Waste Management Unit 30 Surface Soil Lead Investigation Revision 1

18251 West Jefferson Avenue Riverview, Michigan

Riverview-Trenton Railroad Company

March 29, 2021

ASTI Environmental





Waste Management Unit 30 Surface Soil Lead Investigation Revision 1

18251 West Jefferson Avenue Riverview, Michigan

March 29, 2021

Prepared For:

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350

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Waste Management Unit 30 Surface Soil Lead Investigation Revision 1 Riverview-Trenton Railroad Company Former McLouth Steel Site 18251 West Jefferson Avenue Riverview, Michigan

1.0 Introduction

In accordance with the Corrective Action Consent Order ("CACO") dated November 1, 2018 between the Riverview-Trenton Rail Road Company ("RTRR") and the Michigan Department of Environment, Great Lakes, and Energy ("EGLE"), ASTI Environmental ("ASTI") is providing this lead investigation summary for a portion of the property located at 18251 West Jefferson Avenue in the City of Riverview, Wayne County, Michigan ("Subject Property"). The Subject Property lies east of West Jefferson Avenue, south of West Jefferson Avenue, and Monguagon Creek, west of the Trenton Channel of the Detroit River and, north of the former McLouth Steel Facility. The portion of the Subject Property which lies south of Sibley Road, is located in the City of Trenton. A Site Location Map is provided as Figure 1 included in Attachment A. ASTI completed this report in accordance with item number seven within the Statement of Work included as Attachment A of the CACO for the Subject Property and with the Work Plan – Waste Management Unit Investigations prepared by ASTI dated June 28, 2019 ("Work Plan").

This report summarizes investigations, completed by others for the former Electronic Arc Furnace ("EAF") Dust Pile, also known as Waste Management Unit 30 ("WMU-30"). Attachment A of this report includes Figure 1 – Site Location Map and Figure 2 – Site Features Map. ASTI reviewed investigations completed by others to determine the extent of lead impacts in surface soil at concentrations exceeding the current Generic Nonresidential Cleanup Criteria ("GNRCC") for Direct Contact ("DC") of 900 milligrams per kilogram ("mg/kg" or parts per million). ASTI did not collect additional data for the purpose of this investigation.

2.0 Subject Property Background

The McLouth Steel Company ("McLouth") acquired the Subject Property between 1956 and 1961, and used portions of it for storage of raw materials, waste, and product to support the integrated production of steel and iron in the production facility located to the south ("McLouth Facility"). A large slag processing operation, operated by E. C. Levy Company, was also located on the Subject Property. Historically, the Subject Property included the Monguagon Creek channel, which flowed from the north to south and bisected the Subject Property, an oil storage terminal, and a large building with docking facilities. By 1961, the large building and oil terminal had been demolished and the Monguagon Creek channel had been rerouted along River Road where it currently empties into the Trenton Channel northeast of the Subject Property (Figure 2). By 1967, the original channel and mouth area of Monguagon Creek had been filled completely and this area was used for storage of equipment and materials (ore, debris, and scrap)¹.

¹ North Area Characterization Plan, Revised, ESC, November 2, 2000.

After about 1975, steel production decreased until McLouth ceased operations in April of 1996 after filing for Chapter 11 bankruptcy protection on September 29, 1995. At that time, only one blast furnace was operational and most other production units were operating at significantly reduced capacities.

Hamlin Holdings, Inc. acquired the Subject Property in July of 1996, although it is unclear what was conducted on the Subject Property during that time. Detroit Steel Company ("DSC") obtained title for the Subject Property in August of 1996 and used it for storage and conducted removal activities. DSC resumed pickling of strip steel at the McLouth Facility in July 1998. In support of the pickling operations, DSC started the scrubber, Central Wastewater Treatment Plant, and the pH adjustment station at the McLouth Facility. Those operations closed in 2005. Crown Enterprises purchased the Subject Property on June 2, 2000 and conveyed the property to RTRR in November of 2000.

3.0 Waste Management Unit 30 Background

McLouth Steel used both basic oxygen furnaces ("BOF") and EAF for production. The waste emission control dust generated from the EAF air pollution control systems was designated as a listed hazardous waste (K061) under the Resource Conservation and Recovery Act ("RCRA"). Sludge was accumulated in a concrete sump and transferred to the interim status EAF Dust Pile storage area. McLouth filed a notification of waste activity and a RCRA Part A permit on November 17, 1980 for storage of EAF dust prior to treatment or disposal. The unit was classified as an Interim Status Hazardous Waste Storage Unit in McLouth's 1980 Part A permit application. WMU-30 was a roughly 25,000 square feet area with an earthen berm built on top of the fill that covers most of the Subject Property. Figure 3 - WMU-30 Soil Sample Location Map, depicts the WMU-30 area.

Part B of McLouth's RCRA storage permit application was called in by the United States Environmental Protection Agency ("USEPA") in 1984. McLouth made various submissions, resulting in a final RCRA/Act 64 permit application dated February 27, 1988. After rejection of that permit, McLouth decided to close the EAF Dust Pile and accumulate EAF dust for no longer than 90 days².

McLouth operated the waste management unit continuously until early 1989, when new concrete accumulation tanks (WMU-31) were constructed and placed into use. Final removal of waste took place in 1991. Approximately 980 tons of EAF dust were transported to Horsehead Resource Development Company in Palmerton, Pennsylvania.

4.0 WMU-30 Closure Activities

McLouth prepared the EAF Dust Pile Closure Plan ("Closure Plan") in August 1988 and revised the Closure Plan in response to comments by EGLE (then known as the Michigan Department of Natural Resources). The revised Closure Plan was approved on October 31, 1988 with a stipulation which required a hydrogeological investigation. The hydrogeological investigation plan was approved by EGLE (then known as the Michigan Department of Environmental Quality) on October 17, 1995.

² Final Closure Report and Certification – Interim Status Hazardous Waste Storage Unit, Techna Corporation, March 31, 1998.

In 1991, McLouth initiated closure activities in accordance with the revised Closure Plan through removal of residual waste material from the EAF Dust Storage pile area. McLouth did not complete any other closure activities prior to termination of operations in 1996. DSC resumed closure activities in the fall of 1996 and completed those activities in late 1997.

Closure activities were conducted in accordance with the revised Closure Plan and the Hydrogeological Investigation Plan. The closure activities consisted of the following:

- Final removal of waste,
- Soil assessment,
- Groundwater assessment, and
- Final Closure Report and Certification.

Final waste removal activities were completed by McLouth between September 23, 1991 and November 13, 1991. Clayton Environmental Consultants, Inc. ("Clayton") completed the initial soil sampling, supplemental soil sampling, and Soil Assessment Report and Certification between February 1997 and August 1997.

The hydrogeological investigation began on October 30, 1996 with the installation of five groundwater monitoring wells: three upgradient of WMU-30 and two downgradient of WMU-30. Four consecutive quarters of groundwater sampling and analysis began in November 1996 and were completed in August 1997. Groundwater analytical results from downgradient wells were compared to results from upgradient wells to determine if the EAF Dust Storage Pile impacted groundwater. Laboratory analytical results for the downgradient wells showed that the EAF Dust Storage Pile did not impact groundwater. The Final Closure Report provides details of the geology and hydrogeology of the WMU-30 area.

The Final Closure Report and Certification – Interim Status Hazardous Waste Storage Unit ("Final Closure Report") prepared by Techna Corporation ("Techna") in March 1998 provides detail about the assessment and closure activities. The Final Closure Report is included as Attachment B. The following sections provide a summary of the surface soil investigation activities and analytical results.

4.1 Surface Soil Lead Investigation

In November 1996, Clayton collected soil samples in accordance with the approved Closure Plan. The sample collection grid was developed in the 1988 closure plan based on a waste pile with dimensions differing from the bermed area depicted in Figure 3. The original grid and pile are shown in in the Closure Plan, which is included in Appendix B. The Final Closure Report and Certification developed by Techna provided an overlay of the original grid area on the bermed waste storage pile. The soil samples were analyzed for barium, cadmium, chromium, lead, and pH. Clayton collected soil samples within and adjacent to WMU-30 to assess soil and outside of the WMU-30 area to determine soil background concentrations.

In accordance with the CACO, this report describes the previous soil assessment activities to determine if surface soil lead impacts resulting from the WMU-30 storage pile have been delineated with respect to the current GNRCC for DC (900 mg/kg). Soil samples were collected from the 50-foot grid system presented in the Closure Plan. Details of the sample



collection process are included in the Final Closure Report and Certification included as Attachment B. Figure 3 – WMU-30 Soil Sample Location Map (Attachment A) depicts the locations of the samples collected in November 1996 and February 1997. Figure 3 shows the WMU-30 area including sample collection locations.

The impacted area was not fully delineated based on the November 1996 sampling event. Therefore, Clayton collected additional soil samples in February 1997 to define the extent of impacts. Details of the sampling process are included in the Final Closure Report (Attachment B) and the sample locations are included in Figure 3 (Attachment A).

4.2 Lead Analytical Results in Surface Soil

The laboratory analytical results from the November 1996 and February 1997 soil investigations conducted by Clayton are summarized in Table 1 and Table 2, respectively. Table 3 provides a summary the lead analytical results for the background soil samples collected during closure activities. Figure 3 depicts the locations of the soil samples and the locations with lead concentrations in exceedance of the current GNRCC for DC (900 mg/kg). As shown on Figure 3, surface soil from sample locations A2, B2, C2, D1, D2, D6, E1, and F4, collected in November 1996, contained lead concentrations exceeding the current GNRCC for DC. Based on the November 1996 surface soil results, lead was not delineated south of A2, east of D1 and E1, west of D6, or north of E1 and F4. Lead impacts were delineated to the west of A2, B2, C2, D2, and E1 based on samples collected from the west-neighboring grids during the same sampling event. Sample E2 provided delineation north of the impacts detected at D2.

The locations of the surface soil samples collected in February 1997 were chosen to delineate the area of impact as defined by the November 1996 sampling event. The surface soil sample designated as A2-South did not contain a lead concentration exceeding the current GNRCC for DC and therefore provided delineation of surface soil lead impacts at the southern extent of WMU-30. Surface soil samples D1-East and E1-East did not contain lead at concentrations exceeding the current GNRCC for DC and therefore provided delineation of surface soil lead impacts at the eastern extent of WMU-30. The surface soil sample collected within the F1 grid did not contain lead at a concentration exceeding the current GNRCC for DC and therefore provided delineation to the north of E1. The surface soil sample collected at the D7 location did not contain lead at a concentration exceeding the current GNRCC for DC and therefore provided the western delineation of surface soil lead impacts in the WMU-30 area. The concrete pad for WMU-31 provides a barrier to direct contact of surface soil north of D6 and west of F4.

Sample G2 (Figure 3) was collected during the February 1997 sampling event at the northern extent of the proposed grid area. Surface soil in the sample collected from the G2 location (G2 Surface) contained a lead concentration below the current GNRCC for DC. However, the duplicate sample from this location (G2 Surface Duplicate) contained a lead concentration of 990 mg/kg, which exceeds the current GNRCC for DC. Table 2 provides a summary of the lead analytical data for the February 1997 sampling event.

Techna collected additional background in July 1997. Sample TBG-A was collected approximately 50 feet north of G2 and contained a surface soil lead concentration of 41.3 mg/kg. Sample TBG-A provided delineation of the northern extent of the surface soil lead impact defined by the G2 location (Figure 3).



The purpose of this investigation is to evaluate lead concentrations in surface soil; however, the background sample collected from the location TBG-E in the interval between three feet to four feet below ground surface (bgs) contained a lead concentration of 1,100 mg/kg which exceeds the GNRCC for DC. The sample collected from the same location in the interval between one foot and two feet bgs contained a lead concentration of 612 mg/kg which is below the GNRCC for DC. Table 3 provides a summary of the lead analytical data for the background samples.

Based on surface soil samples collected in November 1996, February 1997, and July 1997, lead impacts in exceedance of the current GNRCC for DC were delineated for the WMW-30 waste storage area, as defined by the waste pile and bermed area. Three additional surface soil lead impacts were also discovered outside of the bermed waste area (D6, F4, and G2) and sampling conducted in February 1997, July 1997, and the background samples provided delineation of those areas.

5.0 Measures to Prevent Unacceptable Human Exposure to Lead

Historical soil investigations have delineated lead in surface soil at the former EAF Dust Storage Pile location. These samples also exceed the GNRCC for Drinking Water; however, groundwater at the Subject Property is not currently used for drinking water and will not be used in the future for consumption. Therefore, the Non-residential Drinking Water pathway is not complete. Each of the surface soil samples collected during the WMU-30 investigation contained lead concentrations below the GNRCC for Particulate Soil Inhalation of 44,000 mg/kg.

The lead concentrations in surface soil in the WMU-30 area present an unacceptable risk to human health via direct contact with surface soils. Options to prevent unacceptable human exposure to lead in surface soils include placement of a low-permeability soil cap or paving over the impacted area depicted in Figure 3. A soil cap would consist of clay soil, graded to induce surface runoff and prevent surface water leaching into the subsurface. Paving would include covering the impacted surface soil with concrete or asphalt to restrict direct contact with the soil and prevent surface water from infiltrating through the impacted surface soil. Routine inspections would be required for a soil or pavement cap to ensure that the cap is functioning properly. The cap would be inspected for cracking, vegetation growth (soil cap), and/or other signs that the cap is not functioning as intended. Reports detailing the results of each inspection would also be required.

As restrictive covenant would be required after placement of a cap (soil or pavement) to maintain and prevent removal of the cap. The covenant would also restrict installation of wells for consumptive use of groundwater.

6.0 Summary

WMU-30 was formerly used for storage of EAF Dust created from the steel-making process at the former McLouth Steel Facility located in Trenton, Michigan. EAF dust was stored in the WMU-30 area between 1980 until final removal of waste in 1991. Approximately 980 tons of EAF dust waste (K061) was transported offsite for proper disposal.



In accordance with the CACO dated November 1, 2018, ASTI reviewed data collected during previous investigations conducted by others. ASTI did not collect additional data for the purpose of delineating lead in surface soil in the WMU-30 area. Clayton investigated surface soil in November 1996 and delineation soil sampling in February 1997. The samples collected in February 1997 provided delineation of lead in surface soil in the WMW-30 area with one exception (G2). Additional background samples were collected in July 1997 and provided delineation of the GNRCC DC exceedance in G2. Exceedances of the GNRCC for DC are depicted in the shaded area of Figure 3.

Due to the presence of lead in surface soil in exceedance of the GNRCC for DC, measures are required to restrict direct contact to surface soil with lead concentrations exceeding 900 mg/kg. Likely measures include placement of a low-permeability cap (soil or pavement).

7.0 RCRA Certification Statement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

22,56

Greg S. Oslosky, P.G. Director – Grand Rapids



Tables

Waste Management Unit 30 Surface Soil Investigation

Table 1 Summary of Soil Laboratory Analytical Results - Lead Clayton, November 6 and 7, 1996 WMU-30, RTRR - Riverview 18251 West Jefferson Ave., Riverview, MI ASTI Project Number: 10860

Sample Identification and Depth	Units	Lead
A1 (Surface)	mg/kg ⁽¹⁾	884
A1 (2')	mg/kg	739
A2 (Surface)	mg/kg	7,400
A2 (2')	mg/kg	<20
A3 (Surface)	mg/kg	<50
A3 (1')	mg/kg	<50
A4 (Surface)	mg/kg	620
A4(2')	mg/kg	110
BI (Surface)	mg/kg	860
B1 (2')	mg/kg	<50
B1 (2') Duplicate	mg/kg	<50
B2 (Surface)	mg/kg	7,200
B2 (2')	mg/kg	7,200
B3 (Surface)	mg/kg	330
B3 (2')	mg/kg	<50
B4 (Surface)	mg/kg	880
B4 (2')	mg/kg	150
B5 (Surface)	mg/kg	<50
B5 (2')	mg/kg	<50
Cl (Surface)	mg/kg	120
C1 (Surface) Duplicate	mg/kg	180
C1 (2')	mg/kg	110
C2 (Surface)	mg/kg	1,300
C2 (2')	mg/kg	130
C3 (Surface)	mg/kg	220
C3 (2')	mg/kg	<20
C4 (Surface)	mg/kg	320
C4 (2')	mg/kg	<50
C5 (Surface)	mg/kg	430
C5 (2')	mg/kg	<20
D1 (Surface)	mg/kg	1,100
D1 (2')	mg/kg	<50
D1 (2') Duplicate	mg/kg	<50
D2 (Surface)	mg/kg	1,400
D2 (1')	mg/kg	230
D3 (Surface)	mg/kg	510
D3 (2')	mg/kg	<50
D4 (Surface)	mg/kg	560
D4 (2') D5 (Surface)	mg/kg	<50
D5 (Surface)	mg/kg	620
D5 (2') D6 (Surface)	mg/kg	<50
D6 (Surface)	mg/kg	1,700
D6 (Surface) Duplicate	mg/kg	1,800
D6 (2')	mg/kg	<50

Table 1

Summary of Soil Laboratory Analytical Results - Lead Clayton, November 6 and 7, 1996 WMU-30, RTRR - Riverview 18251 West Jefferson Ave., Riverview, MI

ASTI Project Number: 10860

ASTITIOJECT Number: 10000		
E1 (Surface)	mg/kg	2,900
E1 (2')	mg/kg	<20
E2 (Surface)	mg/kg	440
E2 (2')	mg/kg	95
E3 (Surface)	mg/kg	630
E3 (2')	mg/kg	94
E4 (Surface)	mg/kg	690
E4(2')	mg/kg	<20
F2 (Surface)	mg/kg	780
F2 (2')	mg/kg	210
F2 (2') Duplicate	mg/kg	430
F3 (Surface)	mg/kg	380
F3 (2')	mg/kg	<20
F4 (Surface)	mg/kg	1,100
F4 (2')	mg/kg	<50
GNRCC - Direct Contact ⁽³⁾	mg/kg	900
GNRCC - Particulate Soil Inhalation ⁽³⁾	mg/kg	44,000

Notes:

1 - mg/kg = milligrams per kilogram or parts per million (ppm)

2 - "<" indicates concentration below laboratory reporting limit

3 - Per R299.46, June 25, 2018

BOLD and shading indicates a concentration above criteria

Soil samples were collected by Clayton and originaly reported in the Final Closure Report and Certification, Interim Status Hazardous Waste Storage Unit, Techna, March 31, 1998

Table 2 Summary of Soil Laboratory Analytical Results - Lead Clayton, February 5 and 6, 1997 WMU-30, RTRR - Riverview 18251 West Jefferson Ave., Riverview, MI ASTI Project Number: 10860

Sample Identification and Depth	Units	Lead
A1 South Surface	mg/kg ⁽¹⁾	740
A1 South (2')	mg/kg	270
A1 East Surface	mg/kg	190
A1 East (2')	mg/kg	99
A2 South Surface	mg/kg	19
A2 South Surface Dup.	mg/kg	270
A2 South (2')	mg/kg	NA ⁽²⁾
A4 South Surface	mg/kg	270
A4 South (2')	mg/kg	NA
A5 Surface	mg/kg	220
A5 (2')	mg/kg	NA
B1 East Surface	mg/kg	550
B2 (4')	mg/kg	5
B5 (4')	mg/kg	NA
B6 (2')	mg/kg	NA
C5 (4')	mg/kg	NA
C6 Surface	mg/kg	NA
C6 (2')	mg/kg	NA
D1 East Surface	mg/kg	520
D2 (4')	mg/kg	15
D7 Surface	mg/kg	460
E1 East Surface	mg/kg	90
E2 (4')	mg/kg	NA
F1 Surface	mg/kg	440
F1 (2')	mg/kg	160
G2 Surface	mg/kg	640
G2 Surface Duplicate	mg/kg	990
G2 (2')	mg/kg	270
G4 (Surface)	mg/kg	490
GNRCC - Direct Contact ⁽³⁾	mg/kg	900
GNRCC - Particulate Soil Inhalation ⁽³⁾	mg/kg	44,000

Notes:

1 - mg/kg = milligrams per kilogram or parts per million (ppm)

2 - "NA" not analyzed

3 - Per R299.46, June 25, 2018

BOLD and shading indicates a concentration above criteria

Soil samples were collected by Clayton and originaly reported in the Final Closure Report and Certification, Interim Status Hazardous Waste Storage Unit, Techna, March 31, 1998

Table 3 Summary of Soil Laboratory Analytical Results - Lead Background Soil Samples WMU-30, RTRR - Riverview 18251 West Jefferson Ave., Riverview, MI ASTI Project Number: 10860

Sample Identification	Depth (ft. bgs) ⁽¹⁾	Units	Lead
BGDA	0-1	mg/kg ⁽²⁾	450
BGDA	2-3	mg/kg	<20
BGDB	0-1	mg/kg	130
BGDB (Duplicate)	0-1	mg/kg	170
BGDB	2-3	mg/kg	55
BGDC	0-1	mg/kg	260
BGDC	2-3	mg/kg	110
BGDD	0-1	mg/kg	240
BGDD	2-3	mg/kg	<20
BGD1	0-1	mg/kg	120
BGD1	2-3	mg/kg	13
BGD2	0-1	mg/kg	270
BGD2	2-3	mg/kg	43
TBG-A	0-1	mg/kg	41.3
TBG-B	0-1	mg/kg	191
TBG-B	2-3	mg/kg	96.6
TBG-C	0-1	mg/kg	406
TBG-D	1-2	mg/kg	273
TBG-D	3-4	mg/kg	73
TBG-E	1-2	mg/kg	612
TBG-E	3-4	mg/kg	1,110
TBG-F	0-1	mg/kg	399
TBG-G	0-1	mg/kg	185
GNRCC - Direct Contact ⁽³⁾		mg/kg	900
GNRCC - Particulate Soil Inhalation ⁽³⁾		mg/kg	44,000

Notes:

1 - Feet below ground surface

2 - mg/kg = milligrams per kilogram or parts per million (ppm)

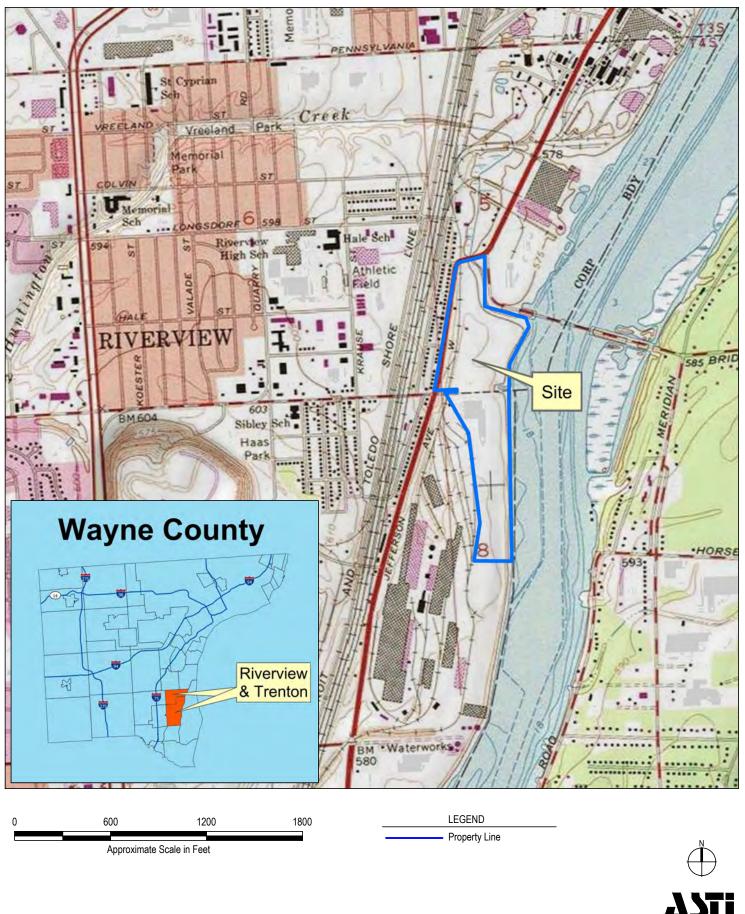
3 - Per R299.46, June 25, 2018

BOLD and shading indicates a concentration above criteria

Soil samples were collected by Techna and originaly reported in the Final Closure Report and Certification, Interim Status Hazardous Waste Storage Unit, Techna, March 31, 1998

Attachment A Figures

Waste Management Unit 30 Surface Soil Investigation



RTRR - WMU-30 Investigation

Created for: Riverview-Trenton Railroad Company ASTI Project 10860, JRN, March 3, 2020 18251 West Jefferson Riverview, MI Fig

Figure 1 - Site Location Map

Environmental



Approximate Scale in Feet

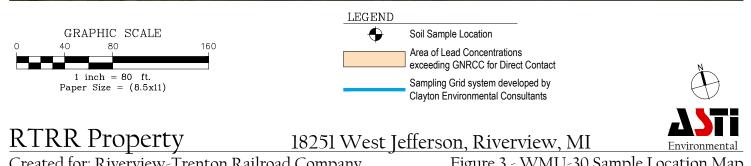
18251 West Jefferson Avenue, Riverview, MI



7, MI Environmental Figure 2 - Site Features Map

RTRR - WMU-30 Investigation Created for: Riverview-Trenton Railroad Company ASTI Project 10860, JRN/JMD, July 16, 2020





Created for: Riverview-Trenton Railroad Company ASTI Project 10860, JRN, March 14, 2021

Figure 3 - WMU-30 Sample Location Map

Attachment B Techna Final Closure Report and Certification

Waste Management Unit 30 Surface Soil Investigation



Knowledge, and the Creativity to Use It

44808 Helm St. Plymouth, MI 48170 (313) 454-1100 Fax. 454-1233

FINAL CLOSURE REPORT AND CERTIFICATION

INTERIM STATUS HAZARDOUS WASTE STORAGE UNIT

DSC Ltd. TRENTON PLANT

MID 017 422 304

Prepared by:

Techna Corporation 44808 Helm Street Plymouth, Michigan 48170

TPN: 00738-12A-001

WASTE MANAGEMENT DIVISION APR 06 1998 RECEIVED

March 31, 1998

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FINAL CLOSURE REPORT AND CERTIFICATION INTERIM STATUS HAZARDOUS WASTE STORAGE UNIT DSC Ltd. TRENTON PLANT MID 017 422 304

1.0 HAZARDOUS WASTE STORAGE AREA CLOSURE CERTIFICATIONS

This closure report is composed of three separate reports (final closure report and reports attached in Appendix B and Appendix C), each containing an engineer's certification of the respective report and work described therein. The following certification by DSC Ltd. references the entire closure project, encompassing all the activities and reports to date.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

DSC Ltd.

Signatur	e: Masshew G. Welkinson
Name:	Matthew G. Wilkinson
Title:	Vice President
Date:	April 1, 1998

The following engineer's certification references the final closure report and all closure data collection and evaluation activities described therein performed by Techna Corporation. I certify under penalty of law that this document and all Techna Corporation attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

TECHNA CORPORATION Signature:

Name: John F. McInnis, P.E.

Date: <u>April 1, 1998</u>

Professional Engineer Registration No.: 37207

Techna Corporation TPN: 00738-12A-001 EAF Closure Report2.doc

2.0 INTRODUCTION

This Closure Report and Certification for the DSC Ltd. (DSC) Interim Status EAF Pollution Control Dust Storage Pile (EAF Dust Pile) was prepared in accordance with the requirements of 40 CFR 265.115 and the approved *Closure Plan for Emission Control Dust Storage Area*, as amended and with stipulations (Appendix A), prepared by McLouth Steel Products Corporation (McLouth). The closure assessment activities were conducted in the following five phases: 1) removal of final wastes, 2) initial closure and background assessment, 3) hydrogeological assessment, 4) supplemental background assessment, and 5) data evaluations and closure reporting.

The EAF Dust Pile closure plan was prepared by McLouth between 1988 and 1995. The Michigan Department of Environmental Quality (MDEQ; fka Michigan Department of Natural Resources) approved the initial closure plan in October 1988 with stipulations. A modified hydrogeological assessment plan was approved by MDEQ as part of the closure plan in 1995. McLouth stopped using the storage pile for EAF dust in 1990± and began accumulating (<90 days) the dust in specially designed concrete tanks. The approved plans had been only partially implemented (removal of EAF wastes in 1991) by the time McLouth terminated operations and entered bankruptcy in 1996. After DSC acquired the assets of McLouth in August 1996, they began activities to complete implementation of the closure plan.

Closure assessment activities were conducted by contractors for DSC between November 1996 and August 1997. Data review, evaluation and reporting activities have been conducted since September 1997. The closure activities and assessment findings are documented in three reports. This final closure report and certification includes discussions of site description and history (Section 3), overall technical approaches to closure (Section 4), technical approaches for collection of supplemental background data (Section 4), and summaries of assessment findings, statistical data evaluations, and conclusion (Section 5). Detailed descriptions and findings of the closure assessment soil sampling and analysis program is presented in a separate report and certification (Appendix B) prepared by Clayton Environmental Consultants, Inc. (Clayton).

Techna Corporation TPN: 00738-12A-001 EAF Closure Report2.doc Detailed descriptions and findings of the hydrogeological assessment conducted by Clayton also are presented in a separate report and certification attached in Appendix C.

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3.0 SITE DESCRIPTION AND HISTORY

3.1 Location

The DSC Trenton Plant is located at 1491 West Jefferson Avenue, Trenton, Wayne County, Michigan. The EAF dust storage pile was located on the north portion of the property, northeast of the intersection of West Jefferson Avenue and Sibley Road (Figures 1 and 2).

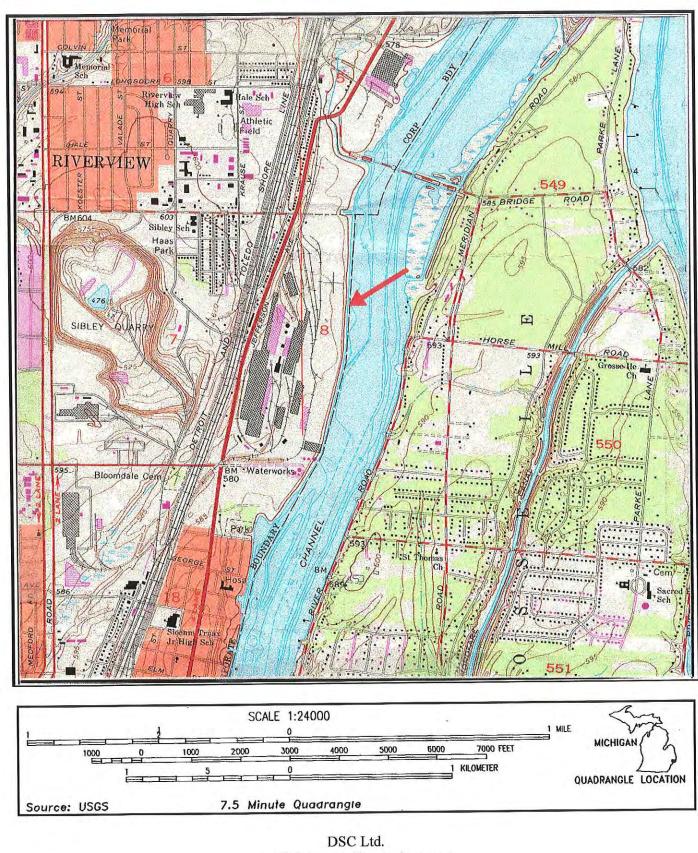
The interim status storage area was constructed on bare soil/fill (see also Section 3.3) in the vicinity of other piles of iron and steel making debris. The storage pile area was identified by McLouth prior to DSC's acquisition of the property, and the area was delineated by an earthen berm for closure activities (Figure 2).

The storage pile area was irregularly shaped and occupied approximately 25,000 square feet of ground surface. It was constructed in an area that is composed of fill to a depth of 15'-20'. This fill consists of iron and steel making wastes (e.g. scales, slag, <u>air pollution control dusts</u>, coke and graphite fines, refractory, and dried process and <u>wastewater treatment sludges</u>) and plant debris (e.g. brick, refractory, and scrap metal). The portion of the site containing the EAF debris pile was acquired between 1956 and 1961 by McLouth based on reviews of aerial photographs. Significant fill was deposited in the area to raise the ground elevation between 1961 and 1967. By 1967 the general area of the EAF pile was in use for storage of raw materials and/or process waste and plant debris in piles. Between 1967 and 1997 the area was in continuous use for storage of these materials, as well as scrap, surplus equipment, and construction materials.

3.2 <u>History and Operation of Waste Management Unit</u>

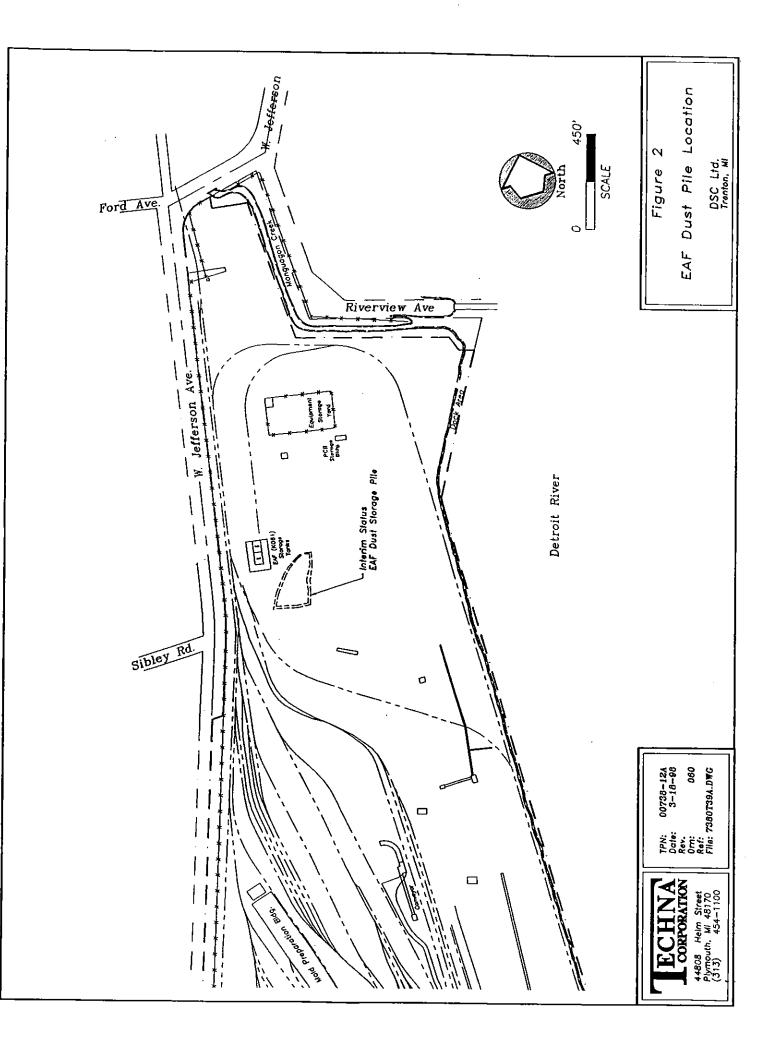
The McLouth Steel Products Corporation was an integrated iron and steel producing facility that used both basic oxygen furnaces (BOF) and electric arc furnaces (EAF) to produce steel. The waste emission control dust generated from EAF air pollution control systems was designated as a listed hazardous waste (K061) by USEPA rules promulgated in 1980 pursuant to the Resource

Site Diagram



DSC Ltd. 1491 West Jefferson Avenue Trenton, Wayne County, Michigan

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Conservation and Recovery Act (RCRA). McLouth filed a notification of waste activity and a RCRA Part A permit on November 17, 1980 for storage of EAF dust prior to treatment or disposal.

The EAF Dust Pile was established on the north portion of the McLouth property as described in Section 3.1 and operated continuously until final removal of waste in 1991. The final waste removal occurred during the period September - November 1991. Approximately 980 tons of EAF dust wastes were transported to Horsehead Resource Development Co. in Palmerton, Pennsylvania.

EAF dust was generated at a rate of approximately 1,500 tons per year from the EAF wet collector air pollution control system located outside the northeast part of the Melt Shop building. Sludge was accumulated in a concrete sump and transferred by truck, wholly within the site boundaries, to the interim status EAF Dust Pile storage area. Stored waste was then periodically transported for off-site disposal or resource recovery.

Part B of McLouth's RCRA storage permit application was called in by the USEPA in 1984. McLouth made various submissions in response to the call in, culminating in a final RCRA/Act 64 Permit Application dated February 27, 1988. After that application was rejected by the Michigan Department of Natural Resources (MDNR), McLouth decided to close the EAF Dust Pile and accumulate EAF dust for no longer than 90 days.

A closure plan was submitted to the MDNR in August 1988 and was subsequently revised in response to MDNR comments. The revised closure plan was approved with stipulations on October 31, 1988. A groundwater monitoring plan, required by the October 1988 stipulations, was approved by the MDEQ on October 17, 1995. Copies of the approved closure plan and groundwater monitoring plan are attached in Appendix A.

Closure activities were initiated by McLouth in 1991 with the removal of residual waste materials from the EAF Dust Pile storage area. No further closure actions were taken by McLouth prior to termination of operations in the spring of 1996. Closure activities were restarted by DSC after acquisition of the property. Closure assessment tasks began in the fall of 1996 and were completed in late 1997. Data evaluation and reporting tasks were completed with the submission of this report.

3.3 Site Setting and Geology

The former EAF Dust Pile storage area was located on an upland portion of the northern part of an approximately 260-acre property (Figure 1) now owned and managed by DSC. The property is bounded on the west by West Jefferson Avenue; on the south by industrial property, then park land and residences; on the east by the Detroit River, and on the north by Monguagon Creek, then other industrial properties. The site is generally flat, with a gradual slope toward the Detroit River, that is more pronounced on the southern portion of the property.

The general site stratigraphy consists of fill overlying a lacustrine clay stratum, which in turn overlies limestone bedrock (Figure 3; from *Summary of Initial Assessment Results, DSC Ltd.* - *Trenton Plant,* October 20, 1997, previously submitted to the MDEQ). The underlying native clay layer typically varies in thickness from 10' to 20', except along the Detroit River in the central portion of the site. Only fill is observed over the bedrock in this area, probably representing historical reclamation of low lying river edges. Fill on the remainder of the site varies in thickness from 4' to 25', generally increasing in thickness from west to east, toward the river. The uppermost zone of saturation was perched in the base of the upper fill stratum, generally bounded by the underlying confining clay unit.

The stratigraphy in the area of the former EAF Dust Pile is consistent with the general site geology. Boring logs from the hydrogeological assessment for closure (Appendix C) indicate that the uppermost stratum typically is composed of approximately ten feet to 15 feet of industrial fill. The fill layer is underlain by the clay stratum observed on the remainder of the

upland portions of the property. Fill was observed to an atypical depth of at least 30 feet in MW-4, southeast of the EAF pile. It was reported by Clayton that this boring was advanced through an area of mounded fill above grade.

The groundwater table in the vicinity of the former EAF dust pile was observed at a depth of approximately eight to 16 feet below typical grade. Groundwater flow direction in the area generally was to the south-southeast. The flow direction appeared to trend in a more southerly direction, with a shallower gradient, east of the former storage pile.

4.0 CLOSURE ACTIVITIES

Closure activities were performed as described in the approved closure plan and hydrogeological investigation plan. Final waste removal was accomplished in 1991. Initial site assessment activities included collection of background samples and assessment (foreground) samples from 0' to 2' BGL (below ground level) at 27 locations. After review of analysis results from those samples, additional samples from stepout locations and greater depths at original locations were collected and analyzed to complete delineation of the suspected potential impact from waste management activities. Background samples from seven additional locations nearer the EAF storage pile were subsequently collected to improve the representativeness of data collected to characterize the chemistry of fill not impacted by waste management activities.

The hydrogeological investigation was conducted using five groundwater observation wells located upgradient and downgradient of the former storage pile. Four quarterly sampling episodes were employed to collect sufficient data for a groundwater impact evaluation.

4.1 <u>Closure Schedule</u>

Closure activities pursuant to the approved plans were performed according to the following schedule:

Final Removal of Waste
Closure Assessment (Soil)
Clayton Initial Sampling and Analysis11/6/96 - 11/7/96
Clayton Supplemental Sampling and Analysis
Clayton Initial Soil Assessment Report and Certification
Techna Supplemental Background Sampling and Analysis
Closure Assessment (Groundwater)
Observation Well Installation10/30/96 - 11/20/96
Initial Sampling and Analysis11/8/96 - 11/20/96

Second Quarterly Sampling and Analysis	2/5/97	
Third Quarterly Sampling and Analysis	5/23/97	
Fourth Quarterly Sampling and Analysis	8/27/97	
Hydrogeological Investigation Report and Certification	12/9/97	
Final Closure Report and Certification		

4.2 Final Waste Removal

Removal and disposal of the last wastes stored in the EAF dust pile commenced on September 23, 1991 and continued until November 13, 1991. Wastes were transported by Autumn Industries, Inc. to Horsehead Resource Development Co. in Palmerton, Pennsylvania. Approximately 980 tons of EAF dust were removed from the storage pile. Copies of transportation manifests for the shipments of waste material are attached in Appendix D.

4.3 <u>Closure Assessment - Soil</u>

Soil samples were collected in November 1996 from background and assessment sampling points selected as described in the approved closure plan (Figure 4, Figure 5 and Appendix B). The initial samples were analyzed for the following species (totals basis): barium, cadmium, chromium, lead and pH. Approximately 20% of the initial samples, and all background samples, also were analyzed for hexavalent chromium. Comparison of initial assessment sample results to calculations of background values for target analytes (mean $+ 3\sigma$ as in the approved work plan) indicated limited areas of impact from barium (Ba), cadmium (Cd), chromium (Cr) and lead (Pb). Hexavalent chromium (Cr VI) was not detected in any sample.

Additional assessment samples were collected in February 1997 to further define the extent of suspected impact. Individual samples were analyzed for only the metals specie(s) measured at levels above background in proximate sample(s) in the previous assessment episode. Method reporting/detection limits for the target analytes are summarized below:

Barium1.0-10 mg/kg (higher limits due to high analyte concentrations)Cadmium0.05-10 mg/kg (higher limits due to high analyte concentrations)Chromium2.5-130 mg/kg (higher limits due to high analyte concentrations)Chromium VI0.1 mg/kgLead1-50 mg/kg (higher limits due to high analyte concentrations)

Complete descriptions of soil assessment activities, procedures and findings are presented in the Clayton closure assessment report and certification attached in Appendix B.

4.4 <u>Supplemental Background Assessment - Soil</u>

Evaluations of the results presented in the Clayton soil assessment report (Appendix B) indicated that a clean closure determination based on the background sampling locations and statistical approach in the approved closure plan would not be appropriate for site conditions for the following reasons:

- the EAF pile was constructed on top of fill with chemical characteristics very similar to the EAF dust;
- the initial background samples were in a fill area and did not represent native soil;
- the target metals concentrations in assessment and background samples exhibited a high degree of variability; and
- the initial background sample locations were too far removed from the EAF pile area to confidently assume that they were representative of the fill upon which the pile was built.

Results of these evaluations further indicated that a clean closure determination would have to be based on a "contribution" standard, particularly for species (cadmium, chromium and lead) with more variable concentrations. To that end, Techna collected additional representative samples of the fill which underlies the area of the EAF pile. The analysis results from assessment samples were then compared to the background data set to determine if waste management activities contributed to the levels of metals in the underlying fill or if those levels were typical of the fill, unimpacted by waste management activities, in the area.

Techna collected ten additional soil samples from seven background locations within approximately 100 feet of the former EAF dust storage pile (Figures 4 and 5) on July 28, 1997. Sample locations were selected at random, but roadways and debris piles were avoided. Samples were collected randomly from depths of 0'-1' BGL, 1'-2' BGL, 2'-3' BGL and 3'-4' BGL. A summary of sampling locations and depths is presented in Table 1 (Section 5). An eleventh sample (TBG-H) was collected from a location approximately 250'-300' south of the EAF pile. This sample was rejected from subsequent background evaluations because of its distance from the EAF pile.

Soil samples were collected with a split barrel sampler. Samples were collected from the soil column at the specified sampling depths. Sampling equipment was decontaminated prior to the collection of each discrete sample using a 1) phosphate free surfactant wash, 2) deionized water rinse, 3) isopropyl alcohol rinse, and 4) final deionized water rinse. Samples were placed directly into 120-ml, pre-cleaned, glass sample jars fitted with Teflon lined covers and stored at approximately 4° C until analyzed.

Samples were managed and transferred to the analysis laboratory, Fire and Environmental Consulting Laboratories, Inc., under strict chain-of-custody protocols. The samples were chemically analyzed for Cd, Cr, and Pb using USEPA Method 6020 (SW-846). Method reporting/detection limits for the target analytes are summarized below:

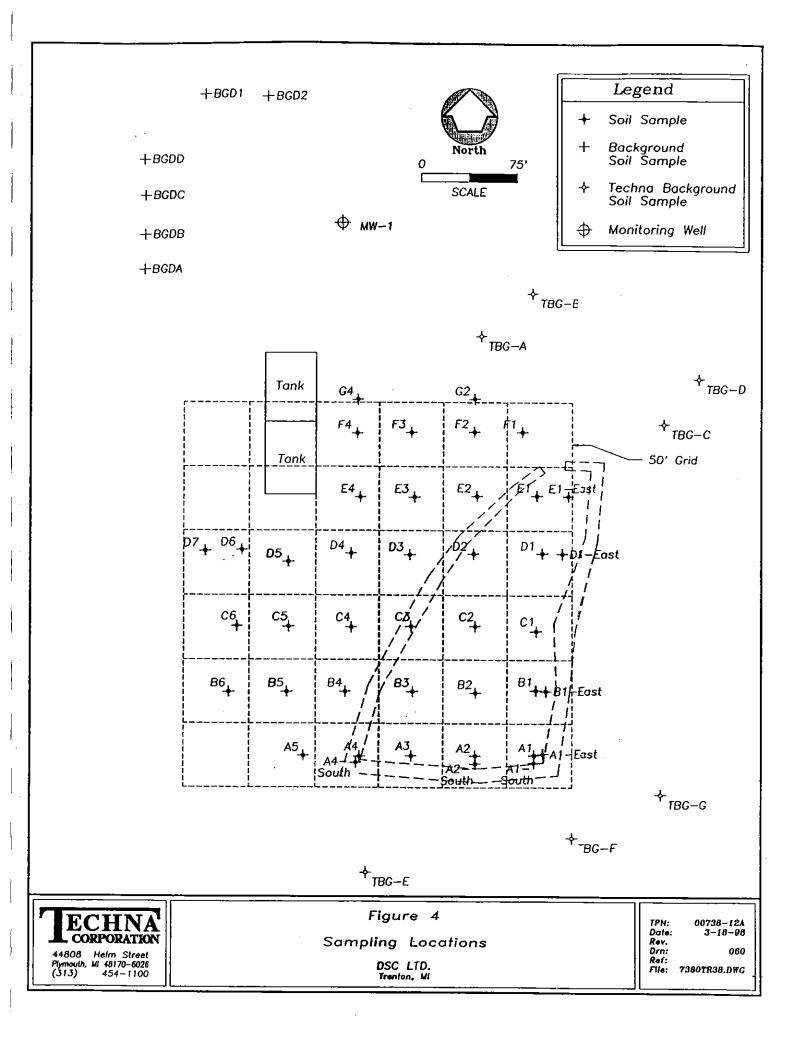
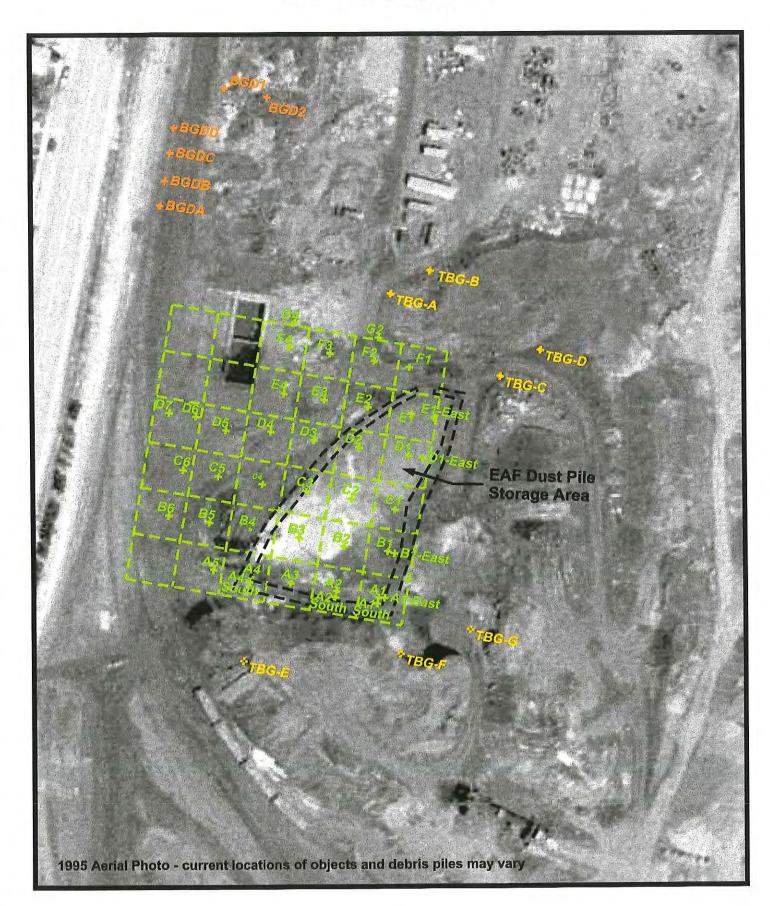


FIGURE 5 Closure Sampling Overlay



Cadmium	0.05 mg/kg
Chromium	1.0 mg/kg
Lead	1.0 mg/kg

4.5 <u>Closure Assessment - Groundwater</u>

Groundwater samples were collected from five observation wells installed in October and November 1996 as specified in the approved closure plan. Samples were collected during four quarterly sampling events and analyzed for the following species: barium, cadmium, chromium, hexavalent chromium, lead and pH. Method reporting/detection limits for the target analytes are summarized below:

Barium	0.2 mg/L
Cadmium	0.0005 mg/L
Chromium	0.05 mg/L
Chromium VI	0.005-0.05 mg/L (higher limits due to matrix interferences)
Lead	0.003 mg/L

Complete descriptions of observation well installation activities, groundwater sampling and analysis procedures, and findings are presented in the Clayton closure assessment report and certification attached in Appendix C.

5.0 CLOSURE ASSESSMENT RESULTS AND CONCLUSIONS

Data collection activities during the closure assessment included 1) background and foreground soil sampling for chemical analyses and visual characterization, 2) groundwater measurements for hydrogeological characterizations, and 3) upgradient and downgradient groundwater sampling for chemical analyses. Results of these activities are presented and discussed in the following subsections.

5.1 Soil Stratigraphy and Hydrogeology

Evaluations of boring logs and groundwater elevation measurements from the hydrogeological investigation (Appendix C), results of previous subsurface investigations (Figure 3), and visual observations during soil sampling were compiled to characterize the subsurface stratigraphy and hydrogeology in the area of the former EAF Dust Pile. The uppermost stratum is composed of approximately 15 feet to 18 feet of industrial fill. The fill layer is composed of brown to black sand and clayey sand containing pebbles, brick, slag, rock and metal debris. Based on historical data for the site, this fill is generally composed of iron and steel making wastes such as slag, scale, air pollution control dusts, wastewater treatment sludges and filter cake, coke fines, refractory, and other debris generated at the site. Fill was observed to an atypical depth of at least 30 feet in MW-4, southeast of the EAF pile. This resulted from the placement of MW-4 on a mounded area of debris (Appendix C).

The fill was underlain by a stratum of native clay. The thickness of this clay was not measured in the area of the EAF dust pile, but was found to be 10 feet to 20 feet thick over most of the property (see below). Groundwater was observed in a perched saturated zone in the fill immediately above the underlying native clay layer. The groundwater table typically was measured at approximately 8 feet to 15 feet below ground level, at elevations between 580 feet and 575 feet NVGD. The elevation of the Detroit River was approximately 573 feet NGVD during the assessment period (*Summary of Initial Assessment Results, DSC Ltd. - Trenton Plant,* October 20, 1997, previously submitted to the MDEQ). Groundwater flow direction in the

area of the former EAF Dust Pile generally is to the south-southeast. The flow direction appears to trend in a more southerly direction, with a shallower gradient, east of the former storage pile. These results were consistent for the four quarterly monitoring periods. Additional groundwater monitoring results are presented in Section 5.3.1 and Appendix C.

5.2 Soil Assessment

5.2.1 Background Soil Samples

Background samples were collected during two sampling episodes. The combined analysis results for detected species in all representative samples are presented in Table 1. Hexavalent chromium was not detected in any background sample. Laboratory analysis reports for these samples are attached in Appendix B and Appendix E.

The upper limit of the mean background concentrations (mean + 3σ ; hereafter, background mean) of the target metals also are presented in Table 1. Upper limits were calculated for both the complete data set and for the Techna samples (TBG) only. The Techna data set was evaluated separately because it is composed of representative samples collected from fill in the immediate vicinity of the former EAF Dust Pile, but in areas not impacted by the waste management activities. The Clayton background samples (Appendix B) were collected in a limited area northwest of the storage area. This sampling area was along a railroad spur near West Jefferson Avenue. The characteristics of this area are different from the storage area, and the fill may not be representative of the material on which the former EAF Dust Pile was operated.

The data sets for all four target metals showed a high degree of variability. This was consistent with the types of industrial fill known to compose the subsurface soil stratum in this area. The fills are comprised of scales, slags, air pollution control dusts and other metals-containing materials generated at high temperature. These materials typically contain microscopic to

TABLE 1

Summary of Target Background Metals Coucentrations and Upper Limit Values

Sample	Depth				
Location	(Ft. BGL)	Barium	Cadmium	Chromium	Lead
BGDA	0-1	270	3,60	480	450
BGDA	2-3	110	0.33	690	<20
BGDB	0-1	82	1.30	650	130
BGDB (Dup.)	0-1	92	1.70	420	170
BGDB	2-3	36	0.77	430	55
BGDC	0-1	50	0.78	330	260
BGDC	2-3	110,	0.40	690	110
BGDD	0-1	68	1.00	360	240
BGDD	2-3	61	0.38	930	<20
BGD1	0-1	100	<0.05	250	120
BGD1	2-3	17	<0.05	530	13
BGD2	0-1	140	< 0.05	290	270
BGD2	2-3	34	< 0.05	540	43
TBG-A	0-1	NA	0.82	561	41.3
TBG-B	0-1	NA	1.83	200	191
TBG-B	2-3	NA	1.38	197	96.6
TBG-C	0-1	NA	5.00	429	406
TBG-D	1-2	NA	1.42	488	273
TBG-D	3-4	NA	1.58	39	73.1
TBG-E	1-2	NA	7,19	3,770	612
TBG-E	3-4	NA	9.18	208	1,110
TBG-F	0-1	NA	2.05	302	399
TBG-G	0-1	NA	2.38	145	185
BACKGROUN	D UPPER LIN	1IT - ALL D	ÁТА		
Mean		90	1.9	560	229
Std. Dev. (S)		65	2.3	730	249
Mean+3S		280	8,9	2,800	976
		285	88	2750	975
BACKGROUND UPPER LIMIT - PROXIMATE (TECHNA "TBG-") DATA					
Mean		NA	3.3	634	339
Std. Dev. (S))	NA	2.9	1,114	324
Mean+3S		NA	12	3,980	1,310

NOTEs: Measurements <MDL were replaced with 0.5 x MDL for statistical calculations;

poge 15 - did not use 1786-H" due to distance from EAF pilo م م ک

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granular sized inclusions of condensed metallic components. This often causes highly variable distributions of metals species in both collected samples and the aliquots removed from those samples for analyses. Background data sets of ≥ 10 samples were used to help compensate for this inherent variability.

The upper limit of background concentrations for the Techna data set were similar to, but somewhat higher than, those for the full data set. This is probably indicative of differences in fill between the more atypical sampling locations specified in the approved closure plan (Clayton data) and the sampling locations more directly associated with the material under the former EAF dust pile (Techna data).

5.2.2 Assessment (Foreground) Soil Samples

The results of chemical analyses performed on foreground samples collected in November 1996 and February 1997 are presented in Tables 1 and 2 in Appendix B. The results for Cd, Cr, and Pb were highly variable, as observed in the background samples. Results for Ba also were quite variable, but generally not as much as the other three analytes. Hexavalent chromium was not detected in any assessment sample.

Soil pH values typically were measured in one of two general ranges: 8.5 - 9.5 S.U. and 11.5 - 12.5 S.U. Samples in the lower range generally were collected from near surface (0'-1') soil, and samples in the higher range generally were collected from the subsurface $(\geq 1' - 2')$.

5.2.3 Comparison of Foreground and Background Data

Since the former EAF Dust Pile was managed on top of fill containing elevated levels of the same target metal contaminants as in the EAF dust, a clean closure demonstration would rely on verification that waste management activities did not result in an increase in (contribution to) the inherent levels of metals in the fill. After reviewing the high variability of the assessment results, it was determined that the appropriate demonstration would be a comparison of 1) the background mean (mean $+ 3\sigma$) of the concentrations of each metal in the local site background fill with 2) the true average concentration of each metal in the assessed (foreground) fill,

Techna Corporation TPN: 00738-12A-001 EAF Closure Report2.doc represented by the 95% upper confidence limit (UCL) of the mean of the measured concentrations.

The foreground data set for each metal was comprised of the analysis results presented in Tables 1 and 2 of Appendix B. The number of data points for the four target metals ranged from 62 to 79. The data set for each metal was divided into ranges of values, and the number of results in each range was plotted to determine if the data distributions were normal or lognormal. These plots are presented in Figure 6.

None of the four data sets demonstrated a normal distribution and were subsequently treated as lognormally distributed. The 95% UCL for the arithmetic mean of the lognormally distributed data was calculated as described in *Supplemental Guidance to RAGS: Calculating the Concentration Term*, USEPA Publication 9285.7-081, May 1992 (Appendix F). The data was first transformed using the natural logarithm function, and the arithmetic mean and standard deviation of the transformed data was determined. The 95% UCL was then calculated using the H-statistic as described in the USEPA reference document. A summary of the results of the 95% UCL calculations is presented in Table 2.

The 95% UCL for the foreground mean concentration of each detected target metal was compared to the background mean for that metal. Comparisons were made to the background mean for all data and for the more proximate Techna data set (see Section 5.2.1). A summary of the comparison data is presented in Table 2.

The foreground 95% UCL for Ba and Cr were well below the respective background reference values. This demonstrates that waste EAF dust management activities did not contribute to the levels of these metals present in the soil under or near the former EAF dust storage pile.

The average foreground concentrations of Cd and Pb were below the respective background reference values calculated from results of analyses of the proximate (Techna) data. However, they were slightly above the reference values calculated from the complete data set. Based on the

FIGURE 6

Concentration Distribution Plots EAF Dust Pile Assessment Results

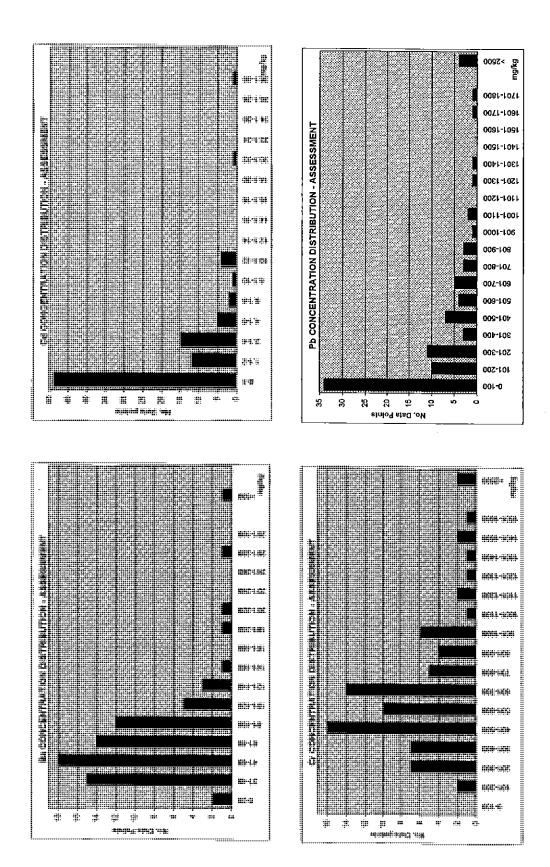


TABLE 2

Summary of Lognormal Statistical Determination of 95% UCL for EAF Dust Pile Assessment Results

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	Background Upper Limit All Data (mg/kg)*	290° 280 22 w	a5,3° ⁶ 8.9 8.8 ⁶⁶	2,800 2734 °5	2021 / 976 963 ²⁵	 7786 and Bell 5 and 15 100 + 100 + 100 - 4 - did ré 100 + 100 + 100 - 4 - is an <u>anthrotic</u> (alaberta noing by chand exchange)
AC 17 H. W. C. T. C.	Background Upper Limit Proximate Data (mg/kg)*	NA Ž + J	12	3,980	1,310	so and and the
-	95% UCL (mg/kg)	86 28.4	9.7 15 ^{.4}	870 538	1,200 S ^Y	
	$\mathbf{H}_{0.95}$	1.941	3.308	1.942	2.847	
	$\mathbf{S}_{\mathbf{inx}}$	0.61 👌	1.92 R	0.62 o ^t	· 1.55 🕅	
	Mean _{inX}	4.11 o ^t	-0.2 <u>9</u>	6.43 ° ⁴	5.35 of	
	N	62	LL	. 89	79	able 1
	Analyte	Ba	Cd	Cr	Рb	* Data from Table 1
		(P)	Ъ. С	Ì		-

following evaluations of the assessment data comparisons, the foreground-background comparisons do not indicate that waste management activities contributed to the levels of Cd and Pb measured in the assessment samples:

- the biased (non-representative) nature of the original (Clayton) data set indicates that comparison to the Techna background data set is more reliable than comparison to the complete data set;
- the high variability of the data support a general conclusion that all of calculated background and foreground values for each metal are comparable.

Therefore, statistical evaluations of the soil assessment results demonstrate that waste EAF dust management and storage activities did not result in a contribution of contamination in the interim status unit or surrounding soil. The data indicate that the final waste removal activities were sufficient to remediate the unit.

5.3 Groundwater Assessment

5.3.1 Results of Quarterly Monitoring

Samples were collected quarterly from upgradient and downgradient groundwater monitoring wells installed around the former EAF Dust Pile during the period November 1996 through August 1997. Samples were analyzed for the assessment target metals (Ba, Cd, Cr, Cr VI, and Pb) and pH. Groundwater elevations were measured five times during this period. Results of these analyses and measurements are presented in Table 1 through Table 5 in Appendix C.

The groundwater flow direction was determined to be consistent throughout the assessment period. It generally flows south-southeast in the vicinity of the former EAF pile, then trends to a more southerly flow direction east of the storage area. A representative groundwater flow diagram is shown in Figure 2 of Appendix C.

These results reveal that observation wells MW-1 and MW-2 are in monitoring locations that would not be impacted by EAF dust storage activities, and MW-3, MW-4 and MW-5 represent downgradient monitoring locations.

5.3.2 Comparison of Downgradient and Upgradient Monitoring Results

Evaluation of groundwater flow direction and observation well placement indicated that wells MW-1 and MW-2 were located in areas that would be unimpacted by EAF dust management activities. Samples from these wells were designated as "background" for purposes of evaluating the potential impact of the EAF pile activities. Observation wells MW-3, MW-4 and MW-5 were designated as downgradient monitoring points. A summary of the chemical analysis results for the hydrogeological assessment is presented in Table 3. The mean and variance for each analyte/well data set (derived from Table 2 through Table 5 in Appendix C) and the t-statistics for the Cochran's t-test are also presented in Table 3.

The groundwater monitoring results were first compared to the health based drinking water criteria applicable to closures under Part 111 of the Michigan Natural Resources and Environmental Protection Act (NREPA). These criteria were referenced in *MERA Operational Memorandum #8, Revision 3 – Type B Criteria*, February 4, 1994. The concentrations of Ba and Cr were below their respective drinking water criteria in ALL samples from ALL wells. Concentrations of Cd and Pb were greater than their respective health based criteria in at least one sample from each well. The mean concentrations of Cd in all wells, except upgradient well MW-2, exceeded the criterion. The mean concentrations of Pb were greater than its health based criterion in all wells.

Based on requirements of the approved closure plan, the groundwater monitoring data for Cd and Pb were statistically evaluated using Cochran's approximation of the Student's t-test. The combined data from MW-1 and MW-2 were used as the upgradient ("background") data set for each metal. A value of one-half MDL was substituted for analysis results reported as "not detected" or less than MDL/MRL.

TABLE 3

Summary and Evaluations of Groundwater Assessment Results

	Ba (mg/L) ²	Cd (mg/L) ¹	Cr (mg/L) ²	Pb (mg/L) ¹
	Upg	radient Wells		
MW-1	0,1	0.015	0,1	0,013
	0.1	0.00025	0.025	0.0015
	0.1	0,0078	0.025	0,004
	0.1	0,00025	0.025	0.0015
Mean	<0.1	0,00583	0,04375	0.00500
S ²	NA	0.00005	NA	2.98E-05
MW-2	9,4	0.00025	0.08	0.0015
	0.2	0.00025	0.025	0.0015
	0.1	0.011	0,025	0.021
	0.2	0,00025	0.025	0.023
Mean	0.12500	0.00294	0,03875	0.01175
S ²	NA	0.00003	NA	0.00014
MW-1+MW-2				
Меал	NA	0.00438125	NA	0.00838
S ²	NA	0.00004	NA	0.00009
· · · ·	•			
	Dowr	ngradient Wells		
MW-3	0.5	0.013	0.12	0.012
	0.6	0.00025	0.025	0.0015
	0.5	0.0083	0.025	0.079
	0.5	0.00025	0.025	0.007
Mean	0.52500	0.00545	0.04875	0.02488
S ²	NA	0.00004	NA	0.00132
t*	NA	0.28103	NA	0.89370
<u>te</u>	NA	2.20959	NA	2.33853
MW-4	0.4	0,017	0.025	0.026
	0.46	0.016	0.025	0.022
	0.4	0.00025	0.025	0.0015
	0.4	0.0068	0.025	0.073
	0.4	0.00025	0.025	0.004
Mean	0.41200	0.00806	<0.025	0.02530
S ²	NA	0.00007	NA	0.00083
t*	NA	0.87059	NA	1.27539
te	NA	1.98457	NA	2.00766
M ₩-5	0.1	0.017	0.11	0.011
	0.2	0.00025	0.025	0.0015
	0.1	0.0074	0.025	0.085
	0.5	0.00025	0.15	0.19
Mean	0.22500	0.00623	0.07750	0.07188
S ²	NA	0.00006	NA	0.00759
t*	NA	0.40953	NA	1.45318
t _c	NA	2.25067	NA	2.35042
MDEQ Default Type B Drinking Water Criteria ³	, 2.4	0.0035	37 / 37	0.004

¹ Evaluated using Cochran's Approximation to the Student's t-Test, 40 CFR 264, Appendix IV (0.5 MDL substituted for ND entries)

² Evalauted against default Type B criterion

³ MERA Operational Memorandum #8, Revision 3 ~ Type B Criteria, February 4, 1994

Reported results < MDL

Results of the t-tests for the two metals, Cd and Pb, detected in both upgradient and downgradient wells at levels above health based criteria were examined. The t-test results ($t^* < t_c$) demonstrate that there is not a significant difference between the upgradient and downgradient mean concentrations of either Cd or Pb in groundwater samples collected and analyzed.

The above results from evaluations of the concentrations of target metals in the upgradient and downgradient wells confirm that EAF dust waste management activities did not impact site groundwater and no groundwater response activities are required for closure of the EAF dust storage pile.

5.4 <u>Summary and Conclusions</u>

Results of comparisons of soil closure assessment results to typical fill chemistries demonstrated that management of EAF dust wastes (K061) at the interim status storage pile did not contribute to the levels of target metals measured in area fill during the closure assessment. This demonstrates that the final waste removal activities successfully remediated the former dust pile sufficient to achieve closure to site specific background.

Results of comparisons of downgradient groundwater assessment results with upgradient groundwater results demonstrated that contaminants from the EAF dust storage pile were not released to groundwater.

The combined closure assessment results established that no residual soil contamination resulted from the former waste management activities at the EAF Dust Pile and that no contaminants were released to the local environment at levels above health based criteria and/or site specific background levels during operation of the pile. Therefore, the EAF Dust Pile has been successfully closed, requiring no further closure response activities.

APPENDIX A

APPROVED CLOSURE PLAN

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STATE OF MICHIGAN



JOHN ENGLER, Governor DEPARTMENT OF ENVIRONMENTAL QUALITY HOLLISTER BUILDING, PO BOX 30473, LANSING MI 46900-7973

RUSSELL J. HARDING, Director

October 17, 1995

Mr. Donald S. Windeler McLouth Steel Corporation 1650 W. Jefferson Avenue Trenton, Michigan 48183

Dear Mr. Windeler:

SUBJECT: Groundwater Monitoring Plan approval McLouth Steel Trenton Plant (McLouth) MID 017 423 304

Waste Management Division (WMD) staff have reviewed Section 2.2 "Task 2-Groundwater Monitoring Program," and the material related to groundwater testing in Sections 2.3 "Task 3-Chemical Testing," and 2.3.1 "Quality Assurance/Quality Control" submitted to the WMD on September 12, 1995. This information was submitted on behalf of McLouth Steel Corporation by Walter W. Tomyn. Stipulation 2.B of the WMD stipulations for approval attached to the October 31, 1988 closure plan approval letter required McLouth to submit a groundwater monitoring plan to the WMD. The sections mentioned above were reviewed in accordance with Stipulation 2.B.

The WMD approves the material WMD staff reviewed in the attachment to the September 12, 1995 with a modification. The attached "Modification for Groundwater Monitoring Plan Approval" describes the modification. The modified groundwater monitoring plan is the approved groundwater monitoring plan, and an enforceable part of the approved closure plan.

This approval does not constitute an approval of any part of the September 5, 1995 attachment to the September 12, 1995 letter related to soil sampling or any section not specifically listed as reviewed by WMD staff. For soil sampling McLouth must follow the approved closure plan. Once sampling and analysis have been completed, McLouth may determine that a closure plan amendment is necessary based upon the sampling results. That will be the first legitimate time McLouth can amend the approved closure plan. Mr. Donald Windeler

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October 17, 1995

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If you have any questions, please call Ms. Angela Hahn of the WMD at 517-373-7738.

Sincerely,

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Kenneth Burda, Chief Hazardous Waste Program Section Waste Management Division 517-373-0530

cc: Mr. Ben Okwumabua/Mr. Tim Sonnenberg, DEQ-Livonia Ms. JoAnn Merrick/Mr. Rick Rusz, DEQ Mr. Steve Buda, DEQ Ms. Angela Hahn, DEQ

October 17, 1995

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McLouth Steel Corporation MID 017 423 304

Modification for Groundwater Monitoring Plan Approval

1. The appropriate number of background and foreground samples must be taken to properly apply the statistical method proposed in the McLouth submittal dated 12/20/89 (Cochran's t-test). If the t-test is not going to be applied, the appropriate number of samples must be taken for the statistical method used.

This modification is necessary to assure proper statistical procedures are used.

NTH Consultants, Ltd. Professional Engineering and Environmental Services



38955 Hills Tech Drive P.O. Box 9173 Farmington Hills, MI 48333-9173 (810) 553-6300 (810) 489-0727 Fax

McLouth Steel Corporation c/o Walter W. Tomyn, P.E. 3742 Elder Road South West Bloomfield, Michigan 48324

September 5, 1995 Project No. 13-4562-01

RE: Modified Work Plan for Remedial Investigation Former Furnace Dust Stockpile McLouth Steel 1650 West Jefferson Trenton, Michigan

Dear Mr. Tomyn:

In response to discussions with representatives of the MDNR on August 24, 1995, and as agreed by all parties present, we are pleased to submit a modified work plan for conducting a remedial investigation at the former furnace dust stockpile formerly located at the McLouth Steel facility in Trenton, Michigan. The modified workplan incorporates the basic sampling plan as proposed in the 1988 work plan prepared by others and previously approved by the MDNR. However, the modified work plan retains our previous monitoring well scheme as presented in our August 1, 1994 work plan, but introduces a monitoring program pursuant to MDNR requests. Furthermore, the modified work plan limits the total number of soil samples required for chemical analysis to near surface samples for the initial analysis. Lastly, 6 borings are added to provide background information. The modified work plan and associated cost estimates are presented below.

Partial pages 1, 3, 4, 5 only.

NTH Consultants, Ltd.

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Mr. Walter W. Tomyn September 5, 1995

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2.2 TASK 2 - GROUNDWATER MONITORING PROGRAM

- Groundwater monitoring wells will be installed in at least four of the test borings as follows: one interior boring, one upgradient background boring, and the two downgradient exterior borings. However, the downgradient wells will be placed no more than 50 feet from the perimeter of the former stockpile. The wells will be used to determine both groundwater quality and local groundwater flow direction. Final well locations and depths will be made based on groundwater conditions encountered during on-site drilling activities. Due to the close proximity of the Detroit River, river staging data will be requested from the U.S. Army Corp of Engineers concurrently with groundwater elevation measurements in the wells.
- In general, the well screens will be set at a depth intended to straddle the uppermost groundwater surface. The wells will be constructed using 2" outside diameter PVC screens and riser pipe. The well screens will be 5 feet long. Unless otherwise directed, the riser pipe will be left above grade and protective, above-ground locking covers will be installed over them and cemented in place. After installation, the wells will be developed and sampled either with disposal polyethylene bailers or a peristaltic pump. Prior to placement in sample jars, the groundwater samples will be filtered using 0.45 micron disposable filters. Development water will be containerized on site until disposal requirements are determined. In addition, where accessible, existing on-site wells that are in service will be sampled in a similar manner.
- The ground surface elevation at each boring location and the top of casing elevation at each monitoring well will be surveyed by a licensed subcontracted surveyor. Top of casing elevations will be surveyed to the nearest 0.01 feet. Ground surface elevations will be surveyed to the nearest 0.1 feet. Elevations will be referenced to a USGS datum or equivalent.

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NTH Consultants, Ltd.

Mr. Walter W. Tomyn September 5, 1995

- Qualified NTH personnel will monitor and record the drilling, sampling, and well installation operations, develop and collect groundwater samples from the monitoring wells, and obtain static water level measurements. Soil conditions encountered will be recorded on individual test boring logs.
- Samples of groundwater and static water level measurements will be obtained on an approximate quarterly basis for a period of one year for a total of four (4) rounds of sample analysis. Water samples will be field filtered and analyzed for dissolved concentrations of cadmium, total chromium, and lead. Following analysis of the year's data the groundwater monitoring program will be evaluated to determine additional needs, if any.
- Upon receipt of analytical results for each sampling period, an interim report summarizing current groundwater conditions will be prepared. Results of the groundwater monitoring program will be summarized in a final report distinct from the final report on the soil conditions encountered during field investigation. summarizing current groundwater conditions.

2.3 TASK 3 - CHEMICAL TESTING

The soil and groundwater samples will be delivered to Eagle Laboratories Inc. of Wixom, Michigan within 24 hours of collection for chemical analysis. Sample analyses will be performed in accordance with MDNR recommended analytical methods and target method detection limits pursuant to MERA Operational Memorandum #6, Revision #3 (MDNR, February 4, 1994). Results of soil sample analyses will be reported on a dry-weight basis.

Based on review of available information, and specifically the constituents of potential concern as identified for K061 waste, selected soil and groundwater samples will be analyzed for the following parameters:

		Method	
Parameter	Soil	<u>Water</u>	
Cadmium (Cd)	7131	213.2	
Chromium *	7195	218.6	
Lead (Pb)	7420	239.2	
Barium **	7081	208.2	

Approximately 25% of soil samples selected for analysis will be tested for the presence of Cr(VI).

** The basis for including barium in the original plan is not clear, as barium is not an indicator for the McLouth Electric Furnace Dust.

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NTH Consultants, Ltd.

Mr. Walter W. Tomyn September 5, 1995

The groundwater analyses will be conducted on field-filtered samples to determine the dissolved concentrations of the parameters of interest.

2.3.1 Quality Assurance/Quality Control

To provide a measure of quality assurance/quality control (QA/QC) for sampling activities, duplicate soil samples (1 sample for each set of 10 soil samples) and daily equipment blanks (one per day) will be submitted to the analytical laboratory for testing. In addition, a duplicate water sample will be submitted for analysis along with each set of water samples.

As an additional quality control procedure, the analytical laboratory will provide QA/QC data with the chemical testing reports. The data supplied by the laboratory will include information on laboratory blanks, laboratory duplicates, spike recoveries, and parameter control limits.

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MCLOUMY STEEL PRODUCTS CORPORATION

1491 West Jefferson * Trenton, Michigan 48183 Telephone (313) 285-1200

September 16, 1988

Mr. Steven Sliver Waste Management Division Michigan Department of Natural Resources Stevens T. Mason Building Box 30028 Lansing, Michigan 48909

Subject: Emission Control Dust Storage Area Closure Plan

Reference: McLouth Steel Products Corporation Trenton, Michigan Plant EPA ID No. MID 017 422 304

Dear Mr. 6liver:

Enclosed please find our revised closure plan, which has been modified in response to your letter dated August 23, 1988 and our subsequent discussions,

Please contact the undersigned at 285-1200, if there are questions or comments on this information.

Very truly yours, MCLOUTH STEEL PRODUCTS CORPORATION

D.S. Windelen D. S. Windeler

Manager of Environmental Affairs

cc: J. R. Turek P. F. Coles - SEG S-862

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CLOSURE PLAN FOR

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EMISSION CONTROL DUST STORAGE AREA

PREPARED FOR:

McLOUTH STEEL PRODUCTS CORPORATION TRENTON, MICHIGAN

PREPARED BY:

SEG ENGINEERS & CONSULTANTS, INC. 1120 MAY STREET LANSING, MICHIGAN 48906

SEPTEMBER 16, 1988

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Statistical Procedures 1.

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CLOSURE PLAN FOR EMISSION CONTROL DUST (ECD) STORAGE AREA

This closure plan has been prepared in accordance with 40 CFR 265 Subpart G. This plan identifies all steps that will be necessary to close the ECD storage facility at the McLouth Corporation's Trenton, Michigan plant (MID 017423304).

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The ECD storage area is located on the northern portion of the Trenton property as shown in Figure 1. The ECD is contained in this area by berms of on-site fill material approximately ten (10) feet high. An approach ramp has been constructed to allow the transport vehicles to end dump over the top of the berms into the storage area.

McLouth will maintain an on-site copy of the approved closure plan and all revisions to the plan until the certification of closure completeness has been submitted and accepted by MDNR Waste Management Division.

Additionally, SEG will prepare a site safety plan to cover the conduct of all persons associated with the sampling and subsequent closure activities.

McLouth will implement this plan immediately following approval of this plan by MDNR.

Upon completion of closure, McLouth will submit a certification that the facility has been closed in accordance with the specifications in the approved closure plan. This certification will be submitted to the MDNR and completed by a registered professional engineer and by McLouth.

I-1a Closure Performance Standard (40 CFR Section 265.111)

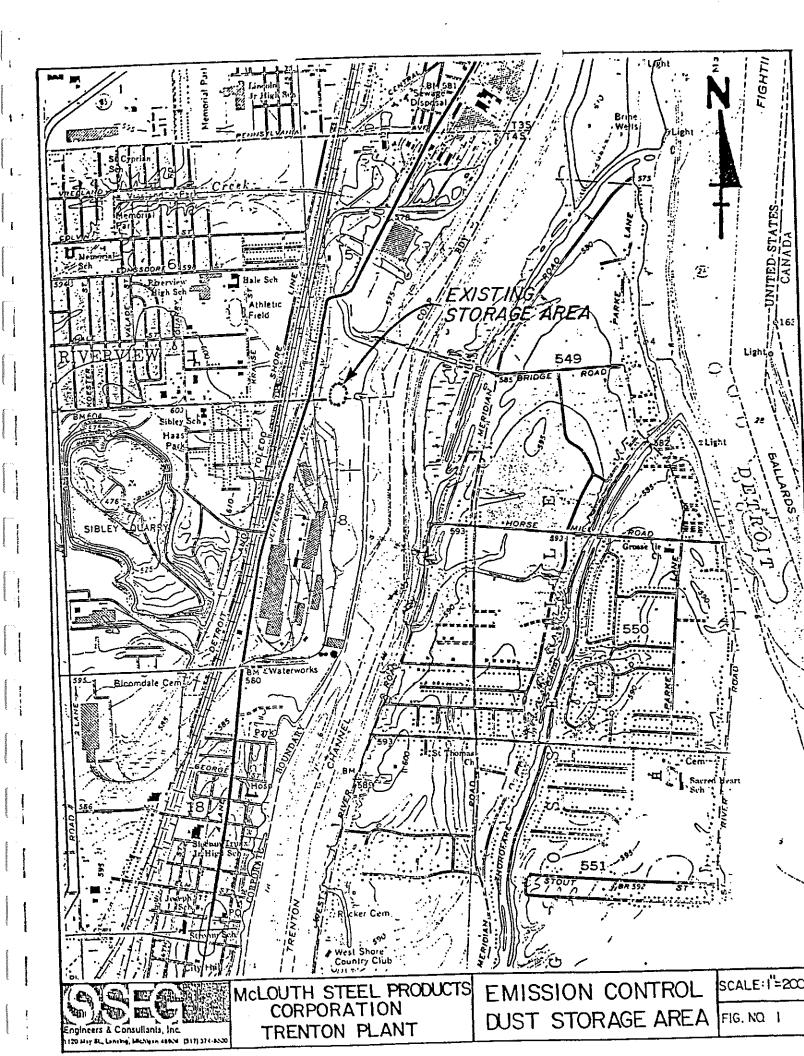
This facility will be closed in a manner that will minimize the need for further maintenance and controls; will minimize or eliminate threats to human health and the environment; and will avoid post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or to the atmosphere. All contaminated materials will be removed to a licensed hazardous waste management facility. This plan will describe how this will be accomplished.

I-1b Final Closure of Facility

McLouth Steel plans to close the storage area at its Trenton, Michigan facility as soon as regulatory approval has been received.

I-1c Maximum Waste Inventory

The maximum inventory of wastes in storage at any time based on



TEXT OF FIRST PARAGRAPH ON PAGE 3 OF APPROVED CLOSURE PLAN

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The complete inventory of material will be removed starting thirty days after regulatory approval of both the closure plan and disposal arrangements. It is currently estimated that complete removal and disposal at an approved hazardous waste management facility will take about one month. Removal of this material will be in compliance with the procedures in I-1d(4). inventory records and inspection reports is estimated to be 6,000 cubic yards of dust.

I-1d(1) Inventory Removal (Revised 9/28/89)

Pilot testing to meet stabilization requirements will begin within thirty days of receipt of MDNR approval of both the closure plan and disposal arrangements. It is currently estimated that the period required for testing, disposal site acceptance, stabilization, and complete removal will take about three months. Pilot testing and stabilization will follow the procedure outlined in APPENDIX E. Handling and removal will follow the procedures in I-1d(4).

I-1d(2) Closure of Storage Area

Following removal of the ECD, a soil sampling program will be initiated to determine if a clean closure has been attained. As shown on Figure 2, a surveyed grid will be superimposed over the storage area. The grid spacing, 50 feet, was suggested by the Michigan Department of Natural Resources. Soil samples will be acquired at selected grid points as shown on Figure 2 at the surface and at a depth of two (2) feet. Background soil samples will be taken as shown on Figure 2 and will be of the same horizons as the remaining samples.

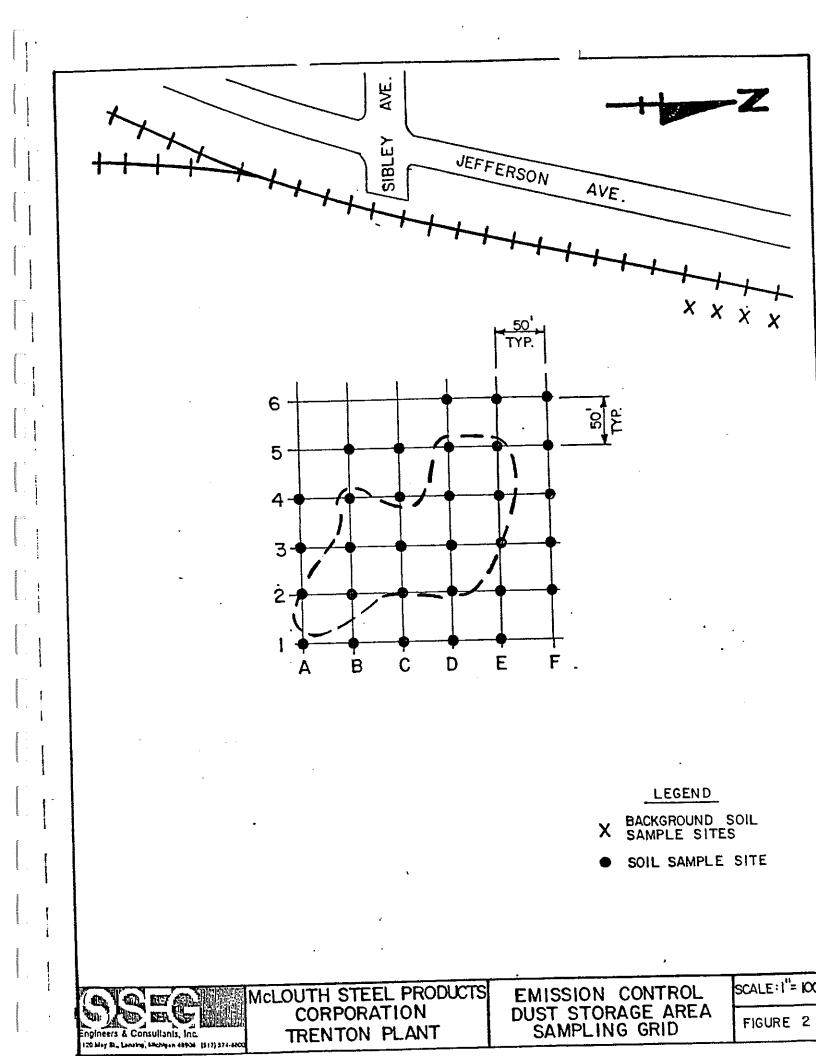
All soil samples will be collected using stainless steel spoons which have been rinsed and cleaned with deionized water prior to use and wrapped to reduce the possibility of contamination. A separate clean spoon will be used for each sample. Samples will be collected in 850 ml glass jars with tops having a teflon liner.

Soil samples will be subjected to analytical testing for those parameters in Table 1. Table 1 also indicates the appropriate protocols and detection limits.

		TABLE 1 - TEST METHODS		
Parameter	Test Method	Anticipated Reference Detection Limit		
			Soil (mg/kg)	Liquid (mg/L) .01 std. units
pH	Electrometric- meter	SW846 Section 9040	.01 std. units	
Barium	Atomic absorption	7 080	1.0	.025
Cadmium	Atomic absorption	7130	0.2	.005
Lead	Atomic absorption	7420	0.4	.010
Chromium (Hexavalent	Atomic absorption	7197 solid, 7196 liquid	.05	.005

SM - Standard Methods for the Examination of Water & Wastewater, 16th ed.

SW846-EPA - Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, 3rd. ed.



Utilizing the statistical procedures outlined in Attachment 1, the analytical results from the storage area samples will be compared to background levels. If the study area results are within the range of plus or minus three (3) standard deviations, it will be concluded that no significant impact has occurred as a result of the storage operation. If the results are outside this range, contamination will be assumed. If the evaluation shows that contamination is present, a contingency plan will be implemented to carry out additional investigation. This contingency plan is described later in this closure plan.

I-1d(3) Contingency Plan for Additional Soil Sampling

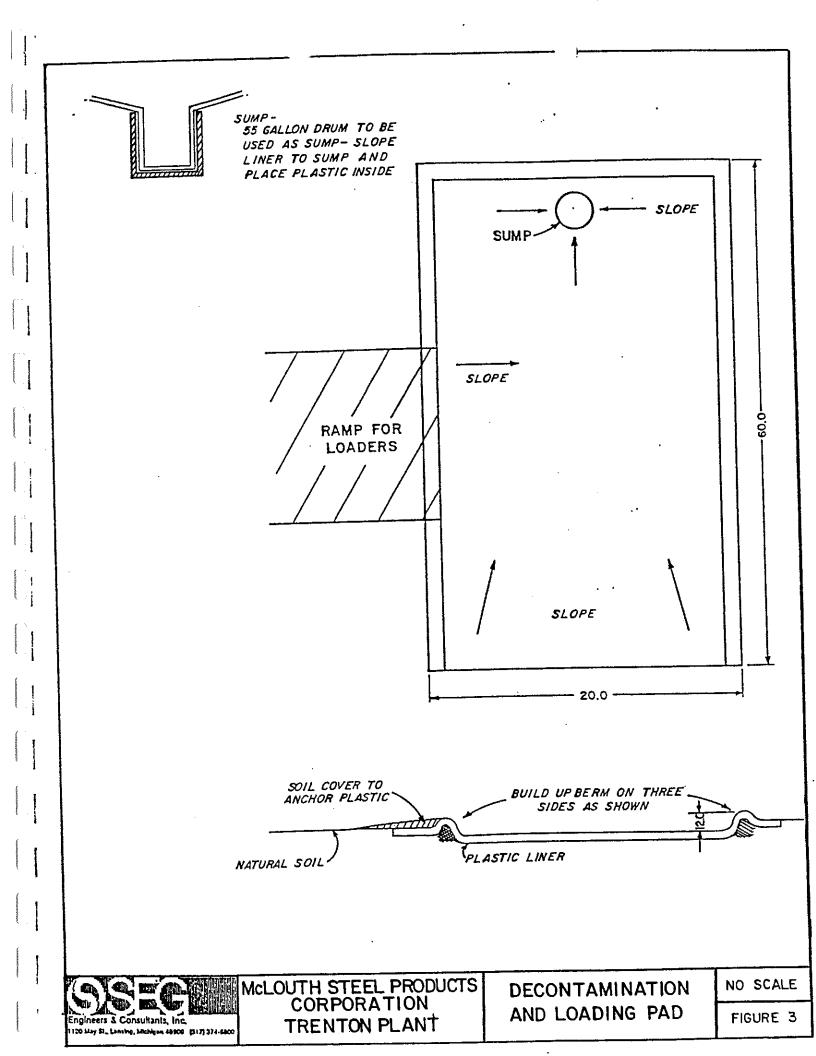
If the results of the initial testing show that contamination is present, additional soil testing will be required. If contamination is present at the two (2) foot depth, at a particular sample site, samples will then be acquired at the four, eight and ten foot depths. If contamination is present at the site perimeter, samples will be taken from one additional grid point. The depths at which samples will be acquired will depend upon the results of the preliminary testing. If preliminary test results show contamination at the surface only, then the new sample site will be sampled at the surface only. If contamination is at the two (2) foot depth, then the samples will be acquired at the surface, two, four, eight and ten foot depths.

All sampling and analytical protocols will be as previously described.

I-1d(4) Soil Removal

Once the horizontal and vertical extent of soil contamination has been determined, an excavation program will be initiated to remove the contamination. Excavation will be accomplished using a backhoe or other type of excavating equipment. A decontamination and loading pad (as shown in Figure 3) will be constructed immediately adjacent to the storage area. All loading will take If the hazardous waste management place within this area. facility does not offer truck decontamination facilities, the interior of the transporting trucks will be lined with plastic and the plastic will be draped over the side of the truck to prevent spills from contacting the truck tires. When the truck is loaded the plastic will be folded over the top of the load and the truck will be tarped in a conventional manner. Any spills on the plastic containment will be cleaned prior to moving the If the proposed short term storage tank is complete at truck. the time of soil removal, the concrete pad associated with the tank will be used in lieu of the plastic covered loading pad previously discussed.

Following removal of the contaminated soil, soil samples, over



the grid used previously, will be acquired to demonstrate a clean closure. Samples will be acquired and tested using the protocols as previously discussed. Samples will be tested for the same parameters as during the investigation.

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Once the excavation is complete and all transporting trucks have left the site, the excavating equipment will be decontaminated on the decon pad. Four samples of raw water will be taken prior to Following the cleaning, three rinse water samples the cleaning. taken from the sump to demonstrate that the decon will be and rinse water Both raw water effective. procedures were samples will be acquired in 60 ml glass jars with teflon lid Samples from the sump will be taken when the rinse waters appear clean of turbidity and the sump has been rinsed To demonstrate that the rinse waters are clean, the three rinse sample results must be equal to or less than the raw water results. However, all rinse waters will be used as make-up water in the electric arc furnace emission control system. rinsate would help control the dissolved solids in the scrubber recycle water. The treatment of the scrubber blowdown is managed under NPDES Permit Number MI0002399.

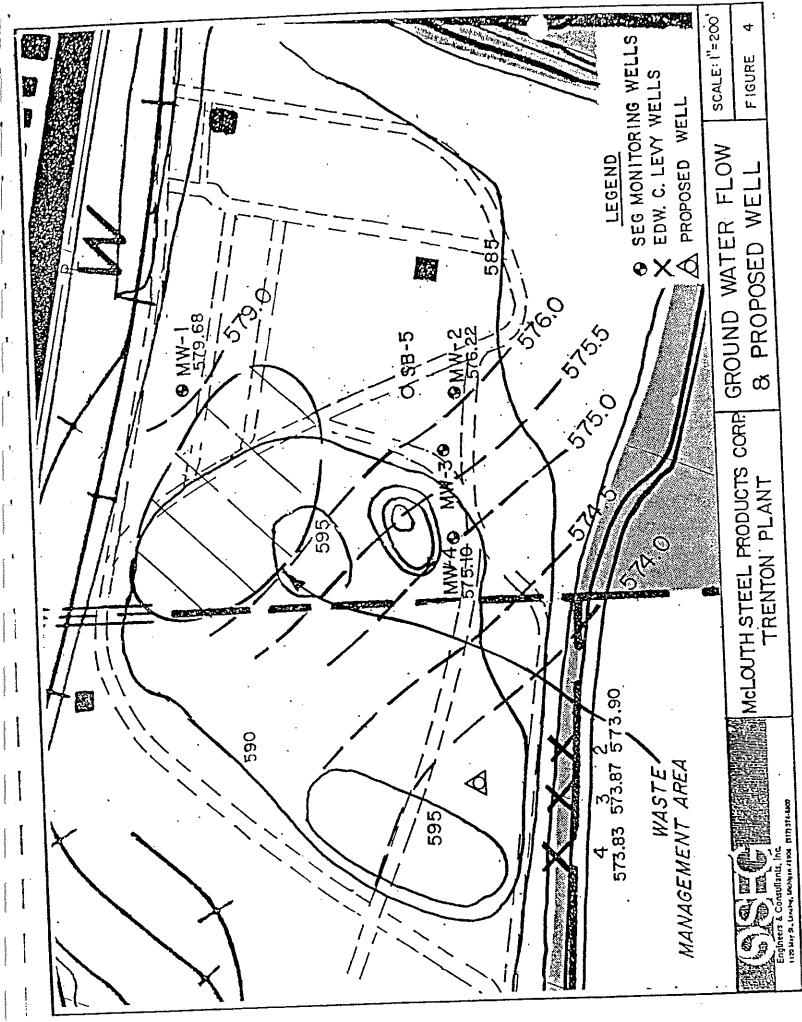
All plastic containment materials will be folded into the sump drum for disposal at a licensed hazardous waste management facility.

I-1e Ground Water Investigation

Four monitoring wells presently exist on the site. These were installed as part of a ground water study to define the hydrogeologic environment in connection with the proposed construction of a new emission control dust storage area. MW 1 is located such that it could be utilized as an upgradient well for the existing storage area. Of the three remaining wells, MW 3 and MW 4 could be utilized as downgradient monitoring locations for the existing storage area.

Based upon the preliminary evaluation of ground water characteristics, an additional downgradient monitoring well will be located approximately 500 feet due south of MW 4 as shown on Figure 4. The well will be constructed of two (2) inch I.D. flush joint Schedule 40 PVC with a five (5) foot PVC well screen. The screen will be sand packed to one foot above the top of the screen and the remaining annular space sealed with bentonite. A protective locking casing cemented into the ground will be provided.

Following installation of the well, all wells (\$1, 3, 4 and 5 (new)) will be sampled and tested for dissolved barium, cadmium, lead, hexavalent chromium. All sampling techniques shall be in conformance with USEPA SW 846. Analyses shall be in conformance with Table 1. The analytical data will then be used in better



defining the need for additional studies.

I-1f Certification of Closure

Following the completion of the closure steps outlined previously, McLouth will provide a certification that the storage area has been closed in accordance with the approved closure plan. This certification will include the following items:

- certification statement by the owner/operator
- certification statement by an independent registered engineer
- site safety plan
- manifests (or manifest summary) for the shipment of all wastes generated by closure activities
- summary of decontamination procedures and wastewater disposal
- summary analysis of closure activities including time table, weather conditions, runoff controls, equipment decontamination, soil and ground water results, etc.
 - results of all tests used to determine clean closure
- statistical comparison of soil samples and background results
- sampling and analysis procedures
- final depths and elevations of waste and soil excava-
- properly labeled and easily identified sampling station tions map including background sampling stations
- of excavated areas final restoration summary of including type of fill material used and future land and corrective use outline, post-closure program action, if applicable
 - copy of the approved closure plan and letter of а closure approval

I-1f Closure Cost Estimate

A closure cost estimate is included in Table 2.

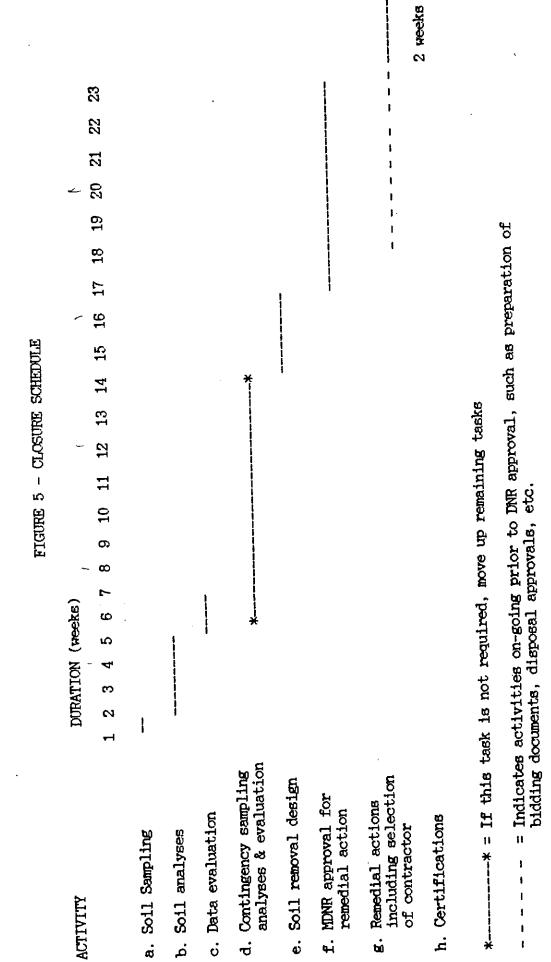
I-1g Closure Schedule

A schedule for the activities associated with the closure of the storage area is attached as Figure 5.

SEG COST ESTIMATES

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Closure schedule is contingent upon availability of licensed disposal sites. Note:

ATTACHMENT 1

STATISTICAL PROCEDURES

WMD/MDNR PRAFT GUIDANCE MAY 988

- Act 64/RCRA Clean Closure
- Real Estate Transactions
- Non-Act 64/RCRA Facilities
- Clean Declaration

HOW CLEAN IS CLEAN?

The State of Michigan has a straight forward position on the question of restoration of groundwater contaminated by an illegal discharge, how much clean-up is required when closing a hazardous waste facility (clean closure), or cleanup of a spill of hazardous materials. State Law, Act 245 and the associated "Groundwater Regulations" require restoration of a contaminated aquifer to its original condition (see paper by J. Bails entitled Aquifer Restoration, March 8, 1984).

Although some proposals will be made to leave some level of contaminants in the soils or groundwater, our position must be that contaminants be removed to non-detectable or, in the case of materials which naturally occur in soils, background levels. Soils and/or groundwater sampling must be included in any cleanup or closure to demonstrate that the site has been effectively restored to its original condition. Cleanups to any other level must be carefully worked out with Enforcement staff input and approval, taking into account applicable regulations and legal responsibilities. Waste and/or soil removed should be classified for disposal as hazardous or nonhazardous to determine disposal options and handling requirements (i.e. solid waste under Act 641 versus a hazardous waste under Act 64).

The following are recommended procedures for evaluating a proposed cleanup and site restoration. These procedures are not "absolutes". Other approaches may be developed and submitted for approval. This system, if used, however is acceptable.

- A. ESTABLISHING SOIL BACKGROUND
 - Background should be established for site specific waste constituents or specific chemicals used in various processes or facility operations. These should fall into three general categories: a) the EP toxic METALS (arsenic, barium, cadmium, chromium, copper, lead, mercury, silver, selenium and zinc) using a total metals (dry-weight mg/kg) test procedure for the soil analysis, b) ORGANIC CONSTITUENTS, and c) other SITE SPECIFIC WASTE CONSTITUENTS (example Cyanide) as totals.
 - 2. A bare minimum of 4 samples should be used to establish "background" in soils to account for natural occurrences and variability within each distinctive soil horizon. Background samples must be collected in an "uncontaminated" area. Based on waste type, contaminant mobility, operation practices and soil type (sand, silty sand, clay) an estimate of contamination depth should be made and background samples taken at comparable depths. Multiple soil horizons should have "background"

"Large size" sites (over 10 acres) Use equation #1

- 2. Sampling format should include either a) all grid point stations as determined by B.1., or b) using the Systematic Random Sampling Method as referenced in SW-846, Section 9.1.1.3.3, or c) using an approved "phased" method of the grid coverage as determined in B.1.
- 3. Depth increments would be dependent on type of subsurface soils. For soil testing within the contaminated area we would generally recommend using 0.25-0.5 foot depth intervals for clays and 1.0 to 5.0 foot depth intervals for silts-sands. The selection of depth increments would also depend on initial soil contamination concentrations (i.e. at ground surface), mobility of contaminant, or height of liquid head on ground surface. Samples collected from specified depth(s) could be either single or in multiple replicates.

C. ORGANIC CONSTITUENT EVALUATION

- Usually, non-detectable levels would be used to delineate clean versus contaminated soils. The following analytical methods are to be used on soil samples:
 - a. For volatile organics, sample preparation should follow EPA SW-846 techniques (8.24, 8.82 or 8.83). Sample collection, preservation and handling is to be referenced to appropriate Method 8010, 8015, 8020, or 8030 for pertinent information. Analysis should be done following EPA Methods 5020 (head space) or 5030 (purge & trap) using EPA validated methods 601, 602, and/or 624 accordingly.
 - b. For extractable compounds, sample preparation should follow EPA techniques (8.85 or 8.86). Procedures should be completed following EPA Methods 3540 (Soxhlet) or 3550 (Sonication). The resulting extract should be analyzed following the conditions described in EPA Method 625.
 - 2. The quantitative limit of detection is defined as: st/sb =3.0, where st is the gross analyte response and sb is the average instrument background single response (noise). The instrument background signal response (sb) is based on the height of peak to peak response of the baseline in an area close to the actual or expected analytic peak. The detection limit is defined as the quantity of the analyte which produces a signal response greater than or equal to three (3.0) times the background instrument noise.
 - 3. An alternative method which uses background levels in native soils may be used as a baseline for measuring contamination. Such an alternative method must be approved by the Waste Management Division in writing.

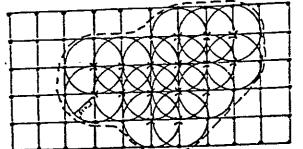
require sample data at each station to be two or more samples. No composite samples. (n 2)

- Average Replicate T-test (TEGD Sept. 1986)
- 4. Using mean and variance of background values to establish an upper limit for delineating significant concentrations such as:
 - a) x + 3S of "background" data as the maximum allowable limit, where 3S equals three times the standard deviation, and x equals the mean. Note this statistical method only requires one sample per station.
- 5. For non-detect values, it is recommended to use either of the following procedures for any of the preceding statistical methods:
 - a) alternate "O" and detection value (dv) for a net value of half the detection value with a variance, or
 - b) the Continuity Correction procedure with the t-test, where if background data is non-detect then use S =1 dv.
 Attachment 2 is a summary explanation for performing the t-test with Continuity Correction.

G. EXCAVATION

Excavation of contaminated areas should be based on the established grid system interval (as recommended in B.1). The radius of excavation around the contaminated sample point(s) is equal to the grid interval (GI = r). Excavation depth would be to the deepest point of contamination. After excavation, the grid must be resampled to verify that the area is free of contamination. If continued contamination is detected, the excavation format is repeated until a satisfactory result is obtained.

Example:



GL = 150 A = 11,250 GI = 15.3

° Sample Station
x Contaminated Station
r = GI = 15 feet

Contaminated soil removal in granular non-cohesive soils may stop at the water table, if encountered, except all <u>waste</u> material must be removed even if it is below the water table. If contaminated soils remain, groundwater monitoring must be done to check for contamination. If contamination is found, groundwater purging or some other method of plume management must be developed, approved and implemented. Inert designation - If soil concentrations are above background but can be demonstrated to meet the inert designation (12-14-87 Draft Document from Waste Evaluation and Manifests Unit - see Attachment 3) then soils can remain in place.

REAL ESTATE TRANSACTIONS/NON-REGULATED (RCRA-ACT 64) FACILITIES

Waste Material

Characteristic - If ignitable reactive, corrosive, or EP Toxic, then waste must go to a licensed hazardous waste facility. If not characteristic, then waste may go Act 64/RCRA facility, or an Act 641 landfill if approved.

<u>Soils</u>

- Metals If not EP Toxic, but above background, soil may go to an Act 641 landfill.
- Reactive If not reactive or pretreated so no longer reactive, soil may go to an Act 641 landfill.
- Organics Soils may go to a licensed Act 64/RCRA facility, or to an Act 641 landfill if the landfill will accept it.
- Inert designation if soil concentrations are above background but meet criteria of inert designation (see Attachment 3) then the soils can remain in place.

I. CLEAN CLOSURE CERTIFICATION CHECKLIST

This checklist was developed to review RCRA clean closures. Due to direct reference to 40 CFR 264 Subpart G by Act 64, Rule 613; Act 64 closures should also be evaluated by this checklist.

Documentation supporting the independent registered professional engineer's certification can be requested under 40 CFR 264.115 and 265.115 (as of October 29, 1986). The owner/operator must submit at least two copies of certification documentation, one for MDNR, and one for the EPA files.

The checklist identifies items recommended to properly evaluate a closure certification. These items are not "absolutes". Othær information or substitutions may be provided with technically justify and certify a "clean closure" or "clean declaration".

This checklist can be used for land disposal facilities and storage facilities. Several of the items would not be required for a storage facility where testing was minimal. Items 1 thru 5 wrould be required for all closures. Items 6 thru 11 would be optional for storage facilities, dependent on extent of testing required. Land disposal facilities would require all items listed.

Attachment I

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WICHIGAN DACKGROUND SOIL SURVEY

TOPSOIL - Results in mg/kg

TOPSOIL	Ag.	A]	As	32	Cd	Lo	Cr	Ľu	Fe	Hq	ti 	in	Wi 	P)	Se	2n 	() 1
INDIVIDUAL SLACIAL LOBES a-Erie Gean st. dev.			1 11.0 ERR	1 73.7 ERR	1 1.0 ERR		1 13.0 ERR	1 17.0 ERR		1 9.10 ERR) 16.0 ERR	1 4.0 ERR		1 61.5 ERR	1 0.71 ERR
n-Saginaw st. dev.		8 4481 869	8. 3.8 0.8	B 41.3 8.7	B 1.0 0.0	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	8 12.4 4.1	8 11.6 3.4	8 8063 1747	B 0.11 0.16		8 237.5 41.4	8 7.8 2.0	8 16.0 17.2	8 0.28 0.09	8 39.1 18.5	8 9.16 0.10
n-Michigan Bean st. dev.		******	4. 2.3 1.2	4 45.8 10.3	4 1.0 0.0	4 2.5 0.0	4 12.0 1.2	4 10.4 4.3	4 4850 451	4 0.05 0.00	4 2.1 \$.8	4 561.3 290.7	4 6.9 1.2	4 12.5 1.3	4 0.25 0.00	4 21.5 2.9	••••••
n-West U. P. Bean st. dev.		4 1610 74	4. 0.8 0.3	48.7 8.2	4 1.0 0.0	4 2.5 0.0	4 6.9 0.9	4 42.1 27.5	4 2475 168	4 0.05 0.00	4 1.0 0.0	4 177.5 22.2	4 3:3 1.5	4 24.0 7.8	4 0.25 0,00	4 61.0 6.6	
					. 233333	*****	: 22222)		222362		323131	*******	*****	*===21	: 27222;		
COMBINED SUMMARY :	 Ag	A1	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Li	Hn.	Ni	Pb	Se	2n	CX
n einisus		12 1540 6160) 0.1	30.7	1.0	2.5	5.5	j 4.5		0.05	1.0	110.0	17 2.5 16.0	6.0	0.25	18.0	0.1
aean st. dev.		3524 157	4 3.	2 46.0) 1.0	ı _ 2.!	i 11.() 3. '						7.0 3.4	12.	9 0.0	6 19.	6 0.
eean + 2 SD eean + 3 SD		667 824							2 1129 3 1401	8 0.3 5 0.4							

n - number of samples for that parameter

minimum - lowest value in data set

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Contraction of the local division of the loc

maximum - highest value in data set

mean - average concentration of data

st. dev. - sample standard deviation

mean + 2 SD - mean value plus 2 standard deviations. If the data is normally distributed,

then 95% of the values should be less than this number.

mean + 3 SD - mean value plus 3 standard deviations. It the data is normally distributed,

then 99% of the values should be less that this number.

THIS BACKGROUND SOIL DATA IS FOR INFORMATION AND COMPARISON PURPOSES ONLY. IT IS NOT INTENDED TO REPLACE SAMPLES TAKEN AT THE SPECIFIC SITE IN QUESTION.

> WASTE MANAGEMENT DIVISION MICHIGAN DEPARTMENT OF NATURAL RESOURCES

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MICHIGAN BACKGROUND SOIL SURVEY

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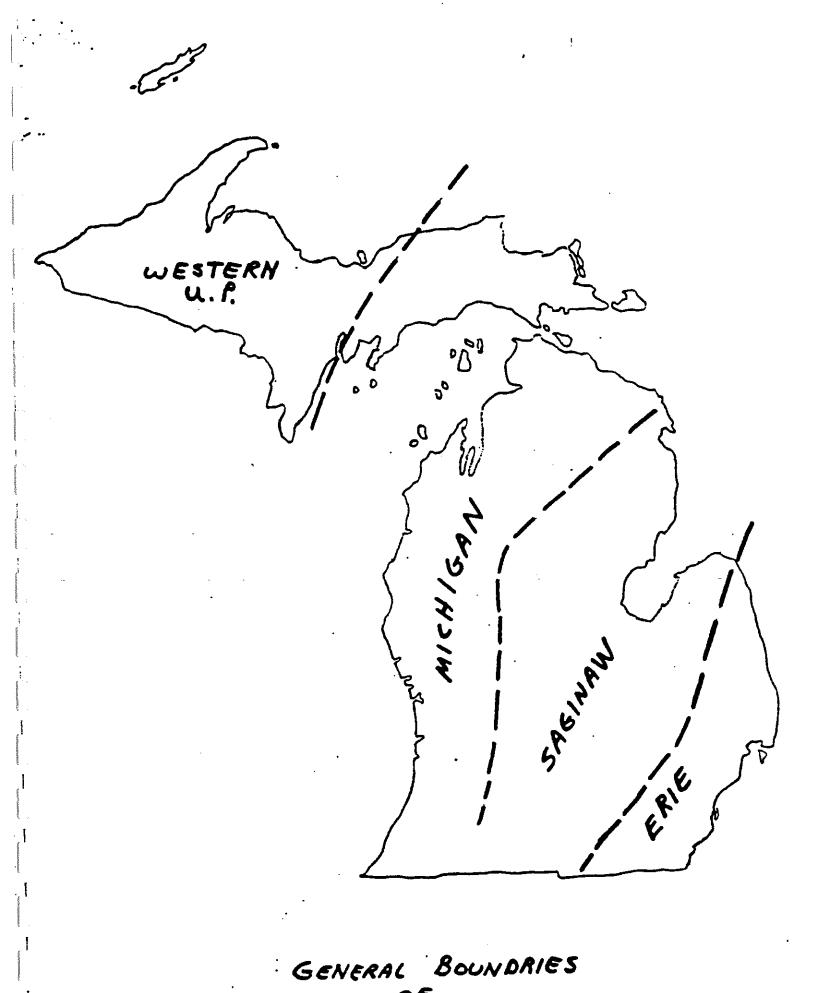
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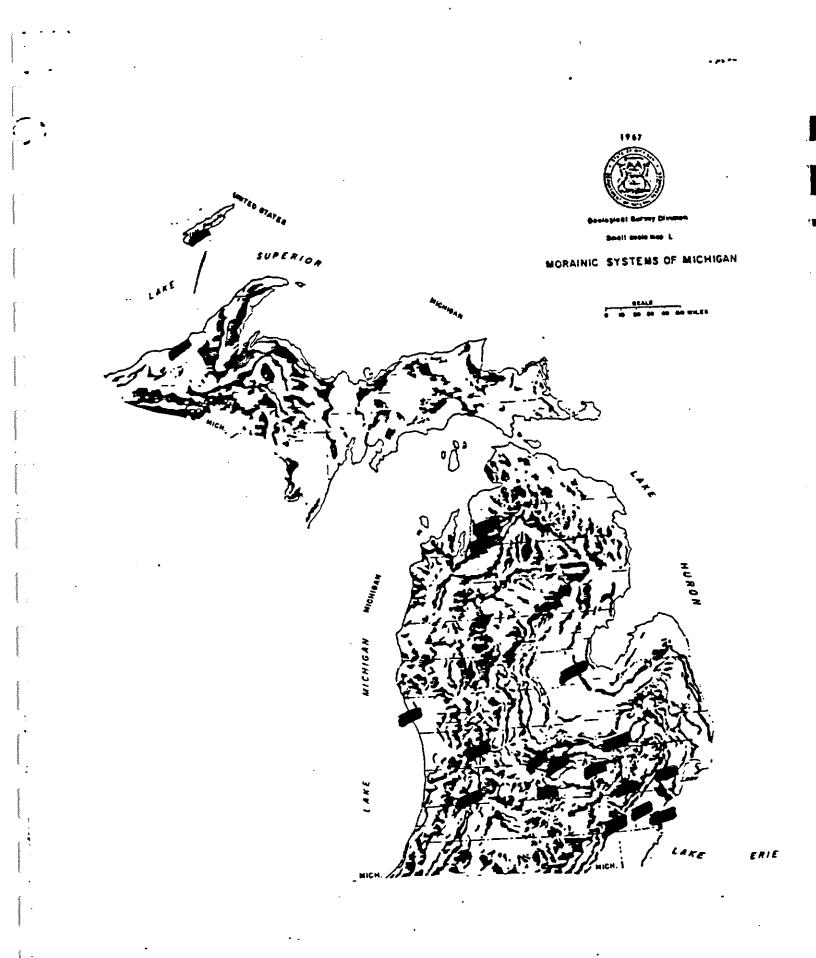
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SANDY CLAY - Results an mg/kg

SANDY CLAY	Ag	Al	As	h	Cd	Ca	Cr	Eu	Fe	Ng	Li 	H n 	Ni 	Pb 	Se	2n 	CN
- INDIVIDUAL SLACIAL ŁOBES N-Erie Bean Bean St. dev.	· · · ·																
n-Saginaw mean st. dev.		3 8063 39	15 9.1 8.4	3 40.1 1.5	15 1.0 0.2	0.3	15 14.8 8.1	15 15.5 4.9	3 15633 115	3 0.05 0.00	3 11.0 0.0	3 336.7 20.8	15 21.7 8.4	15 20.3 8.9	3 0.25 0.00	3 33.3 2.1	0.01
n-Nichigan Bean st. dey.				•								*****		*****			ا خەيبىر
n-West U. P. Bean st. dev.											**===		827223	28 2322	127251	872783	: \$227
COMBINED SUMMARY:	 Ag	A1	As	222222 Ba	 С4		Cr	****** Cu	fe	Hg	Li	fi n	Ni	Pb	Se	2n	t:
·····		3			15	3	15	15		3			15		3	3	
n		ъ 8020		38.7	0.6	7.0	8.0		15500	0.05		320.0	15.0	5.0	0.25	31.0 35.0	
ainiaun abriaun		8130		41.7	1.4	7.5	31.0	24.0	15700	0.05	11.0	360.0	36.0	31.0	0.25	22.0	V.
#SIIMO#		0.00										336.7	21.7	20.3	0.25	33.3	0
eean		8063			1.0	7.2		15.5) 20.9					
st. dev.		59	8.4	1.5	0.2	0.3	B. 1	4.9	115	v. vv	V.V	2410	•••				
					1.4	7.7	30.9	25.3	·15864	0.05	11.0	378.3	38.5				
aean + 2 SD mean + 3 SD		8181 8239							15980			0 399.1	46.9	47.0	0.25	39.6	ь О
		n Binitus Baxisus	- nuabl - Jowe: - high	st value	e in dat	a set	: parame	ter							•		
	5 Bean	mean et. dev. et. 2 SD	- averi - samp - sean	age conc le stand value (centrati dard dev plus 2 s	ion of (viation) standar(d deviat	1865.1	nan unu	2 110885	•						
	8631	n + 3 SD) – sean then	value (991 of	plus 3 s the val	stand <mark>ar</mark> lues s h	d devia nould be	tions. less 1	it the han thi	s nunde	s Horma T.						
		THIS I NOT II	BACKGROL NTENDED	JND SOIL TO REPL	. Data I Ace San	S FOR I Ples T#	NFORMAT IKEN AT	10N ANI The spi	COMPAR	150N PL	IRPDSES Duest I	DHLY. DN.	IT IS				
						NICHI G	NASTE NA	ANAGEME	NT DIVI	SION							



GLACIAL LOBES



NICHIGAN BACKGROUND SOIL SURVEY

SAND - Results in mg/kg

SAND	Ag	A1	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Li	% n	Ni 	Pb 	Se	2n 	CN [
INDIVIDUAL SLACIAL LOBES n-Erie Bean st. dev.	15 0.17 0.23	-	15 2.3 1.4	15 125.9 50.1	15 0.2 0.2		15 3.3 3.6	15 8.7 3.2		14 0.02 0.01			1 18.0 ERR	15 4.5 4.5	15 0.20 0.02	15 25.2 9.8]
n-Saginaw Bean si. dev.	*****		8 2.7 0.6		8 1.4 0.1		8 3.0 1.1	5.8 0.7					8 9.9 1.4	8 14.0 0.0	*****		8 0.01 0.00
n-Michigan mean st. dev.	3 0.20 0.00		3 0.5 0.3	4 6.5 2.1	3 0.2 0.0		7 3.6 5.5	7 6.1 4.5		3 0.04 0.02			7 7.6 11.8	3 7.0 3.0	3 0.20 0.00	7 9.9 6.0	
n-Vest U. P. Bean st. dev.	*****	3 1237 110	3 0.5 0.0	5.6	3 1.0 0.0	3 2.5 0.0	3 8.8 2.6	3 4.2 0.8	309 2033 2	3 0.05 0.00	3 1.0 0.0	3 37.0 6.0	3 3.3 1.4	3 2.5 0.0	0.00	0.2 6.3 2	
	- 111111		; 20223		: 221211	#22X##	: 226522	; \$55528	: :::::::	; ::::::	******	£23233		; =====	2 222222	812925	; ;; ;;;;;
COMBINED SUMMARY:	Ag	Al	As	Ba	Cđ	Co	Sr	Cu	Fe	Hg	Li	K n	Ni	Pb	5e	2n	CN
n einisus Baxieus	1B 0.10 1.00	1110	0.2	2 5.2	0.1	3 2.5 2.5	1.0	1.2	2700	0.02	1.0	31.0	1.6	5 1.2	2 0.16	4.7	7 0.01
acan st. dev.	0.1B 0.21	1237	2.1	1 87.8	0.6												
eean + 2 SD eean + 3 SD	0.60 0.81) 1457		.7 228.4 .0 298.6							-						

n - number of samples for that parameter

minimum - lowest value in data set

maximum - highest value in data set

- mean average concentration of data
- st. dev. sample standard deviation

mean + 2 SD - mean value plus 2 standard deviations. If the data-is normally distributed,

then 95% of the values should be less than this number

mean + 3 SD - mean value plus 3 standard deviations. If the data is normally distributed,

then 991 of the values should be less than this number.

THIS BACKGROUND SOIL DATA IS FOR INFORMATION AND COMPARISON PURPOSES DWLY. IT IS NOT INTENDED TO REPLACE SAMPLES TAKEN AT THE SITE IN DUESTION.

> WASTE MANAGEMENT DIVISION MICHIGAN DEPARTMENT OF NATURAL RESOURCES

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MICHIGAN BACKGROUND SDIL SURVEY

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CLAY	- 9	esu	1 1 .	iħ.	80	/28

CLAY	Ag	A1	As	3a	Cd	Co	Cr	Cu	Fe	Hq 	Li	N n	Ni	Pb 	Se	2n 	си
INDIVIDUAL GLACIAL LOBES n-Erie mean st. dev.	49 0.99 0.93		65 14.7 13.7	65 103.1 63.2	89 1.0 0.7	3 12.3 1.2	65 24.2 11.0	65 19.6 7.2		55 8.04 0.03	3 22.7 0.6	3 450.0 0.0	9.2	84 12.6 6.7	52 0.43 0.16	84 50.8 12.4	13 0.26 0.04
m-Saginam m-Saginam mean st. dev.	+		32 7.7 8.4		32 1.7 0.5		32 12.1 3.5	32 16.4 5.0					32 26.0 8.4	32 23.3 5 .7			32 0.01 0.00
m-Michigan mean st. dev.	11 0.45 0.49		11 2.2 0.8		11 0.2 ERR		11 8.5 0.6	11 16.1 2.0		11 0.12 0.20		-	11 33.6 4.0	11 19.1 6.9	11 0.20 ERR	11 40.6 7.0	11 0.05 ERR
n-West U. P. aran st. dev.		3 9538 1177	3 2.0 0.2	3 94.7 2.9	3 1.0 0.0	3 6.3 0.8	3 27.0 1.0	3 20.7 1.5	3 11017 1200	3 0.05 0.00	3 11.0 1.0	3 256.7 23.1	3 20.0 1.7	3 2.5 0.0	3 0.25 0.00	3 30.7 3.2	
		*****	=======	: ;;:172	******	551125	£27322	*****	22232 ²	****	221227	2123227	223122	******	120222	222122	******
COMBINED SUMMARY:	Ag	A]	As	Ba	Cd	Co	Cr	Cu	Fe	Hg	Li	Hn	Ni	Pb	Se	Zn	CN
n ginigus gaxigus	60 0.10 3.10	3 8400 10750	111 0.2 88.0	6.8	135 0.1 3.5	6 5.5 13.0	111 3.9 53.0	111 9.9 52.0	5 9650 21900	67 0.01 0.70	6 10.0 23.0	6 230.0 450.0	112 4.0 53.0	130 2.5 32.0	66 0.12 0.70	98 22.0 90.0	
mean st. dev.	0.89 0.89	9538 1177		102.B 61.B	1.1 0.8	9.3 3.4			16225 5765				26.9 8.8	15.5 8.1	0.39 0.17		0.11
mean + 2 SD mean + 3 SD		11892 13068		7 226.3 9 288.1													

n - number of samples for that parameter

minimum - lowest value in data set

maximum - hignest value in data set

mean - average concentration of data

st. dev. - sample standard deviation

mean + 2 SD - mean value plus 2 standard deviations. If the data is normally distributed, then 95% of the values should be less than this number.

mean + 3 SD - mean value plus 3 standard deviations. If the data is normally distributed, then 991 of the values should be less than this number.

THIS BACKGROUND SOIL DATA IS FOR INFORMATION AND COMPARISON PURPOSES ONLY. IT IS NOT INTENDED TO REPLACE SAMPLES TAKEN AT THE SPECIFIC SITE IN QUESTION.

- Manifests (or some type of manifest/waste removal summary) of where and how much waste was shipped.
- 2. Certification statement is needed by the onwer/operator AND an independent registered engineer. All independent registered professional engineer certificates must have an original stamp on at least one copy.
- Summary of decontamination procedures (pressure wash, steam clean, etc.) and how waste water was disposed.
- 4. Summary analysis (include conditions of haul roads, time table, soil and groundwater results, weather conditions, runoff controls, equipment decontamination, etc.).
- 5. Results of all tests used to determine clean closure (chart, tables, lab sheets).
- Statistical comparisons on sampling results compared to background. This should include full computations on background and statistical analysis.
- 7. Sampling and analysis procedures (specify references).
- 8. Final depth and evaluations of excavations of wastes and soils.
- 9. Properly labelled and easily identified sampling grid stations (map); including background stations.
- 10. Groundwater data (and statistical evaluation) used to determine if groundwater degradation has occurred (usually four sets of replicate analysis for background compared to sampling event after closure activities). Monitor well construction details and sampling and analysis procedures may be required if documentation is not in the file.
- 11. Summary of final restoration of excavated area including information on fill material used and/or future land use outline. If clean closure cannot be achieved (e.g. contaminated soils to water table and groundwater results show contamination) this summary item should be used to address the post closure program and/or corrective action.
- 12. A copy of the approved closure plan and letter of closure approval.

H. DISPOSAL OPTIONS

Disposal of excavated waste or soil, and purged groundwater must be in accordance with all applicable State regulations. For example, air stripping of contaminated groundwater requires a permit from Air Quality Division. Disposal options in the following order of preference include:

- 1. Removal for incineration
- 2. Removal for treatment
- 3. Removal for landfilling
- 4. In-place treatment/stabilization
- 5. Encapsulation/control migration

Proposals for new or innovative technologies or solutions will also be considered. Specific situations are discussed below for off-site disposal options according to the current Michigan regulations. It must be determined whether the waste and the facility in question is regulated or not under RCRA and Act 64 (Hazardous Waste Laws).

RCRA/ACT 64 REGULATED HAZARDOUS WASTE SITES

Waste Material

- Listed waste must go to Act 64/RCRA permitted TSD
- Characteristic waste Act 64/RCRA TSD, or if treatment renders material non-hazardous, to Act 641 landfill.

Soils

- Metal contamination If EP TOXIC, or a listed metal, contaminated soils must go to an Act 64/RCRA TSD. If soil concentrations are not EP TOXIC but still above background, they can go to an approved Act 641 landfill only if the metal(s) of concern is not listed.
- Reactive a determination that the contaminated soils do not meet the criteria set forth in 40 CFR 261.23(a),5. The test method is "Test Method to Determine Hydrogen Cyanide Released from Waste". Interim proposed method recommended by U.S. EPA SW-846 Section 7.3.3.2. Contaminated soils containing more than 250 ppm total cyanide may be considered reactive. If soils are found reactive, no landfilling is allowed. Soils/wastes must be pretreated to reduce cyanide concentrations so that the contaminated soils are not reactive.
- Organics if listed waste contaminants, then soils are a hazardous waste by the mixture rules. If not listed, then soils should be tested for appropriate waste characteristic test to determine waste classification.

If background sampling has established organic compounds in soils (e.g. coal fragments will given off naphthalene) then contamination would be determined by using a Student's T-test at the 99% level of confidence or other approved statistical method.

D. HEAVY METALS EVALUATION

For metals (for example: As, Ba, Cd, Cr, Cu, Pb, Hg, Ag, Se, Zn, Ni and Mn), it is recommended to use a <u>total metals</u> (dry weight basis mg/kg) test procedure to minimize additional sources of variation since these constituents are naturally occurring. After background is established as per section A.2., contamination would be determined by using a Student's T-test at the 99% level of confidence or other approved method to compare background data to the suspect samples. Any statistically significant increase above background will be considered contaminated.

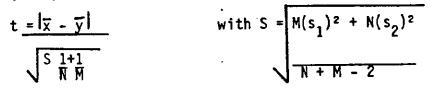
Sample collection, preservation, handling and preparation is to be referenced to EPA Method 3050. Analysis is to be by flame or furnace atomic absorption spectroscopy. Attachment 1 is a summary of typical soil levels on a State-wide basis for comparison purposes only.

E. WASTE SPECIFIC CONSTITUENTS

For inorganic constituents and waste specific constituents we recommend use of total analysis (dry-weight basis) to minimize additional sources of variation since some of these constituents may be naturally occurring. After background is established (see A.2.), contamination would be determined by using a Student's T-test at the 99% level of confidence or other approved statistical method.

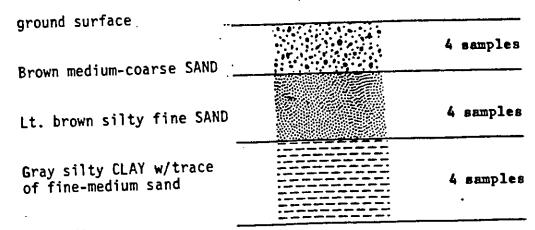
F. STATISTICAL COMPARISONS

 The t-test should be an "approved" method since there are a number of variations. We recommend the Gosset Student T-test (1908) where:



and / / denotes the absolute value sign, S represents the standard deviation, with N being the population of s_1 , N + M - 2 the degrees of freedom and s_1 , s_2 , ... s_n are the sample standard deviations.

2. Cochran's Approximation to the Behrens-Fisher Student's t-test is also available for evaluating background variance versus exceedences (i.e. contamination) as referenced in the 40 CFR 264, Appendix IV. Note this statistical comparison method does established separately (i.e. minimum 4 samples per each soil unit).



SAMPLING GRID Β.

A grid system should be established over the specified closure area. Grid point representation should be proportioned to size 1. of area for equal weighting. It is recommended that one of the following equations be used to determine grid intervals for stationing.

using: 1)
$$A\pi = GI$$
 or 2) $A\pi = GI$
"large site" "small sites"
where: GL = length of area to be gridded
(so ft)

where:

A = area to be gridded (sq. ft.) GI = grid interval

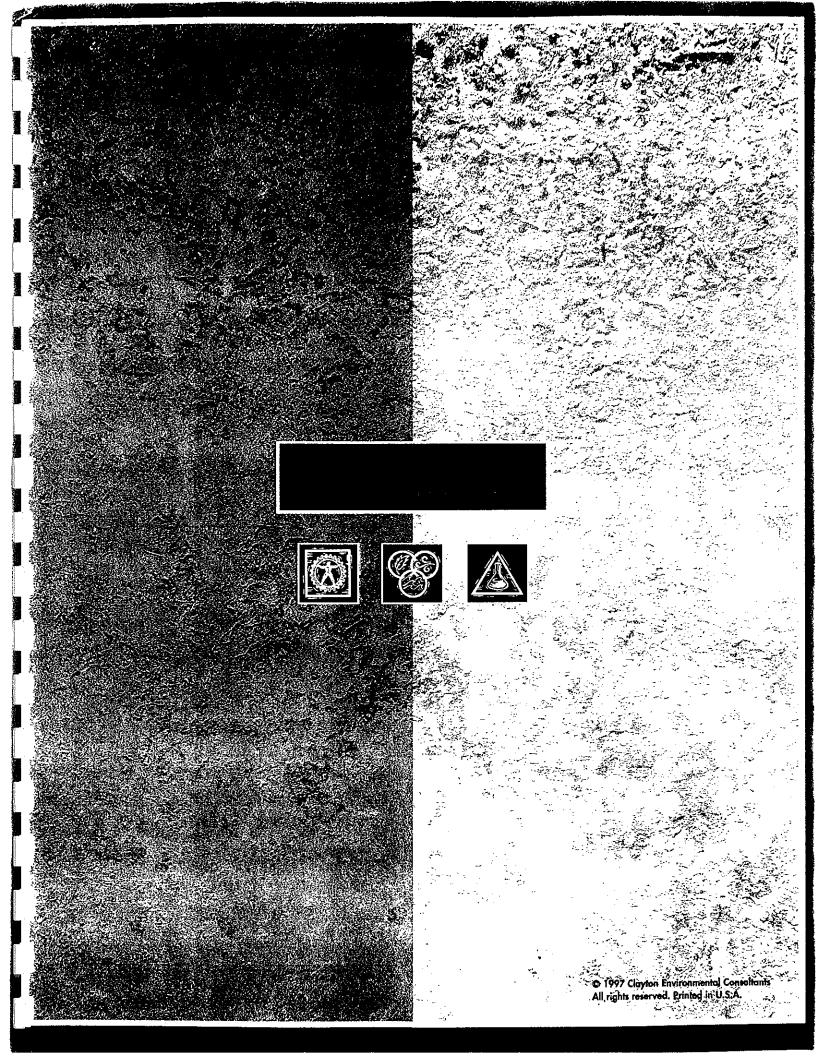
The first equation results in an extremely heavy weighting for small sites but good representation for large areas and the second equation results in a very light weighting for large sites but good representation for small sites. It appears that some boundaries for applying these equations to various size ranges of sites is appropriate. Possible ranges could be a) 0-0.25 acres, b) 0.25-3.0 acres and c) 3.0 acres and greater.

To even further simplify this application we have developed a chart based on an average size range of sites (1 acre = 43,560 sq. ft.).

Site Acreage	Sq. Feet	<u>Grid Interval</u>
0.001-0.25	43-10,890	20 ft. (minimum 9 sample stations)
0.025-3.00	10,890 - 130,680	40 ft.
3.00 +	130,680 +	60 ft.

APPENDIX B

CLAYTON SOIL ASSESSMENT REPORT



22345 Roethel Drive P.O. Box 8022 Novi, M1 48375 (810) 344-1770 Fax (810) 344-2654



Subsurface Investigation for the Former Emission Control Dust Storage Area at the Former McLouth Steel Products Corporation Facility Trenton, Michigan

Submitted to DSC Ltd. Trenton, Michigan

Clayton Project No. 13-97153.00

August 19, 1997

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2.0	SITE BACKGROUND	1
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<u>Table</u>

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- All Contractions

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1.	Summary of analytical results for metals in fill material, November 6 and 7, 1996	7
2	Summary of analytical results for metals in fill material, February 5 and 6, 1997	

<u>Figures</u>

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2.	Fill material sample and background fill material sample locations	4

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<u>Appendices</u>

	SITE HEALTH AND SAFETY PLAN
В	ANALYTICAL RESULTS OF FILL MATERIAL SAMPLES

1.0 INTRODUCTION

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Clayton Environmental Consultants, Inc. is pleased to submit its report for a subsurface investigation conducted at the former McLouth Steel Products Corporation Facility located at 1491 West Jefferson Avenue in Trenton, Michigan. Clayton conducted this investigation of the closure plan in accordance with its proposal dated October 9, 1996 (Clayton Proposal No. 96DETEMR055) and a revised reporting schedule requested by DSC, Ltd.

The purpose of the subsurface investigation was to evaluate the horizontal and vertical extent of barium, cadmium, chromium, hexavalent chromium, and lead at the former emission control dust storage area located at the site. Clayton understands that McLouth Steel formerly stored a listed hazardous waste (Electric Arc Furnace Dust K061) in a diked area prior to the construction of a regulated storage unit for this material. The electric arc furnace dust (EAFD) was removed and properly disposed of by McLouth Steel.

2.0 SITE BACKGROUND

The former McLouth Steel Products Corporation Trenton, Michigan plant is now owned by DSC Ltd. The plant site is bounded on the west and north by Jefferson Avenue, on the south by King Road, and on the east by the Detroit River. The former stockpile area of EAFD is located on the north end of the property, just north of the east extension of Sibley Road. The EAFD was removed and properly disposed of by McLouth Steel. Figure 1 presents a site location map. A copy of the site health and safety plan has been included as Appendix A.

3.0 SUMMARY OF SUBSURFACE INVESTIGATION ACTIVITIES

The following is a summary of activities performed as a part of Clayton's subsurface investigation:

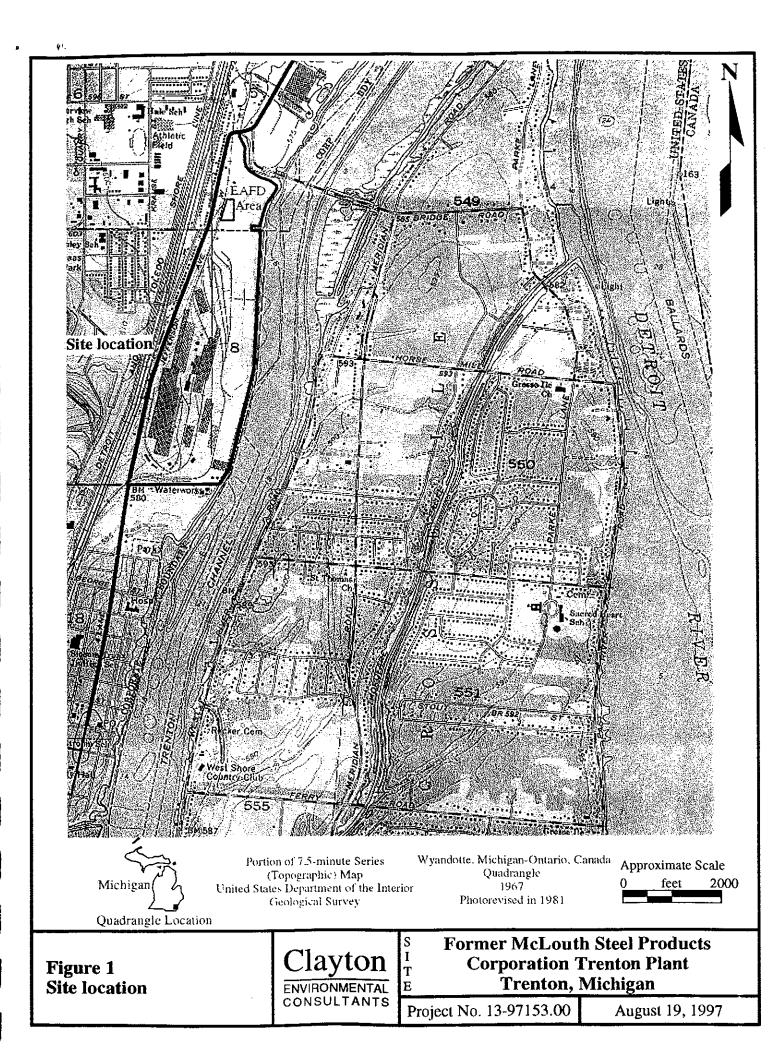
- Collection and analysis of closure fill material samples from the former EAFD storage area
- Collection and analysis of background fill material samples north of the former EAFD storage area
- Evaluation of background concentrations

The installation of monitoring wells and quarterly groundwater sampling events at the property will be addressed in a separate report.

3.1 CLOSURE FILL MATERIAL BORINGS

On November 6 and November 7, 1996 and February 5 and February 6, 1997, Clayton (1) retained a drilling contractor (Fibertec, Inc.) to drill fill material borings utilizing a Geoprobe[®], (2) oversaw drilling of the borings, and (3) collected fill material samples. The drilling contractor extracted fill material samples while using the Geoprobe[®] from clear acetate liners installed within the Geoprobe[®] rods. At the completion of drilling and following collection of the samples, the borings were backfilled with bentonite chips.

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A total of 27 borings (A1 through A4, B1 through B5, C1 through C5, D1 through D6, E1 through E4, and F2 through F4) were advanced on November 6 and November 7, 1996. An additional 19 borings (A1 South, A1 East, A2 South, A4 South, A5, B1 East, B2, B5, B6, C5, C6, D1 East, D2, D7, E1 East, E2, F1, G2, and G4) were advanced on February 5 and February 6, 1997 following receipt of analytical results from the November 6 and November 7, 1996 sampling and discussions with DSC Ltd. personnel.

Fill material samples were collected at the surface and at 2 feet below ground surface. Fill material samples from the surface were collected using a stainless-steel trowel. Fill material samples from beneath the surface were collected using a Geoprobe[®]. Based on visual inspections of samples collected from the borings, Clayton observed a dry, sandy, granular, metallic, slag fill material from the surface to the final depth of the borings (a maximum depth of 4 feet below surface [B2, B5, C5, D2, and E2]). Clayton encountered obstructions drilling Borings A3 and D2 and the borings were advanced to 1-foot-below ground surface. According to the SEG closure plan dated September 16, 1988, fill material samples were collected over a grid with a grid spacing of 50 feet. The fill material sampling locations are shown in Figure 2.

Fill material samples were analyzed for barium, cadmium, chromium, lead, hexavalent chromium, and pH. Following the receipt of analytical results on November 6 and 7, 1996 and discussions with DSC Ltd. personnel, additional fill material samples from the borings advanced on February 5 and 6, 1997 were analyzed for barium, cadmium, chromium, and lead to evaluate the horizontal and vertical extent of compounds of concern.

Clayton retained a surveyor (JCK & Associates, Inc.) to survey the relative locations and ground surface elevations of the borings.

3.2 BACKGROUND FILL MATERIAL SAMPLES

On November 6, 1996, Clayton collected four background fill material samples (BGDA through BGDD) from an area away from the EAFD area along the railroad tracks to determine background concentrations. These background samples were collected at the surface and at a depth of 2 feet below ground surface.

At the request of MDEQ Lansing Waste Management Division, Permits Section personnel, two additional background borings (BGD1 and BGD2) were advanced east of the original four background fill material borings. These background samples were collected at the surface and at a depth of 2 feet below ground surface.

Based on visual inspections of samples collected from the borings, Clayton observed a dry, sandy, granular, metallic, slag fill material from the surface to the final depth of the borings (a maximum depth of 2 feet below surface).

3.3 EQUIPMENT DECONTAMINATION

The drilling contractor and Clayton decontaminated sampling equipment (e.g., Geoprobe[®] rods, and stainless-steel trowels) before collecting samples. The sampling equipment was decontaminated in the following order:

1. Washing and scrubbing the equipment with a nonphosphate detergent solution

2. Rinsing the equipment with tap water

- 3. Rinsing the equipment with deionized water
- 4. Air-drying the equipment

Equipment blanks (Equipment Blanks EB-1 and EB-2) were collected by rinsing the Geoprobe[®] rods and samplers with deionized water and collecting the water in the appropriate containers.

Vehicles were not impacted by drilling activities and were not decontaminated. Fill material generated from drilling was left next to each hole. Decontamination fluid the drilling contractor generated from steam cleaning the Geoprobe[®] rods was placed on the ground.

3.4 SAMPLE COLLECTION AND PRESERVATION

Fill material samples were collected in laboratory-grade containers, and preserved and stored following United States Environmental Protection Agency (USEPA) Publication SW-846, *Testing Methods for Evaluating Solid Waste*. Clayton transported the samples in ice-cooled containers to Clayton's analytical laboratory in Novi, Michigan.

For samples intended for barium, cadmium, chromium, hexavalent chromium, and lead analyses, Clayton used sample jars that the supplier (1) washed with detergent, (2) rinsed three times with deionized water, (3) rinsed with acid, (4) rinsed three times with organicfree water, (5) oven dried, (6) rinsed with solvent, and (7) oven dried.

4.0 LABORATORY ANALYSIS

Clayton selected fill material samples for laboratory analysis from the surface and from the 2-foot-deep interval in fill material samples collected on November 6 and 7, 1996. Following the receipt of analytical results from the samples collected on November 6 and 7, 1996, Clayton collected additional samples at selected locations on February 5 and 6, 1997 from the surface, 2-feet below ground surface, and at 4-feet below ground surface.

Clayton analyzed the fill material samples for barium, cadmium, chromium, lead, and hexavalent chromium using USEPA 6000- and 7000-series methods. Clayton analyzed the fill material samples for pH using USEPA Method 9045.

5.0 ANALYTICAL RESULTS

Tables 1 and 2 summarize metal analytical results from the November 6 and 7, 1996 and February 5 and 6, 1997 fill material sampling. Detailed analytical reports are included as Appendix B.

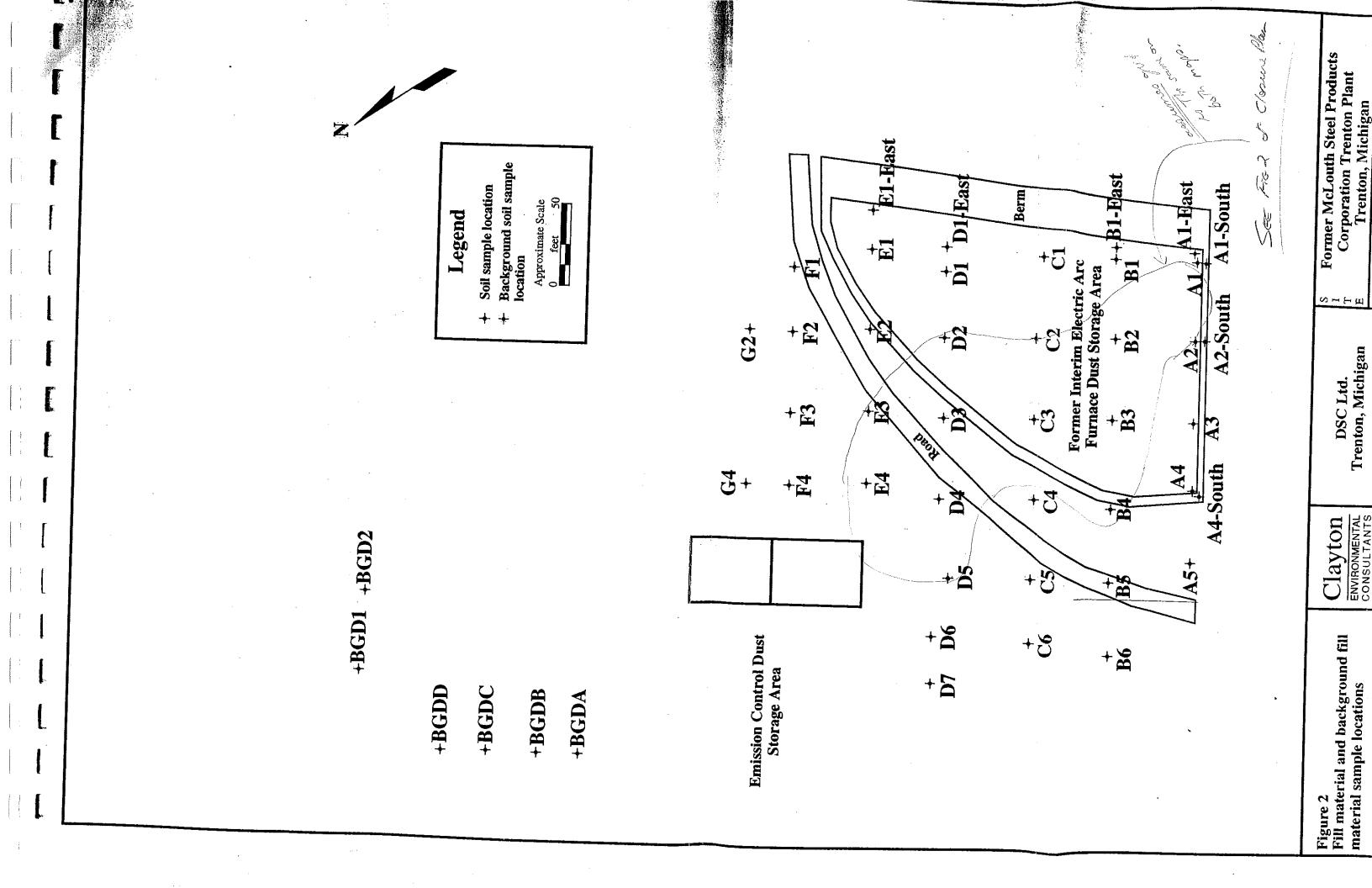


Table 1Summary of Analytical Results for Metals in Fill MaterialClayton Project No. 13-97153.00Sampling Dates: November 6 and 7, 1996

11.18.11 11.18.11 11.19 11. Hd Lead Sample Concentration (mg/kg) Chromium (VI) Chromium Cadmium Barium B1 (Surface) B1 (2) B1 (2) B1 (2) B1 (2) B1 (2) B1 (2) B2 (Surface) B3 (Surface) B3 (Surface) B4 (Surface) B4 (2) B4 (2) B4 (2) B4 (2) B4 (2) C1 (Surface) C1 (Surface) C1 (Surface) C2 (Surface) C3 (Surface) C3 (Surface) C3 (Surface) D1 (2) C3 (Surface) D1 (2) D Sumple Identification F2 (Surface) F2 (Surface) F2 (2') Duplicate F3 (Surface) Analyte A1 (Surface) A1 (2') A2 (Surface) A2 (2') A3 (2') A3 (1') A4 (Surface) A4 (2')

F3 (2')	57	0.55	220	<0.1	<20	5.11	
F4 (Surface)	50	6.1	440	NA	1100	0.6	
- FJ (2')	76	<0.05	380	NA	<50	11.8	
BGDA (Surface)	270	3.6	480	<0.1	450	8.6	_
BGDA (2')	110	0.33	690	<0.1	<20	11.4	
BGDB (Surface)	82	1.3	650	<0.1	130	8.8	
BGDB (2')	36	0.77	430	<0.1	55	11.5	
BGDB (Surface) Duplicate	92	1.7	420	<0.1	260	6.8	
BGDC (Surface)	50	0.78	330	<0.1	170	8.5	
BGDC (2')	110	0.4	690	<0.1	100.	11.2	
BGDD (Surface)	68		360	<0.1	24()	8.2	
BGDD (2')	61	0.38	930	<0.1	<20	11.3	
BGD1 (Surface)	100	<0.05	250	<0.1	120	9.3	
BGD1 (2')	17	<0.05	530	<0.1	13	12.3	
BGD2 (Surface)	140	<0.05	290	<0.1	270	8.9	
BGD2 (2')	34	<0.05	540	<0.1	43	12.3	
mg/kg = milligrams per kil-	ogram or parts p	ber million (ppm	. (1				
NA = Not analyzed	· - ·					•	

Table 2
Summary of Analytical Results for Metals in Fill Material
Clayton Project No. 13-97153.00
Sampling Dates: February 5 and 6, 1997

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	Sample Concentration (mg/kg)			
Analyte	Barium	Cadmium	Chromium	Lead
Sample Identification				
A1 South Surface	NA	10	NA	740
A1 South (2')	NA	NA	NA	270
A1 East Surface	NA	< 0.05	NA	190
A1 East (2')	NA	NA	NA	99
A2 South Surface	NA	< 0.05	NA	19
A2 South Surface Dup.	NA	2	NA	270
A2 South (2')	NA	NA	500	NA
A4 South Surface	NA	4.3	NA	270
A4 South (2')	NA	2,4	460	NA
A5 Surface	NA	1.7	NA	220
A5 (2')	NA	0.52	630	NA
B1 East Surface	NA	NA	NA	550
B2 (4')	NA	0.06	NA	5
B5 (4')	NA	< 0.05	1,600	NA
B6 (2')	NA	NA	740	NA
C5 (4')	NA	<10	7,400	NA
C6 Surface	NA	3.3	700	NA
C6 (2')	NA	1.5	800	NA
D1 East Surface	NA	NA	NA	520
D2 (4')	52	0.28	NA	15
D7 Surface	NA	3.1	NA	460
E1 East Surface	NA	0.61	NA	90
E2 (4')	NA	NA	580	NA
F1 Surface	64	NA	NA	440
F1 (2')	140	1	NA	160
G2 Surface	55	NA	NA	640
G2 Surface Duplicate	- 58	NA	NA	990
G2 (2')	86	0.95	NA	270
G-4 (Surface)	NA	NA	NA	490

mg/kg = milligrams per kilogram or parts per million (ppm) NA = Not analyzed

Subsurface Investigation for Approved Emission Control Dust Storage Area at the Former McLouth Steel Products Corporation Trenton, Michigan

Submitted to DSC Ltd. Trenton, Michigan

Clayton Project No. 13-97153.00

August 19, 1997

Limitations

The information and opinions rendered in this report are exclusively for use by DSC Ltd. Clayton Environmental Consultants, Inc. will not distribute or publish this report without DSC Ltd.'s consent except as required by law or court order. The information and opinions are given in response to a limited assignment and should be implemented only in light of that assignment. Clayton Environmental Consultants, Inc. accepts responsibility for the competent performance of its duties in executing the assignment and preparing reports in accordance with the normal standards of the profession, but disclaims any responsibility for consequential damages.

This report submitted by:

Gary T. Blinkiewicz

Project Hydrogeologist Environmental Management and Remediation Detroit Regional Office

This report reviewed by:

Robert A. Ferree, CPG Senior Geologist and Supervisor of Geosciences Environmental Management and Remediation Detroit Regional Office I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to be the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

This report reviewed by:

Derek R. Wong, Ph.D., P.E.

Senior Hydrogeologist and Manager Environmental Management and Remediation Detroit Regional Office

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APPENDIX A

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Contemporate Look

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SITE HEALTH AND SAFETY PLAN

Detroit Regional Office

22345 Roethel Drive P.O. Box 8022 Novi, MI 48375 (810) 344-1770 Fax (810) 344-2654



Site Health and Safety Plan for the Former McLouth Steel Plant Trenton, Michigan

> Submitted to DSC, Ltd. Trenton, Michigan

Clayton Project No. 13-97153.00

October 25, 1996

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1.0 **INTRODUCTION**

This health and safety plan describes the procedures that will be implemented and followed by Clayton Environmental Consultants, Inc. during work activities at the former McLouth Steel Plant in Trenton, Michigan.

This health and safety plan is based on the planned work activities and environmental investigations to be conducted at the site and the requirements of Title 29 of the Code of Federal Regulations, Section 1910.120 (29 CFR 1910.120). This health and safety plan should be available onsite during work activities.

2.0 WORK ACTIVITIES

The following is a brief description of the work activities to be performed at the site.

- Install three monitoring wells
- Install 31 soil borings in the former emission control dust storage area
- Sample groundwater from two existing and three new monitoring wells

3.0 ONSITE ORGANIZATION

Each person shall be responsible for following the health and safety plan's guidelines at the site. The site safety officer is Mr. Gary T. Blinkiewicz. The safety officer's duties are to:

- Oversee implementation of the health and safety plan
- Confirm that all personnel have proper training and protective equipment
- Conduct a "tailgate" meting on the first day before field activities commence
- Stop work if the health and safety of workers is in question
- Observe workers for signs and symptoms of exposure to contaminants
- Evaluate the effectiveness of the personal protective program on an ongoing basis and upgrade the program as needed
- Inform workers of any changes in the health and safety practices
- Perform daily reviews of the work practices and compliance with the health and safety plan
- Note any signs of worker exposure or stress and take proper action immediately

All personnel who enter the work area must comply with the health and safety practices and procedures described in this health and safety plan.

All incidents at the site, such as injuries or near misses, must be reported to the following people as soon as possible:

• Gary T. Blinkiewicz Site Safety Officer Clayton Environmental Consultants, Inc. (810) 344-1770

4.0 <u>HEALTH AND SAFETY HAZARDS</u>

The health and safety concerns onsite can be categorized as chemical hazards and physical hazards. The potential chemical hazards, based on previous site investigations, are presented by the chemicals listed in the following table.

Hazardous Substance	Potential Health Effects	Permissible Exposure Limit (PEL)	Immediately Dangerous to Life or Health
Barium	eyes, skin, respiratory system damage, heart, CNS damage	0.5 mg/m ³	50 mg/m ³
Cadmium	NIOSH Potential Occupational Carcinogen (prostatic & lung cancer);respiratory system and kidney damage	0.005 mg/m ³	9 mg/m ³
Chromium	eye and skin damage; respiratory system damage	0.5 mg/m ³	250 mg/m ³
Lead	eye damage; GI tract damage; CNS damage; kidney, blood, gingival tissue damage	0.050 mg/m ³	100 mg/m ³

Physical hazards present at the site are limited to unstable footing.

4.1 CHEMICAL HAZARDS

Hazards generally associated with chemicals used onsite and chemical contamination present in soil and/or groundwater include overexposure through the following possible routes of entry: (1) Skin or eye contact resulting in skin damage and in some cases, dermal absorption, (2) Inhalation of chemical vapors, dust or gases, (3) Ingestion of chemicals. To minimize exposure to chemical contaminants, personal protective equipment as specified in this plan must be worn. Site control measures must also be taken to minimize exposures and to provide for contingency measures. Air monitoring/sampling as specified in this plan will be used to assess potential airborne exposure. Material Safety Data Sheets for any chemicals brought onsite should be available for review.

4.2 PHYSICAL HAZARDS

The following subsections describe possible health and safety hazards associated with work activities at the site.

4.2.1 Traffic and Heavy Equipment Hazards

Stay at least 10 feet away from moving equipment. If closer than 10 feet:

- Keep equipment in sight at all times.
- Inform the operator of your location.

The working area will be closed to traffic with barricades, caution tape, cones, or other traffic control equipment.

No unauthorized or unessential vehicle will be allowed to enter the barricaded area. Only trained personnel may operate heavy equipment.

4.2.2 Underground Utilities Hazards

Extreme care will be taken in invasive drilling/excavation techniques to ensure that no utility lines exist at that location.

If an underground utility line is encountered or damaged during the work:

- Stop all activities immediately and clear the area.
- Stop all engines and mechanical and electrical equipment.
- Call MISSDIG (1-800-482-7171) immediately.

4.2.3 Lifting Heavy Objects

To prevent back injury resulting from lifting heavy objects:

- Bend your knees
- Lift with your legs not your back
- Keep your feet centered under you
- Keep the load close to your body

4.2.4 Unstable Footing, Physical Obstacles and Falling Objects

Inspect the work areas carefully before entering and make sure of safe footing. Use caution when navigating physical obstacles, and beware of falling objects.

4.2.5 Overhead Utility Lines

Extreme care must be taken to avoid overhead utility lines with equipment brought onsite.

If an overhead utility line is encountered or damaged during the work:

- Stop all activities immediately and clear the area.
- Stop all engines and mechanical and electrical equipment
- Call US ALERT (1-800-642-2444) immediately.

5.0 ONSITE SAFETY EQUIPMENT

The following subsections describe personal and general safety equipment that will be required onsite.

5.1 PERSONAL SAFETY EQUIPMENT

The following personal protective equipment (PPE) will be required at all times:

- Hard Hat
- Steel toed shoes
- Gloves (vinyl and nitrile)
- Safety glasses or goggles

5.2 GENERAL SAFETY EQUIPMENT

The following items must be available and easily accessible for use:

- First aid kit
- Fire extinguisher (foam, dry chemical, or carbon dioxide)
- Eye wash

6.0 <u>TRAINING</u>

All personnel who may be exposed to onsite contaminants must provide documentation of the following:

- Current training that meets the requirements of 29 CFR 1910.120 to include:
 - 40 hours of classroom instruction/hands-on training
 - Three days of field experience under the supervision of an experienced supervisor
 - Eight hours of annual classroom refresher training, as appropriate
- Eight hours of supervisory training as specified in 29 CFR 1910.120 if a person is a designated supervisor.

Project-specific training and information will be provided either before traveling to the site or at the site before entry into contaminated areas onsite. The information and training will be documented, and will include the following:

- The contents of the health and safety plan
- A discussion of the site specific health and safety hazards, protective measures, and work practices

7.0 MEDICAL SURVEILLANCE

Prior to being assigned to a hazardous or a potentially hazardous activity involving exposure to toxic materials, employees must receive a baseline physical exam. The contents of the physical exam is to be determined by the employee's medical consultant. The baseline physical exam should categorize employees as fit-for-duty and able to wear respiratory protection.

In addition to the baseline physical, employees must have a periodic physical exam every 12 months. All personnel working in contaminated or potentially contaminated areas at the site must have current medical monitoring (i.e., exam within 12 months).

8.0 AIR MONITORING/SAMPLING

During field operations, the air will be monitored with an Hnu Photo Ionization Detector (PID). If organic vapors are consistently detected at a concentration of 50 parts per million (ppm) in the breathing zone, an exclusion zone will be set up to conduct work activities. The exclusion zone limit is set based on the lowest PEL of the contaminants listed. (Personal protective equipment associated with the zones are discussed in greater detail in Section 5.0).

9.0 SITE CONTROL MEASURES

The following safe work practices apply for the entire site: (include applicable restrictions/safe work practices)

- Observe the "buddy system," never enter or exit contaminated areas alone
- Maintain line-of-sight of radio communication between personnel in contaminated and non-contaminated areas
- No smoking, eating or drinking except in a designated "clean zone"
- No horse play
- No matches or lighters in contaminated areas

A site map is attached as Figure 1.

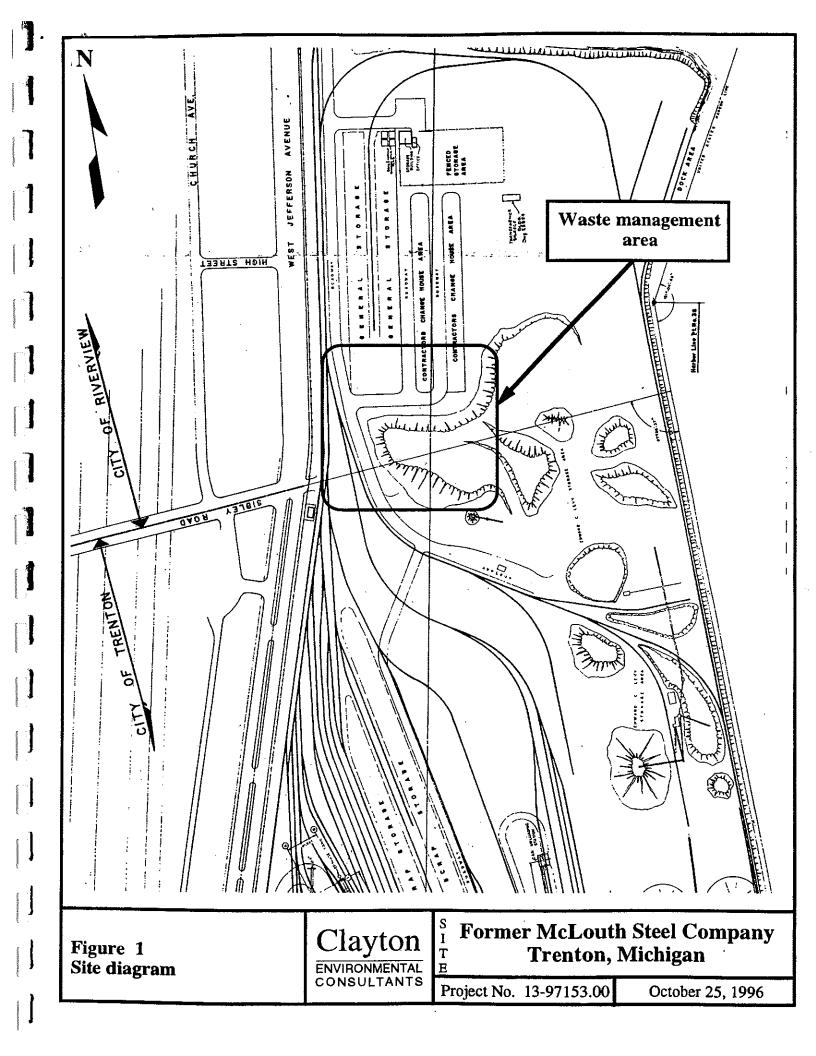
10.0 DECONTAMINATION PLAN

Decontamination involves the orderly controlled removal of contaminants. All personnel and equipment must be decontaminated in the Contamination Reduction Zone. The following are specific procedures for decontamination on this site

Level D: Remove outer garments (i.e., coveralls), remove and discard gloves, wash hands, and face in the offices prior to leaving the site

11.0 WASTE HANDLING AND DISPOSAL

The waste handling procedures discussed in the work plan will be followed. Waste generated by implementation of this health and safety program may include spent protective clothing, such as TyvekTM suits or gloves, and wash rinse solutions. Protective clothing will be collected in a lined container or DOT drum. Liquid wastes will be collected and pumped or poured into DOT approved drums with equipment decontamination rinsate.



12.0 EMERGENCY RESPONSE/CONTINGENCY PLAN

12.1 PERSONAL INJURY

In case of a minor personal injury, general first aid procedures will apply. A first aid kit will be available at the site in a designated location or in company vehicles. All injuries or accidents will be reported to the site safety officer immediately.

More serious injuries may require assistance from paramedics. The project manager, site safety officer, or another designated person will contact the appropriate emergency personnel by dialing 911.

12.2 EYE AND SKIN EXPOSURE TO CHEMICALS

These chemicals and substances are irritants to eyes and skin. In case of exposure:

- Remove contaminated clothing and shoes.
- Flush affected areas with plenty of water.
- IF IN EYE, hold eyelids open and flush with plenty of water.
- If irritation or discomfort continues, call for medical aid immediately.

12.3 INTERNAL EXPOSURE TO CHEMICALS

Chemicals can be harmful if swallowed. In case of exposure:

- Call for medical aid.
- Get immediate medical attention.

12.4 INHALATION EXPOSURE TO CHEMICALS

Inhalation of these chemicals can cause upper respiratory problems, tight chest, muscle aches, headache, nausea, and eye, nose, and throat irritation. In case of exposure:

- Move victim to fresh air.
- If discomfort continues, call for medical aid immediately.
- If breathing has stopped, give artificial respiration.
- If breathing is difficult, give oxygen.

12.5 FIRE HAZARD

In case of fire, leave the area and call fire department immediately.

12.6 EMERGENCY CONTACTS

Emergency contacts will be made, as necessary, from the list in this section:

<u>Hospital</u>

Name:Oakwood Hospital Seaway CenterAddress:5450 Fort Street, Trenton, MichiganPhone:(313) 671-3800

<u>Ambulance:</u> Call 911 or (313) 671-3883

Fire Dept. Call 911

Police Dept. Call 911 or (313) 256-9636

See Figure 2 for locations of emergency facilities.

Other Telephone Numbers

US ALERT: 1-800-642-2444

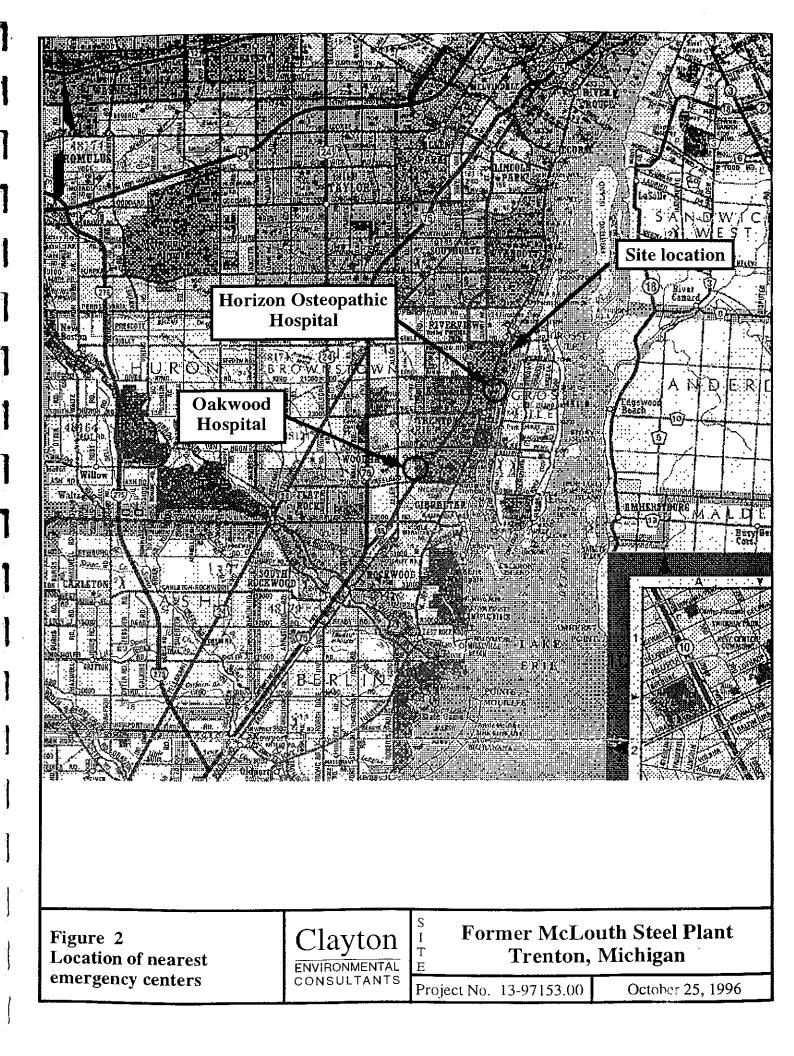
National Response Center: 1-800-424-8802

13.0 SPILL CONTAINMENT PROGRAM

The following spill containment program applies for activities at the site:

- All drums and containers used during the cleanup will meet DOT requirements for the wastes they will contain. Drums will be inspected and integrity assured before they are used and moved. Only drums found to be sound will be used. Drum and container movement will be minimized to reduce the potential for spills.
- Where spills may occur, adequate quantities of spill containment materials (absorbent, pillows, etc.) will be stationed in the immediate area.

This plan prepared by :	Susan J. Boddy Staff Geologist	
This plan reviewed by :	Robert A. Ferree, CPG Senior Geologist and Supervisor o	of Geosciences
Reviewed and accepted by :	Name	Date
Reviewed and accepted by :		



EMERGENCY INFORMATION

IN CASE OF AN EMERGENCY, USE THIS SHEET

Emergency Phone No.: 911

OT

(313) 671-3883

Site Address:

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1491 W. Jefferson Avenue Trenton, Michigan

Nearest Intersection:

Jefferson Avenue and Sibley Road

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APPENDIX B

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ANALYTICAL RESULTS OF FILL MATERIAL SAMPLES

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Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

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Sample Type:SoilDate Sampled:11/06/96Analytical Method:EPA 6010Date Received:11/08/95Analyst:CWDate Analyzed:11/13/96

			Ba	rium
Lab No.		ample ification	(mg/kg)	LOD (mg/kg)
	A1	(SURFACE)	190	/ 1
001a 002a	Al	(2')	150	1
002a 003a			140	· 1
003a 004a	A3	(SURFACE	120	1
004a 005a		(1')	110	1
005a 006a			54	1
006a 007a.	B1	-	82	1
007a. 008a	BI	-	71	1
	B1 B1	(2') DUPLICATE	81	1
009a	B1 B2	(SURFACE)	35	1
010a		-	83	1
011a	B2 B3	(SURFACE)	49	1
012a		(2')	24	1
013a		(SUFACE)	54	1
014a		(SURFACE)	37	· 1 ·
015a		(2')	37	1
016a		(SURFACE)	26	1
017a		•	55	1
018a		(SURFACE) DUPLICATE	34	1
021a	C2	(SURFACE)	51	1
022a	C2	(2') .	65	1
023a	C3	(SURFACE)	- 76	1
024a		(2')		1
025a		(SUFACE)	58	1
026a		(2')	40	1
027a			27	1
028a		• • •	70	
029a		(2')	50	1
030a		(SUFACE)	26	1
031a		(2') DUPLICATE	44	1
032a		(2')	32	1
033a		(SURFACE)	42	1
034a	D4	(2')	29	1

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Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

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Sample Ty Analytica Analyst:	pe: Soil Al Method: EPA 6010 CR		Date Sampled: Date Received: Date Analyzed:	11/06/96 11/08/96 11/13/96
			Barium	
Lab No.	Sample Identification	(mg/kg)	(m	LOD g/kg)
	D5 (2')	18		1
035a		42		1
036a	D6 (SURFACE)	26		1
037a	D6 (2') D6 (SURFACE) DUPLICATE	42		1.
038a	E1 (2')	100		l
041a	E1 (2) E2 (SURFACE)	110		1
042a	E2 (SURFACE)	89		1
043a	E3 (2')	52		1
044a	E3 (2) E4 (SURFACE)	63		1.
045a	E4 (2')	86		1
046a	F_2 (SURFACE)	61		1
047a	F_2 (2')	86		1
048a	F2 (2') DUPLICATE	930		1
049a	F3 (SURFACE)	47		1
050a	F4 (SURFACE)	50		1
051a	A2 (2')	82		1
052a	A4 (2')	44		1
053a 054a	B4 (2')	90		1
054a 055a	C1 (2')	63		1
055a 056a	C3 (2')	61		1
056a 057a	C5 (2')	32		1
057a 058a	$D_2 (1')$	210		1
058a 059a	D3 (SURFACE)	71		1
060a	D5 (SURFACE)	56		1
061a	E1 (SURFACE)	77		1
062a	E3 (SURFACE)	73		1
063a	F3 (2')	57		1
064a	BGDA (SURFACE)	2.70		1
065a	BGDA (2')	110		1
066a	BGDB (SURFACE)	82		1
067a	BGDB (2')	36		1
068a	BGDB (SURFACE) DUPLICATE	92		1

Sample Type:SoilDate Sampled:11/06/96Analytical Method:EPA 6010Date Received:11/08/96Analyst:CRDate Analyzed:11/13/96

Lab No.		Ba	rium
	Sample Identification	(mg/kg)	LOD (mg/kg)
 071a	BGDC (SURFACE)	50	
071a 072a	BGDC (2')	110	1
073a	BGDD (SURFACE)	68	1
074a	BGDD (2')	61	. 1
075a	LAB BLANK	<1	1

General Notes:

<: Less than the indicated limit of detection (LOD)

--: Information not available or not applicable

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Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

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Sample Type:SoilDate Sampled:11/06/96Analytical Method:EPA 6020Date Received:11/08/96Analyst:CRDate Analyzed:11/13/96

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			Cad	lmíum
Lab No.		ample ification	(mg/kg)	LOD (mg/kg)
001a	A1	(SURFACE)	5.4	. 0.05
002a		(2')	<0.05	0.05
003a		(SURFACE)	12	0.05
004a	EA	(SURFACE	3.2	. 0.05
005a		(1')	0.46	0.05
006a		(SURFACE)	5.2	0.05
007a		(SURFACE)	3.4	0.05
008a		(2')	<0.05	0.05
009a		(2') DUPLICATE	<0.05	0.05
010a		(SURFACE)	30	0.05
011a		(2')	1.7	0.05
012a	B3	(SURFACE)	22	0.05
013a		(2')	<0.05	0.05
014a		(SUFACE)	3.9	0.05
015a		(SURFACE)	<0.05	0.05
016a		(2')	<0.05	0.05
017a		(SURFACE)	0.34	0.05
018a		(SURFACE) DUPLICATE	0.52	0.05
021a	C2	(SURFACE)	2.6	0.05
022a		(2')	<0.05	0.05
023a		(SURFACE)	0.4	0.05
024a	· F4	(2')	<0.05	0.05
025a	C4	• •	1.4	0.05
026a	C4	(2')	<0.05	0.05
027a	C5		1.1	0.05
028a	D1	•	3	0.05
029a	D1	-	0.29	0.05
030a		(SUFACE)	7.2	0.05
031a		(2') DUPLICATE	0.4	0.05
032a		(2')	0.13	0.05
033a		(SURFACE)	4	0.05
034a		(2')	0.23	0.05

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Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

Sample Type:SoilDate Sampled:11/06/96Analytical Method:EPA 6020Date Received:11/08/96Analyst:CWDate Analyzed:11/13/96

		Cadmium		
Lab No.	Sample Identification	(mg/kg)	LOD (mg/kg)	
035a	D5 (2')	0.1	0.05	
036a	D6 (SURFACE)	12	. 0.05	
037a	D6 (2')	0.38	0.05	
038a	D6 (SURFACE) DUPLICATE	12	0.05	
041a	E1 (2')	<0.05	0.05	
042a	E2 (SURFACE)	0.22	0.05	
043a	E2 (2')	<0.05	0.05	
044a	E3 (2')	<0.05	0.05	
045a	E4 (SURFACE)	<0.05	0.05	
046a	E4 (2')	0.3	0.05	
047a	F2 (SURFACE)	4.7	0.05	
048a	F2 (2')	<0.05	0,05	
049a	F2 (2') DUPLICATE	3.5	0.05	
050a	F3 (SURFACE)	3.5	· 0.05	
051a	F4 (SURFACE)	.1.9	0.05	
.052a	A2 (2')	0.56	0.05	
053a	A4 (2')	6.6	0.05	
054a	B4 (2')	1.1	0.05	
055a	C1 (2')	0.78	0.05	
056a	C3 (2')	0.13	0.05	
057a	C5 (2')	1.5	0.05	
058a	D2 (1')	2.4	0.05	
059a	D3 (SURFACE)	4.1	0.05	
060a	D5 (SURFACE)	2.6	0.05	
061a	E1 (SURFACE)	11	0.05	
062a	E3 (SURFACE)	3.6	0.05	
063a	F3 (2')	0.55	0.05	
064a	BGDA (SURFACE)	3.6	0.05	
065a	BGDA (2')	0.33	0.05	
066a	BGDR (2) BGDB (SURFACE)	1.3	0.05	
067a	BGDB (2')	0.77	0.05	
067a 068a	BGDB (2 ⁻⁾ BGDB (SURFACE) DUPLICATE	1.7	0.05	

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Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

Sample Ty Analytica Analyst:	ype: al Method:	Soil EPA 6020 CW		Date Sam Date Rec Date Ana	eived:	11/06/96 11/08/96 11/13/96	- - -
				Cadmi	um		
Lab No.	Samp: Identifi	le cation	(mg/kg)			LOD g/kg)	
071a 072a 073a 074a 075a	BGDC	(SURFACE) (2')	0.78 0.4 1 0.38 <0.05			0.05 0.05 0.05 0.05 0.05	

General Notes:

Less than the indicated limit of detection (LOD) Information not available or not applicable <:

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Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

Sample Type:SoilDate Sampled:11/06/96Analytical Method:EPA 6010Date Received:11/08/96Analyst:CwDate Analyzed:11/13/96

		Chr	omium
Lab No.	Sample Identification	(mg/kg)	LOD (mg/kg)
	A1 (SURFACE)	480	
002a	A1 (2')	210	130
003a	A2 (SURFACE)	340	· 130
004a	A3 (SURFACE	540	130
005a	A3 (1')	480	130
006a	A4 (SURFACE)	620	130
007a	B1 (SURFACE)	600	130
008a	B1 (2')	950	130
009a	B1 (2') DUPLICATE	1200	130
010a	B2 (SURFACE)	640	130
011a	B2 (2')	600	130
012a	B3 (SURFACE).	270	130
013a	B3 (2')	760	130
014a	B4 (SUFACE)	540	130
015a	B5 (SURFACE)	420	130
016a	B5 (2')	1300	130
017a [·]	C1 (SURFACE)	460	130
018a	C1 (SURFACE) DUPLICATE	820	130
021a	C2 (SURFACE)	650	130
022a	C2 (2')	810	130
023a	C3 (SURFACE)	410	130
024a	F4 (2')	380	130
025a	C4 (SUFACE)	470	130
026a	C4 (2')	960	130
027a	C5 (SURFACE)	380	130
028a	D1 (SURFACE)	510	130
029a	D1 (2')	690	130
030a	D2 (SUFACE)	410	130
031a	D1 (2') DUPLICATE	550	130
032a	D3 (2')	680	130
033a	D4 (SURFACE)	280	130
034a	D4 (2')	820	130

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Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

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Sample Type:SoilDate Sampled:11/06/96Analytical Method:EPA 6010Date Received:11/08/96Analyst:CRDate Analyzed:11/13/96

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		Chro	muium
Lab No.	Sample Identification	(mg/kg)	LOD (mg/kg)
	D5 (2')	870	130
035a	D6 (SURFACE)	180	130
036a	D6 (2')	680	130
037a	D6 (SURFACE) DUPLICATE	<130	130
038a	E1 (2')	660	50
041a	E1 (27) E2 (SURFACE)	350	50
042a	$E_2 (2')$	1500	50
043a	E2 (2')	910	50
044a	E3 (2) E4 (SURFACE)	490	50
045a	E4 (2')	1000	50
046a	F_2 (SURFACE)	490	50
047a	F_2 (SURFACE) F_2 (2')	630	- 50
048a	F2 (2') F2 (2') DUPLICATE	620	50
049a -		350	50
050a	· · · · · · · · · · · · · · · · · · ·	440	50
051a	F4 (SURFACE)	1400	50
052a	A2 (2')	2600	50
053a	A4 (2')	960	50
054a	B4 (2')	760	50
055a	C1 (2')	1100	50
056a	C3 (2')	1500	50
057a	C5 (2')	270	50
058a	D2 (1')		50
059a	D3 (SURFACE)	1200	50
060a	D5 (SURFACE)	470	50
061a	E1 (SURFACE)	770	50
062a	E3 (SURFACE)	440	50
063a	F3 (2')	220	50 .
064a	BGDA (SURFACE)	480	
065a	BGDA (2')	690	50
06 6 a	BGDB (SURFACE)	650	50
067a	BGDB (2')	430	50
068a	BGDB (SURFACE) DUPLICATE	420	50

Sample Type:SoilDate Sampled:11/06/96Analytical Method:EPA 6010Date Received:11/08/96Analyst:CWDate Analyzed:11/13/96

Lab No.		Chromium	
	Sample Identification	(mg/kg)	LOD (mg/kg)
71a	BGDC (SURFACE)	330	. / 50
	BGDC (2')	690	50
)72a)73a	BGDD (SURFACE)	360	50
074a	BGDD (2')	930	. 50
)74a)75a	LAB BLANK	<2.5	2.5

General Notes:

<: Less than the indicated limit of detection (LOD)

--: Information not available or not applicable

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Sample Type: Analytical Method: Analyst: Soil EPA 7196 CC Date Sampled: 11/06/96 Date Received: 11/08/96 Date Analyzed: 11/14/96

		Hexavaler	nt chromium
Lab No.	Sample Identification	(mg/kg)	LOD (mg/kg)
052a	A2 (2')	<0.1	. 0.1
053a	A4 (2')	<0.1	0.1
054a	B4 (2')	<0.1	· 0.1
055a	C1 (2')	<0.1	. 0.1
056a	C3 (2')	<0.1	0.1
057a	C5 (2')	0.1	0.1
058a	D2 (1')	<0.1	0.1
059a	D3 (SURFACE)	<0.1	0.1
060a	D5 (SURFACE)	<0.1	0.1
061a	E1 (SURFACE)	<0.1	0.1
062a	E3 (SURFACE)	<0.1	0.1
063a	F3 (2')	<0.1	0.1 .
064a	BGDA (SURFACE)	<0.1	0.1
065a	BGDA (2')	<0.1	0.1
066a	BGDA (SURFACE)	<0.1	0.1
067a	BGDA (2')	<0.1	0.1
068a	BGDA (SURFACE) DUPLICATE	<0.1	0.1
071a ·	BGDC (SURFACE)	<0.1	0.1
072a	BGDC (2')	<0.1	0.1
0 7 3a	BGDC (SURFACE)	<0.1	0.1
074a	BGDD (2')	<0.1	0.1

General Notes:

<: Less than the indicated limit of detection (LOD)

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--: Information not available or not applicable

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Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

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Sample Type:SoilDate Sampled:11/06/96Analytical Method:EPA 6010Date Received:11/08/96Analyst:CWDate Analyzed:11/13/96

		L	ead
Lab No.	Sample Identification	(mg/kg)	LOD (mg/kg)
<u></u>		884	./ 50
001a	A1 (SURFACE)	739	50
002a	A1 (2')	7400	50
003a	A2 (SURFACE)	<50	50
004a	A3 (SURFACE)	<50	50
005a	$\mathbf{A3} (\mathbf{1'})$	620	50
006a	A4 (SURFACE)	860	50
007a.	B1 (SURFACE)	<50	50
008a	B1 (2')	<50	50
009a	B1 (2') DUPLICATE	7200	50
010a	B2 (SURFACE)	7200	50
011a	B2 (2')		50
012a	B3 (SURFACE)	330	50
013a	B3 (2')	<50	50
014a	B4 (SUFACE)	880	· 50
015a	B5 (SURFACE)	<50	
016a	B5 (2')	<50	50
017a	C1 (SURFACE)	120	50
018a	C1 (SURFACE) DUPLICATE	180	50
021a	C2 (SURFACE)	1300	50
022a	C2 (2')	130	50
023a	C3 (SURFACE)	220	50
024a .	F4 (2')	<50	50
025a	C4 (SUFACE)	320	50
026a	C4 (2')	<50	50
027a	C5 (SURFACE)	430	50
028a	D1 (SURFACE)	1100	50
029a	D1 (2')	<50	50
030a	D2 (SUFACE)	1400	50
031a	D1 (2') DUPLICATE	<50	50
032a	D3 (2')	<50	50
033a	D4 (SURFACE)	560	50
034a	D4 (2')	<50	50

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Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

Sample Type: Analytical Method: Analyst: Soil EPA 6010 CW

Date	Sampled:	11/06/96
Date	Received:	11/08/96
Date	Analyzed:	11/13/96

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	•	. L	ead
Lab No.	Sample Identification	(mg/kg)	LOD (mg/kg)
	· · · · · · · · · · · · · · · · · · ·		
035a	D5 (2')	<50	50
036a	D6 (SURFACE)	1700	50
037a	D6 (2')	<50	50
038a	D6 (SURFACE) DUPLICATE	1800	50
041a	E1 (2')	<20	20
042a	E2 (SURFACE)	440	20
043a	E2 (2')	95	20
044a	E3 (2')	94	20
045a	E4 (SURFACE)	690	20
046a	E4 (2')	<20	20
047a	F2 (SURFACE)	780	20
048a	F2 (2')	210	20
049a	F2 (2') DUPLICATE	430	20
050a	F3 (SURFACE)	380	20
051a	F4 (SURFACE)	1100	20
052a `	A2 (2')	<20	20
053a	A4 (2')	110	20
054a	B4 (2')	150	20
055a	Cl (2')	110	20
056a	C3 (2')	<20	20
057a	C5 (2')	<20	20
058a	D2 (1')	230	20
059a	D3 (SURFACE)	510	20
060a	D5 (SURFACE)	620	20
061a	E1 (SURFACE)	2900	20
062a	E3 (SURFACE)	630	20
063a	F3 (2')	<20	20
064a	BGDA (SURFACE)	450	20
065a	BGDA (2')	<20	20
066a	BGDB (SURFACE)	130	20
067a	BGDB (2')	55	20
068a	BGDB (SURFACE) DUPLICATE	260	20

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Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

Sample Ty Analytica Analyst:	/pe: al Method:	Soil EPA 6010 CW		Date Sampled: Date Received: Date Analyzed:	11/06/96 11/08/96 11/13/96
			<u></u>	Lead	
Lab No.	Samp Identifi		(mg/kg)		LOD g/kg)
071a	BGDC	SURFACE)	170	· · · · · · · · · · · · · · · · · · ·	20
072a		2')	100		20
073a	-	SURFACE)	240		20
074a	BGDD		<20		20
075a	LAB BI		<1	,	1

General Notes:

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<: Less than the indicated limit of detection (LOD)

--: Information not available or not applicable

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Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

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Sample Ty Analytica Analyst:	ype: al Method:	SOIl EPA 9045 CR	Date Sampled: Date Received: Date Analyzed:	11/06/96 11/08/96 11/13/96
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Lab		ample _		
No.	Ident:	ification		
001a	Al	(SURFACE)	0.0	**
002a	Al	(2')	11.1	
003a	A2	(SURFACE)	8.5	
004a		(SURFACE	8.4	
005a		(1')	10.8	
006a	A4	(SURFACE)	9.2	
007a ,		(SURFACE)	7.9	
008a	Bl	(2')	12.0	
009a		(2') DUPLICATE	12.3	
010a		(SURFACE)	8.6	
011a		(2')	11.9	
012a		(SURFACE)	9.0	
013a		(2')	12.4	
014a		(SUFACE)	8.8	
015a		(SURFACE)	11.1	
016a		(2')	12.3	·.
017a	Cl	(SURFACE)	8.9	
018a	· C1	(SURFACE) DUPLICATE	8.8	
021a		(SURFACE)	8.4	
022a		(2')	11.6	
023a		(SURFACE)	· 9.2	
024a		(2')	11.8	- · ·
025a		(SUFACE)	9.5	
026a		(2')	12.3	
027a		(SURFACE)	8.9	
028a		(SURFACE)	8.8	
029a		(2')	12.2	
030a		(SUFACE)	9.2	
031a	Dl	(2') DUPLICATE	· 12.4	
032a		(2')	12.4	
033a	D4	(SURFACE)	9.1	
034a		(2')	12.3	

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Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

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Sample Ty Analytica Analyst:	ype: Soil al Method: EPA 9045 CR	Date Sampled: 11/06/96 Date Received: 11/08/96 Date Analyzed: 11/13/96
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Lab	Sample	
No.	Identification	
035a	D5 (2')	12.3
036a	D6 (SURFACE)	8.9
037a	D6 (2')	12.3
038a	D6 (SURFACE) DUPLICATE	8.8
041a	E1 (2')	12.4
042a	E2 (SURFACE)	9.2
043a	E2 (2')	12.0
044a	E3 (2')	12.4
045a	E4 (SURFACE)	9.0
046a	E4 (2')	12.1
047 a	F2 (SURFACE)	9.4
048a	F2 (2')	11.2
049a	F2 (2') DUPLICATE	11.4
050a	F3 (SURFACE)	9.1
051a	F4 (SURFACE)	9.0
052a	· A2 (2')	11.9
053a	A4 (2')	12.2
054a	B4 (2')	11.7
055a 056a	C1 (2')	12.3
056a 057a	C3 (2')	12.4
057a 058a	C5 (2') D2 (1')	12.4
059a	D2 (17) D3 (SURFACE)	11.0
060a	D5 (SURFACE)	10.1 8.6
061a	E1 (SURFACE)	8.5
062a	E3 (SURFACE)	9.6
063a	F3 (2')	11.5
064a	BGDA (SURFACE)	. 8.6
065a	BGDA (2')	11.4
066a	BGDB (SURFACE)	8.8
067a	BGDB (2')	11.5
06 8 a	BGDB (SURFACE) DUPLICATE	8.9

Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

Sample Ty Analytica Analyst:	ype: al Method:	Soil EPA 9045 CR	Date Sampled: Date Received: Date Analyzed:	
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Lab No.	Samp Identifi	le cation		
071a	BGDC (SURFACE)	8.5	.*
072a	BGDC ((21)	11.2	
073a	BGDD ((SURFACE)	8.2 ,	
	BGDD (11.3 ·	

General Notes:

<: Less than the indicated limit of detection (LOD)

--: Information not available or not applicable

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Analytical Results for DSC LTD. Clayton Project No. 44091.00/13-97153.00

Sample Identification:	BGD1 (SURFACE)		Date Sampled:	11/06/9
Lab Number:	001a	•	Date Received:	11/15/9
Sample Type: Analyst:	Soil/Sludge DH		Moisture (%):	6
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	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Prepara Method an		Analyti Method an	
	<u></u>	1.00	10		11/10/06		
Barium		100	10	EPA 3050A	11/19/96	EPA 6010A	11/21/9
Cadmium		<0.5	0.5	EPA 3050A	11/19/.96	EPA 6020A	12/04/9
Chromium		250	25	EPA 3050A	11/19/96	EPA 6010A	11/21/9
Lead		120	10	EPA 3050A	11/19/96	EPA 6010A	11/21/9

Sample Identification:	BGD1 (2')		Date Sampled:	11/07/96
Lab Number:	002a		Date Received:	11/15/96
Sample Type:	Soil/Sludge		Moisture (%):	12
Analyst:	DH	•	-	

Analyte		Concentration (mg/kg)	LOD (mg/kg)	Preparation Method and Date		Analytical Method and Date	
Barium		17	10	EPA 3050A	11/19/96	EPA 6010A	11/21/5
Cadmium		<0.5	0.5	EPA 3050A	11/19/96	EPA 6020A	12/04/5
Chromium		530	25	EPA 3050A	11/19/96	EPA 6010A	11/21/
Lead		13	10	EPA 3050A	11/19/96	EPA 6010A	11/21/9
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Analytical Results for DSC LTD. Clayton Project No. 44091.00/13-97153.00

Sample Identification: Lab Number: Sample Type: Analyst:	BGD2 (SURFACE) 003a Soil/Sludge DH	Date Sampled: Date Received: Moisture (%):	11/07/90 11/15/90 25
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	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Prepara Method an		Analyti Method an	
Barium		140	10	EPA 3050A		EPA 6010A	11/21/0
Cadmium		<0.5	0.5	EPA 3050A	11/19/96	EPA 6020A	12/04/9
Chromium		290	25	EPA 3050A	11/19/96	EPA 6010A	11/21/9
Lead		270	20	EPA 3050A	11/19/96	EPA 6010A	11/21/9

Sample Type: Soil/Sludge Moisture (%): 22	le Type: Soil/Sludge Moisture (%): 22	Sample Identification:	BGD2 (2')	Date Sampled:	11/07/96
		Lab Number:	004a	Date Received:	11/15/96
	yst: DH	Sample Type:	Soil/Sludge	Moisture (%):	22
Analyst: DH		Analyst:	DH	•	

Analyte	Concentration (mg/kg)	LOD (mg/kg)	Prepara Method an		Analyti Method an	
Barium	34	10	EPA 3050A	11/19/96	EPA 6010A	11/21/9
Cadmium	<0.5	0.5	EPA 3050A	11/19/96		
Chromium	540	25	EPA 3050A	11/19/96	EPA 6010A	- • • • • •
Lead	43	20	EPA 3050A	11/19/96	EPA 6010A	11/21/

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Analytical Results for DSC LTD. Clayton Project No. 44091.00/13-97153.00

Sample Identification: Lab Number:	LAB BLANK 005a	Date Sampled Date Receive	-
Sample Type: Analyst:	Soil/Sludge DH	Moisture (%)	
			•

Ana	lyte	Concentration (mg/kg)	LOD (mg/kg)	Prepara Method an		Analyti Method an	
					.*		
Barium		<1	1	EPA 3050A	11/19/96	EPA 6010A	11/21/9
Cadmium		<0.05	0.05	EPA 3050A	11/19/96	EPA 6020A	12/04/9
Chromium		<2.5	2.5	EPA 3050A	11/19/96	EPA 6010A	11/21/9
Lead		<1 .	1	EPA 3050A	11/19/96	EPA 6010A	11/21/9

General Notes

--: Information not available or not applicable. The results are reported on a dry weight basis.

Sample Identification: Lab Number: Sample Type: Analyst:	BGD1 (SURFACE) 001 Soil BB		Date Sampled: Date Received:	11/06/96 11/15/96
C	oncentration (mg/kg)	LOD (mg/kg)	Analytical Method	Date Analyzed
Hexavalent chromium	<0.1	0.1	EPA 7196	11/27/96
Sample Identification: Lab Number: Sample Type: Analyst:	BGD1 (SURFACE) 001 Soil MR		Date Sampled: Date Received:	11/06/96 11/15/96
Canalyte	oncentration	LOD	Analytical Method	Date Analyzed
рн	9.3		EPA 9045	11/22/96

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Sample Identification: Lab Number: Sample Type: Analyst:	: BGD1 (2') 002 Soil BB		Date Sampled: Date Received:	11/07/96 11/15/96
Analyte	Concentration (mg/kg)	LOD (mg/kg)	Analytical Method	Date Analyzed
Hexavalent chromium	<0.1	0.1	EPA 7196	11/27/96
	· .		· · · · · ·	
			Date Campled.	11/07/96
			Date Sampled:	11/07/96 11/15/96
Lab Number:	002		Date Sampled: Date Received:	11/07/96 11/15/96
Sample Identification Lab Number: Sample Type: Analyst:				
Lab Number: Sample Type: Analyst:	002 Soil	LOD		

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Sample Identification: BGD2 (SURFACE) Date Sampled: 11/07/96 003 Date Received: Lab Number: 11/15/96 Soil Sample Type: BB Analyst: Concentration LOD Analytical Date (mg/kg) Analyte (mg/kg) Method Analyzed Hexavalent chromium <0.1 0.1 EPA 7196 11/27/96 ... Sample Identification: BGD2 (SURFACE) Date Sampled: 11/07/96 Lab Number: 003 Date Received: 11/15/96 Sample Type: Soil Analyst: MR Concentration LOD Analytical Date Analyte Method Analyzed pН 8.9 - -EPA 9045 11/22/96

Sample Identification: BGD2 (2') Date Sampled: 11/07/96 004 Date Received: Lab Number: 11/15/96 Soil Sample Type: BB Analyst: Concentration LOD Analytical Date Analyte (mg/kg) (mg/kg) Method Analyzed Hexavalent chromium <0.1 0.1 EPA 7196 11/27/96 BGD2 (2') Sample Identification: Date Sampled: 11/07/96 Lab Number: 004 Date Received: 11/15/96 Sample Type: Soil Analyst: MR Concentration LOD Analytical Date Analyte Method Analyzed рН 12.3 - -EPA 9045 11/22/96

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Sample Identification: LAB BLANK Date Sampled: Lab Number: 005 Date Received: . . Sample Type: Soil MR Analyst: Concentration LOD Analytical Date Analyte Method Analyzed 7.0 pН - -EPA 9045 11/22/96

General Notes:

<: Less than the indicated limit of detection (LOD)

--: Information not available or not applicable

Sample Type: Water Analytical Method: EPA 20 Analyst: CW	8 Date	Received: 11	L/06/96 L/08/96 L/14/96
--	--------	--------------	-------------------------------

		Bai	rium
Lab No.	Sample Identification	(mg/L)	LOD (mg/L)
076a	EB-1	<0.2	/ 0 .2
077a	EB-2	<0.2	0.2
078a	LAB BLANK	<0.2	0.2

Sample Ty Analytica Analyst:	ype: al Method:	Water EPA 200.8 CW	Date	Sampled: Received: Analyzed:	11/06/96 11/08/96 11/14/96
Lab Sample No. Identification		Cadmium			
			(mg/L)		LOD (mg/L)
076a	EB-1		0.007		0.0005
077a 078a	EB-2 Lab Bl	ANK	0.006 0.006		0.0005 0.0005

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Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

Date Sampled: Sample Type: Analytical Method: Water 11/06/96 Date Sampled: 11/06/96 Date Received: 11/08/96 EPA 200.8 CW Date Analyzed: 11/14/96 Analyst: Chromium _ _ _ _ _ _ _ _ _ _ _ _ _ -----Sample LOD Lab

No.	Identification	(mg/L)	(mg/L)	
076a	EB-1	<0.05	0.05	
077a	EB-2	<0.05	0.05	
078a	LAB BLANK	<0.05	0.05	

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Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

Sample T Analytica Analyst:	ype: al Method:	Water EPA 200.8 Cw	D	ate Sampled: pate Received: pate Analyzed:	11/06/96 11/08/96 11/14/96
Lab Sample No. Identification		Lead			
		le cation	(mg/L)		LOD (mg/L)
076 a	EB-1		<0.003		0.003
077a	EB-2		0.005		0.003
078a	LAB BI	ANK	<0.003		0.003

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Analytical Results for DSC LTD. Clayton Project No. 43861.00/13-97153.00

Sample T Analytic Analyst:	al Method:	Water EPA 150.1 LH	Date Sam Date Rec Date Ana	eived:	11/06/96 11/08/96 11/11/96
<u> </u>			рН		
Lab No.					
076a	EB-1		1.8	م	
077a	EB-2		1.8		
				•	

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Table 1 Analytical Results for DSC LTD. Clayton Project No. 46378.00/13-97153.00

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Sample Identification: Lab Number: Sample Type: Analyst:	A5 (2') 001a Soil/Sludge CW			Date Samp] Date Recei Moisture	ived: .	02/05/97 02/07/97 29
Analyte	Concentration (mg/kg)	LOD (mg/kg)	Prepara Method ar	ation nd Date	Analy Method	ytical and Date
Cadmium Chromium	0.52 630	0.05 2.5	EPA 3050A EPA 3050A			
Sample Identification: Lab Number: Sample Type: Analyst:	B5 (4') 002a Soil/Sludge CW			Date Samp Date Rece Moisture	ved:	02/05/9' 02/07/9' 9
Analyte	 Concentration (mg/kg) 	LOD (mg/kg)	Prepara Method a		_	ytical and Date

	Analyte	 Concentration (mg/kg) 	LOD (mg/kg)	Prepara Method an		Analytic Method and	
Cadmium Chromium		<0.05 1600	0.05 2.5	EPA 3050A EPA 3050A	02/13/97 02/13/97		02/20/ 02/19/

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Sample Identification: Lab Number: Sample Type: Analyst:	B5 (4') MS 003a Soil/Sludge CW	•	Date Sampled: Date Received: Moisture (%):	02/05/97 02/07/97 8
	:			

	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Prepara Method an		Analyti Method an	
Cadmium		<0.05	0.05	EPA 3050A	02/13/97	EPA 7131A	02/20/9
Chromium		1500	2.5	EPA 3050A	02/13/97	EPA 6010A	02/19/9

Sample Identification:	B5 (4') MSD
Lab Number:	004a
Sample Type:	Soil/Sludge
Analyst:	CW

Date Sampled:	02/05/97
Date Received:	02/07/97
Moisture (%):	7

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	Analyte	 Concentration (mg/kg) 	LOD (mg/kg)	Preparat Method and		Analyti Method an	
Cadmium Chromium		0.06 1500	0.05 2.5		02/13/97 02/13/97	EPA 7131A EPA 6010A	02/19/9 02/19/9

Table 1 (continued) Analytical Results for DSC LTD.

Clayton Project No. 46378.00/13-97153.00

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Sample Identification: Lab Number: Sample Type: Analyst:	C6 SURFACE 005a Soil/Sludge CW	Date Sampled: Date Received: Moisture (%):	02/06/9 02/07/9 23

	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Prepara Method an		Analyti Method an	
Cadmium		3.3	0.05	EPA 3050A	02/13/97	EPA 7131A	02/19/
Chromium		700	2.5	EPA 3050A	02/13/97	EPA 6010A	02/19/

Sample Identification:	C6 (2′)
Lab Number:	006a
Sample Type:	Soil/Sludge
Analyst:	CW

Date Sampled:	02/06/9
Date Received:	02/07/9
Moisture (%):	9

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	Analyte	<pre>- Concentration (mg/kg)</pre>	LOD (mg/kg)	Prepara Method an		Analyti Method ar	
Cadmium	· · ·	1.5	0.05	EPA 3050A	02/13/97	EPA 7131A	02/19/
Chromium		800	2.5	EPA 3050A	02/13/97	EPA 6010A	02/19/

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Sample Identification: Lab Number: Sample Type: Analyst:	C5 (4') 007a Soil/Sludge CW			Date Sampl Date Recei Moisture (ved:	02/06/97 02/07/97 6
Analyte	Concentration (mg/kg)	LOD (mg/kg)	Prepara Method an		Analyt Method a	
Cadmium Chromium	<10 7400	10 27	EPA 3050A EPA 3050A			
Sample Identification: Lab Number: Sample Type: Analyst:	A4 SOUTH (2') 008a Soil/Sludge CW			Date Sampl Date Recei Moisture (ved:	02/05/97 02/07/97 13
Analyte	Concentration (mg/kg)	LOD (mg/kg)	Prepara Method an		Analyt Method a	
Cadmium Chromium	2.4 460	0.05 2.5	EPA 3050A EPA 3050A		EPA 7131A EPA 6010A	

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Table 1 (continued) Analytical Results for DSC LTD. Clayton Project No. 46378.00/13-97153.00

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Sample Identification: Lab Number: Sample Type: Analyst:	B6 (2') 009a Soil/Sludge CW		Date Sam Date Rec Moisture	eived:	02/06/9° 02/07/9° 15
Analyte	Concentration (mg/kg)	LOD (mg/kg)	Preparation Method and Date	Analy Method	
Chromium	740	2.5	EPA 3050A 02/13/9	97 EPA 6010.	A 02/19/
Sample Identification: Lab Number: Sample Type: Analyst:	A2 SOUTH (2') 010a Soil/Sludge CW		Date Sam Date Rec Moisture	eived:	02/05/9 02/07/9 17
Analyte	Concentration (mg/kg)	LOD (mg/kg)	Preparation Method and Date	Analy Method	tical and Date
Chromium	. 500	2.5	EPA 3050A 02/13/9	97 EPA 6010	A 02/19/

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Sample Identification:E2 (4')Date Sampled:02/06/9Lab Number:011aDate Received:02/07/9Sample Type:Soil/SludgeMoisture (%):11Analyst:CWCWCW

	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Preparation Method and Date	Analytical Method and Date
Chromium		580	2.5	EPA 3050A 02/13/97	EPA 6010A 02/19/

Sample Identification:	B1 EAST SURFACE	Date Sampled:	02/06/9
Lab Number:	012a	Date Received:	02/07/9
Sample Type:	Soil/Sludge	Moisture (%):	22
Analyst:	CW		

•	•			•	
	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Preparation Method and Date	Analytical Method and Date
Lead		· 550	1	EPA 3050A 02/13/97	EPA 6010A 02/19/

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Sample Identification: G4 SURFACE Date Sampled: 02/06/97 013a Date Received: 02/07/97 Lab Number: Soil/Sludge Moisture (%): . 19 Sample Type: . . CW Analyst: .*

	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Prepara Method an		Analyti Method an	
Lead		490	1	EPA 3050A	02/13/97	EPA 6010A	02/19/9

Sample Identification:	A1 EAST SURFACE	Date Sampled:	02/05/97
Lab Number:	014a	Date Received:	02/07/97
Sample Type:	Soil/Sludge	Moisture (%):	13
Analyst:	CW		

	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Prepara Method an		Analyt Method a	
Cadmium		<0.05	0.05	EPA 3050A	02/13/97	EPA 6020	02/18/9
Lead		190	1	EPA 3050A	02/13/97	EPA 6010A	02/19/9

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Sample Identification:A1 SOUTH SURFACEDate Sampled:02/05/97Lab Number:015aDate Received:02/07/97Sample Type:Soil/SludgeMoisture (%):20Analyst:CWCWCW

	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Prepara Method and		Analyti Method an	
Cadmium		10	0.05	EPA 3050A	02/13/97	EPA 7131A	02/20/9
Lead		740	1	Epa 3050a	02/13/97	EPA 6010A	02/19/9

Sample Identification:	A2 SOUTH SURFACE	Date Sampled:	02/05/97
Lab Number:	016 a	Date Received:	02/07/97
Sample Type:	Soil/Sludge	Moisture (%):	16
Analyst:	CW		

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-	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Preparation Method and Date	Analytical Method and Date
Cadmium Lead		<0.05 19	0.05	EPA 3050A 02/13/9 EPA 3050A 02/13/9	

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Table 1 (continued) Analytical Results for DSC LTD. Clayton Project No. 46378.00/13-97153.00

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Sample Identification:A5 SURFACEDate Sampled:02/05/97Lab Number:017aDate Received:02/07/97Sample Type:Soil/SludgeMoisture (%):22Analyst:CWCWCW

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	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Prepara Method and		Analyti Method an	
Cadmium		1.7	0.05	EPA 3050A	02/13/97	EPA 7131A	02/20/9
Lead		220	1	EPA 3050A	02/13/97	EPA 6010A	02/19/9

Sample Identification: Lab Number: Sample Type: Analyst:	A4 SOUTH SURFACE 018a Soil/Sludge CW	Date Sampled: Date Received: Moisture (%):	02/05/97 02/07/97 18
Analyst:	CW		

Ana	Analyte	Concentration (mg/kg)	n LOD (mg/kg)	Preparation Method and Date	Analytical Method and Date	
Cadmium		4.3	0.05	EPA 3050A 02/13/97	EPA 7131A 02/20/5	
Lead		270	1	EPA 3050A 02/13/97	EPA 6010A 02/18/5	

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Table 1 (continued) Analytical Results for DSC LTD. Clayton Project No. 46378.00/13-97153.00

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Sample Identification: Lab Number: Sample Type: Analyst:	B2 (4') 019a Soil/Sludge CW	• •	Date Sampled: Date Received: Moisture (%):	02/05/97 02/07/97 7

	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Preparation Method and Date	Analytical Method and Date
Cadmium Lead		0.06 5	0.05	EPA 3050A 02/13/97 EPA 3050A 02/13/97	

Sample Identification:	D7 SURFACE	Date Sampled:	02/06/97
Lab Number:	020a	Date Received:	02/07/97
Sample Type:	Soil/Sludge	Moisture (%):	17
Analyst:	CW		11

	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Preparation Method and Date	Analytical Method and Date
Cadmium Lead		3.1 460	0.05	EPA 3050A 02/13/97 EPA 3050A 02/13/97	

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Sample Identification:E1 EAST SURFACEDate Sampled:02/05/97Lab Number:021aDate Received:02/07/97Sample Type:Soil/SludgeMoisture (%):21Analyst:CWCWCW

Analyte		Concentration	LOD	Preparation	Analytical	
		(mg/kg)	(mg/kg)	Method and Date	Method and Date	
Cadmium		0.61	0.05	EPA 3050A 02/13/97	EPA 7131A 02/19/9	
Lead		90	1	EPA 3050A 02/13/97	EPA 6010A 02/19/9	

Sample Identification:	A2 SOUTH SURFACE DUPLICATE	Date Sampled:	02/05/97
Lab Number:	022a	Date Received:	02/07/97
Sample Type:	Soil/Sludge	Moisture (%):	19
Analyst:	CW		

Analyte	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Preparation Method and Date		Analytical Method and Date	
Cadmium		2	0.05	EPA 3050A	02/13/97	EPA 7131A	02/19/9
Lead		270	1	EPA 3050A	02/13/97	EPA 6010A	02/19/9



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Sample Identification: Lab Number: Sample Type: Analyst:	D2 (4') 023a Soil/Sludge CW		Date Sampled: Date Received: Moisture (%):	02/06/97 02/07/97 10

Analyte		Concentration (mg/kg)	LOD (mg/kg)	Preparation Method and Date		Analytical Method and Date	
Barium		52	1	EPA 3050A	02/13/97	EPA 6010A	02/18/9
Cadmium		0.28	0.05	EPA 3050A	02/13/97	EPA 7131A	02/19/9
Lead		15	1	EPA 3050A	02/13/97	EPA 6010A	02/19/9

Sample Identification:	F1 (2')	Date Sampled:	02/06/97
Lab Number:	024a	Date Received:	02/07/97
Sample Type:	Soil/Sludge	Moisture (%):	12
Analyst:	CW	•	
-			

Analyte		Concentration (mg/kg)	LOD (mg/kg)	Preparation Method and Date		Analytical Method and Date	
Barium		140	1	EPA 3050A	02/13/97	EPA 6010A	02/18/9
Cadmium		1	0.05	EPA 3050A	02/13/97	EPA 7131A	02/19/9
Lead		160	1	EPA 3050A	02/13/97	EPA 6010A	02/19/9

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Sample Identification: G2 (2') Date Sampled: -02/06/97 025a Date Received: Lab Number: 02/07/9 Soil/Sludge Moisture (%): Sample Type: _`**1**1 CW Analyst:

Analyte		Concentration (mg/kg)	LOD (mg/kg)	Preparation Method and Date	Analytical Method and Date	
Barium		86	1	EPA 3050A 02/13/97	EPA 6010A 02/18/9	
Cadmium Lead		0.95 270	0.05	EPA 3050A 02/13/97	EPA 7131A 02/19/5	
		Z/U ***	ـــــــــــــــــــــــــــــــــــــ	EPA 3050A 02/13/97	EPA 6010A 02/19/9	

Sample Identification: Lab Number: Sample Type: Analyst:	F1 SURFACE 026a Soil/Sludge CW	Date Sampled: Date Received: Moisture (%):	02/06/9' 02/07/9' 14
		•	

	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Preparation Method and Date	Analytical Method and Date	
Barium Lead		64 440	1 1	EPA 3050A 02/13/97 EPA 3050A 02/13/97		

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Table 1 (continued) Analytical Results for DSC LTD. Clayton Project No. 46378.00/13-97153.00

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Sample Identification: Date Sampled: G2 SURFACE 02/06/97 027a Date Received: ٠ 02/07/97 Lab Number: Moisture (%): Soil/Sludge 22 Sample Type: CW Analyst: ٠.

	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Preparation Method and Date		Analytical Method and Date	
Barium Lead		55 640	1 1	EPA 3050A Epa 3050a		EPA 6010A EPA 6010A	

Sample Identification:	G2 SURFACE DUPLICATE	Date Sampled:	02/06/97
Lab Number:	028a	Date Received:	02/07/97
Sample Type:	Soil/Sludge	Moisture (%):	26
Analyst:	CW		

	Analyte	<pre>Concentration (mg/kg)</pre>	LOD (mg/kg)	Prepara Method an		Analyti Method an	
Barium		58	1	EPA 3050A	02/13/97	EPA 6010A	02/18/9
Lead		990	1	EPA 3050A	02/13/97	EPA 6010A	02/19/9

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Table 1 (continued) Analytical Results for DSC LTD. Clayton Project No. 46378.00/13-97153.00

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Sample Identification:A1 EAST (2')Date Sampled:02/05/97Lab Number:029aDate Received:02/07/97Sample Type:Soil/SludgeMoisture (%):16Analyst:CWCWCW

 Concentration
 LOD
 Preparation
 Analytical

 Analyte
 (mg/kg)
 (mg/kg)
 Method and Date
 Method and Date

 Lead
 99
 1
 EPA 3050A
 02/13/97
 EPA 6010A
 02/19/9

Sample Identification: Lab Number: Sample Type: Analyst:	Al SOUTH (2') 030a Soil/Sludge CW	Date Sampled: Date Received: Moisture (%):	02/05/97 02/07/97 12
---	--	--	----------------------------

	Analyte	Concentration ' (mg/kg)	LOD (mg/kg)	Preparation Method and Date	Analytical Method and Date
Lead		270	1	EPA 3050A 02/13/9	7 EPA 6010A 02/19/9

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Sample Identification: Date Sampled: 02/06/97 D1 EAST SURFACE Date Received: 02/07/97 031a Lab Number: Moisture (%); 17 Soil/Sludge Sample Type: . CW Analyst: . ·

	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Prepara Method an		Analyti Method an	
Lead		520	1	EPA 3050A	02/13/97	EPA 6010A	02/19/9

Sample Identification:	LAB BLANK
Lab Number:	032a
Sample Type:	Soil/Sludge
Analyst:	CW

Date Sampled:	
Date Received:	02/07/97
Moisture (%):	0

·	Analyte	Concentration (mg/kg)	LOD (mg/kg)	Prepara Method an			Analyti thod an	.cal d Date
Barium		<1	ı	EPA 3050A	02/13/97	EPA	6010A	02/19/9
Cadmium		<0.05	0.05	EPA 3050A	02/13/97	EPA	7131A	02/20/9
Chromium		<2.5	2.5	EPA 305 0a	02/13/97	EPA	6010A	02/19/9
Lead		<1	l	EPA 3050A	02/13/97	EPA	6010A	02/19/9

General Notes

--: Information not available or not applicable. The results are reported on a dry weight basis. **APPENDIX C**

CLAYTON HYDROGEOLOGICAL ASSESSMENT REPORT

Hydrogeological Investigation for the Former Approved Electric Arc Furnace Dust Storage Area at the Former McLouth Steel Products Corporation Facility Trenton, Michigan

Submitted to DSC Ltd. Trenton, Michigan

Clayton Project No. 13-97153.00

December 9, 1997





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Hydrogeological Investigation for the Former Approved Electric Arc Furnace Dust Storage Area at the Former McLouth Steel Products Corporation Facility Trenton, Michigan

Submitted to DSC Ltd. Trenton, Michigan

Clayton Project No. 13-97153.00

December 9, 1997

Clayton Environmental Consultants, Inc.

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B ANALYTICAL RESULTS OF GROUNDWATER SAMPLES

1.0 INTRODUCTION

Clayton Environmental Consultants, Inc. is pleased to submit its report of a hydrogeologic investigation conducted at the former McLouth Steel Products Corporation Trenton Plant located at 1491 West Jefferson Avenue in Trenton, Michigan. Clayton conducted this investigation in accordance with the approved plan for closure of the Electric Arc Furnace Dust (EAFD) interim status hazardous waste storage pile.

The purpose of the investigation was to evaluate barium, cadmium, chromium, hexavalent chromium, and lead in groundwater at the former emission control dust storage area located at the site.

2.0 SITE BACKGROUND

The former McLouth Steel Products Corporation Trenton, Michigan plant is now owned by DSC Ltd. The plant site is bounded on the west and north by Jefferson Avenue, on the south by King Road, and on the east by the Detroit River. The former interim status EAFD storage area is located on the north end of the property, just north of the east extension of Sibley Road. Figure 1 presents a site location map.

3.0 SUMMARY OF SUBSURFACE INVESTIGATION ACTIVITIES

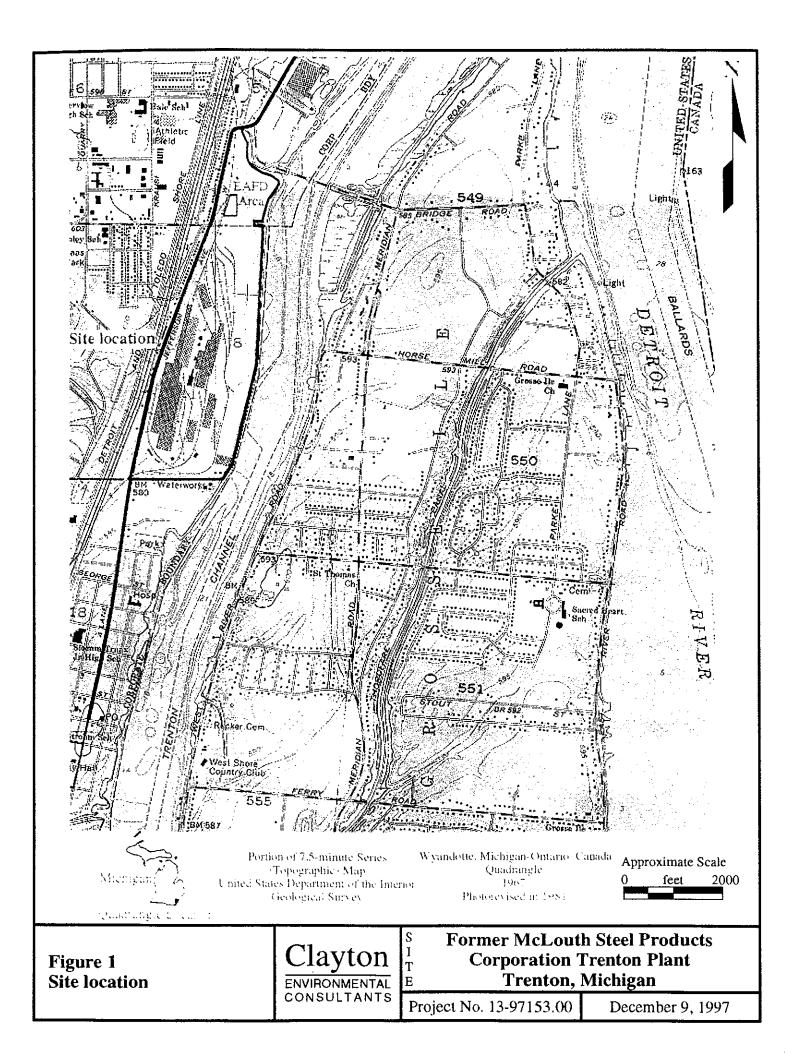
The following is a summary of activities performed as a part of Clayton's hydrogeological investigation:

- Installation of three additional monitoring wells and replacement of one existing monitoring well downgradient of the former EAFD storage area
- · Collection of groundwater samples from the five monitoring wells on a quarterly basis
- Measurement of water levels in the five monitoring wells on a quarterly basis

3.1 MONITORING WELL INSTALLATION

On October 30, October 31, November 1, and November 20, 1996, Clayton installed Monitoring Wells MW-2, MW-3, MW-4, and MW-5 (Figure 2). Two monitoring wells existed from a previous hydrogeologic investigation conducted at the property (Monitoring Wells MW-1 and MW-3). Clayton was unable to utilize existing Monitoring Well MW-3 due to a bent casing and metal debris blockage within the monitoring well. A replacement Monitoring Well MW-3 was installed in approximately the same location. Following the drilling of Monitoring Well MW-2 on October 30, 1996, dry conditions were encountered. On November 20, 1996, Clayton permanently abandoned Monitoring Well MW-2 by (1) removing the well from the ground and (2) filling the hole to the surface with bentonite and cement grout. Clayton installed a replacement Monitoring Well MW-2 on November 20, 1996 approximately 20 feet southeast of the former Monitoring Well MW-2 in an accessible area near the access road.

Hollow-stem augers (4-1/4-inch inside diameter) were used to advance the boreholes. Soil samples were extracted from the borings using a 2-foot-long split-spoon at 5-foot deep intervals from ground surface to the final depths of the borings for soil conditions and types. The soil samples collected were not submitted for laboratory analysis.



Each monitoring well was constructed using a threaded, 2-inch-diameter, polyvinyl chloride (PVC) casing and a 5-foot-long section of 10-slot PVC well screen. The screens had a slot thickness of 0.01 inches. Glues were not used on the casing joints and screen connectors. The well screens were placed at a depth to straddle the top of the water table to allow for seasonal fluctuations in the water table. The monitoring wells were designed to allow (1) groundwater in the water-bearing soil surrounding the screen to seep into the well casing until the static water level (groundwater surface depth) in the well equaled the static water level in surrounding soil, (2) measurement of groundwater surface depth, and (3) collection of groundwater samples at the depth of the screens for laboratory analyses. Clayton developed each monitoring well by bailing at least three times the initial volume of groundwater from the well casing (equal to the cross-sectional area of the riser times the length of the water column in the riser). The monitoring wells were constructed as follows:

- 1. The annular void between the well screen and the borehole was filled with a noncementing, coarse-grained, silica sand filter pack (from the bottom of the boring to a vertical position of 1 foot above the well screen); this filter pack minimized the concentration of soil particulates in the groundwater sample.
- 2. A 2-foot-long column of bentonite pellets was placed above the sand to seal the annular void.
- 3. The remainder of the borehole was filled with a bentonite and cement grout. A waterresistant locking cap was placed on each well casing and an aboveground protective steel cover was installed over the top of the monitoring well.

Clayton examined soil samples from each boring as the drilling contractor (Rau Drilling) extracted soil from each boring; placed the samples in labeled, precleaned glass jars; and stored the sample jars in ice-cooled containers. Clayton prepared a geologic log for each boring based on soil inspection. Clayton visually inspected soil samples from each boring for indications of contamination and screened the samples with a photoionization detector (PID). Soil boring logs including the PID field screening results have been included as Appendix A.

3.2 EQUIPMENT DECONTAMINATION

The drilling contractors and Clayton decontaminated sampling equipment (e.g., split spoons, augers) before collecting soil samples. The sampling equipment was decontaminated in the following order:

- 1. Washing and scrubbing the equipment with a nonphosphate detergent solution
- 2. Rinsing the equipment with tap water
- 3. Rinsing the equipment with deionized water
- 4. Air-drying the equipment

3.3 GROUNDWATER SAMPLES

On November 8 and 20, 1996. February 5, 1997, May 23, 1997, and August 27, 1997, Clayton collected groundwater samples from each monitoring well (Monitoring Wells MW-1 through MW-5). Groundwater elevations were measured during each sampling event. On December 9, 1996, Clayton performed an additional measurement of water levels in each of the five monitoring wells.

Clayton collected groundwater samples from the five monitoring wells after (1) measuring the water depth in each well and (2) purging at least three times the initial volume of groundwater in the well. Clayton then collected the sample using a dedicated disposable bailer after sufficient groundwater seeped into the well.

All groundwater samples were analyzed for barium, cadmium, chromium, lead, hexavalent chromium, and measured for pH. All groundwater samples collected for barium, cadmium, chromium, and lead were field filtered using a dedicated 0.45-micron filter into containers preserved with nitric acid. All groundwater samples collected for hexavalent chromium were placed directly into the appropriate container. All groundwater samples collected for pH were measured in the field.

Clayton collected Equipment Blank EB-3 on November 8, 1996, Equipment Blank EB-1 on February 5, 1997, and Equipment Blank EB-1 on August 27, 1997 after (1) rinsing the disposable bailers with deionized water and (2) placing the water in the appropriate containers. An equipment blank was not collected during the May 23, 1997 sampling event. Matrix spike and matrix spike duplicate samples were collected from Monitoring Well MW-3 and a duplicate sample was collected from Monitoring Well MW-4 on November 8, 1996.

3.4 SAMPLE COLLECTION AND PRESERVATION

Groundwater samples were collected in laboratory-grade containers, and preserved and stored following United States Environmental Protection Agency (USEPA) Publication SW-846, *Testing Methods for Evaluating Solid Waste*. Clayton transported the samples in ice-cooled containers to Clayton's analytical laboratory in Novi, Michigan.

For samples intended for barium, cadmium, chromium, hexavalent chromium, and lead analyses. Clayton used sample jars that the supplier (1) washed with detergent, (2) rinsed three times with deionized water, (3) rinsed with acid, (4) rinsed three times with organicfree water, (5) oven dried, (6) rinsed with solvent, and (7) oven dried.

3.5 SURVEYING

On December 9 and 10, 1996, a surveyor (JCK & Associates, Inc.) retained by Clayton surveyed the relative locations of four new and one existing monitoring wells and the top-of-casing elevations (refer to Figure 2). The elevations of the top of the monitoring well casings were measured relative to a benchmark located at King Road and Jefferson Avenue.

3.6 SITE HYDROGEOLOGY

Clayton typically encountered fill materials (e.g., metals debris, bricks, concrete, refuse) from ground surface to a depth of approximately 12 feet below ground surface except at Monitoring Well MW-4 (see below). Clayton also typically encountered a moist, native clayey sand from 12 feet below ground surface to the final depths of the borings. Monitoring Well MW-2 was advanced to a depth of 17 feet below ground surface, Monitoring Wells MW-3 and MW-5 were advanced to a depth of 18 feet below ground surface. Monitoring Well MW-4 was advanced to a depth of 30 feet below ground surface. Monitoring Well MW-4 was advanced in an elevated area of debris created by activities conducted at the site.

The groundwater depths in each monitoring well were measured using an electric waterlevel indicator. The depth to groundwater measured in each well was from the surveyed mark on the top of the well casing to the groundwater surface in the well. The water depth was recorded to the nearest 0.01 feet. The elevation of the top of each well casing was measured by the surveyor. Groundwater surface elevations (piezometric head) were computed from the top of casing elevations and the measured water depths. Groundwater moves in accordance with the hydraulic gradient from points of high hydraulic head to points of low hydraulic head. The contour lines on the groundwater surface map connect points of equal head. The movement of groundwater is perpendicular to these equal head contour lines.

The piezometric heads in monitoring wells for each groundwater measurement date (November 20, 1996; December 9, 1996, February 5, 1997, May 23, 1997, and August 27, 1997) have been included in Table 1.

Using the elevations of the monitoring wells and depth to groundwater measurements in each monitoring well from December 9, 1996, Clayton triangulated the piezometric elevation differences between the EAFD monitoring wells and estimated the groundwater flow direction is toward the south-southeast. Groundwater surface elevations and interpolated flow direction for the December 9, 1996 elevations have been included on Figure 2.

4.0 LABORATORY ANALYSIS

Clayton analyzed the groundwater samples for barium, cadmium, chromium, lead, and hexavalent chromium using USEPA 6000- and 7000-series methods.

5.0 ANALYTICAL RESULTS

Tables 2 through 5 summarize groundwater analytical results for metals in samples from the November 8 and 20, 1996, February 5, 1997, May 23, 1997, and August 27, 1997 groundwater sampling events. Detailed analytical reports are included as Appendix B.

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MW-4603.0227.16575.86MW-5591.7215.78575.94Groundwater Measurement Date: August 27, 1997MW-1590.8810.96579.92MW-2593.1917.02576.17MW-3592.9216.95575.97	MW-2	593.19	16.99	576.20
MW-5591.7215.78575.94Groundwater Measurement Date: August 27, 1997MW-1590.8810.96579.92MW-2593.1917.02576.17MW-3592.9216.95575.97	MW-3	592.92	16.88	576.04
Groundwater Measurement Date: August 27, 1997MW-1590.8810.96579.92MW-2593.1917.02576.17MW-3592.9216.95575.97	MW-4	603.02	27.16	575.86
MW-1590.8810.96579.92MW-2593.1917.02576.17MW-3592.9216.95575.97	MW-5	591.72	15.78	575.94
MW-2593.1917.02576.17MW-3592.9216.95575.97	G	roundwater Measureme	nt Date: August 27, 19	97
MW-3 592.92 16.95 575.97	MW-1	590.88	10.96	579.92
MW-3 592.92 16.95 575.97	MW-2	593.19	17.02	576.17
	MW-3			575.97
				1
MW-5 591.72 15.73 575.99				

Table 1Piezometric Head in Monitoring Wells

All Andrew States

Table 2
Summary of Analytical Results for Metals in Groundwater
Clayton Project No. 13-97153.00
Sampling Dates: November 8 and 20, 1996

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		Sample Concentration (mg/L)											
Analyte	Barium	Cadmium	Chromium	Chromium (VI)	Lead	pH							
Sample Identification	····		1										
MW-I	<0.2	0.015	0.1	<0.05*	0.013	11.27							
MW-2	<0.2	<0.0005	0.08	<0.05*	<0.003	11.70							
MW-3	0.55	0.013	0.12	<0.05*	0.012	12.52							
MW-3 MS	0.61	0.016	0.12	NA	0.013	NA							
MW-3 MSD	0.53	0.014	<0.05	NA	0.02	NA							
MW-4	0.54	0.017	<0.05	<0.05*	0.026	12.61							
MW-4 Duplicate	0.46	0.016	<0.05	NA	0.022	NA							
MW-5	<0.2	0.017	0.11	<0.05*	0.011	12.02							
EB-3	<0.2	0.015	0.12	NA	0.011	11.40							
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mg/L = milligrams per liter or parts per million (ppm) NA = not analyzed or applicable * Limit of detection was raised due to matrix interference

Clayton ENVIRONMENTAL CONSULTANTS

Table 4
Summary of Analytical Results for Metals in Groundwater
Clayton Project No. 13-97153.00
Sampling Date: May 23, 1997

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Clayton ENVIRONMENTAL CONSULTANTS

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		Sample Concentration (mg/L)											
Analyte	Barium	Cadmium	Chromium	Chromium (VI)	Lead	pH							
Sample Identification		····											
MW-1	<0.2	0.0078	<0.05	<0.05	0.004	11.59							
MW-2	<0.2	0.011	<0.05	<0.05	0.021	12.32							
MW-3	0.5	0.0083	<0.05	<0.05	0.079	12.75							
MW-4	0.4	0.0068	<0.05	<0.05	0.073	12.73							
MW-5	<0.2	0.0074	<0.05	<0.05	0.085	12.69							
			l										

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mg/L = milligrams per liter or parts per million (ppm)

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Table 3
Summary of Analytical Results for Metals in Groundwater
Clayton Project No. 13-97153.00
Sampling Date: February 5, 1997

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Analyte		Sample Concentration (mg/L)											
	Barium	Cadmium	Chromium	Chromium · (VI)	. Lead	pН							
Sample Identification			· · · · · · · · · · · · · · · · · · ·										
MW-1	<0.2	<0.0005	<0.05	<0.005	<0.003	11.45							
MW-2	0.2	<0.0005	<0.05	<0.05*	< 0.003	12.30							
MW-3	0.6	<0.0005	< 0.05	<0.05*	< 0.003	12.75							
MW-4	0.4	<0.0005	<0.05	<0.05*	<0.003	12.82							
MW-5	0.2	<0.0005	<0.05	<0.05*	< 0.003	12.65							
EB-1	<0.2	<0.0005	<0.05	<0.005	<0.003	10.73							
	1		1										

mg/L = milligrams per liter or parts per million (ppm) * Limit of detection was raised due to sample matrix

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Table 5 Summary of Analytical Results for Metals in Groundwater Clayton Project No. 13-97153.00 Sampling Date: August 27, 1997

		Sample Concentration (mg/L)											
Analyte	Barium	Cadmium	Chromium	Chromium (VI)	Lead	рН							
Sample Identification													
MW-1	<0.2	<0.0005	<0.05	<0.05*	<0.003	11.74							
MW-2	0.2	<0.0005	<0.05	<0.05*	0.023	12.42							
MW-3	0.5	<0.0005	< 0.05	<0.005	0.007	13.17							
MW-4	0.4	<0.0005	<0.05	<0.05*	0.004	13.24							
MW-5	0.5	<0.0005	0.15	<0.05*	0.19	13.13							
EB-1	<0.2	<0.0005	<0.05	<0.05*	< 0.003	NA							

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mg/L = milligrams per liter or parts per million (ppm) NA = not analyzed * Limit of detection was raised due to sample matrix

Hydrogeological Investigation for the Former Approved Electric Arc Furnace Dust Storage Area at the Former McLouth Steel Products Corporation Trenton, Michigan

Submitted to DSC Ltd. Trenton, Michigan

Clayton Project No. 13-97153.00

December 9, 1997

Limitations

The information and opinions rendered in this report are exclusively for use by DSC Ltd. Clayton Environmental Consultants, a division of Clayton Group Services, Inc. (Clayton) will not distribute or publish this report without DSC Ltd.'s consent except as required by law or court order. The information and opinions are given in response to a limited assignment and should be implemented only in light of that assignment. Clayton accepts responsibility for the competent performance of its duties in executing the assignment and preparing reports in accordance with the normal standards of the profession, but disclaims any responsibility for consequential damages.

This report submitted by:

This report reviewed by:

Gary T. Blinkiewicz Project Hydrogeologist Environmental Risk Management and Remediation Detroit Regional Office

Robert A. Ferree, CPG Senior Geologist and Supervisor of Geosciences Environmental Risk Management and Remediation Detroit Regional Office I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to be the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

This report reviewed by:

Derek R. Wong, Ph.D., P.E.

Senior Hydrogeologist and Manager Environmental Risk Management and Remediation Detroit Regional Office

APPENDIX A

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SOIL BORING LOGS

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Boring Log



Clayton Boring MW-2

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Final depth	17 feet BGS	n	R	Soil	N	Soil Type	Color	Soil Moisture	Comment	PID ppm	
_							ļ		.		275
Page	1 of 1	0		-							
Boring	Former McLouth					·					
location	Steel Plant										
										·	
l	<u>د</u>	2				•					
								Į			
Client	DSC Ltd.										188
		4	[
1		' -								1	
Designed Mar	13-97153.00.004	, -				•					1888
Projeci No.	13-97133.00.004	1									
Site [Former McLouth	6]		
	Steel Plant										1888
	Stoct 1 han				1						188
1								1			
••		8									
ı						•		<u>;</u>			88
Clayton	Gary Blinkiewicz										188
geologist	•			ļ							188
	Rau Drilhng	10							ļ		1128
	20 Nov 96				ł				1		I RX
	20 Nov 96		1]		
Method	Hollow stem auger		Į						}		
Auger OD	4.25 inches	12									1
Sampler		┨┝────	Į						•.		
Elevation					1						
Datum		<u> </u>]				
iround surface	feet	14			1	CLAYEY SAND with pebbles	Black	Moist	No odor		
	MW-2	ı	80		62	CLATET SAND with periods	Diat	Moist	110 0.01	1	188
lonitoring Well		1		ł	1			Moist			
TOC elevation	feet	16	{	ł	97			Moist			
Grout	3.0 feet BGS 9.0 feet BGS	10		F	1'				1		18
interval Bentonite plug	2.0 feet thick	╢──	<u>+</u>	 	÷						E
Filter park	11.0 feet BGS	11						1			i Bo
interval	17.0 feet BGS	18	1								1
Screen length	5.0 feet	1		1							
Siot size	0.10 inches		1								
Screen bottom	17.0 feet BGS	11			1				1		
Grout method		20	1								
Pack material	sand	11							1		
Grout maternal			1	1							
Development	purge][]									1
Well lock No		22									
			1	1	ł						
Groundwater	Date 1	1							1	ł	
Static level	feet below TOC		1	1				1			1
Elevation	feet	24			1						
Volume purged	galions	 	1								
Conductivity	μπihos	11		1			1	1			
Тетрегацие	°F .		4	1							
рН		26		1					1		
	Date 2		4							1	
Static level	1		1		1		1				
Elevation	feet		4						1		1
Volume purged	-	28				1		1			
Conductivity	µmhos	I	-				1	1			
Temperature											
	1		1	1				1			
рH									1		
		30									
Clayton ENVIRONMENTAL		30	-								

Boring Log



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	Clayton Bor							Soil	Comment	PID
Final depth	18 feet BGS	^	R	Soil	N	Soit Type	Color	Soil Moisture	Conament	ppim
	1 of 1	10								
Page	1 of 1 Former McLouth	╢╹║								
	Steel Plant						1			· ·
IUCONUN								· · ·		1.
		2								1.
Client	DSC Ltd.						1			
						· · · · ·				
		4					1			
	•	l			20	SAND fill with piceces of cement	Dark	Dry	No odor	
Project No.	13-97153.00.004	J	50		25	SALLD III will pieces of contain	Brown	Dry		
	D	6			25			Dry		(
	Former McLouth	ll ° l			25			Dry	1	
	Steel Plant				1					
					1		1]	
		8					1		1	
			l					1 2		
Clayton	Nick McCullough						1			
geologist					1.		Brown	Dry	No odor	
	Rau Drilling	10	50		T	CL4.YEY SILT fill with piecees of concrete and rock	L 10 MI	Dry		
Start date			ł		18		1	Dry		
					100	· · · · · · · · · · · · · · · · · · ·		Dry		
	Hollow stem auger 4.25 inches	12			1 -					
Auger OD Sampler	4.2 Inches	11 '-	1]	
Elevation	· · · · · · · · · · · · · · · · · · ·	- ├	1		1					
Daium		11								
ound surface	feet	14	1	1						
]]					
nitoring Well	MW-3]	10		12	SAND, medium- to coarse-grained	Black	Moist	No odor	
C elevation	feet		J	E	112			Moist		
Grout	3.0 feet BOS	16			13			Moist Moist		
internal	9 0 feet BGS	┛┣━	1		13			MOISU		
entonite plug	20 feet thick	41								
Filier pack	11.0 feet BGS				+				1	
inter al	18 0 feet BGS	- 18								
creen length	50 feet 010 inches	i⊢		1 .						
Slot size	18 0 feet BGS	-11								
rout method		20	1							
ack material	1							1		
rout material			1		ļ					
Development	purge		1						1 .	ļ
Well lock No	<u> </u>	22			1		-			
			4		-					
iroundwater			1	1					1	1
Static level		24	-							
Elevation Jume purged	1	11 - 11			1		1	1		
Conductivity	-		1						1	ł
Сопалсичи Тетрегазите								ļ		
pH		26	1					1		
<u>r ··</u>	Date 2									
Static level		c 🗌	1							1
Elevation	feet		1				1			
olume purged	galions	28						1		
Conductivity			4						1	1
Тетрегалиге	1									
pН	1	┛┝──	-				1			
1		30	'							
lavion						•				
Clayton	•		-					ł		

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Boring Log

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	Clayton Bori						Color	Sail	Comment	PID
Final depth	30 feet BGS	n	R	Soll	N	Soil Type	COIOF	Moisture	Comment	ppm
Page) of 1									
Fage Boring	Former McLouth									
	Steel Plant									
•								1		
	<u>-</u>	2								
Client	DSC Ltd.									
Circia										
	<u> </u>	4				,				
Project No.	13-97153.00.004		50			SAND fill with pebbles, pieces of brick, metal debris,	Black	Dry Dry	No odor	0
		┢╤┤			9 11	and refuse		Dry		
Site	Former McLouth	6			13			Dry-		
	Steel Plant				1.	и				
1		8								
Clayton	Gary Blinkiewicz	╽┝─┤								
geologist		10	70	Source:	41	CLAYEY SAND fill with pebbles, piceces of brick,	Black	Dry	No odor	0
	Rau Drilling	· ¹⁰	10		45	and metal dehns	1	Dry	1	1
-	31 Oct 96 1 Nov 96				1:0			Dry		
	Hollow stem auger				50			Dry	1	
Meinoa Auger OD	4.25 inches	12			1			Í		
Sampler								1		
Elevation					1					
Datum		┨┝───					}			1
ound surface	teet	14		1	ļ		1	1		1
	MW-4	┓┝──								
nitoring Well	icct	-11						1	1	
OC elevation Grout	3.0 feet BGS	16		1			1			
interval	21.0 feet BGS	11.	1		1					
entonite plug	2.0 feet thick]	1							
Filter pack	23.0 feet BGS									
internal	30.0 feet BGS	18	1	1						1
erren ungth	. 50 feet				1				1	
Ster size	0.10 inches	4		1						
creen bollom	30.0 (eet BGS		1		-	man a set of a late of the set of a shall be made and	Brown	Dry	No odor	
rout method	1	20	100	ΎΕ.		CLAYEY SAND fill with pebbles, rock, and precevol brick	Dio	Dry		
ack mairnal	sand		1			1		Dry		1
rout material Development		-11	1					Dry		ł
Development Well lock No	liverke	22	1		1					
			1							
iround=ater	Date 1	_ _					1		1	1
Static level			1	1		1				
Eles ation	1	24	1	1						
olume purged	1	1	┨	. 	-	CLANEN SANDARD Particles	Black/	Dry	No odor	
Conductivity T			20	' 		CLAYEY SAND with pebbles	Gray	Dry		
Temperature		26	-		34		10107	Moist		1
pH	Date 2	- ²°				4		Moist		
Static level	+	╣┝╴	1	-	-		1			1
Elevation		-11	1	ł	1	· .			1	
olume purged		28	1						-	
Conductivity	-	- ``	1						**	1
Temperature			1						1	
pH	4									
		30	1		İ					
Clayton				1						1
2										

Boring Log

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	Clayton Bori	- -		Soil		Soil Type	Color	Soll	Comment	PID	
Final depth	18 feet BGS		Î	3-011	1			Moisture		ppm	
Page	1 of 1	0			╡						
Boring location	Former McLouth Steel Plant	\neg	1								
,		2	ļ								
Client	DSC Ltd.								-		
		4									
Project No.	13-97153.00.004	_	40		36		Black	Dry Dry	No odor	0	
		6			25 26	•		Dry			
	Former McLouth Steel Plant				30			Dry			
		8						:			
Clayton geologist	Gary Blinkiewicz						Dark	Dry	No odor	0	
	Rau Drilling 30 Oct 96	10	60		26 20		Brown	Dry			
Start date Final date	30 Oct 96				18			Dry			
Method	Hollow stem auger				18			Dry			
Auger OD Sampler	4.25 inches	12				-					
Elevation											
Datum Tround surface	feet	14					1				
							Brown	Dry	No odor	0	
fonitoring Well			40		,		BIOWN	Dry	100000		
TOC elevation Grout	feet 3.0 feet BGS	16			15	<i>i</i>		Moist			
internal	9.0 feet BGS				17			Moist			
Bentonite plug	20 feet thick								1		
Filter pack Sintersal	11.0 feet BGS 18.0 feet BGS	18		+					1		1
Screen length	. 5.0 feei			1							E
Ster use	0.10 inches			ł						1	
Screen bottom Grout method	1	20									·
l'ack material											
Grout maternal]								
Development	buths	22						1			
Well lock No	· · · · · · · ·		:								
Groundwater	Date 1		1 .	1							
Static level					1					1	
Ein aunn Volume purged	feet	24									
Conductivity	galions µmhos	\vdash	1	1							
Temperature]					1		1	1
рН		26							, ,		
	Date 2	 	1		1						1
Static level Elevation						.*			1		
Volume purged	2	28	1		1						
Conductivity	μmhus		1	1	1						
Temperature			1								
рН		╟┯	-								
Clayton		30	1								1
ENVIRONMENTAL			1		1				1		
LANNO/VARIENTA:		1	1	F	1		1	1		1	

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APPENDIX B

ANALYTICAL RESULTS OF GROUNDWATER SAMPLES

Page 2 of :

Sample Identification:	MW-1		Date Sampled:	11/08/96
Lab Number:	001a		Date Received:	11/11/96
Sample Type:	Water			-
Analyst:	CW	•		-

÷	Analyte	Concentration (mg/L)	LOD (mg/L)	Prepara Method an		Analyti Method an		
Barium		<0.2	0.20	EPA 3020A	11/19/96	EPA 200.8	11/26/9	
Cadmium		0.015	0.0005	EPA 3020A	11/19/96	EPA 200.8	11/26/9	
Chromium		0.1	0.05	EPA 3020A	11/19/96	EPA 200.8	11/26/9	
Lead		0.013	0.003	EPA 3020A	11/19/96	EPA 200.8	11/26/9	

Sample Identification: Lab Number: Sample Type: Analyst:	MW-3 002a Water CW		Sampled: Received:	÷	11/08/96 11/11/96
-					-

Analyte	Concentration (mg/L)	LOD (mg/L)	Prepara Method an		Analyti Method an	
Barium	0.55	0.20	EPA 3020A	11/19/96	EPA 200.8	11/26/3
Cadmium	0.013	0.0005	EPA 3020A	11/19/96	EPA 200.8	11/26/3
Chromium	0.12	0.05	EPA 3020A	11/19/96	EPA 200.8	11/26/5
Lead	0.012	0.003	EPA 3020A	11/19/96	EPA 200.8	11/26/



Table 1 (continued) Analytical Results for DSC LTD. Clayton Project No. 43906.00/13-97153.00

Page 3 of

Analytical

Date

Method and Date

Date Sampled: 11/08/96 MW-4 Sample Identification: Date Received: 11/11/96 . 003a Lab Number: Water Sample Type: CW Analyst: Analytical Preparation Concentration LOD Method and Date Method and Date (mg/L) (mg/L) Analyte EPA 3020A 11/19/96 EPA 200.8 11/26/5 0.54 0.20 Barium 0.0005 EPA 3020A 11/19/96 EPA 200.8 11/26/5 0.017 Cadmium EPA 3020A 11/19/96 EPA 200.8 11/26/9 0,05 <0.05 Chromium EPA 3020A 11/19/96 EPA 200.8 11/26/9 0.003 0.026 Lead _____ ----

Sample Identification:	MW - 5			I	Date	Sampled:	11/08/9 €
Lab Number:	004a			I	Date	Received:	11/11/9€
Sample Type:	Water						
Analyst:	CW	·					

Analyte	(mg/L)	(mg/L)	Method and Date
	Concentration	LOD	Preparation

Lead	0.011	0.003	EPA 3020A	11/19/96	EPA 200.8	11/26/
Chromium	0.11	0.05			EPA 200.8	
Cadmium	0.017	0.0005				
	0 017	0 0005		11/10/06	EPA 200.8	11/26/
Barium	<0.2	0.20	EPA 3020A	11/19/96	EPA 200.8	11/26/

Table 1 (continued) Analytical Results for DSC LTD. Clayton Project No. 43906.00/13-97153.00

Page 4 of

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Sample Identification: Lab Number: Sample Type: Analyst:	EB-3 005a Water CW		Date Sampled: Date Received:	11/08/96 11/11/96
---	-----------------------------	--	---------------------------------	----------------------

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Analyte	Concentration	LOD	Preparation		Analytical	
	(mg/L)	(mg / L)	Method and Date		Method and Date	
Barium	<0.2	0.20	EPA 3020A	11/19/96	EPA 200.8	11/26/9
Cadmium	0.015	0.0005	EPA 3020A	11/19/96	EPA 200.8	11/26/9
Chromium	0.12	0.05	EPA 3020A	11/19/96	EPA 200.8	11/26/9
Lead	0.011	0.003	EPA 3020A	11/19/96	EPA 200.8	11/26/9

Sample Identification: Lab Number: Sample Type: Analyst:	MW-4 DUPLICATE 006a Water CW	Date Sampled: Date Received:	11/08/96 11/11/96
Analyst:	CW		

Analyte	Concentration (mg/L)	LOD Prepa (mg/L) Method			Analytical Method and Date		
				11/19/96	EPA 200.8	11/26/9	
Barium	0.46	0.20	EPA 3020A				
Cadmium	0.016	0.0005	EPA 3020A	11/19/96	EPA 200.8	11/26/9	
Chromium	<0.05	0.05	EPA 3020A	11/19/96	EPA 200.8	11/26/9	
Lead	0.022	0.003	EPA 3020A	11/19/96	EPA 200.8	11/26/3	

Table 1 (continued) Analytical Results for DSC LTD. Clayton Project No. 43906.00/13-97153.00

Page 5 of

11/08/96 Date Sampled: Sample Identification: MW-3 MS 11/11/96 Date Received: 007a Lab Number: Water Sample Type: CW Analyst:

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Analyte	Concentration (mg/L)	LOD (mg/L)	Prepara Method and		Analyti Method an	
Barium	0.61	0.20	EPA 3020A	11/19/96	EPA 200.8	11/26/9
Cadmium	0.016	0.0005	EPA 3020A	11/19/96	EPA 200.8	11/26/9
Chromium	0.12	0.05	EPA 3020A	11/19/96	EPA 200.8	11/26/9
Lead	0.013	0.003	EPA 3020A	11/19/96	EPA 200.8	11/26/9

Sample Identification: Lab Number:	MW-3 MSD 008a		Date Sampled: Date Received:	11/08/98 11/11/9:
Sample Type:	Water	ан ш. -		· .
Analyst:	CW			

Analyte	Concentration Analyte (mg/L)	LOD (mg/L)	Preparati Method and		Analytical Method and Date		
	· · · · · · · · · · · · · · · · · · ·	0.53	0.20	EPA 3020A	1/19/96	EPA 200.8	11/26/
Barium		0.53			L1/19/96	EPA 200.8	11/26/
Cadmium		0.014	0.0005	2111 002000		EPA 200.8	11/26/
Chromium		<0.05	0.05		L1/19/96		
Lead		0.02	0.003	EPA 3020A 1	11/19/96 	EPA 200.8	11/26/

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Table 1 (continued) Analytical Results for DSC LTD.

Page 6 of f

Clayton Project No. 43906.00/13-97153.00

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Sample Identification:LAB BLANKDate Sampled:--Lab Number:009aDate Received:11/11/96Sample Type:WaterAnalyst:CW

Analyte	Concentration (mg/L)	LOD (mg/L)	Prepara Method an		Analyti Method an	
Barium	<0.2	0.20	EPA 3020A	11/19/96	EPA 200.8	11/26/9
Cadmium	<0.0005	0.0005	EPA 3020A	11/19/96	EPA 200.8	11/26/9
Chromium	<0.05	0.05	EPA 3020A	11/19/96	EPA 200.8	11/26/9
Lead	<0.003	0.003	EPA 3020A	11/19/96	EPA 200.8	11/26/9

General Notes

--: Information not available or not applicable.

Sample Identification: Lab Number: Sample Type: Analyst:	MW-1 001 Water CR		Date Sampled: Date Received:	11/20/96 11/21/96
Analyte	Concentration (mg/L)	LOD . (mg/L)	Analytical Method	Date Analyzed
Hexavalent chromium	<0.05	0.05	EPA 7196	11/21/96
Sample Identification Lab Number: Sample Type: Analyst:	: MW-2 002 Water CR		Date Sampled: Date Received:	11/20/96 11/21/96
Analyte	Concentration (mg/L)	LOD (mg/L)	Analytical Method	Date Analyzed
Hexavalent chromium	<0.05	0.05	EPA 7196	11/21/96

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Sample Identification: Lab Number: Sample Type: Analyst:	MW-2 002b Water CW			Date Sampl Date Recei		11/20/96 11/21/96
Analyte	Concentration (mg/L)	LOD (mg/L)	Prepara Method an		Analyt Method a	
Barium Cadmium Chromium Lead	<0.2 <0.0005 0.08 <0.003	0.2 0.0005 0.05 0.003	EPA 3020A EPA 3020A EPA 3020A EPA 3020A	11/26/96 11/26/96 11/26/96 11/26/96 11/26/96	EPA 6020A EPA 6020A EPA 6020A EPA 6020A	12/04/9 12/04/9 12/04/9 12/04/9

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Sample Identification: Lab Number: Sample Type: Analyst:	MW-3 003 Water CR		Date Sampled: Date Received:	11/20/96 11/21/96
Analyte	oncentration (mg/L)	LOD (mg/L)	Analytical Method	Date Analyzed
Hexavalent chromium	<0.05	0.05	EPA 7196	11/21/96
Sample Identification: Lab Number: Sample Type: Analyst:	MW-4 004 Water CR		Date Sampled: Date Received:	11/20/96 11/21/96
Analyte	Concentration (mg/L)	LOD (mg/L)	Analytical Method	Date Analyzed
Hexavalent chromium	<0.05	0.05	EPA 7196	11/21/96

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Sample Identification Lab Number: Sample Type: Analyst:	: MW-5 005 Water CR		Date Sampled: Date Received:	11/20/96 11/21/96
Analyte	Concentration (mg/L)	LOD (mg/L)	Analytical Method	Date Analyzed
Hexavalent chromium	<0.05	0.05	EPA 7196	11/21/96

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General Notes:

<: Less than the indicated limit of detection (LOD) --: Information not available or not applicable

Limit of detection was raised due to matrix interference.



Sample Identification: Lab Number:	MW-1 001a			Date Sampl Date Recei		02/05/9 02/06/9
Sample Type: Analyst:	Water CW					
:					<u> </u>	
		LOD	Prepara	tion	Analyt	ical
Analyte	Concentration (mg/L)	(mg/L)	Method an		Method a	
	<0.2	0.2	EPA 3020A		EPA 6020	02/19/
Barium	<0.0005	0.0005		02/17/97	EPA 6020	02/19/
Cadmium	<0.05	0.05	EPA 3020A	02/17/97	EPA 6020	02/19/
Chromium	<0.003	0.003	EPA 3020A	02/17/97	EPA 6020	02/19/
Lead						
Sample Identification: Lab Number:	MW-2 002a	 .		Date Samp Date Rece:		
Lead Sample Identification: Lab Number: Sample Type: Analyst:	 МW-2	 ,				
Sample Identification: Lab Number: Sample Type:	MW-2 002a Water					02/05/9 02/06/9
Sample Identification: Lab Number: Sample Type: Analyst:	MW-2 002a Water CW Concentration	LOD	Prepara Method at	Date Rece:	ived: Analyt	02/06/9
Sample Identification: Lab Number: Sample Type:	MW-2 002a Water CW	LOD (mg/L)	Prepara Method an	Date Rece:	ived:	02/06/9
Sample Identification: Lab Number: Sample Type: Analyst:	MW-2 002a Water CW Concentration (mg/L) 0.2	(mg/L) 0.2	Method an EPA 3020A	Date Recent	ived: Analyt Method a EPA 6020	02/06/9 ical ind Date 02/19/
Sample Identification: Lab Number: Sample Type: Analyst: Analyte	MW-2 002a Water CW Concentration (mg/L) 0.2 (0.0005	(mg/L) 0.2 0.0005	Method an EPA 3020A EPA 3020A	Date Rece: ation nd Date 02/17/97 02/17/97	Analyt Method a EPA 6020 EPA 6020	02/06/9 ical ind Date 02/19/ 02/19/
Sample Identification: Lab Number: Sample Type: Analyst: Analyst Barium	MW-2 002a Water CW Concentration (mg/L) 0.2	(mg/L) 0.2	Method an EPA 3020A	Date Rece: ation nd Date 02/17/97 02/17/97	Analyt Method a EPA 6020 EPA 6020 EPA 6020	02/06/9

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Sample Identification: Lab Number: Sample Type: Analyst:	MW-3 003a Water CW			Date Sample Date Receiv		02/05/9 ⁻ 02/06/9 ⁻
Analyte	Concentration (mg/L)	LOD (mg/L)	Prepara Method an	tion d Date	Analyt: Method ar	
Barium Cadmium Chromium Lead	0.6 <0.0005 <0.05 <0.003	0.2 0.0005 0.05 0.03	EPA 3020A EPA 3020A EPA 3020A EPA 3020A	02/17/97 02/17/97 02/17/97 02/17/97 02/17/97	EPA 6020 EPA 6020 EPA 6020 EPA 6020	02/19/ 02/19/ 02/19/ 02/19/
Sample Identification: Lab Number: Sample Type: Analyst:	MW-4 004a Water CW			Date Sampl Date Recei		02/05/9
Analyte	Concentration (mg/L)	LOD (mg/L)	Prepar Method a		Analyt Method a	
Barium Cadmium Chromium Lead	0.4 <0.0005 <0.05 <0.03	0.2 0.0005 0.05 0.03	EPA 3020A EPA 3020A EPA 3020A EPA 3020A	02/17/97	EPA 6020 EPA 6020 EPA 6020 EPA 6020	02/19 02/19 02/19 02/19



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Sample Identification: Lab Number: Sample Type:	MW-5 005a Water CW			Date Sampl Date Recei			02/05/97 02/06/97
Analyst:	CW	·					
· · · · · · · · · · · · · · · · · · ·	<u>.</u>				; ; ; ; _		
Analyte	Concentration (mg/L)	LOD (mg/L)	Prepara Method an			nalyt: nod an	ical nd Date
Barium	0.2	0.2	EPA 3020A	02/17/97	EPA 6	5020	02/19/
Cadmium	<0.0005		EPA 3020A	02/17/97	EPA 6	5020	02/19/
Chromium	<0.05	0.05	EPA 3020A		EPA 6	5020	02/19/
Lead	<0.003	0.003	EPA 3020A	02/17/97	EPA 6	5020	02/19/
······································							
Sample Identification: Lab Number: Sample Type: Analyst:	EB-1 006a Water CW		· • • • • • • • • • • • • • • • • • • •	Date Samp Date Rece			
Sample Identification: Lab Number: Sample Type:	006a Water CW		Prepar	Date Rece	ived:	nalvt	02/06/9
Sample Identification: Lab Number: Sample Type:	006a Water	LOD (mg/L)	Prepar Method a	Date Rece:	ived:	nalyt hod a	02/06/9
Sample Identification: Lab Number: Sample Type: Analyst:	006a Water CW Concentration			Date Rece ation nd Date	ived: An Meti	hod a	02/06/9
Sample Identification: Lab Number: Sample Type: Analyst: Analyte	006a Water CW Concentration (mg/L)	(mg/L) 0.2 0.0005	Method a EPA 3020A EPA 3020A	Date Rece: ation nd Date 02/17/97 02/17/97	ived: Met EPA EPA	hod a 6020 6020	02/19/ 02/19/
Sample Identification: Lab Number: Sample Type: Analyst: Analyte Barium	006a Water CW Concentration (mg/L) <0.2	(mg/L)	Method a EPA 3020A	Date Rece: ation nd Date 02/17/97 02/17/97 02/17/97	A Met EPA EPA EPA	hod a 6020 6020	02/06/9



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Analytical Results for DSC LTD. Clayton Project No. 46319.00/13-97153.00

Sample Identification: Lab Number: Sample Type: Analyst:	LAB BLANK 007a Water CW			Date Sampl Date Recei		02/05/97 02/05/97
Analyte	Concentration (mg/L)	LOD (mg/L)	Prepara Method an		Analyt Method a	
Barium	<0.2	0.2	EPA 3020A		EPA 6020	02/19/9
Cadmium	<0.0005	0.0005	EPA 3020A	02/17/97	EPA 6020	02/19/9
Chromium	<0.05	0.05	EPA 3020A	02/17/97	EPA 6020	02/19/9
Lead	<0.003	0,003	EPA 3020A	02/17/97	EPA 6020	02/19/9

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Sample Identification: Lab Number: Sample Type: Analyst:	MW-1 001 Water CR		Date Sampled: Date Received:	02/05/97 02/06/97
Analyte	Concentration (mg/L)	LOD (mg/L)	Analytical Method	Date Analyzed
Hexavalent chromium	<0.005	0.005	EPA 7196	02/06/97
Sample Identification: Lab Number:	MW-2 002 Water		Date Sampled: Date Received:	02/05/97 02/06/97
Sample Type: Analyst:	CR			·
Analyte	Concentration (mg/L)	LOD (mg/L)	Analytical Method	Date Analyzed
Hexavalent chromium	<0.05	0.05 (a)	EPA 7196	02/06/97

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Clayton ENVIRONMENTAL CONSULTANTS

Sample Identification: Lab Number: Sample Type: Analyst:	MW-3 D03 Water CR		Date Sampled: Date Received:	02/05/97 02/06/97	
Analyte	Concentration (mg/L)	LOD (mg/L)	Analytical Method	Date Analyzed	
Hexavalent chromium	<0.05	0.05 (a)	EPA 7196	02/06/97	
Sample Identification: Lab Number: Sample Type: Analyst:	MW-4 004 Water CR		Date Sampled: Date Received:	02/05/97 02/06/97	
Analyte	Concentration (mg/L)	LOD (mg/L)	Analytical Method	Date Analyzed	
Hexavalent chromium	<0.05	0.05 (a)	EPA 7196	02/06/97	

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Clayton ENVIRONMENTAL CONSULTANTS

Sample Identification: Lab Number: Sample Type: Analyst:	MW-5 005 Water CR		Date Sampled: Date Received:	02/05/97 02/06/97
Analyte	Concentration (mg/L)	LOD (mg/L)	Analytical Method	Date Analyzed
Hexavalent chromium	<0.05	0.05 (a)	EPA 7196	02/06/97
Sample Identification: Lab Number: Sample Type: Analyst:	EB-1 006 Water CR		Date Sampled: Date Received:	02/05/97 02/06/97
Analyte	Concentration (mg/L)	LOD (mg/L)	Analytical Method	Date Analyzed
Hexavalent chromium	<0.005	0.005	· EPA 7196	02/06/97

(a) Limit of detection was raised due to sample matrix. General Notes:

<: Less than the indicated limit of detection (LOD)

--: Information of available or not applicable

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Sample Identification: Lab Number: Sample Type:	001a Water	e Sampled: e Received:	05/23/97 05/23/97
Analyst:	CW		

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Analyte	Concentration (mg/L)	LOD (mg/L)	-	Preparation Method and Date		Analytical Method and Date		
Metals Barium Cadmium Chromium Lead	<0.2 0.0078 <0.05 0.004	0.2 0.0005 0.05 0.003	EPA 6020 EPA 6020 EPA 6020 EPA 6020	06/06/97 06/06/97 06/06/97 06/06/97	EPA 6020 EPA 6020 EPA 6020 EPA 6020) 06/09/9) 06/09/9		

Sample Identification: Lab Number:	MW-2 002a -)ate Sampled:)ate Received:	05/23/97 05/23/9 ⁻
Sample Type:	Water			
Analyst:	CW			

Analyte	Concentration (mg/L)	LOD (mg/L)	Preparation Method and Date	Analytical Method and Date
letals				
Barium	<0.2	C.2	EPA 6020 06/06/97	EPA 6020 06/09/
Cadmium	0.011	0.0005	EPA 6020 · 06/06/97	EPA 6020 06/09
Chromium	<0.05	0.05	EPA 6020 06/06/97	EPA 6020 06/09
Lead	0.021	0.003	EPA 6020 06/06/97	EPA 6020 06/09

06/09/3

06/09/3

06/06/97 EPA 6020

06/06/97 EPA 6020

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Analytical Results for DSC LTD. Clayton Project No. 50210.00/13-97153.00

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Chromium

Lead

Sample Identification: Lab Number: Sample Type: Analyst:	MW-3 003a : Water CW	÷		Date Sampl Date Recei		05/ 23 /9 ⁻ 05/23/9 ⁻
	•					-
	Concentration	LOD	Prepar Method a		Analyt Method a	
Analyte	(mg/L)	(mg/L)				
Metals						
Barium	0.5	0.2	EPA 6020	06/06/97	EPA 6020	06/09/9
Cadmium	0.0083	0.0005	EPA 6020	06/06/97		06/09/9
Chromium	<0.05	0.05	EPA 6020	06/06/97		06/09/9
Lead	0.079	0.003	EPA 6020	06/06/97	EPA 6020	2/00/60
Sample Identification:	MW - 4			Date Sampl	Led:	05/23/97
Lab Number:	004a			Date Recei		05/23/9-
Sample Type:	Water					
Analyst:	CW				-	
						·
	Concentration	LOD	Prepar	ration	Analyt	ical
Analyte	(mg/L)	(mg/L)	Method a		Method a	
Metals	· · · · · · · · · · · · · · · · · · ·					
Barium	0.4	0.2	EPA 6020	06/06/97	EPA 6020	06/09/9
Cadmium	0,D06B	0.0005	EPA 6020	06/06/97	EPA 6020	06/09/5

0.05

0.003

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EPA 6020

EPA 6020

<0.05

0.073

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Analytical Results for DSC LTD. Clayton Project No. 50210.00/13-97153.00

Sample Identification: Lab Number: Sample Type: Analyst:	MW-5 005a Water CW			Date Sampl Date Recei		05/23/97 05/23/97
. Analyte	Concentration (mg/L)	LOD (mg/L)	Prepar Method a		Analyt Method a	
Metals		_				/-
Barium	<0.2	0.2	EPA 6020	06/06/97		06/09/9
Cadmium	0.0074		EPA 6020	06/06/97		06/09/9
Chromium	<0,05	0.05	EPA 6020			06/09/9
Lead	0.085	0.003	EPA 6020		EPA 6020	06/09/9
Sample Identification: Lab Number: Sample Type: Analyst:	LAB BLANK 006a Water CW			Date Sampl Date Recei		05/23/97
Lab-Number: Sample Type:	006a Water	LOD (mg/L)	Prepar Method a	Date Recei		
Lab Number: Sample Type: Analyst: 	005a Water CW Concentration		_	Date Recei	lved: Analyt	
Lab Number: Sample Type: Analyst:	005a Water CW Concentration	(mg/L)	Method a	Date Recei	lved: Analyt	
Lab Number: Sample Type: Analyst: Analyte Metals	005a Water CW Concentration (mg/L)		_	Date Recei	Analyt Method a EPA 6020	ical Ind Date
Lab Number: Sample Type: Analyst: Analyte Metals Barium	005a Water CW Concentration (mg/L)	(mg/L)	Method a EPA 6020	Date Recei	Analyt Method a EPA 6020	ical Ind Date

General Notes

--: Information not available or not applicable.

Sample T Analytic Analyst:	al Method:	Water EPA 7196 CR	· I I	Date Sampl Date Receip Date Prepa Date Analy	lved: 05/23/97 ared: 05/23/97
· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	Hexa	valent ch	romium
Lab No.	Sampl Identific		(mg/L)		LOD (mg/L)
001b 002b	MW - 1 MW - 2		<0.05		· 0.05 0.05 0.05
003b 004b	MW - 3 MW - 4 MW - 5		<0.05 <0.05 <0.05		0.05

<0.05

General Notes:

005b

<: Less than the indicated limit of detection (LOD)

--: Information not available or not applicable

MW - 5



Sample Identification: Lab Number: Sample Type:	MW-1 001a Water CW	e Sampled: • Received:	•	08/27/97 08/27/97
Analyst:	CW .			

Analyte			Preparation Method and Date		Analytical Method and Date		
	· · ·	· · · · · · · · · · · · · · · · · ·					
Dissolved Metals Barium Cadmium Chromium Lead	<0.2 <0.0005 <0.05 <0.003	0.2 0.0005 0.05 0.003	EPA 3020A EPA 3020A EPA 3020A EPA 3020A	09/05/97 09/05/97 09/05/97 09/05/97	EPA 6020 EPA 6020 EPA 6020 EPA 6020	09/08/9 09/08/9 09/08/9 09/08/9	

Sample Identification: Lab Number: Sample Type: Analyst:	MW-2 002a Water CW		•	Date Sampled: Date Received:	08/27/97 08/27/97
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Analyte	Concentration (mg/L)	LOD (mg/L)	Prepara Method an		Analyti Method an	
Dissolved Metals						201001
Barium	0.2	0.2	EPA 3020A	09/05/97	EPA 6020	09/08/
	0.2 <0.0005	0.2 0.0005	EPA 3020A EPA 3020A	09/05/97 09/05/97	EPA 6020 EPA 6020	09/08/
Barium Cadmium Chromium	••-	- • -				



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Analytical Results for DSC LTD. Clayton Project No. 53532.00/13-97153.00

Sample Identification: Lab Number: Sample Type: Analyst:	MW-3 003a Water CW			Date Sampl Date Recei		08/27/9 ⁻ 08/27/9 ⁻
::						
Analyte	Concentration (mg/L)	LOD (mg/L)	Prepara Method ar	ation nd Date	Analyt Method a	
Dissolved Metals				2		
Barium	0.5	0.2	EPA 3020A		EPA 6020	09/08/9
Cadmium	<0.0005	0.0005	EPA 3020A	09/05/97	EPA 6020	09/08/9
Chromium	<0.05	0.05	EPA 3020A	09/05/97		09/08/5
Lead	0.007	0.003	EPA 3020A	09/05/97	EPA 6020	09/08/9
Sample Identification: Lab Number: Sample Type: Analyst:	MW-4 004a Water CW			Date Samp] Date Recei		08/27/9 ⁻ 08/27/9 ⁻
					·····	
Analyte	Concentration (mg/L)	LOD (mg/L)	Prepar Method a		Analyt Method a	
Dissolved Metals						
Barium	0.4	0.2	EPA 3020A	09/05/97	EPA 6020	09/08/
Cadmium	<0.0005	0.0005	EPA 3020A	09/05/97	EPA 6020	09/08/
Chromium	<0.05	0.05	EPA 3020A	09/05/97	EPA 6020	09/08/
			EPA 3020A		EPA 6020	09/08/
Lead	0.004	0.003				

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Analytical Results for DSC LTD. Clayton Project No. 53532.00/13-97153.00

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Sample Identification: Lab Number: Sample Type: Analyst:	MW-5 005a Water CW	Date Sampled: Date Received:	08/27/97 08/27/97
•			

Analyte	Concentration (mg/L)	LOD (mg/L)	Prepara Method an		Analyti Method ar	
		<u></u>		:		
Dissolved Metals Barium	0.5	0.2	EPA 3020A	09/05/97	EPA 6020	09/08/9
Cadmium	<0.0005	0.0005	EPA 3020A	09/05/97	EPA 6020	09/08/9
Chromium	0.15	0.05	EPA 3020A	09/05/97	EPA 6020	09/08/9
Lead	0.19	0.003	EPA 3020A	09/05/97	EPA 6020	0,9/08/9

Sample Identification: Lab Number:	EB-1 006a	Sampled: Received:	08/27/97 08/27/97
Sample Type:	Water		
Analyst:	CW		

Analyte	Concentration (mg/L)	LOD (mg/L)	Preparat Method and		· -	tical and Date
Dissolved Metals						
Barium	<0.2	0.2	EPA 3020A	09/05/97	EPA 6020) 09/08/3
Cadmium	<0.0005	0.0005	EPA 3020A	09/05/97	EPA 6020) 09/08/9
Chromium	<0.05	0.05	EPA 3020A	09/05/97	EPA 6020) 09/08/9
Lead	<0.003	0.003	EPA 3020A	09/05/97	EPA 6020	09/08/



Sample Identification: Lab Number:	LAB BLANK 007a		 Date Sampled: Date Received:	 08/27/97
Sample Type:	Water		•	
Analyst:	CW		-	
		•		

Analyte	Concentration (mg/L)	LOD (mg/L)	Prepara Method an		Analyt: Method ar	
				:*		
Metals	<0.2	0.2	EPA 3020A	09/05/97	EPA 6020	09/08/9
Barium Cadmium	(0.0005	0.0005	EPA 3020A	09/05/97	EPA 6020	09/08/9
Chromium	<0.05	0.05	EPA 3020A	09/05/97	EPA 6020	09/08/9
Lead	<0.003	0.003	EPA 3020A	09/05/97	EPA 6020	09/08/9
		_				

General Notes

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--: Information not available or not applicable.

Sample Identification: Lab Number: Sample Type: Analyst:	MW-1 001 Water SC		Date Sampled: Date Received:	08/27/97 08/27/97
Analyte	Concentration (mg/L)	LOD (mg/L)	Analytical Method	Date Analyzed
Hexavalent chromium	<0.05 (a)	0.05	EPA 7196	08/28/97
			<i></i>	
	-			
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Sample Identification: Lab Number: Sample Type: Analyst:	MW-2 002 Water SC		Date Sampled: Date Received:	08/27/97 08/27/97
Analyte	Concentration (mg/L)	LOD (mg/L)	Analytical Method	Date Analyzed
Hexavalent chromium	<0.05 (a)	0.05	EPA 7196	08/28/97

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Clayton ENVIRONMENTAL CONSULTANTS

Sample Identification: Lab Number: Sample Type: Analyst:	MW-3 003 Water SC		Date Sampled: Date Received:	08/27/97 08/27/97
Analyte	Concentration (mg/L)	LOD (mg/L)	Analytical Method	Date Analyzed
Hexavalent chromium	<0.005	0.005.	EPA 7196	08/28/97
			;	
·				· .
Sample Identification: Lab Number: Sample Type: Analyst:	MW-4 004 Water SC		Date Sampled: Date Received:	08/27/97 08/27/97
Lab Number: Sample Type:	004 Water	LOD (mg/L)		

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Sample Identification: Lab Number: Sample Type: Analyst:	MW-5 005 Water SC		Date Sampled: Date Received:	08/27/97 08/27/97
Analyte	Concentration (mg/I,)	LOD (mg/L)	Analytical Method	Date Analyzed
Hexavalent chromium	<0.05 (a)	0.05	EPA 7196	08/28/97
			i.	
	· _			
Sample Identification: Lab Number: Sample Type: Analyst:	EB-1 006 Water SC		Date Sampled: Date Received:	08/27/97 08/27/97
Lab Number: Sample Type:	006 Water	LOD (mg/L)	Date Sampled:	08/27/97

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Sample Identification: Lab Number: Sample Type: Analyst:	LAB BLANK 008 Water SC			Date Sampled: Date Received:	· · ·		
Analyte	Concentration (mg/L)		LOD (mg/L)	Analytical Method	Date Analyzed		
Hexavalent chromium	<0.005		0.005	EPA 7196	08/28/97		

(a) Limit of detection raised due to sample matrix. General Notes:

<: Less than the indicated limit of detection (LOD)

--: Information not available or not applicable

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APPENDIX D

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FINAL WASTE REMOVAL MANIFESTS

R-WM-51 REV. 1/91	P. O.	aste Management Box 8550 , PA 17105-8550 .VANIA MANIFEST	FORM	/			Form approved. OMB No. 2050-003 Expires 9-30-91	
UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA II D 0 1 7 4 2 3 3 0		Manifest acument No. 9107	2. Page	is not r	ation in the equired by i equired by 5		
4. Generator's Phone (WINDELER	AN 48183		P	AC 49 Gen. ID	ument Num 1057		
5. Transporter 1 Company Name AUTUMN INDUSTRIES, INC.		6. US EPA ID Number 3 6 9 7 4 7 8		C. State	Trans. ID	1	- A.F.*K.	
7. Transporter 2 Company Name	······································	8. US EPA ID Number	r	D. Transporter's Phone ()				
9. Designated Facility Name and Site Add HORSENEAD RESOURCE DEVEL BAST PLANT, DELAWARE AVE	OPMENT CO.	10. US EPA ID Numbe	er'	PA- F. Tran	sporter's Phon	• *(<u></u>)		
PALMERTON, PA 18071		239588	7	1	Facility's ID	15 826-		
11. US DOT Description (Including Prope	r Shipping Name, Hazard Class,	and ID Number)	12. Conta No.		13. Total Quantit	14. Unit	í. Waste No	
a. RQ HAZARDOUS WASTE SOLID BLECTRIC ARC FURNACE SLD	N.O.S. ORN-E 9189)	b o 1				2000 2000 2000	
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d.	······							
J. Additional Descriptions for Materials Lis Lab Pack Physical State	Lab Pack	Physical State		K, Hand	ling Codes for	Wastes List	ted Above	
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	P. C Harrisbur	Waste Management O. Box 8550 /g, PA 17105-8550 YLVANIA MANIFEST I		· · ·	•	Form appr OMB No. Expires 5-	950-0039
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Dooy 5 - TSD Facility: Maximum Generator

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Obox 3 - Generator: Perain This Obox

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R-WM-51 REV. 1/91	Bureau of Waste Management P. O. Box 8550 Harrisburg, PA 17105-8550 OFFICIAL PENNSYLVANIA MANIFEST	FORM	~		OM	п арргоved. В No. 2050-00; (res 9-30-91
UNIFORM HAZARDOUS WASTE MANIFEST		Manifest ocument No.	2. Page 1 of	is not reau	in in the shad lired by Fede lired by State	ed areas
3. Generator's Name and Malling Address MCLOUTH STEEL - ATTE: D. 1 1650 W. JEFFERSON AVENUE	TREATON, MICHIGAN 48183		B. State Ge			900
4. Generator's Phone (313) 285-1 5. Transporter 1 Company Name	6. US EPA ID Number		C. State Tr	ing in the second s	1389 (* 1997) 	એ કરેલે તથાનું છે. આ ગામના છે. આ ગામના આ ગામના છે.
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HORSENEAD RESOURCE DEVELOP EAST PLANT, DELAWARE AVENU PALMERTON, PA 18071	7 8		G. State Fa			545, TT
11. US DOT Description (Including Proper Ship)	PAD0023958	8 7 12. Conta		13. 22	5 826-2	
a.		No.	Туре	Total Quantity	Unit Wt/Vol	Waste No.
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J. Additional Descriptions for Materials Listed At Lab Pack Physical State	Lab Pack Physical State	<u>.</u> 1943) <u>745</u>	K. Handling	Codes for Wa	stes Listed A	bove 👘 🍝
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BAST PLANT, DELAW	ARE AVENUE			G. State F	scility's ID	and and samples of the
PALNERTON, PA 180	71	PAD002395		H. Facility	's Phone (VS 626-2111
11. US DOT Description (Including	Proper Shipping Name,	Hazard Class, and ID Number)	12. Conta	iners	13. Total	14. Unit Waste
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EMERGENCY RESPONSE						
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	8000					
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	Generator's Phone (313), 285-12						
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7.	AUTUMI INDUSTRIES, INC. Transporter, 2 Company Name	8. US EPA ID Nu	47,89				
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9. 1	Designated Facility Name and Site Address	10. US EPA ID N	umber				
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15.	Special Handling Instructions and Additional Info			<u> </u>			<u></u>
	ENERGENCY, RESPONSE GUIDE NO TRUCK # 40201	•31					
	SCALE TICKET & PG000 7						
	P.O. NUMBER - 11515094						
16.	GENERATOR'S CERTIFICATION I hereby	declare that the contents of this consider	nent are fully and non	urstehr desarit	and above by pr	nor chicolog	nd
	. GENERATOR'S CERTIFICATION: I hereby classified, packed, marked, and labeled and are in all res	pects in proper condition for transport by hig	ghway eccording to ap	plicable interna	itional and national	il government regulati	ions.
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3-WM-51 REV. 1/91	PENNSYLVANIA DEPARTMENT OF ENVIRO Bureau of Waste Manage P. O. Box 8550 Harrisburg, PA 17105-8 OFFICIAL PENNSYLVANIA MAN	ment e *	V	AND CHEMOTHER	Form approved OMB No. 2050- Expires 9-30-91
UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. I I D O 1 7 4 2 3 3 0 4	Manifest Document No. C & 9222	2. Page 1	is not regul	In the shaded areas
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Kab Industrial. sta 7. Transporter 2 Company Name	VICES, INC. NIBO727 8. US EPA ID	is .		and a free way a good a down it is in the way a good of	
9. Designated Facility Name and Site HORSENEAD RESOURCE HAST PLANT, DELAW PALMERTON, PA 1807	BEARLOPHERT CO.	Number 9 5 8 8 7	Gislaist	CUNYAID S	
11. US DOT Description (Including P a.	roper Shipping Name, Hazard Class, and ID Numbe	r) 12. Cont No.		13. Total Quantity	14. Unit WI/Val
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20. Facility Owner or Operator: Cer Printed/Typer Name	tillication of receipt of hazardous materials covered	G/30/4/ by this manifest exce	ppt as noted in	llem 19.	MOMTH DAX XE
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UNIFORM HAZARDOL	JS 1. Generator's	US EPA ID No.	Manifest Document No.	2. Page	i Informatic	Expires 9-30	
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4. Generator's Phone 113	/FHUR TRENTON, NI)285-1200	CHIGAN 48183				in in a marine the start of the	
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20. Eacility Owner or Operator: C Pfinted/Toron Mame	OCHA	Signature	2 K			TON HEROT	

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16. GENERATOR'S CERTIFIC, classified, packed, marked, and label	ATION: I hereby declare that the ed and are in all respects in proper	a contents of this consignment condition for transport by highway	are fully and acc ay according to ap	urately desi plicable inte	cribed above by prop criational and national	er shipping name a government regulati	nd are
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16. GENERATOR'S CERTIFIC	ATION: I hereby declare that the con led and are in all respects in proper condit	tents of this consignment a	are fully and acc	curately dr	escribed above by pr	oper shipping nar	ne and a
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ER-WM-51 REV. 1/91	OFFICIAL	larrisburg, PA 17105-85 PENNSYLVANIA MANI	50 FEST 5			14 A. A.	-	OMB No. 2050-003
UNIFORM HAZARDO	OUS 1. Generator	BUS EPA ID No.		Mentfest	2. Pa	ne 1 Informeti		Expires 9-30-91 haded areas
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16. GENERATOR'S CERTI	FICATION: I hereby declare that labeled and are in all respects in proj	the contents of this consider		A.(0	<u> </u>			
classified, packed, marked, and	labeled and are in all respects in pro	per condition for transport by h	ighway ac	cording to app	licable int	cribed above by pr ernational and nation	oper shippin nal governme	g name and are nt regulations.
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Printed/Typed Name	: Certification of receipt of haza	dous materials covered by	this mai	nifest except	as noted	in Item 19.	方也	my -
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EPA Form 8700-22 (Rev. 9/88) Previous			\sim	-1 7		. <u></u>	14	11 1
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	P. O. Box 8550 Harrisburg, PA 17105-8		\checkmark		Form approved. OMB No. 2050-0
1-WM-51 REV. 1/91	OFFICIAL PENNSYLVANIA MAN	VIFEST FORM		· · · · · · · · · · · · · · · · · · ·	Expires 9-30-91
UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. LD 0 1 7 4 2 3 3 0 4	Document No.	2. Page 1	i is not requir	in the shaded areas ed by Federal law ed by State law.
3. Generator's Name and Mailing Address CLOUTH STREE - ATTH: D.	TIDELER		Maria - F. H.	serie waar anger ee ye. Self-t	
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18. Transporter 2 Acknowledgement of Receipt o Printed/Typed Name	- I Materials	Signature Signature	<u> </u>	<u></u>	L	NONTH DAY	YEAR // YEAR
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20. Facility Owner or Operator: Certific Printed Typed Name	ation of receipt of hazardo	us materials covered by Signature	/ this manifest exce	pt as noted	in Item 19.	NONTH RAY	ПЕАВ

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WM-51 REV. 1/91	OFFICIAL PENNSYL	VANIA MANIFEST	ORM	<u> </u>		Expires 8-3	0-91
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4. Generator's Phone (313)	285-1200				en (Dec.Brie en Decementes)	na alla deservations Reliablications avail	es el se Estor D
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PALMERTON, PA 18071	P A, D (0023958			e Phone (Ser	les interesses	A Dist.
11. US DOT Description (Including Pro	per Shipping Name, Hazard Class,	and ID Number)	12. Contain No.	ners Type	13. Total Quantity	14. Unit Wt/Vol	ite No.
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ER	-WM-51 REV. 1/91		CIAL PENNS	YLVANIA MANI	EST FORM			OMB No. 2050-003 Expires 9-30-91
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3. Generator's Name and Mailing Addre					but is require	d by State It	W. 1828-1832-22
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	Bureau of Waste Manage P. O. Box 8550	ement	1		Form approved.
	Harrisburg, PA 17105-8			,	OMB No. 2050-0039
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16. GENERATOR'S CERTIFICATION: 1 heret classified, packed, marked, and labeled and are in all n	y declare that the contents of this con	nsignment are fully and a	courately descri	ibed above by prop	er shipping name and are
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P. O. Bos 650 Harrisburg, PA 17105-8550 OFFICIAL PENNSYLVANIA MANIFEST FORM UNIFORM HAZARDOUS 1. Generator's US EPA ID No. WASTE MANIFEST MTD 0, 1, 7 Å 2 3 3 0 Å 3. Generator's Name and Mailing Address MCLOUTH STEEL - ATTN': D. Wind DEIER MCLOUTH STEEL - ATTN': D. WIND - C. Steel TON': D. STEEL - M. Steel Frank DEIER MCLOUTH STEEL - MCLOUTH STEEL - MCLOUTH WIND - C. STEEL - M. MINER - Total Wind Wind Steel ALENNER MCLOUTH STEEL - MCLOUTH STEEL - MCLOUTH WIND - C. STEEL - MCLOUTH WIND - MCLOUTH WIND - MCLOUTH WIND - MCLOUTH WIND - MCLOUTH WIND - MCLOUTH WIND - MCLOUTH WIND - MCLOUTH WIND - MCLOUTH WIND - MCLOUTH WIND - MCLOUTH WIND - MCLOUTH WIND - MCLOUTH WIN	-0039	
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SCALE TICKET # PC0022		
P.O. # HSX 5094		
16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and a classified, packed, marked, and labeled and are in all respects in proper condition for transport by highway according to applicable international and national government regulations	re	
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economical practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human heal and the environment; OR , if I am a small quantity generator. I have made a good faith effort to minimize my waste generation and select the best waste management method that <u>available to me and that I can afford</u>	y h .s	
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17. Transporter 1 Acknowledgement of Receipt of Materials	- A	
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20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.	_	
Signature B MONTH DAY (E)	R	
PA Form 8700-22 (Rev. 9/88) Previous editions are obsolete		

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20. Facility Owner or Operator: Certifi Printed Ayped Name	ication of receipt of hazardous ma	Ierials covered by this Signature	manifest excep	t as noted in	ltem 19.		YEAR

ER-WM-51 REV. 1/91	. E	PARTMENT OF ENVIRO Bureau of Waste Manâge P. O. Box 8550 Harrisburg, PA 17105-8 L PENNSYLVANIA MAN	nent 50	JACES	FOR SHIPMEN AND CHEMOTH	OF HAZARDOUS, INFE IERAPEUTIC WASTE. Form epp OMB No. Expires 9-	roved. 2050-0039
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SCALE TICKET #							
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16. GENERATOR'S CERTIFI classified, packed, marked, and la	CATION: hereby declare	that the contents of this consid	nment are fully and a	curately de	scribed above by n	roper shinning name a	and are
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CFA Form 8700-22 (Rev. 9/88) Previous editions are obsolete

Copy 5 - TSD Facility: Mail to Generator

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APPENDIX E

LABORATORY ANALYSIS REPORTS - TECHNA BACKGROUND ASSESSMENT



Fire & Environmental Consulting Laboratories, Inc.

One East Complex 1451 East Lansing Drive, Suite 222 East Lansing, MI 48823 Phone (517) 332-0167 Fax (517) 332-6333

August 12, 1997

Attention: Mr. James Harless

Techna Corporation 44808 Helm Street Plymouth, MI 48170-6026

Analytical Laboratory Report

FECL #(s): AA49652-AA49660

Project: 000738-09A-001 Samples collected by: UNKNOWN Date/Time Submitted: 07/30/97 08:00 PO #: Verbal

FECL #: AA49652 Tag: TBG-A Date/Time Collected: 07/28/97 08:22 Matrix: Soil Container(s): 2-Glass Preservation: Refrigeration/None

FECL #: AA49653 Tag: TBG-B (0-1) Date/Time Collected: 07/28/97 08:35 Matrix: Soil Container(s): 2-Glass Preservation: Refrigeration/None

FECL #: AA49654 Tag: TBG-B (2-3) Date/Time Collected: 07/28/97 08:40 Matrix: Soil Container(s): 2-Glass Preservation: Refrigeration/None



FECL #: AA49655

Tag: TBG-C Date/Time Collected: 07/28/97 08:55 Matrix: Soil Container(s): 2-Glass Preservation: Refrigeration/None

FECL #: AA49656

Tag: TBG-D (1-2) Date/Time Collected: 07/28/97 09:07 Matrix: Soil Container(s): 2-Glass Preservation: Refrigeration/None

FECL #: AA49657

Tag: TBG-D (3-4) Date/Time Collected: 07/28/97 09:17 Matrix: Soil Container(s): 2-Glass Preservation: Refrigeration/None

FECL #: AA49658

Tag: TTest Pile A Date/Time Collected: 07/28/97 07:06 Matrix: Soil Container(s): 2-Glass Preservation: Refrigeration/None

FECL #: AA49659

Tag: TTest Pile B Date/Time Collected: 07/28/97 07:10 Matrix: Soil Container(s): 2-Glass Preservation: Refrigeration/None

FECL #: AA49660 Tag: TBG-H Date/Time Collected: 07/28/97 07:18 Matrix: Soil Container(s): 2-Glass Preservation: Refrigeration/None



FECL #: AA49652 Tag: TBG-A Date/Time Collected: 07/28/97 08:22 Matrix: Soil

	Analysis	Results	Units	MRL	Method	Analyst	Date Run
	Inorganics Total Solids	94.4	%	1	160.3	ΙM	08/08/97
	<i>Metals</i> Cadmium Chromium	0. 82 561	mg/kg mg/kg	0.05 1.0	6020 6020	P R P R	08/06/97 08/06/97
	Lead	41.3	mg/kg	1.0	6020	P R	08/06/97
× .	FECL #: AA49653 Tag: TBG-B (0-1) Date/Time Collected: 07/28 Matrix: Soil	8/97 08:35	. "				
:	Analysis	Results	Units	MRL	Method	Analyst	Date Run
	<i>Inorganics</i> Total Solids	91.7	%	1	160.3	ΙM	08/08/97
	<i>Metals</i> Cadmium Chromium Lead	1.83 200 191	mg/kg mg/kg mg/kg	0.05 1.0 1.0	6020 6020 6020	P R P R P R	08/06/97 08/06/97 08/06/97
•	FECL #: AA49654 Tag: TBG-B (2-3) Date/Time Collected: 07/28 Matrix: Soil	/97 08:40					

Analysis	Results	Units	MRL	Method	Analyst	Date Run
<i>Inorganics</i> Total Solids	93.3	%	1	160.3	ΙM	08/08/97

FECL #: AA49654 (Continued) Tag: TBG-B (2-3) Date/Time Collected: 07/28/97 08:40 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
<i>Metals</i> Cadmium Chromium Lead	1.38 197 96.6	mg/kg mg/kg mg/kg	0.05 1.0 1.0	6020 6020 6020	P R P R P R	08/06/97 08/06/97 08/06/97

FECL #: AA49655 Tag: TBG-C Date/Time Collected: 07/28/97 08:55 Matrix: Soil

·	Analysis	Results	Units	MRL	Method	Analyst	Date Run
	Inorganics Total Solids	90.0	%	1	160.3	IM	08/08/97
. ((<i>Metals</i> Cadmium Chromium Lead	5.00 429 406	mg/kg mg/kg mg/kg	0.05 1.0 1.0	6020 6020 6020	P R P R P R	08/06/97 08/06/97 08/06/97

FECL #: AA49656 Tag: TBG-D (1-2) Date/Time Collected: 07/28/97 09:07

Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Inorganics Total Solids	91.2	%	1	160,3	ΙM	08/08/97
<i>Metals</i> Cadmium Chromium Lead	1.42 488 . 273	mg/kg mg/kg mg/kg	0.05 1.0 1.0	6020 6020 6020	P R P R P R	08/06/97 08/06/97 08/06/97



FECL #: AA49657 Tag: TBG-D (3-4) Date/Time Collected: 07/28/97 09:17 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Inorganics Total Solids	87.3	%	1	160.3	ΙM	08/08/97
 <i>Metals</i> Cadmium Chromium Lead	1.58 39.1 73.1	mg/kg mg/kg mg/kg	0.05 1.0 1.0	6020 6020 6020	P R P R P R	08/06/97 08/06/97 08/06/97

FECL #: AA49658 Tag: TTest Pile A Date/Time Collected: 07/28/97 07:06 Matrix: Soil

	Analysis	Results	Units	MRL	Method	Analyst	Date Run
Concernance of the second	<i>Inorganics</i> Total Solids	97. 8	%	1	160.3	ΙM	08/08/97
Alternative Second and a second	Metals Arsenic Barium Cadmium Chromium Copper Lead Mercury Selenium Silver Zinc	6.93 69.7 0.30 31.9 63.0 24.5 Not detected Not detected 0.33 90.7	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg	$\begin{array}{c} 0.50 \\ 1.0 \\ 0.05 \\ 1.0 \\ 1.0 \\ 1.0 \\ 0.10 \\ 0.50 \\ 0.20 \\ 1.0 \end{array}$	6020 6020 6020 6020 6020 7471 6020 6020 6020	PR PR PR PR PR PR PR PR PR	08/09/97 08/09/97 08/09/97 08/09/97 08/09/97 08/09/97 08/09/97 08/09/97 08/09/97
No. Supplementation	Arsenic Barium Cadmium Chromium Copper	0.011 1.45 Not detected 0.01 0.06	mg/L mg/L mg/L mg/L mg/L	0.001 0.01 0.0002 0.01 0.01	200.8 200.8 200.8 200.8 200.8	PR PR PR PR PR	08/09/97 08/09/97 08/09/97 08/09/97 08/09/97



FECL #: AA49658 (Continued) Tag: TTest Pile A Date/Time Collected: 07/28/97 07:06 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Metals (Continued) Lead Mercury Selenium Silver Zinc	Not detected Not detected Not detected Not detected 0.76	mg/L mg/L mg/L mg/L mg/L	0.003 0.0002 0.005 0.0005 0.01	200.8 245.1 200.8 200.8 200.8	PR EB PR PR PR PR	08/09/97 08/11/97 08/09/97 08/09/97 08/09/97
TCLP Extraction % Solids Sample used g Final Volume ml Final Extract pH	100 100 2,000 6.61			1311 1311 1311 1311 1311	I M I M I M I M	08/06/97 08/06/97 08/06/97 08/06/97

FECL #: AA49659 Tag: TTest Pile B

Date/Time Collected: 07/28/97 07:10 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
<i>Inorganics</i> Total Solids <i>Metals</i>	96.6	%	1	160.3	IM	08/08/97
Arsenic Barium Cadmium Chromium Copper Lead Mercury Mercury Selenium Silver	5.38 37.7 0.58 189 43.5 62.5 Not detected Not detected Not detected 0.83	mg/kg mg/kg mg/kg mg/kg mg/kg mg/kg mg/L mg/kg mg/kg	$\begin{array}{c} 0.50 \\ 1.0 \\ 0.05 \\ 1.0 \\ 1.0 \\ 1.0 \\ 0.10 \\ 0.0002 \\ 0.50 \\ 0.20 \end{array}$	6020 6020 6020 6020 6020 6020 7471 245.1 6020 6020	PR PR PR PR PR EB PR PR PR	08/09/97 08/09/97 08/09/97 08/09/97 08/09/97 08/09/97 08/11/97 08/11/97 08/09/97



Analytical Laboratory Report Techna Corporation August 12, 1997

FECL #: AA49659 (Continued) Tag: TTest Pile B Date/Time Collected: 07/28/97 07:10 **Matrix: Soil**

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Metals (Continued)						
Zinc	877	mg/kg	1.0	6020	P R	08/09/97
Arsenic	0.008	mg/L	0.001	200.8	P R	08/00/07
Barium	1.24	mg/L	0.01	200.8	P R P R	08/09/97 08/09/97
Cadmium	Not detected	mg/L	0.0002	200.8	P R	08/09/97
Chromium	0.02	mg/L	0.01	200.8	P R	08/09/97
Copper	Not detected	mg/L	0.01	200.8	P R	08/09/97
Lead	Not detected	mg/L	0.003	200.8	P R	08/09/97
Selenium	Not detected	mg/L	0.005	200.8	PR	08/09/97
Silver	Not detected	mg/L	0.0005	200.8	P R	08/09/97
Zinc	4.82	mg/L	0.01	200.8	PR	08/09/97
TCLP Extraction						
% Solids	100			1311	ΙM	08/06/97
Sample used g	100			1311	ĪM	08/06/97
Final Volume ml	2,000			1311	IM	08/06/97
Final Extract pH	6.30			1311	ΙM	08/06/97
FECL #: AA49660 Tag: TBG-H Date/Time Collected: 07/2 Matrix: Soil	8/97 07:18					
Analysis	Results	Units	MRL	Method	Analyst	Date Run
Inorganics Total Solids	93.1	%	I	160.3	ΙM	08/08/97
<i>Metals</i> Cadmium Chromium	Not detected 906	mg/kg mg/kg	0.05 1.0	6020 6020	P R P R	08/06/97 08/06/97



Note: Methods may be modified for improved performance. Results reported on a dry weight basis, where applicable. Results relate only to items tested. Report shall not be reproduced except in full, without the written approval of FECL.

Violetta F. Murshah

Violetta F. Murshak Laboratory Director

		ГЕСлим 44808 Plymouth,	TECTINA CORFORATION 44808 Helm Street Plymouth, MI 48170-6026	N 9				Telephone Numbers: (313) 454-1100 (313) 454-1233 (FAX)	
		CHAIN (CHAIN OF CUSTODY					Parameters	
Send report to: SPINES HARLESS TELAWA CORP	Project: 00738-09A 001	-094	Lab: FELL		Due Date:			d d	
Sample ID	Date	Time	Grab(G)/ Composite(C)	# Containers	Matrix*	Preservative**	ТЧ <u>д7d5</u> 9Ч 9Ч 1 ХЧ	1 ZW 771	
V BG-A	7/28/97	8:22	ড	ત	S	6	,		4 91.57
(1-0)		8:35		2			2		49,53
489-8(2-3)		8:40				- 	70		20154
UBG-C		B :55		7			ス		25760
V 8 G - D(1-2)		4:0%		-			Х		1/9651
1)BG-DC3-4)		七は					×		1 2761
V TEST PILE-A		30:E	الإمراد				× ₩ X	1 war	1000
V TEST PZUG-B	•	9:10		-		₽	x man 2	i wos	62/6/
ACTER DE ALANA	4			K	- ZA				
1B 9-H	th/52/-CN	81.E	S.	4	V	. 4	X		99660
Collected by:		6	Date: 7/45/92	Time: 9 ' 30					
Relinquished by:	- Car		Dar Ask / C	Time: V. D	Received by	Techa	Surge	Date 7/28/7 7	Time: / 8, "0
Relinquished by A	- ne		Date:7/24/97	Time:/652	Received by:	Is and	mult	Date: 7/29/97	Time: 1650
Relinquished by:			Date:	Time:	Received by:			Date:	Time: }
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Remarks: ALT 451, PA NUTE: PLE	PLEASE 101	RUN	5/48.5124 5/48.5124	1965 and P	ر ۱۹۲۰ × ۱۹۷	54725			
(6) Indicate Preservative Used: 2 °C	2.0	والمحاوية والمحاولة المحاولة					x	:	
*Matrix: S=Solid **Preservatives: (1) H ₂ SO ₄ to pH<2		L=Liquid (2) ION NaOH to pH ≥12		W=Water (3) HNO ₃ to pH <	5	GW=Groundwater (4) 1:1 HCI	SL=Sludge (5) Zinc Acetate		O=Other cocrom.ic

	CHAIN C					-		(313) 454-1233 (FAX)	
		CHAIN OF CUSTODY			-			Parameters	
	Project: 00738-09A 001	Lab: FELL		Due Date: $\zeta / t /$	Las	043 Sunzu Sunzu	01 01 3	45401 dT	
	te Time	Grab(G)/ Composite(C)	# Containers	Matrix* Pr	Preservative**	WI I	IW Ards	241 71	
	43 8:22	હ	7	S	ę	ĸ			
1 CL010 6047	8:35		וי			と			
134-8 (2-3)	8:40		1			ک			
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C2-170-98	4:016					ょ			
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TB G- H + + 75/12	81.E #/	د (4	S	٣	メ			
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Relinquished by:		Date:	Time:	Received by Lab	<u>ە:</u>			Date:	Time:
Relinquished by Lab:	[Received by:				Date:	Time:
Remarks: ALT 451, PART201 NUTE: PLEASE	KUN	5/45.512427	SAMPLC SAAP	LAN KEN	5470	1			
(6) Indicate Preservative Used: 2°C									-
	L=Liquid		W = Water	GW = Groundwater		SL=Sludge		WW= Wastewater	0 ≖ Other
•*Preservatives: (1) H _: SO, to pH<2	(2) 10N NaOH to pH ≥ 12		(3) HNO, to pH <	<2 (4) I:1 HCI		(5) Zinc Acetate	state	(6) See Remarks	COCIe



Fire & Environmental Consulting Laboratories, Inc.

One East Complex 1451 East Lansing Drive, Suite 222 East Lansing, MI 48823 Phone (517) 332-0167 Fax (517) 332-6333

August 06, 1997

Attention: Mr. James Harless

Techna Corporation 44808 Helm Street Plymouth, MI 48170-6026

Analytical Laboratory Report

FECL #(s): AA49566-AA49575

Project: 00738-09A-003 Samples collected by: UNKNOWN Date/Time Submitted: 07/29/97 08:00 PO #: Verbal

FECL #: AA49566 Tag: TTrip Blank Date/Time Collected: 07/24/97 17:15 Matrix: Liquid Container(s): 2-40 mL VOA Preservation: Refrigeration/HCl

FECL #: AA49567 Tag: TB11-A Date/Time Collected: 07/25/97 17:45 Matrix: Soil Container(s): 2-4 oz Glass Preservation: Refrigeration/None

FECL #: AA49568 Tag: TB11-B Date/Time Collected: 07/25/97 07:50 Matrix: Soil Container(s): 2-4 oz Glass Preservation: Refrigeration/None



FECL #: AA49569 Tag: TB11-C Date/Time Collected: 07/25/97 08:00 Matrix: Soil Container(s): 2-4 oz Glass Preservation: Refrigeration/None

FECL #: AA49570 Tag: TB11-D Date/Time Collected: 07/25/97 08:10 Matrix: Soil Container(s): 2-4 oz Glass Preservation: Refrigeration/None

FECL #: AA49571 Tag: TDup Date/Time Collected: 07/25/97 Matrix: Soil Container(s): 2-4 oz Glass Preservation: Refrigeration/None

FECL #: AA49572 Tag: TBG-G Date/Time Collected: 07/25/97 15:18 Matrix: Soil Container(s): 2-4 oz Glass Preservation: Refrigeration/None

FECL #: AA49573 Tag: TBG-F Date/Time Collected: 07/25/97 15:30 Matrix: Soil Container(s): 2-4 oz Glass Preservation: Refrigeration/None

FECL #: AA49574 Tag: TBG-E (1-2) Date/Time Collected: 07/25/97 16:15 Matrix: Soil Container(s): 2-4 oz Glass Preservation: Refrigeration/None

		TECHNA C			e e e e e e e e e e e e e e e e e e e			12/00/09/2004 11/1/10/04		The second
	Ply	44808 Hel Plymouth, MI	Helm Street MI 48170-6026	26		-		Ū	Telephone Numbers: (313) 454-1100 (313) 454-1233 (FAX)	
	C	HAIN O	CHAIN OF CUSTODY	24					Parameters	
Send report to:	Project:		I ah.							
HARLESS	007.39	-860-	FECL	L L	Due Date:	an lan				
TECHNA CURP	500				840	へとし、そ				·····
book Sample ID	L	Time	Grab(G)/ Composite(C)	# Containers	Matrix*	Preservative**	1488 201	2000 2000 2000 2000 2000		
TTRZPBLANKI 344/97		13:15	৫	2	3	4 2 206	ĸ			
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* 7B11-B /		9:50				-	+			
*TB1-C V	00	8:00					+			
* 7B/1-D V	60	3.10					-{			
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184-5 (3-7)	91 →	16:21	₽	-	->	Ð		2		
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Relinquished by:			11	<u>982 - 5</u>	Keceived by:	1 Sanh	Muss	hal	Date: 7/28/9	7 Time: 7 ! 3 g
Relinquished by:		ă c	Dale:		Received by:			,	Date:	Time:
Relinquiched hvv-					Received by:				Date;	Time:
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ed by Lab:		Date:		Time:	Received by:				Dote:	
Remarks: #47 451 L	ZWII	NOS 60		1.56		201 LZM	SEX			Time:
			ws.		DY XEL	סוצע	*	ン はてん	KANPLE C BU-	2-118 Z
(6) Indicate Preservative Used:	4°C + A	HCI SUV	1226	BLANK			ŧ		λ. Α	+ pasarats
*Matrix: S=Solid				W = Water	GW = Groundwater		SL = Sludge		WW - Waterunter	
7> 11d 01 Poctu (1)		(∠) 10N NaOH to pH ≥ 12		(3) HNO, to pH <2	(4) 1:1 H		(5) Zinc Acetate	Ite	n n = wasiewater (6) See Remarks	0=0ther coctom. e



FECL #: AA49575 Tag: TBG-E (3-4) Date/Time Collected: 07/25/97 16:25 Matrix: Soil Container(s): 1-4 oz Glass Preservation: Refrigeration/None



FECL #: AA49566 Tag: TTrip Blank Date/Time Collected: 07/24/97 17:15 Matrix: Liquid

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Organics						
Volatile Organics						
Benzene	Not detected	mg/L	0.001	8260	VFM	07/31/97
Bromodichloromethane	Not detected	mg/L	0.001	8260	VFM	07/31/97
Bromoform	Not detected	mg/L	0.001	8260	VFM	07/31/9 7
Bromomethane	Not detected	mg/L	0.001	8260	VFM	07/31/97
Carbon tetrachloride	Not detected	mg/L	0,001	8260	VFM	07/31/97
Chlorobenzene	Not detected	mg/L	0.001	8260	VFM	07/31/97
Chloroethane	Not detected	mg/L	0,001	8260	VFM	07/31/97
2-Chloroethylvinyl ether	Not detected	mg/L	0.001	8260	VFM	07/31/97
Chloroform	Not detected	mg/L	0.001	8260	VFM	07/31/97
Chloromethane	Not detected	mg/L	0.001	8260	VFM	07/31/97
Dibromochloromethane	Not detected	mg/L	0.001	8260	VFM	07/31/97
1,2-Dichlorobenzene	Not detected	mg/L	0.001	8260	VFM	07/31/97
1,3-Dichlorobenzene	Not detected	mg/L	0.001	8260	VFM	07/31/97
1,4-Dichlorobenzene	Not detected	mg/L	0.001	8260	VFM	07/31/97
1,1-Dichloroethane	Not detected	mg/L	0.001	8260	VFM	07/31/97
1,2-Dichloroethane	Not detected	mg/L	0.001	8260	VFM	07/31/97-
1,1-Dichloroethene	Not detected	mg/L	0.001	8260	VFM	07/31/97
cis-1,2-Dichloroethene	Not detected	mg/L	0.001	8260	VFM	07/31/97
trans-1,2-Dichloroethene	Not detected	mg/L	0.001	8260	VFM	07/31/97 -
1,2-Dichloropropane	Not detected	mg/L	0.001	8260	VFM	07/31/97
cis-1,3-Dichloropropene	Not detected	mg/L	0.001	8260	VFM	07/31/97
trans-1,3-Dichloropropene	Not detected	mg/L	0.001	8260	VFM	07/31/97
Ethylbenzene	Not detected	mg/L	0.001	8260	VFM	07/31/97
Methylene Chloride	Not detected	mg/L	0.001	8260	VFM	07/31/97
Styrene	Not detected	mg/L	0.001	8260	VFM	07/31/97
1,1,2,2-Tetrachloroethane	Not detected	mg/L	0.001	8260	VFM	07/31/97
Tetrachloroethene	Not detected	mg/L	0.001	8260	VFM	07/31/97
Toluene	Not detected	mg/L	0.001	8260	VFM	07/31/97
1,1,1-Trichloroethane	Not detected	mg/L	0.001	8260	VFM	07/31/97
1,1,2-Trichloroethane	Not detected	mg/L	0.001	8260	VFM	07/31/97
Trichloroethene	Not detected	mg/L	0.001	8260	VFM	07/31/97
Trichlorofluoromethane	Not detected	mg/L	0.001	8260	VFM	07/31/97
Vinyl Chloride	Not detected	mg/L	0.001	8260	VFM	07/31/97
p,m-Xylene	Not detected	mg/L	0.001	8260	VFM	07/31/97
o-Xylene	Not detected	mg/L	0.001	8260	VFM	07/31/97



FECL #: AA49566 (Continued) Tag: TTrip Blank Date/Time Collected: 07/24/97 17:15 Matrix: Liquid

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Organics (Continued)						
Volatile Organics (Continu						
Acetone	Not detected	mg/L	0.05	8260	VFM	07/31/97
2-Butanone	Not detected	mg/L	0.05	8260	VFM	07/31/97
Carbon disulfide	Not detected	mg/L	0.05	8260	VFM	07/31/97
2-Hexanone	Not detected	mg/L	0.05	8260	VFM	07/31/97
4-Methyl-2-pentanone	Not detected	mg/L	0.05	8260	VFM	07/31/97
FECL #: AA49567						
Tag: TB11-A						
Date/Time Collected: 07/25	5/97 17:45					
Matrix: Soil						
Analysis	Results	Units	MRL	Method	Analyst	Date Run
Inorganics						
Total Solids	89.1	%	1	160.3	ЛН	08/01/97
Organics						
PNA Extraction	Completed				JKB	07/31/97
GC/MS for Volatile Organi	CS					
Benzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Bromobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Bromochloromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Bromodichloromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Bromoform	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Bromomethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
n-Butylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
sec-Butylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
tert-Butylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Carbon tetrachloride	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Chlorobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Chloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Chloroform	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Chloromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97

FECL #: AA49567 (Continued) Tag: TB11-A Date/Time Collected: 07/25/97 17:45 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Organics (Continued)						
GC/MS for Volatile Organics (Continued)					
2-Chlorotoluene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
4-Chlorotoluene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Dibromochloromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2-Dibromo-3-chloropropane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2-Dibromoethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Dibromomethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2-Dichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,3-Dichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,4-Dichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Dichlorodifluoromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1-Dichloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2-Dichloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1-Dichloroethene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
cis-1,2-Dichloroethene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
trans-1,2-Dichloroethene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2-Dichloropropane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,3-Dichloropropane	Not detected	mg/kg	0.01	82 60	VFM	07/31/97
2,2-Dichloropropane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1-Dichloropropene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Ethylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Hexachlorobutadiene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Isopropylbenzene	Not detected	mg/kg	0.01	82 60	VFM	07/31/97
p-Isopropyltoluene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Methylene chloride	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Naphthalene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
n-Propylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Styrene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1,1,2-Tetrachloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1,2,2-Tetrachloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Tetrachloroethene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Toluene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2,3-Trichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2,4-Trichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1,1-Trichloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1,2-Trichloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97



FECL #: AA49567 (Continued) Tag: TB11-A Date/Time Collected: 07/25/97 17:45 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Organics (Continued)						
GC/MS for Volatile Organic	s (Continued)					
Trichloroethene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Trichlorofluoromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2,3-Trichloropropane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2,4-Trimethylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,3,5-Trimethylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Vinyl chloride	Not detected	mg/kg	0.01	8260	VFM	07/31/97
o-Xylene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
p,m-Xylene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
cis-1,3-Dichloropropene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Polynuclear Aromatics						
Acenaphthene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Acenaphthylene	Not detected	mg/kg	0.33	8270	ЛВ	08/01/97
Anthracene	Not detected	mg/kg	0.33	8270	ЛВ	08/01/97
Benzo(a)anthracene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Benzo(a)pyrene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Benzo(b)fluoranthene	Not detected	mg/kg	0.33	8270	ЈВ	08/01/97
Benzo(k)fluoranthene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Benzo(ghi)perylene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Chrysene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Dibenzo(ah)anthracene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Fluoranthene	Not detected	mg/kg	0.33	8270	ЛВ	08/01/97
Fluorene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Indeno(1,2,3-cd)pyrene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Naphthalene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Phenanthrene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Pyrene	Not detected	mg/kg	0.33	8270	JB	08/01/97
2-Methylnaphthalene	Not detected	mg/kg	0.33	8270	JB	08/01/97



FECL #: AA49568 Tag: TB11-B Date/Time Collected: 07/25/97 07:50 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Inorganics				,		
Total Solids	81.9	%	1	160.3	ЛН	08/01/97
Organics						
PNA Extraction	Completed				JKB	07/31/97
GC/MS for Volatile Organics						
Benzene	Not detected	mg/kg	* 0,1	8260	VFM	08/02/97
Bromobenzene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Bromochloromethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Bromodichloromethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Bromoform	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Bromomethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
n-Butylbenzene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
sec-Butylbenzene	0.6	mg/kg	* 0.1	82 60	VFM	08/02/97
tert-Butylbenzene	0.2	mg/kg	* 0.1	8260	VFM	08/02/97
Carbon tetrachloride	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Chlorobenzene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Chloroethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Chloroform	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Chloromethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
2-Chlorotoluene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
4-Chlorotoluene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Dibromochloromethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,2-Dibromo-3-chloropropane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,2-Dibromoethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Dibromomethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,2-Dichlorobenzene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,3-Dichlorobenzene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,4-Dichlorobenzene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Dichlorodifluoromethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,1-Dichloroethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,2-Dichloroethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,1-Dichloroethene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
cis-1,2-Dichloroethene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
trans-1,2-Dichloroethene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,2-Dichloropropane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
* Higher detection limits due to i					A T. IAT	00/02/2/

* Higher detection limits due to matrix interference and/or high target concentrations.



FECL #: AA49568 (Continued) Tag: TB11-B Date/Time Collected: 07/25/97 07:50 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Organics (Continued)						
GČ/MS for Volatile Organic	s (Continued)					
1,3-Dichloropropane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
2,2-Dichloropropane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,1-Dichloropropene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Ethylbenzene	0.3	mg/kg	* 0.1	8260	VFM	08/02/97
Hexachlorobutadiene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Isopropylbenzene	Not detected	mg/kg	* 0,1	8260	VFM	08/02/97
p-Isopropyltoluene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Methylene chloride	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Naphthalene	0.1	mg/kg	* 0.1	8260	VFM	08/02/97
n-Propylbenzene	1.3	mg/kg	* 0,1	8260	VFM	08/02/97
Styrene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,1,1,2-Tetrachloroethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,1,2,2-Tetrachloroethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Tetrachloroethene	0.2	mg/kg	* 0.1	8260	VFM	08/02/97
Toluene	0.2	mg/kg	* 0,1	8260	VFM	08/02/97
1,2,3-Trichlorobenzene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,2,4-Trichlorobenzene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,1,1-Trichloroethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,1,2-Trichloroethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Trichloroethene	Not detected	mg/kg	* 0,1	8260	VFM	08/02/97
Trichlorofluoromethane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,2,3-Trichloropropane	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
1,2,4-Trimethylbenzene	1.7	mg/kg	* 0.1	8260	VFM	08/02/97
1,3,5-Trimethylbenzene	1.3	mg/kg	* 0.1	8260	VFM	08/02/97
Vinyl chloride	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
o-Xylene	0.4	mg/kg	* 0.1	8260	VFM	08/02/97
p,m-Xylene	1.0	mg/kg	* 0.1	8260	VFM	08/02/97
cis-1,3-Dichloropropene	Not detected	mg/kg	* 0.1	8260	VFM	08/02/97
Polynuclear Aromatics						
Acenaphthene	Not detected	mg/kg	0.33	8270	ЛВ	08/01/97
Acenaphthylene	Not detected	mg/kg	0.33	8270 8270	JB JB	
Anthracene	Not detected	mg/kg	0.33	8270 8270	јВ JB	08/01/97
Benzo(a)anthracene	0,59	mg/kg	0.33	8270 8270		08/01/97
Benzo(a)pyrene	0.47	mg/kg	0.33	8270 8270	JB D	08/01/97
* Higher detection limits due to		mg/Kg	V,JJ	02/U	Љ	08/01/97

* Higher detection limits due to matrix interference and/or high target concentrations.



FECL #: AA49568 (Continued) Tag: TB11-B Date/Time Collected: 07/25/97 07:50 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Organics (Continued)						
Polynuclear Aromatics (Con	ntinued)					
Benzo(b)fluoranthene	0.42	mg/kg	0.33	8270	ЛВ	08/01/97
Benzo(k)fluoranthene	0.42	mg/kg	0.33	8270	JB	08/01/97
Benzo(ghi)perylene	Not detected	mg/kg	0.33	8270	JВ	08/01/97
Chrysene	0.92	mg/kg	0.33	8270	ЛВ	08/01/97
Dibenzo(ah)anthracene	Not detected	mg/kg	0.33	8270	ЛВ	08/01/97
Fluoranthene	0.83	mg/kg	0.33	8270	JВ	08/01/97
Fluorene	0.55	mg/kg	0.33	8270	JB	08/01/97
Indeno(1,2,3-cd)pyrene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Naphthalene	0.99	mg/kg	0.33	8270	JB	08/01/97
Phenanthrene	1.67	mg/kg	0.33	8270	JB	08/01/97
Pyrene	1.56	mg/kg	0.33	8270	JB	08/01/97
2-Methylnaphthalene	2.92	mg/kg	0.33	8270	ЛВ	08/01/97
FECL #: AA49569						
Tag: TB11-C				-		

Date/Time Collected: 07/25/97 08:00 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Inorganics						
Total Solids	68.3	%	1	160.3	ЛН	08/01/97
Organics						
PNA Extraction	Completed				JKB	07/31/97
GC/MS for Volatile Organic	S					
Benzene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Bromobenzene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Bromochloromethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Bromodichloromethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Bromoform	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Bromomethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
n-Butylbenzene	Not detected	mg/kg	0.01	8260	VFM	08/02/97



FECL #: AA49569 (Continued) Tag: TB11-C Date/Time Collected: 07/25/97 08:00 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Organics (Continued)						
GC/MS for Volatile Organics (Continued)					
sec-Butylbenzene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
tert-Butylbenzene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Carbon tetrachloride	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Chlorobenzene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Chloroethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Chloroform	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Chloromethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
2-Chlorotoluene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
4-Chlorotoluene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Dibromochloromethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,2-Dibromo-3-chloropropane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,2-Dibromoethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Dibromomethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,2-Dichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,3-Dichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,4-Dichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Dichlorodifluoromethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,1-Dichloroethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,2-Dichloroethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,1-Dichloroethene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
cis-1,2-Dichloroethene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
trans-1,2-Dichloroethene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,2-Dichloropropane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,3-Dichloropropane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
2,2-Dichloropropane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,1-Dichloropropene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Ethylbenzene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Hexachlorobutadiene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Isopropylbenzene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
p-Isopropyltoluene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Methylene chloride	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Naphthalene	0,03	mg/kg	0.01	8260	VFM	08/02/97
n-Propylbenzene	0.02	mg/kg	0.01	8260	VFM	08/02/97
Styrene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,1,1,2-Tetrachloroethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97



FECL #: AA49569 (Continued) Tag: TB11-C Date/Time Collected: 07/25/97 08:00 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Organics (Continued)						
GČ/MS for Volatile Organic	s (Continued)					
1,1,2,2-Tetrachloroethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Tetrachloroethene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Toluene	0.04	mg/kg	0.01	8260	VFM	08/02/97
1,2,3-Trichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,2,4-Trichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,1,1-Trichloroethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,1,2-Trichloroethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Trichloroethene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Trichlorofluoromethane	Not detected	mg/kg	0.01	8260	VFM	08/02/97
1,2,3-Trichloropropane	Not detected	mg/kg	0.01	82 60	VFM	08/02/97
1,2,4-Trimethylbenzene	0,06	mg/kg	0.01	8260	VFM	08/02/97
1,3,5-Trimethylbenzene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Vinyl chloride	Not detected	mg/kg	0.01	8260	VFM	08/02/97
o-Xylene	0.01	mg/kg	0.01	8260	VFM	08/02/97
p,m-Xylene	0.03	mg/kg	0.01	8260	VFM	08/02/97
cis-1,3-Dichloropropene	Not detected	mg/kg	0.01	8260	VFM	08/02/97
Polynuclear Aromatics						
Acenaphthene	0.71	mg/kg	0.33	8270	ЛВ	08/01/97
Acenaphthylene	Not detected	mg/kg	0.33	8270	ĴВ	08/01/97
Anthracene	0.34	mg/kg	0.33	8270	JB	08/01/97
Benzo(a)anthracene	0.53	mg/kg	0.33	8270	ĴВ	08/01/97
Benzo(a)pyrene	Not detected	mg/kg	0.33	8270	JВ	08/01/97
Benzo(b)fluoranthene	0.39	mg/kg	0.33	8270	JB JB	08/01/97
Benzo(k)fluoranthene	0.39	mg/kg	0.33	8270	JB	08/01/97
Benzo(ghi)perylene	Not detected	mg/kg	0.33	8270	л ЛВ	08/01/97
Chrysene	0.83	mg/kg	0.33	8270	JB	08/01/97
Dibenzo(ah)anthracene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Fluoranthene	2.11	mg/kg	0.33	8270	JB JB	08/01/97
Fluorene	0.84	mg/kg	0.33	8270	JB JB	08/01/97
Indeno(1,2,3-cd)pyrene	Not detected	mg/kg	0.33	8270	JB JB	08/01/97
Naphthalene	1.68	mg/kg	0.33	8270 8270	JВ	08/01/97
Phenanthrene	3.07		0.33	8270 8270		
Pyrene	1.99	mg/kg	0.33		JВ ID	08/01/97
		mg/kg		8270 8270	JB ID	08/01/97
2-Methylnaphthalene	1,80	mg/kg	0.33	8270	JB	08/01/97



FECL #: AA49570 Tag: TB11-D Date/Time Collected: 07/25/97 08:10 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Inorganics					**************************************	
Total Solids	80.5	%	1	160,3	JН	08/01/97
Organics						
PNA Extraction	Completed				ЈКВ	07/31/97
GC/MS for Volatile Organics						
Benzene	Not detected	mg/kg	0,01	8260	VFM	07/31/97
Bromobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Bromochloromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Bromodichloromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Bromoform	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Bromomethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
n-Butylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
sec-Butylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
tert-Butylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Carbon tetrachloride	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Chlorobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Chloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Chloroform	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Chloromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
2-Chlorotoluene	Not detected	mg/kg	0.01	8260 8260	VFM	
4-Chlorotoluene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Dibromochloromethane	Not detected	mg/kg	0.01	8260 8260		07/31/97
1,2-Dibromo-3-chloropropane	Not detected	mg/kg	0.01	8260 8260	VFM VFM	07/31/97
1,2-Dibromoethane	Not detected	mg/kg	0.01	8200 8260	VFM	07/31/97
Dibromomethane	Not detected	mg/kg	0.01	8260 8260	VFM	07/31/97
1,2-Dichlorobenzene	Not detected	mg/kg	0.01	8260 8260		07/31/97
1,3-Dichlorobenzene	Not detected	mg/kg	0.01	8260 8260	VFM	07/31/97
1,4-Dichlorobenzene	Not detected	mg/kg	0.01	8260 8260	VFM	07/31/97
Dichlorodifluoromethane	Not detected	mg/kg	0.01	8260 8260	VFM	07/31/97
1,1-Dichloroethane	Not detected	mg/kg	0.01		VFM	07/31/97
1,2-Dichloroethane	Not detected	mg/kg	0.01	8260 8260	VFM	07/31/97
1,1-Dichloroethene	Not detected	mg/kg		8260	VFM	07/31/97
cis-1,2-Dichloroethene	Not detected	~ ~	0.01	8260		07/31/97
trans-1,2-Dichloroethene	Not detected	mg/kg mg/kg	0.01	8260		07/31/97
1,2-Dichloropropane	Not detected	mg/kg mg/kg	0.01	8260	VFM	07/31/97
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		mg/kg	0.01	8260	VFM	07/31/97



FECL #: AA49570 (Continued) Tag: TB11-D Date/Time Collected: 07/25/97 08:10 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Organics (Continued)						
GC/MS for Volatile Organics	s (Continued)					
1,3-Dichloropropane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
2,2-Dichloropropane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1-Dichloropropene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Ethylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Hexachlorobutadiene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Isopropylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
p-Isopropyltoluene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Methylene chloride	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Naphthalene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
n-Propylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Styrene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1,1,2-Tetrachloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1,2,2-Tetrachloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Tetrachloroethene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Toluene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2,3-Trichlorobenzene	Not detected	mg/kg ···	· 0.01	8260	VFM	07/31/97
1,2,4-Trichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1,1-Trichloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1,2-Trichloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Trichloroethene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Trichlorofluoromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2,3-Trichloropropane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2,4-Trimethylbenzene	0.01	mg/kg	0.01	8260	VFM	07/31/97
1,3,5-Trimethylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Vinyl chloride	Not detected	mg/kg	0.01	8260	VFM	07/31/97
o-Xylene	0.03	mg/kg	0.01	8260	VFM	07/31/97
p,m-Xylene	0.04	mg/kg	0.01	8260	VFM	07/31/97
cis-1,3-Dichloropropene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Polynuclear Aromatics						
Acenaphthene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Acenaphthylene	Not detected	mg/kg	0.33	8270	ЈВ	08/01/97
Anthracene	Not detected	mg/kg	0.33	8270	ЈВ	08/01/97
Benzo(a)anthracene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Benzo(a)pyrene	Not detected	mg/kg	0.33	8270	ЛВ	08/01/97

1



FECL #: AA49570 (Continued) Tag: TB11-D Date/Time Collected: 07/25/97 08:10 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Organics (Continued)						
Polynuclear Aromatics (Contin	ued)					
Benzo(b)fluoranthene	Not detected	mg/kg	0.33	82 70	JB	08/01/97
Benzo(k)fluoranthene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Benzo(ghi)perylene	Not detected	mg/kg	0.33	8270	ЛВ	08/01/97
Chrysene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Dibenzo(ah)anthracene	Not detected	mg/kg	0.33	8270	\mathbf{JB}	08/01/97
Fluoranthene	Not detected	mg/kg	0.33	8270	$\mathbf{J}\mathbf{B}$	08/01/97
Fluorene	Not detected	mg/kg	0.33	8270	${ m JB}$	08/01/97
Indeno(1,2,3-cd)pyrene	Not detected	mg/kg	0.33	8270	ЛВ	08/01/97
Naphthalene	Not detected	mg/kg	0.33	8270	${ m JB}$	08/01/97
Phenanthrene	Not detected	mg/kg	0.33	8270	ЛВ	08/01/97
Pyrene	Not detected	mg/kg	0.33	8270	ЛВ	08/01/97
2-Methylnaphthalene	Not detected	mg/kg	0.33	8270	ЈВ	08/01/97
Tag: TDup Date/Time Collected: 07/25/97 Matrix: Soil Analysis	Results	Units	MRL	Method	Analyst	Date Run
					·	
<i>Inorganics</i> Total Solids	89.6	%	1	160.3	ЛН	08/01/97
Organics						
PNA Extraction	Completed				JKB	07/31/97
GC/MS for Volatile Organics						
Benzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Bromobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Bromochloromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Bromodichloromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Bromoform	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Bromomethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
n-Butylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
-		5 5				



FECL #: AA49571 (Continued) Tag: TDup Date/Time Collected: 07/25/97 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Organics (Continued)						
GC/MS for Volatile Organics	(Continued)					
sec-Butylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
tert-Butylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Carbon tetrachloride	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Chlorobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Chloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Chloroform	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Chloromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
2-Chlorotoluene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
4-Chlorotoluene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Dibromochloromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2-Dibromo-3-chloropropane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2-Dibromoethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Dibromomethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2-Dichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,3-Dichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,4-Dichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Dichlorodifluoromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1-Dichloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2-Dichloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1-Dichloroethene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
cis-1,2-Dichloroethene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
trans-1,2-Dichloroethene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2-Dichloropropane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,3-Dichloropropane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
2,2-Dichloropropane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1-Dichloropropene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Ethylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Hexachlorobutadiene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Isopropylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
p-Isopropyltoluene	Not detected	mg/kg	0.01	8260 8260	VFM	
Methylene chloride	Not detected	mg/kg	0.01	8260 8260	VFM	07/31/97 07/31/97
Naphthalene	Not detected	mg/kg	0.01	8260 8260	VFM	
n-Propylbenzene	Not detected	mg/kg	0.01	8260 8260	VFM VFM	07/31/97
Styrene	Not detected	mg/kg	0.01	8260 8260		07/31/97
1,1,1,2-Tetrachloroethane	Not detected	mg/kg	0.01	8260 8260	VFM	07/31/97
, , , ,		шқ/кқ	0.01	8200	VFM	07/31/97



FECL #: AA49571 (Continued) Tag: TDup Date/Time Collected: 07/25/97 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Organics (Continued)						
GC/MS for Volatile Organic	s (Continued)					
1,1,2,2-Tetrachloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Tetrachloroethene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Toluene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2,3-Trichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2,4-Trichlorobenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1,1-Trichloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,1,2-Trichloroethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Trichloroethene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Trichlorofluoromethane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2,3-Trichloropropane	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,2,4-Trimethylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
1,3,5-Trimethylbenzene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Vinyl chloride	Not detected	mg/kg	0.01	8260	VFM	07/31/97
o-Xylene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
p,m-Xylene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
cis-1,3-Dichloropropene	Not detected	mg/kg	0.01	8260	VFM	07/31/97
Polynuclear Aromatics						
Acenaphthene	Not detected	mg/kg	0.33	8270	ЛВ	08/01/97
Acenaphthylene	Not detected	mg/kg	0.33	8270	ЛВ	08/01/97
Anthracene	Not detected	mg/kg	0.33	8270	ЛВ	08/01/97
Benzo(a)anthracene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Benzo(a)pyrene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Benzo(b)fluoranthene	Not detected	mg/kg	0.33	8270	ЛВ	08/01/97
Benzo(k)fluoranthene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Benzo(ghi)perylene	Not detected	mg/kg	0.33	8270	ЛВ	08/01/97
Chrysene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Dibenzo(ah)anthracene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Fluoranthene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Fluorene	Not detected	mg/kg	0.33	8270	JВ	08/01/97
Indeno(1,2,3-cd)pyrene	Not detected	mg/kg	0.33	8270	лВ	08/01/97
Naphthalene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Phenanthrene	Not detected	mg/kg	0.33	8270	JB	08/01/97
Pyrene	Not detected	mg/kg	0.33	8270	JB	08/01/97
2-Methylnaphthalene	Not detected	mg/kg	0.33	8270	JB	08/01/97

FECL #: AA49572 Tag: TBG-G Date/Time Collected: 07/25/97 15:18 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
<i>Inorganics</i> Total Solids	95.2	%	1	160.3	ш	08/01/97
<i>Metals</i> Cadmium Chromium Lead	2.38 145 185	mg/kg mg/kg mg/kg	0.05 1.0 1.0	6020 6020 6020	P R P R P R	08/06/97 08/06/97 08/06/97

FECL #: AA49573 Tag: TBG-F Date/Time Collected: 07/25/97 15:30 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
Inorganics			_			
Total Solids	90.0	%	· 1	160.3	ЛН	08/01/97
Metals						
Cadmium	2.05	mg/kg	0.05	6020	P R	08/06/97
Chromium	302	mg/kg	1.0	6020	P R	08/06/97
Lead	399	mg/kg	1.0	6020	P R	08/06/97
FECL #: AA49574 Tag: TBG-E (1-2) Date/Time Collected: 07/2 Matrix: Soil	25/97 16:15					
Analysis	Results	Units	MRL	Method	Analyst	Date Run

Analysis	Results	Units	MRL	Method	Analyst	Date Run
<i>Inorganics</i> Total Solids	85.0	%	1	160.3	ЛН	08/01/9 7

FECL #: AA49574 (Continued) Tag: TBG-E (1-2) Date/Time Collected: 07/25/97 16:15 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
<i>Metals</i> Cadmium Chromium Lead	7.19 3,770 612	mg/kg mg/kg mg/kg	0.05 1.0 1.0	6020 6020 6020	P R P R P R	08/06/97 08/06/97 08/06/97

FECL #: AA49575 Tag: TBG-E (3-4) Date/Time Collected: 07/25/97 16:25 Matrix: Soil

Analysis	Results	Units	MRL	Method	Analyst	Date Run
<i>Inorganics</i> Total Solids	94.3	⁰∕₀	1	160.3	Л	08/01/97
Metals Cadmium Chromium Lead	9.18 208 1,110	mg/kg mg/kg mg/kg	0.05 1.0 1.0	6020 6020 6020	P R P R P R	08/06/97 08/06/97 08/06/97

Note: Methods may be modified for improved performance. Results reported on a dry weight basis, where applicable. Results relate only to items tested. Report shall not be reproduced except in full, without the written approval of FECL.

Violetta F. Murshah

Violetta F. Murshak Laboratory Director

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<u>~</u>	Remarks: 767 451 <u>2</u>	TTAT	, AA (WS was bi	4:36/4	PART. AX RES	7201 2Z)	54242				2
<u> </u>	(6) Indicate Preservative Used: 4	4°C 4	#C1 &	Sou TRSP 1	BLAWK			N	* NU/G	•••	BHMALLS BII- AND BII-D In J Zone	าว้
*Matrix: **Presen	*Matrix: S=Solid **Preservatives: (1) H ₂ SO ₄ to pH <2		L=Liquid (2) 10N NaOH to pH ≥12		W = Water (3) HNO ₃ to pH <2		GW = Groundwater (4) 1:1 HCI	SL = Sludge (5) Zinc Acetate	ge Acetate	(0, 7	WW = Wastewater (6) See Remarks	O = Other COCform.ter

APPENDIX F SUPPLEMENTAL GUIDANCE TO RAGS:

CALCULATING THE CONCENTRATION TERM

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 Image: States
 United States
 Office of Solid Waste and Environmental Protection
 Publication 9285.7-081 May 1992

 Agency
 Supplemental Guidance to RAGS: Calculating the Concentration Term

 Office of Emergency and Remedial Response
 Intermittent Bulletin Volume 1 Number 1

The overarching mandate of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is to protect human health and the environment from current and potential threats posed by uncontrolled releases of hazardous substances. To help meet this mandate, the U.S. Environmental Protection Agency's (EPA's) Office of Emergency and Remedial Response has developed a human health risk assessment process as part of its remedial response program. This process is described in Risk Assessment Guidance for Superfund: Volume I — Human Health Evaluation Manual (RAGS/HHEM). Part A of RAGS/HHEM addresses the baseline risk assessment, and describes a general approach for estimating exposure to individuals from hazardous substance releases at Superfund sites.

This built in explains the concentration term in the exposure/intake equation to remedial project managers (RPMs), risk assessors, statisticians, and other personnel. This bulletin presents the general intake equation as presented in RAGS/HHEM Part A, discusses basic concepts concerning the concentration term, describes generally how to calculate the concentration term, presents examples to illustrate several important points, and, lastly, identifies where to get additional help.

THE CONCENTRATION TERM

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How is the concentration term used?

RAGS/HHEM Part A presents the Superfund risk assessment process in four "steps": (1) data collection and evaluation; (2) exposure assessment; (3) toxicity assessment; and (4) risk characterization. The concentration term is calculated for use in the exposure assessment step. Highlight I presents the general equation Superfund uses for calculating exposure, and Illustrates that the concentration term (C) is one of several parameters needed to estimate contaminant intake for an individual. For Superfund assessments, the concentration term (C) in the intake equation is an estimate of the arithmetic average concentration for a contaminant based on a set of site sampling results. Because of the uncertainty associated with estimating the true average concentration at a site, the 95 percent upper confidence limit (UCL) of the arithmetic mean should be used for this variable. The 95 percent UCL provides reasonable confidence that the true site average will not be underestimated.

Feb 25,97 16:25 No.007 P.02

Why use an average value for the concentration term?

An estimate of average concentration is used because:

Supplemental Guidance to RAGS is a buttetia series on risk assessment of Superfund sites. These bullstins serve as supplements to Risk Assessment Guidance for Superfund: Volume I — Human Health Evaluation Monual. The information presented is intended as guidance to EPA and other government employees. It does not constitute relemating by the Agency, and may not be relied on to create a substantive or procedural right suferemable by any other person. The Government may take action that is at variance with these bullcting.

Highlight 1 GENERAL EQUATION FOR ESTIMATING EXPOSURE TO A SITE CONTAMINANT

$$I = C \times \frac{CR \times EFD}{BW} \times \frac{1}{AT}$$

where:

ĩ

С

- = intake (i.e., the quantitative measure of exposure in RAGS/HHEM)
- = contaminant concentration
- CR = contact (intake) rate
- EFD = exposure frequency and duration

BW 🐱 body weight

AT = averaging time

- carcinogenic and chronic noncarcinogenic toxicity criteria¹ are based on lifetime average exposures; and
- (2) average concentration is most representative of the concentration that would be contacted at a site over time.

For example, if you assume that an exposed individual moves randomly across an exposure area, then the spatially averaged soil concentration can be used to estimate the true average concentration contacted over time. In this example, the average concentration contacted over time would equal the spatially averaged concentration over the exposure area. While an individual may not actually exhibit a truly random pattern of movement across an exposure area, the assumption of equal time spent in different parts of the area is a simple but reasonable approach.

When should an average concentration be used?

The two types of exposure estimates now being required for Superfund risk assessments, a reasonable maximum exposure (RME) and an average, should <u>both</u> use an average concentration. To be protective, the overall estimate of intake (see Highlight 1) used as a basis for action at

Superfund sites should be an estimate in the high end of the intake/dose distribution. One high-end option is the RME used in the Superfund program. The RMR which is defined as the highest exposure that could reasonably be expected to occur for a given exposure pathway at a site, is standed to scoront for among any in the subtaningst sconcentration and graphity an sportine statement, (c.g., crossure frequency, For comparative purposes, averaging time). Agency guidance (U.S. EPA, Guidance on Risk Characterization for Risk Managers and Risk Assessors, February 26, 1992) states that an average estimate of exposure also should be presented in risk assessments. For decision-making purposes in the Superfund program, however, RME is used to estimate risk.²

Why use an estimate of the arithmetic mean rather than the geometric mean?

The choice of the arithmetic mean concentration as the appropriate measure for estimating exposure derives from the need to estimate an individual's long-term average exposure. Most Agency health criteria are based on the long-term average daily dose, which is simply the sum of all daily doses divided by the total number of days in the averaging period. This is the definition of an arithmetic mean. The

When acute toxicity is of most concern, a longterm average concentration generally should not be used for risk assessment purposes, as the focus should be to estimate short-term, peak concentrations.

² For additional information on RME, see RAGS/HHEM Part A and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 55 Federal Register 8710, March 8, 1990.

arithmetic mean is appropriate regardless of the pattern of daily exposures over time or the type of statistical distribution that might best describe the sampling data. The geometric mean of a set of sampling results, however, beats no logical connection to the cumulative intake that would result from long-term contact with site contaminants, and it may differ appreciably from -and be much lower than - the arithmetic mean. Although the geometric mean is a convenient parameter for describing central tendencies of lognormal distributions, it is not an appropriate basis for estimating the concentration term used in Superfund exposure assessments. The following simple example may help clarify the difference between the arithmetic and geometric mean when used for an exposure assessment:

> Assume the daily exposure for a trespasser subject to random exposure at a site is 1.0, 0.01, 1.0, 0.01, 1.0, 0.01, 1.0, and 0.01 units/day over an 8-day period. Given these values, the cumulative exposure is simply their summation, or 4.04 units. Dividing this by 8 days of exposure results in an arithmetic mean of 0.505 units/day. This is the value we would want to use in a risk assessment for this individual, not the geometric mean of 0.1 units/day. Viewed another way, multiplication of the geometric mean by the number of days equals 0.8 units, considerably lower than the known cumulative exposure of 4.04 units.

UCL AS AN ESTIMATE OF THE AVERAGE CONCENTRATION

What is a 95 percent UCL?

The 95 percent UCL of a mean is defined as a value that, when calculated repeatedly for randomly drawn subsets of site data, equals or exceeds the true mean 95 percent of the time. Although the 95 percent UCL of the mean provides a <u>conservative estimate</u> of the average (or mean) concentration, it should not be confused with a 95th percentile of site concentration data (as shown in Highlight 2).

Why use the UCL as the average concentration?

Statistical confidence limits are the classical tool for addressing uncertainties of a distribution average. The 95 percent UCL of the arithmetic mean concentration is used as the average concentration because it is not possible to know the true mean. The 95 percent UCL therefore accounts for uncertainties due to limited sampling data at Superfund sites. As sampling data become less limited at a site, uncertainties decrease, the UCL moves closer to the true mean, and exposure evaluations using either the mean or the UCL produce similar results. This concept is illustrated in Highlight 2.

Should a value other than the 95 percent UCL be used for the concentration?

A value other than the 95 percent UCL can be used provided the risk assessor can document that high coverage of the true population mean occurs (i.e., the value equals or exceeds the true population mean with high probability). For exposure areas with limited amounts of data or extreme variability in measured or modeled data, the UCL can be greater than the highest measured or modeled concentration. In these cases, if additional data cannot practicably be obtained, the highest measured or modeled value could be used as the concentration term. Note, however, that the true mean still may be higher than this maximum value (i.e., the 95 percent UCL indicates a higher mean is possible), especially if the most contaminated portion of the site has not been sampled.

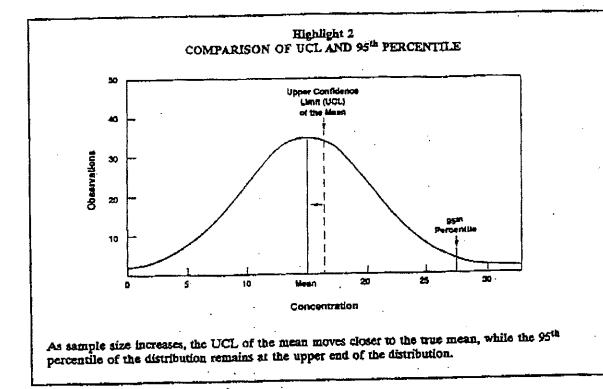
CALCULATING THE UCL

How many samples are necessary to calculate the 95 percent UCL?

Sampling data from Superfund sites have shown that data sets with fewer than 10 samples per exposure area provide poor estimates of the mean concentration (i.e., there is a large difference between the sample mean and the 95 percent UCL), while data sets with 10 to 20 samples per exposure area provide somewhat better estimates of the mean, and data sets with 20 to 30 samples provide fairly consistent estimates of the mean (i.e., the 95 percent UCL is close to the sample mean). Remember that, in general, the UCL approaches the true mean as more samples are included in the calculation.

Should the data be transformed?

EPA's experience shows that most large or "complete" environmental contaminant data sets



from soil sampling are lognormally distributed rather than normally distributed (see Highlights 3 and 4 for illustrations of lognormal and normal distributions). In most cases, it is reasonable to assume that Superfund soil sampling data are lognormally distributed. Because transformation is a necessary step in calculating the UCL of the arithmetic mean for a lognormal distribution, the data should be transformed by using the natural logarithm function (i.e., calculate ln(x), where x is the value from the data set). However, in cases where there is a question about the distribution of the data set, a statistical test should be used to identify the best distributional assumption for the data set. The W-test (Gilbert 1987) is one statistical method that can be used to determine if a data set is consistent with a normal or lognormal distribution. In all cases, it is valuable to plot the data to better understand the contaminant distribution at the site.

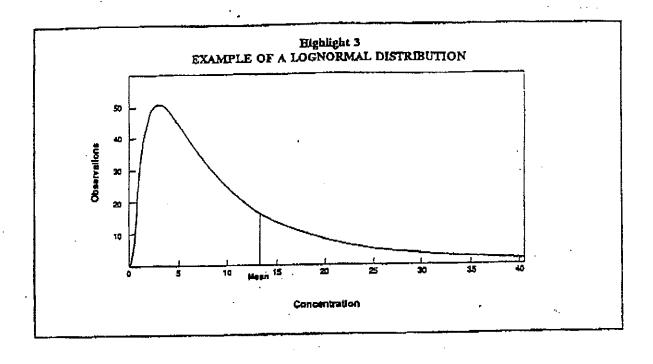
How do you calculate the UCL for a lognormal distribution?

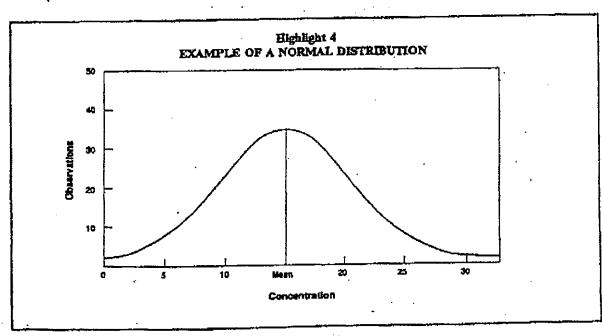
To calculate the 95 percent UCL of the arithmetic mean for a lognormally distributed data set, first transform the data using the natural logarithm function as discussed previously (i.e., calculate ln(x)). After transforming the data, determine the 95 percent UCL for the data set by completing the following four steps:

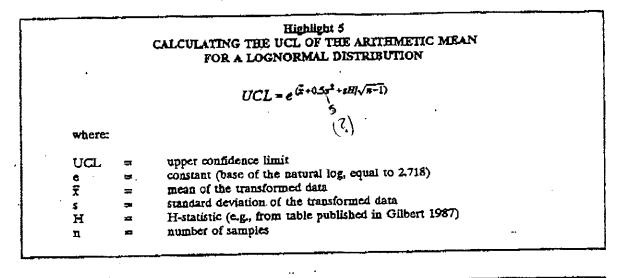
- (1) Calculate the arithmetic mean of the transformed data (which is also the log of the geometric mean);
- (2) Calculate the standard deviation of the transformed data;
- (3) Determine the H-statistic (e.g., see Gilbert 1987); and
- (4) Calculate the UCL using the equation shown in Highlight 5.

How do you calculate the UCL for a normal distribution?

If a statistical test supports the assumption that the data set is normally distributed, calculate the 95 percent UCL by completing the following four steps:







ALCULA	Highlight 6 TING THE UCL OF THE ARITHMETIC MEAN FOR A NORMAL DISTRIBUTIO
•	$UCL = \bar{x} + t \left(s / \sqrt{n} \right)$
where:	
UCL	upper confidence limit
ѫ	mean of the untransformed data
5	standard deviation of the untransformed data
t	= Student-t statistic (e.g., from table published in Gilbert 1987)
n	number of samples

- (1) Calculate the arithmetic mean of the untransformed data;
- (2) Calculate the standard deviation of the untransformed data;
- (3) Determine the one-tailed t-statistic (e.g., see Gilbert 1987); and
- (4) Calculate the UCL using the equation presented in Highlight 6.

Use caution when applying normal distribution calculations if there is a possibility that heavily contaminated portions of the site have not been adequately sampled. In such cases, a UCL from normal distribution calculations could fail below the true mean, even if a limited data set at a site appears normally distributed.

EXAMPLES

The examples shown in Highlights 7 and 8 address the exposure scenario where an individual at a Superfund site has equal opportunity to contact soil in any sector of the contaminated area over time. Even though the examples address only soil exposures, the UCL approach is applicable to all exposure pathways. Guidance and examples for other exposure pathways will be presented in forthcoming bulletins.

*

Highlight 7 presents a simple data set and provides a stepwise demonstration of transforming the data — assuming a lognormal distribution and calculating the UCL. Highlight 8 uses the same data set to show the difference between the UCLs that would result from assuming normal and lognormal distribution of the data. These

Highlight 7 EXAMPLE OF DATA TRANSFORMATION AND CALCULATION OF UCL

This example shows the calculation of a 95 percent UCL of the arithmetic mean concentration for chromium in soil at a Superfund site. <u>This example is applicable only to a</u> <u>scenario in which a spatially random exposure pattern is assumed</u>. The concentrations of chromium obtained from random sampling in soil at this site (in mg/kg) are 10, 13, 20, 36, 41, 59, 67, 110, 110, 136, 140, 160, 200, 230, and 1300. Using these data, the following steps are taken to calculate a concentration term for the intake equation:

- Plot the data and inspect the graph. (You may need the help of a statistician for this part
 [as well as other parts] of the calculation of the UCL.) The plot (not shown, but similar to
 Highlight 3) shows a skew to the right, consistent with a lognormal distribution.
- (2) Transform the data by taking the natural log of the values (i.e., determine ln(x)). For this data set, the transformed values are: 2.30, 2.56, 3.00, 3.58, 3.71, 4.08, 4.20, 4.70, 4.70, 4.91, 4.94, 5.08, 5.30, 5.44, and 7.17.
- (3) Apply the UCL equation in Highlight 5, where:

 $\bar{x} = 4.38$ s = 1.25 H = 3.163 (based on 95 percent) n = 15

The resulting 95 percent UCL of the arithmetic mean is thus found to equal $e^{(6.218)}$, or 502 mg/kg.

Highlight 8

COMPARING UCLS OF THE ARITHMETIC MEAN ASSUMING DIFFERENT DISTRIBUTIONS

In this example, the data presented in Highlight 7 are used to demonstrate the difference in the UCL that is seen if the normal distribution approach were inappropriately applied to this data set (i.e., if, in this example, a normal distribution is assumed).

ASSUMED DISTRIBUTION:	Normal	Lognormal
TEST STATISTIC:	Student-t	H-statistic
95 PERCENT UCL (mg kg):	325	502.

Table A12 Values of $H_{1-\alpha} = H_{0.95}$ for Computing a One-Sided Upper 95% Confidence Limit on a Lognormal Mean

-	m	5	~	10	12	15	21	31	5	101
0.10	2,750	2.035	1.886	1.802	27 <u>7</u> _1	1.749	1.727	1.701	1.684	
0.20	3.295	2,198	1_992	1.881	1.843	1 809	1.771	74.7	1.718	
0.30	4.109	2.402	2.125	- 16	1 927	1.687	633	107	1 761	;-
04-0	5.220	2.651	2.282	2,089	2.026	1 969	1 405	1 856	1 812	
0.50	564-9	2,947	2.465	2.220	2.141	2.068	1,989	1.928	1.876	1.830
0 F U							1	3		
		207.5	2.0/3		112.2	2.181	2.085	2.010	1,946	1.85
07-0	971.6	3.662	2.90	2.532	2,415	2.306	2.191	2.102	2,025	1.96
0.80	10.43	4.062	3,155	2.710	2.570	2.443	2,307	2.207	2.112	2 6
0.90	11.74	4.478	3.420	2,902	2.738	2.589	CE4. C	015.0	206	• •
1.00	13.05	506° 1	3,698	3.103	2.915	2.74	2.564	2, 123	2.306	
							1			
ង	16.33	6.001	4.426	3.639	3.389	3.163	2.923	2.737	2.580	2.46
1.50	19.60	7,120	5.184	4.207	3.896	3.612	115-6	100	1981	
1.75	22.87	8.250	5.960	A. 795	4.477					
8.8	26.14	9,387	5-747	5.396	961					
2.50	32.69	11,67	8.339	6.621	6.067	5.557	5.013	588	1.228	i O I M
50.5		;								
	57°25	~~~~~	n***	+9R* -	7,191	6.570	5,907	5.388	246.4	ي 1
3.50	45.77	16.27	11,56	9.118	8,326	7.596	6.815	6.201	5.681	5.23
8	52.31	18,58	13.18	10.38	9 469	8.630	1.731	7.024	6.42	5
a.50	58,85	20.88	14.80	11.64	10.62	9,669	8.652	7.854	7.176	4
5.0	65.39	23.19	16.43	12,91	11.77	10.71	9.579	6.688	7,929	7.2.7
6.00	10.47	27.81	19.68	15,45	14.00	12.61	11.44	10.36	9.449	3.8
8	91.55	32.43	22,94	18.00	16.39	06.41	13.31	12.05	10.98	10.1
9°9	104.6	37.06	26.20	20.55	18.7	17.01	15.18	13.7	12 51	
0°. 6	117.7	41.68	29.46	23.10	21.03	11.91	17.05			
10.00	130.8	46.31	32,73	25.66	73 75	66 16	19 93			

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This table is used in Section 13.2.

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