

FINAL

**PHASE II SAMPLING REPORT
FOR
DETROIT LEAD ASSESSMENT PROJECT
COMMODITY METALS – 1641 CANIFF STREET
HAMTRAMCK, WAYNE COUNTY, MICHIGAN**

Prepared for:

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
REMEDATION AND REDEVELOPMENT DIVISION**
Detroit Field Office – Cadillac Place
3058 West Grand Boulevard, Suite 2-300
Detroit, Michigan 48202

Prepared by:

WESTON SOLUTIONS OF MICHIGAN, INC.
2501 Jolly Road, Suite 100
Okemos, Michigan 48864

September 2006

W. O. No. 20083.028.001

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EXECUTIVE SUMMARY

Weston Solutions of Michigan, Inc. (WESTON®) was contracted by the Michigan Department of Environmental Quality (MDEQ) Remediation and Redevelopment Division to conduct off-site soil sampling for the Detroit Lead Assessment Project (the Site) in Detroit, Wayne County, Michigan. The Site consisted of evaluating off-site soil conditions near 10 facilities in the Detroit Metropolitan Area that had been identified as potential lead smelters.

WESTON reviewed the available historical information and data from off-site samples from city and state owned properties. Based on this review, WESTON concluded that:

- Two of the former facilities were possible metal smelters.
- Residential areas were located within potential aerial deposition zones.
- Lead was detected downwind above the MDEQ Part 201 Residential Direct Contact Criteria.

Based on these conclusions, WESTON recommended collecting additional off-site soil samples from downwind properties in the affected neighborhoods, performing inspections of the former facilities including interviews with personnel, and collecting samples on the former facilities for lead analysis.

This summary report details the findings of the subsequent activities performed in the vicinity of the Continental Metals/Federated Metals Division. During the facility investigations, WESTON and MDEQ were made aware of the potential that other facilities may have been in the vicinity of the assessment. Additional information gathered indicated that the current Dana Container property (adjacent to Continental Metals) had high levels of lead in soils. In addition, a Baseline Environmental Assessment was discovered for Bulldog Boiler (formerly Commodity Metals) located at 1641 Caniff Street, Hamtramck, Michigan, that detailed high levels of lead in soils at the property. Analytical results from 143 residential properties and four facilities indicate that properties downwind of the historical smelting activities have been impacted by aerial deposition of lead particulate. Over 50% of the potentially affected homes could not be sampled due to a lack of access for these properties. This report concludes that additional work is required in this area including additional sampling and eventual removal of the affected soils.

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SECTION 1

INTRODUCTION

Weston Solutions of Michigan, Inc. (WESTON®) was contracted by the Michigan Department of Environmental Quality (MDEQ) Remediation and Redevelopment Division to perform off-site sampling activities for the Detroit Lead Assessment Project (the Site) in Detroit, Wayne County, Michigan. This work was performed under WESTON's Level of Effort contract with the State of Michigan (Contract No. 2002). This Phase II Summary Report presents a summary of the Phase II analytical results, as well as a recommendation for future activities.

1.1 SITE LOCATION

Continental Metal Company is located at 11500 Russell Street in Detroit, Wayne County, Michigan (Detroit Metropolitan Area, **Figure 1-1** in **Appendix A**). The site is currently owned by Continental Metal. There is a barbed wire fence above the facility perimeter. The gray building is located next to Dana Container, Inc. on the south side. The building is currently used for recovery of aluminum from scrap metals. During the early 1970s, a small batch smelter was located on-site to process the aluminum. Presently, the facility sorts and sizes the aluminum (and other scrap) which is sent off-site for processing by others. The areas five blocks north, south and west of the site are industrial. The area to the east of the site is industrial for one block, and residential for at least four additional blocks.

Federated Metals Division is located at 11630 Russell Street in Detroit, Wayne County, Michigan (**Figure 1-1** in **Appendix A**). The site appears to be in use and owned by Brimar Corporation (Brimar) (formerly Federated Metals), located in Detroit, Michigan. The areas five blocks to the north, south, and west of the site are industrial. The area east of the site is industrial for two blocks, and residential for at least the next four blocks.

Commodity Metals was located at 1641 Caniff Street, which is located east of Continental Metal Company and Federated Metals Division. The former Commodity Metals site appears to be in use and is owned by Bulldog Boiler located in Detroit, Michigan. The areas five blocks to the

north, south, and west of the site are industrial. The area east of the site, is industrial for two blocks, and residential for at least the next four blocks.

1.2 PREVIOUS WORK

WESTON reviewed historical information related to the facility including Bresser's Directory data, Sanborn Fire Insurance Maps from various years, aerial photographs from various years, fire marshal records, Baseline Environmental Assessments (BEAs), and other available information in order to evaluate the potential for historical smelting activities to have occurred at the facilities. The results of this effort are summarized in the *Summary Report for Data Investigation and Detroit Lead Assessment Project*, prepared by WESTON, dated September 2003.

Following the historical data investigation, WESTON worked with MDEQ and the cities of Detroit and Hamtramck to identify city and state owned properties that were available to be sampled upwind and downwind of the suspected former smelting facilities. MDEQ sampled 6 upwind properties and 39 downwind properties had previously been sampled by Wayne County. The analytical results were reviewed to determine if spatial and statistically valid trends in concentrations of lead were present in the soils that would indicate the potential for aerial release of lead from smelting activities. The results of this effort are detailed in the "*Comprehensive Phase I Summary Report for Detroit Lead Assessment Project*" prepared by WESTON, dated March 2004.

The conclusion reached from the available historical information was that the former facility was a possible metals smelter, residential areas are located within potential aerial deposition zones, and lead was detected on a site to the northeast above the MDEQ Part 201 Residential Direct Contact Criteria. Recommendations from the Phase I effort included collecting additional off-site samples from downwind properties in the affected neighborhoods, performing inspections at the former facilities and performing interviews with personnel, and collecting samples on the former facilities for lead analysis.

1.3 BASIS OF CONCERN

Smelting operations often result in the release of airborne particulate matter to off-site locations. This particulate matter may be contaminated with smelting-related chemicals (primarily heavy metals), and deposition of these particles in soil may be of potential concern to human health.

The primary concern associated with the Continental Metals and Federated Metals facilities is the off-site release of smelter-related metals, specifically lead, to soils in the surrounding neighborhood through aerial deposition. The goal of the Phase II sampling was to determine if lead, consistent with smelter-related releases, is present off-site and can be attributed to the former facility.

SECTION 2

FIELD ACTIVITIES AND PROCEDURES

2.1 OVERVIEW OF SAMPLING ACTIVITIES

Experience with previous lead investigations indicated that if lead concentrations were present from aerial deposition, they would be found within a 1,000 foot to 1,500-foot radius. Soil samples were to be collected within approximately 1,000 feet (ft) of each facility, but due to the development around the facilities, samples could not be collected within the 1,000-foot radius stated in the *Quality Assurance Sampling Plan (QASP)* dated October 2003, so the radius was increased.

After the initial screening, it was found that the lead levels in some samples exceeded the MDEQ's residential lead criteria. As a result of these findings, additional assessments were performed throughout the neighborhood in the areas of the former smelter. WESTON mailed out access agreements to each resident located in the downwind direction of the suspected facilities. In addition, a door-to-door attempt was also made to gain access to the residential properties. These efforts resulted in access to 143 of the 303 total residences in the initial study area. Following receipt of access agreements, the properties were sampled following the sampling procedures outlined in the QASP prepared for the Phase I investigation.

All properties sampled were divided into exposure units of approximately 500 square feet in area based on field inspection, and soil samples were collected at random locations within the units. On vacant parcels where it was apparent that a house had previously existed, the units were selected from an area in front of where the porch would have been located, and an area in back of where the house would have been located. Houses on surrounding parcels were used to estimate where the house would have been. Samples were not collected within a 5-foot buffer from house drip lines, or within a 5-foot buffer of any painted structure, or from locations where flaked paint or visibly stained soil existed. Greenways samples were collected from the furthest practicable point from the curb line. All samples from each exposure unit were composited in the field and

were analyzed for lead using United States Environmental Protection Agency (USEPA) Method 6010.

For all sample locations, the WESTON Lead Sampler, selected random sample locations; collected samples; logged the activities at each sample location in a site Personal Data Assistant (PDA) and field logbook; and verified the sample documentation. Sample documentation and preparation was the responsibility of WESTON.

In addition to the residential sampling conducted during Phase II investigation, WESTON also obtained access to Continental Metals, Brimar, and Dana Container (a property adjacent to Continental and Brimar).

2.1.1 Sampling Approach

A total of 372 composite samples were collected from 143 properties in the residential area downwind of the former smelter. In addition, a total of 25 discrete samples (20 soils, and 5 concrete) were collected from Continental Metals, Brimar, and Dana Container to assist in determination of a source area if residential lead contamination was found to be a result of aerial deposition.

Each composite soil sample consisted of five randomly located discrete surface soil samples (0 to 3 inches below ground surface) of approximately equal volume collected from the sampling unit. All discrete soil samples were collected from undisturbed areas (i.e., no signs of recent landscaped areas, gardens, etc.). Soil sampling procedures consisted of removing a volume of soil approximately 3 inches in diameter and 3 inches in depth, using a plastic scoop. The removed soil was placed directly into a large, plastic Ziploc® bag. Each exposure unit had its own dedicated scoop. Samples were not collected from within a 5-foot buffer of any painted structure, or from locations where flaked paint, or visibly stained soil existed to prevent the possible false positive from lead-based paint or other wastes. Foreign materials, such as vegetation, large rocks, and pebbles, etc., were removed from the sample and discarded. Following sample collection, the sample hole was filled with the remaining soil not used in the sample, and grass was neatly placed back over the hole.

During sampling, all information regarding soil description, location, and other distinguishable features present at the sample site were recorded in the field logbook and samples were logged in the PDA. A field sketch was prepared (on 8.5-inch by 11-inch graph paper) for each exposure unit that included: all sample locations and their sample number, physical features (sidewalks, building corners, utility poles), measurements between sample points and physical features, and any information necessary to relocate the area (address, street name, etc.).

Investigative soil samples were designated for matrix spike/matrix spike duplicate (MS/MSD) analysis at a frequency of one per ten soil samples. The lead sampler recorded the MS/MSD in the field logbook and designated it with the appropriate one digit identifier as the sample identification, as specified in the QASP. When non-dedicated sample equipment (stainless steel trowels) was used, equipment blanks were collected at a rate of one per sampling team per day, to assess the effectiveness of decontamination procedures. The samples were collected following decontamination by running distilled water over the stainless steel trowel that was used during a sampling event.

2.1.2 Sampling and Sample Handling Procedures

Clean, decontaminated sampling equipment and sample containers were maintained in a clean, segregated area prior to use. Sampling personnel changed gloves between each sample collection/handling. All samples were assembled and catalogued prior to shipping to the designated MDEQ laboratory. Sampling preservation, containers, and hold times for analytical methods associated with this site are presented in **Subsection 2.1.4**. All information relating to sample collection (field notes, chain-of-custody (COC), sketches) was maintained as presented in **Section 2**.

2.1.3 Decontamination

The non-dedicated sampling equipment (soil samplers, hand trowels, etc.) that were used during the sample collection process were thoroughly decontaminated before the initial use, between uses, and at the end of the field investigation. Equipment decontamination was completed as follows:

- Water spray or brush, if needed, to remove soil/sediment from the equipment.
- Non-phosphate detergent and potable water wash to clean the equipment.
- Final potable water rinse.
- Equipment air dried.
- Placed in clean and marked bucket.

2.1.4 Sample Preservation, Containers, and Hold Times

After collection, the samples were securely stored in a cooler until they were submitted for analysis. The samples were transmitted to the MDEQ Environmental Laboratory in Lansing, Michigan by a common carrier, typically every other day. Soil sample preservatives were not required, but rinsate blank samples were preserved on ice.

2.2 FIELD ACTIVITIES

WESTON personnel, Ms. Lori Kozel, Ms. Amanda DeClercq, Mr. Ken McRowe, Mr. Tony Noxon, and Ms. Shamille Lewis conducted field sampling.

2.2.1 Sample Custody Procedures

Due to the evidentiary nature of sample collection, the possession of samples (COC) must be traceable from the time the samples are collected until they are introduced as evidence in legal proceedings. Following sample collection and identification, the samples were maintained under COC procedures, as described below.

The COC procedures were made available to all personnel involved with the sampling. A typical COC record was completed each time a sample or group of samples was prepared for shipment to the MDEQ laboratory. The record repeated the information on each of the sample labels and served as documentation of handling during shipment. A copy of this record remained with the shipped samples at all times, and another copy was retained by the member of the sampling team who originally relinquished the samples. WESTON personnel completed a COC form for all samples sent to the MDEQ laboratory.

2.2.2 Photo Documentation

WESTON took photographs to document site conditions, sample locations, and the exposure units as they related to adjacent areas. The photographs showed typical operations and operating conditions, as well as special situations and conditions that arose during site activities.

All photographs were taken with a digital camera. Each photograph was recorded in the logbook with the location of the photograph, the direction the photograph was taken, the subject of the photograph, and its significance (i.e., why the picture was taken). Photographs were labeled using the automated assigned number the digital camera provides. The photograph location, direction, and subject were also shown on the site sketch.

SECTION 3

PHASE II ANALYTICAL RESULTS

3.1 SUMMARY OF ANALYSIS

3.1.1 Residential Investigation

During the Phase II investigation, the following samples were either collected from the project area or compiled from existing reports:

- WESTON collected 372 composite soil samples from 143 properties in the downwind direction.
- WESTON reviewed the report prepared by AKT Peerless titled *Additional Information for the Remedial Action Plan, Grand Haven Residential Redevelopment Site*, dated 28 October 2002. The report contained 315 discrete soil samples collected from 35 exposure units.
- WESTON reviewed the report prepared by MEK Environmental Consultants titled *Baseline Environmental Assessments* for Bulldog Boiler dated 31 October 1996.

Field and QA/QC sample results from the downwind areas are provided in **Tables 3-1 and 3-2**, respectively (**Appendix B**).

In accordance with the QASP, a total of 372 investigative composite samples and 80 quality assurance/quality control (QA/QC) samples were sent to the State laboratory located in Lansing, Michigan for analysis via USEPA SW 6010 for total lead. Sample preparation consisted of screening the samples to separate the fine and coarse fractions. In accordance with MDEQ's proposed lead analytical methodology only the fine fraction was analyzed. Out of the 372 samples collected, 89 of the samples contained concentrations of lead above the project screening level [400 milligrams per kilogram (mg/kg)] that was established in the Phase I QASP. These samples range from 400 to 1,100 mg/kg. The results are shown on **Figure 3-1** located in **Appendix A**.

The AKT Peerless report was prepared for Wayne County as part of a previous neighborhood assessment performed in support of redevelopment efforts in the Grand Haven area. The AKT

Peerless analytical results were not directly comparable to the MDEQ Phase II analytical results because the samples were only analyzed for the total fraction (MDEQ analyzed the fine fraction). In addition, the samples collected by AKT Peerless were discrete grab samples (MDEQ collected composite samples). To allow comparison of the AKT Peerless and MDEQ data sets, the AKT Peerless data was “post-composited” by averaging the concentrations found in each exposure unit. This resulted in 35 post composited samples with concentrations averaging 110 mg/kg to 668 mg/kg. The results are shown on **Figure 3-1** in **Appendix A**.

3.1.2 Facility Investigation

In addition, WESTON collected 20 discrete soil samples and five concrete/brick chip samples from the Continental Metals, Brimar, and Dana Container properties. These samples were collected to aid in identifying the source area. The samples were submitted to the MDEQ laboratory for lead analysis. The soil samples consisted of surface soils. However, the soil samples from the Brimar property were collected from the soils immediately beneath a recently paved area. The concrete and brick chip samples were collected from areas identified as former stack or smelter locations. Soil samples were sieved as described above, and the fine fraction was analyzed. The concrete and brick samples were pulverized and the total fraction was analyzed. The soils concentrations ranged from 52 mg/kg to 6,400 mg/kg, and the concrete/brick samples ranged from 20 mg/kg to 1,400 mg/kg. The results are shown on **Figure 3-1** in **Appendix A**.

In addition to the facility sampling performed at Continental Metals, Brimar, and Dana Container, WESTON reviewed the MEK BEA. The Bulldog Boiler property was formerly operated as Commodity Metals, and was noted by others as a potential source of lead contamination because of historical smelting operations. This property is located east across the railroad tracks from the previously listed facilities. The report included the results from 13 soil and concrete samples collected from the property with concentrations ranging from 6.3 mg/kg to 13,000 mg/kg (**Figure 3-1** in **Appendix A**).

Review of the facility analytical information indicates no elevated concentrations of lead are present at Brimar, and elevated concentrations of lead exist on both the Continental Metals, and

Dana Container properties. However, the concentrations and extent identified are not indicative of lead smelting activities. The concentrations and extent found on the former Commodity Metals property is representative of lead smelting activities, and therefore WESTON believes that property is the source area for off-site deposition of contamination which may exist.

3.2 Atmospheric Conditions

During Phase II soil sampling activities, downwind parcels were chosen based on the mean wind direction from 1984 to 1991 for the Detroit Metropolitan area. A copy of the wind rose plot is provided in **Appendix C**. The wind rose plot showed a prominent northeast wind direction in the Detroit Metropolitan area. If smelting operations occurred, lead in soils resulting from aerial deposition would be found downwind in the northeast direction from the suspected source area. Parcels ranging from 500 ft to 2,300 ft in the northeast direction were sampled, as close to the mean downwind direction of the suspect source area. Elevated lead concentrations were found in the downwind direction of the suspected source area. A detailed analysis of downwind concentrations is contained in **Section 3.4 Spatial Analysis**.

3.3 Statistical Analysis

Analytical data was entered into a spreadsheet and then processed using the MDEQ online statistical interface for Part 201 evaluations. As shown on the distribution analysis figures included in **Appendix D**, the log mean is 6.0 mg/kg, which is comparable to the 5.6 mg/kg identified downwind during the Phase I investigation. In addition, the relative frequency histogram (**Appendix D**), and the Box Plot of Log Data indicate the data are evenly distributed across the data set. Comparison of the recent analytical results against the Phase I upwind samples indicates the lead concentrations are sufficiently different from each other, both in mean concentration and distribution, to conclude that the data represent separate conditions (i.e. upwind is expected urban concentrations and downwind have been influenced by another source).

3.4 Spatial Analysis

Where air transport of particulate occurs, it is expected that the largest impacts on the soil through aerial deposition of particulate will occur closest to the source and that the magnitude of the impact will tend to decrease as a function of distance from the source. In addition, it is expected that the spatial pattern of soil impacts will tend to be elongated in the predominant downwind direction. Thus, the Phase II investigation was designed to determine if an off-site transport of airborne particulate has occurred, by examining the spatial pattern of soil contaminant concentrations as a function of distance from the source in a downwind direction. As seen in **Figure 3-1** in **Appendix A**, concentrations of lead greater than the screening level occur within the primary downwind envelope.

To determine the distribution of the lead concentrations in soils as the distance from the suspected source area increases, WESTON graphed the lead concentrations versus distance for both the MDEQ and the Wayne County data sets. A linear regression analysis of the data confirms that a statistically significant decreasing trend ($p=0.000$ for unsieved and $p=0.0573$ for sieved samples) of lead concentrations in soils exists, as distance from the area of interest increases. As a result, conclusions can be made with the certainty that the data sets are representative of the conditions present. The distance versus concentration graph is shown on the attached **Figure 3-2** in **Appendix A**. The sieved samples collected by WESTON and the unsieved samples collected by Wayne County are plotted separately. This figure shows a steeper slope for the sieved data than the unsieved data, which would be expected if aerial deposition were a significant contributing factor. This is caused by the larger airborne particles of lead “falling out” closer to the source (the stack). It should be noted that the graph of the unsieved data indicates lower overall concentrations than the sieved trend line. This may have occurred due to the depth of samples (if collected lower than 3 inches below ground surface), or location (if collected in disturbed areas). However, assuming all of the Wayne County samples were collected in the same manner, the trend of a lesser slope is significant in determining the presence of aerial deposition, when compared against the sieved data set.

SECTION 4

CONCLUSION AND RECOMMENDATIONS

4.1 CONCLUSION

Review of all data and historical information related to the four potential sources (Continental Metals, Brimar, Dana Container, and Commodity Metals) indicate that the likely source of the lead contamination in residential soils is Commodity Metals. WESTON's experience at a previous smelting project, located in the City of Detroit, determined that the area influenced by aerial deposition was limited to an area 1,600 ft downwind of a 100 foot stack. The stack at Bulldog Boiler is still visible, and is approximately 60 ft tall. Assuming similar environmental conditions (wind speed, direction, etc), it is reasonable to assume the limit of deposition would be found within 1,600 ft at this location, also. Based on a review of the information presented above, WESTON believes that aerial deposition of lead occurred at the properties downwind of Bulldog Boiler. Comparison of the stack heights, and review of the concentration versus distance graph, indicate that the extent of deposition has been limited to a distance of 1,600 ft downwind of suspected source area.

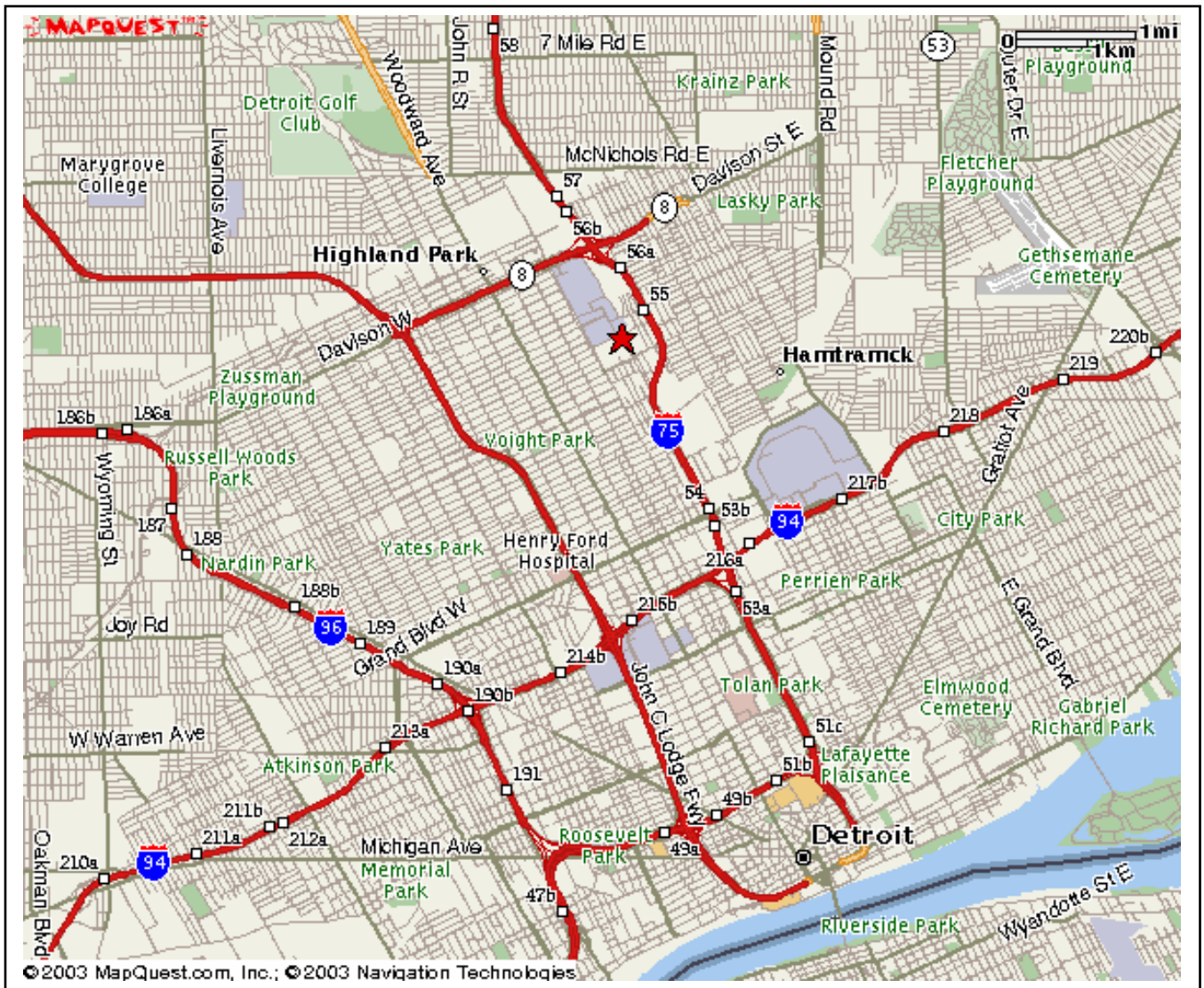
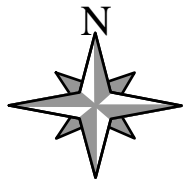
4.2 RECOMMENDATIONS

The contamination detected downwind of the suspected source area appears to be a result of aerial deposition as a result of historical lead smelting. Therefore, WESTON recommends additional sampling, to ensure that all properties within the affected area (1,600 ft downwind of the source area) have been assessed. Following completion of this sampling, a soil removal program should be instituted to remove soil contaminated with lead, which is greater than the health based criteria of 400 mg/kg.

APPENDIX A

FIGURES

FIGURE 1-1
Site Location Map
11500 Russell Street



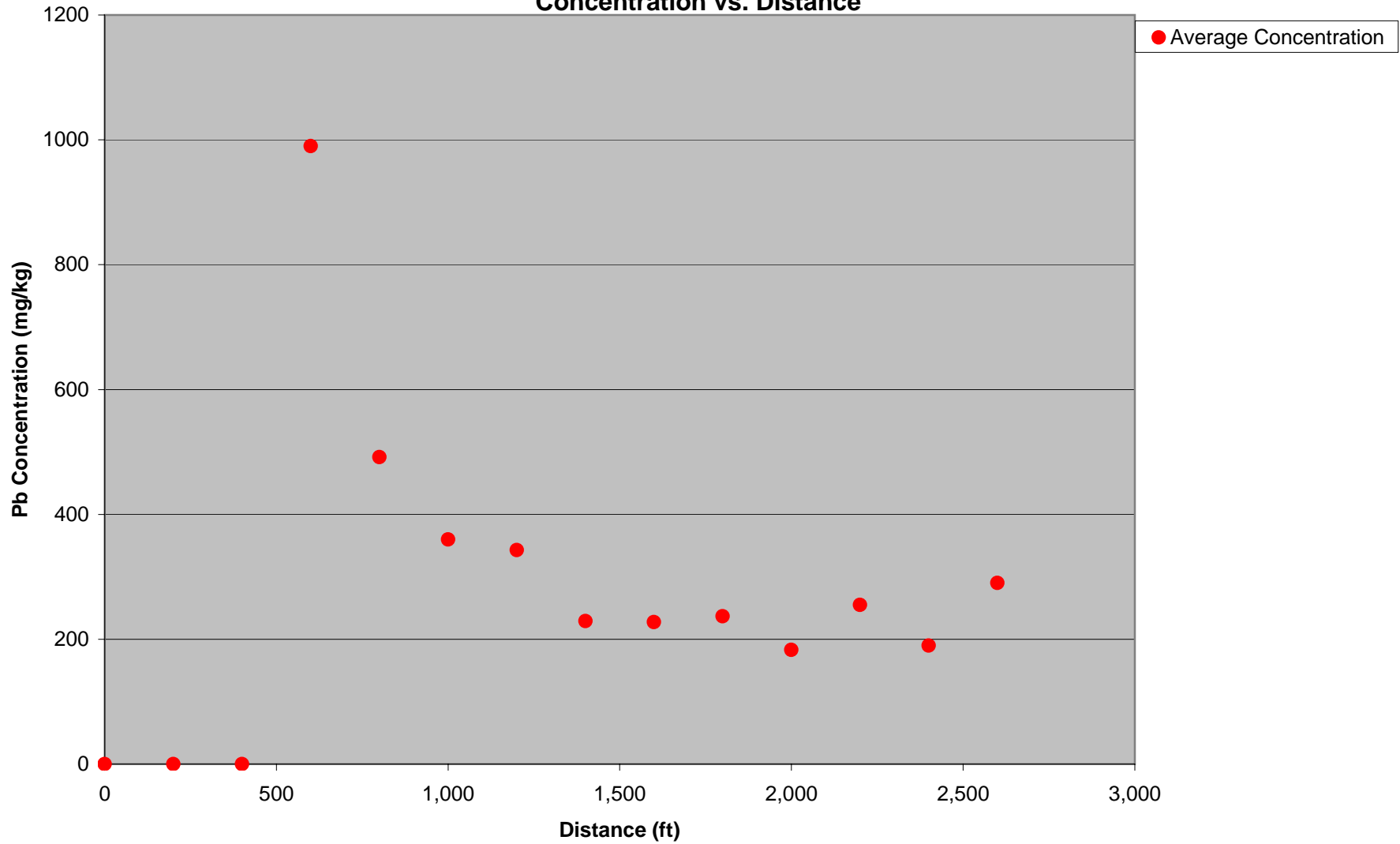
WESTON SOLUTIONS, INC. OF MICHIGAN



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Detroit Lead Assessment Project
Detroit, Wayne County, Michigan
W.O. No. 20083.028.001

Figure 3-2
Continental/Federated Metal
Concentration vs. Distance



APPENDIX B

TABLES

**Table 3-1
Summary of Analytical Results
Investigative Samples
Commodity Metals
Detroit, Michigan**

PROPERTY ID	SAMPLE NO.	DATE	TIME	RESULTS (MG/KG)
1	1	9/14/2004	12:25	600
1	2	9/14/2004	12:35	340
2	3	6/4/2004	10:35	420
2	4	6/4/2004	10:45	430
3	5	6/4/2004	9:35	670
3	6	6/4/2004	9:45	520
3	7	6/4/2004	9:55	210
3	8	6/4/2004	10:05	540
4	9	6/3/2004	15:20	400
4	10	6/3/2004	15:30	320
4	11	6/3/2004	15:55	290
5	12	6/3/2004	14:30	380
5	13	6/3/2004	14:40	400
6	14	6/4/2004	14:10	610
6	15	6/4/2004	14:20	360
7	16	6/3/2004	13:35	280
7	17	6/3/2004	13:45	340
8	18	6/7/2004	9:05	200
9	19	6/7/2004	9:20	280
9	20	6/7/2004	9:30	420
10	21	6/7/2004	9:50	260
10	22	6/7/2004	10:00	470
10	23	6/7/2004	10:10	380
11	24	6/7/2004	10:30	27
12	25	9/14/2004	13:00	620
12	26	9/14/2004	13:10	210
13	27	6/7/2004	10:50	360
13	28	6/7/2004	11:00	450
14	29	6/7/2004	11:20	780
15	30	6/7/2004	12:20	240
15	31	6/7/2004	12:45	190
16	32	6/7/2004	13:00	430
16	33	6/7/2004	13:15	470
17	34	6/7/2004	12:30	280
18	35	6/7/2004	13:50	520
18	36	6/7/2004	14:00	380
19	37	9/14/2004	13:25	210
20	38	9/23/2004	11:40	290
20	39	9/23/2004	11:50	340

Table 3-1
Summary of Analytical Results
Investigative Samples
Commodity Metals
Detroit, Michigan

PROPERTY ID	SAMPLE NO.	DATE	TIME	RESULTS (MG/KG)
21	40	6/7/2004	14:20	280
21	41	6/7/2004	14:30	270
21	42	6/7/2004	14:40	430
22	43	6/7/2004	15:10	140
22	44	6/7/2004	15:20	350
23	45	9/23/2004	11:15	190
24	46	6/22/2004	13:20	130
24	47	6/22/2004	10:25	170
25	48	6/22/2004	13:30	120
25	49	6/22/2004	10:35	140
26	50	6/21/2004	13:30	140
26	51	6/22/2004	8:44	160
26	52	6/22/2004	8:50	170
27	53	6/21/2004	13:45	110
27	54	6/22/2004	8:55	180
28	55	6/22/2004	13:40	120
28	56	6/22/2004	10:45	160
29	57	6/21/2004	13:55	72
29	58	6/22/2004	9:10	150
30	59	6/22/2004	13:55	84
30	60	6/22/2004	10:55	180
31	61	6/21/2004	14:15	87
31	62	6/22/2004	9:25	110
32	63	6/21/2004	14:35	93
33	64	6/22/2004	14:05	190
33	65	6/22/2004	11:05	140
34	66	6/22/2004	9:35	130
35	67	6/22/2004	14:10	110
35	68	6/22/2004	11:15	120
36	69	6/21/2004	14:45	100
37	70	6/22/2004	9:40	130
38	71	6/22/2004	14:20	100
38	72	6/22/2004	11:25	120
39	73	6/21/2004	15:00	99
39	74	6/22/2004	9:50	110
40	75	6/22/2004	14:30	130
40	76	6/22/2004	11:30	110
41	77	6/4/2004	11:10	990
41	78	6/4/2004	11:20	400

Table 3-1
Summary of Analytical Results
Investigative Samples
Commodity Metals
Detroit, Michigan

PROPERTY ID	SAMPLE NO.	DATE	TIME	RESULTS (MG/KG)
42	79	6/4/2004	11:50	370
42	80	6/4/2004	11:40	310
43	81	6/4/2004	13:35	210
43	82	6/4/2004	13:45	770
44	83	6/4/2004	12:30	670
44	84	6/4/2004	12:40	420
45	85	6/4/2004	12:10	550
45	86	6/4/2004	12:20	1100
46	87	6/23/2004	12:35	130
46	88	6/23/2004	9:40	220
47	89	6/22/2004	15:50	140
47	90	6/23/2004	8:10	110
48	91	6/23/2004	12:45	110
48	92	6/23/2004	9:45	150
49	93	6/22/2004	15:40	190
49	94	6/23/2004	8:20	120
50	95	6/22/2004	15:30	170
50	96	6/23/2004	8:30	130
51	97	6/23/2004	12:55	90
51	98	6/23/2004	9:55	170
52	99	6/23/2004	13:05	110
52	100	6/23/2004	10:05	140
53	101	6/22/2004	15:25	150
53	102	6/23/2004	8:45	160
54	103	6/22/2004	15:15	170
54	104	6/23/2004	8:55	150
55	105	6/23/2004	13:15	110
55	106	6/23/2004	10:15	150
56	107	6/22/2004	15:00	190
56	108	6/23/2004	9:05	190
57	109	6/23/2004	13:25	120
57	110	6/23/2004	10:25	160
58	111	6/22/2004	14:50	190
58	112	6/23/2004	9:20	150
59	113	6/23/2004	13:35	91
59	114	6/23/2004	10:35	170
60	115	6/22/2004	14:40	180
60	116	6/23/2004	9:35	160
61	117	6/23/2004	13:45	76

Table 3-1
Summary of Analytical Results
Investigative Samples
Commodity Metals
Detroit, Michigan

PROPERTY ID	SAMPLE NO.	DATE	TIME	RESULTS (MG/KG)
61	118	6/23/2004	10:45	170
62	119	9/13/2005	9:35	850
62	120	9/13/2005	9:45	560
62	121	9/13/2005	9:50	270
63	122	9/13/2005	10:10	430
63	123	9/13/2005	10:20	260
64	124	9/13/2005	10:25	410
65	125	9/13/2005	10:39	260
65	126	9/13/2005	10:40	310
66	127	9/13/2005	10:45	330
66	128	9/13/2005	10:50	420
67	129	9/13/2005	11:19	580
68	130	9/13/2005	11:45	310
68	131	9/13/2005	11:50	210
68	132	9/13/2005	11:55	290
69	133	9/13/2005	12:10	380
69	134	9/13/2005	12:15	430
70	135	9/13/2005	12:30	480
70	136	9/13/2005	12:40	260
71	137	9/15/2005	10:00	690
72	138	9/15/2005	10:15	480
72	139	9/15/2005	10:30	370
73	140	9/15/2005	10:45	290
74	141	9/15/2005	11:00	450
74	142	9/15/2005	11:05	420
74	143	9/14/2005	11:10	300
74	144	9/14/2005	11:15	1000
74	145	9/14/2005	11:20	720
74	146	9/14/2005	11:25	180
74	147	9/14/2005	11:30	270
75	148	9/14/2005	12:15	390
75	149	9/14/2005	12:20	170
76	150	9/14/2005	12:25	360
77	151	9/14/2005	12:30	360
77	152	9/14/2005	12:35	240
77	153	9/15/2005	12:38	470
78	154	9/14/2005	12:40	360
79	155	6/1/2004	9:45	450
79	156	6/1/2004	9:50	340

Table 3-1
Summary of Analytical Results
Investigative Samples
Commodity Metals
Detroit, Michigan

PROPERTY ID	SAMPLE NO.	DATE	TIME	RESULTS (MG/KG)
80	157	6/1/2004	10:10	360
80	158	6/1/2004	10:18	280
81	159	6/1/2004	10:35	340
81	160	6/1/2004	10:41	300
82	161	6/1/2004	10:53	500
82	162	6/1/2004	11:01	530
83	163	6/1/2004	11:13	330
83	164	6/1/2004	11:14	510
84	165	6/3/2004	8:45	630
85	166	6/1/2004	11:40	510
85	167	6/1/2004	11:45	370
86	168	9/13/2005	14:45	430
87	169	6/1/2004	12:02	280
87	170	6/1/2004	12:08	300
88	171	6/1/2004	12:19	450
88	172	6/1/2004	12:24	190
89	173	9/13/2005	14:55	220
90	174	6/1/2004	13:50	360
90	175	6/1/2004	13:55	320
91	176	6/1/2004	14:09	190
91	177	6/1/2004	14:15	160
92	178	6/1/2004	14:36	300
92	179	6/1/2004	14:45	350
92	180	6/1/2004	14:55	260
92	181	6/1/2004	15:00	60
92	182	6/1/2004	15:05	170
93	183	6/1/2004	15:18	480
93	184	6/1/2004	15:25	550
94	185	6/1/2004	15:31	1100
94	186	6/1/2004	15:45	790
95	187	9/13/2005	15:10	220
95	188	9/13/2005	15:15	130
95	189	9/13/2005	15:20	80
95	190	9/13/2005	15:25	290
96	191	6/2/2004	8:35	360
96	192	6/2/2004	8:45	210
97	193	6/3/2004	9:00	330
97	194	6/3/2004	9:15	400
98	195	6/2/2004	9:00	480

Table 3-1
Summary of Analytical Results
Investigative Samples
Commodity Metals
Detroit, Michigan

PROPERTY ID	SAMPLE NO.	DATE	TIME	RESULTS (MG/KG)
98	196	6/2/2004	9:10	230
99	197	6/3/2004	9:25	370
99	198	6/3/2004	9:35	230
100	199	9/13/2005	15:40	290
100	200	9/13/2005	15:30	380
101	201	6/2/2004	9:45	250
101	202	6/2/2004	9:35	290
101	203	6/2/2004	9:25	330
102	204	6/2/2004	10:00	370
102	205	6/2/2004	10:05	370
103	206	6/2/2004	10:15	240
104	207	6/2/2004	10:30	200
105	208	6/2/2004	10:55	260
105	209	6/2/2004	11:05	160
106	210	6/2/2004	11:20	300
106	211	6/2/2004	11:30	230
107	212	6/2/2004	11:40	280
107	213	6/2/2004	11:50	200
108	214	6/2/2004	11:54	200
108	215	6/2/2004	12:10	94
109	216	6/3/2004	10:10	270
109	217	6/3/2004	10:15	270
110	218	6/3/2004	11:05	280
110	219	6/3/2004	11:15	240
110	220	6/3/2004	11:25	390
111	221	6/3/2004	11:35	330
111	222	6/3/2004	11:45	250
112	223	6/2/2004	13:35	220
112	224	6/2/2004	13:45	210
113	225	6/2/2004	14:00	240
113	226	6/2/2004	14:10	160
113	227	6/2/2004	14:20	160
114	228	6/2/2004	14:35	200
114	229	6/2/2004	14:45	330
115	230	6/3/2004	13:00	220
115	231	6/3/2004	13:05	230
116	232	6/24/2004	13:10	130
116	233	6/24/2004	13:50	170
117	234	6/24/2004	13:15	210

Table 3-1
Summary of Analytical Results
Investigative Samples
Commodity Metals
Detroit, Michigan

PROPERTY ID	SAMPLE NO.	DATE	TIME	RESULTS (MG/KG)
117	235	6/24/2004	13:55	180
118	236	6/24/2004	13:20	210
118	237	6/24/2004	14:00	190
119	238	6/24/2004	13:30	180
119	239	6/24/2004	14:10	190
120	240	6/24/2004	13:40	94
120	241	6/24/2004	14:15	100
121	242	6/24/2004	12:05	140
121	243	6/24/2004	9:35	150
122	244	6/23/2004	14:00	100
122	245	6/24/2004	8:00	140
123	246	6/24/2004	12:10	130
123	247	6/24/2004	9:45	160
124	248	6/23/2004	14:10	170
124	249	6/24/2004	8:10	150
125	250	6/24/2004	12:15	170
125	251	6/24/2004	9:55	140
126	252	6/23/2004	14:20	170
126	253	6/24/2004	8:20	160
127	254	6/24/2004	12:20	86
127	255	6/24/2004	10:05	170
128	256	6/24/2004	8:30	160
129	257	6/24/2004	12:30	100
129	258	6/24/2004	10:10	140
130	259	6/23/2004	14:30	140
130	260	6/24/2004	8:25	150
131	261	6/24/2004	10:15	160
132	262	6/23/2004	14:40	99
132	263	6/24/2004	8:35	120
133	264	6/23/2004	14:45	200
133	265	6/24/2004	8:45	110
134	266	6/24/2004	12:35	92
134	267	6/24/2004	10:25	120
135	268	6/23/2004	14:50	180
135	269	6/24/2004	8:55	120
136	270	6/24/2004	12:40	85
136	271	6/24/2004	10:35	120
137	272	6/23/2004	14:55	190
137	273	6/24/2004	9:05	160

Table 3-1
Summary of Analytical Results
Investigative Samples
Commodity Metals
Detroit, Michigan

PROPERTY ID	SAMPLE NO.	DATE	TIME	RESULTS (MG/KG)
138	274	6/24/2004	12:45	100
138	275	6/24/2004	10:45	150
139	276	6/24/2004	10:55	150
140	277	6/23/2004	15:10	200
140	278	6/24/2004	9:10	150
141	279	6/24/2004	12:55	110
141	280	6/24/2004	11:05	82
142	281	6/23/2004	15:15	220
142	282	6/24/2004	9:20	150
143	283	9/14/2004	11:50	620
143	284	9/14/2004	12:10	320
143	285	9/14/2004	12:20	300
144	286	9/14/2004	11:20	420
144	287	9/14/2004	11:35	630
145	288	9/13/2005	14:10	450
145	289	9/13/2005	14:15	220
145	290	9/13/2005	14:20	220
146	291	9/13/2005	14:00	450
147	292	9/14/2004	11:15	320
148	293	9/13/2005	12:20	230
148	294	9/13/2005	12:25	300
149	295	9/14/2004	11:00	390
149	296	9/14/2004	11:10	420
150	297	9/13/2005	11:45	430
150	298	9/13/2005	12:00	300
150	299	9/13/2005	12:10	830
150	300	9/13/2005	12:15	820
150	301	9/13/2005	12:05	240
151	302	9/14/2004	10:30	680
152	303	9/13/2005	11:35	300
153	304	9/13/2005	11:05	440
153	305	9/13/2005	11:25	400
154	306	9/14/2004	10:20	440
155	307	9/14/2004	9:50	780
155	308	9/14/2004	10:00	250
155	309	9/14/2004	10:10	210
156	310	9/13/2005	13:35	140
156	311	9/13/2005	13:40	180
157	312	9/14/2004	9:25	640

Table 3-1
Summary of Analytical Results
Investigative Samples
Commodity Metals
Detroit, Michigan

PROPERTY ID	SAMPLE NO.	DATE	TIME	RESULTS (MG/KG)
157	313	9/14/2004	9:35	320
158	314	9/13/2004	15:25	860
158	315	9/13/2004	15:35	250
159	316	9/13/2004	15:00	490
159	317	9/13/2004	15:10	280
160	318	9/13/2005	10:30	150
160	319	9/13/2005	10:40	260
160	320	9/13/2005	10:50	340
161	321	9/13/2005	10:10	140
161	322	9/13/2005	10:15	94
162	323	9/13/2005	10:05	240
163	324	9/13/2005	9:55	330
163	325	9/13/2005	10:00	330
164	326	9/13/2005	9:35	950
164	327	9/13/2005	9:45	410
165	328	9/12/2005	15:45	250
166	329	9/12/2005	15:40	320
166	330	9/12/2005	16:00	290
167	331	9/13/2004	14:30	420
167	332	9/13/2004	14:40	430
168	333	9/12/2005	15:35	350
168	334	9/12/2005	15:55	260
169	335	9/13/2004	14:10	610
169	336	9/13/2004	14:20	360
170	337	9/12/2005	15:30	220
170	338	9/12/2005	15:50	160
171	339	9/13/2004	13:55	540
171	340	9/13/2004	14:05	270
172	341	9/13/2004	13:10	510
172	342	9/13/2004	13:20	610
173	343	9/13/2004	12:00	280
174	344	9/12/2005	15:05	380
174	345	9/12/2005	15:10	200
175	346	9/13/2004	23:45	470
175	347	9/13/2004	11:55	480
176	348	9/12/2005	14:45	490
176	349	9/12/2005	14:50	560
177	350	9/13/2004	11:25	230
177	351	9/13/2004	11:35	370

Table 3-1
Summary of Analytical Results
Investigative Samples
Commodity Metals
Detroit, Michigan

PROPERTY ID	SAMPLE NO.	DATE	TIME	RESULTS (MG/KG)
178	352	9/12/2005	14:40	530
179	353	9/13/2004	13:35	280
179	354	9/13/2004	13:45	500
180	355	9/13/2004	10:55	400
180	356	9/13/2004	11:05	310
181	357	9/12/2005	13:55	170
181	358	9/12/2005	14:00	160
182	359	9/12/2005	13:30	220
182	360	9/12/2005	13:35	180
182	361	9/12/2005	13:40	260
182	362	9/12/2005	13:45	220
183	363	9/13/2004	10:30	280
183	364	9/13/2004	10:40	240
184	365	9/13/2004	10:05	400
184	366	9/13/2004	10:15	260
185	367	9/12/2005	13:00	500
185	368	9/12/2005	13:15	240
185	369	9/12/2005	13:20	220
186	370	9/12/2005	12:45	190
186	371	9/13/2005	16:18	110
187	372	6/7/2004	15:35	410

Note: **BOLD** values exceed MDEQ Part 201 Criteria

MG/KG = Milligrams per kilogram (Parts per million)

Table 3-2
Summary of Analytical Results
QA/QC Samples
Continental Federated
Detroit, Michigan

SAMPLE #	DATE	TIME	RESULTS (MG/KG)
A	6/1/2004	11:14	530
B	6/1/2004	14:15	540
C	6/1/2004	14:15	550
D	6/1/2004	14:15	160
E	6/2/2004	8:35	370
F	6/2/2004	11:40	290
G	6/2/2004	11:50	200
H	6/2/2004	14:35	230
I	6/2/2004	11:40	630
J	6/2/2004	11:40	640
K	6/2/2004	14:35	590
L	6/2/2004	14:35	600
M	6/3/2004	9:35	260
N	6/3/2004	13:35	250
O	6/3/2004	13:35	680
P	6/3/2004	13:35	680
Q	6/4/2004	09:45	520
R	6/4/2004	12:20	1500
S	6/4/2004	9:45	900
T	6/4/2004	9:45	920
U	6/7/2004	09:50	300
V	6/7/2004	13:00	420
W	6/7/2004	9:50	630
X	6/7/2004	9:50	650
Y	6/22/2004	8:55	180
Z	6/22/2004	11:05	520
AA	6/22/2004	11:05	520
BB	6/22/2004	11:05	130
CC	6/22/2004	14:20	93
DD	6/23/2004	8:10	480
EE	6/23/2004	8:10	490
FF	6/23/2004	8:10	170
GG	6/23/2004	9:55	160
HH	6/23/2004	13:15	470
II	6/23/2004	13:15	470
JJ	6/23/2004	13:15	110
KK	6/23/2004	14:50	200
LL	6/24/2004	8:55	490
MM	6/24/2004	8:55	500

**Table 3-2
Summary of Analytical Results
QA/QC Samples
Continental Federated
Detroit, Michigan**

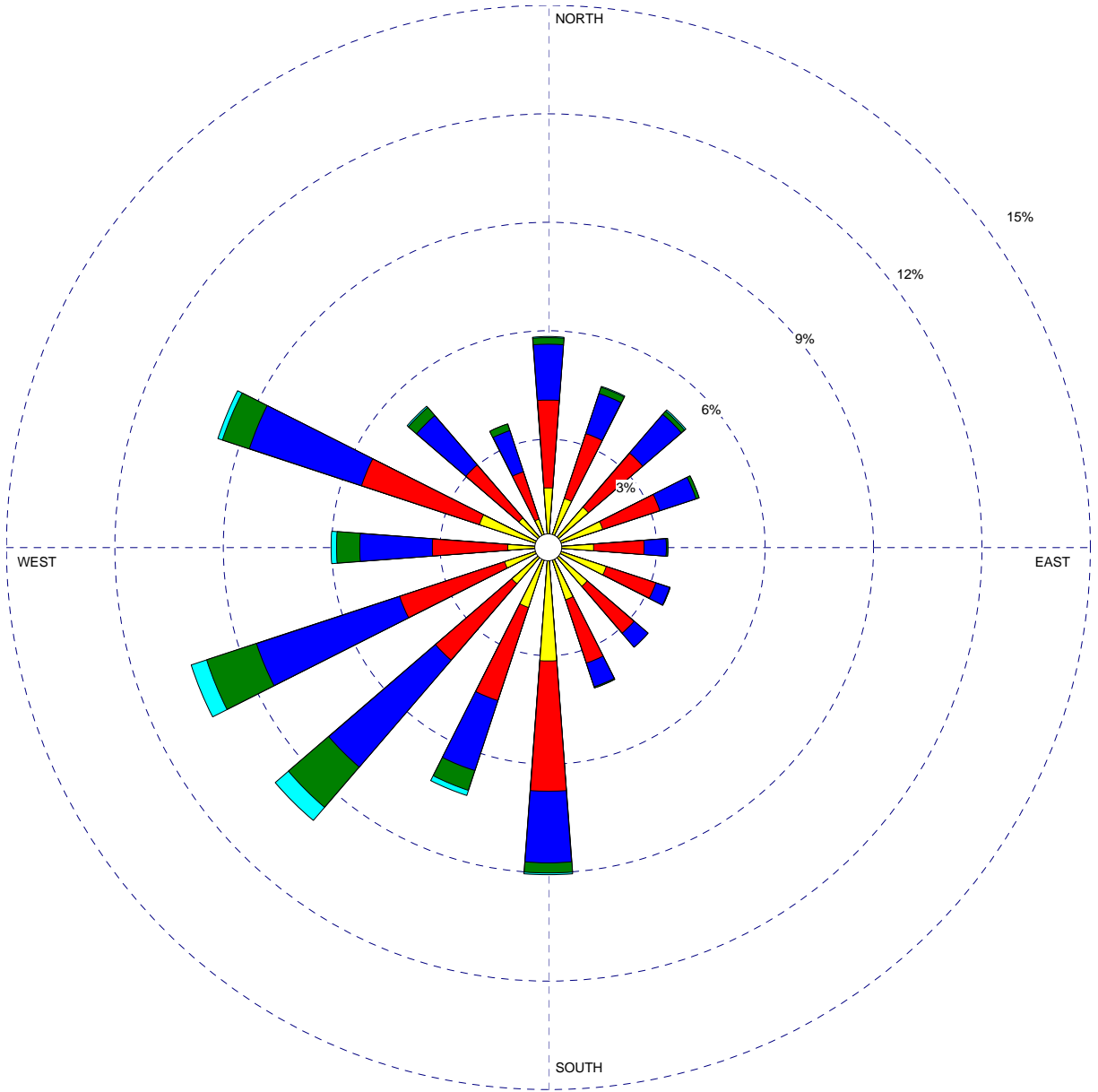
SAMPLE #	DATE	TIME	RESULTS (MG/KG)
NN	6/24/2004	8:55	120
OO	6/24/2004	10:25	98
PP	6/24/2004	11:05	450
QQ	6/24/2004	11:05	450
RR	6/24/2004	11:05	86
SS	6/24/2004	13:10	140
TT	6/24/2004	14:15	450
UU	6/24/2004	14:15	450
VV	6/24/2004	14:15	110
WW	9/13/2004	14:30	920
XX	9/13/2004	14:30	900
YY	9/13/2004	12:00	280
ZZ	9/13/2004	14:30	410
AAA	9/14/2004	12:20	790
BBB	9/14/2004	12:20	780
CCC	9/14/2004	10:30	650
DDD	9/14/2004	13:00	590
EEE	9/14/2004	13:25	670
FFF	9/14/2004	13:25	670
GGG	9/12/2005	12:45	520
HHH	9/12/2005	12:45	560
III	9/12/2005	14:00	180
JJJ	9/12/2005	15:55	370
KKK	9/12/2005	14:40	800
LLL	9/12/2005	14:40	790
MMM	9/12/2005	15:30	520
NNN	9/12/2005	15:30	530
OOO	9/13/2005	10:30	460
PPP	9/13/2005	10:50	410
QQQ	9/13/2005	11:15	430
RRR	9/13/2005	11:55	240
SSS	9/13/2005	14:15	200
TTT	9/13/2005	15:40	280
UUU	9/13/2005	10:15	530
VVV	9/13/2005	10:15	570
WWW	9/13/2005	12:00	750
XXX	9/13/2005	12:00	740
YYY	9/13/2005	14:15	710
ZZZ	9/13/2005	14:15	700
AAAA	9/14/2005	11:10	270
BBBB	9/15/2005	10:00	740

APPENDIX C

WIND ROSE PLOT

WIND ROSE PLOT

STATION #94847 - DETROIT/METROPOLITAN ARPT, MI



<p>Wind Speed (m/s)</p>		DATE 2/3/2003	Weston Solutions, Inc.
	DISPLAY Wind Speed	UNIT m/s	Years 1984-1991
	AVG. WIND SPEED 5.06 m/s	CALM WINDS 3.67%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 84 85 86 87 88 89 90 91 January 1 - December 31 Midnight - 11 PM	ATTACHMENT C

APPENDIX D

STATISTICAL ANALYSIS

APPENDIX D

COMMODITY METALS STATISTICAL DISTRIBUTION

