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Prepared at General Motors
Counsel's Request

PARCEL B

PHASE V ENVIRONMENTAL SITE ASSESSMENT

GENERAL MOTORS CORPORATION
CLARK AVENUE FACILITY
DETROIT, MICHIGAN

MAY 1998

REF. NO. 8889 (39)

This report is printed on recycled paper.

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1.0 INTRODUCTION

Conestoga-Rovers & Associates (CRA) was retained by General Motors Corporation (GM) to conduct a Phase V 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 V ESA was to excavate impacted soils at the Site identified during the Phase I, II, and III ESA during the period from September 1996 to February 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. 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.

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

- 2.0 Background
- 3.0 Scope of Work
- 4.0 Analytical Results
- 5.0 Conclusions

2.0 BACKGROUND

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

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 |

2.3 SUMMARY OF AOCS EVALUATED

Three (3) AOCs were identified during the Phase I ESA and Phase II ESA (CRA, February 1997; and December 1997, updated February 1998). AOC locations are presented on Figure 2.2.

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).

2.4 PHASE III ESA CONCLUSIONS

A total of 12 investigative boreholes were completed during the Phase III ESA on Site. The estimated extent of impacted soil at each of the 3 AOC locations is presented on Figure 2.3.

3.0 SCOPE OF WORK

CRA conducted a Phase V ESA at the Site in October 1996 and February 1998. The Phase V ESA was designed to excavate impacted soil delineated during the Phase III ESA (see Figure 2.3).

3.1 EXCAVATION METHODS

Carlo Environmental Technologies (CET), of Clinton Township, Michigan, performed all Phase V ESA excavation activities at the Site.

Soil was removed with a 235 Excavator and stockpiled and covered with visqueen on Site for future disposition. The limits of the excavation areas were determined by the results of the Phase III ESA borings, visual observations of the excavation area, and verification sampling.

Verification samples were collected from the sidewalls and floor of the excavation area in accordance with the Michigan Department of Environmental Quality (MDEQ) Verification of Soil Remediation (VSR) Guidance Document (April 1994, Revision 1).

Upon receipt of the analytical results, the excavation areas were backfilled with clean fill materials provided by CET from an off-Site source. The backfill was placed in lifts and compacted to at least 95 percent modified proctor density (MPD). Compaction testing was completed by G2 Consulting Group of Troy, Michigan, a subcontractor hired by CET.

3.2 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 excavator and associated equipment 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.

Sampling equipment and tools 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.

3.3 SAMPLE ANALYSIS/DATA VALIDATION

Soil samples were collected and submitted to Encotec of Ann Arbor, Michigan, and analyzed for lead or polynuclear aromatic hydrocarbons (PAHs).

The sample summary table, Table 3.1, presents a detailed list of which parameters were analyzed for each sample collected. Parameter selection was based on which constituents were identified at each AOC during the Phase II and III ESA for the Site.

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

Quality assessment and validation of the analytical data reported by 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

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valid and suitable for quantitative use specific to this project. The data quality assessment and validation memoranda are presented in Appendix B.

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, as defined in the MDEQ-ERD Training Manual, March 1998.

4.0 ANALYTICAL RESULTS

Samples collected from excavation areas were analyzed for PAHs or lead as presented in Table 3.1.

4.1 AOC B-4

The dimensions of the excavation at AOC B-4 were 10 feet by 12 feet, with a depth of 8 feet bgs. The approximate volume of impacted soils was 36 cy.

Six soil verification samples were collected (4 sidewalls, 2 floor) and analyzed for PAHs. Verification sample locations are presented on Figure 4.1.

A summary of detected PAHs in soil verification samples from AOC B-4 is presented in Table 4.1. No parameters were detected above the Michigan Act 451, Part 201 Generic Industrial Direct Contact Criteria in any of the soil samples.

4.2 AOC B-10

The approximate dimensions of the excavation at AOC B-10 were 15 feet by 17 feet, with a depth of 10 feet bgs. The approximate volume of impacted soils was 95 cy.

Six soil verification samples were collected (4 sidewalls, 2 floor) and analyzed for lead. Verification sample locations are presented on Figure 4.2.

A summary of detected lead in soil verification samples from AOC B-10 is presented in Table 4.2. No parameters were detected above the Michigan Act 451, Part 201 Generic Industrial Direct Contact Criteria in any of the soil samples.

4.3 AOC B-15

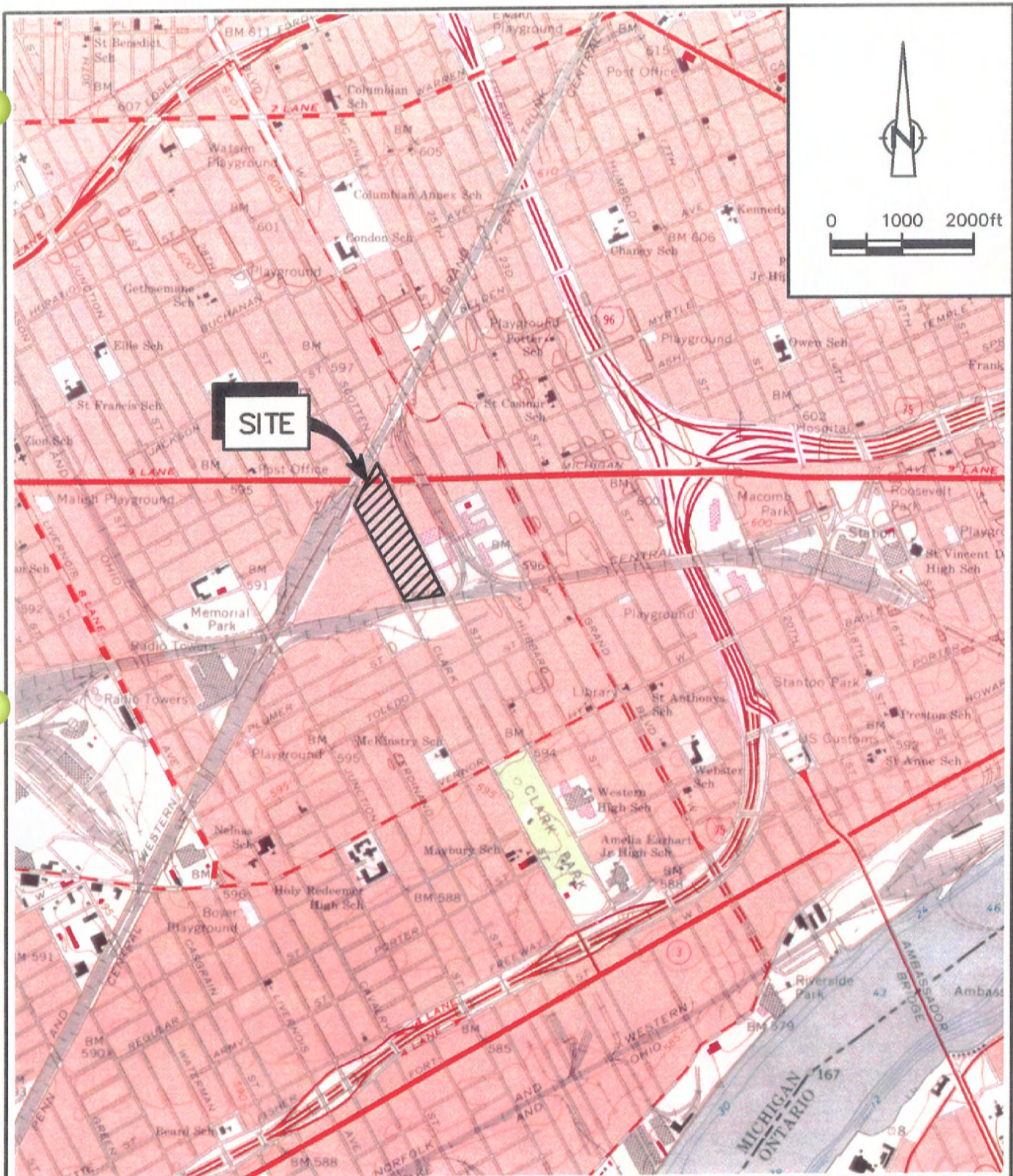
The approximate dimensions of the excavation at AOC B-15 were 23 feet by 20 feet, with a depth of 6 feet bgs. The approximate volume of impacted soils was 103 cy.

Six soil verification samples were collected (4 sidewalls, 2 floor) and analyzed for lead. Verification sample locations are presented on Figure 4.3.

A summary of detected lead in soil verification samples from AOC B-15 is presented in Table 4.2. No parameters were detected above the Michigan Act 451, Part 201 Generic Industrial Direct Contact Criteria in any of the soil samples.

5.0 CONCLUSIONS

Based on the results of the Phase V ESA for the Site, no further remedial action is warranted. Remediation activities have been completed at the Site by GM which satisfy the criteria for Generic Industrial land use, as defined by the Michigan Department of Environmental Quality (MDEQ), which means that the Site can be used for industrial purposes.



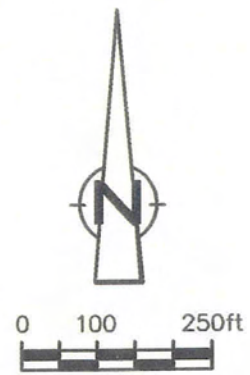
SOURCE: USGS QUADRANGLE MAP;
DETROIT, MICHIGAN



CRA

08889-00(039)GN-DE001

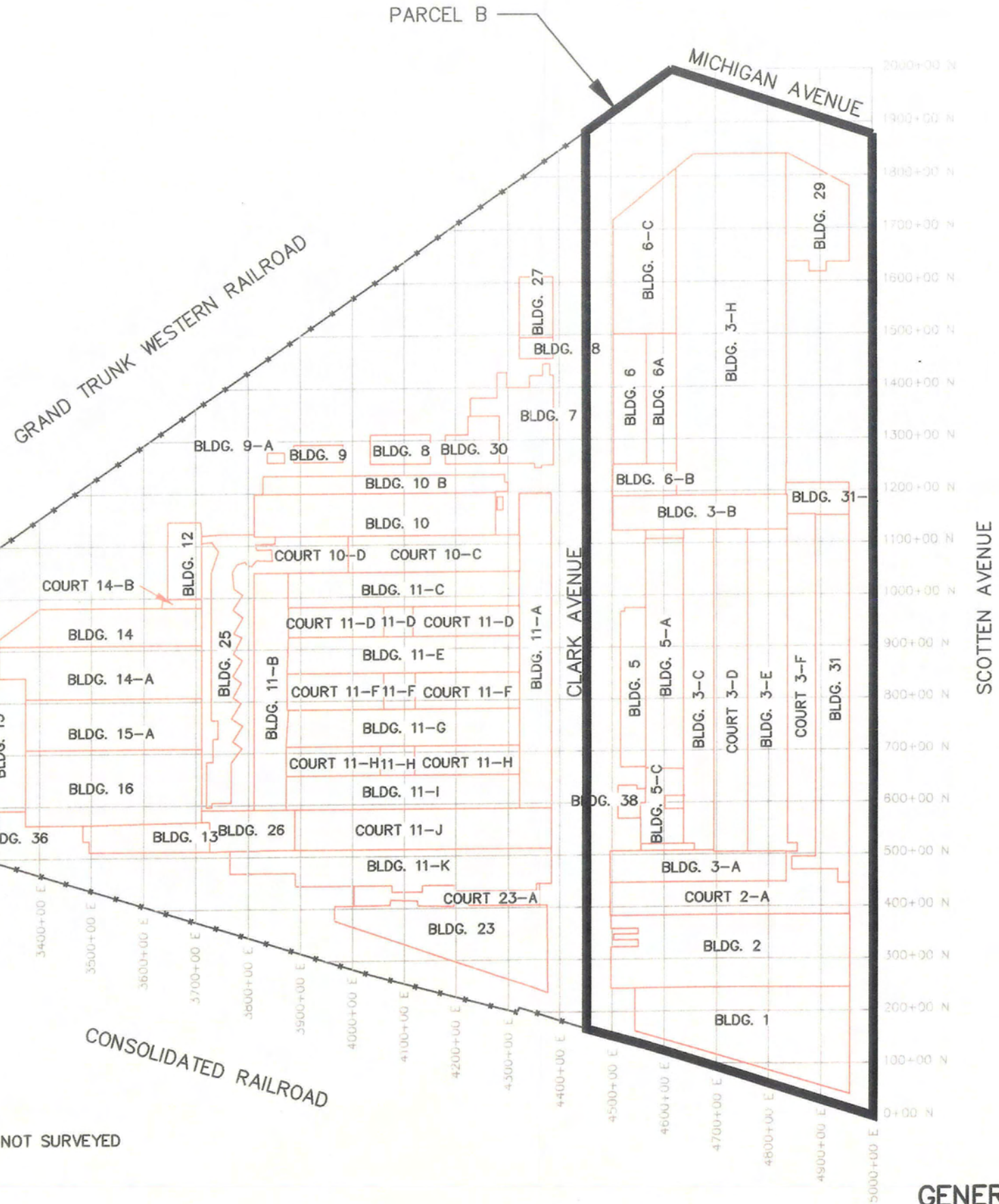
figure 1.1
SITE LOCATION
PARCEL B
GENERAL MOTORS CLARK AVENUE SITE
Detroit, Michigan



LEGEND

— APPROXIMATE
SITE BOUNDARY

NOTE: BUILDING LOCATIONS ARE NOT SURVEYED

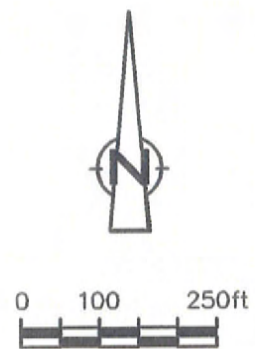
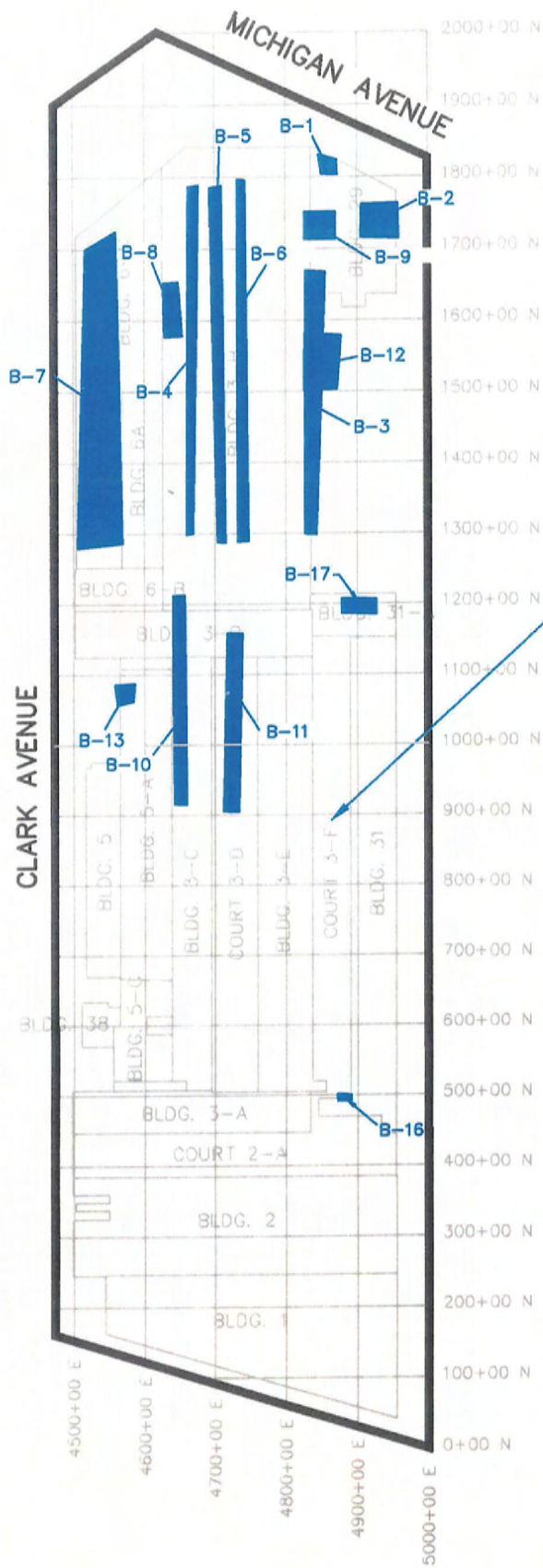


ENGINEERING
BUILDING 40

figure 1.2

SITE PLAN
PARCEL B

GENERAL MOTORS CLARK AVENUE SITE
Detroit, Michigan



LEGEND



SURVEYED PAOC AREA

NOTE: BUILDING LOCATIONS ARE NOT SURVEYED

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

CRA

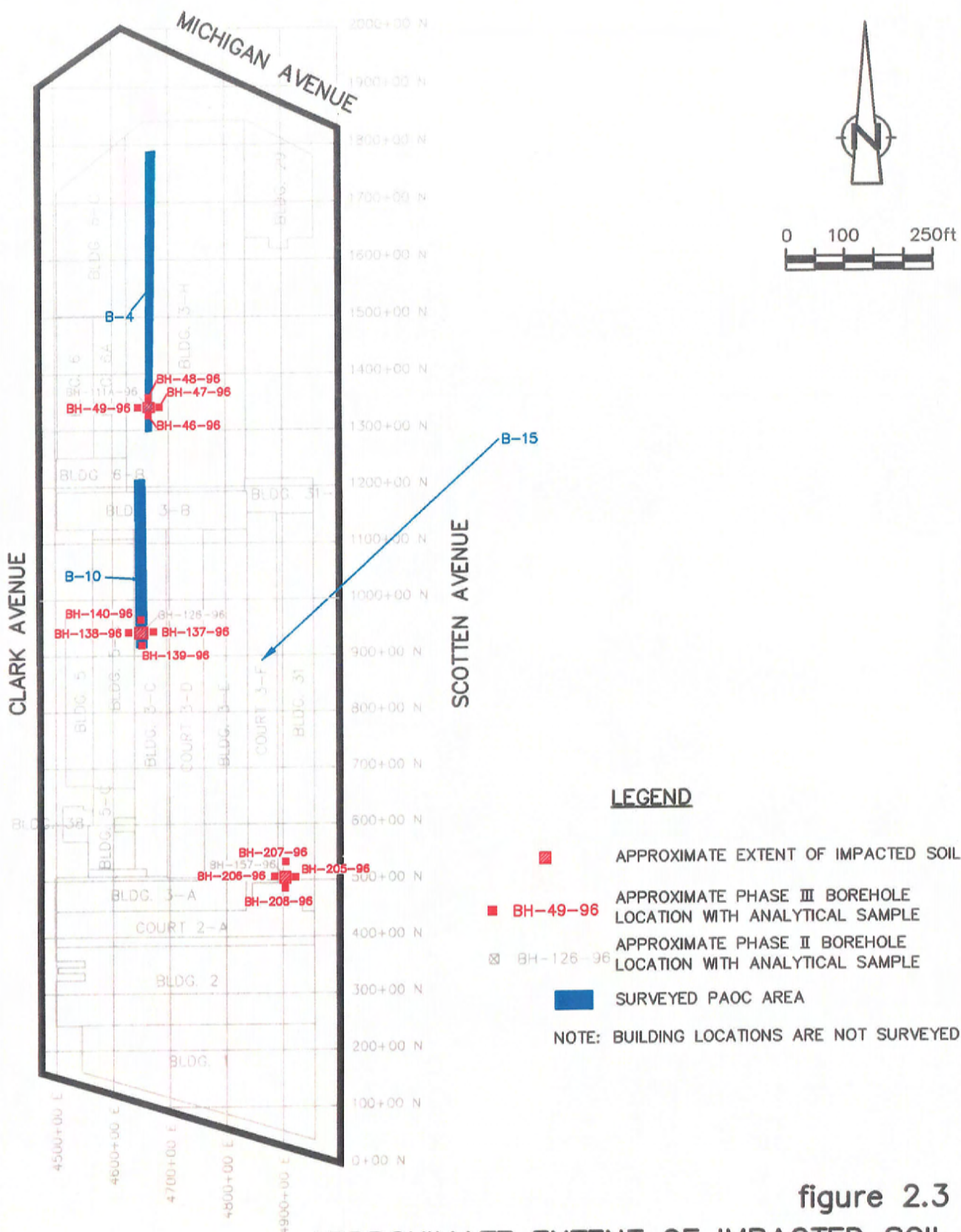
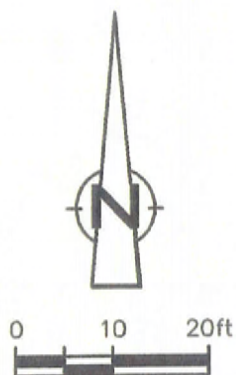
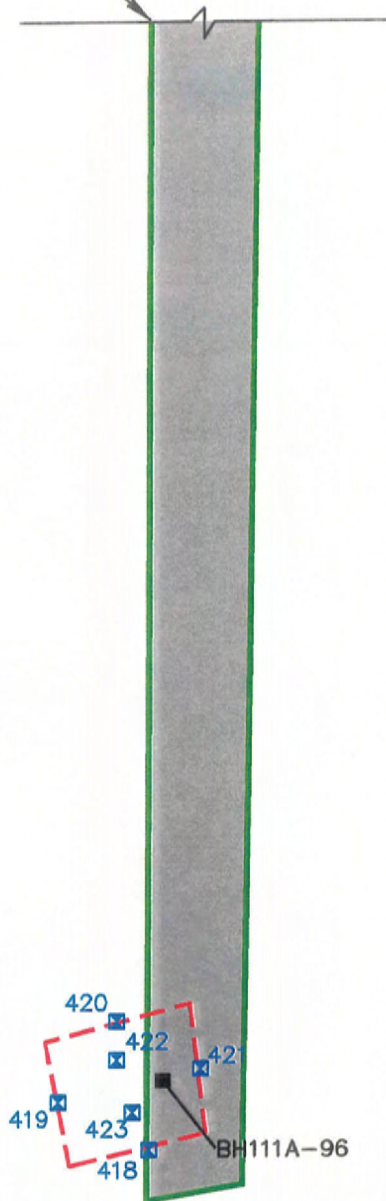


figure 2.3
 APPROXIMATE EXTENT OF IMPACTED SOIL
 PARCEL B
 GENERAL MOTORS CLARK AVENUE SITE
 Detroit, Michigan



AOC B-4



LEGEND



LIMIT OF AOC



LIMIT OF EXCAVATION



VERIFICATION SAMPLE LOCATION



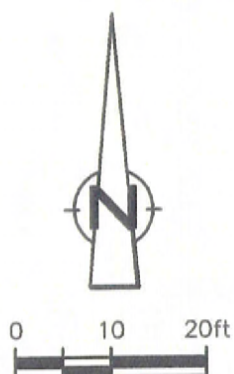
BH111A-96

PHASE II ESA BOREHOLE LOCATION

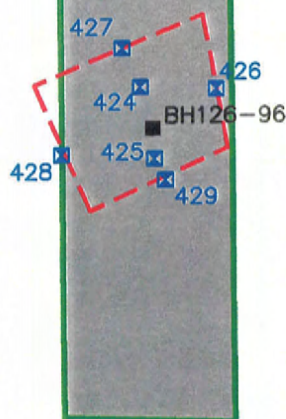
figure 4.1

AOC B-4 VERIFICATION SAMPLE LOCATIONS
PARCEL B
GENERAL MOTORS CLARK AVENUE SITE
Detroit, Michigan

CRA



AOC B-10



LEGEND



LIMIT OF AOC



LIMIT OF EXCAVATION



VERIFICATION SAMPLE LOCATION

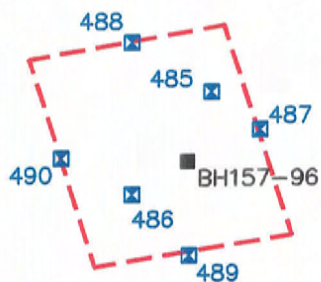
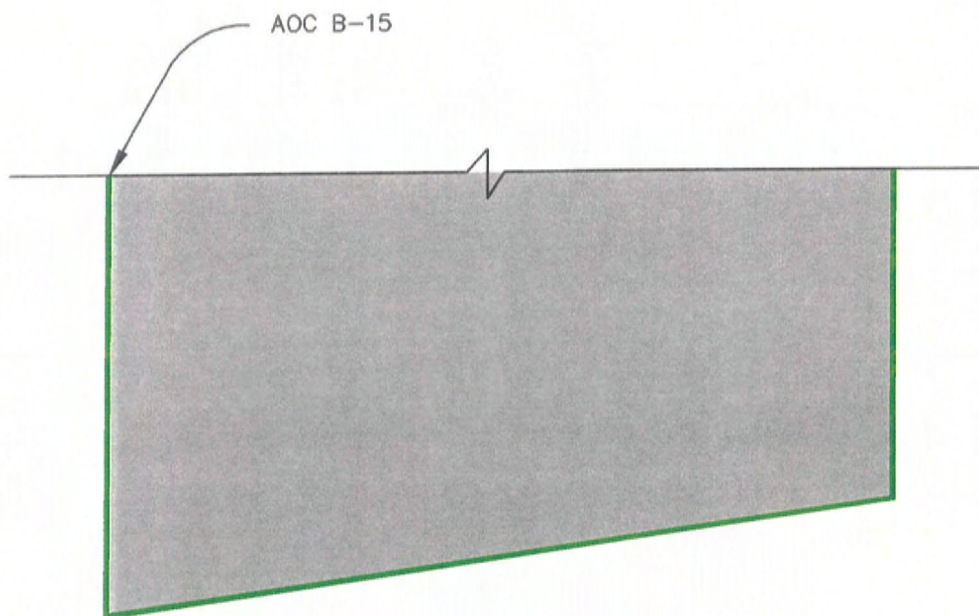
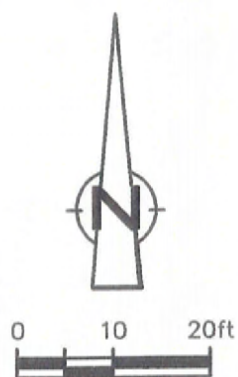


PHASE II ESA BOREHOLE LOCATION

figure 4.2

AOC B-10 VERIFICATION SAMPLE LOCATIONS
PARCEL B
GENERAL MOTORS CLARK AVENUE SITE
Detroit, Michigan

CRA



LEGEND





-  LIMIT OF AOC
-  LIMIT OF EXCAVATION
-  488 VERIFICATION SAMPLE LOCATION
-  BH157-96 PHASE II ESA BOREHOLE LOCATION

figure 4.3

AOC B-15 VERIFICATION SAMPLE LOCATIONS
PARCEL B
GENERAL MOTORS CLARK AVENUE SITE
Detroit, Michigan

TABLE 3.1

**SAMPLE SUMMARY
PHASE V ESA
PARCEL B
GM CLARK AVENUE FACILITY
DETROIT, MICHIGAN**

| <i>Sample Number</i> | <i>Sample Location</i> | <i>AOC Number</i> | <i>Analysis</i> |
|----------------------|------------------------|-------------------|-----------------|
| S-8889-102596-JM-418 | South Wall | B-4 | PAH |
| S-8889-102596-JM-419 | West Wall | B-4 | PAH |
| S-8889-102596-JM-420 | North Wall | B-4 | PAH |
| S-8889-102596-JM-421 | East Wall | B-4 | PAH |
| S-8889-102596-JM-422 | North Floor | B-4 | PAH |
| S-8889-102596-JM-423 | South Floor | B-4 | PAH |
| S-8889-102596-JM-424 | North Floor | B-10 | Lead |
| S-8889-102596-JM-425 | South Floor | B-10 | Lead |
| S-8889-102596-JM-426 | East Wall | B-10 | Lead |
| S-8889-102596-JM-427 | North Wall | B-10 | Lead |
| S-8889-102596-JM-428 | West Wall | B-10 | Lead |
| S-8889-102596-JM-429 | South Wall | | Lead |
| S-8889-020598-SF-485 | East Floor | B-15 | Lead |
| S-8889-020598-SF-486 | West Floor | B-15 | Lead |
| S-8889-020598-SF-487 | East Wall | B-15 | Lead |
| S-8889-020598-SF-488 | North Wall | B-15 | Lead |
| S-8889-020598-SF-489 | South Wall | B-15 | Lead |
| S-8889-020598-SF-490 | West Wall | B-15 | Lead |

Note:

PAH = Polynuclear Aromatic Hydrocarbons

TABLE 4.1
SUMMARY OF DETECTED PAHS IN SOIL
VERIFICATION SAMPLES
PHASE V ESA
PARCEL B
GM CLARK AVENUE FACILITY
DETROIT, MICHIGAN

| AOC NO. | Sample Location | Michigan Generic Residential Direct Contact Criteria (1) | Michigan Generic Industrial Direct Contact Criteria (2) | B-4 South Sidewall 102596-JM-418 10/25/96 | B-4 West Sidewall 102596-JM-419 10/25/96 | B-4 North Sidewall 102596-JM-420 10/25/96 | B-4 East Sidewall 102596-JM-421 10/25/96 | B-4 Floor 102596-JM-422 10/25/96 | B-4 Floor 102596-JM-423 10/25/96 |
|--------------------------|---------------------------|---|--|--|---|--|---|---|---|
| <u>Parameter (µg/kg)</u> | | | | | | | | | |
| | Acenaphthene | 76,000,000 | 810,000,000 | ND(330) | ND(330) | ND(330) | 410 | ND(330) | ND(330) |
| | Acenaphthylene | 1,500,000 | 16,000,000 | ND(330) | ND(330) | ND(330) | ND(330) | ND(330) | ND(330) |
| | Anthracene | 420,000,000 | 1,000,000,000 | 470 | ND(330) | ND(330) | 980 | ND(330) | ND(330) |
| | Benzo (a) anthracene | 14,000 | 210,000 | 660 | ND(330) | ND(330) | 1,500 | ND(330) | ND(330) |
| | Benzo (b) fluoranthene | 14,000 | 210,000 | 400 | ND(330) | ND(330) | 1,200 | ND(330) | ND(330) |
| | Benzo (k) fluoranthene | 140,000 | 2,100,000 | 560 | ND(330) | ND(330) | 1,000 | ND(330) | ND(330) |
| | Benzo (a) pyrene | 1,400 | 21,000 | ND(330) | ND(330) | ND(330) | 1,100 | ND(330) | ND(330) |
| | Benzo (g,h,i) perylene | 1,500,000 | 16,000,000 | 380 | ND(330) | ND(330) | 790 | ND(330) | ND(330) |
| | Chrysene | 1,400,000 | 21,000,000 | 1,100 | ND(330) | ND(330) | 2,100 | ND(330) | ND(330) |
| | Dibenz (a,h) anthracene | 51,000,000 | 540,000,000 | ND(330) | ND(330) | ND(330) | 340 | ND(330) | ND(330) |
| | Fluoranthene | 51,000,000 | 540,000,000 | 1,800 | 370 | ND(330) | 3,300 | ND(330) | ND(330) |
| | Fluorene | 14,000 | 210,000 | ND(330) | ND(330) | ND(330) | 390 | ND(330) | ND(330) |
| | Indeno (1,2,3-c,d) pyrene | 15,000,000 | 160,000,000 | 330 | ND(330) | ND(330) | 650 | ND(330) | ND(330) |
| | Naphthalene | 1,500,000 | 16,000,000 | ND(330) | ND(330) | ND(330) | ND(330) | ND(330) | ND(330) |
| | Phenanthrene | 32,000,000 | 340,000,000 | 1,600 | ND(330) | ND(330) | 3,800 | ND(330) | ND(330) |
| | Pyrene | 15,000,000 | 160,000,000 | 1,500 | ND(330) | ND(330) | 2,700 | ND(330) | ND(330) |
| | 2-Methylnaphthalene | | | ND(330) | ND(330) | ND(330) | ND(330) | ND(330) | ND(330) |

not above criteria
due to rows of criteria
are off 1 row.

need to shift
down 1 row

Notes:

PAH - Polynuclear aromatic Hydrocarbon

ND() - Parameter was not detected above the level in parenthesis.

(1) Values taken from MDEQ Operational Memorandum #8, Revision 4, dated June 5, 1996, and January 26, 1996 Revision, as defined in MDEQ-ERD Training Material, March 1998.

(2) Values taken from MDEQ Operational Memorandum #14, Revision 2, dated June 6, 1995, and January 25, 1996 Revision, as defined in MDEQ-ERD Training Material, March 1998.

TABLE 4.2

SUMMARY OF DETECTED LEAD IN SOIL VERIFICATION SAMPLES

PHASE V ESA

PARCEL B

GM CLARK AVENUE FACILITY
DETROIT, MICHIGAN

| AOC No. | Michigan Generic Residential Direct Contact Criteria (1) | Michigan Generic Industrial Direct Contact Criteria (2) | B-10 North Floor 102596-JM-424 10/25/96 | B-10 South Floor 102596-JM-425 10/25/96 | B-10 East Wall 102596-JM-426 10/25/96 | B-10 North Wall 102596-JM-427 10/25/96 | B-10 West Wall 102596-JM-428 10/25/96 | B-10 South Wall 102596-JM-429 10/25/96 |
|---------|---|--|--|--|--|---|--|---|
|---------|---|--|--|--|--|---|--|---|

Parameter (mg/kg)

| | | | | | | | | |
|------|-----|-------------|-------|-------|-------|-------|------|------|
| Lead | 400 | 900 (draft) | 7.9 J | 8.4 J | 230 J | 130 J | 48 J | 48 J |
|------|-----|-------------|-------|-------|-------|-------|------|------|

Notes:

AOC - Area of Concern.

bgs - below ground surface.

J - The associated numerical value is an estimated quantity.

(1) Values taken from MDEQ Operational Memorandum #8, Revision 4, dated June 5, 1996, and January 26, 1996 Revision,
as defined in MDEQ-ERD Training Material, March 1998.(2) Values taken from MDEQ Operational Memorandum #14, Revision 2, dated June 6, 1995, and January 25, 1996 Revision,
as defined in MDEQ-ERD Training Material, March 1998.

TABLE 4.2

SUMMARY OF DETECTED LEAD IN SOIL VERIFICATION SAMPLES

PHASE V ESA

PARCEL B

GM CLARK AVENUE FACILITY
DETROIT, MICHIGAN

| AOC No. | Michigan Generic Residential Direct Contact Criteria (1) | Michigan Generic Industrial Direct Contact Criteria (2) | B-15 East Floor 020598-SF-485 2/5/98 | B-15 West Floor 020598-SF-486 2/5/98 | B-15 East Wall 020598-SF-487 2/5/98 | B-15 North Wall 020598-SF-488 2/5/98 | B-15 South Wall 020598-SF-489 2/5/98 | B-15 West Wall 020598-SF-490 2/5/98 |
|--------------------------|---|--|---|---|--|---|---|--|
| <u>Parameter (mg/kg)</u> | | | | | | | | |
| Lead | 400 | 900 (draft) | 12 J | 10 J | 6.7 J | 9.9 J | 96 J | 10 J |

APPENDIX A
CHAIN-OF-CUSTODY RECORDS

CRA

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

SHIPPED TO (Laboratory Name):

Envotec

23

CHAIN OF CUSTODY RECORD

SAMPLER'S SIGNATURE: *J.L. McClellan* PRINTED NAME: J.L. McClellan

REFERENCE NUMBER:

8889-40

PROJECT NAME:

CLARK STREET

PARAMETERS

CONTAINERS

SEQ. No. DATE TIME

1 10-25-96 10:30 S-8889-102596-JM-418

2 419

3 420

4 421

5 422

6 423

7 424

8 425

9 426

10 427

11 428

12 429

13 430

14 431

TOTAL NUMBER OF CONTAINERS

REMARKS

24 hr TAT

| | | |
|--|----------------|-------------|
| RELINQUISHED BY: <i>J.L. McClellan</i> | DATE: 10/25/96 | TIME: 10:30 |
| RELINQUISHED BY: | DATE: | TIME: |
| RELINQUISHED BY: | DATE: | TIME: |
| RELINQUISHED BY: | DATE: | TIME: |

| | |
|---|---|
| METHOD OF SHIPMENT: <i>Hand Delivered</i> | AIR BILL No. |
| White - Fully Executed Copy Yellow - Receiving Laboratory Copy | RECEIVED FOR LABORATORY BY: <i>J. McClellan</i> |
| 3468 | DATE: TIME: |

CRA

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

SHIPPED TO (Laboratory Name):

Enotec

CHAIN OF CUSTODY RECORD

REFERENCE NUMBER:
8889-40

PROJECT NAME:

McClark Street

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

PARAMETERS

Lead

| SEQ. No. | DATE | TIME | SAMPLE TYPE | NO OF CONTAINERS | REMARKS |
|----------------|--------|------|----------------------|------------------|---------------|
| 1 | 020598 | | S-8889-020598-SF-485 | 1 | ✓ 24 Hour TAT |
| 2 | ↓ | | ↓ -486 | 1 | ✓ |
| 3 | ↓ | | ↓ -487 | 1 | ✓ |
| 4 | ↓ | | ↓ -488 | 1 | ✓ |
| 5 | ↓ | | ↓ -489 | 1 | ✓ |
| 6 | ↓ | | ↓ -490 | 1 | ✓ |
| <i>5/02/98</i> | | | | | |

TOTAL NUMBER OF CONTAINERS

6

| | | | |
|--|----------------------------|--|------------------------------|
| RELINQUISHED BY: 1. <i>Susan Fielek</i> | DATE: 020598 TIME: 1205 | RECEIVED BY: 1. <i>Earl M. Johnston</i> | DATE: 05/15/98 TIME: 12pm |
| RELINQUISHED BY: 2. | DATE: TIME: | RECEIVED BY: 2. | DATE: TIME: |
| RELINQUISHED BY: 3. | DATE: TIME: | RECEIVED BY: 1. | DATE: TIME: |

METHOD OF SHIPMENT: *Drop off by CRA*

AIR BILL No.

White - Fully Executed Copy
Yellow - Receiving Laboratory Copy

SAMPLE TEAM:
S. Fielek

RECEIVED FOR LABORATORY BY:

Earl M. Johnston

DATE: 05/15/98 TIME: 12pm

4831

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 Fulek PRINTED NAME: Susan Fulek

| SEQ. No. | DATE | TIME | SAMPLE TYPE | No. OF CONTAINERS | PARAMETERS | REMARKS |
|----------------------------|----------|------|---------------------|-------------------|------------|------------|
| 24 | 12/10/97 | | S-889-121097-SF-477 | 1 | ✓ | 24 How-TAT |
| 30 | | | -478 | 1 | ✓ | |
| 31 | | | -479 | 1 | ✓ | |
| 32 | | | -480 | 1 | ✓ | |
| 33 | | | -481 | 1 | ✓ | |
| 34 | | | -482 | 1 | ✓ | |
| 35 | | | -483 | 1 | ✓ | |
| 36 | | | -484 | 1 | ✓ | |
| 37 | | | -485 | 2 | ✓ | |
| 38 | | | -486 | 2 | ✓ | |
| 39 | | | -487 | 1 | ✓ | |
| TOTAL NUMBER OF CONTAINERS | | | | | 13 | |

58 12/10/97

| | | |
|--|------------------------------|---|
| RELINQUISHED BY: 1. <u>Susan Fulek</u> | DATE: 12/10/97 TIME: 1830 | RECEIVED BY: 1. _____ DATE: _____ TIME: _____ |
| RELINQUISHED BY: 2. _____ | DATE: _____ TIME: _____ | RECEIVED BY: 2. _____ DATE: _____ TIME: _____ |
| RELINQUISHED BY: 3. _____ | DATE: _____ TIME: _____ | RECEIVED BY: 3. _____ DATE: _____ TIME: _____ |

METHOD OF SHIPMENT: Drop off by CRA AIR BILL No. _____

| | | | | | |
|-----------------|--|-------------------|--------------------------------|---------------------------------|--|
| While Yellow | -Fully Executed Copy -Receiving Laboratory Copy | Pink Goldenrod | -Shipper Copy -Sampler Copy | SAMPLE TEAM: <u>S. Fulek</u> | RECEIVED FOR LABORATORY BY: <u>S. Fulek</u> |
| 4992 | | | | | DATE: 12/11/97 TIME: 9:00 AM |

APPENDIX B
DATA VALIDATION MEMORANDA

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

MEMO

TO: Sara Anderson

REFERENCE NO: 8889

FROM: Mary Cameron/mc/14/Det.

DATE: November 8, 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 October 25, 1996, collection of six (6) 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 Rollins Environmental Inc. (ENCOTEC), Ann Arbor, Michigan, 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 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 sample was 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)

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

Matrix Spike/Matrix Spike Duplicate Percent Recoveries

To assess the long term accuracy and precision of the analytical methods on various matrices, matrix spike/matrix spike duplicate (MS/MSD) percent recoveries and the relative percent difference (RPD) of the recoveries were determined. The percent recoveries and RPDs acceptance criteria were met for all analyses.

Overall Assessment

The data were found to exhibit acceptable levels of accuracy and precision, based on the provided information.

TABLE 1

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

S-8889-102596-JM-418

S-8889-102596-JM-419

S-8889-102596-JM-420

S-8889-102596-JM-421

S-8889-102596-JM-422

S-8889-102596-JM-423

CRA

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

MEMO

TO: Sara Anderson

REFERENCE NO: 8889

FROM: Mary Cameron/jsd/67/Det.

DATE: March 2, 1998

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 October 25, 1996, collection of six (6) 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 Laidlaw Environmental Inc./Encotec in Ann Arbor, Michigan (Encotec) in accordance with Method SW-846 6010 from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, 3rd Edition, 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 sample 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 concentrations of target analytes, indicating no laboratory-attributable contamination occurred.

Laboratory Control Sample Analysis

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.

Matrix Spike Analysis

Matrix spike samples 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 matrix spike recovery criteria are outlined in Table 2. The remainder of the data were within the acceptance criteria.

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

Duplicate Sample Analyses

The laboratory precision of matrix-specific metals methods was monitored by the analyses of duplicate samples. The duplicate relative percent difference (RPD) data 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
GENERAL MOTORS CLARK STREET SITE
DETROIT, MICHIGAN**

S-8889-102596-JM-424

S-8889-102596-JM-425

S-8889-102596-JM-426

S-8889-102596-JM-427

S-8889-102596-JM-428

S-8889-102596-JM-429

TABLE 2
SUMMARY OF QUALIFIED SAMPLE DATA DUE TO OUTLYING
MATRIX SPIKE RECOVERY DATA
GENERAL MOTORS CLARK STREET
DETROIT, MICHIGAN

| <i>Parameter</i> | <i>Associated Samples</i> | <i>Qualifier¹</i> |
|------------------|---------------------------|------------------------------|
| Lead | S-8889-102596-JM-424 | J |
| | S-8889-102596-JM-425 | |
| | S-8889-102596-JM-426 | |
| | S-8889-102596-JM-427 | |
| | S-8889-102596-JM-428 | |
| | S-8889-102596-JM-429 | |

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.

CRA

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

MEMO

TO: Sara Anderson

REFERENCE NO: 8889-40

FROM: Mary Cameron/mc/63/Det. *MS ✓*

DATE: May 18, 1998

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 February 5, 1998, collection of six (6) soil samples from the General Motors Clark Street Site in Detroit, Michigan. The samples identified in Table 1 were analyzed for lead by method SW-846 6010/6020 from "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", SW-846, 3rd Edition, November 1986 by Laidlaw Environmental, Inc./Encotec in Ann Arbor, Michigan (Encotec). 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 concentrations of target analytes, indicating no laboratory-attributable contamination occurred.

Laboratory Control Sample Analysis

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.

Matrix Spike Analysis

Matrix spike samples were monitored to determine the effects of sample matrix on the laboratories digestion and measurement methods. The data were within the acceptance criteria.

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

Duplicate Sample 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 relative percent difference (RPD) acceptance criteria are summarized in Table 2.

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
GENERAL MOTORS CLARK STREET SITE
DETROIT, MICHIGAN**

S-8889-020598-SF-485

S-8889-020598-SF-486

S-8889-020598-SF-487

S-8889-020598-SF-488

S-8889-020598-SF-489

S-8889-020598-SF-490

TABLE 2

**SUMMARY OF QUALIFIED SAMPLE DATA DUE TO OUTLYING
DUPLICATE RPD CRITERIA
GENERAL MOTORS CLARK STREET SITE
DETROIT, MICHIGAN**

| <i>Parameter</i> | <i>Associated Samples</i> | <i>Qualifier¹</i> |
|------------------|---------------------------|------------------------------|
| Lead | S-8889-020598-SF-485 | J |
| | S-8889-020598-SF-486 | |
| | S-8889-020598-SF-487 | |
| | S-8889-020598-SF-488 | |
| | S-8889-020598-SF-489 | |
| | S-8889-020598-SF-490 | |

¹ The parameter results should be qualified for each of 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 (for detected parameters).