



Privileged and Confidential
Prepared at General Motors
Counsel's Request

PARCEL B

PHASE III ENVIRONMENTAL SITE ASSESSMENT

GENERAL MOTORS CORPORATION
CLARK AVENUE FACILITY
DETROIT, MICHIGAN

DECEMBER 1997
REF. NO. 8889 (38)
This report is printed on recycled paper.

Prepared By:
Conestoga-Rovers & Associates
11100 Metro Airport Center Drive, Suite #160
Romulus, Michigan 48174
(734) 942-0909 Office (734) 942-1858 Fax

TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION	1
2.0 BACKGROUND	2
2.1 SUMMARY OF PAOCS EVALUATED	2
2.2 PHASE II ESA CONCLUSIONS	2
3.0 SCOPE OF WORK	3
3.1 SUMMARY OF AOCS EVALUATED	3
3.2 BREAKDOWN OF BOREHOLES BY LOCATION	3
3.3 BOREHOLE INSTALLATION	3
3.3.1 DRILLING METHODS	3
3.3.2 SOIL SAMPLING METHODS	4
3.3.3 DECONTAMINATION METHODS	4
3.4 SAMPLE ANALYSIS/DATA VALIDATION	5
4.0 GEOLOGY AND HYDROGEOLOGY	7
4.1 SITE GEOLOGY	7
4.2 SITE HYDROGEOLOGY	7
5.0 ANALYTICAL RESULTS	9
6.0 CONCLUSIONS	10

LIST OF FIGURES
(Following Report)

FIGURE 1.1	SITE LOCATION
FIGURE 1.2	SITE PLAN
FIGURE 2.1	LOCATION OF PAOCS
FIGURE 3.1	LOCATION OF AOCS
FIGURE 3.2	PHASE III ESA BOREHOLE LOCATIONS
FIGURE 6.1	APPROXIMATE EXTENT OF IMPACTED SOIL

LIST OF TABLES
(Following Report)

TABLE 3.1	SUMMARY OF BOREHOLE COMPLETION
TABLE 3.2	SAMPLE SUMMARY
TABLE 5.1	SUMMARY OF DETECTED PAHs IN SOIL SAMPLES
TABLE 5.2	SUMMARY OF DETECTED LEAD IN SOIL SAMPLES

LIST OF APPENDICES

APPENDIX A	BOREHOLE STRATIGRAPHIC LOGS
APPENDIX B	CHAIN-OF-CUSTODY FORMS
APPENDIX C	DATA VALIDATION MEMORANDA

1.0 INTRODUCTION

Conestoga-Rovers & Associates (CRA) was retained by General Motors Corporation (GM) to conduct a Phase III Environmental Site Assessment (ESA) for a portion of the GM Clark Avenue Facility located at 2860 Clark Avenue in Detroit, Michigan. The Site is defined for redevelopment as Parcel B (Site). The Site location is presented on Figure 1.1. A Site plan is presented on Figure 1.2.

The purpose of the Phase III ESA was to delineate the vertical and horizontal extent of contamination at each area of concern (AOC) identified during the Phase II ESA of the Site, which was completed from September 1996 to December 1996. Additional Phase II ESA activities were completed in December 1997. The purpose of the Phase II ESA was to confirm or deny a release at all potential areas of environmental concern (PAOCs) identified during the Phase I ESA of the Site, which was also completed from September 1996 to December 1996.

This document presents a summary of the Phase III ESA activities for the Site, in the following sections:

- 2.0 Background
- 3.0 Scope of Work
- 4.0 Geology and Hydrogeology
- 5.0 Analytical Results
- 6.0 Conclusions

2.0 BACKGROUND

CRA conducted a Phase II ESA at the Site during the period from September 1996 through December 1996. Additional Phase II ESA activities were completed in December 1997. The Phase II ESA was designed to confirm or deny a release at the PAOCs identified.

2.1 SUMMARY OF PAOCS EVALUATED

Seventeen (17) PAOCs were identified during the Phase I ESA (CRA, February 1997) and during the additional concrete slab removal in late 1997. PAOC locations are presented on Figure 2.1. The 17 PAOCs were identified during demolition oversight activities and a review of historical environmental areas of interest.

2.2 PHASE II ESA CONCLUSIONS

A total of 92 investigative boreholes were completed during the Phase II ESA on Site. A summary of the Areas of Concern (AOCs) identified based on the results of the Phase I/II ESA is presented in the following table.

<i>AOC Number</i>	<i>Borehole Location</i>	<i>Contaminant of Concern</i>
B-4	BH-111A-96	benzo(a)pyrene
B-10	BH-126-96	lead
B-15	BH-157-96	lead

3.0 SCOPE OF WORK

CRA conducted a Phase III ESA at the Site during the period from September 1996 through February 1997. The Phase III ESA was designed to delineate the vertical and horizontal extent of impacted soil at each AOC identified during the Phase II ESA.

3.1 SUMMARY OF AOCs EVALUATED

Three (3) AOCs were identified during the Phase II ESA (CRA, December 1997; revised February 1998). AOC locations are presented on Figure 3.1.

Phase III ESA boreholes were installed at the 3 AOCs identified during the Phase II ESA, as follows: AOCs B-4, B-10, and B-15. Phase III ESA field activities at each of these AOCs included the installation of four boreholes, located 10-20 feet north, south, east, and west, respectively, of each Phase II ESA borehole location which was previously designated as impacted (as described in Section 2.2).

3.2 BREAKDOWN OF BOREHOLES BY LOCATION

A total of 12 investigative boreholes were completed during the Phase III ESA on Site. A summary of boreholes completed in the Phase III ESA is presented in Table 3.1. Figure 3.2 presents the borehole locations.

3.3 BOREHOLE INSTALLATION

3.3.1 DRILLING METHODS

Carlo Environmental Technologies (CET), of Clinton Township, Michigan, performed all Phase III ESA drilling activities at the Site from September 1996 through February 1997.

Boreholes were advanced using a drill rig equipped with 4 1/4-inch hollow stem augers, approximately two feet into the clay layer which underlies the surficial fill

material at the Site. Boreholes were advanced to approximately ten feet below ground surface (bgs), or until no adverse impact was observed, whichever was deeper.

Borehole stratigraphic logs are included in Appendix A.

3.3.2 SOIL SAMPLING METHODS

Soil samples were collected continuously using split spoon samplers. Two soil samples were collected from each boring, one from the fill material and one from the underlying clay for analysis. Soil samples were screened using a photoionization detector (PID) and visually examined for staining and/or odors. The soil sample collected from the fill material which exhibited the highest PID reading, or most significant staining/odors, was submitted for analysis. The sample collected from the last split spoon advanced into the clay layer was also submitted for analysis.

Soil samples were collected by split-spoon methods in accordance with ASTM Method 1586 using the following sampling protocols:

- i) soil samples were collected using a 24-inch long, 2-inch or 3-inch outside diameter carbon-steel split-spoon sampler (precleaned as described in Section 3.3.3). The split-spoon was attached to precleaned drill rods, and driven ahead of the hollow stem augers (HSAs) into the materials to be sampled using a 140-pound hammer, free falling 30 inches. The number of hammer blows were recorded for each 6-inch increment of penetration; and
- ii) all collected soil samples were described and visually classified according to the USCS System, placed in precleaned laboratory-supplied jars, and submitted to the analytical laboratory for analyses.

3.3.3 DECONTAMINATION METHODS

Prior to mobilization of sampling equipment, and prior to the commencement of sampling activities, all sampling equipment was thoroughly steam-cleaned to remove oil, grease, mud and other foreign matter.

The drill rig and all downhole drilling and sampling equipment (such as augers, cutting bits, and associated equipment and tools), were cleaned using the following sequence:

- i) hot potable water high-pressure, low-volume wash and hand scrubbing, as necessary, supplemented by non-phosphate detergent (Alconox); and
- ii) hot potable water high-pressure, low-volume rinse.

The soil sampling equipment and tools were cleaned prior to the initial borehole, and in between each borehole installed.

Sampling equipment and tools, including split-spoons, were thoroughly cleaned using the following wash sequence:

- i) cleaning with potable water and detergent (Alconox), using a brush to remove particulate matter and surface films;
- ii) rinsing thoroughly with potable water;
- iii) rinsing with isopropanol;
- iv) rinsing thoroughly with deionized water;
- v) allowing the equipment to air dry as long as possible; and
- vi) wrapping with aluminum foil, if appropriate, if the equipment was to be stored or transported.

3.4 SAMPLE ANALYSIS/DATA VALIDATION

Soil samples were collected and submitted to IEA, Inc. of Cary, North Carolina, and Encotec of Ann Arbor, Michigan, and analyzed for various parameters, including lead, and polynuclear aromatic hydrocarbons (PAHs).

The sample summary table, Table 3.2, presents a detailed list of which parameters were analyzed for each sample collected. Parameter selection was based on information obtained during the Phase II ESA for the Site and subsequent discussions with GM.

**Privileged and Confidential
Prepared at General Motors
Counsel's Request**

Samples were shipped via Federal Express or hand delivery to the analytical laboratories in sealed coolers packed with ice under chain-of-custody protocol. Chain-of-Custody records are included as Appendix B.

Quality assessment and validation of the analytical data reported by IEA and Encotec was conducted by CRA's quality assurance officer. The validation of the analytical data was based on laboratory blank data, recovery data from matrix and surrogate spikes, and check samples. The analytical data was assessed for accuracy and precision based on review of the blank and spike recovery data. The analytical data was determined to be valid and suitable for quantitative use specific to this project. The data quality assessment and validation memoranda are presented in Appendix C.

The analytical results for the soil samples were compared to Michigan Act 451, Part 201 Generic Industrial Direct Contact Criteria, as defined in the Environmental Response Division Operational Memorandum #14, Revision 2, dated June 6, 1995.

4.0 GEOLOGY AND HYDROGEOLOGY

4.1 SITE GEOLOGY

The Site is located on the southeastern edge of the Michigan Basin, a regional geologic feature that includes sedimentary rocks of the Paleozoic age.

An accumulation of unconsolidated sediment deposits cover most of the Michigan area, formed during the glaciation of the Pleistocene Epoch. The lacustrine glacial till is comprised of sand, silt, and clay, and has a thickness of 101 to 200 feet (Hydrogeologic Atlas of Michigan, Western Michigan University, 1981). The glacial till at the Site was reported in previous investigations to be 111 to 125 feet thick. The glacial drift is generally not an aquifer, and may include thin interbedded aquifers at depth (Hydrogeologic Atlas of Michigan, Western Michigan University, 1981). The underlying bedrock is reported to be limestone of the Dundee Limestone, a late Devonian formation. The Dundee Limestone is generally a highly fractured, brown, carboniferous rock.

Through years of development and industrial use, the native soils in many areas of the Site have been overlain by earth fill (i.e., sand and gravel), asphalt, concrete, or structures. This surficial layer of fill at the Site is generally less than ten feet thick.

4.2 SITE HYDROGEOLOGY

The stratigraphy at the Site contains two water bearing zones: a shallow perched water zone within the surficial fill and an aquifer within the limestone bedrock beneath the lacustrine glacial till.

The first usable aquifer is protected by impervious material from surficial contamination. No wells in the area are reported to be located in the bedrock. The glacial drift is generally not an aquifer, but may include thin interbedded aquifers at depth (Hydrogeologic Atlas of Michigan, Western Michigan University, 1981).

**Privileged and Confidential
Prepared at General Motors
Counsel's Request**

It should be noted that the perched water in many areas of Detroit is considered by the Michigan Department of Environmental Quality (MDEQ)-Environmental Response Division (ERD) to be groundwater not in an aquifer.

5.0 ANALYTICAL RESULTS

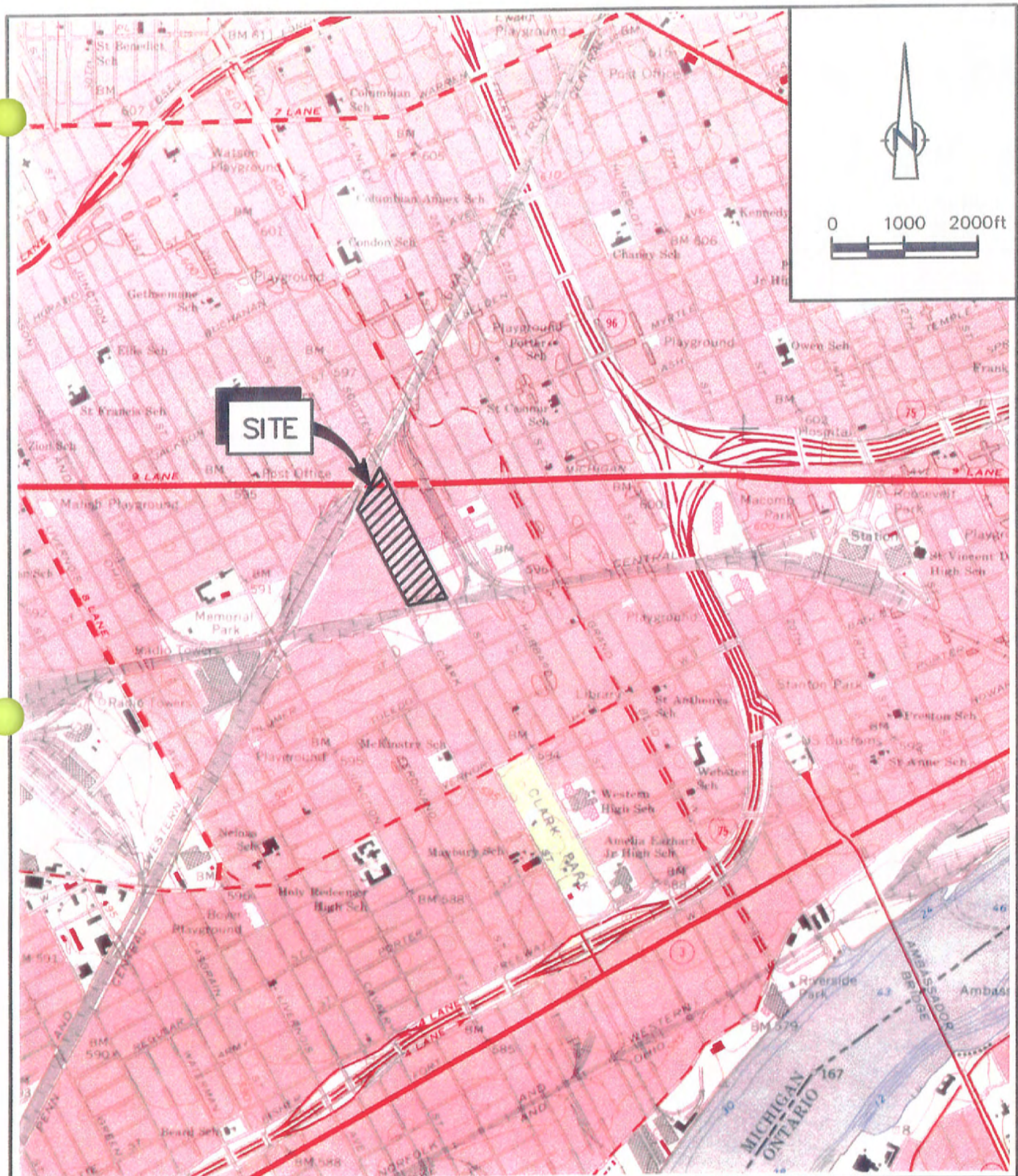
Samples collected from Site borehole locations were analyzed for lead or PAHs, as presented in Table 3.2. Samples were collected at AOCs B-4, B-10, and B-15.

A summary of detected PAHs in soil samples is presented in Table 5.1. No PAHs were detected above the Michigan Act 451, Part 201 Generic Industrial Direct Contract Criteria in any of the soil samples.

A summary of detected lead in soil samples is presented in Table 5.2. Lead was not detected above the Michigan Act 451, Part 201 Generic Industrial Direct Contact Criteria in any of the soil samples.

6.0 CONCLUSIONS

Based on the results of the Phase III ESA for the Site, the approximate extent of impacted soil at AOCs B-4, B-10, and B-15 has been delineated, as presented on Figure 6.1.



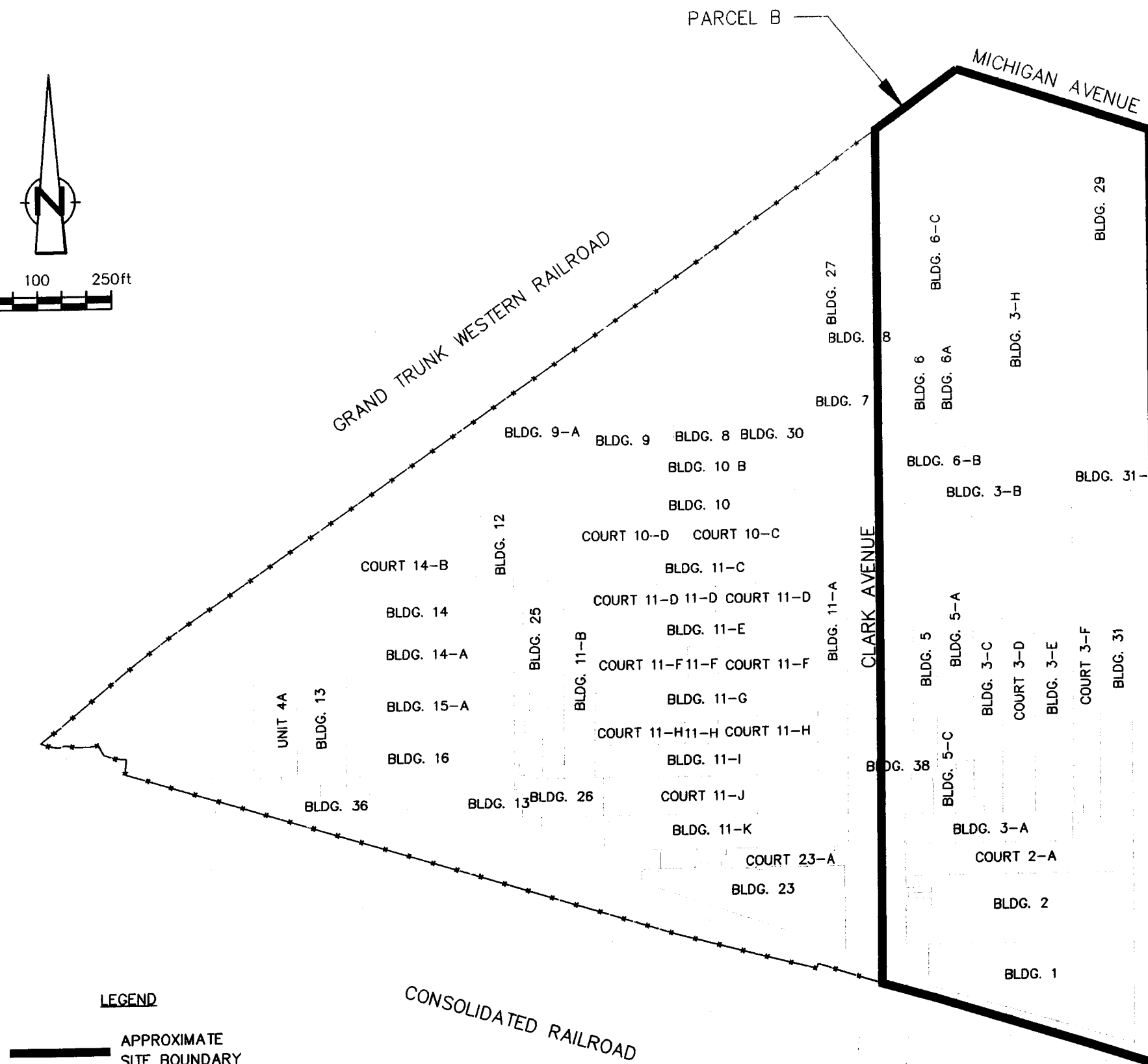
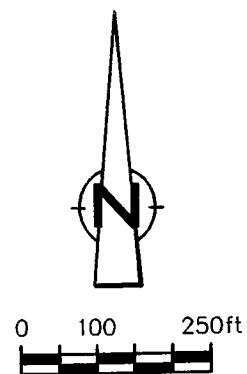
SOURCE: USGS QUADRANGLE MAP;
DETROIT, MICHIGAN



CRA

08889-00(038)GN-DE001

figure 1.1
SITE LOCATION
PARCEL B
GENERAL MOTORS CLARK AVENUE SITE
Detroit, Michigan



ENGINEERING
BUILDING 40

SCOTTEN AVENUE

CLARK AVENUE

MICHIGAN AVENUE

PARCEL B

GRAND TRUNK WESTERN RAILROAD

CONSOLIDATED RAILROAD

LEGEND

— APPROXIMATE
SITE BOUNDARY

NOTE: BUILDING LOCATIONS ARE NOT SURVEYED

figure 1.2
SITE PLAN
PARCEL B
GENERAL MOTORS CLARK AVENUE SITE
Detroit, Michigan

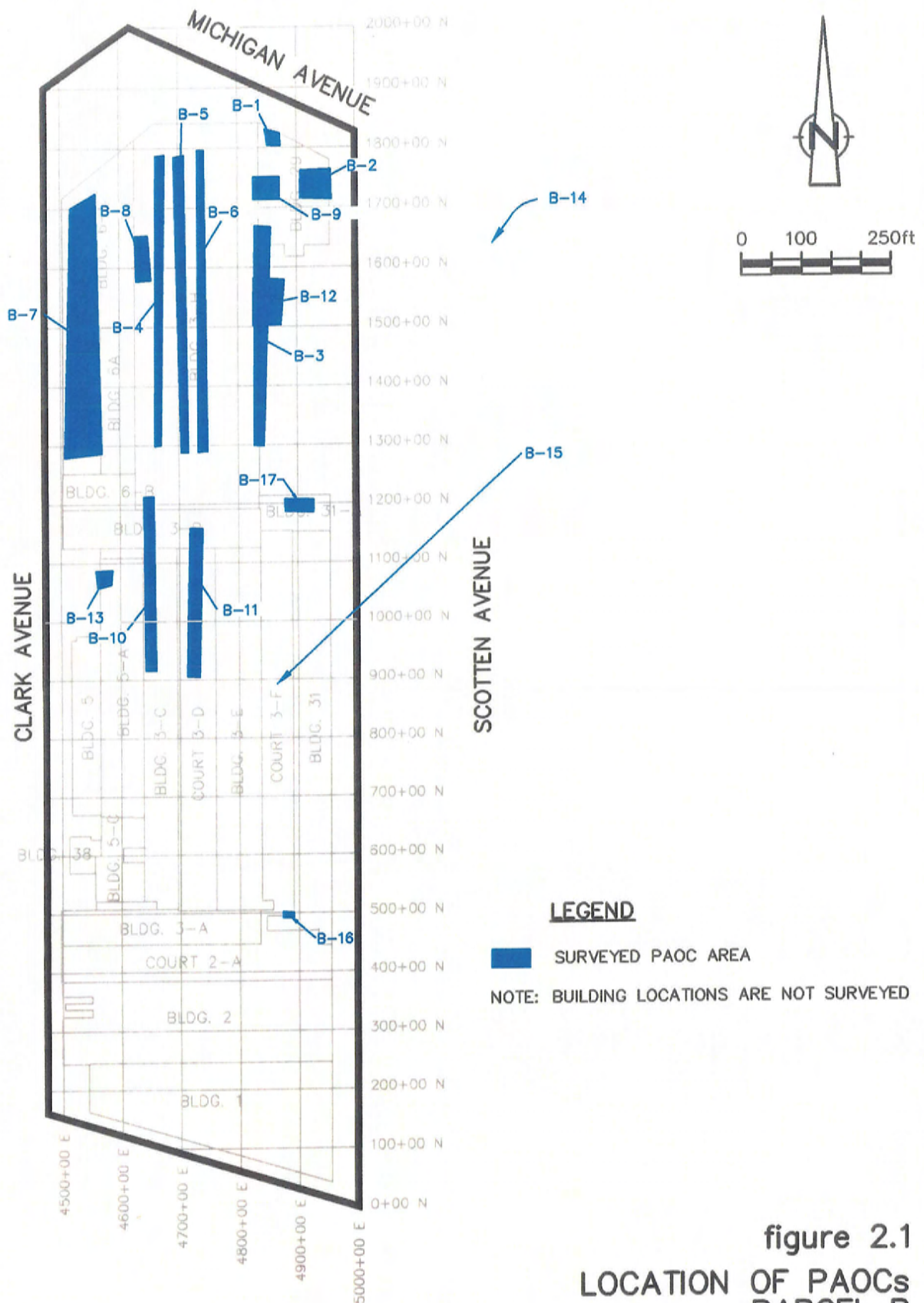


figure 2.1
 LOCATION OF PAOCs
 PARCEL B
 GENERAL MOTORS CLARK AVENUE SITE
Detroit, Michigan

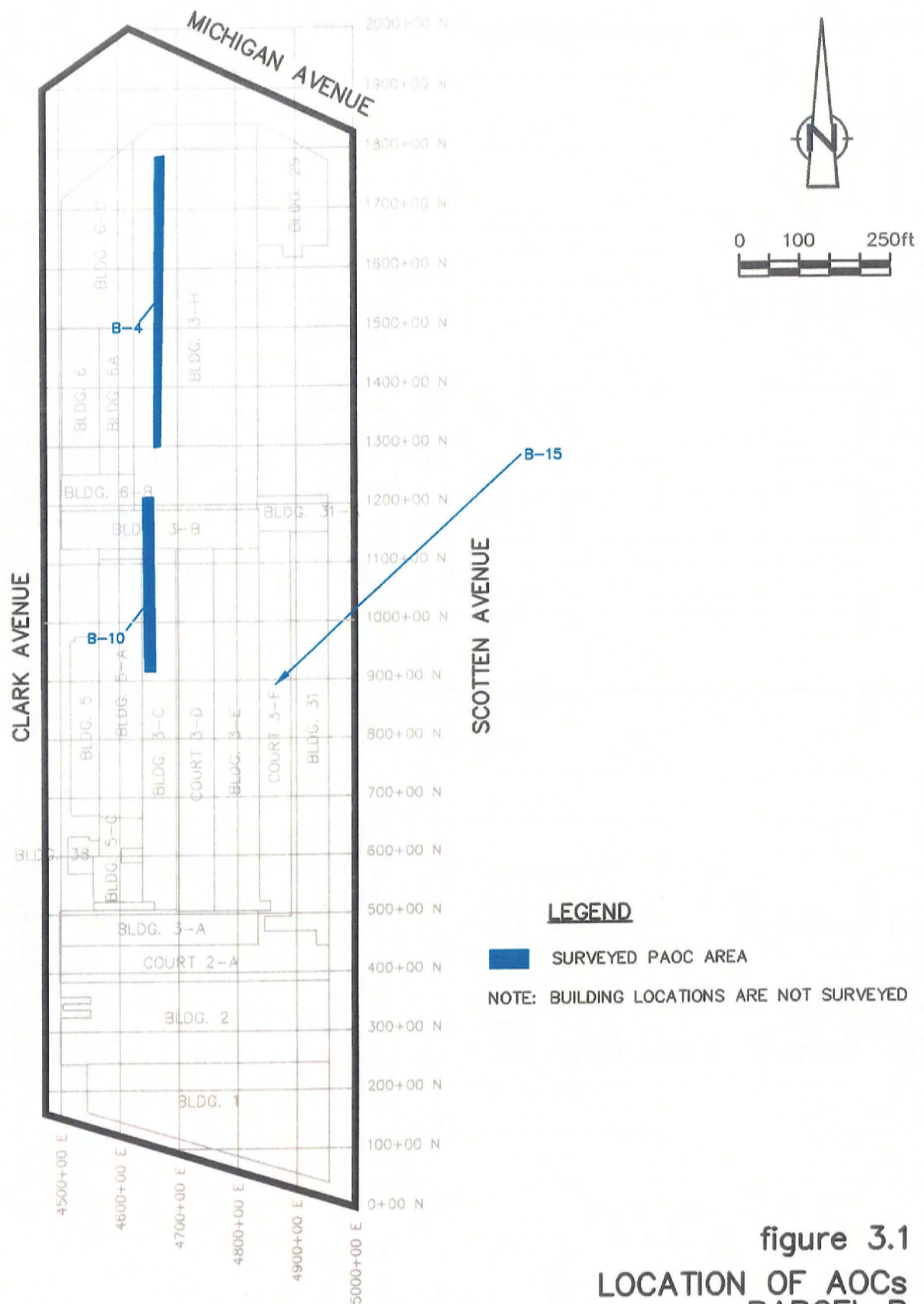


figure 3.1
 LOCATION OF AOCs
 PARCEL B
 GENERAL MOTORS CLARK AVENUE SITE
Detroit, Michigan

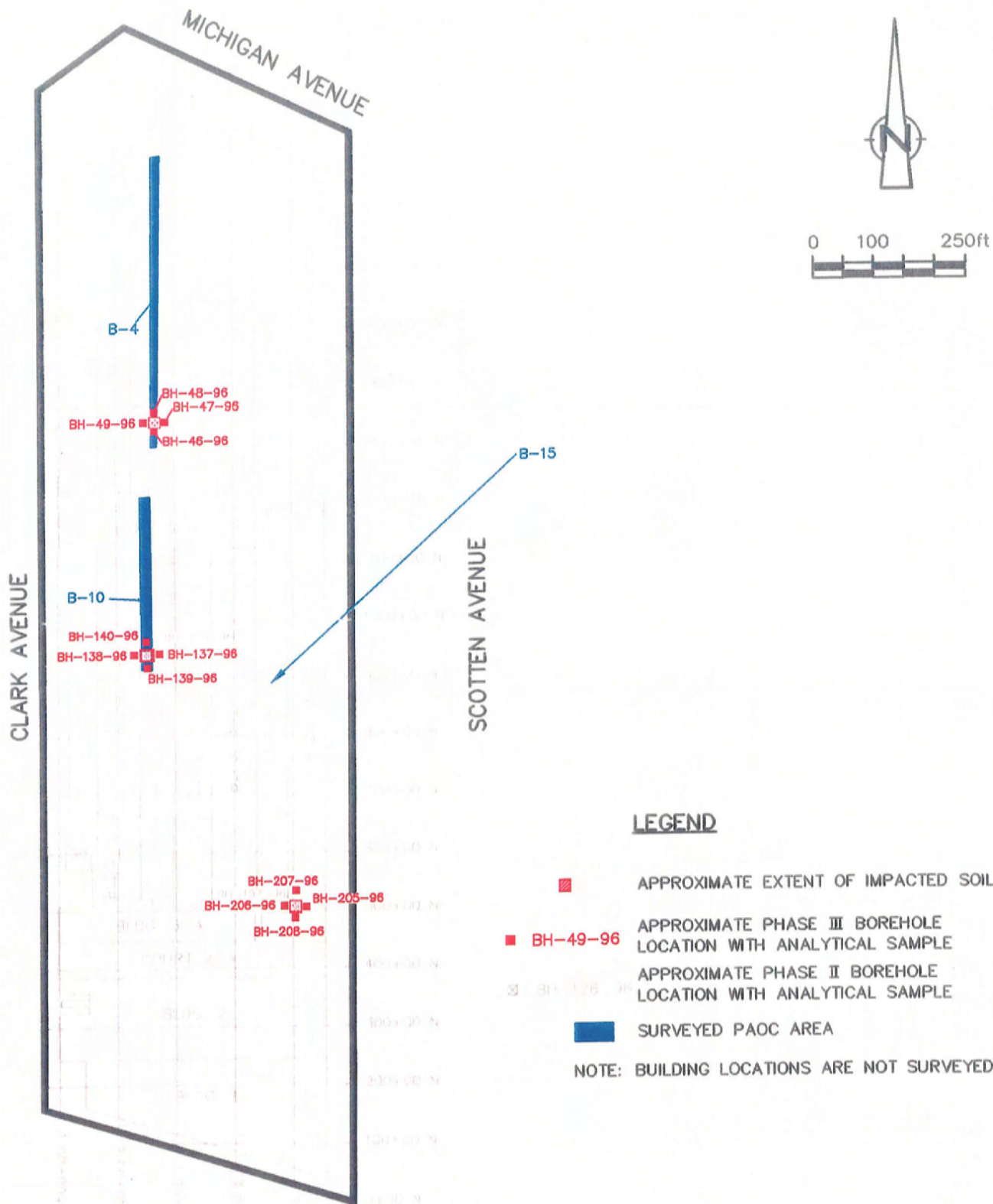


figure 3.2
 PHASE III ESA BOREHOLE LOCATIONS
 PARCEL B
 GENERAL MOTORS CLARK AVENUE SITE
Detroit, Michigan

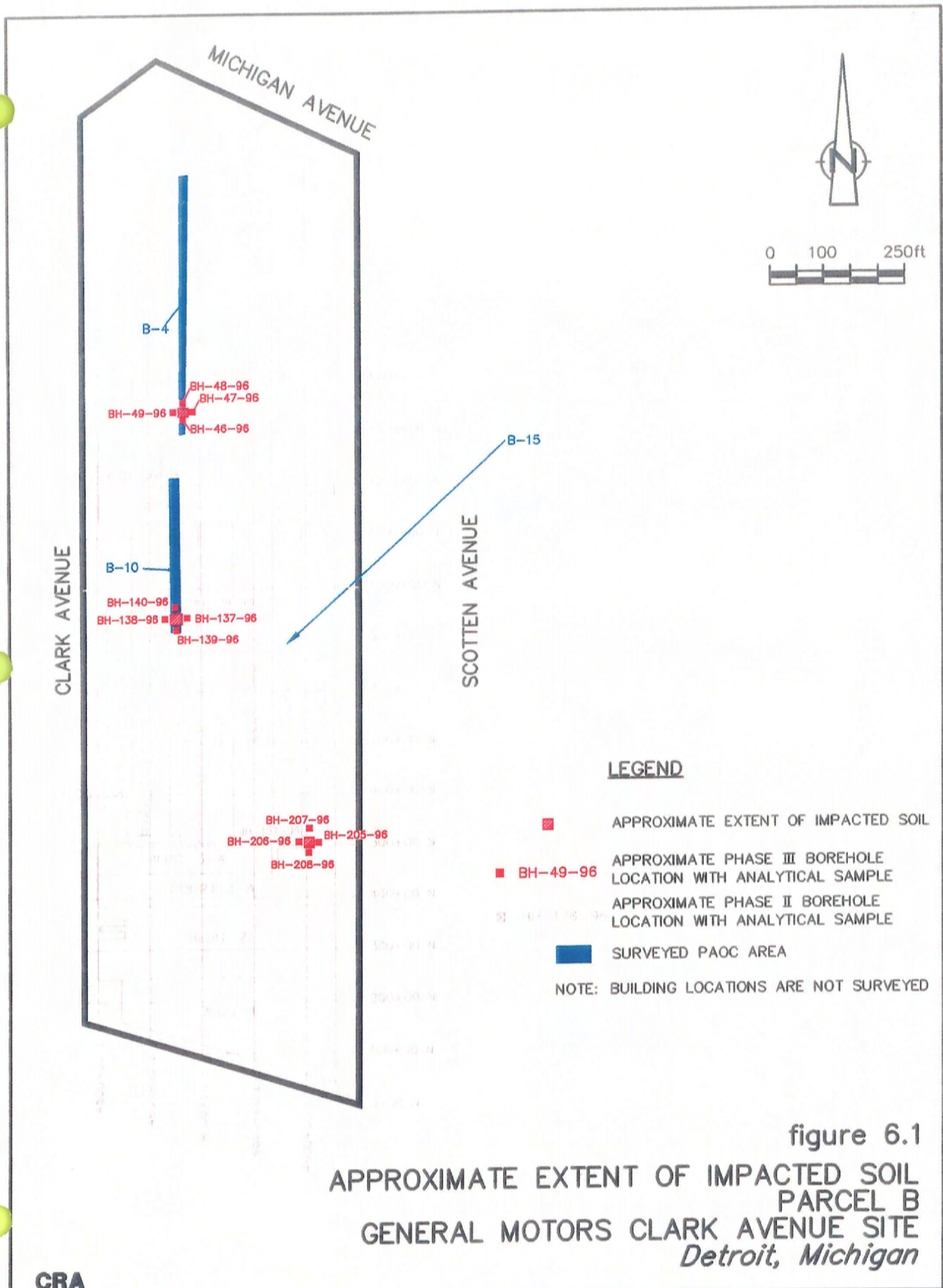


TABLE 3.1

SUMMARY OF BOREHOLE COMPLETION
 PHASE III ENVIRONMENTAL SITE ASSESSMENT-PARCEL B
 GM CLARK AVENUE FACILITY
 DETROIT, MICHIGAN

<i>AOC Demolition/Historical Identification</i>	<i>AOC Number</i>	<i>Number of Boreholes with Analytical Sampling</i>	<i>Number of Boreholes without Analytical Sampling</i>
23	B-4	4	0
29	B-10	4	0
Historic Plating Area	B-15	4	0
Total Phase III ESA Boreholes		12	0

TABLE 3.2

Privileged and Confidential
Prepared at General Motors
Counsel's Request

SAMPLE SUMMARY
PHASE III ENVIRONMENTAL SITE ASSESSMENT
PARCEL B
GM CLARK AVENUE FACILITY
DETROIT, MICHIGAN

<i>Sample Number</i>	<i>Sample Location</i>	<i>AOC Number</i>	<i>Analysis</i>	<i>Depth (feet bgs)</i>
S-8889-091896-SF-090	BH-46-96	B-4	PAH	1-2
S-8889-091896-SF-091	BH-46-96	B-4	PAH	4-6
S-8889-091896-SF-092	BH-47-96	B-4	PAH	0-2
S-8889-091896-SF-093	BH-47-96	B-4	PAH	4-6
S-8889-091896-SF-094	BH-48-96	B-4	PAH	0-2
S-8889-091896-SF-095	BH-48-96	B-4	PAH	4-6 (MS/MSD)
S-8889-091896-SF-096	BH-49-96	B-4	PAH	0-2
S-8889-091896-SF-097	BH-49-96	B-4	PAH	4-6
S-8889-100896-PFR-185	BH-137-96	B-10	Lead	4-4.5
S-8889-100896-PFR-186	BH-137-96	B-10	Lead	5.5-6
S-8889-100896-PFR-187	BH-138-96	B-10	Lead	3.5-4
S-8889-100896-PFR-188	BH-138-96	B-10	Lead	5.5-6
S-8889-100896-PFR-189	BH-139-96	B-10	Lead	2.5-3
S-8889-100896-PFR-190	BH-139-96	B-10	Lead	7.5-8
S-8889-100896-PFR-191	BH-140-96	B-10	Lead	2-2.5
S-8889-100896-PFR-192	BH-140-96	B-10	Lead	5.5-6
S-8889-120296-SF-344	BH-205-96	B-15	Lead	2-4
S-8889-120296-SF-345	BH-205-96	B-15	Lead	4-6
S-8889-120296-SF-346	BH-205-96	B-15	Lead	4-6 (Dup.)
S-8889-120296-SF-347	BH-206-96	B-15	Lead	2-4
S-8889-120296-SF-348	BH-206-96	B-15	Lead	4-6
S-8889-120296-SF-349	BH-207-96	B-15	Lead	4-6
S-8889-120296-SF-350	BH-207-96	B-15	Lead	10-12
S-8889-120296-SF-351	BH-208-96	B-15	Lead	3.75-4.5
S-8889-120296-SF-352	BH-208-96	B-15	Lead	8-10

Notes:

PAH = Polynuclear Aromatic Hydrocarbons
MS/MSD = Matrix Spike/Matrix Spike Duplicate
bgs = below ground surface
Dup=Duplicate

TABLE 5.1
SUMMARY OF DETECTED PAHS IN SOIL SAMPLES
PHASE III ESA
PARCEL B
GM CLARK AVENUE FACILITY
DETROIT, MICHIGAN

AOC No.	Michigan Generic Residential Direct Contact	Michigan Generic Industrial Direct Contact	Criteria (1)	Criteria (2)	B-4 BH-46-96 091896-SF-090	B-4 BH-46-96 091896-SF-091	B-4 BH-47-96 091896-SF-092	B-4 BH-47-96 091896-SF-093	B-4 BH-48-96 091896-SF-094	B-4 BH-48-96 091896-SF-095	B-4 BH-49-96 091896-SF-096	B-4 BH-49-96 091896-SF-097
Sample Location												
Sample ID (S-8889-)												
Sample Depth (feet bgs)												
Date Collected					1-2 9/18/96	4-6 9/18/96	0-2 9/18/96	4-6 9/18/96	0-2 9/18/96	4-6 9/18/96	0-2 9/18/96	4-6 9/18/96
Parameter												
<u>Polynuclear Aromatic Hydrocarbons (pg/kg)</u>												
Benzo(a)anthracene	14,000	210,000			2,700	ND(410)	740	ND(410)	ND(400)	ND(420)	830	ND(420)
Benzo(b)fluoranthene	14,000	210,000			2,400	ND(410)	670	ND(410)	ND(400)	ND(420)	650	ND(420)
Benzo(k)fluoranthene	140,000	2,100,000			1,900	ND(410)	580	ND(410)	ND(400)	ND(420)	650	ND(420)
Benzo(g,h,i)perylene	1,500,000	16,000,000			910	ND(410)	430	ND(410)	ND(400)	ND(420)	ND(420)	ND(420)
Benzo(a)pyrene	1,400	21,000			2,400	ND(410)	710	ND(410)	ND(400)	ND(420)	740	ND(420)
Chrysene	1,400,000	21,000,000			2,700	ND(410)	810	ND(410)	ND(400)	ND(420)	810	ND(420)
Fluoranthene	51,000,000	540,000,000			3,200	ND(410)	1,400	ND(410)	ND(400)	ND(420)	1,200	ND(420)
Indeno(1,2,3-cd)pyrene	14,000	210,000			1,000	ND(410)	410	ND(410)	ND(400)	ND(420)	ND(420)	ND(420)
Phenanthrene	1,500,000	16,000,000			1,200	ND(410)	790	ND(410)	ND(400)	ND(420)	600	ND(420)
Pyrene	32,000,000	340,000,000			3,600	ND(410)	1,400	ND(410)	ND(400)	ND(420)	1,200	ND(420)

Notes:

- ND () - Parameter was not detected above level in parentheses.
bgs - below ground surface
AOC - Area of Concern.
PAH - Polynuclear Aromatic Hydrocarbons
(1) Values taken from MDEQ Operation Memorandum #8, Revision 4,
dated June 5, 1995.
(2) Values taken from MDEQ Operation Memorandum #14, Revision 2,
dated June 6, 1995.

TABLE 5.2
SUMMARY OF DETECTED LEAD IN SOIL SAMPLES
PHASE III ESA
PARCEL B-2
GM CLARK AVENUE FACILITY
DETROIT, MICHIGAN

AOC No.	Michigan Generic Residential	Michigan Generic Industrial	Michigan Direct Contact	B-10 BH-137-96	B-10 BH-137-96	B-10 BH-138-96	B-10 BH-138-96	B-10 BH-139-96	B-10 BH-139-96
Sample Location	Criteria (1)	Criteria (2)	Criteria (2)	100896-PFR-185	100896-PFR-186	100896-PFR-187	100896-PFR-188	100896-PFR-189	100896-PFR-190
Sample ID (S-8889-)				4-4.5	5.5-6	3.5-4	5.5-6	2.5-3	7.5-8
Sample Depth (feet bgs)				10/8/96	10/8/96	10/8/96	10/8/96	10/8/96	10/8/96
Date Sampled									

Parameter (mg/kg)

Lead	400	400	130 J	7.33 J	117 J	7.74 J	11 J	9.63 J
------	-----	-----	-------	--------	-------	--------	------	--------

Notes:

J - The associated numerical value is an estimated quantity.
bgs - below ground surface.

AOC - Area of Concern.

(1) Values taken from MDEQ Operational Memorandum #8,
Revision 4, dated June 5, 1995.

(2) Values taken from MDEQ Operational Memorandum #14,
Revision 2, dated June 6, 1995.

TABLE 5.2
SUMMARY OF DETECTED LEAD IN SOIL SAMPLES
PHASE III ESA
PARCEL B-2
GM CLARK AVENUE FACILITY
DETROIT, MICHIGAN

AOC No.	Michigan Generic Residential	Michigan Generic Industrial	B-10	B-10	B-15	B-15	B-15	B-15	B-15
Sample Location	Direct Contact	Direct Contact	BH-140-96	BH-140-96	BH-205-96	BH-205-96	BH-205-96	BH-205-96	BH-206-96
Sample ID (S-8889-)	Criteria (1)	Criteria (2)	100896-PFR-191	100896-PFR-192	120296-SF-344	120296-SF-345	120296-SF-346	120296-SF-347	
Sample Depth (feet bgs)			2-2.5	5.5-6	2-4	4-6	4-6 (Dup.)	2-4	
Date Sampled			10/8/96	10/8/96	12/2/96	12/2/96	12/2/96	12/2/96	12/2/96

Parameter (mg/kg)

Lead	400	400	111 J	117 J	3.4 J	11 J	13 J	4.7 J	
------	-----	-----	-------	-------	-------	------	------	-------	--

Notes:

- J - The associated numerical value is an estimated quantity.
bgs - below ground surface.
AOC - Area of Concern.
(1) Values taken from MDEQ Operational Memorandum #8,
Revision 4, dated June 5, 1995.
(2) Values taken from MDEQ Operational Memorandum #14,
Revision 2, dated June 6, 1995.

TABLE 5.2
SUMMARY OF DETECTED LEAD IN SOIL SAMPLES
PHASE III ESA
PARCEL B-2
GM CLARK AVENUE FACILITY
DETROIT, MICHIGAN

AOC No.	Michigan Generic Residential	Michigan Generic Industrial	B-15 BH-206-96	B-15 BH-207-96	B-15 BH-207-96	B-15 BH-208-96	B-15 BH-208-96
Sample Location	Direct Contact	Direct Contact	120296-SF-348	120296-SF-349	120296-SF-350	120296-SF-351	120296-SF-352
Sample ID (S-8889-)	Criteria (1)	Criteria (2)	4-6	4-6	10-12	3.75-4.5	8-10
Sample Depth (feet bgs)			12/2/96	12/2/96	12/2/96	12/2/96	12/2/96
Date Sampled							

Parameter (mg/kg)

Lead	400	400	9.6 J	51 J	11 J	5.6 J	12 J
------	-----	-----	-------	------	------	-------	------

Notes:

J - The associated numerical value is an estimated quantity.
bgs - below ground surface.

AOC - Area of Concern.

(1) Values taken from MDEQ Operational Memorandum #8,
Revision 4, dated June 5, 1995.

(2) Values taken from MDEQ Operational Memorandum #14,
Revision 2, dated June 6, 1995.

APPENDIX A

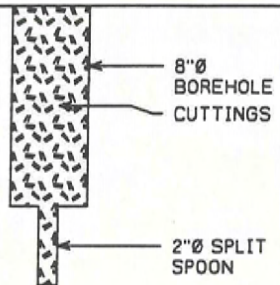
BOREHOLE STRATIGRAPHIC LOGS

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(DL-64)
Page 1 of 1

PROJECT NAME: GM CLARK STREET
PROJECT NUMBER: 8889
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: DETROIT, MICHIGAN

HOLE DESIGNATION: BH46-96
DATE COMPLETED: SEPTEMBER 18, 1996
DRILLING METHOD: 4 1/4" HSA
CRA SUPERVISOR: S. FIELEK

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft.	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	"N" VALUE	PID (ppm)
	GROUND SURFACE	0.00					
-2.5	Fill, clay, silt, sand, gravel, medium dense, dark brown to black, moist	-3.0		1SS	X	10	0.0
-5.0	CL-CLAY, some silt, little sand, trace gravel, firm, low plasticity, mixture of brown and gray, slight rust, green and black staining, moist			2SS	X	6	0.0
-7.5	END OF HOLE @ 7.0ft BGS			3SS	X	5	0.0
-10.0							
-12.5							
-15.0							
-17.5							
-20.0							
-22.5							
-25.0							
-27.5							
-30.0							
-32.5							

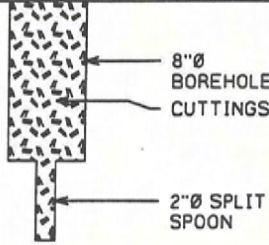
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ☐ STATIC WATER LEVEL ☐
ANALYSIS ☐

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(DL-65)
Page 1 of 1

PROJECT NAME: GM CLARK STREET
PROJECT NUMBER: 8889
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: DETROIT, MICHIGAN

HOLE DESIGNATION: BH47-96
DATE COMPLETED: SEPTEMBER 18, 1996
DRILLING METHOD: 4 1/2" HSA
CRA SUPERVISOR: S. FIELEK

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft.	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	"N" VALUE	PID (ppm)
	GROUND SURFACE	0.00					
-2.5	Fill, clay, silt, sand, gravel, very loose, medium grained, well graded, brown and black mixture, moist - medium dense, little to some gravel		 8"Ø BOREHOLE CUTTINGS 2"Ø SPLIT SPOON	ISS	X	2	0.0
-5.0	CL-CLAY, some silt, little sand, trace gravel, firm, low plasticity, brown, moist	-4.0		2SS	X	22	0.0
	END OF HOLE @ 6.0ft BGS	-6.0		3SS	X	6	0.0
-7.5							
-10.0							
-12.5							
-15.0							
-17.5							
-20.0							
-22.5							
-25.0							
-27.5							
-30.0							
-32.5							

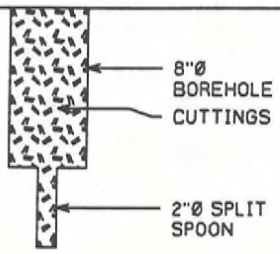
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▼ STATIC WATER LEVEL ▼
ANALYSIS ○

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(DL-66)
Page 1 of 1

PROJECT NAME: GM CLARK STREET
PROJECT NUMBER: 8889
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: DETROIT, MICHIGAN

HOLE DESIGNATION: BH48-96
DATE COMPLETED: SEPTEMBER 18, 1996
DRILLING METHOD: 4 1/4" HSA
CRA SUPERVISOR: S. FIELEK

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft.	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	'N' VALUE	PID (ppm)
	GROUND SURFACE	0.00					
-2.5	Fill, clay, silt, sand, gravel, loose, medium grained, well graded, brown and black mixture, moist		 8"Ø BOREHOLE CUTTINGS 2"Ø SPLIT SPOON	ISS	X	6	0.0
-5.0	CL-CLAY, some silt, trace gravel and sand, soft to firm, low plasticity, mottled brown and gray, occasional sand seam, moist - firm	-3.0		2SS	X	4	0.0
	END OF HOLE @ 6.0ft BGS	-6.0		3SS	X	5	0.0
-7.5							
-10.0							
-12.5							
-15.0							
-17.5							
-20.0							
-22.5							
-25.0							
-27.5							
-30.0							
-32.5							

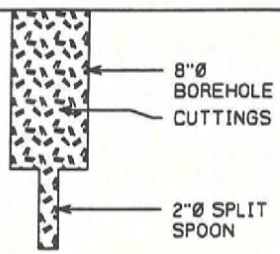
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▼ STATIC WATER LEVEL ▼
ANALYSIS ○

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(DL-67)
Page 1 of 1

PROJECT NAME: GM CLARK STREET
PROJECT NUMBER: 8889
CLIENT: GENERAL MOTORS CORPORATION
LOCATION: DETROIT, MICHIGAN

HOLE DESIGNATION: BH49-96
DATE COMPLETED: SEPTEMBER 18, 1996
DRILLING METHOD: 4 1/4" HSA
CRA SUPERVISOR: S. FIELEK

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft.	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	'N' VALUE	PID (ppm)
	GROUND SURFACE	0.00					
-2.5	Fill, some sand, little silt and gravel, some clay, very loose, medium grained, well graded, brown and slight black occasionally, moist		 8"Ø BOREHOLE CUTTINGS 2"Ø SPLIT SPOON	ISS	X	3	0.0
-5.0	CL-CLAY, some silt, trace sand and gravel, soft, low plasticity, mottled brown and gray, occasional sand seam, moist	-4.0		2SS	X	3	0.0
-6.0	END OF HOLE @ 6.0ft BGS	-6.0		3SS	X	3	0.0
-7.5							
-10.0							
-12.5							
-15.0							
-17.5							
-20.0							
-22.5							
-25.0							
-27.5							
-30.0							
-32.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ☒ STATIC WATER LEVEL ☒
ANALYSIS ☐

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(DL125)
Page 1 of 1

PROJECT NAME: GM CLARK STREET
PROJECT NUMBER: 8889
CLIENT: GM
LOCATION: DETROIT, MI

HOLE DESIGNATION: BH137-96
DATE COMPLETED: OCTOBER 8, 1996
DRILLING METHOD: 4 X" ID HSA
CRA SUPERVISOR: P. RUMMEL

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. AMSL	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	'N' VALUE	PID (ppm)
	GROUND SURFACE	0.00					
-2.5	SW/GW-SAND and GRAVEL (FILL), medium dense, fine to coarse sand, fine to medium gravel, well graded, gray, dry			ISS	X	18	0
		-3.6		2SS	X	4	0
-5.0	SM-SAND, some silt, trace clay, loose, very fine to medium sand, low plasticity, yellow-brown, dry	-5.0		3SS	X	4	11.2
	CL-CLAY, little silt, trace sand, soft, high plasticity, olive green, moist	-6.0					
-7.5	END OF HOLE @ 6.0ft BGS						
-10.0							
-12.5							
-15.0							
-17.5							
-20.0							
-22.5							
-25.0							
-27.5							
-30.0							
-32.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ☐ STATIC WATER LEVEL ☐
ANALYSIS ☐

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(DL126)
Page 1 of 1

PROJECT NAME: GM CLARK STREET
PROJECT NUMBER: 8889
CLIENT: GM
LOCATION: DETROIT, MI

HOLE DESIGNATION: BH138-96
DATE COMPLETED: OCTOBER 8, 1996
DRILLING METHOD: 4 1/2" ID HSA
CRA SUPERVISOR: P. RUMMEL

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. AMSL	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	"N" VALUE	PID (ppm)
	GROUND SURFACE	0.00					
-2.5	SW/GW-SAND and GRAVEL (FILL), loose, fine to coarse sand, fine to medium gravel, well graded, gray, dry	-2.8	 CUTTINGS 8" Ø BOREHOLE	ISS	X	8	0
	SM-SAND, little silt, trace clay, medium dense, very fine to coarse sand, yellow-brown, dry	-4.0		2SS	X	10	0
-5.0	CL-CLAY, little silt, trace sand, firm, medium to high plasticity, dry, brown	-6.0		3SS	X	6	0
	END OF HOLE @ 6.0ft BGS						
-7.5							
-10.0							
-12.5							
-15.0							
-17.5							
-20.0							
-22.5							
-25.0							
-27.5							
-30.0							
-32.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ☒ STATIC WATER LEVEL ☒
ANALYSIS ☐

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(DL127)
Page 1 of 1

PROJECT NAME: GM CLARK STREET
PROJECT NUMBER: 8889
CLIENT: GM
LOCATION: DETROIT, MI

HOLE DESIGNATION: BH139-96
DATE COMPLETED: OCTOBER 8, 1996
DRILLING METHOD: 4 1/2" ID HSA
CRA SUPERVISOR: P. RUMMEL

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. AMSL	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	"N" VALUE	PID (ppm)
	GROUND SURFACE	0.00					
-2.5	SW/GW-SAND and GRAVEL (FILL), medium dense, fine to coarse sand, fine to medium gravel, well graded, gray, dry	-2.2	 CUTTINGS 8" Ø BOREHOLE	1SS	X	16	0
	SW-SAND, trace silt, medium dense, very fine to medium sand, dark brown, dry			2SS	X	12	0
-5.0		-5.8		3SS	X	6	0
-7.5	ML/CL-SILT and CLAY, trace sand, firm, low plasticity, brown, dry	-8.0		4SS	X	6	0
	END OF HOLE @ 8.0ft BGS						
-10.0							
-12.5							
-15.0							
-17.5							
-20.0							
-22.5							
-25.0							
-27.5							
-30.0							
-32.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▼ STATIC WATER LEVEL ▼
ANALYSIS ○

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(DL128)
Page 1 of 1

PROJECT NAME: GM CLARK STREET
PROJECT NUMBER: 8889
CLIENT: GM
LOCATION: DETROIT, MI

HOLE DESIGNATION: BH140-96
DATE COMPLETED: OCTOBER 8, 1996
DRILLING METHOD: 4 1/4" ID HSA
CRA SUPERVISOR: P. RUMMEL

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. AMSL	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	'N' VALUE	PID (ppm)
	GROUND SURFACE	0.00					
-2.5	SW/GW-SAND and GRAVEL (FILL), medium dense, fine to coarse sand, fine to medium gravel, well graded, gray, dry	-1.8	 CUTTINGS 8" Ø BOREHOLE	ISS	X	16	0
	SM-SAND, some silt, little clay, loose, very fine to medium sand, brown, dry, some black staining	-4.0		2SS	X	4	0
-5.0	CL/ML-CLAY and SILT, trace sand, firm, medium plasticity, yellow brown, dry	-6.0		3SS	X	5	0
-7.5	END OF HOLE @ 6.0ft BGS						
-10.0							
-12.5							
-15.0							
-17.5							
-20.0							
-22.5							
-25.0							
-27.5							
-30.0							
-32.5							

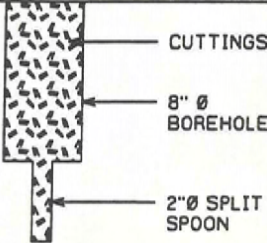
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
 WATER FOUND ▼ STATIC WATER LEVEL ▼
 ANALYSIS ○

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(DL221)
Page 1 of 1

PROJECT NAME: GM CLARK STREET
PROJECT NUMBER: 8889
CLIENT: GM
LOCATION: DETROIT, MI

HOLE DESIGNATION: BH205-96
DATE COMPLETED: DECEMBER 2, 1996
DRILLING METHOD: 4 1/4" HSA
CRA SUPERVISOR: S. FIELEK

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. AMSL	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	"N" VALUE	PID (ppm)
	GROUND SURFACE	0.00					
	GM-GRAVEL (FILL), some silt and sand, well graded, coarse grained, brown and gray, moist		 CUTTINGS 8" Ø BOREHOLE 2" Ø SPLIT SPOON				
-2.5	SM-SAND, some silt, trace gravel, loose, poorly graded, fine to medium grained, black, moist - rusty brown	-2.0		ISS	X	5	7500
-5.0	CL-CLAY, some silt, little sand, trace gravel, firm, low plasticity, mottled gray and brown, moist	-4.0		2SS	X	5	0.0
	END OF HOLE @ 6.0ft BGS	-6.0					
-7.5							
-10.0							
-12.5							
-15.0							
-17.5							
-20.0							
-22.5							
-25.0							
-27.5							
-30.0							
-32.5							

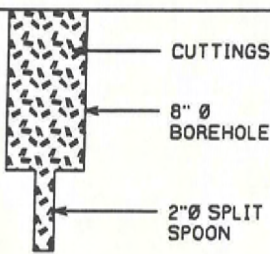
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ☒ STATIC WATER LEVEL ☒
ANALYSIS ☐

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(DL222)
Page 1 of 1

PROJECT NAME: GM CLARK STREET
PROJECT NUMBER: 8889
CLIENT: GM
LOCATION: DETROIT, MI

HOLE DESIGNATION: BH206-96
DATE COMPLETED: DECEMBER 2, 1996
DRILLING METHOD: 4 X" HSA
CRA SUPERVISOR: S. FIELEK

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. AMSL	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	'N' VALUE	PID (ppm)
	GROUND SURFACE	0.00					
	GM-GRAVEL (FILL), some silt and sand, well graded, coarse grained, brown and gray, moist		 CUTTINGS 8" Ø BOREHOLE 2" Ø SPLIT SPOON				
-2.5	SM-SAND, some silt, loose, poorly graded, fine to medium grained, black, moist - rusty brown	-2.0		ISS	X	5	0.0
-5.0	CL-CLAY, some silt, little sand, trace gravel, soft to firm, low plasticity, mottled gray and brown, moist	-4.0		2SS	X	4	0.0
	END OF HOLE @ 6.0ft BGS	-6.0					
-7.5							
-10.0							
-12.5							
-15.0							
-17.5							
-20.0							
-22.5							
-25.0							
-27.5							
-30.0							
-32.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ▼ STATIC WATER LEVEL ▼
ANALYSIS ○

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(DL223)
Page 1 of 1

PROJECT NAME: GM CLARK STREET
PROJECT NUMBER: 8889
CLIENT: GM
LOCATION: DETROIT, MI

HOLE DESIGNATION: BH207-96
DATE COMPLETED: DECEMBER 2, 1996
DRILLING METHOD: 4 1/2" HSA
CRA SUPERVISOR: S. FIELEK

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. AMSL	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	"N" VALUE	PID (ppm)
	GROUND SURFACE	0.00					
-2.5	GM-GRAVEL (FILL), some silt and sand, medium dense, well graded, coarse grained, brown, moist		 CUTTINGS 8" Ø BOREHOLE 2" Ø SPLIT SPOON	1SS	X	10	0.0
-5.0	SM-SAND, some silt, trace clay, very loose, well graded, fine to medium grained, gray, brown and black, moist	-4.0		2SS	X	2	1100
-7.5	CL-CLAY, some silt and sand, trace gravel, very soft to soft, low plasticity, mottled gray and brown, moist - soft to firm	-5.7		3SS	X	2	>9999
-10.0	- stiff, gray			4SS	X	4	183
-12.5	END OF HOLE @ 12.0ft BGS	-12.0		5SS	X	10	0.0
-15.0							
-17.5							
-20.0							
-22.5							
-25.0							
-27.5							
-30.0							
-32.5							

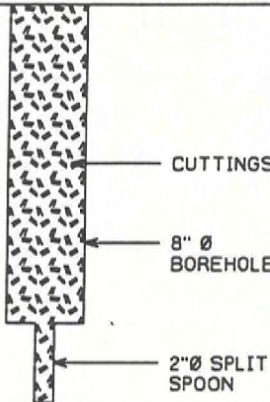
NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ☒ STATIC WATER LEVEL ☒
ANALYSIS ☐

STRATIGRAPHIC AND INSTRUMENTATION LOG (OVERBURDEN)

(DL224)
Page 1 of 1

PROJECT NAME: GM CLARK STREET
PROJECT NUMBER: 8889
CLIENT: GM
LOCATION: DETROIT, MI

HOLE DESIGNATION: BH208-96
DATE COMPLETED: DECEMBER 2, 1996
DRILLING METHOD: 4 1/4" HSA
CRA SUPERVISOR: S. FIELEK

DEPTH ft. BGS	STRATIGRAPHIC DESCRIPTION & REMARKS	ELEV. ft. AMSL	MONITOR INSTALLATION	SAMPLE			
				NUMBER	STATE	'N' VALUE	PID (ppm)
	GROUND SURFACE	0.00					
-2.5	GM-GRAVEL (FILL), some silt and sand, medium dense, well graded, coarse grained, brown and gray, moist	-2.0	 CUTTINGS 8" Ø BOREHOLE 2"Ø SPLIT SPOON	1SS	X	12	0.0
	CL-CLAY, some silt and sand, trace gravel, stiff, low plasticity, mottled gray and brown, moist	-3.7		2SS	X	9	243
-5.0	SM-SAND, some silt, trace clay, loose, well graded, fine to medium grained, rust, brown and gray, moist			3SS	X	7	0.0
-7.5		-7.8		4SS	X	2	0.0
	CL-CLAY, some sand and silt, trace gravel, stiff, low plasticity, gray, moist			5SS	X	9	0.0
-10.0	END OF HOLE @ 10.0ft BGS	-10.0					
-12.5							
-15.0							
-17.5							
-20.0							
-22.5							
-25.0							
-27.5							
-30.0							
-32.5							

NOTES: MEASURING POINT ELEVATIONS MAY CHANGE; REFER TO CURRENT ELEVATION TABLE
WATER FOUND ☐ STATIC WATER LEVEL ☐
ANALYSIS ☐

APPENDIX B

CHAIN-OF-CUSTODY FORMS

CRA

CONESTOGA-ROVERS & ASSOCIATES, INC.
11100 Metro Airport Center Drive - Suite 160
Romulus, MI 48174 (313) 942-0909

CHAIN OF CUSTODY RECORD

SAMPLER'S SIGNATURE: Susan Fielek PRINTED NAME: Susan Fielek

SEQ. No.	DATE	TIME	SAMPLE TYPE	CONTAINERS	PARAMETERS	REMARKS
1	09/12/96	1020	soil	2	✓	24 hr TBT
2	1032	1035	soil	2	✓	
3	1220	1240	soil	2	✓	
4	1400	1405	soil	2	✓	
5	1423	1430	soil	2	✓	
6	1452	1500	soil	2	✓	
7	1506	1515	soil	2	✓	
8	1529	1535	soil	2	✓	
9			soil	2	✓	
10			soil	2	✓	
11			soil	2	✓	
12			soil	2	✓	
13			soil	2	✓	

TOTAL NUMBER OF CONTAINERS 18

RELINQUISHED BY: <u>Susan Fielek</u>	DATE: 09/18/96	RECEIVED BY: 1. _____	DATE: _____
RELINQUISHED BY: _____	TIME: 1900	RECEIVED BY: 2. _____	TIME: _____
RELINQUISHED BY: _____	DATE: _____	RECEIVED BY: 3. _____	DATE: _____
RELINQUISHED BY: _____	TIME: _____	RECEIVED BY: 1. _____	TIME: _____

METHOD OF SHIPMENT: Fed Ex

AIR BILL No. _____

White Yellow	Fully Executed Copy Receiving Laboratory Copy	Pink Goldenrod	Shipped Copy Sampler Copy	SAMPLE TEAM: <u>S. Fielek</u>	RECEIVED FOR LABORATORY BY: <u>D. McCall</u>
No. <u>3399</u>				DATE: <u>9/18/96</u>	TIME: <u>0930</u>

CRA

CONESTOGA-ROVERS & ASSOCIATES, INC.
11100 Metro Airport Center Drive - Suite 160
Romulus, MI 48174 (313) 942-0909

SHIPPED TO (Laboratory Name):

LEA

1908-125 DPT

CHAIN OF CUSTODY RECORD

SAMPLER'S SIGNATURE: Patrick Rummel PRINTED NAME: Patrick Rummel

REFERENCE NUMBER:

8889-30

PROJECT NAME:

GM-Clark Str.

PARAMETERS

CONTAINERS

SEQ. No.

DATE

TIME

SAMPLE TYPE

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

39

40

41

42

43

44

45

46

47

48

49

50

51

52

53

54

55

56

57

58

59

60

61

62

63

64

65

66

67

68

69

70

71

72

73

74

75

76

77

78

79

80

81

82

83

84

85

86

87

88

89

90

91

92

93

94

95

96

97

98

99

100

101

102

103

104

105

106

107

108

109

110

111

112

113

114

115

116

117

118

119

120

121

122

123

124

125

126

127

128

129

130

131

132

133

134

135

136

137

138

139

140

141

142

143

144

145

146

147

148

149

150

151

152

153

154

155

156

157

158

159

160

161

162

163

164

165

166

167

168

169

170

171

172

173

174

175

176

177

178

179

180

181

182

183

184

185

186

187

188

189

190

191

192

193

194

195

196

197

198

199

200

201

202

203

204

205

206

207

208

209

210

211

212

213

214

215

216

217

218

219

220

221

222

223

224

225

226

227

228

229

230

231

232

233

234

235

236

237

238

239

240

241

242

243

244

245

246

247

248

249

250

251

252

253

254

255

256

257

258

259

260

261

262

263

264

265

266

267

268

269

270

271

272

273

274

275

276

277

278

279

280

281

282

283

284

285

286

287

288

289

290

291

292

293

294

295

296

297

298

299

300

301

302

303

304

305

306

307

308

309

310

311

312

313

314

315

316

317

318

319

320

321

322

323

324

325

326

327

CONESTOGA-ROVERS & ASSOCIATES, INC.
11100 Metro Airport Center Drive - Suite 160
Romulus, MI 48174 (313) 942-0909

16A

SHIPPED TO (Laboratory Name):

188-135 DPT

CHAIN OF CUSTODY RECORD

SAMPLER'S
SIGNATURE: Patrick Summell PRINTED NAME:

Patricia Rummel

REFERENCE NUMBER:

05-6255

PROJECT NAME:

GM-Clark Str.

[illegible]

TOTAL NUMBER OF CONTAINERS

RELINQUISHED BY:

SHED BY: Eric. Ruman

DATE: 01/01/91	RECEIVED BY:
----------------	--------------

DATE: (21 6/96)

1.

RELINQUISHED BY:

DATE: _____

RECEIVED BY:

2. _____

TIME:

METHOD OF SHIPMENT: Fedex.

AIR BILL NO.

White	Yellow	Plink	Goldenrod
-Fully Executed Copy	-Receiving Laboratory Copy	-Shipper Copy	-Sampler Copy

SAMPLE TEAM

Salick Kennel

RECEIVED FOR LABORATORY BY:

3693

DATE: 1/1/ TIME:

CONESTOGA-ROVERS & ASSOCIATES, INC.
11100 Metro Airport Center Drive - Suite 160
Romulus, MI 48174 (313) 942-0909

Encofec

CHAIN OF CUSTODY RECORD

REFERENCE NUMBER: 8889-30

PROJECT NAME:

PROJECT NAME:
GM Clark Street

SAMPLER'S SIGNATURE: Susan Field PRINTED NAME: Susan Field

Susan Golek

OF
MEMBERS

PARAMETERS

SIGNATURE: <u>Susan Fickel</u>	NAME: <u>Susan Fickel</u>			SAMPLE TYPE
SEQ: No.	DATE	TIME		

REMARKS

72 mm. T.A.T.

TOTAL NUMBER OF CONTAINERS 021

RELINQUISHED BY: 1. Susan Fick

DATE: 12/02/96
TIME: 17:00

RECEIVED BY:
1. *Dane*

Kusi.

DATE: 12/3/96

RELINQUISHED BY
2. *[Signature]*

DATE: 12/3/96

RECEIVED BY:



TIME: 8.10
DATE: 12/3/9

RELINQUISHED BY:

TIME: 8:45 am
DATE:

RECEIVED BY: 2.

9

TIME:

METHOD OF SHIPMENT: Pick up by ab

AIR BILL No.

White	Fully Executed Copy	Pink	-Shipper Copy
Yellow	Receiving Laboratory Copy	Goldenrod	-Sampler Copy

SAMPLE TEAM:

RECEIVED FOR LABORATORY BY:

No. 3672

DATE: 12-3-96 TIME: 9:15 AM

APPENDIX C

DATA VALIDATION MEMORANDA

CRA

11100 Metro Airport Center Drive
Suite 160
Romulus, MI 48174
(313) 942-0909

MEMO

TO: Sara Anderson

REFERENCE NO: 8889

FROM: Mary Cameron/dfh/13/Det. *mbc*

DATE: November 1, 1996

RE: Data Quality Assessment and Validation for Soil Samples Collected
from the General Motors Clark Street Site in Detroit, Michigan

The following details a quality assessment and validation of the analytical data resulting from the September 9 through September 18, 1996, collection of eight (8) soil samples from the General Motors Clark Street Site in Detroit, Michigan. The samples identified in Table 1 were analyzed for polynuclear aromatics (PNA). Sample analysis was completed at IEA Inc's Cary, North Carolina facility in accordance with the method SW-846 8270 presented in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846 3rd Edition, and Promulgated Updates, November 1986. The quality control criteria used to assess the data were established by the methods and the quality assurance project plan (QAPP).¹

Holding Time Period and Sample Analysis

The holding time period is as follows:

- Polynuclear Aromatics - 14 days from sample collection to extraction
- 40 days from extraction to completion of analysis.

The samples, as indicated by the sample collection, extraction and analysis dates on the chain-of-custody forms and analytical reports provided by IEA, were prepared and analyzed within the required holding time periods.

Method Blank Samples

Contamination of samples contributed by laboratory conditions or procedures was monitored by concurrent preparation and analysis of method blank samples. The method blank samples were reported to be free from detectable levels of target analytes, indicating no laboratory-attributable contamination occurred.

Laboratory Control Sample (LCS)

The laboratory control sample analyses serve as a monitor of the overall performance in all steps of the sample analysis. The LCS percent recoveries were within the laboratory control limits, indicating that an acceptable level of overall performance was achieved.

¹ Application of quality assurance criteria was consistent with "Draft National Functional Guideline for Organic Data Review," December, 1990, revised June, 1991.

Surrogate Compound Percent Recoveries (Surrogate Recoveries) - Organic Analyses

Individual sample performance for the organic analyses was monitored by assessing the results of surrogate compound percent recoveries. The surrogate recovery acceptance criteria was met for all of the samples.

MS/MSD Percent Recoveries - Organic Analyses

To assess the long term accuracy and precision of the analytical methods on various matrices, MS/MSD percent recoveries and the RPD of the recoveries were determined. The data were within acceptance criteria.

Overall Assessment

The data were found to exhibit acceptable levels of accuracy and precision, based on the provided information, and may be used with the qualifications noted.

TABLE 1

**SAMPLE IDENTIFICATION NUMBERS
GM CLARK STREET SITE
DETROIT, MICHIGAN**

S-8889-091896-SF-090
S-8889-091896-SF-091
S-8889-091896-SF-092
S-8889-091896-SF-093
S-8889-091896-SF-094
S-8889-091896-SF-095
S-8889-091896-SF-096
S-8889-091896-SF-097

CRA

11100 Metro Airport Center Drive
Suite #160
Romulus, Michigan 48174
(734) 942-0909

MEMO

TO: Sara Anderson

REFERENCE NO. 8889-30

FROM: Mary Cameron/rm/70/Det.

DATE: December 30, 1996

RE: Data Quality Assessment and Validation for Soil Samples Collected
from the General Motors Clark Street in Detroit, Michigan

The following details a quality assessment and validation of the analytical data resulting from the October 8, 1996, collection of eight (8) soil samples from the General Motors Clark Street Site in Detroit, Michigan. The samples identified in Table 1 were analyzed for lead. Sample analysis was completed at IEA Inc's Cary, North Carolina facility (IEA) in accordance with the Method SW-846 6020 from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846 3rd Edition, and promulgated updates, November 1986. The quality control criteria used to assess the data were established by the methods and the quality assurance project plan (QAPP).¹

Holding Time Period and Sample Analysis

The holding time period for lead analysis is 180 days from sample collection to completion of analysis. The samples, as indicated by the sample collection, extraction and analysis dates on the chain-of-custody forms and analytical reports provided by IEA, were prepared and analyzed within the required holding time periods.

Method Blank Samples

Contamination of samples contributed by laboratory conditions or procedures was monitored by concurrent preparation and analysis of method blank samples. The method blank samples were reported to be free from detectable levels of target analytes, indicating no laboratory-attributable contamination occurred.

Laboratory Control Sample

The laboratory control sample (LCS) analyses serve as a monitor of the overall performance in all steps of the sample analysis. The LCS percent recoveries were within the laboratory control limits, indicating that an acceptable level of overall performance was achieved.

¹ Application of quality assurance criteria was consistent with "Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis", Draft October 1989.

Matrix Spike/Matrix Spike Duplicate Percent Recoveries Analysis

Matrix spike/matrix spike duplicate (MS/MSD) percent recoveries and relative percent difference (RPD) of the recoveries were monitored to determine the effects of sample matrix on the laboratories digestion and measurement methods. The samples that should be qualified due to violation of MS/MSD percent recoveries are outlined in Table 2. The remainder of the data were within the acceptance criteria.

Duplicate Sample Analyses

The laboratory precision of matrix-specific metals methods was monitored by the analyses of duplicate samples. The duplicate RPD acceptance criteria for lead data were also violated but the associated samples were previously qualified. The remaining samples were within the acceptance criteria.

Overall Assessment

The data were found to exhibit acceptable levels of accuracy and precision, based on the provided information, and may be used with the qualifications noted.

TABLE 1

**SAMPLE IDENTIFICATION NUMBERS
GM CLARK STREET SITE
DETROIT, MICHIGAN**

S-8889-100896-PFR-185
S-8889-100896-PFR-186
S-8889-100896-PFR-187
S-8889-100896-PFR-188
S-8889-100896-PFR-189
S-8889-100896-PFR-190
S-8889-100896-PFR-191
S-8889-100896-PFR-192

TABLE 2

SUMMARY OF OUTLYING MATRIX SPIKE/MATRIX SPIKE DUPLICATE
GM CLARK STREET SITE
DETROIT, MICHIGAN

<i>Parameter</i>	<i>Samples</i>	<i>Qualifier¹</i>
Lead	S-8889-100896-PFR-185	J
	S-8889-100896-PFR-186	J
	S-8889-100896-PFR-187	J
	S-8889-100896-PFR-188	J
	S-8889-100896-PFR-189	J
	S-8889-100896-PFR-190	J
	S-8889-100896-PFR-191	J
	S-8889-100896-PFR-192	J

¹ The samples should be qualified for the listed parameter as:

J - The analyte was analyzed for and was positively identified, but the associated numerical value may not be consistent with the amount actually present in the environmental sample.

CRA

11100 Metro Airport Center Drive
Suite #160
Romulus, Michigan 48174
(734) 942-0909

MEMO

TO: Sara Anderson

REFERENCE NO. 8889-30

FROM: Mary Cameron/rm/69/Det.

DATE: January 9, 1997

RE: Data Quality Assessment and Validation for Soil Samples Collected
from the General Motors Clark Street Site in Detroit, Michigan

The following details a quality assessment and validation of the analytical data resulting from the December 2, 1996, collection of nine (9) soil samples from the General Motors Clark Street Site in Detroit, Michigan. The samples identified in Table 1 were analyzed for lead. Sample analysis was completed at Rollins Environmental Inc.'s Ann Arbor, Michigan facility (Encotec) in accordance with the Method SW-846 6020 from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, 3rd Edition, and promulgated updates, November 1986. The quality control criteria used to assess the data were established by the methods and the quality assurance project plan (QAPP).¹

Holding Time Period and Sample Analysis

The holding time period for lead analysis is 180 days from sample collection to completion of analysis. The samples, as indicated by the sample collection, extraction and analysis dates on the chain-of-custody forms and analytical reports provided by Encotec, were prepared and analyzed within the required holding time periods.

Method Blank Samples

Contamination of samples contributed by laboratory conditions or procedures was monitored by concurrent preparation and analysis of method blank samples. The method blank samples were reported to be free from detectable levels of target analytes, indicating no laboratory-attributable contamination occurred.

Laboratory Control Sample

The laboratory control sample (LCS) analyses serve as a monitor of the overall performance in all steps of the sample analysis. The LCS percent recoveries were within the laboratory control limits, indicating that an acceptable level of overall performance was achieved.

¹ Application of quality assurance criteria was consistent with "Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analysis," Draft October 1989.

Matrix Spike Analysis

Matrix spike samples were monitored to determine the effects of sample matrix on the laboratories digestion and measurement methods. Based on the information supplied by the laboratory, the lead matrix spike recoveries were within acceptance criteria.

Duplicate Sample Analyses - Lead Analyses

The laboratory precision of matrix-specific metals methods was monitored by the analyses of duplicate samples. The samples that should be qualified due to violation of duplicate RPD are outlined in Table 2. The remaining samples were within the acceptance criteria.

Field Quality Assurance/Quality Control

The field quality assurance/quality control consisted of one (1) field duplicate sample set. Overall precision for the sampling event and laboratory procedures was monitored using the results of the field duplicate sample set. Table 3 summarizes the results of the detected analytes in the field duplicate sample sets. The data indicate that an adequate level of precision was achieved for the sampling event.

Overall Assessment

The data were found to exhibit acceptable levels of accuracy and precision, based on the provided information, and may be used with the qualifications noted.

TABLE 1

**SAMPLE IDENTIFICATION NUMBERS
GM CLARK STREET SITE
DETROIT, MICHIGAN**

S-8889-120296-SF-344

S-8889-120296-SF-345

S-8889-120296-SF-346

S-8889-120296-SF-347

S-8889-120296-SF-348

S-8889-120296-SF-349

S-8889-120296-SF-350

S-8889-120296-SF-351

S-8889-120296-SF-352

TABLE 2
SUMMARY OF QUALIFIED SAMPLE DATA DUE TO
OUTLYING DUPLICATE RESULTS
GM CLARK STREET SITE
DETROIT, MICHIGAN

<i>Parameter</i>	<i>Associated Samples</i>	<i>Qualifier¹</i>
Lead	S-8889-120296-SF-344	J
	S-8889-120296-SF-345	
	S-8889-120296-SF-346	
	S-8889-120296-SF-347	
	S-8889-120296-SF-348	
	S-8889-120296-SF-349	
	S-8889-120296-SF-350	
	S-8889-120296-SF-351	
	S-8889-120296-SF-352	

¹ The parameter results should be qualified for the listed samples as:

J -The analyte was analyzed for and was positively identified, but the associated numerical value may not be consistent with the amount actually present in the environmental sample.

TABLE 3

SUMMARY OF DETECTED ANALYTIES IN FIELD DUPLICATE SAMPLE SET
GM CALRK STREET SITE
DETROIT, MICHIGAN

<i>Parameter (µg/kg)</i>	<i>Investigative Sample</i>	<i>Duplicate Sample</i>	<i>RPD¹</i>
	S-8889-120296-SF-345	S-8889-120296-SF-346	
Lead	11,000 J ²	13,000 J	17

¹RPD - Relative Percent Difference

² J - The associated numerical value is an estimated quantity.