LAKESHORE ENGINEERING SERVICES, INC.

ENVIRONMENTAL • CIVIL • GEOTECHNICAL

CALUMET RIVER SEDIMENT SAMPLING AND ANALYSIS

CALUMET, ILLINOIS

FINAL REPORT

Contract DACW35-98-D-0008
Delivery Order No. 9

Prepared for:

Department of the Army
Chicago District, Corps of Engineers
Chicago, IL

January 27, 2000

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CALUMET RIVER, ILLINOIS
SEDIMENT SAMPLING REPORT
OCTOBER 24-26, 1999

Delivery Order No. 9
Subcontract to DACW 35-98-D-0008

Prepared for:
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1.0 INTRODUCTION

AScI Corporation, Environmental Survey Division, was engaged as a subcontractor to Lakeshore Engineering Services, Inc. (LES) to conduct a field survey of Calumet River, Illinois, during October 24-26, 1999. The survey involved collection of sediment samples at selected stations for analysis of chemical parameters. This work and the subsequent laboratory analyses are as requested in Delivery Order 9 of LES contract DACW35-98-D-0008 with the U. S. Army Corps of Engineers, Detroit District. The work was performed on behalf of the USACE, Chicago District.

This report provides documentation of the field survey portion of the delivery order, and will be supplemented by the laboratory report, when that work is completed. The report describes the field activities that occurred, the samples collected, and the conditions encountered during the survey.

2.0 FIELD SURVEY ACTIVITIES

The field survey was conducted according to the delivery order Scope of Work for Calumet River, as refined by discussions with the Chicago District's Project Manager, Mr. Devidas Kapadia.

2.1 Survey Preparation

The delivery order required sediment sampling at seven stations located between mile numbers 327 and 333 in the Calumet River, a navigable extension of the harbor. The sampling involved collection of five sediment cores and two grab samples to be processed for analysis of physical and chemical parameters at two different laboratories (Trace Analytical Laboratory, and Dodson-Stilson, Inc.). In order to organize the sampling effort and prepare the sample containers, a sampling plan was developed (Appendix A). This summarized for each station, sample type and parameter the containers required, bottle preparation in some cases, and the samples to be transferred to each lab.

The survey team mobilized with all materials required for preparing and shipping custody samples from the field. Samples resulting from this survey were shipped overnight in sealed ice chests directly to the to the laboratories.

2.2 Field Documentation

Field conditions, activities, and field data were documented on station in a field logbook (see Section 2.8). Information recorded in the logbook includes:

- Sampling station number and description
- Date, time and recorder's name
- Weather notes
- Station water depth and NOAA reference water level
- Station and reference coordinates (by DGPS)
- Sample type and method of collection
- Sediment sample description
- Sample and site photograph numbers and descriptions
- Sampling gear used
- Other station notes

Station identification numbers were provided by the Corps in the delivery order. Water depth was determined by a fathometer. Reference water levels (in feet) were obtained from the NOAA Web site as "Preliminary Water Level Data" *(http://www.opsd.nos.noaa.gov/data_res.html)*, and were used to express water depths in terms of the International Great Lakes Datum (IGLD, 1985). The nearest NOAA water level reference station for southern Lake Michigan is Calumet Harbor, IL (#90870441, V1-SAE WL sensor). Original (handwritten) copies of the logbook forms are included in Appendix B.

Color photographs (Appendix D) were taken of all sediment samples, prior to mixing them, to indicate color, texture and homogeneity. Station photographs were also taken where they might have some bearing on locating stations with regard to shore features. Equipment photos were used to document sampling methods. Photograph code numbers were logged on both the film and the field forms.

2.3 Sampling Locations

Sampling stations were approximately identified by the Chicago District as symbols on area maps and drawings. No geographical coordinates for stations were provided by the Corps. However, a Corps representative was always on hand in the field to help refine station locations just prior to sampling. Water depth was often used to confirm the station points.

Station locations were documented in the field using a differential GPS, a Trimble ProXR. This DGPS utilizes the U. S. Coast Guard differential corrections and has a nominal accuracy of <1

meter. Coordinates were recorded to 0.01 seconds of latitude/longitude (WGS 1984, equivalent to NAD83).

2.4 Site Reconnaissance

For the most part, silty sediments were encountered at the sampling locations, and vibrocores were collected without difficulty. Some reconnaissance coring and grab sampling was carried out in the vicinity of Station CRS-99-004, in order to locate depositional areas.

2.5 Water Sampling

No water samples were collected in this project.

2.6 Sediment Sampling

The sampling plan is summarized in Appendix A. Discrete sediment samples were collected from seven (7) river stations for chemical and grain size analysis. Stations CRS-99-001, -003, -004, -006 and -007 were sampled by vibrocoring. Stations CRS-99-002 and -005 were sampled with a standard Ponar grab sampler. The sampling procedure was as follows.

Vibrocores are collected using an AScI Model P-3 submersible electric vibrocoring unit (240 volt AC, 3 phase), which vibrates at 3,450 vpm. The vibro-head (motor unit) weighs 150 lbs. and is bolted to a 4 in. diameter core tube made of cellulose acetate butyrate (CAB). A ball check valve in the vibro-head and a leaf-type core catcher in the lower end of the tube both help retain cores during tube withdrawal. The whole vibrocoring unit is suspended by a cable from a 15 ft. tower, and is raised and lowered through a hole in the deck. The entire system is deployed on a 24 ft. aluminum pontoon boat equipped with a generator and winch system, and powered by a 25 hp outboard motor.

Core tubes containing sediment and capped at both ends are typically cut open along both sides with a Fein vibrating saw. Clean stainless steel blades (12 in. long) are used to split the core longitudinally. Undisturbed core strata can be observed, measured, photographed, and sub-sampled along the cut surface.

Where only surficial samples are required, or where coring is unsatifactory, samples are collected by means of a stainless steel (SS) Ponar clamshell-type sampler (standard size) weighing 45 lbs. with an 81 square-inch aperture. The sampler may be deployed by hand from the pontoon boat using a line and pulley attached to the top bar of the tower. The Ponar is lowered on the line, triggered by contact with the bottom, and slowly closed before it is hauled up. The retrieved sample is released into a SS pan, and excess water is carefully decanted. The number and area of Ponar grabs comprising the sample is recorded.

Sediments from either cores or grab samples are homogenized in a large SS mixing pan. They may be photographed, and then mixed thoroughly with a SS spoon until the aggregate appeared to be uniform in texture and color. The sediment mixture is then transferred by SS spoons into sample containers. Filled and capped containers are placed in sealable plastic bags and immediately stored in coolers with ice.

Between stations the sampler, the SS pan, mixing bowl, sieve and spoons are all rinsed thoroughly with station water, and are then decontaminated with detergent solution and distilled, deionized water as specified in the work order. The CAB core tubes, which are all new material and disposable, are not decontaminated before sampling, except by rinsing with station water.

2.7 Field Logbook

Section 3.0 below summarizes the site information logged onto the field forms at each station, in numerical (not chronological) order. The field forms in the logbook are printed on weatherproof vinyl paper, and are filled out completely before leaving the station. The NOAA reference water levels are added later (see Section 2.2 above). Copies of the original, complete logbook pages are provided in Appendix B. The typed logbook summaries in Section 4.0 below were prepared from these original field forms.

2.8 Photographic Log

One or more 35-mm color photographs are taken of each sample, prior to homogenizing the sample in the mixing pan. The pan is oriented so as to minimize shadows and glare on the wet sample. In addition, some station and equipment photographs may be taken to indicate reference features onshore or survey procedures on board. Photograph code numbers are logged on the film and on the logbook forms and summaries.

3.0 Logbook Summary

Project Area: Calumet River, Illinois

Sampling Station Number: CRS-99-001

Station Description: ~50 feet N of E jetty near entrance channel, ~half-way along jetty

Weather: Partly cloudy, wind SW ~15-20 mph

Date: October 25, 1999 Time: 1600

Crew: E. Smith, P. Novak **USACE Rep: A. Vaidya**

Station Depth (feet): 22.0 (555.35, IGLD1985)

NOAA Ref. Level (feet): 577.35 @ 1600

Coordinates- Differential GPS: Lat. 41° 43' 55.85"N Long. 87° 31' 38.63" W

GPS Reference:

Collection Gear- Sediments: P-3 Vibrocorer (4 in.)

Sediment Description: Soft to firm sandy silt w/ trace of clay; a few small rock inclusions; gray-brown color; earthy odor; slight oil sheen. (78 in. core)

Photo ID Numbers: 0094, 0095, 0096; 0086 (View NW to entrance channel)

Other:

3.0 Logbook Summary

Project Area: Calumet River, Illinois

Sampling Station Number: CRS-99-002

Station Description: ~20 feet from sheet pile wall, half-way along S side of Turning Basin 1

Weather: Partly cloudy, wind SW ~15-20 mph

Date: October 25, 1999 Time: 1700

Crew: E. Smith, P. Novak USACE Rep: A. Vaidya

Station Depth (feet): 25.0 (552.33, IGLD1985)

NOAA Ref. Level (feet): 577.33 @ 1700

Coordinates- Differential GPS: Lat. 41° 43' 27.11"N Long. 87° 32' 27.77" W

GPS Reference:

Collection Gear- Sediments: Ponar, standard (81 sq. in.)

Sediment Description: Soft sandy silt; no inclusions; brownish-gray color; slightly oily odor; no oil sheen.

Photo ID Numbers: 0087, 0088 (View E into Turning Basin)

Other:

3.0 Logbook Summary

Project Area: Calumet River, Illinois

Sampling Station Number: CRS-99-003

Station Description: ~45 feet from shore, E side of channel, SW of boat slip

Weather: Clear, wind SW ~20-25 mph

Date: October 25, 1999 Time: 1500

Crew: E. Smith, P. Novak USACE Rep: A. Vaidya

Station Depth (feet): 22.0 (555.33, IGLD1985)

NOAA Ref. Level (feet): 577.33 @ 1500

Coordinates- Differential GPS: Lat. 41° 42' 34.68"N Long. 87° 32' 34.49" W

GPS Reference:

Collection Gear- Sediments: P-3 Vibrocorer (4 in.)

Sediment Description: Soft to firm silt w/ clay lumps; clay lump inclusions; brownish-gray to brown color; oily odor; some oil sheen.

0-67 in. - brownish-gray soft silt w/ oil specks
59-62 in. - lumps of gray clay in silt
67-84 in. - brown firm silt w/oil specks

Photo ID Numbers: 0090-0093; 0085 (View NE from site)

Other:

3.0 Logbook Summary

Project Area: Calumet River, Illinois

Sampling Station Number: CRS-99-004

Station Description: ~30 feet from sheet pile wall, E side of river @ S end of barges

Weather: Clear, wind SW ~10-15 mph

Date: October 26, 1999 Time: 1200

Crew: E. Smith, P. Novak USACE Rep: K. Mrozek

Station Depth (feet): 24.0 (553.68, IGLD1985)

NOAA Ref. Level (feet): 577.68 @ 1200

Coordinates- Differential GPS: Lat. 41° 41' 59.23"N Long. 87° 32' 59.87" W

GPS Reference:

Collection Gear- Sediments: P-3 Vibrocorer (4 in.)

Sediment Description: Soft to firm silt; 2 rock inclusions; brown to gray color; no odor; no oil sheen.

0-48 in. - brownish-gray silt
48-60 in. - brown silt
60-68 in. - firmer gray silt (2 clay blobs at 62 in.)

Photo ID Numbers: 0105-0107; 0097 (View E to station near end of barge)

Other: Bottom closer to wall was hard (@ 18 ft. depth); only slag collected in Ponar test sample.

3.0 Logbook Summary

Project Area: Calumet River, Illinois

Sampling Station Number: CRS-99-005

Station Description: ~35 feet off W bank; ~500 feet S of conveyer bridge/pipeline

Weather: Clear, wind S ~10-15 mph

Date: October 25, 1999 Time: 1200

Crew: E. Smith, P. Novak USACE Rep: A. Vaidya

Station Depth (feet): 26.0 (551.29, IGLD1985)

NOAA Ref. Level (feet): 577.29 @ 1200

Coordinates- Differential GPS: Lat. 41° 41' 26.48"N Long. 87° 33' 08.55" W

GPS Reference:

Collection Gear- Sediments: Ponar, standard (81 sq. in.)

Sediment Description: Smooth gelatinous silt; black specks (coal?) inclusions; gray-brown color; no odor; no oil sheen.

Photo ID Numbers: 0083, 0084 (View E to coal loading dock)

Other:

3.0 Logbook Summary

Project Area: Calumet River, Illinois

Sampling Station Number: CRS-99-006

Station Description: ~25 feet off concrete wall opposite W end of CVS Chemical (~75 feet E of outfall)

Weather: Clear, wind W ~5 mph

Date: October 24, 1999 Time: 1700

Crew: E. Smith, P. Novak **USACE Rep**: D. Kapadia

Station Depth (feet): 27.0* (550.61, IGLD1985)

NOAA Ref. Level (feet): 577.61 @ 1700

Coordinates- Differential GPS: Lat. 41° 40' 20.55"N Long. 87° 33' 08.95" W

GPS Reference:

Collection Gear- Sediments: P-3 Vibrocorer (4 in.)

Sediment Description: Silt; 2 rock inclusions; gray to brown color; oily odor; visible oil sheen.
0-40 in. - soft gray oily silt

Photo ID Numbers: 0077, 0078; 0080 (View of site)

Other: *Shallowest depth was 27 feet in station area; water levels higher due to storm from N.

3.0 Logbook Summary

Project Area: Calumet River, Illinois

Sampling Station Number: CRS-99-007

Station Description: ~100 S of discharge weir, ~1,000 feet W of Torrence Ave. bridge

Weather: Clear, wind calm

Date: October 24, 1999 Time: 1600

Crew: E. Smith, P. Novak USACE Rep: D. Kapadia

Station Depth (feet): 24.5 (553.19, IGLD1985)

NOAA Ref. Level (feet): 577.69 @ 1600

Coordinates- Differential GPS: Lat. 41° 40' 03.99"N Long. 87° 33' 44.48" W

GPS Reference:

Collection Gear- Sediments: P-3 Vibrocorer (4 in.)

Sediment Description: Silt to clay w/ peaty matter; 1 rock, peat inclusions; gray to brown color; earthy odor; no oil sheen.

0-8 in. - gray silt
8-18 in. - sandy silt
18-22 in. - firm gray clay
22-38 in. - gray clay w/ peaty lumps
38-40 in. - brown peaty layer
40-47 in. - soft gray clay w/ peaty lumps
47-51 in. - firm gray clay

Photo ID Numbers: 0075, 0076; 0079 (View of site)

Other:

APPENDICES

APPENDIX A - Summary of Sampling Plan
APPENDIX B - Original Field Logbook Forms
APPENDIX C - Maps of Sampling Stations
APPENDIX D- Sample and Station Photographs

APPENDIX A-1 - Summary of Sampling Plan

COE – Calumet River, IL Survey (October 1999)
DACW35-98-D-0008; D.O. 9
Lakeshore Engineering Services/AScI Corporation

Containers & Parameters **Sediments--> |<--Water**

	1 L CG jar →	**1 L CG jar**	**1 L P jar**	**4 oz CG jar**	**4 L P tub**	**1 L P bottle**	**500 mL P bottle**	**500 mL P bottle**	**1 L P bottle**	**1 gal Cubit.**
Station	ice pres.	ice pres.	ice pres.	ice pres.	ice pres.	HNO3 pres.	NaOH pres.	H2SO4 Pres.	ice pres.	ice pres.
Param.	METALS, COD, CN, O&G, TVS	PHOS, NH3, TKN, PCB	GRAIN SIZE	VOLATILES	ELUTRIATE SEDIMENT*	METALS, HARDNESS	CYANIDE	NH3, TKN	pH, TDS, TSS	ELUTRIATE WATER*
CRS-99-001	1	→	1							
CRS-99-002	1	→	1							
CRS-99-003	1	→	1							
CRS-99-004	1	→	1							
CRS-99-005	1	→	1							
CRS-99-006	1	→	1							
CRS-99-007	1	→	1							
To lab:	**Trace**	**Trace**	**DSI**							

Abbreviations: CG - clear glass; AG - amber glass; P - plastic; CP - clear plastic.

APPENDIX B-1 - Original Field Logbook Forms

SAMPLE LOG

ASci Corporation - Environmental Survey Division

Project Area: Calumet R., IL

Sampling Site ID: CRS-99-001

Site Description: ~50' N of E. jetty nr. entrance channel ~half way along jetty

Weather: Partly cloudy, wind SW ~15-20 mph

Date: 10/25/99 **Time:** 1600 **Samplers' Init.:** PN, VFS

Site Water Depth 22.0 **Feet** **NOAA Ref. Level** 577.35 @ 1600

Site Coordinates:

Latitude 41° 43' 53.85" **Longitude** 87° 31' 38.63"

GPS Ref. Site _____ **Ref. Lat.** _____ **Ref. Long.** _____

Collected:

Water ____ **Depth Sampled** ____ **Ft.** **Sampler Type** _____

Benthos ____ **Number of Grabs** _____ **Grab Area** _____ **Sq. In.**

Sediment Grab ____ **Number of Grabs** _____ **Grab Area** _____ **Sq. In.**

Sediment Core ✓ (1) **Core Length** 78 **In.** **Core Diam.** 4 **In.**

Sediment Sample Description:

Color Gray-brown **Odor** Earthy **Visible oil or sheen?** —

Inclusions Occas. rocks **GS/angularity** Soft to firm sandy silt, trace of clay

Sample Photo ID #(s): 0094, 0095, 0096
(0086 - View NW to entrance channel

Sampling Gear:

Water _____

Sediment Vibracorer

Other: _____

APPENDIX B-2 - Original Field Logbook Forms

SAMPLE LOG

ASci Corporation - Environmental Survey Division

Project Area: Calumet R, IL

Sampling Site ID: CRS-99-002

Site Description: ~20' from sheet pile wall, half way along S. side of Turning Basin 1.

Weather: Partly cloudy, wind SW ~15-20 mph

Date: 10/25/99 **Time:** 1700 **Samplers' Init.:** PW, VES

Site Water Depth 25.0 **Feet** **NOAA Ref. Level** 577.33 @ 1700

Site Coordinates:

Latitude 41° 43' 27.11" **Longitude** 87° 32' 27.77"

GPS Ref. Site _____ **Ref. Lat.** _____ **Ref. Long.** _____

Collected:

Water ___ **Depth Sampled** ___ **Ft.** **Sampler Type** _____

Benthos ___ **Number of Grabs** _____ **Grab Area** _____ **Sq. In.**

Sediment Grab ✓ (1) **Number of Grabs** 1 **Grab Area** 81 **Sq. In.**

Sediment Core ___ **Core Length** ___ **In.** **Core Diam.** _____ **In.**

Sediment Sample Description:

Color Brownish-gray **Odor** Slight oily **Visible oil or sheen?** –

Inclusions – **GS/angularity** Soft sandy silt

Sample Photo ID #(s): 0087
(0088 - View E. into Turning Basin 1)

Sampling Gear:

Water _____

Sediment Lrg. Ponar

Other: _____

APPENDIX B-3 - Original Field Logbook Forms

SAMPLE LOG
ASci Corporation - Environmental Survey Division

Project Area: Calumet R., IL

Sampling Site ID: CRS-99-003

Site Description: ~45' from shore, E. side of channel SW of Boat slip

Weather: Clear, wind SW 20-25 mph

Date: 10/25/95 Time: 1500 Samplers' Init.: PN, VES

Site Water Depth 22.0 Feet NOAA Ref. Level 577.33 @ 1500

Site Coordinates:

Latitude 41° 42' 34.68" Longitude 87° 32' 34.49"

GPS Ref. Site _____ Ref. Lat. _____ Ref. Long. _____

Collected:

Water ___ Depth Sampled ___ Ft. Sampler Type _____

Benthos ___ Number of Grabs _____ Grab Area _____ Sq. In.

Sediment Grab ___ Number of Grabs _____ Grab Area _____ Sq. In.

Sediment Core ✓ (1) Core Length 84 In. Core Diam. 4 In.

Sediment Sample Description:

Color Brownish gray ~~to brown~~ Odor Oily Visible oil or sheen? Yes

Inclusions Clay lumps GS/angularity Soft to firm silt (w/ clay lumps)

Sample Photo ID #(s): 0090-0093 (0085 - View NE from site)

Sampling Gear:

Water _____

Sediment Jibroover

Other: _____

APPENDIX B-4 - Original Field Logbook Forms

SAMPLE LOG

ASci Corporation - Environmental Survey Division

Project Area: Calumet R., IL

Sampling Site ID: CRS-99-004

Site Description: ~30' from sheet pile wall ~~E. side of River~~ @ S. end of barges

Weather: Clear, wind SW ~10-15 mph

Date: 10/26/99 **Time:** _____ **Samplers' Init.:** PM, VES

Site Water Depth 24.0 **Feet** **NOAA Ref. Level** 577.68 @ 1200

Site Coordinates:

Latitude 41° 41' 59.23" **Longitude** 87° 32' 59.87"

GPS Ref. Site _____ **Ref. Lat.** _____ **Ref. Long.** _____

Collected:

Water ____ **Depth Sampled** ____ **Ft.** **Sampler Type** _____

Benthos ____ **Number of Grabs** _____ **Grab Area** _____ **Sq. In.**

Sediment Grab ____ **Number of Grabs** _____ **Grab Area** _____ **Sq. In.**

Sediment Core ✓ **Core Length** 68 **In.** **Core Diam.** 4 **In.**

Sediment Sample Description:

Color Brown to gray **Odor** – **Visible oil or sheen?** –

Inclusions 2 rocks **GS/angularity** Silt, soft to firm

Sample Photo ID #(s): 0097 (View E. to station nr. end of barge) 0105-0107

Sampling Gear:

Water _____

Sediment Vibrocoring

Other: Bottom closer to wall (at 18' depth) was hard; ~~ab~~ only slag collected in Ponar (test sample)

APPENDIX B-5 - Original Field Logbook Forms

SAMPLE LOG

ASci Corporation - Environmental Survey Division

Project Area: Calumet R., IL

Sampling Site ID: CRS-99-005

Site Description: ~35' off west bank, ~500' S of conveyer bridge/pipeline

Weather: Clear, wind S ~ 10-15 mph

Date: 10/25/99 **Time:** 1200 **Samplers' Init.:** PN, VES

Site Water Depth 26.0 **Feet** **NOAA Ref. Level** 577.29 @ 1200

Site Coordinates:

Latitude 41° 41' 26.48" **Longitude** 87° 33' 08.55"

GPS Ref. Site_____ **Ref. Lat.**_____ **Ref. Long.**_____

Collected:

Water ___ **Depth Sampled**____ **Ft.** **Sampler Type**_____

Benthos ___ **Number of Grabs**_____ **Grab Area**_____ **Sq. In.**

Sediment Grab ✓ **Number of Grabs** 1 **Grab Area** 81 **Sq. In.**

Sediment Core ___ **Core Length** ____ **In.** **Core Diam.**_____ **In.**

Sediment Sample Description:

Color Gray-brown **Odor** – **Visible oil or sheen?** –

Inclusions Black specks (coal?) **GS/angularity** Smooth gelatinous silt

Sample Photo ID #(s): 0083, 0084 (View E. to coal loading docks)

Sampling Gear:

Water_____

Sediment Lrg. Ponar

Other:_____

APPENDIX B-6 - Original Field Logbook Forms

SAMPLE LOG

ASci Corporation - Environmental Survey Division

Project Area: Calumet R.

Sampling Site ID: CRS-99-006

Site Description: ~25' off concrete wall opposite W. end of CVS chemical (~75' E. of outfall)

Weather: Clear, wind W ~5 mph

Date: 10/24/99 **Time:** 1700 **Samplers' Init.:** PN, VES

Site Water Depth 27.0* **Feet** **NOAA Ref. Level** 577.61 @ 1700

Site Coordinates:

Latitude 41° 40' 20.55" **Longitude** 87° 33' 08.95"

GPS Ref. Site____ **Ref. Lat.**____ **Ref. Long.**____

Collected:

Water ___ **Depth Sampled**___ **Ft.** **Sampler Type**___

Benthos ___ **Number of Grabs**___ **Grab Area**___ **Sq. In.**

Sediment Grab ___ **Number of Grabs**___ **Grab Area**___ **Sq. In.**

Sediment Core ✓ (1) **Core Length** 40 **In.** **Core Diam.** 4 **In.**

Sediment Sample Description: (see core log)

Color Gray to brown **Odor** ~~Earthy~~ Oily **Visible oil or sheen?** Yes

Inclusions 2 rocks **GS/angularity** Silt ~~[illegible]~~

Sample Photo ID #(s): ~~0075, 0076~~ 0077, 0078 (0080 - View of site)

Sampling Gear:

Water___

Sediment Vibrocorer

Other: *27' = Shallowest depth in station area (water levels higher due to storm)

APPENDIX B-7 - Original Field Logbook Forms

SAMPLE LOG

ASci Corporation - Environmental Survey Division

Project Area: Calumet R., IL

Sampling Site ID: CRS-99-007

Site Description: ~100' S. of weir, ~1,000' W of Torrence Bridge

Weather: Clear, winds calm

Date: 10/24/99 Time: 1600 Samplers' Init.: PN, VES

Site Water Depth 24.5 Feet NOAA Ref. Level 577.69 @ 1600

Site Coordinates:

Latitude 41° 40' 03.99" Longitude 87° 33' 44.48"

GPS Ref. Site_____ Ref. Lat._____ Ref. Long._____

Collected:

Water ____ Depth Sampled____ Ft. Sampler Type_____

Benthos ____ Number of Grabs_____ Grab Area_____ Sq. In.

Sediment Grab ____ Number of Grabs _____ Grab Area_____ Sq. In.

Sediment Core ✓ (1) Core Length 51 In. Core Diam. 4 In.

Sediment Sample Description:

Color Gray to brown Odor Earthy Visible oil or sheen? —

Inclusions Rocks, peat GS/angularity Silt to clay w/ peaty matter

Sample Photo ID #(s): 0075, 0076 (0079 (view of site))

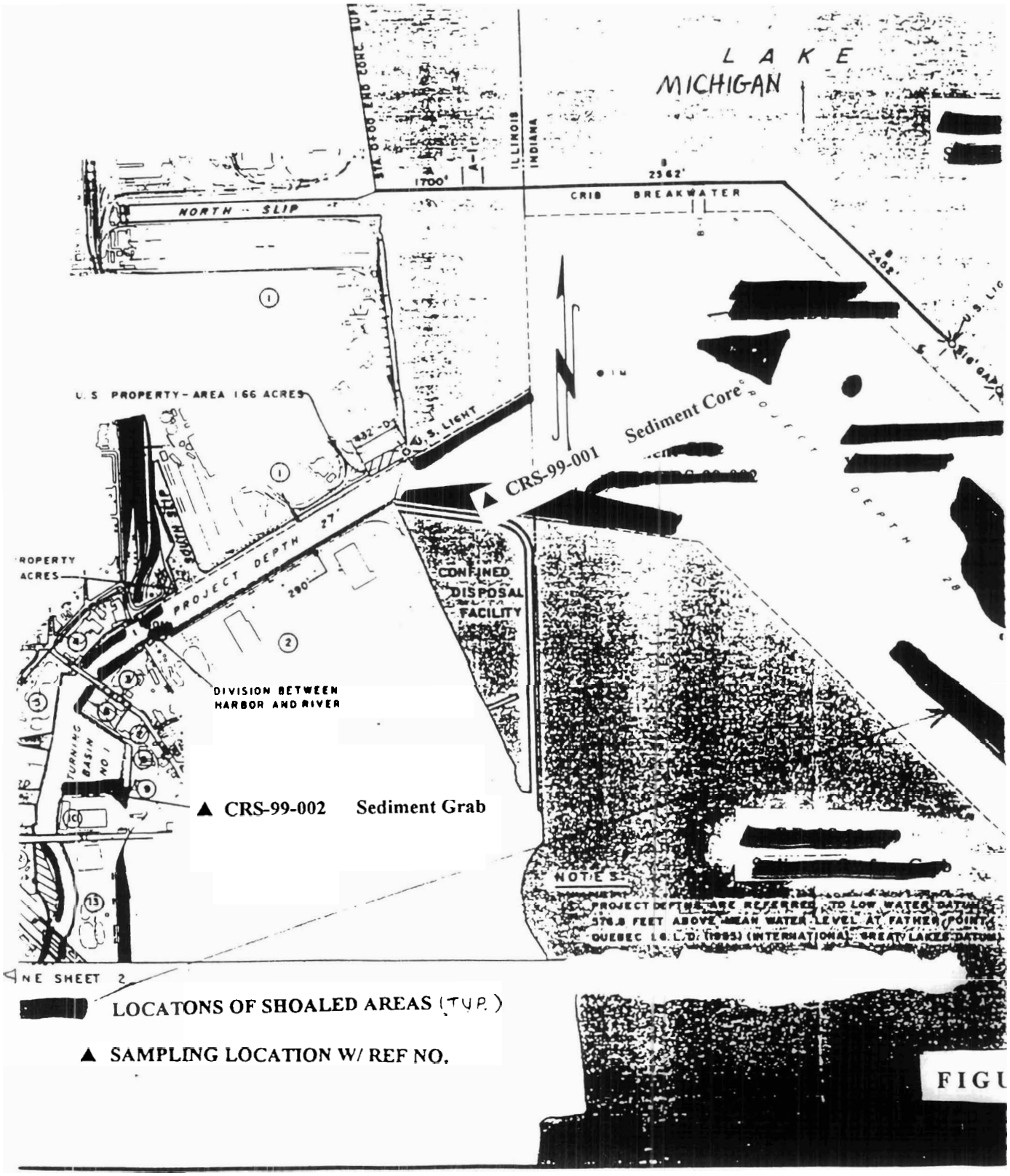
Sampling Gear:

Water_____

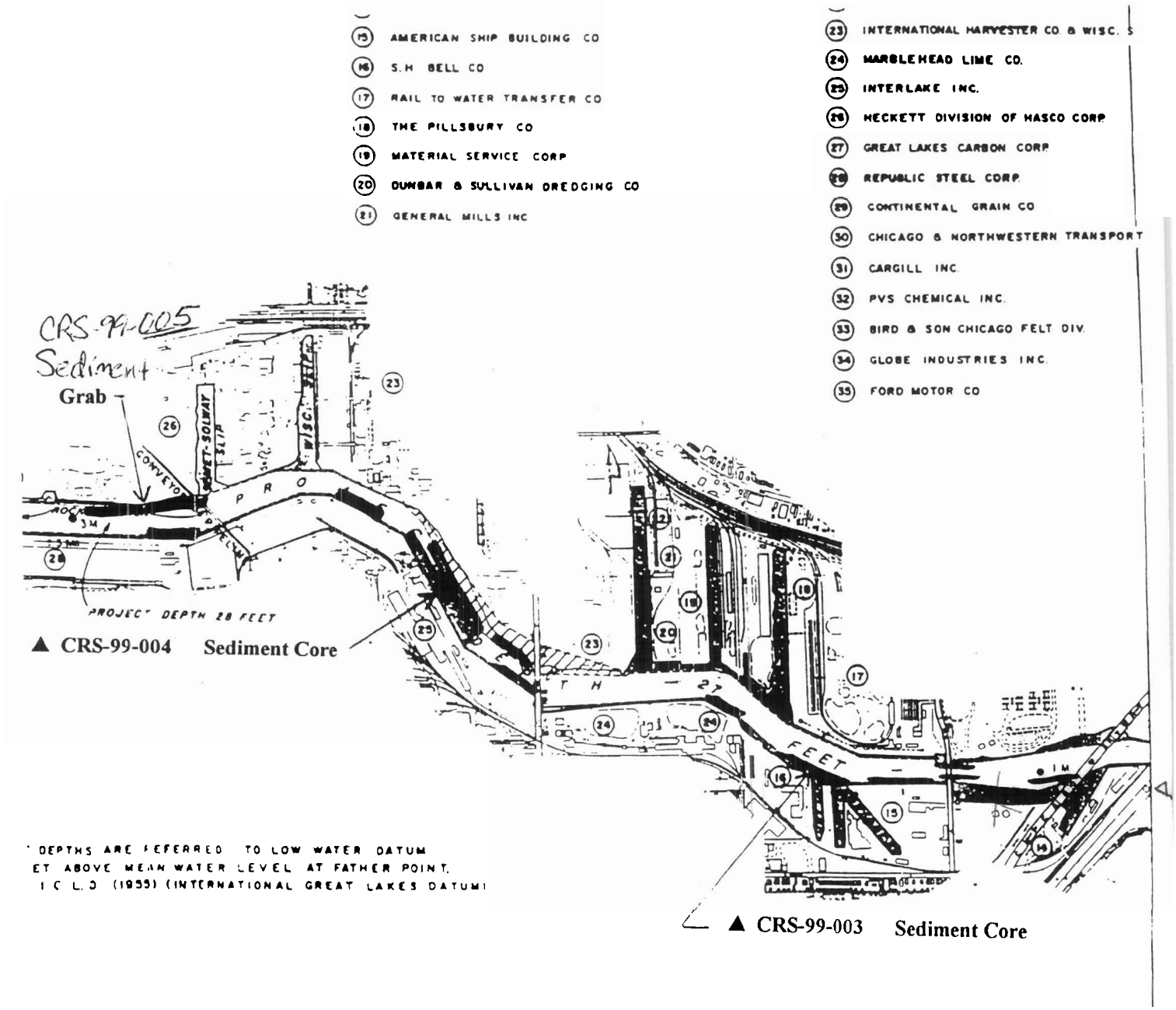
Sediment Vibrocorer

Other:_____

APPENDIX C-1 - Map of Calumet River Sediment Stations



APPENDIX C-2 - Map of Calumet River Sediment Stations



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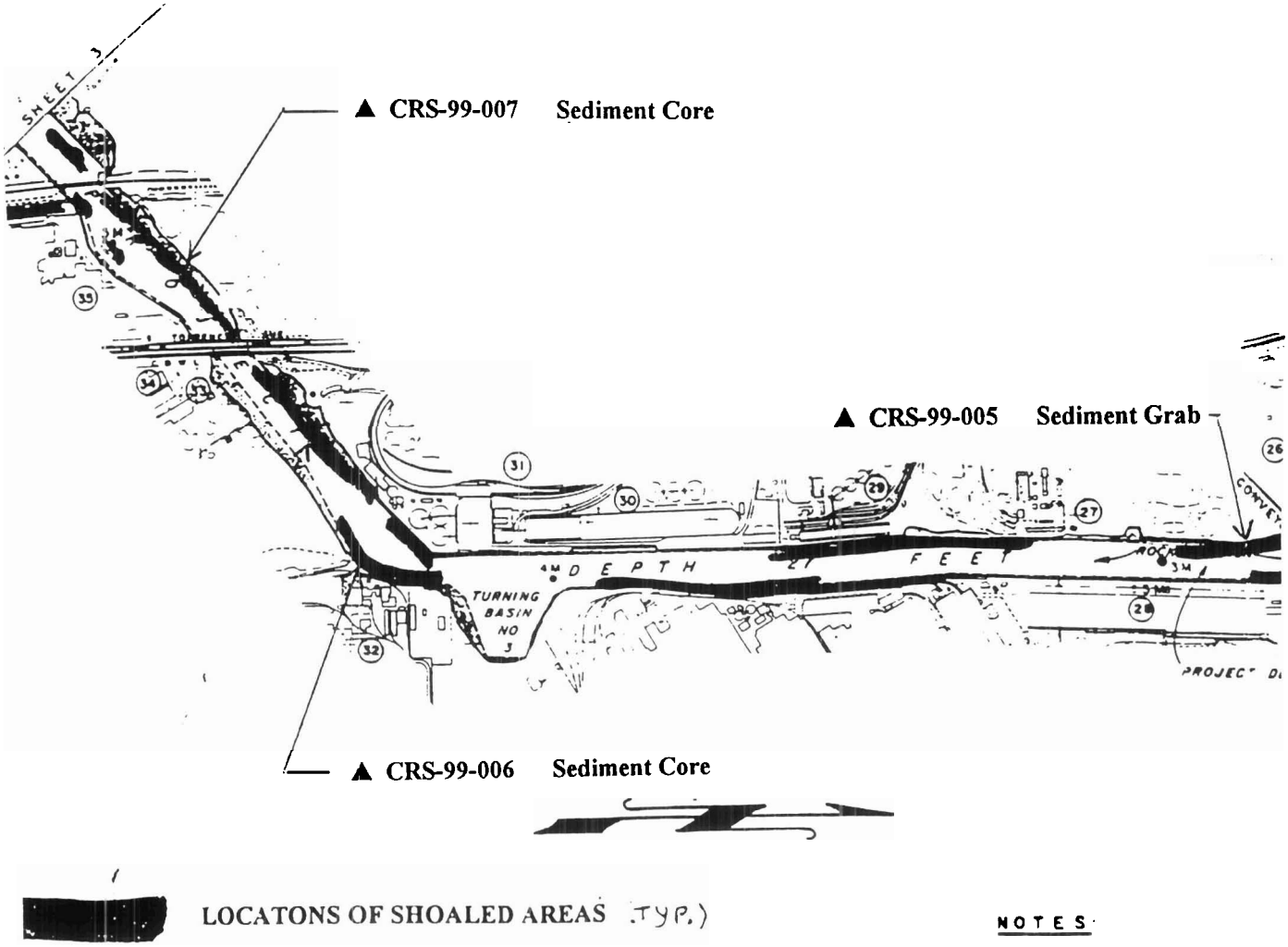
APPENDIX C-3 - Map of Calumet River Sediment Stations



LOCATONS OF SHOALED AREAS (TYP.)

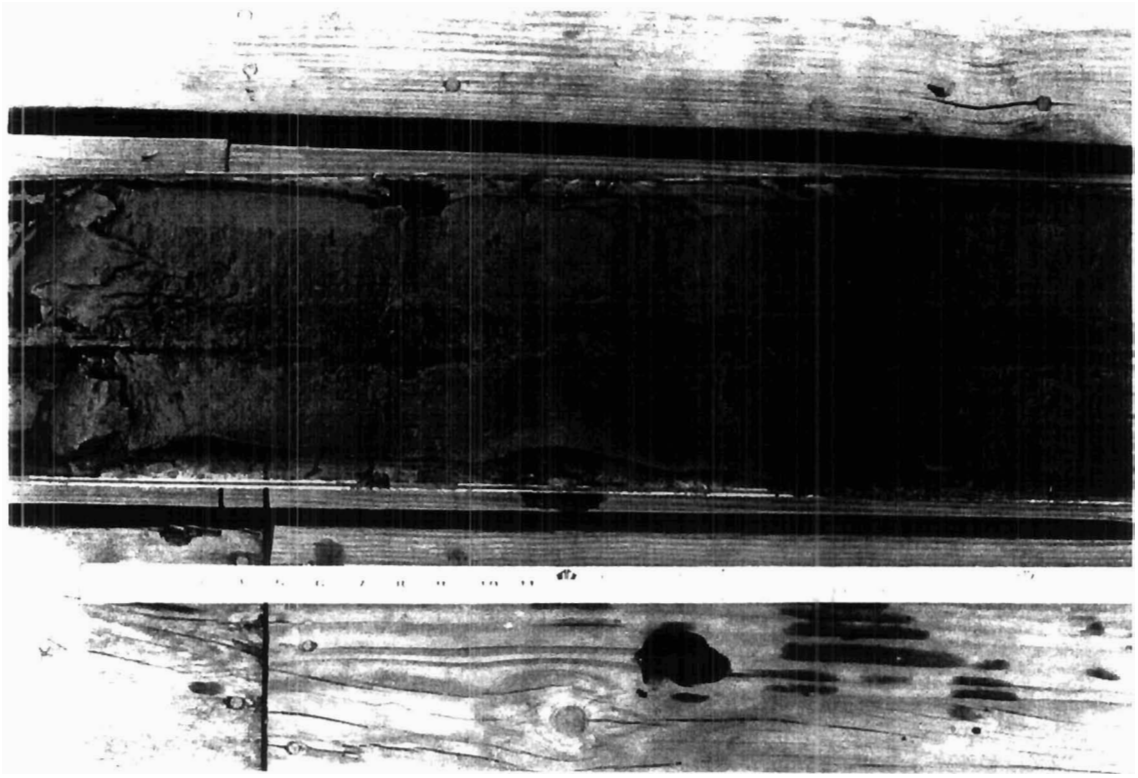
NOTES:

1 PROJECT DEPTHS ARE REF
576.8 FEET ABOVE MEAN
QUEBEC I.C.L.D (1955)

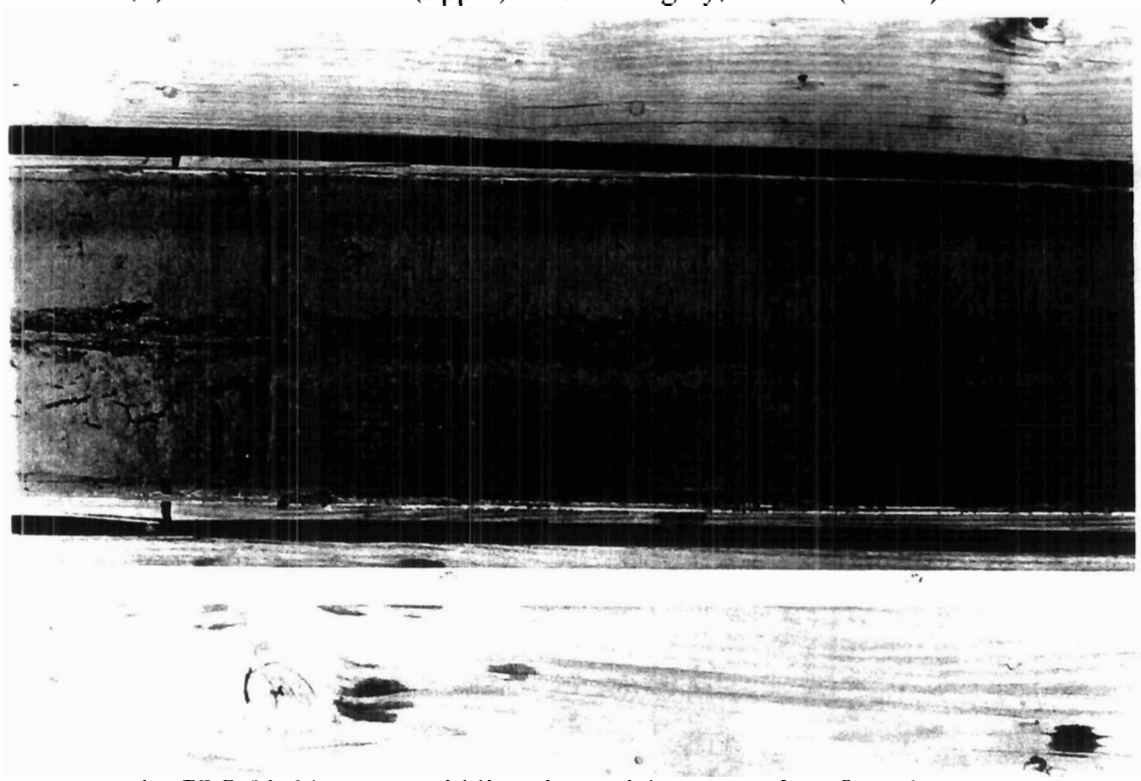
▲ SAMPLING LOCATION W/ REF NO.

FIGURE A-SHEET

APPENDIX D-1 - Sample and Station Photographs

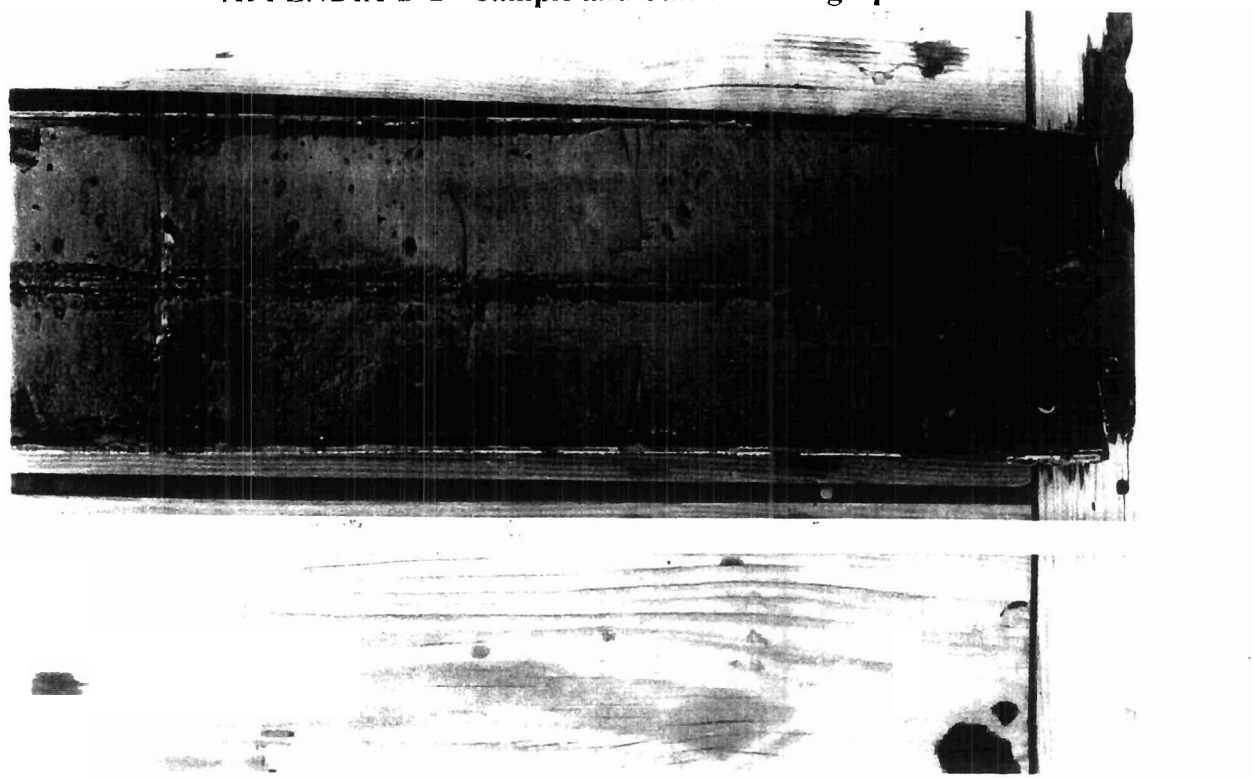


(a) CRS-99-001 core (upper): brownish-gray, soft silt (#0094).

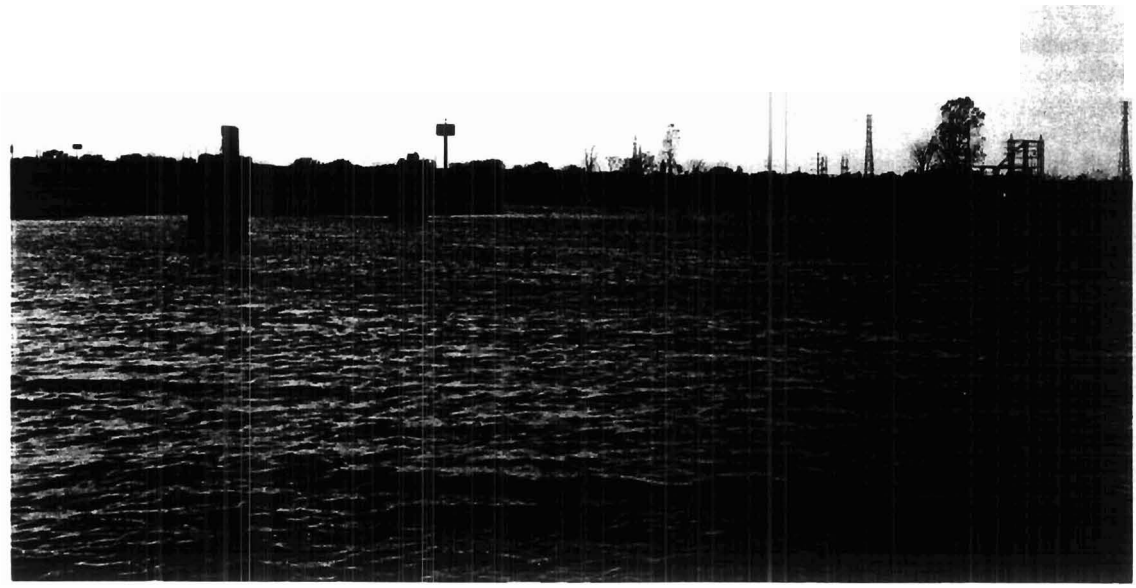


(b) CRS-99-001 core (middle): brownish-gray, soft to firm silt (#0095)

APPENDIX D-2 - Sample and Station Photographs

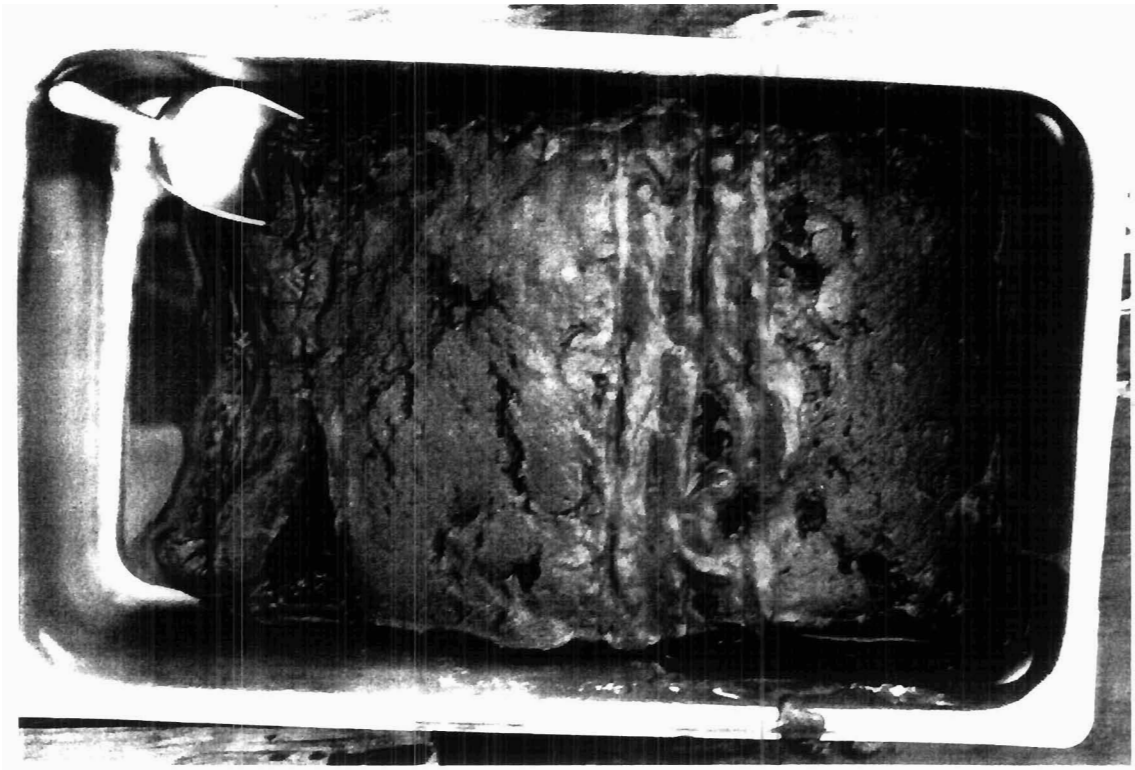


(a) CRS-99-001 core (lower): brownish-gray, firm silt with clay (#0096)



(b) Station CRS-99-001; view northwest to channel entrance (#0086)

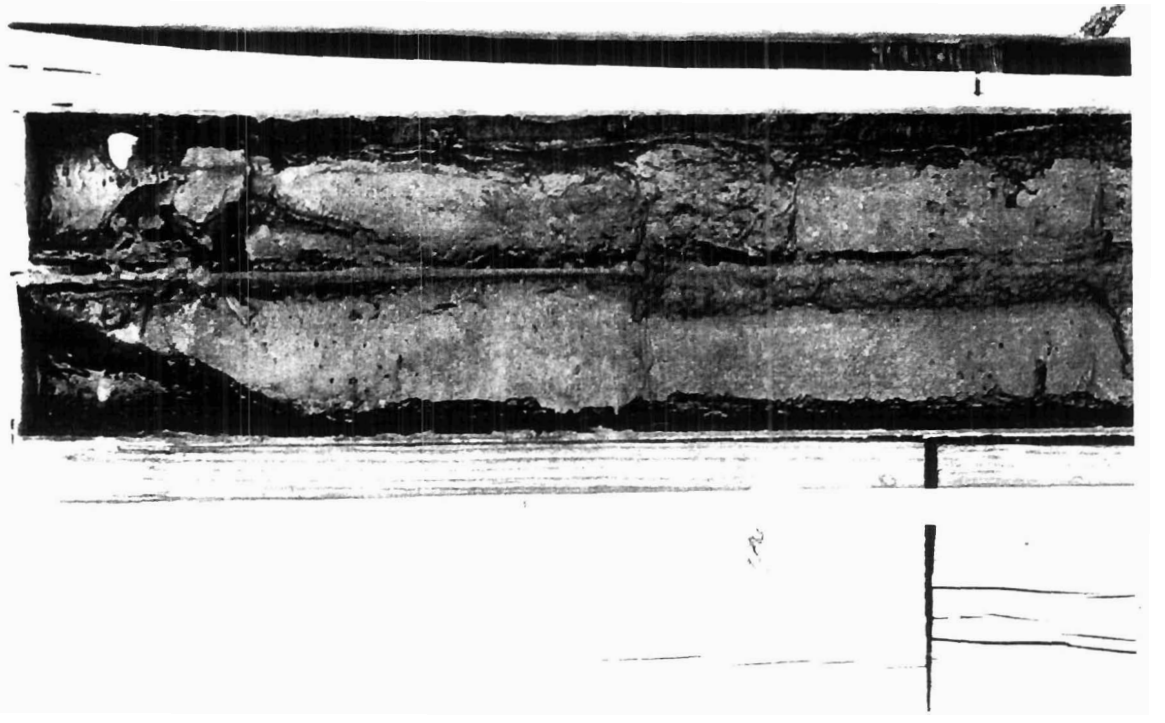
APPENDIX D-3 - Sample and Station Photographs



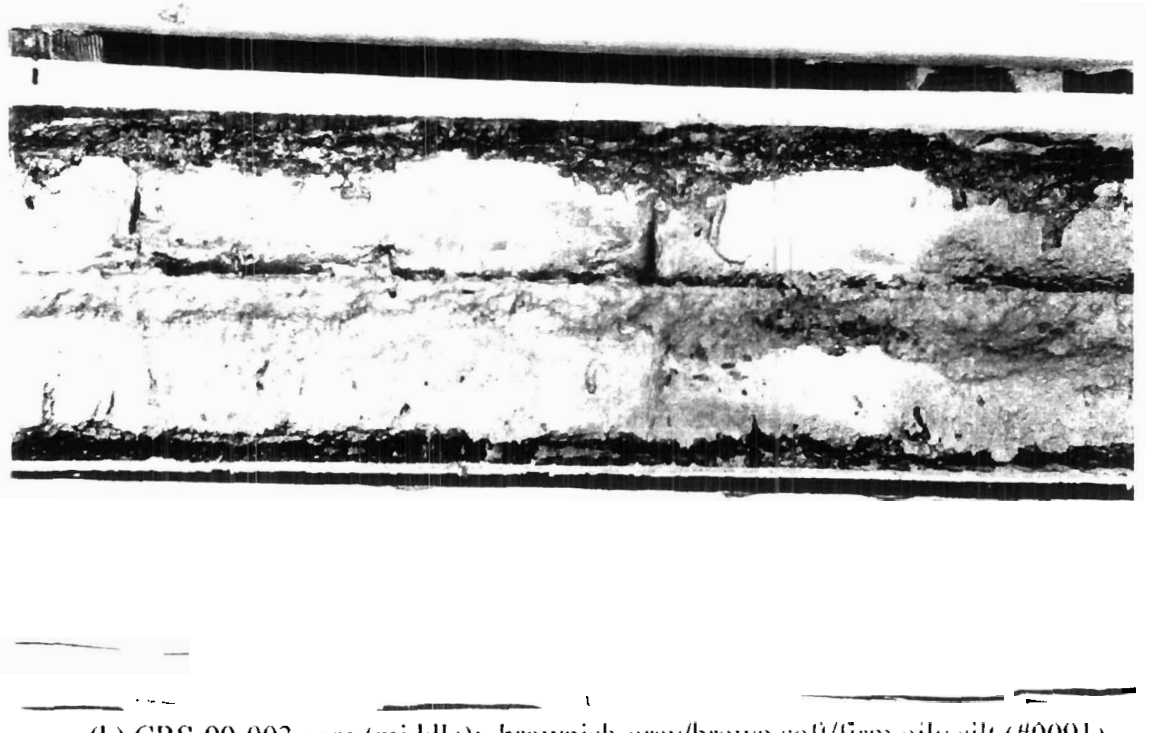
(a) CRS-99-002 grab: brownish-gray, soft to firm oily silt (#0087).

(b) Station CRS-99-002; view east into Turning Basin 1 (#0088).

APPENDIX D-4 - Sample and Station Photographs

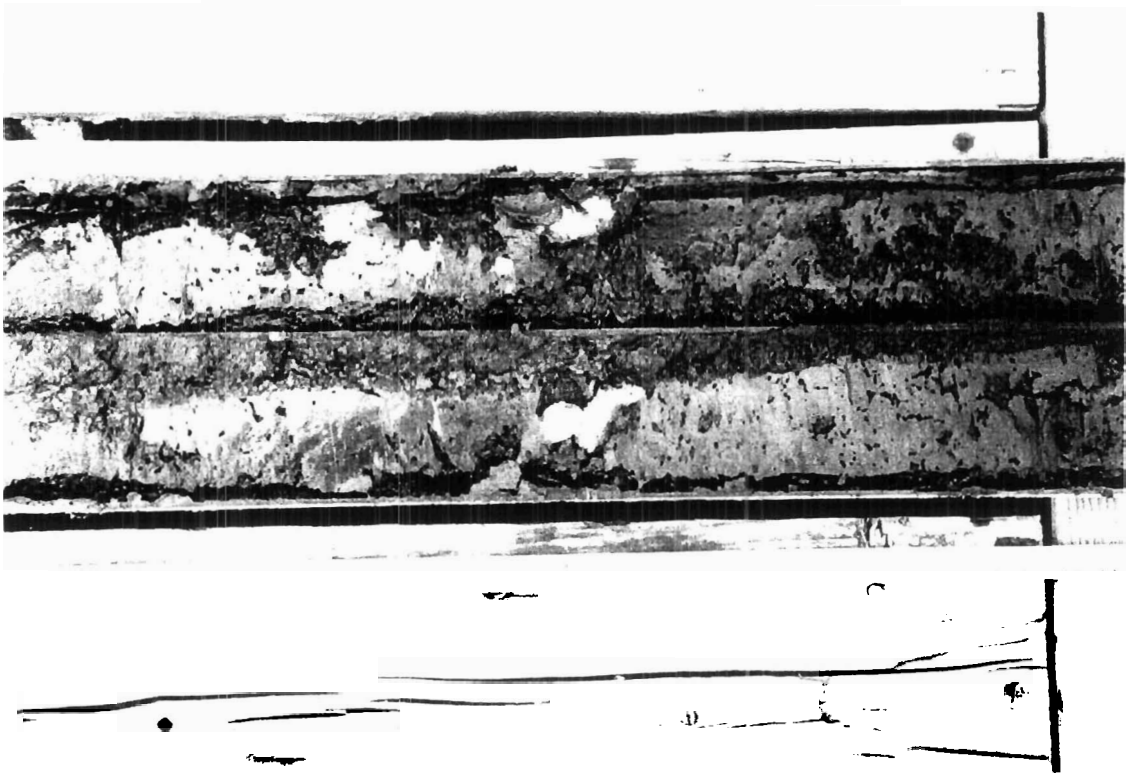


(a) CRS-99-003 core (upper): brownish-gray/brown soft/firm oily silt (#0090).

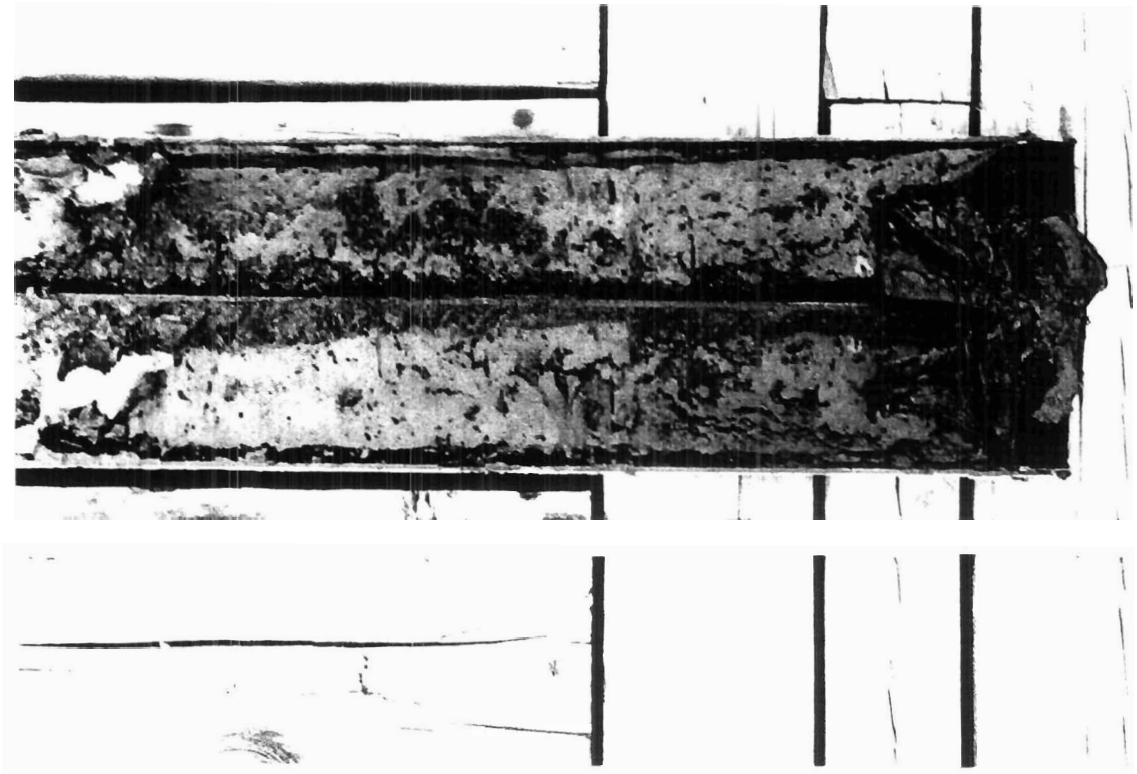


(b) CRS-99-003 core (middle): brownish-gray/brown soft/firm oily silt (#0091).

APPENDIX D-5 - Sample and Station Photographs

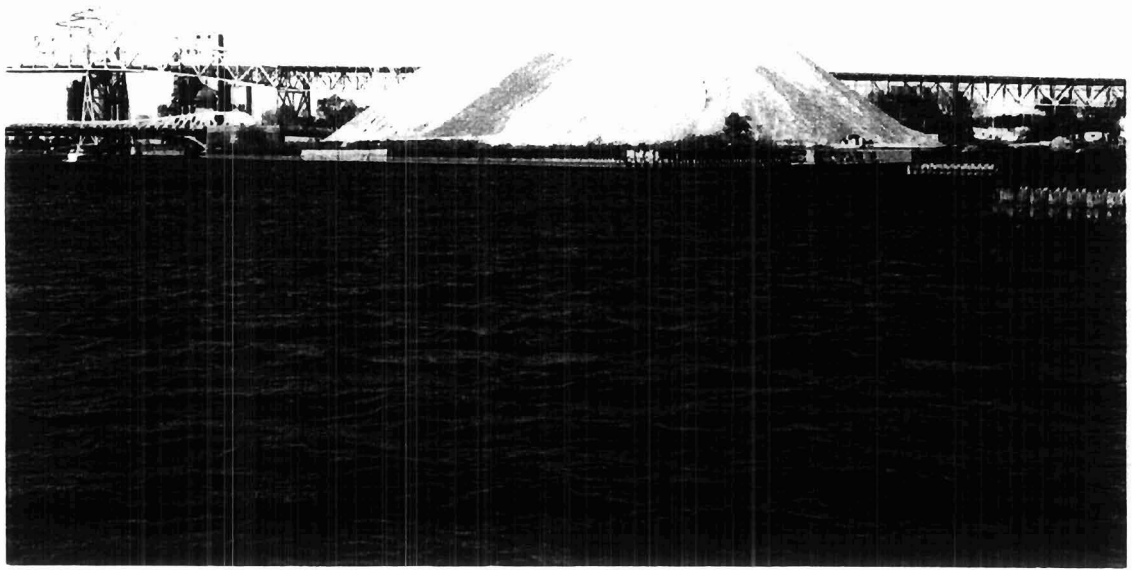


(a) CRS-99-003 core (middle): brownish-gray/brown soft/firm oily silt (#0092).

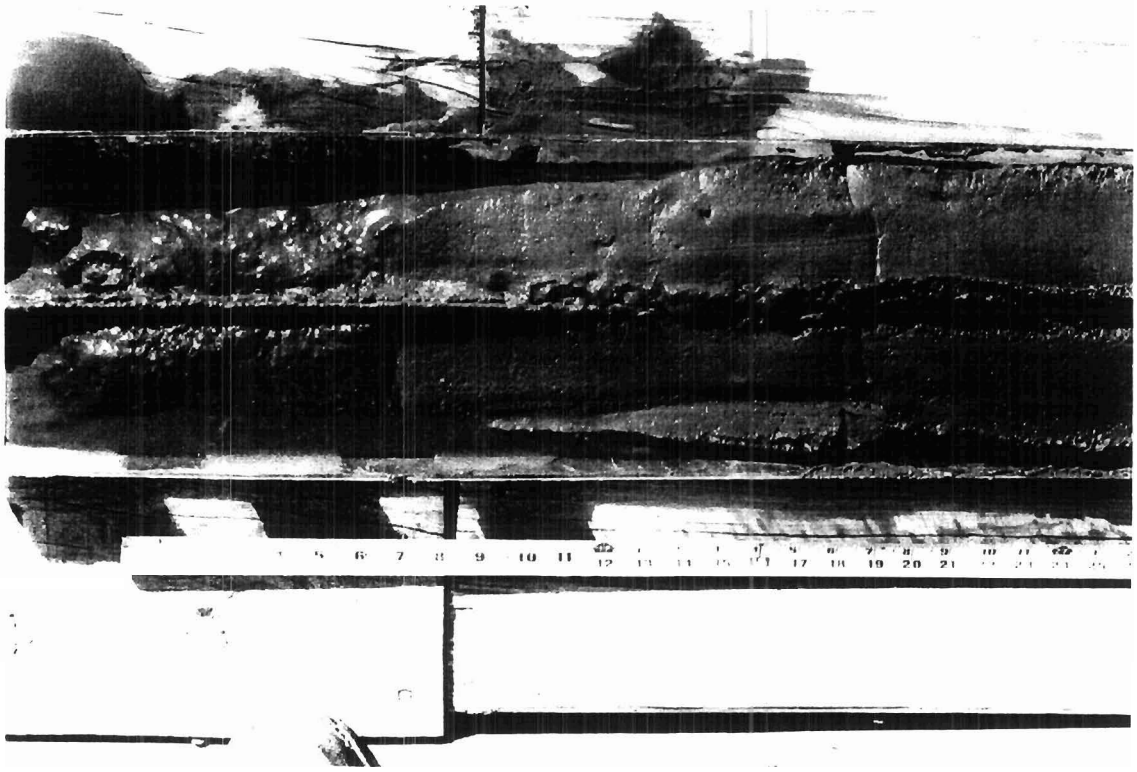


(b) CRS-99-003 core (lower): brownish-gray/brown soft/firm oily silt (#0093).

APPENDIX D-6 - Sample and Station Photographs

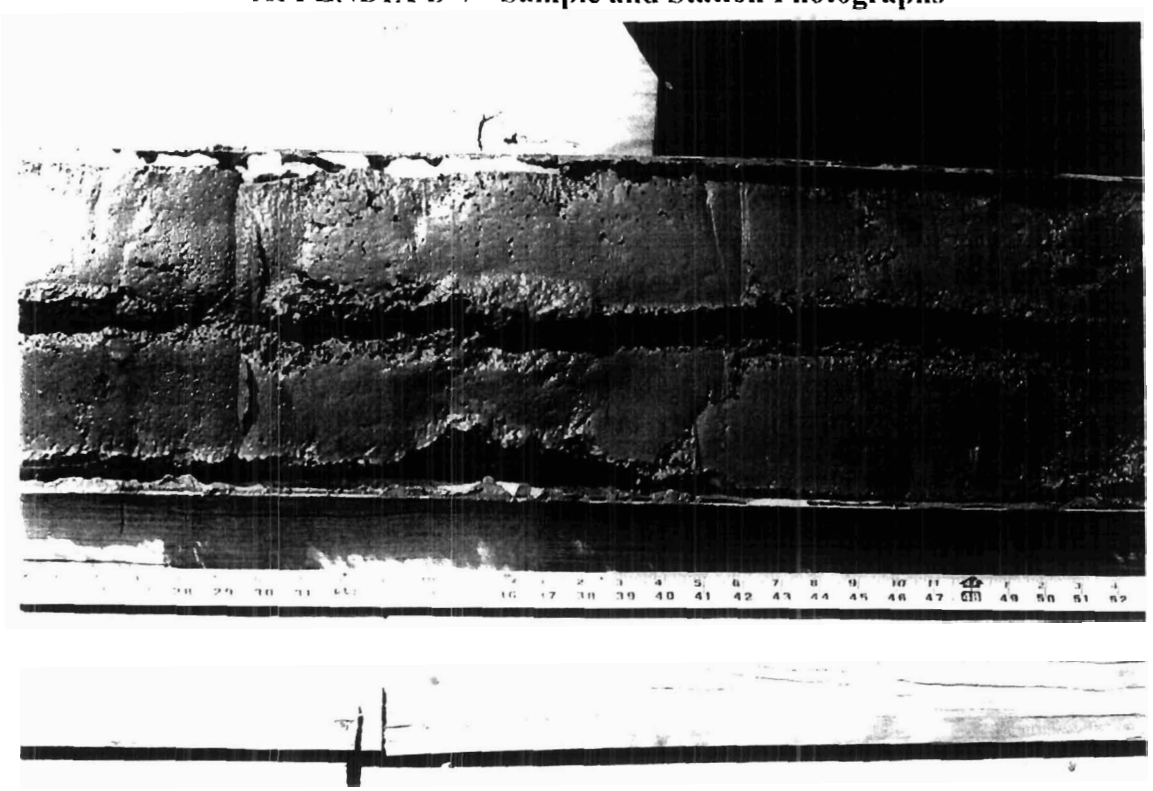


(a) Station CRS-99-003; view northeast from site (#0085).

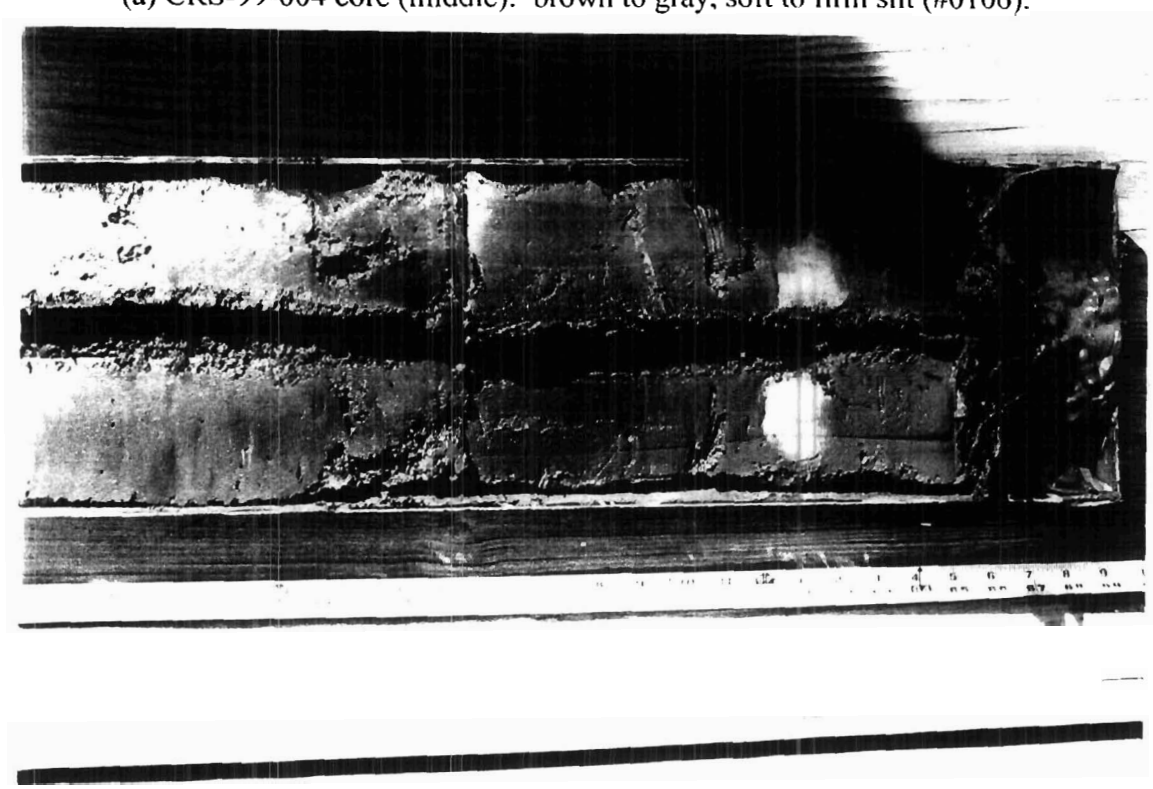


(b) CRS-99-004 core (upper): brown to gray, soft to firm silt (#0105).

APPENDIX D-7 - Sample and Station Photographs

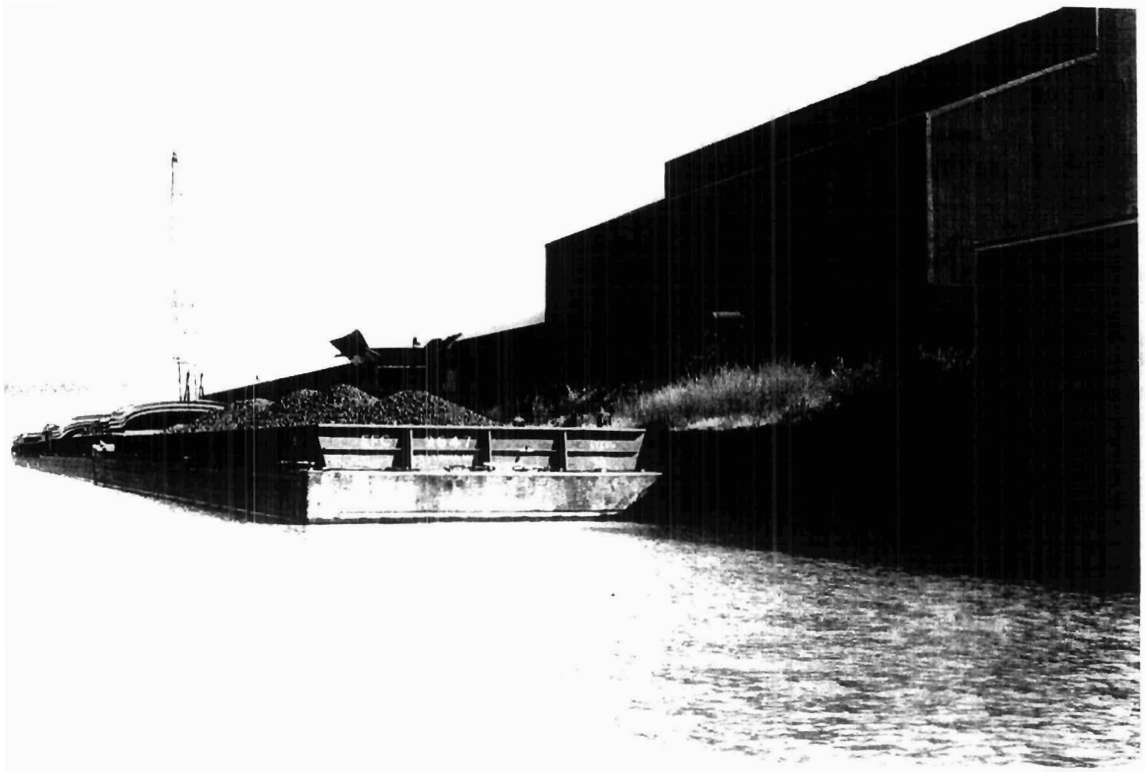


(a) CRS-99-004 core (middle): brown to gray, soft to firm silt (#0106).



(b) CRS-99-004 core (lower): brown to gray, soft to firm silt (#0107).

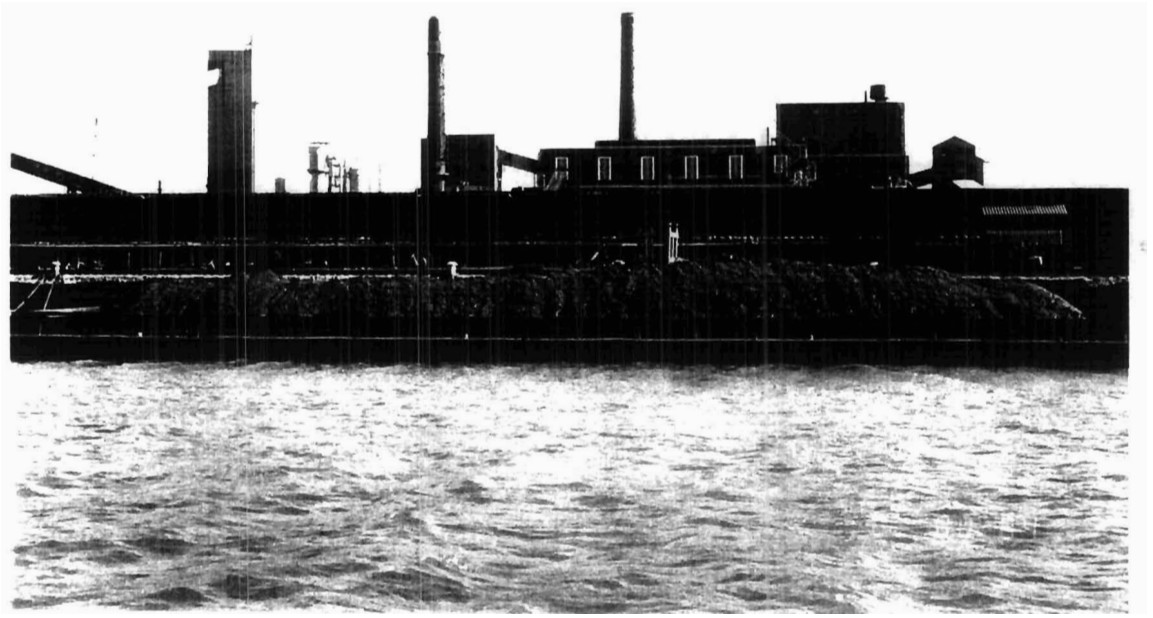
APPENDIX D-8 - Sample and Station Photographs



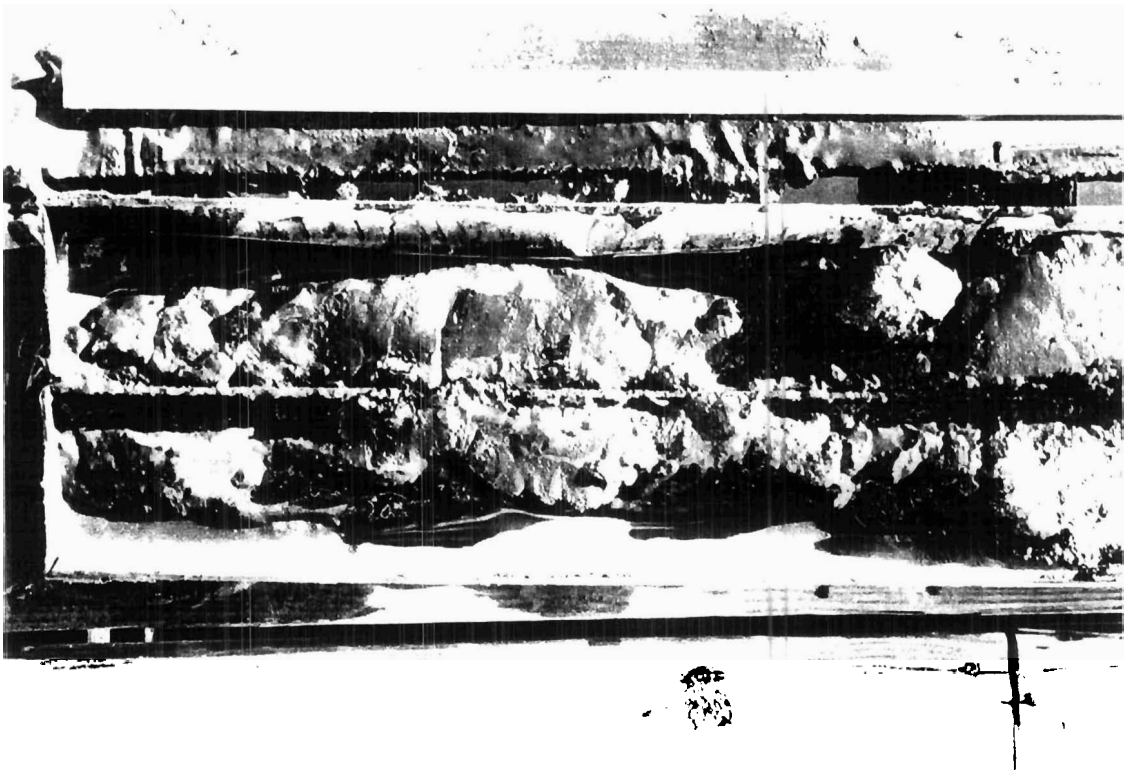
(a)) Station CRS-99-004; view east to station near end of barge (#0097).

(b) CRS-99-005 grab: gray-brown, smooth gelatinous silt w/ specks (#0083).

APPENDIX D-9 - Sample and Station Photographs

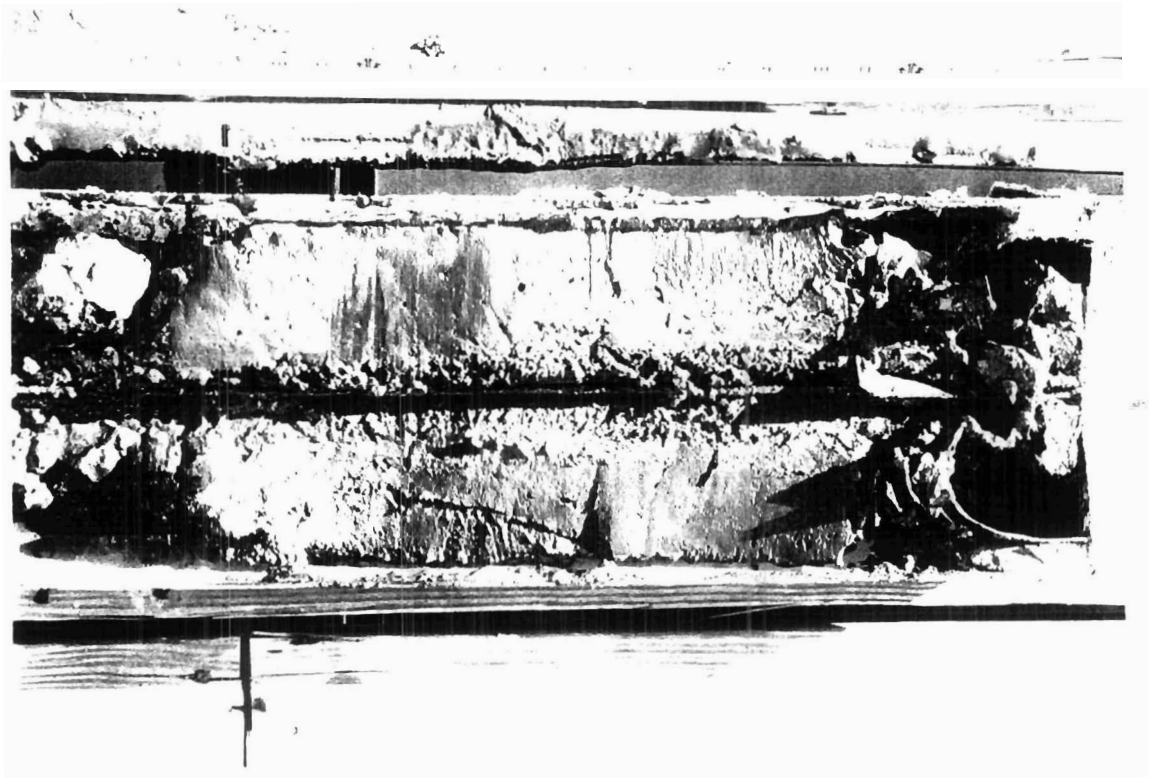


(a) Station CRS-99-005; view east to coal loading dock (#0084).



(b) CRS-99-006 core (upper): gray-brown silt w/ 2 rocks (#0077).

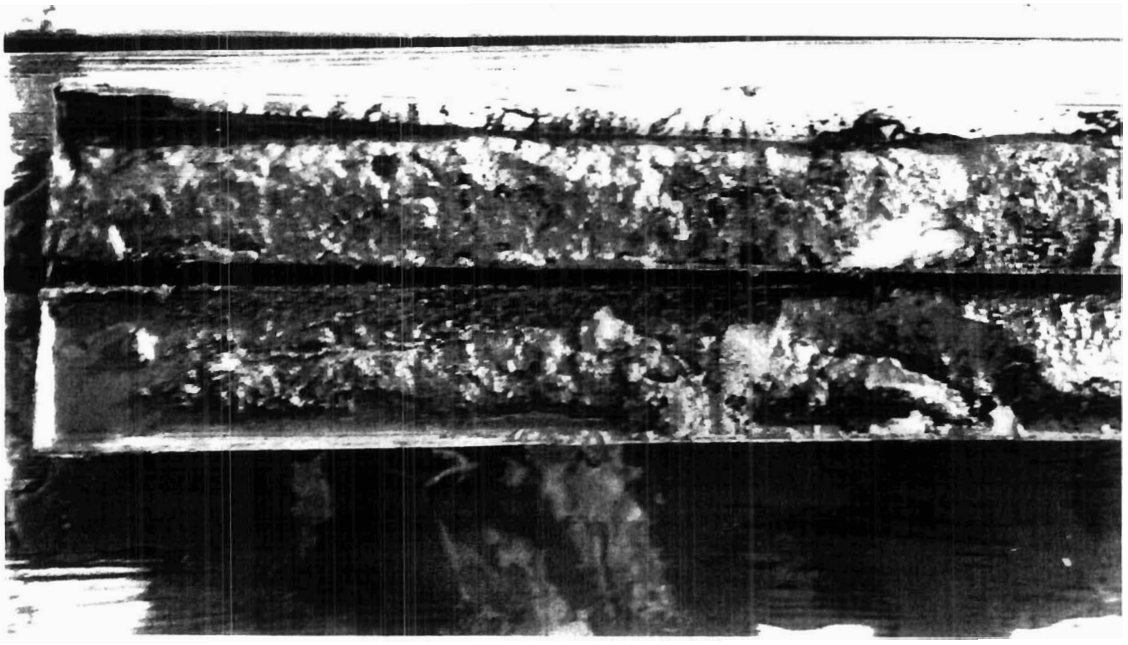
APPENDIX D-10 - Sample and Station Photographs



(a) CRS-99-006 core (lower): gray-brown silt w/ 2 rocks (#0078).

(b) Station CRS-99-006; view of station site (#0080).

APPENDIX D-11 - Sample and Station Photographs



(a) CRS-99-007 core (upper): gray to brown silt/clay w/ peat (#0075).

(b) CRS-99-007 core (lower): gray to brown silt/clay w/ peat (#0076).

APPENDIX D-12 - Sample and Station Photographs

(a) Station CRS-99-007; view of station site (#0079).

Sample Results

Table 1 Calumet River Sediment Bulk Chemistry Data

	Actual Reporting Limit	Units	001	002	003	CRS-99-004	005	006	007	Method Blank	Method Blank
Date Sampled			10/25/99	10/25/99	10/25/99	10/26/99	10/25/99	10/24/99	10/24/99	n/a	n/a
Sample Type			core	grab	core	core	grab	core	core		
Metals											
Arsenic	varies	mg/kg	21	16	18	22	18	46	11	n/d	n/a
Barium	1	mg/kg	73	64	79	80	70	84	48	n/d	n/a
Cadium	varies	mg/kg	1.6	1.4	1.9	4.3	2.1	3.6	0.47	n/d	n/d
Chromium	0.5	mg/kg	54	48	49	72	99	96	29	n/d	n/a
Copper	1	mg/kg	56	62	59	88	140	320	30	n/d	n/a
Lead	varies	mg/kg	180	120	170	340	220	550	52	n/d	n/a
Mercury	0.1	mg/kg	0.22	0.23	0.2	0.27	0.28	1.1	n/d	n/d	n/a
Nickel	varies	mg/kg	27	28	29	41	50	70	30	n/d	n/a
Zinc	varies	mg/kg	520	430	620	1,500	1,100	1,600	190	n/d	n/a
Iron	varies	mg/kg	110,000	59,000	60,000	78,000	67,000	83,000	27,000	n/d	n/a
Manganese	varies	mg/kg	2,000	1,100	2,200	1,800	2,000	1,200	530	n/d	n/a
Ammonia Nitrogen	1	mg/kg	240	77	120	160	85	220	86	1.2	n/a
TKN	varies	mg/kg	980	1,000	640	1,100	1,500	1,000	900	n/d	n/a
Oil & Grease	varies	mg/kg	n/d	n/d	810	670	n/d	2,800	n/d	n/d	n/a
Tot. Phos.	varies	mg/kg	630	600	620	770	690	1,100	400	n/d	n/a
% Vol. Residue	n/a	%	2.3	3.1	3.9	4.4	4.8	3.1	2.5	n/a	n/a
Total Solids (%)	n/a	%	53	56.6	66.3	59.5	50.3	58.4	71.2	n/a	n/a
COD	varies	mg/kg	110,000	120,000	180,000	210,000	310,000	180,000	63,000	n/d	n/a
% Fines [3]	n/a	%	73	66.7	43.8	63.7	83	47.2	44.4	n/a	n/a
% Sand	n/a	%	27	31.8	46.7	33.9	17	43	52.2	n/a	n/a
% Passing 200 sieve	n/a	%	80.4	72.9	48.2	69.3	88.2	50.7	46.1	n/a	n/a
Total Cyanide	.20-.23	mg/kg	0.8	1.5	2.5	5.9	1.7	0.34	1.1	n/d	n/a
PCBs	varies	ug/kg									
Aroclor-1242			n/d	n/d	110	280	340	1,400	n/d	n/d	n/a
Aroclor-1260			n/d	99	n/d	n/d	n/d	n/d	n/d	n/d	n/a

Remaining PCBs were undetected.

Notes:

1 - All units are mg/kg, except where indicated

2 - n/a listed in the method blank means that there was not a method blank run for that particular analysis.

3 - % fines includes silt and clay.

n/a: not applicable

n/d: not detectable

TRACE Analytical Laboratories, Inc.
2241 Black Creek Road • Muskegon, MI 49444-2673 • Phone 231-773-5998 • Fax 231-773-6537

Amended January 12, 2000

Ms. Patti Novak
Lakeshore Engineering
RE: TRACE ID: Y151
8144 Calumet

STATEMENT OF DATA QUALIFICATIONS

TRACE ID:	Y151-06	**Sample ID:**	CRS-99-002
Parameter:	Total Chromium	**Method:**	SW-846 6010

Qualifier:
*

Explanation:
The matrix spike recovery was slightly out of control low, resulting in an out of control RPD result between the matrix spike and the matrix spike duplicate.

Qualification/Narrative:
All positive results for Chromium in the non-spiked version of the sample must be considered estimated.

TRACE ID:	Y151 SB110503	**Sample ID:**	Method Blank
Parameter:	Ammonia	**Method:**	EPA 350.1

Qualifier:
*

Explanation:
The Method Blank had a 1.2 mg/L hit for Ammonia.

Qualification/Narrative:
Because the hit of Ammonia in the Method Blank was less than 5% of what was found in the samples, no data requires qualification.

Dodson Stilson

Dodson-Stilson, Inc.

ENGINEERS • ARCHITECTS • SCIENTISTS

A DLZ Company

November 19, 1999

Ms. Ann L. Preston
Trace Analytical Laboratories, Inc.
2241 Black Creek Road
Muskegon, MI 49444

Re: Laboratory Test Report
Columet
Indiana
DSI Job No. 9921-321200

Dear Ms. Preston:

Please find enclosed the results of the Laboratory Testing performed for the referenced project. The laboratory testing includes:

Sample No.	Grain Size Analysis With Hydrometer Analysis (ASTM D421, ASTM D422)	Water Content (ASTM D2216)
CRS-99-001	✓	✓
CRS-99-002	✓	✓
CRS-99-003	✓	✓
CRS-99-004	✓	✓
CRS-99-005	✓	✓
CRS-99-006	✓	✓
CRS-99-007	✓	✓

We would like to thank you for letting us be of service to you. If you should have any questions, please feel free to call.

Sincerely,

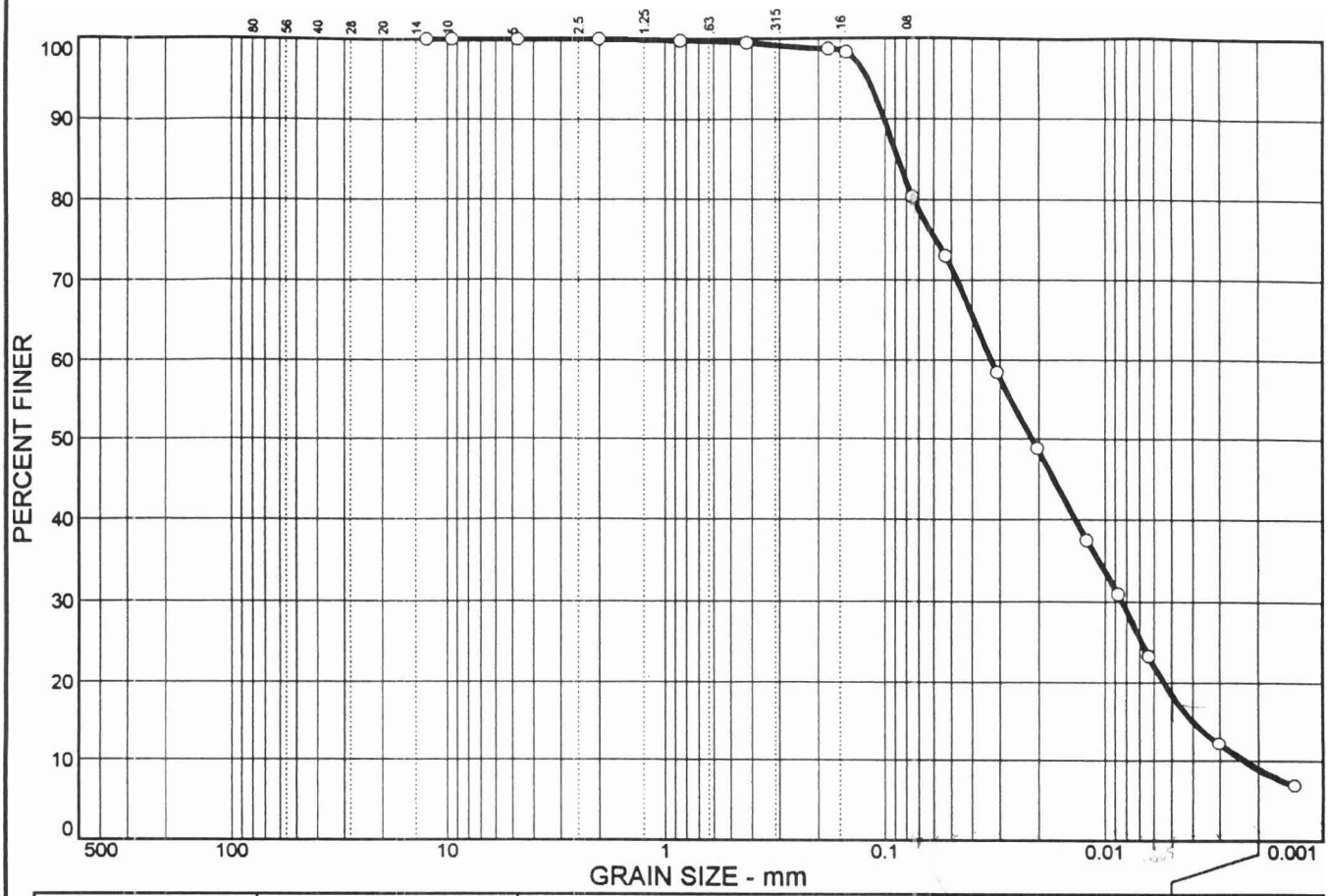
DODSON-STILSON, INC., a DLZ Company

Barry K. Wong, MSCE, P.E.
Geotechnical Field Services Manager

BKW/cb
I:\SECT\9921\321200\COLUMET.BKW

6121 Huntley Road • Columbus, Ohio 43229-1003 • (614) 848-4141 • FAX (614) 848-6712
With Offices Throughout Ohio, Indiana and Michigan

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	0.5	26.5	64.0	9.0

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
12.5 mm.	100.0		
9.5 mm.	100.0		
4.75 mm.	100.0		
2.00 mm.	100.0		
0.850 mm.	99.8		
0.425 mm.	99.5		
0.180 mm.	98.7		
0.150 mm.	98.3		
0.075 mm.	80.4		
0.053 mm.	73.0		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.0872 D_{60}= 0.0329 D_{50}= 0.0214
D_{30}= 0.0084 D_{15}= 0.0039 D_{10}= 0.0023
C_u= 14.17 C_c= 0.93

Classification

USCS= AASHTO=

Remarks

Moisture Content= 84.4%

Sample No.: CRS-99-001 **Source of Sample:** **Date:** 11/18/99
Location: Y151-05 **Elev./Depth:**

DODSON-STILSON, INC.

Client: Trace Analytical Lab
Project: Calumet
Test Methods: ASTM D-421, D-422, D-2216
Project No: 9921-3212.00 **Plate**

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Trace Analytical Lab
Project: Calumet
Test Methods: ASTM D-421, D-422, D-2216
Project Number: 9921-3212.00

Sample Data

Source:
Sample No.: CRS-99-001
Elev. or Depth: **Sample Length (in./cm.):**
Location: Y151-05
Description:
Date: 11/18/99 **PL:** **LL:** **PI:**
USCS Classification: **AASHTO Classification:**
Testing Remarks: Moisture Content= 84.4%

Mechanical Analysis Data

	Initial
Dry sample and tare=	47.88
Tare =	0.00
Dry sample weight =	47.88

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
12.5 mm	0.00	0.00	100.0
9.5 mm	0.00	0.00	100.0
4.75 mm	0.00	0.00	100.0
2.00 mm	0.00	0.00	100.0
0.850 mm	0.09	0.00	99.8
0.425 mm	0.13	0.00	99.5
0.180 mm	0.39	0.00	98.7
0.150 mm	0.21	0.00	98.3
0.075 mm	8.58	0.00	80.4
0.053 mm	3.52	0.00	73.0

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 100.0
Weight of hydrometer sample: 47.88
Calculated biased weight= 47.88
Automatic temperature correction
Composite correction at 20 deg C = -3.7

Meniscus correction only=
Specific gravity of solids= 2.7
Hydrometer type: 151H
Effective depth L= 16.294964 - 0.2645 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.2	1.0213	1.0176	0.0134	21.3	10.7	0.0310	58.4
5.00	20.2	1.0184	1.0147	0.0134	18.4	11.4	0.0203	48.8
15.00	20.3	1.0150	1.0113	0.0134	15.0	12.3	0.0121	37.5
30.00	20.4	1.0130	1.0093	0.0134	13.0	12.9	0.0088	30.9

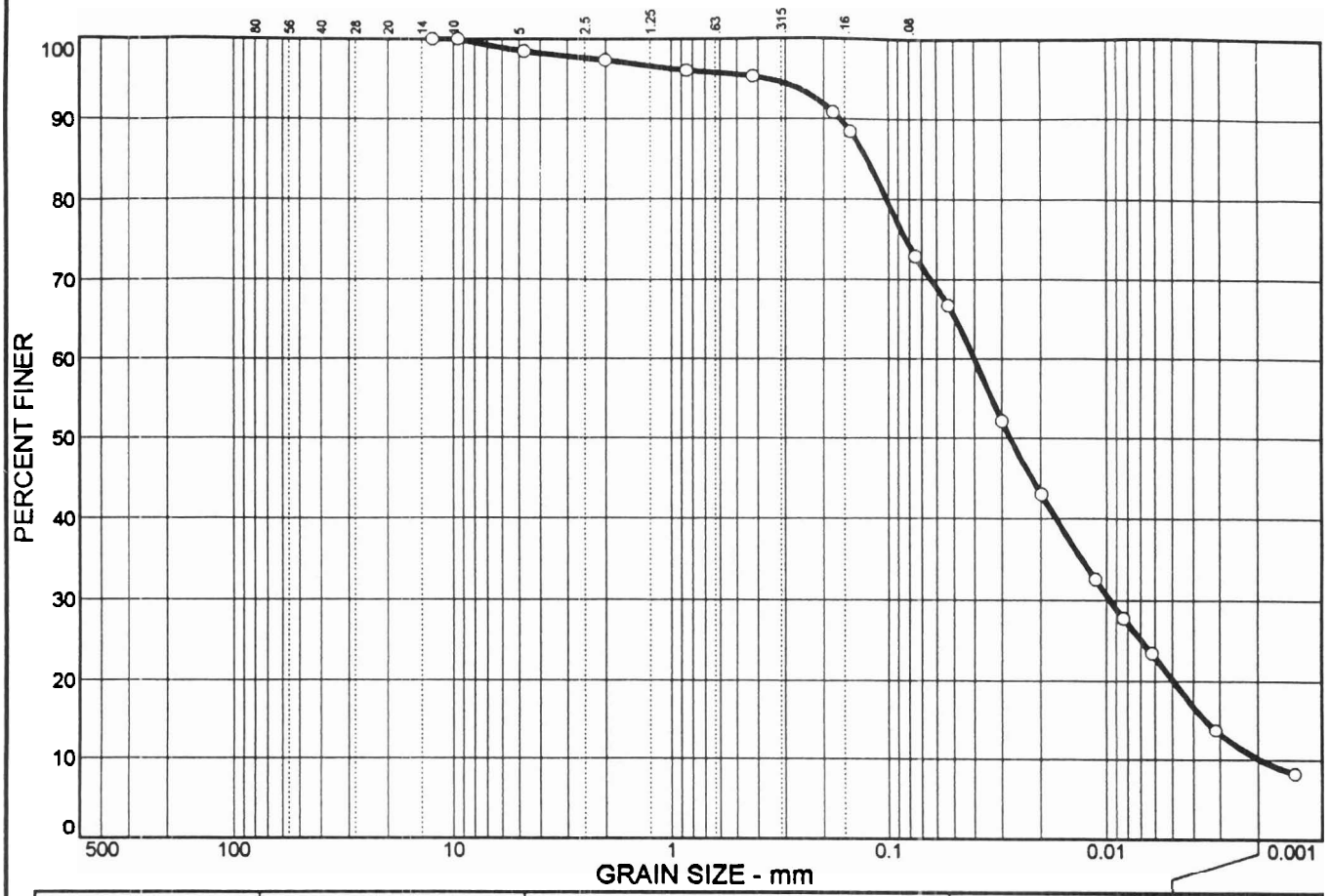
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
60.00	20.5	1.0107	1.0070	0.0134	10.7	13.5	0.0063	23.3
272.00	21.4	1.0072	1.0037	0.0132	7.2	14.4	0.0030	12.2
1440.00	20.2	1.0058	1.0021	0.0134	5.8	14.8	0.0014	7.0

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #270
% COBBLES = % GRAVEL =
% SAND = 27.0 (% coarse = 0.0 % medium = 0.5 % fine = 26.5)
% SILT = 64.0 % CLAY = 9.0

D_{85}= 0.09 D_{60}= 0.03 D_{50}= 0.02
D_{30}= 0.01 D_{15}= 0.00 D_{10}= 0.00
C_c= 0.9284 C_u= 14.1711

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	1.5	1.1	2.1	28.6	56.6	10.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
12.5 mm.	100.0		
9.5 mm.	100.0		
4.75 mm.	98.5		
2.00 mm.	97.4		
0.850 mm.	96.1		
0.425 mm.	95.3		
0.180 mm.	90.8		
0.150 mm.	88.4		
0.075 mm.	72.9		
0.053 mm.	66.7		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.126 D_{60}= 0.0402 D_{50}= 0.0275
D_{30}= 0.0096 D_{15}= 0.0035 D_{10}= 0.0019
C_u= 20.66 C_c= 1.19

Classification

USCS= AASHTO=

Remarks

Moisture Content= 81.3%

Sample No.: CRS-99-002 **Source of Sample:** **Date:** 11/18/99
Location: Y151-06 **Elev./Depth:**

DODSON-STILSON, INC.

Client: Trace Analytical Lab
Project: Calumet
Test Methods: ASTM D-421, D-422, D-2216
Project No: 9921-3212.00 **Plate**

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Trace Analytical Lab
Project: Calumet
Test Methods: ASTM D-421, D-422, D-2216
Project Number: 9921-3212.00

Sample Data

Source:
Sample No.: CRS-99-002
Elev. or Depth: **Sample Length (in./cm.):**
Location: Y151-06
Description:
Date: 11/18/99 **PL:** **LL:** **PI:**
USCS Classification: **AASHTO Classification:**
Testing Remarks: Moisture Content= 81.3%

Mechanical Analysis Data

	Initial
Dry sample and tare=	272.57
Tare =	61.07
Dry sample weight =	211.50

Sample split on 2.00 mm mm sieve
Split sample data:
Sample and tare = 59.71 Tare = .00 Sample weight = 59.71

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
12.5 mm	0.00	0.00	100.0
9.5 mm	0.00	0.00	100.0
4.75 mm	3.22	0.00	98.5
2.00 mm	2.31	0.00	97.4
0.850 mm	0.77	0.00	96.1
0.425 mm	0.55	0.00	95.3
0.180 mm	2.75	0.00	90.8
0.150 mm	1.42	0.00	88.4
0.075 mm	9.51	0.00	72.9
0.053 mm	3.83	0.00	66.7

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 97.4
Weight of hydrometer sample: 59.71
Calculated biased weight= 61.30
Automatic temperature correction
Composite correction at 20 deg C = -3.7

Meniscus correction only=
Specific gravity of solids= 2.7
Hydrometer type: 151H
Effective depth L= 16.294964 - 0.2645 x Rm

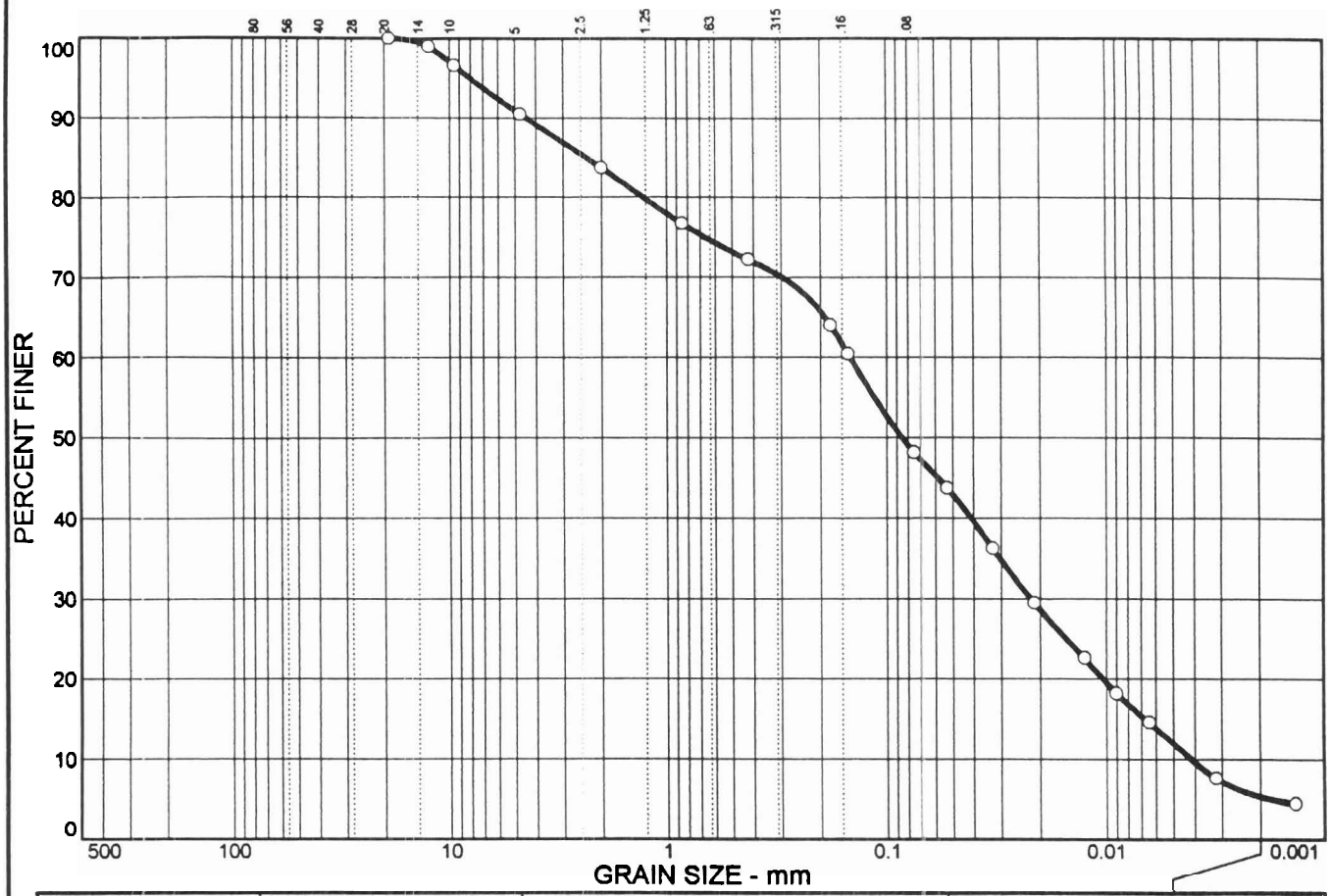
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.3	1.0238	1.0201	0.0134	23.8	10.0	0.0299	52.1
5.00	20.3	1.0203	1.0166	0.0134	20.3	10.9	0.0198	43.0
17.00	20.4	1.0162	1.0125	0.0134	16.2	12.0	0.0112	32.5
32.00	20.4	1.0144	1.0107	0.0134	14.4	12.5	0.0084	27.8
60.00	20.6	1.0127	1.0091	0.0133	12.7	12.9	0.0062	23.5
252.00	20.6	1.0090	1.0053	0.0133	9.0	13.9	0.0031	13.8
1441.00	20.2	1.0069	1.0032	0.0134	6.9	14.5	0.0013	8.3

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #270
% COBBLES = % GRAVEL = 1.5 (% coarse = % fine = 1.5)
% SAND = 31.8 (% coarse = 1.1 % medium = 2.1 % fine = 28.6)
% SILT = 56.6 % CLAY = 10.1

D_{85}= 0.13 D_{60}= 0.04 D_{50}= 0.03
D_{30}= 0.01 D_{15}= 0.00 D_{10}= 0.00
C_c= 1.1892 C_u= 20.6597

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	9.5	6.8	11.5	28.4	38.4	5.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19.0 mm.	100.0		
12.5 mm.	99.0		
9.5 mm.	96.6		
4.75 mm.	90.5		
2.00 mm.	83.7		
0.850 mm.	76.7		
0.425 mm.	72.2		
0.180 mm.	64.0		
0.150 mm.	60.4		
0.075 mm.	48.2		
0.053 mm.	43.8		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 2.35 D_{60}= 0.147 D_{50}= 0.0849
D_{30}= 0.0221 D_{15}= 0.0066 D_{10}= 0.0041
C_u= 35.51 C_c= 0.80

Classification

USCS= AASHTO=

Remarks

Moisture Content= 45.1%

Sample No.: CRS-99-003 **Source of Sample:** **Date:** 11/18/99
Location: Y151-04 **Elev./Depth:**

DODSON-STILSON, INC.

Client: Trace Analytical Lab
Project: Calumet
Test Methods: ASTM D-421, D-422, D-2216
Project No: 9921-3212.00 **Plate**

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Trace Analytical Lab
Project: Calumet
Test Methods: ASTM D-421, D-422, D-2216
Project Number: 9921-3212.00

Sample Data

Source:
Sample No.: CRS-99-003
Elev. or Depth: **Sample Length (in./cm.):**
Location: Y151-04
Description:
Date: 11/18/99 **PL:** **LL:** **PI:**
USCS Classification: **AASHTO Classification:**
Testing Remarks: Moisture Content= 45.1%

Mechanical Analysis Data

	Initial
Dry sample and tare=	272.61
Tare =	65.82
Dry sample weight =	206.79

Sample split on 2.00 mm mm sieve
Split sample data:
Sample and tare = 46.41 Tare = .00 Sample weight = 46.41

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
19.0 mm	0.00	0.00	100.0
12.5 mm	2.13	0.00	99.0
9.5 mm	4.84	0.00	96.6
4.75 mm	12.59	0.00	90.5
2.00 mm	14.07	0.00	83.7
0.850 mm	3.86	0.00	76.7
0.425 mm	2.54	0.00	72.2
0.180 mm	4.52	0.00	64.0
0.150 mm	1.98	0.00	60.4
0.075 mm	6.81	0.00	48.2
0.053 mm	2.39	0.00	43.8

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 83.7
Weight of hydrometer sample: 46.41
Calculated biased weight= 55.45
Automatic temperature correction
Composite correction at 20 deg C = -3.7

Meniscus correction only=
Specific gravity of solids= 2.7
Hydrometer type: 151H
Effective depth L= 16.294964 - 0.2645 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.1	1.0164	1.0127	0.0134	16.4	12.0	0.0328	36.3
5.00	20.1	1.0140	1.0103	0.0134	14.0	12.6	0.0213	29.5
15.00	20.1	1.0116	1.0079	0.0134	11.6	13.2	0.0126	22.6
30.00	20.2	1.0101	1.0064	0.0134	10.1	13.6	0.0090	18.3
60.00	20.5	1.0088	1.0051	0.0134	8.8	14.0	0.0064	14.7
250.00	21.5	1.0062	1.0027	0.0132	6.2	14.7	0.0032	7.7
1440.00	20.0	1.0053	1.0016	0.0134	5.3	14.9	0.0014	4.5

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #270
% COBBLES = % GRAVEL = 9.5 (% coarse = % fine = 9.5)
% SAND = 46.7 (% coarse = 6.8 % medium = 11.5 % fine = 28.4)
% SILT = 38.4 % CLAY = 5.4

D_{85}= 2.35 D_{60}= 0.15 D_{50}= 0.08
D_{30}= 0.02 D_{15}= 0.01 D_{10}= 0.00
C_c= 0.7984 C_u= 35.5054

PARTICLE SIZE DISTRIBUTION TEST REPORT

% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	2.4	0.6	5.6	27.7	56.1	7.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
12.5 mm.	100.0		
9.5 mm.	98.5		
4.75 mm.	97.6		
2.00 mm.	97.0		
0.850 mm.	93.9		
0.425 mm.	91.4		
0.180 mm.	86.0		
0.150 mm.	82.7		
0.075 mm.	69.3		
0.053 mm.	63.7		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.170 D_{60}= 0.0433 D_{50}= 0.0269
D_{30}= 0.0099 D_{15}= 0.0043 D_{10}= 0.0028
C_u= 15.63 C_c= 0.81

Classification

USCS= AASHTO=

Remarks

Moisture Content= 64.9%

Sample No.: CRS-99-004 **Source of Sample:** **Date:** 11/18/99
Location: Y151-07 **Elev./Depth:**

DODSON-STILSON, INC.

Client: Trace Analytical Lab
Project: Calumet
Test Methods: ASTM D-421, D-422, D-2216
Project No: 9921-3212.00 **Plate**

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Trace Analytical Lab
Project: Calumet
Test Methods: ASTM D-421, D-422, D-2216
Project Number: 9921-3212.00

Sample Data

Source:
Sample No.: CRS-99-004
Elev. or Depth: **Sample Length (in./cm.):**
Location: Y151-07
Description:
Date: 11/18/99 **PL:** **LL:** **PI:**
USCS Classification: **AASHTO Classification:**
Testing Remarks: Moisture Content= 64.9%

Mechanical Analysis Data

	Initial
Dry sample and tare=	230.21
Tare =	58.11
Dry sample weight =	172.10

Sample split on 2.00 mm mm sieve
Split sample data:
Sample and tare = 53.19 Tare = .00 Sample weight = 53.19

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
12.5 mm	0.00	0.00	100.0
9.5 mm	2.58	0.00	98.5
4.75 mm	1.57	0.00	97.6
2.00 mm	1.07	0.00	97.0
0.850 mm	1.72	0.00	93.9
0.425 mm	1.33	0.00	91.4
0.180 mm	2.98	0.00	86.0
0.150 mm	1.84	0.00	82.7
0.075 mm	7.34	0.00	69.3
0.053 mm	3.05	0.00	63.7

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 97.0
Weight of hydrometer sample: 53.19
Calculated biased weight= 54.84
Automatic temperature correction
Composite correction at 20 deg C = -3.7

Meniscus correction only=
Specific gravity of solids= 2.7
Hydrometer type: 151H
Effective depth L= 16.294964 - 0.2645 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	21.4	1.0217	1.0182	0.0132	21.7	10.6	0.0304	52.6
5.00	21.4	1.0186	1.0151	0.0132	18.6	11.4	0.0199	43.6
15.00	21.4	1.0152	1.0117	0.0132	15.2	12.3	0.0120	33.8
30.00	21.4	1.0130	1.0095	0.0132	13.0	12.9	0.0086	27.4
60.00	21.5	1.0108	1.0073	0.0132	10.8	13.4	0.0062	21.1
250.00	22.1	1.0073	1.0039	0.0131	7.3	14.4	0.0031	11.2
1440.00	22.0	1.0053	1.0019	0.0131	5.3	14.9	0.0013	5.4

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #270
% COBBLES = % GRAVEL = 2.4 (% coarse = % fine = 2.4)
% SAND = 33.9 (% coarse = 0.6 % medium = 5.6 % fine = 27.7)
% SILT = 56.1 % CLAY = 7.6

D_{85}= 0.17 D_{60}= 0.04 D_{50}= 0.03
D_{30}= 0.01 D_{15}= 0.00 D_{10}= 0.00
C_c= 0.8086 C_u= 15.627

PARTICLE SIZE DISTRIBUTION TEST REPORT

% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.0	0.0	2.0	15.0	70.8	12.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
12.5 mm.	100.0		
9.5 mm.	100.0		
4.75 mm.	100.0		
2.00 mm.	100.0		
0.850 mm.	99.4		
0.425 mm.	98.0		
0.180 mm.	94.6		
0.150 mm.	93.7		
0.075 mm.	88.2		
0.053 mm.	83.0		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.0587 D_{60}= 0.0235 D_{50}= 0.0152
D_{30}= 0.0068 D_{15}= 0.0026 D_{10}= 0.0016
C_u= 14.93 C_c= 1.27

Classification

USCS= AASHTO=

Remarks

Moisture Content= 104.3%

Sample No.: CRS-99-005 **Source of Sample:** **Date:** 11/18/99
Location: Y151-03 **Elev./Depth:**

DODSON-STILSON, INC.

Client: Trace Analytical Lab
Project: Calumet
Test Methods: ASTM D-421, D-422, D-2216
Project No: 9921-3212.00 **Plate**

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Trace Analytical Lab
Project: Calumet
Test Methods: ASTM D-421, D-422, D-2216
Project Number: 9921-3212.00

Sample Data

Source:
Sample No.: CRS-99-005
Elev. or Depth: **Sample Length (in./cm.):**
Location: Y151-03
Description:
Date: 11/18/99 **PL:** **LL:** **PI:**
USCS Classification: **AASHTO Classification:**
Testing Remarks: Moisture Content= 104.3%

Mechanical Analysis Data

	Initial
Dry sample and tare=	56.18
Tare =	0.00
Dry sample weight =	56.18

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
12.5 mm	0.00	0.00	100.0
9.5 mm	0.00	0.00	100.0
4.75 mm	0.00	0.00	100.0
2.00 mm	0.00	0.00	100.0
0.850 mm	0.32	0.00	99.4
0.425 mm	0.80	0.00	98.0
0.180 mm	1.89	0.00	94.6
0.150 mm	0.51	0.00	93.7
0.075 mm	3.13	0.00	88.2
0.053 mm	2.88	0.00	83.0

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 100.0
Weight of hydrometer sample: 56.18
Calculated biased weight= 56.18
Automatic temperature correction
Composite correction at 20 deg C = -3.7

Meniscus correction only=
Specific gravity of solids= 2.7
Hydrometer type: 151H
Effective depth L= 16.294964 - 0.2645 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	21.4	1.0264	1.0229	0.0132	26.4	9.3	0.0285	64.6
5.00	21.4	1.0231	1.0196	0.0132	23.1	10.2	0.0189	55.3
15.00	21.5	1.0187	1.0152	0.0132	18.7	11.3	0.0115	42.9
30.00	21.5	1.0160	1.0125	0.0132	16.0	12.1	0.0084	35.3

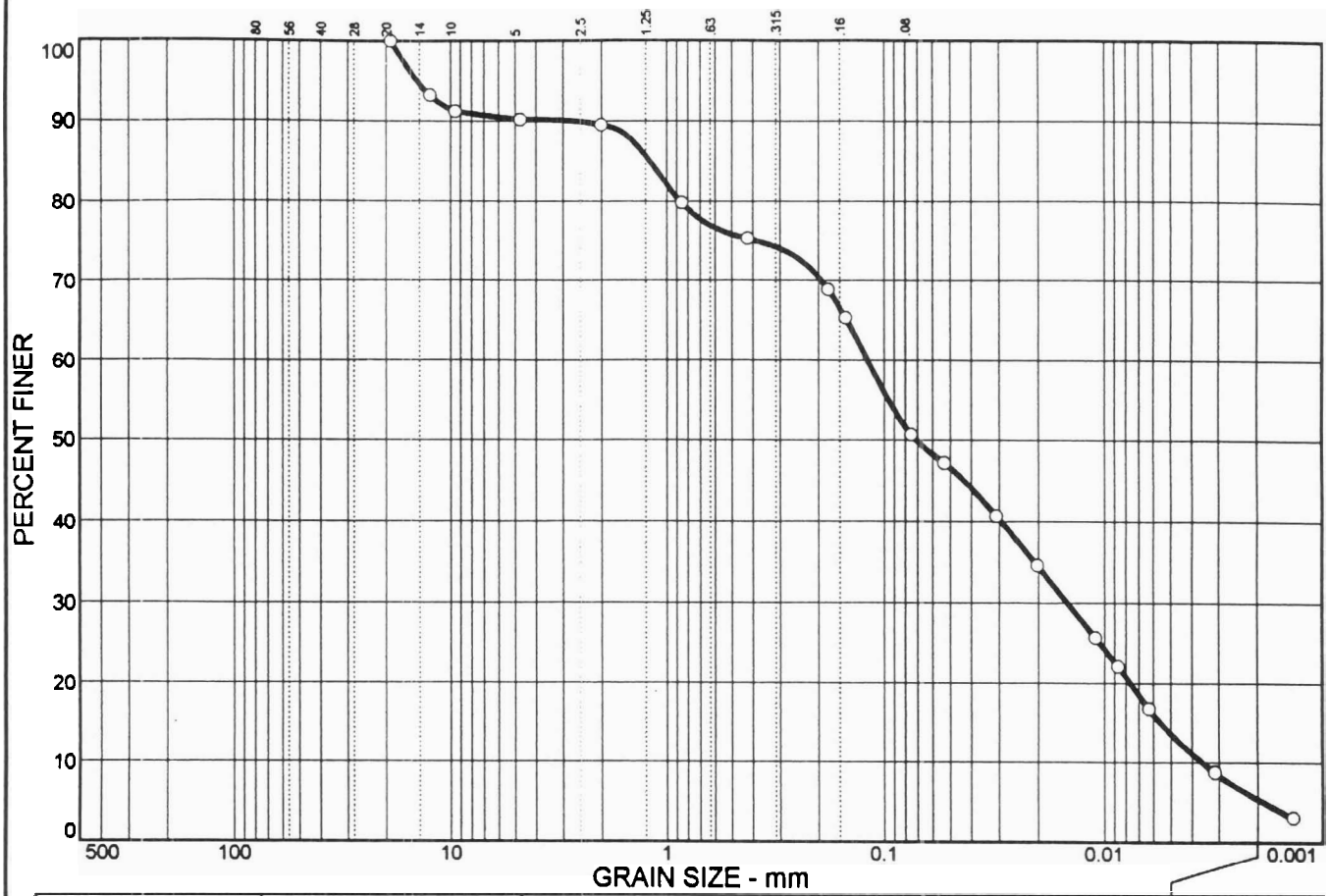
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
60.00	21.6	1.0131	1.0096	0.0132	13.1	12.8	0.0061	27.1
250.00	22.1	1.0093	1.0059	0.0131	9.3	13.8	0.0031	16.6
1440.00	22.0	1.0064	1.0030	0.0131	6.4	14.6	0.0013	8.4

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #270
% COBBLES = % GRAVEL =
% SAND = 17.0 (% coarse = 0.0 % medium = 2.0 % fine = 15.0)
% SILT = 70.8 % CLAY = 12.2

D_{85}= 0.06 D_{60}= 0.02 D_{50}= 0.02
D_{30}= 0.01 D_{15}= 0.00 D_{10}= 0.00
C_c= 1.2688 C_u= 14.9324

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	9.8	0.7	14.2	28.1	41.8	5.4

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19.0 mm.	100.0		
12.5 mm.	93.2		
9.5 mm.	91.2		
4.75 mm.	90.2		
2.00 mm.	89.5		
0.850 mm.	79.8		
0.425 mm.	75.3		
0.180 mm.	68.8		
0.150 mm.	65.2		
0.075 mm.	50.7		
0.053 mm.	47.2		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 1.19 D_{60}= 0.119 D_{50}= 0.0710
D_{30}= 0.0148 D_{15}= 0.0055 D_{10}= 0.0036
C_u= 33.38 C_c= 0.51

Classification

USCS= AASHTO=

Remarks

Moisture Content= 62.6%

Sample No.: CRS-99-006 **Source of Sample:** **Date:** 11/18/99
Location: Y151-02 **Elev./Depth:**

DODSON-STILSON, INC.

Client: Trace Analytical Lab
Project: Calumet
Test Methods: ASTM D-421, D-422, D-2216
Project No: 9921-3212.00 **Plate**

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Trace Analytical Lab
Project: Calumet
Test Methods: ASTM D-421, D-422, D-2216
Project Number: 9921-3212.00

Sample Data

Source:
Sample No.: CRS-99-006
Elev. or Depth: **Sample Length (in./cm.):**
Location: Y151-02
Description:
Date: 11/18/99 **PL:** **LL:** **PI:**
USCS Classification: **AASHTO Classification:**
Testing Remarks: Moisture Content= 62.6%

Mechanical Analysis Data

	Initial
Dry sample and tare=	280.98
Tare =	61.12
Dry sample weight =	219.86

Sample split on 2.00 mm mm sieve
Split sample data:
Sample and tare = 57.81 Tare = .00 Sample weight = 57.81

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
19.0 mm	0.00	0.00	100.0
12.5 mm	14.92	0.00	93.2
9.5 mm	4.44	0.00	91.2
4.75 mm	2.19	0.00	90.2
2.00 mm	1.50	0.00	89.5
0.850 mm	6.26	0.00	79.8
0.425 mm	2.91	0.00	75.3
0.180 mm	4.23	0.00	68.8
0.150 mm	2.32	0.00	65.2
0.075 mm	9.32	0.00	50.7
0.053 mm	2.29	0.00	47.2

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 89.5
Weight of hydrometer sample: 57.81
Calculated biased weight= 64.59
Automatic temperature correction
Composite correction at 20 deg C = -3.7

Meniscus correction only=
Specific gravity of solids= 2.7
Hydrometer type: 151H
Effective depth L= 16.294964 - 0.2645 x Rm

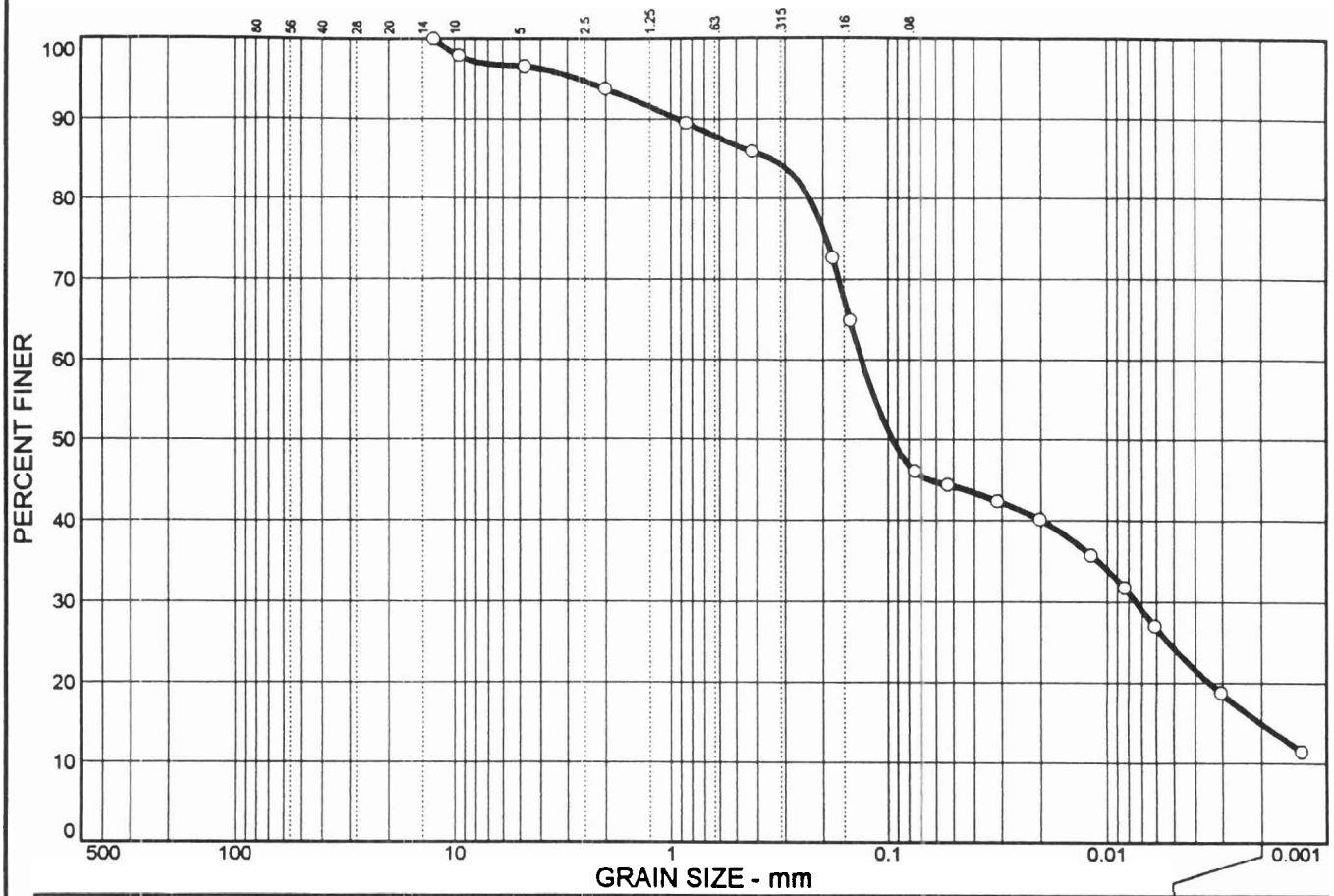
Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	21.4	1.0201	1.0166	0.0132	20.1	11.0	0.0310	40.7
5.00	21.4	1.0176	1.0141	0.0132	17.6	11.6	0.0202	34.6
18.00	21.4	1.0140	1.0105	0.0132	14.0	12.6	0.0111	25.7
30.00	21.5	1.0125	1.0090	0.0132	12.5	13.0	0.0087	22.1
60.00	21.5	1.0104	1.0069	0.0132	10.4	13.5	0.0063	16.9
250.00	22.2	1.0070	1.0036	0.0131	7.0	14.4	0.0031	8.8
1440.00	20.0	1.0050	1.0013	0.0134	5.0	15.0	0.0014	3.1

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #270
% COBBLES = % GRAVEL = 9.8 (% coarse = % fine = 9.8)
% SAND = 43.0 (% coarse = 0.7 % medium = 14.2 % fine = 28.1)
% SILT = 41.8 % CLAY = 5.4

D_{85}= 1.19 D_{60}= 0.12 D_{50}= 0.07
D_{30}= 0.01 D_{15}= 0.01 D_{10}= 0.00
C_c= 0.5102 C_u= 33.3805

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	3.4	2.8	7.9	41.5	29.5	14.9

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
12.5 mm.	100.0		
9.5 mm.	97.9		
4.75 mm.	96.6		
2.00 mm.	93.8		
0.850 mm.	89.5		
0.425 mm.	85.9		
0.180 mm.	72.7		
0.150 mm.	64.9		
0.075 mm.	46.1		
0.053 mm.	44.4		

* (no specification provided)

Soil Description

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.350 D_{60}= 0.133 D_{50}= 0.0951
D_{30}= 0.0074 D_{15}= 0.0020 D_{10}=
C_u= C_c=

Classification

USCS= AASHTO=

Remarks

Moisture Content= 42.5%

Sample No.: CRS-99-007 **Source of Sample:** **Date:** 11/18/99
Location: Y151-01 **Elev./Depth:**

DODSON-STILSON, INC.

Client: Trace Analytical Lab
Project: Calumet
Test Methods: ASTM D-421, D-422, D-2216
Project No: 9921-3212.00 **Plate**

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Trace Analytical Lab
Project: Calumet
Test Methods: ASTM D-421, D-422, D-2216
Project Number: 9921-3212.00

Sample Data

Source:
Sample No.: CRS-99-007
Elev. or Depth: **Sample Length (in./cm.):**
Location: Y151-01
Description:
Date: 11/18/99 **PL:** **LL:** **PI:**
USCS Classification: **AASHTO Classification:**
Testing Remarks: Moisture Content= 42.5%

Mechanical Analysis Data

	Initial
Dry sample and tare=	273.90
Tare =	58.61
Dry sample weight =	215.29

Sample split on 2.00 mm mm sieve
Split sample data:
Sample and tare = 52.92 Tare = .00 Sample weight = 52.92

Sieve tare method

Sieve	Weight retained	Sieve tare	Percent finer
12.5 mm	0.00	0.00	100.0
9.5 mm	4.43	0.00	97.9
4.75 mm	2.84	0.00	96.6
2.00 mm	6.01	0.00	93.8
0.850 mm	2.44	0.00	89.5
0.425 mm	2.00	0.00	85.9
0.180 mm	7.47	0.00	72.7
0.150 mm	4.39	0.00	64.9
0.075 mm	10.60	0.00	46.1
0.053 mm	0.97	0.00	44.4

Hydrometer Analysis Data

Separation sieve is #10
Percent -#10 based upon complete sample= 93.8
Weight of hydrometer sample: 52.92
Calculated biased weight= 56.42
Automatic temperature correction
Composite correction at 20 deg C = -3.7

Meniscus correction only=
Specific gravity of solids= 2.7
Hydrometer type: 151H
Effective depth L= 16.294964 - 0.2645 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	21.3	1.0186	1.0150	0.0132	18.6	11.4	0.0315	42.4
5.00	21.3	1.0178	1.0142	0.0132	17.8	11.6	0.0201	40.1
15.00	21.4	1.0162	1.0127	0.0132	16.2	12.0	0.0118	35.7
31.00	21.4	1.0148	1.0113	0.0132	14.8	12.4	0.0083	31.7
60.00	21.5	1.0131	1.0096	0.0132	13.1	12.8	0.0061	27.0
250.00	22.2	1.0101	1.0067	0.0131	10.1	13.6	0.0031	18.8
1440.00	21.9	1.0075	1.0040	0.0131	7.5	14.3	0.0013	11.4

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #270
% COBBLES = % GRAVEL = 3.4 (% coarse = % fine = 3.4)
% SAND = 52.2 (% coarse = 2.8 % medium = 7.9 % fine = 41.5)
% SILT = 29.5 % CLAY = 14.9

D_{85}= 0.35 D_{60}= 0.13 D_{50}= 0.10
D_{30}= 0.01 D_{15}= 0.00

TRACE Analytical Laboratories, Inc
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December 1, 1999

Ms. Patti Novak
Lakeshore Engineering
RE: TRACE ID: Y151
8144 Calumet

CROSS REFERENCE TABLE

LAKESHORE ID	TRACE ID
CRS-99-007	Y151-01
CRS-99-006	Y151-02
CRS-99-005	Y151-03
CRS-99-003	Y151-04
CRS-99-001	Y151-05
CRS-99-002	Y151-06
CRS-99-004	Y151-07

TRACE Analytical Laboratories, Inc
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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method:	SW-846 8082
Matrix:	S
DL Multiplier:	1.170
Sample Date:	10/24/99
Sample Received:	10/29/99
Extraction Date:	11/01/99
Analysis Date:	11/03/99
Report Date:	11/29/99

Trace ID:	Y151-01
Sample ID:	CRS-99-007
Batch ID:	PCB110101S
% Solids:	71.2

PCBs	**RESULTS**	**REPORTING LIMITS**
Aroclor-1016	U	50 ug/kg
Aroclor-1221	U	50 ug/kg
Aroclor-1232	U	50 ug/kg
Aroclor-1242	U	50 ug/kg
Aroclor-1248	U	50 ug/kg
Aroclor-1254	U	50 ug/kg
Aroclor-1260	U	50 ug/kg
Surrogates	**RECOVERY**	**CONTROL LIMITS**
Decachlorobiphenyl	62 %	28 - 136
Tetrachloro-m-xylene	47 %	36 - 125

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method:	SW-846 8082
Matrix:	S
DL Multiplier:	1.425
Sample Date:	10/24/99
Sample Received:	10/29/99
Extraction Date:	11/01/99
Analysis Date:	11/04/99
Report Date:	11/29/99

Trace ID:	Y151-02
Sample ID:	CRS-99-006
Batch ID:	PCB110101S
% Solids:	58.4

PCBs	**RESULTS**	**REPORTING LIMITS**
Aroclor-1016	U	57 ug/kg
Aroclor-1221	U	57 ug/kg
Aroclor-1232	U	57 ug/kg
Aroclor-1242	X	57 ug/kg
Aroclor-1248	U	57 ug/kg
Aroclor-1254	U	57 ug/kg
Aroclor-1260	U	57 ug/kg
Surrogates	**RECOVERY**	**CONTROL LIMITS**
Decachlorobiphenyl	46 %	28 - 136
Tetrachloro-m-xylene	44 %	36 - 125

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

TRACE Analytical Laboratories, Inc.
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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Trace ID: Y151-02-2
Sample ID: CRS-99-006
Batch ID: PCB110101S
% Solids: 58.4

Method: SW-846 8082
Matrix: S
DL Multiplier: 7.125
Sample Date: 10/24/99
Sample Received: 10/29/99
Extraction Date: 11/01/99
Analysis Date: 11/04/99
Report Date: 11/29/99

PCBs	RESULTS	REPORTING LIMITS
Aroclor-1016	X	290 ug/kg
Aroclor-1221	X	290 ug/kg
Aroclor-1232	X	290 ug/kg
Aroclor-1242	1400	290 ug/kg
Aroclor-1248	X	290 ug/kg
Aroclor-1254	X	290 ug/kg
Aroclor-1260	X	290 ug/kg
Surrogates	**RECOVERY**	**CONTROL LIMITS**
Decachlorobiphenyl	% X	28 - 136
Tetrachloro-m-xylene	% X	36 - 125

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method:	SW-846 8082
Matrix:	S
DL Multiplier:	1.570
Sample Date:	10/25/99
Sample Received:	10/29/99
Extraction Date:	11/01/99
Analysis Date:	11/04/99
Report Date:	11/29/99

Trace ID:	Y151-05
Sample ID:	CRS-99-001
Batch ID:	PCB110101S
% Solids:	53.0

PCBs	**RESULTS**	**REPORTING LIMITS**
Aroclor-1016	U	63 ug/kg
Aroclor-1221	U	63 ug/kg
Aroclor-1232	U	63 ug/kg
Aroclor-1242	U	63 ug/kg
Aroclor-1248	U	63 ug/kg
Aroclor-1254	U	63 ug/kg
Aroclor-1260	U	63 ug/kg
Surrogates	**RECOVERY**	**CONTROL LIMITS**
Decachlorobiphenyl	44 %	28 - 136
Tetrachloro-m-xylene	43 %	36 - 125

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * Results do not meet QC acceptance criteria, see narrative

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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method:	SW-846 8082
Matrix:	S
DL Multiplier:	1.254
Sample Date:	10/25/99
Sample Received:	10/29/99
Extraction Date:	11/01/99
Analysis Date:	11/03/99
Report Date:	11/29/99

Trace ID:	Y151-04
Sample ID:	CRS-99-003
Batch ID:	PCB110101S
% Solids:	66.3

PCBs	**RESULTS**	**REPORTING LIMITS**
Aroclor-1016	U	50 ug/kg
Aroclor-1221	U	50 ug/kg
Aroclor-1232	U	50 ug/kg
Aroclor-1242	110	50 ug/kg
Aroclor-1248	U	50 ug/kg
Aroclor-1254	U	50 ug/kg
Aroclor-1260	U	50 ug/kg
Surrogates	**RECOVERY**	**CONTROL LIMITS**
Decachlorobiphenyl	62 %	28 - 136
Tetrachloro-m-xylene	76 %	36 - 125

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method:	SW-846 8082
Matrix:	S
DL Multiplier:	1.652
Sample Date:	10/25/99
Sample Received:	10/29/99
Extraction Date:	11/01/99
Analysis Date:	11/03/99
Report Date:	11/29/99

Trace ID:	Y151-03
Sample ID:	CRS-99-005
Batch ID:	PCB110101S
% Solids:	50.3

PCBs	**RESULTS**	**REPORTING LIMITS**
Aroclor-1016	U	66 ug/kg
Aroclor-1221	U	66 ug/kg
Aroclor-1232	U	66 ug/kg
Aroclor-1242	340	66 ug/kg
Aroclor-1248	U	66 ug/kg
Aroclor-1254	U	66 ug/kg
Aroclor-1260	U	66 ug/kg
Surrogates	**RECOVERY**	**CONTROL LIMITS**
Decachlorobiphenyl	35 %	28 - 136
Tetrachloro-m-xylene	40 %	36 - 125

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

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Lakeshore Engineering
Project: #8144/Calumet

Method:	SW-846 8082
Matrix:	S
DL Multiplier:	1.471
Sample Date:	10/25/99
Sample Received:	10/29/99
Extraction Date:	11/01/99
Analysis Date:	11/03/99
Report Date:	11/29/99

Trace ID:	Y151-06
Sample ID:	CRS-99-002
Batch ID:	PCB110101S
% Solids:	56.6

PCBs	**RESULTS**	**REPORTING LIMITS**
Aroclor-1016	U	59 ug/kg
Aroclor-1221	U	59 ug/kg
Aroclor-1232	U	59 ug/kg
Aroclor-1242	U	59 ug/kg
Aroclor-1248	U	59 ug/kg
Aroclor-1254	U	59 ug/kg
Aroclor-1260	99	59 ug/kg
Surrogates	**RECOVERY**	**CONTROL LIMITS**
Decachlorobiphenyl	30 %	28 - 136
Tetrachloro-m-xylene	39 %	36 - 125

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method:	SW-846 8082
Matrix:	S
DL Multiplier:	1.398
Sample Date:	10/26/99
Sample Received:	10/29/99
Extraction Date:	11/01/99
Analysis Date:	11/05/99
Report Date:	11/29/99

Trace ID:	Y151-07
Sample ID:	CRS-99-004
Batch ID:	PCB110101S
% Solids:	59.5

PCBs	**RESULTS**	**REPORTING LIMITS**
Aroclor-1016	U	56 ug/kg
Aroclor-1221	U	56 ug/kg
Aroclor-1232	U	56 ug/kg
Aroclor-1242	280	56 ug/kg
Aroclor-1248	U	56 ug/kg
Aroclor-1254	U	56 ug/kg
Aroclor-1260	U	56 ug/kg
Surrogates	**RECOVERY**	**CONTROL LIMITS**
Decachlorobiphenyl	77 %	28 - 136
Tetrachloro-m-xylene	53 %	36 - 125

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: SW-846 7060
Matrix: S
Report Date: 11/30/99

Total Metals
Arsenic

Batch ID: MIC110202S
Digestion Date: 11/02/99

Analysis Date: 11/19/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-03	CRS-99-005	18	0.79 mg/kg	50.3	10/25/99	10/29/99	15.7
Y151-05	CRS-99-001	21	0.75 mg/kg	53.0	10/25/99	10/29/99	14.9
Y151-06	CRS-99-002	16	0.70 mg/kg	56.6	10/25/99	10/29/99	14.0
Y151 SB110202	Method Blank	U	0.10 mg/kg	100	NA	NA	1.0

Analysis Date: 11/29/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	11	0.69 mg/kg	71.2	10/24/99	10/29/99	13.8
Y151-02	CRS-99-006	46	0.85 mg/kg	58.4	10/24/99	10/29/99	17.0
Y151-04	CRS-99-003	18	0.74 mg/kg	66.3	10/25/99	10/29/99	14.8
Y151-07	CRS-99-004	22	0.83 mg/kg	59.5	10/26/99	10/29/99	16.6

TRACE ID Suffix Key. DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: SW-846 6010
Matrix: S
Report Date: 11/30/99

Total Metals
Barium

Batch ID: MIC110202S
Digestion Date: 11/02/99

Analysis Date: 11/12/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151 SB110202	Method Blank	U	1.0 mg/kg	100	NA	NA	1.0

Analysis Date: 11/18/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	48	1.0 mg/kg	71.2	10/24/99	10/29/99	1.38
Y151-02	CRS-99-006	84	1.0 mg/kg	58.4	10/24/99	10/29/99	1.70
Y151-03	CRS-99-005	70	1.0 mg/kg	50.3	10/25/99	10/29/99	1.97
Y151-04	CRS-99-003	79	1.0 mg/kg	66.3	10/25/99	10/29/99	1.48
Y151-05	CRS-99-001	73	1.0 mg/kg	53.0	10/25/99	10/29/99	1.87
Y151-06	CRS-99-002	64	1.0 mg/kg	56.6	10/25/99	10/29/99	1.75
Y151-07	CRS-99-004	80	1.0 mg/kg	59.5	10/26/99	10/29/99	1.66

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: SW-846 6010
Matrix: S
Report Date: 11/30/99

Total Metals
Cadmium

Batch ID: MIC110202S
Digestion Date: 11/02/99

Analysis Date: 11/12/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151 SB110202I	Method Blank	U	0.50 mg/kg	100	NA	NA	1.0

Analysis Date: 11/18/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-02	CRS-99-006	3.6	0.85 mg/kg	58.4	10/24/99	10/29/99	1.70
Y151-03	CRS-99-005	2.1	0.98 mg/kg	50.3	10/25/99	10/29/99	1.97
Y151-04	CRS-99-003	1.9	0.74 mg/kg	66.3	10/25/99	10/29/99	1.48
Y151-05	CRS-99-001	1.6	0.94 mg/kg	53.0	10/25/99	10/29/99	1.87
Y151-06	CRS-99-002	1.4	0.88 mg/kg	56.6	10/25/99	10/29/99	1.75
Y151-07	CRS-99-004	4.3	0.83 mg/kg	59.5	10/26/99	10/29/99	1.66

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

TRACE Analytical Laboratories, Inc.
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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: SW-846 7131
Matrix: S
Report Date: 11/30/99

Total Metals
Cadmium
Analysis Date: 11/22/99

Batch ID: MIC110202S
Digestion Date: 11/02/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	0.47	0.11 mg/kg	71.2	10/24/99	10/29/99	11.0
Y151 SB110202F	Method Blank	U	0.050 mg/kg	100	NA	NA	1.0

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

TRACE Analytical Laboratories, Inc
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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: SW-846 6010
Matrix: S
Report Date: 11/30/99

Total Metals
Chromium

Batch ID: MIC110202S
Digestion Date: 11/02/99

Analysis Date: 11/12/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151 SB110202	Method Blank	U	0.50 mg/kg	100	NA	NA	1.0

Analysis Date: 11/18/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	29	0.50 mg/kg	71.2	10/24/99	10/29/99	1.38
Y151-02	CRS-99-006	96	0.50 mg/kg	58.4	10/24/99	10/29/99	1.70
Y151-03	CRS-99-005	99	0.50 mg/kg	50.3	10/25/99	10/29/99	1.97
Y151-04	CRS-99-003	49	0.50 mg/kg	66.3	10/25/99	10/29/99	1.48
Y151-05	CRS-99-001	54	0.50 mg/kg	53.0	10/25/99	10/29/99	1.87
Y151-06	CRS-99-002	48 *	0.50 mg/kg	56.6	10/25/99	10/29/99	1.75
Y151-07	CRS-99-004	72	0.50 mg/kg	59.5	10/26/99	10/29/99	1.66

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

TRACE Analytical Laboratories, Inc
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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: SW-846 6010
Matrix: S
Report Date: 11/30/99

Batch ID: MIC110202S
Digestion Date: 11/02/99

Total Metals
Copper

Analysis Date: 11/12/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151 SB110202	Method Blank	U	1.0 mg/kg	100	NA	NA	1.0

Analysis Date: 11/18/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	30	1.0 mg/kg	71.2	10/24/99	10/29/99	1.38
Y151-02	CRS-99-006	320	1.0 mg/kg	58.4	10/24/99	10/29/99	1.70
Y151-03	CRS-99-005	140	1.0 mg/kg	50.3	10/25/99	10/29/99	1.97
Y151-04	CRS-99-003	59	1.0 mg/kg	66.3	10/25/99	10/29/99	1.48
Y151-05	CRS-99-001	56	1.0 mg/kg	53.0	10/25/99	10/29/99	1.87
Y151-06	CRS-99-002	62	1.0 mg/kg	56.6	10/25/99	10/29/99	1.75
Y151-07	CRS-99-004	88	1.0 mg/kg	59.5	10/26/99	10/29/99	1.66

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

TRACE Analytical Laboratories, Inc
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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: SW-846 6010
Matrix: S
Report Date: 11/30/99

Total Metals
Iron

Batch ID: MIC110202S
Digestion Date: 11/02/99
Analysis Date: 11/22/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	27000	34 mg/kg	71.2	10/24/99	10/29/99	34.4
Y151-02	CRS-99-006	83000	42 mg/kg	58.4	10/24/99	10/29/99	42.4
Y151-03	CRS-99-005	67000	49 mg/kg	50.3	10/25/99	10/29/99	49.2
Y151-04	CRS-99-003	60000	37 mg/kg	66.3	10/25/99	10/29/99	37.0
Y151-05	CRS-99-001	110000	47 mg/kg	53.0	10/25/99	10/29/99	46.7
Y151-06	CRS-99-002	59000	44 mg/kg	56.6	10/25/99	10/29/99	43.7
Y151-07	CRS-99-004	78000	42 mg/kg	59.5	10/26/99	10/29/99	41.6
Y151 SB110202	Method Blank	U	2.0 mg/kg	100	NA	NA	1.0

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

TRACE Analytical Laboratories, Inc.
2241 Black Creek Road • Muskegon, MI 49444-2673 • Phone 231-773-5998 • Fax 231-773-6537

Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: SW-846 6010
Matrix: S
Report Date: 11/30/99

Total Metals
Lead

Batch ID: MIC110202S
Digestion Date: 11/02/99

Analysis Date: 11/12/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151 SB110202	Method Blank	U	5.0 mg/kg	100	NA	NA	1.0

Analysis Date: 11/18/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	52	6.9 mg/kg	71.2	10/24/99	10/29/99	1.38
Y151-03	CRS-99-005	220	9.8 mg/kg	50.3	10/25/99	10/29/99	1.97
Y151-04	CRS-99-003	170	7.4 mg/kg	66.3	10/25/99	10/29/99	1.48
Y151-05	CRS-99-001	180	9.4 mg/kg	53.0	10/25/99	10/29/99	1.87
Y151-06	CRS-99-002	120	8.8 mg/kg	56.6	10/25/99	10/29/99	1.75
Y151-07	CRS-99-004	340	8.3 mg/kg	59.5	10/26/99	10/29/99	1.66

Analysis Date: 11/29/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-02	CRS-99-006	550	85 mg/kg	58.4	10/24/99	10/29/99	17.0

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: SW-846 6010
Matrix: S
Report Date: 11/30/99

Total Metals
Manganese
Analysis Date: 11/22/99

Batch ID: MIC110202S
Digestion Date: 11/02/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	530	17 mg/kg	71.2	10/24/99	10/29/99	34.4
Y151-02	CRS-99-006	1200	21 mg/kg	58.4	10/24/99	10/29/99	42.4
Y151-03	CRS-99-005	2000	25 mg/kg	50.3	10/25/99	10/29/99	49.2
Y151-04	CRS-99-003	2200	19 mg/kg	66.3	10/25/99	10/29/99	37.0
Y151-05	CRS-99-001	2000	23 mg/kg	53.0	10/25/99	10/29/99	46.7
Y151-06	CRS-99-002	1100	22 mg/kg	56.6	10/25/99	10/29/99	43.7
Y151-07	CRS-99-004	1800	21 mg/kg	59.5	10/26/99	10/29/99	41.6
Y151 SB110202	Method Blank	U	2.0 mg/kg	100	NA	NA	1.0

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: SW-846 7471
Matrix: S
Report Date: 11/30/99

Total Metals
Mercury
Analysis Date: 11/02/99

Batch ID: MIC110202S
Digestion Date: 11/02/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	U	0.10 mg/kg	71.2	10/24/99	10/29/99	1.0
Y151-02	CRS-99-006	1.1	0.10 mg/kg	58.4	10/24/99	10/29/99	1.0
Y151-03	CRS-99-005	0.28	0.10 mg/kg	50.3	10/25/99	10/29/99	1.0
Y151-04	CRS-99-003	0.20	0.10 mg/kg	66.3	10/25/99	10/29/99	1.0
Y151-05	CRS-99-001	0.22	0.10 mg/kg	53.0	10/25/99	10/29/99	1.0
Y151-06	CRS-99-002	0.23	0.10 mg/kg	56.6	10/25/99	10/29/99	1.0
Y151-07	CRS-99-004	0.27	0.10 mg/kg	59.5	10/26/99	10/29/99	1.0
Y151 SB110202	Method Blank	U	0.10 mg/kg	100	NA	NA	1.0

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

TRACE Analytical Laboratories, Inc
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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: SW-846 6010
Matrix: S
Report Date: 11/30/99

Batch ID: MIC110202S
Digestion Date: 11/02/99

Total Metals
Nickel

Analysis Date: 11/12/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151 SB110202	Method Blank	U	1.0 mg/kg	100	NA	NA	1.0

Analysis Date: 11/18/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	30	1.4 mg/kg	71.2	10/24/99	10/29/99	1.38
Y151-02	CRS-99-006	70	1.7 mg/kg	58.4	10/24/99	10/29/99	1.70
Y151-03	CRS-99-005	50	2.0 mg/kg	50.3	10/25/99	10/29/99	1.97
Y151-04	CRS-99-003	29	1.5 mg/kg	66.3	10/25/99	10/29/99	1.48
Y151-05	CRS-99-001	27	1.9 mg/kg	53.0	10/25/99	10/29/99	1.87
Y151-06	CRS-99-002	28	1.8 mg/kg	56.6	10/25/99	10/29/99	1.75
Y151-07	CRS-99-004	41	1.7 mg/kg	59.5	10/26/99	10/29/99	1.66

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

TRACE Analytical Laboratories, Inc
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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: SW-846 6010
Matrix: S
Report Date: 11/30/99

Total Metals
Phosphorus

Batch ID: MIC110202S
Digestion Date: 11/02/99

Analysis Date: 11/12/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151 SB110202	Method Blank	U	5.0 mg/kg	100	NA	NA	1.0

Analysis Date: 11/29/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	400	14 mg/kg	71.2	10/24/99	10/29/99	13.8
Y151-02	CRS-99-006	1100	17 mg/kg	58.4	10/24/99	10/29/99	17.0
Y151-03	CRS-99-005	690	20 mg/kg	50.3	10/25/99	10/29/99	19.7
Y151-04	CRS-99-003	620	15 mg/kg	66.3	10/25/99	10/29/99	14.8
Y151-05	CRS-99-001	630	19 mg/kg	53.0	10/25/99	10/29/99	18.7
Y151-06	CRS-99-002	600	18 mg/kg	56.6	10/25/99	10/29/99	17.5
Y151-07	CRS-99-004	770	17 mg/kg	59.5	10/26/99	10/29/99	16.6

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: SW-846 6010
Matrix: S
Report Date: 11/30/99

Total Metals
Zinc

Batch ID: MIC110202S
Digestion Date: 11/02/99

Analysis Date: 11/12/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151 SB110202	Method Blank	U	1.0 mg/kg	100	NA	NA	1.0

Analysis Date: 11/18/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	190	1.4 mg/kg	71.2	10/24/99	10/29/99	1.38
Y151-06	CRS-99-002	430	1.8 mg/kg	56.6	10/25/99	10/29/99	1.75

Analysis Date: 11/29/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-02	CRS-99-006	1600	17 mg/kg	58.4	10/24/99	10/29/99	17.0
Y151-03	CRS-99-005	1100	20 mg/kg	50.3	10/25/99	10/29/99	19.7
Y151-04	CRS-99-003	620	15 mg/kg	66.3	10/25/99	10/29/99	14.8
Y151-05	CRS-99-001	520	19 mg/kg	53.0	10/25/99	10/29/99	18.7
Y151-07	CRS-99-004	1500	17 mg/kg	59.5	10/26/99	10/29/99	16.6

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: EPA 350.1
Matrix: S
Report Date: 11/29/99

Ammonia

Batch ID: AMM110503S
Preparation Date: 11/05/99
Analysis Date: 11/05/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	86	1.0 mg/kg	71.2	10/24/99	10/29/99	1.0
Y151-02	CRS-99-006	220	1.0 mg/kg	58.4	10/24/99	10/29/99	1.0
Y151-03	CRS-99-005	85	1.0 mg/kg	50.3	10/25/99	10/29/99	1.0
Y151-04	CRS-99-003	120	1.0 mg/kg	66.3	10/25/99	10/29/99	1.0
Y151-05	CRS-99-001	240	1.0 mg/kg	53.0	10/25/99	10/29/99	1.0
Y151-06	CRS-99-002	77	1.0 mg/kg	56.6	10/25/99	10/29/99	1.0
Y151-07	CRS-99-004	160	1.0 mg/kg	59.5	10/26/99	10/29/99	1.0
Y151 SB110503	Method Blank	1.2	1.0 mg/kg	100	NA	NA	1.0

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

TRACE Analytical Laboratories, Inc
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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: Plumb
Matrix: S
Report Date: 11/29/99

COD

Batch ID: COD110801S
Preparation Date:
Analysis Date: 11/03/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-05	CRS-99-001	110000	760 mg/kg	53.0	10/25/99	10/29/99	3.79

Analysis Date: 11/08/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	63000	1300 mg/kg	71.2	10/24/99	10/29/99	6.39
Y151-02	CRS-99-006	180000	1700 mg/kg	58.4	10/24/99	10/29/99	8.66
Y151-03	CRS-99-005	310000	2400 mg/kg	50.3	10/25/99	10/29/99	12.1
Y151-04	CRS-99-003	180000	1900 mg/kg	66.3	10/25/99	10/29/99	9.43
Y151-06	CRS-99-002	120000	850 mg/kg	56.6	10/25/99	10/29/99	4.27
Y151-07	CRS-99-004	210000	2200 mg/kg	59.5	10/26/99	10/29/99	11.1
Y151 SB110801	Method Blank	U	200 mg/kg	100	NA	NA	1.0

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

TRACE Analytical Laboratories, Inc.
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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: EPA 9071
Matrix: S
Report Date: 11/29/99

Oil & Grease

Batch ID: O&G110301S
Preparation Date:
Analysis Date: 11/04/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	U	350 mg/kg	71.2	10/24/99	10/29/99	1.40
Y151-02	CRS-99-006	2800	430 mg/kg	58.4	10/24/99	10/29/99	1.71
Y151-03	CRS-99-005	U	500 mg/kg	50.3	10/25/99	10/29/99	1.99
Y151-04	CRS-99-003	810	380 mg/kg	66.3	10/25/99	10/29/99	1.51
Y151-05	CRS-99-001	U	470 mg/kg	53.0	10/25/99	10/29/99	1.88
Y151-06	CRS-99-002	U	440 mg/kg	56.6	10/25/99	10/29/99	1.76
Y151-07	CRS-99-004	670	420 mg/kg	59.5	10/26/99	10/29/99	1.68
Y151 SB110301	Method Blank	U	250 mg/kg	100	NA	NA	1.0

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

TRACE Analytical Laboratories, Inc.
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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: EPA 9012
Matrix: S
Report Date: 11/29/99

Total Cyanide

Batch ID: CYD110703S
Preparation Date: 11/07/99
Analysis Date: 11/08/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	1.1	0.20 mg/kg	71.2	10/24/99	10/29/99	1.0
Y151-02	CRS-99-006	0.34	0.20 mg/kg	58.4	10/24/99	10/29/99	1.0
Y151-03	CRS-99-005	1.7	0.23 mg/kg	50.3	10/25/99	10/29/99	1.91
Y151-04	CRS-99-003	2.5	0.20 mg/kg	66.3	10/25/99	10/29/99	1.0
Y151-05	CRS-99-001	0.80	0.20 mg/kg	53.0	10/25/99	10/29/99	1.0
Y151-06	CRS-99-002	1.5	0.20 mg/kg	56.6	10/25/99	10/29/99	1.0
Y151-07	CRS-99-004	5.9	0.20 mg/kg	59.5	10/26/99	10/29/99	1.0
Y151 SB110703	Method Blank	U	0.20 mg/kg	100	NA	NA	1.0

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

TRACE Analytical Laboratories, Inc
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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: EPA 351.2
Matrix: S
Report Date: 11/29/99

Total Kjeldahl Nitrogen

Batch ID: TKN110901S
Preparation Date: 11/09/99
Analysis Date: 11/11/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	900	66 mg/kg	71.2	10/24/99	10/29/99	3.32
Y151-02	CRS-99-006	1000	84 mg/kg	58.4	10/24/99	10/29/99	4.21
Y151-03	CRS-99-005	1500	110 mg/kg	50.3	10/25/99	10/29/99	5.26
Y151-04	CRS-99-003	640	49 mg/kg	66.3	10/25/99	10/29/99	2.46
Y151-05	CRS-99-001	980	78 mg/kg	53.0	10/25/99	10/29/99	3.89
Y151-06	CRS-99-002	1000	86 mg/kg	56.6	10/25/99	10/29/99	4.28
Y151-07	CRS-99-004	1100	73 mg/kg	59.5	10/26/99	10/29/99	3.64
Y151 SB110901	Method Blank	U	20 mg/kg	100	NA	NA	1.0

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

TRACE Analytical Laboratories, Inc.
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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method: Plumb
Matrix: S
Report Date: 11/29/99

Percent Volatile Residue

Batch ID: PVR110501S

Analysis Date: 11/05/99

Trace ID	Sample ID	Results	Reporting Limits	% Solids	Sample Date	Sample Received	DL Multiplier
Y151-01	CRS-99-007	2.5%	NA	71.2	10/24/99	10/29/99	1.0
Y151-02	CRS-99-006	3.1%	NA	58.4	10/24/99	10/29/99	1.0
Y151-03	CRS-99-005	4.8%	NA	50.3	10/25/99	10/29/99	1.0
Y151-04	CRS-99-003	3.9%	NA	66.3	10/25/99	10/29/99	1.0
Y151-05	CRS-99-001	2.3%	NA	53.0	10/25/99	10/29/99	1.0
Y151-06	CRS-99-002	3.1%	NA	56.6	10/25/99	10/29/99	1.0
Y151-07	CRS-99-004	4.4%	NA	59.5	10/26/99	10/29/99	1.0

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

Quality Control Results

Wet Chemistry Quality Control Report

TKN

Trace LCS ID:	SS/SSD110901
QC Batch ID:	TKN110901S
Analysis Date:	11/11/99
MS/MSD ID:	Y151-01 MS/MSD
Method:	351.2

Parameter	LCS Spk. Added mg/kg	LCSD Spk. Added mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS % Rec.	LCSD % Rec.	RPD	Control Limits % Rec.	Control Limits RPD
TKN	100	100	83.32	75.56	83	*76	8.8	80 - 120	20

Parameter	Sample Result mg/kg	MS Spk. Added mg/kg	MSD Spk. Added mg/kg	MS Result mg/kg	MSD Result mg/kg	MS % Rec.	MSD % Rec.	RPD	Control Limits % Rec.	Control Limits RPD
TKN	899.7	331.6	325.6	1286	1242	117	105	11	75 - 125	20

TKN *The laboratory control sample duplicate recovery was out of control. Because the laboratory control sample recovery and the RPD between the laboratory control sample and laboratory control sample duplicate were in control, no qualification of data is necessary.

TRACE
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Ms. Patti Novak
Lakeshore Engineering
Project: #8144/Calumet

Method:	SW-846 8082
Matrix:	S
DL Multiplier:	1.0
Sample Date:	NA
Sample Received:	NA
Extraction Date:	11/01/99
Analysis Date:	11/03/99
Report Date:	11/29/99

Trace ID:	Y151 SB110101
Sample ID:	Method Blank
Batch ID:	PCB110101S
% Solids:	100

PCBs	**RESULTS**	**REPORTING LIMITS**
Aroclor-1016	U	50 ug/kg
Aroclor-1221	U	50 ug/kg
Aroclor-1232	U	50 ug/kg
Aroclor-1242	U	50 ug/kg
Aroclor-1248	U	50 ug/kg
Aroclor-1254	U	50 ug/kg
Aroclor-1260	U	50 ug/kg
Surrogates	**RECOVERY**	**CONTROL LIMITS**
Decachlorobiphenyl	101 %	28 - 136
Tetrachloro-m-xylene	71 %	36 - 125

TRACE ID Suffix Key: DUP - Duplicate MS - Matrix Spike MSD - Matrix Spike Duplicate RPD - Relative Percent Difference QC - Additional Quality Control - # - Rerun
Qualifier Key: U - Compound not detected J - Estimated value B - Analyte present in blank E - Exceeded the range of calibration D - Quantified from a dilution
X - Quantified from a previous run S - Quantified from a subsequent run * - Results do not meet QC acceptance criteria, see narrative

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Laboratory Control Spike Recovery and RPD Summary Report

Trace ID : SS, SSD 110101
QC Batch ID: PCB1101C1S
Analytical Batch:
Extraction Date: 11-1-99
Analysis Date: 11-3-99

Analyst Initials: TML
Matrix: SOIL
Method Number: 8082
Client: Lakeshore Engineering Y151
Multiplier: 0.0333

Compound Name	Blank Conc. mg/kg	LCS Spk Added mg/kg	LCSD Spk Added mg/kg	LCS Final mg/kg	LCSD Final mg/kg	LCS %Rec	LCSD %Rec	RPD	QC Limits RPD	QC Limits %Rec
Aroclor 1016	0	0.67	0.67	0.55	0.53	83	80	4.4	37	41-131
Aroclor 1260	0	0.67	0.67	0.55	0.55	82	83	0.3	37	51-143

Surrogates	Amount Added	LCS Conc	LCSD Conc	LCS %Rec	LCSD %Rec	QC Limits % Rec
Decachlorobiphenyl	0.50	0.49	0.48	97	95	28-136
Tetrachloro-m-xylene	0.50	0.36	0.35	72	70	36-125

= see narrative below

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Matrix Spike Recovery and RPD Summary Report

Trace ID : MS, MSD Y151-06
QC Batch ID: PCB110101S
Analytical Batch:
Extraction Date: 11-1-99
Analysis Date: 11-3-99

Analyst Initials: TML
Matrix: SOIL
Method Number: 8082
Client: Lakeshore Engineering Y151
MS Multiplier: 0.0588
MSD Multiplier: 0.0587

Compound Name	Sample Conc. mg/kg	MS Spk Added mg/kg	MSD Spk Added mg/kg	MS Final mg/kg	MSD Final mg/kg	MS %Rec	MSD %Rec	RPD	QC Limits RPD	QC Limits %Rec
Aroclor 1016	0	1.18	1.17	0.65	0.71	55	60	8.6	37	25-126
Aroclor 1260	0	1.18	1.17	0.52	0.50	40	38	5.1	34	30-145

Surrogates	Amount Added	MS Conc	MSD Conc	MS %Rec	MSD %Rec	QC Limits % Rec
Decachlorobiphenyl	0.50	0.20	0.15	41	30	28-136
Tetrachloro-m-xylene	0.50	0.37	0.25	74	51	36-125

* = see narrative below

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Laboratory Control Spike Recovery and RPD Summary Report

Trace LCS ID : SS/SSD110202
QC Batch ID: MIC110202S
Digestion Date: 11/02/99

Analyte	Method Blank Result mg/kg	Spk. Added mg/kg	LCS Results mg/kg	LCSD Results mg/kg	LCS %Rec	LCSD %Rec	RPD	QC Limits RPD	QC Limits %Rec	Method
Arsenic	U	1.00	1.003	1.017	100	102	2.0	17	76 - 123	7060
Barium	U	40.0	39.0	37.2	98	93	5.2	20	80 - 120	6010
Cadmium	U	40.0	41.6	40.1	104	100	3.9	20	80 - 120	6010
Cadmium	U	0.100	0.1117	0.1046	112	105	6.5	16	75 - 131	7131
Chromium	U	40.0	40.3	38.4	101	96	5.1	20	80 - 120	6010
Copper	U	40.0	37.3	36.8	93	92	1.1	20	80 - 120	6010
Iron	U	400	418	402	105	101	3.9	20	80 - 120	6010
Lead	U	40.0	41.0	38.2	103	96	7.0	20	80 - 120	6010
Manganese	U	40.0	40.7	40.0	102	100	2.0	20	80 - 120	6010
Mercury	U	0.1068	0.1103	0.1145	103	107	3.8	20	80 - 120	7471
Nickel	U	40.0	39.3	36.5	98	91	7.4	20	80 - 120	6010
Phosphorus	U	400	404	399	101	100	1.0	20	80 - 120	6010
Zinc	U	40.0	42.5	41.3	106	103	2.9	20	80 - 120	6010

Matrix Spike Recovery and RPD Summary Report

Trace ID : Y151-06 MS/MSD
QC Batch ID: MIC110202S
Digestion Date: 11/02/99
Matrix: Soil

Analyte	Sample Conc. mg/kg	MS Spk Added mg/kg	MSD Spk Added mg/kg	MS Results mg/kg	MSD Results mg/kg	MS %Rec	MSD %Rec	RPD	QC Limits RPD	QC Limits %Rec	Method
Arsenic	16.22	1.77	1.77	19.1	18.7	165 *	138 #	18	31	50 - 138	7060
Barium	64.0	70.7	70.7	119	130	78	93	18	20	75 - 125	6010
Cadmium	1.39	70.671	70.671	62.7	64.1	87	89	2.3	20	75 - 125	6010
Chromium	47.9	70.7	70.7	98.8	111	72 *	90	22 *	20	75 - 125	6010
Copper	62.4	70.7	70.7	124	139	87	109	22 *	20	75 - 125	6010
Iron	58746	707	707	49470	54770	0 *	0 *	0	20	75 - 125	6010
Lead	125	70.67	70.67	189.00	194.00	91	98	7.4	20	75 - 125	6010
Manganese	1135	70.7	70.7	1193	1219	82	119	37 *	20	75 - 125	6010
Mercury	0.2286	0.1887	0.1887	0.4516	0.4398	118	112	5.2	23	65 - 131	7471
Nickel	27.9	70.7	70.7	89.2	91.9	87	91	4.5	20	75 - 125	6010
Phosphorus	600	707	707	1210	1237	86	90	4.5	20	75 - 125	6010
Zinc	426	71	71	537	516	157 *	127 *	21 *	20	75 - 125	6010

Arsenic *The matrix spike recovery was out of control. Because the matrix spike duplicate recovery and the RPD between the matrix spike and matrix spike duplicate were in control, no qualification of data is necessary.

Chromium *The matrix spike recovery was out of control low, resulting in an out of control RPD between the matrix spike and matrix spike duplicate The result for this analyte in the non-spiked version of the sample must be considered estimated.

Copper *The relative percent difference between the matrix spike and matrix spike duplicate was out of control. Because both spike recoveries were in control, no qualification of data is necessary.

Iron *The matrix spike and matrix spike duplicate recoveries were out of control low. Because the sample background concentration is greater than four times the spiked concentration, no qualification of data is necessary.

Manganese The relative percent difference between the matrix spike and matrix spike duplicate was out of control. Because both spike recoveries were in control, no qualification of data is necessary.

Zinc *The matrix spike and matrix spike duplicate recoveries were out of control high. The RPD between the matrix spike and matrix spike duplicate was also out of control. Because the sample background concentration is greater than four times the spiked concentration, no qualification of data is necessary.

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Wet Chemistry Quality Control Report

Ammonia

Trace LCS ID:	SS/SSD110503
QC Batch ID:	AMM110503S
Analysis Date:	11/05/99
MS/MSD ID:	Y151-01 MS/MSD
Method:	350.1

COD

Trace LCS ID:	SS/SSD110801
QC Batch ID:	COD110801S
Analysis Date:	11/08/99
MS/MSD ID:	Y151-01 MS/MSD
Method:	Plumb

CYANIDE

Trace LCS ID:	SS/SSD110703
QC Batch ID:	CYD110703S
Analysis Date:	11/08/99
MS/MSD ID:	Y151-01 MS/MSD
Method:	9012

Oil & Grease

Trace LCS ID:	SS/SSD110301
QC Batch ID:	O&G110301S
Analysis Date:	11/04/99
MS/MSD ID:	Y151-01 MS/MSD
Method:	9071

Parameter	LCS Spk. Added mg/kg	LCSD Spk. Added mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS % Rec.	LCSD % Rec.	RPD	Control Limits % Rec.	Control Limits RPD
Ammonia	24.0	24.0	24.47	24.48	102	102	0	80 - 120	20
COD	12500	12500	12126	12032	97	96	1.0	80 - 120	20
Cyanide	4.80	4.80	4.853	4.829	101	101	0	90 - 110	20
Oil & Grease	2995	3145	2725	2525	91	80	13	80 - 120	20

Parameter	Sample Result mg/kg	MS Spk. Added mg/kg	MSD Spk. Added mg/kg	MS Result mg/kg	MSD Result mg/kg	MS % Rec.	MSD % Rec.	RPD	Control Limits % Rec.	Control Limits RPD
Ammonia	86.27	54.02	52.02	143.0	134.8	105	93	12	75 - 125	20
COD	63039	59162	66375	116784	123537	91	91	0	75 - 125	20
Cyanide	1.114	5.618	5.618	6.436	6.306	95	92	3.2	75 - 125	20
Oil & Grease	U	4759	4637	4640	4721	97	102	5.0	75 - 125	20

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Wet Chemistry Quality Control Report

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TKN

Trace LCS ID:	SS/SSD110901
QC Batch ID:	TKN110901S
Analysis Date:	11/11/99
MS/MSD ID:	Y151-01 MS/MSD
Method:	351.2

Parameter	LCS Spk. Added mg/kg	LCSD Spk. Added mg/kg	LCS Result mg/kg	LCSD Result mg/kg	LCS % Rec.	LCSD % Rec.	RPD	Control Limits % Rec.	Control Limits RPD
TKN	100	100	83.32	75.56	83	*76	8.8	80 - 120	20

Parameter	Sample Result mg/kg	MS Spk. Added mg/kg	MSD Spk. Added mg/kg	MS Result mg/kg	MSD Result mg/kg	MS % Rec.	MSD % Rec.	RPD	Control Limits % Rec.	Control Limits RPD
TKN	899.7	331.6	325.6	1286	1242	117	105	11	75 - 125	20

TKN	*The laboratory control sample duplicate recovery was out of control. Because the laboratory control sample recovery and the RPD between the laboratory control sample and laboratory control sample duplicate were in control, no qualification of data is necessary.

Chain of Custody Form(s)
Sample Log-in Checklist(s)

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Phone 616-773-5998 • Fax 616-773-6537

ANALYTICAL SERVICES AUTHORIZATION
CHAIN-OF-CUSTODY RECORD

11/19

7423
TRACE ID NO. Y151

Page 1 of 1

PLEASE COMPLETE STEPS 1 THRU 3. TRACE PERSONNEL WILL COMPLETE SECTIONS SHADED BLUE.

STEP 1 Report Results To

Client Name: LAKESHORE ENGINEERING
Contact Person: PATRICIA NOVAK
Mailing Address: 19215 W. EIGHT MILE RD.
City, State, Zip Code: DETROIT, MI, 48219
Phone: 313-535-7882 Fax: 313-535-7875
Client Job Name/No.: 8144- Calumet
Trace Quote No.: 4884 Purchase Order No.:
Sampled By: Patricia Novak

For Use by TRACE Personnel Only

Logged By: ARoque Checked By: [illegible]
Sample Condition Upon Receipt: Acceptable Other (Specify below)
ON ICE
Cooler Temp. (°C): 5.2 pH Checked: Yes No
Volatiles Preserved: Yes No Metals FF: Yes No Pres: Yes No

Step 2 Sample Identification / Request for Analytical Services

Regulatory Requirements: MERA TMDLs ☐ RCRA ☐ NPDES ☐ Drinking Water ☐ Other: ACOE

Turnaround Requirements: Standard ☐ 5 Day (RUSH) ☐ 2-4 Day (RUSH) ☐ 24 Hour (RUSH) ☐ * Requires prior approval

Bulk

Matrix Key: S = Soil, W = Water, O = Oil, SL = Sludge, A = Air, X = Other

ANALYSIS REQUESTED

TRACE NO.	DATE TAKEN	TIME TAKEN	METALS FIELD FILTERED	VOLATILES PRESERVED	CLIENT SAMPLE ID	MATRIX	NUMBER OF CONTAINERS	As, Ba, Cd, Cr, Cu,	Fe, Pb, Mn, Hg, Ni,	Zn, Total cyanide,	Phosphorus, Oil & Grease,	NH3-N, TKN,	Total PCB's, COD,	Volatile Solids,	Grain Size (Fairmont)		REMARKS	Possible Health Hazard
01	10-24-99	16:00			CRS-99-007	Sed	2	X	X	X	X	X	X	X	X			
02	10-24-99	17:00			CRS-99-006	Sed	2	X	X	X	X	X	X	X	X			
03	10-25-99	12:00			CRS-99-005	Sed	2	X	X	X	X	X	X	X	X			
04	10-25-99	15:00			CRS-99-003	Sed	2	X	X	X	X	X	X	X	X			
05	10-25-99	16:00			CRS-99-001	Sed	2	X	X	X	X	X	X	X	X			
06	10-25-99	17:00			CRS-99-002	Sed	2	X	X	X	X	X	X	X	X			
07	~~10-25-99~~ 10-26-99	~~18:00~~ 12:00			CRS-99-004	Sed	2	X	X	X	X	X	X	X	X			

2 coolers

STEP 3 Chain-of-Custody

Item #	RELEASED BY	RECEIVED BY	DATE	TIME	Item #	RELEASED BY	RECEIVED BY	DATE	TIME
01-07	1) Patricia Novak	Air Borne	10-28-99	5:00pm	01-07	2) Air Borne	ARoque	10/29/99	2:50
	3)					4)			

In executing this agreement, the Client acknowledges acceptance of the terms of the agreement as listed on the reverse side.

Date: 10/29/99 | Client Name: LAKESHORE ENGINEERING | # of Coolers:

HPN #: | Project Name: $144 CALUMET | Cooler #s:

Project #: Y151 | Logged in by: Micoyse | Cooler #s:

Cooler Receipt

Cooler/samples delivered by: Trace courier [ ] Hand delivered [ ] Commercial courier [X]

Name of delivery person:

Name of courier service: AIRBORNE

Did cooler come with a bill of lading? No [ ] Yes [X]

Way Bill or Tracking #:

COC Seals present and intact on cooler? No [ ] Yes [X]

SEE BACK

Custody seals signed by:

Client COC number:

Type of packing in cooler:

Coolant and Temperature

Type of Coolant Used

	Yes	No
Slurry w/ crushed, cubed, or chip ice?	X	
Multiple bags of ice around samples?		
Ice Packs/ Blue Ice :		
No Coolant Present:		

Temperature (as taken in Cooler)

Date: 10/29/99 Time: 2:50

Temperature Blank: °C

Range of 3 samples: 5.2 °C

Melt Water: °C

Ice still present upon receipt: [X] Yes [ ] No

General

	Yes	No	NA
COC taped to inside of cooler lid?	X		
All bottles arrived unbroken with labels in good condition?	X		
Each sample is in a sealed plastic bag?		X	
Labels filled out completely?	X		
All bottle labels agree with Chain of Custody (COC)?	X		
Sufficient sample to run tests requested?	X		
pH checked and samples at correct pH?			X
Correct preservative added to samples?			X
DRO/GRO samples received and appropriate check in form completed?			X
Air bubbles absent from VOAs?			
COC filled out properly and signed by client?	X		
COC signed in by TRACE sample custodian?	X		
Was project manager called and samples discussed?			

Contact: Date:

Notes:

CUSTODY SEAL

Date 10-28-99

Signature Patricia Nozzek

I-CHEM® Brand Products

Naige Nuc International

90009

CUSTODY SEAL

Date 10.28.99

Signature Patricia Nozzek

I-CHEM® Brand Products

90009

FROM

TO

Preprint Format No. | Origin | Airbill Number 6980855011

Method of Payment — Assumed sender unless otherwise noted

- [ ] Bill Sender
- [ ] Bill Receiver
- [ ] Bill 3rd Party
- [ ] Paid in Advance

AIRBORNE EXPRESS

EXP (Letter - 150 lbs) [X]

NAS (Letter - 5 lbs) [ ]

SDS (Letter - 150 lbs) [ ]

Billing Reference will appear on invoice

NO. of Pkgs	Weight (LBS)	One box must be checked: Letter Express	Express Pak	Other Packaging
1		[ ]	[ ]	[X]

Special Instructions

- [X] SAT
- [ ] HAA
- [ ] LAB
- [ ]

698 085 50

* 6 9 8 0 8 5 5 0 1 1 *

001 (9/98) S-06 PACKAGE LABEL

6ONF 5W 5BH