INTERIM MEASURES WORK PLAN FOR PCB-IMPACTED AREAS (GM SMCO FACILITY)

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(Following Text)

LIST OF ACRONYMS AND TERMS

40 CFR 761	Title 40 of the Code of Federal Regulations, Part 761
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
MDEQ	Michigan Department of Environmental Quality
mg/kg	milligrams per kilogram
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyls
POTW	Publicly Owned Treatment Works
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SMCO	Saginaw Metal Casting Operations
U.S. EPA	United States Environmental Protection Agency

1.0 INTRODUCTION

This report presents the Interim Measures Work Plan (IM Work Plan) for soil at Investigative Unit (IU) D and IU E 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 locations of IU D and IU E are also presented on Figure 1.2.

This IM Work Plan was prepared in accordance with Title 40 of the Code of Federal Regulations, Part 761 (40 CFR 761) as a notification to the U.S. EPA of GM's intent to implement a cleanup of the Site-related polychlorinated biphenyl (PCB) contamination under the risk based option set forth under 40 CFR 761.61(c). The cleanup will address TSCA-regulated soils, specifically identified as those materials with PCB concentrations greater than 16 mg/kg. Act 451 Part 201 identifies 16 mg/kg PCB as the risk-based direct contact criteria. Should impacted soils be identified beyond the anticipated excavation limits based on verification sample GM may re-evaluate the 16 mg/kg cleanup objective and contact the U.S. EPA if the objective cannot practically be met.

The objective of this interim measure is to remove PCBs above 16 mg/kg. PCBs were reported in two soil samples from two locations within IU D, one at SB-00709 (43.5 mg/kg at 2 to 4 feet bgs) located on the south side of IU D on Figure 3.1, and one at SB-298 (32.2 mg/kg at 1 to 3 feet bgs) located on the north side of IU D on Figure 3.2. Following completion of the excavations, verification samples will be collected along sidewalls and bottom excavation bottom for PCB, manganese, and chromium analysis.

PCBs were reported in two soil samples from two locations within IU E, one at SB-03737A (18.3 mg/kg at 0 to 2 feet bgs), and one at MW-03734 (52.2 mg/kg at 0 to 2 feet bgs), as shown on Figure 3.3. Following completion of the excavations, verification samples will be collected along sidewalls and bottom excavation bottom for PCB analysis.

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 D and

IU E were investigated. Soil sample results reported PCBs at concentrations above 16 mg/kg.

This IM Work Plan details full-scale interim measures to address PCB soil impacts in IU D and IU E. The purpose of this IM Work Plan is to remediate selected areas to 16 mg/kg to allow for easier redevelopment opportunities.

2.0 DESCRIPTION OF AREAS

2.1 IU D

This area includes the operating SMCO plant and surrounding areas.

2.2 IU E

This area includes a receiving dock, railroad sidings, bulk materials storage, the Advanced Development Laboratory, and the current Powerhouse.

3.0 RCRA FACILITY INVESTIGATION

3.1 SOIL INVESTIGATION

Extensive soil investigations have been completed in IU E and D as part of the RFI. Soil sample locations and PCB data for IU E and D (north and south) are presented on Figures 3.1, 3.2, and 3.3, respectively.

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 of groundwater varies from 3.5 feet bgs adjacent to the Saginaw River to 9.5 feet bgs on the eastern side of the Site. 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. The deeper or bedrock water bearing unit flows generally north toward Saginaw Bay.

4.0 PROPOSED FULL-SCALE INTERIM MEASURES

Full-scale interim measures will consist of the excavation and off-Site disposal of PCB-impacted surface soil and the backfilling of the excavated area with a clean, inert backfill material and a minimum of 10 inches of clean soil. Proposed excavation areas are identified on Figures 3.1, 3.2, and 3.3.

4.1 RATIONALE FOR PROPOSED INTERIM MEASURES

Surface soil impacted by PCBs above 16 mg/kg will be excavated, verification and waste characterization samples will be taken, and the soil will be removed from the Site by a licensed waste hauler and delivered to an appropriately licensed landfill. GM is proposing to remove surficial PCB-impacted soil above 16 mg/kg to allow for easier redevelopment of the property.

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 Soil Excavation

4.2.6 Verification Sampling

4.2.7 Transportation and Off-Site Disposal

4.2.8 Backfilling

4.2.9 Decontamination

4.2.10 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.

The HASP will be prepared and implemented consistent with Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120.

4.2.2 CONTRACTOR PROCUREMENT

A qualified, OSHA-trained remedial contractor will be procured for the removal and disposal of the PCB remediation waste. The remedial contractor will be responsible for the construction and removal of all temporary facilities (including a decontamination area, staging area, and support trailers); PCB remediation waste removal, transportation, and disposal; backfilling; and Site restoration.

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

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 SOIL EXCAVATION

The extent of excavation is identified on Figures 3.1, 3.2, and 3.3. Soils containing concentrations of PCBs above 16 mg/kg will be excavated using a hydraulic excavator. The limits of each excavation will be marked in the field prior to excavation (see Section 4.2.3).

It is anticipated that additional sloughing soil will be removed in addition to the PCB remediation waste. This will be based on a 1:1 angle of repose of the soil. The quantity of soil removed will be determined once the limits of excavation have been determined.

Excavated soils 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 16 mg/kg cleanup objective and contact the U.S. EPA if the objective cannot practically be met.

4.2.6 VERIFICATION SAMPLING

Verification sampling will be conducted consistent with 40 CFR 761 Subpart O "Sampling to Verify Completion of Self-Implementing Cleanup and On-Site Disposal of Bulk PCB Remediation Waste and Porous Surfaces."

Verification samples will be collected based on a 5-foot grid overlaid onto the proposed excavation per §761.283. Verification sampling locations will be determined once the limits of excavation have been determined.

Verification samples will be submitted to the laboratory and analyzed for PCBs. Should PCBs be detected at concentrations greater than 16 mg/kg in a composite sample, the excavation in the area of inference defined by that composite sample will be extended appropriately and additional verification samples collected. The composited area may also be resampled in discrete locations to better define the PCB distribution prior to re-excavation.

4.2.7 TRANSPORTATION AND OFF-SITE DISPOSAL

Disposal will be required for three waste streams: PCB remediation waste containing PCBs greater than or equal to 50 mg/kg, PCB remediation waste containing PCBs less than 50 mg/kg, and wastewater. PCB remediation waste will be disposed of in accordance with 40 CFR 761.61 *PCB Remediation Waste.*

PCB Remediation Waste Containing PCBs Greater Than or Equal to 50 mg/kg

This PCB remediation waste will include excavated soil containing PCBs at concentrations greater than or equal to 50 mg/kg. Prior to leaving the Site, the haul trucks and roll-off boxes will be securely tarped. Manifests will be prepared and will accompany the loads in accordance with 40 CFR 761 Subpart K *PCB Waste Disposal Records and Reports.*

PCB Remediation Waste Containing PCBs Less Than 50 mg/kg

This PCB remediation waste that is designated for off-Site disposal at a licensed municipal solid waste landfill will include excavated soils containing PCBs at concentrations less than 50 mg/kg, non-liquid cleaning materials (e.g., rags), and personal protective equipment at any concentration generated during the implementation of the cleanup. Prior to leaving the Site, the haul trucks and roll-off boxes will be securely tarped. The waste will be disposed of at a municipal landfill consistent with 40 CFR 761.61(a)(5)(v) *Cleanup Wastes.*

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.

4.2.8 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 and a minimum of 10 inches of clean soil at the ground surface. 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.

4.2.9 DECONTAMINATION

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

Decontamination will be conducted using a diesel wipe per 40 CFR 761.79(c)(2). Decontamination materials will be disposed of consistent with 40 CFR 761.61 (a)(5).

4.2.10 SITE RESTORATION AND DEMOBILIZATION

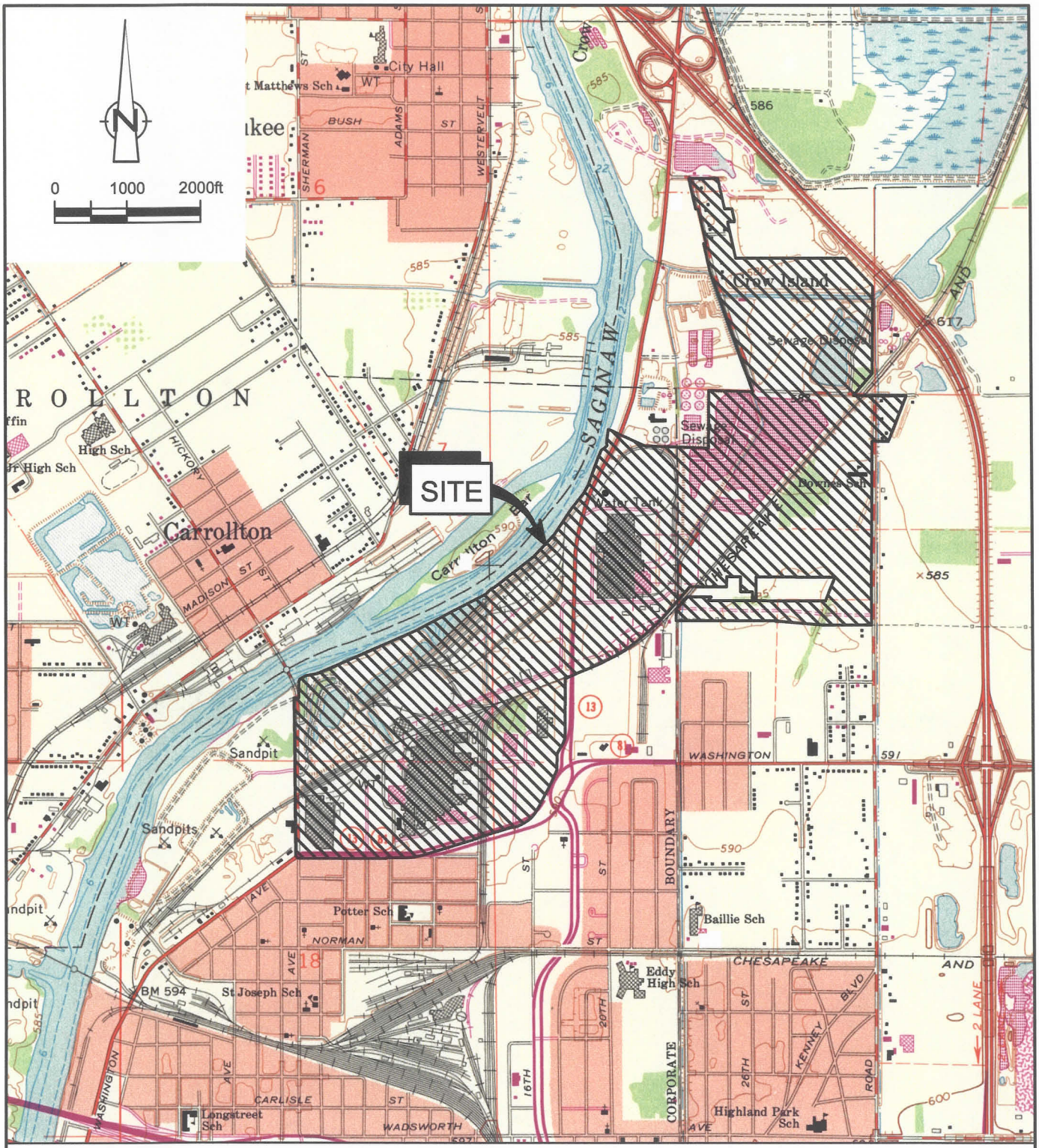
The contractor will remove any remaining temporary fencing, the decontamination pad, equipment, and other materials and supplies brought onto the Site for the cleanup activities. The area effected by the soil excavation activities will be seeded to establish a new vegetative cover.

5.0 REPORTING/DOCUMENT PREPARATION

Upon the completion of the PCB cleanup, a PCB Cleanup Report will be prepared in general accordance with 40 CFR 761.61(a)(9) 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 PCB 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(015)GN-WA005 SEP 25/2003

N

0 200 500ft

LEGEND

A — — INVESTIGATIVE UNIT BOUNDARY AND IDENTIFIER

NOTE: TOPO - SANBORN, 1998

SCALE VERIFICATION

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

GENERAL MOTORS CORPORATION
SAGINAW METAL CASTING OPERATIONS

SAGINAW, MICHIGAN

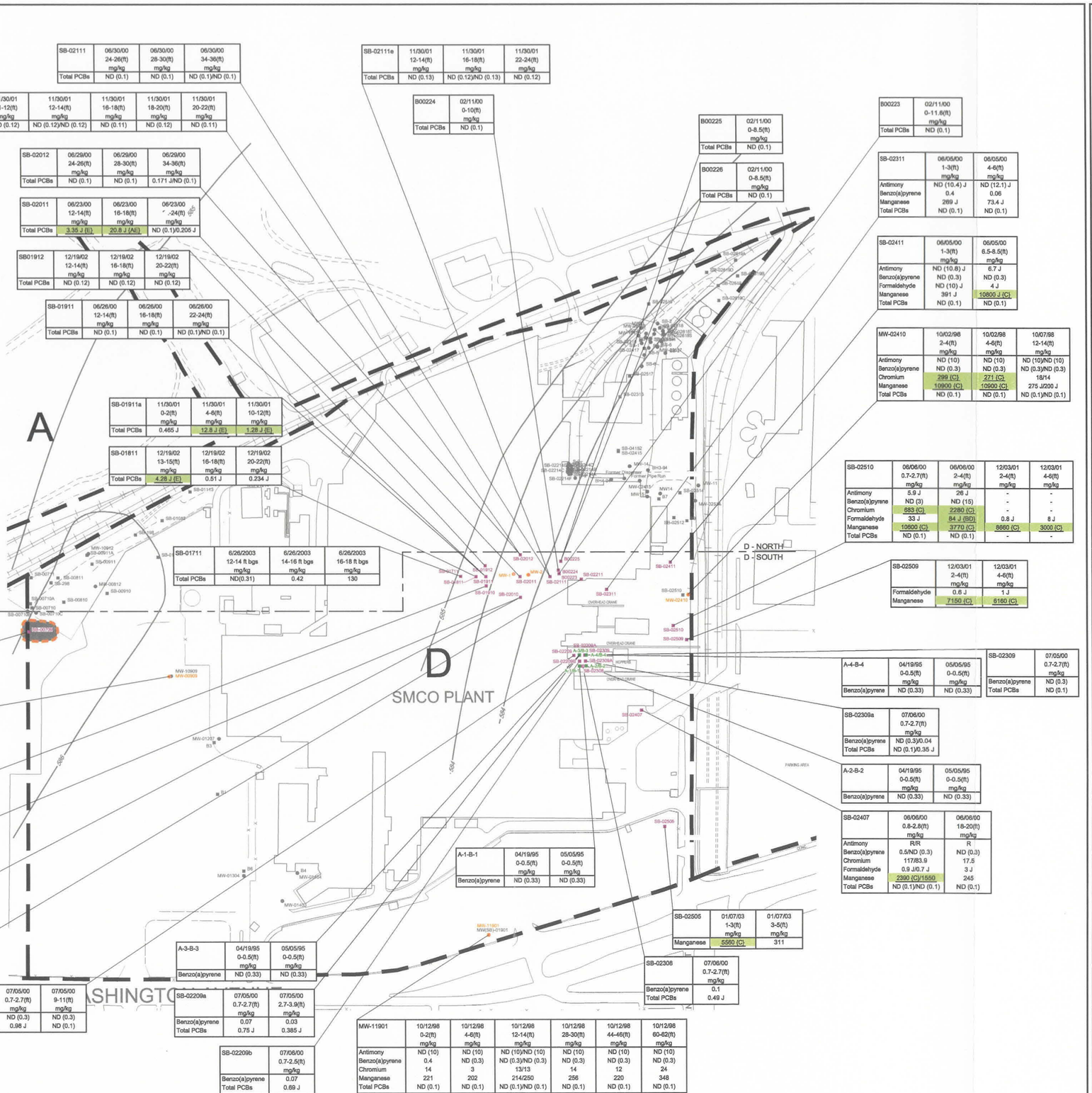
SITE PLAN

CRA **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: 1" = 500'	Project N°: 17075-30	Report N°: 015	Drawing N°: figure 1.2

17075-30(015)GN-WA006 DEC 06/2004



Hazardous Substance	State Wide Default Background	Industrial & Commercial II, III & IV: Direct Contact A	Industrial & Commercial II, III & IV: Soil Volatilization to Indoor Air B	Industrial & Commercial II, III & IV: Ambient Air Particulate Soil Inhalation C	Industrial & Commercial II, III & IV: Ambient Air Finite VSIC for 2 Meter Source Thickness D	Toxic Substance Control Act E
Total PCBs		16	16000	6500	28000	1
Aluminum	6900	370000				
Ammonia				2900000		
Antimony		670		5900		
Arsenic	5.8	37		910		
Benzene		400	8.4	470000	99	
Benzo(a)pyrene		8		1900		
Benzo(b)fluoranthene		80				
Benzo(k)fluoranthene		800				
Beryllium		1600		590		
bis(2-Ethylhexyl)phthalate		10000		890000		
2-Butanone		27000	27000	29000000	35000	
Cadmium	1.2	2100		2200		
Carbazole		2400				
Chloride						
Chromium		9200		240		
Chromium, Hexavalent		9200		240		
Chrysene		8000				
Cobalt	6.8	9000		5900		
Cyanide (total)	0.39	250		250		
Dibenz(a,h)anthracene		8				
1,1-Dichloroethene		570	0.33	78000	15	
cis-1,2-Dichloroethene		640	41	1000000	430	
1,2-Dichloropropane		550	7.4	120000	51	
2,4-Dimethylphenol		36000		2100000		
Ethylbenzene		140	140	13000000	3100	
Fluoranthene		130000	1000000	4100000	880000	
Formaldehyde		60000	65	300000	69	
Indeno(1,2,3-cd)pyrene		80				
Iron	12000	580000				
Lead	21	900		44000		
Manganese	440	90000		1500		
Mercury	0.13	580	89	8800	62	
Methylphenol (Cresol)		36000		2900000		
Naphthalene		52000	470	88000	350	
Nickel	20	150000		16000		
Pentachlorophenol		320		130000		
Phenanthrene		5200	5100	2900	190	
Phenol		12000		18000000		
Selenium	0.41	9600		59000		
Sodium		1000000				
Toluene		250	250	12000000	36000	
Trichloroethene		500	37	2300000	440	
Vanadium		5500				
Vinyl chloride		34	2.8	890000	170	
Xylene (total)		150	150	130000000	65000	
Zinc (Total)	47	630000				

SB-02111	06/30/00 24-26(ft) mg/kg	06/30/00 28-30(ft) mg/kg	06/30/00 34-36(ft) mg/kg
Total PCBs	ND (0.1)	ND (0.1)	ND (0.1)/ND (0.1)

SB-02012b	11/30/01 11-12(ft) mg/kg	11/30/01 12-14(ft) mg/kg	11/30/01 16-18(ft) mg/kg	11/30/01 18-20(ft) mg/kg	11/30/01 20-22(ft) mg/kg
Total PCBs	ND (0.12)	ND (0.12)/ND (0.12)	ND (0.11)	ND (0.12)	ND (0.11)

SB-02012	06/29/00 24-26(ft) mg/kg	06/29/00 28-30(ft) mg/kg	06/29/00 34-36(ft) mg/kg
Total PCBs	ND (0.1)	ND (0.1)	0.171 J/ND (0.1)

SB-02011	06/23/00 12-14(ft) mg/kg	06/23/00 16-18(ft) mg/kg	06/23/00 -24(ft) mg/kg
Total PCBs	3.35 J (E)	20.8 J (AE)	ND (0.1)/0.205 J

SB01912	12/19/02 12-14(ft) mg/kg	12/19/02 16-18(ft) mg/kg	12/19/02 20-22(ft) mg/kg
Total PCBs	ND (0.12)	ND (0.12)	ND (0.12)

SB-01911	06/26/00 12-14(ft) mg/kg	06/26/00 16-18(ft) mg/kg	06/26/00 22-24(ft) mg/kg
Total PCBs	ND (0.1)	ND (0.1)	ND (0.1)/ND (0.1)

SB-02111e	11/30/01 12-14(ft) mg/kg	11/30/01 16-18(ft) mg/kg	11/30/01 22-24(ft) mg/kg
Total PCBs	ND (0.13)	ND (0.12)/ND (0.13)	ND (0.12)

B00224	02/11/00 0-10(ft) mg/kg
Total PCBs	ND (0.1)

B00225	02/11/00 0-8.5(ft) mg/kg
Total PCBs	ND (0.1)

B00226	02/11/00 0-8.5(ft) mg/kg
Total PCBs	ND (0.1)

B00223	02/11/00 0-11.6(ft) mg/kg
Total PCBs	ND (0.1)

SB-02311	06/05/00 1-3(ft) mg/kg	06/05/00 4-6(ft) mg/kg
Antimony	ND (10.4) J	ND (12.1) J
Benzo(a)pyrene	0.4	0.06
Manganese	269 J	73.4 J
Total PCBs	ND (0.1)	ND (0.1)

SB-02411	06/05/00 1-3(ft) mg/kg	06/05/00 6.5-8.5(ft) mg/kg
Antimony	ND (10.8) J	6.7 J
Benzo(a)pyrene	ND (0.3)	ND (0.3)
Formaldehyde	ND (10) J	4 J
Manganese	391 J	10800 J {C}
Total PCBs	ND (0.1)	ND (0.1)

MW-02410	10/02/98 2-4(ft) mg/kg	10/02/98 4-6(ft) mg/kg	10/07/98 12-14(ft) mg/kg
Antimony	ND (10)	ND (10)	ND (10)/ND (10)
Benzo(a)pyrene	ND (0.3)	ND (0.3)	ND (0.3)/ND (0.3)
Chromium	299 {C}	271 {C}	18/14
Manganese	10900 {C}	10900 {C}	275 J/200 J
Total PCBs	ND (0.1)	ND (0.1)	ND (0.1)/ND (0.1)

SB-01911a	11/30/01 0-2(ft) mg/kg	11/30/01 4-6(ft) mg/kg	11/30/01 10-12(ft) mg/kg
Total PCBs	0.465 J	12.8 J {E}	1.28 J {E}

SB-01811	12/19/02 13-15(ft) mg/kg	12/19/02 16-18(ft) mg/kg	12/19/02 20-22(ft) mg/kg
Total PCBs	4.28 J {E}	0.51 J	0.234 J

SB-02510	06/06/00 0.7-2.7(ft) mg/kg	06/06/00 2-4(ft) mg/kg	12/03/01 2-4(ft) mg/kg	12/03/01 4-6(ft) mg/kg
Antimony	5.9 J	26 J	-	-
Benzo(a)pyrene	ND (3)	ND (15)	-	-
Chromium	683 {C}	2280 {C}	-	-
Formaldehyde	33 J	84 J {BD}	0.8 J	8 J
Manganese	10600 {C}	3770 {C}	8660 {C}	3000 {C}
Total PCBs	ND (0.1)	ND (0.1)	-	-

SB-01711	6/26/2003 12-14 ft bgs mg/kg	6/26/2003 14-16 ft bgs mg/kg	6/26/2003 16-18 ft bgs mg/kg
Total PCBs	ND(0.31)	0.42	130

SB-02509	12/03/01 2-4(ft) mg/kg	12/03/01 4-6(ft) mg/kg
Formaldehyde	0.6 J	1 J
Manganese	7150 {C}	6160 {C}

SB-00709	12/12/02 0-2(ft) mg/kg	12/12/02 2-4(ft) mg/kg
Total PCBs	ND (0.11)	43.5 J (AE)

A-4-B-4	04/19/95 0-0.5(ft) mg/kg	05/05/95 0-0.5(ft) mg/kg
Benzo(a)pyrene	ND (0.33)	ND (0.33)

SB-02309	07/05/00 0.7-2.7(ft) mg/kg
Benzo(a)pyrene	ND (0.3)
Total PCBs	ND (0.1)

SB-02309a	07/06/00 0.7-2.7(ft) mg/kg
Benzo(a)pyrene	ND (0.3)/0.04
Total PCBs	ND (0.1)/0.35 J

MW-00909	10/15/98 0-2(ft) mg/kg	10/15/98 8-9(ft) mg/kg
Antimony	ND (10)	ND (10)/ND (10)
Benzo(a)pyrene	ND (0.3)	ND (0.3)/ND (0.3)
Chromium	24	13/12
Manganese	275	269/333
Total PCBs	ND (0.1)	ND (0.1)/ND (0.1)

A-2-B-2	04/19/95 0-0.5(ft) mg/kg	05/05/95 0-0.5(ft) mg/kg
Benzo(a)pyrene	ND (0.33)	ND (0.33)

SB-01910	12/19/02 18-20(ft) mg/kg	12/19/02 20-22(ft) mg/kg	12/19/02 22-24(ft) mg/kg
Total PCBs	0.485 J	0.205 J	0.31 J

SB-02407	06/06/00 0.8-2.8(ft) mg/kg	06/06/00 18-20(ft) mg/kg
Antimony	R/R	R
Benzo(a)pyrene	0.5/ND (0.3)	ND (0.3)
Chromium	117/83.9	17.5
Formaldehyde	0.9 J/0.7 J	3 J
Manganese	2390 {C}/1550	245
Total PCBs	ND (0.1)/ND (0.1)	ND (0.1)

A-1-B-1	04/19/95 0-0.5(ft) mg/kg	05/05/95 0-0.5(ft) mg/kg
Benzo(a)pyrene	ND (0.33)	ND (0.33)

SB-02010	06/28/00 11-13(ft) mg/kg	06/28/00 16-18(ft) mg/kg	06/28/00 20-22(ft) mg/kg
Total PCBs	ND (0.1)	ND (0.1)	ND (0.1)/ND (0.1)

SB-02010a	11/30/01 0-2(ft) mg/kg	11/30/01 5.5-7.5(ft) mg/kg	11/30/01 9.5-11.5(ft) mg/kg	11/30/01 12-13(ft) mg/kg
Total PCBs	0.395 J	0.31 J	0.46 J	ND (0.12)

SB-02505	01/07/03 1-3(ft) mg/kg	01/07/03 3-5(ft) mg/kg
Manganese	5560 {C}	311

A-3-B-3	04/19/95 0-0.5(ft) mg/kg	05/05/95 0-0.5(ft) mg/kg
Benzo(a)pyrene	ND (0.33)	ND (0.33)

SB-02308	07/06/00 0.7-2.7(ft) mg/kg
Benzo(a)pyrene	0.1
Total PCBs	0.49 J

SB-02211	06/06/00 0-2(ft) mg/kg	06/06/00 16-18(ft) mg/kg
Antimony	R	R
Benzo(a)pyrene	0.2	ND (0.3)
Chromium	22.1	16.2
Formaldehyde	2 J	3 J
Manganese	300	209
Total PCBs	ND (0.1)	ND (0.1)

SB-02209	07/05/00 0.7-2.7(ft) mg/kg	07/05/00 9-11(ft) mg/kg
Benzo(a)pyrene	ND (0.3)	ND (0.3)
Total PCBs	0.98 J	ND (0.1)

SB-02209a	07/05/00 0.7-2.7(ft) mg/kg	07/05/00 2.7-3.9(ft) mg/kg
Benzo(a)pyrene	0.07	0.03
Total PCBs	0.75 J	0.385 J

SB-02209b	07/06/00 0.7-2.5(ft) mg/kg
Benzo(a)pyrene	0.07
Total PCBs	0.69 J

MW-11901	10/12/98 0-2(ft) mg/kg	10/12/98 4-6(ft) mg/kg	10/12/98 12-14(ft) mg/kg	10/12/98 28-30(ft) mg/kg	10/12/98 44-46(ft) mg/kg	10/12/98 60-62(ft) mg/kg
Antimony	ND (10)	ND (10)	ND (10)/ND (10)	ND (10)	ND (10)	ND (10)
Benzo(a)pyrene	0.4	ND (0.3)	ND (0.3)/ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)
Chromium	14	3	13/13	14	12	24
Manganese	221	202	214/250	256	220	348
Total PCBs	ND (0.1)	ND (0.1)	ND (0.1)/ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)

LEGEND

A — — —	INVESTIGATIVE UNIT BOUNDARY AND IDENTIFIER
——585——	GROUNDWATER ELEVATION FT. AMSL (NAVD 88)
●	MONITORING WELL LOCATION - RFI
■	SOIL BORING LOCATION - RFI
■ ●	SAMPLE LOCATION - NO REPORTED DATA
🟩	SOIL BORING LOCATION - HISTORICAL
▨	PROPOSED EXCAVATION

NOTES:

1. TOTAL PCBs WERE SUMMED BY ADDING THE POSITIVE DETECTIONS PLUS HALF THE QUANTITATION LIMITS FOR NON-DETECT RESULTS OF AROCLORS DETECTED ELSEWHERE AT THE SITE. IF QUANTITATION LIMITS ARE NOT AVAILABLE, HALF THE REPORTING LIMITS ARE USED FOR NON-DETECTED VALUES.
2. SCREENING CRITERIA AND SAMPLE RESULTS ARE COMPARED TO TWO SIGNIFICANT DIGITS. RESULTS EQUAL TO SCREENING CRITERIA ARE NOT HIGHLIGHTED AS EXCEEDANCES.
3. PARAMETER LISTS ARE AREA SPECIFIC BASED ON EXCEEDANCES.
4. GROUNDWATER CONTOURS REPRESENT THE UPPER SATURATED ZONE.
5. LOCATION SB-10711 WAS SUMMED AT ND AND DETECTIONS AS SUMMATION OF THE DETECTED AROCLORS.

KEY MAP

SCALE VERIFICATION

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

GENERAL MOTORS CORPORATION
SAGINAW METAL CASTING OPERATIONS
SAGINAW, MICHIGAN

ANALYTICAL DATA
IU D SOUTH

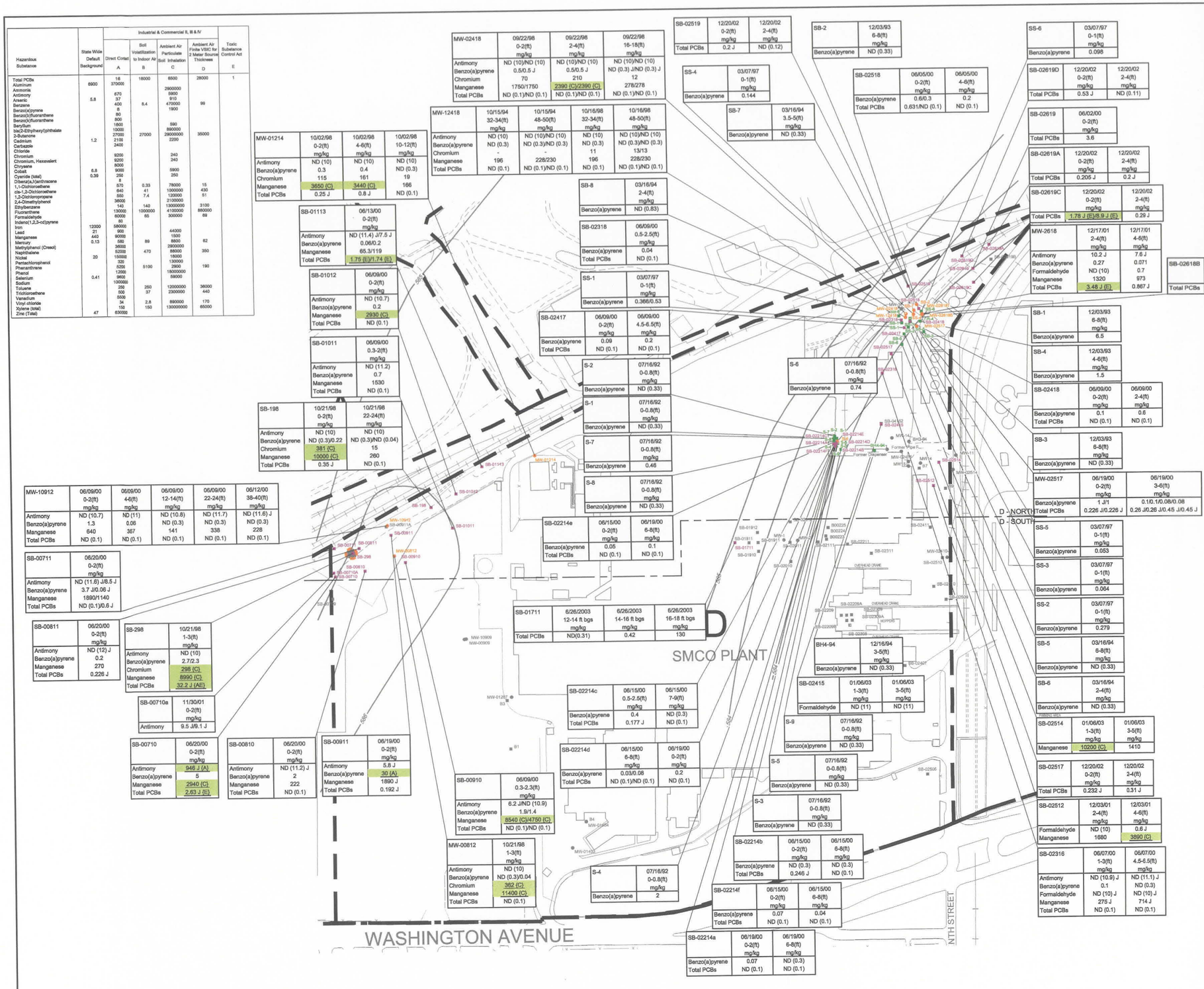
CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
MICHIGAN STATE PLANE SOUTH, NAD 83 USING INTERNATIONAL FEET, NGVD 88
NOTE: TOPO - SANBORN, 1998

Project Manager:	Reviewed By:	Date:
I.R.	M.T.	DECEMBER 2004

Scale:	Project Nº:	Report Nº:	Drawing Nº:
1" = 150'	17075-30	015	figure 3.1

17075-30(015)GN-WA009 DEC 06/2004



Hazardous Substance	State Wide Default Background	Industrial & Commercial II, III & IV Direct Contact A	Soil Volatilization to Indoor Air B	Ambient Air Particulate Soil Inhalation C	Ambient Air Finite VSIC for 2 Meter Source Thickness D	Toxic Substance Control Act E
Total PCBs		16	16000	6500	28000	1
Aluminum	6900	370000				
Ammonia				2900000		
Antimony		670		5900		
Arsenic	5.8	37		910		
Benzene		400	8.4	470000	99	
Benzo(a)pyrene		8		1900		
Benzo(b)fluoranthene		80				
Benzo(k)fluoranthene		800				
Beryllium		1600		590		
bis(2-Ethylhexyl)phthalate		10000		890000		
2-Butanone		27000	27000	29000000	35000	
Cadmium	1.2	2100		2200		
Carbazole		2400				
Chloride						
Chromium		9200		240		
Chromium, Hexavalent		9200		240		
Chrysene		8000				
Cobalt	6.8	9000		5900		
Cyanide (total)	0.39	250		250		
Dibenz(a,h)anthracene		8				
1,1-Dichloroethene		570	0.33	78000	15	
cis-1,2-Dichloroethene		640	41	1000000	430	
1,2-Dichloropropane		550	7.4	120000	51	
2,4-Dimethylphenol		36000		2100000		
Ethylbenzene		140	140	13000000	3100	
Fluoranthene		130000	1000000	4100000	880000	
Formaldehyde		60000	65	300000	69	
Indeno(1,2,3-cd)pyrene		80				
Iron	12000	580000				
Lead	21	900		44000		
Manganese	440	90000		1500		
Mercury	0.13	580	89	8800	62	
Methylphenol (Cresol)		36000		2900000		
Naphthalene		52000	470	88000	350	
Nickel	20	150000		16000		
Pentachlorophenol		320		130000		
Phenanthrene		5200	5100	2900	190	
Phenol		12000		18000000		
Selenium	0.41	9600		59000		
Sodium		1000000				
Toluene		250	250	12000000	36000	
Trichloroethene		500	37	2300000	440	
Vanadium		5500				
Vinyl chloride		34	2.8	890000	170	
Xylene (total)		150	150	130000000	65000	
Zinc (Total)	47	630000				

MW-02418	09/22/98 0-2(ft) mg/kg	09/22/98 2-4(ft) mg/kg	09/22/98 16-18(ft) mg/kg
Antimony	ND (10)/ND (10)	ND (10)/ND (10)	ND (10)/ND (10)
Benzo(a)pyrene	0.5/0.5 J	0.5/0.5 J	ND (0.3) J/ND (0.3) J
Chromium	70	210	12
Manganese	1750/1750	2390 (C)/2390 (C)	278/278
Total PCBs	ND (0.1)/ND (0.1)	ND (0.1)/ND (0.1)	ND (0.1)/ND (0.1)

SB-02519	12/20/02 0-2(ft) mg/kg	12/20/02 2-4(ft) mg/kg
Total PCBs	0.2 J	ND (0.12)

SB-2	12/03/93 6-8(ft) mg/kg
Benzo(a)pyrene	ND (0.33)

SS-6	03/07/97 0-1(ft) mg/kg
Benzo(a)pyrene	0.098

SS-4	03/07/97 0-1(ft) mg/kg
Benzo(a)pyrene	0.144

SB-02518	06/05/00 0-2(ft) mg/kg	06/05/00 4-6(ft) mg/kg
Benzo(a)pyrene	0.6/0.3	0.2
Total PCBs	0.631/ND (0.1)	ND (0.1)

SB-02619D	12/20/02 0-2(ft) mg/kg	12/20/02 2-4(ft) mg/kg
Total PCBs	0.53 J	ND (0.11)

SB-7	03/16/94 3.5-5(ft) mg/kg
Benzo(a)pyrene	ND (0.33)

MW-12418	10/15/94 32-34(ft) mg/kg	10/15/94 48-50(ft) mg/kg	10/16/98 32-34(ft) mg/kg	10/16/98 48-50(ft) mg/kg
Antimony	ND (10)	ND (10)/ND (10)	ND (10)	ND (10)/ND (10)
Benzo(a)pyrene	ND (0.3)	ND (0.3)/ND (0.3)	ND (0.3)	ND (0.3)/ND (0.3)
Chromium	-	-	11	13/13
Manganese	196	228/230	196	228/230
Total PCBs	ND (0.1)	ND (0.1)/ND (0.1)	ND (0.1)	ND (0.1)/ND (0.1)

SB-02619	06/02/00 0-2(ft) mg/kg
Total PCBs	3.6

MW-01214	10/02/98 0-2(ft) mg/kg	10/02/98 4-6(ft) mg/kg	10/02/98 10-12(ft) mg/kg
Antimony	ND (10)	ND (10)	ND (10)
Benzo(a)pyrene	0.3	0.4	ND (0.3)
Chromium	115	161	19
Manganese	3650 (C)	3440 (C)	166
Total PCBs	0.25 J	0.8 J	ND (0.1)

SB-02619A	12/20/02 0-2(ft) mg/kg	12/20/02 2-4(ft) mg/kg
Total PCBs	0.205 J	0.2 J

SB-8	03/16/94 2-4(ft) mg/kg
Benzo(a)pyrene	ND (0.83)

SB-02619C	12/20/02 0-2(ft) mg/kg	12/20/02 2-4(ft) mg/kg
Total PCBs	1.78 J (E)/8.9 J (E)	0.29 J

SB-01113	06/13/00 0-2(ft) mg/kg
Antimony	ND (11.4) J/7.5 J
Benzo(a)pyrene	0.06/0.2
Manganese	65.3/119
Total PCBs	1.75 (E)/1.74 (E)

SB-02318	06/09/00 0.5-2.5(ft) mg/kg
Benzo(a)pyrene	0.04
Total PCBs	ND (0.1)

MW-2618	12/17/01 2-4(ft) mg/kg	12/17/01 4-6(ft) mg/kg
Antimony	10.2 J	7.6 J
Benzo(a)pyrene	0.27	0.071
Formaldehyde	ND (10)	0.7
Manganese	1320	973
Total PCBs	3.48 J (E)	0.867 J

SB-02618B	01/06/03 0-2(ft) mg/kg	01/06/03 2-4(ft) mg/kg
Total PCBs	0.284 J	ND (0.12)

SB-01012	06/09/00 0-2(ft) mg/kg
Antimony	ND (10.7)
Benzo(a)pyrene	0.2
Manganese	2930 (C)
Total PCBs	ND (0.1)

SS-1	03/07/97 0-1(ft) mg/kg
Benzo(a)pyrene	0.366/0.53

SB-1	12/03/93 6-8(ft) mg/kg
Benzo(a)pyrene	6.5

SB-02417	06/09/00 0-2(ft) mg/kg	06/09/00 4.5-6.5(ft) mg/kg
Benzo(a)pyrene	0.09	0.2
Total PCBs	ND (0.1)	ND (0.1)

SB-4	12/03/93 4-6(ft) mg/kg
Benzo(a)pyrene	1.5

SB-01011	06/09/00 0.3-2(ft) mg/kg
Antimony	ND (11.2)
Benzo(a)pyrene	0.7
Manganese	1530
Total PCBs	ND (0.1)

S-2	07/16/92 0-0.8(ft) mg/kg
Benzo(a)pyrene	ND (0.33)

S-6	07/16/92 0-0.8(ft) mg/kg
Benzo(a)pyrene	0.74

SB-02418	06/09/00 0-2(ft) mg/kg	06/09/00 2-4(ft) mg/kg
Benzo(a)pyrene	0.1	0.6
Total PCBs	ND (0.1)	ND (0.1)

SB-198	10/21/98 0-2(ft) mg/kg	10/21/98 22-24(ft) mg/kg
Antimony	ND (10)	ND (10)
Benzo(a)pyrene	ND (0.3)/0.22	ND (0.3)/ND (0.04)
Chromium	381 (C)	15
Manganese	10000 (C)	260
Total PCBs	0.35 J	ND (0.1)

S-1	07/16/92 0-0.8(ft) mg/kg
Benzo(a)pyrene	ND (0.33)

S-7	07/16/92 0-0.8(ft) mg/kg
Benzo(a)pyrene	0.46

SB-3	12/03/93 6-8(ft) mg/kg
Benzo(a)pyrene	ND (0.33)

MW-02517	06/19/00 0-2(ft) mg/kg	06/19/00 3-6(ft) mg/kg
Benzo(a)pyrene	1 J/1	0.1/0.1/0.08/0.08
Total PCBs	0.226 J/0.226 J	0.26 J/0.26 J/0.45 J/0.45 J

MW-10912	06/09/00 0-2(ft) mg/kg	06/09/00 4-6(ft) mg/kg	06/09/00 12-14(ft) mg/kg	06/09/00 22-24(ft) mg/kg	06/12/00 38-40(ft) mg/kg
Antimony	ND (10.7)	ND (11)	ND (10.8)	ND (11.7)	ND (11.6) J
Benzo(a)pyrene	1.3	0.06	ND (0.3)	ND (0.3)	ND (0.3)
Manganese	640	367	141	338	228
Total PCBs	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)

S-8	07/16/92 0-0.8(ft) mg/kg
Benzo(a)pyrene	ND (0.33)

SB-02214e	06/15/00 0-2(ft) mg/kg	06/19/00 6-8(ft) mg/kg
Benzo(a)pyrene	0.05	0.1
Total PCBs	ND (0.1)	ND (0.1)

SS-5	03/07/97 0-1(ft) mg/kg
Benzo(a)pyrene	0.053

SB-00711	06/20/00 0-2(ft) mg/kg
Antimony	ND (11.6) J/8.5 J
Benzo(a)pyrene	3.7 J/0.06 J
Manganese	1890/1140
Total PCBs	ND (0.1)/0.6 J

SS-3	03/07/97 0-1(ft) mg/kg
Benzo(a)pyrene	0.064

SS-2	03/07/97 0-1(ft) mg/kg
Benzo(a)pyrene	0.279

SB-01711	6/26/2003 12-14 ft bgs mg/kg	6/26/2003 14-16 ft bgs mg/kg	6/26/2003 16-18 ft bgs mg/kg
Total PCBs	ND(0.31)	0.42	130

SB-00811	06/20/00 0-2(ft) mg/kg
Antimony	ND (12) J
Benzo(a)pyrene	0.2
Manganese	270
Total PCBs	0.226 J

SB-298	10/21/98 1-3(ft) mg/kg
Antimony	ND (10)
Benzo(a)pyrene	2.7/2.3
Chromium	298 (C)
Manganese	8990 (C)
Total PCBs	32.2 J (AE)

BH4-94	12/16/94 3-5(ft) mg/kg
Benzo(a)pyrene	ND (0.33)

SB-5	03/16/94 6-8(ft) mg/kg
Benzo(a)pyrene	ND (0.33)

SB-02415	01/06/03 1-3(ft) mg/kg	01/06/03 3-5(ft) mg/kg
Formaldehyde	ND (11)	ND (11)

SB-6	03/16/94 2-4(ft) mg/kg
Benzo(a)pyrene	ND (0.33)

SB-02214c	06/15/00 0.5-2.5(ft) mg/kg	06/15/00 7-9(ft) mg/kg
Benzo(a)pyrene	0.4	ND (0.3)
Total PCBs	0.177 J	ND (0.1)

SB-00710a	11/30/01 0-2(ft) mg/kg
Antimony	9.5 J/9.1 J

S-9	07/16/92 0-0.8(ft) mg/kg
Benzo(a)pyrene	ND (0.33)

SB-02514	01/06/03 1-3(ft) mg/kg	01/06/03 3-5(ft) mg/kg
Manganese	10200 (C)	1410

SB-00710	06/20/00 0-2(ft) mg/kg
Antimony	946 J (A)
Benzo(a)pyrene	5
Manganese	2940 (C)
Total PCBs	2.63 J (E)

SB-00810	06/20/00 0-2(ft) mg/kg
Antimony	ND (11.2) J
Benzo(a)pyrene	2
Manganese	222
Total PCBs	ND (0.1)

SB-00911	06/19/00 0-2(ft) mg/kg
Antimony	5.8 J
Benzo(a)pyrene	30 (A)
Manganese	1890 J
Total PCBs	0.192 J

SB-02214d	06/15/00 6-8(ft) mg/kg	06/19/00 0-2(ft) mg/kg
Benzo(a)pyrene	0.03/0.08	0.2
Total PCBs	ND (0.1)/ND (0.1)	ND (0.1)

S-5	07/16/92 0-0.8(ft) mg/kg
Benzo(a)pyrene	ND (0.33)

SB-02517	12/20/02 0-2(ft) mg/kg	12/20/02 2-4(ft) mg/kg
Total PCBs	0.232 J	0.31 J

SB-00910	06/09/00 0.3-2.3(ft) mg/kg
Antimony	6.2 J/ND (10.9)
Benzo(a)pyrene	1.9/1.4
Manganese	8540 (C)/4750 (C)
Total PCBs	ND (0.1)/ND (0.1)

S-3	07/16/92 0-0.8(ft) mg/kg
Benzo(a)pyrene	ND (0.33)

SB-02512	12/03/01 2-4(ft) mg/kg	12/03/01 4-6(ft) mg/kg
Formaldehyde	ND (10)	0.6 J
Manganese	1680	3890 (C)

SB-02214b	06/15/00 0-2(ft) mg/kg	06/15/00 6-8(ft) mg/kg
Benzo(a)pyrene	ND (0.3)	ND (0.3)
Total PCBs	0.246 J	ND (0.1)

MW-00812	10/21/98 1-3(ft) mg/kg
Antimony	ND (10)
Benzo(a)pyrene	ND (0.3)/0.04
Chromium	362 (C)
Manganese	11400 (C)
Total PCBs	ND (0.1)

SB-02316	06/07/00 1-3(ft) mg/kg	06/07/00 4.5-6.5(ft) mg/kg
Antimony	ND (10.9) J	ND (11.1) J
Benzo(a)pyrene	0.1	ND (0.3)
Formaldehyde	ND (10) J	ND (10) J
Manganese	275 J	714 J
Total PCBs	ND (0.1)	ND (0.1)

S-4	07/16/92 0-0.8(ft) mg/kg
Benzo(a)pyrene	2

SB-02214f	06/15/00 0-2(ft) mg/kg	06/15/00 6-8(ft) mg/kg
Benzo(a)pyrene	0.07	0.04
Total PCBs	ND (0.1)	ND (0.1)

SB-02214a	06/19/00 0-2(ft) mg/kg	06/19/00 6-8(ft) mg/kg
Benzo(a)pyrene	0.07	ND (0.3)
Total PCBs	ND (0.1)	ND (0.1)

0 60 150ft

LEGEND

A — — —	INVESTIGATIVE UNIT BOUNDARY AND IDENTIFIER
——585——	GROUNDWATER ELEVATION FT. AMSL (NAVD 88)
●	MONITORING WELL LOCATION - RFI
■	SOIL BORING LOCATION - RFI
■ ●	SAMPLE LOCATION - NO REPORTED DATA
■	SOIL BORING LOCATION - HISTORICAL
▨	PROPOSED EXCAVATION

NOTES:

1. TOTAL PCBs WERE SUMMED BY ADDING THE POSITIVE DETECTIONS PLUS HALF THE QUANTITATION LIMITS FOR NON-DETECT RESULTS OF AROCLORS DETECTED ELSEWHERE AT THE SITE. IF QUANTITATION LIMITS ARE NOT AVAILABLE, HALF THE REPORTING LIMITS ARE USED FOR NON-DETECTED VALUES.
2. SCREENING CRITERIA AND SAMPLE RESULTS ARE COMPARED TO TWO SIGNIFICANT DIGITS. RESULTS EQUAL TO SCREENING CRITERIA ARE NOT HIGHLIGHTED AS EXCEEDANCES.
3. PARAMETER LISTS ARE AREA SPECIFIC BASED ON EXCEEDANCES.
4. GROUNDWATER CONTOURS REPRESENT THE UPPER SATURATED ZONE.
5. LOCATION SB-10711 WAS SUMMED AT ND AND DETECTIONS AS SUMMATION OF THE DETECTED AROCLORS.

KEY MAP

SCALE VERIFICATION

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

GENERAL MOTORS CORPORATION
SAGINAW METAL CASTING OPERATIONS

SAGINAW, MICHIGAN

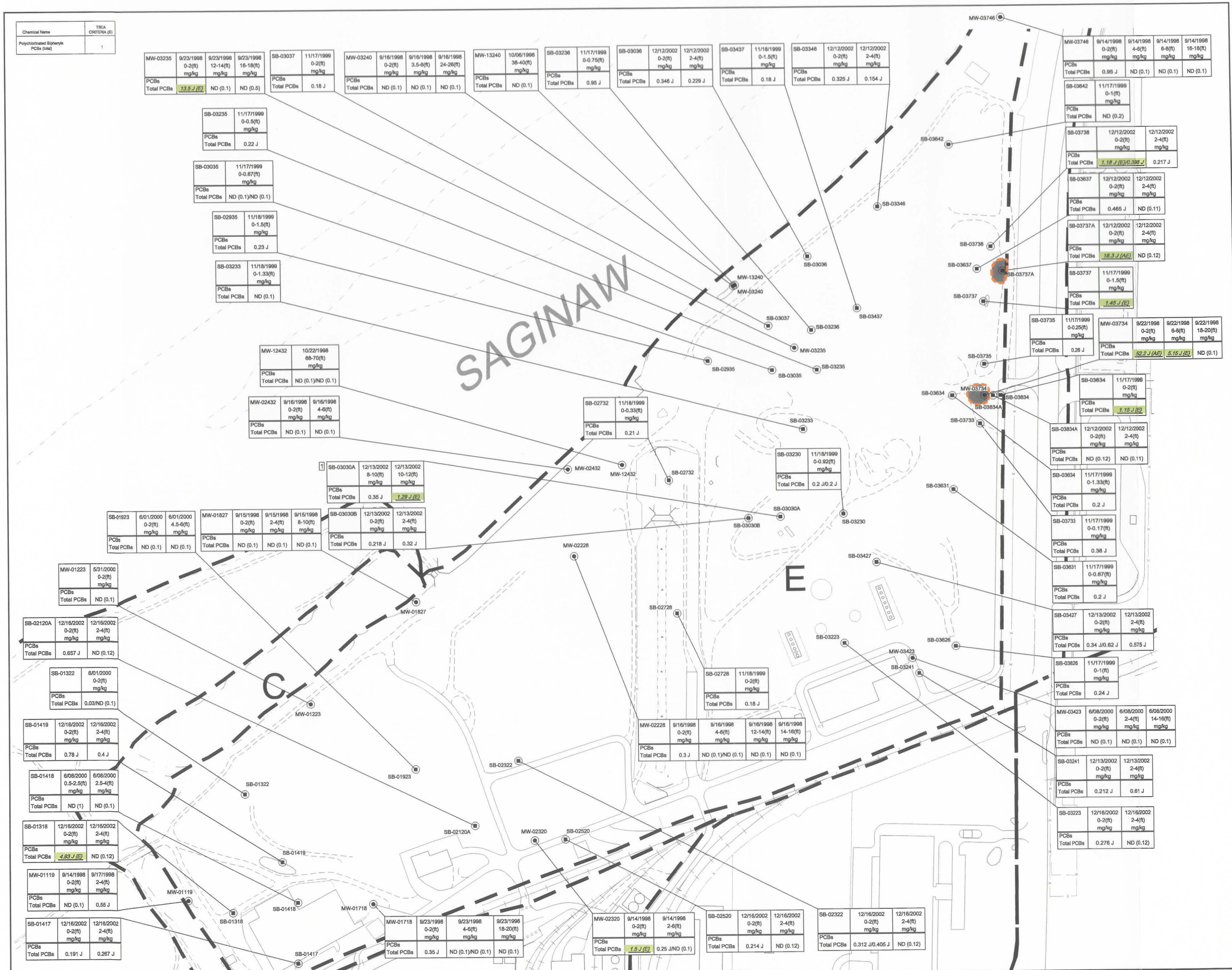
ANALYTICAL DATA
IU D NORTH

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
MICHIGAN STATE PLANE SOUTH, NAD 83 USING INTERNATIONAL FEET, NGVD 88
NOTE: TOPO - SANBORN, 1996

Project Manager:	Reviewed By:	Date:	
I.R.	M.T.	DECEMBER 2004	
Scale: 1" = 150'	Project Nº: 17075-30	Report Nº: 015	Drawing Nº: figure 3.2

17075-30(015)GN-WA008 DEC 06/2004



0 60 150ft

LEGEND

A — — INVESTIGATIVE UNIT BOUNDARY AND IDENTIFIER
SD-10A △ NON-RFI SURFACE WATER/SEDIMENT SAMPLE LOCATION
MW-01223 RFI MONITORING WELL LOCATION
SB-01419 RFI BORING LOCATION
1 FIRST SAMPLE COLLECTED BELOW PILE IN FOUNDRY SAND
PROPOSED EXCAVATION

NOTE:
GROUNDWATER IS EXPECTED TO BE REACHED AT APPROXIMATELY 4' bgs.

NOTES:
1. TOTAL PCBs WERE SUMMED BY ADDING THE POSITIVE DETECTIONS PLUS HALF THE QUANTITATION LIMITS FOR NON-DETECT RESULTS OF AROCLORS DETECTED ELSEWHERE AT THE SITE. IF QUANTITATION LIMITS ARE NOT AVAILABLE, HALF THE REPORTING LIMITS ARE USED FOR NON-DETECTED VALUES.
2. SCREENING CRITERIA AND SAMPLE RESULTS ARE COMPARED TO TWO SIGNIFICANT DIGITS. RESULTS EQUAL TO SCREENING CRITERIA ARE NOT HIGHLIGHTED AS EXCEEDANCES.

KEY MAP

SCALE VERIFICATION

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

GENERAL MOTORS CORPORATION
SAGINAW METAL CASTING OPERATIONS
SAGINAW, MICHIGAN

PROPOSED EXCAVATION AREAS
IU E

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:
MICHIGAN STATE PLANE SOUTH, NAD 83 USING INTERNATIONAL FEET, NGVD 88
TOPO - SANBORN, 1996

Project Manager:	Reviewed By:	Date:	
I.R.	M.T.	DECEMBER 2004	
Scale: 1" = 150'	Project Nº: 17075-30	Report Nº: 015	Drawing Nº: figure 3.3

17075-30(015)GN-WA001 DEC 06/2004

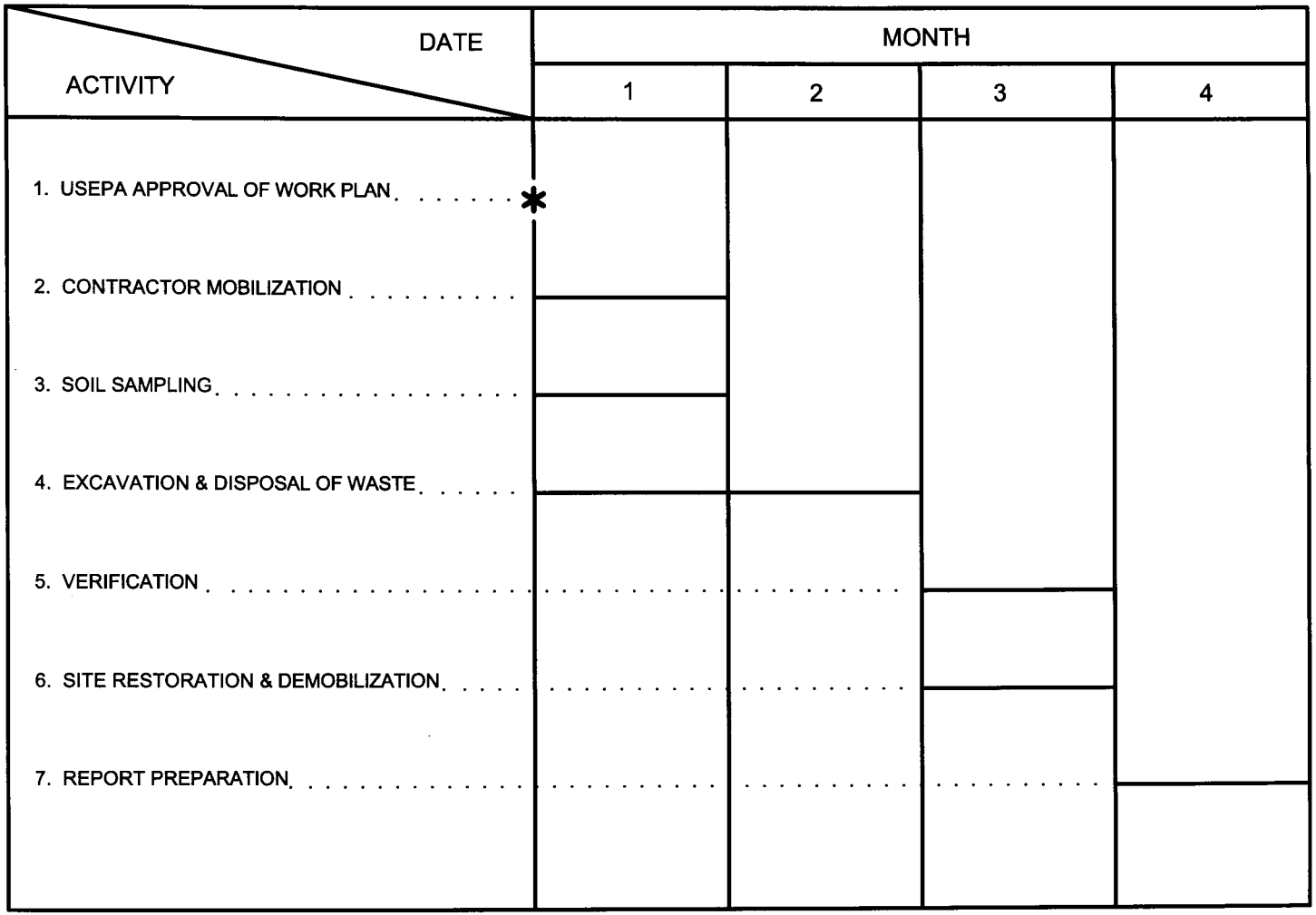


figure 6.1

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

17075-30(015)GN-WA007 MAR 03/2004