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TECHNICAL MEMORANDUM NO. 2
GEOTECHNICAL, HYDROGEOLOGICAL AND SUPPLEMENTAL PREDESIGN INVESTIGATION

WA 07-5NH2.0/08-5N30.0
CONTRACT 68-W8-0040

NORTHSIDE SANITARY LANDFILL/
ENVIRONMENTAL CONSERVATION AND
CHEMICAL CORPORATION
Zionsville, Indiana

November 9, 1988

CH2M HILL

Engineers
Planners
Economists
Scientists

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GLT592/43

CONTENTS

	Page
Introduction	1
Objectives	2
Approach	3
Personnel	3
Geotechnical Investigation	4
Soil Boring	5
Test Pit Excavation	5
Cone Penetrometer Testing	5
Field Density Testing	6
Soil Sample Selection	7
Geotechnical Samples	7
Chemical Samples	7
Hydrogeological Investigation	8
Well Installation	8
Piezometers	9
Monitoring Wells	9
Pump Test Well	10
Water Level Measurements	10
Groundwater Sampling	10
Aerial Photography, Surveying, and Mapping	11
Decontamination Practices	12
Heavy Equipment	12
Soil Sampling Equipment	12
Interpretation of Results	12
Geotechnical Considerations	12
Multilayered Cap	13
Material Estimates	15
Borrow Area	15
Groundwater Interceptor Trench	17
Hydrogeology	18
ECC Site	18
NSL Site	19
Chemical Contaminant Distribution	20
Subsurface Soils	20
Groundwater	22

Appendix A. Soil Boring Logs
Appendix B. Test Pit Logs
Appendix C. Cone Penetrometer Logs and Data
Appendix D. Geotechnical Laboratory Test Results

CONTENTS (Continued)

Appendix E. Target Compound List and Contract Required Quantification Limits
Appendix F. Soil and Groundwater Chemical Data
F-1 Metals--Soil and Groundwater
F-2 Organic Compounds--Soil and Groundwater
F-3 Conventional Parameters--Groundwater

CONTENTS (Continued)

TABLES

		Follows Page
1	Sample Identification Matrix--Soil Samples for Geotechnical Laboratory Analysis	7
2	Sample Identification Matrix--Soil Samples Chemical Analysis	7
3	Groundwater Elevations	9
4	Purge Volumes and Water Clarity	10
5	Monitoring Well Field Parameters	11
6	Sample Identification Matrix--Monitoring Wells	11
7	Estimated Material Quantities for Cap	15
8	Physical Analyses of Borrow Area Soil Samples	16
9	Physical Analyses of Interceptor Trench Soil Samples	17
10	Inorganic Soil Concentrations Above Background Levels	21

CONTENTS (Continued)

FIGURES

		Follows Page
1	Location Map	1
2	Predesign Investigation Areas	2
3	Borrow Area Investigation Location Map	4
4	Groundwater Interceptor Trench and Landfill Area Investigation Location Map	4
5	Supplemental Investigation Area (ECC) Location Map	4
6	Well Construction Details	8
7	Groundwater Sampling Locations	10
8	Schematic Diagram of Proposed Landfill Cap	13
9	Locations Used for Stratigraphic Information: ECC	18
10	Cross Section Location Map: ECC	18
11	ECC Cross Sections	18
12	Isopach Map of Upper Sand and Gravel Unit	19
13	Top of Lower Confining Unit Surface Elevation Map	19
14	Supplemental Investigation Area (ECC) Monitoring Well Locations	19
15	Potentiometric Surface Map: ECC	19
16	Potentiometric Surface Map: NSL Borrow Area	20
17	Cross Section: NSL Interceptor Trench Area	20
18	Total Volatile and Semivolatile Organic Compound Concentrations in Groundwater	23

GLT821/3

TECHNICAL MEMORANDUM

TO: Karen Vendl
U.S. EPA
CERCLA Enforcement Section

FROM: Al Sloan/CH2M HILL

PREPARED BY: Cindy Cruciani
Ned Pennock
Janelle Williams

DATE: November 9, 1988

RE: Northside Sanitary Landfill/Environmental Conservation and Chemical Corporation Geotechnical, Hydrogeological, and Supplemental Predesign Investigation Technical Memorandum

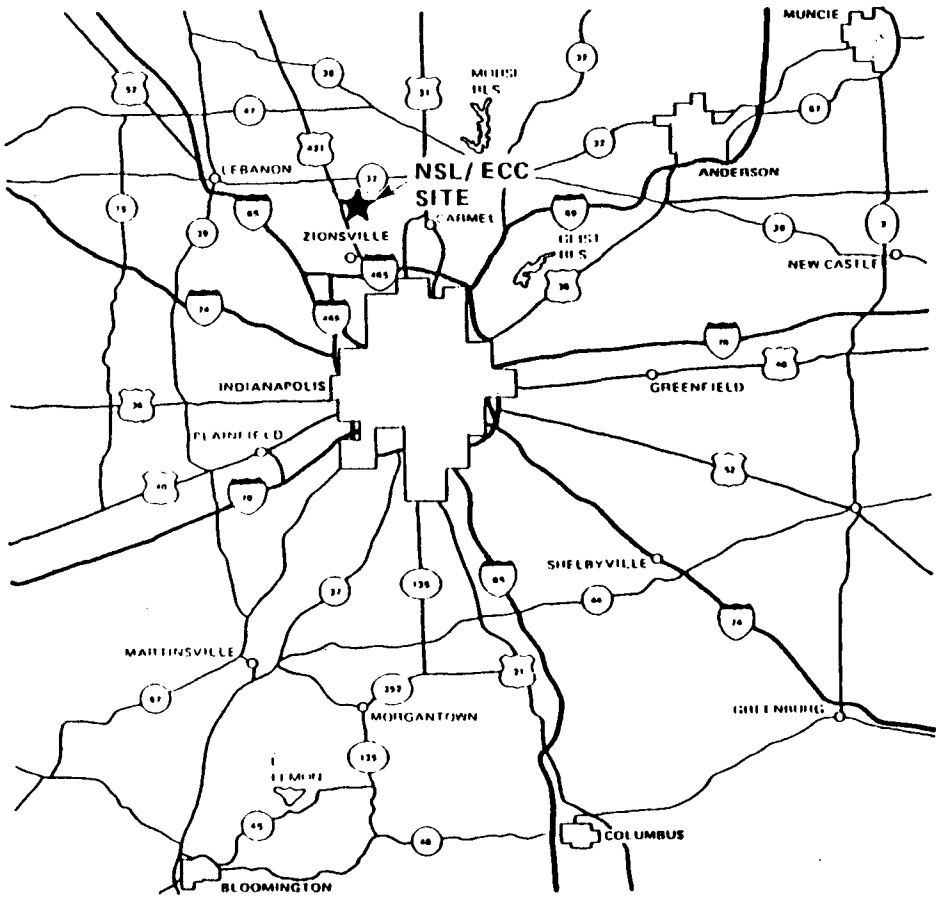
PROJECT: GLO64641.F1
GLO64641.FQ
GLO63582.F1
GLO63582.FQ

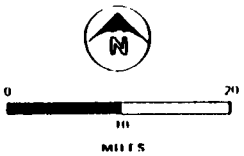
INTRODUCTION

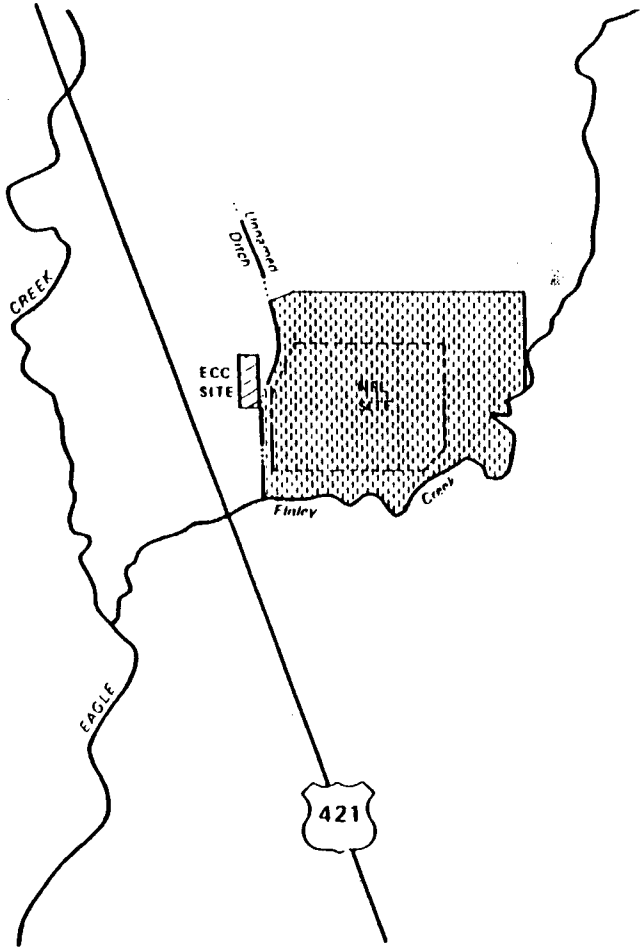
This memorandum summarizes field activities, data results, and data interpretations for work performed for the geotechnical and hydrogeological predesign activities and supplemental investigation for the Northside Sanitary Landfill (NSL) and Environmental Conservation and Chemical Corporation (ECC) sites. The locations of both sites are shown in Figure 1.

The NSL site is a municipal solid waste disposal facility, active since at least 1962. In addition to solid waste, at least 16 million gallons of hazardous waste have been disposed of in the landfill according to a RCRA 103C notification signed by the Vice President of NSL. Leachate from these wastes has been detected migrating into Finley Creek and groundwater contamination was detected in onsite monitoring wells.

The ECC site was a solvent recycling facility that was engaged in recovery, reclamation, and brokering of primary solvents, oils, and other wastes received from industrial clients. Waste products were received in drums and bulk tankers and prepared for reclamation or disposal. Drum shipments to the site were halted in February, 1982.







LEGEND

NSL SITE

ECC SITE

LANDFILL AREA

SOURCE U.S.G.S. 7.5 min quad
rangle, Reston, Ind
1969

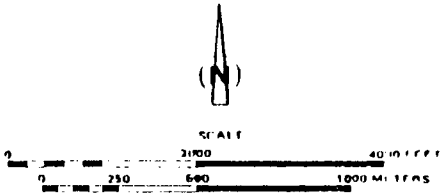


FIGURE 1
LOCATION MAP
NSL/ECC TECH MEMO

Feasibility Studies for each site and a Combined Alternatives Analysis for both sites were completed and issued December 5, 1986. The U.S. EPA chose Combined Alternative No. 5, groundwater interception and treatment plus capping, in its Record of Decision signed September 25, 1987 to be the remedial action for closing the site. The alternative includes the following components:

- Deed and access restrictions to prevent future development of the sites
- A multilayer cap over both sites that meets the requirements of the Resource Conservation and Recovery Act
- Rerouting surface waters to allow construction of the groundwater interception system and to reduce the potential for contaminant movement to surface water through existing surface water drainageways
- Leachate collection and treatment for the NSL site
- Groundwater collection through an interceptor trench and treatment for both sites
- Monitoring to ensure the effectiveness of the remedial action

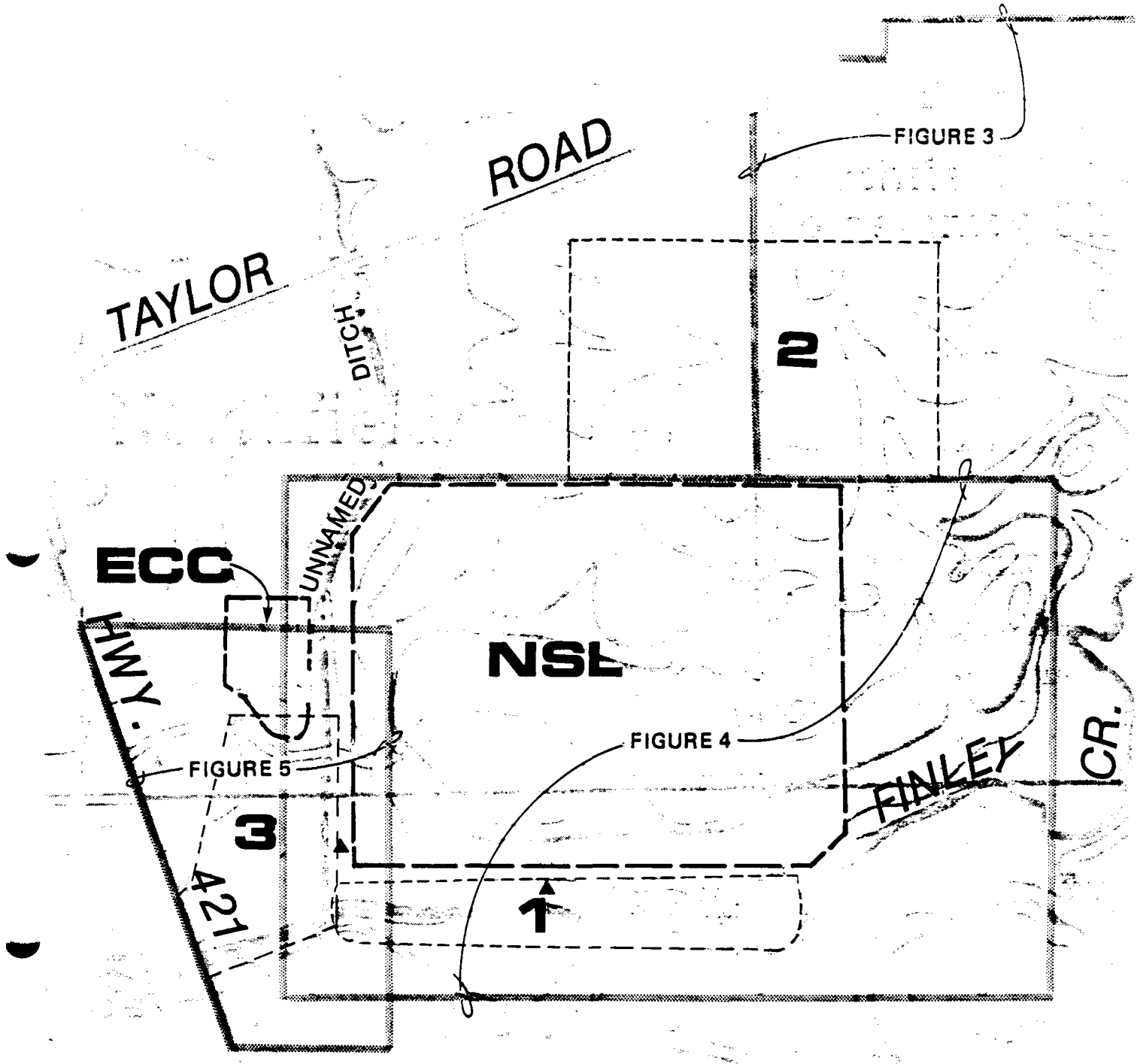
The predesign field investigation was performed to further characterize physical and chemical conditions of both sites in preparation for the design of the selected remedial action. Three separate but related areas were investigated during the study, as shown in Figure 2.

OBJECTIVES

The general objectives of the study were to investigate the geotechnical characteristics of subsurface material for engineering design purposes and to define the nature and extent of contamination originating from the ECC site.

Specific objectives were to:

- Identify physical characteristics of the soil and groundwater to aid in defining engineering design parameters for excavation along the alignment of



LEGEND

1 GROUNDWATER INTERCEPTION TRENCH AREA

2 BORROW AREA

3 SUPPLEMENTAL INVESTIGATION AREA

N

0 500

SCALE IN FEET

BASEMAP SOURCE: USGS Rosston, Ind. Quadrangle, 1969.

FIGURE 2
PRE-DESIGN
INVESTIGATION AREAS
NSL/ECC TECH MEMO

the proposed interceptor trench (Area 1; see Figure 2)

- Classify soils in the proposed borrow area (Area 2) and the existing landfill for suitability as fill and landfill cover material

- Supplement existing information to further define subsurface soil and groundwater conditions and contamination in the area south of the ECC site and southwest of the NSL site (Area 3)

APPROACH

To achieve the objectives, a field investigation program was conducted in March through May 1988. It consisted of sampling from soil borings, test pit excavations, cone penetrometer probes, construction of piezometers and monitoring wells, installation of a well for pump testing, groundwater sampling and analysis, aerial photography, and topographic surveying and mapping.

PERSONNEL

CH2M HILL personnel and their responsibilities during the investigation were:

Team Member	Responsibility
Al Sloan	Project Manager
Janelle Williams	Assistant Project Manager
Cindy Cruciani	Hydrogeologist
Mark Evans	Geotechnical Engineer
Rich Johns	Geotechnical Engineer
Chris Lawrence	Geotechnical Engineer
Louise Palmer	Geotechnical Engineer
Mark Nielsen	Geotechnical Engineer
Bob Brownfield	Geotechnical Engineer
Scott Koeppel	Geotechnical Engineer
Roger Huddleston	Hydrogeologist
Jim Kennedy	Hydrogeologist/Review Team Leader
David Shekoski	Sample Documentation
Angelo Liberatore	Site Safety Coordinator
Jeff Keiser	Sample Team Leader
Dan Chatfield	Surveyor/Rodman
Joe Feyder	Surveyor

Richard Gibbs, Randy Rose, and Robin Hamlet of Black and Veatch were also site safety coordinators during the investigation.

GEOTECHNICAL INVESTIGATION

Geotechnical characteristics were determined for the three areas under investigation at NSL/ECC: Proposed borrow area, proposed groundwater interceptor trench alignment area and the supplemental investigation area south of ECC. Twelve soil borings, 10 test pit excavations, and 10 cone penetrometer test (CPT) soundings were used in the proposed borrow area (Figure 2) to determine the quantity of suitable material available for use as fill or landfill cap material. Soil borings and CPT soundings were advanced to depths up to 40 and 52 feet, respectively. Test pits were excavated to depths of 10 feet. Samples were analyzed to define the geotechnical characteristics of the borrow area soil. Locations are shown in Figure 3.

Ten soil borings and 29 CPT soundings were used along the proposed groundwater interceptor trench alignment (Figure 2) to provide geotechnical and hydrogeological information needed for design. Borings were advanced to depths up to 45 feet and CPT soundings were advanced to depths up to 35 feet. Boring and CPT sounding locations for this area are shown in Figure 4. Sixteen field density tests were also performed to evaluate the present landfill cap (Figure 4).

Three test pits were excavated south of NSL (Figure 4) to provide geotechnical and hydrogeological information needed to reroute Finley Creek. Two of the pits were excavated to 10 feet. However, water was encountered in the third pit at 5 feet and was terminated there.

Twenty-five soil borings were used in the supplemental investigation area south of the ECC site (Figure 2) to define hydrogeological conditions and to obtain samples for chemical analysis. Boring locations are shown in Figure 5. The borings were advanced through an upper topsoil/silty material and into a sand and gravel unit. Soil borings were advanced to depths of 12 to 42 feet and were terminated when the contact between the sand and gravel unit and a hard, glacial till aquitard was encountered.

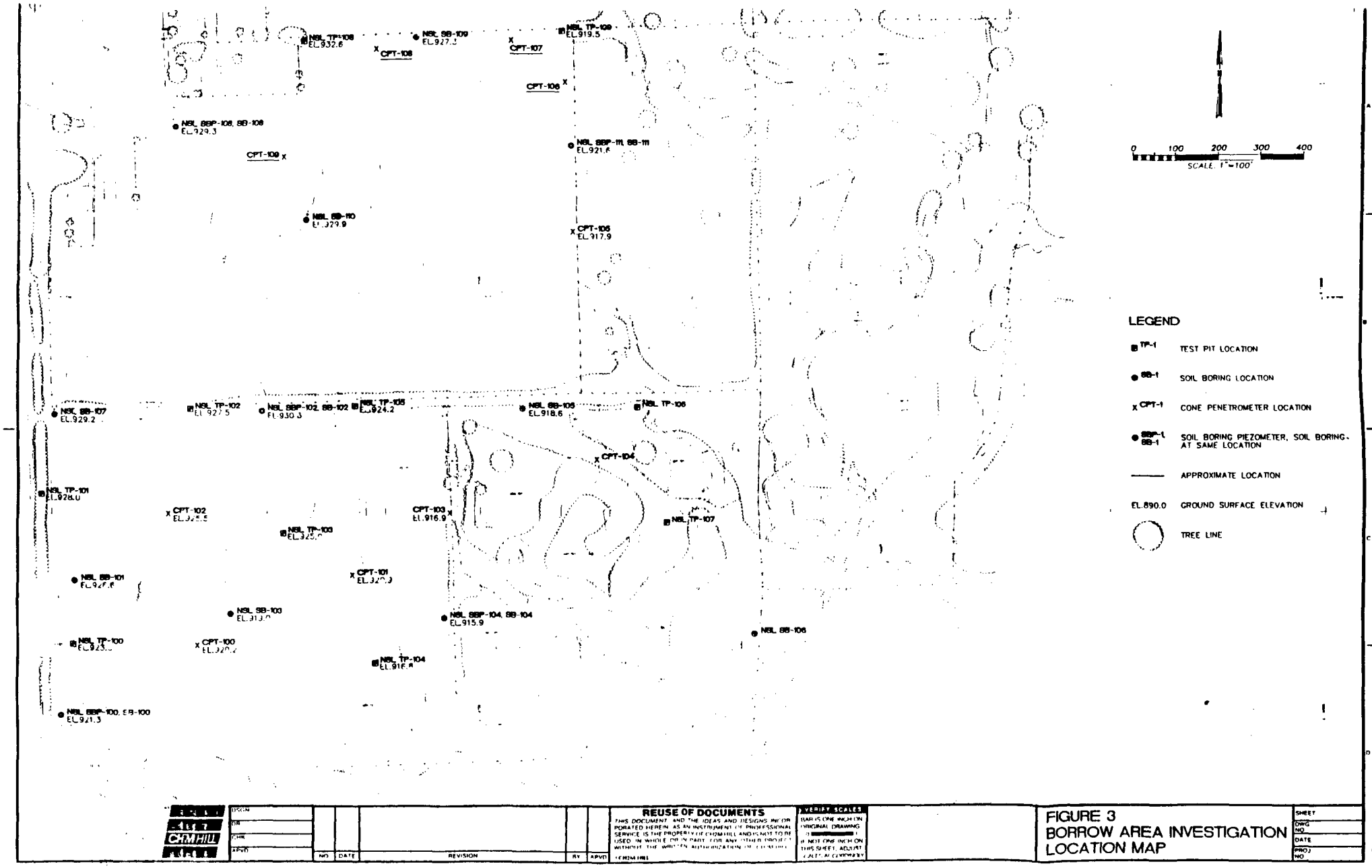


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FIGURE 3
BORROW AREA INVESTIGATION LOCATION MAP

SHEET
DWG NO
DATE
PROJ NO

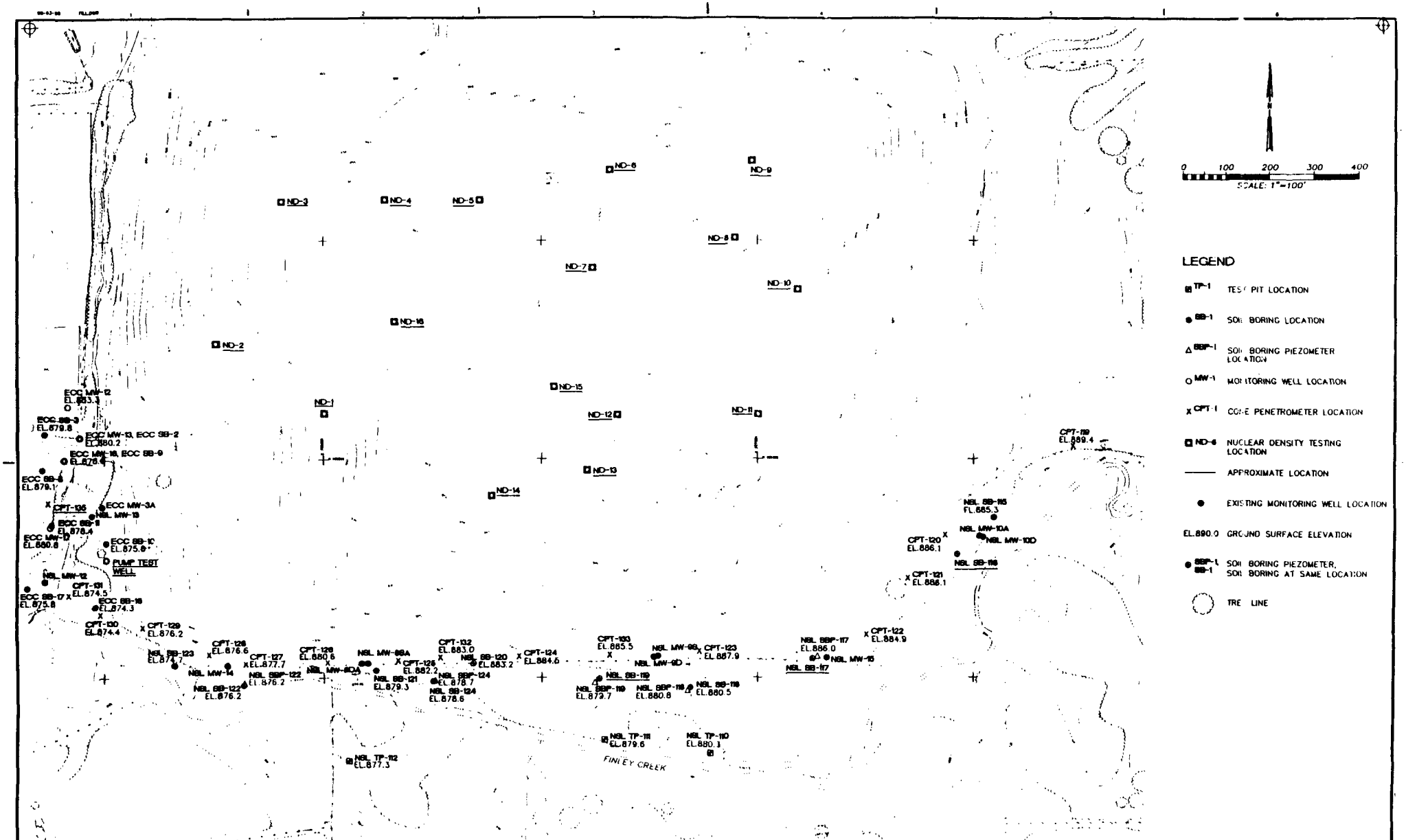

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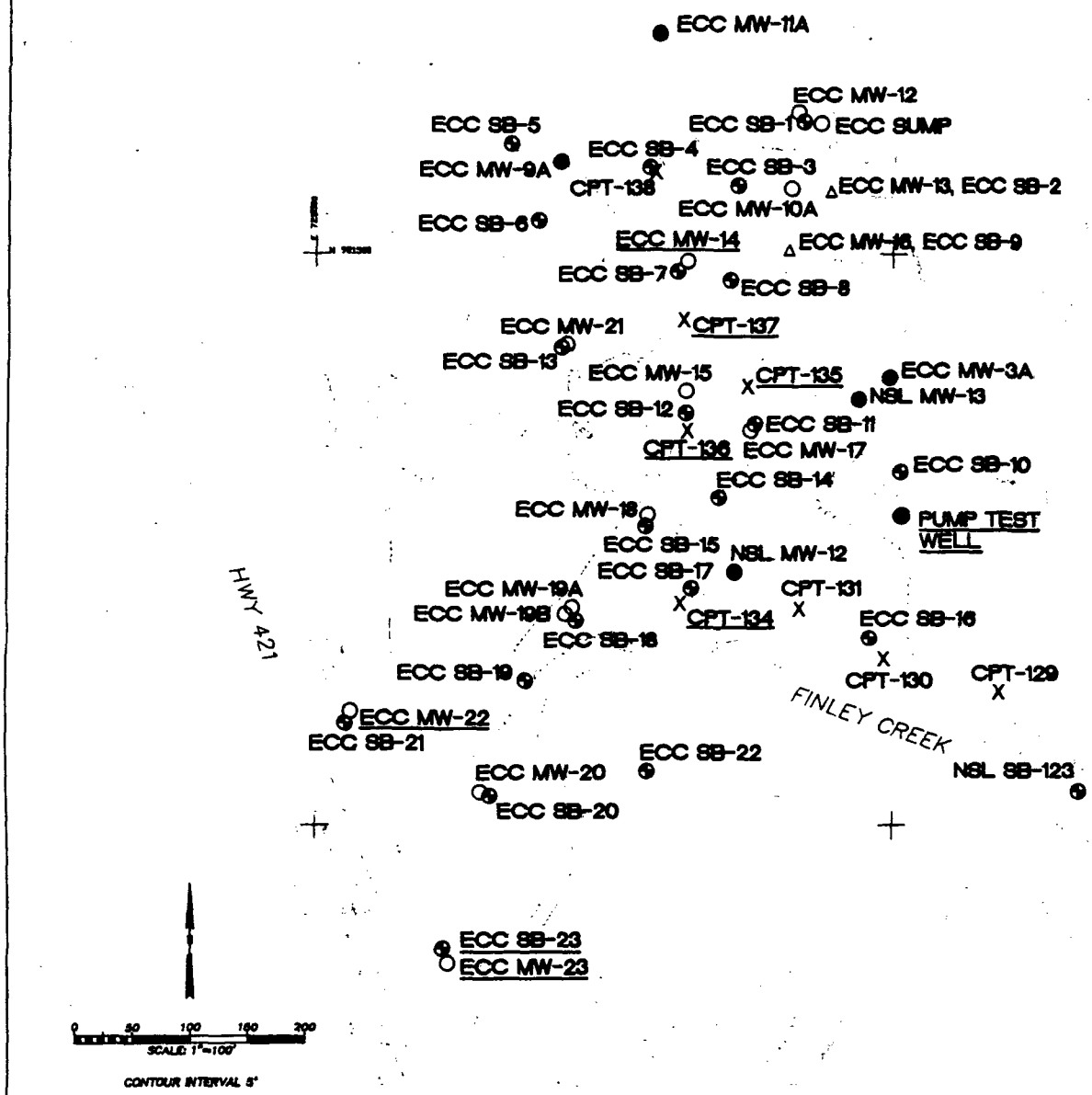
FIGURE 4
GROUNDWATER INTERCEPTOR TRENCH AND LANDFILL AREA INVESTIGATION LOCATION MAP

SHEET
DWG NO
DATE
PROJ NO

9-19-88



LEGEND

● SB-1	SOIL BORING LOCATION
○ MW-1	MONITORING WELL LOCATION
x CPT-1	CONE PENETROMETER LOCATION
——	APPROXIMATE LOCATION
△ SBP-1, SB	SOIL BORING PIEZOMETER AND SOIL BORING AT SAME LOCATION
●	EXISTING MONITORING WELL LOCATION
	TREE LINE

FIGURE 5
SUPPLEMENTAL INVESTIGATION AREA (ECC) LOCATION MAP
NSL/ECC

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SOIL BORING

All soil borings were advanced using 3-3/8- or 4-1/4-inch I.D., hollow-stem augers with a Mobile Drill B-61 (truck mounted) or B-63 (ATV) drilling rig. The water supply for drilling operations was obtained offsite from the fire department in Zionsville, Indiana. Drilling services were provided by ATEC Associates, Inc. of Indianapolis.

At all locations, plastic sheeting was placed on the ground surface to hold any contaminated soils to minimize the possibility of surface contamination. Borings were sampled continuously for geotechnical and chemical characteristics using a 2-foot-long, 2-inch O.D. split-barrel sampler, in general accordance with the standard penetration test (SPT). The sampler was driven into the soil ahead of the lead auger. Blow counts needed to penetrate the 2-foot interval were recorded and the sample was described by a geotechnical engineer or hydrogeologist using the Unified Soil Classification System (USCS). Each soil sample was scanned at the time of collection with an HNu photoionization detector or an OVA organic vapor analyzer (Appendix A) and scanning results were recorded on boring logs. Soil samples were collected and saved for later geotechnical and chemical analysis.

TEST PIT EXCAVATION

Test pits were excavated to an approximate maximum depth of 10 feet with a Cat 416 backhoe. In some places, the water table was encountered before the 10-foot depth, and sloughing of the side walls prohibited deeper excavation. Each test pit was logged by a geotechnical engineer (See Appendix B).

CONE PENETROMETER TESTING

CPT soundings of subsurface soils in the borrow and interceptor trench areas provided near-continuous profiles of the subsurface soils at each test location. In particular, the cone soundings were performed to identify sand seams or stringers that may not have been noted during boring.

CPT is a quasi-static method of measuring the penetration resistance of a cone tip pushed into the subsurface. The CPT apparatus was mounted on a truck with a 27-ton reaction

force. The cone and rods, the loading frame, and the electronic components associated with the data output were enclosed within a trailer on the truck. The cone used at the first location had a 20 cm^2 area (2.0-inch diameter). However, the 20 cm^2 cone was abandoned in favor of a 10 cm^2 cone (1.4-inch diameter) because of poor data resolution.

Cone tips had 60 degree points (angles) and were pushed hydraulically at a steady rate of 2 cm/s. Both penetrometers contained strain gauges above their tips to measure vertical resistance and along the shafts above their tips to measure the frictional drag of the soil at a point 5 cm above the tips. Inclinometers were also located in the tips to measure the angle of the cone and shaft, which may have been deflected by boulders, cobbles, or very dense layers.

Information from the strain gauges was recorded at 5-cm depth intervals, providing an almost continuous stratigraphic profile. Tip resistance, frictional resistance, and inclination were recorded on magnetic tape. The data and the friction ratio (frictional resistance compared to tip resistance) were printed as each sounding was run. Data from the adjacent borings and monitoring wells were used to estimate groundwater depths and overburden pressures for calculating overconsolidation ratios and shear strengths of the soils encountered in the soundings.

Raw data from the CPT are interpreted using a computer and must be considered approximate since no corroborative soil samples were collected during testing. For example, computers often misidentify hard clay deposits observed in soil borings drilled near CPT sounding locations as silty or sandy material. Therefore, profiles of interpreted in situ soil types are provided on the CPT logs in Appendix C. Graphs of tip resistance, friction resistance, friction ratio, and soil behavior types are also presented on the CPT logs.

FIELD DENSITY TESTING

Sixteen field density tests were performed at various locations on top of the landfill to evaluate the condition of the current cover and its use as part of the final cap (Figure 4). Readings were taken from the upper 6 inches of the daily cover by a technician from ATEC Associates at the direction of a CH2M HILL

geotechnical engineer. A Troxler model No. 3401 nuclear density machine was used.

In most cases, a considerable amount of landfill refuse was intermixed with the daily cover. Due to the lack of proper soil cover over parts of the landfill, several density locations had to be moved so they would not be taken directly in the landfill refuse.

Bag samples were obtained from six of the test locations. Modified Proctor moisture density relationships were determined for those samples (Appendix D).

SOIL SAMPLE SELECTION

Geotechnical Samples

ATEC Associates Geotechnical Laboratory performed the geotechnical laboratory tests. The samples selected for laboratory testing were representative of the units encountered during soil boring or test pit excavations. A total of 150 samples were analyzed from 40 soil borings and 10 test pits as well as from the landfill surface. The samples were tested for one or more of the following parameters: moisture content, grain size, Atterberg limits, coefficient of permeability, moisture density, and specific gravity (Table 1).

Laboratory results from samples taken from the borrow area and the existing landfill cover will be used primarily to assess the type and quantity of material suitable for use in this project. In particular, the material properties and compactability were considered. The results from samples taken from the interceptor trench area will be used primarily to determine the strength properties of the soil for estimating trench wall stability. The geotechnical laboratory results as provided by ATEC are presented in Appendix D.

Chemical Samples

Chemical soil samples were taken only from the soil borings in the ECC supplemental investigation area to help define the nature and extent of any contamination emanating from the ECC site. Samples were placed in EPA-approved containers and sent to an EPA contract laboratory for analysis (Table 2). Target Compound List substances analyzed for are shown in

TABLE 1
NSL/ECC PREDESIGN INVESTIGATION
SAMPLE IDENTIFICATION MATRIX--SOIL SAMPLES FOR GEOTECHNICAL LABORATORY ANALYSIS

SAMPLE NUMBER	LOCATION	DEPTH (FT)	COLLECTION DATE	SHIPMENT DATE	MOISTURE CONTENT	GRAIN SIZE	ATTERBERG LIMITS	PERMEABILITY	MOISTURE DENSITY	SPECIFIC GRAVITY
NSLSB100-3	NSLSB100	5.0 - 7.0	3/22/88	3/23/88	X	X	X			
NSLSB100-9		20.0 - 21.5			X	X	X			
NSLSB101-3	NSLSB101	5.0 - 7.0	3/23/88	3/23/88	X	X	X			
NSLSB101-6		12.5 - 14.5			X	X	X			
NSLSB102-5	NSLSB102	10.0 - 12.0	3/23/88	3/23/88	X	X	X			
NSLSB103-BS1	NSLSB103	0 - 15.0	3/22/88	3/23/88	X	X	X	X	X	
NSLSB103-BS1D		0 - 15.0			X					
NSLSB103-4		8.5 - 10.5				X				
NSLSB103-8		18.5 - 20.5			X	X	X			
NSLSB104-3	NSLSB104	6.0 - 8.0	3/22/88	3/23/88	X	X	X			
NSLSB104-6		13.5 - 15.5			X		X			
NSLSB104-8		18.5 - 20.5			X	X	X			
NSLSB105-BS1	NSLSB105	0 - 25.0	3/23/88	3/23/88	X	X	X	X	X	
NSLSB105-BS1D		0 - 25.0			X					
NSLSB105-2		3.5 - 5.5			X		X			
NSLSB105-5		11.0 - 13.0			X	X	X			
NSLSB105-8		18.5 - 20.5			X	X	X			
NSLSB106-3	NSLSB106	6.0 - 8.0	3/23/88	3/23/88	X	X	X			
NSLSB107-4	NSLSB107	7.5 - 9.5	3/23/88	3/23/88	X	X	X			
NSLSB107-9		20.0 - 21.5			X	X	X			
NSLSB108-2	NSLSB108	2.5 - 4.5	3/24/88	3/24/88	X	X	X			
NSLSB108-9		20.0 - 21.5			X	X	X			
NSLSB109-4	NSLSB109	7.5 - 9.5	3/24/88	3/24/88	X	X	X			
NSLSB110-6	NSLSB110	13.5 - 15.5	3/24/88	3/24/88	X	X	X			
NSLSB110-8		18.5 - 20.5			X	X				
NSLSB111-10	NSLSB111	23.5 - 24.5	3/24/88	3/24/88	X	X				
NSLSB111-BS1		0 - 15.0			X	X	X	X	X	
NSLSB111-BS1D		0 - 15.0			X					
NSLSB115-2	NSLSB115	3.5 - 5.5	3/28/88	4/01/88	X					
NSLSB115-4		8.5 - 10.5					X			
NSLSB115-5		11.0 - 13.0			X					
NSLSB115-11B		26.0 - 27.0				X				
NSLSB115-13		31.0 - 32.0				X				
NSLSB116-3	NSLSB116	5.0 - 7.0	3/28/88	4/01/88		X				
NSLSB116-4		7.5 - 9.5			X					
NSLSB116-9		20.0 - 21.5			X	X				
NSLSB116-10		22.5 - 24.0					X			

SB = SOIL BORING
BS = BAG SAMPLE
D = DUPLICATE

TABLE 1
NSL/ECC PREDESIGN INVESTIGATION
SAMPLE IDENTIFICATION MATRIX--SOIL SAMPLES FOR GEOTECHNICAL LABORATORY ANALYSIS

SAMPLE NUMBER	LOCATION	DEPTH (FT)	COLLECTION DATE	SHIPMENT DATE	MOISTURE CONTENT	GRAIN SIZE	ATTERBERG LIMITS	PERMEABILITY	MOISTURE DENSITY	SPECIFIC GRAVITY
NSLSB117-16,17	NSLSB117	38.5 - 42.0	4/05/88	4/13/88		X				
NSLSB118-6,7	NSLSB118	12.5 - 16.5	3/30/88	4/01/88		X				
NSLSB118-8		17.5 - 19.0					X			
NSLSB118-11		25.0 - 26.5			X					
NSLSB119-3	NSLSB119	6.0 - 8.0	3/30/88	4/01/88	X					
NSLSB119-4,5		8.5 - 13.0			X		X			
NSLSB119-9		21.0 - 22.0				X				
NSLSB120-13, 13D	NSLSB120	30.5 - 32.5	4/17/88	4/19/88			X			
NSLSB120-14		33.0 - 35.0					X			
NSLSB120-14D		33.0 - 35.0					X			
NSLSB121-9,10	NSLSB121	18.5 - 22.2	4/15/88	4/19/88		X				
NSLSB121-11		23.5 - 24.3			X					
NSLSB121-12		26.0 - 27.8					X			
NSLSB121-12D		26.0 - 27.8					X			
NSLSB122-4,6	NSLSB122	8.5-10.5, 13.5-15.5	4/11/88	4/13/88			X			
NSLSB122-5		11.0 - 13.0			X					
NSLSB122-10		23.5 - 25.5				X				
NSLSB123-3	NSLSB123	5.0 - 6.5	4/04/88	4/06/88	X					
NSLSB123-3D		5.0 - 6.5			X					
NSLSB123-5		10.0 - 11.5				X				
NSLSB123-6		12.5 - 14.0			X					
NSLSB123-7,8		15.0 - 19.0					X			
NSLSB123-13		30.0 - 31.4								X
NSLSB124-4	NSLSB124	7.5 - 8.7	4/16/88	4/19/88		X				
NSLSB124-6		12.5 - 13.8				X				
NSLSB124-9		20.0 - 20.6			X					
NSLSB124-10		22.5 - 23.2					X			
ECCSB02-5	ECCSB2	8.0 - 10.0	4/16/88	4/19/88		X				
ECCSB03-3		4.0 - 6.0	4/05/88	4/06/88	X					
ECCSB03-7		12.0 - 14.0			X					
ECCSB03-8		14.0 - 16.0					X			
ECCSB04-6	ECCSB4	10.0 - 12.0	4/14/88	4/19/88			X			
ECCSB04-7		12.0 - 14.0			X					
ECCSB04-12,13		22.0 - 26.0				X				
ECCSB05-5	ECCSB5	8.0 - 10.0	4/13/88	4/19/88			X			
ECCSB05-5D		8.0 - 10.0					X			
ECCBS05-8		14.0 - 16.0			X					
ECCSB05-12		22.0 - 24.0				X				
ECCSB05-12D		22.0 - 24.0				X				
ECCSB06-17	ECCSB6	32.0 - 34.0	4/12/88	4/13/88		X				

SB = SOIL BORING
D = DUPLICATE

TABLE 1
NSL/ECC PREDESIGN INVESTIGATION
SAMPLE IDENTIFICATION MATRIX--SOIL SAMPLES FOR GEOTECHNICAL LABORATORY ANALYSIS

SAMPLE NUMBER	LOCATION	DEPTH (FT)	COLLECTION DATE	SHIPMENT DATE	MOISTURE CONTENT	GRAIN SIZE	ATTERBERG LIMITS	PERMEABILITY	MOISTURE DENSITY	SPECIFIC GRAVITY
ECCSB07-4	ECCSB7	6.0 - 8.0	4/11/88	4/13/88			X			
ECCSB07-5		8.0 - 10.0			X					
ECCSB07-9,10		16.0 - 20.0				X				
ECCSB08-9	ECCSB8	17.5 - 18.0	4/12/88	4/13/88		X				
ECCSB09-3	ECCSB9	4.0 - 6.0	4/17/88	4/19/88		X				
ECCSB10-8	ECCSB10	14.0 - 16.0	4/13/88	4/19/88		X				
ECCSB11-5	ECCSB11	8.0 - 10.0	4/05/88	4/06/88	X		X			
ECCSB11-8		14.0 - 16.0				X				
ECCSB11-9		16.0 - 18.0			X					
ECCSB11-10		18.0 - 20.0					X			
ECSSB11-11		20.0 - 22.0			X					
ECCSB11-12		22.0 - 24.0					X			
ECCSB11-12D		22.0 - 24.0					X			
ECCSB12-7	ECCSB12	12.0 - 14.0	4/07/88	4/13/88		X				
ECCSB12-9		16.0 - 18.0				X				
ECCSB12-10		18.0 - 20.0			X					
ECCSB13-7	ECCSB13	12.0 - 14.0	4/11/88	4/13/88			X			
ECCSB13-8		14.0 - 16.0			X					
ECCSB13-16,19		31.0-32.0,37.0-38.0				X				
ECCSB14-6	ECCSB14	10.0 - 12.0	4/08/88	4/13/88	X					
ECCSB14-7		12.0 - 14.0					X			
ECCSB14-8,9,10		14.0 - 20.0				X				
ECCSB15-6	ECCSB15	10.0 - 12.0	4/07/88	4/13/88			X			
ECCSB15-7		12.0 - 14.0			X					
ECCSB15-11		20.0 - 22.0				X				
ECCSB16-3	ECCSB16	4.0 - 6.0	4/15/88	4/19/88	X					
ECCSB16-3D		4.0 - 6.0			X					
ECCSB16-4		6.0 - 8.0					X			
ECCSB16-7		12.0 - 14.0				X				
ECCSB17-2	ECCSB17	2.0 - 4.0	4/08/88	4/13/88	X					
ECCSB17-7,8		12.0 - 16.0				X				
ECCSB18-6	ECCSB18	10.0 - 12.0	4/14/88	4/19/88	X					
ECCSB18-9,10		16.0 - 20.0					X			
ECCSB19-15	ECCSB19	28.0 - 30.0	4/15/88	4/19/88		X				
ECCSB20-9	ECCSB20	16.0 - 18.0	4/15/88	4/19/88		X				
ECCSB20-9D		16.0 - 18.0				X				

SB = SOIL BORING
D = DUPLICATE

TABLE 1
NSL/ECC PREDESIGN INVESTIGATION
SAMPLE IDENTIFICATION MATRIX--SOIL SAMPLES FOR GEOTECHNICAL LABORATORY ANALYSIS

SAMPLE NUMBER	LOCATION	DEPTH (FT)	COLLECTION DATE	SHIPMENT DATE	MOISTURE CONTENT	GRAIN SIZE	ATTERBERG LIMITS	PERMEABILITY	MOISTURE DENSITY	SPECIFIC GRAVITY
PACKING SAND			4/19/88	4/19/88		X				
NSLTP100-G1	NSLTP100	3.8	4/05/88	4/06/88	X		X			
NSLTP100-B		3.8			X	X		X	X	
NSLTP100-G2		7.6			X					
NSLTP100-G3		8.7				X				
NSLTP101-G1	NSLTP101	4.0	4/05/88	4/06/88	X					
NSLTP101-B		5.6			X	X	X	X	X	
NSLTP101-G2		5.6			X					
NSLTP102-G1	NSLTP102	3.0	4/05/88	4/06/88	X					
NSLTP102-B		7.5			X	X	X	X	X	
NSLTP102-G2		8.0			X					
NSLTP103-G1	NSLTP103	4.0	4/05/88	4/06/88	X					
NSLTP103-B		4.0			X	X	X	X	X	
NSLTP103-G2		9.0			X					
NSLTP104-G1	NSLTP104	5.0	4/05/88	4/06/88	X					
NSLTP104-B		5.0			X	X	X	X	X	
NSLTP104-G2		9.3			X					
NSLTP105-G1	NSLTP105	4.0	4/05/88	4/06/88	X					
NSLTP105-B		4.5			X	X	X	X	X	
NSLTP105-G2		6.7			X					
NSLTP106-G1	NSLTP106	3.0	4/05/88	4/06/88	X					
NSLTP106-B		3.0			X	X	X	X	X	
NSLTP106-G2		8.0			X					
NSLTP107-G1	NSLTP107	5.0	4/05/88	4/06/88	X					
NSLTP107-B		5.0			X	X	X	X	X	
NSLTP107-G2		7.5			X					
NSLTP108-G1	NSLTP108	3.0	4/04/88	4/06/88	X					
NSLTP108-B		3.0			X	X	X	X	X	
NSLTP108-G2		7.0			X					
NSLTP109-G1	NSLTP109	3.0	4/04/88	4/06/88	X					
NSLTP109-B		8.0			X	X	X	X	X	
NSLTP109-G2		8.0			X					
NSLND1-BS1	LANDFILL CAP	0 - 1.5	3/25/88	3/25/88		X			X	
NSLND3-BS2	LANDFILL CAP	0 - 1.5				X	X		X	
NSLND6-BS4	LANDFILL CAP	0 - 1.5			X	X			X	
NSLND9-BS5	LANDFILL CAP	0 - 1.5				X	X		X	
NSLND11-BS6	LANDFILL CAP	0 - 1.5			X	X			X	

BS = BAG SAMPLE
TP = TEST PIT
ND = NUCLEAR DENSITY TEST LOCATION

Table 2
SAMPLE IDENTIFICATION MATRIX--SOIL SAMPLES CHEMICAL ANALYSIS
NSL/ECC

Sample Number	Location	Depth (ft)	Collection Date	Shipment Date	Laboratory Organics	Laboratory Metals
ECCSB01-01	ECCSB01	0-11	4-19-88	04-19-88	CLAYT	DATAC
ECCSB01-02	ECCSB01	0-11	4-19-88	04-19-88	CLAYT	--
ECCSB01-03	ECCSB01	11-13	4-19-88	04-19-88	CLAYT	DATAC
ECCSB01-04	ECCSB01	13-15	4-19-88	04-20-88	CLAYT	DATAC
ECCSB01-07	ECCSB01	19-21	4-20-88	04-20-88	CLAYT	DATAC
ECC-DM		--	4-19-88	04-20-88	CLAYT	--
ECCSB02-06	ECCSB02	10-12	4-16-88	04-18-88	HAZLE	CAMBR
ECCSB02-08	ECCSB02	14-16	4-16-88	04-18-88	HAZLE	CAMBR
ECCSB03-06	ECCSB03	10-12	4-05-88	04-06-88	AMAN	ALI
ECCSB05-15	ECCSB05	28-30	4-13-88	04-14-88	HAZLE	CAMBR
ECCSB06-13	ECCSB06	24-26	4-12-88	04-13-88	HAZLE	CAMBR
ECCSB06-20	ECCSB06	38-40	4-12-88	04-13-88	HAZLE	CAMBR
ECCSB07-13	ECCSB07	24-26	4-12-88	04-12-88	HAZLE	CAMBR
ECCSB08-01	ECCSB08	0-2	4-12-88	04-12-88	HAZLE	CAMBR
ECCSB08-05	ECCSB08	8-10	4-12-88	04-12-88	HAZLE	CAMBR
ECCSB09-06	ECCSB09	10-12	4-17-88	04-18-88	HAZLE	CAMBR
ECCSB10-07	ECCSB10	12-14	4-13-88	04-13-88	HAZLE	CAMBR
ECCSB11-07	ECCSB11	12-14	4-05-88	04-06-88	AMAN	ALI
ECCSB12-03	ECCSB12	4-6	4-07-88	04-07-88	AMAN	ALI
ECCSB13-09/10	ECCSB13	16-20	4-11-88	04-12-88	HAZLE	CAMBR
ECCSB14-01	ECCSB14	8-10	4-08-88	04-11-88	HAZLE	CAMBR
ECCSB14-02	ECCSB14	18-20	4-08-88	04-11-88	HAZLE	CAMBR
ECCSB15-03	ECCSB15	22-24	4-07-88	04-07-88	AMAN	ALI
ECCSB15A-04	ECCSB15A	6-8	4-19-88	04-19-88	CLAYT	--
ECCSB16-11	ECCSB16	20-22	4-15-88	04-15-88	HAZLE	CAMBR
ECCSB18-14	ECCSB18	26-28	4-14-88	04-14-88	HAZLE	CAMBR
ECCSB18A-02	ECCSB18A	2-4	4-19-88	04-19-88	CLAYT	--
ECCSB18A-03	ECCSB18A	4-6	4-19-88	04-19-88	CLAYT	DATAC
ECCSB18A-04	ECCSB18A	6-8	4-19-88	04-19-88	CLAYT	--
ECCSB18A-05	ECCSB18A	8-10	4-19-88	04-19-88	CLAYT	--
ECCSB18A-06	ECCSB18A	10-12	4-19-88	04-19-88	CLAYT	DATAC
ECCSB18B-26/28	ECCSB18B	26-28	4-18-88	04-18-88	HAZLE	--
ECCSB18B-28/30	ECCSB18B	28-30	4-18-88	04-18-88	HAZLE	CAMBR
ECCSB19-13	ECCSB19	24-26	4-15-88	04-15-88	HAZLE	CAMBR
ECCSB20-13	ECCSB20	24-26	4-15-88	04-15-88	HAZLE	CAMBR
ECCSB21-06	ECCSB21	10-12	4-27-88	04-28-88	USTES	CENTR
ECCSB21-08	ECCSB21	14-16	4-27-88	04-28-88	USTES	CENTR
ECCSB21-11	ECCSB21	20-22	4-27-88	04-28-88	USTES	CENTR
ECCSB23-07	ECCSB23	12-14	4-28-88	04-28-88	USTES	CENTR
ECCSB23-10	ECCSB23	18-20	4-28-88	04-28-88	USTES	CENTR
ECCFB01	--	--	4-16-88	04-18-88	HAZLE	CAMBR

DM = Drilling Mud
SB = Soil Boring Location
FB = Field Blank

AMAN = American Analytical and Technologies, OK
ALI = Associated Laboratories, Inc., CA
CAMBR = Cambridge Analytical Associates, MA
CENTR = Century Laboratories, Inc., NJ
CLAYT = Clayton Environmental Consultants, MI
DATAC = Datachem, UT
HAZLE = Hazleton Laboratories, WI
USTES = U.S. Testing Co., Inc., NJ

GLT592/38

Appendix E. Each sample was chosen to represent a portion of the hydrogeologic system to better define the extent of contamination. Most samples were taken from the uppermost sand and gravel unit underlying the ECC site. Results of the chemical analyses are presented in Appendix F.

HYDROGEOLOGICAL INVESTIGATION

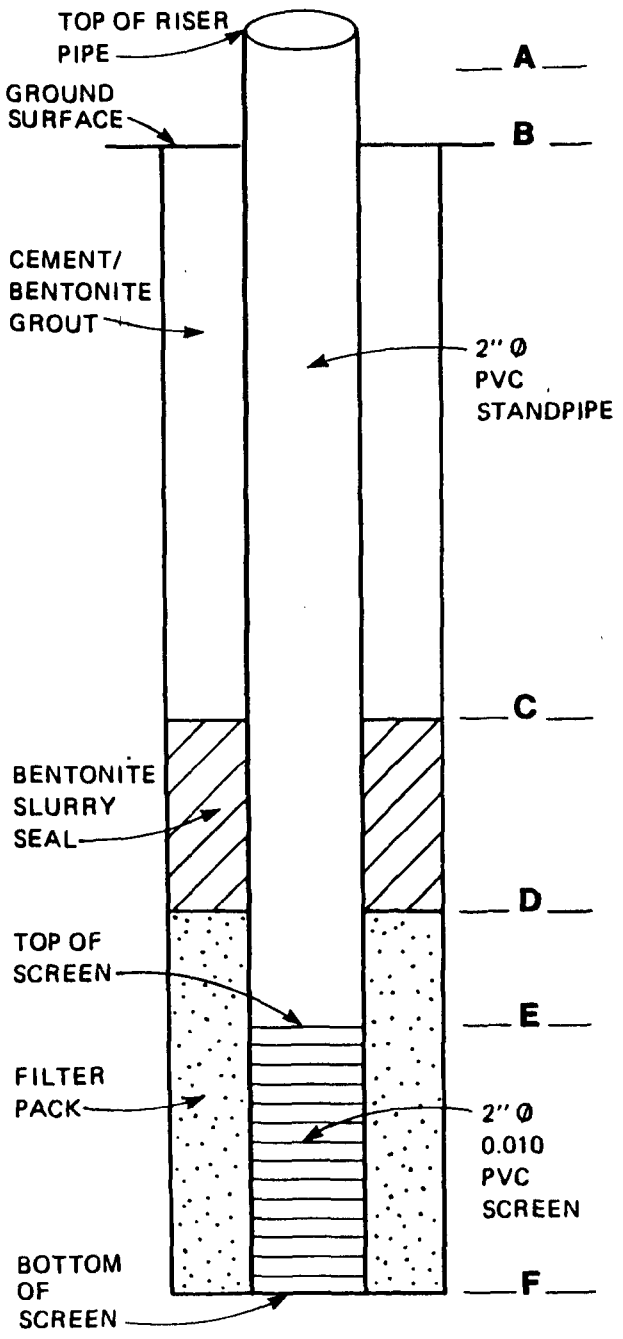
WELL INSTALLATION

Piezometers or monitoring wells were installed at each of the three study areas. Although construction methods were identical, piezometers were installed for use as groundwater level indicators, and monitoring wells were installed to be used to sample groundwater for chemical analysis. Locations of all wells are shown in Figures 3 through 5. Both types of wells were placed in borings drilled using either hollow-stem auger or casing advancer methods. Wells were constructed of 2-inch Schedule 40 PVC threaded standpipe and screen lengths. Screen slot size was 0.02 inch.

A washed silica sand (No. 5) filter pack was placed in the annular space across from the entire screened interval to a height 1 to 2 feet above the top of the screened interval. The level of the filter pack was sounded continuously using a weighted measuring tape to ensure continuous placement. The natural formation was allowed to collapse around well screens in areas of flowing sand to form a natural filter pack. The natural formation was also allowed to collapse 1 to 2 feet above the top of the well screen.

A thickened bentonite slurry seal was placed above the filter pack in the annular space with a tremie pipe. The seal was approximately 2 feet thick to isolate the screened zone. A cement-bentonite grout was placed above the seal in the annular space to the ground surface.

A concrete pad was constructed around each monitoring well standpipe. A 5-foot-long, 6-inch-square locking protective standpipe was installed over each monitoring well. Three protective guardposts were installed around wells considered to be in areas susceptible to vehicle traffic. Specific well construction details are presented in Figure 6 and in the appropriate soil boring logs (Appendix A). Wells were developed by pumping until discharge water was clear. Fifty-five to 100 gallons were removed from each well.



	NSLSBP100	NSLSBP102	NSLSBP104	NSLSBP108	NSLSBP111	NSLSBP117
A	923.4	932.1	918.2	932.4	923.6	886.6
B	921.3	930.3	915.9	929.3	921.6	886.0
C	900.8	920.3	904.9	908.3	907.1	847
D	897.8	917.3	902.9	906.3	905.1	845
E	894.3	915.3	898.9	904.3	903.1	844
F	884.3	905.3	888.9	894.3	893.1	842

	NSLSBP118	NSLSBP119	NSLSBP122	NSLSBP124	ECCMW12	ECCMW13
A	882.8	882.7	877.9	880.3	885.5	883.3
B	880.8	879.7	876.2	878.7	883.3	880.2
C	866.8	865.7	870.2	872.7	882.3	878.2
D	864.8	863.7	868.2	870.7	881.3	877.2
E	863.8	862.7	866.1	868.7	873.3	876.2
F	858.8	857.7	861.1	863.7	868.3	866.2

	ECCMW14[a]	ECCMW15	ECCMW16	ECCMW17	ECCMW18	ECCMW19A
A	880.9	880.3	881.0	883.0	879.9	879.9
B	878.7	878.8	878.6	880.8	877.2	877.7
C	868.7	868.8	873.6	873.8	866.5	873.7
D	866.7	866.8	871.6	871.8	864.5	871.8
E	863.7	864.8	869.6	869.8	862.2	871.1
F	853.7	859.8	864.6	864.8	857.2	867.6

	ECCMW19B	ECCMW20	ECCMW21	ECCMW22[a]	ECCMW23	PUMP TEST WELL[a, b]
A	880.3	876.5	882.6	875.7		878.4
B	877.6	874.1	879.8	873.4		875.6
C	863.1	865.1	865.8	858.4	(Surface elevation	866.6
D	861.1	863.1	863.6	856.4	not available)	864.6
E	858.4	861.1	862.8	853.4		862.6
F	848.4	846.1	847.8	843.4		852.6

Notes:

[a] Elevation estimated using nearby soil boring elevation.

[b] Pump test well was constructed of 4" diameter PVC rather than 2".

FIGURE 6
MONITORING AND OBSERVATION WELL CONSTRUCTION DIAGRAM
NSL/ECC TECH MEMO

Piezometers

Five piezometers were placed in the borrow area. Well screens were placed in a hard clayey/silty material in order to obtain water level measurements to define excavation design. Water levels in the borrow area are listed in Table 3.

Five piezometers were also placed along the alignment of the interceptor trench to obtain piezometric information (Figure 4). Most of the piezometers in the trench area were placed in fractured clay tills at a shallow depth (less than 40 feet), if possible, within a sandy zone. Piezometer construction details are shown in Figure 6.

Monitoring Wells

Thirteen monitoring wells were installed in the area south of the ECC site. The soil boring program delineated the horizontal and vertical limits of the sand and gravel unit that occur downgradient from the site. Monitoring wells were placed where a sufficient amount of sand and/or gravel was found during soil boring and where the wells would probably be downgradient of contaminated zones. Wells were placed approximately 10 feet upgradient of existing soil borings. Soil boring profiles including HNu screening results were constructed in the field. The distribution of HNu readings in these profiles were sometimes used to determine the screen length for the monitoring well. Depth intervals from which high HNu readings were recorded were screened to sample the groundwater from a region of possible high organic contamination. Most well screens were seated at the interface between the sand and gravel aquifer and the underlying confining glacial till.

Monitoring well ECCMW19B was placed 7 to 10 feet upgradient of ECCSB18. Contaminated material was not encountered during soil boring, but was encountered at the monitoring well location. High HNu readings were recorded in the breathing zone when a depth of approximately 3 feet was reached. Level B health and safety personal protection equipment was used for the rest of the well installation.

The well screen for ECCMW19A was placed across a shallow 6-inch sandy zone in the mostly silty material. The silty

Table 3
GROUNDWATER ELEVATIONS
NSL/ECC

Well No.	Date Recorded	Top of Casing (TOC) Elevation (ft, MSL)	Depth to Water, Ft Below TOC	Water Level Elevation (ft, MSL)
NSLSBP100	3-25-88	923.4	14.2	909.2
	3-28-88		14.2	909.2
	5-02-88		14.1	909.3
NSLSBP102	3-25-88	932.1	7.1	925.0
	3-28-88		7.3	924.8
	5-02-88		8.81	923.3
NSLSBP104	3-25-88	918.2	6.4	911.8
	3-28-88		6.1	912.1
	5-02-88		8.05	910.2
NSLSBP108	3-25-88	932.4	9.3	923.1
	3-28-88		8.9	923.5
	5-02-88		10.2	922.2
NSLSBP111	3-28-88	923.6	7.9	915.7
	5-02-88		9.1	914.5
NSLSBP117	5-02-88	886.6	5.2	881.4
NSLSBP118	5-02-88	882.8	5.4	877.4
NSLSBP119	5-02-88	882.7	2.1	880.6
NSLSBP122	5-02-88	877.9	5.4	872.5
NSLSBP124	5-02-88	880.3	5.8	874.5
ECCMW12	4-29-88	885.5	2.48	883.0
ECCMW13	4-29-88	883.3	9.70	873.6
ECCMW14	4-29-88	880.9[a]	5.40	875.5[a]
ECCMW15	4-29-88	880.3	4.60	875.7
ECCMW16	4-29-88	881.0	7.51	873.5
ECCMW17	4-29-88	883.0	7.65	875.4
ECCMW18	4-29-88	879.9	7.34	872.6
ECCMW19A	4-29-88	879.9	8.85	871.1
ECCMW19B	4-29-88	880.3	8.95	871.4
ECCMW20	4-29-88	876.5	7.99	868.5
ECCMW21	4-29-88	882.6	6.63	876.0
ECCMW22	4-29-88	875.7[a]	7.35	868.4[a]
ECCMW23	4-29-88	-	8.05	-
Pump test well	5-02-88	878.4[a]	6.5	871.9[a]
ECCMW1A	4-29-88	888.4[a]	9.97	878.4[a]
ECCMW2A	5-02-88	888.5[a]	8.5	880.0[a]
ECCMW3A	4-29-88	877.0[a]	5.86	871.1[a]
ECCMW8A	4-29-88	884.5[a]	5.99	878.5[a]
ECCMW10A	4-29-88	880.6[a]	8.43	872.2[a]
ECCMW11A	4-29-88	885.2[a]	7.94	877.3[a]
NSLMW8S	5-02-88	881.7[a]	8.5	873.2[a]
NSLMW9S	5-02-88	887.9[a]	11.85	876.0[a]
NSLMW10S	5-02-88	885.6[a]	5.45	880.2[a]
NSLMW11S	5-02-88	897.7[a]	4.15	893.6[a]
NSLMW12	5-02-88	874.1[a]	4.3	869.8[a]
NSLMW13	5-02-88	876.7[a]	5.75	871.0[a]
NSLMW14	5-02-88	877.9[a]	5.9	872.0[a]
NSLMW15	5-02-88	886.3[a]	5.6	880.7[a]
NSLMW16	5-02-88	912.9[a]	9.4	903.5[a]
NSLMW18	4-29-88	887.2[a]	7.72	879.5[a]
	5-02-88		7.90	879.3[a]

SBP = Soil Boring Piezometer
MW = Monitoring Well

[a]Approximate elevations

GLT592/40

zone was found to be contaminated during placement of monitoring well ECCMW19B.

Pump Test Well

A 4-inch PVC test well was installed next to soil boring ECCSB10. The well was installed to enable a pump test to be completed to determine hydraulic properties of the sand and gravel unit underlying the ECC site and the southwest portion of the NSL site. Well construction was similar in all respects to construction for the monitoring wells and piezometers. A 10-foot screen was placed at the base of the aquifer. The pump test was not completed during this field effort.

WATER LEVEL MEASUREMENTS

After wells were developed, water levels were measured using a "popper" (sounding device) attached to a measuring tape. All measurements were made from the top of the well casing. See Table 3 for water level measurements.

GROUNDWATER SAMPLING

Thirteen completed monitoring wells were sampled for metals, volatile and semivolatile organic compounds, and conventional parameters to define the extent of groundwater contamination south of the ECC site. The sump barrel on the concrete pad was also sampled. Well ECCMW1A, constructed upgradient of the ECC site in 1983, was sampled as a background well. Water used in the drilling operations was also analyzed to check if any contaminants were added during drilling. Sampling took place on April 27, April 28, and May 3, 1988; see Figure 7 for sampling locations.

A 4-foot-long, 2-inch-diameter stainless steel bailer was used to purge the wells. The standing volume of water in each well was calculated based on the total depth of the well and the depth to water surface in the well. At least five well volumes were purged. In many wells, the water was still turbid after removing more than five well volumes. Calculated purge volumes, water clarity, and actual well volumes purged are presented in Table 4. The sump barrel was not purged before sampling. Samples for metals, volatile and semivolatile organic compounds, and conventional parameter analyses were collected with the stainless steel

7-29-88

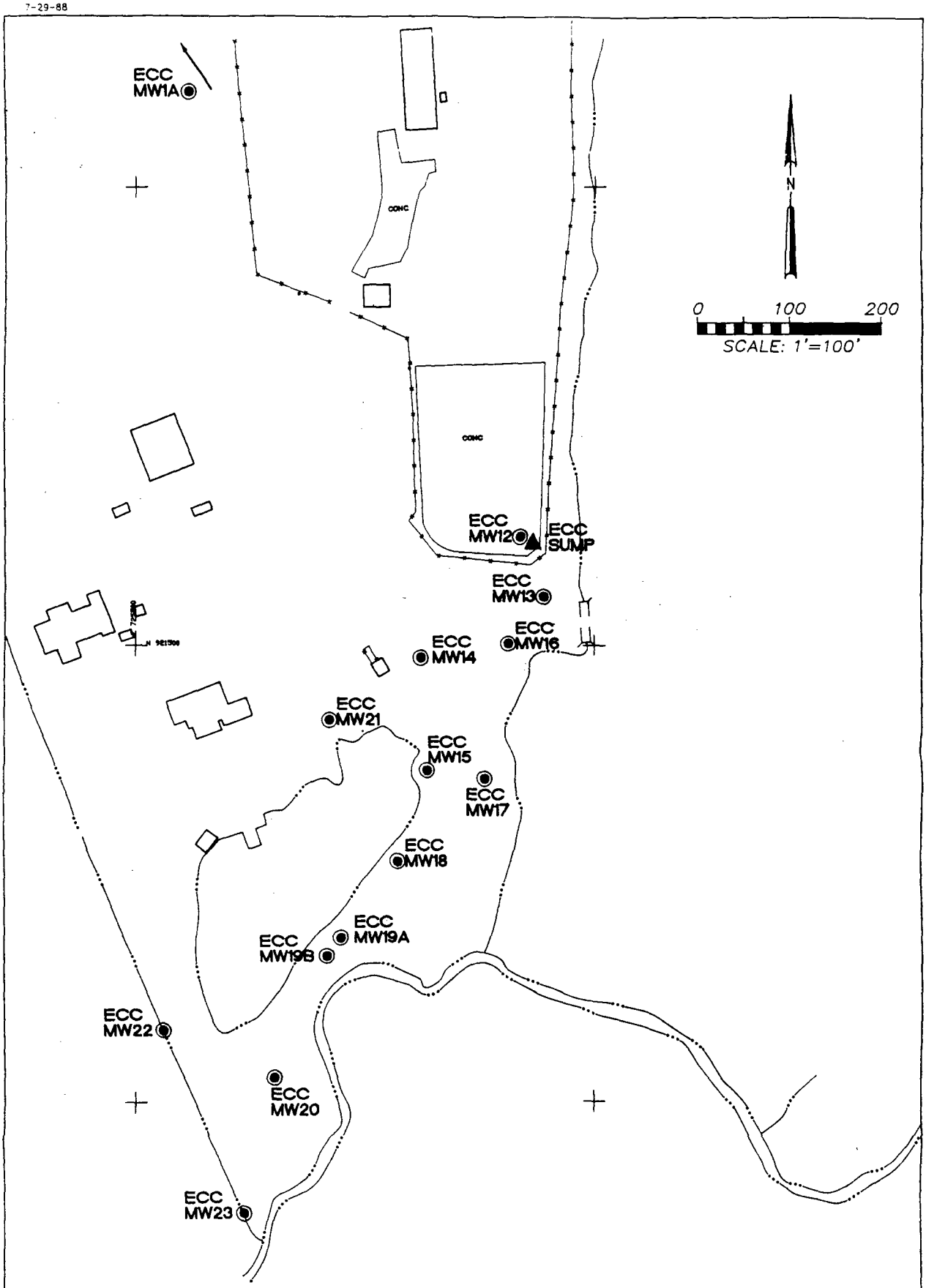


FIGURE 7
GROUNDWATER SAMPLING LOCATIONS
NSL/ECC TECH MEMO

CH2M HILL

164641 FIG14.DWG

Table 4
PURGE VOLUMES AND
WATER CLARITY
NSL/ECC

Well No.	Well Volume (gallons)	Water Clarity	Actual Purge Volume (gallons)
ECCMW1A	3.2	Clear	16
ECCMW12	2.6	Very turbid	25
ECCMW13	1.2	NR	10
ECCMW14	3.3	NR	20
ECCMW15	2.5	Very turbid	25
ECCMW16	1.4	Very turbid	20
ECCMW17	1.7	Very turbid	20
ECCMW18	2.4	Very turbid	18
ECCMW19A	0.5	Very turbid	10
ECCMW19B	3.7	Clear	30
ECCMW20	3.6	NR	20
ECCMW21	4.4	Turbid	30
ECCMW22	3.7	Turbid	22
ECCMW23	3.2	Turbid	20
Sump barrel	--	Slightly turbid	--

MW = Monitoring Well
NR = Not recorded

GLT592/41

bailer and poured into containers provided through the U.S. EPA bottle repository. Field measurements of temperature, pH, and specific conductivity were made for each sample (see Table 5).

All samples collected were placed on ice immediately after collection to maintain a temperature of approximately 4°C. One sample fraction for metal analysis was filtered through a 0.45-um filter immediately after collection. Sample fractions for metals were preserved with nitric acid to a pH of less than 2. Samples for chemical oxygen demand and ammonia analysis were preserved with sulfuric acid to a pH of less than 2. Samples were packed according to U.S. EPA laboratory program protocol and shipped to the assigned contract laboratory (Table 6). Target compound list compounds that were analyzed for are presented in Appendix E. The results of groundwater chemical analyses results are presented in Appendix F.

The stainless steel bailer was decontaminated by scrubbing with a 10 percent methanol solution, rinsing with distilled water, and allowing the bailer to air dry. Purge water and spent decontamination solutions were put into 55-gallon drums and stored onsite. No HNu readings above background were noted in the breathing zone. Level D protection was used during well sampling.

AERIAL PHOTOGRAPHY, SURVEYING, AND MAPPING

The site had not been photographed or surveyed for mapping since 1983, so both were done for the predesign. Aerial photographs were taken on March 22, 1988 by Remote Sensing Services Ltd. The photographs consisted of the following:

- 1 line, 4 exposures 1"=350' 60% F.O.L.
- 1 line, 4 exposures 1"=550' 60% F.O.L.
- 1 single exposure 1"=1,200'

CH2M HILL surveyed the site on April 21 through 24.

Field surveys for this project were structured to accomplish the following: provide X, Y, and Z photo control coordinates (horizontal and vertical values to control mapping); tie to old mapping control points to establish a relationship between old and new mapping control; tie to National geodetic control to provide state plane coordinates and elevations

Table 5
MONITORING WELL FIELD PARAMETERS
NSL/ECC

Sample Number	Date	Temperature (°C)	pH (su)	Specific Conductivity (umhos/cm at 25°C)
ECCMW1A	4-27-88	9.2	9.02	658
ECCMW12	4-28-88	15	7.66	750
ECCMW13	4-28-88	9.5	7.03	1,304
ECCMW14	4-28-88	10	7.53	786
ECCMW15	4-27-88	9	7.59	721
ECCMW16	4-27-88	7	7.26	1,172
ECCMW17	4-27-88	8	NR	833
ECCMW18	4-27-88	8	7.60	856
ECCMW19A	4-28-88	11	7.21	833
ECCMW19B	4-28-88	11	7.55	653
ECCMW20	4-27-88	7	7.64	1,172
ECCMW21	4-27-88	9	7.69	662
ECCMW22	5-03-88	14	7.34	962
ECCMW23	5-03-88	15	7.28	1,563
Sump Barrel	4-28-88	12	7.71	351

NR = Not Recorded

GLT592/37

Table 6
SAMPLE IDENTIFICATION MATRIX--MONITORING WELLS
NSL/ECC

Sample Number	Collection Date	Shipment Date	Laboratory Organic	Laboratory Metals	Conventional Parameters
ECCDW01	4-25-88	4-25-88	USTES	CENTR	--
ECCMW1A	4-27-88	4-27-88	USTES	CENTR	ISBH
ECCMW12	4-28-88	4-28-88	USTES	CENTR	ISBH
ECCMW13	4-28-88	4-28-88	USTES	CENTR	ISBH
ECCMW13D	4-28-88	4-28-88	USTES	CENTR	ISBH
ECCMW14	4-28-88	4-28-88	USTES	CENTR	ISBH
ECCMW14D	4-28-88	4-28-88	USTES	CENTR	ISBH
ECCMW15	4-27-88	4-27-88	USTES	CENTR	ISBH
ECCMW16	4-27-88	4-27-88	USTES	CENTR	ISBH
ECCMW17	4-27-88	4-27-88	USTES	CENTR	ISBH
ECCMW18	4-27-88	4-27-88	USTES	CENTR	ISBH
ECCMW19A	4-28-88	4-28-88	USTES	CENTR	ISBH
ECCMW19B	4-28-88	4-28-88	USTES	CENTR	ISBH
ECCMW20	4-27-88	4-27-88	USTES	CENTR	ISBH
ECCMW21	4-27-88	4-27-88	USTES	CENTR	ISBH
ECCMW22	5-03-88	5-03-88	S3	EEE	ISBH
ECCMW22D	5-03-88	5-03-88	S3	EEE	ISBH
ECCMW23	5-03-88	5-03-88	S3	EEE	ISBH
ECCMW96	5-03-88	5-03-88	S3	EEE	ISBH
ECCMW97	4-28-88	4-28-88	USTES	---	--
ECCMW98	4-28-88	4-28-88	USTES	CENTR	ISBH
ECCMW99	4-27-88	4-27-88	USTES	CENTR	ISBH
ECCSUMP01	4-28-88	4-28-88	USTES	CENTR	ISBH

SUMP = Sump Barrel
DW = Drillers' Water
MW = Monitoring Well
USTES = U.S. Testing Co., Inc., NJ
CENTR = Century Laboratories, Inc., NJ
S3 = S-Cubed, CA
EEE = Energy and Environmental Engineering, MA
ISBH = Indiana State Board of Health
ECCMW13D was a duplicate of ECCMW13
ECCMW14D was a duplicate of ECCMW14
ECCMW22D was a duplicate of ECCMW22
ECCMW96, ECCMW98, and ECCMW99 were field blanks
ECCMW97 was a trip blank

GLT592/39

based on sea level datum; tie to 1/4 section corners adjacent to the project site; and provide field surveys of X, Y, and Z values for all exploration locations such as borings, tests pits, and wells.

The surveys outlined above were accomplished with conventional differential levels and with a Wild DI 1000 total station.

CH2M HILL mapped the area to provide a 1"=50' scale design map with 1-foot contours. Site maps are shown in Figures 3 to 5. The information on the map will be used in the predesign report and updated as necessary for design. Engineering design and graphics data bases were created during the mapping process. These computer data bases were used to generate a variety of work products and design exhibits.

DECONTAMINATION PRACTICES

HEAVY EQUIPMENT

All heavy equipment used during soil boring and well installation (e.g., drill rig, augers, tools) was decontaminated between locations in the interceptor trench and ECC areas. A high pressure steam cleaner was used on the equipment at an onsite decontamination pad. The pad consisted of an earthen depression graded to a collection sump and lined with 30-mil PVC. Water was collected in the sump during decontamination activities and contained in 55-gallon drums for later disposal.

SOIL SAMPLING EQUIPMENT

The split-barrel sampler and all sampling utensils were decontaminated between each use by washing with a trisodium phosphate and tap water solution, rinsing with tap water, washing with a 10 percent methanol and deionized water solution, rinsing with deionized water, and air drying. Decontamination water was collected in 55-gallon drums for disposal.

INTERPRETATION OF RESULTS

GEOTECHNICAL CONSIDERATIONS

Borings, test pits, and CPT data were used to collect geotechnical information for future use in design. Economical landfill cover design involves matching the design

requirements with available soil properties. Typical property requirements have been assumed in evaluating materials for use in construction. These requirements may be modified during final design.

Multilayered Cap

The purpose of a cap or final cover is to minimize leaching of the soil or landfill contaminants to the groundwater. Figure 8 depicts a typical multilayered cover system. The actual properties needed for each layer depend on precipitation, slope steepness, permeability of the topsoil layer, type of barrier layer, frost depth, and past or future use of the area. Descriptions of the physical soil properties, and applicable Resource Conservation and Recovery Act (RCRA) guidance specifications for the layers shown are presented below.

Topsoil. An organic-rich soil cover is required on the landfill cap to support vegetation that will minimize erosion and preserve slope stability. The final top slope of the cover should be 3 to 5 percent after allowing for settling and subsidence. Sideslopes steeper than 5 percent should be protected so that erosion is less than 2 ton/acre as calculated using the U.S. Department of Agriculture Universal Soil Loss Equation. The state of Indiana recommends a final top slope of 4 percent and sideslopes not steeper than 25 percent.

Fill Layer. The fill layer beneath the topsoil may consist of sand, silty sand, silt, or silty gravel. It should be compatible with the overlying topsoil and the underlying drainage layer. Topsoil should not be able to migrate into the fill layer and the fill layer should not be able to migrate into the underlying drainage layer. The importance of the coefficient of permeability of fill material will vary depending on the total cover system.

The fill layer protects the barrier layer from root and freeze/thaw damage. Its thickness will depend on the needs of the other layers. If a total of 18 inches of moisture-holding soil is needed to support vegetation and 6 inches of topsoil is to be used, then 12 inches of fill is necessary. If the frost depth is 30 inches and the drainage layer is 12 inches thick, then the fill and topsoil layer should be a

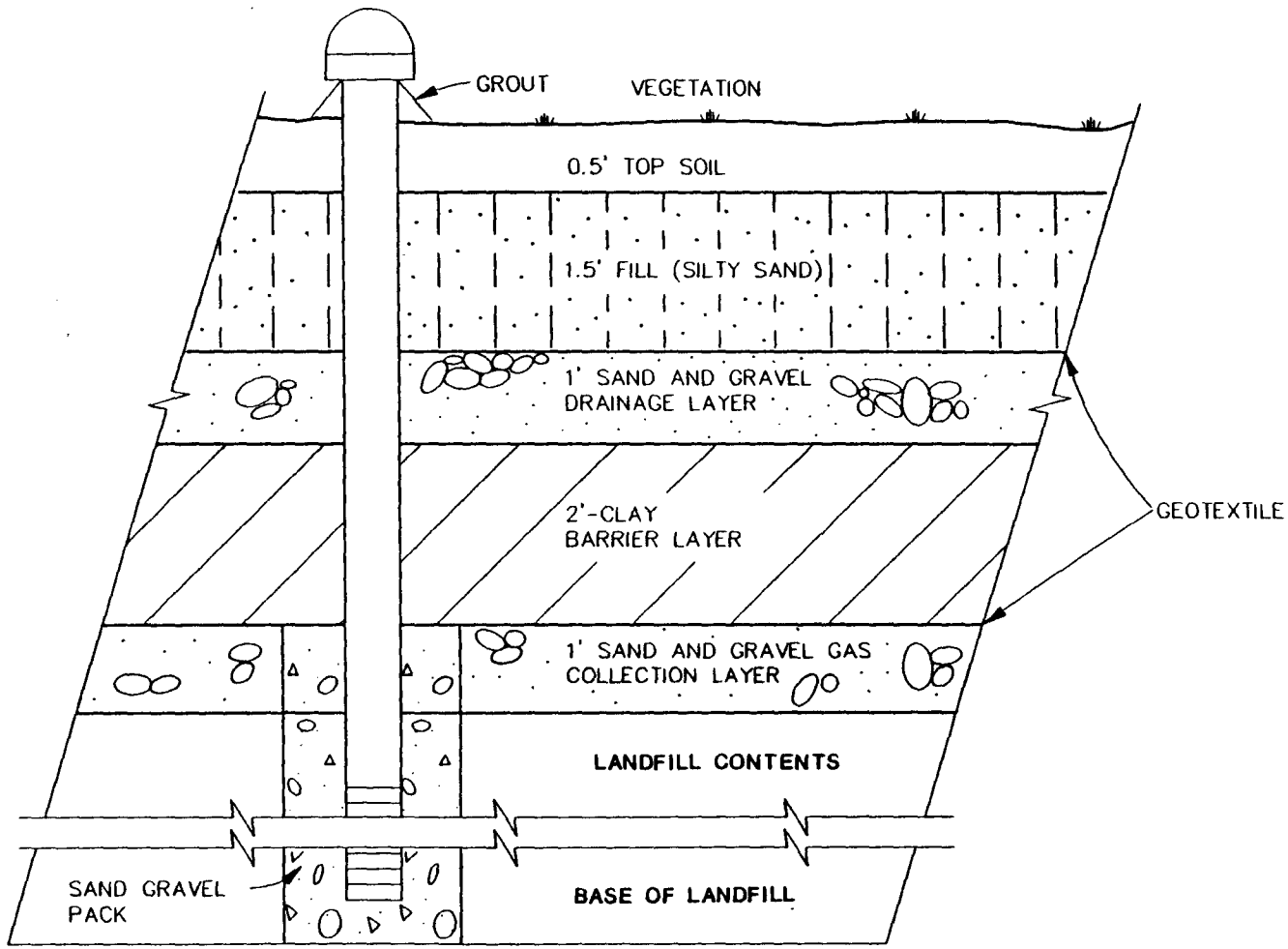


FIGURE 8
SCHEMATIC DIAGRAM OF LANDFILL CAP AND GAS VENTING SYSTEM
NSL/ECC TECH MEMO

total of 18 inches thick to prevent frost damage to the barrier layer.

Upper Filter Layer. A filter layer may be needed to prevent clogging of the underlying drainage layer by migration of soil from the overlying fill layer. A specific filter layer may not be required if the gradation of the drainage layer prevents clogging. The filter can be either soil or geotextile.

Drainage Layer. The drainage layer is needed to enable water to flow freely in a lateral direction, thereby minimizing head on and flow through the low permeability layer. Typical drainage material consists of clean, free draining sand and gravel with a high internal friction angle to resist sliding. RCRA requirements state that the drainage layer should have a hydraulic conductivity of not less than 1×10^{-3} cm/s and that the final bottom slope should be at least 2 percent after allowing for settling and subsidence.

Barrier Layer. The purpose of the barrier layer is to reduce infiltration, thereby minimizing leachate production and potential groundwater contamination. Typically, a soil barrier layer may consist of clay, silty clay, or clayey silt. The suitability of the barrier soil depends primarily on its permeability, which is in turn related to particle size and distribution and the amount of clay particles in the material. To prevent a "bathtub effect," RCRA requirements state that the landfill cover must be no more permeable than the most impermeable component of the liner system, or in this case of the underlying soils. If natural deposits of suitable materials are not locally available, imported soil and bentonite may be mixed to produce a final material with the required properties. RCRA also specifies that the barrier layer be wholly below the average depth of frost penetration.

Soil plasticity and moisture content affect the performance of the barrier layer. For example, a highly plastic soil, although difficult to work with, is less likely to develop fissures and cracks due to subsidence that would otherwise reduce the overall effectiveness of the layer. The moisture content of the soil is an important consideration regarding the constructibility of the barrier layer. The moisture content must be such that the required compaction can be attained. During construction, the soil must be at or above

optimum moisture to produce a dense, compacted, homogeneous layer of soil.

Lower Filter Layer. A lower geotextile filter layer may be needed to prevent clogging of the underlying gas collection layer by infiltration of the overlying barrier layer.

Gas Collection Layer. A gas collection layer or venting system will be needed to intercept gas produced by the waste, thereby relieving pressure from gas that might otherwise build up beneath the barrier layer. Typical gas collection layers consist of clean, free-draining sand or gravel. Gas venting wells may be required. The specific design of the gas collection system will depend on the estimated amount of gas production. A gas collection layer will not be required over the ECC site or outside of the leachate collection system.

Material Estimates

The final configuration of the NSL/ECC cover will not be determined until all design elements have been considered. However, the necessary materials can still be estimated based on thicknesses assumed in the conceptual model (Figure 8). The estimates were calculated assuming a combined site area of 77 acres. The calculated quantities are summarized in Table 7.

Estimates for sideslope and crown fill may change substantially. The final shape of the cover will have a marked effect on the fill requirements. Future activities at the landfill may also alter the estimated fill requirements. However, the estimated quantities for the various layers that comprise the cap are not likely to change significantly as long as the area to be capped remains essentially the same.

Borrow Area

Surface and subsurface soil investigations completed in the proposed onsite borrow area consisted of 12 soil borings, 10 test pits, and 10 CPT soundings. The purpose of the investigation was to determine the suitability of onsite soils for use in the final cover. Soils in the borrow area were tested for a variety of physical parameters, including Atterberg limits, grain-size distribution, moisture content,

Table 7
ESTIMATED MATERIAL QUANTITIES FOR CAP
NSL/ECC

Layer	Thickness	Amount	Units
Fill: 4:1 Sideslope	--	72,000	cu yd
Fill: 3% Crown	--	34,100	cu yd
Fill: 6% Crown	--	132,000	cu yd
Fill	1.5 feet	124,000	cu yd
Top Soil	0.5 foot	62,000	cu yd
Filter Layer	--	373,000	sq yd
Drainage Layer	1 foot	124,000	cu yd
Barrier Layer	2 feet	248,000	cu yd
Filter Layer	--	373,000	sq yd
Gas Collection Layer	1 foot	124,000	cu yd

GLT592/45

maximum dry density, and permeability. The results of those analyses are summarized in Table 8.

Using the Unified Soil Classification System, most of the soil samples analyzed plotted as silty clay (CL-ML). The CL-ML classification is based on grain-size distribution (>50 percent, by weight, of the samples passing a No. 200 sieve) and Atterberg limits (liquid limit between 10 and 28 and plastic index between 4 and 7). Borrow area soils with the CL-ML classification range from silty clays to sandy silty clays. The few samples that plotted as clay (CL) have a plasticity index between 8 and 13 and consist of clays to sandy clays.

The soils designated as CL-ML and CL are of low plasticity, which makes them more susceptible to cracking as a result of differential settlement of the landfill. Cracking could reduce the effectiveness of the material as a barrier layer. This characteristic requires further consideration during design.

The natural moisture content of the borrow area soils range from 6.8 to 29 percent, with most of the samples falling between 10 and 14 percent natural moisture. These moisture contents are slightly wetter than optimum moisture for the Modified Proctor compactive effort (see compaction curves, Appendix D).

An important physical characteristic of the borrow area soil is the coefficient of permeability. With the exception of NSLSB-103, sample BS-1, the permeability of the tested soil samples falls between 7.4×10^{-8} and 6.8×10^{-9} cm/s. The permeability of NSLSB-103, sample BS-1, was 1.6×10^{-6}. These permeabilities are for remolded soil samples and may not reflect the permeabilities of the in situ soils beneath the combined NSL/ECC site. The permeability required for cap construction has not yet been clearly identified and must be determined for design to proceed.

Sandy soils in the borrow area plot as clayey silty sand (SC-SM), clayey sand (SC), or well graded sand with silt (SW-SM) (Table 8). Examination of the soil boring logs (Appendix A) and CPT logs (Appendix C) indicates that sandy soils are found in thin seams and generally comprise less than 5 percent of the total soils sampled in the borrow area. The exceptions to this are soil borings NSLSB-104,

03-Aug-88

Table 8 (Page 1 of 2)
PHYSICAL ANALYSIS OF BORROW AREA SOIL SAMPLES
NSL/ECC

Test Pit/ Boring No.	Sample No.	Depth (ft)	(a) USCS	Natural Moisture Content(%)	Atterberg Limits LL	PL	PI	P200(%)	Maximum Dry Density (lb/cu ft)	Proctor(%)	Coefficient of Permeability (cm/s)
NSLSB-100	S-3	5.0 - 7.0	CL-ML	12.8	21	14	7	55.3			
	S-9	20.0 - 21.5	CL-ML	6.8	17	13	4	55.3			
NSLSB-101	S-3	5.0 - 7.0	CL-ML	18.7	22	16	6	82.7			
	S-6	12.5 - 14.5	SC-SM	11.2	19	13	6	33.7			
NSLSB-102	S-5	10.0 - 12.0	CL-ML	10.8	18	13	5	57.7			
NSLSB-103	BS-1	0 - 15.0	CL-ML	12.2	21	14	7	56.1	136.1		
	BS-1D	0 - 15.0	CL-ML	8.3						94.7	1.6E-6
	S-4	8.5 - 10.5	sc-sm					40.8			
	S-8	18.5 - 20.5	CL-ML	8.9	18	12	6	55.4			
NSLSB-104	S-3	6.0 - 8.0	CL-ML	12.1	20	15	5	55.5			
	S-6	13.5 - 15.5	cl-ml	6.8	17	12	5				
	S-8	18.5 - 20.5	CL-ML	10.8	17	12	5	52.4			
NSLSB-105	BS-1	0 - 25	CL-ML	11.2	22	15	7	56.0	135.8		
	BS-1D	0 - 25	CL-ML	9.9						95.0	7.0 x 10E-8
	S-2	3.5 - 5.5	cl-ml	10.9	22	14	8				
	S-5	11.0 - 13.0	SC-SM	10.1	14	10	4	45.1			
	S-8	18.5 - 20.5	CL-ML	11.0				57.8			
	S-8	18.5 - 20.5	CL-ML		16	12	4				
NSLSB-106	S-3	6.0 - 8.0	CL-ML	10.9	18	11	7	58.1			
NSLSB-107	S-4	7.5 - 9.5	CL-ML	12.0	19	12	7	58.0			
	S-9	20 - 21.5	CL-ML	8.7	19	13	6	53.9			
NSLSB-108	S-2	2.5 - 4.5	CL-ML	11.6	22	15	7	56.9			
	S-9	20.0 - 21.5	SC	11.3	24	13	11	49.6			
NSLSB-109	S-4	7.5 - 9.5	CL-ML	12.4	20	15	5	50.9			
NSLSB-110	S-6	13.5 - 15.5	SC-SM	10.7	18	12	6	47.0			
	S-8	18.5 - 20.5	SW-SM	13.9				10.8			
NSLSB-111	S-10	23.5 - 24.5	SM	16.9				13.0			
	BS-1	0 - 15	CL	13.8	28	18	10	63.0	131.9		
	BS-1D	0 - 15	CL	11.7						94.6	7.3 x 10E-9
NSL-TP-100	G-1	3.8	CL-ML	12.1	22	15	7	64.1	135.5		
	G-2	7.6		11.9							
	B	3.8		9.2						94.8	8.5 X 10E-9

(a) Upper case symbols denote that the classification is based on laboratory tests.
Lower case symbols denote that the classification is based on field identification.

Table 8 (Page 2 of 2)
PHYSICAL ANALYSIS OF BORROW AREA SOIL SAMPLES
NSL/ECC

Test Pit/ Boring No.	Sample No.	Depth (ft)	(a) USCS	Natural Moisture Content(%)	Atterberg Limits LL	PL	PI	P200(%)	Maximum Dry Density (lb/cu ft)	Proctor(%)	Coefficient of Permeability (cm\s)
NSL-TP-101	G-1	4.0		21.0							
	G-2	5.6		11.4							
	B	5.6	CL-ML	10.6	21	15	6	59.8	136.7	95.0	1.8 x 10E-8
NSL-TP-102	G-1	3.0		24.8							
	G-2	8.0		13.1							
	B	7.5	CL-ML	11.1	19	13	6	57.3	132.9	95.5	1.3 x 10E-8
NSL-TP-103	G-1	4.0		13.7							
	G-2	9.0		10.7							
	B	4.0	CL-ML	10.8	20	14	6	57.1	134.7	95.2	1.4 X 10E-8
NSL-TP-104	G-1	5.0		14.8							
	G-2	9.3		11.9							
	B	5.0	CL-ML	11.2	21	13	8	60.1	132.7	94.9	1.1 x 10E-8
NSL-TP-105	G-1	4.0		11.7							
	G-2	6.7		16.1							
	B	4.5	CL-ML	11.5	21	15	6	56.3	132.9	94.8	2.6 x 10E-8
NSL-TP-106	G-1	3.0		18.4							
	G-2	8.0		17.4							
	B	3.0	CL	11.9	27	14	13	55.2	129.6	94.9	7.4 x 10E-8
NSL-TP-107	G-1	5.0		12.1							
	G-2	7.5		10.9							
	B	5.0	CL-ML	10.6	19	13	6	57.8	132.9	95.4	9.5 x 10E-9
NSL-TP-108	G-1	3.0		25.6							
	G-2	7.0		22.3							
	B	3.0	CL-ML	11.4	22	15	7	55.3	130.1	95.5	6.8 x 10E-9
NSL-TP-109	G-1	3.0		29.0							
	G-2	8.0		13.0							
	B	8.0	CL	11.4	23	15	8	58.4	134.6	94.5	1.3 x 10E-8

(a) Upper case symbols denote that the classification is based on laboratory tests.
Lower case symbols denote that the classification is based on field identification.

NSLSB-110, and NSLSB-111, which contained approximately 12.5 percent, 50 percent, and 8 percent sandy soil.

Although the borrow area soils were investigated primarily to determine their usefulness in a barrier layer, some of the material may be used for other parts of the cap. The grain-size distribution tables in Appendix D indicate that none of the sampled soils are clean enough to be used as a drainage layer. However, most of the tested sandy material has a silty or clayey component, making it potentially suitable for use in the fill layer. Since the barrier layer will be constructed first, soil that is encountered during excavation that is suitable as fill material can be stockpiled for future use in the fill layer.

The surface area of the borrow area is approximately 40 acres. On average, therefore, 4 feet of silty clay from the borrow area will be required to construct a 2-foot-thick barrier layer on the combined NSL/ECC site.

In summary, there appears to be a sufficient supply of soil in the borrow area to be used as a barrier layer. It is also possible that borrow area soil may be used as additional fill or cover material. The soil appears to be of sufficient quality to enable construction of a RCRA compliant cap.

Groundwater Interceptor Trench

Surface and subsurface investigations along the alignment of the interceptor trench consisted of 10 soil borings and 20 CPT soundings. Three test pits were also excavated along Finley Creek. The soils in the area were tested for Atterberg limits, grain-size distribution, and natural moisture content (Table 9).

The overall character of the fine-grained soils near the interceptor trench are similar to the borrow area soils. All of the soil samples analyzed plotted as either CL-ML or CL and had a plastic index of 6 to 9. SPT blow counts indicate that most of these soils are very hard.

Approximately 10 percent of the soil from each soil boring in the interceptor trench area consisted of sandy material, which is more than in the proposed borrow area. In general, the sandy soils were found in thin seams (<1 foot thick);

Table 9
PHYSICAL ANALYSIS OF INTERCEPTOR TRENCH SOIL SAMPLES
NSL/ECC

Boring No.	Sample No.	Depth (ft)	(a) USCS	Natural Moisture Content(%)	Atterberg Limits LL	PL	PI	P200(%)
NSLSB-115	S-2	3.5 - 5.5	cl-ml	14.4				
	S-4	8.5 - 10.5	CL		21	12	9	
	S-5	11.0 - 13.0	cl	10.1				
	S-11B	26.0 - 27.0	sc-sm					37.8
	S-13	31.0 - 32.0	sc					37.7
NSLSB-116	S-3	5.0 - 7.0	sm					45.9
	S-4	7.5 - 9.5	cl-ml	10.2				
	S-9	20.0 - 21.5	cl-ml	7.0				53.1
	S-10	22.5 - 24.0	CL-ML		19	12	7	
NSLSB-117	S-16,17	38.5 - 42.0	sm					19.8
NSLSB-118	S-4	7.5 - 9.5	cl-ml					
	S-6,7	12.5 - 16.5	cl-ml					57.6
	S-8	17.5 - 19.0	CL-ML		15	11	4	
	S-11	25.0 - 26.5	cl-ml	8.5				
NSLSB-119	S-3	6.0 - 8.0	cl	10.8				
	S-4,5	8.5 - 13.0	CL-ML	9.3	20	13	7	
	S-9	21.0 - 22.0	sm					12.5
NSLSB-120	S-13	30.5 - 32.5	CL		21	13	8	
	S-14	33.0 - 35.0	CL-ML		19	13	6	
	S-14D	33.0 - 35.0	CL-ML		20	14	6	
NSLSB-121	S-9,10	18.5 - 22.2	cl-ml					60.7
	S-11	23.5 - 24.3	cl-ml	7.3				
	S-12	26.0 - 27.8	CL-ML		19	13	6	
	S-12D	26.0 - 27.8	CL-ML		20	13	7	
NSLSB-122	S-4,6	8.5 - 10.5, 13.5 - 15.5	CL-ML		19	13	6	
	S-5	11.0 - 13.0	ml	12.0				
	S-10	23.5 - 25.5	ml					25.8
NSLSB-123	S-3	5.0 - 6.5	cl-ml	9.9				
	S-3D	5.0 - 6.5	cl-ml	8.6				
	S-5	10.0 - 11.5						43.5
	S-6	12.5 - 14.0	cl-ml	8.7				
	S-7,8	15.0 - 19.0	CL-ML		20	14	6	
	S-13	30.0 - 31.4	cl-ml					
NSLSB-124	S-4	7.5 - 8.7	SP-SM					11.1
	S-6	12.5 - 13.8	SP-SM					10.3
	S-9	20.0 - 20.6	cl-ml	8.4				
	S-10	22.5 -23.2	CL-ML		20	13	7	

(a) Upper case symbols denote that the classification is based on laboratory tests.
Lower case symbols denote that the classification is based on field identification.

however, in one boring, layers consisting of mostly sand were as much as 9 feet thick starting at the ground surface. Sandy soils are identified on the soil boring logs (Appendix A). Based on the conditions encountered and typical construction requirements for pipe installation, it appears that a groundwater interceptor trench can be constructed in this area. Final design of the interceptor trench may need to include a stability analysis of the trench walls and consider a method for controlling groundwater.

HYDROGEOLOGY

ECC Site

Soil borings were drilled at locations shown in Figure 9 to delineate the stratigraphy of the ECC site. Soil boring information was used to plot the cross section location map (Figure 10) and geologic cross sections (Figure 11A-G). The stratigraphy of unconsolidated deposits in the vicinity of ECC has been interpreted to include five basic units that delineate shallow groundwater flow.

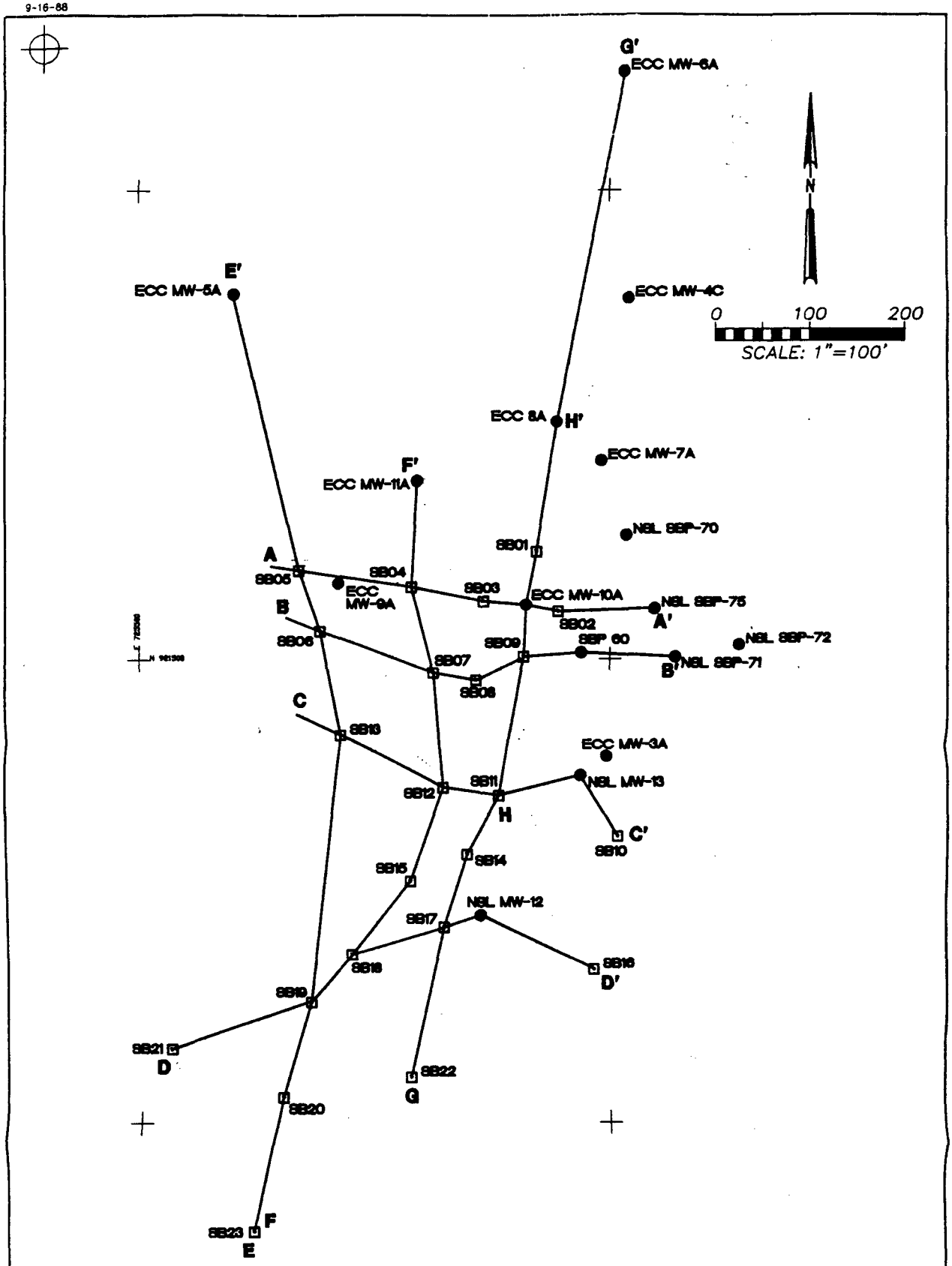
1. A surficial fill unit made up of varied silt, sand, and gravel debris. Natural materials are found at the ground surface where this unit is not present.

2. Recent (post-glacial) alluvial deposits--consisting primarily of silt and clay with minor sand lenses and natural organic debris. These materials may be transitional with underlying reworked colluvial deposits. The alluvium is generally a brown or orangish-brown oxidized color.

3. Mixed fluvial/colluvial deposits--probably formed as immediate post-glacial deposits--consist of poor- to well-graded silts, sands, and angular to subangular gravels. Alternate layers of varying materials ranging up to 6 inches thick in a 2-foot-long soil sample are common.

4. Glacial basal or lodgement till--consisting primarily of homogenous, very hard clays and silts with some embedded coarse particles. The till is fractured with fractures generally ranging in width from one sand grain's diameter to approximately 1 inch. The fractures have been infilled with fine to medium grained sand.

9-16-88



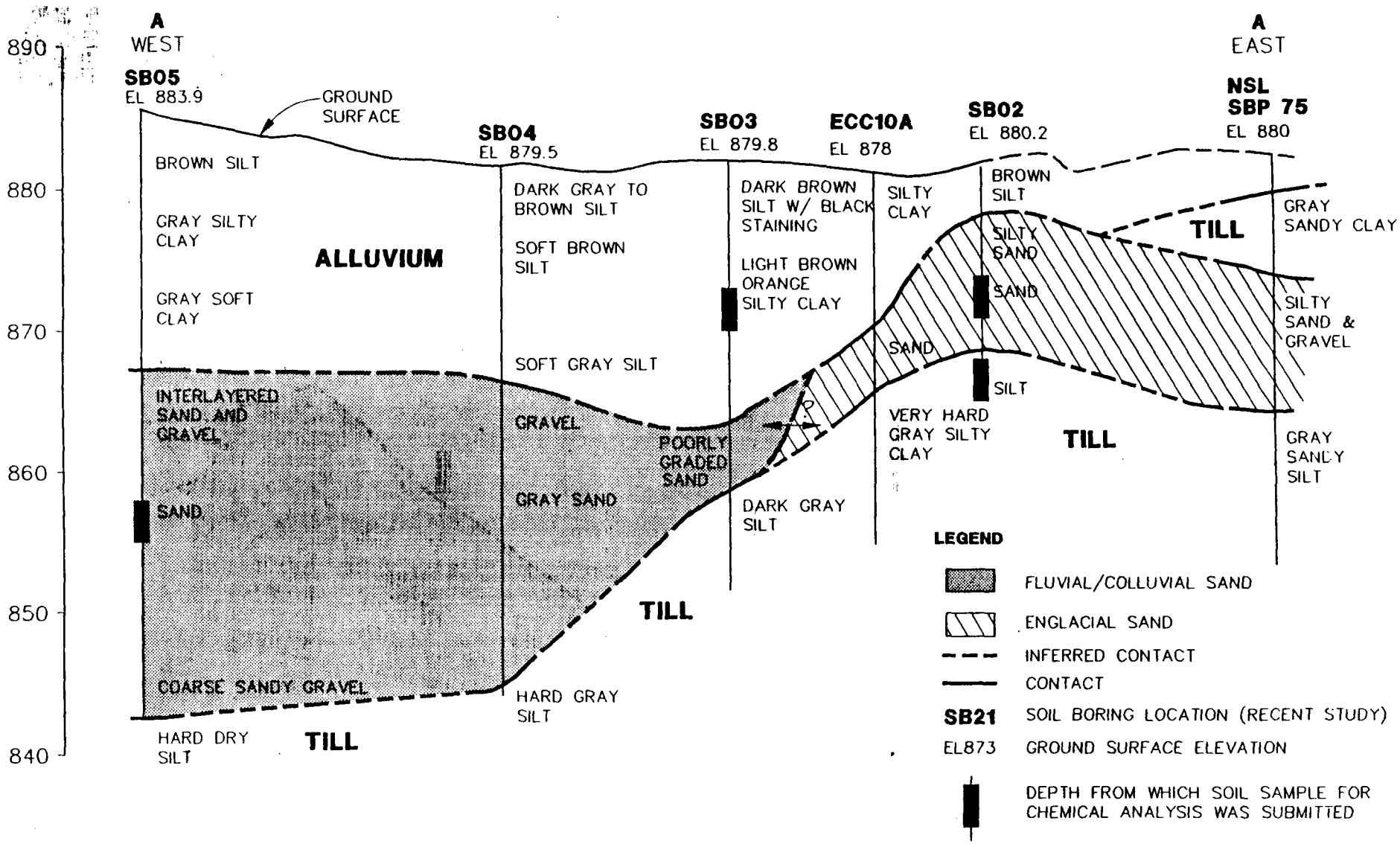
LEGEND

- ▣ SOIL BORING LOCATION: SUPPLEMENTAL INVESTIGATION
- ● PREVIOUS INVESTIGATION MONITORING WELL OR SOIL BORING PIEZOMETER

FIGURE 10
CROSS SECTION LOCATION MAP, ECC
NSL/ECC TECH MEMO

CH2M HILL

DD-MM-YY



SCALE
VERTICAL 1"=10'
HORIZONTAL: 1"=50'

FIGURE 11-A
CROSS-SECTION A-A'
NSL/ECC TECH MEMO

CH2M HILL

X

9-13-88

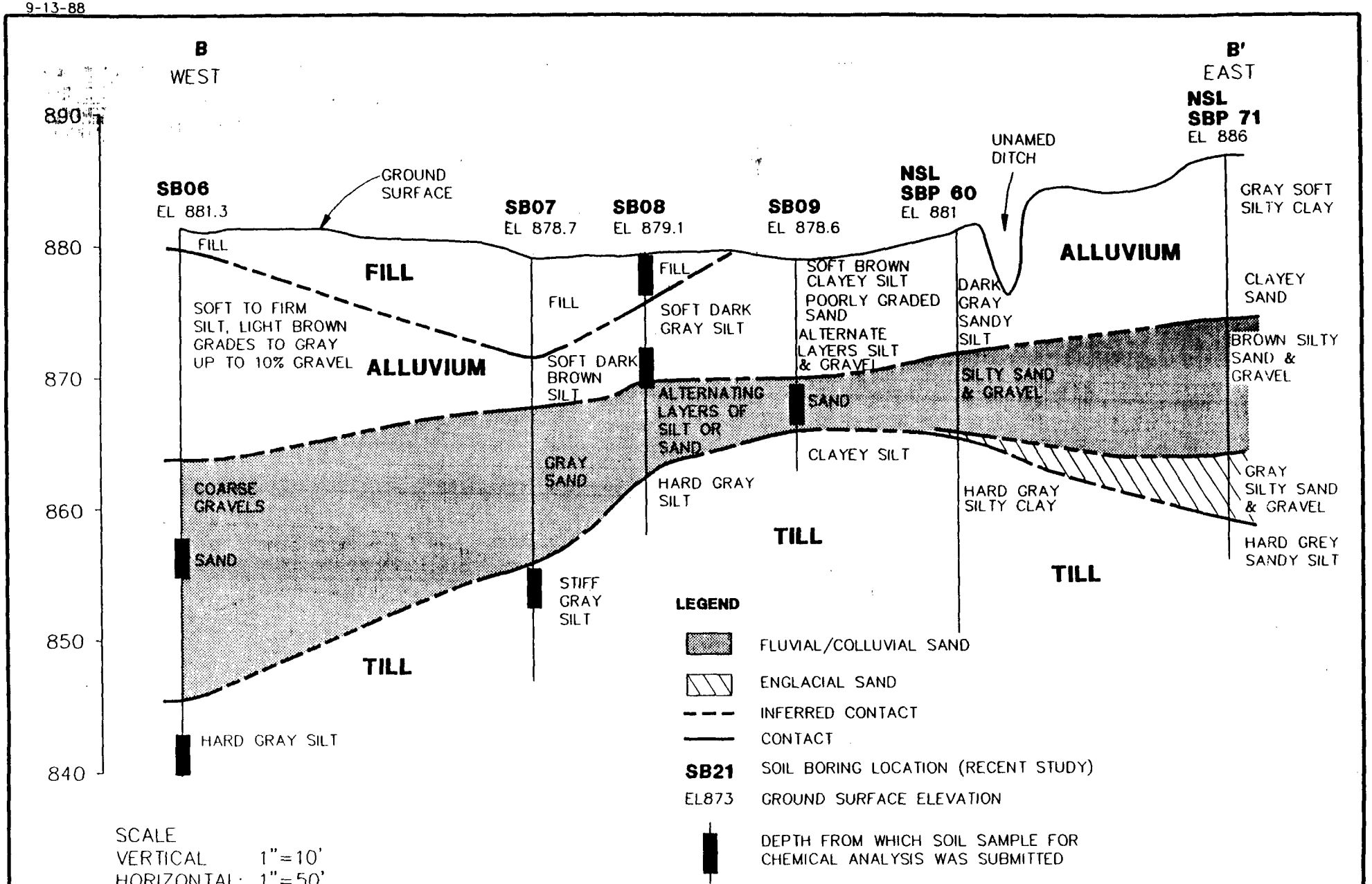
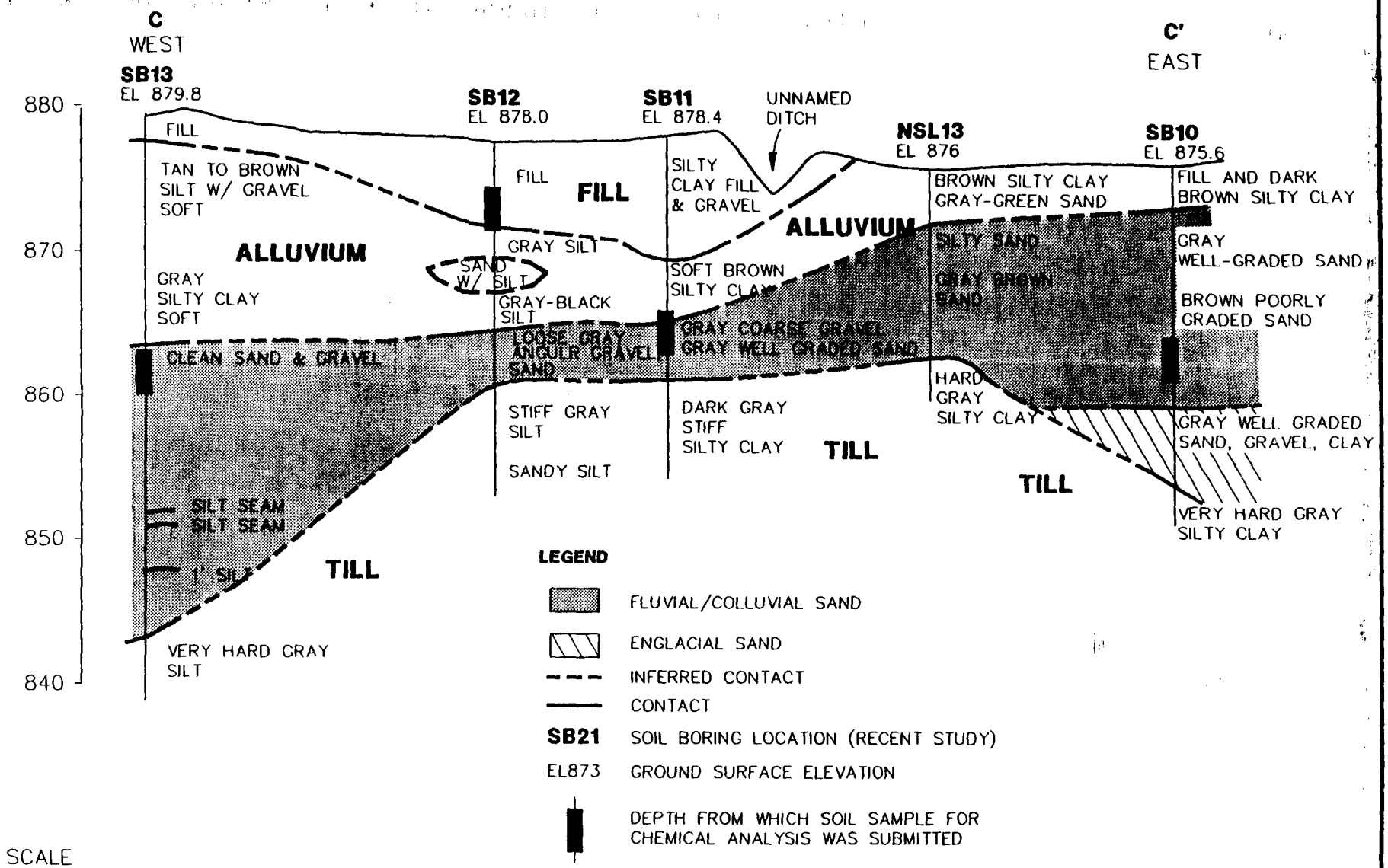


FIGURE 11-B
CROSS-SECTION B-B'
NSL/ECC TECH MEMO

CH2M HILL

B

9-13-88



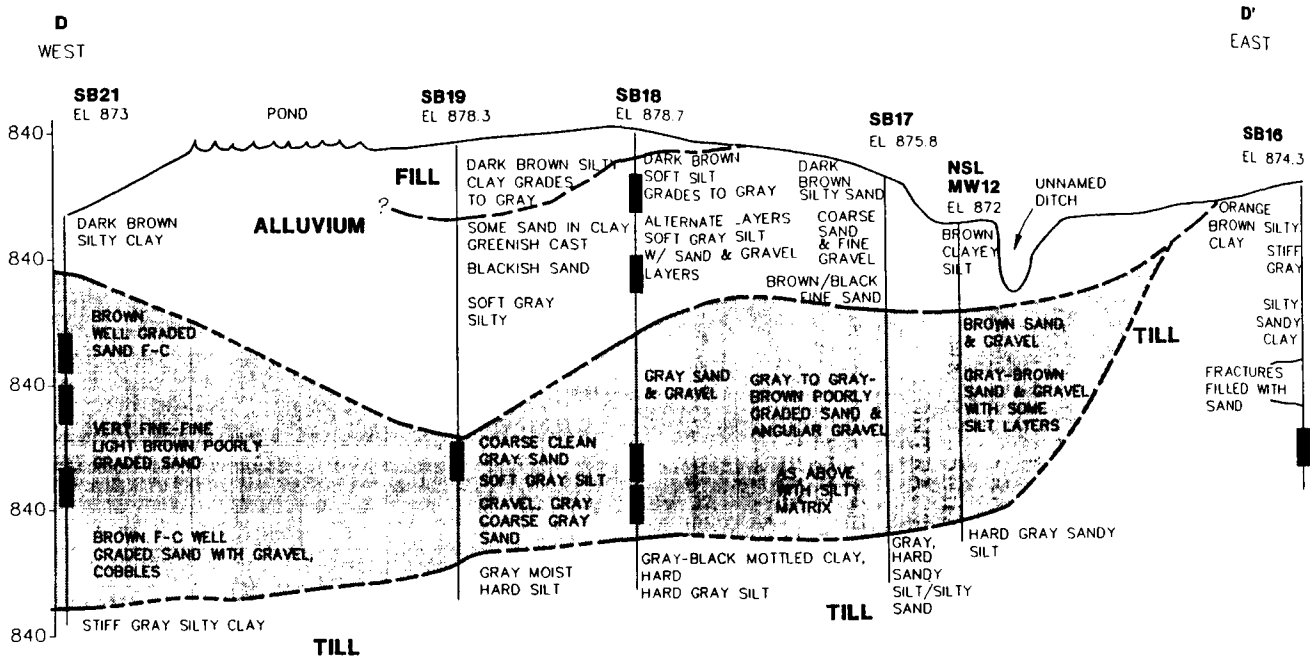
SCALE
VERTICAL 1"=10'
HORIZONTAL: 1"=50'

FIGURE 11-C
CROSS-SECTION C-C'
NSL/ECC TECH MEMO

CH2M HILL

C

DATE



LEGEND

- FLUVIAL/COLLUVIAL SAND
- INFERRED CONTACT
- CONTACT
- **SB21** SOIL BORING LOCATION (RECENT STUDY)
- EL873 GROUND SURFACE ELEVATION
- DEPTH FROM WHICH SOIL SAMPLE FOR CHEMICAL ANALYSIS WAS SUBMITTED

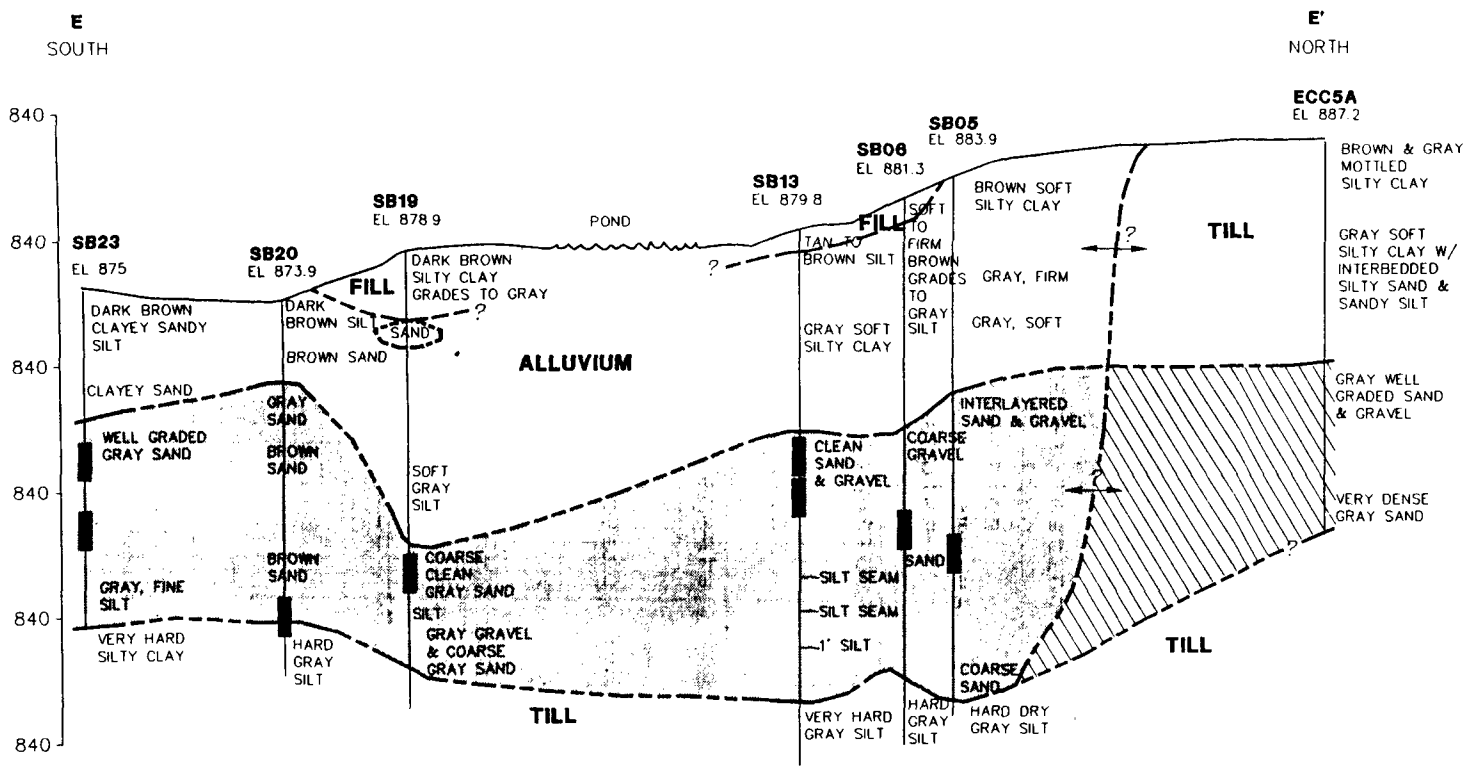
SCALE
VERTICAL 1"=10'
HORIZONTAL: 1"=50'

FIGURE 11-D
CROSS-SECTION D-D'
NSL/ECC TECH MEMO

CH2M HILL

FILENAME.EXT

DATE



LEGEND

- FLUVIAL/COLLUVIAL SAND
- ENGLACIAL SAND
- INFERRED CONTACT
- CONTACT
- **SB21** SOIL BORING LOCATION (RECENT STUDY)
- EL873 GROUND SURFACE ELEVATION
- DEPTH FROM WHICH SOIL SAMPLE FOR CHEMICAL ANALYSIS WAS SUBMITTED

SCALE
VERTICAL 1"=10'
HORIZONTAL: 1"=100'

FIGURE 11-E
CROSS-SECTION E-E'
NSL/ECC TECH MEMO

CH2M HILL

9-14-88

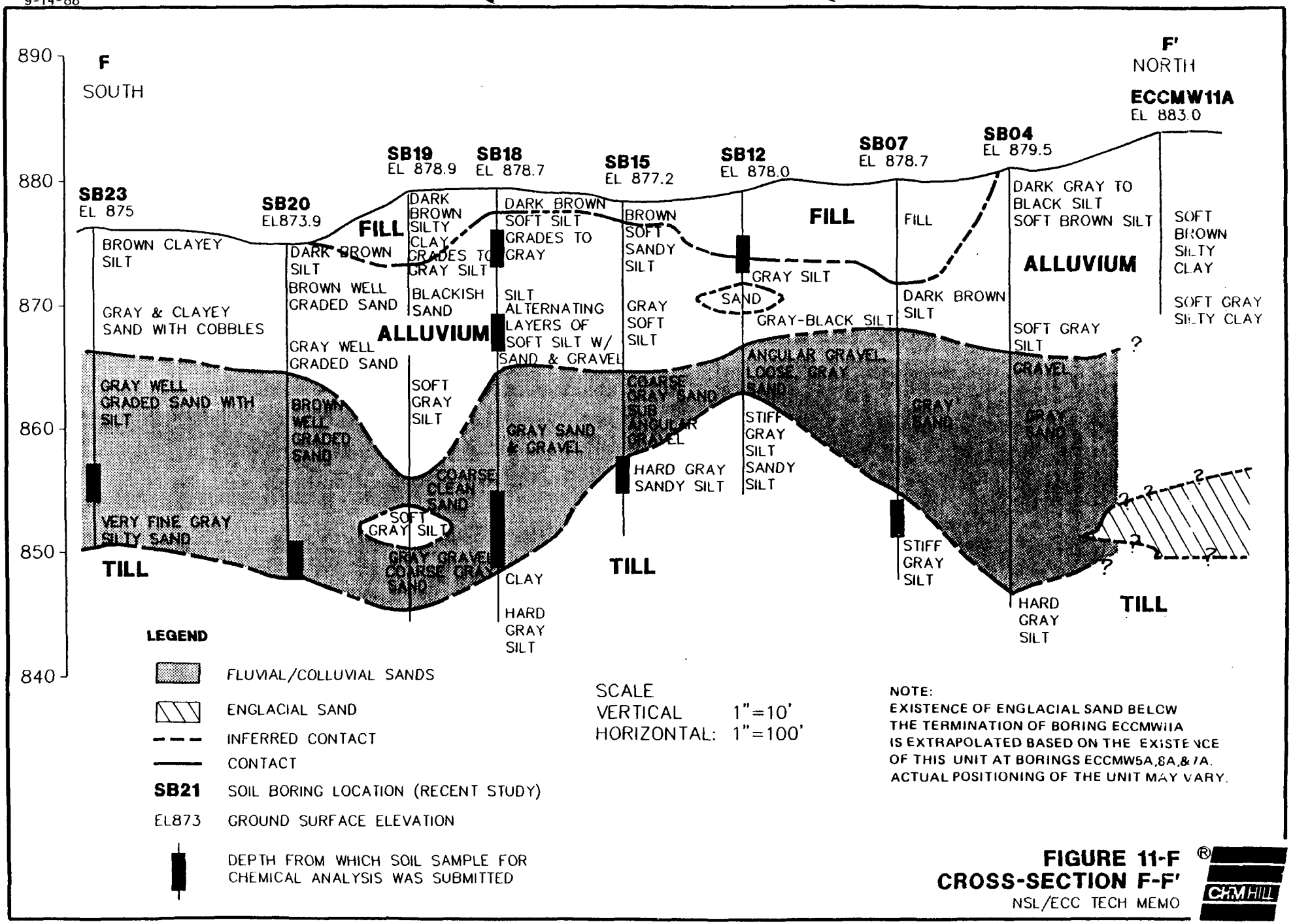


FIGURE 11-F
CROSS-SECTION F-F'
NSL/ECC TECH MEMO

CH2M HILL

E

9-13-88

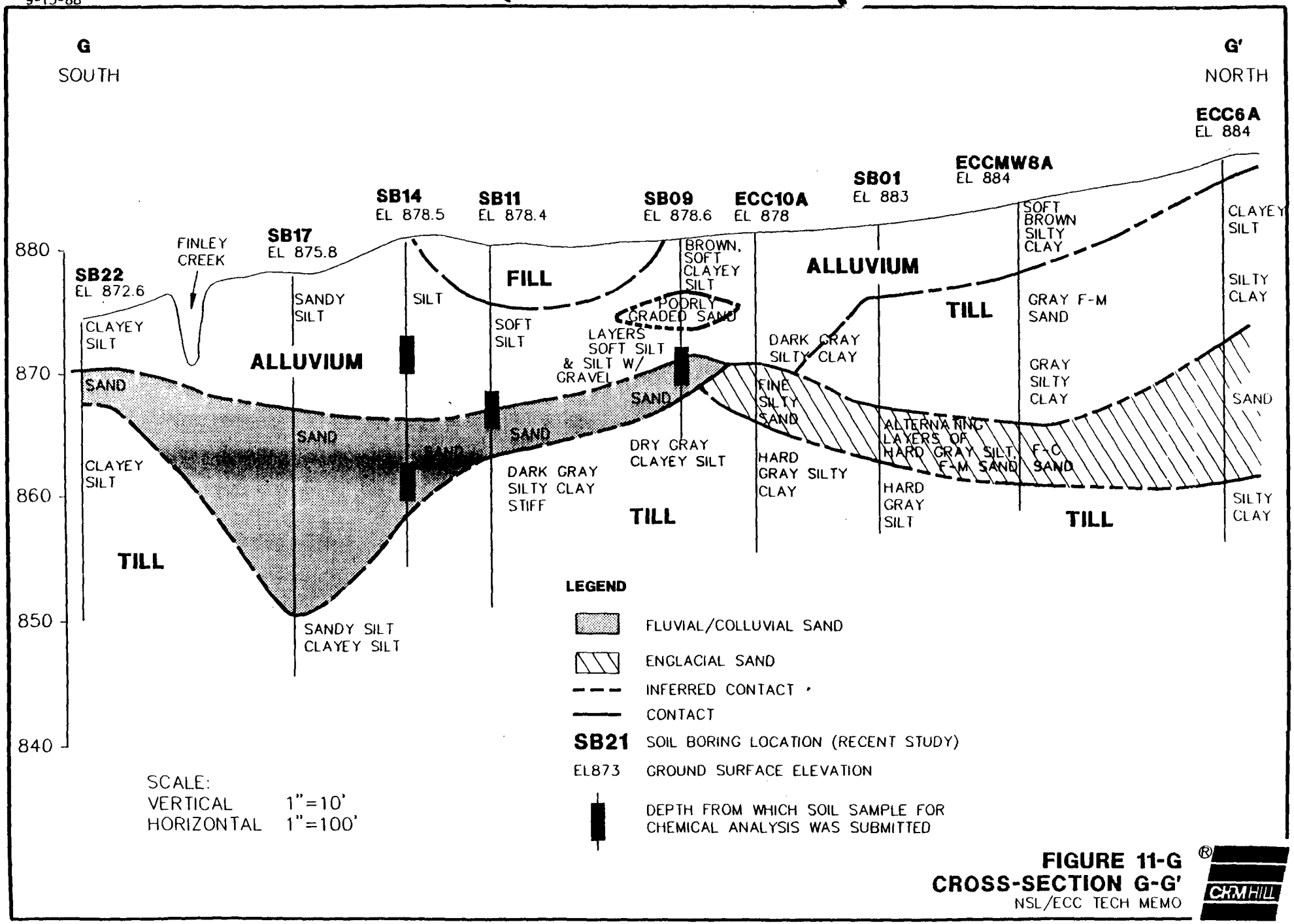


FIGURE 11-G
CROSS-SECTION G-G'
NSL/ECC TECH MEMO

CH2M HILL

F

5. Englacial sands--dense sand lenses deposited within the finer grained glacial tills. Generally distinguished from fluvial/colluvial sands by higher blow counts recorded during Standard Penetration Testing (SPT), gray color, and presence of overlying till unit (see Boring Logs, Appendix A).

The fluvial/colluvial sand (Unit 3, above) and an englacial sand (Unit 5) occur at relatively the same elevation and appear to be in direct contact such that they, as a continuous unit, make up the uppermost water bearing unit at the site. The lateral extent of each unit is shown on Figure 11G, cross section G-G'. The section extends from the region south of ECC (the supplemental investigation area) northward into the region investigated during the Remedial Investigation (RI). The fluvial/colluvial sand appears to extend at least as far north as ECC SB09, and then thins in that vicinity contacting the englacial sand farther north.

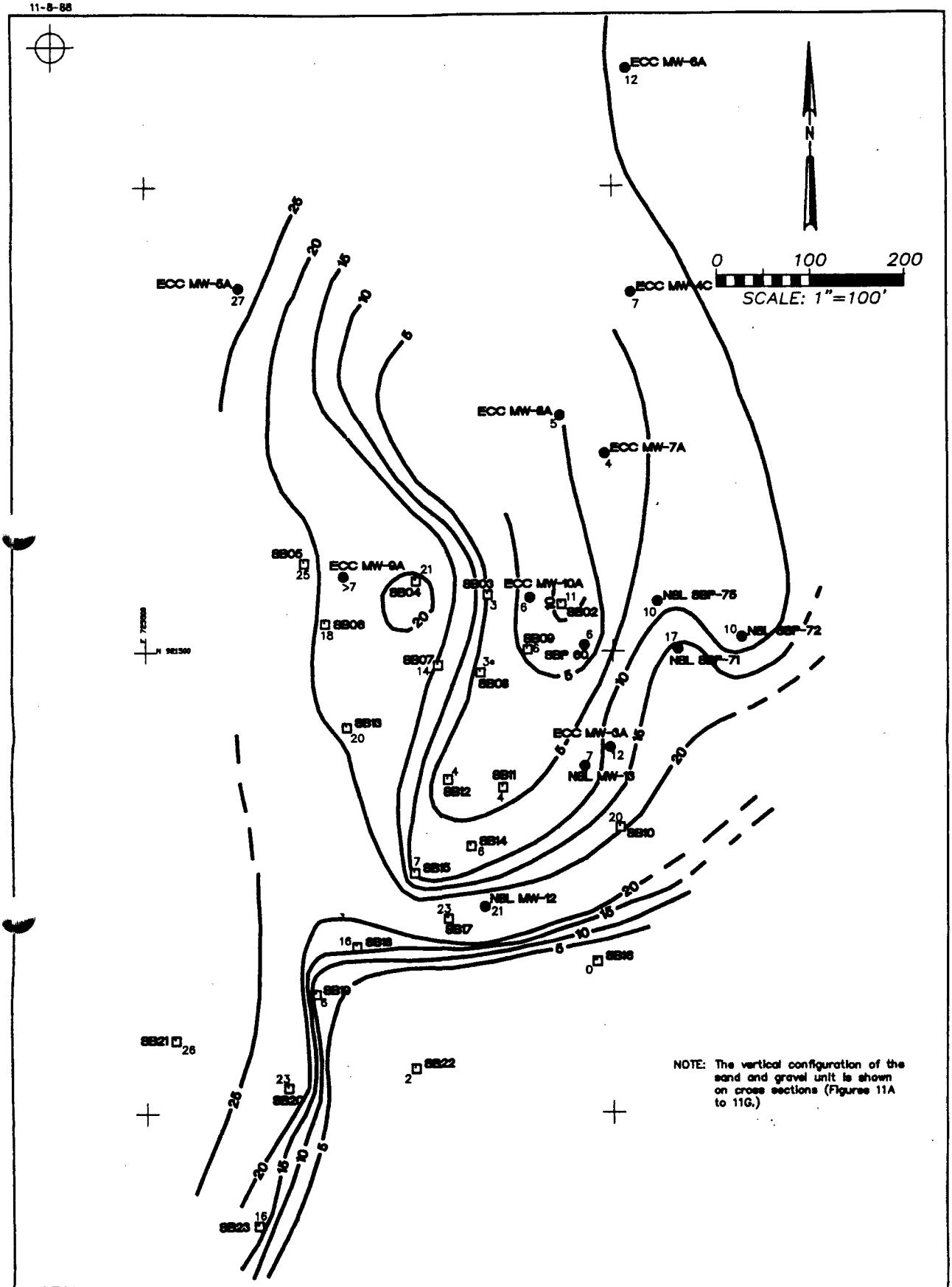
The vertical extent of the water bearing unit is depicted on Figures 11A through 11G. An isopach may of the thickness of the water bearing unit, and a contour elevation map of the top of the glacial till are shown in Figures 12 and 13, respectively. The fluvial/colluvial portion of the unit is bound above by the alluvium and below by till. The englacial sand portion of the unit is bounded above and below by till. The fractured gray till is visible near the land surface in the unnamed ditch east and northeast of ECC.

Water levels were measured on April 29 and May 2 at existing and newly installed monitoring wells. Monitoring well locations for the ECC Area are shown in Figure 14. A potentiometric surface map of the water bearing unit drawn from water level measurements taken on April 29, 1988 is shown in Figure 15. Groundwater from the water bearing unit in the vicinity of the ECC site and in the southwest portion of the NSL site appears to be discharging to the unnamed ditch and to Finley Creek. The depth of the pond is unknown so its relationship to the groundwater has not been fully established.

NSL Site

The soil boring program for the NSL site was performed to gather geotechnical information for the proposed borrow and interceptor trench areas. The investigation for both areas

11-8-88



NOTE: The vertical configuration of the sand and gravel unit is shown on cross sections (Figures 11A to 11G.)

LEGEND

10	CONTOUR LINE OF EQUAL THICKNESS OF SAND AND GRAVEL UNIT BENEATH ECC SITE CONTOUR INTERVAL: 5 FEET (COMPOSITE OF FLUVIAL AND ENGLACIAL SAND UNITS.)
SBP	SOIL BORING LOG FROM PRE-EXISTING PIEZOMETERS INSTALLED BY OWNER
SB22	SOIL BORING LOG FROM SUPPLEMENTAL INVESTIGATION
NSL 12	SOIL BORING LOG FROM MONITORING WELL INSTALLED DURING NORTHSIDE LANDFILL RI
ECC 9A	SOIL BORING LOG FROM MONITORING WELL INSTALLED DURING ECC RI
*	FROM 10' TO 18' DEPTH IN SB08 THERE ARE ALTERNATING SAND-SILT LAYERS. AT LEAST 3' TOTAL OF SAND IS PRESENT.

FIGURE 12
ISOPACH MAP OF WATER BEARING UNIT (THICKNESS FEET)
NSL/ECC TECH MEMO

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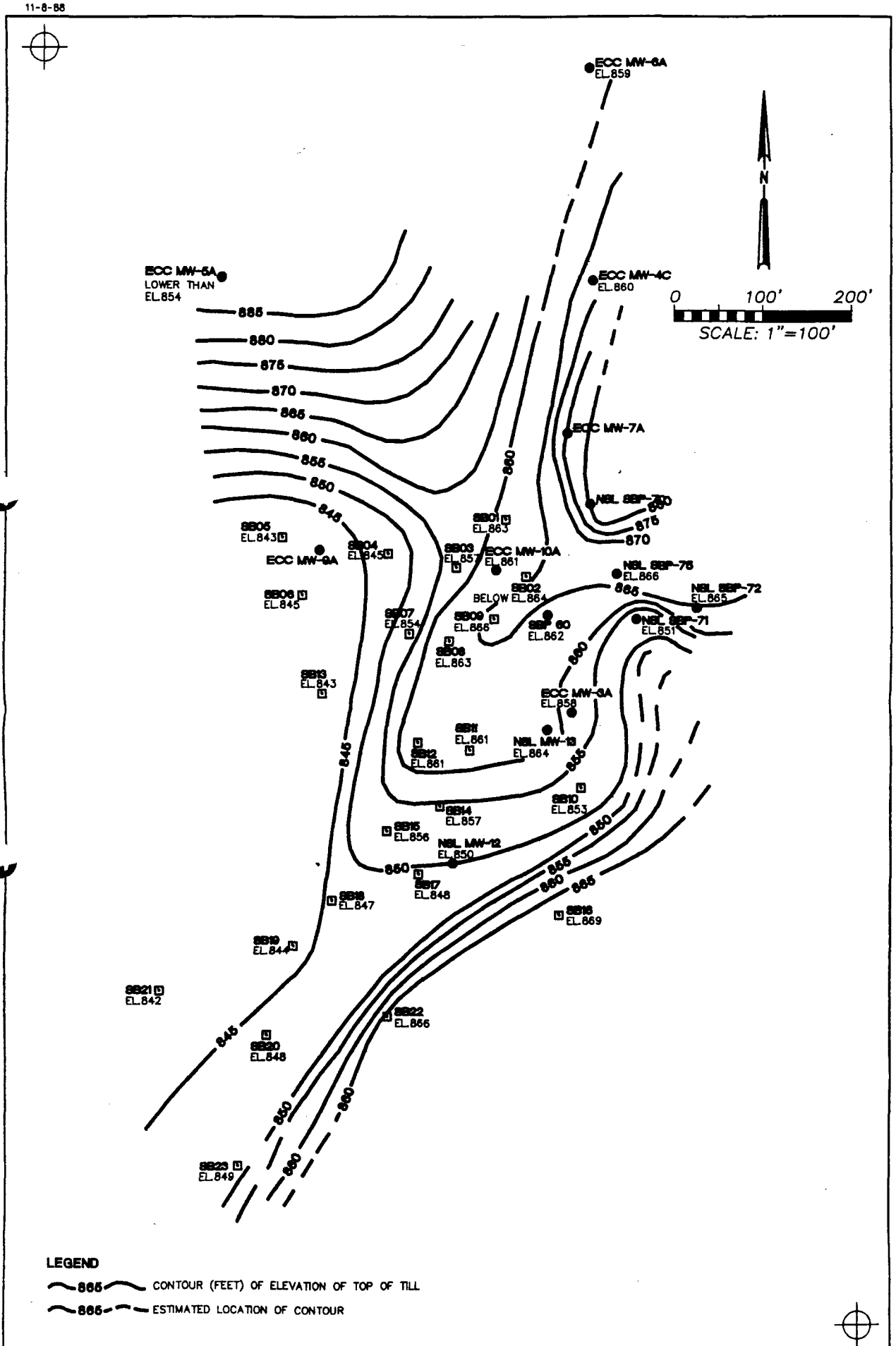
11-8-88



LEGEND

885 CONTOUR (FEET) OF ELEVATION OF TOP OF TILL

885 ESTIMATED LOCATION OF CONTOUR

FIGURE 13
ELEVATION OF TOP OF LOWER CONFINING UNIT (Silty Clay/Clayey Silt)
NSL/ECC TECH MEMO

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9-16-88

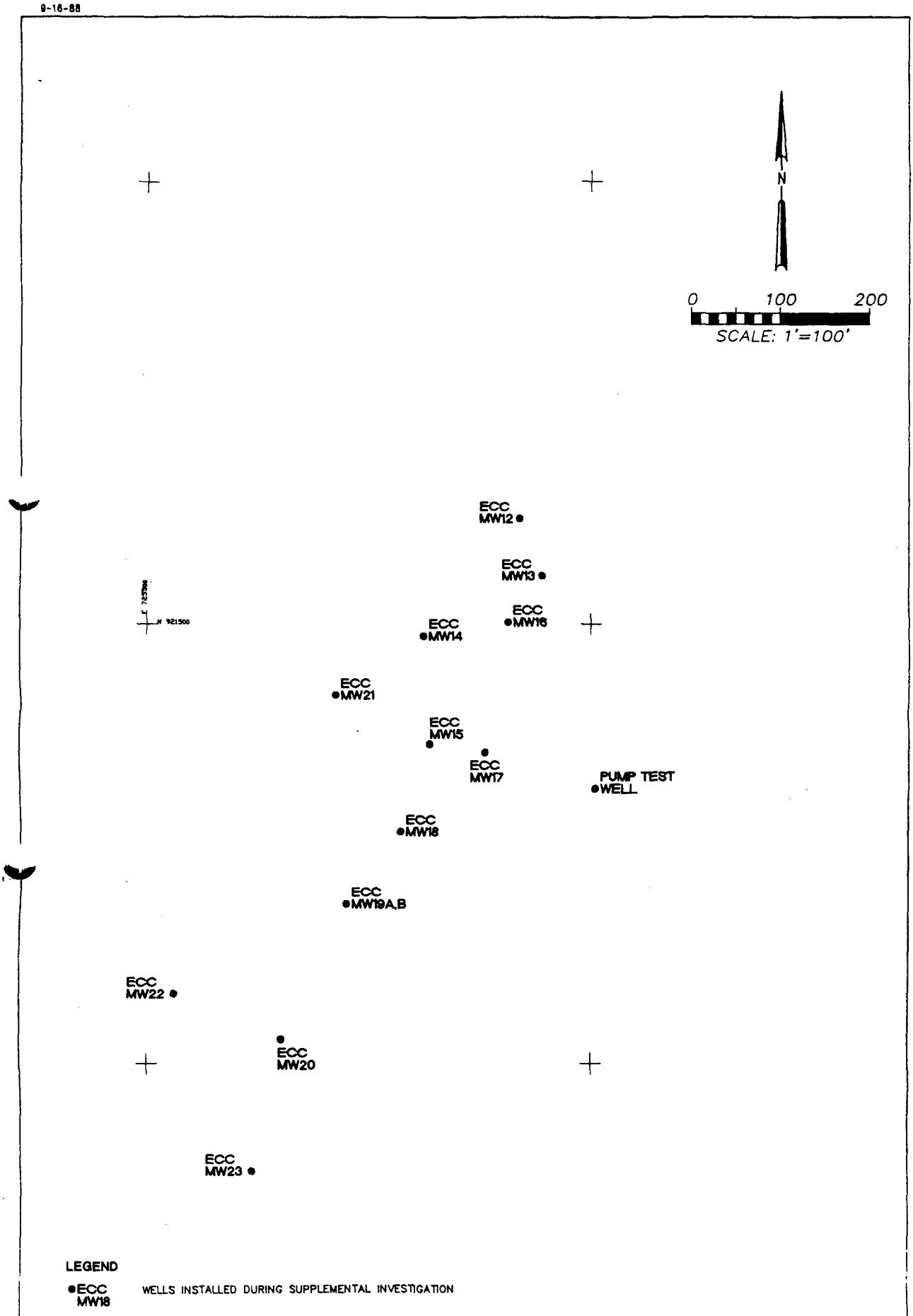

FIGURE 14
SUPPLEMENTAL INVESTIGATION AREA (ECC)
MONITORING WELL LOCATIONS
NSL/ECC TECH MEMO

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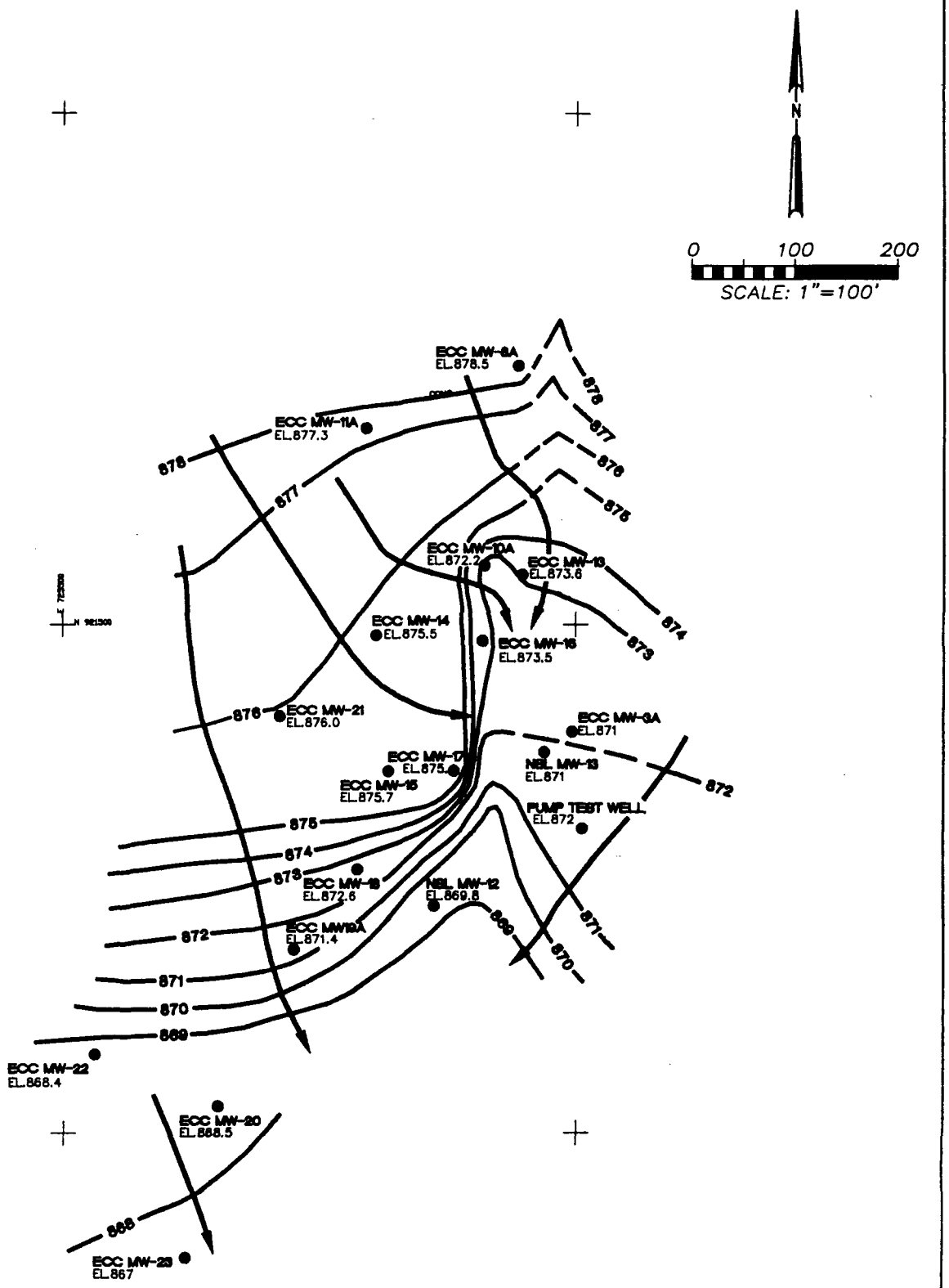
11-9-88



LEGEND

~~865~~ POTENTIOMETRIC SURFACE CONTOUR FOR SAND AND GRAVEL AQUIFER. CONTOUR INTERVAL: 1 FOOT.

- - 865 - - INFERRED POTENTIOMETRIC SURFACE CONTOUR

→ DIRECTION OF GROUNDWATER MOVEMENT IN SURFICIAL AQUIFER

NOTE: Contours have been drawn to suggest that the pond is not hydraulically connected to the sand and gravel aquifer. This relationship has not been fully established.

FIGURE 15
POTENTIOMETRIC SURFACE MAP OF UPPER SAND AND GRAVEL AQUIFER: ECC APRIL 29, 1988
NSL/ECC TECH MEMO

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consisted of investigating the upper 40 feet of material for predesign geotechnical information. This upper zone consists mainly of fractured silty clay till with some sandy seams and lenses. The sand seams along fractures and sandier zones in the upper unit are preferential pathways for groundwater movement. The till is a very hard, silty clay in both the borrow area and trench regions.

A potentiometric map of the borrow area (Figure 16) shows that groundwater movement in the upper, water-bearing unit is to the south-southeast. The water table occurs at a depth of 6 to 12 feet below the ground surface.

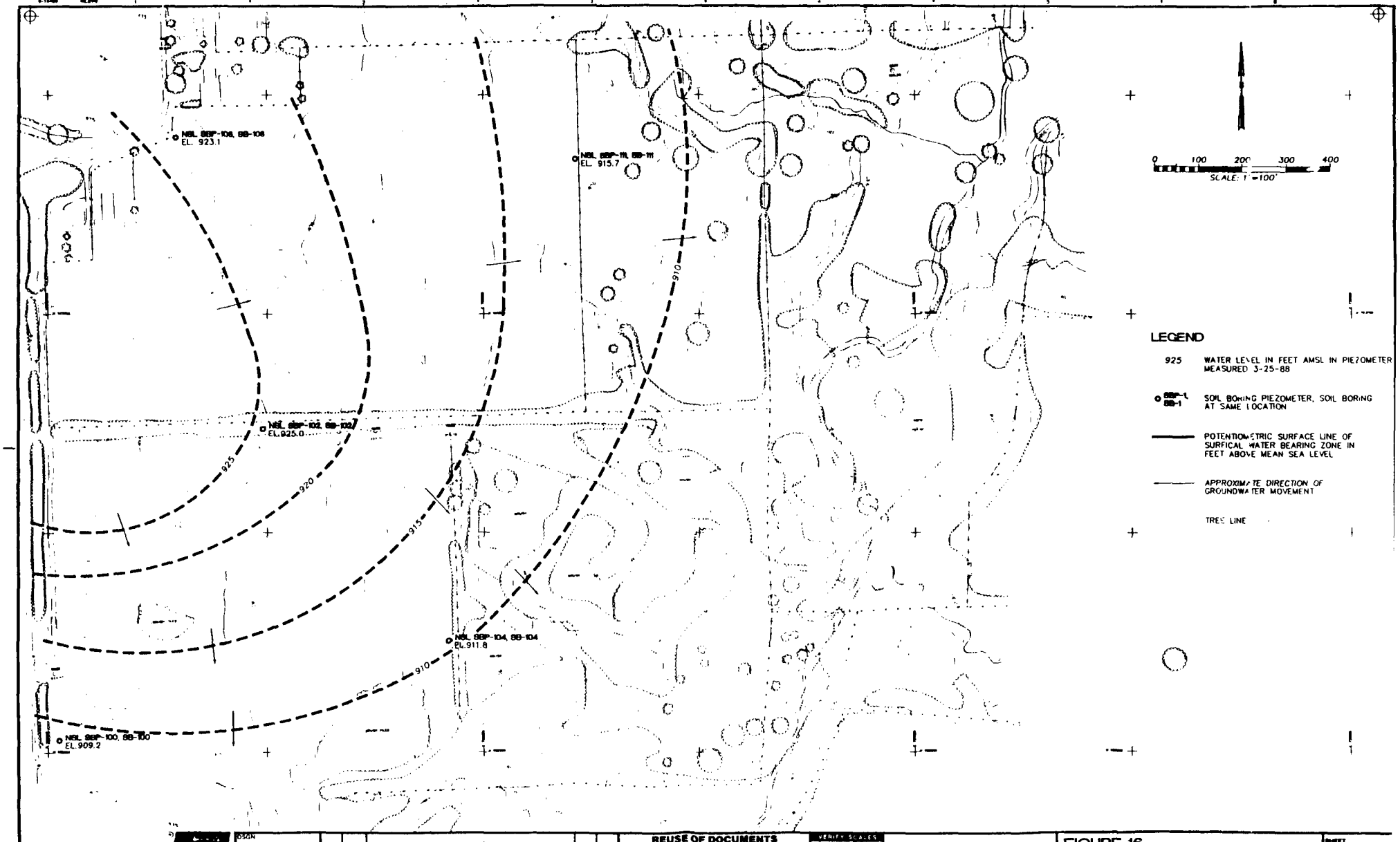
The general direction of groundwater movement along the alignment of the interceptor trench appears to be from north to south (Figure 17). The water level in the upper water bearing till averages 5 feet below the ground surface.

CHEMICAL CONTAMINANT DISTRIBUTION

Subsurface Soils

Some of the soil samples taken during the subsurface soil boring program were submitted for chemical analysis through the Contract Laboratory Program (CLP). The depth intervals that had samples sent for analysis are shown in Figures 11A through 11H. Complete subsurface soil sampling results are shown in Table F-1A (metals) and F-2A (organic compounds) of Appendix F.

Organic Compounds. Results of the organic analyses of subsurface soils samples taken during the supplemental investigation are shown in Table F-2A. The highest concentrations of organic constituents were found in soil boring ECCSB-18. A soil boring (SB18) and two monitoring well installation borings (SB18A and SB18B) in the vicinity of SB18 were sampled. The shallow SB18 samples from silty material had relatively high organic concentrations. The high concentrations coincide with elevated organic vapor concentrations observed in the breathing air space when ECCMW19B was installed in the vicinity of ECCSB18. Elevated organic concentrations were also found at depth from the sand and gravel unit in SB18 (depths 26 to 28 feet and 28 to 30 feet), but the results are not conclusive because of the possibility of cross contamination during the installation of ECCMW19B. However, organic contaminants were found downgradient of



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DSGN
DRWN
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NO	DATE	REVISION	BY	APVD

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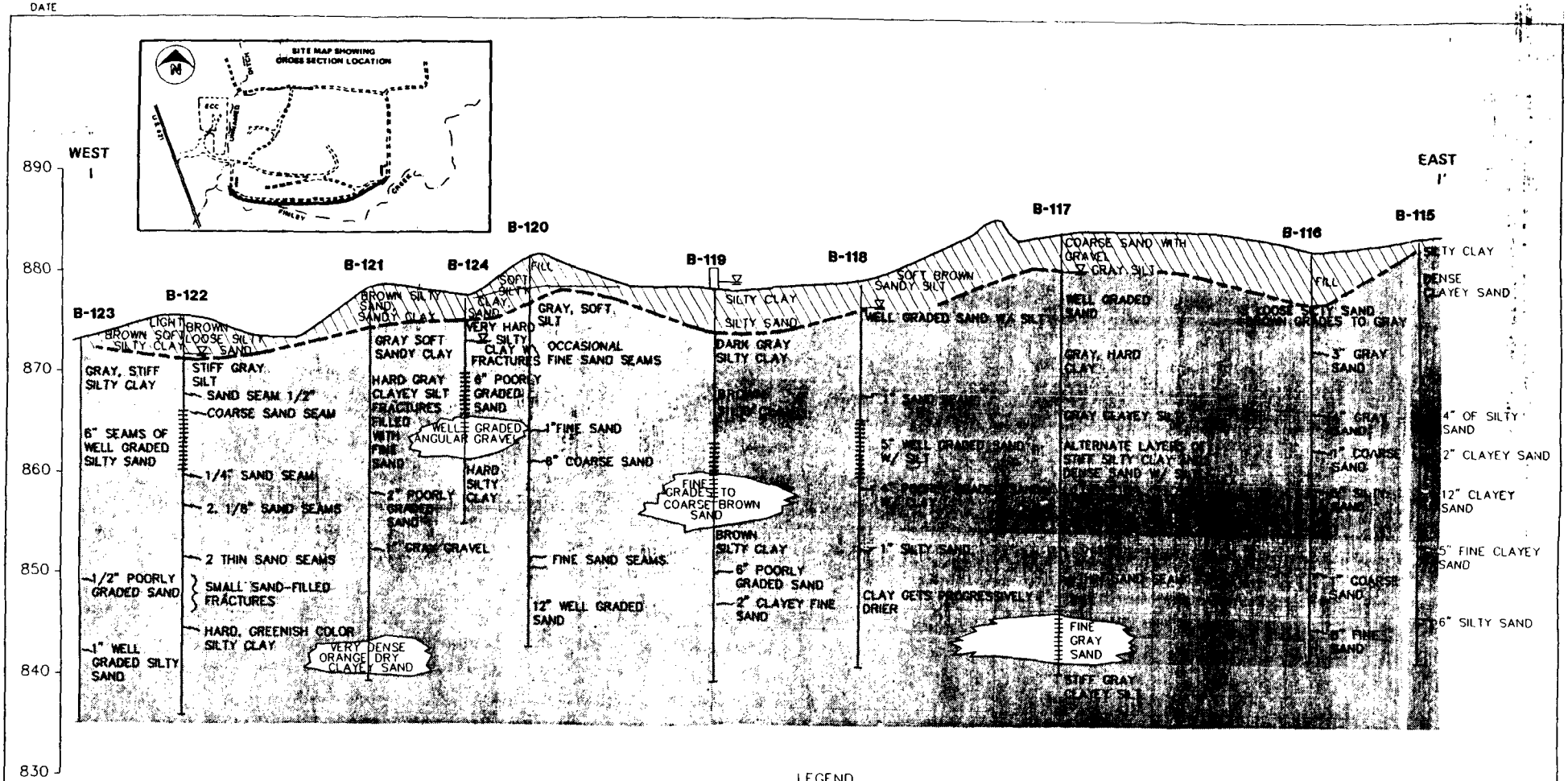
VERIFY SCALES
BAR IS 1 INCH ON ORIGINAL
IF NOT 1 INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

FIGURE 16
POTENTIOMETRIC SURFACE MAP: NSL BORROW AREA

SHEET
DWG NO
DATE
PROJ NO

VERBALLY IDENTIFICATION
SQUIRE NO
CONTRACT
COMPOSITE
OVERLAY
SCREEN

DATE



LEGEND

- WATER ELEVATION
- BORING DEPTH
- B-122 BORING NUMBER
- PIEZOMETER SCREENED INTERVAL
- SOIL HORIZONTAL AND FILL
- HARD, GRAY, FRACTURED SILTY CLAY/CLAYEY SILT: GLACIAL TILL
- NON COHESIVE SOILS

SCALE:

VERTICAL 1'=1'

HORIZONTAL 1"=150'

FIGURE 17
CROSS-SECTION
NSL INTERCEPTOR TRENCH AREA
NSL/ECC TECH MEMO

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SB18 in the sand and gravel sample from SB20 (depth 24 to 26 feet) and the silt sample from SB19 (depth 24 to 26 feet), which were obtained before the cross contamination occurred during the installation of ECCMW19B.

Organic concentrations, other than common laboratory contaminants, were found in other soil boring samples at shallow depths from the surface fill (SB08: 0 to 2 feet, SB12: 4 to 6 feet) and the upper silty clay/clayey silt units (SB08: 8 to 10 feet, SB14: 8 to 10 feet). Some organic concentrations are also found at the interface between the sand and gravel unit and the lower confining unit, or just within the top of the lower confining unit (SB02: 14 to 16 feet, SB07: 24 to 26 feet). Other samples taken from the sand and gravel unit, in addition to those from sample SB20, also have organic concentrations (SB02: 10 to 12 feet, SB05: 28 to 30 feet, SB09: 10 to 12 feet, SB10: 12 to 14 feet, SB11: 12 to 14 feet, SB13: 16 to 20 feet, SB14: 18 to 20 feet, SB15A: 6 to 8 feet, SB16: 20 to 22 feet). Soil borings SB21 and SB23 did not have organic concentrations in the sand and gravel unit.

Metals. General standards are not established for inorganic metal concentrations in subsurface soil. Therefore, metal concentrations reported for subsurface soils are compared with estimated background levels for the inorganic constituents to determine if contamination is present.

Background soil concentrations were estimated for the ECC site during the remedial investigation using eight ECC Phase 2 RI soil samples. Results of the organic analyses indicated that organic contaminants were either not present or present in relatively minor concentrations in those samples. Therefore, the eight samples were considered least affected by waste handling operations at the site and were selected to estimate background levels for inorganic concentrations.

The ranges of concentrations of some inorganic constituents from the background samples are shown in Table 10, along with any constituent that was found above the background range in the subsurface soil samples. Samples taken from the sand and gravel unit had only antimony, cadmium, and silver at levels above background; one sample (SB12-03) had mercury above background. Samples taken from surface fill had aluminum, antimony, barium, lead, silver, manganese,

TABLE 10

INORGANIC SOIL CONCENTRATIONS ABOVE BACKGROUND LEVELS
BACKGROUND LEVELS WERE DETERMINED IN THE ECC REMEDIAL INVESTIGATION
WSL/ECC PREDESIGN INVESTIGATION

	Range in Background Concentration Determined During Phase 2 of ECC Remedial Investigation*														
Sample Number:		ECCSB02-06	ECCSB02-06	ECCSB03-06	ECCSB05-15	ECCSB06-13	ECCSB06-20	ECCSB07-13	ECCSB08-01	ECCSB08-05	ECCSB09-06	ECCSB10-07	ECCSB11-07	ECCSB12-03	ECCSB13-09/10
Sample Location:		ECCSB02	ECCSB02	ECCSB03	ECCSB05	ECCSB06	ECCSB06	ECCSB07	ECCSB08	ECCSB08	ECCSB09	ECCSB110	ECCSB11	ECCSB12	ECCSB13
ITR Number:		MET316	MET317	MET302	MET310	MET354	MET355	MET306	MET308	MET309	MET319	MET353	MET301	MET304	MET305
Date Sampled:		04/16/88	04/16/88	04/05/88	04/13/88	04/12/88	04/12/88	04/12/88	4/12/88	04/12/88	04/17/88	04/13/88	04/05/88	04/07/88	04/11/88
Depth, Ft:		10-12	14-16	10-12	26-30	24-26	38-40	24-26	0-2	8-10	10-12	12-14	12-14	4-6	16-20
Percent Solids:		81.0	92.0	91.5	88.2	86.5	90.0	91.6	92.3	90.2	85.1	88.2	89.3	88.8	87.9
Hydrogeologic Unit:		S & G	INTERFACE	UPPER	S & G	S & G	INTERFACE	INTERFACE	UPPER FILL	UPPER	S & G	S & G	S & G	UPPER FILL	S & G
INORGANICS (mg/kg dry weight)															
Aluminum	4100 - 10600						12200 J								
Antimony	<25 - 42		59 J				96 J		69 J	85 J		47 J			43 J
Arsenic	4.6 - 17														
Barium	33 - 81														
Beryllium	<0.3 - 0.67														
Cadmium	<2 - 4.1					5.8 J	7.9 J								
Chromium	11 - 15						18 J								
Cobalt	5.8 - 14		18 J												
Copper	18 - 30														
Iron	14000 - 27000														
Lead	6.7 - 15								399 J					33 J	
Manganese	109 - 555													1160	
Mercury	<0.05			0.19									0.19	0.21	
Nickel	15 - 37														
Selenium	<2.5														
Silver	<2.5	6.5 J	6.3 J		6.7 J	7.7 J	6.4 J	5.7 J	4.5 J	5.2 J	5.6 J	3.1 J			6.7 J
Thallium	<3.0														
Vanadium	17 - 35														
Zinc	44 - 90														

	Range in Background Concentration Determined During Phase 2 of ECC Remedial Investigation*						
Sample Number:		ECCSB14-01	ECCSB14-02	ECCSB16-11	ECCSB18-14	ECCSB18A-03	ECCSB18B-28/ECCSB19-13
Sample Location:		ECCSB14	ECCSB14	ECCSB16	ECCSB18	ECCSB18A	ECCSB18B ECCSB19
ITR Number:		MET352	MET351	MET312	MET311	MET322	MET320 MET314
Date Sampled:		04/08/88	04/08/88	04/15/88	04/14/88	04/19/88	04/18/88 04/15/88
Depth, Ft:		8-10	18-20	20-22	26-28	4-6	26-30 24-26
Percent Solids:		83.7	87.0	89.7	95.6	88.6	93.1 89.0
Hydrogeologic Unit:		UPPER	S & G	S & G	S & G	UPPER FILL	TRANSITION UPPER
INORGANICS (mg/kg dry weight)							
Aluminum	4100 - 10600					16100	
Antimony	<25 - 42		72 J		79 J		74 J
Arsenic	4.6 - 17						
Barium	33 - 81					97.7	
Beryllium	<0.3 - 0.67						
Cadmium	<2 - 4.1		6.1 J		6.2 J		5 J 5.3 J
Chromium	11 - 15						
Cobalt	5.8 - 14	17 J					
Copper	18 - 30						
Iron	14000 - 27000						
Lead	6.7 - 15						
Manganese	109 - 555						
Mercury	<0.05						
Nickel	15 - 37						
Selenium	<2.5						
Silver	<2.5	5.2 J	11 J	5.3 J	6.1 J		
Thallium	<3.0						
Vanadium	17 - 35						
Zinc	44 - 90					108	

* Background Concentrations estimated using Phase 2 ECC Remedial Investigation
Background Soil Values: See ECC RI Report, Table 4-4

J Estimated value; or the report value is less than the contract required detection limit but greater than the instrument detection limit.

S & G Sand and Gravel Unit
INTERFACE Interface between sand and gravel and lower confining units
UPPER Upper confining Unit, usually silty material
LOWER Lower confining unit, a very hard silty clay/clayey silt
TRANSITION Transitional sequence of interlayered silty clays and sands or gravels
UPPER FILL Surficial Fill beginning at the ground surface

mercury, and zinc at levels above soil background concentrations. Cohesive soils of the upper confining unit had antimony, cadmium, cobalt, mercury, and silver at levels above background concentrations. Cohesive soils of the lower confining unit had aluminum, antimony, cadmium, chromium, cobalt, and silver at concentrations above background.

Groundwater

Groundwater samples were analyzed by the CLP for organic compounds and metals, and the ISBH for conventional pollutants. Analytical results are shown in Table F-1B (metals), F-2B (organic compounds) and F-3 (conventional parameters) of Appendix F. Sampling locations are shown in Figure 7. All recently installed wells except ECCMW19A are screened in the sand and gravel aquifer south of the ECC site and southwest of the NSL site. ECCMW19A is screened in the shallow silty clay above the sand and gravel unit. Groundwater samples were also obtained in the ECC source area, ECCMW12 and ECCSUMP. ECCMW12 is in the sump under the concrete pad. ECCSUMP is the sump barrel on the concrete pad. ECCMW1A is a background (upgradient) well installed in 1983. All the other wells sampled were installed during this supplemental investigation. Both organic and inorganic contaminants were found in groundwater from the supplemental investigation area.

Organic Compounds. Chloroform (8 ug/l) and phenol (7 ug/l) were found in field blanks 99 and 96, respectively. In addition, bis(2-ethylhexyl)phthalate was found in two field blanks at a maximum concentration of 25 ug/l.

A sample of the drillers' water showed contamination with several volatile organic compounds including chloroform (71 ug/l), 1,1,1-trichloroethane (24 ug/l), bromodichloroethane (6 ug/l), trichloroethene (36 ug/l), and tetrachloroethene (28 ug/l). In addition, phthalates were also found in low concentrations. The sources of these organic compounds are unknown. Drilling water was obtained offsite from the Zionsville City Fire Department and held in the water tanks on the drilling contractors vehicles until needed.

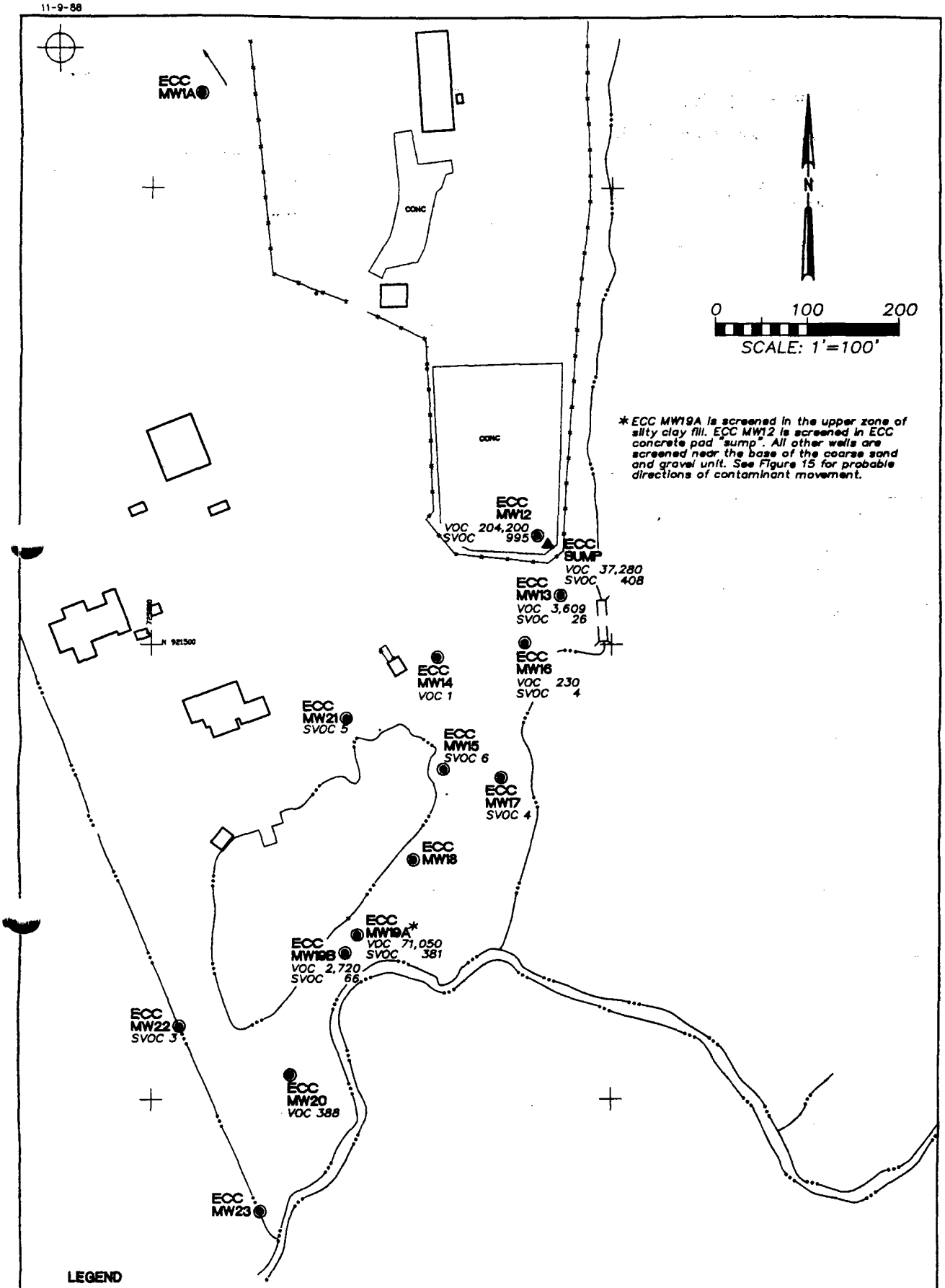
No volatile organic compounds were found in the background well (ECCMW1A). The highest total concentrations of volatile organic compounds were found in ECCMW12 (204,200 ug/l), ECCSUMP (37,280 ug/l), ECCMW19A

(71,050 ug/l), ECCMW13 (3,609 ug/l), and ECCMW19B (2,720 ug/l). Lower total volatile organic concentrations were found in ECCMW20 (388 ug/l) and ECCMW16 (230 ug/l). Maximum concentrations of volatile organic contaminants found in the wells include methylene chloride (12,000 ug/l), acetone (11,000 ug/l) 1,1-dichloroethane (3,700 ug/l), total 1,2-dichloroethene (72,000 ug/l), chloroform (5,300 ug/l), 1,1,1-trichloroethane (64,000 ug/l), trichloroethene (16,000 ug/l), tetrachloroethene (13,000 ug/l), and toluene (7,200 ug/l). Methylene chloride, acetone, and toluene are common laboratory contaminants but the concentrations found are higher than would be expected for laboratory contamination. Chloroethane at 3,400 ug/l was also detected in ECCMW13. Very low (<10 ug/l) or no volatile organic compounds were detected in ECCMW14, ECCMW15, ECCMW1A, ECCMW17, ECCMW18, ECCMW21, ECCMW22, and ECCMW23.

In ECCMW19A, which was screened in the shallow silty clay above the sand and gravel unit, the volatile organic compounds detected include 1,2-dichloroethene (total), 1,1,1-trichloroethane, trichloroethene, tetrachloroethene, ethylbenzene, and xylene (total). Other than ethylbenzene and xylene, the same compounds were detected in ECCMW19B. 1,1-dichloroethane was also found in ECCMW19B. As ECCMW19B was not cased through the shallow silty clay zone during installation, contamination may have travelled from the shallow source at ECCMW19A to the deeper unit, ECCMW19B which is installed at the same location. ECCMW20, which is also in, the sand and gravel unit and downgradient of ECCMW19B, was found to have vinyl chloride and chloroethane, as well as 1,1-dichloroethane and 1,2-dichloroethene (total).

Semivolatile organic compound concentrations were highest in ECCMW12, ECCSUMP, and ECCMW19A. Lower concentrations were found in ECCMW19B and ECCMW13. Semivolatile compounds found include 1,2-dichlorobenzene, 1,4-dichlorobenzene, 4-methylphenol, 2,4-dimethylphenol, isophorone, naphthalene, 2-methylphenol, and phthalate esters. Semivolatile concentrations for individual compounds were less than 310 ug/l. No semivolatile compounds besides low concentrations of the laboratory contaminants, phthalate esters, were found in ECCMW1A, ECCMW14, ECCMW15, ECCMW16, ECCMW17, ECCMW18, ECCMW20, ECCMW21, ECCMW22, and ECCMW23. Total volatile and semivolatile organic compound concentrations in groundwater are shown in Figure 18.

11-9-88



LEGEND

ECC MW18	MONITORING WELLS SAMPLED
▲	ECC SUMP SAMPLED
VOC	TOTAL VOLATILE ORGANIC COMPOUND CONCENTRATIONS (ug/l)
SVOC	TOTAL SEMI-VOLATILE ORGANIC COMPOUND CONCENTRATIONS (ug/l) (NOT INCLUDING FIELD OR LABORATORY BLANK CONTAMINATION)

FIGURE 18
TOTAL VOLATILE AND SEMI VOLATILE ORGANIC COMPOUND CONCENTRATIONS IN GROUNDWATER
NSL/ECC TECH MEMO

CH2M HILL

L55555.DA\FIG18.DWG

Metals. In unfiltered field blanks, low concentrations of aluminum (Al), antimony (Sb), arsenic (As), barium (Ba), calcium (Ca), chromium (Cr), copper (Cu), iron (Fe), lead (Pb), magnesium (Mg), manganese (Mn), potassium (K), sodium (Na), and zinc (Zn) were found. The drillers' water and background well, ECCMW1A, contained Al, Ba, Ca, Cr, Cu, Fe, Pb, Mg, Mn, K, Na, and Zn.

The metals of concern which must be reduced to meet proposed NSL NPDES discharge limits include As, Cr, Cu, Pb, Fe, and Zn. Arsenic ranged from 2.2 to 32 ug/l and was found in all wells except ECCMW19B. Chromium was also found in all wells and in highest concentrations in ECCMW22 (238 ug/l) and ECCMW23 (286 ug/l). In the other locations, chromium ranged from 6 to 65 ug/l. Copper was also found in highest concentrations in ECCMW22 (1,660 ug/l) and ECCMW23 (1,220 ug/l). Copper concentrations were also high in ECCMW17 (423 ug/l) and ECCMW20 (350 ug/l).

Iron concentrations were highest in monitoring wells ECCMW22 (944,000 ug/l) and ECCMW23 (468,000 ug/l). Iron concentrations were also high in ECCMW17 (88,900 ug/l), ECCMW20 (92,900 ug/l) and ECCMW21 (76,000 ug/l). Lead concentrations ranged from undetected to 723 ug/l in ECCMW17. Zinc was found in all wells and the sump; its concentration was highest in ECCMW22 (2,770 ug/l) and ECCMW23 (2,050 ug/l).

In filtered groundwater, concentrations of all metals were lower, indicating that most metals are associated with the suspended solids. The only metals above proposed NPDES discharge limits in the filtered water were arsenic, chromium, and iron. Arsenic concentrations were highest in ECCMW19A at 24 ug/l. Chromium was highest in ECCMW23 (12.5 ug/l), and iron concentrations were highest in ECCMW13 (12,500 ug/l).

Conventional Pollutants. Groundwater samples were also analyzed for COD, TDS, TSS, alkalinity (as $CaCO_3$), NH_3-N, and chlorides. Very small concentrations (<15 mg/l) of COD, TDS, and alkalinity were noted in the field blanks. Concentrations in background well ECCMW1A were TDS at 418 mg/l, TSS at 78 mg/l, alkalinity at 313 mg/l, chlorides at 12 mg/l, and ammonia at 0.2 mg/l. No COD was measured in the background well. COD concentrations ranged from undetected in ECCMW19B up to 1,800 mg/l in ECCMW22. The average concentration of COD in groundwater was approximately 500 mg/l. COD concentrations may be high in ECCMW22 and ECCMW23 because they are

downgradient of the landfill owner's septic leachate field. Chloride concentrations were also high at ECCMW22 and ECCMW23. Chloride concentrations at other locations were higher than background and ranged from 13 mg/l at ECCMW18 to 170 mg/l at ECCMW20.

Total dissolved solids in all wells ranged from 406 mg/l to 973 mg/l. Total suspended solids were high in many of the wells, particularly ECCMW22 and ECCMW23. This may be because the wells were not surged during well development.

Ammonia concentrations were low with the highest concentration of 5.6 mg/l at ECCMW12. Alkalinity ranged from 147 mg/l to 1,511 mg/l. High concentrations of alkalinity were noted at ECCMW17, ECCMW20, ECCMW22, and ECCMW23. High alkalinity concentrations at those locations may originate from dissolved landfill materials or dissolution of carbon dioxide from anaerobic decomposition of organics. Alkalinity at the other locations was close to the concentration measured in the background well.

Appendix A
Soil Boring Logs

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-01 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA/Mobile drill B61
WATER LEVEL AND DATE START 4/19/88 FINISH 4/20/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION	Spoon HNu ppm
					~6-8" concrete ~1' of pea gravel			
5					BLIND DRILLED			
10					Crushed rock to 12' depth			
		S3			6" sand 6" gray silt as below		There was a sheen on the sand at the base of the cobbles	
		S4	1.7	12-9-11-11 (20)	Silt gray, moist - wet, ~15% small gvl. sand seams every 6", low plasticity, medium dense,			20 ppm
		S5	1.25	13-13-19-25 (32)	6" silt as above. 6" sand, fine to med. ~20% silt, wet, gray 3" silt as above, hard.		The rotary bit caught on the bottom of the PVC and pulled it out.	.4ppm
		S6	1.7	14-22-28-32 (50)	12" silt as above. 6" sand med., gray, wet, clean. 2" silt as above, hard.			Bkg.
20		S7	1.5	21-23-25-40 (48)	6" sand as above 12" silt as above, hard.		(till) Note: 6" of sand at surface may have been from previous sand layers.	.6
		S8	1.3	20-25-32-41 (57)	Silt, gray, hard, moist, ~15% small gravel, low plasticity.		No metal sample taken. (till)	Bkg.
		S9	1.25	22-25-40-63 (65)	15" as above			
25					End Soil Boring @ 25.0		Bottom part broke off in hole. Sheared the retainer. Bottome 6" assumed to be dry V. hard fill.	

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-02 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(3 3/8" i.d.) /Mobile Drill B61
WATER LEVEL AND DATE START 4/16/88 FINISH 4/16/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION	Spoon ~~Hnu~~ ppm
		S1	1.7	7-8-10-11 (18)	top 10" silty dry fill, brown. bot. 10" fine sand, dry fill. Brown			0.0
		S2	0." took another 0.8	5-5-6-6 (11)	Silt dark gray, moist, low plasticity, soft, ~10% by volume of what looked like charcoal. (ML) 8" silt as above (ML)			0.0
5		S3	1.0	2-2-3-2 (5)	4" Silty sand ~30% silt, <10% clay sand was light brown, med. wet. (SM) 2" Silty sand as above (SM)			0.0
		S4	1.0	4-10-12-13 (22)	10" Sand coarse, wet, brown, ~10% silt (SW)			0.0
		S5	1.7	4-8-8-8 (16)	Sand same as above, black band at 9' 10% gravel (3/4" max) (SW)		Took small jar chem anal t=1045	0.0
10		S6	1.8	7-8-10-10 18	2" Sand med-coarse, brown 25% silt, wet (SP) 20" Same as S5 (SW)		Took large chem jars t = 1050	0.0
		S7	1.5	6-10-13-18 (23)	Sand as in S5 (SW)			1.0
15		S8	2.0	23-42-55-85 (97)	4" Sand as above (SW) 20" Silt, dry to moist, hard, gray, ~20% rocks up to 1". (ML)		Took Chem. of fill. (till)	
		S9			End of Boring @ 16'		Set screen from 14' to 4'	
		S10			Started setting well @ 11:30 AM		Sandpack 14.5 to 3'	
20		S11					Bentonite 3' to 2' grout to surface.	
		S12						
25		S13						
		S14						
		S15						

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-03 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(3 3/8" i.d.) /Mobile Drill B61
WATER LEVEL AND DATE START 4/5/88 FINISH 4/5/88 LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		S01	0.9	3-6-6-6 (12)	6" Silty Clay, dk br, tr. grav, wet, soft 2" Gravel, black 4" Clayey Silt, dk br to black, moist, soft to firm		Start 0850 HNu=1.0ppm ABG Bg=0.5ppm Fill
		S02	1.0	5-4-4-5 (8)	Silty Clay, tr sand, gravel dk br to black, moist Soft, organic staining One dolomite cobble ≈2" diam (CL-ML)		t=0906 HNu=0.5ppm ABG Drillers only have 1 split spoon!
		S03	1.5	2-6-7-9 (13)	Silty Clay, tr sand, gravel, lt orangish brown/gray moist, soft, some "roots", mottled. (CL-ML)		t=0912 HNu=0.2ppm-0 ABG Took duplicate of physical sample
		S04	1.8	6-7-8-9 (15)	As above, soft to firm, black "staining" (CL-ML)		t=0918 HNu=0 ABG
		S05	1.6	5-6-7-9 (13)	Top 1' as above (No mottling)(CL-ML) Bottom 0.6 Silty Clay, gray, dry to moist, firm gravel, fine sand		t=0928 HNu=Bg
10		S06	1.5	5-6-7-8 (13)	As above Soft to Firm (CL-ML)		t=0934 HNu=0.2ppm ABG Took chemical set
		S07	1.5	3-4-6-7 (10)	As above (CL-ML)		t=0941 HNu=Bg
15		S08	1.6	3-4-5-6 (9)	As above (CL-ML)		t=0948 HNu=Bg
		S09	1.3	3-5-6-8 (11)	As above, soft (CL-ML)		gradation? More sand t=0956 HNu=0.5ppm ABG
		S10	1.5	3-5-6-8 (11)	Top 1.1' As above, more fine sand, soft, (CL-ML) Lower 0.4' silty clay, tr. fine sand, gray, dry, hard		t=1022 HNu ≈ B.G.
20		S11	1.7	10-12-18-19 (30)	Top 1' As above, more (CL-ML) 0.3' fine, poorly graded sand, tr silt, gray, wet (SP) 0.4' F.C. poorly graded sand (SP) little to no silt, wet, med dense		t=1022 HNu=0.4 in sand
		S12	1.9	11-14-18-25 (32)	Top 2" As above (SP) Lower 1.6' silty clay/clayey silt, gray, dry to moist, hard, tr fine sand, tr grav (CL-ML)		t=1035 HNu=0.2 in sand seam Not enough for chemical sample
25		S13	1.7	13-18-27-40 (45)	As above Hard to stiff (CL-ML) 1.5' As above		t=1059 HNu=B.G. Took VOA's only
		S14	1.9	30-48-94-90	Lower 5" fine, poorly graded sand, tr. silt, dk. brown to gray, moist, dense		Very hard to sample t=1100 HNu=2.0ppm ABG on fine sand
		S15	1.2	28-100-50/0.2	Silty clay/clayey silt, dk brown, dry hard, crumbles (CL-ML) ~~End soil Boring @ 30'~~		Rock at ≈27' t=1122 HNu=B.G.

Rev. 8/15/88

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-04 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(3 3/8" i.d.) /Mobile Drill B61
WATER LEVEL AND DATE START 4/14/88 FINISH 4/14/88 LOGGER Bob Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION	Spoon HNu ppm Bkg
					2" crushed stone			
		S1	1.3	5-12-7-8 (19)	14" silt dark gray to black, dry to moist, firm, ~5% coarse sand. (ML)		t=1530	
		S2	1.8	2-5-6-7 (11)	Same as above.		(weathered fill)	
5		S3	2.0	2-2-3-5 (5)	Same as above, brown, moist to wet		t=1550	
		S4	1.7	5-4-6-17 (10)	Same as above, gray, wet on outside moist on inside.			
		S5	2.0	5-6-7-8 (13)	Same as above, moist		t=1605	
10		S6	1.7	4-5-6-8 (11)	Same as above			
		S7	1.7	2-2-3-4 (5)	Silt gray, moist, <5% coarse sand, low plasticity, soft. (ML)			
15		S8	1.7	4-5-6-7 (11)	gravel gray, 3/4' max, ~30% sand, well graded, clean wet. (GW)		t=1620	
		S9	2.0	5-7-6-6 (13)	Sand gray, coarse, wet, <2% silt (SP)			
		S10	1.5	7-7-9-9 (16)	Same as above, but well graded. (SW)			
20		S11	1.3	8-9-10-11 (19)	Same as above			
		S12	1.0	7-8-9-10 (17)	Same as above. ~10% gravel 3/4" max.			
25		S13	1.5	8-10-12-12 (22)	Same as S12			
		S14	1.7	8-12-13-18 (25)	Sand, gray med. to coarse, <5% silt, ~10% gravel, wet.		Took Chemical Samples - No Physical	
		S15	1.5	12-14-19-21 (33)	Sand gray, fine to med, <5% silt, (SW)			

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-04 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana

ELEVATION DRILLING CONTRACTOR ATEC Associates

DRILLING METHOD AND EQUIPMENT HSA(3 3/8" i.d.) /Mobile Drill B61

WATER LEVEL AND DATE START 4/14/88 FINISH 4/14/88 LOGGER Bob Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30		S16	2.0	10-14-24-20 (38)	Sand fine, clean dense, gray wet w/ 1" high plasticity clay seams every 8 to 10"		HNu Bkg
		S17	2.0	9-12-15-15 (27)	Sand gray, v. fine, ~5% silt in sand, 1" silt seams every 3-4".		
		S18	2.0	10-36-17-31 (53)	Sand as above		
35					8" Silt gray, v. hard, dry, ~10% coarse sand, low plast. (ML)		
					End Soil Boring @ 36'		

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-05 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(3 3/8" i.d.) /Mobile Drill B61
WATER LEVEL AND DATE START 4/13/88 FINISH 4/13/88 LOGGER C Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		S1	1.6	2-2-3-4 (5)	Silty clay, brown, moist, soft, tr sand (CL)		Start @ 1500 (Topsoil) t=1506 HNu= B.G.
		S2	1.4	2-2-3-3 (5)	As above (CL) one crack 8" from bottom, tr. gravel		t=1512 HNu=B.G.
5		S3	ø	2-3-3-4 (6)	No recovery 1st attempt No recovery 2nd attempt NO SAMPLE		t=1514 HNu=B.G. Told drillers to drill to 6' try for 6-8'
		S4	2.0	3-5-8-10 (13)	As above grades to firm (CL)		t=1522 HNu=B.G.
		S5	2.0	4-6-7-10 (13)	Silty clay, gray, moist, firm, tr sand, tr gravel (CL)		t=1529 HNu=B.G. Took Physical Duplicate
10		S6	2.0	2-6-7-8 (13)	As above		t=1530 HNu=B.G., No physical sample
		S7	1.6	1-3-4-6 (7)	As above 1.3' Lower 6" 3-4 "cracks" filled with sand Lower 1" well graded M-C sand, gray, wet 150 se, tr. gravel (SW)		Took Chemical Sample t=1538 HNu=B.G.
15		S8	2.0	2-4-6-7 (10)	Silty clay, tr gravel, gray, soft 1/8" sand seam 1" from top (CL)		t=1542 HNu=B.G.
		S9	1.5	2-4-7-14 (11)	As above (CL) 1' sand seam 0.4' from top, 1' from top. Bottom 1" F-M sand, gray, wet, loose		t=1548 HNu=B.G.
		S10	1.0	2-4-6-10 (10)	0.3 interlayered sand & gravel, gray, differing lithologies, wet, loose (GW-SW) 0.3' as S8		t=1555 HNu=B.G.
20		S11	2.0	8-9-10-11 (19)	0.4' sand & gravel (SW) 1.0' sand & gravel as above 1.0' sand, med, gray, wet <5% silt, ~5% small gravel. (SP)		
		S12	1.2	6-8-10-10 (18)	Same as above, med to coarse (SP)		
25		S13	1.6	6-8-9-12 (17)	Same as above (SP)		
		S14	0.7	6-8-10-12 (18)	0.4 Same as above 0.3 sand, gray, fine, clean (SP)		
		S15	1.7	3-7-12-14 (19)	Sand gray, fine wet, clean. (SP)		Chemical set

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-5 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(3 3/8" i.d.) /Mobile Drill B61
WATER LEVEL AND DATE START 4/13/88 FINISH 4/13/88 LOGGER C Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		S16	1.3	10-12-14-18 (26)	Same as above		
		S17	1.8	10-19-29-30 (48)	Same as above		
		S18	1.8	8-20-25-32 (45)	8" as above 14" Sand gray, v. fine, wet, clean. (SP)		
		S19	2.0	8-14-20-19	Same as above. (~2% Silt)		t=1750 HNu=Bg
		S20	2.0	8-14-20-22	Sand v. fine, wet, gray, ~30% silt, 1/2" silt seams every 6 or 8" (SM)		
40		S22	2.0	8-12-30-46	12" as above 6" coarse sandy gravel 6" silt gray, hard, dry, ~10% small gravel		(till))
					End Soil Boring @ 42'		

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-06 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT Mobile Drill B61/Hollow Stem augers 3 3/8" i.d.
WATER LEVEL AND DATE START 4/12/88 FINISH 4/12/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION	
		S1	1.0	2-2-3-4 (5)	Topsoil dark brown, moist, fill, small roots, soft, slightly plastic			HNu Bkg
		S2	1.0	3-3-3-3 (6)	Silt, moist, light brown, soft, slightly plastic (ML)			
5		S3	1.2	2-2-2-3 (4)	Same as above, wet at bottom 6" also a little gravel in the bottom 6" (~10%)		Apparent water @ 5.5'	
		S4	1.3	(soft)	Same as above, 30% gravel. Bottom 4" silt (moist)		Till	
		S5	2.0	5-6-7-8 (13)	Silt as above, wet, gray, ~10% gravel, firm.		Till	
10		S6	2.0	5-6-7-10 (13)	Same as above		Chemical sample taken ECC SB-06-06	
		S7	1.7	4-6-6-8 (12)	Same as above (gravel layer 1" thick @ 13')			HNu Bkg
15		S8	1.7	5-8-8-8 (16)	12" Same as S6 6" sand, gray, medium <2% silt, wet (SP)		1555 hrs	
		S9	1.7	4-5-6-11 (11)	2" saturated till as above Silt, gray, moist ~10% clay med plastic, soft (thin sand layers every 2 to 4")(ML)		first competent sand layer Till	
20		S10	1.3	6-8-9-10 (17)	gravel w/ sand max size - 1", gray, wet, <5% silt, ~30% coarse sand, poorly graded. (GP)			
		S11	1.3	5-8-8-9 (16)	Sand w/ gravel, gray, wet ~20% gravel clean, max size - 3/4" Well graded. (SW)			
		S12	1.0	8-10-11-12 (21)	Same as above			
25		S13	1.5	8-14-16-20 (30)	16" same as above 12" sand fine to med size, gray, clean, wet poorly graded, ~10% small gravel (SP)		Chemical Sample Taken ECC SB-06-13	
		S14	1.8	8-16-18-18 (34)	Same as sand above. (SP)			
		S15	1.5	9-18-21-26 (39)	Sand same as above, increasing siltiness in bottom 4".			

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-06 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT Mobile Drill B61/Hollow Stem augers 3 3/8" i.d.
WATER LEVEL AND DATE START 4/12/88 FINISH 4/12/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		S16	2.0	9-26-30-30	Sand, gray-tan, wet, dense, fine to med size Silt seam 1" thick @ 31.5'		HNu Bkg
		S17	1.7	14-18-20-22	Sand, tan, fine, moist, clean, poorly graded.		
35		S18	2.0	10-15-18-21	Same as above, ~5% silt.		
		S19	2.0	8-9-10-12	Silt, tan, wet, soft, <5% clay Low plasticity (ML)		
		S20	2.0	11-25-36-50	12" as above 12" Silt dark gray, ~10% grav., dry, hard		Chemical Sample Taken ECC SB-06-20 Till
40		S21	1.8	13-26-36-40	Same as above		
					End Soil Boring @ 42'		

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-07 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3 3/8" HSA Mobile Drill B61
WATER LEVEL AND DATE START 4/11/88 FINISH 4/12/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		S1	2.0	23-25-35-35 (60)	Crushed limestone fill, stained black for top foot.		HNu-10ppm
					8" Crushed limestone fill		
		S2	2.0	24-20-8-8 (28)	16" silt, dark brown, ~10% fine sand, moist low plasticity (ML)		HNu-11ppm
5		S3	0.5	6-8-10-10 (18)	Rubbish - silicon sealant, rocks (fill)		HNu-2ppm
		S4	1.3	9-4-4-4 (8)	8" rubbish as above		
					8" Silt w sand & clay - dark brown, moist, soft low plastic, ~20% fine sand (ML)		HNu-4ppm
		S5	1.0	2-2-3-4 (5)	as above, more wet		HNu-Bkg
10		S6	1.5	2-2-4-7 (6)	12" as above		HNu-Bkg
					6" sand, fine, gray, wet ~10% silt (SP-SM)		
		S7	0.7	0-0-2-3 (2)	6" sand as above 2" gravel (1/2" max) well graded, wet		HNu-Bkg
15		S8	2.0	6-8-9-12 (17)	Sand med coarse, gray, wet, well graded, small gravel (~10%) V. clean (SW)		HNu-Bkg HNu Bkg
		S9	1.5	6-8-12-12 (20)	Same as above		
		S10	1.3	8-8-10-11 (18)	Same as above		
20		S11	1.3	10-13-13-14 (26)	Same as above		
		S12	1.7	11-13-18-24 (31)	Same as above, medium (~5%gravel) lack of fine sand (SP)		
		S13	1.8	30-23-27-60 (50)	8" same as above		0820
					14" silt, gray, moist, nonplastic, ~20% fine, fine sand seams every 2-3" (ML)		Rocks @ interface of sand and silt. bottom 1" of spoon was hard dry fill
		S14	1.5	38-80-100/6"	Silt, gray, dry on inside, wet on outside Small rock fragments (>5%), hard.		Took Chemical Sample out of S13
		S15	1.8	25-31-55-65 (86)	7" Same as S14		Till
					7" sand, med, gray, wet, poorly graded, clean (SP)		
					8" Same as S14 (ML)		

Rev. 8/15/88

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-07 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3 3/8" HSA Mobile Drill B61
WATER LEVEL AND DATE START 4/11/88 FINISH 4/12/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30		S16	2.0	25-40-55-75 (95)	Same as S14		HNu / Bkg
					End Soil Boring @ 32'		
35							

OHM HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-08 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3 3/8" HSA Mobile Drill B61
WATER LEVEL AND DATE START 4/12/88 FINISH 4/12/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION	HNu ppm
		S1	1.8	7-11-19-20 (30)	Fill concrete chunks, asphalt pavement chunks & other black debris 10" Same as above		Took Chem. No physical Drillers noted water @ 3'	0.1
		S2	1.7	10-11-19-20 (30)	10" Silt, dark gray, ~20% sand, low plast. wet (ML)			0.2
5		S3	0.7	3-3-8-5 (11)	Silt tan to gray, wet, low plasticity, soft. (ML)			10
		S4	1.0	1-4-3-2 (7)	Same as above		HNu-12ppm	12
		S5	1.3	3-4-6-8 (10)	Same as above		Took Chem - No Physical	0.3
10		S6	1.8	3-4-6-7 (10)	Silt gray, saturated, ~20% sand (fine) in thin lenses, soft		Till	Bkg
		S7	1.3	5-5-6-8 (11)	Same as above, sand seams are more coarse.			
15		S8	1.2	3-4-6-8 (10)	10" Same as above 4" Sand lense (fine) wet, poorly graded (SP)			
		S9	1.7	8-11-16-18 (27)	12" Same as S6 4" Sand lense as above 4" Same as S6			
		S10	2.0	11-16-18-19 (34)	Silt gray, ~20% fine gravel, dry, hard		Till	
20		S11	2.0	12-16-18-30 (34)	Silt as S10			
					End Soil Boring @ 22'			
25								

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-09 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 4 1/4" HSA Mobile Drill B61
WATER LEVEL AND DATE START 4/17/88 FINISH 4/17/88 LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		S1	0.8	3-2-4-9 (6)	Sandy, clayey silt, brown, moist, soft (ML-CL)		Begin augering t=1220 (Fill) t=1225
		S2	1.2	4-5-6-6 (11)	0.9' As above (ML-CL) 1/2" sand seam, poorly graded, (SP) Med grained dry to moist, lt. brown, loose to med dense. Rest: as above		HNu=BG t=1235 HNu=BG
5		S3	0.8	3-4-2-2 (6)	Sand, poorly graded, med grained, lt. brown, wet, loose 2" gravel, near bottom (SP-GW) large pebble in bottom: 60 mm long		t=1240 HNu=BG
		S4	1.4	1-6-10-10 (16)	1' Clayey silt, with large gravel, pebbles to 50mm (ML)		t=1245 HNu=BG
		S5	1.4	14-13-14-13 (27)	Alternating 6" layers silt, gray, wet, soft and large gravel with clay (as S4)(GW-ML)		t=1249 HNu=BG
10		S6	2.0	9-6-10-6 (16)	Sand, fine, gray, wet, loose (SP) grades to well graded gravel wet, loose (GW)		t=1255 HNu=BG took chemical
		S7	1.2	7-6-10-10 (16)	0.7' = as above (SW-GW) 0.5' - clayey silt, gray, dry (ML-CL) to moist, firm to stiff, tr. gravel		t=1305 HNu=BG Physical of till Till at 12'
15		S8	1.0	9-10-11-15 (21)	Clayey silt, tr. gravel, gray, dry, hard		t=1310 HNu=BG Till Physical Dup
					End Soil Boring @ 16'		Told drillers to set 5' well screen from 14' to 9' ECC MW 16
20							
25							

Rev. 8/15/88

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-10 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA 3 3/8" ID Mobile Drill B53
WATER LEVEL AND DATE START 4/13/88 FINISH 4/13/88 LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		S1		4-7-10-13 (17)	Blind Drilled (Fill)		Start 0750 No Sample
		S2	1.0	4-7-10-13 (17)	Top 6" Silty clay tr gravel, sand, dk brown, moist, soft (Fill) Lower 6" well graded F-C, sand, lt gray, wet to moist, loost to med dense (SW)		t=0800 HNu=B.G. physical sample of lower 6"
5		S3	0.5	9-13-10-7 (23)	Well graded sand F-C-, tr gravel, pebbles to 40mm, lt. gray, wet, loose (SW)		t=0806 HNu=B.G.
		S4	1.2	5-5-7-9 (12)	Well graded sand F-C, tr gravel, lt gray to brown, wet, loose some clay (SW)		t= 0812 Took Chemical Set HNu=B.G.
		S5	1.3	7-9-10-10 (19)	Top 6" F-M poorly graded sand (SP) brown, wet, dense, lower 0.8' as S-4 (SW)		t=0819 HNu=B.G.
10		S6	1.2	4-7-8-12 (15)	About 6" of material from blow in before spoon was set Well graded sand F-C, tr gravel, one pebble (broken) to 50mm, lt brown, wet, loose to med dense, some black staining (SW)		Having a lot of blow in. Put head of water in augers to keep out blow in t=0831 HNu=0 not measured
		S7	1.4	13-12-20-17 (32)	As above (SW) Top 1' As above (SW) Lower 0.9' F-M Poorly graded sand, brown but 6" of white, "sugar" looking, wet, med dense (SP)		t=0840 HNu=B.G. Took Chemical Set More water added to augers
15		S8	1.9	15-26-29-30 (55)	Top 0.8' as above (SP) Lower 0.4' sand and gravel (SW) pebbles to 80mm, varying lithology, 3" lense within with the very coarse gravels, tr clay (GC)		t=0901 HNu=B.G. t=0910 HNu= B.G. Tested HNu w/ felt tip
		S9	1.2	13-20-28-21 (48)	Well graded F-C sand, tr gravel, brown to gray, moist to wet, dense (SW)		t=0919 HNu= B.G.
20		S10	1.9	10-18-17-20 (35)	Top 0.8' F to M poorly graded sand, gray, moist to wet, dense (SP) 0.3' well graded sand with clay, tr gravel, pebbles to 20mm, gray, moist to wet, dense firm (SW); lower 0.4" well graded sand & gravel, gray, tr. pebbles to 10mm, loose (SW)		Took Physical Duplicate t=0930 HNu=B.G.
		S11	1.5	8-10-23-20 (33)	Top 1' well graded F-C sand, gray, wet, dense 23' Lower 0.8' silty clay, gray dry to moist, v. hard 6" from bottom sand seam 1/4" (CL-ML)		pp>4.5 1000 Took break 1010 Begin drilling again. A lot of blow in. Sample interval cleaned out twice
		S12	1.8	18-22-28-37 (50)			
25		S13	1.3	23-38-34 (72)	As above sand seams, about 5 over the interval		Approx 4" from above t=1030 HNu=B.G.
					End Soil Boring @ 25.5'		

Rev. 8/15/88

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-11 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA 4 1/4" ID Mobile Drill B61
WATER LEVEL AND DATE START 4/5/88 FINISH 4/5/88 LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		S1	1.2	4-2-7-5 (9)	6" Silty clay, brown, tr gravel, moist, loose (CL-ML) 3" F-C sand well graded, tr gravel, brown black organics (SW) (CL=ML) 6" Silty clay, brown, tr. gravel, moist, loose (CL-ML)		Start sample 1430 Bg HNu=0.5ppm t=1433 HNu=B.G. Fill organics throughout
		S2	1.3	8-20-22-18 (42)	1' As above (CL-ML) 0.3' Sandy gravel & cobbles to 40mm, white, dry, loose (Fill)		t=1441 HNu=B.G. Fill
5		S3	1.1	12-11-4-4 (15)	0.5' As above 3" silty fine gr sand (clay), poorly graded, buff to lt. brown, wet, soft to med dense 6" silty clay, gray w/ black staining, soft, moist		t=1502 HNu=0.5ppm ABG (Fill) Chemical sample 2VOA's 1-8oz
		S4	0.8	4-8-12-10 (20)	6" Same as above 0.3' coarse sand & gravel fragments to 30mm white/buff, dry		t=1512 HNu=B.G. Fill
		S5	1.6	5-6-7-7 (13)	Silty clay/clayey silt, tr. gravel, fine sand, gray to dk. brown, moist, soft, homogeneous (CL-ML)		t=1517 HNu=B.G.
10		S6	1.8	4-4-7-15 (11)	Top 1.6' As above Bottom 0.2' well graded F-C sand, tr gravel, gray, wet, loose to med dense (SW)		t=1525 HNu=B.G.
		S7	1.8	11-11-11-13 (22)	~~6" silty clay as in S5~~ 1.3' med to coarse sand & gravel, gray, wet, loose		t=1535 HNu=B.G. but took chemical set
		S8	1.9	13-14-14-25 2nd attempt	Top 0.5' F-C well graded sand, gray, wet loose (SW) 0.5' coarse gravel, varying lithology, wet, loose (GP)		t=1545 No recovery: out of sampler 2nd attempt: Had to set sampler ≈1ft before interval because of
		S9	1.5	8-12-15-16 (27)	0.9' F-C Well graded sand, gray, wet loose (SW) 6" as above (SW) 1.0 silty clay, tr. gravel, dk. gray, moist to dry, stiff (CL-ML)		blow in HNu= 0.4 3.1>3.2 ABG after 5 min. in jar t=1553 t=1600 HNu=B.G. About 6" blow in (Till)
		S10	1.0	7-14-15-21 (29)	As above (CL-ML)		t=1616 A lot in augers. HNu=B.G. Actual sample recovery (Till)
20		S11	1.3	10-16-16-17 (32)	As above (CL-ML)		t=1630 HNu=B.G. (Till) Will have them drive one more spoon for till, grout & move over.
		S12	1.5	11-15-16-25 (31)	About 6" from above in augers As above (CL-ML)		t=1650 (Till) HNu=0.5 ABG
25					End Soil Boring @ 24'		Duplicate 1700 Told drillers to grout hole. Told to make grout thicker. Will move over to set well.

Rev. 8/15/88

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-12 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3 1/4" HSA, Mobile Drill B61 rig, continuous 24" samples (2 inch OD)
WATER LEVEL AND DATE START 4/7/88 FINISH 4/7/88 LOGGER RE Huddleston

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	0-2	S1	2.0	6-8-10-14 (18)	Dk. brown silty sand (SM), with medium gravel, & wood fragments, moist, slightly stiff, Fill		HNu=BG
0930	2-4	S2	2.0	8-8-20-30 (28)	Brown silty sand as above. Gravel content ~30% angular medium gravel. No wood fragments observed. (SM)		HNu=1.5ppm max Took sample for chem. Anal. ECC SB-12/02
0935	4-6	S3	2.0	18-24-30-14 (54)	F-M sand & gravel fill (SP-SM) as above, brown-gray, dry		HNu=1.8ppm up to 7ppm max Chem sample ECC-SB-12/03
	6-8	S4	1.0	5-9-7-5 (16)	Gray silt (ML) tr. sand, with gravel, moist		No physical sample collected. HNu=0.5ppm bkgnd in hole
	8-10	S5	2.0	3-3-2-2 (5)	Brown-gray, medium sand with silt & seams of silt (SP) silt seams are gray-black ~ 2" thick with organic plant fragments, wet		HNu=0.2ppm
10	10-12	S6	1.5	sunk in-1-1-1 (2)	Gray-black fine sandy silt (SM-ML)soft, plastic slightly sticky, wet		HNu=BG in hole=BG
	12-14	S7	2.0	4-5-6-10 (11)	As above to 13' washed fine to medium angular gravel (GP-GW) wet, loose		HNu=BG
15	14-16	S8	2.0	8-10-13-14 (23)	Gray, medium sand, loose, wet (SP)		HNu=BG
	16-18	S9	1.0	5-5-10-12 (15)	Sand as above to 17' Slightly stiff, wet, gray silt (ML) trace fine angular-subangular gravel, not sticky		HNu=BG in hole=BG Till
	18-20	S10	2.0	7-11-15-25 (26)	Silt as above- stiff, gravel content 10-30%, becoming drier with depth		HNu=BG
20	20-22	S11	2.0	13-15-16-37 (31)	Silt as above, becomes sandier from 21-22' (is silty sand SM at this depth)		HNu=BG (outside of sample is wet, but till is dry)
	22-24	S12	2.0	10-22-32-44 (54)	Sand seam 22-23' - medium sand, wet grades to sandy till as in 20-22' sample		HNu=BG End Drilling @1030
25					End Soil Boring @ 24'		Boring open to 22', sample to 24'

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-13 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION North West of owners Pond
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3 3/8" HSA, Mobile Drill B53
WATER LEVEL AND DATE START 4/11/88 FINISH 4/11/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		S1	1.8	2-3-3-3 (6)	8" Dark brown topsoil Silt tan, moist, tr. fine sand, low plasticity	ML	HNu=BG Fill
		S2	1.3	3-5-6-7 (11)	Silt tan, moist, tr. small gravel & sand, low plast. 1 thin sand seam sticks (1/2")		HNu=BG
5		S3	2.0	3-6-6-8 (12)	Same as above, light brown. ~10% clay (ML)		HNu=BG
		S4	1.25	5-8-10-10 (18)	Same as above, gray brown ~15% gravel		HNu=BG
		S5	1.8	4-6-7-7 (13)	Silty clay, gray, low plasticity, tr. small gravel moist. CL-ML		HNu=BG
10		S6	1.75	4-6-8-10 (14)	Same as S5 ~10% gravel, wet		HNu=0.2 above BG Peak
		S7	1.5	3-6-7-9	Same as above		0.1 HNu above BG
		S8	1.5	5-6-8-11 (14)	Same as above Water present, sand seam 1/16" @ 15.5		0.1 HNu above BG
		S9	0.8	5-5-5-5 (10)	Sand w/ gravel gray, well graded, 1/2" max wet, clean (lack of fine sand) (SW)		Chem. sample taken (only 1 jar of each.) ECC SB13-09/10 (No Physical Sample)
		S10	1.3	7-5-5-6 (10)	Same as above		Finish chemical samples on this spoon. Oily sheen showed up in cuttings.
20		S11	1.5	5-6-6-7 (12)	Same as above		≈15 mm between samplees because of sand flow.
		S12	1.0	7-7-6-8 (13)	Same as above		
25		S13	0.8	0-8-8-10 (16)	Same as above		
		S14	1.0	4-6-12-14 (18)	Same as above (silt seam @ 27 1/2')		
		S15	1.5	13-13-13-16 (26)	Same as above (Silt seam @ 29')		Took chemical sample

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-13 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION North West of owners Pond
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3 3/8" HSA, Mobile Drill B53
WATER LEVEL AND DATE START 4/11/88 FINISH 4/11/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30		S16	2.0	10-11-12-18 (23)	12" sand gray, ~5% silt, medium to coarse w~10% gravel (SP)		HNu BG
					12" Silt gray ~20% fine sand, low plasticity (ML)		
		S17	1.7	7-7-7-14 (14)	Sand, gray, medium, 1" silt lenses every 4 to 6", otherwise sand was clean.		
35		S18	1.5	7-13-16-20 (29)	Same as above		
		S19	1.8	15-19-17-46 (36)	15" Same as above		
					7" Silt, gray, ~20% v. fine sand, non plastic (ML)		
		S20	2.0	15-38-40-60 (78)	4" Silt as above. Silt, gray, ~20% gravel (1/2" max), v. hard, dry		Note: 1" gravel at interface Till
40		S21	1.5	40-60-80-130 (140)	Silt as above		
					End Soil Boring @ 42'		

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-14 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3 3/8" HSA, Mobile Drill B61, 24" continuous split-spoon samples, 2" OD
WATER LEVEL AND DATE START 4/8/88 FINISH 4/8/88 LOGGER R. Huddleston

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	0-2	S1	1.8	1-1-3-4 (4)	Moist brown silt (ML) trace fine sand, trace clay, plastic, slightly sticky, trace gravel		HNu=BG
	2-4	S2	2.0	3-3-5-5 (3)	As above, sand content slightly higher with organic-wood particles, trace black mottles		HNu=trace (~0.2ppm)
5	4-6	S3	1.5	3-2-2-2 (4)	Dark brown, moist, sandy silt (SM) with very fine gravel, slightly plastic, non sticky		HNu=1.5ppm
	6-8	S4	1.2	1-2-2-2 (4)	Silty clayey gray sand (SM-SC) with fine angular gravel. Tip of spoon contains black sand & gravel which appears to be discolored but doesn't do anything to HNu		HNu=trace =3 downhole
	8-10	S5	1.2	4-4-4-4 (8)	Black gravel & sand (GP) loose wet		HNu=BG
10					9.5-10' is soft silty clay (CL-ML) trace very fine gravel.		took chemical analysis sample ECC-SB 14/01 @ 1330 Till
	10-12	S6	1.4	5-6-8-10 (14)	Gray brown clayey silt (ML) with fine-medium sand, trace very fine gravel, soft, slightly plastic plastic, slightly sticky, moist		Not enough sample for phys. anal. HNu=0.2ppm
	12-14	S7	1.2	3-5-6-11 (11)	As above		HNu=BG
					As above, becoming sandier with depth to ~14.5'		
15	14-16	S8	1.8	6-8-10-11 (18)	Medium sand (SP), then to coarse sand (SP) with fine angular gravel 15-16'		14.5 - 15 - contact w/ sand at 14.5 HNu=BG
	16-18	S9	2.0	18-15-16-18 (31)	Gray coarse sand (SP) and fine-medium angular gravel 20-30% nonsticky, nonplastic, loose		Sand blowing into augers, cleaned out with spoons HNu=BG
	18-20	S10	2.0	8-16-18-19 (34)	As above - brown, gray color		HNu-0.5ppm Collected chemical analytical sample ECC-SB-14-02 @ 1410
20	20-22	S11	2.0	11-14-18-27 (32)	Sand as above to 21'		Sand blowing up in augers Had to clean out with spoons
					Stiff gray silty sand (SM) dense, with fine subangular gravel ~20%, nonsticky, slightly plastic		HNu=0.2ppm
	22-24	S12	2.0	18-22-23-26 (45)	Same as above, with ~3" sand seam @ 22'		HNu=0.5ppm Collected chemical analysis sample ECC-SB-14-03 @1447
25	24-26	S13	2.0	18-25-26-27 (51)	Same as above, with 4" coarse sand seam at ~25.5 trace clay, slightly sticky (SM-SC)		HNu=BG End Drilling @ 1455
					End Soil Boring @ 26'		(Hole open to 24', sampled to 26')

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PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-15 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3 1/4" HSA, Mobile Drill B61, 24" split-spoon continuous 2" OD samples
WATER LEVEL AND DATE START 4/7/88 FINISH 4/7/88 LOGGER R. Huddleston

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	0-2	S1	1.5	3-3-4-5 (7)	Dk. drown, moist silty sand (SM) tr. organic plant material, slightly plastic, tr. fine gravel Topsoil		HNu=BG
	2-4	S2	1.5	3-3-3-3 (6)	Brown silt (ML), tr. clay, moist, slightly sticky plastic, tr. fine medium gravel		HNu=1ppm
5	4-6	S3	1.2	2-2-4-6 (6)	As above, with sand (fine) moist		HNu=1ppm Took chem. sample ECC-SB-15/01 @ 1420
	6-8	S4	2.0	4-6-10-10 (16)	Brown moist sandy silt (SM) slightly plastic, nonsticky, tr. fine rounded gravel		Not enough sample for phys. anal. HNu=BG
	8-10	S5	0.5	3-2-4-4 (6)	Gray silt (ML) wet, soft, tr clay, trace fine gravel (a couple), medium-coarse peices of gravel, slightly plastic		HNu=BG
10	10-12	S6	2.0	4-4-6-7 (10)	Grayish brown, soft, silt (ML) 10-20% very fine subanguler gravel, tr. very fine sand, trace clay, plastic, nonsticky		(Till)
	12-14	S7	1.5	4-5-6-7 (11)	Silt as above, wet		Spoon wet HNu=BG (Till)
15	14-16	S8	1.5	4-5-8-8 (13)	@14.5' medium-coarse gray sand (SP), loose, wet		Spoon wet HNu=BG
	16-18	S9	1.5	WOH-6-8-10 (14)	Medium to coarse sand (SP) as above, with fine subrounded-subanguler gravel		HNu=BG Took chem. sample ECC-SB-15/02 @1445
20	18-20	S10	2.0	10-12-20-20	Sand (SP) as above		Could only fill 8 oz jars <1/2 full HNu=BG Not enough sample to fill physical sample jar. Sand blowing in augers-cleaned out augers & spun them to try to drill out sand.
	20-22	S11	2.0	17-20-19-18	Sand as above		HNu=BG See Field logbook for more details. Took several spoons to clean out augers before sampling.
	22-24	S12	2.0	12-29-32-32 (57)	Sandy silt (SM) very stiff ~10% fine gravel, moist, gray medium sand seam @~23-23.5 Till below this, very compact		HNu=BG Till Chem. anal. sample ECC-SB-15/03 @ 1540
25	24-26	S13	2.0	11-28-30-45 (58)	Interlayred silty sand (SM) and medium-coarse sand (SP)in ~6" seams. Sand is loose & wet with silt in ~1" seams. Silty sand is stiff, cohesive		HNu=BG
	26-28	S14	2.0	27-37-52-80 (89)	Silty sand-very stiff, gray very fine sandy silt (ML) with fine subrounded-subangular gravel ~10-20% a sand stronger <1/2" @ ~27.5' Till appears dry, but outside of sample is wet.		HNu=BG
					End Soil Boring @ 28'		Boring open to 26', sampled to 28'.

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-15A MW18 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana

ELEVATION DRILLING CONTRACTOR ATEC Associates

DRILLING METHOD AND EQUIPMENT 4 1/4" HSA, Mobile Drill B53

WATER LEVEL AND DATE START 4/19/88 FINISH 4/19/88 LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		S1			BLIND DRILLED		
		S2					
5		S3	1.2	4-4-7-7 (11)	Clayey, sandy silt, dk. brown, moist, soft		t=1455 HNu=BG (Topsoil)
		S4	1.3	7-8-10-11 (18)	As above 0.4' 6" c. sand poorly graded (SP) 6" gravel (GP)		t=1458 Took chemical sample: VOA's only HNu=1ppm
		S5	1.0	8-7-7-4 (14)	coarse gravel/cobbles to 25mm with clay		(Fill?) Does not appear natural Does not appear natural t=1500
10		S6		2-3-4-5 (7)	2" bottom silt, tr. gravel, dk brown, moist to dry, soft (ML) Silty clay, gray to brown, tr. gravel, sand, wet to moist, soft, sticky, plastic (CL-ML)		(Natural) t=1509 HNu=BG
		S7					Found no significant readings. Told drillers to auger to 18' and take spoon. Target zone 22'
15		S8			BLIND DRILLED		
		S9					
		S10	1.9	20-27-15-10 (42)	1' coarse gravel & pebbles 6" sand, coarse, with gravel, dk. brown to gray, moist to wet, loose		Blow counts high due to large rock =50mm encountered at about 18' t=1535 HNu=BG
20		S11	1.8	10-14-17-22 (31)	6" gravel & pebbles as above 2" sand as above 2"silt in tip of spoon, grey, moist, soft, tr. grav. Silt as above		t=1540 HNu=BG
					End Soil Boring @22'		
25							

Rev. 8/15/88

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-16 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3 3/8" HSA, Mobile Drill B53
WATER LEVEL AND DATE START 4/15/88 FINISH 4/15/88 LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		S1	0.7	8-5-5-5 (10)	Silty clay, tr. sand. lt. orangish, brown, moist soft, (CL-ML)		Begin 1108 t=1109 HNu=BG
		S2	0.7	2-3-3-5 (6)	6" sandy clay, dk. brown, moist, soft, plastic (CL) 3" clayey sand, fine, gray, moist to wet, soft (SM)		t=1110 HNu=BG
		S3	1.2	5-8-10-13 (18)	Silty clay, brown to gray, moist tr. sand, soft some small sand seams. One is 1" F-M (CL-ML) well graded (SW)		t=1115 HNu=BG Took physical dup.
		S4	1.6	13-17-22-23 (39)	Silty, sandy clay, gray, tr. gravel, stiff. Has "cracks" filled with sand (CL-ML)		t=1120 HNu=BG
		S5	1.5	12-14-16-21 (30)	6" silt, grey, moist to wet, (ML) tr. fine sand, soft 3" sand M, poorly graded, wet, loose, to med dense (SP) 6" v. fine sandy silt, gray, tr. gravel, dry, v. stiff (ML)		t=1124 HNu=BG
10		S6	1.6	11-17-17-19 (34)	As above, more clay, hard, dry (CL-ML)		t=1128 HNu=BG
		S7	1.9	11-18-23-24 (41)	As above, pebbles to 30mm (CL-ML)		t=1134 HNu=BG
		S8	2.0	14-20-21-31 (41)	As above (CL-ML) 2 sand seams, 1 1/2" apart, 1 foot from bottom, < 1/16" thick		t=1135 HNu=BG
		S9	1.9	14-20-23-43 (43)	As above (CL-ML) 2 cracks, 2" apart, 1 ft. from bottom		t=1147 HNu=BG
		S10	1.8	21-29 (>50)	As above (CL-ML) v. stiff, about 10% sandy material, coarse grained cracked		t=1157 Spoon wet HNu=BG
		S11	1.6	10-13-12-22 (25)	Top 8" sand, F-M, poorly (SP) graded, gray, wet, loose (SP) 3" silty clay, tr. sand, gray, (CL-ML) moist, soft 2" coarse sand, poorly graded, wet, med dense (SP) Rest as S10		t=1200 Adding water to get sampler out? took chemical
		S12	1.5	20-20-28-43 (48)	As S10 (CL-ML)		t=1211 HNu=BG
25					End Soil Boring @ 24'		t=1215 Stopped 4/15

Rev. 8/15/88

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-17 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3 1/4" HSA, Mobile Drill B61, 24" continuous split spoon sampling, 2" OD
WATER LEVEL AND DATE START 4/8/88 FINISH 4/8/88 LOGGER R. Huddleston

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	0-2	S1	1.2	5-2-2-3 (4)	Brown, moist, sandy silt (SM) Topsoil, with grass & roots, trace gravel		HNu=BG
	2-4	S2	1.2	2-2-1-1 (3)	As above to ~3' Brown moist silty fine sand (SP-SM), trace clay soft, loose, with root fragments		HNu=0.5ppm
5	4-6	S3	15.	3-6-6-6 (12)	As above, to wet sand content (sandy silt - SM) Coarse sand & fine gravel at 5.5-6.0' (SP)		HNu=0.4ppm Driller said that soil is so soft that any gravel at all will inhibit sample collection & result in poor recovery
	6-8	S4	0.5	WOH-4-2-2 (6)	Wet, coarse sand and gravel, trace silt & clay (SP-SM), lose, brown, very slightly plastic		HNu=0.5ppm Not enough recovery to collect chemical sample
	8-10	S5	0.7	2-2-2-2 (4)	Brown-black fine sand (SP-SM), trace silt & clay trace subrounded, fine-medium gravel (<10%), loose, soft, wet, very slightly plastic.		HNu=0.5ppm
10	10-12	S6	2.0	6-6-11-12 (17)	Wet, gray medium-coarse sand (SP) (coarse sand seam @ 10-10.5' becomes medium sand), loose (nonplastic)		HNu=1ppm 0820 Chem. anal. sample ECC-SB-17-01
	12-14	S7	2.0	5-7-9-11 (16)	Gray brown sand (SP) interlayered medium & coarse zones ~6" each, trace fine-medium angular gravel, wet, loose (nonplastic)		HNu=BG
	14-16	S8	1.7	11-12-15-21 (27)	Gray medium-coarse sand (SA) wet, loose, nonplastic, nonsticky, trace fine gravel		Sand blowing into augers - had to clean out augers with spoon HNu=BG
	16-18	S9	2.0	11-13-13-12 (26)	Coarse sand (SP) as above with fine angular gravel ~20%		HNu=BG Sand blowing in augers-cleaned out augers with spoon-had to add water to put a load in the augers-injected water & pulled
	18-20	S10	2.0	11-13-16-17 (29)	Coarse sand & gravel as above fine-medium, angular (HNu=BG, Problem same as above)		augers up to try to wash sand out (had a sealing T on the top auger they washed the water through
20	20-22	S11	2.0	11-12-14-15 (28)	As above		still had ~1' of material in augers) HNu=BG Sand was easily cleaned out with only one spoon. Problems
	22-24	S12	1.8	15-12-14-15 (26)	As above (HNu=BG, No sand blow-in)		with sand as above, some difficulty advancing augers (augers were briefly locked in sand, but driller
25	24-26	S13	2.0	12-21-23-30 (44)	As above-bottom 2" are more dense with silty matrix-appears to be grading to till-like material (HNu=BG)		was able to spin them free & continue auger advancement) Sand blow-in in augers, removed with spoon prior to sampling formation
	26-28	S14	2.0	46-25-36-50 (61)	Coarse sand as above to ~27', grades to fine sand (SP), then to sandy silt (SM-MC) with fine subangular gravel from ~27.5-28'		Sand blowing in augers, cleaned out of spoon. HNu=BG
	28-30	S15	1.5	38-28-30-30 (58)	Gray sandy silt (SM-ML) non plastic, nonsticky dense, ~10% fine subangular gravel, with fine sand seam ~2" thick at ~29', grades to a yellowish brown		Took chem. anal. sample ECC-SB17-02 of sands. Phys. sample of till @ 1015 (Till boundary @ 27.5') HNu=trace (0.2ppm) Phys. sample of

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-17 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3 1/4" HSA, Mobile Drill B61, 24" continuous split spoon sampling, 2" OD
WATER LEVEL AND DATE START 4/8/88 FINISH 4/8/88 LOGGER R. Huddleston

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30	30-32	S16	2.0	10-26-36-50 (62)	silty clay (ML-CL), ~10% fine subangular gravel. Yellowish brown silty clay(ML-CL) sticky, plastic, moist, slightly stiff, trace fine gravel (<10%)		the yellow-brown till collected HNu=BG End Drilling @ 1045
					grading to gray color at ~30.5', which grades at ~31-31.5' to lower clay content silt (ML) trace sand, trace clay, gravel ~10% stiff, slightly sticky & slightly plastic		Drilled to 30', sampled to 32'
35					End Soil Boring @ 32'		

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC-SB-18 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3 3/8" HSA, Mobile Drill B61
WATER LEVEL AND DATE START 4/14/88 FINISH 4/14/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION	Spoon HNu ppm
		S1	2.0	5-6-7-7 (13)	3" topsoil, dk. brown, silt 21" silt, firm, brown, ~10% gravel (1/2" max) low plasticity, moist. (fill)			0.2
		S2	1.5	4-5-5-4 (10)	9" as above (ML)		9" same material but natural fill	0.2
5		S3	0.5	3-3-4-4 (7)	Same as above, soft, moist, gray.		t=1035	0.0
		S4	1.5	4-4-5-5 (9)	8" same as above. 2" sand med. wet, clean (SP) 8" silt, low plast. gray, moist, soft			0.8
		S5	1.2	8-17-9-8 (26)	6" silt as above, dk. gray (ML) 4" gravel gray, 1" max. ~10 sand, <5 silt 4" same S3, moist. (GP)			0.0
10		S6	2.0	8-8-10-12 (18)	Same as above, gray silt, ~10% gravel, moist, low plasticity			0.1
		S7	1.7	5-7-9-13 (16)	Same as above w/ sand seam @ 13.5' (4" thick sand, med., wet)		t=1055 No deeper than 12'	0.0
		S8	1.7	5-7-6-7 (13)	8" as above 6" sand, coarse, ~30% small gravel, <5% silt (SP) 6" same as S7			0.0
		S9	2.0	4-5-6-8 (11)	Same as above, wet (ML)			0.0
		S10	1.7	4-6-7-8 (13)	Same as above, wet. Bottom 2" contained 30-40% sand & gravel		t=1110	0.0
20		S11	1.8	7-11-13-12 (24)	Sand gray, medium, <5% silt, ~10% small gravel wet (SP)		Sand took chem. samples Began adding water to augers to keep sand from flowing	5.0
		S12	1.0	9-13-15-16 (28)	Sand, coarse, ~ 20% gravel (3/4" max.), <5% silt, wet. (SP)			4.2
25		S13	1.0	9-23-27-11 (50)	Same as above Bottom clogged at 2", rock			2.0
		S14	1.7	11-15-15-53 (30)	Same as above.		Took chem. samples.	
		S15	2.0	50-40-56-90 (96)	12" same as above 1" shale like rock 11" sand gray, fine <5% silt, moist, dense (SP)			5.5

OHM/HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-18 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3 3/8" HSA, Mobile Drill B61
WATER LEVEL AND DATE START 4/14/88 FINISH 4/14/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30		S16	0.7	17-16-20-23 (36)	Sand gray, coarse, ~20% small grav. <5% fine (SP)		HNu Bkg
		S17	0.7	14-23-53-76 (76)	Clay, brown-gray-black splotchy, med. plastic ~10% gravel, <10% silt		
35		S18	2.0	23-33-50-70 (88)	Silt gray, v. hard, ~5% coarse sand, low plasticity, dry (ML)		
					End Soil Boring @ 36'		

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-18A MW19A SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA (4 1/4"), Mobile Drill B53
WATER LEVEL AND DATE START 4/19/88 FINISH 4/19/88 LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		S1	0.8	6-6-5-9 (11)	Sandy clayey silt, dk. brown, dry, tr. gravel, firm, grades to gray (ML)		t=0940 Begin auger in large t=1000 at about 8'. Move rig HNu=1.4 back approx. 1'.
		S2	0.7	3-3-3-4 (6)	As above, gray, (ML)		t=1001 0955 start again. HNu=10.0 VOA sample taken
5		S3	1.4	2-4-3-7 (7)	Silty clay with sand, tr. gravel, gray with greenish cast, moist, soft to firm (CL-ML)		t=1010 HNu=184 Full chemical set taken
		S4	1.5		Silt, gray (ML), moist, soft grades to Sandy silt with zones of up to 30-40% sand (ML), moist, soft		t=1015 Silt HNu=94 Sand HNu=2.0
		S5	1.2	8-9-6-7 (15)	Lower 6"=coarse sand gravel (GP) 6" coarse clayey gravel (GW) Lower 6" silty clay, gray, wet, soft, (ML)		VOAS taken of sand t=1020 HNu=62
10		S6	1.6	9-6-5-7 (11)	Silt, gray, tr. pebbles to 30mm, wet, sticky, soft (ML)		VOAS taken of sand t=1030 HNu = 25ppm
					End Soil Boring @ 12'		Full chemical set
20							
25							

Rev. 8/15/88

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-19 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3 3/8" i.d. HSA, Mobile Drill B61
WATER LEVEL AND DATE START 4/15/88 FINISH 4/15/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION	Spoon HNu ppm
		S1	1.7	5-7-8-5 (15)	Silt, brown, ~10% gravel, low plasticity, moist grass roots		Fill	0
		S2	0.8	4-10-5-4 (15)	As above gray, no roots		Fill	0
5		S3	1.8	5-9-10-7 (19)	As above dark gray		Fill	0
		S4	1.5	3-4-5-8 (9)	10" as above (moist)			0
					8" Sand wet			
		S5	1.7	3-4-5-9 (9)	12" Sand black, greasy appearance, ~10% silt, wet			3ppm
					8" silt gray, moist, ~10% small gravel, low plast.			
10		S6	2.0	5-7-10-11 (17)	Same as above		Till	0
		S7	2.0	5-7-8-9 (15)	Same as above			
15		S8	2.0	5-6-7-8 (13)	Same as above			
		S9	1.8	4-5-6-7 (11)	Same as above Sand seam @ 17' (1" thick)		Began adding water.	
		S10	1.3	4-5-8-8 (13)	Same as above no sand seams.			
20		S11	1.2	5-6-9-12 (15)	Same as above			
		S12	1.3	5-10-8-7 (18)	Same as above			
					Bottom 2" coarse sand gray, (SP) ~5% silt.			
					2" sand, med, clean, SP			
25		S13	1.5	4-7-7-9 (14)	12" Same as S6.		Chem. sample. No physical.	
					4" sand, med, clean, SP			
		S14	1.8	8-9-12-15 (21)	Same as S6 w/medium size sand in 1/8" seam at 27.5'			
		S15	1.7	13-12-11-11 (23)	Gravel gray, 1" max, >5% silt ~10% sand, wet (GP)			

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W64641.PQ	ECC SB-19 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana

ELEVATION _____ DRILLING CONTRACTOR ATEC Associates

DRILLING METHOD AND EQUIPMENT 3 3/8" i.d. HSA, Mobile Drill B61

WATER LEVEL AND DATE _____ START 4/15/88 FINISH 4/15/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30		S16	1.5	11-12-12-21 (24)	10" Sand coarse, gray, wet, <5% silt 8" silt, gray, dry, v. hard, low plast.		Spoon HNu ppm Till
		S17	2.0	20-38-39-45 (77)	As above, bottom 2" moist. Silt		t=1530
		S18	1.8	23-40-50-68 (90)	Same as above, moist, hard.		
					End Soil Boring @ 36'		

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-20 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3 3/8" i.d. HSA, Mobile Drill B61
WATER LEVEL AND DATE START 4/15/88 FINISH 4/15/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION	COMMENTS: Spoon HNu ppm
		S1	1.0	3-3-5-5 (8)	Top soil, dark brown silt w/ small roots			0.0
		S2	1.5	3-2-3-2 (5)	8" same as above 10" sand brown, moist, medium <5% silt (SW)		Started adding water to augers	0.0
5		S3	0.5	3-4-5-9 (9)	Same as sand above.		Rock lodged in tip of spoon.	0.0
		S4	1.3	10-6-3-4 (9)	Same as above (4") 12" sand, light gray, ~5% silt, wet. (SW)			0.0
		S5	1.3	12-11-8-10 (19)	Sand light gray, ~10% gravel (3/4" max) ~10% silt, wet (SW)			0.0
10		S6	1.3	8-9-10-12 (19)	Sand, med. wet, brown, <5%silt well graded (SW)			0.0
		S7	1.0	6-8-8-8 (16)	Sand, brown, wet, <5% silt, ~10% gravel (1/2" max) SW.			0.0
15		S8	1.8	9-10-11-12 (21)	Same as above		Took chemicals t=1005 No physical	0.0
		S9	2.0	9-13-12-12 (25)	Same as above			0.0
		S10	1.7	10-14-17-17 (31)	10" as above 10" sand well graded to medium size, <10% silt, wet			0.0
20		S11	1.5	16-16-22-24 (38)	Sand as above			1.0
		S12	1.0	17-13-12-14 (25)	Sand brown, coarse, <5% silt, wet (SP)		HNu read BG as 0.4	BG
25		S13	1.7	16-16-20-25 (36)	14" sand as above 6" sand fine-med, ~10 silt in bottom 2" otherwise clean. (SP)		Chemical sample taken	1ppm
		S14	2.0	35-30-35-50 (65)	10" sand as above 14" Silt, gray, ~10% coarse sand, low plasticity, dry, hard, (till)			2ppm
					End Soil Boring @ 28'			

Rev. 8/15/88

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-21 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(4-1/4" i.d.) /Mobile Drill B53
WATER LEVEL AND DATE START 4/27/88 FINISH 4/27/88 LOGGER Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		S1	0.5	1-2-3-5 (5)	Silty Clay, trace gravel, sand, dk. brown, moist, soft (ML-CL)		t = 1335 HNu = BG
		S2	1.3	1-2-1-3 (3)	Silty Clay with Sand, dk. brown, some black stains, moist (sticky), soft (CL-ML)		t = 1356 HNu = BG
		S3	1.0	1-5-7-8 (12)	Clayey Silt, trace gravel, gray, soft to firm, dry to moist (ML)		t = 1340 HNu = BG
5					Lower 2" F-C Well Gr. Sand, brown, moist, med. dense (SW)		
		S4	Ø	7-6-7-9 (13)	NO RECOVERY		t = 1348 No recovery
		S5	Ø	6-9-16-19 (25)	NO RECOVERY		t = 1352 Spoon is very wet HNu = Cuttings are suspect; "loose clay" but sand; don't know where the interval is that they're coming from
10		S6	2.0	9-8-8-10 18	Well graded F-C Sand, tr. gravel, brown, wet, dense (SW)		t = 1400 HNU = BG
		S7	2.0	9-12-11-13 (23)	As Above (SW)		t = 1410 HNu = BG
		S8	2.0	9-11-14-12 (25)	As Above (SW)		t = 1418 HNu = BG (till)
		S9	2.0	9-12-16-17 (28)	As Above (SW)		t = 1432 HNu = BG
		S10	2.0	19-30-36-32	F-M Well graded sand, lt. brown, moist, dense		t = 1441 HNu = BG
20					(As Above, but sand is fining (SW))		
		S11	2.0	14-16-27-20 (43)	V. Fine-Fine Poorly Graded Sand, lt. brown, wet, dense, tr. gravel (SP)		t = 1452 HNu = BG
		S12	2.0	19-23-25-27 (48)	As Above (SP)		t = 1502 HNu = BG
25		S13	2.0	18-18-27-23 (45)	F-C Well Graded Sand With Gravel, cobbles to 60mm, brown, wet, med. dense (SW)		t = 1515 HNu = BG
		S14	2.0	13-15-21-28 (36)	1.5' As Above (SW) 0.5' Silt, gray, with v. fine sand, wet, firm, plastic (ML)		t = 1527 HNu = BG
		S15	2.0	--	F-C Well Graded Sand, brown, wet, loose to med. dense (SW)		t = 1539 HNU = BG

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC SB-21 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana

ELEVATION DRILLING CONTRACTOR ATEC Associates

DRILLING METHOD AND EQUIPMENT HSA(4-1/4" i.d.) /Mobile Drill B53

WATER LEVEL AND DATE START 4/27/88 FINISH 4/27/88 LOGGER Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION (SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL)	SYMBOLIC LOG	COMMENTS (DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION)
		S16	2.0	25-32-40-50/3"	1.0 As Above (SW)		t = 1546
					1.0 Silty Clay, tr. gravel, gray, dry to moist, stiff (CL-ML)		HNu = BG Till at 31'
					End Soil Boring @ 32.0'		
35							

Rev. 8/15/88

PROJECT NUMBER	BORING NUMBER
W64641.FQ	ECC-SB-22 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA Mobile Drill B53
WATER LEVEL AND DATE START 4/26/88 FINISH 4/26/88 LOGGER Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		S1	1.0	2-2-3-2 (5)	Clayey Silt, dk. brown, moist to dry, sandy, firm (ML). Lower 2" Sand, F-C, lt. brown, dry, loose (SM)		t=1450 HNu = BG Topsoil
		S2	1.3	2-3-5-13 (8)	Top 6" Silty, Clayey Sand, dk. brown, dry, med. dense (SM). Lower: Well Graded F-C Sand, orange grades to lt. brown, med. dense, moist, up to 10% gravel (SW)		t = 1453 HNu = BG Sand
5		S3	0.8	7-18-21-17 (39)	Clayey Sand, dk. brown, with cobbles to 70mm and broken rock frags., wet.		t = 1502 HNu = BG Spoon saturated
		S4	1.2	12-12-14-16 (26)	8" Fine Sand, gray, 30% clay, moist to wet, dense (SM)		t = 1512 Sounded like we were HNu - BG pounding thru cobbles
					6" Clayey Silt with Sand (ML-CL), gray, stiff, tr. gravel, dry to moist (Till)		Sample of this
		S5	1.1		As Above (ML-CL) (Hard)		t = 1520 HNu = BG
10		S6	1.2	22-13-14-15 (27)	As Above (ML-CL) Some very small zones with more sand, fine		t = 1530 Will be a lot of junk in HNu = BG top of spoon
	13.5 / 14.0	S7	1.0	26-33-31 (64)	As Above		t = 1540 Auger is coring the HNu = BG till. Only sampling 18".
	15.5 / 16.0	S8	1.1	40-32-37 (69)	As above (ML-CL). Sand seam 6" from bottom, 1-1/2" thick, well graded F-C with silt, gray, moist to wet, dense (SM)		t = 1557 1st interval boring HNu = BG on cobble TILL
	17.5 / 18.0	S9	1.3	32-22-30 (54)	As Above (ML-CL)		t = 1600 Augers still coring till HNu = BG
		S10	1.4	28-32-32 (64)	As Above (ML-CL) Lower 6" coarse sand and gravel, wet, loose, cobbles to 30mm		t = 1633 HNu = BG TILL
20		S11	0.5	50-23-38-19 (61)	Coarse Rock, but probably just broken up from spoon. Lower 4" clay till (ML). Above that Sand F-M (SP), pooly sorted, moist to wet, gray, dense (sampled)		t = 1700 Hard to tell actual 1st HNu = BG interval recovery Bouncing on cobble TILL
		S12	1.9	28-24-33-33 (57)	Clayey Silt with V. Fine Sand, tr. gravel, gray, dry, v. hard		t = 1725 HNu = BG TILL
25					End Soil Boring @ 24'		

Rev. 8/15/88

PROJECT NUMBER	BORING NUMBER	
W64641.FQ	ECC SB-23 MW23	SHEET 1 OF

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(4-1/3" i.d.) /Mobile Drill B53
WATER LEVEL AND DATE START 4/28/88 FINISH 4/28/88 LOGGER Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
		S1	0.9	3-3-5-7 (8)	Clayey, Sandy Silt, dk. brown, some orange oxidation, dry to moist, soft (ML)		t = 0958 HNu = BG
		S2	Ø	2-2-2-4 (4)	NO RECOVERY Rock in spoon tip		t = 0959
5		S3	0.7	5-11-4-7 (15)	0.2' As Above (ML) 0.5" Clayey Sand with Cobbles to 60mm, orange, cobbles are dolomitic, dry to moist, soft to med. dense (SC)		t = 1005 Drove thru cobble HNu = BG (Could be trash)
		S4	0.7	6-5-7-13 (12)	As Above, gray, F-C sand, wet (SC)		t = 1010 Water @ ~ 5-6' HNu = BG
		S5	0.8	13-12-10-11 (22)	As Above (SC)		t = 1013 HNu = BG
10		S6	1.2	7-9-11-11 (20)	F-C Well Graded Sand, gray, wet, loose with silt, tr. some gravel (SW)		t = 1017 A lot of slough HNu = BG from above
		S7	1.8	9-8-12 (20)	As Above (SW)		t = 1025 HNu = BG Took chemical sample
15		S8	2.0	9-9-10-9 (19)	As above (SW)		t = 1032 HNu = BG
		S9	2.0	11-13-16-19 (29)	As Above (SW)		t = 1042 HNu = BG
20		S10	2.0	13-14-16-16 (30)	As Above (SW)		t = 1105 Having a lot of blow-in HNu = BG problems; adding head of water; took chemical sample
		S11	2.0	10-12-24-24 (36)	As Above (SW)		t = 1114 HNU = BG
		S12	2.0	12-24-27-27 (51)	As Above (SW)		t = 1124 HNu = BG
25		S13	1.8	24-32-45-25/3" Spoon full	1.2' As Above 0.6' V. Fine Silty Sand, gray, wet, dense (SM)		t = 1134 Spoon is full after HNu = BG 3rd interval
		S14	1.3	21-39-51/5" (90)	0.5 As Above 0.8 Silty Clay, tr. Sand, tr. Gravel, gray, moist to dry, v. hard (CL-ML)		t = 1446 Drillers have 6' of blow in HNu = BG augers to 26'. Probably TILL at 26.5' till at ≈ 26' and have formed seal. Will go to rotary wash
					End Soil Boring @ 28'		12:00 Drillers have to go back to shop to get washer; 14:00 Return with tee.

PROJECT NUMBER	BORING NUMBER
W63582.F1	NSLS B-100 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area/≈ at B.L. 7+005
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(4-1/4" i.d.) /Mobile Drill B61
WATER LEVEL AND DATE START 3/22/88 FINISH 3/22/88 LOGGER R. Johns

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	2.0	S1	1.2	4-6-7-8 (13)	Silty Clay with Fine Gravel, brown, slightly moist, stiff (CL-ML)		Start drilling @ 2:05 HNu = BG PP = 2.0 TSF
	2.5						
	4.5	S2	1.3	4-6-7-7 (13)	As Above, iron oxide stains		HNu = BG PP = 3.5
	5.0						
5	7.0	S3	1.7	3-3-5-6 (8)	As Above, less silty, gray mottle, few pieces of 1/2" gravel		PP = 2.5 HNu = BG
	7.5						
	9.5	S4	1.9	6-6-8-8 (14)	Top 10" As Above, moist Bottom 1'-1", Silty Clay, gray, iron oxide stains, moist, firm (CL-ML) Top 2" As Above		HNu = BG PP = 1.0
	10.0						
10	12.0	S5	1.4	10-4-6-8 (10)	Mid 6" Silty Sand and Gravelly Sand, brown, moist, firm (SW-SM) Bottom 10" as S4 (bottom sample)		Water on rods @ 11.0' HNu = BG
	12.5						
	14.5	S6	1.5	6-10-27-30 (37)	Top 1.3' Silty Clay with fineGravel, gray-brown, slightly moist, hard (CL) Bottom .2' pieces of rock (boulder)		PP > 4.5 HNu = BG Drill chatter
	15.0						
	16.5	S7	1.5	22-35-45 (80)	Clay with Silt & Fine Gravel, Dk. brown, dry, hard (CL-ML)		PP ≥≥ 4.5 HNu = BG
	17.5						
	19.0	S8	1.5	26-40-47 (87)	As Above		PP >> 4.5 HNu = BG
	20.0						
20	21.5	S9	1.5	25-50-48 (98)	As Above		HNu = BG PP>>4.5
	22.5						
	24.0	S10	1.5	17-27-36 (63)	As Above, trace med. to large gravel		HNu = BG PP >> 4.5
	25.0						
25	26.5	S11	1.5	17-20-23 (43)	As Above		HNu = BG PP >> 4.5
	27.5						
	29.0	S12	1.5	14-15-18 (33)	As Above; w/5" layer of silty clayey med. sand, brown, moist (SM)		PP HNu = BG

PROJECT NUMBER	BORING NUMBER
W63582.F1	NSLS B-100 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area/= at B.L. 7+005
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(4-1/4" i.d.) /Mobile Drill B61
WATER LEVEL AND DATE START 3/22/88 FINISH 3/22/88 LOGGER R. Johns

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30	32.0	S13	2.0	8-11-17-21 (28)	As Above slightly moist		HNu = BG PP >> 4.5
	32.5						
	34.0	S14	2.0	9-11-18-27 (29)	As Above		HNu = BG PP > 4.5
	35.0						
	37.0	S15	2.0	9-16-20-28 (36)	As Above		HNu = BG PP > 4.5
	37.5						
	39.5	S16	2.0	11-14-21-31	As Above		HNu = BG PP > 4.5
					End Soil Boring @ 39.5'		End of boring 5:30 pm Begin piez. install. 5:30 pm Casing set & sand pack placed no water for slurry left hole 6:30 pm Arrive 3/23 to complete well; 7:30 am; finish well 9:30 am Bottom of well: 37.5' Bottom of screen: 37.0' Top of screen: 27.0' Top of filter pack: 23.5' Top of Seal: 20.5' Bent./cement grout to top (see logs by Cindy Cruciani)

PROJECT NUMBER	BORING NUMBER
W63582.F1	NSLS B-101 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area/≈ 40' E. of B.L.

ELEVATION DRILLING CONTRACTOR ATEC Associates 4000S

DRILLING METHOD AND EQUIPMENT HSA(3 3/8" i.d.) /Mobile Drill B61

WATER LEVEL AND DATE START 3/22/88 FINISH 3/22/88 LOGGER R. Johns

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	2.0	S1	1.1	2-3-5-5 (8)	Clay with Med. Sand, Brown, Moist, Stiff (CL)		Start drilling @ 9:45 {{ = 2.0 TSF HNu = BG
	2.5						
	4.5	S2	1.3	2-3-2-5 (5)	Sandy Silt, some small gravel, brown, moist, firm (ML)		PP = 1.0 HNu = BG
5	5.0						
	7.0	S3	1.5	2-3-2-6 (5)	Sandy, Clayey Silt with Gravel, brown, moist, firm (CL-ML)		HNu = BG PP = 1.0
	7.5						
	9.5	S4	1.9	2-6-10-11 (16)	Sandy Clay, med. brown, moist, v. stiff (CL)		HNu = BG PP = 2.75
10	10.0						
	12.0	S5	2.0	5-6-10-11 (16)	Clay, some gravel, brown to dk. gray, moist, v. stiff (CL) Bottom 6" Silty Clay w/gravel, brown, moist (ML)		PP = HNu = BG) Water encountered on rods @ 12' Appro. wet zone interpreted by driller
	12.5						
	14.5	S6	1.8	4-4-15-21 (19)	Sandy Clay, some gravel, brown, wet, stiff (CL); bottom 5" Silty Sand with gravel & clay, brown, wet (SC-SM)		HNu = BG PP = 1.5
	15.0						
	17.0	S7	1.5	9-11-13-20 (24)	Silty Clay, trace med. sand, brown, moist, hard (CL), trace gravel		HNu = BG PP > 4.5
	17.5						
	18.7	S8	1.0	15-25-100/2	As Above, more large sand, piece of 1-1/4" gravel		HNu = BG PP >> 4.5
					End Soil Boring @ 18.7'		Water in spoon Auger refusal @ 18.7 ft. (boulder) Start grouting 10:53 Left hole 11:30
20							
25							

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W63582.F1	NSLS B-102 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area/≈ 5+00 E. @ 0+00 (fenceline)
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(3 3/8" i.d.) /Mobile Drill B61
WATER LEVEL AND DATE START 3/23/88 FINISH 3/23/88 LOGGER R. Johns

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	2.0	S1	1.2	2-3-5-7 (8)	Silty Clay with tr. fine gravel, med. brown, slightly moist, firm, (CL) or (CL-ML)		Start drilling @ 10:20 HNu = BG PP = 2.0 HNu Bkg
	2.5						
	4.5	S2	1.5	4-7-10-10 (17)	As Above, with lt. gray vertical 1/16" seams of mottling, v. stiff.		HNu = BG PP = 3.0
	5.0						
5	7.0	S3	1.6	5-7-9-10 (16)	As Above, less gravel, more mottling, v. stiff		HNu = BG PP = 4.0
	7.5						
	9.5	S4	1.9	6-6-8-15 (14)	As Above, few pieces 3/8" gravel, v. stiff, less mottling		HNu = BG PP = 3.25
	10.0						
10	12.0	S5	1.6	5-6-7-11 (13)	As Above, dk. brownish gray, no mottling		HNu = BG PP = 3.0
	12.5						
	14.5	S6	1.9	3-5-5-9 (10)	As S5, stiff, a little more moist		HNu = BG PP = 1.25
	15.0						
15	17.0	S7	1.7	7-7-10-12 (17)	As S5, hard, in upper .5', many pieces of med. gravel from 1-1/4" to 1/4"		HNu = BG PP > 4.5
	17.5						
	19.5	S8	1.8	3-5-6-8 (11)	As S5, stiff, a few pieces of med. gravel (1-1/2" max.)		HNu = BG PP = 1.25 Water on rods at 19.5 ft.
	20.0						
20	22.0	S9	1.4	5-6-11-14 (17)	Top 2": Silty Sand with tr. clay, dk. brn., wet, loose (SM) Bottom 1.2': As S5, slightly moist, hard		HNu = BG PP > 4.5
	22.5						
	24.0	S10	1.2	16-29-54	Clay with Silt, tr. fine gravel, dk. brown, dry to slighty moist, crumbles when broken, hard, (CL)		HNu = deflection-but prob. due to moisture; will ck. hole-hole=BG PP >> 4.5
25					End Soil Boring @ 25'		End drilling @ 12:00 Begin setting well 1:30 Finished well 2:30 Bottom of well: 25' Bottom of screen: 25' Top screen: 15' Top Filter Pack: 13' Top Seal: 10"; bent/cem. grout to top (see logs by Cindy Cruciani)

PROJECT NUMBER	BORING NUMBER
W63582.F1	NSLS B-103 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(4-1/4" i.d.) /Mobile Drill B53
WATER LEVEL AND DATE START 3/22/88 FINISH 3/22/88 LOGGER M. Evans

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	1.0						
	3.0	S1	2.0	3-4-7-11 (11)	Sandy Silty Clay, dk. brn., damp, stiff, fine to very fine sand (CL-ML)		Start drilling @ 10:00 PP = 3.0-4.0 TSF
	3.5						
5	5.5	S2	2.0	4-6-7-8 (13)	Same as Above		PP = 2.5-3.5
	6.0						
	8.0	S3	2.0	4-7-9-10 (16)	Same, trace fine gravel		PP = 3.0-3.5
	8.5						
10	10.5	S4	2.0	3-3-4-5 (7)	Same, wet, firm		PP = 1.0-1.5
	11.0						
	13.0	S5	2.0	9-10-15-18 (25)	Same, gray-brown, dry to damp, very stiff		PP = 4.5 + Bag sample #1 0-15'
	13.5						
	15.0	S6	1.5	13-26-45 (71)	Same, dry, hard		PP = 4.5+
	16.0						
	18.0	S7	2.0	21-28-21-24 (49)	Same, dry to damp		PP = 4.5+
	18.5						
20	20.5	S8	2.0	4-10-16-30 (26)	Same, damp, very stiff to hard		PP = 4.5+
	21.0						
	22.1	S9	1.1	30-86-20/1" (106+)	Sandy Clayey Silt, dark gray, dry, hard (CL-ML)		PP = 4.5+
	23.5						
25	25.0	S10	1.5	27-19-39 (58)	Same, dry to damp		Spoon was wet, sample is damp to dry
					End Soil Boring @ 25'		Finish @ 11:45 Hole grouted; no obs. well

PROJECT NUMBER	BORING NUMBER
W63582.F1	NSLS B-104 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area

ELEVATION DRILLING CONTRACTOR ATEC Associates

DRILLING METHOD AND EQUIPMENT HSA(4-1/4" i.d.) /Mobile Drill B53

WATER LEVEL AND DATE START 3/22/88 FINISH 3/22/88 LOGGER M. Evans

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	1.0						Start @ 13:45
	3.0	S1	0.8	3-3-4-4 (7)	Sandy Clayey Silt, brown, mottled, fine & black, moist, firm (CL-ML)		
	3.5						
5	5.5	S2	1.3	3-4-7-7 (11)	Same, stiff, trace fine gravel		PP = 1.0-1.5 TSF
	6.0						
	8.0	S3	2.0	7-9-8-14 (17)	Same, very stiff		PP = 3.0 TSF
	8.5						
10	10.5	S4	2.0	11-17-26-24 (43)	Top 12" Poorly Graded Sand with Silt, light brown, moist, dense (SP-SM)		Material in top 12" grades into material in bottom 12"
	11.0				Bottom 12": Sandy Clayey Silt, dark gray-black, dry to damp, hard (CL-ML)		PP = 4.5+
	13.0	S5	1.8	14-20-25 (55)	Same, dry		PP = 4.5+
	13.5						
15	15.5	S6	1.8	36-40-55 (95)	Same		PP = 4.5+
	16.0						
	18.0	S7	2.0	11-16-16-21 (32)	Poorly graded Sand with Silty Clay, dark gray-black, dry to damp, fine sand w/trace coarse sand (SP-SC)		Very slow auger advancement S8 top of spoon full of water
	18.5						
20	20.5	S8	1.8	7-11-15-15 (26)	Sandy Silty Clay, dark gray-black, damp to moist,ff (CL-ML)		PP = 4.5+ Very slow auger advancement
	21.0						
	23.0	S9	2.0	8-13-14-16 (27)	Same, trace fine gravel		PP = 4.5+
	23.5						
25	25.5	S10	1.8	12-14-16-19 (30)	Same		PP = 4.5+
	26.0						
	28.0	S11	2.0	9-10-13-16 (23)	Same		PP = 4.5+
					End Soil Boring @ 28'		Finished drilling 15:40

PROJECT NUMBER	BORING NUMBER
W63582.F1	NSLS B-105 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(4-1/4" i.d.) /Mobile Drill B53
WATER LEVEL AND DATE START 3/23/88 FINISH 3/23/88 LOGGER M. Evans

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	1.0						
	3.0	S1	1.5	3-6-7-9 (13)	Silty Clay, light brown, mottled rust, damp to moist, stiff (CL-ML)		PP = 2.5-3.0
	3.5						
5	5.5	S2	2.0	6-8-11-14 (19)	Same, trace fine to coarse sand, very stiff		PP = 4.5
	6.0						
	8.0	S3	2.0	7-9-11-15 (20)	Silty Clay with Sand, light brown, mottled tan and rust, damp to moist, stiff-very stiff, trace fine gravel		PP = 2.0-2.5
	8.5						
10	10.5	S4	2.0	6-10-14-18 (24)	Same, trace fine gravel (CL-ML)		PP = 4.0-4.5
	11.0						
	13.0	S5	2.0	6-7-10-25 (17)	Gravelly Silty Clay with Sand, dark brown, moist, stiff (CL-ML)		PP = 4.5+
	13.5				3" layer Poorly Graded Sand with Silty Clay, brown, moist, fine sand, med. dense (SC-SM)		Bag sample #1 0-25 feet
	15.5	S6	0.7	20-23-19-17 (42)	Gravelly Silty Clay with Gravel, sane as S5		
	16.0						
	18.0	S7	1.8	5-6-7-7 (13)	Sandy Silty Clay with Gravel, dark gray to black, moist, stiff (CL-ML)		PP = 2.0-2.5
	18.5						
20	20.5	S8	1.5	2-3-7-12 (10)	Same		PP = 1.0-1.5
	21.0						
	23.0	S9	2.0	6-7-8-9 (15)	Sandy Silty Clay, trace gravel, otherwise same		PP = 1.0
	23.5						
25	25.5	S10	2.0	12-15-18-27 (33)	Same, hard, damp		PP = 4.5+
					End Soil Boring @ 25.5'		

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W63582.F1	NSLS B-106 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(4-1/4" i.d.) /Mobile Drill B53
WATER LEVEL AND DATE START 3/23/88 FINISH 3/23/88 LOGGER M. Evans

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	1.0						Start @ 13:20
	1.0–3.0	S1	1.4	2-2-3-3 (5)	Silty Clay, trace fine sand, dark brown, firm, moist to wet (CL-ML)		PP = 1.0
	3.5–5.5	S2	1.0	1-1-1-1 (2)	Same		
5	6.0–8.0	S3	2.0	6-9-10-11 (19)	Sandy Silty Clay, dark gray-black, moist, very stiff, trace fine gravel (CL-ML)		Water @ 5-6' PP = 4.5+
	8.5–10.5	S4	2.0	6-10-12-13 (22)	Same		
10	11.0–13.0	S5	0.2	12-19-18-23 (37)	Same, hard		First attempt, no recovery; second try, 0.2'
	13.5–15.5	S6	2.0	8-13-14-18 (27)	Sandy Silty Clay with Gravel, dark gray to black, moist to damp, very stiff (CL-ML)		PP = 4.5+
15	16.0–18.0	S7	2.0	13-16-22-27 (38)	Same		
	18.5–20.5	S8	2.0	16-26-25-34 (51)	Same		
20					End Soil Boring @ 20.5"		Finish drilling at 14:15
25							

CHM/

PROJECT NUMBER	BORING NUMBER
W63582.F1	NSLS B-107 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area/≈ 20' South on Baseline
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(4-1/4" i.d.) /B-61 Truck Mounted Rig (Mobile Drill)
WATER LEVEL AND DATE START 3/23/88 FINISH 3/23/88 LOGGER R. Johns

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	2.0	S1	1.4	3-3-3-4 (6)	Clay with Silt, tr. fine gravel, med. brown, with gray mottling, slightly moist, firm (CL-ML)		Start drilling @ 3:15 HNu = BG PP = 2.0
	2.5						
		S2	1.7	3-5-8-11 (13)	As Above, gray vertical 1/8-1/4" "seams" of mottling		HNu = BG PP = 3.0, then splits sample
	4.5						
5	5.0						
	7.0	S3	1.8	5-6-8-10 (14)	As S1, with orange oxide staining, v. stiff		HNu = BG PP = 3.5-4.5
	7.5						
	9.5	S4	1.7	5-5-5-6 (10)	As S1, with thin 1/4" seam of silty sand		HNu = PP = 2.0
	10.0						
10	12.0	S5	1.6	5-6-8-11 (14)	Top .2': Silty Sand, tr. gravel, med. brn., moist, loose (SM); Mid .5': Silt, tr. clay, med. brn., moist to wet (ML); Mid .2": Silty Sand as top .2'; ;Mid .2': Silty Sand with fine gravel, med. brn., moist (SM); Bot. .5': Silt as mid .5'		HNu = BG PP = Sample S5 is silt from mid .5'
	12.5						
	14.5	S6	1.6	2-14-11-11 (25)	Top .9': Silty Clay, tr. gravel, dk. bwn., slightly moist, soft (CL); Mid .2': Silty Sand w/gravel; Bottom .5': Silty Clay, as top .9'		HNu = BG PP = 0.5 Sample from bottom .5'
	15.0						
	16.5	S7	1.6	3-3-5-7 (8)	Silty Clay w/Fine Gravel, dk. brn.-gray, moist, firm, (CL) or (CL-ML)		HNu = BG PP = 1.0
	17.5						
	19.0	S8	1.7	4-5-6-7 (11)	As S7, w/more silt (CL-ML)		HNu = BG PP = 1.0
	20.0						
20	21.5	S9	1.2	12-15-33 (48)	Clay with Silt, tr. fine gravel, dk. bwn., dry (crumbles) to slightly moist,hard (CL-ML)		HNu = BG PP >> 4.5
	22.5						
	23.7	S10	1.3	23-56-50/.2 ~~50/3"~~	As Above, dry (crumbles)		HNu = BG PP >> 4.5, then sample splits Water on rods @ 25' PP >> 4.5
	25.0						
25	26.3	S11	1.0	35-60-50/3	As Above, slightly moist		HNu = 3-2 ppm above; will ck w/OVA
	27.5				End Soil Boring @ 26.3'		End drilling @ 4:34 pm Begin grouting; finish grouting @ 5:15 pm
	29.0						

PROJECT NUMBER	BORING NUMBER
W63582.F1	NSLS B-108 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area/in wheat field

ELEVATION DRILLING CONTRACTOR ATEC Associates ≈ 50' S. of gate

DRILLING METHOD AND EQUIPMENT HSA(4-1/4" i.d.) /Mobile Drill B61

WATER LEVEL AND DATE START 3/24/88 FINISH 3/24/88 LOGGER R. Johns

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	2.0	S1	1.5	2-3-3-2 (6)	Clay with Silt, slightly moist, dk. brown, gray mottling, stiff, iron staining (CL)		Start drilling @ 1:25 HNu = BG PP = 1.5
	2.5						
	4.5	S2	1.0	3-6-7-8 (13)	Silty Clay, lt. brn., slightly moist, tr. fine gravel, stiff (CL-ML or CL)		HNu = BG PP = 2.0
5	5.0						
	7.0	S3	1.3	5-7-8-9 (15)	As Above		HNu = BG PP = 1.75
	7.5						
	9.5	S4	1.9	4-4-7-11 (11)	Top 1.2': As Above, moist, more silt, some sand (CL-ML) Bottom .7': Silt, med. brn., moist, soft (ML) Sample S9		PP = 1.5 HNu = BG
10	10.0						
	12.0	S5	1.4	3-5-6-8 (11)	Top 0.4': Coarse, Well Graded Sand, with silt lt. brown, wet, some small gravel, differing lithology (SW) Rest Silty Clay with sand, gray, moist, soft, some gravel (CL)		HNu = BG t = 1400 Water on rods @ 11' PP = 1.5
	12.5						
	14.5	S6	1.7	5-6-8-9 (14)	As Above, 1/16" med.-coarse gr. sand seam ≈ 13.5' depth		HNu = BG t = 1404 PP = 1.75
15	15.0						
	17.0	S7	1.8	5-5-9-11 (14)	As Above		t = 1410 PP = 2.0 HNu = BG
	17.5						
	18.0	S8	1.4	11-19-19 (38)	Top .5': Silty Clay w/fine gravel, dk. brn., moist to slightly moist, stiff (CL-ML) Mid .3': Silty Sand, well graded, few pieces gravel (3/4"), brn., wet, loose (SM)-sample S8 Bottom .1': Fine Sand w/silt, brn., moist, loose (SC)		PP = 2.0 HNu = BG Spoon wet inside
20	20.0						
	21.5	S9	1.7	11-36-40 (76)	Clay with Silt, tr. fine gravel, dk. brn., slightly moist, hard (CL)		PP >> 4.5 Drilling gets harder HNu = BG
	22.5						
	23.5	S10	1.2	50-50/4" 50/4"	As Above		PP >> 4.5
	25.0						
25	26.5	S11	1.9	47-41-57 (98)	As Above, breaks on horizontal planes w/mod. effort, Bottom .1' less gravel, silt, dk. brn., moist (ML)		PP >> 4.5
	27.5						
	29.0	S12	1.6	25-33-60 (93)	Top .3': Fine Silty Sand, moist, dk. brn., loose (SM) Bottom 1.3": As S9, occasional thin 1/16" silty sand lenses		Drill chatter PP >> 4.5 HNu = BG
30							

PROJECT NUMBER	BORING NUMBER
W63582.F1	NSLS B-108 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area/in wheat field

ELEVATION DRILLING CONTRACTOR ATEC Associates ≈ 50' S. of gate

DRILLING METHOD AND EQUIPMENT HSA(4-1/4" i.d.) /Mobile Drill B61

WATER LEVEL AND DATE START 3/23/88 FINISH 3/23/88 LOGGER R. Johns

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30	31.5	S13	1.5	35-45-55 (100)	As S9, less gravel		PP >> 4.5 HNu = BG
	32.5						
	34.0	S14	1.2	20-37-57 (94)	Upper .4': As S9 Lower 1.4': Clayey Silt, some sand, med.-fine, Brn., moist, med. dense (ML), sample S14		HNu = BG
35	35.0				End Soil Boring @ 35'		Begin settling well 4:00 Finish well @ 6:00 Bottom screen: 35.0' Top screen: 25.0' Top sand pack: 23' Top seal: 21' Bent./cement grout to top

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W63582.F1	NSLS B-109 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area/in wheat field on n. fence

ELEVATION DRILLING CONTRACTOR ATEC Associates

DRILLING METHOD AND EQUIPMENT HSA(3 3/8" i.d.) /Mobile Drill B61

WATER LEVEL AND DATE START 3/24/88 FINISH 3/24/88 LOGGER R. Johns

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	2.0	S1	1.6	2-3-4-6 (7)	Clay with Silt, absence of gravel, med. brown, slightly moist, stiff (CL)		Start drilling @ 10:30 HNu = BG PP = 2.0, then sample breaks
	2.5						
	4.5	S2	1.5	2-3-4-3 (7)	Top .7': As Above Bottom .8': Silty Clay, tr. fine gravel, tr. fine sand, med. brn., slightly moist, firm (CL-ML)		HNu = BG PP = 1.25
	5.0						
5	7.0	S3	1.0	2-3-3-5 (6)	As S2 (bottom), pieces of gravel One piece 1-1/4"		HNu = BG
	7.5						
	9.5	S4	1.8	4-5-6-7 (11)	Silty Clay, tr. fine gravel, med. to light brn., slightly moist to moist, v. stiff (CL or CL-ML) At 1.4' thin 1/16" seam sandy silt		HNu = BG PP = 3.0
	10.0						
10	12.0	S5	1.8	4-7-7-9 (14)	Top 1.2': As S4, iron oxide stains Bottom .6': As S4, med. gray, soft to firm, possibly more silt		HNu = BG PP = 3.5 PP = 1.0 Water on rods @ 12.5'
	12.5						
	14.5	S6	1.5	4-6-7-8 (13)	As S4, slightly moist, med.-dark gray, v. stiff		HNu = BG PP = 3.5 Water on inside of spoon
	15.0						
15	17.0	S7	1.5	4-6-7-9 (13)	Top .6': Lean Clay . silt, med. brown, slightly moist, v. stiff (CL) Bottom .9': Silty Clay As S9, med. brn., slightly moist, stiff (CL-ML)		HNu = BG PP = 3.5 PP = 2.0
	17.5						
	19.5	S8	1.8	5-7-9-10 (16)	As Above, hard		HNu = BG PP > 4.5
	20.0						
20	21.5	S9	1.3	8-23-29 (52)	Top .3': Poorly Graded Fine Silty Sand, brn., moist (SP-SM) Mid .5': As S8 - Sample S9A Bottom 0.5': Well Graded Coarse Sand with Silt, Brn., moist, loose, tr. gravel & clay (SW-SM)		Water on rods @ 20' PP >> 4.5 HNu = BG Sample S9B
	22.5						
	24.0	S10	1.3	11-20-31 (51)	Clay with Silt, tr. fine gravel, med. brn., slightly moist, hard (CL)		PP >> 4.5
	25.0						
25	27.0	S11	1.8	15-9-9-11 (18)	As S10, v. stiff		HNu = BG PP = 2.0-3.5, varies in sample
					End Soil Boring @ 27'		End drilling @ 11:22 Begin grouting Leave hole 11:45

PROJECT NUMBER	BORING NUMBER
W63582.F1	NSLS B-110 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(4-1/4" i.d.) /Mobile Drill B53
WATER LEVEL AND DATE START 3/24/88 FINISH 3/24/88 LOGGER M. Evans

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	1.0						Start drilling @ 10:20
	3.0	S1	1.0	3-7-7-11 (14)	Organic Silty Clay, trace sand, brown to black, moist, stiff, organic (OL)		PP = 1.5-2.0
	3.5						
5	5.5	S2	1.8	4-5-5-6 (10)	Poorly Graded Sand with Silty Clay, fine sand, dark brown, moist, loose (SP-SC)		PP = 1.0 TSF
	6.0						
	8.0	S3	1.5	2-3-3-3 (6)	Same, trace fine gravel		
	8.5						
10	10.5	S4	1.5	2-3-5-8 (8)	Sandy Silty Clay, light brown to tan, moist, firm (CL-ML)		PP = 2.0
	11.0						
	13.0	S5	2.0	8-13-14-13 (27)	Top 18": Same, very stiff Bottom: Sandy Silty Clay, dark gray, damp to moist, very stiff (CL-ML)		PP = 4.5+ Water @ about 13 feet
	13.5						
15	15.5	S6	2.0	5-7-9-11 (16)	Same		PP = 3.0-3.5
	16.0						
	18.0	S7	2.0	10-15-12-13 (27)	Top 6": Same Bottom: Well Graded Sand, med. to coarse, brown, wet, med. dense (SW-SM)		
	18.5						
20	20.5	S8	2.0	15-13-12-14 (25)	Same as Above		
	21.0						
	22.0						
	23.0	S9	1.0	12-16-50/0"	Same		Auger refusal @ 23.0 feet
25					End Soil Boring @ 23.0'		

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W63582.F1	NSLS B-111 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area

ELEVATION DRILLING CONTRACTOR ATEC Associates

DRILLING METHOD AND EQUIPMENT HSA(4-1/4" i.d.) /Mobile Drill B53

WATER LEVEL AND DATE START 3/24/88 FINISH 3/24/88 LOGGER M. Evans

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	1.0						Start @ 14:20
	3.0	S1	1.6	5-6-11-10 (17)	Silty Clay, tan, mottled rust, damp to mois,t very stiff (CL-ML)		PP = 2.5-3.0 TSF
	3.5						
5	5.5	S2	1.2	3-5-6-7 (11)	Same, stiff, trace fine gravel		PP = 1.5
	6.0						
	8.0	S3	1.8	4-5-6-7 (11)	Sandy Silty Clay, tan, mottled rust, moist, stiff, trace fine to medium gravel (CL-ML)		PP = 1.5
	8.5						
10	10.5	S4	1.9	4-6-7-10 (13)	Same		PP = 1.5
	11.0						
	13.0	S5	1.8	7-11-14-15 (25)	Same, brown to gray, damp, very stiff		PP = 4.5+
	13.5						Bag sample #1 0-15 feet
15	15.5	S6	2.0	12-12-11-11 (23)	Same		PP = 4.5+
	16.0						
	17.5	S7	1.1	20-19-19 (38)	Same, hard		Water @ about 16 feet
	18.5						
20	20.0	S8	0.3	19-24-27 (51)	Same (assumed)		First attempt - no recovery Second attempt - 0.3 ft. May not be true sample
	21.0						
	23.0	S9	1.8	8-9-21-30 (30)	Top 12": Same Poorly Graded Sand with SiltyClay, dark gray, moist, interlayered with Sandy Silty Clay (SP-SC) and (CL-ML)		
	23.5						
25	25.5	S10/ S11	2.0	8-6-3-6 (9)	Top 12": Sand, fine, gray, moist, medium dense (SM) Bottom: Silty Clay, gray, moist, stiff (CL-ML)		PP = 2.0
	26.0						
	28.0	S12	2.0	12-16-25-30 (41)	Sandy Silty Clay, gray, damp, dense (CL-ML)		
	28.5						
30				12-14-18-30 (32)	Same (no sample)		
	30.5						

End Soil Boring @ 30.5'

PROJECT NUMBER	BORING NUMBER
W63582.F1	NSLS B-115 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area /near existing Well NSL 105

ELEVATION DRILLING CONTRACTOR ATEC Associates

DRILLING METHOD AND EQUIPMENT HSA(3-3/8" i.d.) /Mobile Drill B53

WATER LEVEL AND DATE START 3/28/88 FINISH 3/28/88 LOGGER R. Johns

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	1.0						Start drilling @ 1:30
	3.0	S1	1.1	1-2-3-4 (5)	Top .6': Clay with Silt & Tr. Sand, brn., iron stains, moist, soft (CL) Bottom .5': As Above, no sand, dk. gray, moist, soft (CL)		HNu = BG PP = 0.5
	3.5						
5	5.5	S2	1.4	4-5-11-21 (16)	Silty Clay, tr. fine gravel, med. brn., moist, soft to hard, occasional lenses 1/16" of med. sand (CL-ML); few pieces 1/4" gravel		HNu = BG PP = .75-4.5
	6.0						
	8.0	S3	1.6	17-15-11-15 (26)	Top .7': Poorly Graded Clayey Sand, tr. silt, med., brn., moist, loose (SP-SC) Bottom .9': Clay with Silt, tr. fine Gravel, gray-brown, slightly moist, hard, (CL), tr. fine sand		HNu = BG PP >> 4.5
	8.5						
10	10.5	S4	1.8	7-11-13-15 (24)	As Above, some med. to fine gravel		HNu = BG PP >> 4.5
	11.0						
	13.0	S5	1.9	9-15-16-24 (31)	As Above, tr. gravel		HNu = BG PP >> 4.5
	13.5						
15	15.5	S6	0.7	32-38-50-35 (88)	Clay with Silt, tr. fine sand, tr. fine gravel, med. brn., slightly moist, hard (CL)		Hit a cobble, blow counts high (t = 2:00 pm)
	16.0						
	18.0	S7	1.9	31-50-53-50/5"	Top 1.6': As Above, slightly moist to dry, w/5 lenses of 1/6"-1/8" silt and fine sand, crumbles in horiz. planes w/mod. pressure Bottom 0.3': Well Graded Silty Sand, brn., moist, medium (SW-SM)		PP > 4.5 - sample cracks HNu = BG Water on rods @ 18'
	18.5						
20	20.5	S8	1.6	22-28-50-50/5"	As S6, slightly moist, brn.		Spoon wet HNu = BG PP >> 4.5 t = 2:19
	21.0						
	21.8	S9	1.2	47-50/5"	Top 0.2': Well Graded Clayey Sand, brn., wet, loose (SW-SC) Bottom: As S6		Spoon wet t = 2:30
	23.5						
	24.5	S10	1.0	47-50/5"	Top .5: As S6 Bottom: As S6, more silt (CL-ML)		Top of spoon full of wet silt & gravel (slough) PP >> 4.5
25	26.0						
	27.0	S11	2.0	43-50/5"	Top 1.0': Well Graded Silty Clayey Sand, brn., wet, loose (SW-SM) - S11A Bottom 1.0': As S6, with marly (1/2 sample), lenses of fine sand & silt - S11B		2:44 High RDGS @ Site Slough in hole (1.0') B-116, shut down to monitor 2:50 - restart drilling
	28.5						
	29.3	S12	0.9	50-50/3"	As S6, w/2 lenses (1/4") of fine silty sand		HNu = BG PP >> 4.5

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-115 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area/near existing Well NSL 105

ELEVATION DRILLING CONTRACTOR ATEC Associates

DRILLING METHOD AND EQUIPMENT HSA(3-3/8" i.d.) /Mobile Drill B53

WATER LEVEL AND DATE START 3/28/88 FINISH 3/28/88 LOGGER R. Johns

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30	31.0 / 32.0	S13	1.3	22-50/5" 50/5"	Top 0.4': Fine Clayey Sand, poorly graded, brn., wet, loose (SC) Bottom: As S6, occasional seams 1/16"-1/4" of fine silty sand		Sample from top 0.4' Spoon wet PP >> 4.5
	33.5 / 35.5	S14	1.9	11-13-30-39 (43)	Top 3': Clayey Fine Sand, poorly graded sand, brn., wet, loose (SC) Bottom: As S6, less gravel, green-brown		HNu = BG PP = 4.5 t = 3:28
35	36.0 / 38.0	S15	2.0	18-25-28-45 (53)	As S6, occasional thin 1/16" lenses of fine sand		HNu = BG PP >> 4.5
	38.5 / 40.5	S16	1.9	19-27-50/50/3" (77)	Top 0.6': Silty Sand, poorly graded, brn., moist, med. dense (SP-SM) Bottom: As S6, occasional thin lenses of fine sand		Sample from top 0.6 PP >> 4.5 Drilling hard & slow
40	41.0 / 43.0	S17	1.3	32-29-33-35 (62)	As S6, w/1" lens of silty fine sand (moist)		OVA = 2 ppm t = 4:30
					End Soil Boring @ 43.0'		End drilling @ 4:50 Begin grouting Finish grouting @ 6:00
45							

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-116 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(3-3/8" i.d.) /Mobile Drill B61
WATER LEVEL AND DATE START 3/28/88 FINISH 3/28/88 LOGGER L. Palmer

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	TYPE AND NUMBER	RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	2.0	S1	0.8	2-2-2-2 (4)	Fill, fine sand, brown, loose, wood, debris, plastic, topsoil, clay		Start drilling @ 1:10 pm HNu = Background (BG)
	2.5						
		S2	1.6	3-3-3-3 (6)	Top 8": Fill, sandy clay, brown (CL) Bottom 9": Topsoil, black, firm (OL)		Top PP = 3.0 HNu = BG Bot PP = 0.5 Driller reports water on rods at 3.5'
	4.5						
5	5.0 / 7.0	S3	1.6	4-6-6-6 (12)	Silty Sand, gray, fine to medium, 30% silt, wet, loose (SM) Top - brownish gray; bottom - gray		HNu = BG 1" diameter gravel at bottom
	7.5						
	9.5	S4	1.1	4-6-8-9 (14)	Silty Clay, gray, 10% coarse sand, moist, very stiff (CL-ML).		PP = 4.5+ HNu = BG Glacial till
10	12.0	S5	1.7	6-8-12-15 (20)	Same as Above, with 1/4" clayey sand seams (SC) @ 12", moist, very stiff (CL-ML)		PP = 4.5+ HNu = BG
	12.5						
	14.0	S6	0.7	8-12-15 (27)	Top 3": Sand, gray, wet (SP) Bottom 5": Silty Clay, gray, 10% sand, moist, very stiff (CL-ML)		HNu = BG PP = 4.5+, 3.5
	15.0						
	16.5	S7	1.5	10-15-35 (50)	Silty Clay, gray, moist, very stiff to hard, 1-1/2" diam. gravel at bottom (CL-ML)		HNu = BG PP = 4.5+
	17.5						
	19.0	S8	1.2	26-32-29 (61)	Top 6": Same as Above (CL-ML) Middle 4": Sand, gray, fine to med., moist, dense (SP) Bottom 4": Silty Clay, gray, moist, hard (CL-ML)		PP = 4.5+ HNu = BG PP = 4.5+
	20.0						
20	21.5	S9	1.5	16-25-34 (59)	Silty Clay, gray, hard, with 10% coarse sand and gravel 1/4" to 1" (CL-ML)		HNu = BG PP = 4.5+
	22.5						
	24.0	S10	1.2	30-30-39 (69)	Top 9": Same as Above, v. hard (CL-ML) Bottom 5": Silty Sand, gray, fine-grained, dry to moist, dense (SM)		Cobble or boulder encountered at 22' HNu = BG Duplicate sample from top PP = 4.5+
	25.0						
25	26.5	S11	1.1	16-16-20 (36)	Silty Clay, gray, 10% sand sizes, 1" diam. gravel at top, moist, hard (CL-ML)		Water on rods @ 24.5' HNu = BG PP = 4.5+ Glacial till
	27.5						
	29.0	S12	1.5	16-19-21 (40)	Same as Above, hard (CL-ML)		Sand cave @ top of sample is wet PP = 4.5+ OVA = 8 ppm in clay OVA > 100 ppm in sand cave Shut down drilling @ 2:46 pm

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-116 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Burrow area
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(3-3/8" i.d.) /Mobile Drill B61
WATER LEVEL AND DATE START 3/28/88 FINISH 3/28/88 LOGGER L. Palmer

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30	30.0 / 31.5	S13	1.5	15-16-20 (36)	Same as Above (CL-ML) 1" coarse sand seam at bottom, moist (SP)		Restart drilling 3:00 pm OVA = 20-30 in clay and sand PP = 4.5+
	32.5 / 34.0	S14	1.4	11-11-16 (27)	Same as Above Very stiff to hard (CL-ML)		OVA = 20-30 HNu = BG PP = 4.5
35	35.0 / 36.5	S15	1.5	9-11-16 (27)	Same as Above, very stiff		PP = 4.5 Duplicate sample OVA = 30-40 = 80-120
	37.5 / 39.0	S16	1.5	16-20-30 (50)	Top 9": Same as Above, moist, hard (CL-ML) Bottom 8": Sand, gray, fine-grained, dry to moist, dense (SP		OVA = 40-60 in clay OVA = 20-30 in sand PP = 3.0, 4.5
40	40.0 / 41.5	S17	1.5	11-13-16 (29)	Silty Clay, gray, moist, hard (CL-ML)		PP = 4.5+ OVA = 60-70 ~~Auger cuttings have thin streak of oil~~
					End Soil Boring @ 41.5'		Hole grouted with cement-bentonite grout

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-117 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT 3-3/8" HSA/Mobile drill B53
WATER LEVEL AND DATE START 4/5/88 FINISH 4/7/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	0.5						
	2.5	S1	1.3	5-7-9-12	5" Fine Sand, uniform, brown (SP) 11" Coarse Sand w/gravel, orange-gray (SP)		HNu = BG
	3.0						
	5.0	S2	1.7	6-5-6-9	Same as Above, very wet (SP) Silt, gray, wet, low plasticity, very wet (ML) Clay, gray, low plasticity, ~ 20% silt (CL)		HNu = BG
5	5.5						
	7.5	S3	1.8	None taken	Sand, well graded, wet, all colors (SW) tr. rock frag. > 2% silt		HNu = BG
	8.0						
	10.0	S4	1.8	7-8-10-10	18": Same as Above 4": Clay, gray, low plasticity, ~ 10% small gravel (CL)		HNu = BG
10	10.5						
	12.5	S5	1.25	11-18-26-33	Same as Above (CL)		HNu = BG
	13.0						
	15.0	S6	0.1	13-17-24-36	Tip plugged with Same as Above		HNu = BG
15	15.5						
	17.5	S7	2.0	9-13-20-28	Same as Above		HNu = BG
	18.0						
	20.0	S8	2.0	22-29-28-34	Same as Above		HNu = BG
20	20.5						
	22.5	S9	1.0	21-25-47-50/4"	Clayey Silt, gray, v. stiff, low plasticity, moist, ~ 10% small gravel (ML)		HNu = BG Till
	23.0						
	25.0	S10	1.3	23-49-50/4"	Top 6": Same as Above Sand, gray, ~ 10% silt, dense, wet, well graded (SW)		HNu = BG
25	25.5						
	27.5	S11	1.2	23-46-50/3"	4": Same as S9 (ML) 5": Sand (S10) (SW) 2": Same as S9 (ML) 3": Sand (S10) (SW)		HNu = BG
	28.0						
	30.0	S12	1.0	28-46-50/5"	Same as S9 (ML)		Top 2" of S12 was filled with washed sand-assumed to be back flow

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-117 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(3 3/8" i.d.) /Mobile Drill on ATV B53
WATER LEVEL AND DATE START 4/5/88 FINISH 4/7/88 LOGGER B. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	30.5						
	32.5	S13	2.0	26-30-38-42	Top of spoon packed w/sand-back wash (ML) Bottom 14": Same as S9		HNu = BG Drillers cleaned out augers
	33.0						
	35.0	S14	1.5	13-22-30-34	Same as S9		HNu = BG Noted top of spoon was filled with back wash
35	35.5						
	37.5	S15	1.0	31-34-50/5"	Same as S9, dry, with thin diagonal fine sand seam		Tip - 0.1 Above BG
	38.0						
	40.0	S16	2.0	15-17-47-50/5"	6": As Above 18": Sand, fine, gray, v. wet, > 5% silt (SP)		HNu = BG Tip - 0.1 above BG
40	40.5						
	42.5	S17	2.0	24-32-84-31/1"	Sand, Same as Above, w/small pieces of root and wood		HNu = BG During drilling of sample S16 black film came up w/cuttings
	43.0						
	45.0	S18	1.5	17-27-50/5"	10": Same as Above 8": Same as S9, moist (ML)		Had 4' of flowing sand in augers
45					End Soil Boring @ 45.0'		Well was set with screen interval from 42' to 44' Sand pack from 41' to 44' Bentonite from 39' to 41' Grout from 0' to 39'

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-118 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(3-3/8" i.d.) /Mobile Drill B61
WATER LEVEL AND DATE START 3/30/88 FINISH 3/30/88 LOGGER C. Lawrence

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	2.0	S1	0.7	2-3-3-4 (6)	Sandy Silt, brown, wet, soft (ML)		Start drilling 8:50 HNu = BG
	2.5						
	4.5	S2	0.7	4-5-5-7 (10)	Sandy Silt, similar to S1 for top 9" of sample (ML) Well Graded Sand w/Silt, trace gravel, lt. brown to gray, wet, loose (SW-SM)		HNu = 0.4 ppm in sand
	5.0						
5	7.0	S3	0.5	4-5-8-9 (13)	Silty Clay, brown to gray, some organics, wet, soft (CL-ML)		HNu = BG Appears to be slough-no sample
	7.5						
	9.5	S4	1.5	7-8-9-11 (17)	Silty Clay, gray, moist, stiff (CL-ML)		HNu = BG (till) PP = 4.0
	10.0						
10	12.0	S5	1.3	6-8-12-12 (20)	Silty Clay, similar to S4; 1" Sand layer from bottom of sample, 5% silt, wet, med. (SW)		PP = 4.5+ in clay HNu = BG
	12.5						
	14.0	S6	1.4	16-16-18 (34)	Silty Clay, similar to S4 except 10% gravel, moist, hard (CL-ML)		HNu = BG (till) PP = 4.5+
	15.0						
15	16.5	S7	1.0	20-32-35 (67)	Silty Clay, similar to S6		HNu = BG PP = 4.5+
	17.5						
	19.0	S8	1.5	23-33-33 (66)	Silty Clay, similar to S6 Well Graded Sand w/Silt @ bottom 5" of sample, brown, gray, wet, medium (SW-SM)		HNu = lens fogged OVA = 30 ppm
	20.0						
20	21.5	S9	1.2	24-33-33 (66)	Silty Clay, similar to S6 for top 4" of sample, moist, hard, Poorly Graded Sand w/Clay, fine sand, brown, gray, hard, dry-moist (SP-SC)		Blowout boring 1st try OVA = 6 OVA = 20-30
	22.5						
	24.0	S10	1.4	30-38-39 (77)	Silty Clay, similar to S6, except dry Silty Sand, 1" layer 3" from sample bottom, Fine Sand = 20% silt, dry (SM)		HNu = BG
	25.0						
25	26.5	S11	1.5	15-19-20 (39)	Silty Clay, similar to S6, except dry		HNu = BG
	27.5						
	29.0	S12	1.3	14-19-23 (42)	Silty Clay, similar to S11		HNu = BG

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-118 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana

ELEVATION DRILLING CONTRACTOR ATEC Associates

DRILLING METHOD AND EQUIPMENT HSA(3 3/8" i.d.) /Mobile Drill B61

WATER LEVEL AND DATE START 3/30/88 FINISH 3/30/88 LOGGER C. Lawrence

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30	31.5	S13	1.5	13-14-22	Silty Clay, similar to S11		HNu = BG
	32.5						
	34.0	S14	1.1	20-32-34	Silty Clay, similar to S11 except 10% medium-fine gravel in last 3" of sample		HNu = BG
	35.0						
35	36.5	S15	1.5	13-16-20	Silty Clay, similar to S11		HNu = BG (oil observed in mud coming from hole)
	37.5						
	39.0	S16	1.5	15-18-26	Silty Clay, similar to S11		HNu = BG Stop @ 11:15
					End Soil Boring @ 39.0"		Finish grout @ 12:00 pm
40							

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-119 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT (3-3/8" i.d.), 8' OP HSA, ATV Mounted Mobile Drill B53
WATER LEVEL AND DATE START 3/30/88 FINISH 3/30/88 LOGGER R. Johns

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	1.0						Start drilling @ 8:30 am
	3.0	S1	1.0	4-4-4-5 (9)	Silty Clay, trace sand, trace fine gravel, surface organics, brn., slightly moist, stiff (CL-ML)		OVA = 2 HNu = BG PP = 2.0-3.0
	3.5						
5	5.5	S2	0.9	12-14-6-11 (20)	Top 0.2: As Above Mid 0.3: Silty Sand, contains up to 1" fragments of rock, poorly graded, dk. gray, wet, loose (SM-SP) Bottom: As S1, dk. gray		HNu = BG Spoon wet OVA = 1-2 PP = 2.0
	6.0						
	8.0	S3	1.8	9-11-14-16 (25)	Clay with Silt, tr. fine gravel, gray-brown, slightly moist, hard (CL-ML)(occasional 1/4"-1/2" pieces gravel)		HNu = BG OVA = 5-6 PP = 4.5
	8.5						
10	10.5	S4	1.9	11-22-28-31 (50)	As S3, frequent 1/4" gravel, med. brown, hard		HNu = BG OVA = 1-2 PP >> 4.5
	11.0						
	13.0	S5	1.7	30-37-37-50/5" (74)	As S3, brown		HNu = BG OVA = 7.0 PP >> 4.5
	13.5						
	14.5	S6	0.6	43-50/5"	As S5		OVA = 5.0 (OVA= 100 down hole & cuttings) HNu = BG PP >> 4.5 (LEL = 20%)
15	16.0						
	16.5	S7	0.4	50/5"	As S5, quartz fragments (chips) from cobble		HNu = 0.4, lamp fogged? OVA = t = 9:30 PP >> 4.5
	18.5				Top 0.4: As S5 sample		
	19.5	S8A S8B	1.0	30-60/6"	Mid 0.4: Poorly Graded Fine Sand, brn., S8A wet, loose (SP) Bottom 0.2: Well Graded Sand with some gravel, tr. clay, subrounded gravel, brn., wet, loose (SW) sample S8B		OVA = > 10 HNu = 1 Presence of brown oil film in sands
20	21.0						
	22.0	S9	0.9	48/50/5"	Poorly Graded Coarse Sand with gravel, tr. fines, subrounded, wet, loose (SP)		OVA = 30 t = 10:00 HNu =
	23.5						
	24.5	S10	0.9	39-50/5"	Top 0.1: As Above Bottom: As S5		OVA = 25 PP >> 4.5
25	26.0						
	28.0	S11	1.7	31-35-37-50/5" (72)	Top 0.3': As S5, moist, firm Mid 0.6': Poorly Graded Coarse Sand w/gravel, as S9 Bottom: As S5		PP = 1.0 OVA = 65
	28.5						
	30.0	S12	1.3	35-48-50/5"	Top 0.2': Clayey Fine Sand, brn., wet, loose (SC) Bottom: As S5, breaks along thin (1/16") seams of fine sand)		OVA = 35 PP >> 4.5

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-119 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area/
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT (3-3/8" i.d.), 8' OP HSA, ATV Mounted Mobile Drill B53
WATER LEVEL AND DATE START 3/30/88 FINISH 3/30/88 LOGGER R. Johns

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30	31.0						
	32.5	S13	1.3	31-49-50/4"	As S5		PP>>4.5 OVA = 8
	33.5						
	34.3	S14	0.6	45-50/2"	As S5, fine sand lenses (1/16")		OVA = 5 PP>>4.5
35	36.0						
	37.4	S15	1.5	38-49-50/4"	As S5		OVA = >25 PP>>4.5
	38.5						
	40.0	S16	1.5	30-48-50/5"	As S5		OVA = 3.5 PP>>4.5 End Drilling @ 11:30
40					End Soil Boring @ 40.0'		@ 11:40 start grouting Finish @ Offset 8' to set well & push tubes Start drilling @ 2:50 (8" OD, 4" ID HSA)
45							(1) Push (Shelby) @ 19.5'-21.5' - no sand recovery; hit clay-bent tube (2) Push @ 22-24' - no sand recovery; hit clay & 2" rock; bent tube (3) Push @ 23' - no recovery Grout up hole and move to other side of hole to try to locate sand. (4) Located at least 6" sand with bottom at 22'. Set pz. with screen from 17 to 22'.

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-120 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Borrow area/
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA (3-3/8" i.d.)/Mobile Drill B53
WATER LEVEL AND DATE START 4/17/88 FINISH 4/18/88 LOGGER R. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	0.5						
	2.5	S1	1.2	4-5-6-8 (11)	Silt, brown, occasional 1/2" gravel, soft, moist, low plasticity (ML)		HNu = BG
	3.0						
	5.0	S2	1.7	3-5-5-9 (10)	Silt, gray, soft, moist, low plasticity, occasional stick, fine sand seams every 4" (black at bottom) (ML)		HNu = BG
5	5.5						
	7.5	S3	1.0	1-2-4-3 (6)	Same as Above, very soft, no sticks, occasional 1/2" rock, low plasticity, ~ 10% sand (ML)		HNu = BG
	8.0						
	10.0	S4	1.0	2-6-23-36 (29)	Silt, hard, gray, v. wet ~ 10% coarse sand, occasional fine sand seam (wet only on outside) (ML)		HNu = BG Till
10	10.5						
	12.5	S5	1.5	28-35-50 (85)	Same as Above, v. hard, dry		HNu = BG
	13.0						
	15.0	S6	1.0	42-50/5" (50+)	Silty Sand, coarse, gray, well graded, v. hard & dry (SM)		HNu = BG Quit for the day
15	15.5						
	17.5	S7	1.0	30-50/5" (50+)	Same as S4		HNu = BG
	18.0						
	20.0	S8	0.7	50/4"	Same as S4, moist inside, 1" fine sand seam 2" from the bottom of the sample		HNu = BG
20	20.5						
	22.5	S9	1.2	50/5"	Mud with sand seam from 21-21.5', coarse, clean, poorly graded		Note: tip may have been clogged by a rock that fell out when they pulled the spoons
	23.0						
	25.0	S10	1.7	23-34-56-58/3" (90)	Same as S4		HNu = BG
25	25.5						
	27.5	S11	0.8	49-50/3"	Same as S4		HNu = BG
	28.0						
	30.0	S12	0.8	38-50/5"	Same as Above, occasional 1/2" gravel		HNu = BG

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-120 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana/Trench area/ = 50' from fence near old stream bed

ELEVATION DRILLING CONTRACTOR ATEC Associates

DRILLING METHOD AND EQUIPMENT HSA (3-3/8" i.d.)/Mobile Drill B53

WATER LEVEL AND DATE START 4/17/88 FINISH 4/18/88 LOGGER R. Brownfield

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30	30.5						
	32.5	S13	0.7	100/6"	Clay, no sand seams (CL)		Took physical dup. (plasticity) HNu = BG
	33.0						
	35.0	S14	1.0	49-50/5"	Silty Clay, 2 fine sand seams in sample (CL-ML)		Took physical dup. (gradation) HNu = BG
35	35.5						
	37.5	S15	1.3	29-39-44 (83)	4": Same as Above 12": Sand, coarse to fine, well graded, clean (SW)		HNu = BG
	38.0						
	40.0	S16	1.0	33-89	Same as S4		09:30 told to grout up hole 4/18/88
40					End Soil Boring @ 40.0'		

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-123 • SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA, ATV Mounted Mobile Drill B61
WATER LEVEL AND DATE START 3/31/88 FINISH 4/04/88 LOGGER C. Cruciani, R. Johns

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	2.0	S1	0.9	1-2-4-10 (6)	Sandy Silty Clay, lt. brn., moist, soft, organics @ surface (CL-ML)		Start drilling @ 2:50 PP = 0.5
	2.5						
	4.5	S2	0.9	13-16-19-25 (35)	Silty Clay, tr. coarse sand, gray, slightly moist, v. stiff (CL-ML)		PP = 4.0 Rain is affecting HNu instruments We smelled an odor & decided to shut down till instruments work
	5.0						
5	6.5	S3	1.3	21-26-30 (56)	Silty Clay, tr. F-C Sand, tr. gravel, lt. brown to gray, moist, v. stiff (CL-ML)		HNu = BG Start @ 8:32 4/4/88
	7.5						
	9.0	S4	1.5	24-20-28 (48)	Top 8": As Above Lower 10": Hard (CL-ML)		t = 8:40 HNu = BG Spoon wet
	10.0						
10	11.5	S5	1.3	21-24-19 (43)	6": F-C Well Graded Silty Sand, fine to coarse, lt. brown, wet, med. dense (SW) 6": Like S3; 6" Poorly Graded fine Sand, lt. brown, wet, med. dense (SP)		t = 8:47 Spoon wet HNu = BG
	12.5						
	14.0	S6	1.2	12-19-21 (40)	As S3, , except soft to firm (CL-ML)		t = 08:55 HNu = BG
	15.0						
	16.5	S7	1.5	14-19-28 (47)	As S3, firm to hard (CL-ML)		t = 08:58 HNu = BG
	17.5						
	19.0	S8	1.3	20-24-50/4"	As S3, stiff (CL-ML)		t = 9:10 HNu = BG
20	21.5	S9	1.6	20-20-34 (54)	As S3, stiff to v. hard, dry to moist (CL-ML)		On top of rock at approx. 19' 09:15 Told drillers to move over HNu = BG t = 09:25
	22.5						
	23.8	S10	1.4	32-46-50/4"	As S3, v. hard, dry (CL-ML) 0.3' from bottom fine grained Poorly Graded Sand, lt. brown, wet, med. dense, 1/2" seam		t = 09:36 HNu = BG
	25.0						
25	26.4	S11	1.0	35-55-50/4"	As S3, v. stiff (CL-ML), one broken pebble ≈ 20mm, dolomite		t = 09:49 HNu = BG
	27.5						
	28.7	S12	0.8	60-50/0.2'	Silty, Fine Sandy Clay, tr. gravel, lt. brown to gray, dry, hard to v. hard		t = 09:59 HNu = BG

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-123 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA Mobile Drill B61
WATER LEVEL AND DATE START 3/31/88 FINISH 4/04/88 LOGGER C. Cruciani, R. Johns

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30	31.4	S13	0.9	31-50/0.4'	Top 1-2": Well Graded F-C Silty Sand, lt. brown, moist to wet, med. dense (SW) Rest as S12, v. hard (CL-ML)		t = 10:22 Blow in at ≈ 30' HNu = BG Probable sand seam
	32.5						
	33.8	S14	0.8	41-50/0.3'	Silty Clay, tr. sand, tr. gravel, lt. brown to gray, dry, hard to v. hard (CL-ML)		t = 10:42 HNu = BG
	35.0						
35	36.5	S15	1.1	13-25-50 (75)	As Above		t = 11:03 Have to clean out interval HNu = BG to 35' with split spoon. Use another sampler for S15.
	37.5						
	39.0	S16		19-31-46 (77)	As Above		t = 11:22 A lot of stuff in augers. HNu = BG 10' heave? Doubt it. Ray puts sampler down again and gets it through stuff in auger.
40					El Boring @ 39.0'		No well
45							

CHMHILL

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-122 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana

ELEVATION DRILLING CONTRACTOR ATEC Associates

DRILLING METHOD AND EQUIPMENT HSA(3-3/8" i.d.) /Mobile Drill B53

WATER LEVEL AND DATE START 4/11/88 FINISH 4/12/88 LOGGER M. Nielsen

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	1.0						
	3.0	S1	1.0	2-3-2-3 (5)	Upper 6": Silty Sand, brown, moist, loose, (2-15% P200 (SM)) Lower 6": Sand with some silt, moist, med. to fine, 5-12% P200 (SP-SM) Upper 6" Same, gravel to 1-1/2"		HNu = BG PP - Pocket Penetrometer
	3.5						
5	5.5	S2	1.1	13-15-2-3 (17	Lower 7": Silt, gray, wet, v. stiff, low plasticity (ML)		HNu = BG Spoon wet PP = 4.5 TSF
	6.0						
	8.0	S3	1.2	5-6-5-3 (11)	Silt, gray, stiff, low plasticity, sand seam at end of spoon and 6" from end ±1/2" seam		HNu = BG PP = 4.5 TSF
	8.5						
10	10.5	S4	1.7	13-19-15-27 (34)	Silt, gray, hard, low plasticity, trace of gravel, coarse sand seam 6" from bottom of spoon (ML)		HNu = BG PP = 4.5 TSF
	11.0						
	13.0	S5	0.8	19-50/5" (> 69)	Same as Above, v. hard (ML)		HNu = BG PP = 4.5 TSF
	13.5						
15	15.5	S6	1.0	30-50/3" (> 80)	Same, v. hard, sand seam 2" from bottom, ± 1/4" thick		HNu = BG PP - 4.5 TSF
	16.0						
	18.0	S7	1.7	35-47-43-50/5" (90)	Upper 3": Sandy Silt, gray, v. hard, sand & gravel 10-20%, low plasticity (ML) Lower 18": Silt, gray, v. hard, low plasticity, + 18" sand seams 4" & 6" from bottom		HNu = BG PP = 4.5 TSF
	18.5						
20	20.5	S8	2.0	26-33-50 (83)	Silt, gray, v. hard, some gravel in upper 6" (ML)		HNu = BG PP = 4.5 TSF
	21.0						
	23.0	S9	1.9	26-31-50/5" (> 81)	Silt, same as above (ML)		HNu = BG PP = 4.5 TSF
	23.5						
25		S10	0.8	32-50/3" (> 82)	Sandy Silt, gray, v. hard, upper 6" had 20-30% sand & gravel, lower portion had 2 thin sand seams		HNu = BG PP = 4.5 TSF
	25.5						
	26.0 / 28.5	S11	0.9	45-50/5"	Sandy Silt, tr. clay, gray, v. hard, small sandy seams < 1mm, dry (ML)		Hammer needs welding; ATEC left at 4:30 pm; 0800 start 4/12/88 HNu = BG PP > 4.5
	29.3	S12	0.7	49-50/4"	Silty v. fine grained Sand, or sandy silt, gray, dry to moist, v. hard, or dense; small cracks/ sandy seams (SM-ML)		HNu reads ≈ 15 ppm from sample registering moisture?

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-122 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(3-3/8" i.d.) /Mobile Drill B53
WATER LEVEL AND DATE START 4/11/88 FINISH 4/12/88 LOGGER M. Nielsen

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30	31.0						
	32.5	S13	0.9	17-31-42	Silty Clay, tr. sand, tr. gravel, greenish gray, green mineralization or discoloration, dry, v. hard, some orange/lt. brown color (CL-ML)		PP = > 4.5 HNu = = 10 ppm t = 0844
	33.5						
	35.0	S14	1.3	15-32-50/4"	As Above		HNu = 75 ppm t = 0856 PP > 4.5
35	36.0						
	37.5	S15	1.0	29-50/4"	Clayey Silt with Sand, tr. gravel, gray, dry, v. hard (CL-ML) PP = > 4.5		t = 0905 HNu = 20 ppm
	38.5						
40	40.0	S16	1.3	73-50/2"	Silt, gray, dry to moist, firm, hard to try pocket penetrometer		t = 0922 HNu = 1.0 ppm
					End Soil Boring @ 40.0'		Will set piezometer at 15' See log book

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-121 SHEET 1 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT (3-3/8" i.d., 8" OP HSA, ATV Mounted Mobile Drill B53
WATER LEVEL AND DATE START 4/15/88 FINISH 4/15/88 LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	2.0	S1	0.7	3-3-8-14 (11)	Silty Sand, brown, dry, roots, etc., dense (SM)		t = 16:03 TOPSOIL HNu = BG grades to
	4.0	S2	1.2	4-5-7-7 (12)	6": As Above Silty Sandy Clay, brown, dry to moist, soft, tr. gravel (CL-ML)		t = 16:04 HNu = BG
5	6.0	S3	1.4	2-2-4-4 (6)	As Above, brown grades to gray (CL-ML)		t = 16:11 HNu = BG
	8.0	S4	0.7	2-3-3-9 (6)	No physical sample taken 0.4': As Above (CL) 0.3': Clayey Gravel, gray, black, moist, clay, loose (GC)		t = 16:14 HNu = BG TILL
10	10.0	S5	0.75	10-13-21-22 (34)	Clayey Silt, with very fine sand, gray, dry to moist, tr. gravel, stiff		t = 16:15 HNu = BG TILL
	11.0						
	13.0	S6	1.7	19-26-37-32 (63)	As Above, cracks filled with fine sand, 5 over 1.7', one 1/2" sand seam 2" from bottom		t = 16:25 Spoon wet at about 10' HNu = BG depth
	13.5						
15	14.7	S7	1.2	24-45-50/3" (>95)	As Above, lower 1' very hard, dry (CL-ML)		t = 16:34 TILL very hard HNu = BG hammering
	16.0						
	18.5	S8	1.7	27-39-40-50/5" (79)	1.4': As Above (CL-ML) 0.2': Poorly Graded med. Sand (SP), gray, wet, med. dense 0.1: As S7		t = 16:44 TILL HNu = BG
20	19.9	S9	1.8	36-50-50/5" (>100)	Silty Clay, tr. gravel, sand, gray, dry to moist, v. hard (CL-ML)		t = 16:53 TILL HNu = BG
	21.0						
	22.2	S10	1.5	27-29-50/2" (> 79)	As Above, pebbles to 40mm (CL-ML)		t = 17:07 TILL HNu = BG
	23.5						
25	24.3	S11	1.0	74-50/5" (> 50)	As Above for 0.9' (CL-ML) 0.1': Gravel coarse, wet, loose, gray (GW)		t = 17:19 Very hard to sample HNu = BG
	26.0						
	27.8	S12	1.2	17-23-32-50/4" (55)	0.2: Fine Sand: could be wash from above (SP) Silty Clay, tr. gravel, sand, gray, dry to moist, v. hard (CL-ML)		t = 17:29 (Sand Seam) HNu = BG TILL
	30.0	S13	1.4	28-30-50/6" (> 80)	As Above (CL-ML)		t = 17:39 TILL HNu =

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-121 SHEET 2 OF 2

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(3-3/8" i.d.) /Mobile Drill B53
WATER LEVEL AND DATE START 4/15/88 FINISH 4/15/88 LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
30	31.0						
	33.0	S14	1.6	26-24-32-31 (56)	As Above (CL-ML)		t = 17:55 TILL HNu = BG
	33.5						
35	35.5	S15	1.5	31-29-34-45 (63)	As Above (CL-ML)		t = 18:14 TILL HNu = BG
	36.0						
	38.0	S16	1.9	26-31-36-50 (67)	Clayey, fine-coarse Sand (SC), lt. orangish brown, dry, v. dense Sand seam 1" F-C, Poorly graded (SP) 1" from bottom		t = 18:31 HNu = BG TILL
	38.5						
	40.0	S17		38-40-50/5"	As Above		t = 18:40 TILL HNu = BG
40					End Soil Boring @ 40.0'		
45							

CH2M HILL

PROJECT NUMBER	BORING NUMBER
W63582.FQ	NSLS B-124 SHEET 1 OF 1

SOIL BORING LOG

PROJECT NSL/ECC LOCATION Zionsville, Indiana
ELEVATION DRILLING CONTRACTOR ATEC Associates
DRILLING METHOD AND EQUIPMENT HSA(3-3/8" i.d.) /Mobile Drill B53
WATER LEVEL AND DATE START 4/16/88 FINISH 4/16/88 LOGGER C. Cruciani

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY (FT)	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
0	2.0	S1	1.0	2-4-4-5 (8)	8" Silty Clay, tr. sand, dk. brown, moist, soft 4": Silty, F-M Sand, lt. brown, moist, med. dense (SW)		13:11 Begin augering into soil Topsoil t = 13:30 HNu = BG
	2.5						
	4.5	S2	1.3	2-11-30-38 (41)	Silty Clay, tr. gravel, gray, dry, v. hard (CL-ML)		t = 13:34 TILL HNu = BG Took physical dupe PP = > 4.5
	5.0						
5	6.5	S3	1.3	30-49-50/4" (> 99)	As Above, 5 cracks over interval (CL-ML)		t = 13:40 HNu = BG Water inside rock at spoon tip
	7.5						
	8.7	S4	1.5	17-41-50/3" (> 91)	0.5': As Above (CL-ML) 0.5': Poorly Graded m. Sand, gray, wet, loose to med. dense (SP); 0.5': Hard Silty Clay, with 1/2" sand seams (CL-ML)		t = 13:46 HNu = BG in sand
	10.0						
10	10.2	S5	0.3	50/3"	8" of sand from above 3" hard Silty Clay in tip of spoon (CL-ML)		t = 13:54 Only drove spoon 3" HNu = BG
	12.5						
	13.8	S6	1.0	36-49-50/4"	Poorly Graded Gravel with Silt and F-C Sand, gray, moist to wet, loose gravel is angular (SP-SM)		t = 14:00 HNu = BG
	15.0						
	16.0	S7	0	57-50/2"	0.5': F-M Sand, gray, wet, dense (SP) 0.5': Silty Clay, gray, dry, hard (CL-ML)		t = 14:29 Having a lot of blow-in HNu = BG Are cleaning out auger & putting head of water down. Cleaned out a 2nd time, all sand
	17.5						
	18.8	S8	1.8	26-51-50/3"	1' F-C Well Graded Sand, moist to wet, gray, dense; took physical of sand 0.8': Silty Clay, gray, dry, v. hard (CL-ML)		t = 14:40 HNu = BG t = 15:00 took break to fix throttle
	20.0						
20	20.6	S9	1.0	53-50/2"	As Above, tr. gravel		t = 15:18 Spoon is wet HNu = BG
	22.5						
	23.2	S10	0.8	43-50/3"	As Above		t = 15:35
25					End Soil Boring @ 23.2'		Tried to auger through this interval, refusal of augers on a boulder. Told drillers to offset, auger down to 13', take spoon, set well at 15'.

CH2M HILL

PROJECT NUMBER: 116230.C3 | BORING NUMBER: ECC-6A | SHEET 1 OF 1

SOIL BORING LOG

PROJECT: ECC REMEDIAL INVESTIGATION | LOCATION: NORTHEAST

ELEVATION: | DRILLING CONTRACTOR: ATEC ASSOC.

DRILLING METHOD AND EQUIPMENT: 3½" ID HSA's TO 28.5' 6½" ID HSA's TO 23.0'

WATER LEVEL AND DATE: 8.5' - 09:25 HRS 9/1/83 START: 0815-9/1/83 FINISH: 1735-9/1/83 LOGGER: I. H. JOHNS

ELEVATION	DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
								START 0815 HRS STARTED SAMPLING AT 5' BELOW GROUND SURFACE
	5.0	X	SS-1	18"	2-4-6	CLAYEY SILT, MOTTLED BROWN, MOIST, STIFF, 10% FINE SAND (ML-CL)		
		X	SS-2	18"	8-11-12	8.0'		
		X	SS-3	18"	5-6-8	SILTY CLAY, GRAY, MOIST, STIFF, 10% FINE TO MED. SAND (CL)		
	10.0	X	SS-4	18"	4-5-7			
		X	SS-5	12"	4-5-8			
		X	SS-6	18"	10-11-11	13.5'		Water Noted at 13.5' ON SS-6 (09:20 HRS)
	15	X	SS-7	18"	2-2-2	SAND, FINE TO COARSE, GRAY, WET, MED. DENSE TO DENSE, ~10% FINE GRAVEL, (SP)		Water Noted at 8.5' ON AW-RODS (09:25 HRS)
		X	SS-8	18"	7-7-10			
		X	SS-9	18"	8-22-48			
		X	SS-10	6"	9-15-20			
	20							
	23.5	X	SS-11	18"	15-27-21	24.5		
	25	25.0				SILTY CLAY, GRAY, MOIST, HARD, 10% SAND, (CL-ML)		
	28.5	X	SS-12	12"	33-50-63			NO HNU READINGS ABOVE BACKGROUND
	30					BOTTOM OF BORING	30.0	

CH2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET 1 OF 2
W65230.C3	ECC-5A	

SOIL BORING LOG

PROJECT ECC REMEDIAL INVESTIGATION LOCATION SOUTHWEST

ELEVATION 88[illegible] DRILLING CONTRACTOR MATECO DRILLING

DRILLING METHOD AND EQUIPMENT CME 550 RIG, 3 3/4" HOLLOW STEM AUGERS

WATER LEVEL AND DATE 10.0' - 6/24/83 START 6/24/83 FINISH 6/24/83 LOGGER B.N. ZVIBLEMA

ELEVATION	DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	2							
	4	4.5						
	6	6.5	SS-1	24"	5-7-9-13	SILTY CLAY, MOTTLED BROWN AND GRAY, MOIST, VERY STIFF, TRACE OF ROOTS, TRACE GRAVEL (CL-ML)		
	8	9.5						
	10	11.5	SS-2	18"	7-4-4-4	SILTY CLAY, GRAY, WET, MEDIUM STIFF, WITH INTERBEDDED SILTY SAND AND SANDY SILT (cl-ml)		WATER AT 10' NOTED WHILE DRILLING WITH HOLLOW STEM AUGERS
	12	14.5						
	14	16.5	SS-3	17"	5-6-7-9	CLAYEY SILT, GRAY, WET, STIFF, TRACE SAND (ml) ~18.0'		
	16	19.5						
	18	21.5	SS-4	16"	6-6-6-8	SAND, FINE TO COARSE, GRAY, WET, MEDIUM DENSE, SOME FINE GRAVEL (SW)		HARDER DRILLING BELOW 22'
	20	24.5						
	22	26.5	SS-5	0"	12-15-18-19			
	24							
	26							
	28							

CH2M HILL

PROJECT NUMBER	BORING NUMBER	
WG5230.C3	ECC-3A	SHEET 1 OF 1

SOIL BORING LOG

PROJECT ECC REMEDIAL INVESTIGATION LOCATION SOUTHEAST CORNER

ELEVATION 976.6 DRILLING CONTRACTOR MATCO DRILLING CO.

DRILLING METHOD AND EQUIPMENT 3¼" I.D. Hollow Stem Augers (CME-45C TRAILER-MOUNTED DRILL RIG)

WATER LEVEL AND DATE 6/14/83 - 8:50 AM START 6/14/83 FINISH 6/14/83 LOGGER T. H. JOHNSON

ELEVATION	DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS (BLOWS PER 6-INCHES)	SOIL DESCRIPTION (NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL)	SYMBOLIC LOG	COMMENTS (DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION)
	2'	X	SS-1	12"	7 4 2 6	SILTY CLAY, BROWN TO BLACK, DRY TO MOIST, STIFF, TRACE ORGANICS (CL)		
	4'	X	SS-2	15"	3 3 4 4			
	6'	X	SS-3	4"	2 4 7 6	6.0'		WATER AT 6.0' NOTED WHILE DRILLING WITH HOLLOW STEM AUGERS
	8'	X	SS-4	12"	3 3 2 2	SAND, FINE TO COARSE, BROWN, WET, LOOSE TO MEDIUM DENSE, SOME SILT, TRACE FINE TO COARSE GRAVEL (SW-SM)		
	10'	X	SS-5	18"	4 6 6 7			
	12'	X	SS-6	24"	3 3 4 5			
	14'	X	SS-7	24"	8 19 15 12			
	16'	X	SS-8	24"	4 11 10 15			
	18'	X	SS-9	20"	13 25 11 7	17.5'		
	20'	X	SS-10	18"	5 7 9 13	SILTY CLAY, GRAY, MOIST, STIFF, TRACE FINE TO COARSE SAND (CL-ML)		
	22'	X	SS-11	20"	5 10 13 19	21.5'		
	24'	X	SS-12	24"	16 23 42 52	SILTY SAND, FINE TO MEDIUM, GRAY, MOIST, DENSE (SM) 23.5'		
						SILTY CLAY, GRAY, MOIST, HARD, SOME SAND, TRACE GRAVEL (CL) 24.0'		
						BOTTOM OF BORING AT 24.0'		

CH2M HILL

PROJECT NUMBER	BORING NUMBER	
WG5230.C3	ECC-4C	SHEET 1 OF 6

SOIL BORING LOG

PROJECT ECC REMEDIAL INVESTIGATION LOCATION EAST

ELEVATION 884.62 DRILLING CONTRACTOR MATECO DRILLING CO.

DRILLING METHOD AND EQUIPMENT CME-45 TRAILER MOUNTED RIG, 3¼" I.D. HOLLOW STEM AUGERS TO 26

WATER LEVEL AND DATE 10.0'-6/14/83-1600 HRS START 6/14/83 FINISH 6/21/83 LOGGER B.N. ZVIBLEMAN

ELEVATION	DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS (BLOWS PER 6-INCHES)	SOIL DESCRIPTION (NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL)	SYMBOLIC LOG	COMMENTS (DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION)
			SS-1	18"	5-4-4-7	FILL		
	2		SS-2	20"	6-4-7-7	4.0'		
	4		SS-3	16"	3-4-5-6	SILT, BLACK, SOME ORGANICS, TRACE SAND, MOIST (ml-ol) 5.5'		
	6		SS-4	16"	4-5-9-11	CLAYEY SILT, GRAY, MOIST, STIFF, TRACE FINE TO COARSE SAND (ML) 9.5'		
	8		SS-5	18"	7-12-12-10			
	10		SS-6	13"	10-14-20-18	SAND, FINE TO COARSE, GRAY, SOME CLAY (SC)		WATER AT 10.0'
	12		SS-7	12"	25-37-34-33	SAND, FINE TO COARSE, GRAY, SOME CLAY, GRADES TO SILTY SAND (SC)		
	14		SS-8	13"	15-22-30-45			
	16		SS-9	20"	30-33-40-47	17.0'		
	18		SS-10	11"	40-60/5"	SILTY CLAY, GRAY, MOIST, HARD, INTERBEDDED WITH SILTY FINE SAND (CL)		
		18.9						
	20		SS-11	24"	25-33-30-32	21.5'		
	22		SS-12	20"	18-22-24-32	CLAY, GRAY, MOIST, HARD, SOME FINE TO COARSE SAND (CL)		
	24		SS-13	24"	17-23-26-30			
	26							PULLED HOLLOW STEM AUGERS AND SET 4" CASING TO 25' STARTED DRILLING WITH 3¾" ROLLER BIT AND WATER
	28							

DRILLING LOG

State Indiana

Site Northside Sanitary Landfill

Boring No. NSL 13

Drilling Firm Alt and Witzig Eng., Inc.

Type of Drill Mobil-53

Driller K. Schwarzkopf

Geologist C. Bieze

Start Date 12-17-84

Completion Date 12-17-84

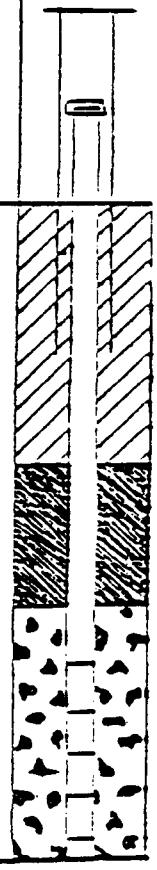
Ground El. 876.05

Groundwater El.
at completion 871.75
after 68 days 874.70

Total Depth of Boring 15.5'

Screen Interval 3.5' - 13.5'

Elev.	Depth	Description	Blow Count	Sample No.	Remarks	Well Const.
			per 6"	2"O.D. Split Spoon	4 1/4" Hollow Stem Auger	
			140# Hammer 30" Drop		T.I.C. = 878.36	
876.05		Ground Surface				
		SILTY CLAY, sandy, trace gravel, moderately soft, brown DRY	3	1		
	1	SILTY SAND, fine-coarse grain, trace clay, trace gravel, hard, brown DRY	3			
			4			
	2		2			
		SILTY CLAY, some sand, soft, gray-green DRY	3	2		
	3		4			
		SAND, fine-medium grain, some silt, trace gravel, brown MOIST	3			
	4	CLAYEY silt, gray-green MOIST	4	3	Water at 4.3'	
		SAND, fine-coarse grain, silty, trace clay, trace gravel, loose, brown	3			
	5	WET	2	4		



Lock #2429

State Indiana

Site Northside Sanitary Landfill

Boring No. NSL 13

Page 2 of 3

Elev.	Depth	Description	Blow Count	Sample No.	Remarks	Well Cons
			2	4		
	6		1			
		SILTY SAND, fine-medium grain, trace gravel, gray-brown WET		CUTTINGS		
	7					
	8					
	9	SAND, fine grain, trace silt, gray-brown WET	3			
	10	CLAYEY SILT, moderately hard, gray WET	6	5		
		SAND, fine-medium grain, trace small gravel, brown-gray WET	9			
	11			CUTTINGS		
	12				Very Slow Drilling 12.0-14.0	
	13					
	14	SILTY CLAY, trace fine sand, some gravel, moderately hard gray DRY	13	6		
	15		15			

State Indiana

Site Northside Sanitary Landfill

Boring No. NSL 12

Page 3 of 3

Elev.	Depth	Description	Blow Count	Sample No.	Remarks	Well Const.
357		SAND, fine-medium grain, gray-brown	16			
		WET		6		
	16		19			
	17					
	18					
356		SAND and GRAVEL, fine coarse grain, trace silt, medium-large gravel, moderately hard, gray-brown	15			
			18	7		
		WET				
	20		24			
	21					
	22					
	23	SANDY SILT, trace clay, moderately hard, gray				
		WET	15			
	24			8		
			18			
			40		No HNU readings above background	
	25					

Specifications:

10' 2" I.D. SCH 40 PVC Riser Pipe
20' 2" I.D. SCH 40 0.010" Slot PVC Well Screen
5' 4" Diameter Locking Steel Casing
Vented PVC Riser Cap

0' - 2.0' Cement Grout
2.0' - 3.0' Bentonite Seal
3.0' - 18.0' Pea Gravel
18.0' - 24.5' Natural Fill

State Indiana

Site Northside Sanitary Landfill

Boring No. NSL 12

Page 2 of 3

Elev.	Depth	Description	Blow Count	Sample No.	Remarks	Well Const.
		SAND and GRAVEL, silty, fine-coarse grain, gray brown WET		CUTTINGS		
	6					
	7					
	8	SAND and GRAVEL, silty fine-coarse grain, gray brown WET	6			
	9		5	4		
			9			
	10	SAND and GRAVEL, trace silt seam, fine-coarse grain, gray-brown WET		CUTTINGS		
	11					
	12					
	13	SAND and GRAVEL, grades to silt, trace clay, red-brown WET	18			
860	14	SAND, fine-medium grain, gray-brown WET	22	5		
			32			
859	15	SILT, some clay, brown moderately hard	16	6		

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

LOG OF BORING NO. SB-60

CLIENT: Northside Sanitary Landfill
PROJECT NAME: Water Survey
PROJECT LOCATION: Zionsville, Indiana
BORING LOCATION:
FOREMAN: J. Heffelmire
INSPECTOR:

JOB NO. 21-21043
START DATE 8-12-82
FINISH DATE 8-13-82
BORING METHOD HSA
ROCK CORE DIA. ____ IN.
SHELBY TUBE DIA. ____ IN.

SOIL/ROCK DESCRIPTION (SURFACE ELEVATION ____ DATUM ____)	STRATUM DEPTH, FT.	DEPTH, FT.	STD. PENETRATION SAMPLE NO.	STD. PENETRATION BLOWS/6 IN. THREE 6 IN. INCREMENTS	RECOVERY, %	SHELBY TUBE NO.	BORING AND SAMPLING NOTES
Dark gray moist SANDY SILT with trace of Clay		5			90	1	
	8.5						
Gray wet SILTY SAND and GRAVEL		10	1	11 11/11	20		
	13.5						
Brown wet CLAYEY SAND and GRAVEL	14.0		2	13 38/48	100		
Gray wet fine SAND	14.5	15					
Gray moist HARDPAN							Twist off @17.0' back 3.0' redrill
		20	3	20 33/57	100		
		25	4	50 0.5			
		30	5	50 0.3			
Bottom test boring @ 30.0'							

WATER LEVEL OBSERVATIONS
NOTED ON RODS none FT.
AT COMPLETION 5.0 FT.
AFTER ____ HRS. ____ FT.

BORING METHOD
HSA – HOLLOW STEM AUGER
CFA – CONTINUOUS FLIGHT AUGER
DC – DRIVEN CASING
MD – MUD DRILLING
RC – ROCK CORING
CA – CASING ADVANCER

*THESE SHELBY TUBE SAMPLES OBTAINED IN AN AUXILIARY BORING DRILLED A FEW FEET FROM THIS BORING

State Indiana

Boring No. NSL 13

Site Northside Sanitary Landfill

Page 3 of 3

Elev.	Depth	Description	Blow Count	Sample No.	Remarks	Well Const.
860	16	SILTY CLAY, trace fine grain sand, some gravel, moderately hard, gray DRY	12	6	Clay Till at approximately 15.0'	
	17					
	18					
	19					
	20					
					No HNU readings above background	

Specifications:

10' 2" I.D. SCH 40 PVC Riser Pipe
10' 2" I.D. SCH 40 0.010" Slot PVC Well Screen
5' 4" Diameter Locking Steel Casing
Vented PVC Riser Cap

0' - 2.0' Cement Grout
2.0' - 3.1' Bentonite Seal
3.1' - 15.5' Pea Gravel

DRILLING LOG

State Indiana

Site Northside Sanitary Landfill

Boring No. NSL 12

Drilling Firm Alt and Witzig Eng., Inc.

Type of Drill Mobil-53

Driller K. Schwarzkoof

Geologist C. Bieze

Start Date 12-18-84

Completion Date 12-18-84

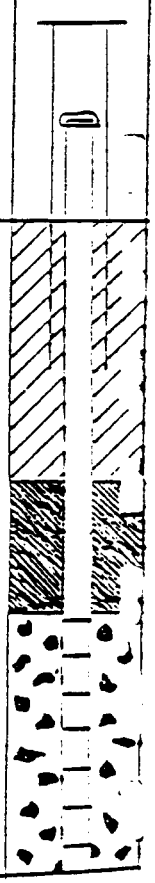
Ground El. 873.59

Groundwater El.
at completion 871.09
after 63 days 871.56

Total Depth of Boring 24.5'

Screen Interval 3.0' - 23.0'

Elev.	Depth	Description	Blow Count	Sample No.	Remarks	Well Const
			per 6"	2"O.D. Split Spoon	4 1/4" I.D. Hollow Stem Auger	
873.59		Ground Surface	140# Hammer 30" Fall		T.I.C = 875.82	
		SILT, some clay, trace sand and gravel, brown	4			
		DRY	2	1		
	1		5			
	2	SAND and GRAVEL, fine-medium grain, brown	6		Water at 2.5'	
		WET	14	2		
	3		7			
		SAND and GRAVEL, fine-coarse grain, gray-brown	5			
		WET	6	3		
	4		8			
	5					



Lock #2429

CH2M HILL

PROJECT NUMBER: WG5230.C3

BORING NUMBER: ECC-11A

SHEET 1 OF 1

SOIL BORING LOG

PROJECT: ECC RI

LOCATION: SW Entrance to Site

ELEVATION:

DRILLING CONTRACTOR: ATEC

DRILLING METHOD AND EQUIPMENT: Mobil B-61 4" I.D. HSA's

WATER LEVEL AND DATE:

START: 11/5/84 FINISH: 11/5/84 LOGGER: J.H. Johnson

ELEVATION	DEPTH BELOW SURFACE	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	2							HNu reading background (~ 0ppm)
	4							
	6							
	8							
	10		SS-1	4"	8-6-10	Silty Clay, Brown, some fine sand and gravel, wet		HNu reading ~60ppm in HSA
	12							
	14		SS-2	16"	5-5-7	Silty Clay, Gray, some sand and gravel, moist. BOTTOM OF BORING @ 15.0'		HNu reading at ~60ppm. Decided to set well screen from 10' to 15' B.G.S. because of high HNu readings
	16							

REV 11/82 FORM 015

CH2M HILL

PROJECT NUMBER: W65230.C3 | BORING NUMBER: ECC-8A | SHEET 1 OF 1

SOIL BORING LOG

PROJECT: ECC RI | LOCATION: NE Corner of Concrete Pad

ELEVATION: | DRILLING CONTRACTOR: ATEC

DRILLING METHOD AND EQUIPMENT: Mobil B-61 Rig 4" I.D. HSA's

WATER LEVEL AND DATE: | START: 10/26/84 | FINISH: 10/26/84 | LOGGER: J. H. Johnson

ELEVATION	DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	2							HNu reading background (~0.5 ppm)
	4	X	SS-1	14"	3-4-4	Silt-Clay, Brown to Gray, Stiff, some sand, blocky texture, moist		
	6							
	8							
	10	X	SS-2	9"	4-6-7	Sand, Gray, Fine to Medium, wet		
	12							
	14	X	SS-3	2"	8-12-12	Silty Clay, Gray, moist to wet		
	16							
	18					~18'		
	20	X	SS-4	16"	10-13-12	Sand, Fine to Coarse, some Fine gravel, wet		Flowing sand below 20'
	22							
	24					Bottom of Boring @ 25'		
	26							

REV 11/82 FORM 01586

C-2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET
W65230.C3	ECC-7A	1 OF 1

SOIL BORING LOG

PROJECT: ECC REMEDIAL INVESTIGATION — LOCATION: SOUTH OF ECC-4

ELEVATION: — DRILLING CONTRACTOR: ATEC ASSOC.

DRILLING METHOD AND EQUIPMENT: 3 1/4 HSA'S TO 29.5 FT. BELOW GROUND SURFACE

WATER LEVEL AND DATE: 12.5 FT - 9/1/83 — START: 9/1/83-1630 — FINISH: 9/1/83-1810 hrs — LOGGER: I. H. JOHNSON

ELEVATION	DEPTH BELOW SURFACE	SAMPLE: INTERVAL	SAMPLE: TYPE AND NUMBER	SAMPLE: RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
						FILL, SAND, SILT, CLAY, MOTTLED BROWN, SOME TRASH — 4.0'		DRILLED TO 5.0 FT TO START SPLIT-SPOON SAMPLING
	5	X	SS-1	10"	2-5-9	SILTY CLAY, MOTTLED GREEN, MOIST, STIFF, (CL) — 6.5'		
		X	SS-2	12"	10-13-14	CLAYEY SILT, GRAY, MOIST, STIFF TO HARD, (CL-ML)		
		X	SS-3	12"	13-16-21			
	10	X	SS-4	9"	16-19-20			
		X	SS-5	12"	17-30-28	12.0'		
		X	SS-6	16"	12-17-18	SILTY SAND, FINE, GRAY, WET, DENSE, (SM) — 13.0'		
	15	X	SS-7	18"	11-20-27	CLAYEY SILT, GRAY, MOIST, HARD, WITH INTERBEDDED, SILTY SAND, FINE, GRAY, MOIST TO WET, DENSE (ML-CL) AND (SM)		WATER NOTED AT 15.5' ON RODS
		X	SS-8	18"	18-19-35			
		X	SS-9	18"	4-28-46			
		X	SS-10	14"	20-29-21			
	20							
		X	SS-11	18"	17-30-39	CLAYEY SILT, GRAY, MOIST, HARD, ~10 TO 15% SAND, (ML-CL)		
	25							NO HNU READINGS ABOVE BACKGROUND
		X	SS-12	9"	49-65/6"	SILTY SAND, FINE, GRAY, WET, (SM) — BOTTOM OF BORING @ 29.5'		WATER AT 12.5 FT. AT COMPLETION
	30							

CH2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET
W65230.C3	ECC-10A	1 OF 1

SOIL BORING LOG

PROJECT ECC RI LOCATION South of Fence Along Road

ELEVATION 2-2 Grade-Surface DRILLING CONTRACTOR ATEC

DRILLING METHOD AND EQUIPMENT Mobil B-61 Drill Rig, 4" I.D. HSAs

WATER LEVEL AND DATE _____ START 11/2/84 FINISH 11/2/84 LOGGER J.H. Johnson

ELEVATION	DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	2							HN_u reading background (~0.5ppm)
	4							
	6							
	8							
	10	X	SS-1	12"	4-10-16	Silty Clay, Dark Gray, some sand and fine gravel, Silty Sand, Bottom 4" of Sample, moist to wet ~10.5'		
	12							
	14	X	SS-2	4"	22-47-50/3"	Sand, Light Brown, Fine, Some Silt, wet ~16.5'		Rod Chatter, possible cobbles and coarse gravel at 15 ft.
	16							
	18	/	SS-3	9"	8-13-14	Silty Clay, Dark Gray, some sand and fine gravel, moist		
	20							
	22							
	24	X	SS-4	14"	11-26-38	Silty Clay and Clayey Silt, Gray, Hard, moist, some sand and gravel. Bottom of Boring @ 25.0'		
	26							

REV 11/82 FORM Q1586

CH2M HILL

PROJECT NUMBER	BORING NUMBER	SHEET
W65230.C3	ECC-9A	1 OF 1

SOIL BORING LOG

PROJECT ECC RI LOCATION Southwest of SW Corner of Site

ELEVATION _____ DRILLING CONTRACTOR ATEC

DRILLING METHOD AND EQUIPMENT Mobil B-61 Rig, 4" I.D. HSA's and 6" I.D. HSA's

WATER LEVEL AND DATE _____ START 10/31/84 FINISH 11/2/84 LOGGER I. H. Johnson

ELEVATION	DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	SAMPLE RECOVERY	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: NAME, GRADATION OR PLASTICITY, PARTICLE SIZE DISTRIBUTION, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY, USCS GROUP SYMBOL	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS AND INSTRUMENTATION
	2							HN_3 reading background (~0.5ppm)
	4							
	6							
	8							
	10		SS-1	18"	6-11-18	Silty Clay, Gray, Stiff, moist some sand and fine gravel.		
	12							
	14		SS-2	0"	7-11-17	Silty Clay, Gray, stiff, moist some sand and fine gravel		
	16							
	18					~18'		
	20		SS-3	12"	4-4-12	Sand and Gravel, Fine to Coarse, Gray, wet		Sand flowed into bottom of HSA's to 6' B.G.S. after driving SS-3. Had to ream borehole with 6" I.D. HSA's and added water to set well pipe and screen.
	22							
	24					Bottom of Boring @ 25'		
	26							

Consulting Geotechnical & Materials Engineers

LOG OF BORING NO. 71

CLIENT: Northside Sanitary Landfill
PROJECT NAME: Landfill
PROJECT LOCATION: Zionsville, Indiana
BORING LOCATION:
FOREMAN: E. Lomax
INSPECTOR:

JOB NO. 21-21058
START DATE 10-23-82
FINISH DATE 10-23-82
BORING METHOD HSA
ROCK CORE DIA. ___ IN.
SHELBY TUBE DIA. ___ "

SOIL/ROCK DESCRIPTION (SURFACE ELEVATION ___ DATUM ___)	STRATUM DEPTH, FT.	DEPTH, FT.	STD. PENETRATION: SAMPLE NO.	BLOWS/6 IN. THREE 6 IN. INCREMENTS	RECOVERY, %	SHELBY TUBE NO.	BORING AND SAMPLING NOTES
Gray moist SILTY CLAY		5	1	4 5/6	25		
	7.5						
Brown very moist CLAYEY SAND		10	2	2 3/8	50		
	11.0						
Brown wet SILTY SAND and GRAVEL		15	3	8 10/12	25		
		20	4	13 25/29	100		
	22.5						
Gray wet SILTY SAND and GRAVEL		25	5	18 19/23	100		Set observation well @25.0'
	27.5						
Gray SANDY SILT with Gravel		30	6	38/83 0.5	100		
Bottom test boring @ 30.0'							

WATER LEVEL OBSERVATIONS
NOTED ON RODS 11.0 FT.
AT COMPLETION ___ FT.
AFTER ___ HRS. ___ FT.

BORING METHOD
HSA - HOLLOW STEM AUGER
CFA - CONTINUOUS FLIGHT AUGER
DC - DRIVEN CASING
MD - MUD DRILLING
RC - ROCK CORING
CA - CASING ADVANCER

*THESE SHELBY TUBE SAMPLES OBTAINED IN AN AUXILIARY BORING DRILLED A FEW FEET FROM THIS BORING

Consulting Geotechnical & Materials Engineers

LOG OF BORING NO. 70

CLIENT: Northside Sanitary Landfill
PROJECT NAME: Landfill
PROJECT LOCATION: Zionsville, Indiana
BORING LOCATION:
FOREMAN: E. Lomax
INSPECTOR:

JOB NO. 21-21058
START DATE 10-22-82
FINISH DATE 10-22-82
BORING METHOD HSA
ROCK CORE DIA. ____ IN.
SHELBY TUBE DIA. ____ IN.

SURFACE ELEVATION: DATUM:

SOIL/ROCK DESCRIPTION	STRATUM DEPTH, FT.	DEPTH, FT.	SAMPLE NO.	STD. PENETRATION BLOWS/6 IN. THREE 6 IN. INCREMENTS	RECOVERY, %	SHELBY TUBE NO.	BORING AND SAMPLING NOTES
Dark brown CLAY with Trash							
		5	1	4 6/4	25		Drove 3-times
	5.5						
Gray moist CLAYEY SAND			2	3 2/3	25		
		10	3	6 10/19	25		
	12.0						
Gray moist SANDY CLAY with Gravel							
		15	4	35/50 0.4	75		
	17.5						
Gray dry SANDY SILT with Gravel							
		20	5	25 35/40	75		
		25	6	37 27/50 0.4	100		
							Auger refusal@28.0'
Bottom test boring @28.0'							

WATER LEVEL OBSERVATIONS
NOTED ON RODS no FT.
AT COMPLETION no FT.
AFTER ____ HRS. ____ FT.

BORING METHOD
HSA – HOLLOW STEM AUGER
CFA – CONTINUOUS FLIGHT AUGER
DC – DRIVEN CASING
MD – MUD DRILLING
RC – ROCK CORING
CA – CASING ADVANCER

*THESE SHELBY TUBE SAMPLES OBTAINED IN AN AUXILIARY BORING DRILLED A FEW FEET FROM THIS BORING

Consulting Geotechnical & Materials Engineers

LOG OF BORING NO. 75

CLIENT: Northside Sanitary Landfill
PROJECT NAME: Landfill
PROJECT LOCATION: Zionsville, Indiana
BORING LOCATION:
FOREMAN: E. Lomax
INSPECTOR:

JOB NO. 21-21058
START DATE: 10-[illegible]-87
FINISH DATE: 10-[illegible]-87
BORING METHOD:
ROCK CORE DIA:
SHELBY TUBE DIA:

SOIL ROCK DESCRIPTION SURFACE ELEVATION DATUM	STRATUM DEPTH, FT.	DEPTH, FT.	SAMPLE NO	STD PENETRATION BLOWS/6 IN THREE 6 IN. INCREMENTS	RECOVERY, %	SHELBY TUBE NO	BORING AND SAMPLING NOTES
Gray very SANDY CLAY							
		5	1	3 3/6	50		
	8.0						
Brown wet SILTY SAND and GRAVEL		10	2	8 8/9	50		
		15	3	8 10/11	75		
	17.5						
Gray SANDY SILT with gravel and sand seams		20	4	11 18/29	75		
		25	5	39 49/50 0.4	100		2 Samples sand seam
							Set observation well @29.0'
Bottom test boring @ 28.8'		30	6	50 0.3	25		

WATER LEVEL OBSERVATIONS
NOTED ON RODS 8.5 FT.
AT COMPLETION ____ FT.
AFTER ____ HRS. ____ FT.

BORING METHOD
HSA – HOLLOW STEM AUGER
CFA – CONTINUOUS FLIGHT AUGER
DC – DRIVEN CASING
MD – MUD DRILLING
RC – ROCK CORING
CA – CASING ADVANCER

*THESE SHELBY TUBE SAMPLES OBTAINED IN AN AUXILIARY BORING DRILLED A FEW FEET FROM THIS BORING

Consulting Geotechnical & Materials Engineers

LOG OF BORING NO. 72

CLIENT: Northside Sanitary Landfill
PROJECT NAME: Landfill
PROJECT LOCATION: Zionsville, Indiana
BORING LOCATION:
FOREMAN: E. Lomax
INSPECTOR:

JOB NO. 21-21058
START DATE 10-25-82
FINISH DATE 10-25-82
BORING METHOD HSA
ROCK CORE DIA.
SHELBY TUBE DIA.

SOIL/ROCK DESCRIPTION SURFACE ELEVATION DATUM	STRATUM DEPTH, FT.	DEPTH, FT.	STD. PENETRATION SAMPLE NO.	BLOWS/6 IN. THREE 6 IN. INCREMENTS	RECOVERY, %	SHELBY TUBE NO.	BORING AND SAMPLING NOTES
Brown dry fine SAND	7.0	5	1	6 8/9	75		
Gray lightly moist SILTY CLAY with Sand	12.5	10	2	8 9/11	100		
Brown very moist SILTY SAND and GRAVEL	17.5	15	3	3 9/12	50		
Gray wet SILTY SAND and GRAVEL	22.5	20	4	11 19/21	100		
Gray moist SILTY CLAY with Silt and Gravel seams (0.2' thick)	27.0	25	5	11 14/13	100		
Gray SANDY CLAY with Gravel		30	6	8 15/27	75		Set observation well @ 28.5'
Bottom test boring @ 30.0'							

WATER LEVEL OBSERVATIONS
NOTED ON RODS 17.5 FT.
AT COMPLETION ____ FT.
AFTER ____ HRS. ____ FT.

BORING METHOD
HSA – HOLLOW STEM AUGER
CFA – CONTINUOUS FLIGHT AUGER
DC – DRIVEN CASING
MD – MUD DRILLING
RC – ROCK CORING
CA – CASING ADVANCER

* THESE SHELBY TUBE SAMPLES OBTAINED IN AN AUXILIARY BORING DRILLED A FEW FEET FROM THIS BORING

Appendix B
Test Pit Logs

GLT592/042

PROJECT NUMBER	TEST PIT NUMBER NSL- TP-100	SHEET 1 OF 1

TEST PIT WALL LOG

surface: sparse grasses, topsoil & clay fill

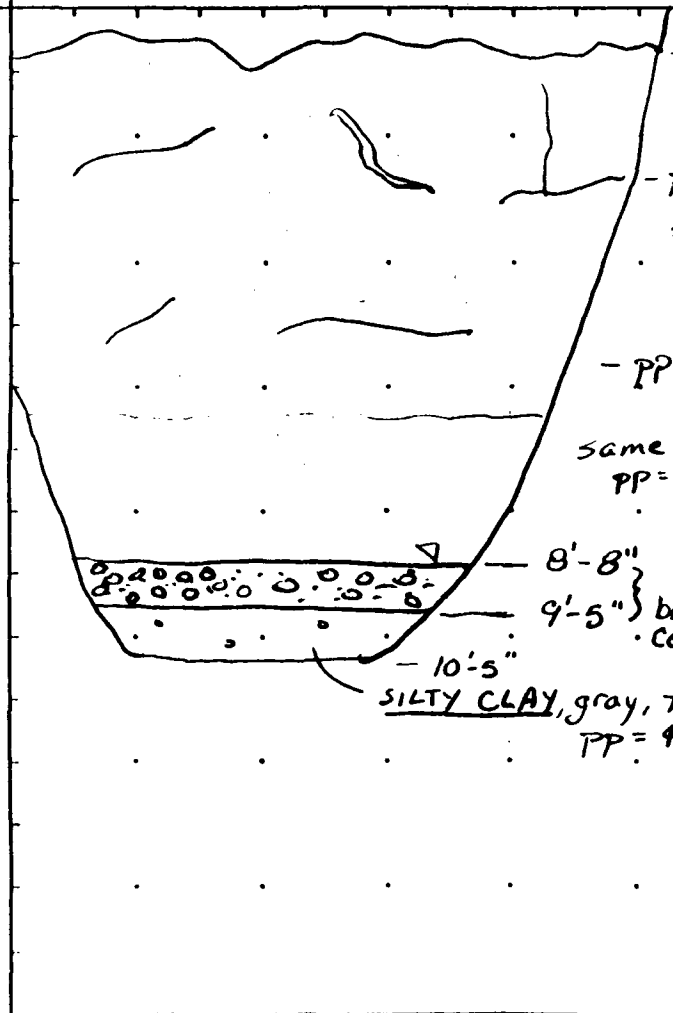
PROJECT NSL/ECC LOCATION BORROW PIT AREA MAP OF E WALL OF PIT

ELEVATION _____ CONTRACTOR ATEC, INDIANAPOLIS, IN DATE EXCAVATED 4/5/88

WATER LEVEL AND DATE _____ EXCAVATION METHOD BACKHOE, CAT 416 LOGGER L PALMER

APPROXIMATE DIMENSIONS: LENGTH 10'-5" WIDTH 4'-0 DEPTH 10'-2" REMARKS _____

DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER
	3.5	
	4.0	B & G1
5'		
	7.6'	G2
	8.7'	G3
10'		



0" to 8" topsoil with brown clay fill on surface

- pp = 2.0, 2.5, 2.75 @ 3'

SILTY CLAY, brown with gray streaks, desiccated, trace sand & gravel, moist; stiff to very stiff (CL-ML) glacial till

- pp = 3.5 @ 5' to 6'

same as above, hard
pp = 4.5 +

8'-8"
9'-5" } Well-graded SAND w/GRAVEL (SW) brown, 5% cobbles, evenly graded cobbles to fine sand; wet

- 10'-5"

SILTY CLAY, gray, trace sand and gravel, hard, moist
pp = 4.5 + tsf glacial till (CL-ML)

COMMENTS

Start 3:30 pm

Bulk Sample & Jar Sample @ 3'-10"

Jar Sample G2 @ 7'-7"

No Seepage Seams noted above 8'; walls dry

Jar Sample G3 @ 8'-8"

finished excavating 3:57 pm
water to 9'± from SW seam; hole backfilled

pp = pocket penetrometer tsf

REV 7/86 FORM D1599

CH2M HILL

PROJECT NO.	TEST PIT NO. NSL-TP-101	SHEET 1 OF 1

Surface brn fill & topsoil, recently burned

TEST PIT WALL LOG

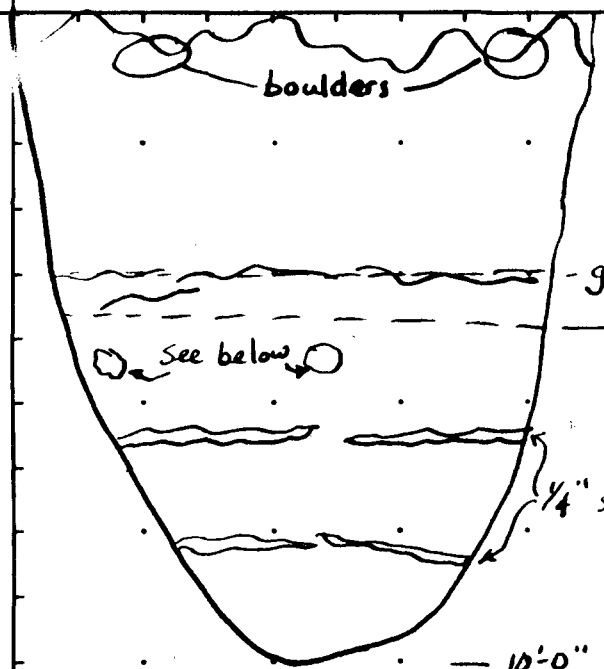
PROJECT NSL / ECC LOCATION BORROW PIT AREA MAP OF N WALL OF PIT

ELEVATION CONTRACTOR ATEC, INDIANAPOLIS, IN DATE EXCAVATED 4/5/88

WATER LEVEL AND DATE EXCAVATION METHOD BACKHOE, CAT 416 LOGGER L PALMER

APPROXIMATE DIMENSIONS: LENGTH 9± WIDTH 3'-9" DEPTH 10'-0 REMARKS

ELEVATION	DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	
		3.0'	G1	
	5'	3.6'	B & G2	
	10'			



0" to 10" SILTY CLAY FILL w/TOPSOIL, brown and black. Two 12" boulders

· SILTY CLAY, brown, trace sand & gravel, stiff, moist, glacial till (CL-ML)

PP = 2.0

- gray mottling

4'-6"

SILTY CLAY, same as above, very stiff

PP = 3.5 to 4.0

1/4" SILT SEAMS, gray, moist

10'-0"

seepage from 4"ϕ sandy areas @ 5'-4"

COMMENTS

Start 2:54 pm

JAR SAMPLE @ 4'-0

Bulk Sample & Jar @ 5'-7"

Water seeping to bottom of pit from seepage @ 5'-4"

finish excavation 3:16 p

hole back filled

pp = pocket penetrometer tsf

CH2M HILL

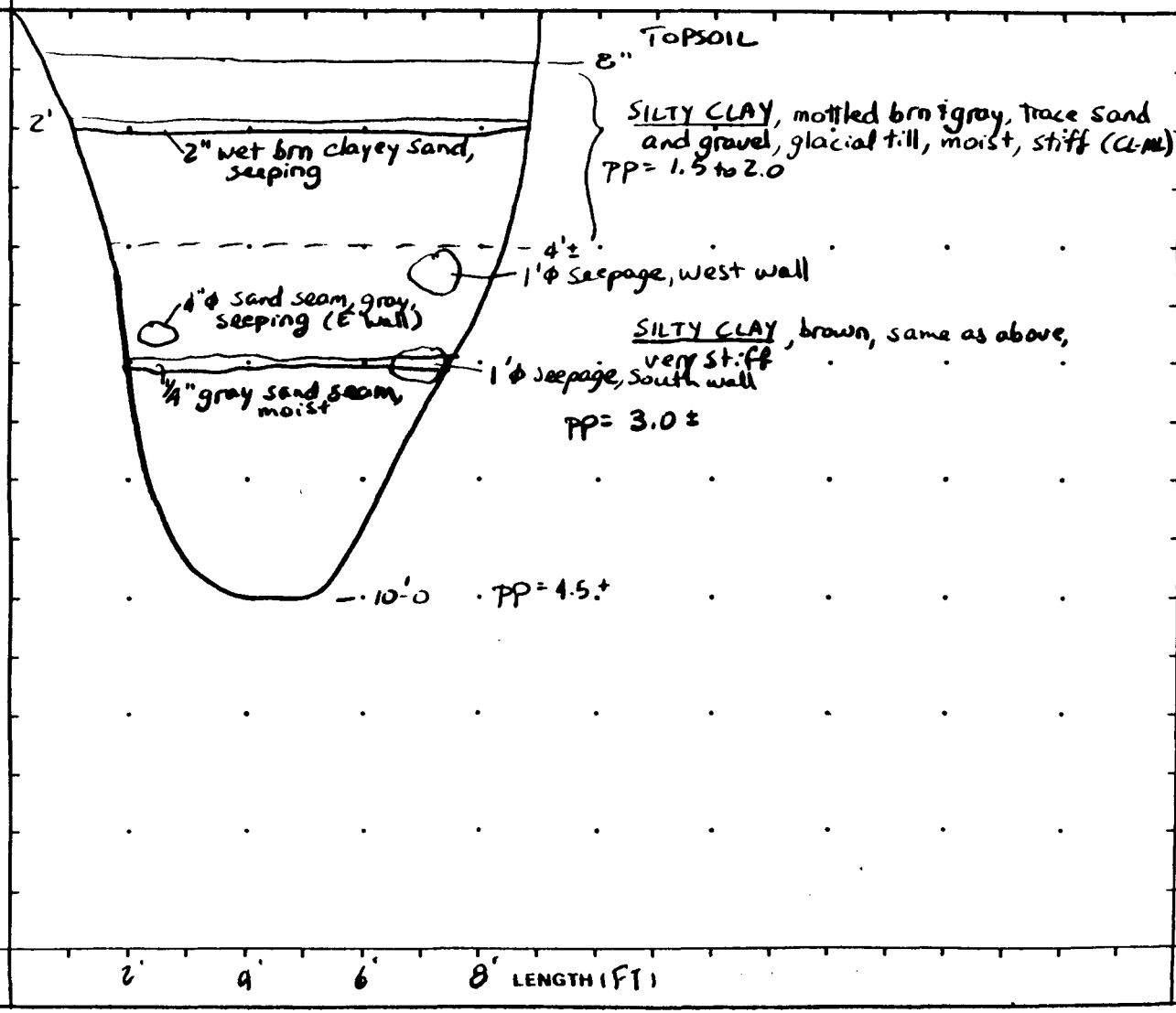
PROJECT NO.	TEST PIT NO. NSL-TP-102	SHEET 1 OF 1

Surface · mowed grass on topsoil

TEST PIT WALL LOG

PROJECT NSL/ECC
LOCATION BORROW PIT AREA
MAP OF ____ WALL OF PIT
ELEVATION
CONTRACTOR ATEC, INDIANAPOLIS, IN
DATE EXCAVATED 4/5/88
WATER LEVEL AND DATE
EXCAVATION METHOD BACKHOE, CAT 416
LOGGER L PALMER
APPROXIMATE DIMENSIONS: LENGTH 9'-3" WIDTH 3'-4" DEPTH 10'-0 REMARKS

ELEVATION	DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER
		3.0	G1
		7.5' / 8.0'	B & G2



COMMENTS

start 2:05 pm

Jar Sample @ 3'-0"

Seepage from areas 4' to 6' flowing water into pit

Bulk Sample & Jar Sample @ 7.6'-8'

finish excavating 2:30 pm

3"± water on bottom

hole back filled

pp: pocket penetrometer, tsf

CH2M HILL

PROJECT NO.	TEST PIT NO. NSL-TP-103	SHEET 1 OF 1

TEST PIT WALL LOG

Surface: light brush & weeds, topsoil + clay

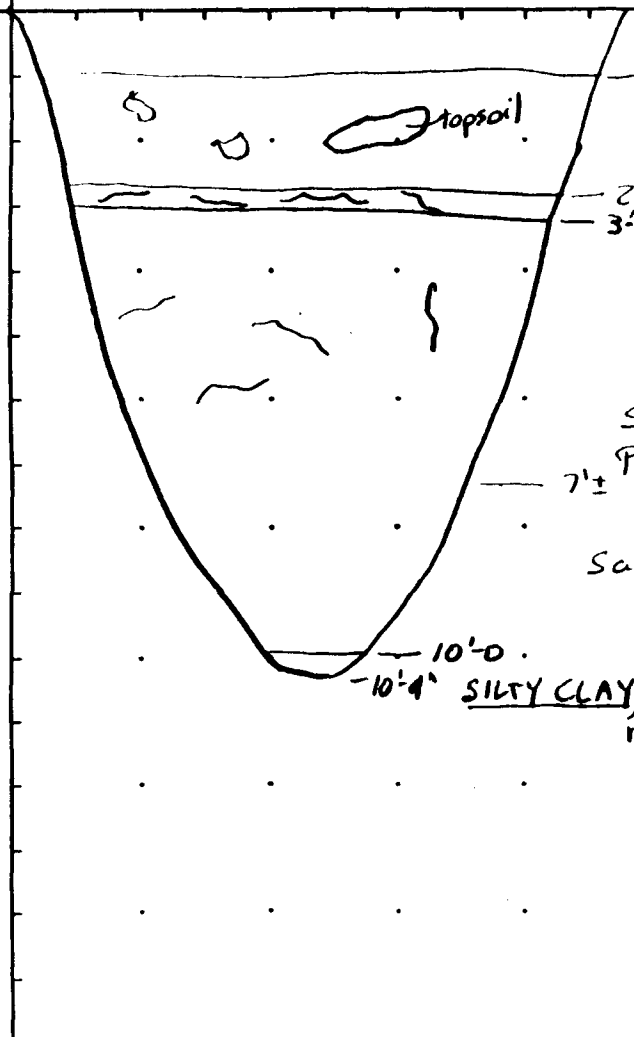
PROJECT NSL/ECL — LOCATION BORROW PIT AREA — MAP OF N WALL OF PIT

ELEVATION — CONTRACTOR ATEC — DATE EXCAVATED 4/5/88

WATER LEVEL AND DATE — EXCAVATION METHOD BACKHOE - 24" BUCKET — LOGGER L PALMER

APPROXIMATE DIMENSIONS: LENGTH 9'-3 WIDTH 4'-0 DEPTH 10'-4" REMARKS No WATER

ELEVATION	DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	COMMENTS
				Start 5:55 pm
		4.0	B1	Bulk Sample and Jar Sample G1 4.0'-4.5'
		4.5	G1	
	5'			
		9.0	G2	Jar Sample G2 @ 9'-0
	10'			



TOPSOIL & BROWN CLAY FILL

FILL: SILTY CLAY, brown, trace sand & gravel (CL-ML) pp = 1.0

SILTY CLAY, brown, trace sand & gravel, gray silt streaks in dessiccation cracks, (1/4" to 1" thick) at 2' intervals, moist, stiff (CL-ML)

Same as above, very stiff pp = 3.0, 4.0, 4.5, 3.5

Same as above, very stiff to hard, moist pp = 4.5, 4.0

SILTY CLAY; gray, trace sand & gravel, glacial till, moist, very stiff (CL-ML)

finished excavating 6:13p

backfill hole → DRY

No SEEPAGE NOTED

pp = pocket penetrometer, tsf

CH2M HILL

Surface: light brush & weeds, topsoil and brown fill

PROJECT NO.	TEST PIT NO. NSL - TP-104	SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT NSL/ECC LOCATION BORROW PIT AREA MAP OF NE WALL OF PIT

ELEVATION CONTRACTOR ATEC DATE EXCAVATED 4/5/88

WATER LEVEL AND DATE EXCAVATION METHOD BACKHOE, 24" BUCKET LOGGER L PALMER

APPROXIMATE DIMENSIONS: LENGTH 10'-8" WIDTH 3'-6" DEPTH 10'-5" REMARKS

ELEVATION	DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER		COMMENTS
				10" TOPSOIL	Start 4:20 pm
				SILTY CLAY; brown, trace sand & gravel (glacial till), moist, stiff (CL-ML) pp = 3.0	
				firm to stiff, pp = 2.0 moist to wet; 3'-6"; 15"ϕ BOULDER	Bulk Sample and Jar Sample - 5'-0 (brown clayey SILT)
5'	5.0'		B & G1	4'-8" CLAYEY SILT, brown, moist to wet, firm (ML)	
				5'-8" SILTY CLAY, brown, trace sand & gravel, (glacial till), moist, stiff (CL-ML) pp = 2.0	Jar Sample G2 @ 9.3'
	9.3'		G2	Same as above, very stiff to hard pp = 4.5	4:40 Water flowing through seepage holes @ 5'-5", 4'-7", 3'-3"; sides of pit sloughing into pit
10'				10'-5" Poorly graded SAND; brown, fine to medium, wet, (boiling through clay @ 10'-0) (under pressure) (SP)	finished pit @ 4:45; rapidly filling w/water
					pp: pocket penetrometer tsf

2' 4' 6' 8' LENGTH (FT)

CH2M HILL

surface topsoil with mowed grass

PROJECT NO.	TEST PIT NO. NSL - TP-105	SHEET 1 OF 1

TEST PIT WALL LOG

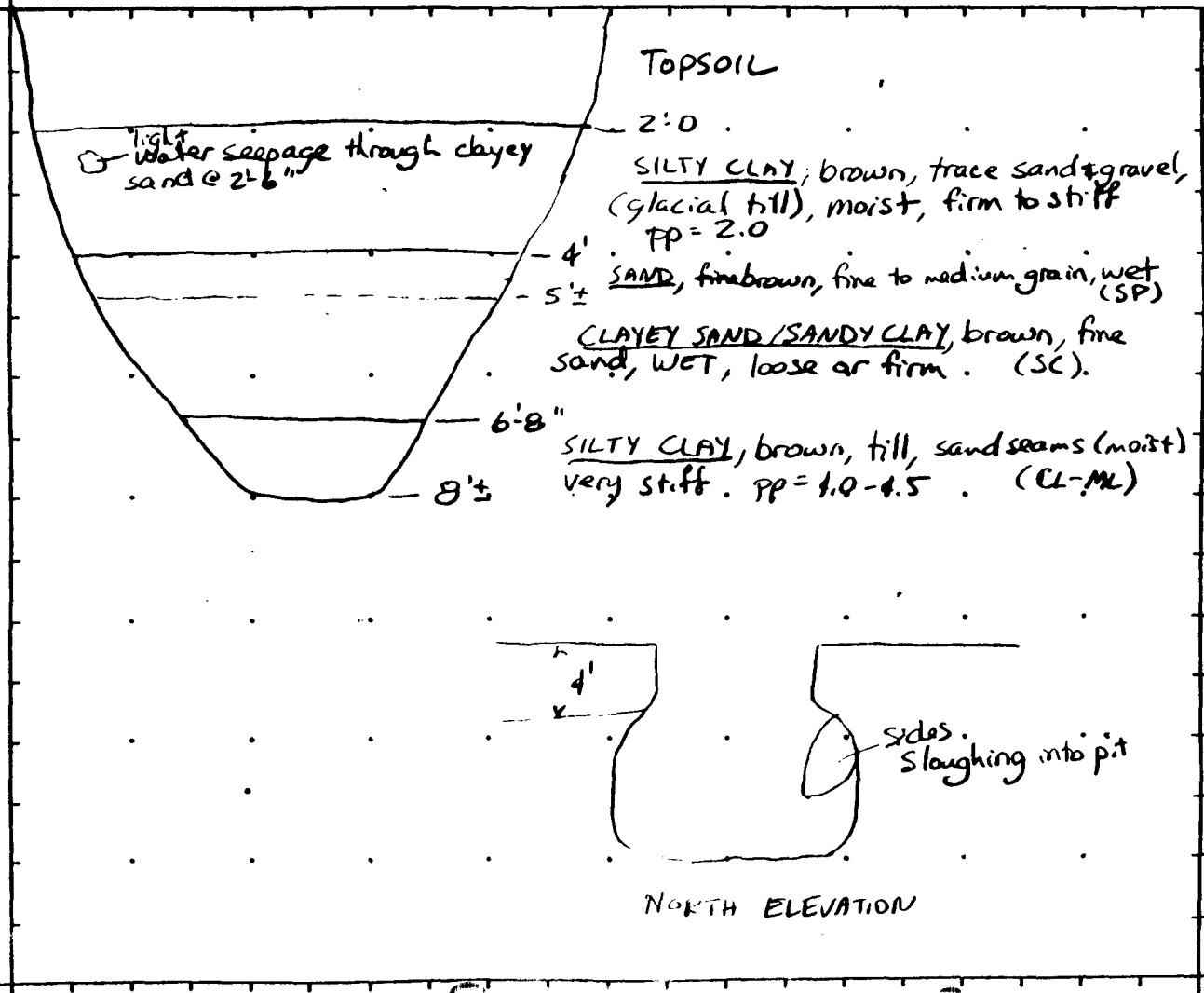
PROJECT NSL / ECC LOCATION BORROW PIT AREA MAP OF E WALL OF PIT

ELEVATION CONTRACTOR ATEC DATE EXCAVATED 4/5/88

WATER LEVEL AND DATE EXCAVATION METHOD BACKHOE, 24" BUCKET LOGGER L PALMER

APPROXIMATE DIMENSIONS: LENGTH 10'-0 WIDTH 5'-0 DEPTH 8'± REMARKS

ELEVATION	DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER
		4.0'	B1
		4.5'	G1
	5'		
		6.7'	G2
	10'		



COMMENTS

Start 11:30 am

JAR SAMPLE G1 @ 4'-0 brn fine to med. sand

JAR SAMPLE G2 @ 6'-8" CLAY

SIDES OF PIT SLOUGHING in, water flowing from 4' to 6', FILLING PIT faster than can dig.

Abandon excavation @ 8', 3' water and mud in bottom, rising

Backfill hole immediately

PP = pocket penetrometer tsf

CH2M HILL

PROJECT NO.	TEST PIT NO. NSL - TP-106	SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT NSL/ECC LOCATION BORROW AREA MAP OF N1 WALL OF PIT

ELEVATION _____ CONTRACTOR ATEC DATE EXCAVATED 4/5/88

WATER LEVEL AND DATE _____ EXCAVATION METHOD CAT 416 TRACTOR LOGGER SL KUEPPEL

APPROXIMATE DIMENSIONS: LENGTH 10' WIDTH 4' DEPTH 10' REMARKS _____

ELEVATION	DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER		COMMENTS
				TOPSOIL, brown, moist, ML	
				SILTY lean CLAY, brown, moist, firm, CL-ML	
			G-1	SILTY lean CLAY, brown, moist, hard, rock fragments, & up to cobble, CL-ML	BULK SAMPLE @ 3' PP = 4.5+ TSF
	5			SILTY GRAVEL, brown, medium dense, moist, GM	
				SILTY lean CLAY, brown, moist, hard, some gravel, CL-ML	
			G-2		
				CLAYEY SILT, gray, moist, hard, ML	
	10				

0 5 LENGTH (FT) 10

CH2M HILL

PROJECT NO.	TEST PIT NO. NSL-TP 107	SHEET 1 OF 1

TEST PIT WALL LOG

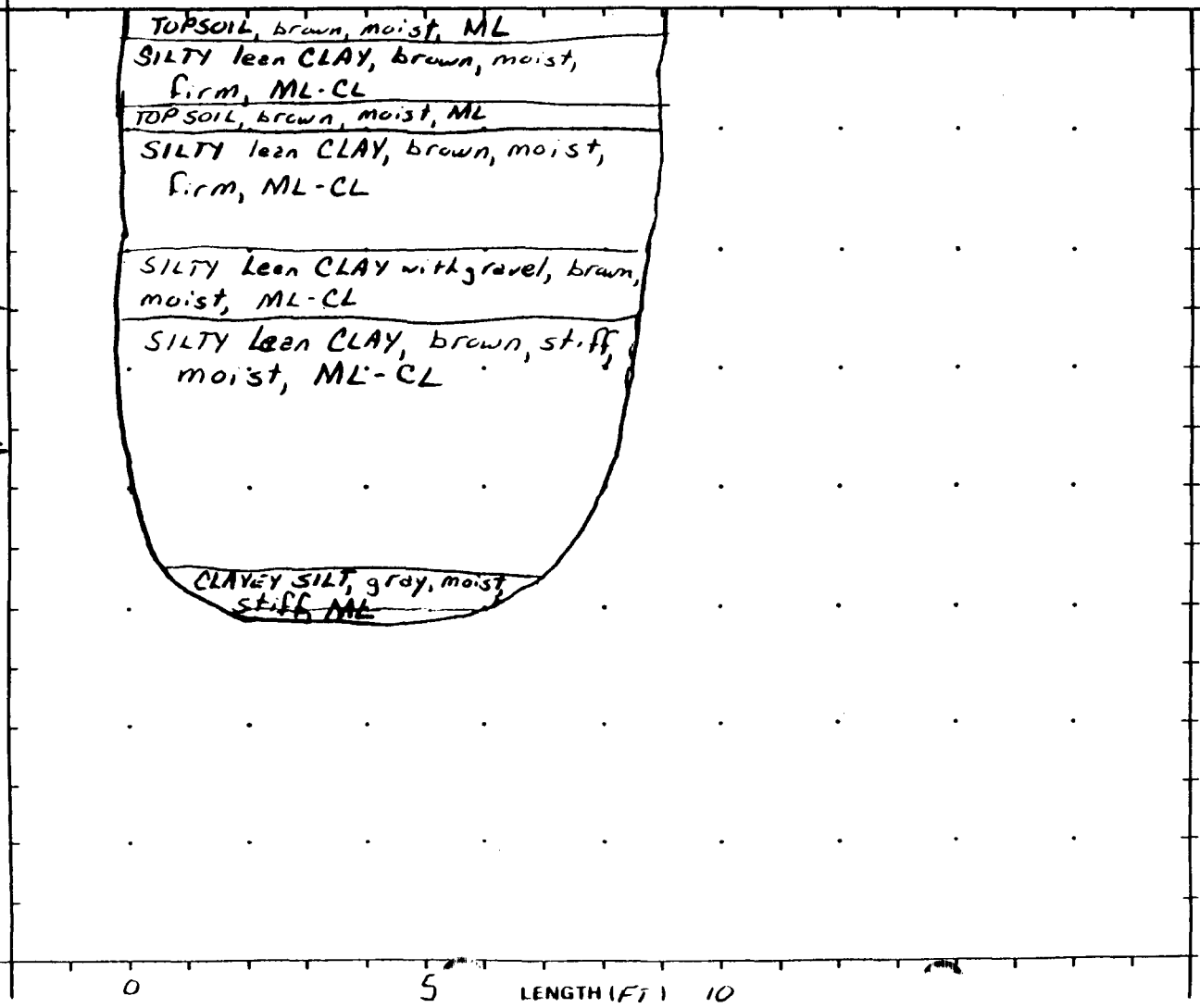
PROJECT NSL/ECC LOCATION Borrow Area MAP OF W WALL OF PIT

ELEVATION ____ CONTRACTOR ATEC DATE EXCAVATED 4/5/88

WATER LEVEL AND DATE 4/5/88 4' EXCAVATION METHOD CAT 416 Tractor LOGGER SL Koeppel

APPROXIMATE DIMENSIONS: LENGTH 9' WIDTH 3½' DEPTH 10' REMARKS ____

ELEVATION	DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	DESCRIPTION	COMMENTS
				TOPSOIL, brown, moist, ML	
				SILTY lean CLAY, brown, moist, firm, ML-CL	
				TOPSOIL, brown, moist, ML	
				SILTY lean CLAY, brown, moist, firm, ML-CL	BULK SAMPLE @ 3'-5'
				SILTY lean CLAY with gravel, brown, moist, ML-CL	
	5		G-1	SILTY lean CLAY, brown, stiff, moist, ML-CL	
			G-2		
	10			CLAYEY SILT, gray, moist, stiff ML	



CH2M HILL

PROJECT NO.	TEST PIT NO. NSL-	
NSL/ECC	TP 108	SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT NSL/ECC LOCATION Borrow Area MAP OF N WALL OF PIT

ELEVATION _____ CONTRACTOR ATEC DATE EXCAVATED 4/4/88

WATER LEVEL AND DATE 4/5/88 3.0' EXCAVATION METHOD Cat 416 Tractor LOGGER SL Kuppel

APPROXIMATE DIMENSIONS: LENGTH 12' WIDTH 4' DEPTH 10' REMARKS _____

ELEVATION	DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	
				TOPSOIL, dark brown, moist, organics, ML
				SILTY lean CLAY, brown, moist, firm, low to moderate plasticity, ML-CL
			G-1	
				As Above, wet, ML-CL
	5			SILTY lean CLAY with sand, brown, firm, wet, low plasticity, ML-CL
			G-2	
				SILTY lean CLAY, brown, stiff, moist, low plasticity, CL
	10			

LENGTH (FT) 0 5 10

COMMENTS

PP = 1.0 TSF

BULK SAMPLE @ 3.0

WATER SEEPS BETWEEN 3 & 4.5'

CH2M HILL

PROJECT NO.	TEST PIT NO. NSL - TP109	SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT NSL/ECC LOCATION Borrow Area MAP OF N WALL OF PIT

ELEVATION _____ CONTRACTOR ATEC DATE EXCAVATED 4/4/88

WATER LEVEL AND DATE _____ EXCAVATION METHOD CAT 416 Tractor LOGGER S L Koeppel

APPROXIMATE DIMENSIONS: LENGTH 85' WIDTH 3' DEPTH 10' REMARKS _____

ELEVATION	DEPTH BELOW SURFACE (FT)	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER		COMMENTS
				TOPSOIL, brown, moist, soft, ML	
			G-1	SILTY lean CLAY, brown, moist, stiff, CL-ML	
	5			As Above, wet, CL-ML	
			G-2	SANDY CLAY with gravel, brown, wet, soft, CL	BULK SAMPLE @ 8'
	10			SANDY CLAY, brown, wet, stiff, CL	

0 5 LENGTH (FT) 10

CH2M HILL

PROJECT NO.	TEST PIT NO. NSL-TP-110	SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT NSL/ECC LOCATION South of NSL MAP OF ____ WALL OF PIT

ELEVATION ____ CONTRACTOR ATEC DATE EXCAVATED 4/6/88

WATER LEVEL AND DATE ____ EXCAVATION METHOD Backhoe LOGGER JRB

APPROXIMATE DIMENSIONS: LENGTH 10' WIDTH 2½' DEPTH 10' REMARKS Excavation made to determine trench excavation Feasibility

ELEVATION	DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	DESCRIPTION
				Topsoil, light brown, dry, grass roots.
	2'			Sand, gray & tan, fine, moist, some gravel, very soft, ~10% silt.
	4'			Gravel, brown to gray, ~10% silt, clean pockets in places of water flow, occasional cobbles.
	6'			Silty Clay, gray, moist to wet, low plasticity, ~10% small rounded gravel.
	8'			
	10'			

LENGTH (ft) 2' 4' 6' 8' 10' 12'

COMMENTS

There was immediate water flow from the gravel zone.

Stability did not seem to be a problem.

Dewatering would take considerable effort.

CH2M HILL

PROJECT NO.	TEST PIT NO. NSL-TP-111	SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT NSL/ECC LOCATION South of NSL MAP OF ____ WALL OF PIT

ELEVATION ____ CONTRACTOR ATEC DATE EXCAVATED 4/6/88

WATER LEVEL AND DATE ____ EXCAVATION METHOD Backhoe LOGGER JRB

APPROXIMATE DIMENSIONS: LENGTH 10' WIDTH 2½' DEPTH 10' REMARKS to determine excavation feasibility

ELEVATION	DEPTH BELOW SURFACE	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER	
				Topsoil, dark brown, moist, roots up to 2" diam.
	2'			Sand, brown, moist, well graded, ~5% fines.
	4'			Sandy Gravel, tan to brown, some cobble size stone, ~10% silt,
	6'			Clayey Silt gray (till), hard, with small rounded gravel, low plasticity.
	8'			
	10'			

LENGTH (ft) 2' 4' 6' 10'

COMMENTS

Excavation of the sand seems to be no problem.

Gravel layer began flowing water immediately and began collapsing after 5 min. of exposing. The sand collapsed also once the gravel was gone.

Note: Finley Creek surface is 2½' below ground surface. (3' high from 4/5/88)

CH2M HILL

PROJECT NO.	TEST PIT NO. NSL - TP112	SHEET 1 OF 1

TEST PIT WALL LOG

PROJECT NSL / ECC LOCATION _____ MAP OF W WALL OF PIT

ELEVATION _____ CONTRACTOR ATEC, INDIANAPOLIS, IN DATE EXCAVATED 4-13-88

WATER LEVEL AND DATE _____ EXCAVATION METHOD BACKHOE LOGGER B BROWNFIELD

APPROXIMATE DIMENSIONS: LENGTH ~10' WIDTH ~3½' DEPTH ~5' REMARKS _____

ELEVATION	DEPTH BELOW SURFACE (')	SAMPLE INTERVAL	SAMPLE TYPE AND NUMBER		COMMENTS
				SILT, DARK BROWN, MOIST, LOTS OF ROOTS, RICH TOPSOIL	START @ 1440
				SAND, BROWN, MOIST, 10% SILT.	STABLE
	5			SAND, BROWN, COARSE-GRAINED, CLEAN	▽ @ 4.5' BOTTOM OF HOLE FILLS W/ H_2O. IMMEDIATE SLOUGHING. OVERLYING SOIL SLOUGHS DUE TO UNDERCUTTING OF LOWER SAND
					UNABLE TO EXCAVATE MORE THAN 5' W/O FILL IN OF BOTTOM
					END @ 1525

2 4 6 8 10 LENGTH (FT)

Appendix C
Cone Penetrometer Logs and Data

GLT592/042

Note: Surface ground elevations which are approximate are:

CPT 100, 100A, 101, 102, 102A, 102B, 103, 104, 105, 106, 107, 108, 109, 119, 122A, 125, 125A, 128A, 129, 129B, 134, 135, 136, 137, 137A, 137B, 138A

All groundwater elevations are approximate.

GLT636/51

CPT NUMBER, SURFACE ELEVATION, COMPLETION DEPTH, AND ESTIMATED GROUND WATER ELEVATION

CPT NUMBER	SURFACE GROUND ELEVATION, MSL	COMPLETION DEPTH, FT	GROUND WATER ELEVATION, MSL
100	922.1	12.30	911.1
100A	922.1	13.12	911.1
101	919.8	17.22	913.2
102	927.5	16.40	913.2
102A	927.5	5.74	913.2
102B	927.5	16.56	913.2
103	917.4	45.92	913.2
104	914.9	18.04	913.2
105	919.4	51.66	916.9
106	924.2	24.60	916.9
107	926.8	22.14	916.9
108	931.0	24.60	924.4
109	933.4	23.78	924.4
119	889.4	5.74	881.9
119A	889.4	18.04	881.9
120	886.1	17.22	881.9
121	886.1	13.94	882.3
122	884.9	4.10	882.3
122A	884.9	15.58	882.3
123	887.9	23.78	882.3
124	884.5	12.30	877.7
125	882.0 ?	10.66	874.9
125A	882.0 ?	10.66	874.9
126	880.6	20.50	874.9
127	877.7	16.40	873.7
128	876.6	5.74	873.7
128A	876.6	9.02	873.7
129	876.2	4.10	872.6
129A	876.2	9.02	872.6
129B	876.2	9.84	872.6
130	874.4	16.40	871.5
131	874.5	18.04	871.5
132	883.0	9.02	877.7
133	885.5	18.04	875.5

CPT NUMBER, SURFACE ELEVATION, COMPLETION DEPTH, AND ESTIMATED GROUND WATER ELEVATION

CPT NUMBER	SURFACE GROUND ELEVATION, MSL	COMPLETION DEPTH, FT	GROUND WATER ELEVATION, MSL
134	880.1	25.42	872.8
135	880.1	18.04	872.8
136	879.0	3.28	874.4
137	882.6	2.46	877.2
137A	882.6	3.28	877.2
137B	882.6	2.46	877.2
138	879.5	3.28	874.5
138A	879.5	35.26	874.5

LEGEND FOR CPT LOGS

SOIL BEHAVIOR TYPE

Fill

Gravelly

Sand

Sandy

Silt

Silty

Clay

Clayey

NOTE:
Predominant Type Shown in Bold

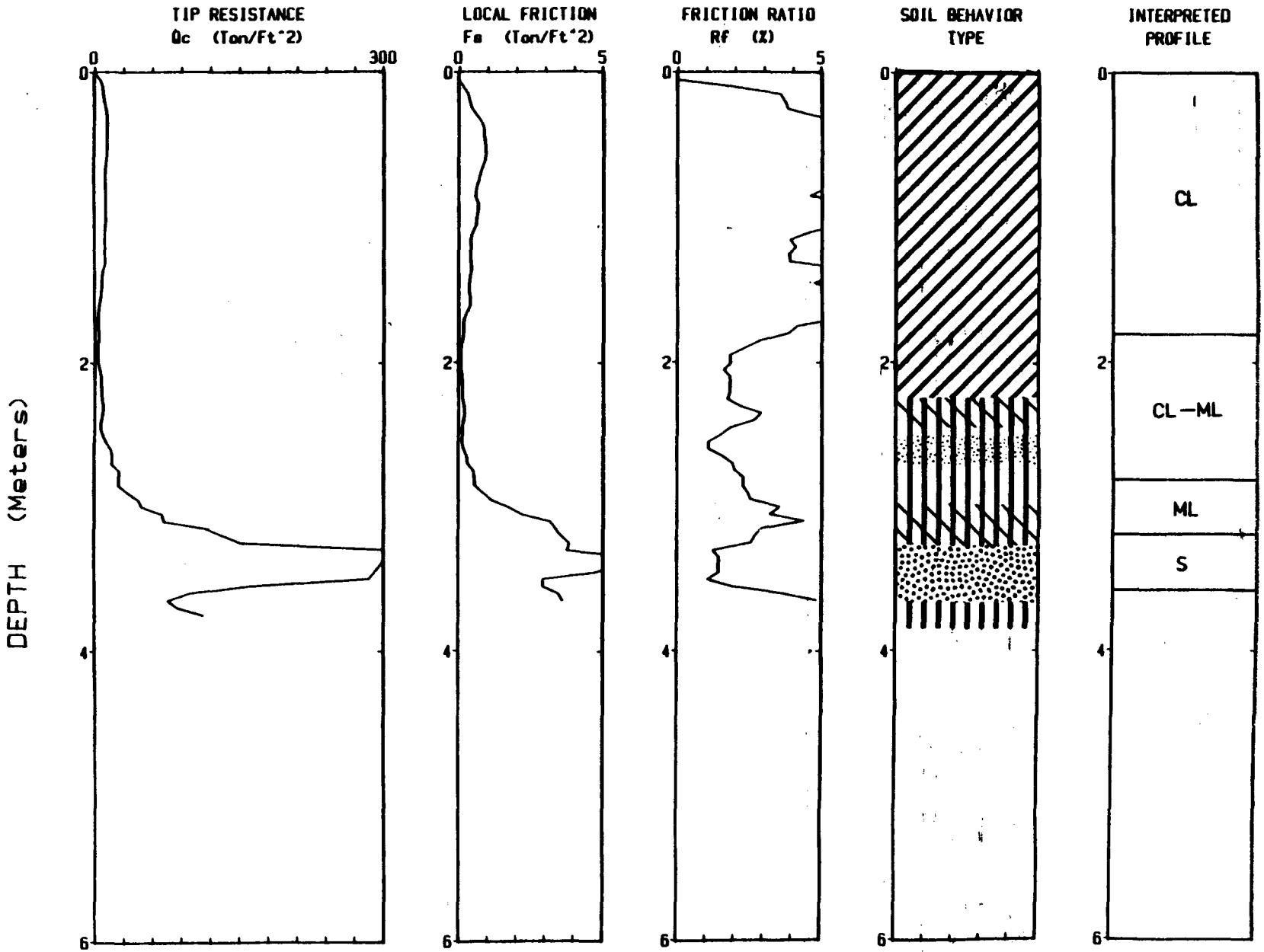
INTERPRETED PROFILE

FILL	Misc. Fill, Granular Fill, Rubble
TOP-SOIL	Topsoil or Tilled Soil
CL	Clay
CL—ML	Silty Clay
ML	Silt
S	Undifferentiated: Sand, Silty Sand, or Clayey Sand
G	Undifferentiated: Gravel, Silty Gravel, or Clayey Gravel
S—G	Sandy Gravel/Gravelly Sand

NORTHSIDE LANDFILL

Contractor: TERRA TECH. Test Date: 04-08-88 Page No: 1 / 1

Location: CPT-100 Elevation: 922.1 MSL TERRA Job No.: 88-1008

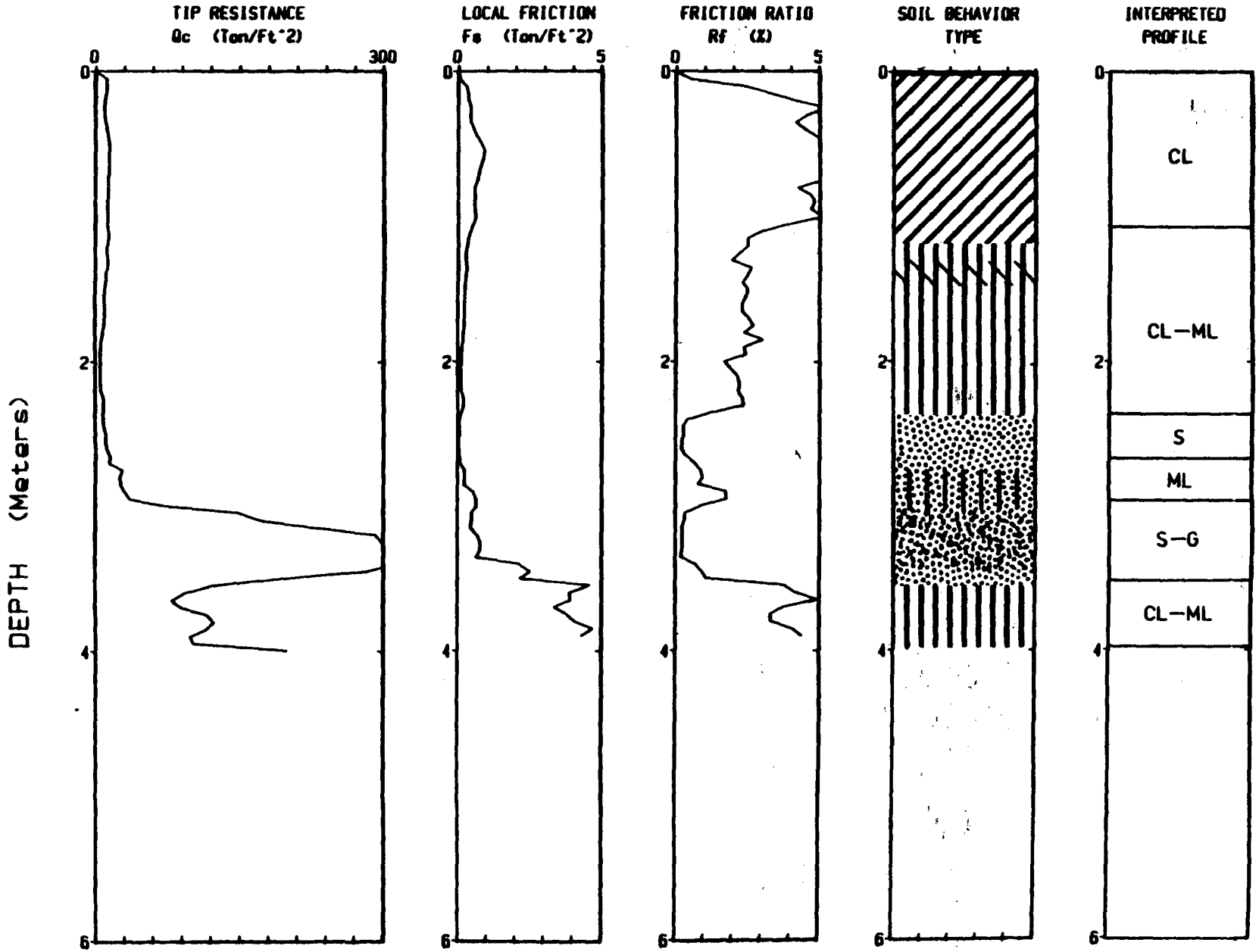


Depth Increment : .05 m Max Depth : 3.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-08-88 | Page No: 1 / 1

Location: CPT-100A | Elevation: 922.1 MSL | TERRA Job No.: 88-1008



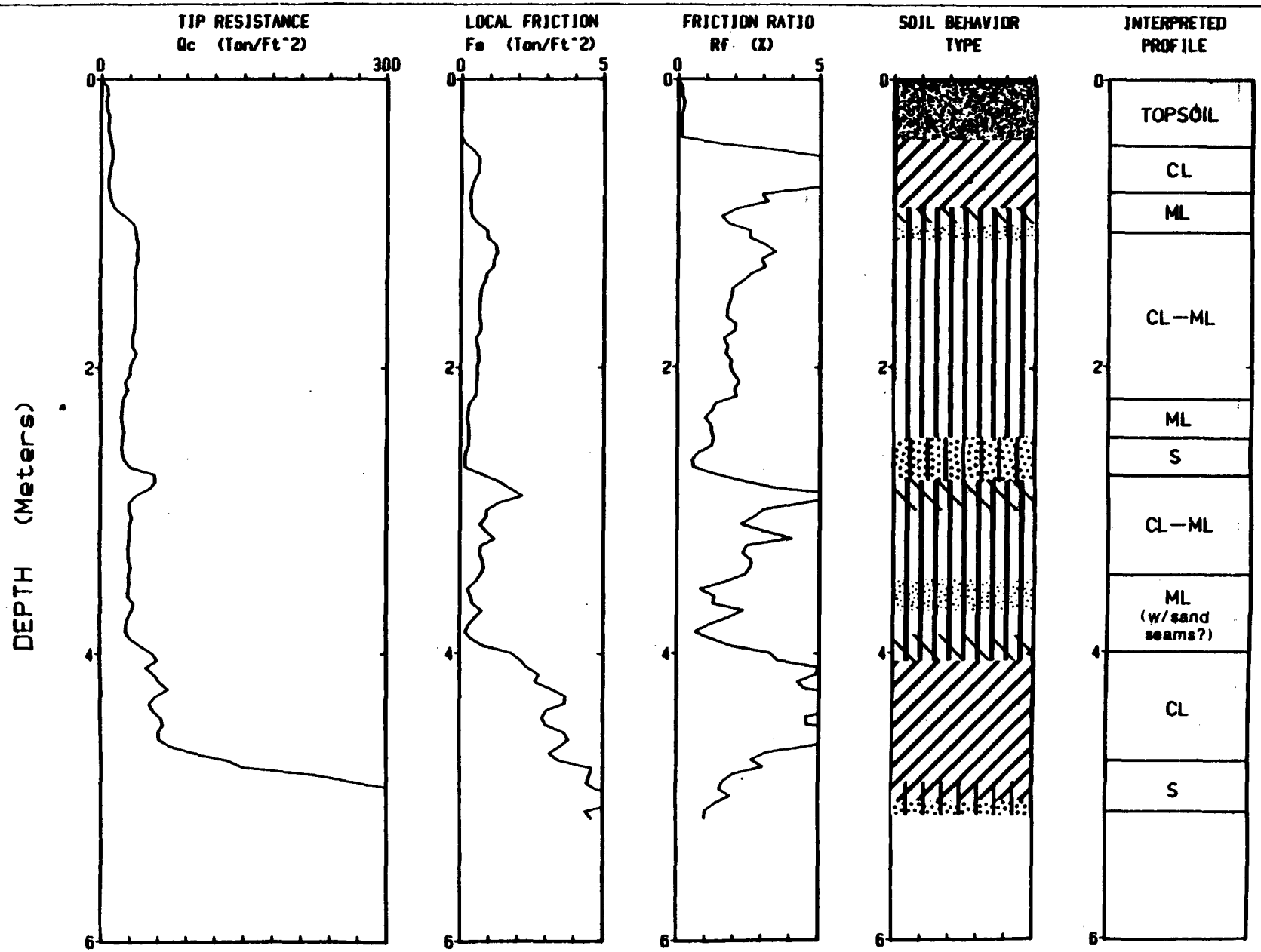
Depth Increment .05 m

Max Depth : 4 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-08-88 | Page No: 1 / 1

Location: CPT-101 | Elevation: 919.8 MSL | TERRA Job No.: 88-1008



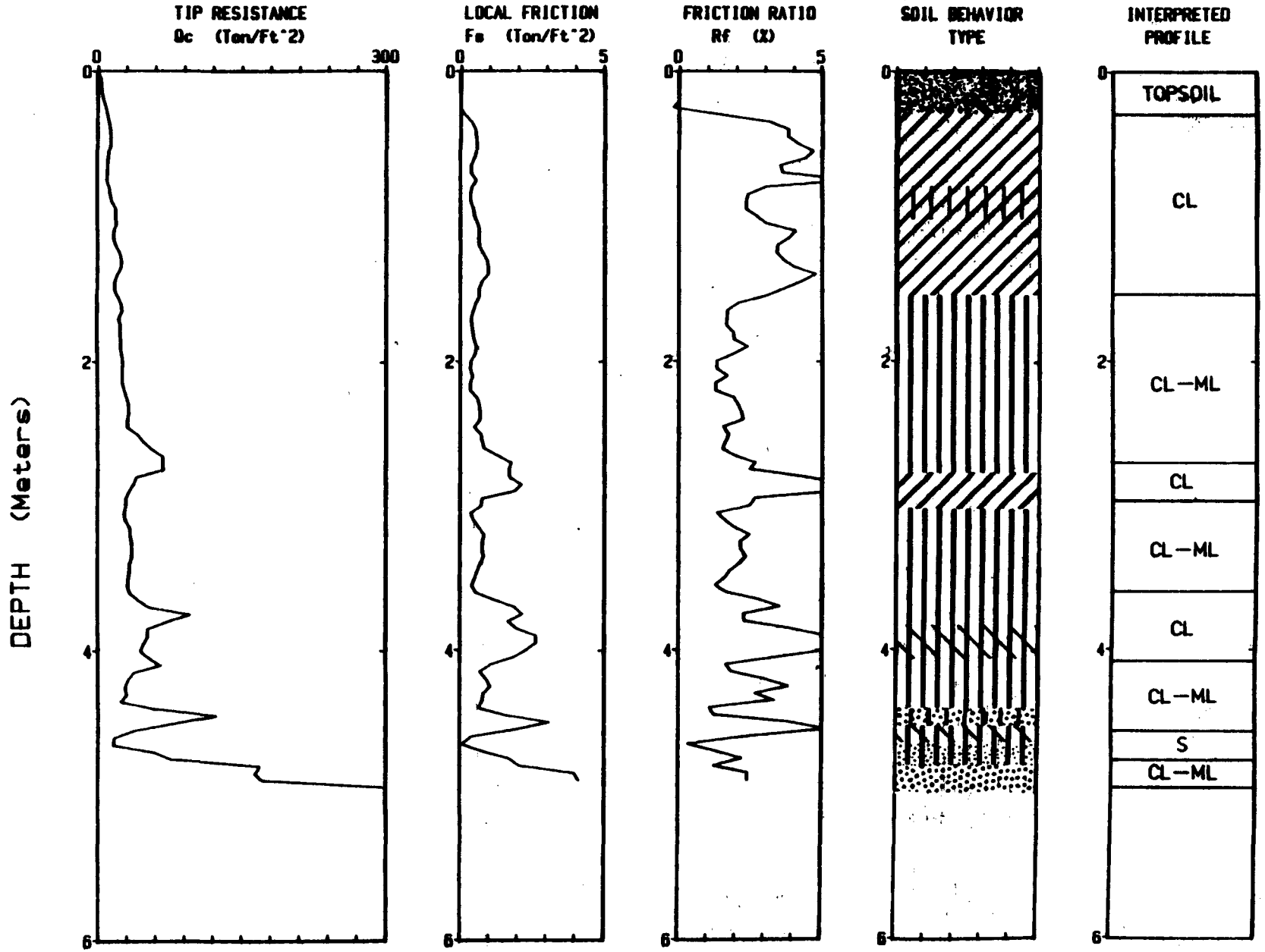
Depth Increment : .05 m

Max Depth : 5.25 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-08-88 | Page No: 1 / 1

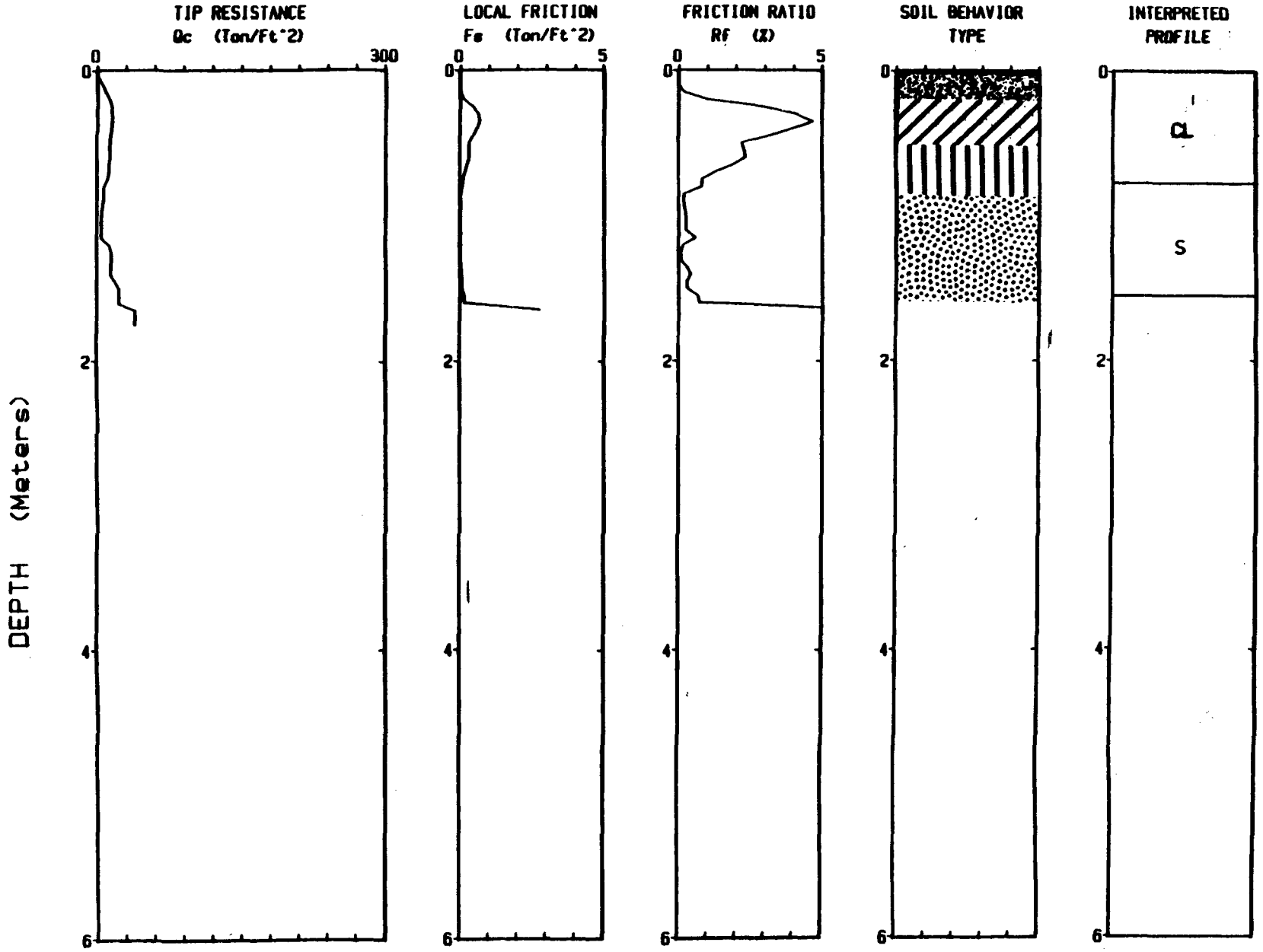
Location: CPT-102 | Elevation: 927.5 MSL | TERRA Job No.: 88-1008



NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-08-88 | Page No: 1 / 1

Location: CPT-102A | Elevation: 927.5 MSL | TERRA Job No.: 88-1008



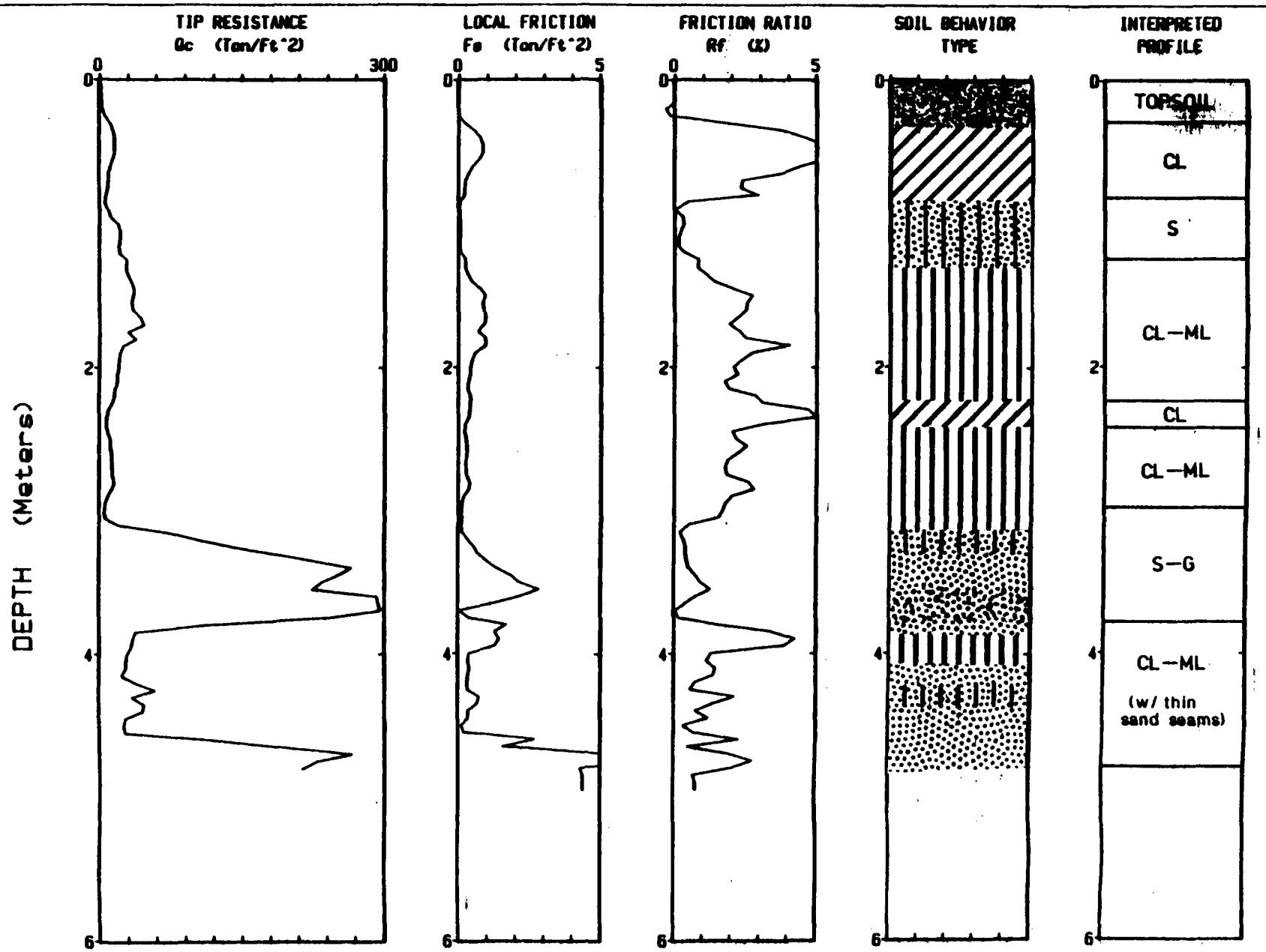
Depth Increment : .05 m

Max Depth : 1.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-08-88 | Page No: 1 / 1

Location: CPT-102B | Elevation: 927.5 MSL | TERRA Job No.: 88-1008



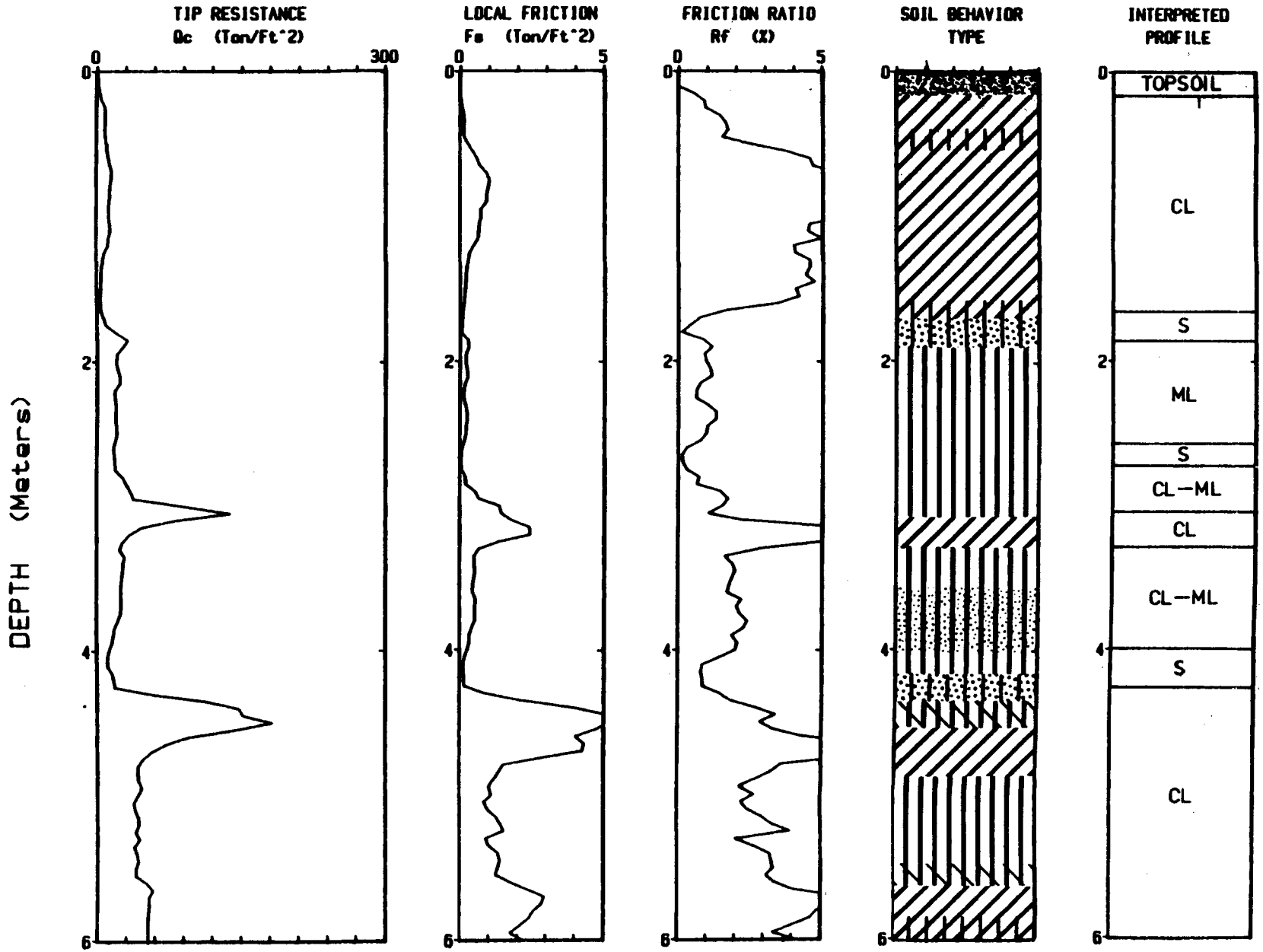
Depth Increment : .05 m

Max Depth : 5.05 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-07-88 | Page No: 1 / 3

Location: CPT-103 | Elevation: 917.4 MSL | TERRA Job No.: 88-1008



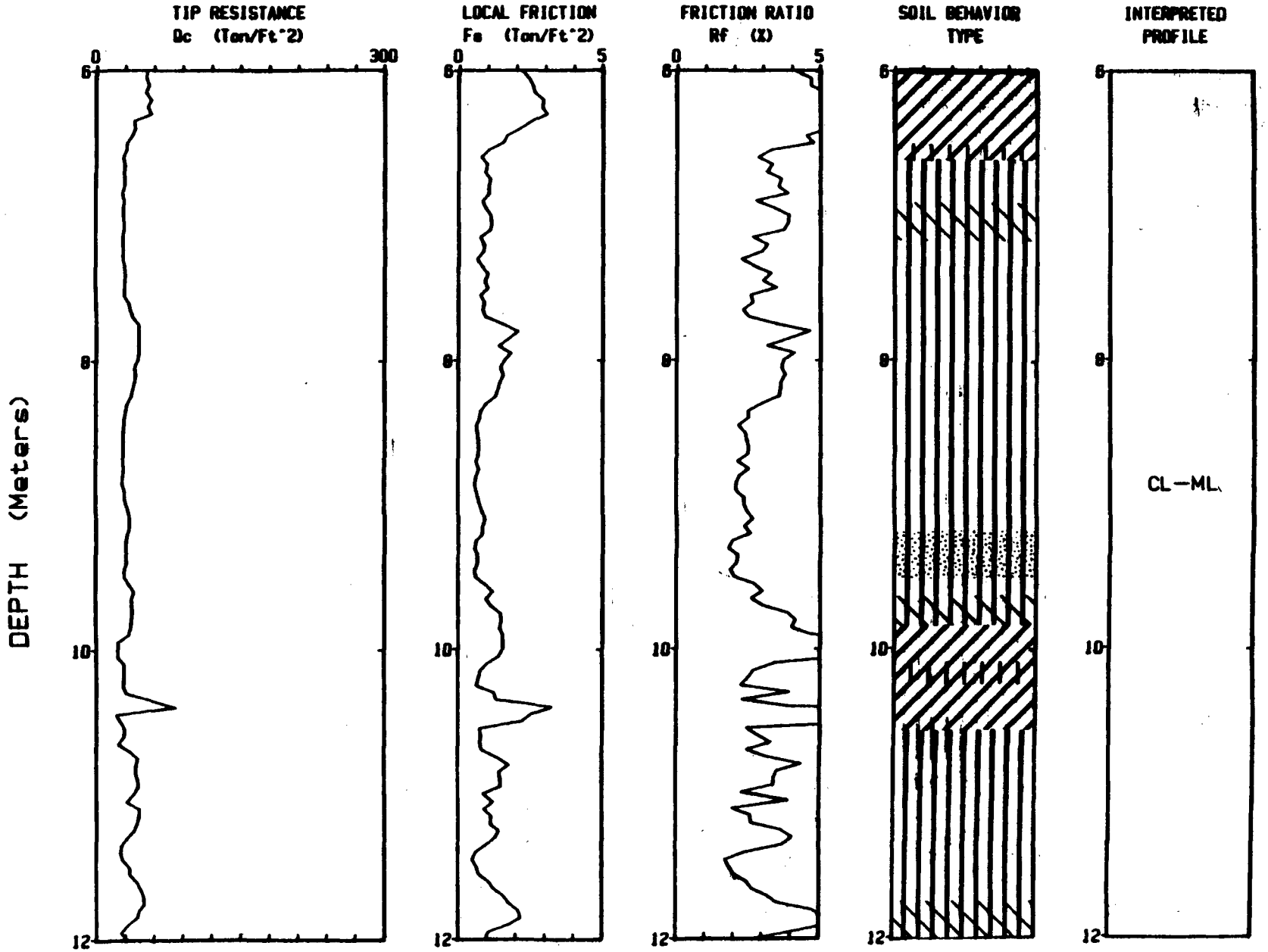
Depth Increment : .05 m

Max Depth : 14 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-07-88 | Page No: 2 / 3

Location: CPT-103 | Elevation: 917.4 MSL | TERRA Job No.: 88-1008



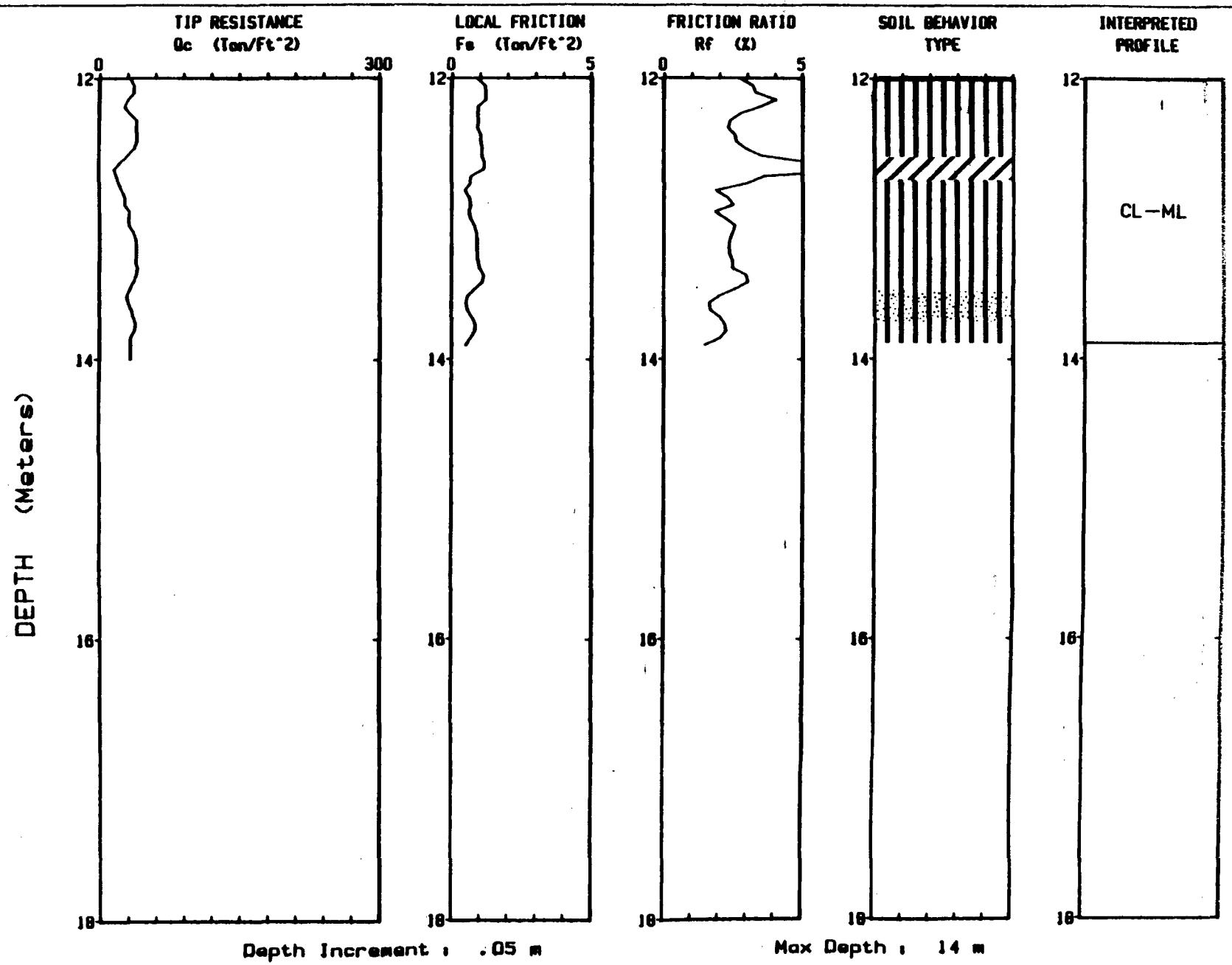
Depth Increment .05 m

Max Depth : 14 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-07-88 | Page No: 3 / 3

Location: CPT-103 | Elevation: 917.4 MSL | TERRA Job No.: 88-1008



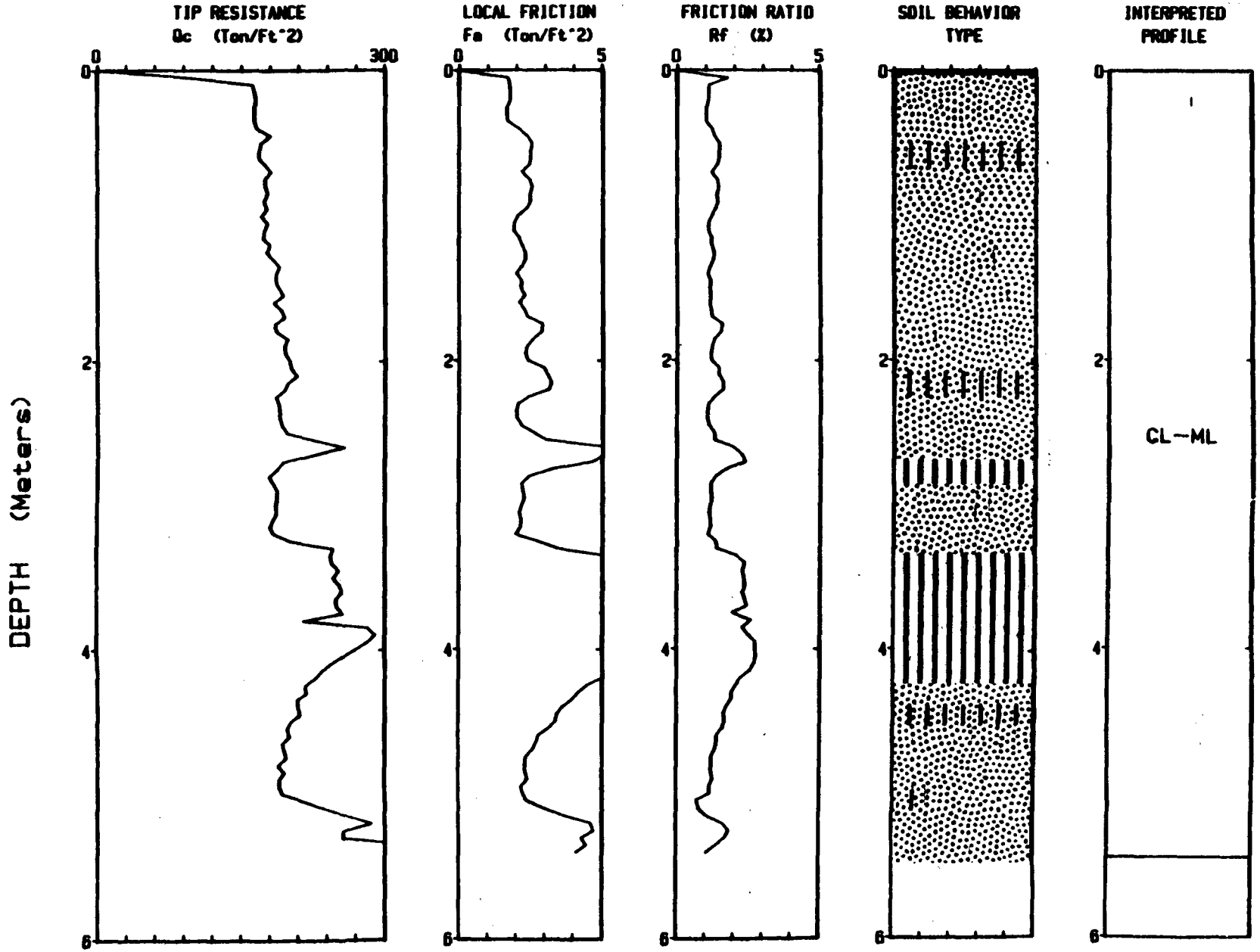
Depth Increment : .05 m

Max Depth : 14 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-07-88 | Page No: 1 / 1

Location: CPT-104 | Elevation: 914.9 MSL | TERRA Job No.: 88-1008



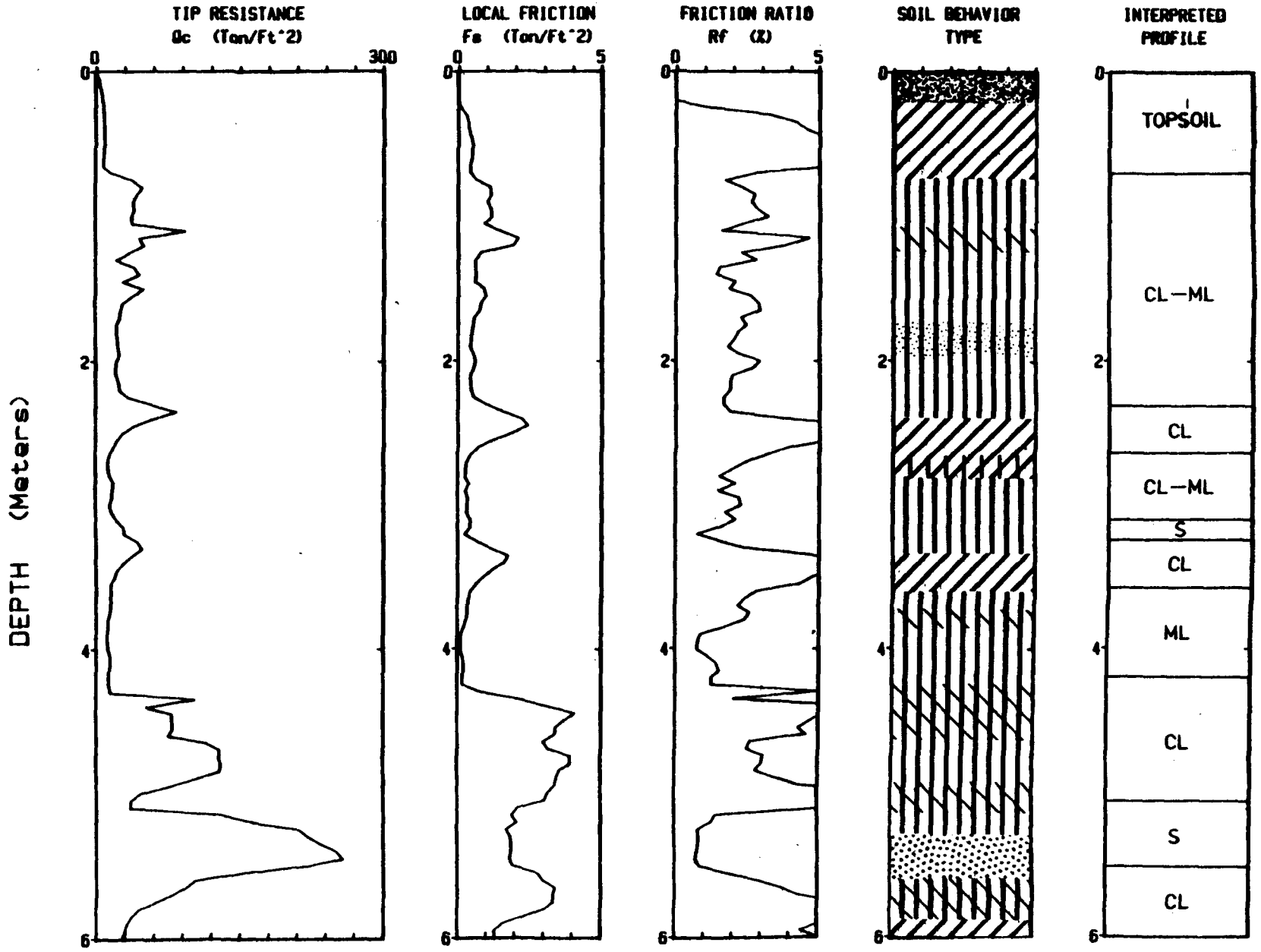
Depth Increment : .05 m

Max Depth : 5.5 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-10-88 | Page No: 1 / 3

Location: CPT-105 | Elevation: 919.4 MSL | TERRA Job No.: 88-1008



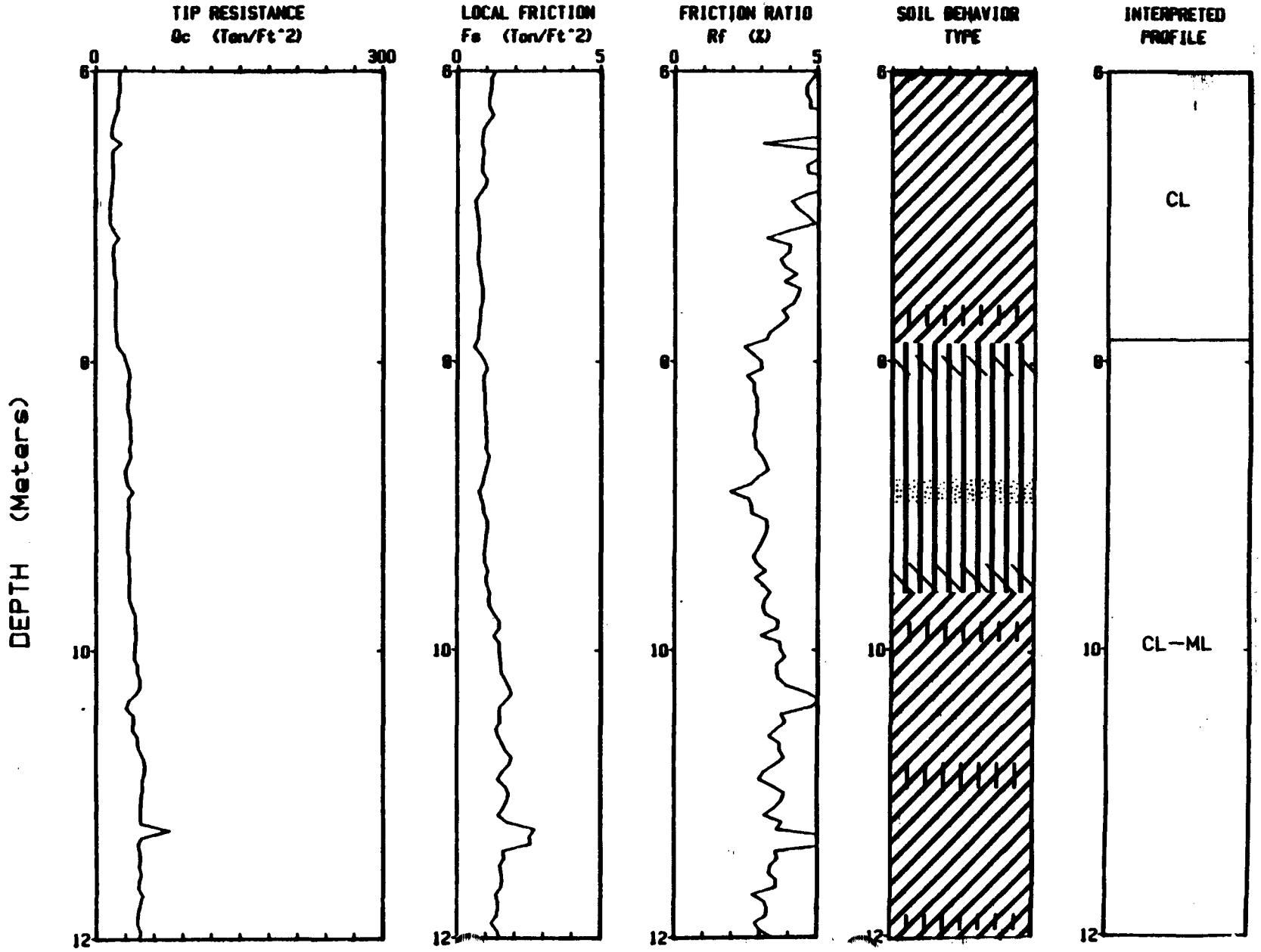
Depth Increment : .05 m

Max Depth : 15.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-10-88 | Page No: 2 / 3

Location: CPT-105 | Elevation: 919.4 MSL | TERRA Job No.: 88-1008



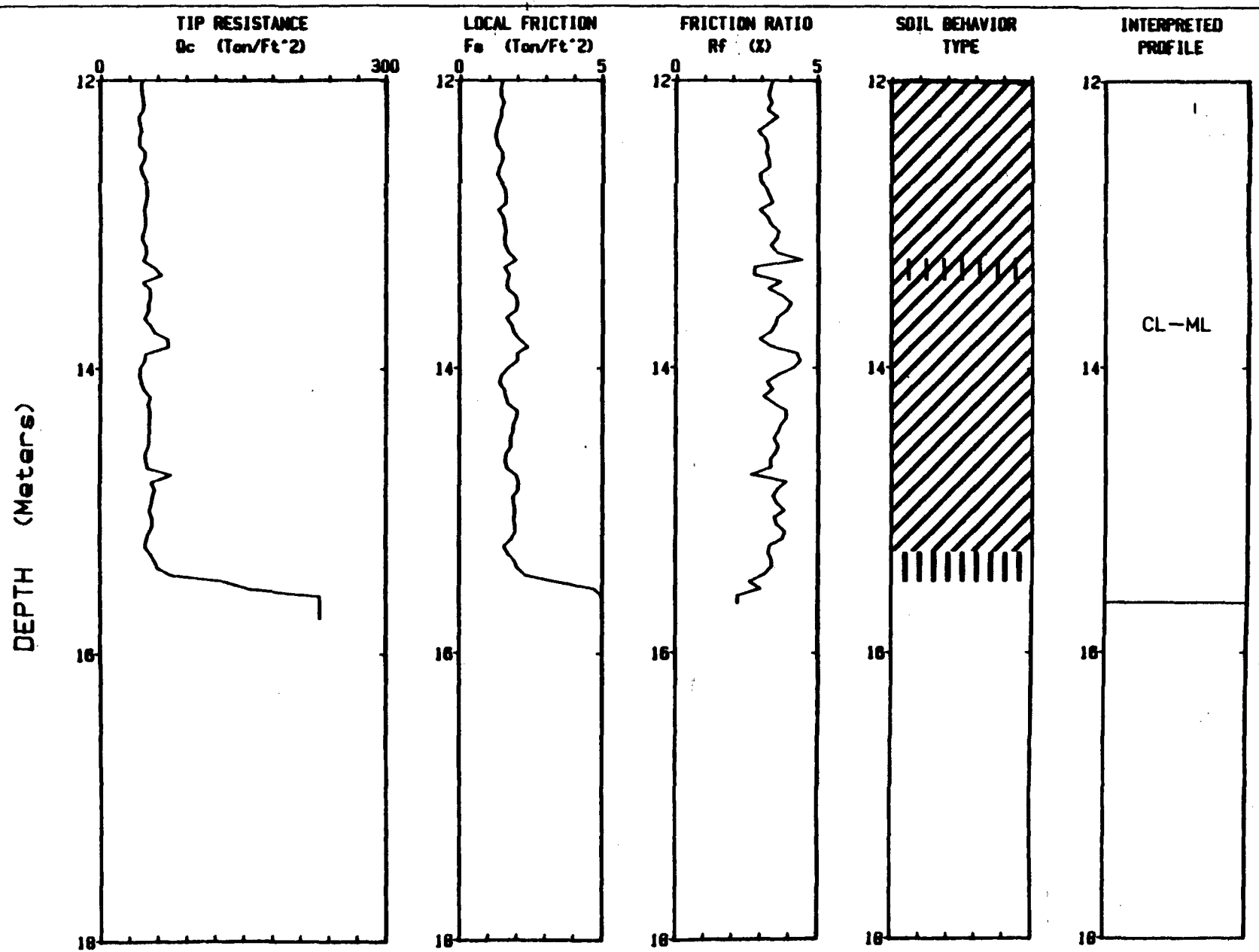
Depth Increment : .05 m

Max Depth : 15.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-10-88 | Page No: 3 / 3

Location: CPT-105 | Elevation: 919.4 MSL | TERRA Job No.: 88-1008



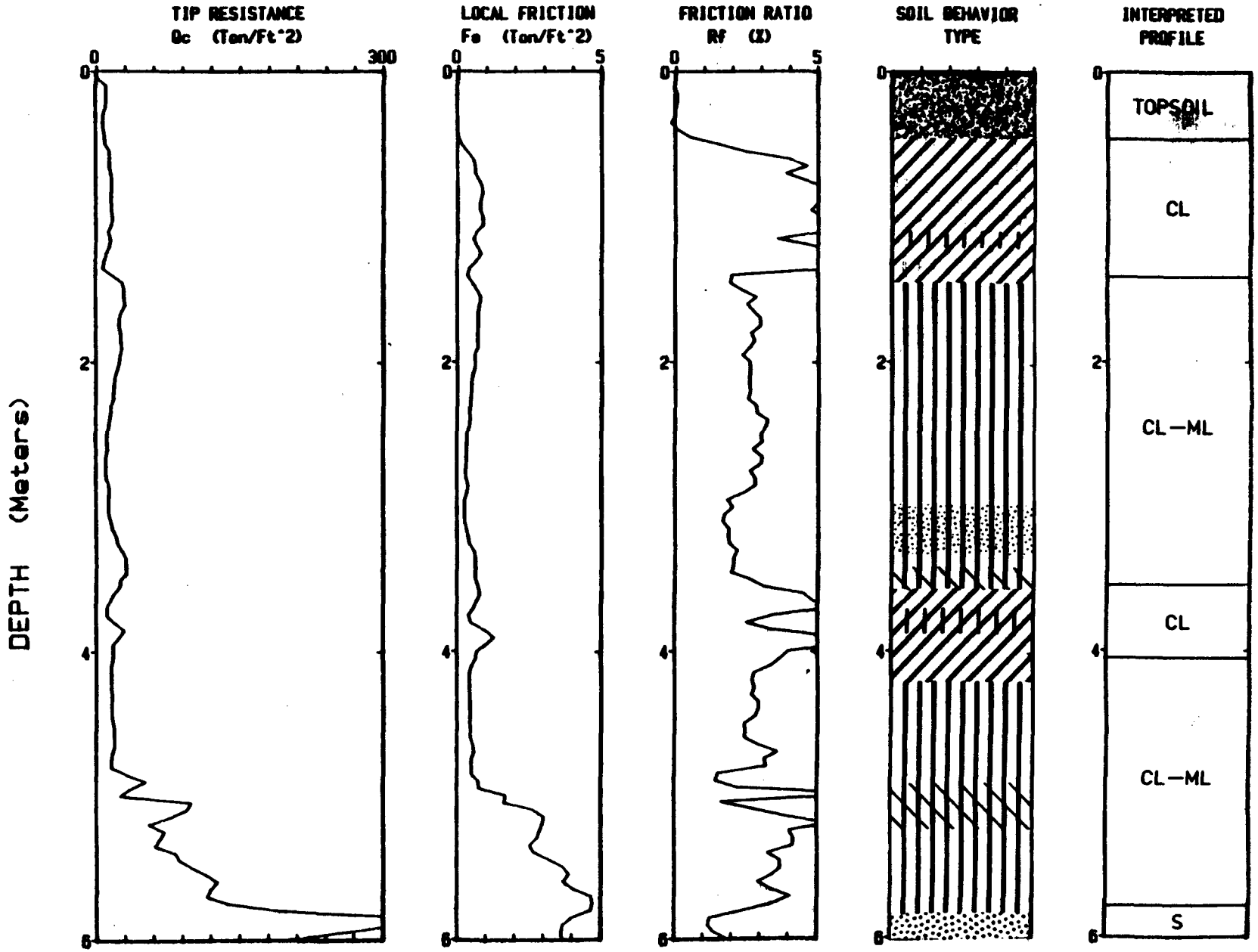
Depth Increment : .05 m

Max Depth : 15.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-10-88 | Page No: 1 / 2

Location: CPT-106 | Elevation: 924.2 MSL | TERRA Job No.: 88-1008



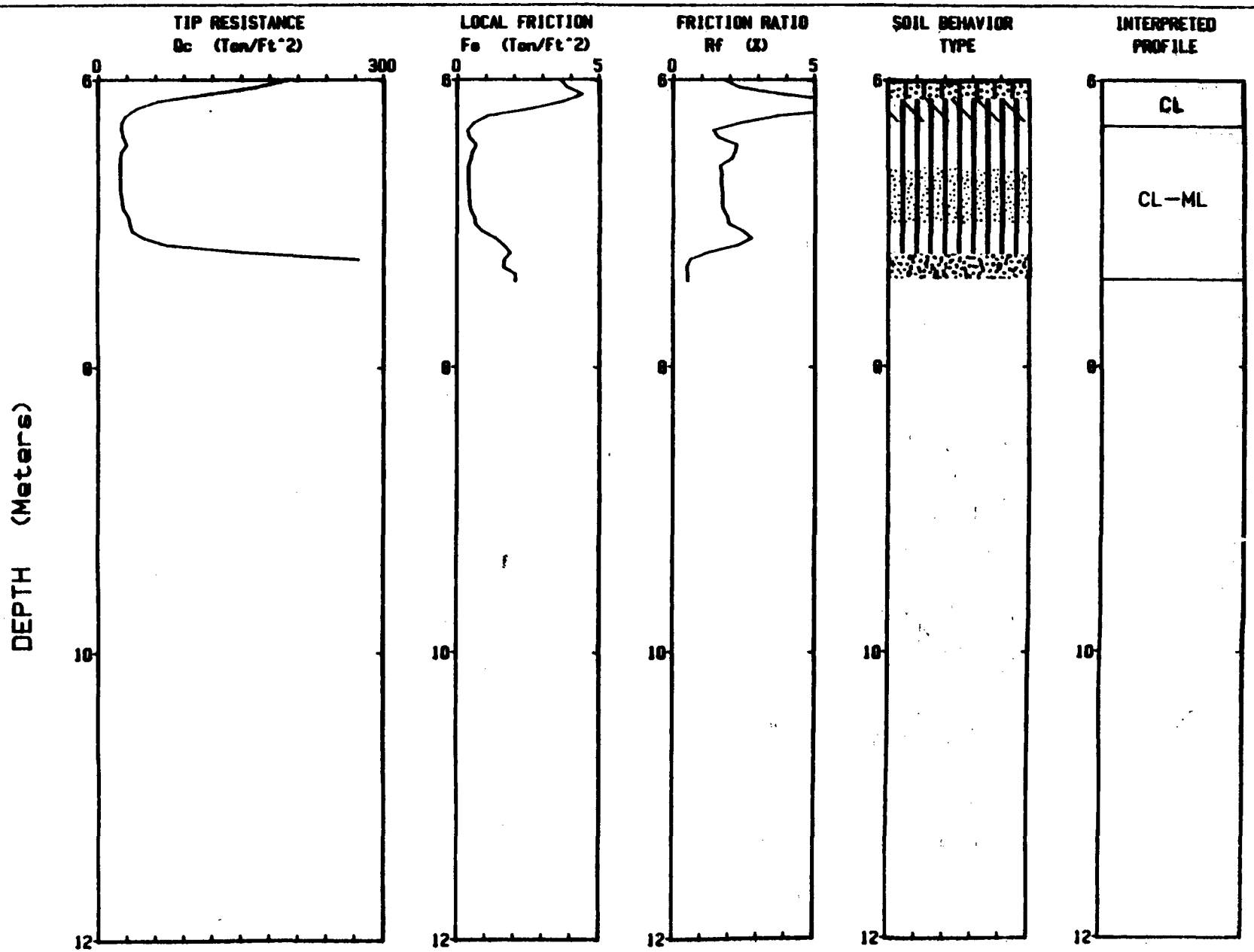
Depth Increment : .05 m

Max Depth : 7.5 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-10-88 | Page No: 2 / 2

Location: CPT-106 | Elevation: 924.2 MSL | TERRA Job No.: 88-1008



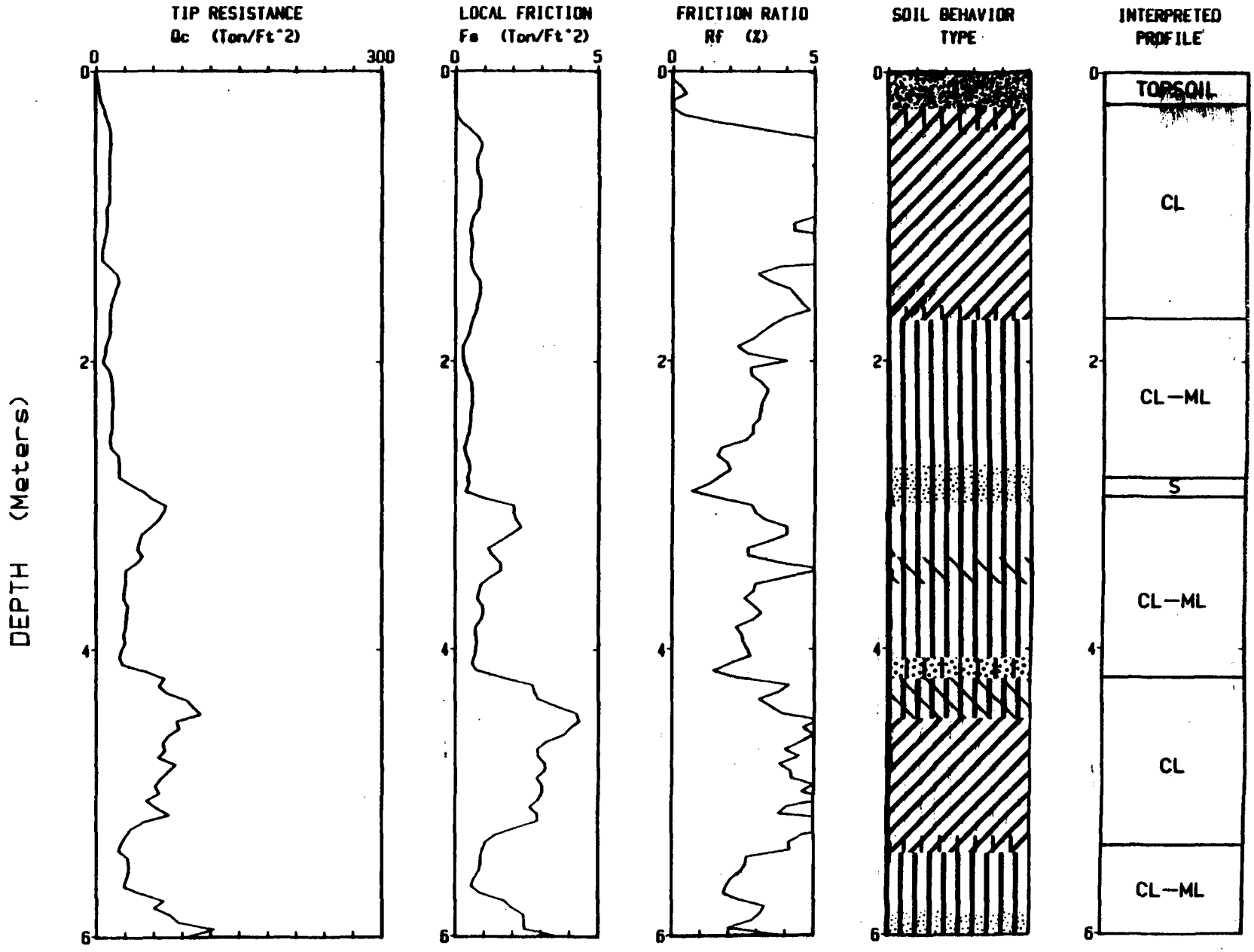
Depth Increment : .05 m

Max Depth : 7.5 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-10-88 | Page No: 1 / 2

Location: CPT-107 | Elevation: 926.8 MSL | TERRA Job No.: 88-1008



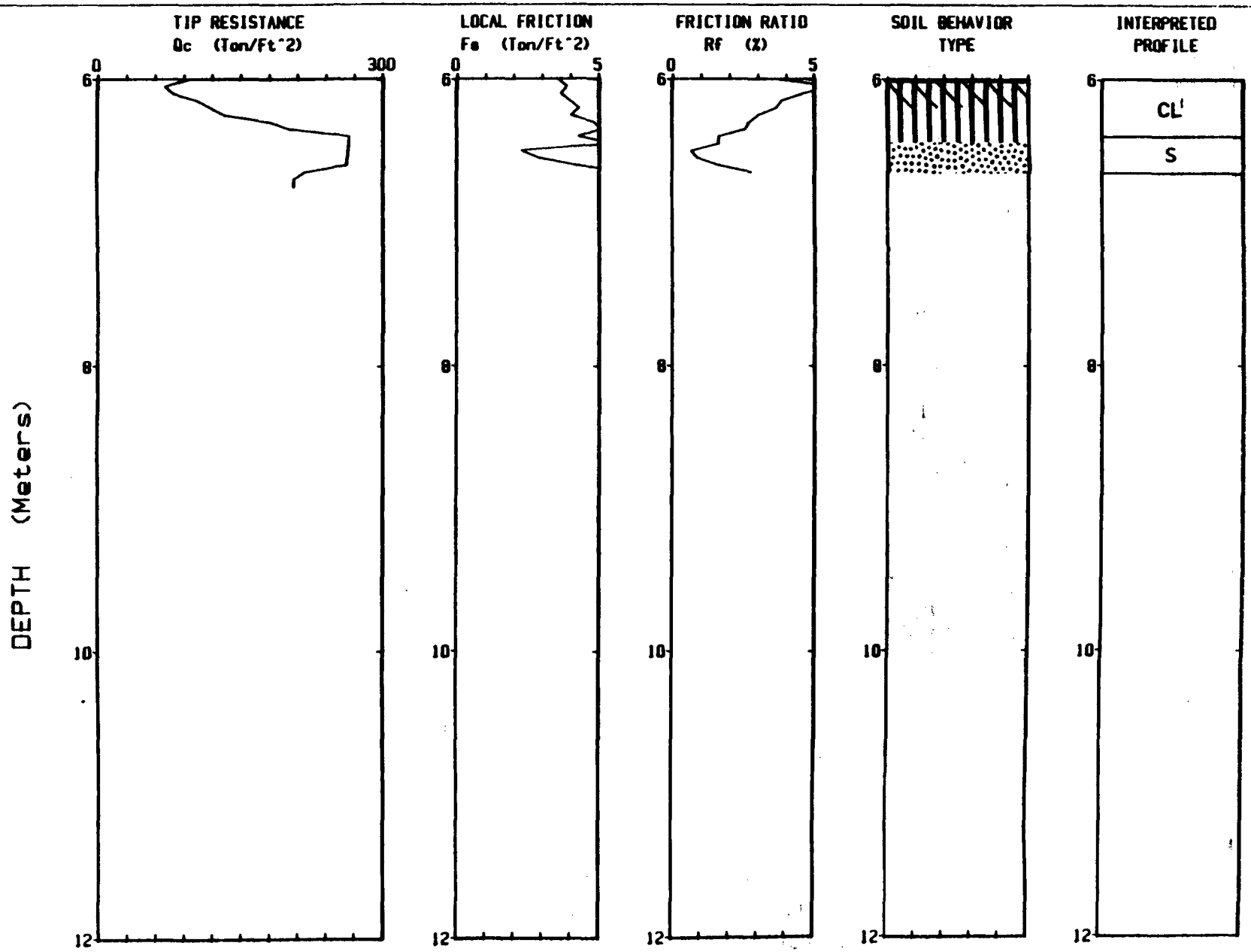
Depth Increment = .05 m

Max Depth : 6.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-10-88 | Page No: 2 / 2

Location: CPT-107 | Elevation: 926.8 MSL | TERRA Job No.: 88-1008



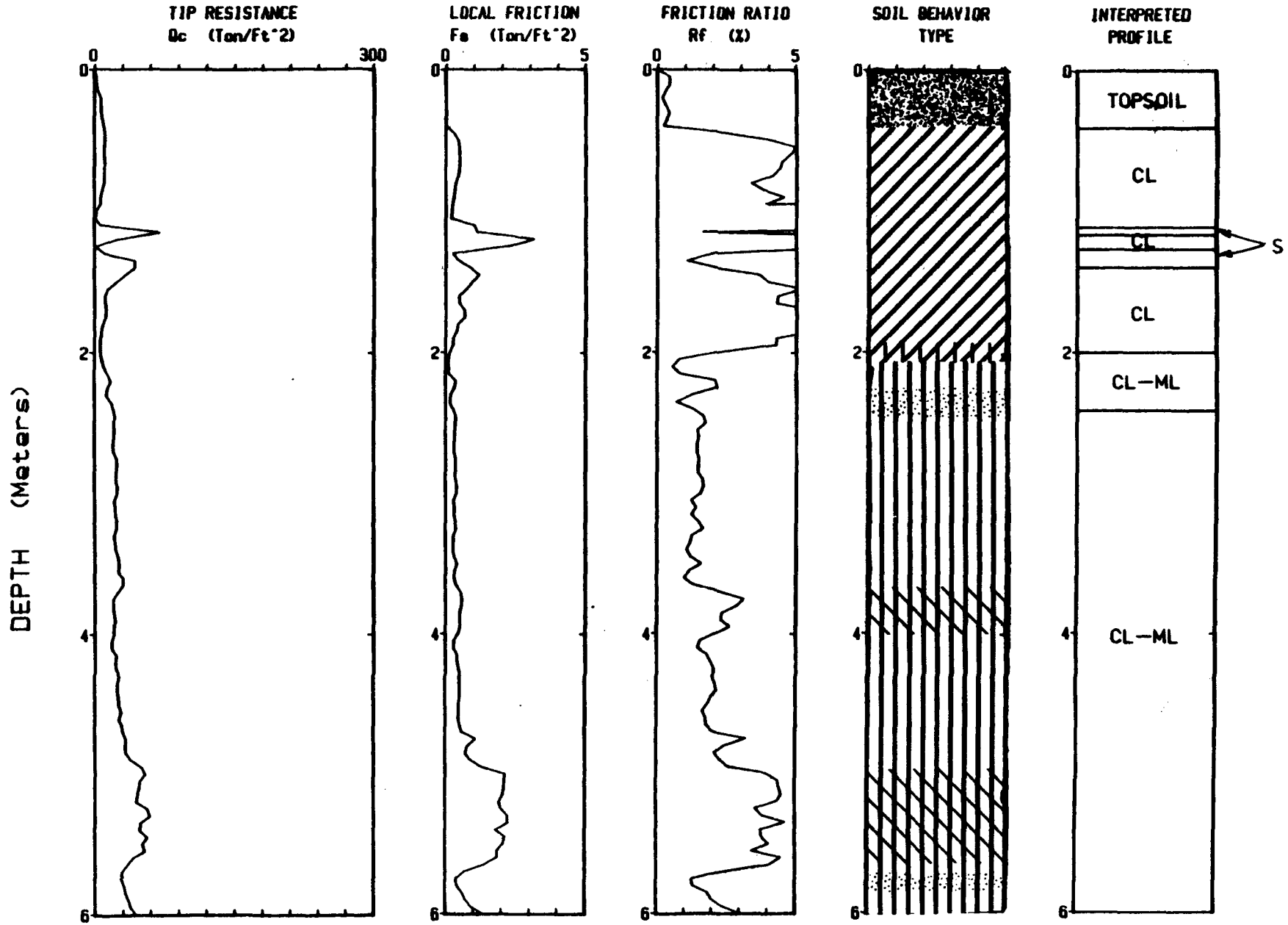
Depth Increment : .05 m

Max Depth : 6.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-10-88 | Page No: 1 / 2

Location: CPT-108 | Elevation: 931.0 MSL | TERRA Job No.: 88-1008



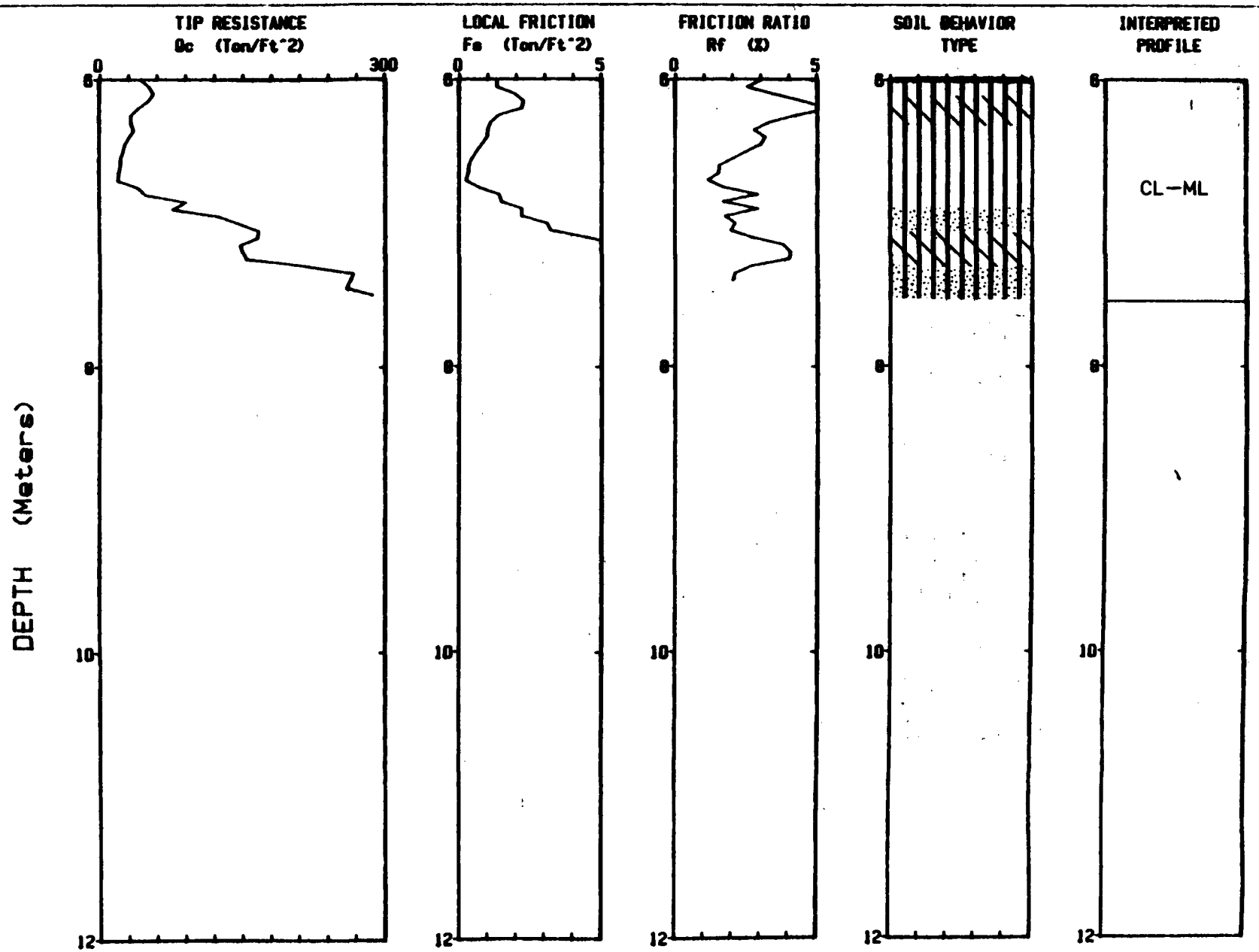
Depth Increment : .05 m

Max Depth : 7.5 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-10-88 | Page No: 2 / 2

Location: CPT-108 | Elevation: 931.0 MSL | TERRA Job No.: 88-1008



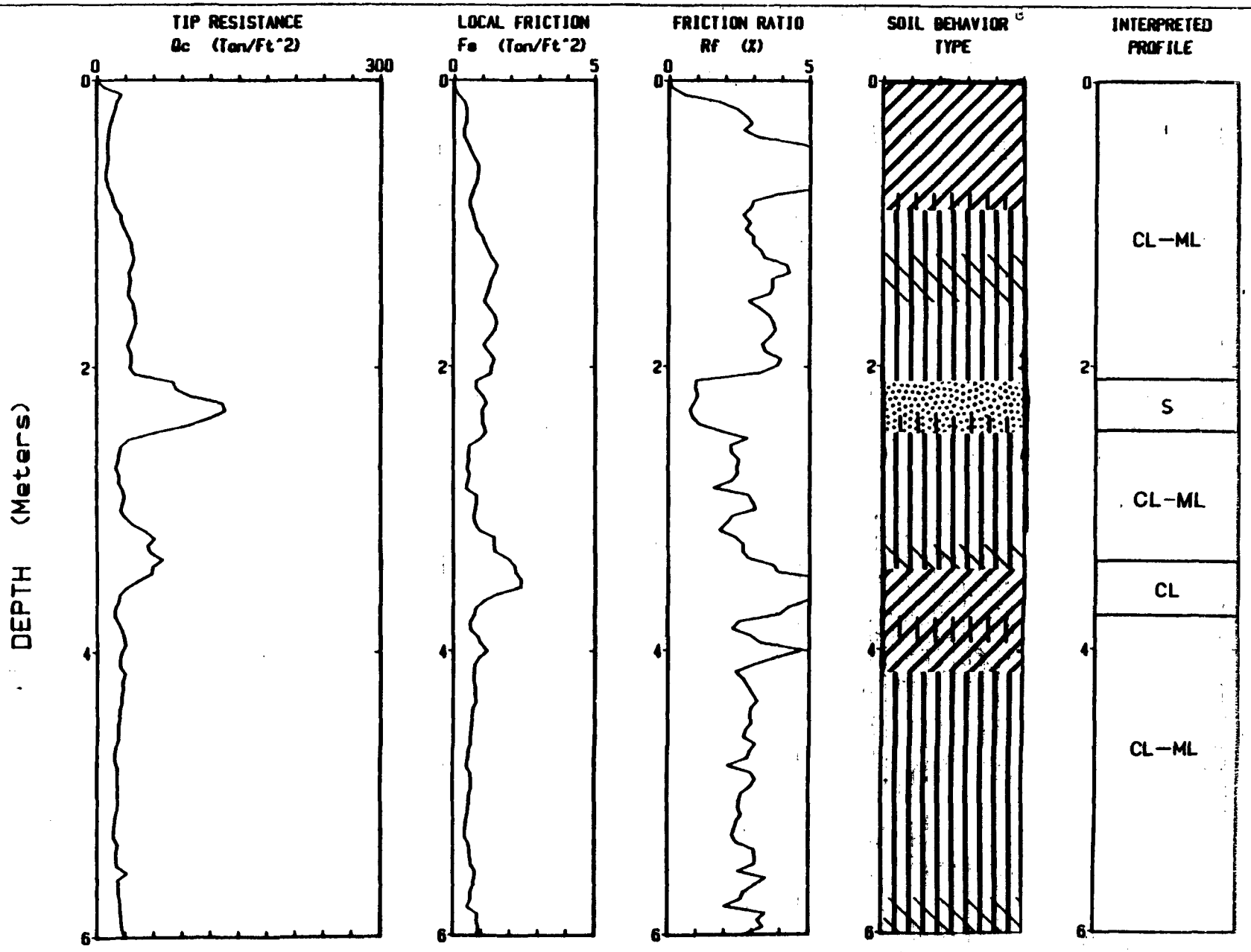
Depth Increment : .05 m

Max Depth : 7.5 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-10-88 | Page No: 1 / 2

Location: CPT-109 | Elevation: 931.0 MSL | TERRA Job No.: 88-1008



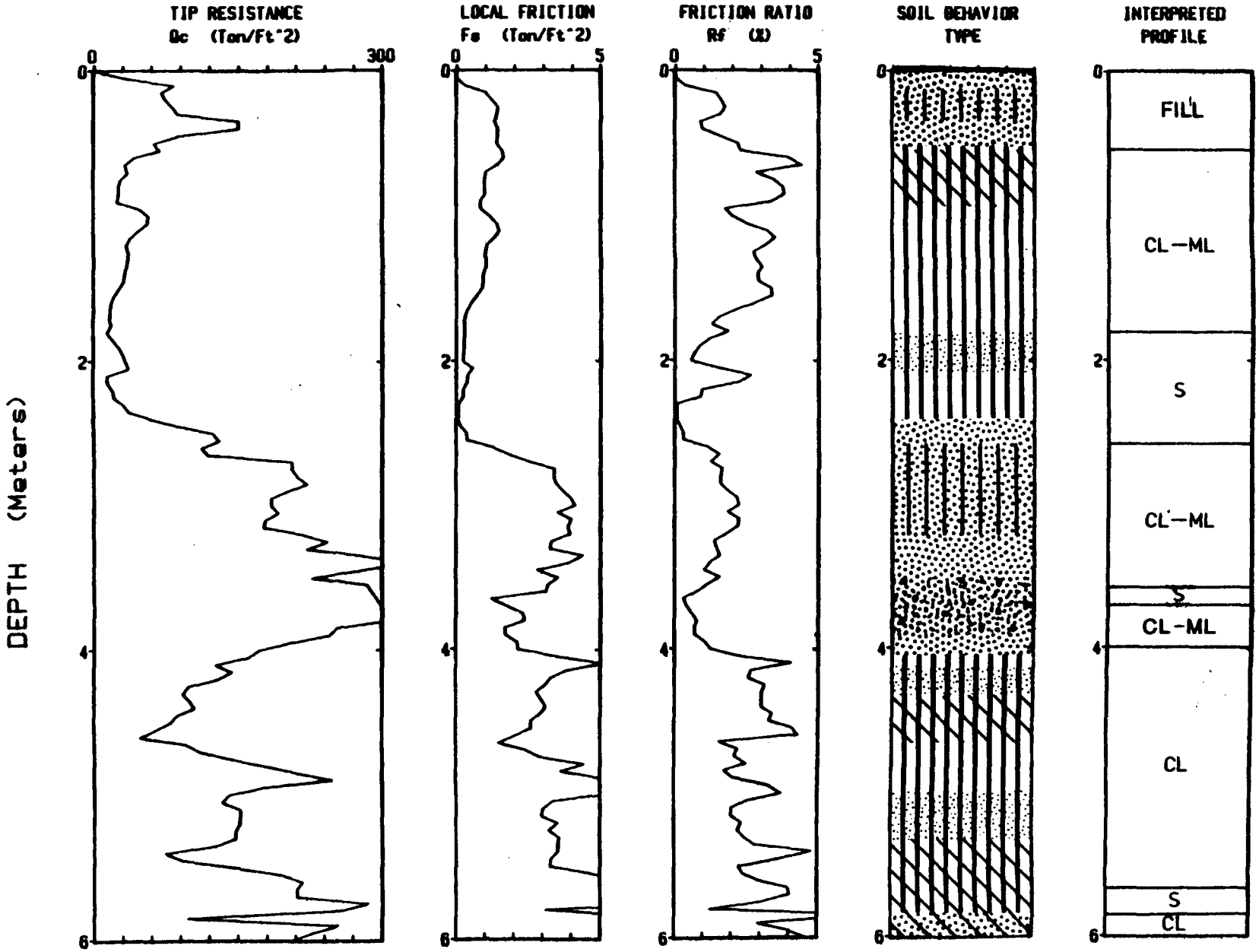
Depth Increment : .05 m

Max Depth : 7.25 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 2

Location: CPT-126 | Elevation: 877.7 MSL | TERRA Job No.: 88-1008



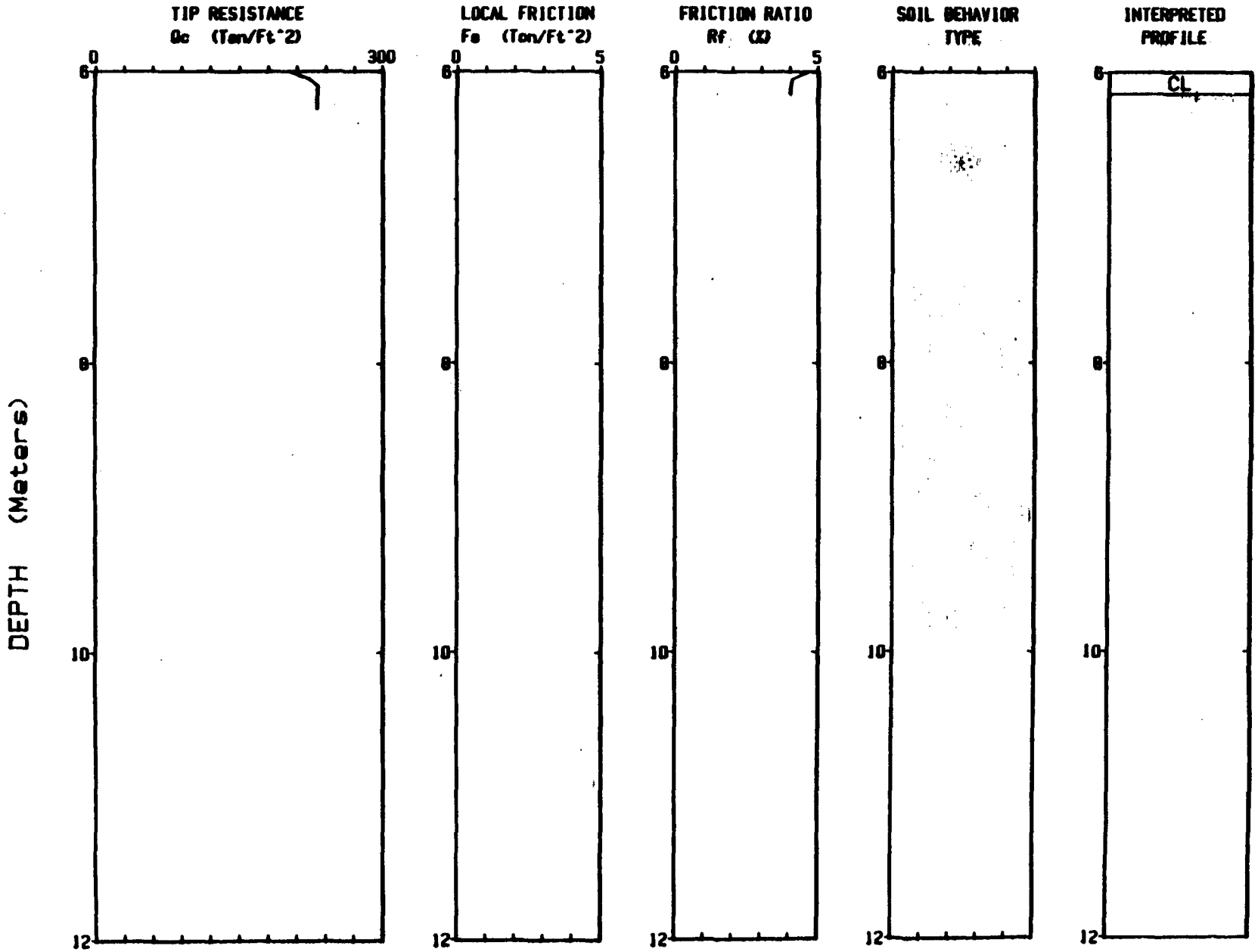
Depth Increment : .05 m

Max Depth : 6.25 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 2 / 2

Location: CPT-126 | Elevation: 877.7 MSL | TERRA Job No.: 88-1008



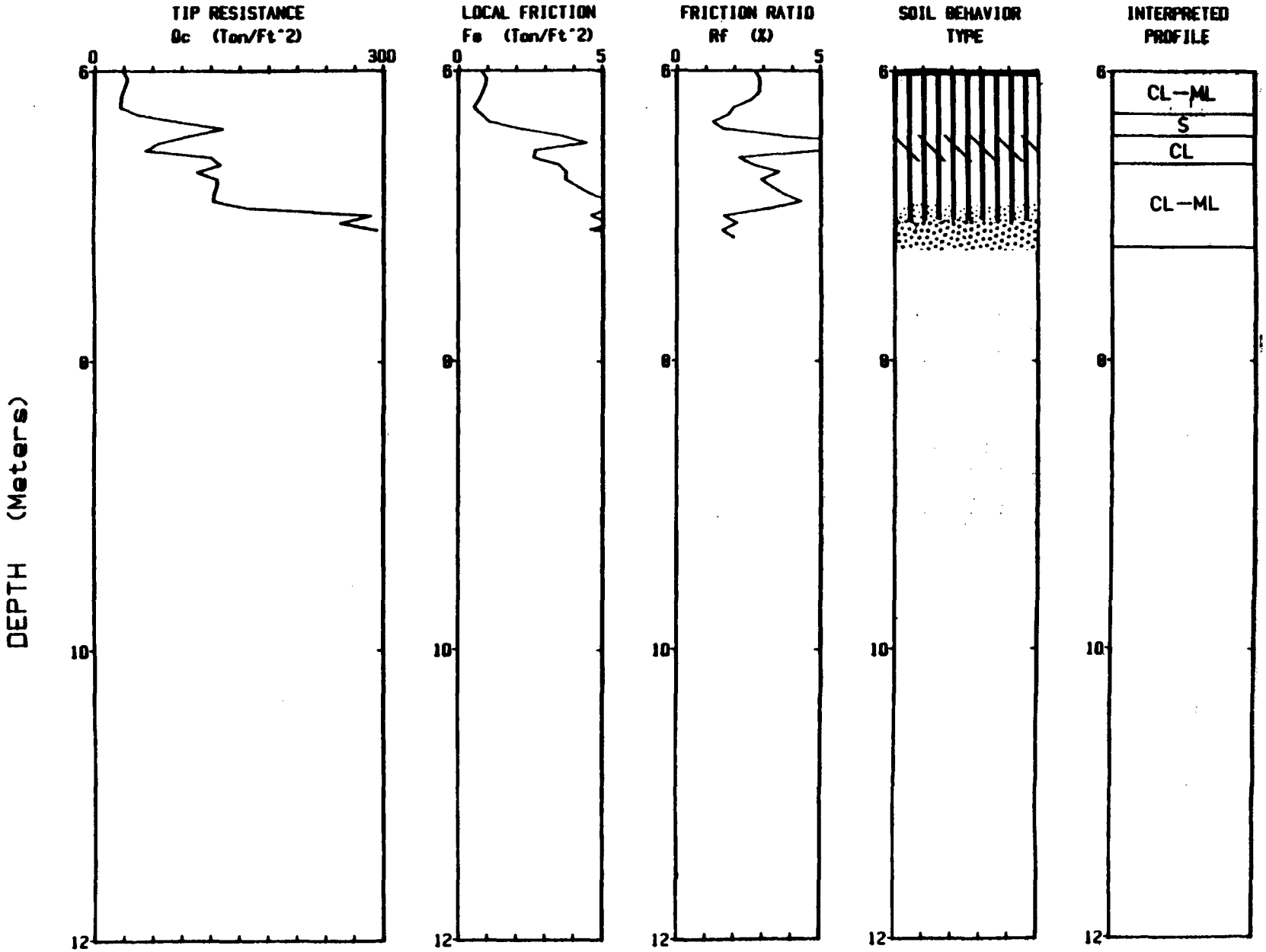
Depth Increment = .05

Max Depth = 8.25 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-10-88 | Page No: 2 / 2

Location: CPT-109 | Elevation: 931.0 MSL | TERRA Job No.: 88-1008



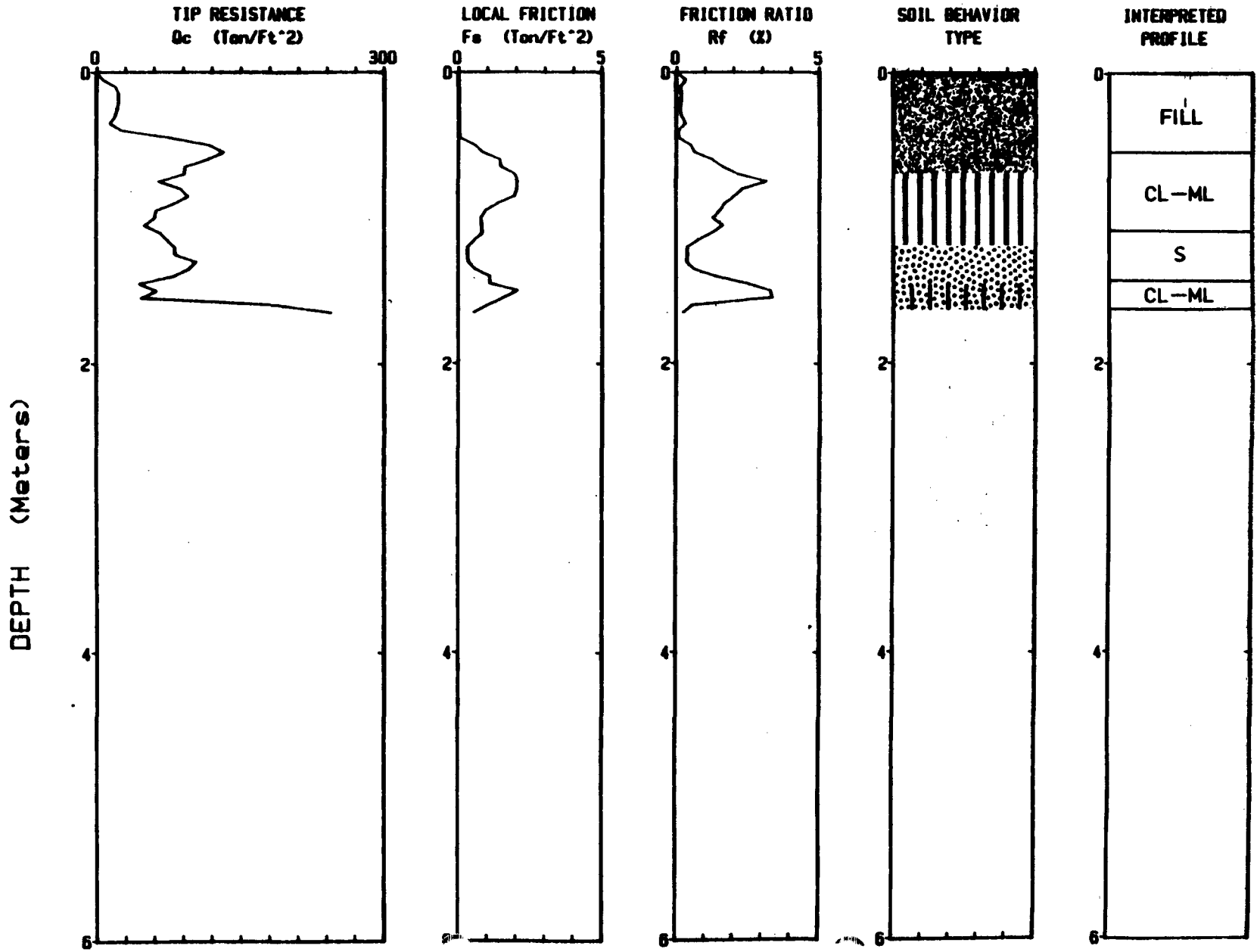
Depth Increment : .05 m

Max Depth : 7.25 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

Location: CPT-119 | Elevation: 889.4 MSL | TERRA Job No.: 88-1008

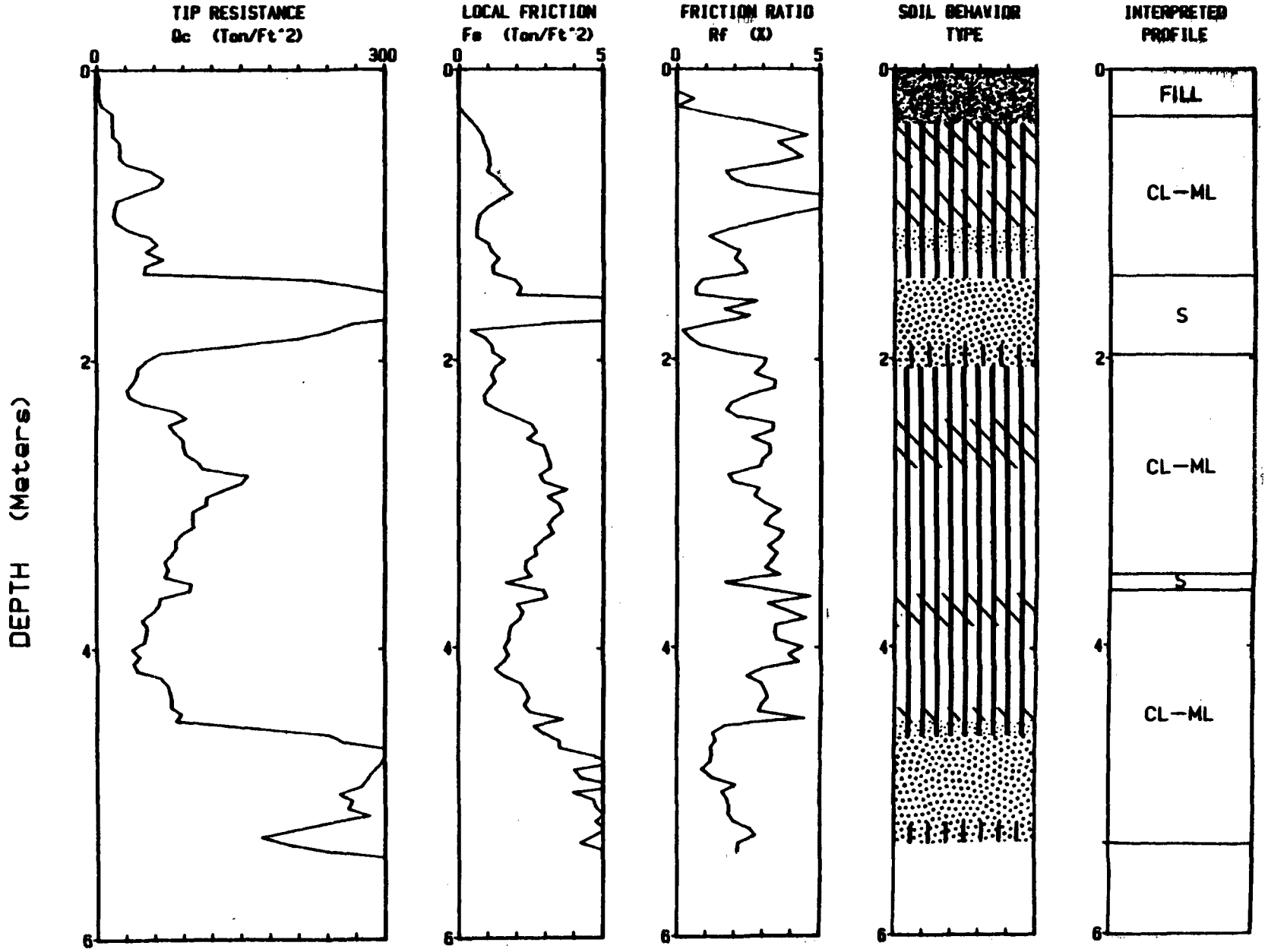


Depth Increment .05 m Max Depth : 1.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

Location: CPT-119A | Elevation: 889.4 MSL | TERRA Job No.: 88-1008



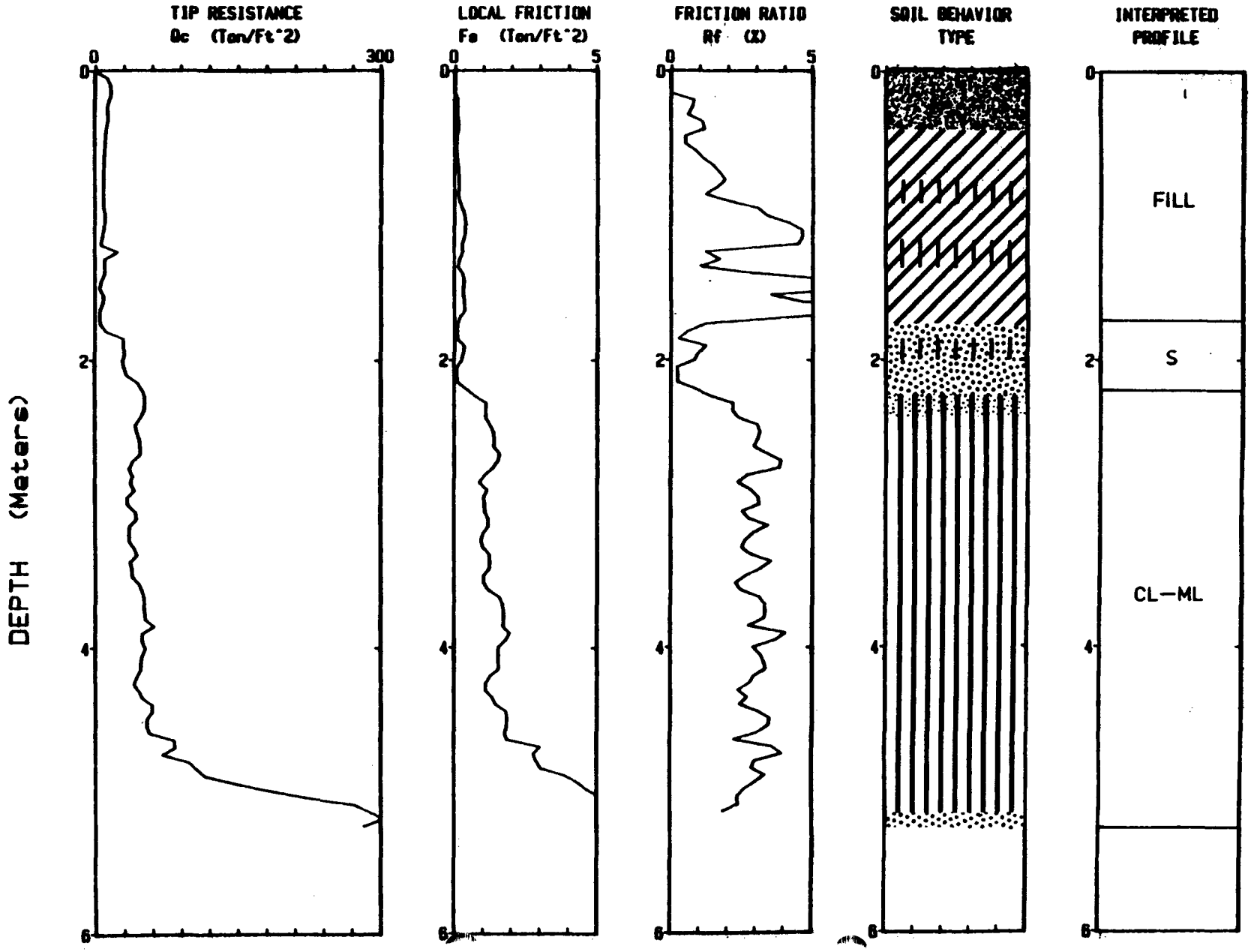
Depth Increment : .05 m

Max Depth : 5.5 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

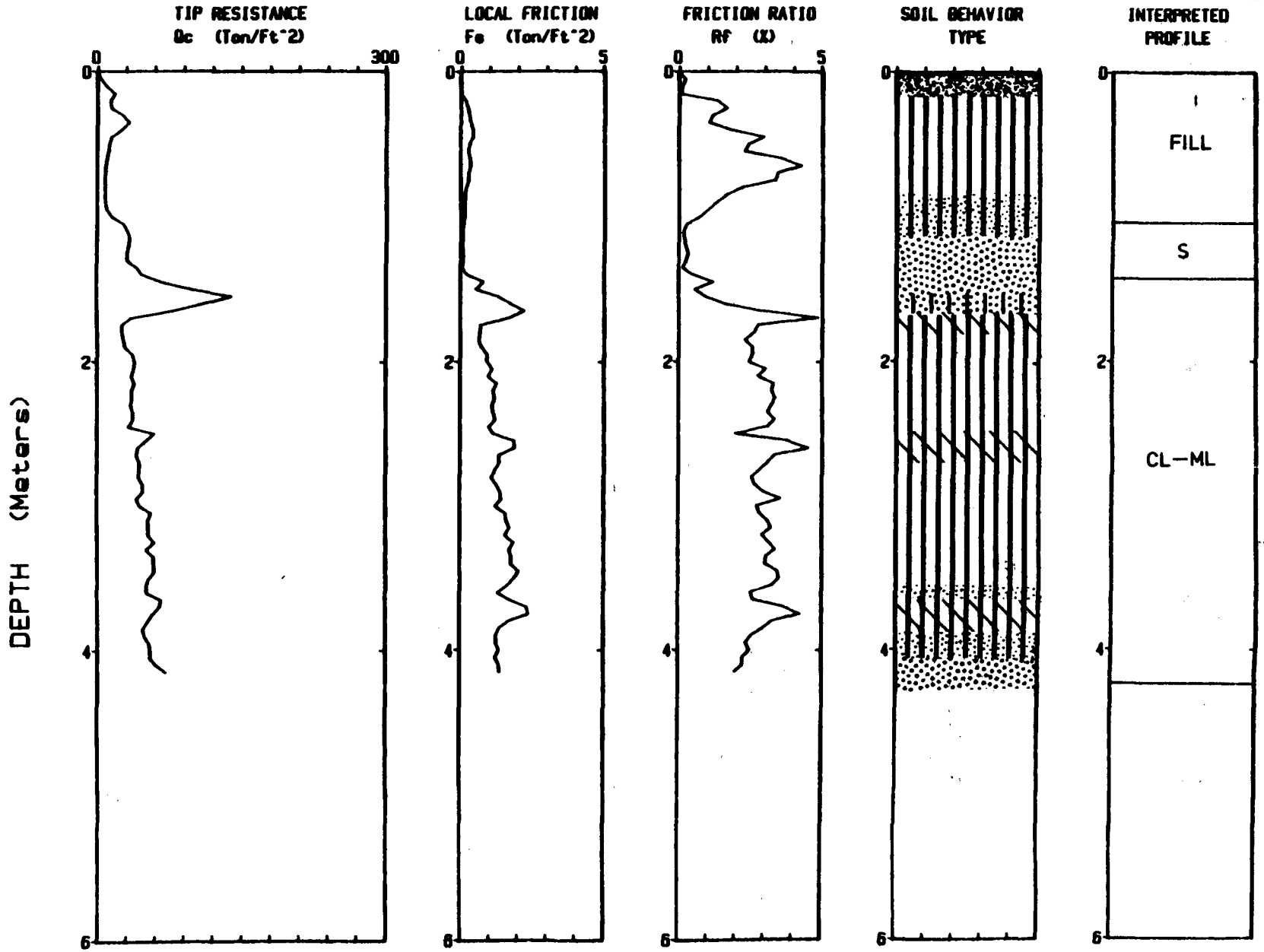
Location: CPT-120 | Elevation: 886.1 MSL | TERRA Job No.: 88-1008



NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

Location: CPT-121 | Elevation: 886.1 MSL | TERRA Job No.: 88-1008



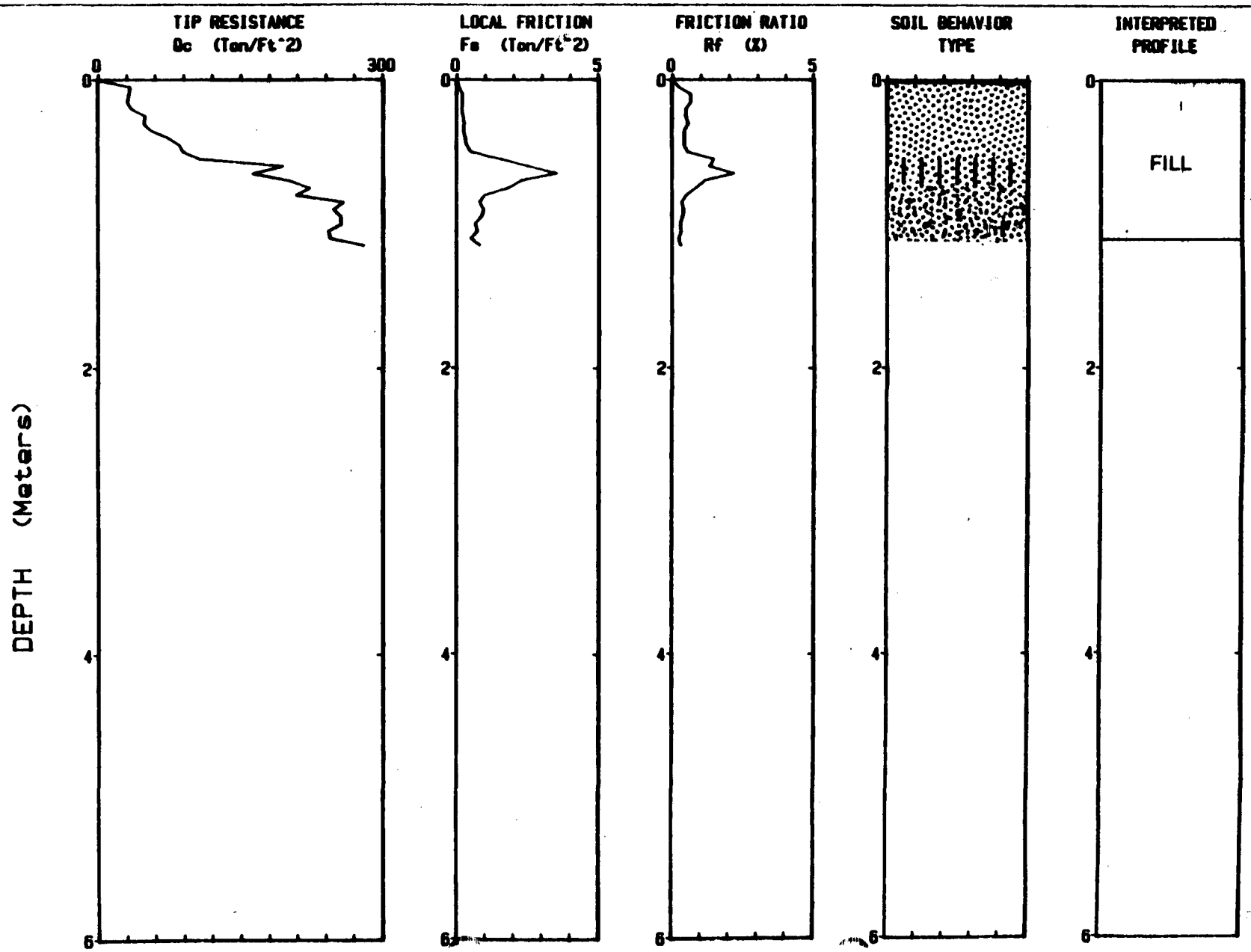
Depth Increment : .05 m

Max Depth : 4.25 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

Location: CPT-122 | Elevation: 884.9 MSL | TERRA Job No.: 88-1008



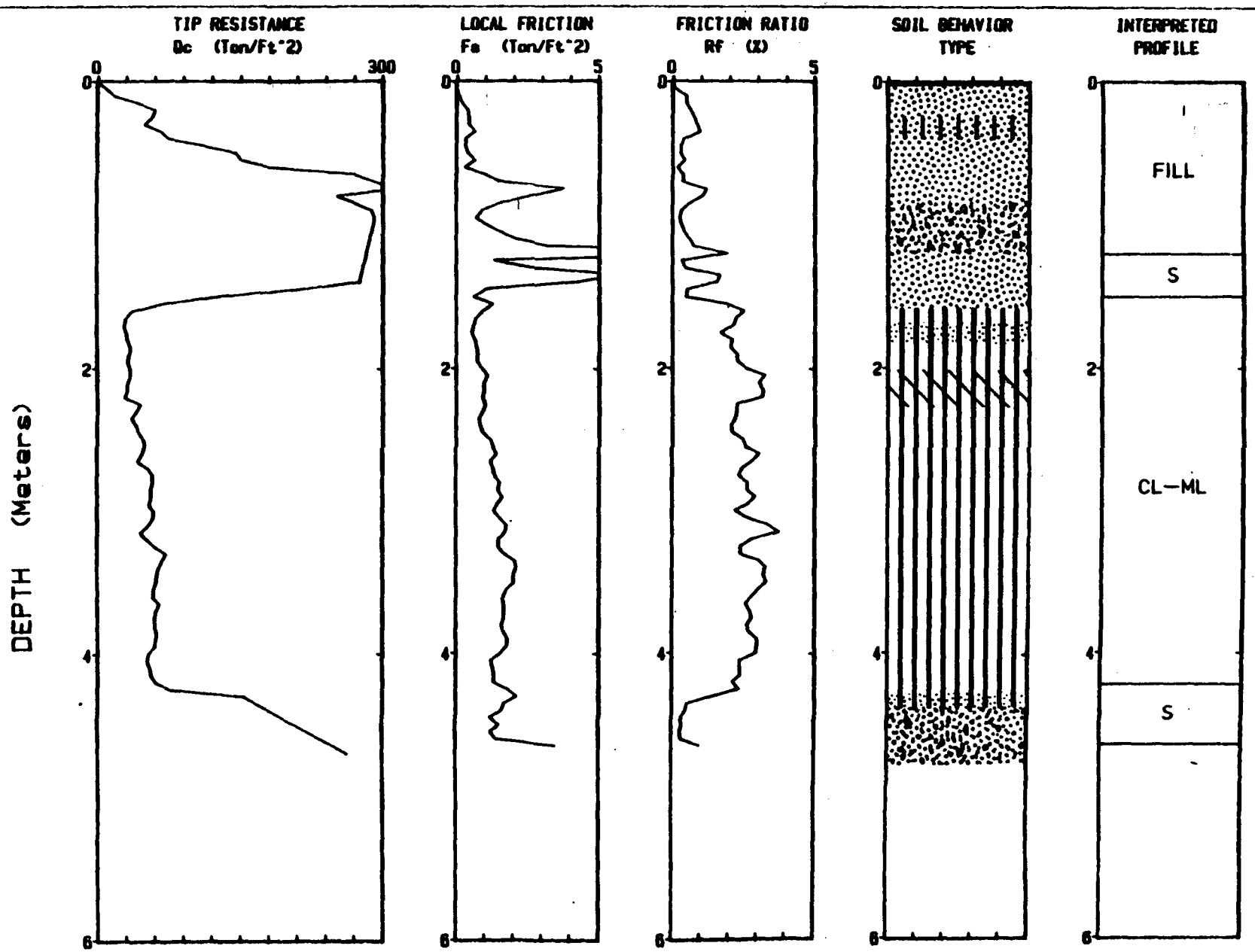
Depth Increment : .05 m

Max Depth : 1.25 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

Location: CPT-122A | Elevation: 884.9 MSL | TERRA Job No.: 88-1008



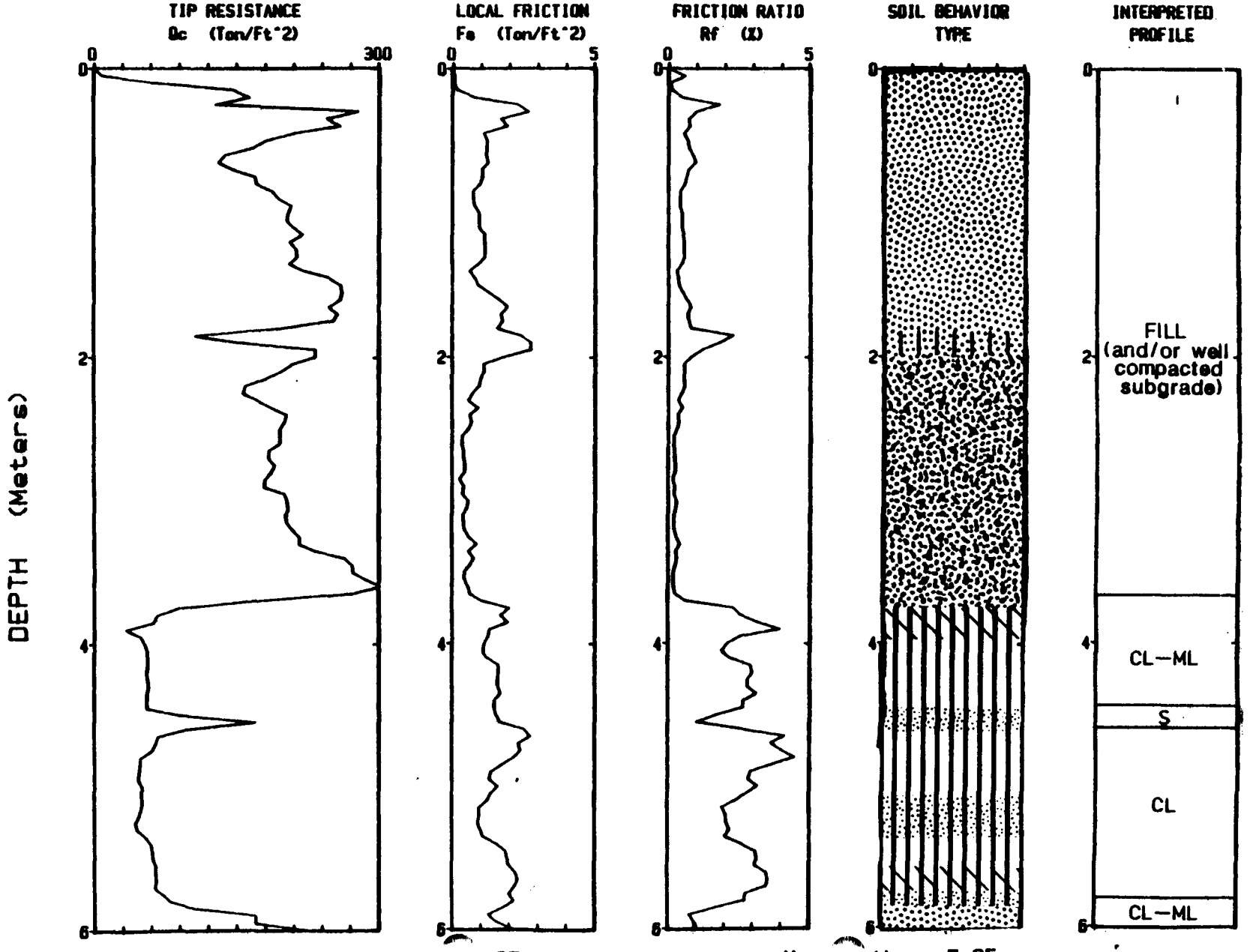
Depth Increment : .05 m

Max Depth : 4.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 2

Location: CPT-123 | Elevation: 887.9 MSL | TERRA Job No.: 88-1008



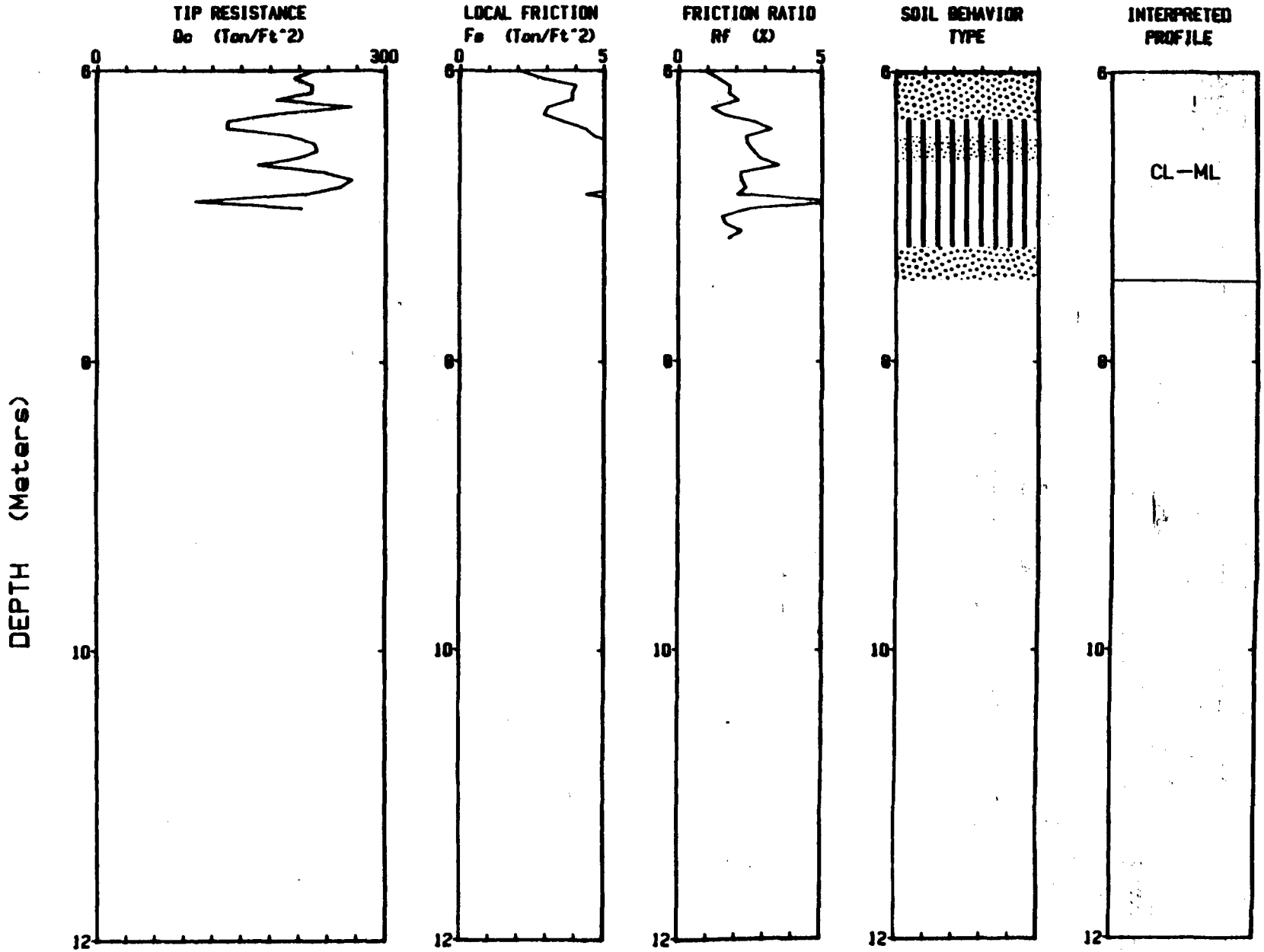
Depth Increment .05 m

Max Depth : 7.25 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 2 / 2

Location: CPT-123 | Elevation: 887.9 MSL | TERRA Job No.: 88-1008



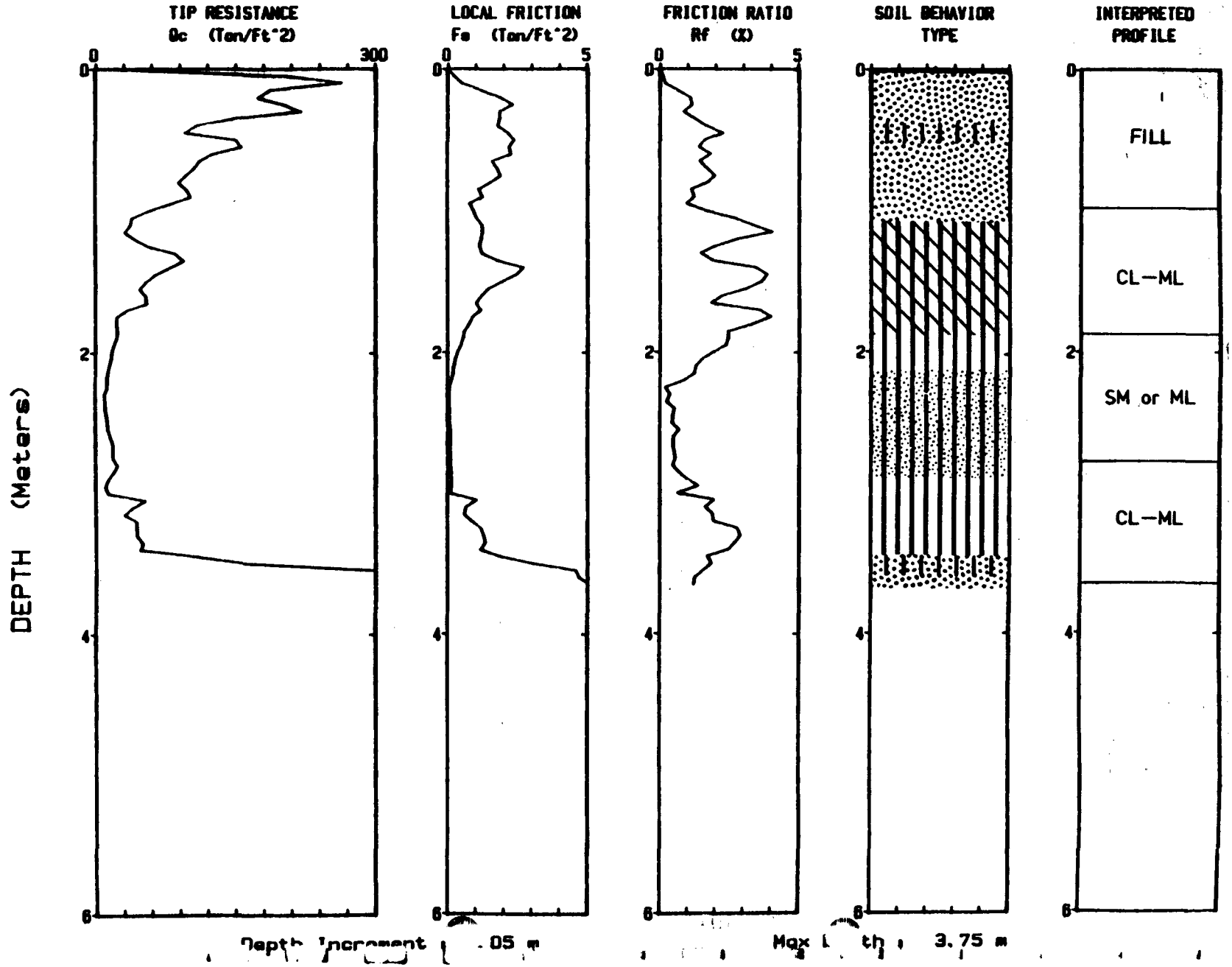
Depth Increment : .05 m

Max Depth : 7.25 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

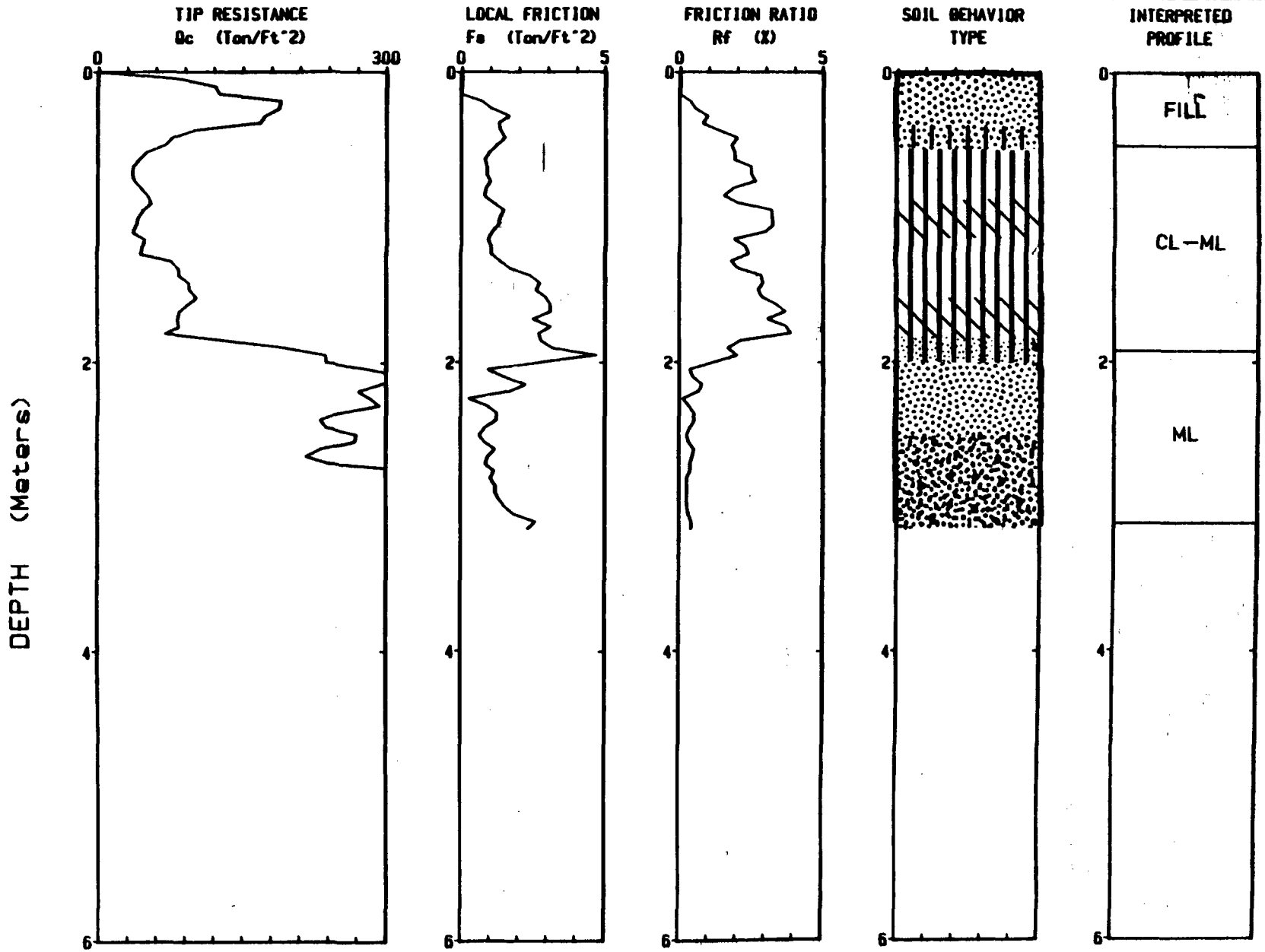
Location: CPT-124 | Elevation: 884.5 MSL | TERRA Job No.: 88-1008



NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

Location: CPT-125 | Elevation: 882.0 MSL | TERRA Job No.: 88-1008



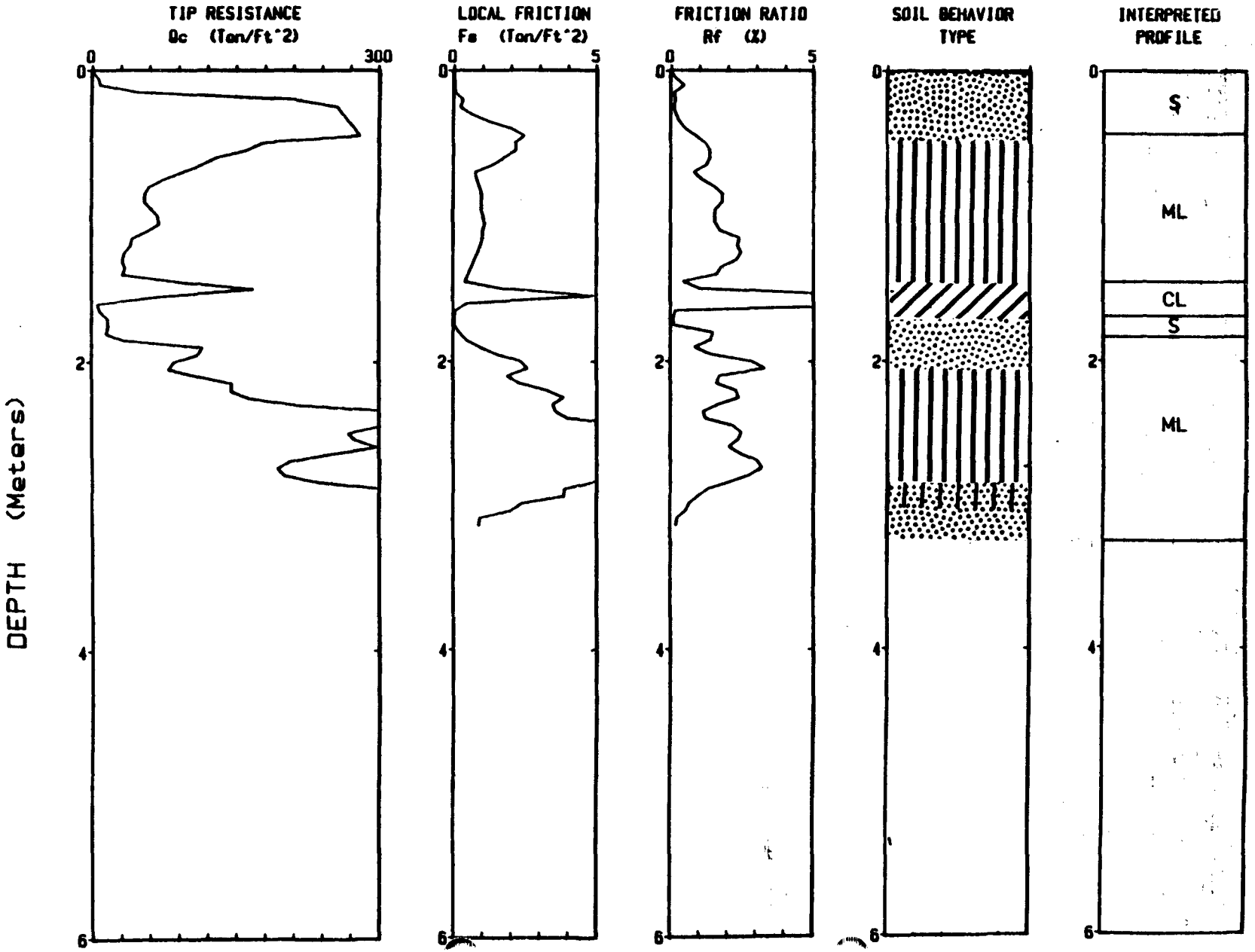
Depth Increment : .05 m

Max Depth : 3.25 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. Test Date: 04-09-88 Page No: 1 / 1

Location: CPT-125A Elevation: 889.4 MSL TERRA Job No.: 88-1008

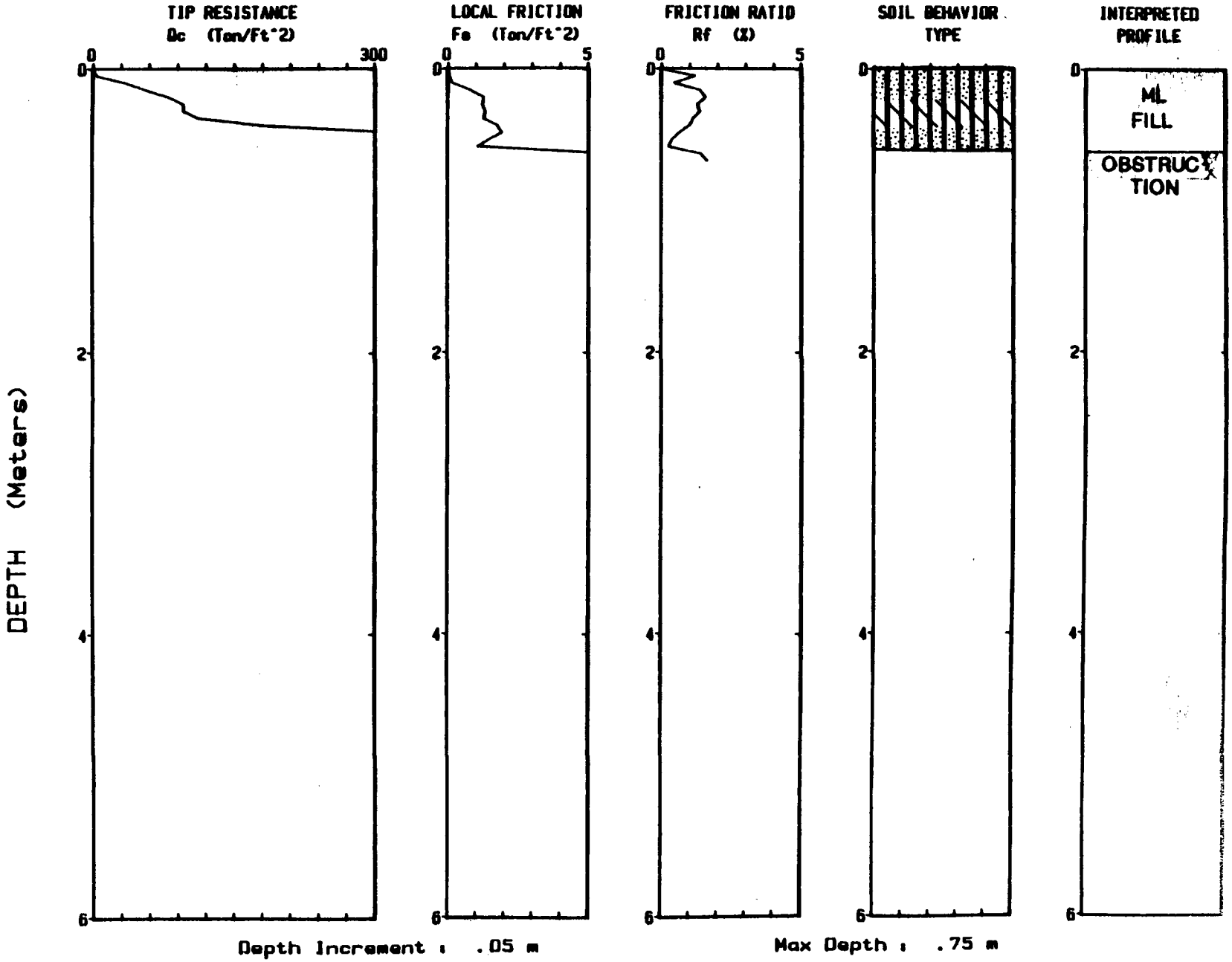


Depth Increment .05 m Max Depth : 3.25 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. Test Date: 04-09-88 Page No: 1 / 1

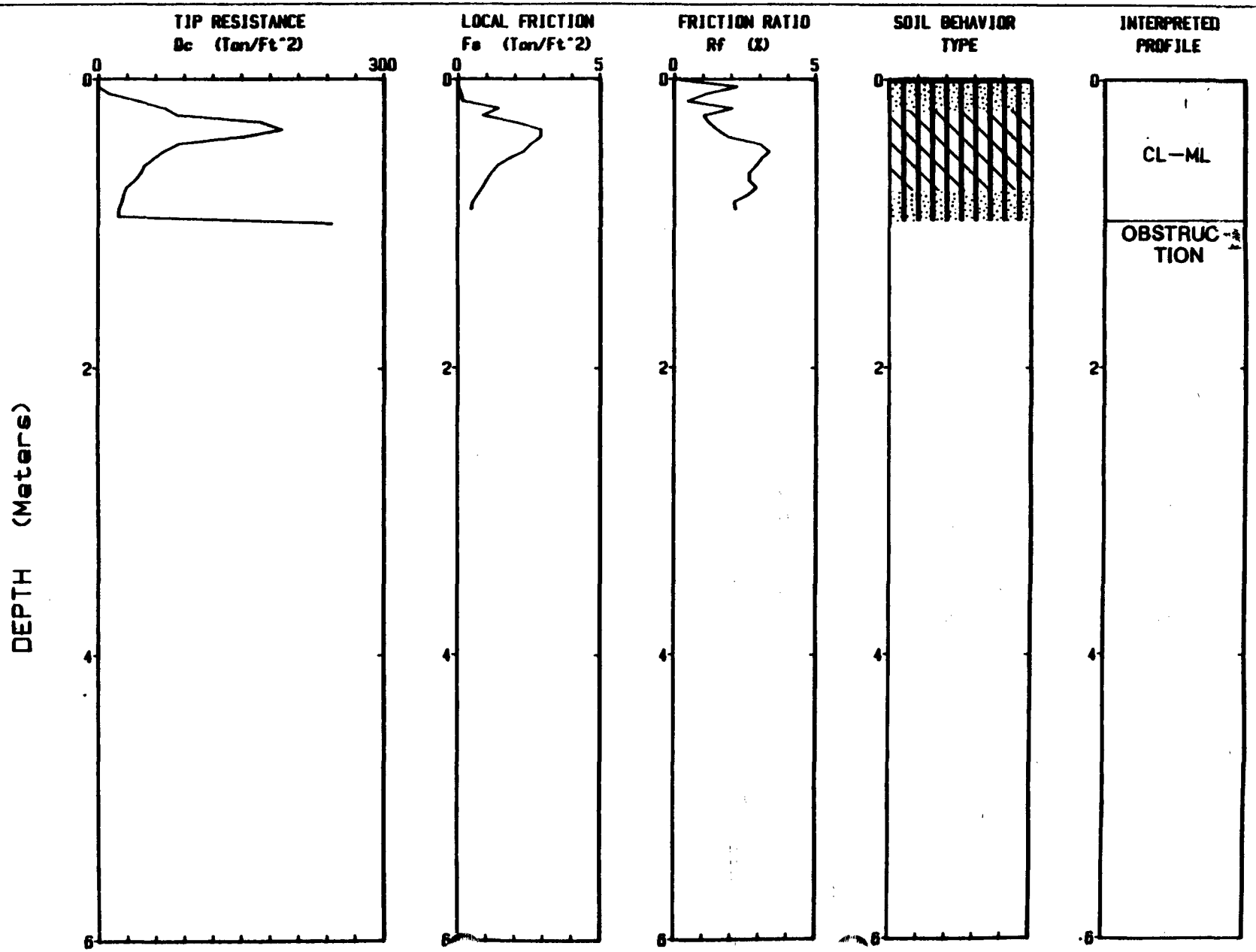
Location: CPT-137B Elevation: 882.6 MSL TERRA Job No.: 88-1008



NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-08-88 | Page No: 1 / 1

Location: CPT-138 | Elevation: 879.5 MSL | TERRA Job No.: 88-1008

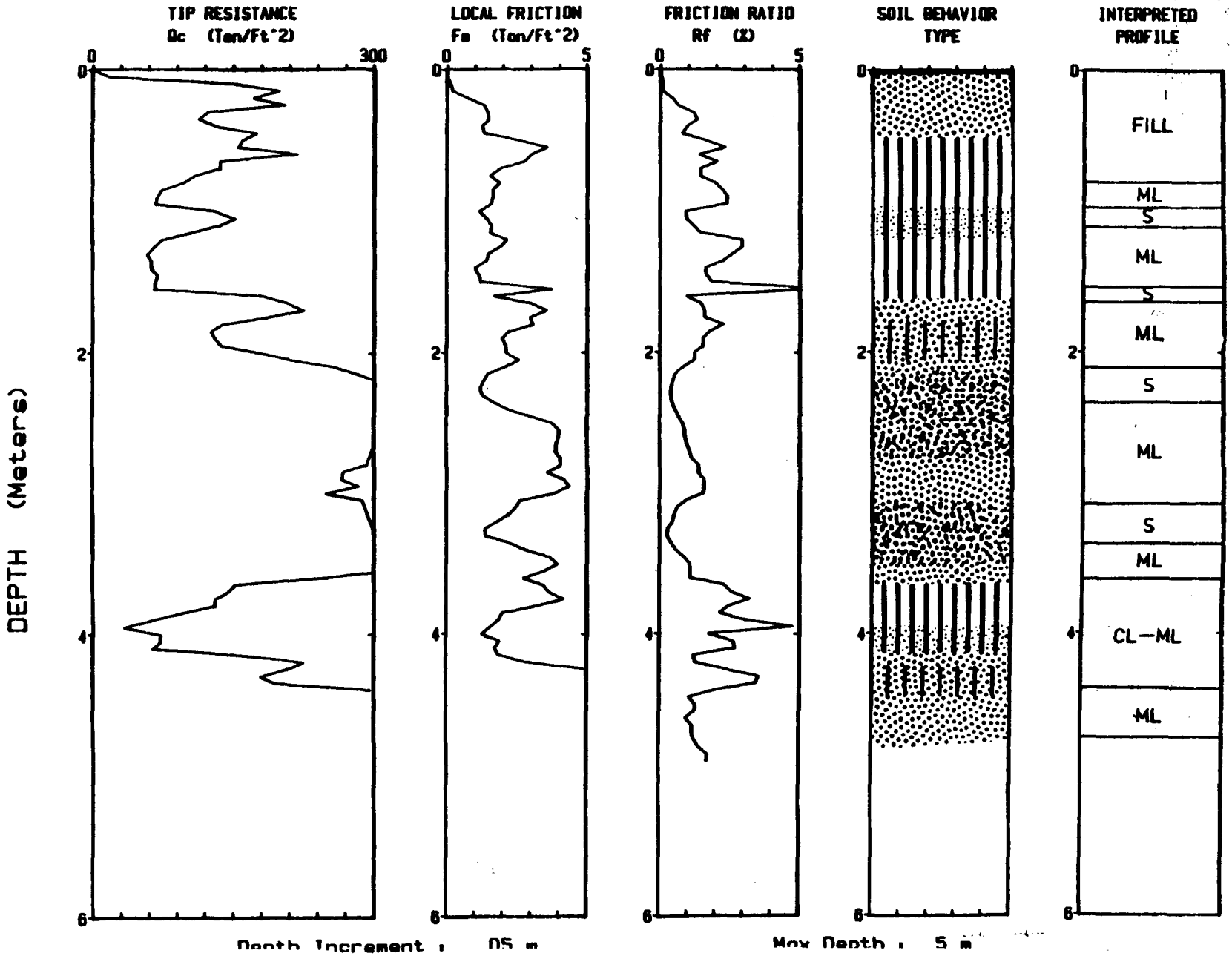


Depth Increment : .05 m Max Depth : 1 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

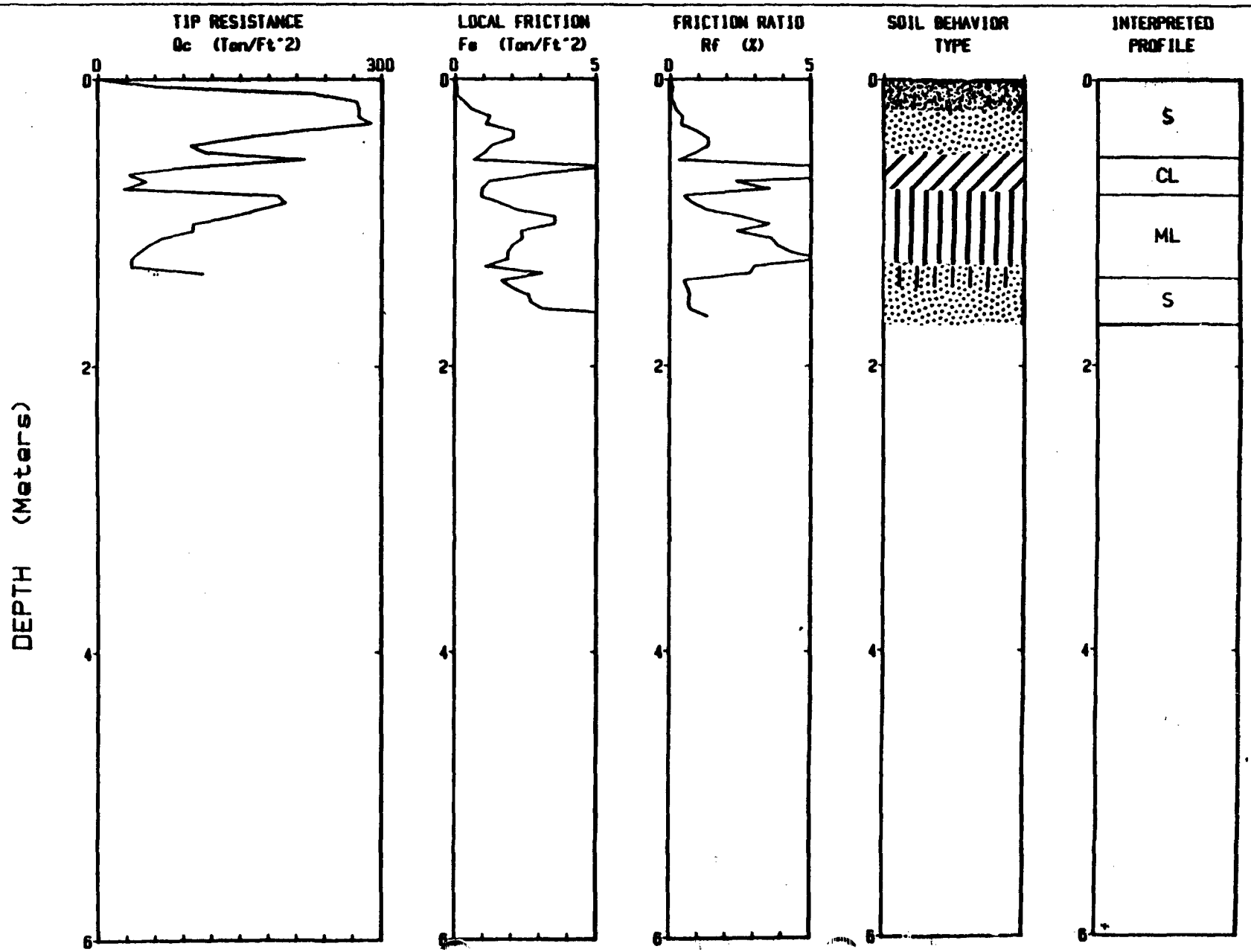
Location: CPT-127 | Elevation: 877.7 MSL | TERRA Job No.: 88-1008



NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-08-88 | Page No: 1 / 1

Location: CPT-128 | Elevation: 877.7 MSL | TERRA Job No.: 88-1008



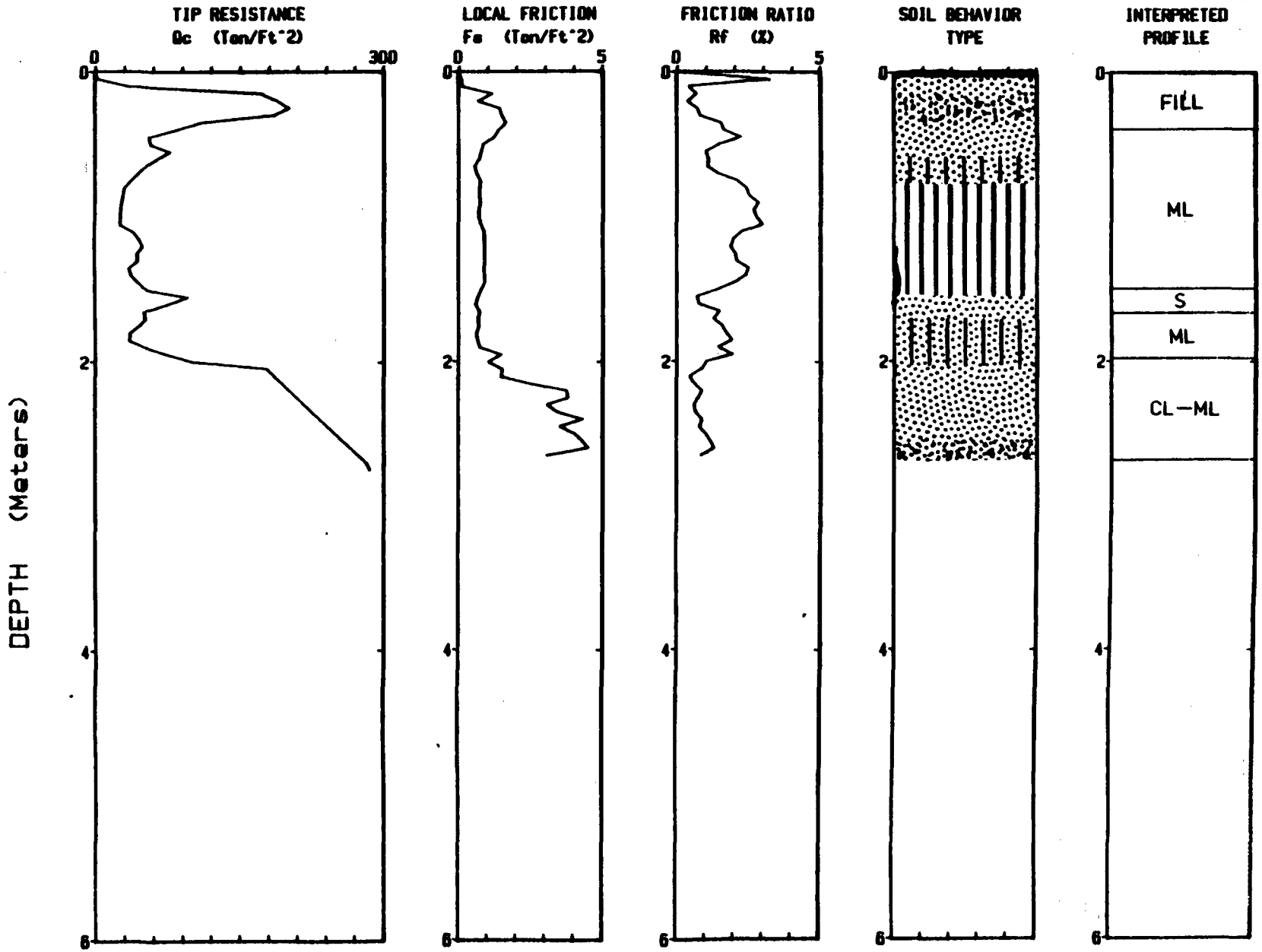
Depth Increment .05 m

Max Depth : 1.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

Location: CPT-128A | Elevation: 876.6 MSL | TERRA Job No.: 88-1008



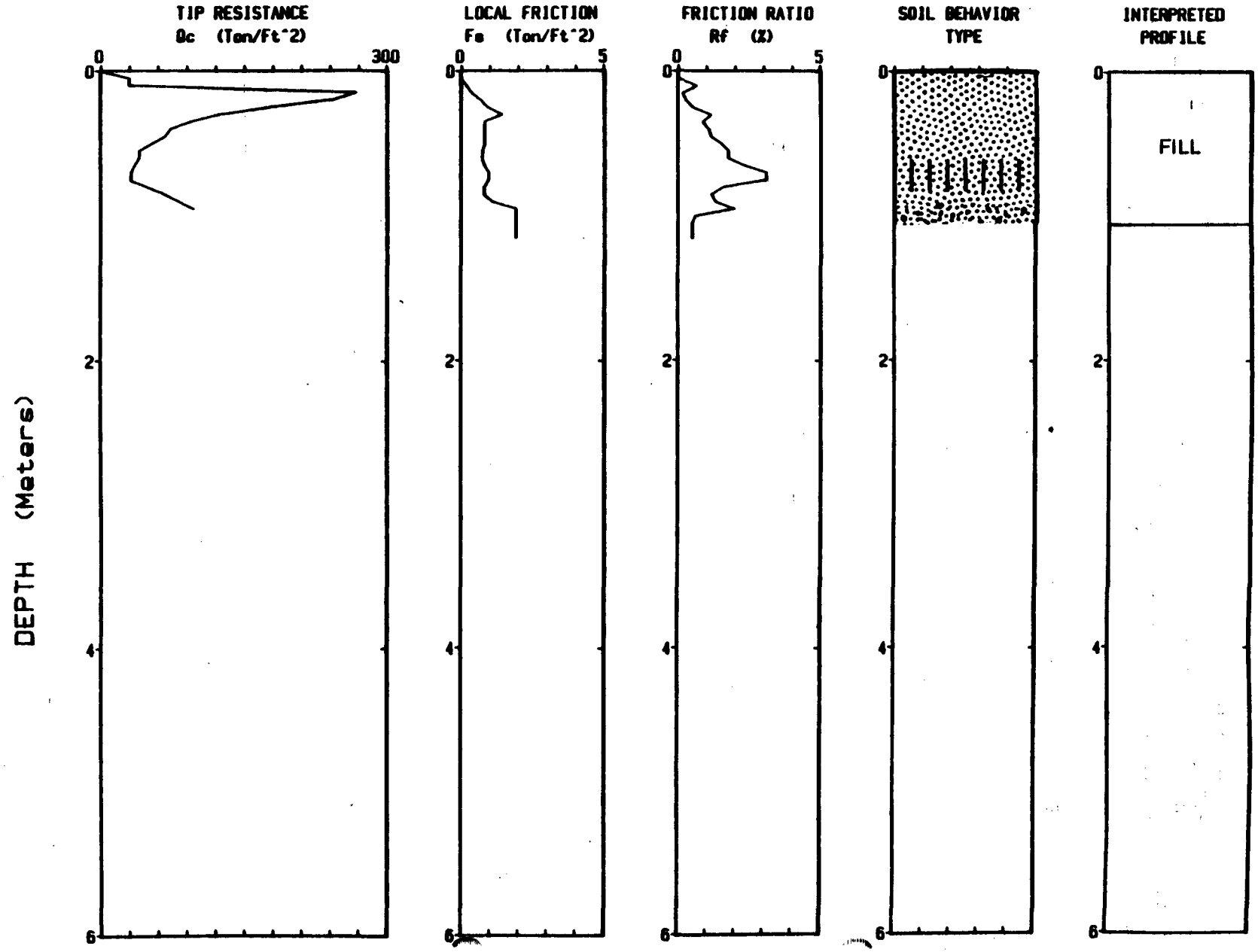
Depth Increment : .05 m

Max Depth : 2.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. Test Date: 04-08-88 Page No: 1 / 1

Location: CPT-129 Elevation: 876.2 MSL TERRA Job No.: 88-1008

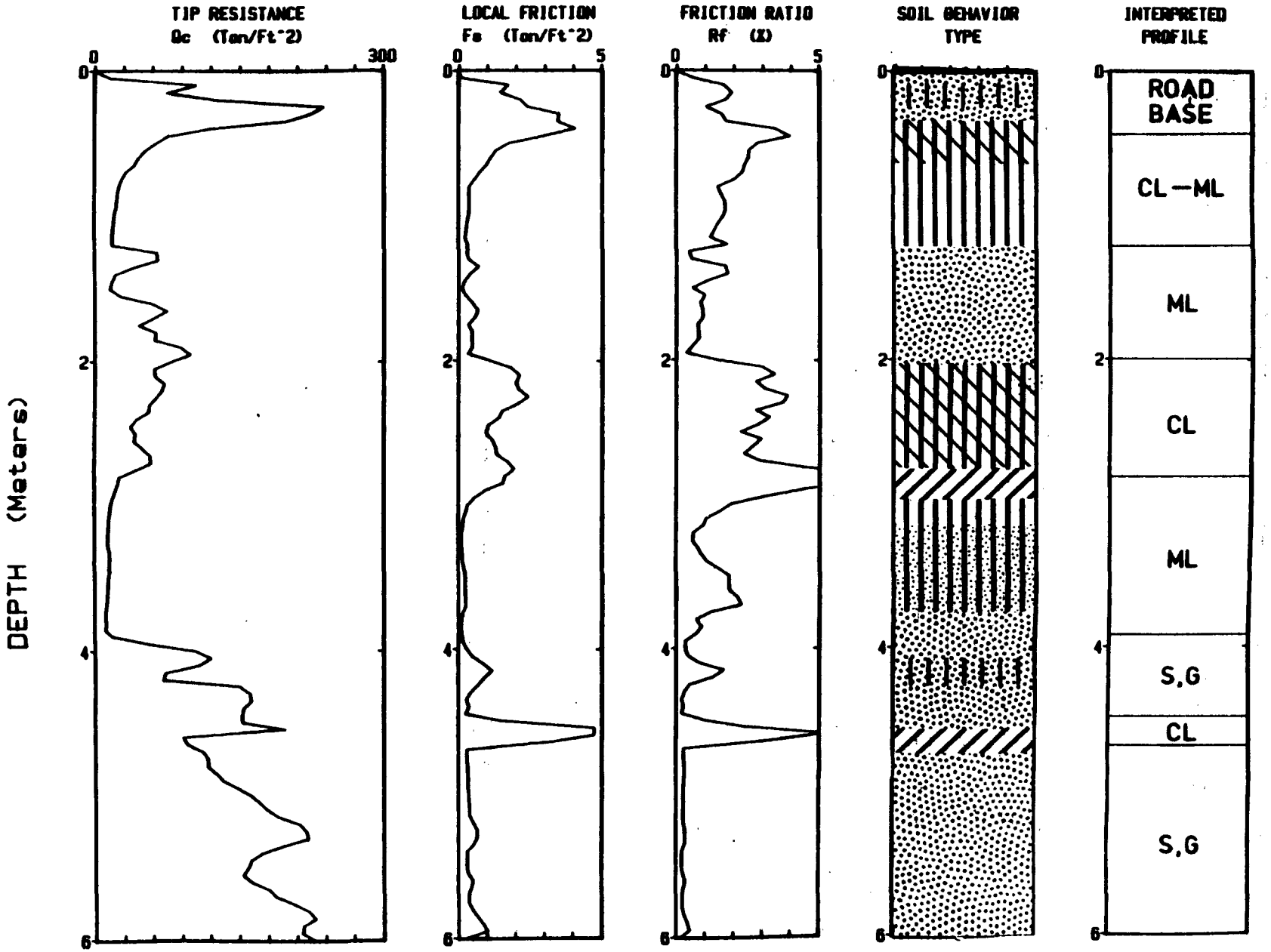


Depth Increment .05 m Max Depth : 1.25 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-08-88 | Page No: 1 / 2

Location: CPT-138A | Elevation: 879.5 MSL | TERRA Job No.: 88-1008



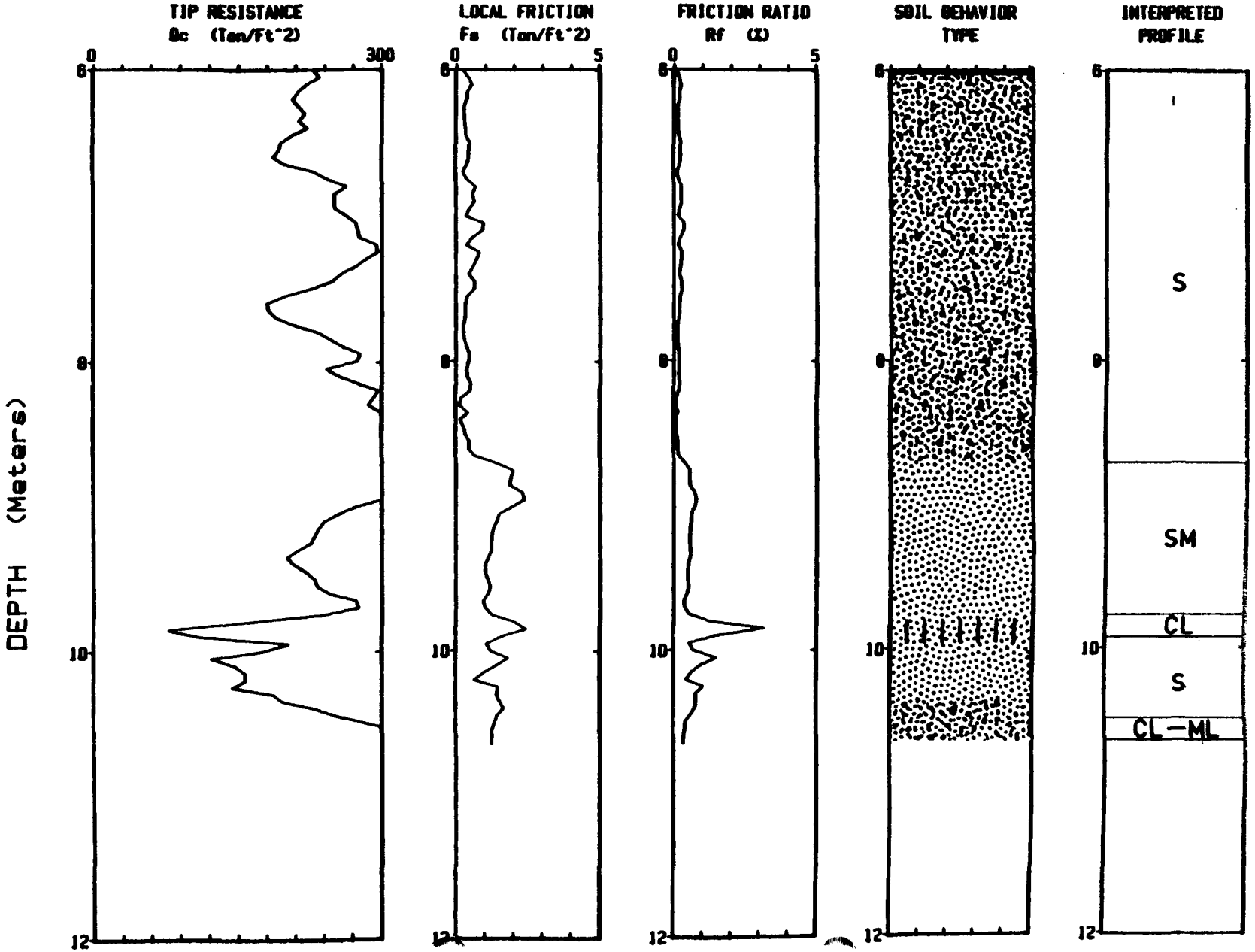
Depth Increment : .05 m

Max Depth : 10.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-08-88 | Page No: 2 / 2

Location: CPT-138A | Elevation: 879.5 MSL | TERRA Job No.: 88-1008



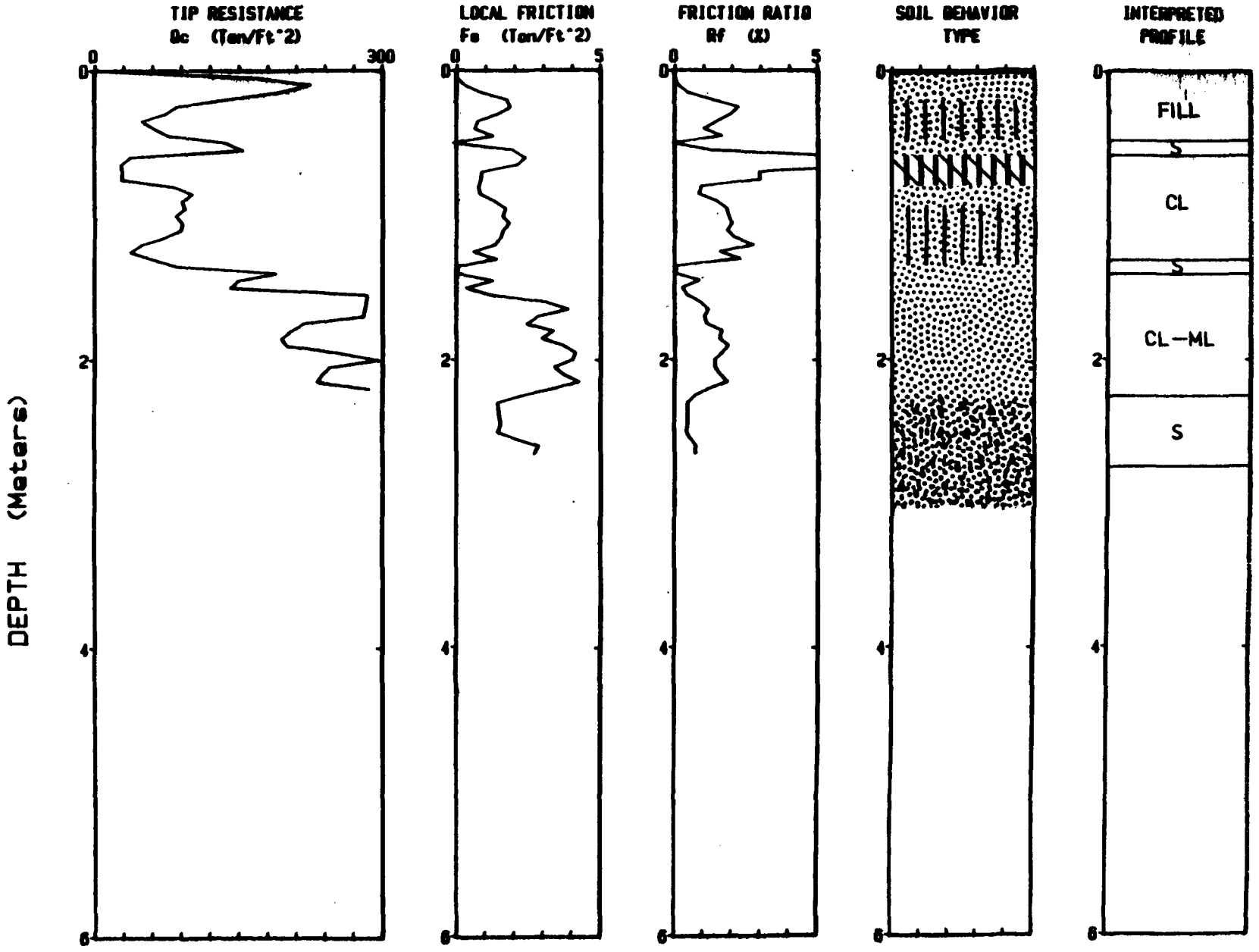
Depth Increment .05 m

Max Depth : 10.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-08-88 | Page No: 1 / 1

Location: CPT-129A | Elevation: 876.2 MSL | TERRA Job No.: 88-1008



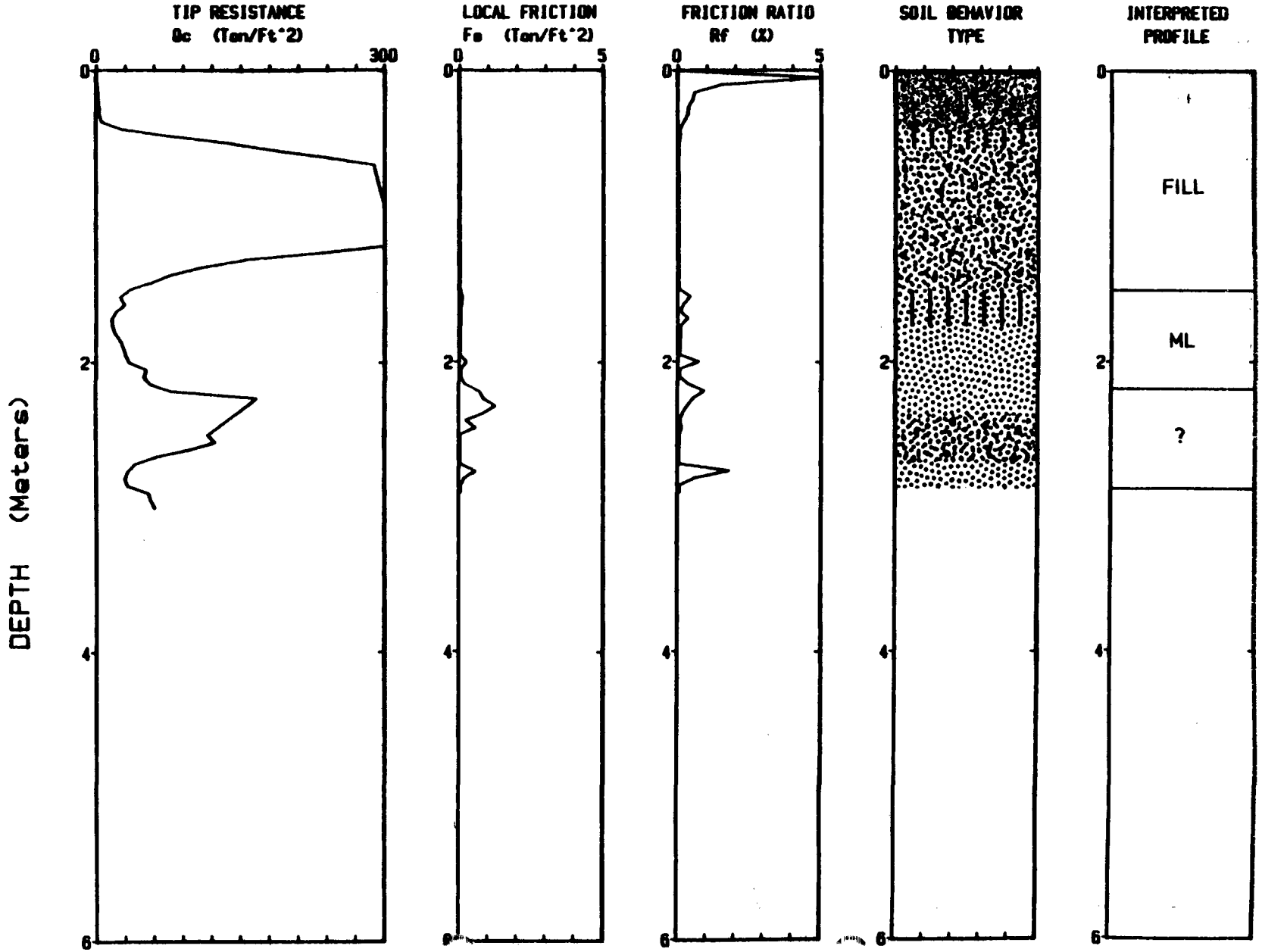
Depth Increment : .05 m

Max Depth : 2.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-10-88 | Page No: 1 / 1

Location: CPT-129B | Elevation: 876.2 MSL | TERRA Job No.: 88-1008



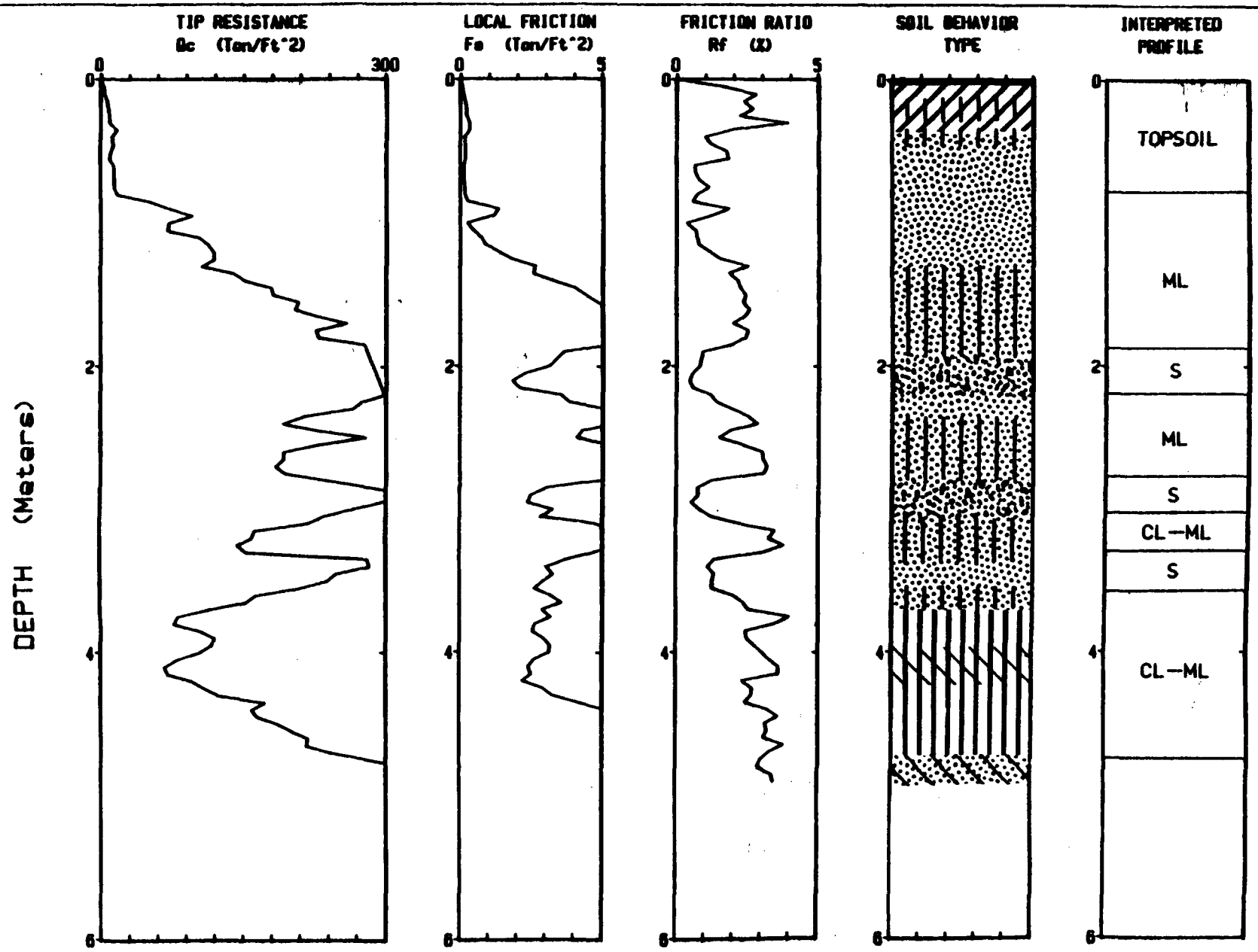
Depth Increment = .05 m

Max Depth = 3 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-10-88 | Page No: 1 / 1

Location: CPT-130 | Elevation: 874.4 MSL | TERRA Job No.: 88-1008



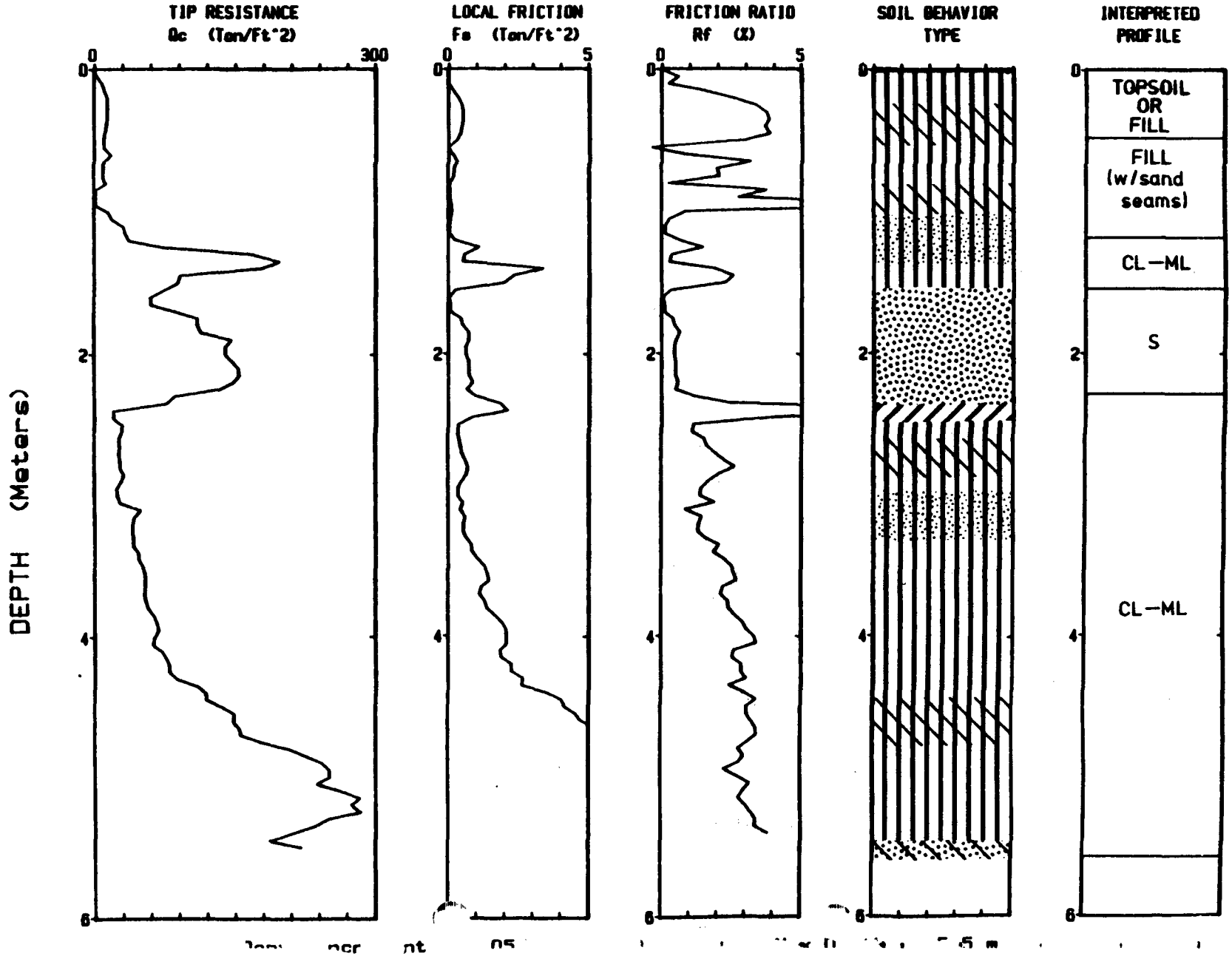
Depth Increment : .05 m

Max Depth : 5 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-10-88 | Page No: 1 / 1

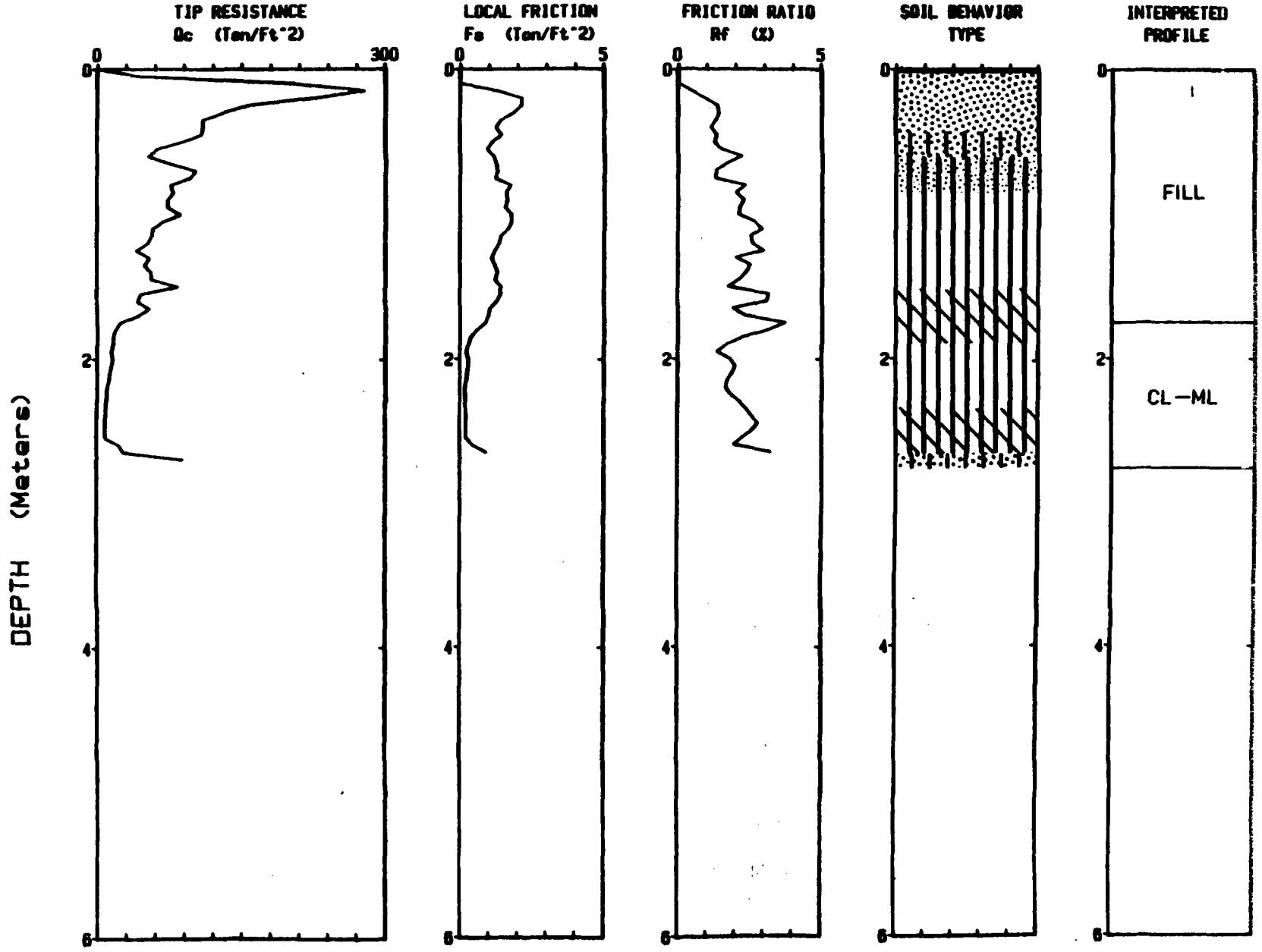
Location: CPT-131 | Elevation: 874.5 MSL | TERRA Job No.: 88-1008



NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

Location: CPT-132 | Elevation: 883.0 MSL | TERRA Job No.: 88-1008



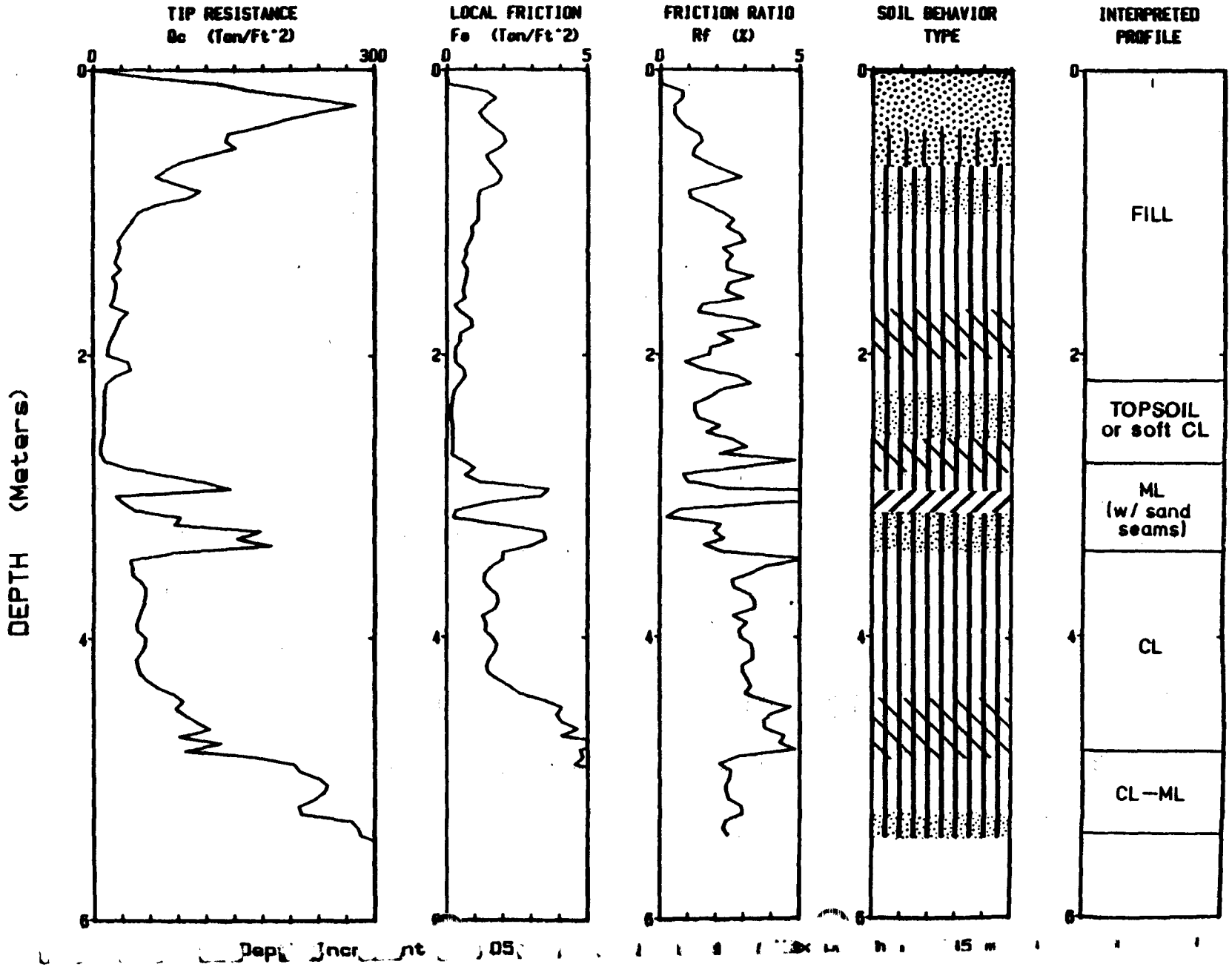
Depth Increment : .05 m

Max Depth : 2.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

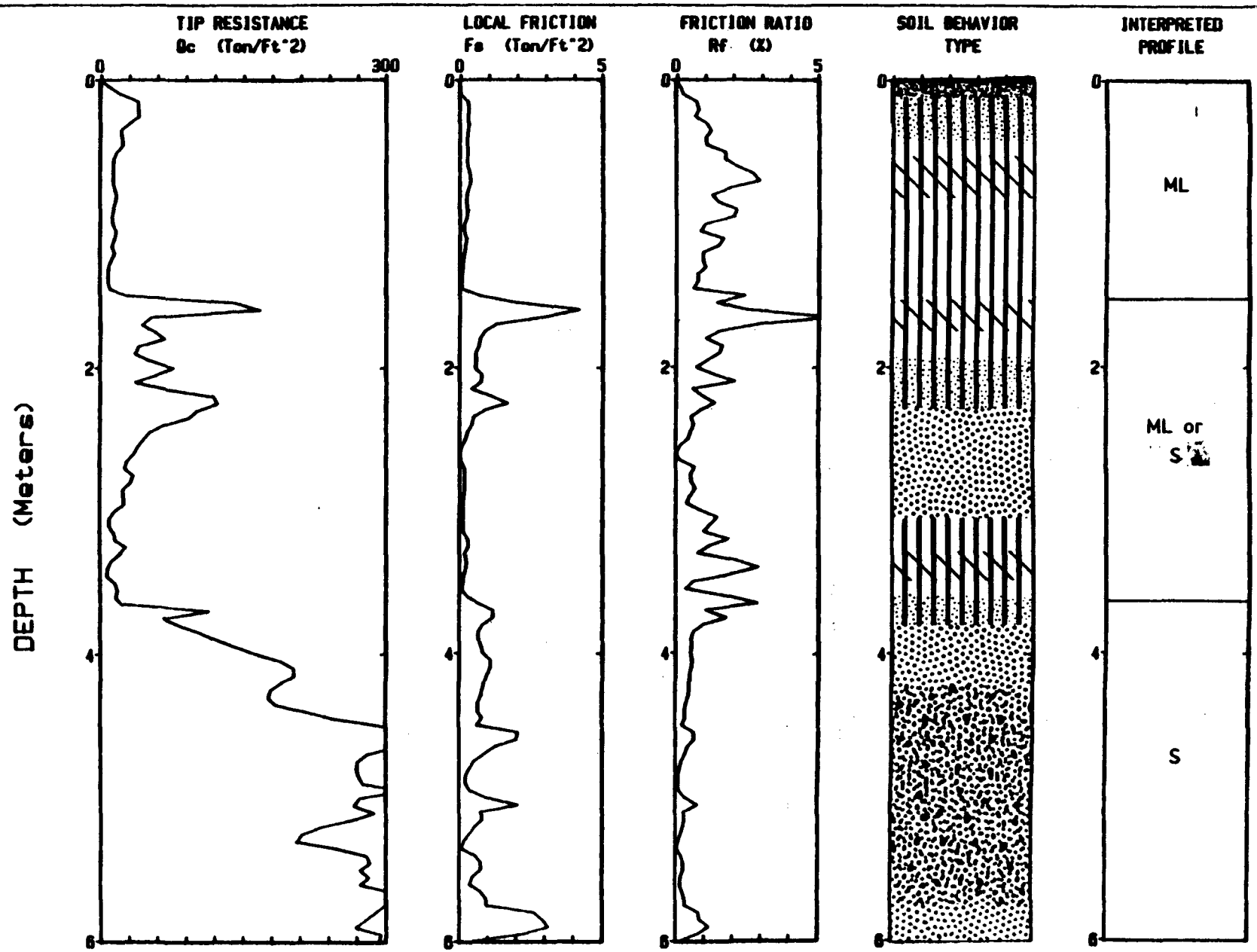
Location: CPT-133 | Elevation: 885.5 MSL | TERRA Job No.: 88-1008



NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-08-88 | Page No: 1 / 2

Location: CPT-134 | Elevation: 880.1 MSL | TERRA Job No.: 88-1008



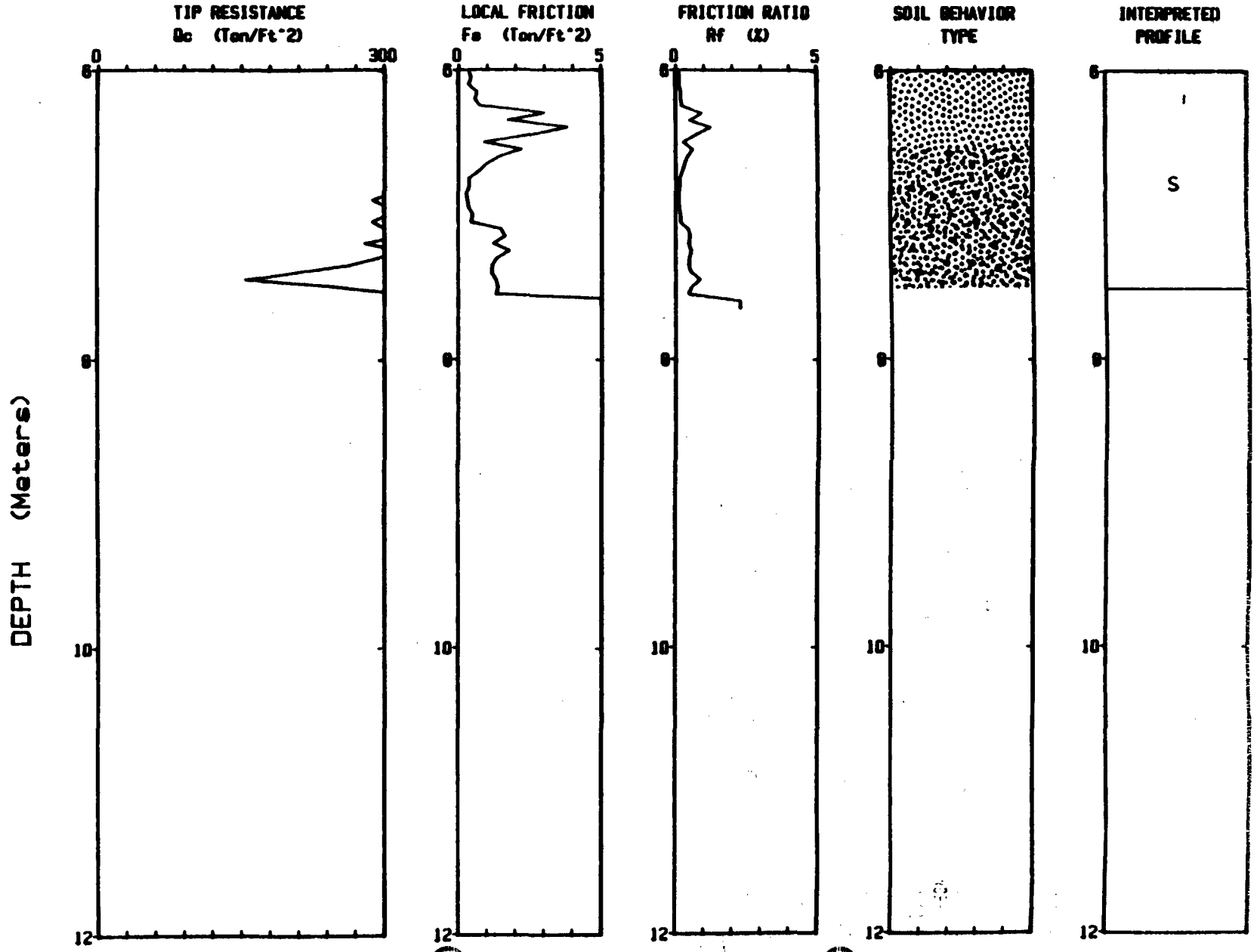
Depth Increment : .05 m

Max Depth : 7.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 2 / 2

Location: CPT-134 | Elevation: 880.1 MSL | TERRA Job No.: 88-1008

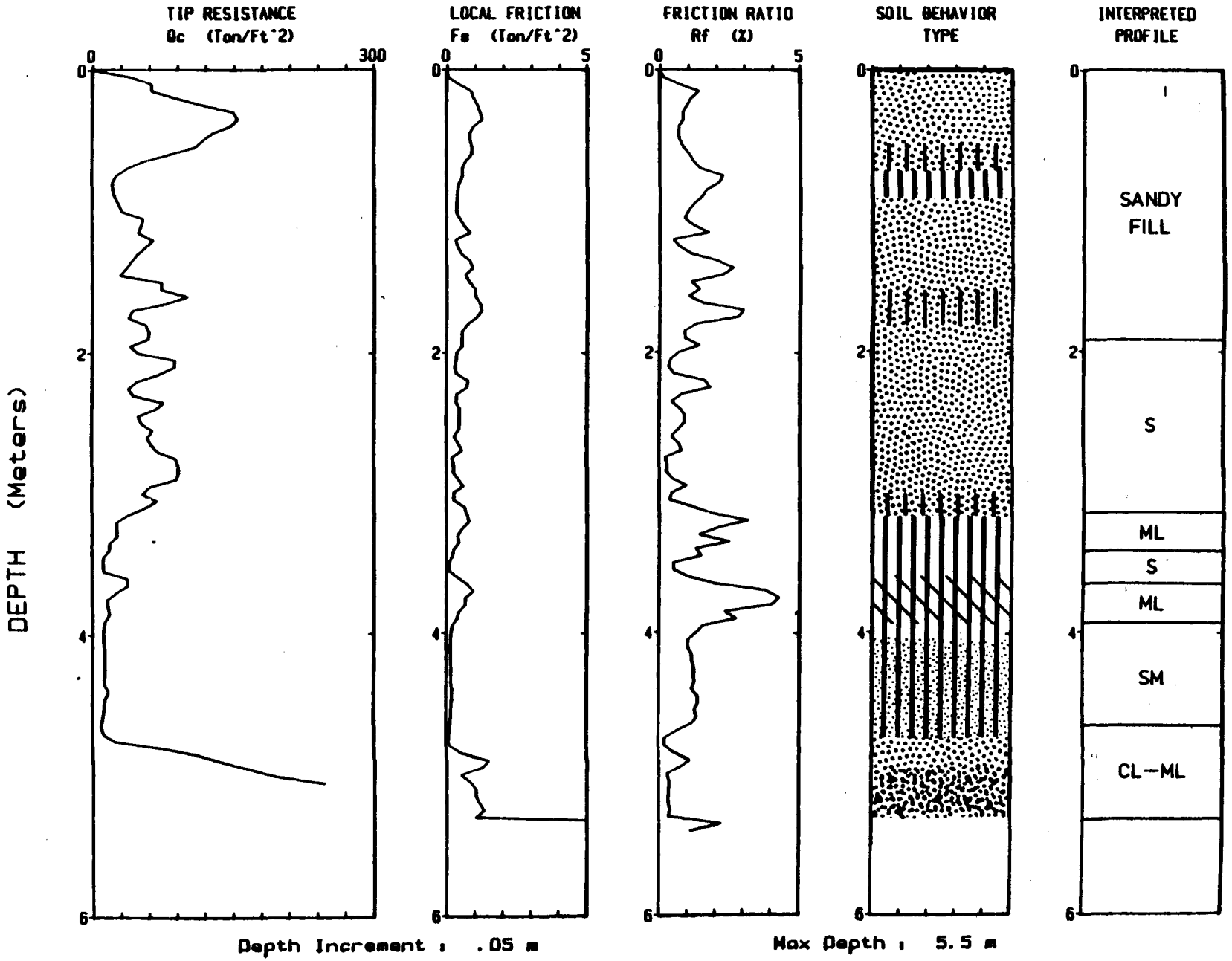


Depth Increment = .05 m Max Depth = 7.75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

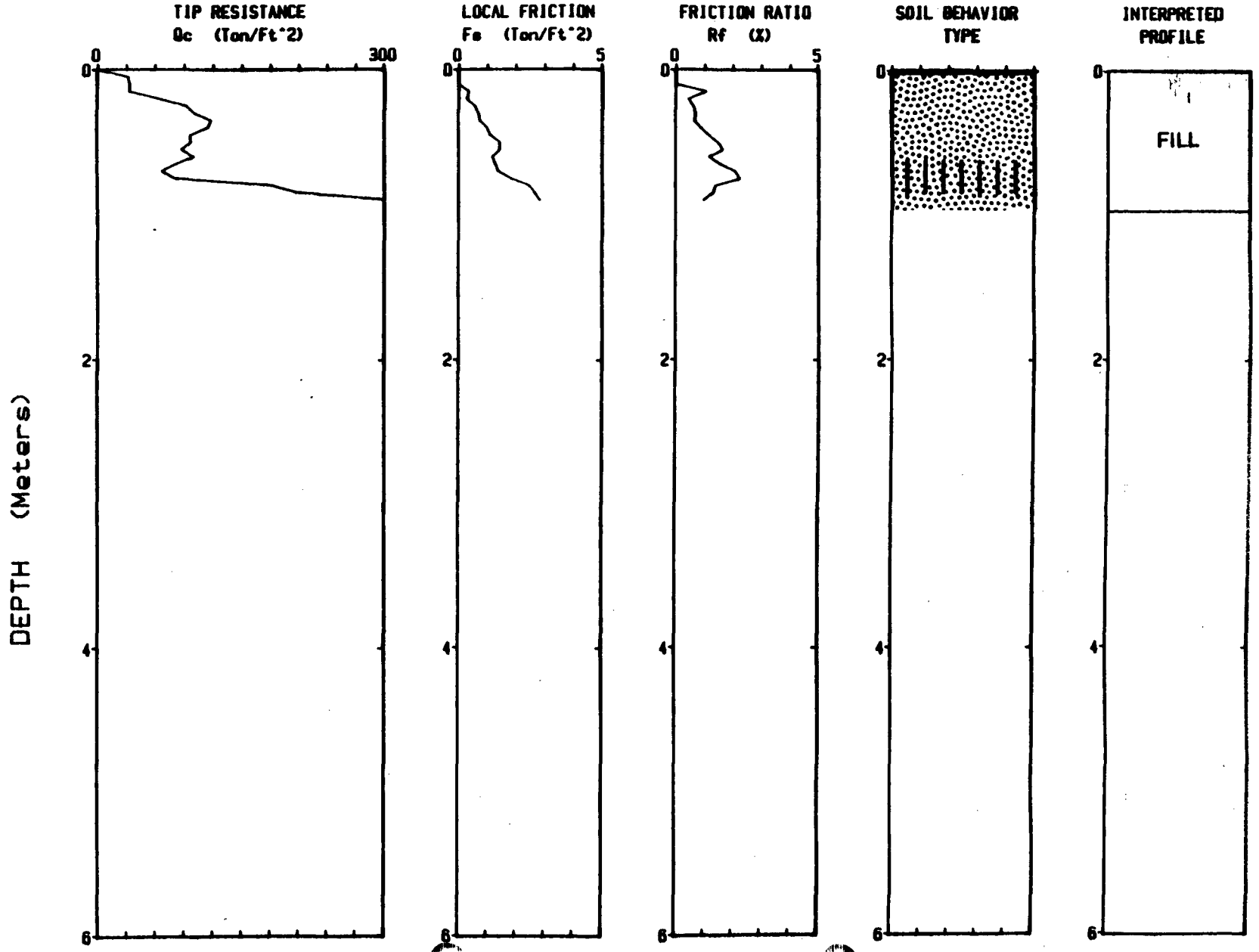
Location: CPT-135 | Elevation: 880.1 MSL | TERRA Job No.: 88-1008



NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

Location: CPT-136 | Elevation: 879.0 MSL | TERRA Job No.: 88-1008

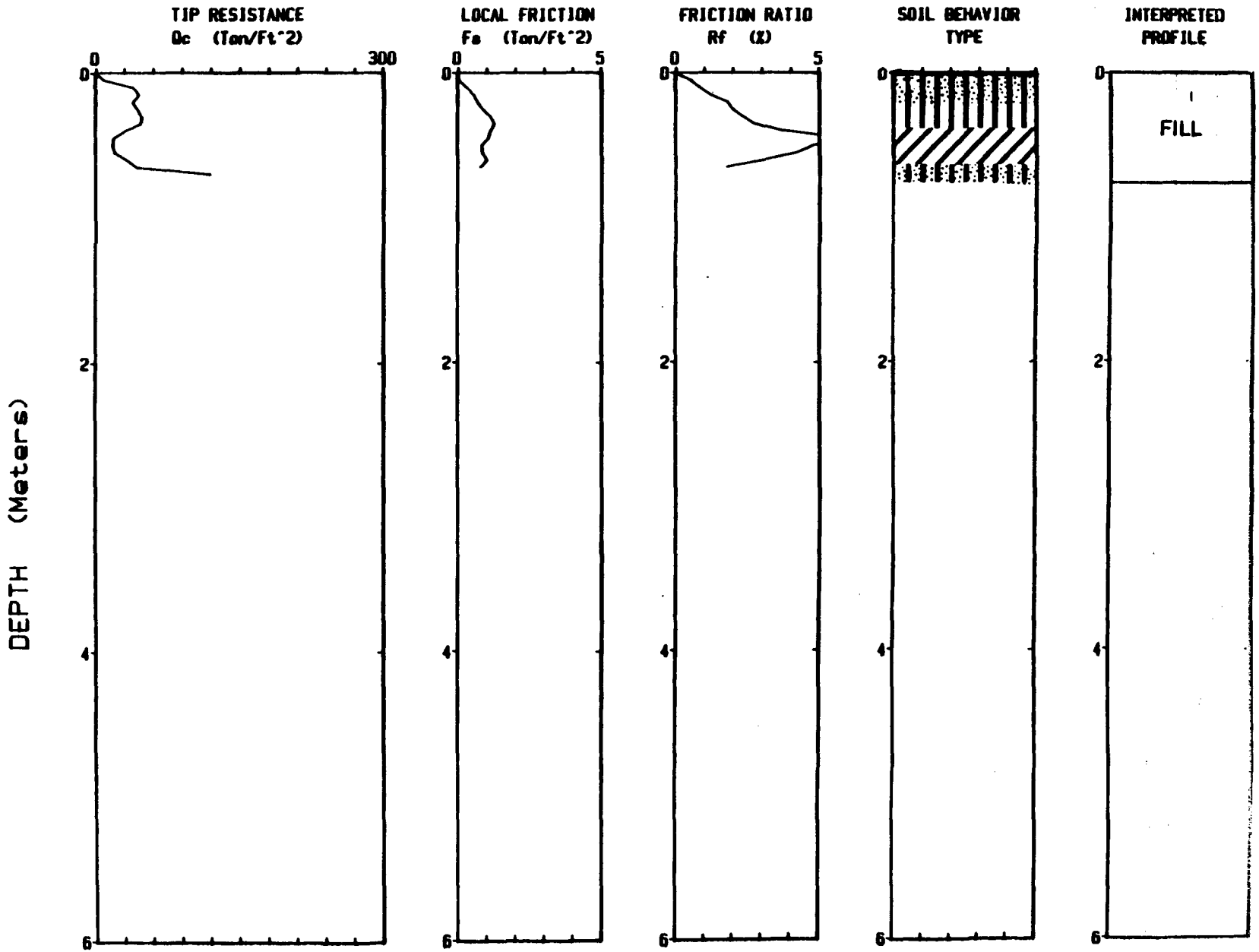


Depth Increment .05 m Max Depth : 1 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

Location: CPT-137 | Elevation: 882.6 MSL | TERRA Job No.: 88-1008



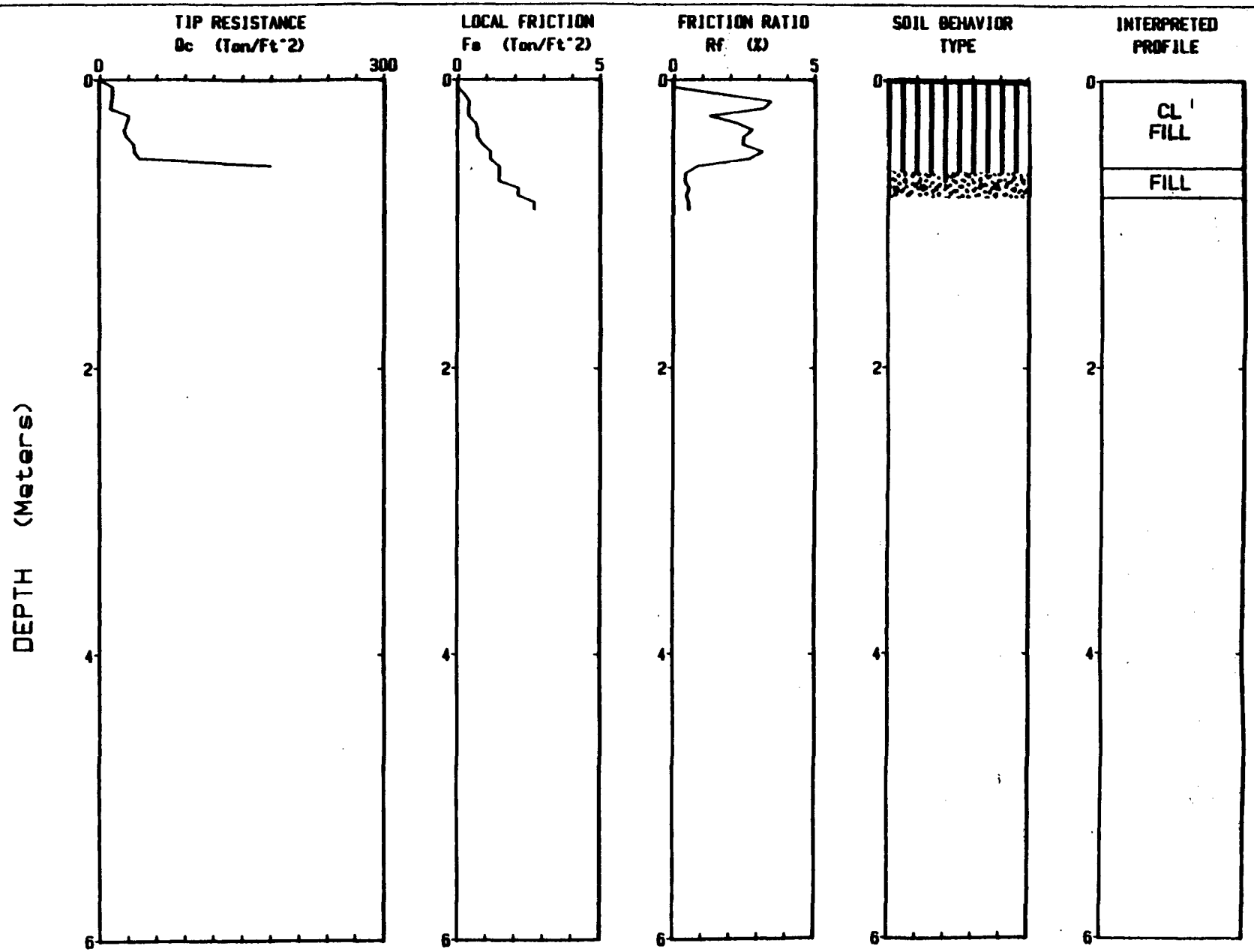
Depth Increment : .05 m

Max Depth : .75 m

NORTHSIDE LANDFILL

Contractor: TERRA TECH. | Test Date: 04-09-88 | Page No: 1 / 1

Location: CPT-137A | Elevation: 882.6 MSL | TERRA Job No.: 88-1008



Depth Increment = .05 m

Max Depth = 1 m

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-100
Job No. : 88-1008
Tot. Unit Wt.: (avg) : 125 pcf

Test Date : 01-08-88
Elevation : 322.1 MSL
Water table (meters) : 3.4

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	9.70	0.28	2.89	0.03	silty clay to clay	UNDFND	UNDFD	6	.80
0.50	1.64	13.46	0.83	6.20	0.08	clay	UNDFND	UNDFD	13	1.11
0.75	2.46	11.70	0.81	6.92	0.13	clay	UNDFND	UNDFD	11	.96
1.00	3.23	11.56	0.62	5.36	0.18	clay	UNDFND	UNDFD	11	.94
1.25	4.10	10.34	0.45	4.39	0.23	clay	UNDFND	UNDFD	10	.84
1.50	4.92	7.94	0.40	4.99	0.28	clay	UNDFND	UNDFD	8	.63
1.75	5.74	3.94	0.28	7.06	0.33	clay	UNDFND	UNDFD	4	.30
2.00	6.56	3.32	0.09	2.59	0.38	clay	UNDFND	UNDFD	3	.24
2.25	7.38	6.98	0.12	1.75	0.44	clayey silt to silty clay	UNDFND	UNDFD	3	.54
2.50	8.20	7.42	0.16	2.16	0.49	silty clay to clay	UNDFND	UNDFD	5	.57
2.75	9.02	18.32	0.29	1.58	0.54	sandy silt to clayey silt	UNDFND	UNDFD	7	1.48
3.00	9.84	35.76	0.97	2.72	0.59	sandy silt to clayey silt	UNDFND	UNDFD	14	2.93
3.25	10.66	109.10	3.24	2.97	0.64	sandy silt to clayey silt	UNDFND	UNDFD	42	9.03
3.50	11.48	345.94	4.58	1.32	0.69	sand	>90	46-48	>50	UNDEFINED
3.75	12.20	105.74	3.77	3.57	0.72	sandy silt to clayey silt	UNDFND	UNDFD	41	8.75

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-100A
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : 04-08-88
Elevation : 822.1 MSL
Water Table (meters) : 2.4

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Dr - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	10.40	0.31	2.96	0.03	silty clay to clay	UNDFND	UNDFD	7	.86
0.50	1.64	11.98	0.58	4.82	0.08	clay	UNDFND	UNDFD	11	.39
0.75	2.46	13.58	0.78	5.76	0.13	clay	UNDFND	UNDFD	13	1.12
1.00	3.28	12.24	0.58	4.71	0.18	clay	UNDFND	UNDFD	12	1.00
1.25	4.10	12.38	0.35	2.84	0.23	clayey silt to silty clay	UNDFND	UNDFD	6	1.01
1.50	4.92	10.68	0.25	2.34	0.28	clayey silt to silty clay	UNDFND	UNDFD	5	.36
1.75	5.74	8.68	0.21	2.44	0.33	silty clay to clay	UNDFND	UNDFD	6	.69
2.00	6.56	5.22	0.12	2.38	0.38	silty clay to clay	UNDFND	UNDFD	3	.40
2.25	7.38	5.88	0.13	2.18	0.44	silty clay to clay	UNDFND	UNDFD	4	.45
2.50	8.20	8.72	0.07	0.83	0.49	clayey silt to silty clay	UNDFND	UNDFD	4	
2.75	9.02	15.68	0.08	0.54	0.54	sandy silt to clayey silt	UNDFND	UNDFD	6	1.25
3.00	9.84	38.40	0.45	1.17	0.59	silty sand to sandy silt	40-50	34-36	12	UNDEFINED
3.25	10.66	238.70	0.57	0.24	0.64	gravelly sand to sand	>90	44-46	38	UNDEFINED
3.50	11.48	316.78	1.64	0.52	0.69	gravelly sand to sand	>90	46-48	>50	UNDEFINED
3.75	12.30	99.74	3.91	3.92	0.72	clayey silt to silty clay	UNDFND	UNDFD	48	8.25
4.00	13.12	127.92	3.79	2.96	0.75	sandy silt to clayey silt	UNDFND	UNDFD	49	10.59

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ***

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-104
Job No. : 88-1008
Tot. Unit Wtr (avg) : 125 pcf

Test Date : 04-07-88
Elevation : 214.0 MSL
Water table (meters) : .5

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	150.54	1.74	1.16	0.03	sand to silty sand	>90	>48	36	UNDEFINED
0.50	1.64	169.32	2.07	1.22	0.08	sand to silty sand	>90	>48	41	UNDEFINED
0.75	2.46	173.96	2.42	1.39	0.12	sand to silty sand	>90	>48	42	UNDEFINED
1.00	3.28	175.36	2.38	1.36	0.14	sand to silty sand	>90	>48	42	UNDEFINED
1.25	4.10	176.30	2.09	1.18	0.17	sand	>90	>48	34	UNDEFINED
1.50	4.92	187.82	2.17	1.16	0.19	sand	>90	>48	35	UNDEFINED
1.75	5.74	190.44	2.40	1.26	0.22	sand to silty sand	>90	>48	46	UNDEFINED
2.00	6.56	196.18	2.52	1.28	0.24	sand to silty sand	>90	>48	47	UNDEFINED
2.25	7.38	198.52	2.97	1.50	0.27	sand to silty sand	>90	>48	48	UNDEFINED
2.50	8.20	193.12	2.19	1.13	0.29	sand	>90	46-48	37	UNDEFINED
2.75	9.02	219.12	4.23	1.93	0.32	sand to silty sand	>90	>48	>50	UNDEFINED
3.00	9.84	185.36	2.26	1.22	0.35	sand	>90	46-48	36	UNDEFINED
3.25	10.66	188.20	2.22	1.18	0.37	sand	>90	46-48	36	UNDEFINED
3.50	11.48	247.00	5.19	2.10	0.40	sand to silty sand	>90	46-48	>50	UNDEFINED
3.75	12.30	252.92	5.78	2.28	0.42	silty sand to sandy silt	>90	46-48	>50	UNDEFINED
4.00	13.12	267.86	6.89	2.57	0.45	silty sand to sandy silt	>90	46-48	>50	UNDEFINED
4.25	13.94	235.60	5.82	2.47	0.47	silty sand to sandy silt	>90	46-48	>50	UNDEFINED
4.50	14.76	210.66	3.71	1.76	0.50	sand to silty sand	>90	44-46	>50	UNDEFINED
4.75	15.58	197.12	2.71	1.37	0.53	sand to silty sand	>90	44-46	47	UNDEFINED
5.00	16.40	191.80	2.30	1.20	0.55	sand	>90	44-46	37	UNDEFINED
5.25	17.22	324.54	3.72	1.15	0.58	sand	>90	46-48	>50	UNDEFINED
5.50	18.04	375.34	4.12	1.10	0.60	sand	>90	46-48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR: (v 3.02) ***

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-105
Job No. : 88-1008
Tot. Unit Wt: (avg) : 125 pcf

Test Date : 04-10-88
Elevation : 919.4 MSL
Water table (meters) : .8

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	6.10	0.02	0.33	0.03	sensitive fine grained	UNDFND	UNDFD	3	.50
0.50	1.64	8.88	0.40	4.55	0.08	clay	UNDFND	UNDFD	3	.73
0.75	2.46	15.54	0.50	3.23	0.13	silty clay to clay	UNDFND	UNDFD	10	1.28
1.00	3.28	41.34	1.13	2.73	0.17	sandy silt to clayey silt	UNDFND	UNDFD	15	3.43
1.25	4.10	52.22	1.43	2.73	0.20	sandy silt to clayey silt	UNDFND	UNDFD	20	4.32
1.50	4.92	36.78	0.66	1.79	0.22	sandy silt to clayey silt	UNDFND	UNDFD	14	3.04
1.75	5.74	27.16	0.72	2.64	0.25	sandy silt to clayey silt	UNDFND	UNDFD	10	2.23
2.00	6.56	22.56	0.50	2.20	0.27	sandy silt to clayey silt	UNDFND	UNDFD	9	1.84
2.25	7.38	24.72	0.48	1.95	0.30	sandy silt to clayey silt	UNDFND	UNDFD	9	2.02
2.50	8.20	53.44	1.92	3.41	0.33	clayey silt to silty clay	UNDFND	UNDFD	26	[illegible]
2.75	9.02	15.46	0.57	3.70	0.35	silty clay to clay	UNDFND	UNDFD	10	[illegible]
3.00	9.84	15.04	0.31	1.91	0.38	clayey silt to silty clay	UNDFND	UNDFD	9	1.23
3.25	10.66	27.70	0.41	1.47	0.40	sandy silt to clayey silt	UNDFND	UNDFD	11	2.25
3.50	11.48	30.44	1.31	4.32	0.43	silty clay to clay	UNDFND	UNDFD	19	2.47
3.75	12.30	14.56	0.41	2.84	0.45	clayey silt to silty clay	UNDFND	UNDFD	7	1.15
4.00	13.12	11.38	0.15	1.23	0.48	clayey silt to silty clay	UNDFND	UNDFD	5	.38
4.25	13.94	13.14	0.17	1.31	0.51	sandy silt to clayey silt	UNDFND	UNDFD	5	1.02
4.50	14.76	65.36	2.75	4.20	0.53	clayey silt to silty clay	UNDFND	UNDFD	31	5.37
4.75	15.58	104.88	3.38	3.22	0.56	sandy silt to clayey silt	UNDFND	UNDFD	40	8.66
5.00	16.40	96.16	3.49	3.63	0.58	sandy silt to clayey silt	UNDFND	UNDFD	37	7.93
5.25	17.22	116.32	2.15	1.85	0.61	silty sand to sandy silt	70-80	40-42	27	UNDEFINED
5.50	18.04	237.92	1.88	0.79	0.63	sand	>90	44-46	45	UNDEFINED
5.75	18.86	96.78	3.18	3.29	0.66	sandy silt to clayey silt	UNDFND	UNDFD	37	7.97
6.00	19.69	33.14	1.91	5.75	0.68	clay	UNDFND	UNDFD	32	2.66
6.25	20.51	24.28	1.14	4.68	0.71	clay	UNDFND	UNDFD	23	1.91
6.50	21.33	20.02	0.98	4.91	0.74	clay	UNDFND	UNDFD	19	[illegible]
6.75	22.15	18.02	0.91	5.05	0.76	clay	UNDFND	UNDFD	17	[illegible]
7.00	22.97	15.78	0.73	4.65	0.79	clay	UNDFND	UNDFD	15	1.13
7.25	23.79	13.16	0.75	3.94	0.81	silty clay to clay	UNDFND	UNDFD	12	1.47
7.50	24.61	20.20	0.80	3.98	0.84	silty clay to clay	UNDFND	UNDFD	13	1.55
7.75	25.43	20.50	0.81	3.93	0.86	silty clay to clay	UNDFND	UNDFD	13	1.57
8.00	26.25	25.78	0.75	2.89	0.89	clayey silt to silty clay	UNDFND	UNDFD	12	2.01
8.25	27.07	34.70	0.96	2.77	0.92	sandy silt to clayey silt	UNDFND	UNDFD	13	2.75
8.50	27.89	35.30	0.99	2.81	0.94	sandy silt to clayey silt	UNDFND	UNDFD	14	2.79
8.75	28.71	34.52	1.04	3.00	0.97	clayey silt to silty clay	UNDFND	UNDFD	17	2.72
9.00	29.53	33.92	0.85	2.51	0.99	sandy silt to clayey silt	UNDFND	UNDFD	13	2.67
9.25	30.35	32.82	1.00	3.05	1.02	clayey silt to silty clay	UNDFND	UNDFD	16	2.57
9.50	31.17	34.12	0.99	2.90	1.04	sandy silt to clayey silt	UNDFND	UNDFD	13	2.58

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ***

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-104
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : 04-09-88
Elevation : 880.1 MSL
Water table (meters) : 2.2

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	31.26	0.19	0.62	0.03	silty sand to sandy silt	80-90	>48	10	UNDEFINED
0.50	1.64	23.12	0.27	1.19	0.08	sandy silt to clayey silt	UNDFND	UNDFD	9	1.92
0.75	2.46	13.72	0.31	2.27	0.13	clayey silt to silty clay	UNDFND	UNDFD	7	1.13
1.00	3.28	14.02	0.22	1.54	0.18	sandy silt to clayey silt	UNDFND	UNDFD	5	1.15
1.25	4.10	13.38	0.16	1.14	0.23	sandy silt to clayey silt	UNDFND	UNDFD	5	1.13
1.50	4.92	12.48	0.19	1.51	0.28	clayey silt to silty clay	UNDFND	UNDFD	6	1.01
1.75	5.74	93.12	2.25	2.42	0.33	silty sand to sandy silt	80-90	42-44	30	UNDEFINED
2.00	6.56	54.86	0.60	1.09	0.38	silty sand to sandy silt	60-70	40-42	18	UNDEFINED
2.25	7.38	81.84	0.95	1.16	0.44	sand to silty sand	70-80	40-42	20	UNDEFINED
2.50	8.20	71.38	0.44	0.62	0.47	sand to silty sand	60-70	40-42	17	UNDEFINED
2.75	9.02	32.48	0.09	0.27	0.49	silty sand to sandy silt	40-50	34-36	10	UNDEFINED
3.00	9.84	23.74	0.13	0.56	0.52	silty sand to sandy silt	<40	32-34	8	UNDEFINED
3.25	10.66	15.16	0.20	1.32	0.55	sandy silt to clayey silt	UNDFND	UNDFD	6	1.21
3.50	11.48	11.72	0.16	1.35	0.57	clayey silt to silty clay	UNDFND	UNDFD	5	.91
3.75	12.30	47.50	0.67	1.42	0.60	silty sand to sandy silt	50-60	36-38	15	UNDEFINED
4.00	13.12	123.34	0.74	0.60	0.62	sand	70-80	42-44	24	UNDEFINED
4.25	13.94	193.44	0.96	0.50	0.65	sand	>90	44-46	37	UNDEFINED
4.50	14.76	223.10	0.68	0.31	0.67	gravelly sand to sand	>90	44-46	36	UNDEFINED
4.75	15.58	298.22	1.32	0.44	0.70	gravelly sand to sand	>90	44-46	48	UNDEFINED
5.00	16.40	282.16	0.41	0.15	0.73	gravelly sand to sand	>90	44-46	45	UNDEFINED
5.25	17.22	252.36	0.89	0.35	0.75	gravelly sand to sand	>90	44-46	40	UNDEFINED
5.50	18.04	258.26	0.44	0.17	0.78	gravelly sand to sand	>90	44-46	41	UNDEFINED
5.75	18.86	291.52	0.68	0.23	0.80	gravelly sand to sand	>90	44-46	47	UNDEFINED
6.00	19.69	307.10	2.26	0.74	0.83	sand	>90	44-46	>50	UNDEFINED
6.25	20.51	326.86	0.56	0.17	0.85	gravelly sand to sand	>90	44-46	>50	UNDEFINED
6.50	21.33	341.48	2.39	0.70	0.88	gravelly sand to sand	>90	44-46	>50	UNDEFINED
6.75	22.15	338.40	1.13	0.33	0.91	gravelly sand to sand	>90	44-46	>50	UNDEFINED
7.00	22.97	305.26	0.37	0.12	0.93	gravelly sand to sand	>90	44-46	49	UNDEFINED
7.25	23.79	308.48	1.32	0.43	0.96	gravelly sand to sand	>90	44-46	49	UNDEFINED
7.50	24.61	233.46	1.28	0.55	0.98	sand	>90	42-44	45	UNDEFINED
7.75	25.43	311.88	5.89	1.89	1.01	sand to silty sand	>90	44-46	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ***

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-13E
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : 04-03-88
Elevation : 259.1 MSL
Water table (meters) : 2.1

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	75.10	0.68	0.90	0.03	sand to silty sand	>90	>48	18	UNDEFINED
0.50	1.64	139.14	1.00	0.72	0.08	sand	>90	>48	27	UNDEFINED
0.75	2.46	61.18	0.70	1.14	0.13	silty sand to sandy silt	80-90	46-48	20	UNDEFINED
1.00	3.28	25.36	0.35	1.40	0.18	sandy silt to clayey silt	UNDFND	UNDFD	10	2.09
1.25	4.10	55.06	0.52	0.94	0.23	silty sand to sandy silt	70-80	42-44	18	UNDEFINED
1.50	4.92	45.18	0.74	1.64	0.28	silty sand to sandy silt	60-70	40-42	14	UNDEFINED
1.75	5.74	66.26	1.10	1.66	0.33	silty sand to sandy silt	70-80	42-44	21	UNDEFINED
2.00	6.56	52.86	0.53	1.00	0.38	silty sand to sandy silt	60-70	40-42	17	UNDEFINED
2.25	7.38	65.80	0.47	0.71	0.44	sand to silty sand	60-70	40-42	18	UNDEFINED
2.50	8.20	57.18	0.40	0.70	0.47	sand to silty sand	60-70	38-40	14	UNDEFINED
2.75	9.02	68.66	0.36	0.52	0.49	sand to silty sand	60-70	40-42	16	UNDEFINED
3.00	9.84	76.86	0.33	0.43	0.52	sand to silty sand	60-70	40-42	18	UNDEFINED
3.25	10.66	42.46	0.58	1.37	0.55	silty sand to sandy silt	50-60	36-38	14	UNDEFINED
3.50	11.48	16.44	0.24	1.48	0.57	sandy silt to clayey silt	UNDFND	UNDFD	6	1.31
3.75	12.30	25.30	0.55	2.19	0.60	sandy silt to clayey silt	UNDFND	UNDFD	10	2.04
4.00	13.12	13.38	0.34	2.53	0.62	clayey silt to silty clay	UNDFND	UNDFD	6	1.04
4.25	13.94	12.06	0.13	1.11	0.65	sandy silt to clayey silt	UNDFND	UNDFD	5	.83
4.50	14.76	12.80	0.16	1.25	0.67	sandy silt to clayey silt	UNDFND	UNDFD	5	.89
4.75	15.58	12.46	0.09	0.72	0.70	sandy silt to clayey silt	UNDFND	UNDFD	5	.85
5.00	16.40	137.40	0.77	0.56	0.73	sand	80-90	40-42	26	UNDEFINED
5.25	17.22	338.38	1.08	0.32	0.75	gravelly sand to sand	>90	46-48	>50	UNDEFINED
5.50	18.04	501.22	5.78	1.15	0.78	sand	>90	46-48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note. For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-136
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : 04-09-88
Elevation : 270.0 MSL
Water table (meters) : 1.4

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	51.10	0.23	0.46	0.03	sand to silty sand	>90	>48	12	UNDEFINED
0.50	1.64	105.60	0.99	0.94	0.08	sand to silty sand	>90	>48	25	UNDEFINED
0.75	2.46	82.55	1.41	1.69	0.13	silty sand to sandy silt	>90	46-48	27	UNDEFINED
1.00	3.28	296.66	2.95	0.99	0.18	sand	>90	>48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-107
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : [illegible]
Elevation : 882.5 MSL
Water table (meters) : 1.5

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	35.38	0.50	1.42	0.03	silty sand to sandy silt	80-90	>48	11	UNDEFINED
0.50	1.64	32.12	1.08	3.36	0.08	clayey silt to silty clay	UNDFND	UNDFD	15	2.67
0.75	2.46	102.72	1.30	0.98	0.13	sand to silty sand	>90	>48	32	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-137A
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : 04-03-88
Elevation : 882.6 MSL
Water table (meters) : 1.6

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	16.50	0.28	1.70	0.03	sandy silt to clayey silt	UNDFND	UNDFD	5	1.37
0.50	1.64	31.50	0.83	2.63	0.08	sandy silt to clayey silt	UNDFND	UNDFD	12	2.61
0.75	2.46	269.70	1.53	0.57	0.13	sand	>90	>48	>50	UNDEFINED
1.00	3.28	506.10	2.58	0.51	0.18	gravelly sand to sand	>90	>48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Burgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor :TERRA TECH.
Location :CPT-137B
Job No. :88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date :4-09-88
Elevation :882.5 MSL
Water table (meters) : 1.6

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	55.14	0.68	1.23	0.03	silty sand to sandy silt	>90	>48	18	UNDEFINED
0.50	1.64	223.80	1.54	0.69	0.08	sand	>90	>48	43	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-101
Job No. : 88-1008
Test Date : [illegible]-18-88
Elevation : 919.8 MSL
Water table (meters) : 2.
Tot. Unit Wt. (avg) : 125 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	6.84	0.01	0.15	0.03	sensitive fine grained	UNDFND	UNDFD	3	.56
0.50	1.64	9.84	0.14	1.40	0.08	clayey silt to silty clay	UNDFND	UNDFD	5	.81
0.75	2.46	8.80	0.53	6.05	0.13	clay	UNDFND	UNDFD	8	.72
1.00	3.28	19.38	0.40	2.04	0.18	sandy silt to clayey silt	UNDFND	UNDFD	7	1.60
1.25	4.10	38.22	1.11	2.90	0.23	sandy silt to clayey silt	UNDFND	UNDFD	15	3.16
1.50	4.92	36.24	0.85	2.35	0.28	sandy silt to clayey silt	UNDFND	UNDFD	14	2.99
1.75	5.74	35.88	0.67	1.86	0.33	sandy silt to clayey silt	UNDFND	UNDFD	14	2.96
2.00	6.56	33.46	0.59	1.75	0.38	sandy silt to clayey silt	UNDFND	UNDFD	13	2.75
2.25	7.38	26.12	0.50	1.93	0.42	sandy silt to clayey silt	UNDFND	UNDFD	10	2.14
2.50	8.20	22.16	0.26	1.16	0.45	sandy silt to clayey silt	UNDFND	UNDFD	8	1.80
2.75	9.02	31.48	0.30	0.96	0.47	silty sand to sandy silt	40-50	34-36	10	UNDEFINED
3.00	9.84	40.34	1.51	3.70	0.50	clayey silt to silty clay	UNDFND	UNDFD	20	3.33
3.25	10.66	30.54	0.88	2.89	0.53	clayey silt to silty clay	UNDFND	UNDFD	15	2.49
3.50	11.48	30.28	0.70	2.31	0.55	sandy silt to clayey silt	UNDFND	UNDFD	12	2.46
3.75	12.30	30.48	0.46	1.51	0.58	sandy silt to clayey silt	UNDFND	UNDFD	12	2.47
4.00	13.12	36.44	0.70	1.92	0.60	sandy silt to clayey silt	UNDFND	UNDFD	14	2.97
4.25	13.94	59.36	2.61	4.40	0.63	clayey silt to silty clay	UNDFND	UNDFD	28	4.87
4.50	14.76	58.44	3.26	5.57	0.65	clay	UNDFND	UNDFD	>50	4.79
4.75	15.58	85.34	3.52	4.12	0.68	clayey silt to silty clay	UNDFND	UNDFD	41	7.03
5.00	16.40	262.80	5.00	1.90	0.71	sand to silty sand	>90	44-46	>50	UNDEFINED
5.25	17.22	455.88	4.75	1.04	0.73	sand	>90	46-48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-102
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : 04-08-88
Elevation : 927.0 MSL
Water table (meters) : 4.4

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	5.68	-0.00	-0.07	0.03	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.50	1.64	12.34	0.44	3.38	0.08	silty clay to clay	UNDFND	UNDFD	8	1.07
0.75	2.46	10.36	0.46	4.44	0.13	clay	UNDFND	UNDFD	10	.85
1.00	3.28	16.16	0.41	2.54	0.18	clayey silt to silty clay	UNDFND	UNDFD	8	1.33
1.25	4.10	19.04	0.67	3.53	0.23	silty clay to clay	UNDFND	UNDFD	12	1.56
1.50	4.92	21.00	0.86	4.08	0.28	silty clay to clay	UNDFND	UNDFD	13	1.72
1.75	5.74	23.34	0.48	1.99	0.33	sandy silt to clayey silt	UNDFND	UNDFD	9	1.96
2.00	6.56	24.88	0.47	1.87	0.38	sandy silt to clayey silt	UNDFND	UNDFD	10	2.04
2.25	7.38	27.24	0.41	1.51	0.44	sandy silt to clayey silt	UNDFND	UNDFD	10	2.23
2.50	8.20	33.76	0.66	1.95	0.49	sandy silt to clayey silt	UNDFND	UNDFD	13	2.[illegible]
2.75	9.02	61.56	1.29	2.10	0.54	silty sand to sandy silt	60-70	38-40	20	UNDEFI[illegible]
3.00	9.84	33.18	1.44	4.35	0.59	silty clay to clay	UNDFND	UNDFD	21	2.71
3.25	10.66	32.08	0.62	1.95	0.64	sandy silt to clayey silt	UNDFND	UNDFD	12	2.62
3.50	11.48	33.48	0.67	2.01	0.69	sandy silt to clayey silt	UNDFND	UNDFD	13	2.73
3.75	12.30	51.40	1.24	2.42	0.74	sandy silt to clayey silt	UNDFND	UNDFD	20	4.22
4.00	13.12	53.34	2.25	4.22	0.79	clayey silt to silty clay	UNDFND	UNDFD	26	4.37
4.25	13.94	43.00	1.12	2.61	0.85	sandy silt to clayey silt	UNDFND	UNDFD	16	3.51
4.50	14.76	63.16	1.38	2.18	0.90	silty sand to sandy silt	50-60	36-38	20	UNDEFINED
4.75	15.58	40.76	0.98	2.39	0.93	sandy silt to clayey silt	UNDFND	UNDFD	16	3.31
5.00	16.40	234.80	4.11	1.75	0.95	sand to silty sand	>90	42-44	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ***

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-102A
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : 04-08-88
Elevation : 917.3 MSL
Water Table (meters) : 4.4

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	9.12	0.12	1.29	0.03	clayey silt to silty clay	UNDFND	UNDFD	4	.75
0.50	1.64	14.32	0.53	3.67	0.08	silty clay to clay	UNDFND	UNDFD	9	1.18
0.75	2.46	12.12	0.22	1.78	0.13	clayey silt to silty clay	UNDFND	UNDFD	6	.99
1.00	3.28	5.34	0.02	0.34	0.18	sensitive fine grained	UNDFND	UNDFD	3	.43
1.25	4.10	8.36	0.02	0.19	0.23	sensitive fine grained	UNDFND	UNDFD	4	.67
1.50	4.92	16.86	0.05	0.27	0.28	silty sand to sandy silt	<40	34-36	5	UNDEFINED
1.75	5.74	32.72	1.72	5.27	0.33	clay*	UNDFND	UNDFD	31	2.63

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ***

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-102B
Job No. : 88-1008
Tot. Unit Wt: (avg) : 125 pcf

Test Date : 04-08-88
Elevation : 307.3 MSL
Water table (meters) : 4.4

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	3.18	-0.00	-0.13	0.03	undefined	UNDFND	UNDFD	UDF	UNDEFINED
0.50	1.64	14.70	0.64	4.33	0.08	clay	UNDFND	UNDFD	14	1.21
0.75	2.46	9.72	0.37	3.85	0.13	clay	UNDFND	UNDFD	9	.79
1.00	3.28	9.98	0.06	0.56	0.18	sandy silt to clayey silt	UNDFND	UNDFD	4	.31
1.25	4.10	22.18	0.08	0.35	0.23	silty sand to sandy silt	40-50	36-38	7	UNDEFINED
1.50	4.92	32.30	0.54	1.67	0.28	sandy silt to clayey silt	UNDFND	UNDFD	12	2.66
1.75	5.74	37.22	0.84	2.25	0.33	sandy silt to clayey silt	UNDFND	UNDFD	14	3.07
2.00	6.56	24.00	0.66	2.74	0.38	clayey silt to silty clay	UNDFND	UNDFD	11	1.96
2.25	7.38	15.78	0.36	2.31	0.44	clayey silt to silty clay	UNDFND	UNDFD	8	1.27
2.50	8.20	8.24	0.27	3.23	0.49	clay	UNDFND	UNDFD	8	
2.75	9.02	12.62	0.25	2.01	0.54	clayey silt to silty clay	UNDFND	UNDFD	6	1.00
3.00	9.84	8.82	0.21	2.36	0.59	silty clay to clay	UNDFND	UNDFD	5	.68
3.25	10.66	67.98	0.23	0.34	0.64	sand to silty sand	60-70	38-40	16	UNDEFINED
3.50	11.48	231.08	1.39	0.60	0.69	sand	>90	44-46	44	UNDEFINED
3.75	12.30	276.90	1.31	0.47	0.74	gravelly sand to sand	>90	44-46	44	UNDEFINED
4.00	13.12	48.58	1.20	2.46	0.79	sandy silt to clayey silt	UNDFND	UNDFD	19	3.99
4.25	13.94	34.78	0.32	0.91	0.85	silty sand to sandy silt	<40	32-34	11	UNDEFINED
4.50	14.76	35.58	0.41	1.16	0.90	silty sand to sandy silt	<40	32-34	11	UNDEFINED
4.75	15.58	137.20	3.16	1.60	0.93	sand to silty sand	80-90	42-44	47	UNDEFINED
4.95	16.24	530.34	4.37	0.82	0.95	gravelly sand to sand	>90	46-48	150	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02)

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-103
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : [illegible]
Elevation : 317.4 MSL
Water table (meters) : 1.2

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	4.40	0.03	0.73	0.03	sensitive fine grained	UNDFND	UNDFD	2	.36
0.50	1.64	9.44	0.17	1.80	0.09	clayey silt to silty clay	UNDFND	UNDFD	5	.79
0.75	2.46	14.14	0.73	5.19	0.13	clay	UNDFND	UNDFD	14	1.16
1.00	3.28	13.10	0.84	6.38	0.18	clay	UNDFND	UNDFD	13	1.07
1.25	4.10	11.92	0.53	4.46	0.23	clay	UNDFND	UNDFD	11	.97
1.50	4.92	4.38	0.20	4.47	0.27	clay	UNDFND	UNDFD	4	.34
1.75	5.74	5.42	0.08	1.48	0.30	sensitive fine grained	UNDFND	UNDFD	3	.42
2.00	6.56	23.50	0.20	0.83	0.33	silty sand to sandy silt	40-50	36-38	8	UNDEFINED
2.25	7.38	21.00	0.18	0.88	0.35	sandy silt to clayey silt	UNDFND	UNDFD	8	1.71
2.50	8.20	19.70	0.22	1.12	0.38	sandy silt to clayey silt	UNDFND	UNDFD	8	1.60
2.75	9.02	18.38	0.06	0.33	0.40	silty sand to sandy silt	<40	32-34	6	UNDEFINED
3.00	9.84	44.72	0.60	1.33	0.43	silty sand to sandy silt	50-60	38-40	14	UNDEFINED
3.25	10.66	64.86	1.90	2.92	0.45	sandy silt to clayey silt	UNDFND	UNDFD	25	5.35
3.50	11.48	26.10	0.52	2.01	0.48	sandy silt to clayey silt	UNDFND	UNDFD	10	2.11
3.75	12.30	24.90	0.49	1.97	0.51	sandy silt to clayey silt	UNDFND	UNDFD	10	2.01
4.00	13.12	16.52	0.35	2.14	0.53	clayey silt to silty clay	UNDFND	UNDFD	8	1.31
4.25	13.94	14.44	0.13	0.93	0.56	sandy silt to clayey silt	UNDFND	UNDFD	6	1.12
4.50	14.75	130.82	3.47	2.65	0.58	silty sand to sandy silt	80-90	42-44	42	UNDEFINED
4.75	15.58	82.16	4.05	4.92	0.61	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
5.00	16.40	42.74	1.23	2.87	0.63	sandy silt to clayey silt	UNDFND	UNDFD	16	3.47
5.25	17.22	40.30	1.20	2.98	0.66	sandy silt to clayey silt	UNDFND	UNDFD	15	3.27
5.50	18.04	41.12	1.19	2.90	0.68	sandy silt to clayey silt	UNDFND	UNDFD	16	3.32
5.75	18.86	51.22	2.23	4.35	0.71	clayey silt to silty clay	UNDFND	UNDFD	25	4.17
6.00	19.69	52.34	2.19	4.19	0.74	clayey silt to silty clay	UNDFND	UNDFD	25	4.26
6.25	20.51	54.06	2.71	5.01	0.76	silty clay to clay	UNDFND	UNDFD	35	4.40
6.50	21.33	41.34	2.19	5.29	0.79	clay	UNDFND	UNDFD	40	3.33
6.75	22.15	29.56	0.96	3.26	0.81	clayey silt to silty clay	UNDFND	UNDFD	14	2.35
7.00	22.97	28.48	0.99	3.49	0.84	clayey silt to silty clay	UNDFND	UNDFD	14	2.25
7.25	23.79	26.58	0.94	3.28	0.86	clayey silt to silty clay	UNDFND	UNDFD	14	2.26
7.50	24.61	29.82	0.88	2.96	0.89	clayey silt to silty clay	UNDFND	UNDFD	14	2.35
7.75	25.43	36.32	1.00	2.74	0.92	sandy silt to clayey silt	UNDFND	UNDFD	14	2.89
8.00	26.25	43.92	1.71	3.90	0.94	clayey silt to silty clay	UNDFND	UNDFD	21	3.52
8.25	27.07	38.80	1.41	3.64	0.97	clayey silt to silty clay	UNDFND	UNDFD	19	3.09
8.50	27.89	29.20	0.73	2.50	0.99	sandy silt to clayey silt	UNDFND	UNDFD	11	2.23
8.75	28.71	28.22	0.68	2.41	1.02	sandy silt to clayey silt	UNDFND	UNDFD	11	2.20
9.00	29.53	29.18	0.64	2.21	1.04	sandy silt to clayey silt	UNDFND	UNDFD	11	2.28
9.25	30.35	33.28	0.80	2.41	1.07	sandy silt to clayey silt	UNDFND	UNDFD	13	2.61
9.50	31.17	30.52	0.61	1.99	1.10	sandy silt to clayey silt	UNDFND	UNDFD	12	2.38

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) **

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH. Location : CPT-10G Page No. 2

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Dr (%)	PHI deg.	SPT N	Su tsf
9.75	31.99	37.32	1.14	3.06	1.12	clayey silt to silty clay	UNDFND	UNDFD	19	2.34
10.00	32.81	29.74	1.51	5.07	1.15	clay	UNDFND	UNDFD	28	2.30
10.25	33.63	25.82	0.89	3.30	1.17	clayey silt to silty clay	UNDFND	UNDFD	13	2.06
10.50	34.45	43.60	2.11	4.84	1.20	silty clay to clay	UNDFND	UNDFD	28	3.45
10.75	35.27	31.48	0.89	2.84	1.22	sandy silt to clayey silt	UNDFND	UNDFD	12	2.44
11.00	36.09	41.00	1.40	3.40	1.25	clayey silt to silty clay	UNDFND	UNDFD	20	3.23
11.25	36.91	39.72	1.14	2.88	1.27	sandy silt to clayey silt	UNDFND	UNDFD	15	3.12
11.50	37.73	28.68	0.78	2.73	1.30	clayey silt to silty clay	UNDFND	UNDFD	14	2.19
11.75	38.55	44.58	1.27	2.85	1.33	sandy silt to clayey silt	UNDFND	UNDFD	17	3.52
12.00	39.37	35.20	1.59	4.53	1.35	silty clay to clay	UNDFND	UNDFD	22	2.73
12.25	40.19	32.36	1.10	3.34	1.38	clayey silt to silty clay	UNDFND	UNDFD	16	2.53
12.50	41.01	39.66	1.01	2.55	1.40	sandy silt to clayey silt	UNDFND	UNDFD	15	[illegible]
12.75	41.83	21.66	0.94	4.34	1.43	silty clay to clay	UNDFND	UNDFD	14	[illegible]
13.00	42.65	28.48	0.61	2.13	1.45	sandy silt to clayey silt	UNDFND	UNDFD	11	2.15
13.25	43.47	37.34	0.90	2.40	1.48	sandy silt to clayey silt	UNDFND	UNDFD	14	2.38
13.50	44.29	37.28	1.01	2.70	1.51	sandy silt to clayey silt	UNDFND	UNDFD	14	2.87
13.75	45.11	33.64	0.64	1.91	1.53	sandy silt to clayey silt	UNDFND	UNDFD	13	2.57
14.00	45.93	33.54	0.58	1.73	1.56	sandy silt to clayey silt	UNDFND	UNDFD	13	2.55

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) **

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH. Location : CPT-10E Page No. 2

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
9.75	31.99	36.20	1.15	3.17	1.07	clayey silt to silty clay	UNDFND	UNDFD	17	2.85
10.00	32.81	40.72	1.43	3.52	1.10	clayey silt to silty clay	UNDFND	UNDFD	20	3.22
10.25	33.63	43.32	1.60	3.70	1.12	clayey silt to silty clay	UNDFND	UNDFD	21	3.43
10.50	34.45	36.48	1.60	4.38	1.15	silty clay to clay	UNDFND	UNDFD	23	2.86
10.75	35.27	43.96	1.59	3.62	1.17	clayey silt to silty clay	UNDFND	UNDFD	21	3.49
11.00	36.09	48.76	1.64	3.37	1.20	clayey silt to silty clay	UNDFND	UNDFD	23	3.87
11.25	36.91	51.78	1.83	3.54	1.22	clayey silt to silty clay	UNDFND	UNDFD	25	4.12
11.50	37.73	44.68	1.95	4.37	1.25	silty clay to clay	UNDFND	UNDFD	29	3.52
11.75	38.55	45.44	1.47	3.23	1.27	clayey silt to silty clay	UNDFND	UNDFD	22	3.58
12.00	39.37	43.56	1.36	3.13	1.30	sandy silt to clayey silt	UNDFND	UNDFD	17	3.42
12.25	40.19	43.52	1.45	3.34	1.33	clayey silt to silty clay	UNDFND	UNDFD	21	3.42
12.50	41.01	42.84	1.34	3.12	1.35	sandy silt to clayey silt	UNDFND	UNDFD	16	3.25
12.75	41.83	46.04	1.44	3.13	1.38	sandy silt to clayey silt	UNDFND	UNDFD	18	3.62
13.00	42.65	47.50	1.55	3.25	1.40	clayey silt to silty clay	UNDFND	UNDFD	23	3.73
13.25	43.47	46.14	1.71	3.71	1.43	clayey silt to silty clay	UNDFND	UNDFD	22	3.52
13.50	44.29	54.18	1.73	3.19	1.45	sandy silt to clayey silt	UNDFND	UNDFD	21	4.28
13.75	45.11	51.26	1.87	3.65	1.48	clayey silt to silty clay	UNDFND	UNDFD	25	4.03
14.00	45.93	55.38	2.04	3.69	1.51	clayey silt to silty clay	UNDFND	UNDFD	27	4.37
14.25	46.75	46.50	1.55	3.33	1.53	clayey silt to silty clay	UNDFND	UNDFD	22	3.68
14.50	47.57	51.32	1.89	3.69	1.56	clayey silt to silty clay	UNDFND	UNDFD	25	4.03
14.75	48.39	53.86	1.73	3.22	1.58	sandy silt to clayey silt	UNDFND	UNDFD	21	4.23
15.00	49.21	53.86	1.97	3.65	1.61	clayey silt to silty clay	UNDFND	UNDFD	26	4.23
15.25	50.03	50.86	1.82	3.58	1.63	clayey silt to silty clay	UNDFND	UNDFD	24	3.93
15.50	50.85	75.44	2.28	3.02	1.66	sandy silt to clayey silt	UNDFND	UNDFD	29	6.02
15.75	51.67	216.26	4.95	2.29	1.69	silty sand to sandy silt	80-90	38-40	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (V 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-106
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : 04-10-88
Elevation : 924.2 MSL
Water Table (meters) : 2.2

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	8.84	0.00	0.05	0.03	sensitive fine grained	UNDFND	UNDFD	4	.73
0.50	1.64	8.36	0.04	0.50	0.08	sensitive fine grained	UNDFND	UNDFD	4	.69
0.75	2.46	15.14	0.60	3.94	0.13	silty clay to clay	UNDFND	UNDFD	10	1.25
1.00	3.28	16.36	0.85	5.18	0.18	clay	UNDFND	UNDFD	15	1.34
1.25	4.10	13.60	0.73	5.34	0.23	clay	UNDFND	UNDFD	13	1.11
1.50	4.92	18.34	0.54	2.93	0.28	clayey silt to silty clay	UNDFND	UNDFD	9	1.50
1.75	5.74	27.04	0.76	2.81	0.33	clayey silt to silty clay	UNDFND	UNDFD	13	2.22
2.00	6.56	25.60	0.67	2.60	0.38	clayey silt to silty clay	UNDFND	UNDFD	12	2.10
2.25	7.38	19.08	0.50	2.60	0.44	clayey silt to silty clay	UNDFND	UNDFD	9	1.55
2.50	8.20	13.44	0.41	3.02	0.47	silty clay to clay	UNDFND	UNDFD	6	1
2.75	9.02	10.72	0.31	2.89	0.49	silty clay to clay	UNDFND	UNDFD	7	.54
3.00	9.84	12.78	0.30	2.38	0.52	clayey silt to silty clay	UNDFND	UNDFD	6	1.01
3.25	10.66	18.00	0.33	1.82	0.55	sandy silt to clayey silt	UNDFND	UNDFD	7	1.44
3.50	11.48	29.36	0.53	2.16	0.57	sandy silt to clayey silt	UNDFND	UNDFD	11	2.35
3.75	12.30	15.44	0.63	4.11	0.60	clay	UNDFND	UNDFD	15	1.22
4.00	13.12	21.32	0.89	4.18	0.62	silty clay to clay	UNDFND	UNDFD	14	1.71
4.25	13.94	15.40	0.47	3.08	0.65	clayey silt to silty clay	UNDFND	UNDFD	7	1.21
4.50	14.76	16.34	0.45	2.75	0.67	clayey silt to silty clay	UNDFND	UNDFD	8	1.28
4.75	15.58	17.88	0.52	2.90	0.70	clayey silt to silty clay	UNDFND	UNDFD	9	1.41
5.00	16.40	31.82	0.84	2.65	0.73	sandy silt to clayey silt	UNDFND	UNDFD	12	2.56
5.25	17.22	79.34	2.63	3.32	0.75	sandy silt to clayey silt	UNDFND	UNDFD	30	6.52
5.50	18.04	79.44	2.99	3.76	0.78	clayey silt to silty clay	UNDFND	UNDFD	38	6.52
5.75	18.86	122.88	4.22	3.43	0.80	sandy silt to clayey silt	UNDFND	UNDFD	47	10.14
6.00	19.69	260.22	3.91	1.50	0.83	sand to silty sand	>90	44-46	>50	UNDEFINED
6.25	20.51	81.98	3.14	3.83	0.85	clayey silt to silty clay	UNDFND	UNDFD	39	6.72
6.50	21.33	26.12	0.51	1.95	0.88	sandy silt to clayey silt	UNDFND	UNDFD	10	2 [illegible]
6.75	22.15	23.32	0.41	1.76	0.91	sandy silt to clayey silt	UNDFND	UNDFD	9	1 [illegible]
7.00	22.97	28.56	0.52	1.83	0.93	sandy silt to clayey silt	UNDFND	UNDFD	11	2.25
7.25	23.79	117.02	1.50	1.28	0.96	sand to silty sand	70-80	38-40	28	UNDEFINED
7.50	24.61	393.36	1.98	0.50	0.98	gravelly sand to sand	>90	44-46	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ***

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-129A
Job No. : 88-1003
Tot. Unit [illegible] (avg) : 125 pcf

Test Date : 04-08-88
Elevation : [illegible] MSL
Water table (meters) : 1.1

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	161.02	0.95	0.59	0.03	sand	>90	>48	31	UNDEFINED
0.50	1.64	79.92	0.77	0.97	0.08	sand to silty sand	>90	>46	19	UNDEFINED
0.75	2.46	54.80	1.62	2.96	0.13	sandy silt to clayey silt	UNDFND	UNDFD	21	4.55
1.00	3.28	90.98	1.24	1.36	0.18	sand to silty sand	90-90	46-46	22	UNDEFINED
1.25	4.10	67.42	1.36	2.02	0.23	silty sand to sandy silt	70-90	44-46	22	UNDEFINED
1.50	4.92	125.30	0.60	0.48	0.25	sand	>90	46-48	24	UNDEFINED
1.75	5.74	233.40	2.70	0.92	0.28	sand	>90	>48	>50	UNDEFINED
2.00	6.56	230.00	3.63	1.58	0.31	sand to silty sand	>90	>48	>50	UNDEFINED
2.25	7.38	265.68	3.37	1.27	0.33	sand	>90	>48	>50	UNDEFINED
2.50	8.20	342.96	1.46	0.43	0.36	gravelly sand to sand	>90	>48	>50	UNDEFINED
2.75	9.02	404.66	2.41	0.60	0.38	gravelly sand to sand	>90	>48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTRP (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-1[illegible]
Job No. : 88-1002
Fill Unit Wt. (avg) : 125 pcf

Test Date : [illegible]
Elevation : [illegible] MSL
Water table (meters) : 1.1

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Dr - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	1.56	0.01	0.64	0.03	sensitive fine grained	UNDFND	UNDFD	1	.12
0.50	1.64	50.64	0.01	0.03	0.08	sand to silty sand	80-90	46-48	12	UNDEFINED
0.75	2.46	283.60	0.01	0.00	0.13	gravelly sand to sand	>90	>48	45	UNDEFINED
1.00	3.28	373.90	0.01	0.00	0.18	gravelly sand to sand	>90	>48	>50	UNDEFINED
1.25	4.10	319.46	0.01	0.00	0.23	gravelly sand to sand	>90	>48	>50	UNDEFINED
1.50	4.92	85.62	0.01	0.01	0.25	sand	80-90	44-46	16	UNDEFINED
1.75	5.74	20.86	0.04	0.21	0.28	silty sand to sandy silt	40-50	36-38	7	UNDEFINED
2.00	6.56	27.44	0.06	0.20	0.31	silty sand to sandy silt	40-50	36-38	9	UNDEFINED
2.25	7.38	30.56	0.36	0.44	0.33	sand to silty sand	70-80	42-44	19	UNDEFINED
2.50	8.20	423.32	0.57	0.14	0.36	gravelly sand to sand	>90	>48	>50	UNDEF
2.75	9.02	70.66	0.12	0.17	0.38	sand to silty sand	70-80	40-42	17	UNDEFINED
3.00	9.84	46.44	0.25	0.53	0.41	sand to silty sand	50-60	38-40	11	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location: CPT-107
Job No: 88-1008
Tot. Unit [illegible] (avg) : 125 pcf

Test Date : 04-10-88
Elevation : 926.3 MSL
Water table (meters) : 3

DEPTH (meters)	(feet)	Ic (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	4.72	0.01	0.13	0.03	sensitive fine grained	UNDFND	UNDFD	2	.39
0.50	1.64	14.26	0.49	3.45	0.08	silty clay to clay	UNDFND	UNDFD	9	1.18
0.75	2.46	14.52	0.79	5.47	0.13	clay	UNDFND	UNDFD	14	1.13
1.00	3.28	13.52	0.78	5.80	0.18	clay	UNDFND	UNDFD	13	1.11
1.25	4.10	9.74	0.54	5.59	0.23	clay	UNDFND	UNDFD	9	.79
1.50	4.92	18.40	0.71	3.86	0.28	silty clay to clay	UNDFND	UNDFD	12	1.51
1.75	5.74	16.14	0.69	4.25	0.33	clay	UNDFND	UNDFD	15	1.31
2.00	6.56	10.98	0.32	2.93	0.38	silty clay to clay	UNDFND	UNDFD	7	.88
2.25	7.38	16.80	0.51	3.06	0.44	clayey silt to silty clay	UNDFND	UNDFD	8	1.36
2.50	8.20	17.18	0.51	2.97	0.49	clayey silt to silty clay	UNDFND	UNDFD	8	1.39
2.75	9.02	20.78	0.40	1.91	0.54	sandy silt to clayey silt	UNDFND	UNDFD	8	1.68
3.00	9.84	48.78	0.85	1.74	0.59	silty sand to sandy silt	50-60	36-38	16	UNDEFINED
3.25	10.66	57.12	2.00	3.49	0.63	clayey silt to silty clay	UNDFND	UNDFD	27	4.70
3.50	11.48	38.88	1.37	3.53	0.65	clayey silt to silty clay	UNDFND	UNDFD	19	3.18
3.75	12.30	30.44	0.87	2.86	0.68	clayey silt to silty clay	UNDFND	UNDFD	15	2.47
4.00	13.12	29.80	0.73	2.53	0.70	sandy silt to clayey silt	UNDFND	UNDFD	11	2.33
4.25	13.94	47.94	1.26	2.62	0.73	sandy silt to clayey silt	UNDFND	UNDFD	18	3.92
4.50	14.76	93.12	3.57	3.83	0.76	clayey silt to silty clay	UNDFND	UNDFD	45	7.68
4.75	15.58	73.76	3.34	4.53	0.78	clayey silt to silty clay	UNDFND	UNDFD	35	6.06
5.00	16.40	70.34	3.03	4.30	0.81	clayey silt to silty clay	UNDFND	UNDFD	34	5.77
5.25	17.22	55.62	2.68	4.81	0.83	silty clay to clay	UNDFND	UNDFD	28	4.54
5.50	18.04	28.76	1.01	3.50	0.86	clayey silt to silty clay	UNDFND	UNDFD	14	2.30
5.75	18.86	42.14	0.90	2.14	0.88	sandy silt to clayey silt	UNDFND	UNDFD	16	3.41
6.00	19.69	88.38	2.55	2.89	0.91	sandy silt to clayey silt	UNDFND	UNDFD	34	7.26
6.25	20.51	101.16	3.96	3.91	0.94	clayey silt to silty clay	UNDFND	UNDFD	48	8.32
6.50	21.33	272.48	4.40	1.62	0.96	sand to silty sand	>90	42-44	>50	UNDEFINED
6.75	22.15	243.68	5.99	2.46	0.99	silty sand to sandy silt	>90	42-44	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-10B
Job No. : 88-1008
Tot. Unit Wt (avg) : 125 pcf

Test Date : [illegible]-88
Elevation : 801.0 MSL
Water Table (meters) : 2

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	4.42	0.01	0.27	0.03	sensitive fine grained	UNDFND	UNDFD	2	.36
0.50	1.64	9.74	0.17	1.70	0.08	clayey silt to silty clay	UNDFND	UNDFD	5	.80
0.75	2.46	10.58	0.48	4.54	0.13	clay	UNDFND	UNDFD	10	.87
1.00	3.28	5.84	0.25	4.35	0.18	clay	UNDFND	UNDFD	5	.47
1.25	4.10	20.36	1.55	7.59	0.23	clay	UNDFND	UNDFD	20	1.67
1.50	4.92	30.78	0.74	2.40	0.28	sandy silt to clayey silt	UNDFND	UNDFD	12	2.54
1.75	5.74	11.74	0.60	5.08	0.33	clay	UNDFND	UNDFD	11	.95
2.00	6.56	5.26	0.28	4.41	0.38	clay	UNDFND	UNDFD	6	.48
2.25	7.38	12.46	0.18	1.43	0.42	clayey silt to silty clay	UNDFND	UNDFD	6	[illegible]
2.50	8.20	18.44	0.25	1.36	0.45	sandy silt to clayey silt	UNDFND	UNDFD	7	[illegible]
2.75	9.02	20.94	0.31	1.46	0.47	sandy silt to clayey silt	UNDFND	UNDFD	8	1.70
3.00	9.84	23.64	0.37	1.57	0.50	sandy silt to clayey silt	UNDFND	UNDFD	9	1.92
3.25	10.66	22.38	0.32	1.41	0.53	sandy silt to clayey silt	UNDFND	UNDFD	9	1.81
3.50	11.48	23.30	0.30	1.27	0.55	sandy silt to clayey silt	UNDFND	UNDFD	9	1.88
3.75	12.30	25.74	0.43	1.66	0.58	sandy silt to clayey silt	UNDFND	UNDFD	10	2.08
4.00	13.12	20.36	0.50	2.44	0.60	clayey silt to silty clay	UNDFND	UNDFD	10	1.63
4.25	13.94	20.54	0.37	1.78	0.63	sandy silt to clayey silt	UNDFND	UNDFD	8	1.64
4.50	14.76	25.04	0.50	2.00	0.65	sandy silt to clayey silt	UNDFND	UNDFD	10	2.01
4.75	15.58	29.20	0.62	2.14	0.68	sandy silt to clayey silt	UNDFND	UNDFD	11	2.35
5.00	16.40	41.74	1.16	2.77	0.71	sandy silt to clayey silt	UNDFND	UNDFD	16	3.39
5.25	17.22	47.94	2.02	4.22	0.73	clayey silt to silty clay	UNDFND	UNDFD	22	3.90
5.50	18.04	52.34	2.09	3.99	0.76	clayey silt to silty clay	UNDFND	UNDFD	25	4.27
5.75	18.86	36.78	1.20	3.27	0.78	clayey silt to silty clay	UNDFND	UNDFD	18	2.86
6.00	19.69	36.48	0.80	2.19	0.81	sandy silt to clayey silt	UNDFND	UNDFD	14	2.84
6.25	20.51	46.20	1.81	3.92	0.83	clayey silt to silty clay	UNDFND	UNDFD	22	3.74
6.50	21.33	29.68	0.88	2.95	0.86	clayey silt to silty clay	UNDFND	UNDFD	14	[illegible]
6.75	22.15	24.26	0.39	1.60	0.88	sandy silt to clayey silt	UNDFND	UNDFD	9	1.90
7.00	22.97	97.46	2.08	2.13	0.91	silty sand to sandy silt	60-70	38-40	31	UNDEFINED
7.25	23.79	156.68	5.12	3.27	0.94	sandy silt to clayey silt	UNDFND	UNDFD	>50	12.93
7.50	24.61	258.82	5.97	2.31	0.96	silty sand to sandy silt	>90	42-44	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) **

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-109
Job No. : 93-1002
Tot. Unit Wt. (avg) : 125 pcf

Test Date : 94-11-18
Elevation : 801.0 MSL
Water table (meters) : 2.7

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	18.26	0.29	1.59	0.03	sandy silt to clayey silt	UNDFND	UNDFD	7	1.51
0.50	1.64	12.00	0.45	3.72	0.08	silty clay to clay	UNDFND	UNDFD	9	.99
0.75	2.46	10.32	0.79	7.22	0.13	clay	UNDFND	UNDFD	10	.89
1.00	3.28	21.54	0.64	2.99	0.18	clayey silt to silty clay	UNDFND	UNDFD	10	1.73
1.25	4.10	35.46	1.10	3.09	0.23	clayey silt to silty clay	UNDFND	UNDFD	17	2.83
1.50	4.92	34.52	1.34	3.87	0.28	clayey silt to silty clay	UNDFND	UNDFD	17	2.35
1.75	5.74	39.14	1.34	3.42	0.33	clayey silt to silty clay	UNDFND	UNDFD	19	3.22
2.00	6.56	34.62	1.26	3.63	0.38	clayey silt to silty clay	UNDFND	UNDFD	17	2.85
2.25	7.38	67.44	1.00	1.15	0.44	sand to silty sand	70-80	42-44	21	UNDEFINED
2.50	8.20	89.20	1.02	1.14	0.49	sand to silty sand	70-80	40-42	21	UNDEFINED
2.75	9.02	22.10	0.52	2.33	0.54	sandy silt to clayey silt	UNDFND	UNDFD	8	1.79
3.00	9.84	25.50	0.65	2.54	0.57	sandy silt to clayey silt	UNDFND	UNDFD	10	2.07
3.25	10.66	46.58	1.04	2.24	0.60	sandy silt to clayey silt	UNDFND	UNDFD	18	3.82
3.50	11.48	56.50	2.03	3.59	0.62	clayey silt to silty clay	UNDFND	UNDFD	27	4.65
3.75	12.30	22.30	1.30	5.83	0.65	clay	UNDFND	UNDFD	21	1.79
4.00	13.12	26.54	0.83	3.14	0.67	clayey silt to silty clay	UNDFND	UNDFD	13	2.14
4.25	13.94	25.74	0.75	2.91	0.70	clayey silt to silty clay	UNDFND	UNDFD	12	2.07
4.50	14.76	23.18	0.69	2.99	0.73	clayey silt to silty clay	UNDFND	UNDFD	11	1.85
4.75	15.58	19.40	0.55	2.82	0.75	clayey silt to silty clay	UNDFND	UNDFD	9	1.53
5.00	16.40	20.79	0.57	2.72	0.78	clayey silt to silty clay	UNDFND	UNDFD	10	1.64
5.25	17.22	18.30	0.45	2.47	0.80	clayey silt to silty clay	UNDFND	UNDFD	9	1.43
5.50	18.04	19.20	0.53	2.79	0.83	clayey silt to silty clay	UNDFND	UNDFD	9	1.50
5.75	18.86	23.72	0.66	2.79	0.85	clayey silt to silty clay	UNDFND	UNDFD	11	1.88
6.00	19.69	25.74	0.76	2.94	0.88	clayey silt to silty clay	UNDFND	UNDFD	12	2.04
6.25	20.51	29.06	0.77	2.64	0.90	sandy silt to clayey silt	UNDFND	UNDFD	11	2.31
6.50	21.33	85.54	2.41	2.82	0.93	sandy silt to clayey silt	UNDFND	UNDFD	33	7.02
6.75	22.15	107.30	3.23	3.01	0.96	sandy silt to clayey silt	UNDFND	UNDFD	41	8.82
7.00	22.97	163.72	4.73	2.89	0.98	silty sand to sandy silt	80-90	40-42	>50	UNDEFINED
7.25	23.79	327.40	6.74	2.06	1.01	sand to silty sand	>90	44-46	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH
Location : CPT-119
Job No. : 88-1008
Fill Unit Wt (avg) : 115 pcf

Test Date : [illegible]
Elevation : 8[illegible] MSL
Water Table (meters) : 2.3

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	18.56	0.03	0.14	0.03	silty sand to sandy silt	70-80	>48	5	UNDEFINED
0.50	1.64	50.36	0.14	0.28	0.08	sand to silty sand	30-90	46-48	12	UNDEFINED
0.75	2.46	88.78	1.54	1.56	0.13	silty sand to sandy silt	>90	>48	32	UNDEFINED
1.00	3.28	77.30	1.39	1.80	0.18	silty sand to sandy silt	80-90	46-48	25	UNDEFINED
1.25	4.10	70.86	0.55	0.77	0.23	sand to silty sand	70-80	44-46	17	UNDEFINED
1.50	4.92	76.32	1.03	1.33	0.28	silty sand to sandy silt	70-80	42-44	25	UNDEFINED
1.75	5.74	245.52	4.92	2.00	0.33	sand to silty sand	>90	>48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-11SA
Job No. : 88-1008
Est. Unit Wt. (avg) : 125 pcf

Test Date : 04-08-88
Elevation : 209.4 MSL
Water table (meters) : 2.3

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Dr - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	3.54	0.00	0.11	0.03	sensitive fine grained	UNDFND	UNDFD	2	.09
0.50	1.64	18.88	0.59	3.10	0.08	clayey silt to silty clay	UNDFND	UNDFD	9	1.33
0.75	2.46	42.08	1.10	2.61	0.13	sandy silt to clayey silt	UNDFND	UNDFD	16	3.49
1.00	3.28	33.19	1.31	3.94	0.18	clayey silt to silty clay	UNDFND	UNDFD	16	2.75
1.25	4.10	45.82	0.82	1.79	0.23	silty sand to sandy silt	60-70	42-44	15	UNDEFINED
1.50	4.92	149.38	1.58	1.06	0.28	sand to silty sand	>90	46-48	36	UNDEFINED
1.75	5.74	332.38	5.89	1.77	0.33	sand to silty sand	>90	>48	>50	UNDEFINED
2.00	6.56	142.08	1.06	0.75	0.38	sand	>90	44-46	27	UNDEFINED
2.25	7.38	36.94	1.10	2.98	0.44	sandy silt to clayey silt	UNDFND	UNDFD	14	3.04
2.50	8.20	76.40	1.90	2.49	0.48	sandy silt to clayey silt	UNDFND	UNDFD	29	6.32
2.75	9.02	98.58	2.94	2.98	0.50	sandy silt to clayey silt	UNDFND	UNDFD	38	8.17
3.00	9.84	133.82	3.22	2.40	0.53	silty sand to sandy silt	80-90	42-44	43	UNDEFINED
3.25	10.66	94.74	3.24	3.42	0.56	sandy silt to clayey silt	UNDFND	UNDFD	36	7.34
3.50	11.48	74.94	2.49	3.32	0.58	sandy silt to clayey silt	UNDFND	UNDFD	29	6.18
3.75	12.30	76.60	2.38	3.11	0.61	sandy silt to clayey silt	UNDFND	UNDFD	29	6.32
4.00	13.12	47.28	1.80	3.80	0.63	clayey silt to silty clay	UNDFND	UNDFD	23	3.87
4.25	13.94	52.70	1.66	3.14	0.66	sandy silt to clayey silt	UNDFND	UNDFD	20	4.32
4.50	14.76	80.08	2.63	3.28	0.68	sandy silt to clayey silt	UNDFND	UNDFD	31	6.59
4.75	15.58	271.50	3.47	1.28	0.71	sand	>90	44-46	>50	UNDEFINED
5.00	16.40	368.14	4.65	1.26	0.74	sand	>90	46-48	>50	UNDEFINED
5.25	17.22	251.34	4.88	1.94	0.76	sand to silty sand	>90	44-46	>50	UNDEFINED
5.50	18.04	246.24	4.73	1.92	0.79	sand to silty sand	>90	44-46	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (V 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-120
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : 04-13-88
Elevation : 326.1 MSL
Water Table (meters) : 1.0

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	14.66	0.04	0.29	0.03	sandy silt to clayey silt	UNDFND	UNDFD	6	1.21
0.50	1.64	11.92	0.09	0.78	0.08	sandy silt to clayey silt	UNDFND	UNDFD	5	.97
0.75	2.46	8.72	0.12	1.40	0.13	clayey silt to silty clay	UNDFND	UNDFD	4	.71
1.00	3.28	9.12	0.21	2.35	0.18	clayey silt to silty clay	UNDFND	UNDFD	4	.74
1.25	4.10	10.96	0.33	3.05	0.23	silty clay to clay	UNDFND	UNDFD	7	.89
1.50	4.92	7.82	0.24	3.04	0.27	silty clay to clay	UNDFND	UNDFD	5	.62
1.75	5.74	6.20	0.26	4.19	0.30	clay	UNDFND	UNDFD	6	.48
2.00	6.56	26.22	0.20	0.78	0.33	silty sand to sandy silt	40-50	36-38	8	UNDEFINED
2.25	7.38	42.02	0.28	0.67	0.35	silty sand to sandy silt	50-60	38-40	13	UNDEFINED
2.50	8.20	46.84	1.20	2.55	0.38	sandy silt to clayey silt	UNDFND	UNDFD	18	
2.75	9.02	42.92	1.44	3.36	0.40	clayey silt to silty clay	UNDFND	UNDFD	21	3.33
3.00	9.84	36.90	1.03	2.80	0.43	sandy silt to clayey silt	UNDFND	UNDFD	14	3.02
3.25	10.66	38.22	1.08	2.82	0.45	sandy silt to clayey silt	UNDFND	UNDFD	15	3.13
3.50	11.48	39.46	1.15	2.91	0.48	sandy silt to clayey silt	UNDFND	UNDFD	15	3.22
3.75	12.30	49.60	1.46	2.94	0.51	sandy silt to clayey silt	UNDFND	UNDFD	19	4.07
4.00	13.12	52.78	1.74	3.30	0.53	sandy silt to clayey silt	UNDFND	UNDFD	20	4.33
4.25	13.94	44.80	1.40	3.12	0.56	sandy silt to clayey silt	UNDFND	UNDFD	17	3.68
4.50	14.76	53.38	1.51	2.83	0.58	sandy silt to clayey silt	UNDFND	UNDFD	20	4.37
4.75	15.58	69.60	2.25	3.23	0.61	sandy silt to clayey silt	UNDFND	UNDFD	27	5.72
5.00	16.40	129.60	3.77	2.91	0.63	sandy silt to clayey silt	UNDFND	UNDFD	50	10.71
5.25	17.22	283.92	5.78	2.04	0.66	sand to silty sand	>90	46-48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA [illegible]
Location : CPT-121
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : [illegible]
Elevation : [illegible] MSL
Water table (meters) : 1.2

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	12.12	0.09	0.74	0.03	sandy silt to clayey silt	UNDFND	UNDFD	5	1.00
0.50	1.64	22.24	0.36	1.63	0.08	sandy silt to clayey silt	UNDFND	UNDFD	9	1.84
0.75	2.46	8.82	0.29	3.31	0.13	clay	UNDFND	UNDFD	9	.72
1.00	3.28	3.95	0.12	1.24	0.18	clayey silt to silty clay	UNDFND	UNDFD	5	.81
1.25	4.10	31.36	0.07	0.22	0.23	silty sand to sandy silt	50-60	40-42	10	UNDEFINED
1.50	4.92	56.95	0.34	0.59	0.26	sand to silty sand	60-70	42-44	14	UNDEFINED
1.75	5.74	77.46	1.53	1.98	0.29	silty sand to sandy silt	70-80	42-44	25	UNDEFINED
2.00	6.56	31.40	0.78	2.48	0.32	sandy silt to clayey silt	UNDFND	UNDFD	12	2.58
2.25	7.38	36.30	1.14	3.14	0.34	clayey silt to silty clay	UNDFND	UNDFD	17	2.98
2.50	8.20	39.78	1.12	2.82	0.37	sandy silt to clayey silt	UNDFND	UNDFD	15	3.27
2.75	9.02	43.74	1.53	3.50	0.39	clayey silt to silty clay	UNDFND	UNDFD	21	3.60
3.00	9.84	44.64	1.29	2.87	0.42	sandy silt to clayey silt	UNDFND	UNDFD	17	3.67
3.25	10.66	54.92	1.67	3.04	0.44	sandy silt to clayey silt	UNDFND	UNDFD	21	4.52
3.50	11.48	56.22	1.83	3.26	0.47	sandy silt to clayey silt	UNDFND	UNDFD	22	4.62
3.75	12.30	57.34	1.88	3.26	0.49	sandy silt to clayey silt	UNDFND	UNDFD	22	4.75
4.00	13.12	51.12	1.38	2.70	0.52	sandy silt to clayey silt	UNDFND	UNDFD	20	4.19
4.25	13.94	172.18	1.30	0.75	0.55	sand	>90	44-46	33	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTPI [illegible] ***

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-112
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : 04-03-88
Elevation : 384.9 MSL
Water Table (meters) : .3

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	36.30	0.17	0.48	0.03	silty sand to sandy silt	>90	>48	12	UNDEFINED
0.50	1.64	70.50	0.33	0.46	0.08	sand to silty sand	>90	>48	17	UNDEFINED
0.75	2.46	177.94	2.33	1.31	0.13	sand to silty sand	>90	>48	43	UNDEFINED
1.00	3.28	245.70	0.94	0.34	0.17	gravelly sand to sand	>90	>46	33	UNDEFINED
1.25	4.10	305.94	0.92	0.30	0.20	gravelly sand to sand	>90	>46	43	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-122A
Job No. : 88-1028
Test Date : [illegible]
Elevation : [illegible]
Water Table (measured) : [illegible]
Tot. Unit Wtr (avg) : 125 pcf

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	37.66	0.23	0.61	0.03	silty sand to sandy silt	>90	>48	12	UNDEFINED
0.50	1.64	89.92	0.41	0.46	0.08	sand to silty sand	>90	48	22	UNDEFINED
0.75	2.46	262.82	1.44	0.55	0.13	sand	>90	>48	>50	UNDEFINED
1.00	3.28	286.74	1.35	0.47	0.17	gravelly sand to sand	>90	>48	46	UNDEFINED
1.25	4.10	429.44	3.92	0.91	0.20	gravelly sand to sand	>90	>48	>50	UNDEFINED
1.50	4.92	305.04	2.85	0.94	0.22	sand	>90	>48	>50	UNDEFINED
1.75	5.74	38.30	0.79	2.06	0.25	sandy silt to clayey silt	UNDFND	UNDFD	15	2.16
2.00	6.56	33.26	0.75	2.25	0.27	sandy silt to clayey silt	UNDFND	UNDFD	13	2.74
2.25	7.38	33.90	0.99	2.91	0.30	sandy silt to clayey silt	UNDFND	UNDFD	12	2.79
2.50	8.20	41.94	0.93	2.21	0.33	sandy silt to clayey silt	UNDFND	UNDFD	16	3.45
2.75	9.02	50.16	1.31	2.61	0.35	sandy silt to clayey silt	UNDFND	UNDFD	19	4.13
3.00	9.84	56.62	1.47	2.60	0.38	sandy silt to clayey silt	UNDFND	UNDFD	22	4.66
3.25	10.66	53.96	1.59	2.94	0.40	sandy silt to clayey silt	UNDFND	UNDFD	21	4.44
3.50	11.48	65.36	1.98	3.02	0.43	sandy silt to clayey silt	UNDFND	UNDFD	25	5.39
3.75	12.30	60.42	1.67	2.77	0.45	sandy silt to clayey silt	UNDFND	UNDFD	23	4.97
4.00	13.12	58.36	1.67	2.83	0.48	sandy silt to clayey silt	UNDFND	UNDFD	23	4.93
4.25	13.94	60.36	1.39	2.31	0.51	sandy silt to clayey silt	UNDFND	UNDFD	23	4.96
4.50	14.76	339.58	1.61	0.47	0.53	gravelly sand to sand	>90	46-48	>50	UNDEFINED
4.75	15.58	330.99	2.98	0.78	0.56	gravelly sand to sand	>90	>48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 V 3.10 ***

NORTHSIDE SANITARY LANDFILL

Test sector : TERRA TECH. Test Date : 04.22.88
Location : CPT 102 Elevation : 307.9 MSL
Job No. : 88-1008 Water table (meters) : 1.7
Tot. Unit Wt.* (avg.) : 125 pcf

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	101.46	0.67	0.66	0.03	sand to silty sand	>90	>48	24	UNDEFINED
0.50	1.64	234.24	1.71	0.73	0.08	sand	>90	>48	45	UNDEFINED
0.75	2.46	149.86	1.12	0.75	0.13	sand	>90	>48	29	UNDEFINED
1.00	3.28	192.82	0.81	0.42	0.18	sand	>90	>48	37	UNDEFINED
1.25	4.10	210.14	1.05	0.50	0.23	sand	>90	>48	40	UNDEFINED
1.50	4.92	229.16	0.86	0.37	0.28	sand	>90	>48	44	UNDEFINED
1.75	5.74	254.80	1.65	0.65	0.33	sand	>90	>48	49	UNDEFINED
2.00	6.56	183.30	2.25	1.22	0.37	sand to silty sand	>90	46-48	44	UNDEFINED
2.25	7.38	179.74	0.94	0.52	0.39	sand	>90	46-48	34	UNDEFINED
2.50	8.20	191.42	0.65	0.34	0.42	sand	>90	46-48	37	UNDEFINED
2.75	9.02	189.80	0.38	0.20	0.44	sand	>90	46-48	36	UNDEFINED
3.00	9.84	189.42	0.38	0.20	0.47	sand	>90	44-46	36	UNDEFINED
3.25	10.66	206.72	0.45	0.22	0.49	gravelly sand to sand	>90	44-46	33	UNDEFINED
3.50	11.48	251.58	0.62	0.25	0.52	gravelly sand to sand	>90	46-48	40	UNDEFINED
3.75	12.30	223.22	0.92	0.41	0.55	sand	>90	44-46	43	UNDEFINED
4.00	13.12	52.06	1.44	2.77	0.57	sandy silt to clayey silt	UNDFND	UNDFD	20	4.27
4.25	13.94	55.56	1.41	2.54	0.60	sandy silt to clayey silt	UNDFND	UNDFD	21	4.55
4.50	14.76	62.24	1.54	2.47	0.62	sandy silt to clayey silt	UNDFND	UNDFD	24	5.11
4.75	15.58	91.26	2.32	2.54	0.65	silty sand to sandy silt	70-80	40-42	29	UNDEFINED
5.00	16.40	46.94	1.60	3.41	0.67	clayey silt to silty clay	UNDFND	UNDFD	22	3.82
5.25	17.22	46.88	1.05	2.24	0.70	sandy silt to clayey silt	UNDFND	UNDFD	18	3.81
5.50	18.04	55.78	1.47	2.63	0.73	sandy silt to clayey silt	UNDFND	UNDFD	21	4.55
5.75	18.86	65.68	2.12	3.23	0.75	sandy silt to clayey silt	UNDFND	UNDFD	25	5.37
6.00	19.69	149.68	1.76	1.18	0.78	sand to silty sand	80-90	40-42	36	UNDEFINED
6.25	20.51	220.74	3.52	1.60	0.80	sand to silty sand	>90	42-44	>50	UNDEFINED
6.50	21.33	176.56	4.18	2.37	0.83	silty sand to sandy silt	80-90	42-44	>50	UNDEFINED
6.75	22.15	221.50	5.68	2.56	0.85	silty sand to sandy silt	>90	42-44	>50	UNDEFINED
7.00	22.97	238.84	5.45	2.28	0.88	silty sand to sandy silt	>90	42-44	>50	UNDEFINED
7.25	23.79	419.08	6.56	1.57	0.91	sand	>90	46-48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ***

NORTHSIDE SANITARY LANDFILL

Test Date : [illegible]
Elevation : [illegible]
Water table [illegible]

Job No. : 88-1[illegible]
Est. Unit Wt. Range : 125 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	206.22	1.22	0.59	0.03	sand	>90	>48	40	UNDEFINED
0.50	1.64	144.02	1.39	1.38	0.08	sand to silty sand	>90	>48	34	UNDEFINED
0.75	2.46	118.92	1.94	1.63	0.13	sand to silty sand	>90	>48	28	UNDEFINED
1.00	3.28	85.16	1.10	1.29	0.18	sand to silty sand	80-90	46-48	20	UNDEFINED
1.25	4.10	41.20	1.16	2.82	0.23	sandy silt to clayey silt	UNDFND	UNDFD	16	3.41
1.50	4.92	75.02	2.02	2.69	0.28	sandy silt to clayey silt	UNDFND	UNDFD	29	5.22
1.75	5.74	41.92	1.13	2.69	0.32	sandy silt to clayey silt	UNDFND	UNDFD	16	3.46
2.00	6.56	20.28	0.51	2.51	0.38	clayey silt to silty clay	UNDFND	UNDFD	10	1.65
2.25	7.38	12.78	0.13	1.03	0.43	sandy silt to clayey silt	UNDFND	UNDFD	5	1.02
2.50	8.20	10.36	0.04	0.39	0.46	sandy silt to clayey silt	UNDFND	UNDFD	4	.82
2.75	9.02	16.80	0.09	0.51	0.48	sandy silt to clayey silt	UNDFND	UNDFD	6	1.35
3.00	9.84	15.42	0.11	0.71	0.51	sandy silt to clayey silt	UNDFND	UNDFD	6	1.23
3.25	10.66	41.92	0.85	2.04	0.54	sandy silt to clayey silt	UNDFND	UNDFD	16	3.44
3.50	11.48	83.84	1.74	2.08	0.56	silty sand to sandy silt	60-70	40-42	27	UNDEFINED
3.75	12.30	423.24	4.83	1.14	0.59	sand	>90	48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from [illegible] (v 3.02) **

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Cone Type : CPT-11E
Job No. : 93-1000
Test Unit Wgt (avg) : 112 pcf

Test Date : [illegible]
Elevation : [illegible]
Water Table : [illegible]

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	143.16	0.37	0.26	0.03	sand	>90	>48	27	UNDEFINED
0.50	1.64	117.10	1.41	1.20	0.08	sand to silty sand	>90	>48	28	UNDEFINED
0.75	2.46	40.24	0.90	2.24	0.13	sandy silt to clayey silt	UNDFND	UNDFD	15	0.24
1.00	3.28	47.84	1.09	2.29	0.18	sandy silt to clayey silt	UNDFND	UNDFD	18	0.37
1.25	4.10	42.36	1.05	2.48	0.23	sandy silt to clayey silt	UNDFND	UNDFD	16	0.51
1.50	4.92	87.10	2.16	2.48	0.28	silty sand to sandy silt	80-90	44-46	28	UNDEFINED
1.75	5.74	88.92	2.95	3.31	0.33	sandy silt to clayey silt	UNDFND	UNDFD	34	1.28
2.00	6.56	174.62	3.22	1.85	0.38	sand to silty sand	>90	46-48	42	UNDEFINED
2.25	7.38	290.10	1.31	0.45	0.44	gravelly sand to sand	>90	>48	46	UNDEFINED
2.50	8.20	256.82	0.96	0.37	0.47	gravelly sand to sand	>90	46-48	41	UNDEFINED
2.75	9.02	255.54	0.98	0.38	0.49	gravelly sand to sand	>90	46-48	41	UNDEFINED
3.00	9.84	532.56	1.25	0.24	0.52	gravelly sand to sand	>90	>48	>50	UNDEFINED
3.25	10.66	620.58	2.16	0.35	0.55	gravelly sand to sand	>90	>48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ***

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-12BA
Job No. : 88-1002
Test Date : [illegible]
Elevation : [illegible] MSL
Water table [illegible]
Unit Weight (avg) : 125 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	120.48	0.71	0.59	0.03	sand	>90	>48	23	UNDEFINED
0.50	1.64	97.30	1.32	1.35	0.08	sand to silty sand	>90	48	23	UNDEFINED
0.75	2.46	54.74	0.68	1.24	0.13	silty sand to sandy silt	70-80	46-48	17	UNDEFINED
1.00	3.28	25.94	0.71	2.53	0.18	sandy silt to clayey silt	UNDFND	UNDFD	10	1.23
1.25	4.10	41.10	0.88	2.14	0.21	sandy silt to clayey silt	UNDFND	UNDFD	16	0.40
1.50	4.92	43.04	0.87	2.02	0.23	sandy silt to clayey silt	UNDFND	UNDFD	16	0.55
1.75	5.74	53.44	0.66	1.05	0.26	sand to silty sand	70-80	42-44	15	UNDEFINED
2.00	6.56	50.26	0.90	1.50	0.28	silty sand to sandy silt	70-80	42-44	19	UNDEFINED
2.25	7.38	277.98	2.61	0.69	0.31	gravelly sand to sand	>90	>48	>50	UNDEFINED
2.50	8.20	482.06	3.69	0.76	0.34	gravelly sand to sand	>90	>48	>50	UNDEFINED
2.75	9.02	331.10	5.00	1.51	0.36	sand	>90	>48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 2.02) ****

NORTHSIDE SANITARY LANDFILL

Test Date : 04-08-88
Elevation : 378.1 MSL
Water table (measured) : 1.1

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	149.30	0.45	0.30	0.03	sand	>90	>48	29	UNDEFINED
0.50	1.64	82.02	0.93	1.13	0.08	sand to silty sand	>90	>48	20	UNDEFINED
0.75	2.46	35.62	0.83	2.34	0.13	sandy silt to clayey silt	UNDFND	UNDFD	14	2.95
1.00	3.28	126.04	1.30	1.03	0.18	sand to silty sand	>90	>48	30	UNDEFINED
1.25	4.10	405.56	1.90	0.47	0.23	gravelly sand to sand	>90	>48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 2.02) ****

NORTHSIDE SANITARY LANDFILL

Investigator : TERRA TECH.
Location : CPT-12B
Job No. : 92-1008
Test Date : 14-10-92
Elevation : 377.7 MSL
Water table (meters) : .9
Tot. Unit Wgt (avg) : 125 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	223.68	0.44	0.20	0.03	gravelly sand to sand	>90	>48	36	UNDEFINED
0.50	1.64	173.38	1.48	0.85	0.08	sand	>90	>48	33	UNDEFINED
0.75	2.46	85.00	2.23	2.63	0.13	sandy silt to clayey silt	UNDFND	UNDFD	33	7.07
1.00	3.28	158.32	2.33	1.47	0.18	sand to silty sand	>90	>48	38	UNDEFINED
1.25	4.10	58.92	2.07	3.52	0.21	clayey silt to silty clay	UNDFND	UNDFD	28	4.69
1.50	4.92	238.68	2.07	0.87	0.23	sand	>90	>48	46	UNDEFINED
1.75	5.74	508.44	5.51	1.08	0.26	sand	>90	>48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH
Location : CPT-12T
Job No. : 88-1008
Test Date : [illegible]
Elevation : [illegible] MSL
Water Table (meters) : [illegible]
Tot. Unit Wt (avg) : 125 pcf

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Sq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	149.78	0.47	0.32	0.03	sand	>90	>48	29	UNDEFINED
0.50	1.64	140.08	1.62	1.15	0.08	sand to silty sand	>90	>48	34	UNDEFINED
0.75	2.46	150.28	2.55	1.70	0.13	sand to silty sand	>90	>48	35	UNDEFINED
1.00	3.28	86.74	1.57	1.81	0.18	silty sand to sandy silt	80-90	46-48	23	UNDEFINED
1.25	4.10	105.78	1.71	1.62	0.23	silty sand to sandy silt	80-90	46-48	24	UNDEFINED
1.50	4.92	63.10	1.23	1.95	0.26	silty sand to sandy silt	70-80	42-44	20	UNDEFINED
1.75	5.74	173.52	3.00	1.73	0.29	sand to silty sand	>90	46-48	42	UNDEFINED
2.00	6.56	141.52	2.28	1.61	0.32	sand to silty sand	>90	46-48	34	UNDEFINED
2.25	7.38	275.66	1.70	0.62	0.34	sand	>90	>48	>50	UNDEFINED
2.50	8.20	418.06	2.36	0.56	0.37	gravelly sand to sand	>90	>48	>50	UNDEFIN
2.75	9.02	403.20	3.95	0.98	0.39	sand	>90	>48	>50	UNDEFINED
3.00	9.84	271.00	3.99	1.47	0.42	sand to silty sand	>90	46-48	>50	UNDEFINED
3.25	10.66	420.94	2.06	0.49	0.44	gravelly sand to sand	>90	>48	>50	UNDEFINED
3.50	11.48	495.28	2.83	0.57	0.47	gravelly sand to sand	>90	>48	>50	UNDEFINED
3.75	12.30	198.26	3.50	1.77	0.49	sand to silty sand	>90	44-46	47	UNDEFINED
4.00	13.12	77.28	1.94	2.52	0.52	sandy silt to clayey silt	UNDFND	UNDFD	30	6.37
4.25	13.94	145.32	2.64	1.81	0.55	sand to silty sand	80-90	42-44	35	UNDEFINED
4.50	14.76	334.34	6.02	1.80	0.57	sand to silty sand	>90	46-48	>50	UNDEFINED
4.75	15.58	529.46	5.93	1.12	0.60	sand	>90	>48	>50	UNDEFINED
5.00	16.40	502.32	8.21	1.63	0.62	sand	>90	>48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02)

NORTHSIDE SANITARY LANDFILL

Contractor :TERRA TECH.
Location :CPT-125A
Job No. :88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date :4-09-88
Elevation :882.0 MSL
Water table (meters) : 2.2

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	106.10	0.10	0.09	0.03	sand	>90	>48	20	UNDEFINED
0.50	1.64	324.50	1.67	0.51	0.08	gravelly sand to sand	>90	>48	>50	UNDEFINED
0.75	2.46	113.26	1.35	1.19	0.13	sand to silty sand	>90	>48	27	UNDEFINED
1.00	3.28	59.30	0.96	1.62	0.18	silty sand to sandy silt	70-80	46-48	19	UNDEFINED
1.25	4.10	49.34	0.95	1.93	0.23	silty sand to sandy silt	60-70	44-46	16	UNDEFINED
1.50	4.92	70.76	0.77	1.09	0.28	sand to silty sand	70-80	44-46	17	UNDEFINED
1.75	5.74	29.80	1.06	3.57	0.33	clayey silt to silty clay	UNDFND	UNDFD	14	2.45
2.05	6.73	64.94	1.17	1.81	0.39	silty sand to sandy silt	60-70	42-44	21	UNDEFINED
2.30	7.55	154.94	2.92	1.88	0.45	sand to silty sand	>90	46-48	37	UNDEFINED
2.55	8.37	299.98	5.39	1.80	0.47	sand to silty sand	>90	>48	>50	UNDEFINED
2.80	9.19	228.58	5.93	2.60	0.50	silty sand to sandy silt	>90	46-48	>50	UNDEFINED
3.05	10.01	347.48	3.37	0.97	0.53	sand	>90	>48	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Robertson and Campanella 1983 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-12B
Job No. : 92-1008
Test Date : [illegible]
Elevation : 877.7 MSL
Water Table (meters) : 1.7
Soil Unit Wt. (avg) : 120 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	63.86	0.79	1.14	0.03	sand to silty sand	>90	>48	16	UNDEFINED
0.50	1.64	107.66	1.36	1.27	0.08	sand to silty sand	>90	>48	25	UNDEFINED
0.75	2.46	40.34	1.30	3.19	0.13	clayey silt to silty clay	UNDFND	UNDFD	20	3.09
1.00	3.28	35.62	0.92	2.59	0.18	sandy silt to clayey silt	UNDFND	UNDFD	14	2.35
1.25	4.10	41.50	1.23	2.97	0.23	sandy silt to clayey silt	UNDFND	UNDFD	16	3.43
1.50	4.92	30.70	0.91	2.96	0.28	clayey silt to silty clay	UNDFND	UNDFD	15	2.53
1.75	5.74	17.24	0.39	2.24	0.33	clayey silt to silty clay	UNDFND	UNDFD	9	1.40
2.00	6.56	24.22	0.21	0.86	0.37	silty sand to sandy silt	40-50	34-36	9	UNDEFINED
2.25	7.38	20.94	0.31	1.50	0.39	sandy silt to clayey silt	UNDFND	UNDFD	9	1.70
2.50	8.20	67.60	0.10	0.15	0.42	sand to silty sand	60-70	40-42	16	UNDEFINED
2.75	9.02	154.52	1.87	1.21	0.44	sand to silty sand	>90	44-46	37	UNDEFINED
3.00	9.84	200.66	3.71	1.85	0.47	sand to silty sand	>90	46-48	48	UNDEFINED
3.25	10.66	201.30	3.70	1.84	0.49	sand to silty sand	>90	44-46	48	UNDEFINED
3.50	11.48	266.38	3.55	1.33	0.52	sand	>90	46-48	50	UNDEFINED
3.75	12.30	399.80	2.29	0.57	0.55	gravelly sand to sand	>90	>48	50	UNDEFINED
4.00	13.12	236.34	2.00	0.85	0.57	sand	>90	44-46	45	UNDEFINED
4.25	13.94	130.80	3.73	2.85	0.60	silty sand to sandy silt	80-90	42-44	42	UNDEFINED
4.50	14.76	91.54	2.84	3.10	0.62	sandy silt to clayey silt	UNDFND	UNDFD	35	7.55
4.75	15.58	90.68	2.26	2.49	0.65	silty sand to sandy silt	70-80	40-42	29	UNDEFINED
5.00	16.40	189.88	4.79	2.52	0.67	silty sand to sandy silt	>90	42-44	50	UNDEFINED
5.25	17.22	146.38	3.20	2.18	0.70	silty sand to sandy silt	80-90	42-44	47	UNDEFINED
5.50	18.04	116.84	3.42	2.93	0.73	sandy silt to clayey silt	UNDFND	UNDFD	45	9.64
5.75	18.86	223.64	7.26	3.25	0.75	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
6.00	19.69	207.12	7.08	3.42	0.78	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
6.25	20.51	229.06	9.21	4.00	0.80	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) **

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-13B
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : 04-02-87
Elevation : 879.5 MSL
Water table (meters) : 1.5

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	42.00	0.53	1.25	0.03	silty sand to sandy silt	>90	>48	13	UNDEFINED
0.50	1.64	133.74	2.55	1.91	0.08	silty sand to sandy silt	>90	>48	43	UNDEFINED
0.75	2.46	43.28	1.22	2.81	0.13	sandy silt to clayey silt	UNDFND	UNDFD	17	3.59
1.00	3.28	67.10	0.84	1.25	0.18	silty sand to sandy silt	70-80	44-46	21	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-10GA
Job No. : 38-1008
Unit Unit Wt. (avg) : 125 pcf

Test Date : [illegible]
Elevation : [illegible] MSL
Water Table (meters) : 1.5

DEPTH (meters)	(feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	112.38	1.57	1.40	0.03	sand to silty sand	>90	>48	27	UNDEFINED
0.50	1.64	134.34	3.14	2.33	0.08	silty sand to sandy silt	>90	>48	43	UNDEFINED
0.75	2.46	38.82	0.91	2.35	0.13	sandy silt to clayey silt	UNDFND	UNDFD	15	3.22
1.00	3.28	21.75	0.35	1.59	0.18	sandy silt to clayey silt	UNDFND	UNDFD	8	1.73
1.25	4.10	27.42	0.26	0.94	0.23	silty sand to sandy silt	50-60	38-40	9	UNDEFINED
1.50	4.92	31.78	0.33	1.05	0.28	silty sand to sandy silt	50-60	38-40	10	UNDEFINED
1.75	5.74	53.02	0.46	0.86	0.32	sand to silty sand	60-70	40-42	13	UNDEFINED
2.00	5.56	73.00	0.56	0.72	0.35	sand to silty sand	70-80	42-44	19	UNDEFINED
2.25	7.38	65.24	2.09	3.21	0.37	sandy silt to clayey silt	UNDFND	UNDFD	25	5.40
2.50	8.20	46.36	1.39	2.99	0.40	sandy silt to clayey silt	UNDFND	UNDFD	18	3
2.75	9.02	49.54	1.49	3.02	0.42	sandy silt to clayey silt	UNDFND	UNDFD	19	4.[illegible]
3.00	9.84	20.20	0.97	4.79	0.45	clay	UNDFND	UNDFD	13	1.63
3.25	10.66	13.34	0.12	0.93	0.47	sandy silt to clayey silt	UNDFND	UNDFD	5	1.05
3.50	11.48	14.60	0.17	1.19	0.50	sandy silt to clayey silt	UNDFND	UNDFD	5	1.15
3.75	12.30	11.64	0.22	1.87	0.53	clayey silt to silty clay	UNDFND	UNDFD	6	.90
4.00	13.12	40.06	0.15	0.37	0.55	sand to silty sand	40-50	36-38	10	UNDEFINED
4.25	13.94	103.74	0.81	0.78	0.58	sand to silty sand	70-80	40-42	25	UNDEFINED
4.50	14.76	156.32	0.55	0.35	0.60	sand	80-90	42-44	30	UNDEFINED
4.75	15.58	122.56	2.61	2.13	0.63	silty sand to sandy silt	70-80	42-44	39	UNDEFINED
5.00	16.40	135.36	0.34	0.25	0.65	sand	80-90	42-44	25	UNDEFINED
5.25	17.22	194.36	0.46	0.24	0.68	sand	>90	44-46	37	UNDEFINED
5.50	18.04	181.78	0.40	0.22	0.71	sand	80-90	42-44	35	UNDEFINED
5.75	18.86	179.34	0.39	0.22	0.73	sand	80-90	42-44	34	UNDEFINED
6.00	19.69	222.00	0.65	0.29	0.76	gravelly sand to sand	>90	44-46	35	UNDEFINED
6.25	20.51	217.72	0.39	0.18	0.78	gravelly sand to sand	>90	42-44	35	UNDEFINED
6.50	21.33	211.24	0.34	0.16	0.81	gravelly sand to sand	>90	42-44	34	UNDEFINED
6.75	22.15	210.56	0.36	0.17	0.83	gravelly sand to sand	>90	42-44	34	UNDEFINED
7.00	22.97	255.36	0.52	0.20	0.86	gravelly sand to sand	>90	44-46	41	UNDEFINED
7.25	23.79	283.56	0.71	0.25	0.88	gravelly sand to sand	>90	44-46	45	UNDEFINED
7.50	24.61	257.34	0.59	0.23	0.91	gravelly sand to sand	>90	42-44	41	UNDEFINED
7.75	25.43	191.82	0.30	0.16	0.94	sand	80-90	42-44	37	UNDEFINED
8.00	26.25	258.30	0.36	0.14	0.96	gravelly sand to sand	>90	42-44	41	UNDEFINED
8.25	27.07	272.22	0.38	0.14	0.99	gravelly sand to sand	>90	42-44	43	UNDEFINED
8.50	27.89	319.26	0.24	0.09	1.01	gravelly sand to sand	>90	44-46	>50	UNDEFINED
8.75	28.71	379.32	0.99	0.26	1.04	gravelly sand to sand	>90	44-46	>50	UNDEFINED
9.00	29.53	317.94	2.07	0.65	1.06	gravelly sand to sand	>90	44-46	>50	UNDEFINED
9.25	30.35	236.70	1.31	0.56	1.09	sand	>90	42-44	45	UNDEFINED
9.50	31.17	214.74	1.08	0.50	1.12	sand	80-90	40-42	41	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-132
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : 04-[illegible]-88
Elevation : 283.0 MSL
Water table (meters) : 1.5

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	180.04	1.12	0.62	0.03	sand	>90	>48	34	UNDEFINED
0.50	1.64	109.14	1.40	1.28	0.08	sand to silty sand	>90	>48	26	UNDEFINED
0.75	2.46	77.30	1.16	1.50	0.13	silty sand to sandy silt	80-90	46-48	25	UNDEFINED
1.00	3.28	77.04	1.66	2.15	0.18	silty sand to sandy silt	80-90	46-48	25	UNDEFINED
1.25	4.10	54.20	1.47	2.70	0.23	sandy silt to clayey silt	UNDFND	UNDFD	21	4.49
1.50	4.92	59.34	1.23	2.08	0.28	silty sand to sandy silt	60-70	42-44	19	UNDEFINED
1.75	5.74	40.48	1.09	2.69	0.33	sandy silt to clayey silt	UNDFND	UNDFD	16	3.34
2.00	6.56	15.28	0.32	2.07	0.36	clayey silt to silty clay	UNDFND	UNDFD	7	1.24
2.25	7.38	10.40	0.19	1.81	0.38	clayey silt to silty clay	UNDFND	UNDFD	5	.83
2.50	8.20	7.58	0.19	2.48	0.41	silty clay to clay	UNDFND	UNDFD	5	.59
2.75	9.02	96.28	0.70	0.72	0.43	sand to silty sand	70-80	42-44	23	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTRI (v 3.02) ****

NORTHSIDE SANITARY LANDFILL

Test Date : 04-09-88
Elevation : [illegible] MSL
Water table (meters) : [illegible]

Location : CPT-13C
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	174.24	0.92	0.53	0.03	sand	>90	>48	33	UNDEFINED
0.50	1.64	181.92	1.64	0.90	0.08	sand	>90	>48	35	UNDEFINED
0.75	2.46	102.16	1.69	1.65	0.13	silty sand to sandy silt	>90	>48	33	UNDEFINED
1.00	3.28	53.13	1.24	1.49	0.18	silty sand to sandy silt	80-90	46-48	27	UNDEFINED
1.25	4.10	32.86	0.86	2.61	0.23	sandy silt to clayey silt	UNDFND	UNDFD	13	2.71
1.50	4.92	24.92	0.65	2.60	0.28	clayey silt to silty clay	UNDFND	UNDFD	12	2.05
1.75	5.74	25.72	0.56	2.19	0.33	sandy silt to clayey silt	UNDFND	UNDFD	10	2.11
2.00	6.56	19.18	0.47	2.44	0.38	clayey silt to silty clay	UNDFND	UNDFD	9	1.56
2.25	7.38	25.08	0.44	1.75	0.44	sandy silt to clayey silt	UNDFND	UNDFD	10	2.05
2.50	8.20	10.72	0.16	1.51	0.49	clayey silt to silty clay	UNDFND	UNDFD	5	
2.75	9.02	9.10	0.27	2.97	0.54	silty clay to clay	UNDFND	UNDFD	6	[illegible]
3.00	9.84	30.48	1.35	2.42	0.59	silty sand to sandy silt	60-70	40-42	25	UNDEFINED
3.25	10.66	87.16	1.43	1.64	0.63	silty sand to sandy silt	60-70	40-42	23	UNDEFINED
3.50	11.48	101.14	2.40	2.38	0.65	silty sand to sandy silt	70-80	40-42	32	UNDEFINED
3.75	12.30	50.84	1.54	3.02	0.68	sandy silt to clayey silt	UNDFND	UNDFD	19	4.17
4.00	13.12	49.10	1.46	2.97	0.70	sandy silt to clayey silt	UNDFND	UNDFD	19	4.02
4.25	13.94	49.42	1.57	3.18	0.73	sandy silt to clayey silt	UNDFND	UNDFD	19	4.04
4.50	14.76	78.38	2.85	3.61	0.76	sandy silt to clayey silt	UNDFND	UNDFD	30	6.50
4.70	15.42	112.04	4.50	4.02	0.78	very stiff fine grained (*)	UNDFND	UNDFD	>50	UNDEFINED
4.95	16.24	189.10	5.15	2.72	0.80	silty sand to sandy silt	80-90	42-44	>50	UNDEFINED
5.20	17.06	203.72	6.08	2.60	0.83	silty sand to sandy silt	>90	42-44	>50	UNDEFINED
5.40	17.72	193.86	7.08	2.41	0.85	silty sand to sandy silt	>90	44-46	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) **

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-100
Job No. : 88-1008
Tot. Unit Wt. (avg) : 125 pcf

Test Date : [illegible]
Elevation : [illegible] MSL
Water Table Underwater : [illegible]

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	5.84	0.14	2.36	0.03	silty clay to clay	UNDFND	UNDFD	4	.48
0.50	1.64	11.68	0.21	1.83	0.08	clayey silt to silty clay	UNDFND	UNDFD	6	.95
0.75	2.46	12.68	0.12	0.91	0.13	sandy silt to clayey silt	UNDFND	UNDFD	5	1.04
1.00	3.28	51.68	0.61	0.99	0.18	sand to silty sand	70-80	44-46	15	UNDEFINED
1.25	4.10	104.52	1.04	0.99	0.21	sand to silty sand	>90	46-48	25	UNDEFINED
1.50	4.92	151.72	3.36	2.22	0.23	silty sand to sandy silt	>90	46-48	48	UNDEFINED
1.75	5.74	224.80	5.22	2.32	0.26	silty sand to sandy silt	>90	>48	>50	UNDEFINED
2.00	6.56	346.48	4.16	1.20	0.28	sand	>90	>48	>50	UNDEFINED
2.25	7.38	365.20	2.71	0.74	0.31	gravelly sand to sand	>90	>48	>50	UNDEFINED
2.50	8.20	235.36	4.86	2.06	0.34	sand to silty sand	>90	>48	>50	UNDEFINED
2.75	9.02	197.62	5.72	2.89	0.36	silty sand to sandy silt	>90	46-48	>50	UNDEFINED
3.00	9.84	412.80	3.21	0.78	0.39	gravelly sand to sand	>90	>48	>50	UNDEFINED
3.25	10.66	183.00	4.73	2.58	0.41	silty sand to sandy silt	>90	46-48	>50	UNDEFINED
3.50	11.48	240.56	3.51	1.46	0.44	sand to silty sand	>90	46-48	>50	UNDEFINED
3.75	12.30	143.26	3.08	2.15	0.46	silty sand to sandy silt	80-90	44-46	46	UNDEFINED
4.00	13.12	103.68	2.87	2.77	0.49	sandy silt to clayey silt	UNDFND	UNDFD	40	8.57
4.25	13.94	84.16	2.52	2.99	0.52	sandy silt to clayey silt	UNDFND	UNDFD	32	6.94
4.50	14.76	161.38	4.82	2.99	0.54	silty sand to sandy silt	80-90	44-46	>50	UNDEFINED
4.75	15.58	231.28	7.48	3.23	0.57	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
5.00	16.40	306.34	10.13	3.30	0.59	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 10

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTRI Ver 3.02 ***

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH.
Location : CPT-131
Job No. : 88-1000
Tot. Unit Wt. (avg.) : 125 pcf

[illegible]
Elevation : 274.5 MSL
Water table (meters) : 1.9

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Eq - Dr (%)	PHI deg.	SPT N	Su tsf
0.25	0.82	10.38	0.21	2.02	0.03	clayey silt to silty clay	UNDFND	UNDFD	5	.86
0.50	1.64	11.86	0.43	3.64	0.08	silty clay to clay	UNDFND	UNDFD	3	.98
0.75	2.46	11.30	0.16	1.40	0.13	clayey silt to silty clay	UNDFND	UNDFD	5	.93
1.00	3.28	6.16	0.06	1.04	0.18	sensitive fine grained	UNDFND	UNDFD	3	.49
1.25	4.10	39.30	0.29	0.74	0.21	silty sand to sandy silt	60-70	40-42	13	UNDEFINED
1.50	4.92	144.38	1.74	1.21	0.23	sand to silty sand	>90	46-48	35	UNDEFINED
1.75	5.74	78.08	0.16	0.21	0.26	sand to silty sand	70-80	44-46	19	UNDEFINED
2.00	6.56	129.70	0.64	0.49	0.28	sand	>90	46-48	25	UNDEFINED
2.25	7.38	146.84	0.74	0.50	0.31	sand	>90	46-48	28	UNDEFINED
2.50	8.20	45.78	1.22	2.66	0.34	sandy silt to clayey silt	UNDFND	UNDFD	18	[illegible]
2.75	9.02	26.96	0.45	1.66	0.36	sandy silt to clayey silt	UNDFND	UNDFD	10	2.20
3.00	9.84	26.72	0.49	1.84	0.39	sandy silt to clayey silt	UNDFND	UNDFD	10	2.17
3.25	10.66	39.44	0.51	1.29	0.41	silty sand to sandy silt	50-60	36-38	13	UNDEFINED
3.50	11.48	45.52	0.94	2.06	0.44	sandy silt to clayey silt	UNDFND	UNDFD	17	3.73
3.75	12.30	53.74	1.29	2.40	0.46	sandy silt to clayey silt	UNDFND	UNDFD	21	4.41
4.00	13.12	63.58	1.83	2.87	0.49	sandy silt to clayey silt	UNDFND	UNDFD	24	5.13
4.25	13.94	73.48	2.07	2.81	0.52	sandy silt to clayey silt	UNDFND	UNDFD	29	5.05
4.50	14.76	114.30	3.40	2.97	0.54	sandy silt to clayey silt	UNDFND	UNDFD	44	9.45
4.75	15.58	156.82	5.07	3.23	0.57	sandy silt to clayey silt	UNDFND	UNDFD	>50	12.99
5.00	16.40	235.80	6.32	2.68	0.59	silty sand to sandy silt	>90	44-46	>50	UNDEFINED
5.25	17.22	268.54	8.08	3.01	0.62	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED
5.50	18.04	220.28	7.78	3.53	0.64	sand to clayey sand (*)	UNDFND	UNDFD	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

(*) overconsolidated or cemented

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v3.02) **

NORTHSIDE SANITARY LANDFILL

Contractor : TERRA TECH. Location : [illegible]

DEPTH (meters)	DEPTH (feet)	Qc (avg) (tsf)	Fs (avg) (tsf)	Rf (avg) (%)	SIGV' (tsf)	SOIL BEHAVIOUR TYPE	Dr (%)	PHI deg.	SPT N	Su tsf
9.75	31.99	252.98	1.09	0.43	1.14	gravelly sand to sand	>90	42-44	40	UNDEFINED
10.00	32.81	145.18	1.66	1.14	1.17	sand to silty sand	70-90	38-40	35	UNDEFINED
10.25	33.63	145.46	1.24	0.86	1.19	sand	70-90	38-40	28	UNDEFINED
10.50	34.45	244.58	1.46	0.60	1.22	sand	80-90	42-44	47	UNDEFINED
10.75	35.27	384.32	1.21	0.31	1.24	gravelly sand to sand	>90	44-45	>50	UNDEFINED

Dr - All sands (Jamiolkowski et al. 1985) PHI - Durgunoglu and Mitchell 1975 Su: Nk= 12

**** Note: For interpretation purposes the PLOTTED CPT PROFILE should be used with the TABULATED OUTPUT from CPTINTR1 (v 3.02) ****

Appendix D
Geotechnical Laboratory Test Results

GLT592/42

All geotechnical laboratory testing was performed by ATEC Associates, Inc., as shown below.

Number of Tests	Test	Procedure
88	Moisture Content	ASTM D-2216
60	Atterberg Limits	ASTM D-4318
16	Sieve Analysis	ASTM D-422
56	Sieve Analysis/Hydrometer	ASTM D-422
18	Modified Proctors	ASTM D-1557
13	Triaxial Permeability Tests	COE EM 1110-02-1906
1	Specific Gravity	ASTM D-854

The following table is provided to match ATEC's soil boring and test pit numbers in this appendix to those used throughout the text.

Appendix Number	Text Number	Location
100 to 107	NSLSB-100 to NSLSB-107	Borrow Area
B103 to B111	NSLSB-108 to NSLSB-111	Borrow Area
B115 to B123	NSLSB-115 to NSLSB-123	GW Interceptor Trench
ND1 to ND11	NSLND1 to NSLND11	Landfill Cap
ECC/SB-3 to ECC/SB-19	ECCSB3 to ECCSB19	ECC Supplemental Investigation Area
ECC/SB-120 to ECC/SB-19	NSLSB-120 to NSLSB19	GW Interceptor Trench
NSL/SB-122	NSLSB-122	GW Interceptor Trench
NSL/SB/124	NSLSB-124	GW Interceptor Trench
TP-100 to TP-109	NSLTP-100 to NSLTP-109	Borrow Area
108 to 111	NSLSB-108 to NSLSB-111	Borrow Area
112 to 119	NSLSB-112 to NSLSB-119	GW Interceptor Trench

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: GH2M Hill

ATEC Job No: 21-81008

Project Name: North side landfill/FCC

Project location: Zionsville, IN

Sample obtained from: on-site sample No. BS-6, ND-11 gw

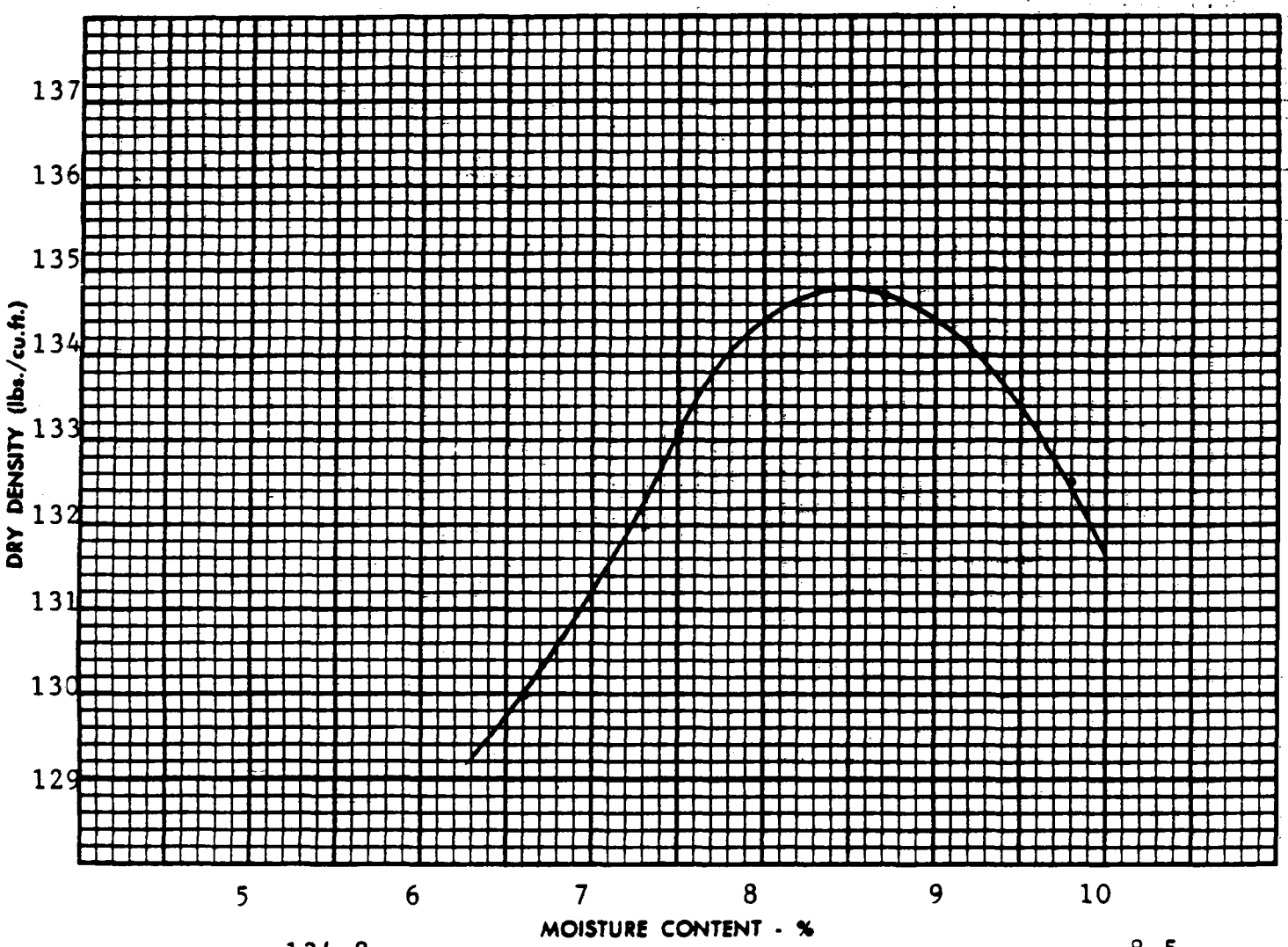
Sample Description: dark brown to gray clayey silt with some gravel

Test Type: Method A

Proctor: Modified

Tested by: W. Bracken

Date: 3-30-88



Maximum Dry Density 134.8 lbs./cu.ft.

Optimum Moisture 8.5 %

Remarks:

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To:

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: CH2M Hill

ATEC Job No: 21-81008

Project Name: North side of landfill/FCC

Project location: Zionsville, IN

Sample obtained from: on-site

Sample No. BS-5, ND-9

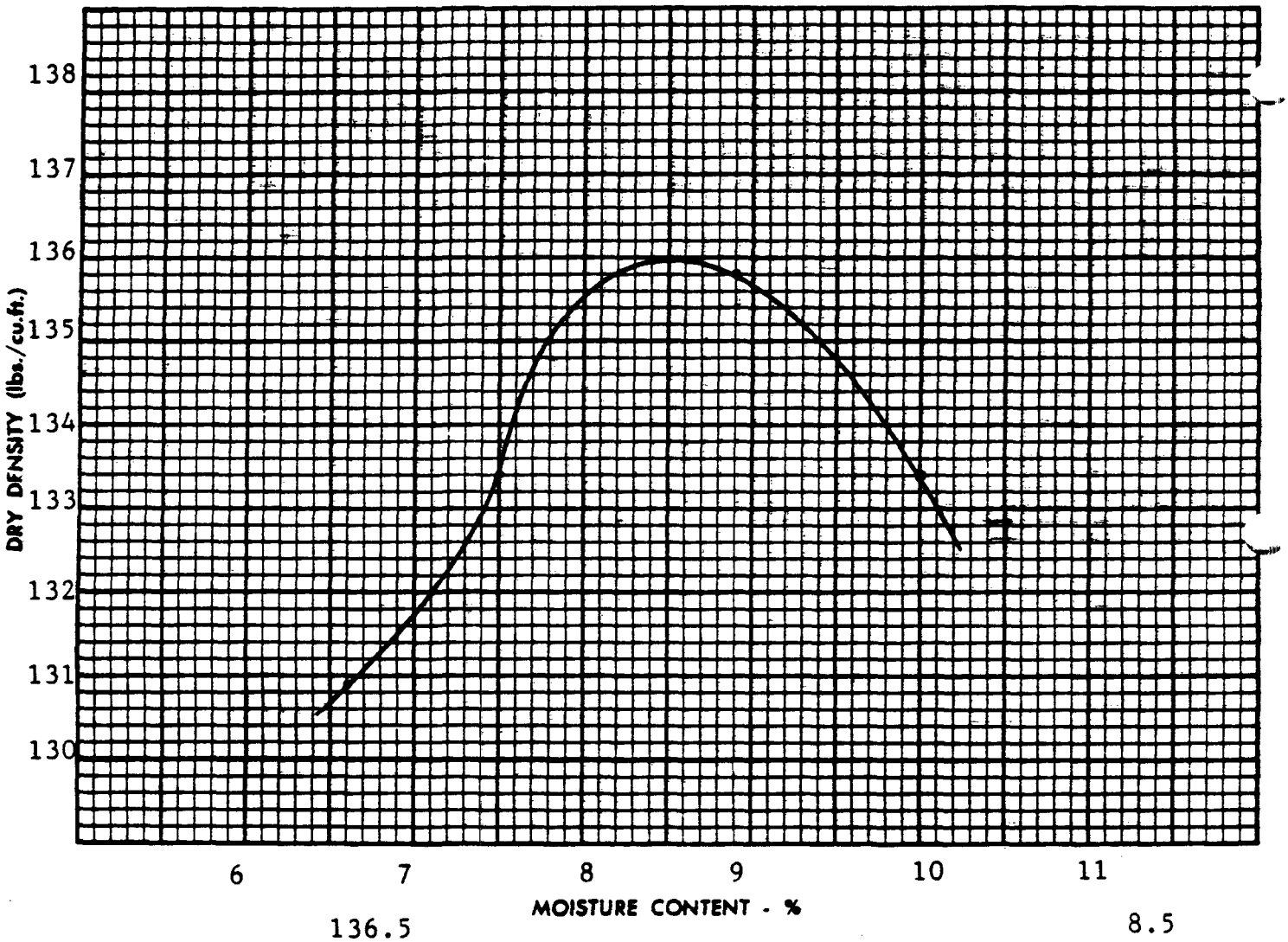
Sample Description: dark brown clayey silt with a trace of sand and gravel

Test Type: Method A

Proctor: Modified

Tested by: W. Bracken

Date: 3-30-88



Maximum Dry Density 136.5 lbs./cu.ft.

Optimum Moisture 8.5 %

Remarks:

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To:

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: CH2M Hill

ATEC Job No: 21-81008

Project Name: North side landfill/FCC

Project location: Zionsville, IN

Sample obtained from: on-site Sample No. BS-4, ND-6

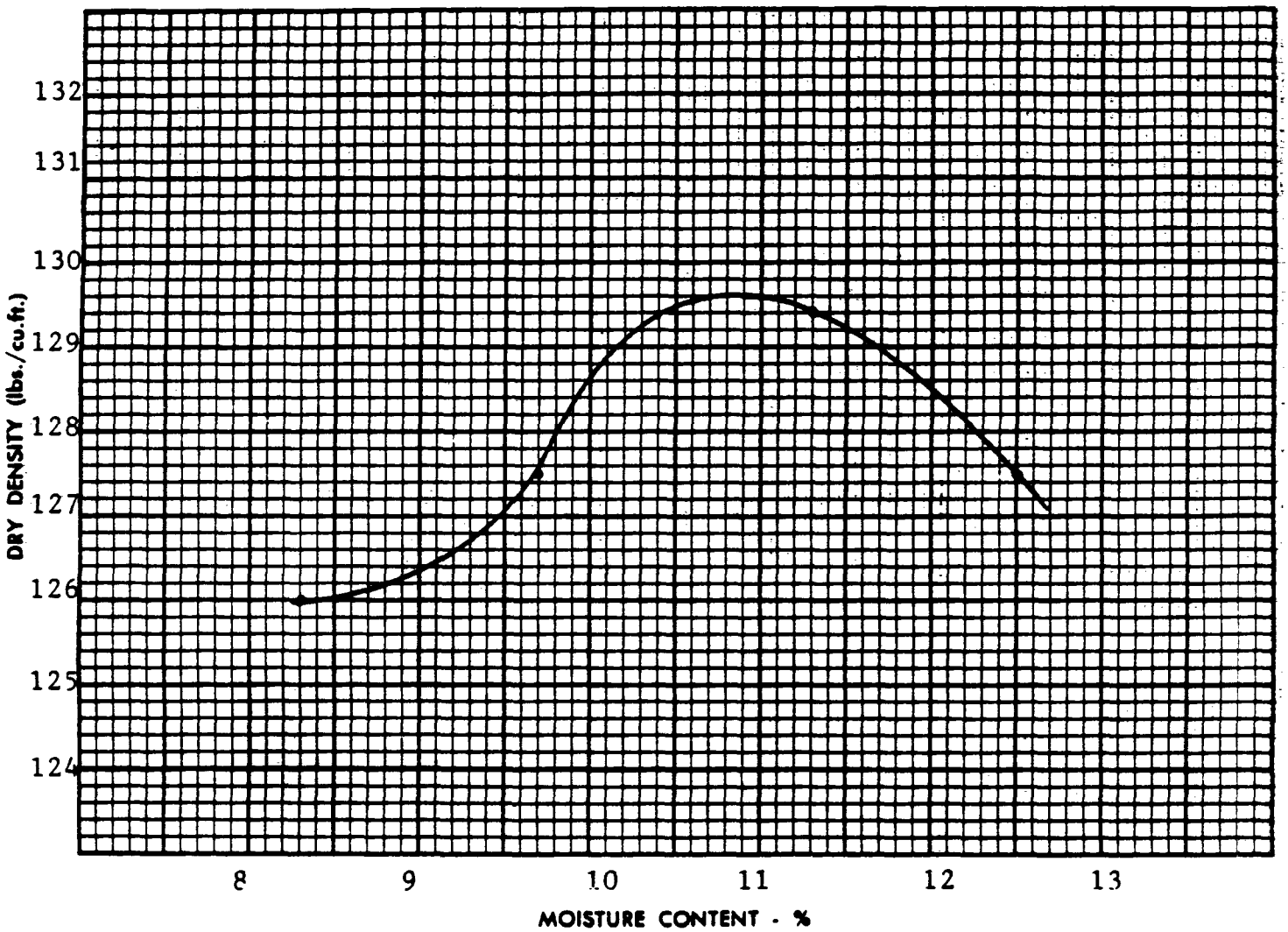
Sample Description: light brown silty clay with a trace of sand and gravel

Test Type: Mehtod A

Proctor: Modified

Tested by: W. Bracken

Date: 3-30-88



Maximum Dry Density 129.6 lbs./cu.ft.

Optimum Moisture 10.8 %

Remarks:

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To:

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: CH2M Hill

ATEC Job No: 21-81008

Project Name: North side landfill/FCC

Project location: Zionsville, IN

Sample obtained from: on-site Sample No. BS-2, ND-3

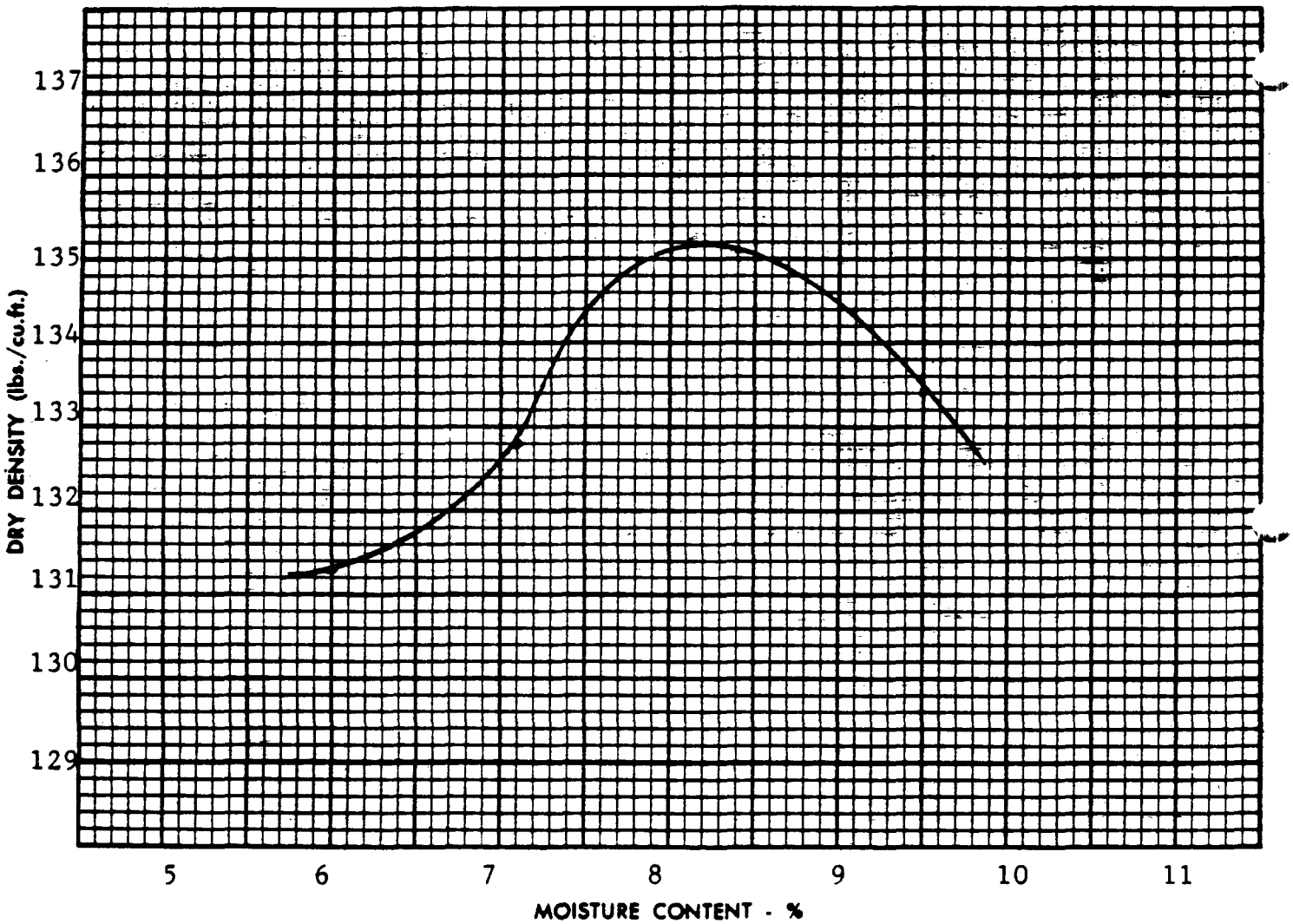
Sample Description: medium brown silty clay with some sand & gravel

Test Type: Method A

Proctor: Modified

Tested by: W. Bracken

Date: 3-30-88



Maximum Dry Density 135.2 lbs./cu.ft.

Optimum Moisture 8.2 %

Remarks:

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To:

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: CH2M Hill

ATEC Job No: 21-81008

Project Name: North side Landfill/FCC

Project location: Zionsville, IN

Sample obtained from: on-site Sample No. BS-1, ND-1

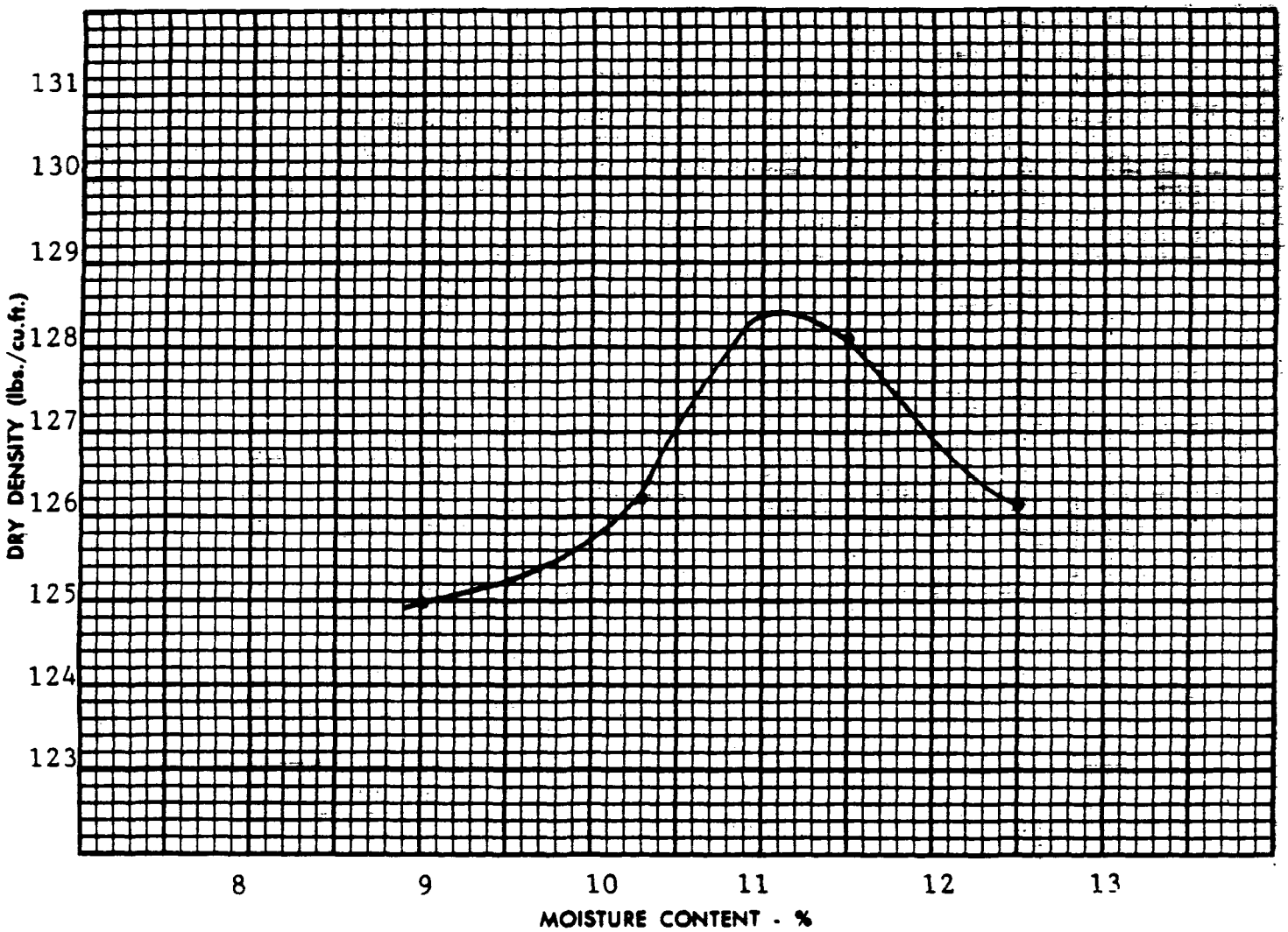
Sample Description: dark brown silty clay with a trace of gravel

Test Type: Method A

Proctor: Modified

Tested by: W. Bracken

Date: 3-30-88



Maximum Dry Density 128.4 lbs./cu.ft.

Optimum Moisture 11.1 %

Remarks:

ATEC ASSOCIATES, INC. FIELD DENSITY TEST RESULTS

Consulting Geotechnical & Materials Engineers

Project Northside Landfill Project Number 21-82083

Client ATEC-Drilling Inspection Date: 3-25-88

Contractor

Compaction Equipment Inspector S. Gray

TEST NO.	LOCATION	LIFT/ ELEV.	MAX. DEN.	DRY DEN.	MOISTURE %	PROCTOR %
8	See client representative for locations	existing grade elevations	136.5	121.6	13.3	89.1
9	See client representative for locations	existing grade elevations	136.5	122.1	13.5	89.5
10	See client representative for locations	existing grade elevations	136.5	102.8	18.2	75.3
11	See client representative for locations	existing grade elevations	134.8	121.6	9.6	90.2
12	See client representative for locations	existing grade elevations	134.8	120.8	10.7	89.6
13	See client representative for locations	existing grade elevations	134.8	118.9	13.4	88.2
14	See client representative for locations	existing grade elevations	134.8	121.4	11.0	90.1
15	See client representative for locations	existing grade elevations	134.8	122.3	14.8	90.7
16	See client representative for locations	existing grade elevations	131.9	112.0	13.8	84.9

Minimum Specification Requirement is % of modified Proctor

* - Test failed to meet minimum density requirement.
R - Retest of previously failed test.

REMARKS:

ATEC ASSOCIATES, INC. FIELD DENSITY TEST RESULTS

Consulting Geotechnical & Materials Engineers

Project Northside Landfill Project Number 21-82083

Client ATEC-Drilling Inspection Date: 3-25-88

Contractor

Compaction Equipment Inspector S. Gray

TEST NO.	LOCATION	LIFT/ ELEV.	MAX. DEN.	DRY DEN.	MOISTURE %	PROCTOR %
1	See client representative for locations	existing grade elevations	128.4	112.1	16.0	87.3
2	See client representative for locations	existing grade elevations	128.4	109.6	17.8	85.4
3	See client representative for locations	existing grade elevations	135.2	117.0	13.8	86.5
4	See client representative for locations	existing grade elevations	135.2	108.1	14.5	80.0
5	See client representative for locations	existing grade elevations	131.9	111.4	15.6	84.5
6	See client representative for locations	existing grade elevations	129.6	99.7	15.7	76.9
7	See client representative for locations	existing grade elevations	129.6	112.8	14.6	87.0

Minimum Specification Requirement is % of modified Proctor

* - Test failed to meet minimum density requirement.
R - Retest of previously failed test.

REMARKS:

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To:

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: CH_2 M Hill

ATEC Job No: 21-81008

Project Name: Northside Landfill

Project location:

Sample obtained from: TP109 B 8'

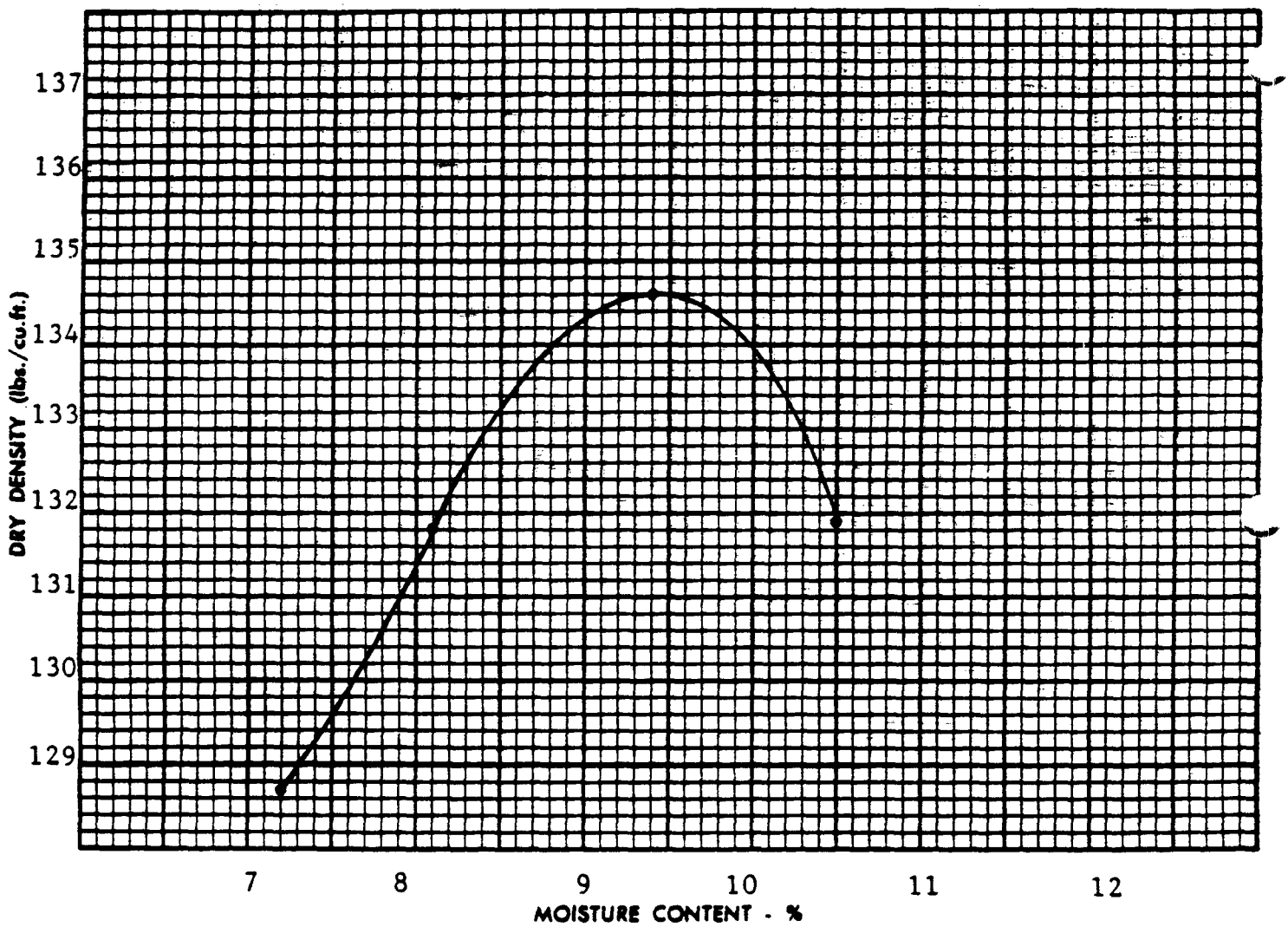
Sample Description: Medium brown clayey silt with a trace of sand and gravel

Test Type: Method A

Proctor: Modified

Tested by: W. Bracken

Date: 4-8-88



Maximum Dry Density 134.6 lbs./cu.ft.

Optimum Moisture 9.4 %

Remarks:

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To:

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: CH_2 M Hill

ATEC Job No: 21-81008

Project Name: Northside Landfill

Project location:

Sample obtained from: TP 106 B 3'5"

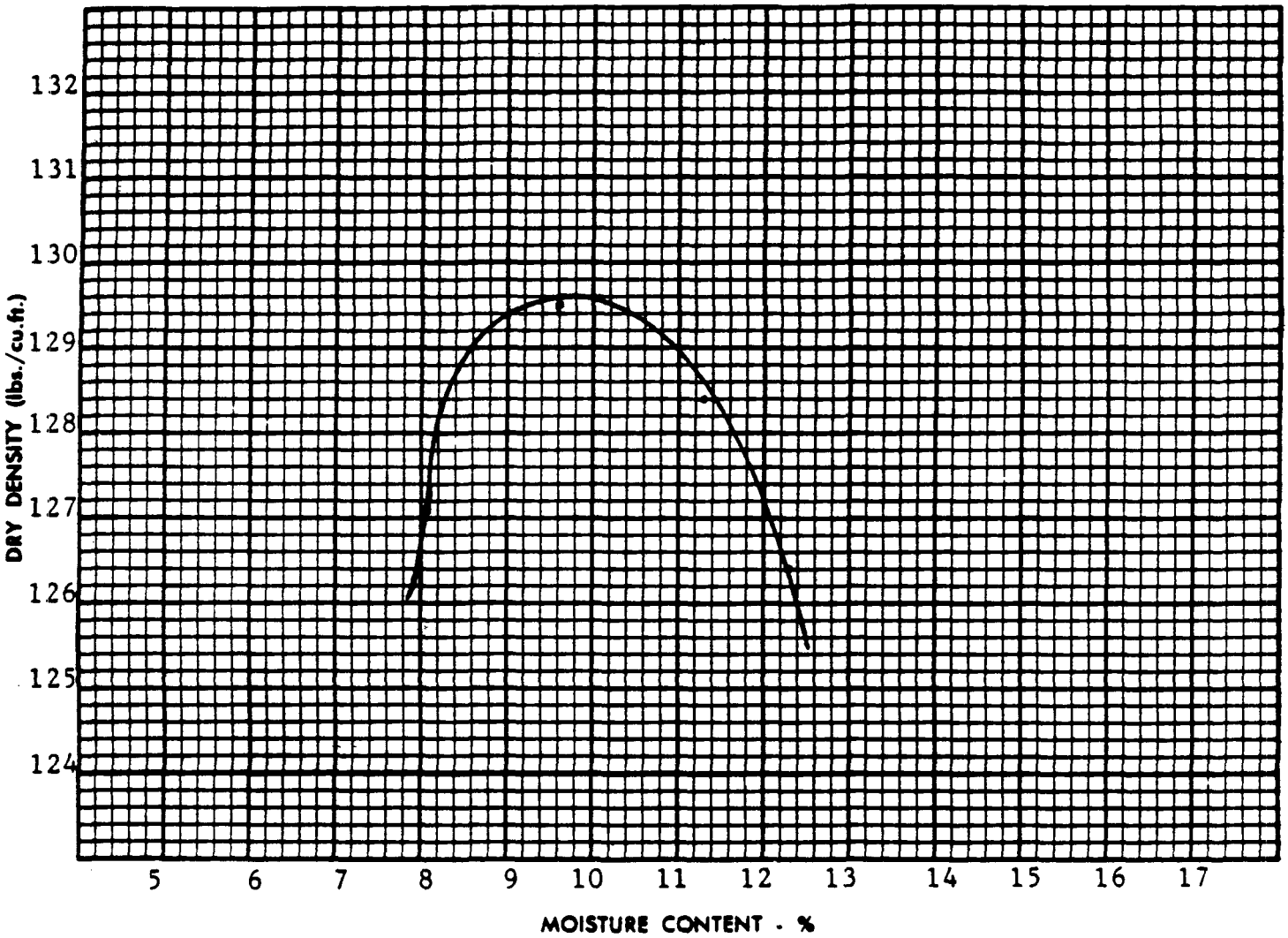
Sample Description: light brown sandy, clayey silt with some gravel

Test Type: Method A

Proctor: Modified

Tested by: W. Bracken

Date: 4-6-88



Maximum Dry Density 129.6 lbs./cu.ft.

Optimum Moisture 9.8 %

Remarks:

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To:

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: CH_2 M Hill

ATEC Job No: 21-81008

Project Name: Northside Landfill

Project location:

Sample obtained from: TP105 B 4'6"

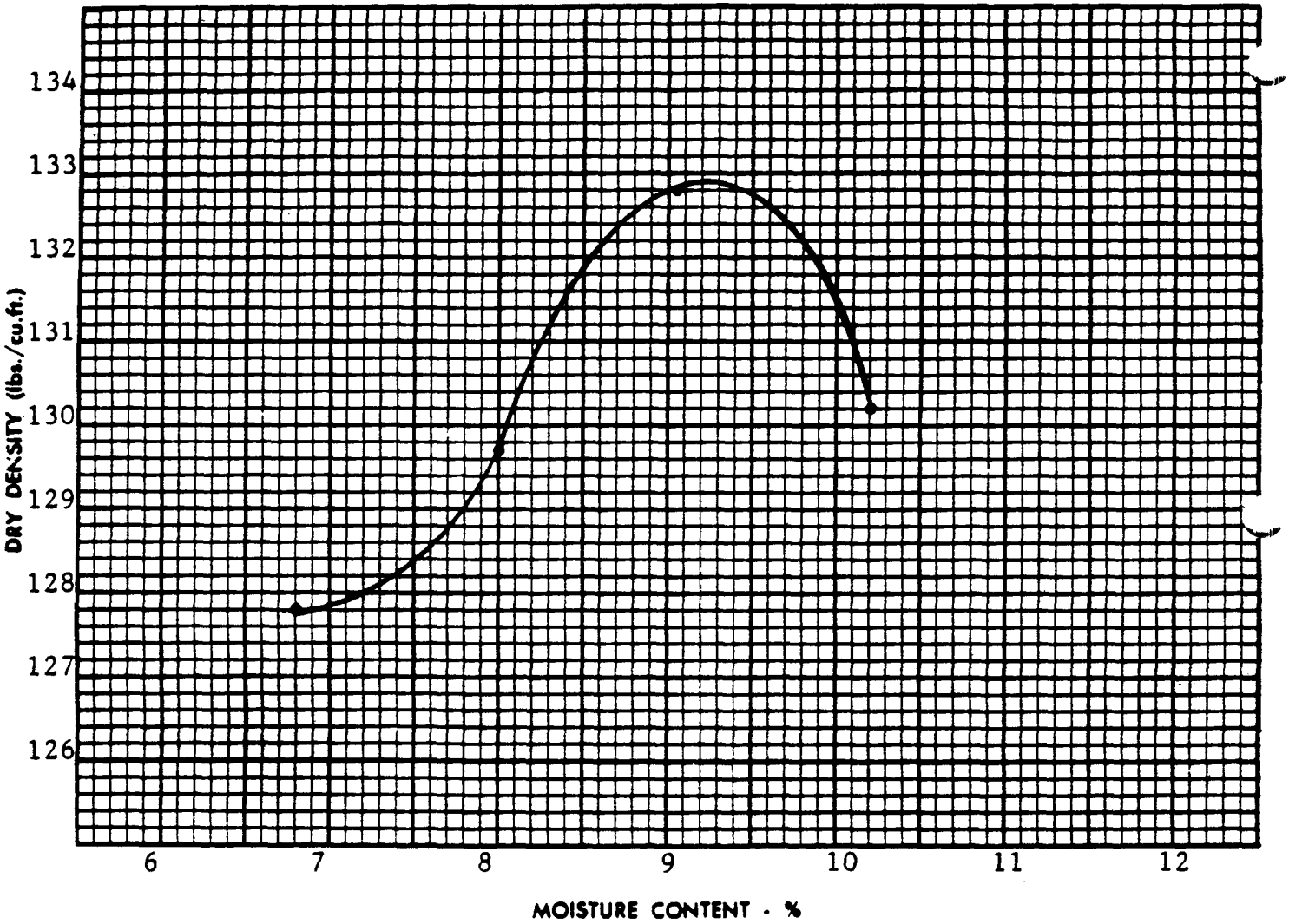
Sample Description: light brown sandy silt

Test Type: Method A

Proctor: Modified

Tested by: W. Bracken

Date: 4-7-88



Maximum Dry Density 132.9 lbs./cu.ft.

Optimum Moisture 9.2 %

Remarks:

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To.

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: CH_2 M. Hill

ATEC Job No: 21-81008

Project Name: Northside Landfill

Project location:

Sample obtained from: TP104 B 5'

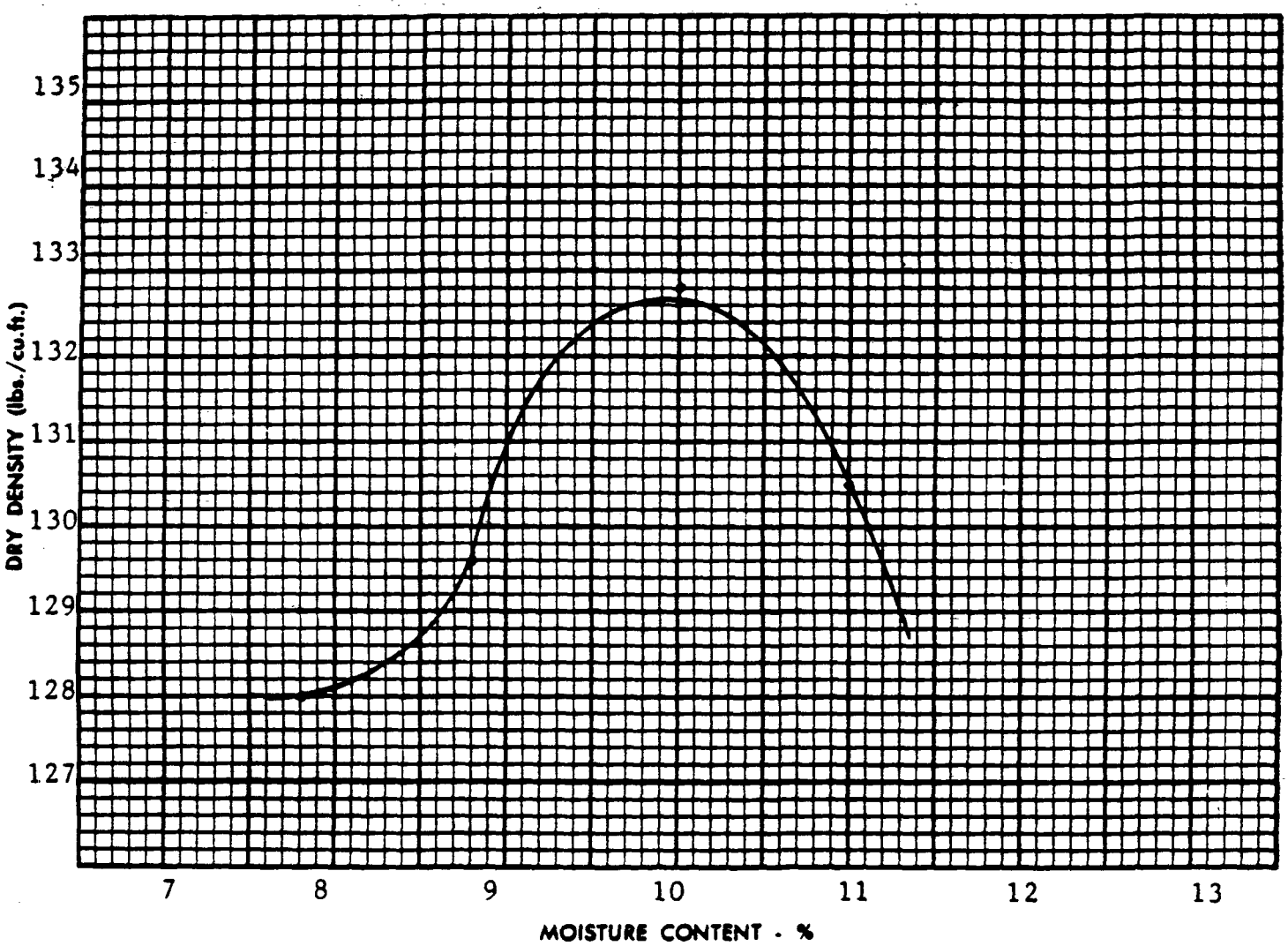
Sample Description: light brown sandy, clayey silt with a trace of gravel

Test Type: Method A

Proctor: Modified

Tested by: W. Bracken

Date: 4-6-88



Maximum Dry Density 132.7 lbs./cu.ft.

Optimum Moisture 9.9 %

Remarks:

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To:

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: CH_2 M Hill

ATEC Job No: 21-81008

Project Name: Northside Landfill

Project location:

Sample obtained from: TP103 B 4'

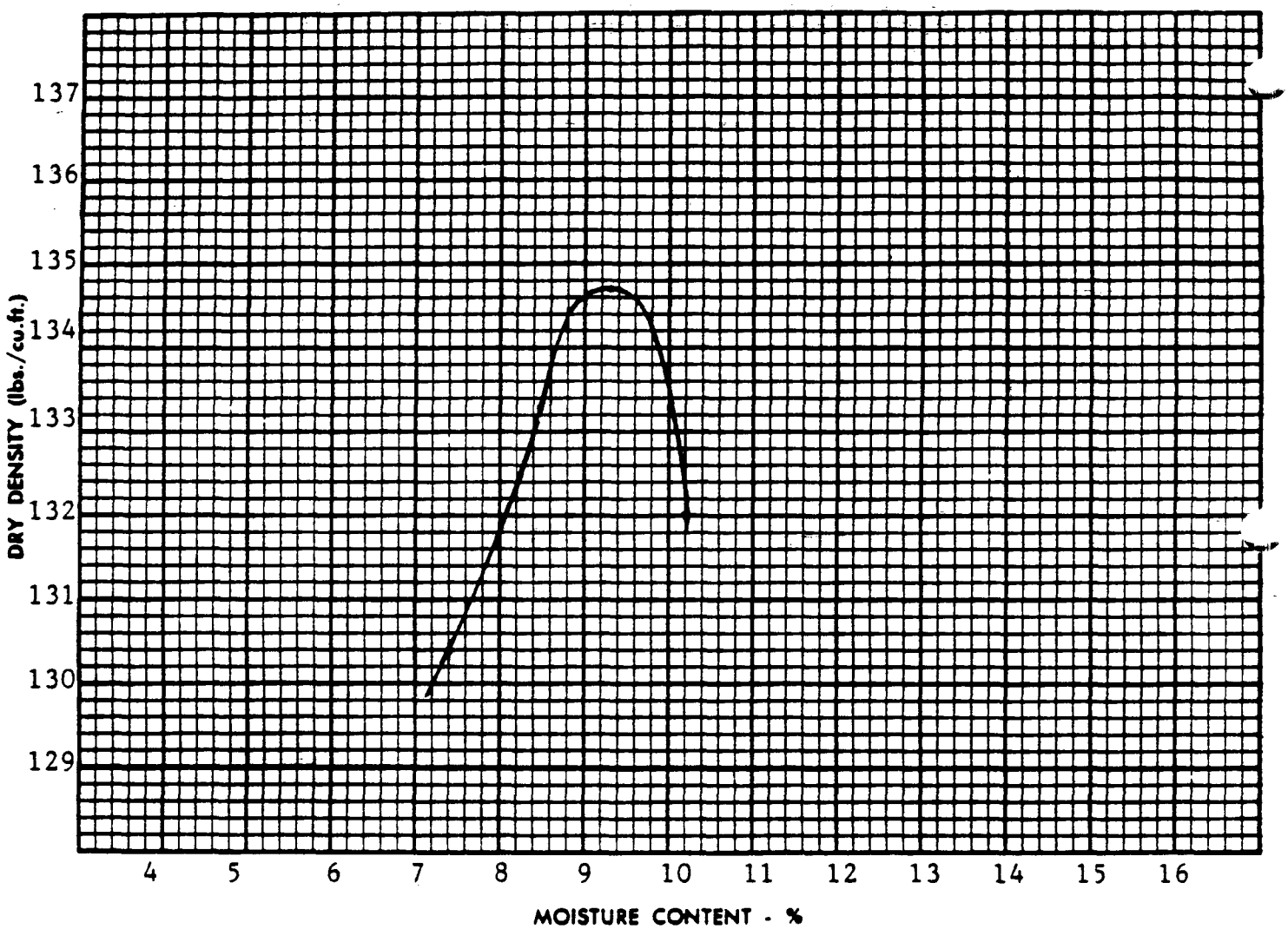
Sample Description: light brown sandy, clayey silt with some gravel

Test Type: Method A

Proctor: Modified

Tested by: W. Bracken

Date: 4-6-88



Maximum Dry Density 134.7 lbs./cu.ft.

Optimum Moisture 9.3 %

Remarks:

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To:

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: CH_2M Hill

ATEC Job No: 21-81008

Project Name: North side Landfill

Project location:

Sample obtained from: TP102 B 7'6"

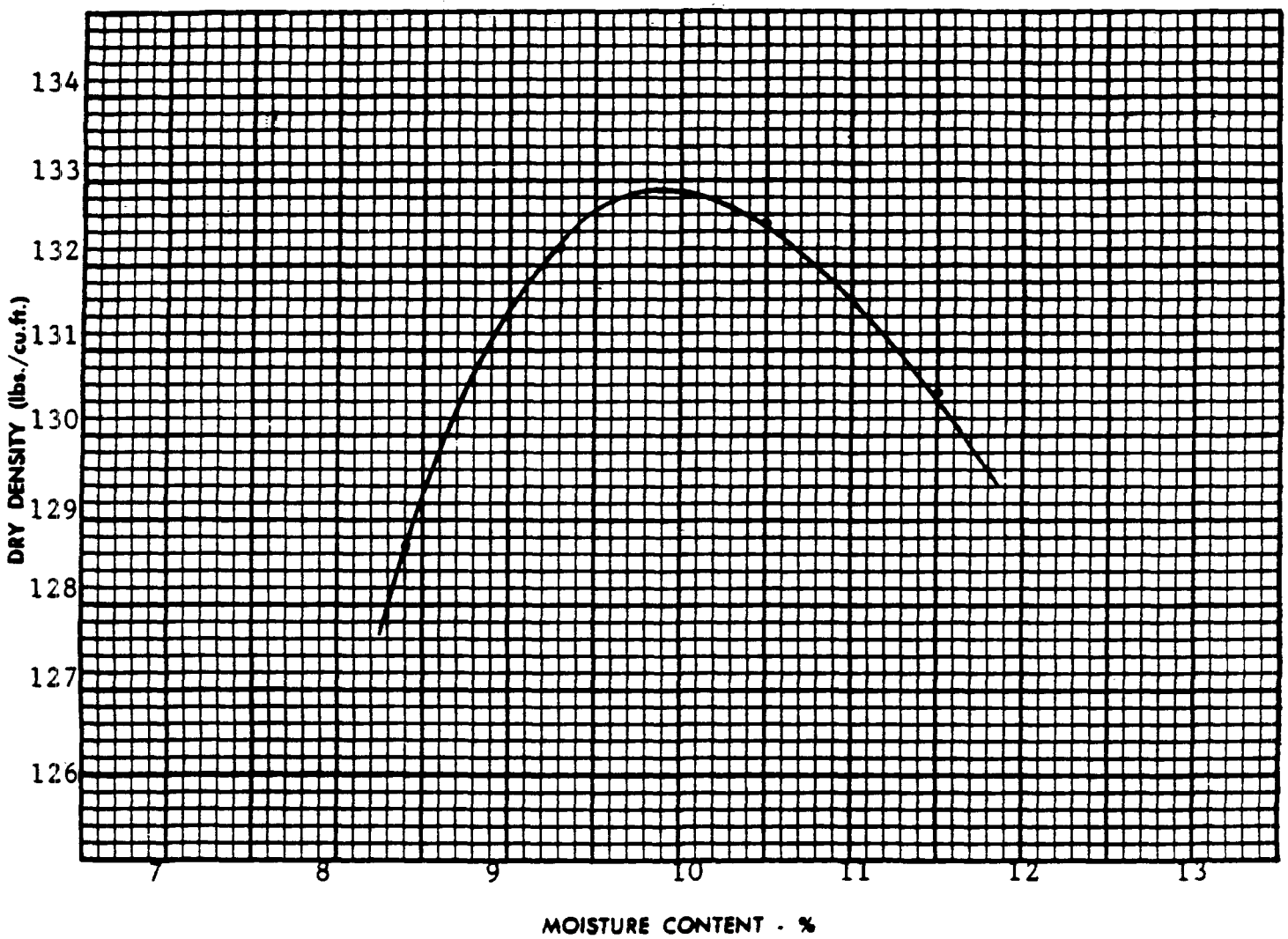
Sample Description: Medium brown clayey silt with some sand and a trace of gravel

Test Type: Method A

Proctor: Modified

Tested by: W. Bracken

Date: 4-6-88



Maximum Dry Density 132.9 lbs./cu.ft.

Optimum Moisture 9.9 %

Remarks:

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To:

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: CH_2M Hill

ATEC Job No: 21-81008

Project Name: Northside Landfill

Project location:

Sample obtained from: TP 101 B 5'7"

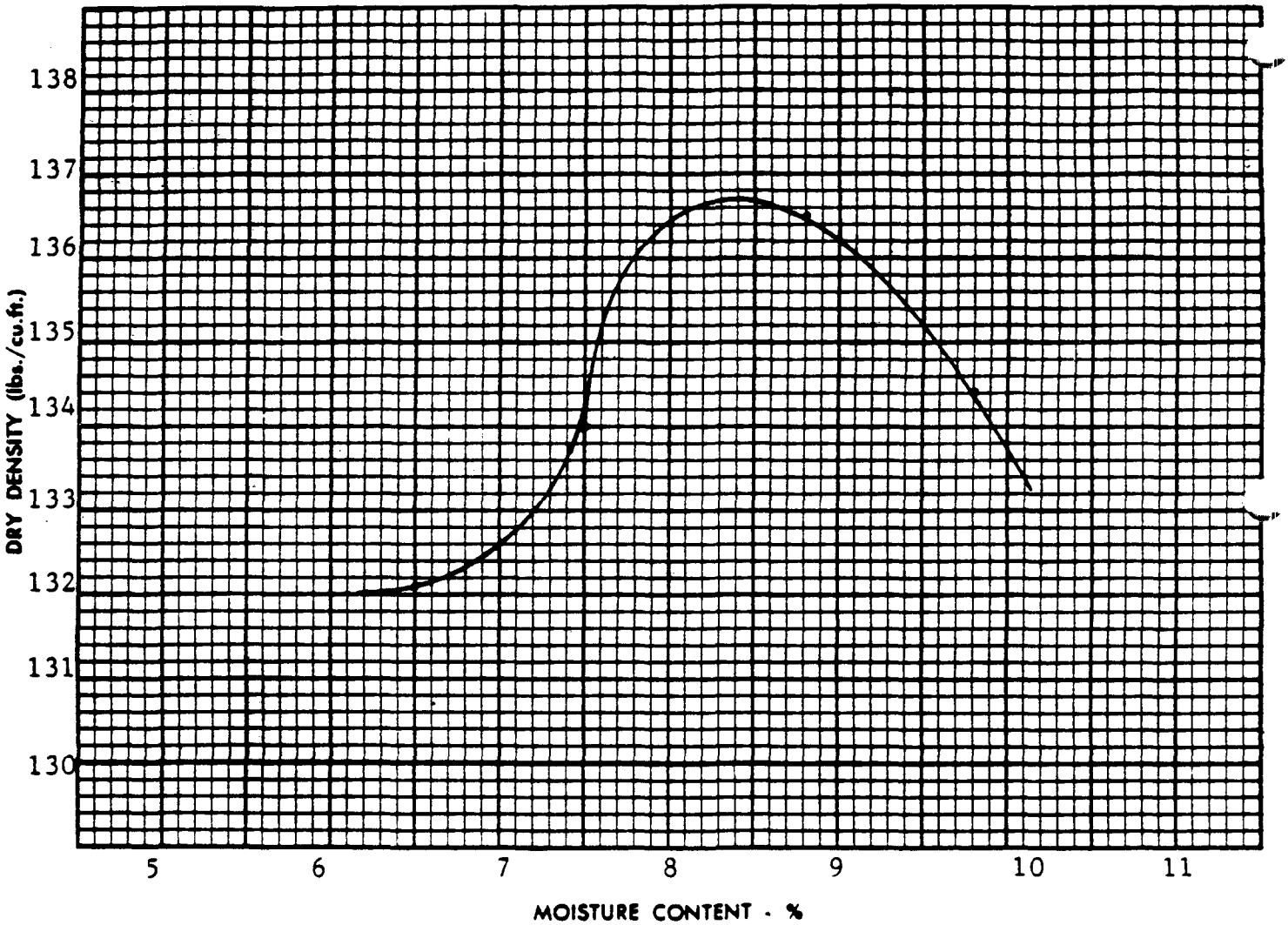
Sample Description: light brown sandy, silty clay with a trace of gravel

Test Type: Method A

Proctor: Modified

Tested by: W. Bracken

Date: 4-6-88



Maximum Dry Density 136.7 lbs./cu.ft.

Optimum Moisture 8.4 %

Remarks:

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: CH_2 M Hill

ATEC Job No: 21-81008

Project Name: Northside Landfill

Project location:

Sample obtained from: TP107 B 5'

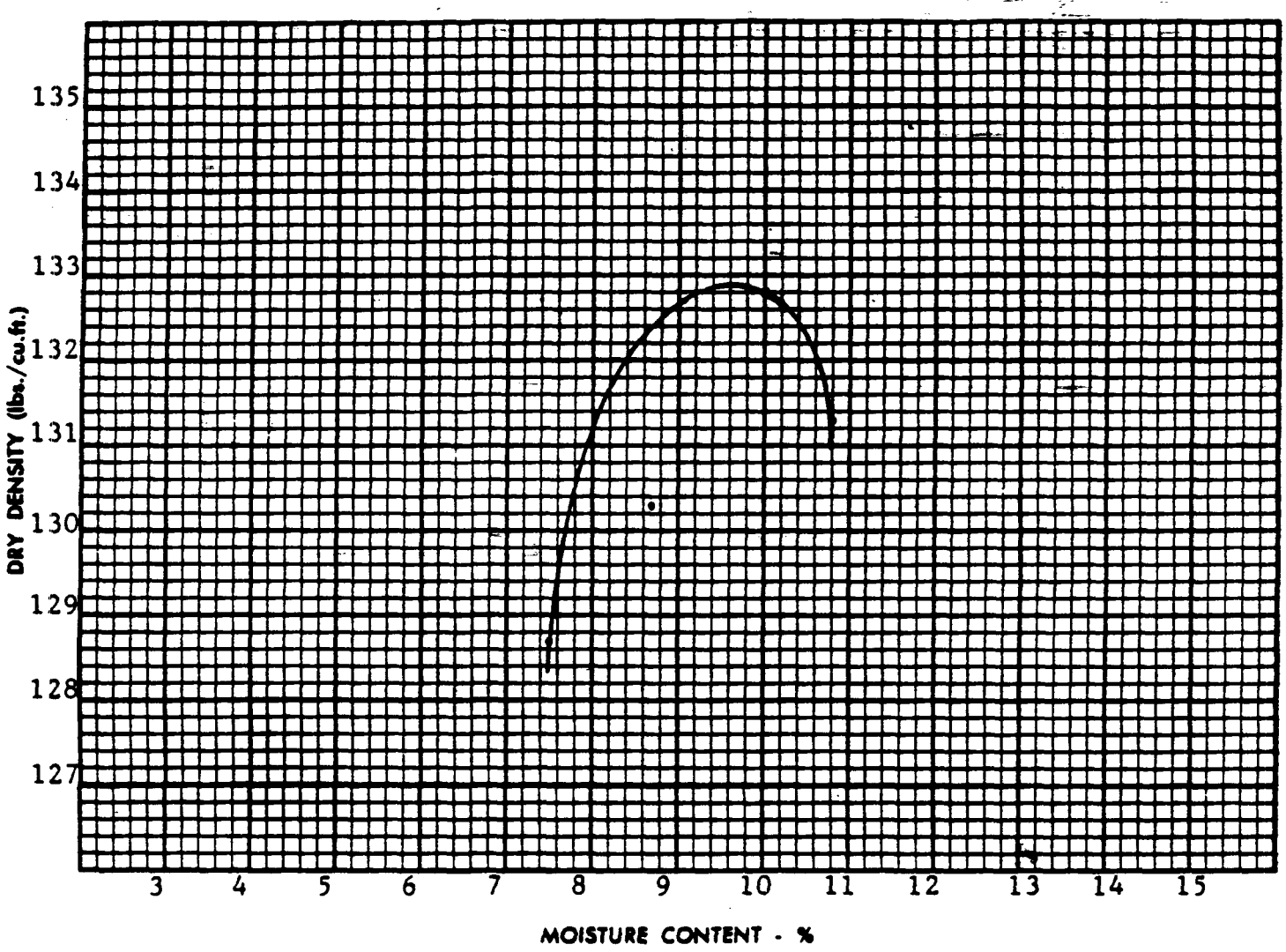
Sample Description: dark brown clayey silt with a trace of sand and gravel

Test Type: Method A

Proctor: Modified

Tested by: W. Bracken

Date: 4-6-88



Maximum Dry Density 132.9 lbs./cu.ft.

Optimum Moisture 9.7 %

Remarks:

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: CH_2 M Hill

ATEC Job No: 21-81008

Project Name: North Side Landfill

Project location:

Sample obtained from: B-103 BS-1 0'-15'

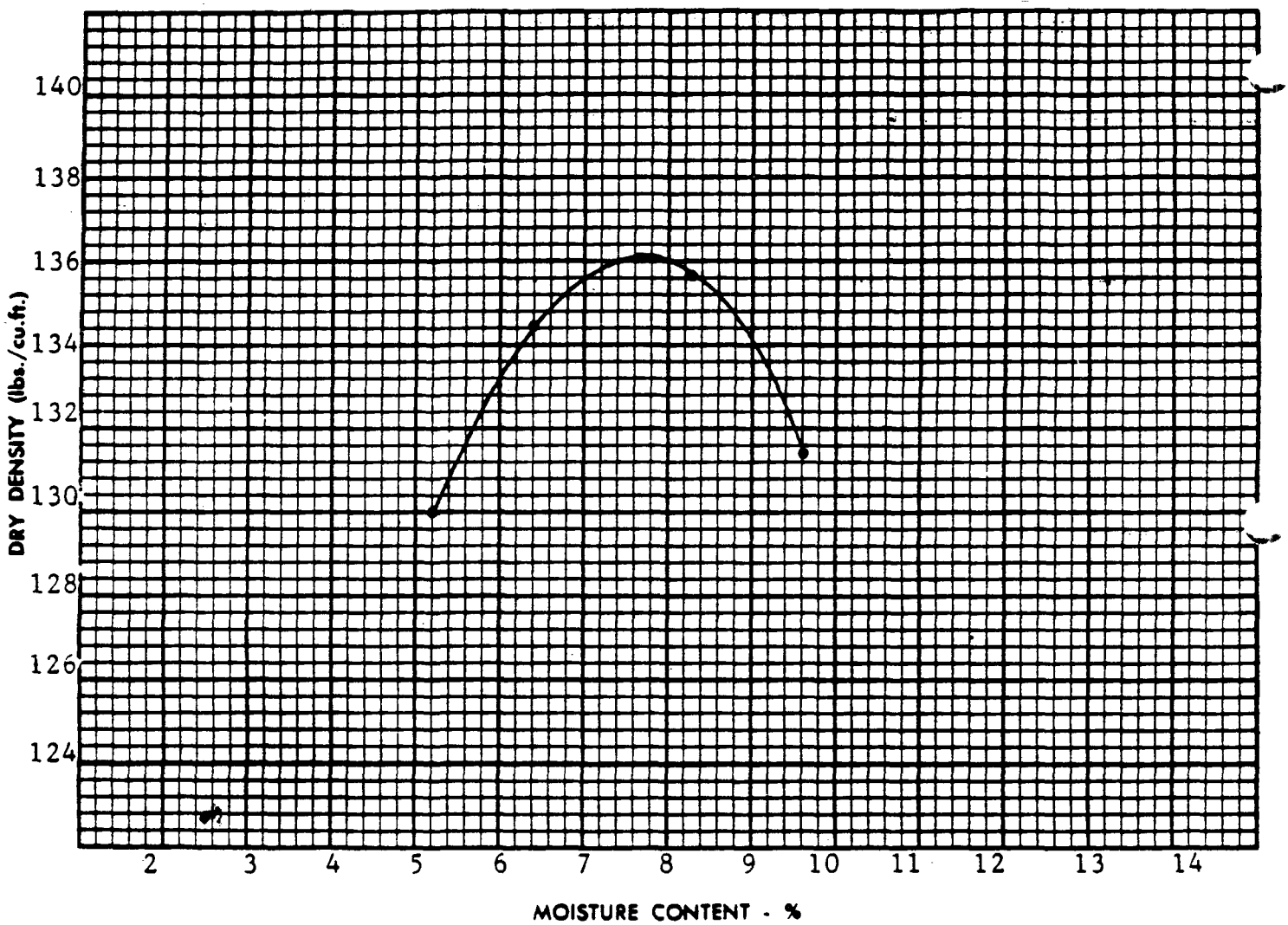
Sample Description: brown silty clay

Test Type: Method A

Proctor: Modified

Tested by: D. Sparks

Date: 3-28-88



Maximum Dry Density 136.1 lbs./cu.ft.

Optimum Moisture 7.7 %

Remarks:

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To:

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: CH_2M Hill

ATEC Job No: 21-81008

Project Name: Northside Landfill

Project location:

Sample obtained from: TP 100 B 3'10"

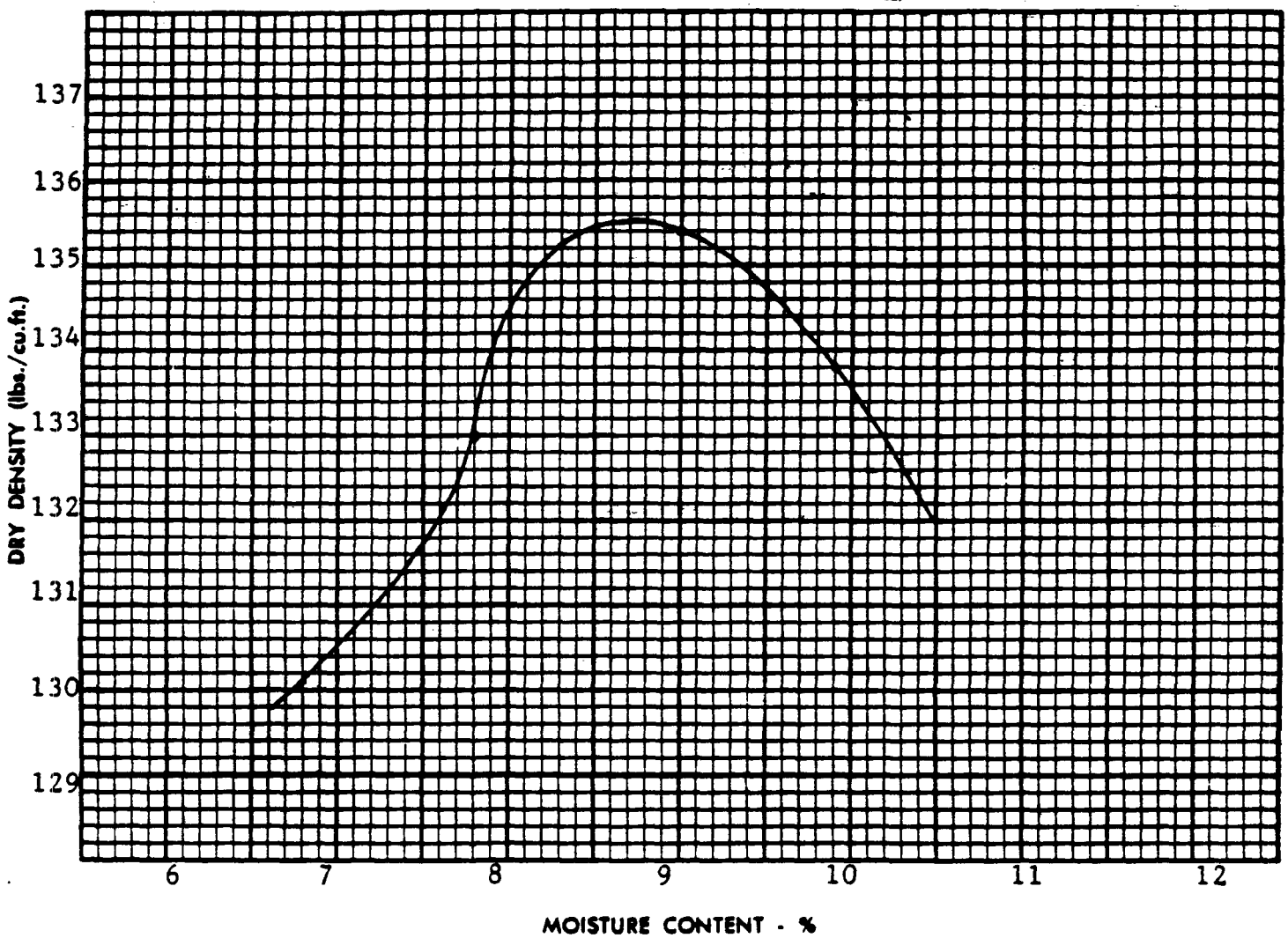
Sample Description: Medium Brown clayey silt with some sand and gravel

Test Type: Method A

Proctor: Modified

Tested by: W. Bracken

Date: 4-6-88



Maximum Dry Density 135.5 lbs./cu.ft.

Optimum Moisture 8.7 %

Remarks:

ATEC Associates, Inc.

Consulting Geotechnical & Materials Engineers

Reply To

MOISTURE/DENSITY RELATIONSHIP
(Proctor Method)

District Offices: Indianapolis/Chicago
Baltimore-Washington/Cincinnati/Louisville

Client: CH2M Hill

ATEC Job No: 21-81008

Project Name: North side landfill/FCC

Project location: Zionsville, IN

Sample obtained from: on-site Sample No. B-111 BS-1 gw

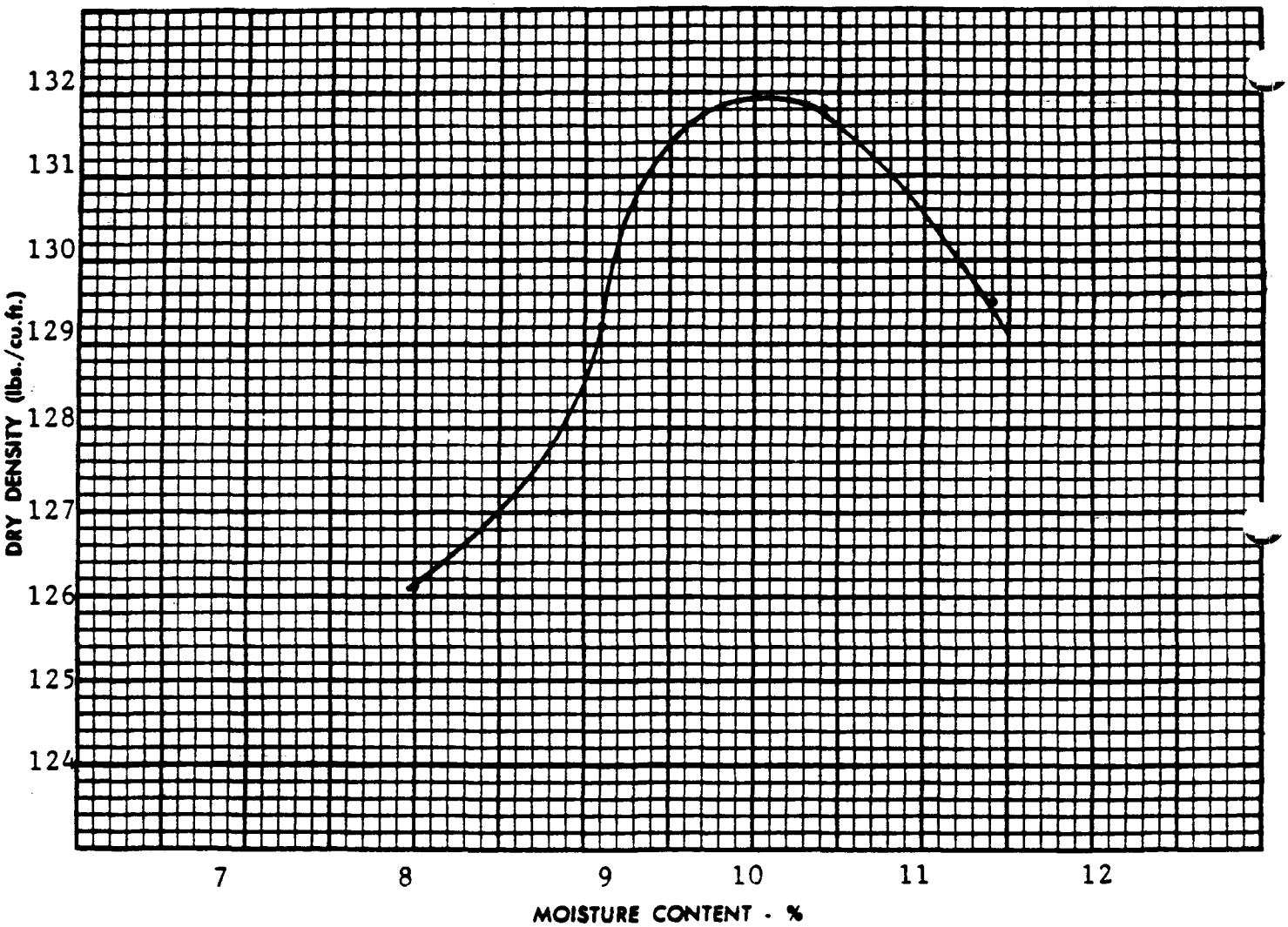
Sample Description: medium brown silty clay with a trace of sand

Test Type: Method A

Proctor: Modified

Tested by: W. Bracken

Date: 3-30-88



Maximum Dry Density 131.9 lbs./cu.ft.

Optimum Moisture 10.1 %

Remarks:

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	TP108	TP109
Sample:	B	B
Depth :	3'	8'

Sieve Size	% Finer	
1"	-	-
3/4"	-	-
1/2"	-	-
3/8"	100	100
#4	96	98
#8	93	94
#10	92	93
#16	90	91
#30	85	87
#40	82	84
#50	77	80
#80	68	72
#100	65	69
#200	55.3	58.4

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.033	42.2	0.033	42.5		
0.021	39.5	0.021	38.8		
0.012	33.0	0.012	33.3		
0.009	31.2	0.009	29.6		
0.006	24.8	0.006	25.0		
0.003	19.3	0.003	18.5		
0.001	16.5	0.001	14.8		

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	TP-105	TP-106	TP-107
Sample:	B	B	B
Depth :	4'6"	3'5"	5'

Sieve Size	% Finer		
1"	-	-	-
3/4"	-	100	-
1/2"	100	98	100
3/8"	99	96	99
#4	98	95	97
#8	95	92	94
#10	-	91	-
#16	93	88	91
#30	90	83	85
#40	87	80	83
#50	83	75	78
#80	70	66	71
#100	67	64	68
#200	56.3	55.2	57.8

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.033	38.1	0.033	43.2	0.033	44.9
0.021	34.3	0.021	39.6	0.021	39.3
0.013	26.7	0.012	32.4	0.012	33.7
0.009	22.9	0.009	27.0	0.009	28.0
0.006	21.0	0.006	25.2	0.006	23.4
0.003	17.1	0.003	18.0	0.003	16.8
0.001	13.3	0.001	14.4	0.001	14.0

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	TP-102	TP-103	TP-104
Sample:	B	B	B
Depth :	7'6"	4'	5'

Sieve Size	% Finer		
1"	-	-	-
3/4"	100	100	-
1/2"	96	98	-
3/8"	-	96	100
#4	94	93	98
#8	92	90	94
#10	91	89	93
#16	87	86	91
#30	83	82	87
#40	81	80	85
#50	77	76	80
#80	70	69	72
#100	66	67	69
#200	57.3	57.1	60.1

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.033	43.4	0.032	44.3	0.033	41.7
0.021	38.0	0.021	41.6	0.021	38.9
0.012	34.4	0.012	35.4	0.012	32.4
0.009	30.8	0.009	30.1	0.009	27.8
0.006	24.4	0.006	23.9	0.006	24.1
0.003	19.0	0.003	17.7	0.003	18.5
0.001	14.5	0.001	14.2	0.001	14.8

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	ECC/SB-123	TP100	TP101
Sample:	S-5	~~G-1~~ B gw	B
Depth :	10-11.5	3'10"	5'7"

Sieve Size	% Finer		
1"	-	-	-
3/4"	-	-	-
1/2"	-	-	-
3/8"	100	-	100
#4	99	100	98
#8	95	99	94
#10	94	-	93
#16	90	97	90
#30	85	93	86
#40	82	90	84
#50	75	86	80
#80	62	77	72
#100	58	74	70
#200	43.9	64.1	59.8

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.035	26.1	0.032	48.3	0.032	47.2
0.022	23.3	0.021	40.4	0.021	43.5
0.013	18.7	0.012	36.5	0.012	36.1
0.009	14.9	0.009	31.5	0.009	33.3
0.007	13.1	0.006	26.6	0.006	26.8
0.002	11.2	0.003	21.7	0.003	19.4
0.001	9.3	0.001	16.7	0.001	15.7

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	ECC/SB-19	ECC/SB-121	ECC/SB-122
Sample:	S-15	S-9 and 10	S-10
Depth :	28-30	-	23.5-25.5

Sieve Size	% Finer		
1"	100	-	-
3/4"	90	-	100
1/2"	81	-	98
3/8"	76	100	95
#4	60	98	85
#8	44	92	72
#10	42	90	68
#16	32	88	59
#30	23	84	49
#40	20	82	45
#50	16	78	40
#80	13	71	33
#100	12	69	32
#200	9.6	60.7	25.8

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.036	6.7	0.032	47.5	0.035	18.9
0.023	5.8	0.021	41.2	0.022	17.5
0.013	5.8	0.012	34.9	0.013	15.5
0.009	5.0	0.009	31.4	0.009	13.5
0.007	3.7	0.006	26.9	0.007	11.5
0.003	2.5	0.003	21.5	0.003	8.1
0.001	1.2	0.001	14.3	0.001	4.7

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	ECC/SB-13	ECC/SB-16	ECC/SB-17
Sample:	S-16 and 19	S-7	S-7 and 8
Depth :	~~32-38~~ 31-32 + 37-38 gw	-	12-16

Sieve Size	% Finer		
1"	-	-	-
3/4"	-	-	100
1/2"	-	100	97
3/8"	-	98	94
#4	-	94	85
#8	-	83	75
#10	-	80	73
#16	100	77	60
#30	99	73	50
#40	-	71	45
#50	97	67	37
#80	88	62	15
#100	85	60	12
#200	69.9	52.0	6.2

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.034	37.7	0.032	41.3	0.037	4.3
0.022	25.8	0.021	36.5	0.023	3.6
0.013	13.9	0.012	30.2	0.014	2.2
0.009	9.9	0.009	25.4	0.010	1.4
0.007	-	0.006	23.8	0.007	-
0.003	6.0	0.003	17.5	0.003	-
0.001	-	0.001	12.7	0.001	-

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	ECC/SB-5	ECC/SB-9	ECC/SB-12
Sample:	S-~~120~~ 12D gw	S-3	S-9
Depth :	22-24	-	16-18

Sieve Size	% Finer		
1"	-		-
3/4"	-	100	-
1/2"	100	95	100
3/8"	93	88	99
#4	81	69	95
#8	66	55	86
#10	63	53	83
#16	49	46	80
#30	34	37	76
#40	27	31	74
#50	18	20	70
#80	10	10	63
#100	9	9	61
#200	5.4	6.0	53.8

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.037	3.7	0.037	4.2	0.032	42.8
0.023	-	0.023	-	0.021	37.9
0.014	2.5	0.013	-	0.012	32.9
0.010	-	0.009	-	0.009	29.6
0.007	-	0.007	2.6	0.006	23.9
0.003	1.2	0.003	2.1	0.003	18.1
0.001	-	0.001	1.1	0.001	11.5

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	ND-9 11	ECC/SB-2	ECC/SB-5
Sample:	BS-6	S-5	S-12
Depth :	0-1.5	8-10	22-24

Sieve Size	% Finer		
1"	-	100	-
1-1/2"	-	79	-
3/4"	-	72	100
1/2"	100	63	97
3/8"	99	58	94
#4	96	46	81
#8	92	35	67
#10	91	33	63
#16	87	26	48
#30	83	19	30
#40	80	17	22
#50	75	14	14
#80	66	11	7
#100	64	-	6
#200	53.2	8.7	4.4

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.033	39.9	0.036	6.5	0.037	3.7
0.021	36.3	0.023	5.9	0.023	2.5
0.012	30.8	0.013	5.2	0.014	1.2
0.009	27.2	0.009	4.6	0.010	-
0.006	23.6	0.007	2.9	0.007	-
0.003	17.2	0.003	2.6	0.003	-
0.001	13.6	0.001	1.3	0.001	-

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	ND-3	ND-6	ND-9
Sample:	BS-2	BS-4	BS-5
Depth :	0-1.5	0-1.5	0-1.5

Sieve Size	% Finer		
1"	-	-	-
3/4"	100	-	-
1/2"	99	-	100
3/8"	97	100	99
#4	90	97	95
#8	86	95	91
#10	85	94	-
#16	81	92	87
#30	77	89	83
#40	73	86	80
#50	69	82	76
#80	62	72	68
#100	59	70	65
#200	50.1	59.9	56.3

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.032	41.5	0.032	49.1	0.032	46.2
0.021	38.1	0.021	45.3	0.021	42.6
0.012	29.6	0.012	37.8	0.012	33.5
0.009	27.1	0.009	34.0	0.009	30.8
0.006	24.5	0.006	30.2	0.006	28.1
0.003	21.1	0.003	23.6	0.003	19.9
0.001	13.5	0.001	19.8	0.001	15.4

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	117	118	ND-1
Sample:	S-16 and 17	S-6 and 7	BS-1
Depth :	~~39-42~~ 38.5-42.0 gw	12.5-16.5	0-1.5

Sieve Size	% Finer		
1"	-	-	-
3/4"	-	100	-
1/2"	-	99	-
3/8"	-	-	100
#4	-	97	98
#8	-	93	95
#10	100	91	-
#16	99	89	92
#30	97	84	88
#40	94	81	85
#50	82	77	81
#80	40	69	73
#100	35	67	71
#200	19.8	57.6	62.0

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.037	9.9	0.033	40.7	0.032	52.3
0.023	7.9	0.021	37.1	0.020	48.5
0.013	-	0.012	32.6	0.012	39.0
0.010	5.9	0.009	28.9	0.009	35.2
0.007	-	0.006	23.5	0.006	31.4
0.003	4.0	0.003	19.9	0.003	23.8
0.001	3.0	0.001	15.4	0.001	19.0

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	115	116	116
Sample:	S-13	S-3	S-9T and 9B
Depth :	31-32	5-7	20-21.5

Sieve Size	% Finer		
1"	-	-	-
3/4"	-	-	-
1/2"	-	-	100
3/8"	100	100	99
#4	96	99	95
#8	93	-	90
#10	-	-	89
#16	90	-	86
#30	85	-	80
#40	82	98	77
#50	75	94	72
#80	56	68	63
#100	51	61	61
#200	37.7	45.9	53.1

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.034	30.5	0.034	34.5	0.033	42.4
0.022	26.8	0.022	30.6	0.021	37.1
0.013	20.3	0.013	22.7	0.012	30.1
0.009	18.5	0.009	20.7	0.009	26.5
0.006	17.5	0.006	18.7	0.006	24.7
0.003	12.0	0.003	14.8	0.003	17.7
0.001	9.2	0.001	12.8	0.001	12.4

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	111	111	115
Sample:	BS-1	S-10	S-11B
Depth :	-	23.5 - 24.5	26 - 27

Sieve Size	% Finer		
1"	-	-	-
3/4"	-	-	100
1/2"	100	-	98
3/8"	99	-	95
#4	98	-	91
#8	95	100	84
#10	-	99	83
#16	92	97	77
#30	89	88	70
#40	87	79	66
#50	83	63	61
#80	75	40	49
#100	73	33	48
#200	63.0	13.0	37.8

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.032	51.5	0.037	3.9	0.034	25.5
0.020	47.7	0.023	-	0.022	22.2
0.012	39.1	0.014	-	0.013	19.8
0.009	34.4	0.010	-	0.009	16.5
0.006	30.5	0.007	-	0.007	14.8
0.003	24.8	0.003	2.9	0.003	11.5
0.001	21.0	0.001	2.0	0.001	9.1

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	109	110	110
Sample:	S-4	S-6	S-8
Depth :	7.5 - 9.5	13.5 - 15.5	18.5 - 20.5

Sieve Size	% Finer		
1"	-	-	-
3/4"	100	100	-
1/2"	89	96	100
3/8"	88	95	96
#4	86	91	86
#8	82	80	72
#10	81	77	69
#16	79	74	59
#30	75	71	42
#40	73	68	31
#50	69	64	22
#80	63	57	15
#100	60	55	14
#200	50.9	47.0	10.8

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.033	38.7	0.032	38.4	0.037	6.2
0.021	35.5	0.021	30.7	0.023	-
0.012	30.7	0.012	26.1	0.013	5.5
0.009	25.8	0.009	23.1	0.010	4.1
0.006	22.6	0.006	20.0	0.007	3.4
0.003	16.1	0.003	14.6	0.003	2.7
0.001	10.5	0.001	9.0	0.001	-

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	107	108	108
Sample:	S-9	S-2	S-9
Depth :	20.0 - 21.5	2.5 - 4.5	20.0 - 21.5

Sieve Size	% Finer		
1"	-	-	100
3/4"	100	-	81
1/2"	96	-	-
3/8"	93	100	-
#4	91	97	77
#8	87	92	69
#10	86	90	67
#16	83	87	66
#30	79	83	65
#40	76	81	64
#50	73	77	62
#80	65	69	58
#100	63	67	56
#200	53.9	56.9	49.6

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.032	44.5	0.032	44.8	0.031	41.1
0.021	39.4	0.021	41.2	0.020	37.2
0.012	30.8	0.012	34.1	0.012	32.5
0.009	28.3	0.009	30.5	0.009	29.9
0.006	23.1	0.006	26.9	0.006	26.5
0.003	18.0	0.003	19.7	0.003	19.9
0.001	12.8	0.001	14.3	0.001	13.9

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	105	106	107
Sample:	S-8	S-3	S-4
Depth :	18.5 - ~~21.5~~ 20.5 yw	6.0 - 8.0	7.5 - 9.5

Sieve Size	% Finer		
1"	-	-	-
3/4"	-	-	-
1/2"	100	-	100
3/8"	99	100	99
#4	95	96	96
#8	91	93	93
#10	-	92	92
#16	88	89	89
#30	83	85	85
#40	81	82	83
#50	77	77	79
#80	70	62	70
#100	68	67	68
#200	57.8	58.1	58.0

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.032	45.2	0.032	47.6	0.032	45.8
0.021	39.8	0.021	43.0	0.021	42.2
0.012	30.8	0.012	34.8	0.012	33.0
0.009	28.1	0.009	32.9	0.009	31.2
0.006	23.5	0.006	26.5	0.006	25.7
0.003	18.1	0.003	21.0	0.003	20.2
0.001	12.7	0.001	15.5	0.001	14.7

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	104	105	105
Sample:	S-8	BS-1	S-5
Depth :	18.5 - 20.5	0.0 - 2.5	11.0 - 13.0

Sieve Size	% Finer		
1"	-	-	-
3/4"	100	-	-
1/2"	96	100	100
3/8"	95	99	98
#4	90	95	90
#8	87	92	85
#10	86	91	84
#16	82	87	79
#30	78	83	74
#40	75	80	70
#50	71	76	65
#80	63	67	55
#100	61	65	53
#200	52.2	56.0	45.1

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.032	42.8	0.032	46.8	0.033	38.5
0.021	38.5	0.021	41.4	0.021	33.4
0.012	31.6	0.012	34.2	0.013	25.9
0.009	27.4	0.009	28.8	0.009	24.2
0.006	24.8	0.006	26.1	0.006	20.9
0.003	18.0	0.003	19.8	0.003	15.9
0.001	12.0	0.001	13.5	0.001	11.7

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	103	103	104
Sample:	S-4	S-8	S-3
Depth :	8.5 - 10.5	18.5 - 20.5	6.0 - 8.0

Sieve Size	% Finer		
1"	-	-	-
3/4"	100	-	-
1/2"	97	100	100
3/8"	96	99	97
#4	86	96	94
#8	78	92	90
#10	77	91	-
#16	72	87	87
#30	67	83	83
#40	63	80	80
#50	59	76	76
#80	50	68	68
#100	48	65	66
#200	40.8	55.4	55.5

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.033	36.6	0.033	43.3	0.032	45.0
0.021	29.0	0.021	39.7	0.021	41.4
0.013	23.6	0.012	30.7	0.012	32.4
0.009	19.1	0.009	24.4	0.009	28.8
0.006	16.8	0.006	20.8	0.006	25.2
0.003	12.2	0.003	16.3	0.003	18.9
0.001	7.6	0.001	11.7	0.001	14.4

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	101	102	103
Sample:	S-6	S-5	BS-1
Depth :	12.5 - 14.5	10.0 - 12.0	0.0 - 15.0

Sieve Size	% Finer		
1"	-	-	-
3/4"	100	-	100
1/2"	98	100	99
3/8"	92	98	-
#4	82	94	95
#8	73	90	91
#10	71	-	90
#16	63	87	86
#30	55	84	82
#40	52	81	80
#50	48	77	75
#80	42	69	67
#100	40	68	65
#200	33.7	57.7	56.1

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.034	25.4	0.031	51.4	0.031	51.7
0.022	24.0	0.021	42.5	0.021	42.8
0.013	19.8	0.012	35.4	0.012	34.8
0.009	17.0	0.009	30.1	0.009	29.4
0.006	14.1	0.006	25.7	0.006	25.9
0.003	10.6	0.003	21.3	0.003	21.4
0.001	7.1	0.001	15.1	0.001	15.2

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Grain Size Analysis

Boring:	100	100	101
Sample:	S-3	S-9	S-3
Depth :	5.0 - 7.0	20.0 - 21.5	5.0 - 7.0

Sieve Size	% Finer		
1"	-	-	-
3/4"	100	-	-
1/2"	94	100	-
3/8"	-	99	100
#4	91	95	99
#8	87	90	-
#10	-	-	-
#16	84	87	98
#30	81	83	97
#40	78	80	96
#50	75	76	95
#80	67	68	92
#100	65	66	91
#200	55.3	55.3	82.7

Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer	Hydrometer Size (mm)	Percent Finer
0.032	46.9	0.033	42.1	0.029	74.4
0.021	39.9	0.021	37.6	0.020	58.7
0.012	33.0	0.013	28.6	0.012	47.0
0.009	29.5	0.009	26.9	0.009	40.1
0.006	24.3	0.006	22.4	0.006	34.3
0.003	18.2	0.003	17.0	0.003	25.5
0.001	13.9	0.001	11.6	0.001	18.6

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Sieve Analysis

Boring:	ECC/SB-20	ECC/SB-20	ECC/SB-124	ECC/SB-124	TP-100
Sample:	S-9	S-9D	S-4	S-6	G-3
Depth :	16.0 - 18.0	16.0 - 18.0	-	-	8.7
Sieve Size	% Finer				
1"	-	-	-	-	100
3/4"	100	-	100	100	95
1/2"	98	100	94	98	90
3/8"	96	98	90	95	84
#4	82	88	80	68	66
#8	65	76	71	47	53
#16	46	61	64	33	40
#30	32	44	58	25	24
#50	15	24	24	18	11
#100	9	16	14	13	7
#200	6.6	12.7	11.1	10.3	6.1

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Sieve Analysis

Boring:	ECC/SB-11	ECC/SB-12	ECC/SB-14	ECC/SB-15
Sample:	S-8	S-7	S-8, 9 & 10	S-11
Depth :	14.0 - 16.0	12.0 - 14.0	14.0 - 20.0	20.0 - 22.0

Sieve Size	% Finer			
1"	-	100	100	100
3/4"	-	84	96	94
1/2"	-	70	93	90
3/8"	100	55	87	83
#4	96	46	78	67
#8	83	34	69	54
#16	63	23	59	42
#30	433	15	49	32
#50	19	10	31	19
#100	8	6	16	11
#200	4.2	4.1	11.3	8.0

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Sieve Analysis

Boring:	ECC/SB-6	ECC/SB-7	ECC/SB-8	ECC/SB-10
Sample:	S-17	S-9 & 10	S-9	S-8
Depth :	32.0 - 34.0	16.0 - 20.0	17.5 - 18.0	-

Sieve Size	% Finer			
1"	-	-	-	-
3/4"	-	100	-	100
1/2"	-	99	100	97
3/8"	-	98	99	95
#4	-	90	98	91
#8	100	78	96	85
#16	99	59	94	76
#30	98	36	92	60
#50	88	14	78	39
#100	29	6	55	21
#200	8.4	3.9	37.5	13.1

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results - Sieve Analysis

Boring:	Packing Sand	119	ECC/SB-4	ECC/SB-6
Sample:	-	S-9	S-12 & 13	S-17
Depth :	-	21.0 - 22.0	22.0 - 26.0	32.0 - 34.0
Sieve Size	% Finer			
1"	-	-	-	
3/4"	-	100	100	-
1/2"	-	95	92	-
3/8"	-	-	90	-
#4	-	78	80	-
#8	100	57	65	100
#16	12	42	46	99
#30	0.4	32	28	98
#50	0.3	22	12	88
#100	-	16	6	29
#200	0.3	12.5	4.1	8.4

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results (cont'd)

Boring Number	Sample	Depth, ft	Moisture Content, %	Atterberg Limits LL	PL	PI	% Modified Proctor	Specific Gravity	Rate of Permeability (cm/sec)
TP-108	G-1	2.5	25.6						
	G-2	7.0	22.3						
	B	3.0	11.4	22	15	7	95.5		6.8×10^{-9}
TP-109	G-1	3.0	29.0						
	G-2	8.5	13.0						
	B	8.0	11.4	23	15	8	94.5		1.3×10^{-8}

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results (cont'd)

Boring Number	Sample	Depth, ft	Moisture Content, %	Atterberg Limits LL	PL	PI	% Modified Proctor	Specific Gravity	Rate of Permeability (cm/sec)
ECC/SB-124	S-10	-		20	13	7			
[illegible]SL/SB-122	S-5	11.0 - 13.0	12.0						
NSL/SB/124	S-9	-	8.4						
TP-100	G-1	3.8	12.1	22	15	7			
	G-2	7.6	11.9						
	B	3.8	9.2				94.8		8.5×10^{-9}
TP-101	G-1	4.0	21.0						
	G-2	5.6	13.4						
	B	5.6	10.6	21	15	6	95.0		1.8×10^{-8}
TP-102	G-1	3.0	24.8						
	G-2	8.0	13.1						
	B	7.5	11.1	19	13	6	95.5		1.3×10^{-8}
[illegible]P-103	G-1	4.0	13.7						
	G-2	9.0	10.7						
	B	4.0	10.8	20	14	6	95.2		1.4×10^{-8}
TP-104	G-1	5.0	14.8						
	G-2	9.3	11.9						
	B	5.0	11.2	21	13	8	94.9		1.1×10^{-8}
TP-105	G-1	4.0	18.7						
	G-2	6.7	16.1						
	B	4.5	11.5	21	15	6	94.8		2.6×10^{-8}
TP-106	G-1	3.0	18.4						
	G-2	8.0	17.4						
	B	3.4	11.9	27	14	13	94.9		7.4×10^{-8}
TP-107	G-1	5.0	12.1						
	G-2	8.0	10.9						
	B	5.0	10.6	19	13	6	95.4		9.5×10^{-9}

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results (cont'd)

Boring Number	Sample	Depth, ft	Moisture Content, %	Atterberg Limits LL	PL	PI	% Modified Proctor	Specific Gravity	Rate of Permeability (cm/sec)
ECC/SB-11	S-5	8.0 - 10.0	10.1	17	12	5			
	S-9	16.0 - 18.0	10.4						
	S-10	-		21	13	8			
	S-11	-	9.2						
	S-12	22.0 - 24.0		19	16	3			
	S-12D	22.0 - 24.0		25	14	11			
ECC/SB-12	S-10	18.0 - 20.0	9.2						
ECC/SB-13	S-7	12.0 - 14.0		18	13	5			
	S-8	14.0 - 16.0	10.6						
ECC/SB-14	S-6	10.0 - 12.0	10.6						
	S-7	12.0 - 14.0		17	12	5			
ECC/SB-15	S-6	10.0 - 12.0		18	12	6			
	S-7	12.0 - 14.0	10.3						
ECC/SB-16	S-3	-	9.7						
	S-3D	-	10.1						
	S-4	-		19	12	7			
ECC/SB-17	S-2	2.0 - 4.0	20.7						
ECC/SB-18	S-6	10.0 - 12.0	10.0						
	S-9 &10	16.0 - 20.0		17	13	4			
ECC/SB-120	S-13 &13D	-		21	13	8			
	S-14	33.0 - 35.0		19	13	6			
	S-14D	-		20	14	6			
ECC/SB-121	S-12	-		19	13	6			
	SB-12D	-		20	13	7			
ECC/SB-122	S-4&6	7.5 - 15.5		19	13	6			
ECC/SB-123	S-7&8	15.0 - 19.0		20	14	6			

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results (cont'd)

Boring Number	Sample	Depth, ft	Moisture Content, %	Atterberg Limits LL	PL	PI	% Modified Proctor	Specific Gravity	Rate of Permeability (cm/sec)
B116	S-4	7.5 - 9.5	10.2						
	S-9	20.0 - 21.5	7.0						
	S-10T	22.5 - 24.0		19	12	7			
B118	S-4	7.5 - 9.5	(No Sample)						
	S-8	17.5 - 19.0		15	11	4			
	S-11	25.0 - 26.5	8.5						
B119	S-3	6.0 - 8.0	10.8						
	S-4 & 5	8.5 - 13.0	9.3	20	13	7			
B121	S-11	-	7.3						
B123	S-3	5.0 - 6.5	9.9						
	S-30	5.0 - 6.5	8.6						
	S-6	12.5 - 14.0	8.7						
	s-13	30.0 - 31.4						2.80	
ND3	BS-2	0.0 - 1.5		23	13	10			
ND6	BS-4	0.0 - 1.5	14.5						
~~ND9~~ ND11	BS-6	0.0 - 1.5	10.6						
ND9	BS-5	0.0 - 1.5		22	13	9			
ECC/SB-3	S-3	4.0 - 5.0	10.9						
	S-7	12.0 - 14.0	10.6						
	S-8	14.0 - 16.0		17	12	5			
ECC/SB-4	S-6	10.0 - 12.0		17	13	4			
	S-7	12.0 - 14.0	11.0						
ECC/SB-5	S-5	-		18	12	6			
	S-5D	-		17	13	4			
	S-8	-	11.0						
ECC/SB-7	S-4	6.0 - 8.0		19	14	5			
	S-5	8.0 - 10.0	12.4						

NORTHSIDE LANDFILL

CH2M Hill
ATEC Project Number 21-81008
June 9, 1988

Test Results

Boring Number	Sample	Depth, ft	Moisture Content, %	Atterberg Limits LL	PL	PI	% Modified Proctor	Specific Gravity	Rate of Permeability (cm/sec)
100	S-3	5.0 - 7.0	12.8	21	14	7			
	S-9	20.0 - 21.5	6.8	17	13	4			
101	S-3	5.0 - 7.0	18.7	22	16	6			
	S-6	12.5 - 14.5	11.2	19	13	6			
102	S-5	1.0 - 12	10.8	18	13	5			
103	BS-21	0.0 - 15.0	12.2	21	14	7			
	BS-21D	0.0 - 15.0	8.3				94.7		1.6×10^{-6}
	S-8	18.5 - 20.5	8.9	18	12	6			
104	S-3	6.0 - 8.0	12.1	20	15	5			
	S-6	13.5 - 15.5	6.8	17	12	5			
	S-8	18.5 - 20.5	10.8	17	12	5			
105	BS-1	0.0 - 25.0	11.2	22	15	7			
	BS-1D	0.0 - 25.0	9.9				95.0		7.0×10^{-8}
	S-2	3.5 - 5.5	10.9	22	14	8			
	S-5	11.0 - 13.0	10.1	14	10	4			
	S-8	18.5 - 20.5	11.0						
	S-8	18.5 - 21.5		16	12	4			
106	S-3	6.0 - 8.0	10.9	18	11	7			
107	S-4	7.5 - 9.5	12.0	19	12	7			
	S-9	20.0 - 21.5	8.7	19	13	6			
B108	S-2	2.5 - 4.5	11.6	22	15	7			
	S-9	20.0 - 21.5	11.3	24	13	11			
B109	S-4	7.5 - 9.5	12.4	20	15	5			
B110	S-6	13.5 - 15.5	10.7	18	12	6			
	S-8	18.5 - 20.5	13.9						
B111	S-10	23.5 - 24.5	16.9						
	BS-21	23.5 - 24.5	13.8	28	18	10			
	BS-21D		11.7				94.6		7.3×10^{-9}
B115	S-2	3.5 - 5.5	14.4						
	S-4	8.5 - 10.5		21	12	9			
	S-5	11.0 - 13.0	10.1						

Appendix E
Target Compound List and Contract Required Quantification Limits

Appendix E
TARGET COMPOUND LIST AND
CONTRACT REQUIRED QUANTIFICATION LIMITS (Page 1 of 4)

Volatiles	CAS Number	Quantification Limits Low Concentration Analysis[a] Water (ug/l)	Soil/Sediment[b] (ug/kg)
1. Chloromethane	74-87-3	10	10
2. Bromomethane	74-83-9	10	10
3. Vinyl Chloride	75-01-4	10	10
4. Chloroethane	75-00-3	10	10
5. Methylene Chloride	75-09-2	5	5
6. Acetone	67-64-1	10	10
7. Carbon Disulfide	75-15-0	5	5
8. 1,1-Dichloroethene	75-34-4	5	5
9. 1,1-Dichloroethane	75-35-3	5	5
10. 1,2-Dichloroethene (total)	540-59-0	5	5
11. Chloroform	67-66-3	5	5
12. 1,2-Dichloroethane	107-06-2	5	5
13. 2-Butanone	78-93-2	10	10
14. 1,1,1-Trichloroethane	71-55-6	5	5
15. Carbon Tetrachloride	56-23-5	5	5
16. Vinyl Acetate	108-05-4	10	10
17. Bromodichloromethane	75-27-4	5	5
18. 1,1,2,2-Tetrachloroethane	79-34-5	5	5
19. 1,2-Dichloropropane	78-87-5	5	5
20. Cis-1,3-Dichloropropene	10061-02-5	5	5
21. Trichloroethene	79-01-6	5	5
22. Dibromochloromethane	124-48-1	5	5
23. 1,1,2-Trichloroethane	79-00-5	5	5
24. Benzene	71-43-2	5	5
25. Trans-1,3-Dichloropropene	10061-01-6	5	5
26. Bromoform	75-25-2	5	5
27. 2-Hexanone	591-78-6	10	10
28. 4-Methyl-2-pentanone	108-10-1	10	10
39. Tetrachloroethene	127-18-4	5	5
30. Toluene	108-88-3	5	5
31. Chlorobenzene	108-90-7	5	5
32. Ethyl Benzene	100-41-4	5	5
33. Styrene	100-42-5	5	5
34. Xylenes (total)	133-02-7	5	5
Semivolatiles			
35. Phenol	108-95-2	10	330
36. bis(2-Chloroethyl)ether	111-44-4	10	330
37. 2-Chlorophenol	95-57-8	10	330
38. 1,3-Dichlorobenzene	541-73-1	10	330
39. 1,4-Dichlorobenzene	106-46-7	10	330
40. Benzyl Alcohol	100-51-6	10	330
41. 1,2-Dichlorobenzene	95-50-1	10	330
42. 2-Methylphenol	95-48-7	10	330
43. bis(2-Chloroisopropyl)ether	39638-32-9	10	330

Note: Specific quantification limits are highly matrix dependent. The quantification limits listed herein are provided for guidance and may not always be achievable.

[a]Quantification limits listed for soil/sediment are based on wet weight. The quantification limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

[b]Medium Soil/Sediment Contract Required Quantification Limits (CRQL) for Volatile TCL Compounds are 100 times the individual Low Soil/Sediment CRQL; for Semivolatile TCL Compounds they are 60 times the individual Low Soil/Sediment CRQL.

Semivolatiles (Continued)	CAS Number	Quantification Limits Low Concentration Analysis[a] Water (ug/l)	Soil/Sediment (ug/kg)
44. 4-Methylphenol	106-44-5	10	330
45. N-Nitroso-Dipropylamine	621-64-7	10	330
46. Hexachloroethane	67-72-1	10	330
47. Nitrobenzene	98-95-3	10	330
48. Isophorone	78-59-1	10	330
49. 2-Nitrophenol	88-75-5	10	330
50. 2,4-Dimethylphenol	105-67-9	10	330
51. Benzoic Acid	65-85-0	50	1,600
52. bis(2-Chloroethoxy)methane	111-91-1	10	330
53. 2,4-Dichlorophenol	120-83-2	10	330
54. 1,2,4-Trichlorobenzene	120-82-1	10	330
55. Naphthalene	91-20-3	10	330
56. 4-Chloroaniline	106-47-8	10	330
57. Hexachlorobutadiene	87-68-3	10	330
58. 4-Chloro-3-methylphenol (para-chloro-meta-cresol)	59-50-7	10	330
59. 2-Methylnaphthalene	91-57-6	10	330
60. Hexachlorocyclopentadiene	77-47-4	10	330
61. 2,4,6-Trichlorophenol	88-06-2	10	330
62. 2,4,5-Trichlorophenol	95-95-4	50	1,600
63. 2-Chloroanaphthalene	91-58-7	10	330
64. 2-Nitroaniline	88-74-4	50	1,600
65. Dimethyl Phthalate	131-11-3	10	330
66. Acenaphthylene	208-96-8	10	330
67. 2,6-Dinitrotoluene	606-20-2	10	330
68. 3-Nitroaniline	99-09-2	50	1,600
69. Acenaphthene	83-32-9	10	330
70. 2,4-Dinitrophenol	51-28-5	50	1,600
71. 4-Nitrophenol	100-02-7	50	1,600
72. Dibenzofuran	132-64-9	10	330
73. 2,4-Dinitrotoluene	121-14-2	10	330
74. Diethylphthalate	84-66-2	10	330
75. 4-Chlorophenyl Phenyl ether	7005-72-3	10	330
76. Fluorene	86-73-7	10	330
77. 4-Nitroaniline	100-01-6	50	1,600
78. 4,6-Dinitro-2-methylphenol	534-52-1	50	1,600
79. N-nitrosodiphenylamine	86-30-6	10	330
80. 4-Bromophenyl Phenyl ether	101-55-3	10	330
81. Hexachlorobenzene	118-74-1	10	330
82. Pentachlorophenol	87-86-5	50	1,600
83. Phenanthrene	85-01-8	10	330
84. Anthracene	120-12-7	10	330
85. Di-n-butylphthalate	84-74-2	10	330
86. Fluoranthene	206-44-0	10	330
87. Pyrene	129-00-0	10	330
88. Butyl Benzyl Phthalate	85-68-7	10	330

Note: Specific quantification limits are highly matrix dependent. The quantification limits listed herein are provided for guidance and may not always be achievable.

[a]Quantification limits listed for soil/sediment are based on wet weight. The quantification limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

[b]Medium Soil/Sediment Contract Required Quantification Limits (CRQL) for Semivolatile TCL Compounds are 60 times the individual Low Soil/Sediment CRQL.

Semivolatiles (Continued)	CAS Number	Quantification Limits Low Concentration Analysis[a] Water (ug/l)	Soil/Sediment[b] (ug/kg)
89. 3,3'-Dichlorobenzidine	91-94-1	20	660
90. Benzo(a)anthracene	56-55-3	10	330
91. Chrysene	218-01-9	10	330
92. bis(2-ethylhexyl)phthalate	117-81-7	10	330
93. Di-n-octyl Phthalate	117-84-0	10	330
94. Benzo(b)fluoranthene	205-99-2	10	330
95. Benzo(k)fluoranthene	207-08-9	10	330
96. Benzo(a)pyrene	50-32-8	10	330
97. Indeno(1,2,3-cd)pyrene	193-39-5	10	330
98. Dibenz(a,h)anthracene	53-70-3	10	330
99. Benzo(g,h,i)perylene	191-24-2	10	330

Note: Specific quantification limits are highly matrix dependent. The quantification limits listed herein are provided for guidance and may not always be achievable.

[a]Quantification limits listed for soil/sediment are based on wet weight. The quantification limits calculated by the laboratory for soil/sediment, calculated on dry weight basis as required by the contract, will be higher.

[b]Medium Soil/Sediment Contract Required Quantification Limits (CRQL) for Semivolatile TCL Compounds are 60 times the individual Low Soil/Sediment CRQL; for Pesticide/PCB TCL Compounds they are 15 times the individual Low Soil/Sediment CRQL.

Appendix F
Soil and Groundwater
Chemical Data

F-1 Metals - soil and groundwater
F-2 Organic Compounds - soil and groundwater
F-3 Conventional Parameters - soil

TABLE F-1A

NSL/ECC PREDESIGN INVESTIGATION ANALYTICAL RESULTS
SOIL - METALS

Sample Number:	ECCSB01-01	ECCSB01-03	ECCSB01-04	ECCSB01-07	ECCSB02-06	ECCSB02-08	ECCSB03-06	ECCSB05-15	ECCSB06-13	ECCSB06-20	ECCSB07-13
Sample Location:	ECCSB01	ECCSB01	ECCSB01	ECCSB01	ECCSB02	ECCSB02	ECCSB03	ECCSB05	ECCSB06	ECCSB06	ECCSB07
ITR Number:	MET356	MET357	MET323	MET324	MET316	MET317	MET302	MET310	MET354	MET355	MET306
Date Sampled:	04/19/88	04/19/88	04/19/88	04/20/88	04/16/88	04/16/88	04/05/88	04/13/88	04/12/88	04/12/88	04/12/88
Depth, Ft:	0-11	11-13	13-15	19-21	10-12	14-16	10-12	20-30	24-26	30-40'	24-26
Percent Solids:	82.3	90.6	91.5	90.0	81.0	92.0	91.5	88.2	86.5	90.0	91.6
INORGANICS (mg/kg dry weight)											
Aluminum	17300	12500	12300	8050	2700 J	7220 J	5040	2600 J	1670 J	12200 J	2420 J
Antimony	5.5 R	10 R	19.3 R	16.7 R	28 J	59 J	---	34 J	---	96 J	42 J
Arsenic	4.3	4.4	2.9	7	2.7 J	4.1 J	4.3	5.6 J	5.6 J	11 J	6.5 J
Barium	124	68.6	71	44.4	---	44	45	---	---	69	13 J
Beryllium	0.65 J	0.54 J	0.54 J	0.43 J	---	---	---	---	---	---	---
Cadmium	0.48 J	---	---	---	2.2 J	2.9 J	---	---	5.8 J	7.9 J	1.5 J
Calcium	8290	81600	85900	101000	113000 J	76800 J	101000	94800 J	163000 J	80500 J	115000 J
Chromium	23.1 B	18.1 B	17.9 B	12.1 B	8.7 J	12 J	9.1	---	13 J	18 J	---
Cobalt	9.9 J	8.1 J	8.4 J	6.8 J	---	18 J	6.2 J	---	---	---	---
Copper	26.5 B	23.7 B	17.8 B	17.9 B	13 J,B	14 J,B	21 J,B	7.4 J,B	9.4 J,B	23 J,B	13 J,B
Iron	19300 J	16600 J	17200 J	14500 J	7000 J	13000 J	15400	5870 J	5380 J	19300 J	6750 J
Lead	10.1 J	6.5 J	8 J	6.5 J	5.4 J	7.1 J	7.7 J	4.7 J	4.6 J	9.8 J	3.8 J
Magnesium	3910	23000	27400	28000	33700 J	20300 J	27300 J	19100 J	25900 J	25800 J	31200 J
Manganese	454	306	329	378	294 J	328 J	316	193 J	232 J	409 J	245 J
Mercury	---	---	---	---	---	---	0.19	---	---	---	---
Nickel	18.4	18.3	16.4	12.7	---	---	24	---	---	20	---
Potassium	2080	3560	3470	2170	592 J	1890	1240	735 J	500 J	3290	797 J
Selenium	---	---	---	3.3 J	---	---	0.2 J	---	---	---	---
Silver	---	1.3 J	1.5 J	1.4 J	6.5 J	6.3 J	2.2	6.7 J	7.7 J	6.4 J	5.7 J
Sodium	122 J,B	---	---	---	131 J	147 J	199 J,B	124 J	122 J	210 J	161 J
Thallium	---	---	---	---	---	---	0.28 J	---	---	---	---
Vanadium	45 R	30.4 R	31.7 R	23.8 R	7.4 J	18	11	11 J	12	39	---
Zinc	60.9	43.5	45.7	59.9	33	59	41	22	13	65	25

"---" All compounds in all samples underwent analysis. If concentration is not listed, the compound was not detected above instrument detection limit.
J Estimated value; or the report value is less than the contract required detection limit but greater than the instrument detection limit.
B Compound present at equal to or less than five times the concentration present in the laboratory blank.
R Data unusable, indicates possible false negative or very low spike sample recovery.

TABLE F-1A

NSL/ECC PREDESIGN INVESTIGATION ANALYTICAL RESULTS
SOIL - METALS

Sample Number:	ECCSB18A-03	ECCSB18A-06	ECCSB18B-28/30	ECCSB19-13	ECCSB20-13	ECCSB21-06	ECCSB21-08	ECCSB21-11	ECCSB23-07	ECCSB23-10	ECCFB-01
Sample location:	ECCSB18A	ECCSB18A	ECCSB18B	ECCSB19	ECCSB20	ECCSB21	ECCSB21	ECCSB21	ECCSB23	ECCSB23	FIELD BLANK
ITR Number:	MET322	MET321	MET320	MET314	MET313	MET360	MET361	MET362	MET377	MET378	MET318
Date Sampled:	04/19/88	04/19/88	04/18/88	04/15/88	04/15/88	04/27/88	04/27/88	04/27/88	04/28/88	04/28/88	04/16/88
Depth, Ft:	4-6	10-12	28-30	24-26	24-26	10-12	14-16	20-22	12-14	18-20	
Percent Solids:	88.6	90.5	93.1	89.0	87.9	81.3	86.6	86.8	89.6	93.7	98.7
INORGANICS (mg/kg dry weight)											
Aluminum	18100	9980	1640 J	6390 J	2780 J	1540 J	1350 J	1450 J	2180 J	2540 J	119 J,B
Antimony	9.4 R	15.5 R	33 J	74 J	39 J	--- R	2.85 R	--- R	--- R	--- R	---
Arsenic	6.5	5.8	1.6 J	4 J	2.4 J	2.2 J	1.9 J	2.5 J	1.7 J	1.2 J	9.1 J
Barium	97.7	56.2	---	57	16 J	6.1 J	2.2 J	7.6 J	6.4 J	12 J	---
Beryllium	0.63 J	0.56 J	---	---	---	---	---	---	---	---	---
Cadmium	---	---	5 J	5.3 J	2.6 J	0.54 J	1.3 J	0.76 J	1.6 J	1.2 J	---
Calcium	39800	101000	205000 J	95300 J	162000 J	70000	103000	78600	105000	90800	304 J,B
Chromium	23.3 B	15.6 B	3.8 J	9.3 J	2.5 J	3.4 J	3.9 J	3.9 J	5.9 J	6.6 J	8 J
Cobalt	10.3	7 J	---	---	---	2 J	2.2 J	2.1 J	3.3 J	3.8 J	---
Copper	27.3 B	24.8 B	9.9 J,B	18 J,B	10 J,B	7.9 J	5.9 J	6.7 J	11 J	13 J	---
Iron	20400 J	15900 J	6310 J	12500 J	6330 J	3900 J	3700 J	4860 J	5780 J	6730 J	696 J
Lead	9.6 J	5.9 J	3.5 J	6.1 J	3.5 J	4.1	4.4	4.2	5.5	5.4	1.9 J
Magnesium	12900	28100	24000 J	26900 J	27500 J	13853 J	26600 J	19500 J	28100 J	18900 J	84 J
Manganese	618	355	210 J	307 J	219 J	133 J	171 J	165 J	216 J	239 J	6.4 J
Mercury	---	---	---	---	---	0.13 J	---	0.23 J	0.18 J	---	---
Nickel	22.4	15.3	9.2	---	---	6.8 J	7.7 J	7.1 J	12 J	13 J	---
Potassium	3130	2940	425 J	1910	815 J	321 J	230 J	294 J	404 J	482 J	---
Selenium	3.4 J	---	---	---	---	---	---	---	---	---	---
Silver	---	1.4 J	11 J	5.3 J	7.9 J	--- R	--- R	--- R	--- R	--- R	---
Sodium	---	---	131 J	182 J	194 J	27 J	48 J	51 J	25 J	46 J	21 J
Thallium	---	---	---	---	---	---	---	---	---	---	---
Vanadium	48 R	35.5 R	5.3 J	22	7.7 J	4.8 J	5.7 J	5.3 J	8.4 J	10 J	---
Zinc	108	41.5	18	62	28	18 J	18 J	16 J	28 J	38 J	5.8

"---" All compounds in all samples underwent analysis. If concentration is not listed, the compound was not detected above instrument detection limit.
J Estimated value; or the report value is less than the contract required detection limit but greater than the instrument detection limit.
B Compound present at equal to or less than five times the concentration present in the laboratory blank.
R Data unusable, indicates possible false negative or very low spike sample recovery.

TABLE F-1B

NSL/ECC PREDESIGN INVESTIGATION ANALYTICAL RESULTS
GROUNDWATER - METALS

FILTERED

Sample Number:	ECCMW01(F)	ECCMW1A(F)	ECCMW12(F)	ECCMW13(F)	ECCMW13D(F)	ECCMW14(F)	ECCMW14D(F)	ECCMW15(F)	ECCMW16(F)	ECCMW17(F)	ECCMW18(F)	ECCMW19A(F)
Sample Location:		ECCMW1A	ECCMW12	ECCMW13	ECCMW13	ECCMW14	ECCMW14	ECCMW15	ECCMW16	ECCMW17	ECCMW18	ECCMW19A
ITR Number:	NET359	NET326	NET374	NET364	NET366	NET330	NET332	NET334	NET336	NET338	NET340	NET368
Date Sampled:	04/25/88	04/27/88	04/28/88	04/28/88	04/28/88	04/28/88	04/28/88	04/27/88	04/27/88	04/27/88	04/27/88	04/28/88
Sample Type:	DRILLERS H20	GRAB	GRAB	GRAB	DUPL	GRAB	DUPL	GRAB	GRAB	GRAB	GRAB	GRAB
INORGANICS (ug/l)												
Aluminum	18 J,B	77 J,B	55 J,B	21 J,B	168 J,B	48 J,B	28 J,B	31 J,B	36 J,B	123 J,B	382 J	534 J
Antimony	---	---	---	---	---	21 J,B	---	---	---	---	---	---
Arsenic	---	---	12	16 J	19 J	---	---	---	---	2.1 J	---	24 J
Barium	64 J	316 B	161 J,B	279 B	290 B	371 B	356 B	348 B	382 B	508	540	404 B
Beryllium	---	---	---	---	---	---	---	---	---	---	---	---
Cadmium	---	3 J,B	---	---	---	2.7 J	---	2.1 J	---	---	3.1 J,B	---
Calcium	52500	86200	108000	157000	162000	89800	89200	90400	147000	96600	179000	92600
Chromium	---	8 J,B	7 J,B	5 J,B	8 J,B	8 J,B	6 J,B	11 J,B	8 J,B	8 J,B	10 J,B	12 J,B
Cobalt	---	---	---	---	7 J	---	---	---	---	---	---	---
Copper	6 J	15 J,B	4 J,B	3 J,B	5 J,B	3 J,B	5 J,B	5 J,B	---	4 J,B	8 J,B	9 J,B
Iron	--- R	1990 J	621 J	12500 J	10300 J	570 J	178 J,B	516 J	4420 J	408 J,B	6220 J	5220 J
Lead	---	10 J	---	---	7.3 J	---	19 J	3.9 J	3.3 J	---	11 J	4 J
Magnesium	14800	31100	13000	41300	42500	33400	33600	34200	39400	34100	37000	31200
Manganese	46	51	225	684	746	37	33	45	263	97	402	430
Mercury	---	0.2 J	---	---	---	---	---	---	---	0.2 J	0.2 J	---
Nickel	---	6 J	16 J	16 J	19 J	9 J	8 J	6 J	11 J	8 J	6 J	11 J
Potassium	2480 J	1300 J,B	16500	1740 J	2060 J	1560 J	1440 J	1180 J,B	3400 J	1920 J	1460 J,B	1700 J
Selenium	--- R	--- R	--- R	--- R	--- R	--- R	--- R	--- R	--- R	--- R	--- R	--- R
Silver	---	---	---	---	---	---	---	---	---	---	---	---
Sodium	11700	9640	16000	24300	26000	16200	15900	14800	24400	16300	13800	21100
Thallium	---	---	---	---	---	---	---	---	---	---	---	---
Vanadium	---	---	---	---	---	5 J	4 J	---	---	---	---	6 J
Zinc	38 J	305 J	177 J,B	106 J,B	77 J,B	85 J,B	12 J,B	38 J,B	56 J,B	100 J,B	126 J,B	213 J

Sample Number:	ECCMW19B(F)	ECCMW20(F)	ECCMW21(F)	ECCMW22(F)	ECCMW22D(F)	ECCMW23(F)	ECCSUMP01(F)	ECCMW96(F)	ECCMW98(F)	ECCMW99(F)
Sample Location:	ECCMW19B	ECCMW20	ECCMW21	ECCMW22	ECCMW22	ECCMW23(F)	SUMP			
ITR Number:	NET370	NET343	NET328	NET380	NET382	NET384	NET372	NET386	NET376	NET344
Date Sampled:	04/28/88	04/27/88	04/27/88	05/3/88	05/3/88	05/3/88	04/28/88	05/3/88	04/28/88	04/27/88
Sample Type:	GRAB	GRAB	GRAB	GRAB	DUPL	GRAB	GRAB	FIELD BLANK	FIELD BLANK	FIELD BLANK
INORGANICS (ug/l)										
Aluminum	43 J,B	26 J,B	254 J	1970 J	173 J,B	81.4 J,B	36 J,B	72.8 J,B	37 J,B	47 J,B
Antimony	---	15 J,B	---	--- R	--- R	--- R	---	--- R	---	72 B
Arsenic	2 J	4 J	---	6.9 J	7.9 J	3.8 J	7 J	--- R	---	---
Barium	404 B	570	320 B	398 J,B	381 J,B	455 J,B	109 J,B	106 J	100 J	81 J
Beryllium	---	---	---	---	---	---	---	---	---	---
Cadmium	---	1.9 J,B	---	---	---	---	---	---	---	2.8 J
Calcium	80500	102000	104000	102000	93500	145000	53400	268 J,B	400 J	1120 J
Chromium	9 J,B	11 J,B	6 J,B	12.3 J,B	7.4 J,B	12.5 J,B	6 J,B	9.4 J	5 J	7 J
Cobalt	---	---	---	6.5 J,B	---	---	---	5.9 J	---	---
Copper	4 J,B	3 J,B	4 J,B	21.2 J,B	8.3 J,B	8.9 J,B	3 J,B	9.6 J,B	10 J	10 J
Iron	2110 J	82 R	1440 J	5140 J	348 J,B	172 J,B	4680 J	97.5 J,B	37 J	85 R
Lead	---	---	4.8 J	16.5 J	4 J,B	3.8 J,B	---	2.2 J	---	---
Magnesium	27400	42900	30300	35100	32400	48700	5250	---	52 J	171 J
Manganese	69	200	142	196	128	231	181	---	---	4 J
Mercury	---	---	---	---	---	---	---	---	---	---
Nickel	---	13 J	---	24.8 J,B	18.2 J,B	23.4 J,B	6 J	18.6 J,B	---	---
Potassium	1480 J	7060	1280 J,B	2970 J	2770 J	3940 J	8330	---	209 J	320 J
Selenium	--- R	--- R	--- R	--- R	--- R	--- R	--- R	--- R	--- R	--- R
Silver	---	---	---	---	---	---	---	---	---	---
Sodium	14000	56400	12000	51400	49900	69900	7100	442 J,B	573 J	733 J
Thallium	---	---	---	--- R	--- R	--- R	---	--- R	---	---
Vanadium	---	4 J	---	---	---	---	---	---	---	---
Zinc	52 J,B	25 J,B	56 J,B	144 J,B	95.5 J,B	123 J,B	95 J,B	37.7 JB	38 J	55 J

"---" All compounds in all samples underwent analysis. If concentration is not listed, the compound was not detected above instrument detection limit.
J Estimated value; or the report value is less than the contract required detection limit but greater than the instrument detection limit.
B Compound present at equal to or less than five times the concentration present in the laboratory or field blank.

TABLE F-2A

MSL/ECC PREDESIGN INVESTIGATION ANALYTICAL RESULTS
SOIL - ORGANIC RESULTS

Sample Number:	ECCSB01-01	ECCSB01-02	ECCSB01-03	ECCSB01-04	ECCSB01-07	ECCDM	ECCSB02-06	ECCSB02-08	ECCSB03-06	ECCSB05-15	ECCSB06-13	ECCSB06-20	ECCSB07-13
Sample Location:	ECCSB01	ECCSB01	ECCSB01	ECCSB01	ECCSB01	DRILLERS MUD	ECCSB02	ECCSB02	ECCSB03	ECCSB05	ECCSB06	ECCSB06	ECCSB07
OTB Number:	ES 722	ES 723	ES 724	ES 726	ES 727	ES 725	ES 710	ES 711	ES 691	ES 704	ES 702	ES 703	ES 697
Date Sampled:	4/19/86	4/19/86	4/19/86	4/19/86	4/20/86	4/19/86	4/16/86	4/16/86	4/05/86	4/13/86	4/12/86	4/12/86	4/12/86
Depth, Ft:	0-11	0-11	11-13	13-15	19-21	--	10-12	14-16	10-12	28-30	24-26	30-40	24-26
Percent Moisture:	19.29	21.26	10.27	25.98	14.29	94.82(?)	12.0	10.0	8.0	11.0	15.0	9.0	9.0
Hydrogeologic Unit:	<--------Sump----------						S & G	INTERFACE	UPPER	S & G	S & G		
SEMIVOLATILE ORGANICS													
Phenol	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
1,2-Dichlorobenzene	600 J	N/A	110 J	--	--	N/A	--	--	--	--	--	--	--
1,4-Dichlorobenzene	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
2-Methylphenol	910	N/A	100 J	--	--	N/A	--	--	--	--	--	--	--
4-Methylphenol	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
2,4-Dimethylphenol	510 J	N/A	--	--	--	N/A	--	--	--	--	--	--	--
Isophorone	--	N/A	120 J	--	--	N/A	--	--	--	--	--	--	--
Naphthalene	220 J	N/A	110 J	--	--	N/A	--	--	--	--	--	--	--
2-Methylnaphthalene	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
Diethylphthalate	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
Fluorene	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
Phenanthrene	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
Anthracene	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
Di-n-Butylphthalate	160 JB	N/A	--	--	--	N/A	930 B	110 JB	--	2400 B	2000 B	3300 B	1300 JB
Fluoranthene	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
Pyrene	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
Benzo(a)Anthracene	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
Chrysene	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
bis(2-Ethylhexyl) Phthalate	8600	N/A	--	--	--	N/A	30 J	--	--	--	33 J	290 J	--
2-Nitroaniline	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
3-Nitroaniline	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
4-Nitroaniline	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
4,6-Dinitro-2-Methylphenol	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
Butylbenzylphthalate	320 J	N/A	300 J	100 J	--	N/A	--	--	--	--	--	--	--
Di-n-Octyl Pthalate	260 J	N/A	--	--	--	N/A	--	--	--	--	--	--	--
Benzo(b)Fluoranthene	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
Benzo(k)Fluoranthene	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
Benzo(a)Pyrene	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
Indeno(1,2,3-cd)Pyrene	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--
Benzo(g,h,i)Perylene	--	N/A	--	--	--	N/A	--	--	--	--	--	--	--

"---" All compounds in all samples underwent analysis. If concentration is not listed, the compound was not detected above quantification detection limits.
J Estimated value; or the report value is less than the contract required detection limit but greater than the quantification detection limit.
B Compound present at equal to or less than five times the concentration present in the field blank.
N/A Not analyzed.
R Unusable, indicates possible false negative.
S & G Sand and Gravel Unit
INTERFACE Interface between sand and gravel and lower confining units
UPPER Upper confining Unit, usually silty clay or clayey silt
LOWER Lower confining unit, very hard silty clay
TRANSITION Transitional sequence of interlayered silty clays and sands or gravels
UPPER FILL Material that is filled in beginning at ground surface

TABLE F-2A

MSL/KCC PREDESIGN INVESTIGATION ANALYTICAL RESULTS
SOIL - ORGANIC RESULTS

Sample Number:	KCCSB08-01	KCCSB08-05	KCCSB09-06	KCCSB10-07	KCCSB11-07	KCCSB12-03	KCCSB13-09/10	KCCSB14-01	KCCSB14-02	KCCSB15-03	KCCSB15A-04	KCCSB16-11	KCCSB18-14
Sample Location:	KCCSB08	KCCSB08	KCCSB09	KCCSB10	KCCSB11	KCCSB12	KCCSB13	KCCSB14	KCCSB14	KCCSB15	KCCSB15A	KCCSB16	KCCSB18
QTR Number:	KS 699	KS 700	KS 713	KS 701	KS 690	KS 693	KS 696	KS 695	KS 694	KS 692	KS 721	KS 706	KS 705
Date Sampled:	4/12/88	4/12/88	4/17/88	4/13/88	4/05/88	4/07/88	4/11/88	4/08/88	4/08/88	4/07/88	4/19/88	4/15/88	4/14/88
Depth, Ft:	0-2	8-10	10-12	12-14	12-14	4-6	16-20	8-10	18-20	22-24	6-8	20-22	26-28
Percent Moisture:	14.0	10.0	14.0	11.0	10.0	10.0	18.0	12.0	14.0	9.0	10.12	9.0	8.0
Hydrogeologic Unit:	UPPER	UPPER	S & G	S & G	S & G	UPPER FILL	S & G	UPPER	S & G	LOWER	S & G		
SEMIVOLATILE ORGANICS													
Phenol	--	--	--	--	--	--	--	--	--	--	N/A	--	--
1,2-Dichlorobenzene	--	--	--	--	--	--	--	16 J	--	--	N/A	--	--
1,4-Dichlorobenzene	--	--	--	--	--	--	--	--	--	--	N/A	--	--
2-Methylphenol	--	--	--	--	--	--	--	--	--	--	N/A	--	--
4-Methylphenol	--	--	--	--	--	--	--	--	--	--	N/A	--	--
2,4-Dimethylphenol	--	--	--	--	--	--	--	--	--	--	N/A	--	--
Isophorone	--	--	--	--	--	--	--	--	--	--	N/A	--	--
Naphthalene	--	35 J	--	--	--	3800 J	--	--	--	--	N/A	--	--
2-Methylnaphthalene	--	130 J	--	--	--	19000 J	--	--	--	--	N/A	--	--
Diethylphthalate	--	--	--	--	--	--	--	--	--	--	N/A	--	--
Fluorene	29 J	--	--	--	--	6400 J	--	--	--	--	N/A	--	--
Phenanthrene	330 J	15 J	54 J	--	--	5400 J	--	--	--	--	N/A	--	--
Anthrancene	54 J	--	--	--	--	--	--	--	--	--	N/A	--	--
Di-n-Butylphthalate	4300	1100 JB	620 B	2700 B	--	--	3800	--	--	--	N/A	1800 B	2900 B
Fluoranthene	670	--	62 J	--	--	--	--	8 J	--	--	N/A	--	--
Pyrene	620	--	58 J	--	--	--	--	--	--	--	N/A	--	--
Benzo(a)Anthracene	230 J	--	20 J	--	--	--	--	--	--	--	N/A	--	--
Chrysene	310 J	--	--	--	--	--	--	--	--	--	N/A	--	--
bis(2-Ethylhexyl) Phthalate	1300	110 J	58 J	30 J		--	48 J	66 J	47 J	--	N/A	130 J	--
2-Nitroaniline	--	--	--	--	--	--	--	--	--	--	N/A	--	--
3-Nitroaniline	--	--	--	--	--	--	--	--	--	--	N/A	--	--
4-Nitroaniline	--	--	--	--	--	--	--	--	--	--	N/A	--	--
4,6-Dinitro-2-Methylphenol	--	--	--	--	--	--	--	--	--	--	N/A	--	--
N-Nitrosodiphenylamine	--	--	--	--	--	--	--	--	--	--	N/A	--	--
Butylbenzylphthalate	--	--	--	--	--	--	--	--	--	160 J	N/A	--	--
Di-n-Octyl Pthalate	--	--	--	--	--	--	--	--	--	--	N/A	--	--
Benzo(b)Fluoranthene	370 J	--	--	--	--	--	--	--	--	--	N/A	--	--
Benzo(k)Fluoranthene	360 J	--	--	--	--	--	--	--	--	--	N/A	--	--
Benzo(a)Pyrene	280 J	--	--	--	--	--	--	--	--	--	N/A	--	--
Indeno(1,2,3-cd)Pyrene	120 J	--	--	--	--	--	--	--	--	--	N/A	--	--
Benzo(g,h,i)Perylene	79 J	--	--	--	--	--	--	--	--	--	N/A	--	--

"--" All compounds in all samples underwent analysis. If concentration is not listed, the compound was not detected above quantification detection limits.
J Estimated value; or the report value is less than the contract required detection limit but greater than the quantification detection limit.
B Compound present at equal to or less than five times the concentration present in the field blank.
N/A Not analyzed.
R Unusable, indicates possible false negative.
S & G Sand and Gravel Unit
INTERFACE Interface between sand and gravel and lower confining units
UPPER Upper confining Unit, usually silty clay or clayey silt
LOWER Lower confining unit, very hard silty clay
TRANSITION Transitional sequence of interlayered silty clays and sands or gravels
UPPER FILL Material that is filled in beginning at ground surface

TABLE F-2A

NSL/ECC PREDESIGN INVESTIGATION ANALYTICAL RESULTS
SOIL - ORGANIC RESULTS

Sample Number:	ECCSB18A-02	ECCSB18A-03	ECCSB18A-04	ECCSB18A-05	ECCSB18A-06	ECCSB18B-26/28	ECCSB18B-26/28	ECCSB18B-28/30	ECCSB19-13	ECCSB20-13	ECCSB21-06	ECCSB21-08	ECCSB21-11
Sample Location:	ECCSB18A	ECCSB18A	ECCSB18A	ECCSB18A	ECCSB18A	ECCSB18B	ECCSB18B	ECCSB18B	ECCSB19	ECCSB20	ECCSB21	ECCSB21	ECCSB21
OTR Number:	ES 716	ES 717	ES 718	ES 719	ES 720	ES 714(low)	ES 714(med)	ES715	ES708	ES707	EW791	EW792	EW793
Date Sampled:	4/19/88	4/19/88	4/19/88	4/19/88	4/19/88	4/18/88	4/18/88	4/18/88	4/15/88	4/15/88	4/27/88	4/27/88	4/27/88
Depth, Ft:	2-4	4-6	6-8	8-10	10-12	26-28	26-28	28-30	24-26	24-26	10-12	14-16	20-22
Percent Moisture:	9.5	9.05	9.16	12.94	10.58	17.0	17.0	14.0	11.0	14.0	14.0	9.0	16.0
Hydrogeologic Unit:	UPPER	UPPER	UPPER	UPPER	UPPER	S & G	S & G	TRANSITION	UPPER	S & G	S & G	S & G	S & G
VOLATILE ORGANICS (ug/kg)													
Chloromethane	--	--	--	--	--	3 J	--	--	--	--	--	--	--
Bromomethane	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride	--	--	--	--	--	70 J	--	--	--	--	--	--	--
Chloroethane	--	--	--	--	--	18	--	--	--	--	--	--	--
Methylene Chloride	--	--	--	--	--	--	--	--	--	--	--	--	--
Acetone	--	--	--	--	--	--	--	--	--	--	--	--	--
Carbon Disulfide	--	--	--	--	--	4 J	--	--	--	--	--	--	--
1,1-Dichloroethene	--	--	--	--	--	250 J	--	--	--	170 J	--	--	--
1,1-Dichloroethane	--	--	--	640 J	--	1500 J	5200 J	390 J	--	1600	--	--	--
1,2-Dichloroethene (Total)	53000	2400	1600	14000	--	2700 J	5600 J	1500	2 J	33000	--	--	--
Chloroform	--	--	--	--	--	--	2800 J	650 J	-- R	--	--	--	--
1,2-Dichloroethane	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Butanone	-- R	-- R	-- R	-- R	-- R	-- R	-- R	1700 J	170	1600 J	-- R	-- R	-- R
1,1,1-Trichloroethane	38000	320 J	1400	18000	180 J	3400 J	39000 J	12000	--	14000	--	--	--
Carbon Tetrachloride	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl Acetate	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene	240000	1300	750	51000	740	640 J	150000 J	55000	12	24000	--	--	--
Dibromochloromethane	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	--	--	--	--	--	--	--	--	--	--	--	--	--
trans-1,2-Dichloropropene	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromoform	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-Pentanone	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	--	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	51000	470 J	240 J	12000	350 J	680 J	31000 J	8700	--	--	--	--	--
1,1,2,2-Tetrachloroethane	--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	3300 J	320 J	2400	2700	2600	860 J	2000 J	2700 J	160	--	33 J	130 J	120 J
Chlorobenzene	--	--	--	--	--	20 J	--	--	--	--	--	--	--
Ethylbenzene	12000	220 J	2300	4400	--	1900 J	6800 J	1500 J	--	--	--	--	--
Styrene	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes	50000	1100	7700	15000	170 J	5000 J	25000 J	5700 J	--	--	--	--	--

"---" All compounds in all samples underwent analysis. If concentration is not listed, the compound was not detected above quantification detection limits.
J Estimated value; or the report value is less than the contract required detection limit but greater than the quantification detection limit.
B Compound present at equal to or less than five times the concentration present in the field blank.
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R Unusable, indicates possible false negative.
S & G Sand and Gravel Unit
INTERFACE Interface between sand and gravel and lower confining units
UPPER Upper confining Unit, usually silty clay or clayey silt
LOWER Lower confining unit, very hard silty clay
TRANSITION Transitional sequence of interlayered silty clays and sands or gravels
UPPER FILL Material that is filled in beginning at ground surface

TABLE F-2A

MSL/ECC PREDESIGN INVESTIGATION ANALYTICAL RESULTS
SOIL - ORGANIC RESULTS

Sample Number:	ECCSB18A-02	ECCSB18A-03	ECCSB18A-04	ECCSB18A-05	ECCSB18A-06	ECCSB18B-26/28	ECCSB18B-26/28	ECCSB18B-28/30	ECCSB19-13	ECCSB20-13	ECCSB21-06	ECCSB21-08	ECCSB21-11
Sample Location:	ECCSB18A	ECCSB18A	ECCSB18A	ECCSB18A	ECCSB18A	ECCSB18B	ECCSB18B	ECCSB18B	ECCSB19	ECCSB20	ECCSB21	ECCSB21	ECCSB21
OTR Number:	KS 716	KS 717	KS 718	KS 719	KS 720	KS 714(low)	KS 714(med)	KS715	KS708	KS707	KW791	KW792	KW793
Date Sampled:	4/19/88	4/19/88	4/19/88	4/19/88	4/19/88	4/18/88	4/18/88	4/18/88	4/15/88	4/15/88	4/27/88	4/27/88	4/27/88
Depth, Ft:	2-4	4-6	6-8	8-10	10-12	26-28	26-28	28-30	24-26	24-26	10-12	14-16	20-22
Percent Moisture:	9.5	9.05	9.16	12.94	10.56	17.0	17.0	14.0	11.0	14.0	14.0	9.0	16.0
Hydrogeologic Unit:	UPPER	UPPER	UPPER	UPPER	UPPER	S & G	S & G	TRANSITION	UPPER	S & G	S & G	S & G	S & G
SEMIVOLATILE ORGANICS													
Phenol	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
1,2-Dichlorobenzene	N/A	16000	N/A	N/A	28000	2900	N/A	9900 J	--	--	--	--	--
1,4-Dichlorobenzene	N/A	--	N/A	N/A	--	--	N/A	65 J	--	--	--	--	--
2-Methylphenol	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
4-Methylphenol	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
2,4-Dimethylphenol	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Isophorone	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Naphthalene	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
2-Methylnaphthalene	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Diethylphthalate	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Fluorene	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Phenanthrene	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Anthrancene	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Di-n-Butylphthalate	N/A	--	N/A	N/A	250 JB	590 B	N/A	170 JB	3500 B	2800 B	--	--	35 JB
Fluoranthene	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Pyrene	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Benzo(a)Anthracene	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Chrysene	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
bis(2-Ethylhexyl) Phthalate	N/A	--	N/A	N/A	--	--	N/A	70 J	25 J	--	1300	1200	1300
2-Nitroaniline	N/A	--	N/A	N/A	--	--	N/A	--	--	--	-- R	-- R	-- R
3-Nitroaniline	N/A	--	N/A	N/A	--	--	N/A	--	--	--	-- R	-- R	-- R
4-Nitroaniline	N/A	--	N/A	N/A	--	--	N/A	--	--	--	-- R	-- R	-- R
4,6-Dinitro-2-Methylphenol	N/A	--	N/A	N/A	--	--	N/A	--	--	--	-- R	-- R	-- R
N-Nitrosodiphenylamine	N/A	--	N/A	N/A	--	--	N/A	--	--	--	-- R	-- R	-- R
Butylbenzylphthalate	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Di-n-Octyl Pthalate	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Benzo(b)Fluoranthene	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Benzo(k)Fluoranthene	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Benzo(a)Pyrene	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Indeno(1,2,3-cd)Pyrene	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--
Benzo(g,h,i)Perylene	N/A	--	N/A	N/A	--	--	N/A	--	--	--	--	--	--

"---" All compounds in all samples underwent analysis. If concentration is not listed, the compound was not detected above quantification detection limits.
J Estimated value; or the report value is less than the contract required detection limit but greater than the quantification detection limit.
B Compound present at equal to or less than five times the concentration present in the field blank.
N/A Not analyzed.
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S & G Sand and Gravel Unit
INTERFACE Interface between sand and gravel and lower confining units
UPPER Upper confining Unit, usually silty clay or clayey silt
LOWER Lower confining unit, very hard silty clay
TRANSITION Transitional sequence of interlayered silty clays and sands or gravels
UPPER FILL Material that is filled in beginning at ground surface

TABLE F-2A

NSL/ECC PREDESIGN INVESTIGATION ANALYTICAL RESULTS
SOIL - ORGANIC RESULTS

Sample Number:	ECCSB23-07	ECCSB23-10	ECCFB-01
Sample Location:	ECCSB23	ECCSB23	FIELD BLANK
OTR Number:	ES730	ES731	ES712
Date Sampled:	4/28/86	4/28/86	4/16/86
Depth, Ft:	12-14	18-20	
Percent Moisture:	9.0	12.0	1.0
Hydrogeologic Unit:	S & G	S & G	
VOLATILE ORGANICS (ug/kg)			
Chloromethane	--	--	--
Bromomethane	--	--	--
Vinyl Chloride	--	--	--
Chloroethane	--	--	--
Methylene Chloride	--	--	--
Acetone	--	--	--
Carbon Disulfide	--	--	1 J
1,1-Dichloroethene	--	--	--
1,1-Dichloroethane	--	--	--
1,2-Dichloroethene (Total)	--	--	--
Chloroform	--	--	--
1,2-Dichloroethane	--	--	--
2-Butanone	-- R	-- R	--
1,1,1-Trichloroethane	--	--	--
Carbon Tetrachloride	--	--	--
Vinyl Acetate	--	--	--
Bromodichloromethane	--	--	--
1,2-Dichloropropane	--	--	--
cis-1,3-Dichloropropene	--	--	--
Trichloroethene	--	--	--
Dibromochloromethane	--	--	--
1,1,2-Trichloroethane	--	--	--
Benzene	--	--	--
cis-1,3-Dichloropropene	--	--	--
trans-1,2-Dichloropropene	--	--	--
Bromoform	--	--	--
4-Methyl-2-Pentanone	--	--	--
2-Hexanone	--	--	--
Tetrachloroethene	--	--	--
1,1,2,2-Tetrachloroethane	--	--	--
Toluene	38 J	--	--
Chlorobenzene	--	--	--
Ethylbenzene	--	--	--
Styrene	--	--	--
Total Xylenes	--	--	--

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N/A Not analyzed.
R Unusable, indicates possible false negative.
S & G Sand & Gravel Unit

TABLE F-2A

NSL/ECC PREDESIGN INVESTIGATION ANALYTICAL RESULTS
SOIL - ORGANIC RESULTS

Sample Number:	ECCSB23-07	ECCSB23-10	ECCFB-01
Sample Location:	ECCSB23	ECCSB23	FIELD BLANK
OTR Number:	KS730	KS731	KS712
Date Sampled:	4/28/88	4/28/88	4/16/88
Depth, Ft:	12-14	18-20	
Percent Moisture:	9.0	12.0	1.0
Hydrogeologic Unit:	S & G	S & G	
SEMIVOLATILE ORGANICS			
Phenol	--	--	--
1,2-Dichlorobenzene	--	--	--
1,4-Dichlorobenzene	--	--	--
2-Methylphenol	--	--	--
4-Methylphenol	--	--	--
2,4-Dimethylphenol	--	--	--
Isophorone	--	--	--
Naphthalene	--	--	--
2-Methylnaphthalene	--	--	--
Diethylphthalate	--	--	--
Fluorene	--	--	--
Phenanthrene	--	--	--
Anthrancene	--	--	--
Di-n-Butylphthalate	--	--	720
Fluoranthene	--	--	--
Pyrene	--	--	--
Benzo(a)Anthracene	--	--	--
Chrysene	--	--	--
bis(2-Ethylhexyl) Phthalate	960	940	--
2-Nitroaniline	-- R	-- R	--
3-Nitroaniline	-- R	-- R	--
4-Nitroaniline	-- R	-- R	--
4,6-Dinitro-2-Methylphenol	-- R	-- R	--
N-Nitrosodiphenylamine	-- R	-- R	--
Butylbenzylphthalate	--	--	--
Di-n-Octyl Pthalate	--	--	--
Benzo(b)Fluoranthene	--	--	--
Benzo(k)Fluoranthene	--	--	--
Benzo(a)Pyrene	--	--	--
Indeno(1,2,3-cd)Pyrene	--	--	--
Benzo(g,h,i)Perylene	--	--	--

"---" All compounds in all samples underwent analysis. If concentration is not listed, the compound was not detected above quantification detection limits.
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R Unusable, indicates possible false negative.
S & G Sand & Gravel Unit

TABLE F-2B

NSL/ECC PREDESIGN INVESTIGATION ANALYTICAL RESULTS
GROUNDWATER - ORGANIC RESULTS

Sample Number:	ECCDW01	ECCMW1A	ECCMW12	ECCMW13	ECCMW13	ECCMW13D	ECCMW14	ECCMW14D	ECCMW15	ECCMW16	ECCMW17	ECCMW18	ECCMW19A
Sample Location:		ECCMW1A	ECCMW12	ECCMW13	ECCMW13	ECCMW13	ECCMW14	ECCMW14	ECCMW15	ECCMW16	ECCMW17	ECCMW18	ECCMW19A
DTR Number:	ES728	EW781	EW800	EW794	EW796	EW795	EW783	EW784	EW785	EW786	EW787	EW788	EW797
Date Sampled:	04/25/88	04/27/88	04/28/88	04/28/88	04/28/88	04/28/88	04/28/88	04/28/88	04/27/88	04/27/88	04/27/88	04/27/88	04/28/88
Sample type:	DRILLER H2O	GRAB	GRAB	GRAB	MSD	DUPL	GRAB	DUPL	GRAB	GRAB	GRAB	GRAB	GRAB
VOLATILE ORGANICS (ug/l)													
Chloromethane	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromomethane	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride	--	--	--	--	--	--	--	--	--	--	--	--	--
Chloroethane	--	--	--	2800	3600	3800	--	--	--	--	--	--	--
Methylene Chloride	--	--	12000	109 J	--	--	--	--	--	--	--	--	--
Acetone	--	--	11000	--	--	--	--	--	--	210	--	--	--
Carbon Disulfide	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	--	--	3700	--	75 J	79 J	--	--	--	15	--	--	--
1,2-Dichloroethene (Total)	--	--	72000	--	--	--	--	--	--	--	--	--	35000
Chloroform	71	--	5300	--	--	--	--	--	--	--	--	--	--
1,2-Dichloroethane	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Butanone	--	--	-- R	-- R	-- R	-- R	-- R	-- R	--	--	--	--	-- R
1,1,1-Trichloroethane	24	--	64000	--	--	--	--	--	--	--	--	--	21000
Carbon Tetrachloride	--	--	--	--	--	--	--	--	--	--	--	--	--
Vinyl Acetate	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	6	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	--	--	--	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	--	--	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene	36	--	16000	--	--	--	2 J	--	--	--	--	--	11000
Dibromochloromethane	--	--	--	--	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	--	--	--	--	--	--	--	--	--	--	--	--	--
Benzene	--	--	--	--	--	--	--	--	--	4 J	--	--	--
cis-1,3-Dichloropropene	--	--	--	--	--	--	--	--	--	--	--	--	--
Trans-1,2-Dichloropropene	--	--	--	--	--	--	--	--	--	--	--	--	--
Bromoform	--	--	--	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-Pentanone	--	--	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	--	--	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	28	--	13000	--	--	--	--	--	--	--	--	--	1200 J
1,1,2,2-Tetrachloroethane	--	--	--	--	--	--	--	--	--	--	--	--	--
Toluene	1 J	--	7200 J	93 J	130 J	140 J	--	--	--	0.9 J	--	--	--
Chlorobenzene	--	--	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	--	--	--	--	--	--	--	--	--	--	--	--	850 J
Styrene	--	--	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes	--	--	--	--	--	--	--	--	--	--	--	--	2000 J
SEMIVOLATILE ORGANICS													
Phenol	--	--	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichlorobenzene	--	--	67	--	--	--	--	--	--	--	--	--	310
1,4-Dichlorobenzene	--	--	--	--	--	--	--	--	--	--	--	--	65
2-Methylphenol	--	--	--	--	21 J	--	--	--	--	--	--	--	--
4-Methylphenol	--	--	290	--	--	--	--	--	--	--	--	--	--
2,4-Dimethylphenol	--	--	300	10 J	10 J	5 J	--	--	--	--	--	--	--
Isophorone	--	--	120	--	--	--	--	--	--	--	--	--	--
Naphthalene	--	--	28	--	--	--	--	--	--	--	--	--	--
2-Methylnaphthalene	--	--	--	--	--	--	--	--	--	--	--	--	6 J
Diethylphthalate	--	--	130	19 J	4 J	4 J	--	--	6 J	--	--	--	--
Di-n-Butylphthalate	4 J	5 J	3 J	--	3 J	3 J	--	--	--	4 J	4 J	--	--
bis(2-Ethylhexyl) Phthalate	22 B	15 JB	49 B	26 B	27 B	28 B	16 JB	37 JB	21 B	18 JB	13 JB	13 JB	15 JB
Dimethyl Phthalate	--	--	57	--	--	--	--	--	--	--	--	--	--
2-Nitroaniline	--	--	-- R	-- R	-- R	-- R	-- R	-- R	--	--	--	--	-- R
3-Nitroaniline	--	--	-- R	-- R	-- R	-- R	-- R	-- R	--	--	--	--	-- R
4-Nitroaniline	-- R	-- R	-- R	-- R	-- R	-- R	-- R	-- R	-- R	-- R	-- R	-- R	-- R
4,6-Dinitro-2-Methylphenol	--	--	-- R	--	--	--	--	--	--	--	--	--	--
N-Nitrosodiphenylamine	--	--	-- R	-- R	-- R	-- R	-- R	-- R	--	--	--	--	-- R

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B Compound present at equal to or less than five times the concentration present in the field blank.
N/A Not analyzed.
R Unusable, indicates possible false negative.

TABLE F-2B

NSL/ECC PREDESIGN INVESTIGATION ANALYTICAL RESULTS
GROUNDWATER - ORGANIC RESULTS

Sample Number:	ECCMW19B	ECCMW20	ECCMW21	ECCMW22	ECCMW22D	ECCMW23	ECCSUMP01	ECCMW96	ECCMW97	ECCMW98	ECCMW99
Sample Location:	ECCMW19B	ECCMW20	ECCMW21	ECCMW22	ECCMW22	ECCMW23	SUMP				
QTR Number:	EW798	EW789	EW782	ES733	ES734	ES735	EW799	ES736	EW732	ES729	EW790
Date Sampled:	04/28/88	04/27/88	04/27/88	05/03/88	05/03/88	05/03/88	04/28/88	05/03/88	04/28/88	04/28/88	04/27/88
Sample type:	GRAB	GRAB	GRAB	GRAB	DUPL	GRAB	GRAB	FIELD BLANK	TRIP BLANK	FIELD BLANK	FIELD BLANK
VOLATILE ORGANICS (ug/l)											
Chloromethane	--	--	--	--	--	--	--	--	--	--	--
Bromomethane	--	--	--	--	--	--	--	--	--	--	--
Vinyl Chloride	--	100	--	--	--	--	--	--	--	--	--
Chloroethane	--	27	--	--	--	--	--	--	--	--	--
Methylene Chloride	--	--	--	--	--	--	3200	--	--	--	--
Acetone	--	--	--	--	--	--	--	--	--	--	--
Carbon Disulfide	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethene	--	--	--	--	--	--	--	--	--	--	--
1,1-Dichloroethane	220	26	--	--	--	--	1800	--	--	--	--
1,2-Dichloroethene (Total)	330	230	--	--	--	--	16000	--	--	--	--
Chloroform	--	--	--	--	--	--	850 J	--	--	--	8
1,2-Dichloroethane	--	--	--	--	--	--	--	--	--	--	--
2-Butanone	-- R	--	--	--	--	--	-- R	--	-- R	-- R	--
1,1,1-Trichloroethane	360	5	--	--	--	--	13000	--	--	--	--
Carbon Tetrachloride	--	--	--	--	--	--	--	--	--	--	--
Vinyl Acetate	--	--	--	--	--	--	--	--	--	--	--
Bromodichloromethane	--	--	--	--	--	--	--	--	--	--	--
1,2-Dichloropropane	--	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	--	--	--	--	--	--	--	--	--	--	--
Trichloroethene	1700	--	--	--	--	--	1300	--	--	--	--
Dibromochloromethane	--	--	--	--	--	--	--	--	--	--	--
1,1,2-Trichloroethane	--	--	--	--	--	--	--	--	--	--	--
Benzene	--	--	--	--	--	--	--	--	--	--	--
cis-1,3-Dichloropropene	--	--	--	--	--	--	--	--	--	--	--
Trans-1,2-Dichloropropene	--	--	--	--	--	--	--	--	--	--	--
Bromoform	--	--	--	--	--	--	--	--	--	--	--
4-Methyl-2-Pentanone	--	--	--	--	--	--	--	--	--	--	--
2-Hexanone	--	--	--	--	--	--	--	--	--	--	--
Tetrachloroethene	110	--	--	--	--	--	430 J	--	--	--	--
1,1,2,2-Tetrachloroethane	--	--	--	--	--	--	--	--	--	--	--
Toluene	--	--	--	--	--	--	700 J	--	--	--	--
Chlorobenzene	--	--	--	--	--	--	--	--	--	--	--
Ethylbenzene	--	--	--	--	--	--	--	--	--	--	--
Styrene	--	--	--	--	--	--	--	--	--	--	--
Total Xylenes	--	--	--	--	--	--	--	--	--	--	--
SEMIVOLATILE ORGANICS											
Phenol	--	--	--	6 JB	6 JB	--	13 J	7 J	N/A	--	--
1,2-Dichlorobenzene	66	--	--	--	--	--	85	--	N/A	--	--
1,4-Dichlorobenzene	--	--	--	--	--	--	--	--	N/A	--	--
2-Methylphenol	--	--	--	--	--	--	140	--	N/A	--	--
4-Methylphenol	--	--	--	--	--	--	35	--	N/A	--	--
2,4-Dimethylphenol	--	--	--	--	--	--	51	--	N/A	--	--
Isophorone	--	--	--	--	--	--	35	--	N/A	--	--
Naphthalene	--	--	--	--	--	--	5 J	--	N/A	--	--
2-Methylnaphthalene	--	--	--	--	--	--	--	--	N/A	--	--
Diethylphthalate	--	--	--	--	--	--	32	--	N/A	--	--
Di-n-Butylphthalate	--	--	5 J	--	--	--	4 J	--	N/A	--	--
bis(2-Ethylhexyl) Phthalate	34 B	8 JB	26 B	5 J	--	--	36 B	--	N/A	25	15 J
Dimethyl Phthalate	--	--	--	--	--	--	8 J	--	N/A	--	--
2-Nitroaniline	-- R	--	--	--	--	--	-- R	--	N/A	-- R	--
3-Nitroaniline	-- R	--	--	--	--	--	-- R	--	N/A	-- R	--
4-Nitroaniline	-- R	-- R	-- R	--	--	--	-- R	--	N/A	-- R	-- R
4,6-Dinitro-2-Methylphenol	--	--	--	--	--	--	--	--	N/A	--	--
N-Nitrosodiphenylamine	-- R	--	--	--	--	--	-- R	--	N/A	-- R	--

--- All compounds in all samples underwent analysis. If concentration is not listed, the compound was not detected above quantification detection limits.
J Estimated value; or the report value is less than the contract required detection limit but greater than the quantification detection limit.
B Compound present at equal to or less than five times the concentration present in the field blank.
N/A Not analyzed.
R Unusable, indicates possible false negative.

TABLE F-3

NSL/ECC PREDESIGN INVESTIGATION ANALYTICAL RESULTS
GROUNDWATER - CONVENTIONAL PARAMETERS

Sample Number:	ECCMW1A	ECCMW12	ECCMW13	ECCMW13D	ECCMW14	ECCMW14D	ECCMW15	ECCMW16	ECCMW17	ECCMW18	ECCMW19A
Sample Location:	ECCMW1A	ECCMW12	ECCMW13	ECCMW13	ECCMW14	ECCMW14	ECCMW15	ECCMW16	ECCMW17	ECCMW18	ECCMW19A
Control Number:	A2840	A2854	A2850	A2851	A2848	A2849	A2842	A2843	A2844	A2845	A2852
Date Sampled:	04/27/88	04/28/88	04/28/88	04/28/88	04/28/88	04/28/88	04/27/88	04/27/88	04/27/88	04/27/88	04/28/88
Sample type:	GRAB	GRAB	GRAB	DUPL	GRAB	DUPL	GRAB	GRAB	GRAB	GRAB	GRAB
CONVENTIONAL PARAMETERS (mg/L)											
COD	---	510	340	280	120	120	160	210	720	160	140
TDS	418	647	795	790	453	454	460	750	477	428	522
TSS	78 J	1440 J	4750 J	4580 J	1400 J	1230 J	1530 J	2530 J	8480 J	1960 J	2160 J
ALKALINITY (as CaCO3)	313	255	459	460	495	458	552	686	1052	552	376
NH3-N	0.2	5.6	1.1	1.2	0.6	0.6	0.6	1.0	0.9	0.6	1.0
CHLORIDES	12	75	81	78	21	21	21	68	24	13	47

Sample Number:	ECCMW19R	ECCMW20	ECCMW21	ECCMW22	ECCMW22D	ECCMW23	ECCSUMP01	ECCMW96	ECCMW98	ECCMW99
Sample Location:	ECCMW19R	ECCMW20	ECCMW21	ECCMW22	ECCMW22	ECCMW23	SUMP			
Control Number:	A2853	A2846	A2841	A2858	A2859	A2860	A2855	A2861	A2856	A2847
Date Sampled:	04/28/87	04/27/88	04/27/88	05/03/88	05/03/88	05/03/88	04/28/88	05/03/88	04/28/88	04/27/88
Sample type:	GRAB	GRAB	GRAB	GRAB	DUPL	GRAB	GRAB	FIELD BLANK	FIELD BLANK	FIELD BLANK
CONVENTIONAL PARAMETERS (mg/L)										
COD	---	580	300	1800	1400	1700	130	10	8	---
TDS	406	773	431	598	605	973	647	---	13	6
TSS	27 J	7290 J	4610 J	28940 J	18720 J	16900 J	32 J	---	---	---
ALKALINITY (as CaCO3)	341	1004	731	1507	1511	1008	147	3	3	5
NH3-N	0.6	2.8	0.4	0.3	0.2	0.6	3.1	---	---	---
CHLORIDES	11	170	12	86	87	310	29	---	---	---

"---" All parameters in all samples underwent analysis. If concentration is not listed, the parameter was not detected above instrument detection limit.
J Estimated value.