIL, brown, moist							0
	GW-SANDY GRAVEL, brown, moist	587.77						
	SP-SAND, medium, light brown, moist	587.57	2" Ø BOREHOLE	1GP		100		0
4			NATURAL COLLAPSE/ BENTONITE					
	CH-CLAY, firm, gray, moist	583.97						0
6	CL-NATIVE CLAY, trace gravel, hard, brown and gray	583.22		2GP		100		0
8	END OF BOREHOLE @ 8.0ft BGS	580.97						
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/5/02

STRATIGRAPHIC AND INSTRUMENTATION LOG
(OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-36
DATE COMPLETED: December 7, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.22						
	GW-SANDY GRAVEL, gray, moist	589.72						
	CL-SANDY CLAY, gray, dry	589.22						0
	SP-SAND, trace gravel, fine, brown, moist							
2	CI-CLAY, hard, brown, moist	588.22	2" Ø BOREHOLE	1GP		100		
	SP-SAND, fine, black, moist	587.52						
	CI-CLAY, with black silty clay, blocky, soft to firm, brown,	587.32						0
4	CL-NATIVE CLAY, trace gravel, soft to firm, brown	586.22	NATURAL COLLAPSE/ BENTONITE					
								0
6				2GP		100		
								0
8	END OF BOREHOLE @ 8.0ft BGS	582.22						
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-37
DATE COMPLETED: December 7, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	590.06						
	GW-SANDY GRAVEL, gray, dry							
	SP-SAND, trace gravel, moist	589.06						0
2			2" Ø BOREHOLE	1GP		100		4.7
4	SP-SAND, fine, black, wet, sheen	586.06						0
6	STONE, crushed	584.06	NATURAL COLLAPSE/ BENTONITE	2GP		100		
	SP-SAND, with gravel, wet	583.86						
	SP-SAND, fine, gray, wet, odor	583.31						3.9
8	SILT, trace gravel, black, sheen on water, odor	582.06						1.7
	SP-SILTY SAND, gray, wet, odor	580.56						
10				3GP		100		4.4
12	END OF BOREHOLE @ 12.0ft BGS	578.06						
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-39
DATE COMPLETED: December 7, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE REC (%)	SAMPLE 'N' VALUE	SAMPLE PID (ppm)
	GROUND SURFACE	589.96						
	GW-SANDY GRAVEL, gray, moist	589.63						
	CL-SANDY CLAY, hard, gray, dry	589.29						
	STONE, crushed, white	588.96						
	SP-SAND, black, moist							0
2			2" Ø BOREHOLE	1GP		100		
	SW-SAND, coarse, brown, moist	587.46						0
4	- wet		NATURAL COLLAPSE/ BENTONITE					
	CL-NATIVE CLAY, trace gravel, hard, brown and gray	584.88						0
6				2GP		100		
								0
8	END OF BOREHOLE @ 8.0ft BGS	581.96						
10								
12								
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE

OVERBURDEN LOG 17075-11.GPJ CRA_CORP.GDT 3/1/02

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

PROJECT NAME: SMCO
PROJECT NUMBER: 17075-11
CLIENT: GM
LOCATION: SAGINAW, MI

HOLE DESIGNATION: GP-40
DATE COMPLETED: December 7, 2001
DRILLING METHOD: GEOPROBE
FIELD PERSONNEL: P. CUSHING

DEPTH ft BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft AMSL	MONITOR INSTALLATION	SAMPLE NUMBER	SAMPLE INTERVAL	REC (%)	'N' VALUE	PID (ppm)
	GROUND SURFACE	590.60						
	GW-SANDY GRAVEL, gray, moist	589.93						
	CL-CLAY, hard, gray, dry	589.60						0
	SP-SAND, fine, black, moist	589.10						
	GW-SANDY GRAVEL, coarse, dry	588.60	2" Ø BOREHOLE	1GP				
2	SW-SILTY SAND, coarse, with gravel, gray, moist, odor							0
4	- wet, black staining							
		584.93						
6	CI-SANDY CLAY, firm, gray,moist, black staining, odor		NATURAL COLLAPSE/ BENTONITE	2GP				0
		582.60						
8	CH-SANDY CLAY, soft, wet, staining, odor -large rocks present throughout prevent further probing							
10				3GP				0
		578.60						
12	END OF BOREHOLE @ 12.0ft BGS							
14								

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE